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Investigations of Chemosynthetic Communities on the Lower Continental Slope of the Gulf of Mexico

Contract No.: ***1435-01-05-39187***

DEEP CHEMOSYNTHETIC Reconnaissance II CRUISE REPORT

4 June - 6 July 2007

September 2007

Deep Chemosynthetic Reconnaissance II
CRUISE REPORT
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for

Investigations of Chemosynthetic Communities on the Lower Continental Slope of the Gulf of Mexico

by

TDI-BROOKS INTERNATIONAL, INC.

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1902 Pinon, College Station, TX 77845, USA. 001-979-696-3634

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DEEP CHEMOSYNTHETIC RECONNAISSANCE II CRUISE REPORT
NOAA Ship *Ronald H. Brown*: 4 June - 6 July 2007

for

Investigations of
Chemosynthetic Communities On the Lower Continental Slope
of the Gulf of Mexico

1 INTRODUCTION

Overview

This document represents the TDI-Brooks International, Inc. Deep Chemosynthetic Reconnaissance II (DCR2) Post-Cruise Report for contract number: 1435-01-05-39187, issued by the U.S.Department of the Interior, Minerals Management Service "Investigations of Chemosynthetic Communities on the Lower Continental Slope of the Gulf of Mexico" (CHEMO III). The Deep Chemosynthetic Reconnaissance II Cruise was conducted on the NOAA Ship research vessel *Ronald H. Brown* and the ROV JASON from 4 June - 6 July 2007, and was the fourth cruise conducted for this contract. The cruise mobilized and embarked from Panama City, Florida, and de-mobilized at Galveston, Texas. This report compiles detailed information regarding operational procedures, stations occupied, and sampling activity. Results reported were obtained by analysis of the sampling information and data during the cruise and immediately afterward. Results will possibly be revised . This report is a preliminary product of the contract.

Background

The largest oil reserves in the continental United States are found in the Gulf of Mexico. The Mineral Management Service (MMS) is responsible for overseeing the responsible extraction of these natural resources. By the early 1980s, energy companies had developed the technology to explore and extract oil and gas in waters up to 1,000 m deep.

During the mid to late 1980s, MMS contracted with the Geochemical and Environmental Research Group (GERG) at Texas A&M University (TAMU) to collect animals from areas of the deep sea floor associated with active oil and gas seeps. The original expectations of both the MMS and the scientists involved were that few animals would be found associated with these "toxic" sea floor environments, and that perhaps the few that were found would be unhealthy at best. However, when the trawls came to the surface over Bush Hill a site that became one of the best studied seep sites in the world, they were so full of animals the nets could only be brought on board with the help of an extra crane. In addition, the animals were not the usual fauna of the deep Gulf of Mexico. The nets were full of giant tubeworms and mussels, which had only recently been discovered at deep-sea hydrothermal vents in the Pacific Ocean. Since that time similar (but different) cold-seep and hydrothermal-vent communities have been discovered in many different geological settings in the world's oceans.

Over the last 20 years these animals and communities have been studied at moderate depths in

the Gulf of Mexico (GoM), along with the geology, geochemistry, and microbiology that allows them to flourish. As a result, the hydrocarbon seep communities in less than 1,000 m on the Upper Louisiana Slope of the Gulf of Mexico, are the most intensively studied and most understood of any deep-sea cold-seep communities in the world. The basic biology of the dominant animals, their life histories, and the biodiversity and biogeography of the seep and coral communities on the Upper Louisiana Slope is now understood. The successional processes that lead to the eventual development of coral communities on carbonates created during periods of active hydrocarbon seepage is understood. Also discovered are some amazing communities, such as the ice worms that inhabit methane ice and the mussels that ring the Brine Pool NR-1.

Meanwhile, energy companies have continued to develop the technology to extract oil and gas from deeper and deeper water and now have the capability to drill oil wells in all water depths in the GoM Outer Continental Slope. Although several GoM hydrocarbon seep sites at depths greater than 1,000 m have been visited by scientists, only a single site has been the focus of more than a few exploratory dives. This site, at 2,200 m in Alaminos Canyon, has lush communities of tubeworms and mussels that are reminiscent of the shallower sites that are well known. However, the underlying geology and almost all of the species present are different. Preliminary studies indicate that the structure of the communities associated with the tubeworms and mussels is also quite different. The normal "background" fauna are different at this depth, and different patterns of interaction between these animals and the seep specific animals are expected. Not only is the ecology of this deep community not understood, at this point the types of communities that exist at depths between 1,000 and 2,200 m are not known. Advances in this understanding and knowledge are the goal of this contract.

Purpose

The primary purpose of this research cruise was to use ROV JASON to conduct near-bottom multibeam (SM 2000) and photographic surveys of the prime sampling sites identified during a previous cruise (2006 R/V Atlantis & DSV ALVIN). Within the framework of these data sets, detailed sampling and mapping of benthic communities, sediments, lithified substrates, and brines was continued. Tubeworms stained in 2006 were collected for growth studies. Remote camera systems were deployed and recovered. New sites, within the study area, chosen from analyses of 3-D seismic data were explored.. The sites studied are in areas energy companies will soon drill for oil and gas.

Preparation

Preparation for this cruise began in the fall of 2005, when Harry Roberts began to study a variety of types of information that would help discover new hydrocarbon seep and hard-ground communities in the deep Gulf of Mexico. Information was gathered from thousands of cores collected by the TDI-Brooks International, Inc. group, satellite images of persistent oil slicks on the surface of the Gulf, and extensive collections of geophysical data and maps of the sea floor that were made available for this project by the Mineral Management Service. Fourteen sites were identified with a high potential to host lush chemosynthetic and/or deep-water coral communities.

In March of 2006, the first cruise of this program, the Reconnaissance Cruise, began on the RV GYRE. Thousands of pictures of the sea floor were taken at locations identified by Roberts and

his team. These pictures provided the first look at the dive sites we were to dive on for the ALVIN mission. Some sites revealed little except a muddy sea floor. At most of the sites there was strong evidence of seepage, and at least scattered occurrence of the types of animals expected at seep sites. In one case there were abundant soft corals, and at a few, there were large communities of seep animals.

Based on the Reconnaissance Cruise Report, the Deep Chemosynthetic Community Characterization cruise, the images of the sea floor, previous knowledge of the geophysics and geochemistry of the sites, and a desire to explore over a wide depth and geographic range, the cruise and dives for the Deep Chemosynthetic Reconaisance II cruise were planned and completed.

2 CRUISE OVERVIEW

This research cruise provided essential information on the ecology and biodiversity of these deep-sea communities, which will be provided to regulatory agencies and energy companies as oil exploration moves into deeper and deeper water.

An overview of the cruise is given in **Table 2-1**.

Table 2-1. Cruise overview

NOAA Ship	RONALD H. BROWN
Cruise Number:	RB-07-04
Project::	Investigations of Chemosynthetic Communities on the Lower Continental Slope of the Gulf of Mexico
Cruise dates:	4 June - 6 July 2007
Chief Scientist	Dr. Charles R. Fisher, Penn State University, Department of Biology, State College PA16802
Working Area:	The northern Gulf of Mexico continental slope
Itinerary:	Depart: Ft. Lauderdale FL,- 4 June; Arrive: Galveston TX, - 6 July
Endorsements:	RADM Richard R. Behn, NOAA, Director, Marine and Aviation Operations Centers, Marine Operations Center, Atlantic, Norfolk, VA 23510-1145

Equipment

A. Equipment and capabilities provided by the ship

1. Seabeam or equivalent multibeam bathymetric mapping sonar
2. XBT for speed of sound calibration
3. Differential GPS navigation and serial data output, NMEA format
4. Heading and water depth instruments with serial data output
5. Deck machinery for science gear (small fish traps) deployment and recovery
6. A-frame for launching Medea
7. Power to the winch and vans
8. Dynamic positioning system for vessel station-keeping
9. INMARSAT satellite telephone service for voice and data (email)
10. Networked computer printers and plotter
11. Use of walk in cold room and freezer for experiments and sample storage
12. Use of –80°C Freezer, and use of –20 chest freezer.
13. Use of Compressed Air in main lab
14. Use of compressed air in staging bay
15. Three air tuggers
16. Narrow band Acoustic Doppler Current Profiling (ADCP) system

17. Laboratory and storage space
18. PC based SCS workstations
19. Zodiac, or equivalent, and motor for elevator recovery, ROV contingencies, and video and still photo acquisition
20. Crane support for all equipment during mobilization in Ft. Lauderdale and demobilization in Galveston.
21. Access to and use of the moon pool and tranducer
22. Access to clean sea water and fresh water on aft deck or in wet lab.

Additionally sufficient consumables, backup units, and on-site spares and technical support were in place to assure that operational interruptions are minimal. All measurement instruments had current calibrations, and all pertinent calibration information was included in the data package. The ship was requested to provide technical expertise and assistance if unexpected problems arise

B. Equipment and capabilities provided by the science party

The scientific party provided the following items:

1. All biological and chemical sampling equipment and supplies including: push core equipment, mussel pots, methane sensor, tube worm collection device, various nets and bio-boxes.
2. All software associated with photo mosaic
3. All fish traps and associated acoustic releases for off site collections
4. Remote camera systems
5. in situ mass spectrometer chemical sensor
6. Deployment/recovery elevators
7. JASON II ROV and associated equipment
8. Navigational transponders associated w/ ROV operations
9. Dynacom winch system
10. Control van, tool van, rigging, vehicle, and shipping vans
11. Effer crane

Navigation

The following navigation equipment was provided by the *Ronald H Brown:*

Gyro Compass

The RON BROWN has a Sperry Mark 37 gyro compass. The gyro has a syncro to digital converter installed and the NEMA heading messages are available for scientific use. The data is recorded by the shipboard data acquisition system (SCS). The Mark 37 gyro relies on manual latitude and speed corrections.

GPS

There are three primary GPS - a Trimble Centurian P-code GPS, a Magnavox MX-200 GPS, and a Northstar 941x differential GPS. Data outputs from all three GPS receivers are available for scientific use and are continually recorded by SCS. A GPS networked time code receiver is presently time synching the shipboard data acquisition system and the computer dynamic positioning system. Software is available for time synching the networked PC-based scientific

computers.

Navigation

There are two navigation software packages -SPAWAR Integrated Charting Engine (ICE) and Kongsberg Simrad SPS. Both run simultaneously on the bridge and have the ability to receive GPS input from P-Code or DGPS. Traditional paper charts are used as well.

Radar

There are two Sperry Rascar Touch Screen navigational radars on the bridge. One radar is an S-band (10 cm) 30 kW radar and the other is an X-band (3 cm) 25 kW radar. Both radars are used for collision avoidance and navigation.

Simrad Robertson Dynamic Positioning System

The Simrad Robertson Multi-purpose pilot system (RMP) is capable of operating in one of three different modes. In Manual Mode, the vessel is controlled using the Z-Drive hand controls. In Autopilot Mode, the system controls the vessel's heading while speed is controled through the hand controls. This is the same as any standard autopilot system. Dynamic Positioning Mode gives automatic computer control of the vessel. The system can hold a desired GPS position, perform measured maneuvers, follow a track, or a combination of these. Various navigational inputs are provided to give position reference and active wind compensation.

Doppler Speed Log

A Raytheon model DSN-450 Doppler sonar provides an indication of ship's speed, distance traveled and, at continental shelf depths, an indication of water depth. At deep ocean depths the speed is referenced to the water mass under the ship, water depth is inoperable. The output is displayed at several locations throughout the ship and fed into the ships autopilot. The speed output is also recorded on SCS and is available for scientific use.

Position Heading and Attitude Sensor

A Seatex Seapath 200 is used by the ship to determine the vessels position, heading and attitude (heave, pitch and roll). The unit provides this solution by combining raw data from a MRU and two GPS carrier phase receivers. The unit is stand alone and requires no outside input from other sensors for accurate heading, roll, pitch and heave. For more accurate positioning of the ship, DGPS correctors are applied. Heading, determined from GPS phase measurements between the two GPS carrier phase receivers, velocity and position from GPS together with roll, pitch, heading (yaw) and acceleration measurements from the MRU, is input into a Kalman filter. The filter outputs position and velocity in three axes.

NAVTEX

A receiver for receiving and printing the international automated medium frequency (518 KHz) direct-printing service, which provides navigational and meteorological warnings and forecasts, as well as urgent marine safety information to ships was provided. The receiver is located on the bridge.

Weather

Weather broadcasts, facsimile pictures and charts are gathered during ship satellite connections

to the internet. Weather forecasts and alerts are also received from Inmarsat C and the US Navy Meteorological Forecasting Centers. The ship's Seaspace Terascan system receives visual, infrared, and water vapor images from NOAA geo-stationary satellites GOES 8 and GOES 10 and NOAA polar orbiting satellites.

3 SAMPLING

Jason / Medea

Jason/Medea is a remotely operated vehicle (ROV) system. It is a two-body ROV system, with *Medea* serving in a tether management role that decouples *Jason* from surface motion (**Figure 3-1**). *Jason* is connected to *Medea* by a neutrally buoyant tether that is 0.84" in diameter and approximately 35 meters long. Like the tow cable, it also uses three copper conductors and three single-mode optical fibers, but uses Spectra fibers to provide strength while reducing size and weight. The tether has a breaking strength of 41,000 lb. *Medea* weighs 1200 pounds in air and is maneuvered by controlling the surface ship's position within a dynamic positioning reference frame. Medea serves as a buffer between the ROV and the ship, and prevents the umbilical tether from tugging on the ROV as the ship rises and falls with sea state.

Figure 3-1. Illustration of Jason/Medea (WHOI).

Medea also reduces the total load on the umbilical, which is the primary limiting factor in the operation of an ROV that dives to these depths. Medea is equipped with down-looking cameras. Both *Medea* (**Figure 3-2**) and *Jason* (**Figure 3-3**) are designed to operate to a maximum depth of 6,500 meters (21,385 feet).

Figure 3-2. *Medea,* shown on deck (WHOI).

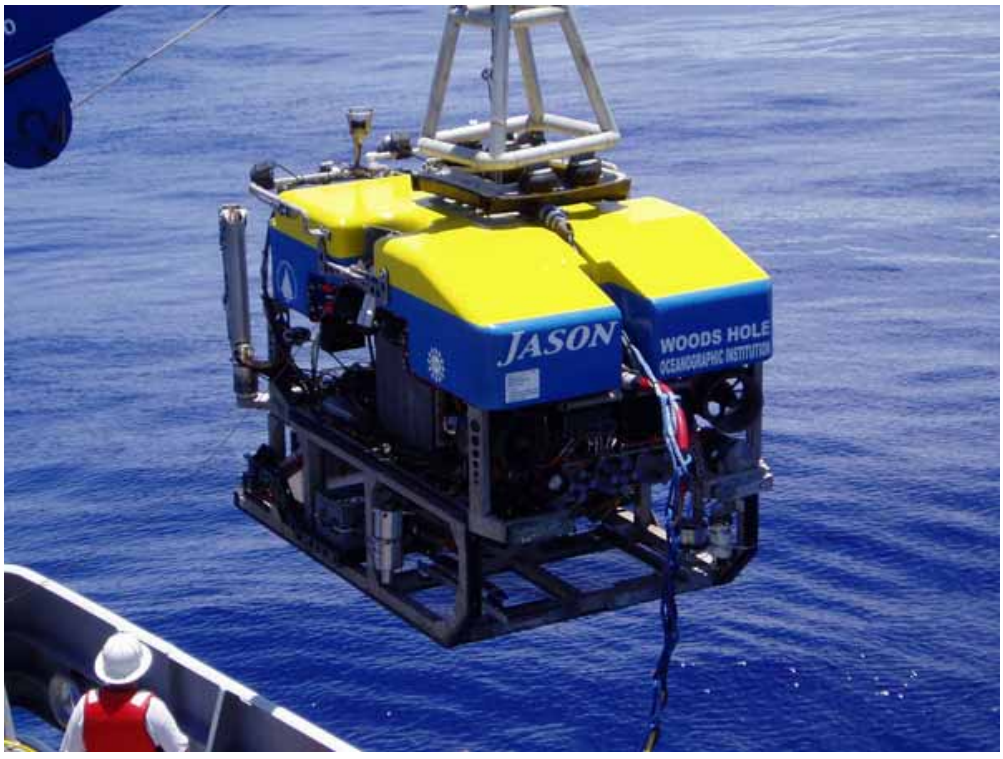

Figure 3-3. *Jason* launch (WHOI).

Movements of the support ship maneuver *Medea* utilizing dynamic positioning. *Jason* is propelled by six DC brushless electric thrusters that provide about 600 pounds thrust in the

vertical, longitudinal and lateral directions. It weighs about 8,000 pounds in air but is neutrally buoyant at depth.

Both *Medea* and *Jason* are real time optical imaging platforms with high quality cameras and lighting. *Medea* is configured with a silicon intensified target (SIT) black & white camera for terrain identification and visual location of *Jason* when both are operating. *Jason's* sample tray (**Figure 3-4**) carried water samplers, push cores to collect seafloor cores, a "slurp" pump to collect fauna, temperature probes, mass spectrometer and other sampling gear.

Figure 3-4. *Jason's* sample tray.

Three people operate *Jason*. A **Pilot** "flies" the ROV. An **Engineer** monitors all the systems (electrical, mechanical, hydraulic, etc) and operates the winch which pays out / hauls in the fiber optic cable which is attached to *Medea.* A **Navigator** positions the research vessel so that *Medea* and *Jason* can operate in the desired area. A fourth person is responsible for organizing all the data collected.

Bushmaster

The Bushmaster (**Figure 3-5**) is a large collection net that is closed using a system of hydraulic

cylinders and cables. They collect intact communities of tube worms and all associated fauna on the seafloor.

Figure 3-5. The "Bushmaster", a collecting net designed to recover an entire bush of tube worms including all the species that live in association with the worms.

These collection devices are very efficient, catching almost everything larger than about 64 micrometers.

Figure 3-6. Bushmaster Junior collection device.

During a tubeworm bush collection, the net is lowered over the top of a tubeworm bush with the mechanical arm of the ROV. A metal cable on the bottom is then cinched closed, collecting the tubeworm bush and all of the animals inside. The fine-meshed net of the Bushmaster is placed into a small container that is also lined with a net. Once all of the organisms captured along with the tubeworms are removed, the bush is taken out of the tub and wrapped in plastic and preserved.

Slurp

The diagram of a slurp gun (**Figure 3-7**) is a generalized design to illustrate the mechanics. It does not necessarily represent the equipment used on the *JASON*.

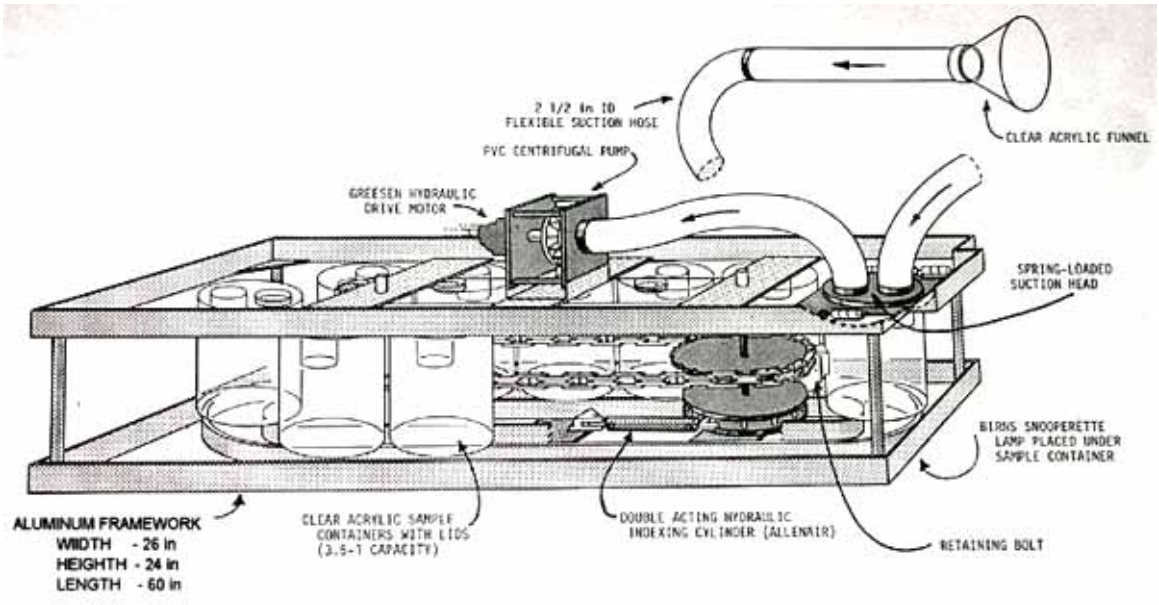

Figure 3-7 Annotated diagram of a suction sampler

Fish Trap

The fish trap was deployed but did not respond to the release signal.

Mussel Pot

Mussel pots were used to collect and preserve mussels and other organisms.

Figure 3-8. Mussel pot deployed with manipulator arm of *JASON*.

SM2000 Multi-Beam

The SM 2000 is electronically scanned multibeam sonar operating at either 90 or 200 kHz with a range of 800, or 400 meters (respectively).

Niskin

Niskin samples were collected during the cruise. The sampler collected water samples in unconventional deployments (**Figure 3-9)** and also in more conventional modes, attached to *Jason* (**Figure 3-13**, yellow arrow).

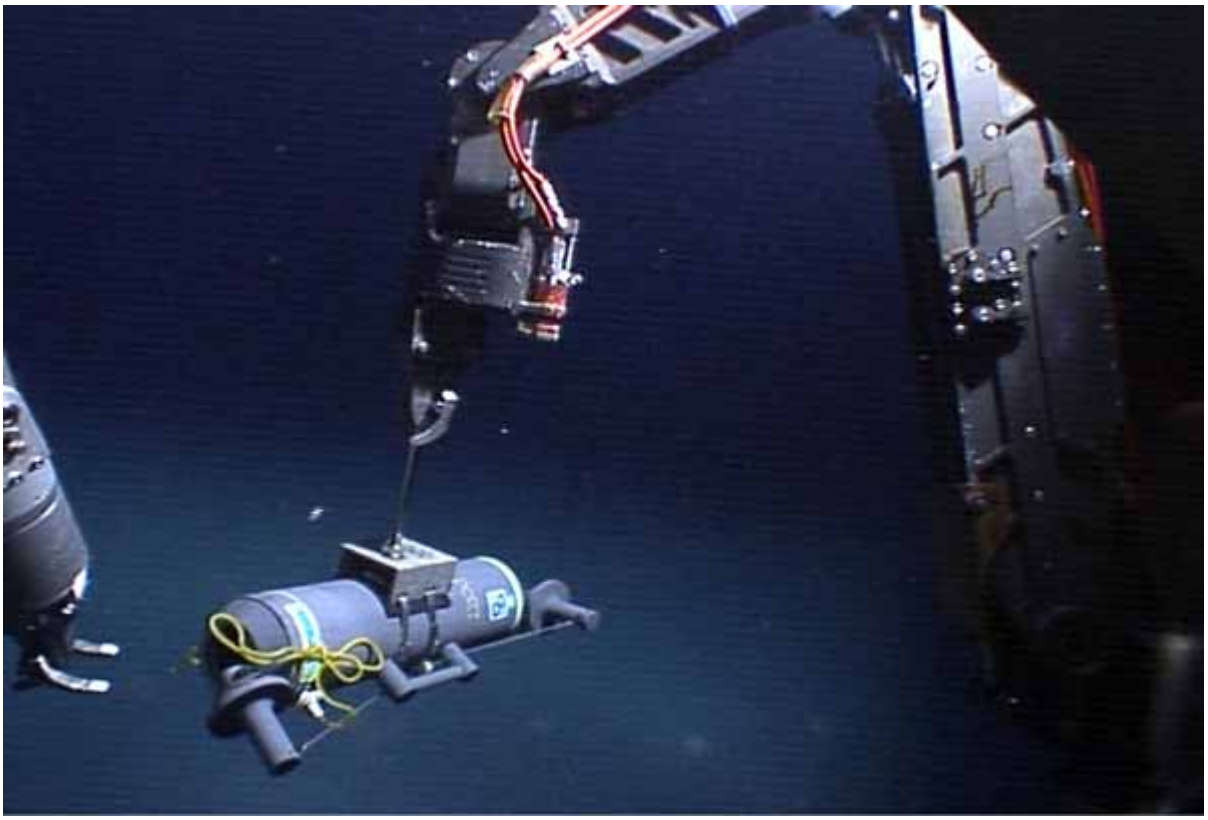

Figure 3-9 . The Jason group fabricated this Niskin bottle that could be lowered into the brine pool and triggered to collect a water sample without disturbing the delicate interface.

Imaging

A Rotary Time-lapse Camera was deployed using the elevator and placed with *Jason* (**Figures 3-10** through **3-12**).

Figure 3-10. Two time-lapse cameras are loaded on the elevator and ready for their initial deployment.

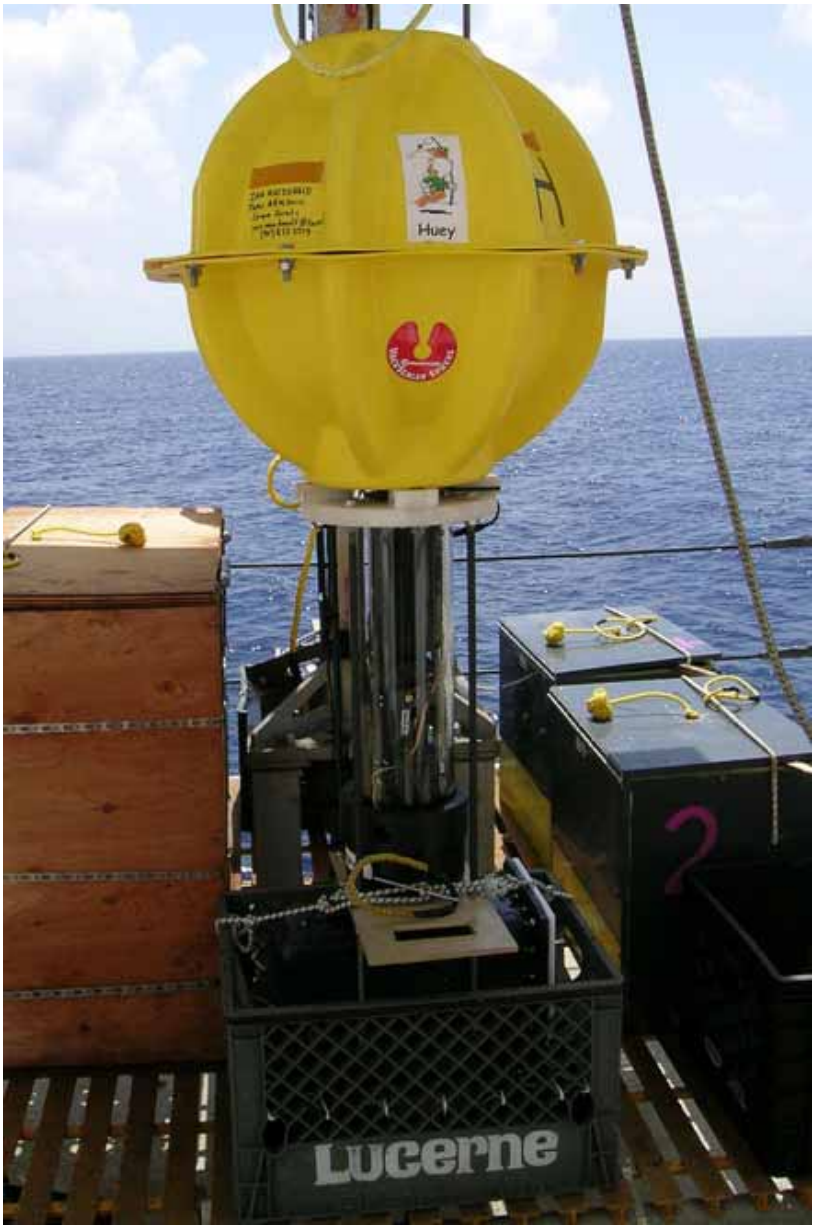

Figure 3-11. Rotary Camera 'H' (aka 'Huey)' sits on elevator awaiting deployment.

Figure 3-12. 360° image is an example of the type of imagery collected with the time-lapse rotary camera (lights from the *Jason* ROV to the right)

Mass Spectrometer

During the research cruise, a mass spectrometer was used to measure dissolved gases around hydrocarbon seeps (**Figures -13, 6-14**). The distribution of hydrocarbon gases, such as methane, ethane, butane and propane as well as hydrogen sulfide, could play a key role in determining which animal communities inhabit these environments. The underwater mass spectrometer called the *in situ* mass spectrometer (ISMass), will be used to construct a geochemical map of key dissolved gases in conjunction with the other ecological data being collected by the other researchers.

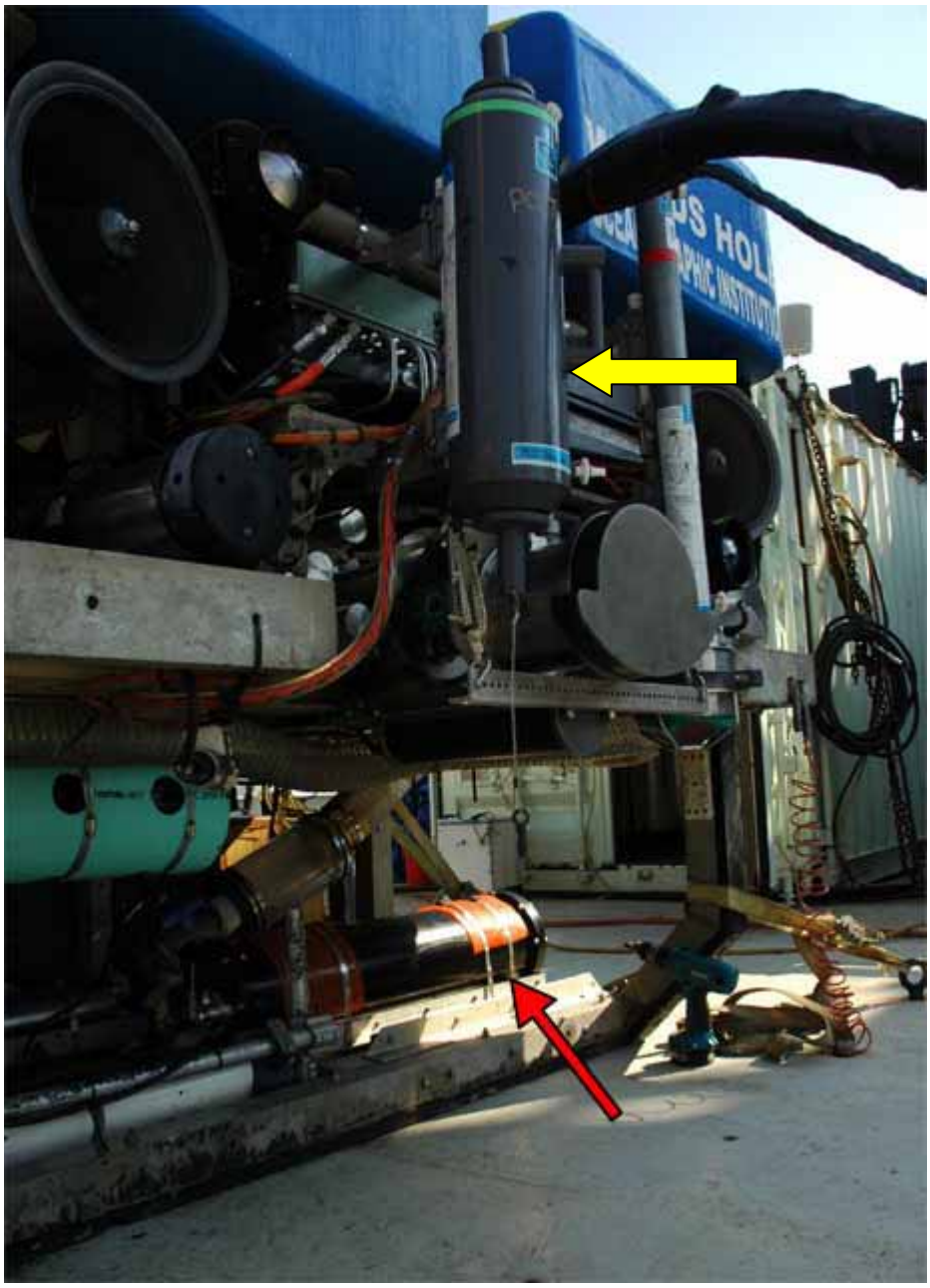

Figure 3-13.The mass spectrometer is bolted down on the back of the Jason (red arrow) below the Niskin bottle (yellow arrow)..

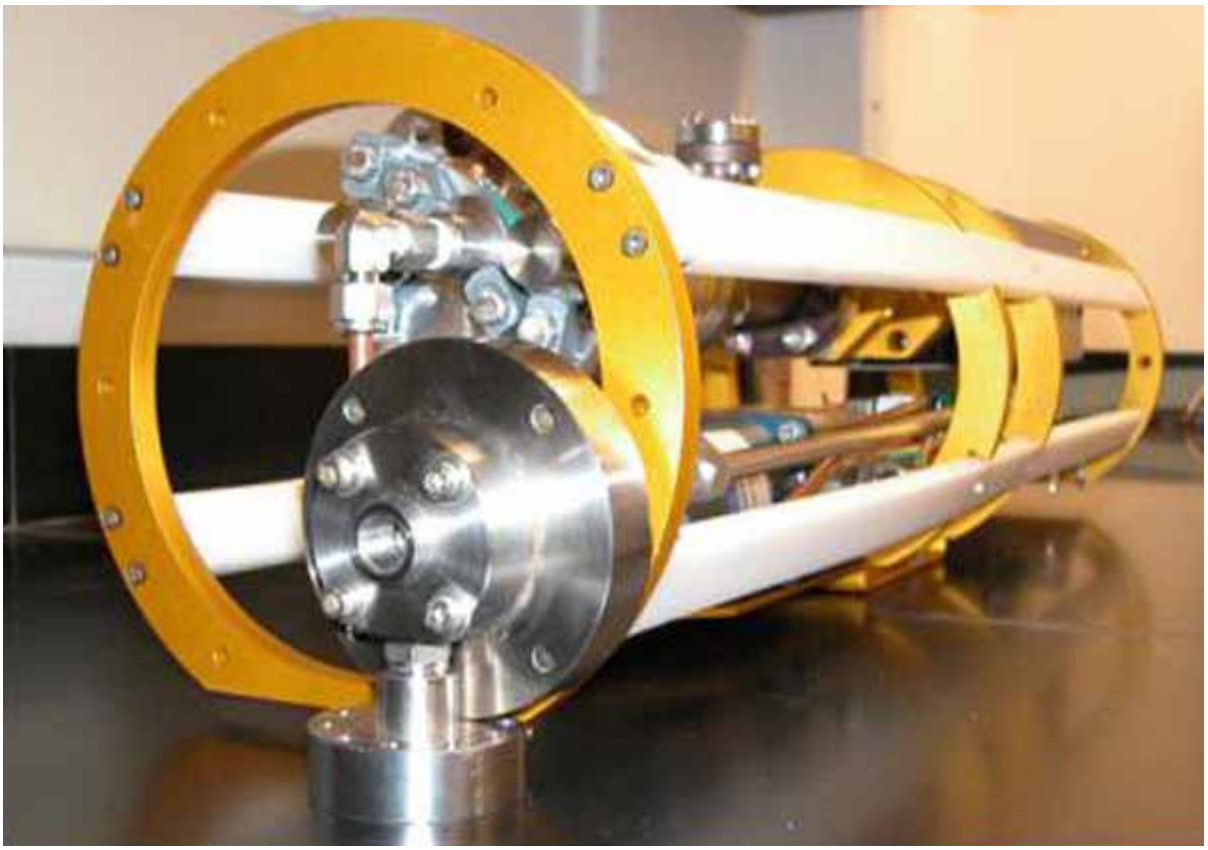

Figure 3-14. A mass spectrometer with a uniquely designed membrane inlet system allowing *in situ* dissolved gas measurements in deep-sea environments.

Cores

Push cores are made of a removable clear poly carbonate tube that is used to collect sediment samples (**Figure 3-15**). Each tube is 7.5 cm in diameter and 30 cm long, and can collect up to 20 cm of sediment per tube.

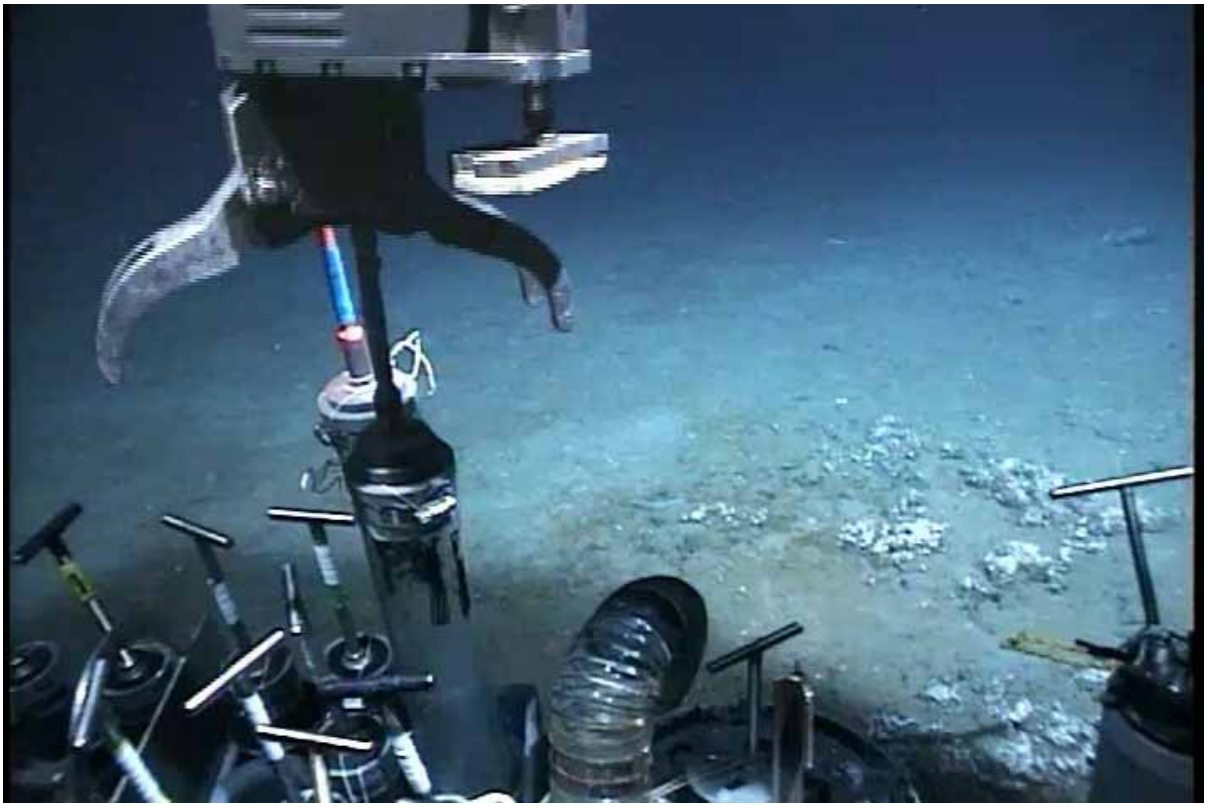

Figure 3-15. During *Jason* Lowering #275, the Jason manipulator arm reaches for another push core.

4 CRUISE SUMMARY

Participants

The Ronald H. Brown was staffed as shown in **Table 4-1**.

Table 4-1. Staffing of *Ronald H. Brown*

NAME	AFFIL.	SEX	NAT.	POSITION
Dr. Charles Fisher	PSU	M	US	Chief scientist
Dr. Harry Roberts	LSU	M	US	Chief scientist
Dr. Ian Macdonald	TAMUCC	M	US	scientist
Oscar Garcia	TAMUCC	M	MEX	student
Dr. Robert Carney	LSU	M	US	scientist
Kathy Lostis	UGA	F	US	scientist
Kim Hunter	UGA	F	US	scientist
Vladimir Samarkin	UGA	M	RUS	scientist
Katherine Segarra	UGA	F	US	student
Marshall Bowles	UGA	M	US	student
Dr. Eric Cordes	Harvard	M	US	scientist
Dr. Peter Girguis	Harvard	M	US	scientist
Sunita Shah	Harvard	F	US	student
Gernot Friederich	MBARI	M	Germ	scientist
Dr. Stephane Hourdez	Roscoff	M	FRA	scientist
Guy Telesnicki	PSU	M	CAN	technician
Erin Becker	PSU	F	US	student
Lara Miles	PSU	F	US	student
Stephanie Lessard-Pilon	PSU	F	CAN	student
Julia Zekely	UNIVIE	F	AUS	student
Ingrid Kolar	UNIVIE	F	AUS	student
Irmgard Eichinger	UNIVIE	F	AUS	student
Bernie Bernard	Brooks TDI	M	US	scientist
Mike Kullman	Brooks TDI	M	US	scientist
William Shedd	MMS	M	US	scientist
Jesse Hunt	MMS	M	US	scientist
Jeremy Potter	NOAA-OE	M	US	outreach
Nicole Morris	NOAA-OE	F	US	outreach
Peter Etnoyer	TAMUCC	M	US	scientist
Jim Brooks	Brooks TDI	M	US	scientist
Dr. Christina Kellogg	USGS	F	US	scientist
TBD	NOAA-OE	?	?	outreach
Matt Heintz co-Exped leader	WHOI	M	US	JASON CREW

NAME	AFFIL.	SEX	NAT.	POSITION
Andy Bowen co-Exped leader	WHOI	M	UK	JASON CREW
Alberto Collasius	WHOI	M	US	JASON CREW
Robert Waters	WHOI	M	US	JASON CREW
Robert Elder	WHOI	M	US	JASON CREW
Casey Agee	WHOI	M	US	JASON CREW
Will Handley	WHOI	M	US	JASON CREW
Nile Akel Kevis-Stirling	WHOI	M	US	JASON CREW
Brian Bingham	WHOI	M	US	JASON CREW
James Brennan	WHOI	M	US	JASON CREW
James Pelowski	WHOI	M	US	JASON CREW

Cruise Activity

Following is a summary of the daily activities during the cruise, from mobilization in Panama City, Florida to de-mobilization in Galveston, Texas.

Date	**Activity**
5/31	Jason arrives FL and begins onload
6/2	Scientists begin to arrive
6/3	cience unload and set up
6/4	Departure delayed from 1400 to 1700 due to slow fueling and crane repairs
	DPS testing until early evening, return tech to land and begin transit about 2100
6/5	Transit
6/6	Transit. on station 2000 Arrive at AT 340 in the afternoon of June 6, deploy transponders and establish the ROV navigational net (approx 4-6 hours) and deploy Jason II. Since this is our first dive, we will assume some details to work out and assume 84 hours on this station (two lowerings)*. SM 2000 mapping, down looking camera work, bushmaster, coring, and testing of all chemical sensors are a priority
	Deploy 3 transponders and collect data
6/7	Deploy 1 elevator (0600)
	Deploy 1 fish trap (0700)
	Deploy Jason at AT 340 at 0800 for 37 hour dive **JII 269**
	First 4 hours spent confirming navigation
	Now running SM 2000 calibration and will make 2 passes over the CRP
6/8	dive ops until midnight
6/9	Elevator on deck at 010, Jason on deck at 013, dip test mass spec housing at 0800
	call up fish trap at 0900. Look for fish trap …. Never found.
	Start to launch Jason at 1200, 1 hour delay, launch at AT 340 at 1300 for 24 hour dive **JII270**
	Launch elevator at 1600

Date	Activity
6/10	Arrive at GC 852, deploy transponders, establish net, and deploy Jason II A single lowering with same priorities Allow approximately 60 hours total recover elevator about 0800 with cores, mussels, and one camera Recover Jason at 2400.
6/11	Try to talk to fish trap from 00:00 until 0200, Transit to MC 462, Arrive MC 462 about 0800, Noon launch of Jason delayed due to space conflicts with survey seismic ships
	Jason launched at 17:30 on MC 462 for 16 hr dive **JII 271**
6/12	Jason recovered at 0900 and transit to GC 415 started
	Arrive at GC 415 at 1900
	Launch Jason at 2000 for 12 hr dive **JII 272**
6/13	Arrive at WR 289: deploy transponders, establish net, and deploy Jason II A single lowering with same priorities, but no Bushmaster (substitute mussel collection devices). Recover transponders Allow approximately 60 hours total. Recover Jason at 0800
	Launch at GC 852 for 43 hour dive at 2000 **JII 273**
6/14	dive ops
6/15	recover Jason at 1500
6/15	launch at GB 697 at 2400 **JII 274**
6/16	Conduct exploratory dives in 2-4 sites in the general area of GC 852 (within 100 km), but at shallower depth. The final decision on the sites is still being refined, and number visited and time spent at each will depend on our results from these exploratory dives. Remove SM 2000 from Jason and outfit for single dive exploration and sampling. of several sites. If available, we will use USBL for navigation and no transponder net, although proximity of sites (short transit times), may allow deployment and use of transponders and LBL net during 12 hour surface interval. We have several potential sites in this area (the two top runners are in lease blocks GC 415, and GB 647, with additional potential dive sites in GC 559 GC 822, and 2 others separated by 4 km in GB 697 and GB 741). We will allow 6 days for these operations at this time. A transfer of personnel will occur while we are in this area, on 6/18 or 6/19. Recover Jason at 0030 due to possible Mass Spec lea k. Relaunch Jason at 0130.
6/17	Recover Jason at 0830 and transit to transfer at 1100, exchange personnel, begin transit to WR at 1400 Launch Jason at 2000 for 20hr dive at WR 269 **JII 275**
6/18	Recover Jason at 1600 and begin transit to AT 340
6/19	Launch Jason at 0830 for 48 hour dive at AT 340 **JII 276**
6/20	recover Jason at 1200 for some deck Jason fun at AT 340
	launch Jason at 2400 for 32 hour clean up dive at AT 340 **JII 277**
6/22	Return to AT 340. Allow 3 days for 2 lowerings (18 hour) and recovery of transponders. recover Jason at 0800 and recover transponders
	Start transit to GC 852 at 1200
6/23	Arrive on station at 0100 and conduct drift test, Launch elevator at 0130, Launch Jason at 0230 for long dive at GC 852 **JII 278**

Date	Activity
6/24	recover Jason at 16 00 and conduct engineering tests. Recover transponders transit to the Christmas tree:
6/25	Return to GC 852. Allow 2 days for 1 lowering and recovery of transponder 0500 begin multibeam survey over 829 dive site to finalize underlay and dive coordinates Survey completed at 0645, Dive at 0800 at the Christmas tree (GB 829)**JII 279**
6/25	Recover Jason from last dive in GC at 20:00
6/26	Launch Jason for 16 hour dive at GB 647 at 08:00 **JII 280,** head for AC 645 from GB 647 by 20:00
6/27	** Transit to Alaminos Canyon, stopping for a short exploratory dive in transit**. Approximately 250 miles of transit, allow 24 hours transit time and 24 hours for a dive in transit Arrive in AC 645 by 7 am for transfer. Transfer personnel and deploy transponders and elevator with Ian's camera until 1400, launch Jason at AC 645 by 1400 for a 46 hour dive, SM2000, (then cores, off load camera, load cores and send it up) mosaics, banded worms, chemistry, transects, slurp
6/29	Arrive AC 645; make a single dive with SM 2000. This may require a nav net and transponders. Allow 48 hours.Recover Jason at 1200
	Deploy transponders at 818
	Deploy elevator at 818 (camera and cores)
6/30	Launch Jason at AC 818 for 36 hour dive at 0000
	SM2000 and explore (SM2000, chem, slurp, BM, mosaic)
7/01	Arrive AC 818: make 3 shorter (16 hour average) dives at this location: use SM 2000 on first dive, so a LBL nav net may be required. Allow 4 days recover Jason at 1200 ** Take stock of the weather** if building, do another at 818 now.
	Transit to 601
	Deploy transponders
	Deploy elevator
7/02	Launch Jason at AC 601 for 40 hour coring+ dive at 0000
7/03	Recover Jason at 1600
	Recover transponders at 601
	Recover transponders at 645
7/04	Launch at AC 818 at 0400 for the last dive (29 hours), Note this is more time than needed and so the most important thing is to complete the first two dives, even if each take an extra 16 hours**
7/05	Recover Jason recover Jason at 0900
	recover transponders
	Depart AC 818leave for Galveston at 1200
7/06	arrive Galveston at 0800

5 EDUCATION OUTREACH CRUISE SUMMARY

"Classroom to Sea" labs and related classroom materials continued to be developed. The education team interviewed scientists to better understand the background for their specific research as well as the purpose of the activities during the cruise. The purpose was to find applications for the science classroom.

The following components were contained in the Expedition Education Module.

Expedition Purpose
A summary of why scientists and educators are interested in exploring this area and what can be learned.

Lesson Plans
A collection of inquiry and National Science Education Standards-based lesson plans for students in grades 5-12 that have been specifically designed for this expedition. These lessons have also been correlated to the Ocean Literacy Essential Principles and Fundamental Concepts.

Multimedia Learning Object(s)
Links to Lessons for interactive multimedia presentations and Learning Activities on Deep-Sea Corals, Chemosynthesis and Hydrothermal Vent Life, Deep-Sea Benthos, Energy from the Oceans, and Food, Water, and Medicine from the Sea were available.

OceanAGE Ocean Career Connections
Archived video and online Web chats between students and scientists highlighting a few of the careers that are represented onboard the ship during the Expedition to the Deep Slope 2007 mission.

Other Resources and Links
A list of other resources and links related to this expedition.

6 SITE CHARACTERIZATION AND SUMMARIES

The following section describes site characteristics and geological settings of the dive site locations visited during the cruise (**Figure 6-1**). Dive maps showing *JASON's* track and sampling locations, as well as representative photographs, are presented as individual figures at each site. The 16 dive sites are discussed in the chronological order visited, although later dives could have been made at the same site (**Table 6-1**).

Table 6-1. Sites characterized listed in chronological order

Area/ Site	Lowering Id	Start/ Launch Y/M/D	End/ On Deck Y/M/D	Data Time (H:M:S)	Lowering Time	Max Depth (meters)
AT340	**J2-269**	2007/06/07 11:58	2007/06/09 06:02	37:58:00	4:06:00	2212.0
AT340	**J2-270**	2007/06/09 16:48	2007/06/11 04:30	32:22:00	3:20:00	2213.0
MC462	**J2-271**	2007/06/11 21:37	2007/06/12 13:16	13:49:00	1:50:00	973.0
GC415	**J2-272**	2007/06/13 01:10	2007/06/13 12:11	0:00:00	11:01:00	1107.0
GC852	**J2-273**	2007/06/14 00:00	2007/06/15 19:10	41:09:00	2:01:00	1633.0
GB697	**J2-274**	2007/06/16 05:05	2007/06/17 12:50	29:43:00	2:02:00	1281.0
WR269	**J2-275**	2007/06/18 00:05	2007/06/18 20:06	17:42:00	2:19:00	1964.0
AT340	**J2-276**	2007/06/19 12:36	2007/06/20 17:21	25:31:00	3:14:00	2213.0
AT340	**J2-277**	2007/06/21 04:04	2007/06/22 12:10	29:13:00	2:53:00	2213.0
GC852	**J2-278**	2007/06/23 06:15	2007/06/24 20:09	36:06:00	1:48:00	1426.0
GB829	**J2-279**	2007/06/25 12:09	2007/06/25 22:31	8:18:00	2:04:00	1303.0
GB647	**J2-280**	2007/06/26 09:59	2007/06/27 00:17	12:49:00	1:29:00	1014.0
AC645	**J2-281**	2007/06/28 05:36	2007/06/29 23:02	38:30:00	2:56:00	2223.0
AC818	**J2-282**	2007/06/30 12:31	2007/07/01 19:41	27:51:00	3:19:00	2750.0
AC601	**J2-283**	2007/07/02 11:57	2007/07/04 10:09	42:41:00	3:31:00	2338.0
AC818	**J2-284**	2007/07/04 21:06	2007/07/05 13:26	12:44:00	3:36:00	2747.0

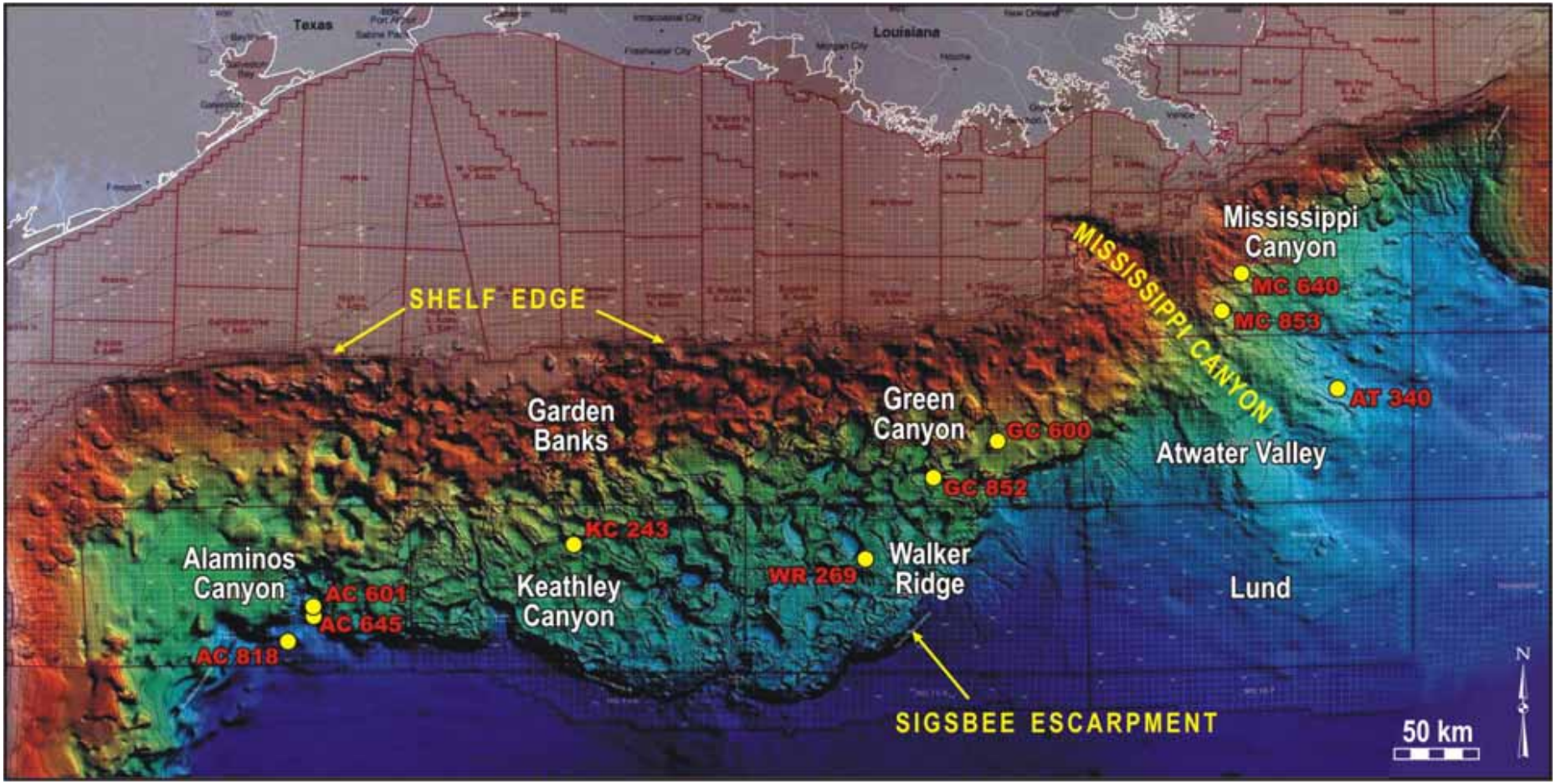

Figure 6-1. Site locations of JASON dives.

Atwater Valley 340

Geologic Summary of AT340

The AT340 dive site is geologically characterized as a bathymetric high along the eastern extension of Mississippi Canyon where it transitions from a canyon to a submarine fan. The site consists of three mounded areas on top of the overall bathymetric high. Geophysical data indicate that the feature is supported by salt in the shallow subsurface. Seismic profiles identify a clear vertical migration pathway for the flux of fluids and gases to the modern seafloor. This pathway is defined by acoustic blanking of the seismic record, suggesting both reflection of acoustic energy by hard bottom conditions at the surface and perhaps gas in the subsurface along the migration route. The surface reflectivity maps, created by analyzing the first return from the seafloor from 3D seismic data, indicate high reflectivity in the areas localized around the three mounded features. Five dives have been made on the overall AT340 feature. Three dives concentrated on the local mounded area in the SE quadrant. On the 3D seismic surface reflectivity maps, this area displayed a complex pattern of high to moderate reflectivity. Observations from ALVIN confirm extensive hard bottom conditions that result from authigenic carbonate precipitation, a by-product of microbial utilization of seeping hydrocarbons. Inspection of these carbonates reveals that they contain abundant mussel shells. In addition, carbonate precipitation occurs around the bases of tubeworm bushes. Scattered among the blocks and pavements of authigenic carbonate are living mussel beds and tube worm colonies. One site named the “mussel brick road” represents an elongate (about 75 m long) and densely packed bed of living mussels forming in a joint or separation in the underlying authigenic carbonate pavement. Between the blocks of carbonates, clumps of tubeworms, and beds of mussels are patches of sediment colonized by urchins (These organisms play an active role in the bioturbation of sediments and represent a community component distinct from the tubeworm and mussel aggregations) (**Figure 6-1**), a few soft corals, and other sparsely distributed organisms.

Figure 6-1. Hard urchins were abundant in portions of the AT340 site.

In the NW quadrant of the AT340 study area, a distinct mound occurs. On surface reflectivity maps derived from 3D seismic data, this mound stands out as a very high amplitude feature. Two dives on this feature confirm the fact that it is composed almost entirely of hard bottom. Inspection of the areas of lithified seafloor shows that the carbonate block and pavements (**Figure 6-2**) are composed almost entirely of mussel shells, one layer on top of another.

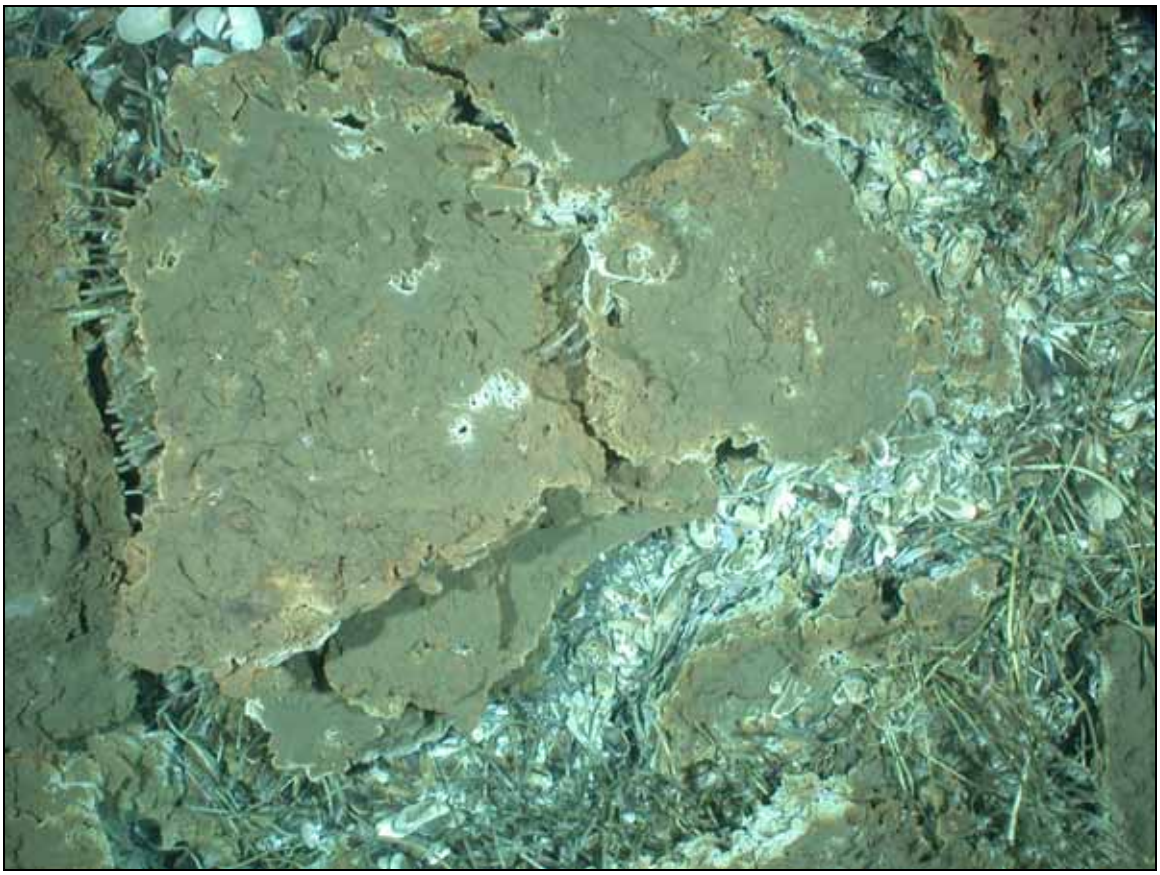

Figure 6-2. Extensive carbonate pavements indicate protracted seepage. Fracturing and continuing colonization by mussels and tubeworms demonstrates ongoing seepage.

Because of this unique construction we named the site "mussel mound." Many blocks seemed to have very little sediment matrix, just mussel shells and binding carbonate cements. Although most of the mussel shells did not house live mussels, several patches of live mussels were observed at the apex of the mound. Both the crest areas and flanks of the mound were covered with tubeworms. Many tubeworm colonies occurred beneath and at the edges of carbonate blocks, but free-standing colonies were also present. To the east and off the flank of the mound a brine vent is present. Fluidized sediment, brine, and hydrocarbons are being vented at this site (**Figure 6-3**).

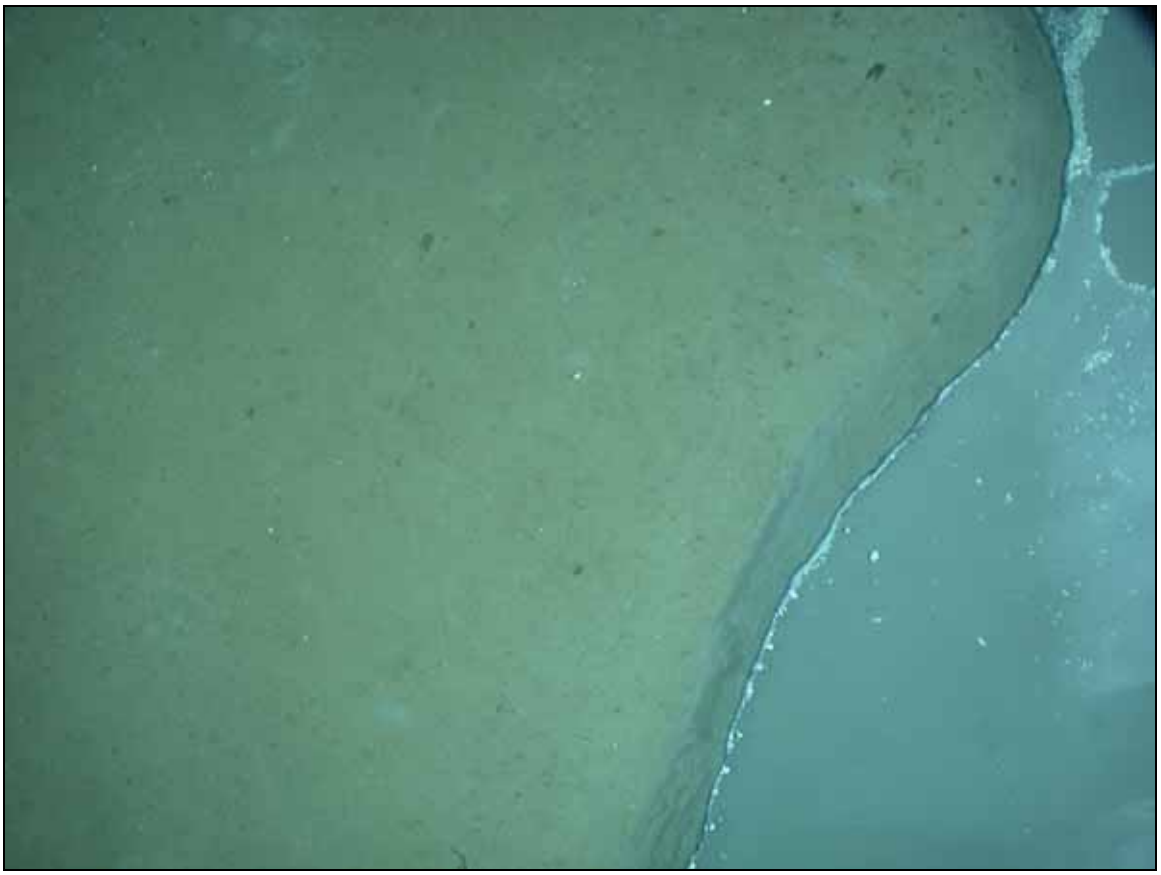

Figure 6-3. Surface brine flows generate extensive pools and channels that support mussel aggregations at AT340.

Around the vent site and along the flow field there are extensive mussel beds. Seismic profiles across the AT340 feature indicate the presence of salt in the relatively shallow subsurface. The brine is likely coming from the dissolution of this salt body.

Site Summary - Atwater Valley 340

Atwater Valley 340 is a large and complex site with abundant and varied chemosynthetic communities spread over a relatively large area. It has the largest mussel beds of any site yet visited. Two of these were especially spectacular. One is a solid bed of mixed species and sizes of live mussels that we estimate is over 10 m wide and 20 m long, and we nicknamed "Brooksi Banks" (**Figure 6-4**). The other was a relatively continuous linear bed over 70 m in length that was nicknamed the "Mussel Brick Road." Both of these were imaged intensively enough to allow almost complete photographic reconstruction of the entire features.

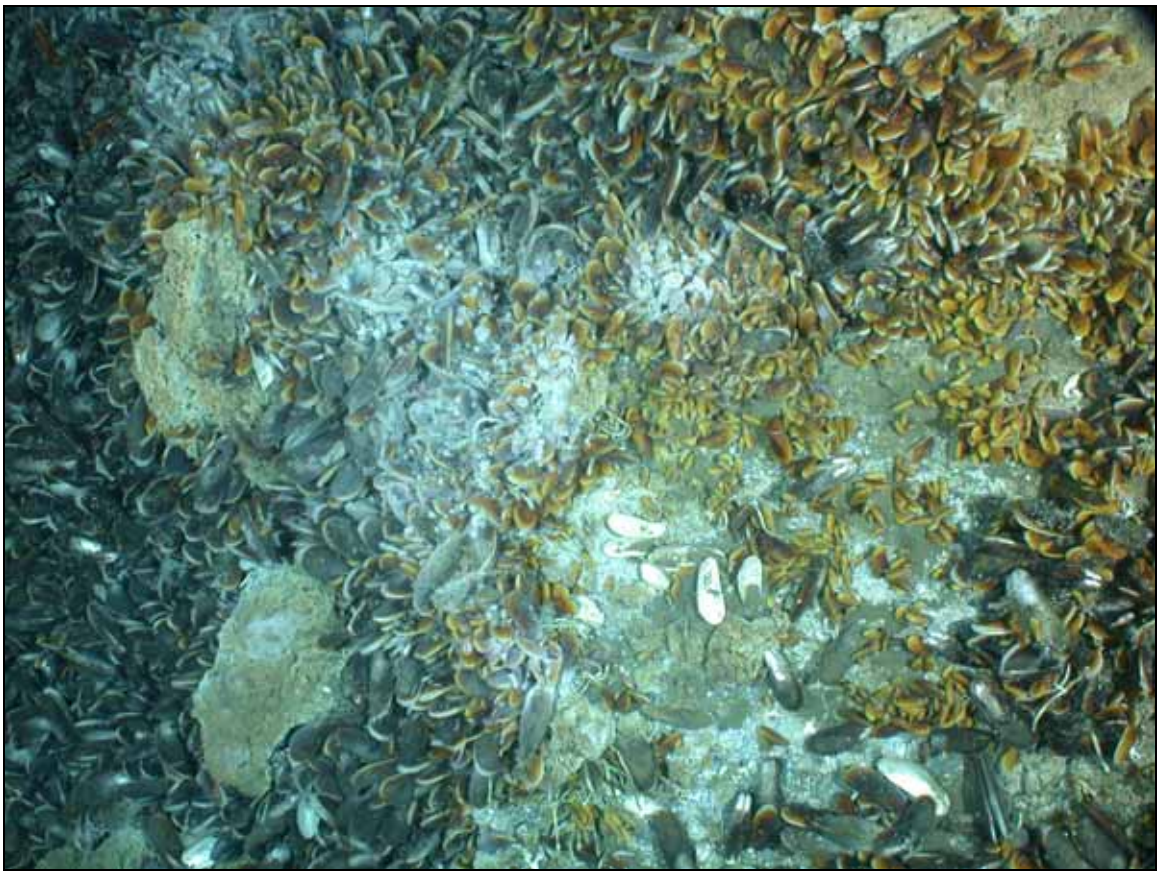

Figure 6-4. This down-cam image shows two species of seep mussels in a dense bed.

Further detailed study of these beds will be especially informative, as this is the one site where we have collected both *B. heckerae* and *B. brooksi*, the two bathymodioline mussels that harbor both methanotrophic and chemoautotrophic symbionts. It appears from the pictures that *B. childressi* is also present in the large mussel bed, but confirmation will await sampling this bed in 2007. Both of these features are in the SE quadrant of the site. There are patchy small mussel aggregations (of large individuals) in the NE quadrant, and scattered intermediate sized mussel beds near the topographic high in the far W edge of the site and in the bottom of what appears to be 2 m diameter blowout craters in that area.

Tubeworms are also very abundant at this site. They occur in large numbers among the large carbonate slabs in the SE and W portions of the site. *Escarpia laminata* is the dominant species in the aggregations ("bushes") sampled and appears to be dominant in most of the aggregations seen. However, *Lamellibrachia* sp is also quite abundant; as large individuals and in small groups protruding from underneath and between carbonate slabs and in mixed aggregations with *E. laminata*. In addition to two large areas with abundant tubeworms, several smaller ridges with carbonates were also colonized by both species.

The most dominant megafauna species associated with the tubeworm aggregations was the shrimp *Alvinocaris muricola*. This shrimp species was also abundant in the mussel collections, co-occuring with the abundant brittle star *Ophioctenella acies* in this habitat. The *B. heckerae*

that were collected also contained the commensal polychaetes *Branchipolynoe seepensis* and a nautillinellid. A large proportion of the *E. laminata* collected contained a phyllodocid polychaete that is likely a blood-sucking parasite.

Another animal that was abundant (and dominant) in some areas of soft sediment with visual evidence of seep impact was a spatangid heart urchin. Several (at least five) beds of these were found over the course of the five dives to this site. None of these beds were associated with carbonates, but some were close to the other sites or isolated mussel clumps. In areas where the sediments around the urchins were stained black and white, the urchins did not appear to be moving much. In areas where seepage was less apparent, there were often long trails associated with the urchins.

Few colonial cnidarians were seen at this site. However small gorgonian colonies were present near the scattered mussel beds in the NE quadrant of the site and noted on the carbonates in the W edge. Isolated whip corals were present in many areas. In some areas a small colonial anemone was abundant on tubeworm tubes and dead mussel shells. Individual anemones were often noted over non-seep affected sediments and a small crab with an orange anemone was a regular site in the vicinity of the active seep areas. (**Figure 6-5**)

Figure 6-5. Anthropogenic debris like this monofilament line was common at AT340.

Green Canyon 852

Geologic Setting: GC852

The GC852 site is one of the most diverse on our dive schedule. The area of interest is a N-S oriented elongate mound that rises from the seafloor at the southeastern edge of a middle-to-lower slope suprasalt sedimentary basin. The top of this mounded region is at a water depth of approximately 1,435 m. The overall elongate-mounded area is approximately 2 km long, the highest elevation on this feature is at the southern end. This southern area is characterized by a localized mound that rises more than 20 m above the northern crest of the overall feature. The 3D seismic surface reflectivity data indicate that the entire crest of this feature exhibits a high amplitude response, suggesting the presence of hard bottom conditions. Scattered highly reflective targets are also present around the upper flanks of the ridge-like feature. Profiles of the subsurface configuration of this feature indicate acoustically turbid migration pathways to the modern seafloor. These vertically oriented acoustic "wipeout zones" are migration routes for fluids and gases to the modern seafloor. The structural and stratigraphic framework of the subsurfaces focuses these products (including hydrocarbons) to the GC852 mounded area.

Photo reconnaissance work in March 2006, as well as direct observations made with the aid of ALVIN, indicates the presence of numerous chemosynthetic communities around the mounded area in the southern half of the study area. Tubeworms, mussel beds, and carbonate outcrops are common around the flanks of the southern mound. Although the ALVIN did not travel to the northern end of the N-S trending overall feature, the photo reconnaissance indicated brine seeps and carbonates, but no chemosynthetic communities. At the apex of the southern mound, carbonate blocks and hardgrounds are common, and soft corals are taking advantage of the hard substrates as a place to attach and grow. Bacterial mats seem to be few and far between.

Site Description - Green Canyon 852

This site lies on the southern extent of a steep-sided N-S trending elongated mound rising from over 1500 to 1395 m depth. This feature occurs at the SE edge of a well-defined sedimentary basin. The overall mounded area is approximately 2 km long with the highest elevation at the southern end. This area of primary interest is characterized by a localized mound that rises more than 20 m above the rest of this overall feature. The 3D seismic surface reflectivity data from this area indicate that the entire crest of the elongated feature exhibits a high amplitude response relative to surrounding seafloor, suggesting the presence of hard bottom conditions. Scattered highly reflective targets are concentrated in the vicinity of the southern mound. Profiles of the southern end of the elongated mound indicate acoustically turbid migration pathways to the modern seafloor. These "wipeout zones" are interpreted as routes for upward transport of fluids and gases from the deep subsurface. Submersible operations confirmed the indicators of hydrocarbon seepage in this area. These operations were conducted on the crest of this feature in an area approximately 650 m N-S and 300 m E-W. The crest of the feature has extensive carbonate that appears to have been scoured by currents removing sediment from between 2-3 m high carbonate pillars. At the tops of the pillars are numerous types of corals: gorgonians, antipatharians, bamboo coral, and scleractinians (**Figure 6-6**), as well as numerous individuals of a globose soft-ball sized hexactinilid sponge, a few anemones, and a yellow *zoanthid* sp encrusting dead bamboo corals.

Figure 6-6. Chemosynthetic communities at the GC852 site comprised a series of features situated along a 1.5 km ridge line. The southern-most area was characterized by large carbonates with mussels and tubeworms.

Numerous plumate polychates and hydroids were visible in macrophotos of the carbonates. The hard coral *Solenosmilia variablis* was collected and *Madrepora oculata* was observed. A potential identification of *Lophelia pertusa* was also made from the photographic record, but this could not be confirmed since there were no specimens of this species collected. There was an unidentified species of chirostylid crab commonly associated with the soft corals and a species of ophionerid brittle star on the gorgonians (**Figures 11-7** and **11-8**).

Figure 6-7. The northern portion of the site contained an area where massive carbonates were colonized by scleractinian corals.

Figure 6-8. Soft corals included living octocoral polyps and dead skeletons colonized by zooanthids.

Also on top of the mound are some scattered tubeworms and smaller carbonates and an area of active oil seepage. On the flanks of the mound were two areas of active seepage and authigentic carbonate. One feature is about 80 m to the NE of the corals and consisted of low-lying cracked carbonate blocks, occasional methane bubble streams, and oily sediments. Aggregations of both species of tubeworms, *Escarpia laminata* and *Lamellibrachia* sp., were collected here. Small mussel beds nested in carbonate (**Figure 6-9**) comprised *Bathymodiolus brooksi* and *B. childressi*.

Figure 6-9. Tubeworm colonies at GC852 were generally sparse assemblages attached to carbonate and cemented shells.

The most common associated fauna were *A. muricola* and *O. acies*. Many of the *E. laminata* collected contained a species of phyllodocid polychaete, which is an apparent blood-sucking parasite. Dead tubeworm tubes often contained this species and another polychaete filling their tubes. A second area of active seepage was found approximately 400 m to the south of the corals near the top of a ridge extending down from the other sites. The substrate in this area consisted of numerous small to medium sized carbonate slabs and boulders and areas of carbonate rubble. Numerous transits between the two areas found only mud between the sites.

The same species noted above were present in the second area. The tubeworms were present as scattered individuals as well as small aggregations associated with the carbonates and mussels were present in beds among the carbonates as well as in small groups apparently nestled in the sediment. Vesicomyid clams were also present in this area, although none were collected. These collections extend the depth range of the common upper slope gastropod *Cataegis meroglypta*, the mussel *Tamu fisheri*, and the methane ice-worm *Hesiocaeca methanicola* to 1400 m, and extends the geographic range of *S. variables* to the NE from previous Gulf records in the Straits of Florida.

Walker Ridge 269

Geologic Setting for WR269

The dive site is at the northern edge of a suprasalt intraslope basin on the lower Continental Slope, approximately 10 lease blocks away from the Sigsbee Escarpment. The site consists of a series of mound-like areas that extend to the east into WR 270. These mounded features are on a ridge that separates two very distinct intraslope basins that are floored by salt or salt welds.

Previous studies, using high quality 3D seismic data, indicate the presence of a well-defined bottom simulating reflector (BSR) that cuts across stratigraphic reflectors of the basin fill to the south of the area of interest. This feature, which is interpreted to indicate the base of the gas hydrate stability zone, appears to have free gas trapped beneath the BSR. The mounds on the modern seafloor are updips of the interpreted gas hydrates and associated free gas. It appears that gas is bypassing the gas hydrate stability zone along permeable beds that are upturned along the basin margin. The topographic buildups that are the focal points of our investigation are interpreted as being several large expulsion features that have built mounds through the extrusion of fluidized sediment along with other products such as hydrocarbons.

Surface reflectivity maps of the area derived from 3D seismic data suggest the location of several active vents (circular low amplitude zones) and associated flows that have localized areas of high reflectivity. The areas of high reflectivity are interpreted as regions of local seafloor lithification and perhaps fields of clam shells.

The particular area selected for investigation is characterized by rather subtle topography except for a localized mound that rises some 30 m above the surrounding seafloor. The area was selected on the basis of its characteristics on geophysical records. The mound-like feature was interpreted as a sediment extrusion site and the surrounding areas as overlapping mud flows. The surface reflectivity maps suggest that there are some highly reflective zones that surround and are located to the west of this central vent feature. These highly reflective zones are usually lithified seafloor areas or fields of clam shells in this setting.

If the vent is active, fluidized mud is frequently found with bacterial mats usually in abundance. If the vent is not very active, the central crater sites are usually the sites of complex chemosynthetic communities. The fact that the surface reflectivity maps show a low amplitude response in the vent area suggests the presence of gas or soft bottom condition. Small islands of slightly higher reflectivity suggests variable bottom conditions in the area of the vent and a reasonable probability of finding tube worm, mussels, and carbonate rocks. This proved to be the case at this site. Even though the flows themselves may not be highly productive in terms of chemosynthetic communities, there are “hot spots” in the flows that support communities and result in localized cementation of the seafloor. The highly reflective areas to the west of the vent site are interpreted as being of this nature. One of the areas is circular and probably represents an old venting site.

If hydrocarbons are still being migrated to the seafloor in this area, it could support a sizeable area of chemosynthetic communities. Unfortunately, our dive to explore this area was cut short

because of weather, and we were not able to ground truth our interpretations of the areas west of the main venting site. Our interpretations of venting sites and highly reflective areas near it were correct (**Figures 11-10 and 11-11**).

Figure 6-10. Although there were extensive areas of seep-affected sediments at the WR269 site, development of tubeworm or mussels aggregations was very restricted.

Figure 6-11. The surface sediment in the regions of seepage featured a rich assortment of pogonophorans, holothurans, and crustaceans.

Alaminos Canyon 818

Geologic Summary of AC818

The AC818 site is located seaward of the Sigsbee Escarpment and slightly to the west of Alaminos Canyon. The site is associated with the ChevronTexaco Tiger Prospect in a water depth of approximately 2750 m. A wellhead is present in the vicinity of a well-developed chemosynthetic community discovered on an ROV survey of the immediate wellhead area. The regional geology of this region is that of a rather flat area of relatively low reflectivity on 3D seismic surface reflectivity data. Immediately to the southwest is a highly reflective area of seafloor that corresponds to a submarine fan extending seaward and to the southeast from Perdido Canyon. This fan has very high surface reflectivity on 3D seismic reflectivity data and is interpreted to be composed largely of sand. The chemosynthetic community site is located on a regional fault that trends north-northeast to south-southwest. This fault is clearly defined in seismic profile data, but the location of the known chemosynthetic community and perhaps others along the fault are not well defined on surface reflectivity data. However, there are small and very localized reflective anomalies along the fault like beads on a necklace. The lack of

seismic response is probably due to the small sizes of the chemosynthetic community sites.

Direct observation from our first ALVIN dive at the AC818 community site near the wellhead confirmed the localized nature of this assemblage of chemosynthetic organisms. The seismic data suggest that there should be a number of these small communities distributed along the fault.

Site Description - AC818

Depth 2740-2750 m, Explored during ALVIN Dives 4192 and 4195.
Previous data: This site is about 50 m north of an exploratory drill site (wellhead left in place X555, Y 892). During clean-up surveys with an ROV, a small community was discovered.

Summary of dive observations:

Along a N-S fault, there is an area of diffuse seepage, as evidence by sediment stains, pogonophorans, sea urchins, and a relatively small area with tubeworms and mussels. It starts about 50 m north of the wellhead and stretches for about 50 m. After a short break, there is a second, smaller area north with two small mussel beds and one tubeworm patch. Dive 4195 explored about 350 m north of the area covered during Dive 4192 and south of the wellhead.

This area follows a fault on a north-south axis. Sediment stain and some oil bubbling out were observed. Thi site has the most active seepage colonized by tubeworms and mussels and is close to exposed carbonate. Carbonate sometimes forms overhangs and pits, with obvious bacterial stain.

Biology

Sea urchins were very common in the area where the sediment was stained (**Figure 6-12**). The snail *Phymorhynchus* were abundant on the stained areas. Beds of dead clam shells were also common. No live clams were observed, but five small live individuals were found in a mussel scoop sampl. The clams that were collected were a different species from *Calyptogena ponderosa* and appear to be the same as observed in the clam beds on the sea-floor. Tubeworms (*Escarpia laminata*) are common in the central area (**Figure 6-13**), found close to mussels (mainly *Bathymodiolus brooksi* and a few *B. heckerae*) and spatangoid sea urchins. No *Lamellibrachia* sp. were observed on either dive. The sea-cucumber *Chiridota* sp. is very abundant in mussel beds. The shrimp collected were *Alvinocaris muricola* and a single specimen of a possibly new *Alvinocaris* species. Two species of brittle star were collected (*Ophioctenella acies* and *Ophienigma spinilimbata*).

Figure 6-12. The AC818 site featured extensive bacterial mats and hard urchin aggregations, but relatively few and isolated tubeworm clusters. Extensive shell pavements indicate reduced flux in recent times.

Figure 6-13. Tubeworms at the AC818 site were stained to study their growth rate. This aggregation will be collected in 2007 to determine growth over the coming year.

Alaminos Canyon 601

Geologic Setting: AC601

Alaminos Canyon is a reentrant into the Sigsbee Escarpment at the base of the Continental Slope off western Louisiana-eastern Texas, slightly west of the longitude of the Sabine River. From the edge of the Sigsbee Escarpment, the Alaminos Canyon extends landward a distance equivalent to 6-7 lease blocks. Our dive sites in AC601 are located in approximately the middle of the canyon and toward the eastern side. Geologically, the sites are located on the top of a breached anticline that generally trends E-W. The base of the Continental Slope is a compressional environment forced by the sedimentary loading upslope. Compressional folding characterizes the strata underlying the Louann salt sheet that is being thrust out over the basin floor. The AC601 area of interest is stratigraphically above one of these compressional features that has been fractured and faulted. The fractures and faults that breach the crestal area of the anticlinal structure provide the migration pathways for transporting fluids and gases to the modern seafloor. The AC601 block is situated directly over the breached anticline crest and consequently, there are a number of well-defined expulsion features in this block. The locations of these features are easily identified on

3D seismic surface reflectivity maps. On subsurface profiles, clear migration pathways to the seafloor can be identified. There are four major reflectivity targets and a number of smaller targets in AC601. The anomaly of interest for this project is in the NW corner of the block. It was mapped with deep tow side-scan sonar and subbottom data in the 1990s. It became clear from analysis of these data that the feature in the NW quadrant of the block was a mounded fluid and gas expulsion feature with some evidence of mudflow activity radiating from the crestal area of the mound. More recent analysis with 3D seismic data indicates high reflectivity targets associated with the mound top and a low amplitude zone to the north of the mound. The high amplitude targets at the crest and on the upper flanks of the mound suggest lithification of the seafloor which usually indicates inactivity of fluidized sediment venting, an old feature. In 2005, a MMS-sponsored ROV survey confirmed the presence of chemosynthetic communities at this site. This survey also found that the low amplitude zone to the north of the mound represented a sizeable brine lake.

Site Summary - Alaminos Canyon 601

There were several mpressions on the biology of the brine lake and environs. The first thing noticed after crossing the shoreline and moving over the lake, was an abundance of pelagic sea cucumbers. However many of these were swimming very slowly (even for a sea cucumber) and many others were not swimming at all. After poking a few it was confirmed that many were simply drifting through the "fog." Occasional fish were seen in a similar state.

The first impression of the brine lake was that there was a clear interface and shoreline of brine, with flock aggregations of various sizes floating at this interface. Over that is a more amorphous layer that was refered to as fog. It looks almost smokey. In places, it is thick, in others, especially near some shorelines, it is almost non-existent. The brine below the visible interface is quite clear in some areas, and very cloudy in others. We possibly stirred it up a bit and it will take time to settle. We stay light and move slowly as our "bow wave" is clearly disturbing the interface. After stopping to sample, ALVIN gets just heavy enough to settle on the interface, where it floats nicely. From here the smokey layer can reach the level of the camera bar, but is sometimes below it (about 1.5 m thick). Looking out the port view-port the interface normally can be seen, but is sometimes in the murk. There are no signs of sea monkeys in the brine or in the smoke.

The shoreline, intertidal, and beach are shown in **Figure 6-14**. It is very similar in appearance to a beach, with areas of shell deposition, areas of what looks like sand and rocks, and areas of relatively clean beach. The fact that it is littered with trash also brings up images of beaches. There are even carbonates in the shallows that are only partially submerged in the brine. The brine on the shorelines is so clear that it is sometime hard to see. The bathymetry of the shoreline is quite variable on different areas of the lake. On the E. edge a "sand spit" was observed and the shallows extended for quite a distance. On the NW edge, it was a relatively steep dropoff. In areas where we moved along the shoreline 10 m away from the pool (the N-NE edges), an old shoreline (resembling a high tide mark) was clearly visible. Urchins could be seen and, what appeared to be pogonophorans, occasionally small mussel clumps, and very occasionally a few tubeworms on the shoreline 5-10 m from the pool.

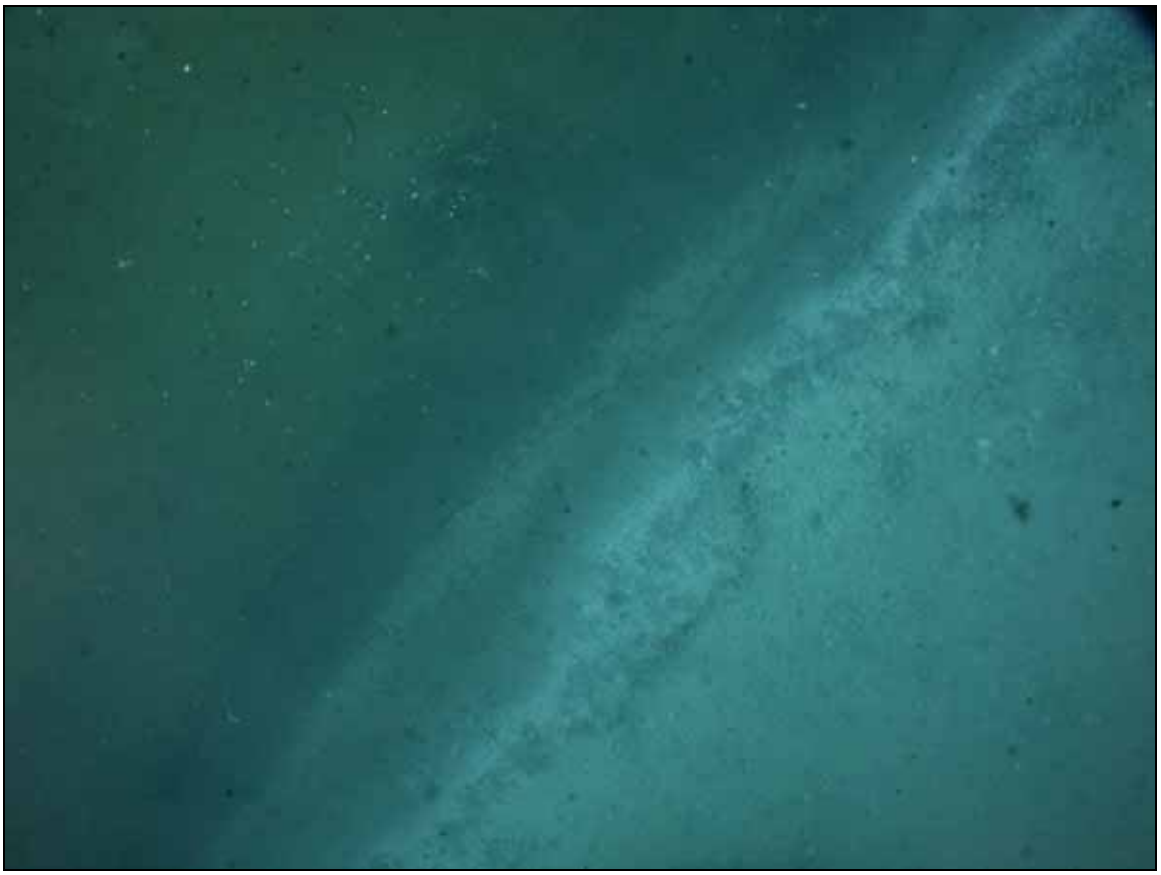

Figure 6-14. This image shows the shoreline of a brine pool at AC601 that was approximately 150 m in diameter. ALVIN divers were able to trace most of the edge and to collect samples of the brine with Niskin bottles operated by the submarine.

Up slope to the south, mud prevailed. The common pelagic sea cucumber was very abundant, feeding on the mud. 8-10 were often in view. Near the top of the ridge, the bigger species was moderately abundant with scattered smaller ones (3-4 in the field of view at a time). Near the tops of the ridges, usually on the flanks, scattered exposed carbonates and tubeworm clumps were observed. Many were isolated clumps without visible carbonates (one of these was collected, along with pieces of the buried carbonate it was attached to.) Many of the clumps were heavily colonized with attached fauna. They generally appeared quite old, but occasional smaller, non-encrusted aggregations were seen. No live mussels were seen on any carbonates outcrops or anywhere except near the pool. The small area of "ridge" to the south did not seem to circle the pool, but it is a minor feature and the "ridge" was not very distinct. The sub went up when it could and detoured a bit when sonar hits were noticed. Quite a few scattered areas with a few nice tubeworm clumps and associated communities and moderate sized carbonate outcroppings were observed (**Figures 11-15** and **11-16**).

Figure 6-15. Two species of shrimp and epifaunal octocorals on an Escarpia tube worm at AC601.

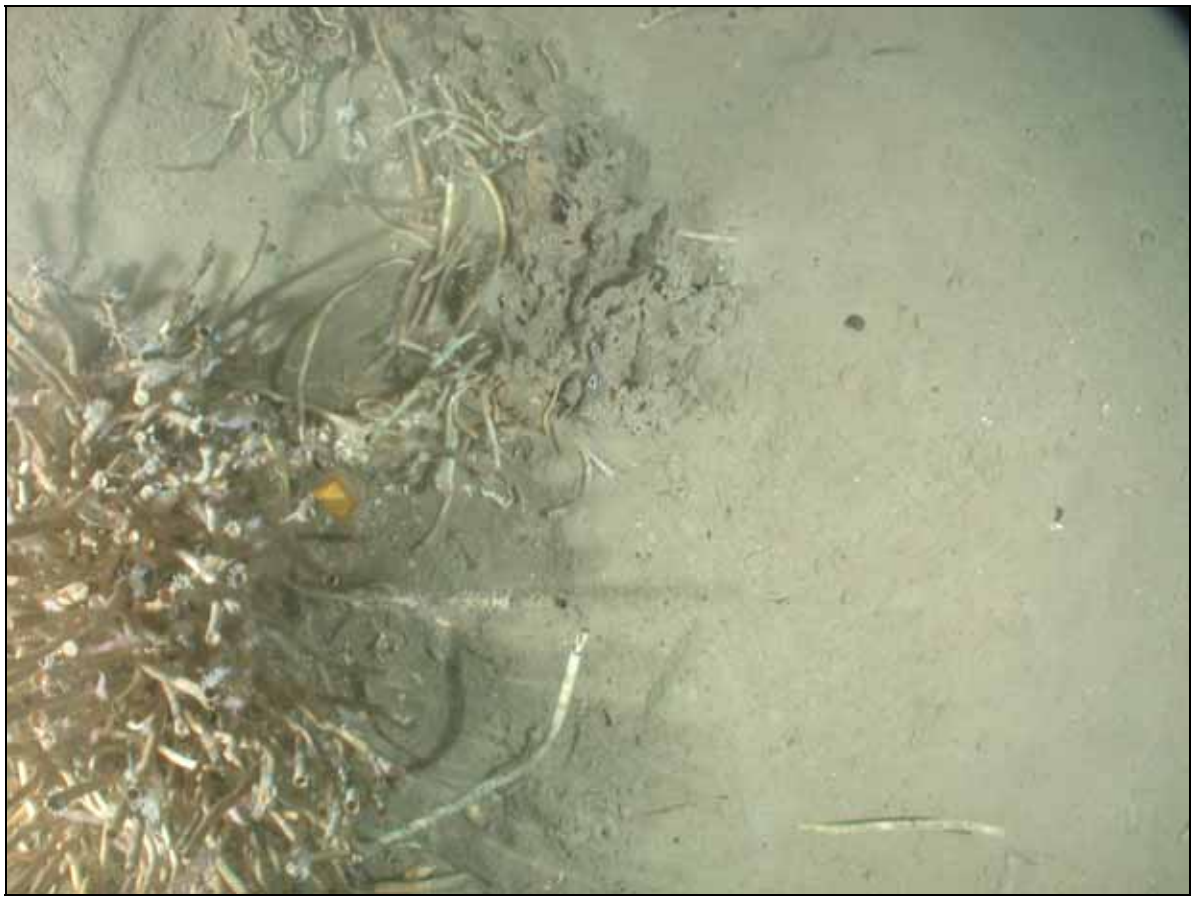

Figure 6-16. Chemosynthetic fauna at AC601 was restricted to isolated aggregations of tubeworms and mussels.

7 DIVE SUMMARIES

Sixteen dives at 11 sites were completed with JASON. At some sites, multiple dives were made while at other sites only a single dive was completed. **Table 7-1** and **7-2** summarize the JASON dive activity and **Table 7-3** summarizes dive activity over the program. Detailed dive information is presented on the pre-dive planning (**Appendix xx**) samples collected (**Appendix xx),** dive activities **(Appendix xx).**

Table 7-1. *Jason* dive data.

Site	Lowering Id	Start/ Launch	End/ On Deck	Data Time	Lowering Time	Max Depth (m)
AT340	**J2-269**	2007/06/07 11:58	2007/06/09 06:02	37:58:00	4:06:00	2,212
AT340	**J2-270**	2007/06/09 16:48	2007/06/11 04:30	32:22:00	3:20:00	2,213
MC462	**J2-271**	2007/06/11 21:37	2007/06/12 13:16	13:49:00	1:50:00	973
GC415	**J2-272**	2007/06/13 01:10	2007/06/13 12:11	0:00:00	11:01:00	1,107
GC852	**J2-273**	2007/06/14 00:00	2007/06/15 19:10	41:09:00	2:01:00	1,633
GB697	**J2-274**	2007/06/16 05:05	2007/06/17 12:50	29:43:00	2:02:00	1,281
WR269	**J2-275**	2007/06/18 00:05	2007/06/18 20:06	17:42:00	2:19:00	1,964
AT340	**J2-276**	2007/06/19 12:36	2007/06/20 17:21	25:31:00	3:14:00	2,213
AT340	**J2-277**	2007/06/21 04:04	2007/06/22 12:10	29:13:00	2:53:00	2,213
GC852	**J2-278**	2007/06/23 06:15	2007/06/24 20:09	36:06:00	1:48:00	1,426
GB829	**J2-279**	2007/06/25 12:09	2007/06/25 22:31	8:18:00	2:04:00	1,303
GB647	**J2-280**	2007/06/26 09:59	2007/06/27 00:17	12:49:00	1:29:00	1,014
AC645	**J2-281**	2007/06/28 05:36	2007/06/29 23:02	38:30:00	2:56:00	2,223
AC818	**J2-282**	2007/06/30 12:31	2007/07/01 19:41	27:51:00	3:19:00	2,750
AC601	**J2-283**	2007/07/02 11:57	2007/07/04 10:09	42:41:00	3:31:00	2,338
AC818	**J2-284**	2007/07/04 21:06	2007/07/05 13:26	12:44:00	3:36:00	2,747
16			**Totals:**	**406:26:00**	**51:29:00**	

Table 7-2. Dive summary

SITE	Dive	LEASE_AREA	SEQ	DEPTH_(M)	LATITUDE	LONGITUDE
Y1	269, 270, 276, 277	AT 340	1,7	2,242	27.646389	-88.365833
Y5	273, 278	GC 852	4,8	1,448	27.112500	-91.164167
Y6	275	WR 269	6	1,862	26.684444	-91.671389
y8	283	AC 601	13	2,366	26.362500	-94.510278
Y9	281	AC 645	11	2,226	26.371389	-94.496944
Y10	282, 284	AC 818	12	2,875	26.161389	-94.576667
Y11	280	GB 647	10		27.331389	-92.435000
Y14	271	MC 462	2		28.494444	- 88.881389
Y15	272	GC 415	3		27.542222	- 90.990278
Y	279	GB829	9			
Y16	274	GB 697	5		27.283611	- 92.112778
2		MC 640		1,404	28.355833	-88.793056
3		MC 853		1,082	28.123333	-89.139722
4		GC 600		1,249	27.366389	-90.564167
7		KC 243		1,610	26.750278	-92.829167
12		GB 741			27.248611	-92.112778
13		GC 559			27.426667	-90.434167

Table 7-3. Dive activity over the program.

Lease Area	Sampled
AC601	June 2006, June 2007
AC645	June 2006
AC818	June 2006, June 2007
AT340	June 2006, June 2007
GB647	June 2007
GB697	June 2007
GB829	June 2007
GC415	June 2007
GC852	June 2006, June 2007
MC462	June 2007
WR269	June 2006, June 2007

Target Selection, AT340

Prior to last year's exploration of Atwater Valley block 340 (AT340) in the Gulf of Mexico using a camera sled in March 2006 and the Alvin submersible dives in May 2006, Bill Shedd and Jesse Hunt of the Minerals Management Service (MMS) and Dr. Harry Roberts of Louisiana State University (LSU) reviewed the 3-D seismic data (acquired by the MMS under 30 CFR 251 G&G Explorations of the Outer Continental Shelf) to choose this site, as well as several others, to explore for natural oil and gas seeps likely to have chemosynthetic communities living off the hydrocarbon and the associated hydrogen sulfide. Though these data were originally generated for the use of the oil industry to explore for deep oil and gas targets, Shedd and Hunt had recognized that they would be useful in finding seafloor seeps as well.

The bathymetry maps generated from the AT340 seismic data highlighted areas in the Gulf of Mexico with distinct highs and lows that were likely formed by hydrocarbon seeps (**Figure 7-1**). These same areas showed anomalous variation in the amplitude (or, the strength of the returning signal of the seismic data) that had earlier been shown to be caused by carbonates in the sediments formed by the chemosynthetic bacteria consuming hydrocarbons. Those areas appear "hard" (as red, yellow, and dark green on seismic amplitude maps).

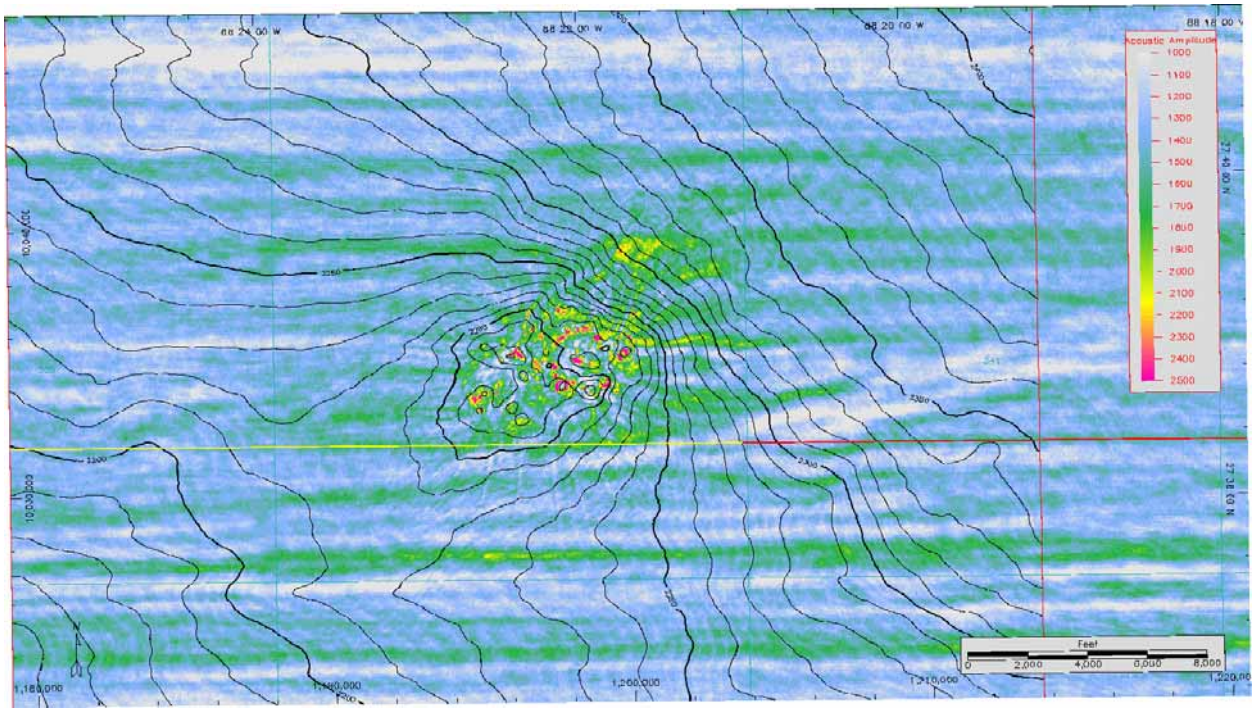

Figure 7-1. 3-D seismically derived bathymetric map (contour interval, 10 meters)with amplitude overlay at site AT340; seismic data and derivative interpretations used by permission.

Macroscopic chemosynthetic organisms (tubeworms, mussels, and clams), those animals with chemosynthetic bacteria living symbiotically within their tissue, are commonly found on and around these carbonate rock outcrops when they have been swept clean of the surrounding mud by deep sea currents. There are also spots on the amplitude maps that appear to be softer than the typical soft bottom mud, that have been shown by previous research (Roberts, et al., 2001) to be seeps with very high, episodic flow rates and void of chemosynthetic communities. These "soft" spots are usually surrounded by carbonates, where the flow is slower and steady (where there is a steady source of food for these communities).

The reconnaissance cruise in March 2006 and the Alvin dives in May 2006 confirmed that the locations chosen from the 3-D maps were all active seeps that contained variable population sizes and diversity of chemosynthetic organisms. The amplitude response from 3-D seismic data could be used to predict the location of active hydrocarbon seeps on the lower slope of the Gulf of Mexico as it did on the upper slope. The bathymetric maps were adequate for finding the highs and lows at the sites. The major drawbacks of 3-D data, though, are the horizontal and vertical resolution. Most 3-D data have horizontal sample sizes of around 15 meters by 30 meters and vertical resolutions of 5-10 meters (the contour interval used on the map in **Figure 7-1** is 10 meters); many of the sub-environments of chemosynthetic communities are smaller than the horizontal sample of 3-D data and bathymetric changes are in the 1-2 meter range. To identify these subtle features at the more interesting sites from last year's Alvin dives with improved bathymetry maps to aid in navigation, we decided to obtain high resolution bathymetry surveys over AT 340 and three other sites using the Autonomous Underwater Vehicle (AUV) "Hugin." As a part of this multi-year MMS Chemo III project, C&C Technologies, Inc. had provided a high-quality AUV-multibeam bathymetric survey dataset and contour map that we were able to use on dives at this site.

From our Alvin dives last year, we had a lingering perception that the positions reported by the navigation system on Alvin for this site were offset from their true position by perhaps 25 to 35 meters (refer to the *Navigation* section of this report for a detailed discussion of multi-vessel navigation and geodetics reconciliation issues). Due to the importance of reconciling positions reported by the navigation systems on the four survey vessels involved in this multi-year program, our first Jason dive priority was to perform a detailed survey of a prominent geologic feature revealed by our recent AUV survey. This feature is shown as a crater in **Figure 7-2**, as derived from the AUV dataset.

The crater is shown as a circular depression of depth 2,200 m in the center of the contour map. The diameter of the crater at the fourth and outer-most concentric 2-m contour line (*i.e.*, up to 2,194 m water depth) is about 67 m. We were confident that we could find the center of this crater using Jason, so we defined the crater center as our Central Reference Point (CRP) for the site work at AT340. We defined the AUV survey positions as the assumed true positions of all features at the site, and then used the AUV survey to measure the position of the center of the crater. The latitude in WGS84 for the crater center from the AUV survey was measured as N27 38.67010. The longitude was measured as W088 22.08535. We used this position as the ***defined-as-true*** position of the site CRP.

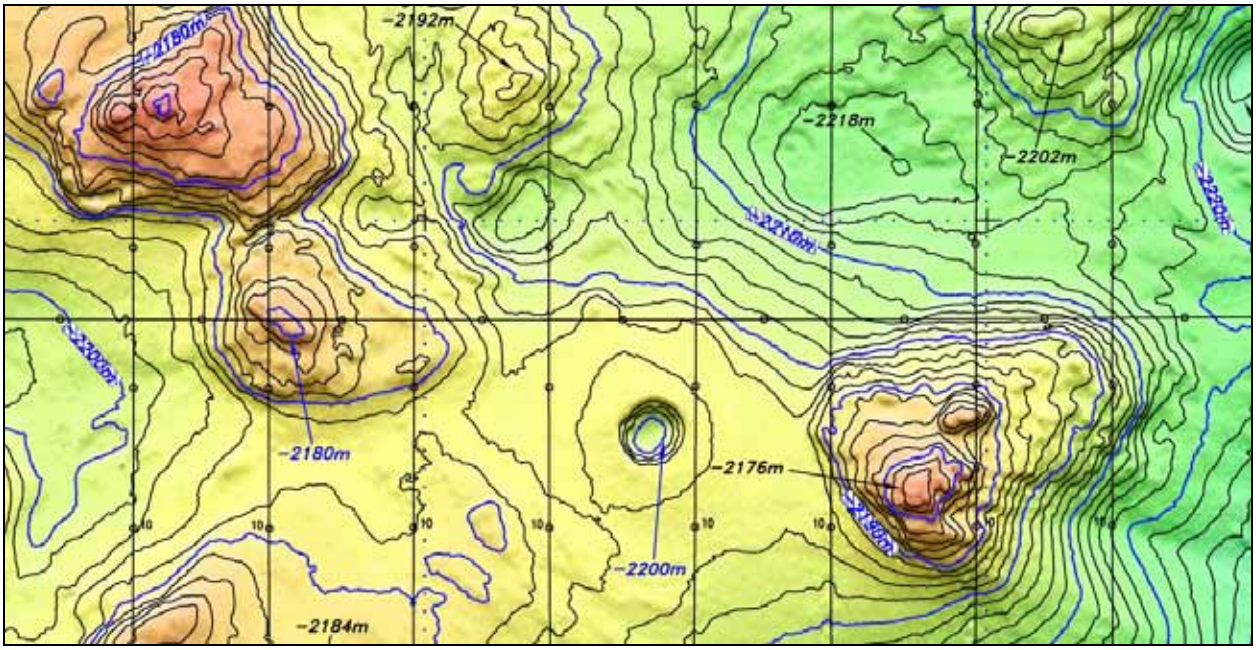

Figure 7-2. The crater used for defining a Central Reference Point at site AT340

We then determined the Northing (Y) and Easting (X) in meters for this CRP for the local coordinate system in which Jason would work. We did this by applying a geodetic False Northing (-3,058,258.71 m) and a False Easting (135,152.2 m) to the standard UTM Zone 16 projection for the WGS84 Datum, then calculating the local X and Y from the latitude and longitude of the site CRP as measured from the AUV survey. These are the same Falsings used for the local projection of the dives at this site with Alvin last year. These Falsing shifts had been selected for the Alvin dives at this site in order to place a "Local Origin" in X,Y space near the targets of interest at the site. The latitude of this Local Origin is N27 38.50000 and the longitude is W088 22.20000. The local coordinates thus calculated and assigned to the site AT340 CRP were X = 192 m and Y = 312 m. We placed this CRP target into Jason's navigation system along with targets of interest positioned by Alvin last year and targets positioned by a geologic review of the AUV contour map.

Targets developed for this site are listed in **Table 7-4**. Targets appended with "Jason" in their name have listed their position fixes logged by Jason after each marker or target was found. Targets appended with "Predicted" have listed the predicted position of the marker, though the marker was not found by Jason. To predict each such marker position, we applied an X and Y shift to the old Alvin positions (see note at bottom of table) in order to transform each of them to predicted locations for Jason and the future. The method and justification for deriving this transformation offset is detailed in the following *Dive Summary* for **Dive 269**.

Table 7-4. Target locations for site AT340

Target	Latitude	Longitude	Local X (m)	Local Y (m)	Depth (m)
Local Origin	N27 38.500000	W088 22.200000	0	0	2,194
Cent Ref Point	N27 38.670102	W088 22.085353	192	312	2,201
BenchMarker #1 Jason	N27 38.678012	W088 21.887194	518	323	2,194
BallMarker #2 Jason	N27 38.699431	W088 21.857052	568	362	2,190
Marker #11 Jason	N27 38.690605	W088 21.873362	541	346	2,183
Blue Flight Bag Jason	N27 38.702626	W088 21.862565	559	368	2,190
Urchins #1 Jason	N27 38.702751	W088 21.959871	399	370	2,193
Cores in Urchins Jason	N27 38.701794	W088 21.947088	420	368	2,193
Marker #12 Jason	N27 38.841125	W088 22.425623	-384	621	2,175
Marker #15 Jason	N27 38.697320	W088 21.851550	577	358	2,191
Harry's Rock Jason	N27 38.838844	W088 22.437150	-383	630	2,173
SW Mound	N27 38.623116	W088 22.564597	-597	234	2,184
Marker #3 Predicted	N27 38.697199	W088 21.863714	557	358	2,192
IanMarker #6 Predicted	N27 38.696217	W088 21.853363	574	356	2,190
Marker #8 Predicted	N27 38.839494	W088 22.426211	-385	618	2,175
Urchins #2 Predicted	N27 38.737589	W088 22.216339	-22	439	2,192
Marker #5 Predicted	N27 38.669931	W088 21.772760	706	306	2,206

Alvin to Jason local transform: 24m at 95deg, or add 24m to x and subtract 5 m from y.

Dive 269 Summary, AT340

Time in water: 2007/06/07 11:58
Time on bottom: 2007/06/07 14:01
Time off bottom: 2007/06/09 03:59
Time out of water: 2007/06/09 06:02
Water time: 42 hours 4 minutes
Bottom time: 37 hours 58 minutes
Minimum working depth: 1873.96 m
Maximum working depth: 2212.51 m
Produced 12G of raw vehicle data

After the LBL net was calibrated at this site (see *LBL Calibration* section for details of the procedure), Jason was deployed into the water at 08:04 hrs local on 07 June. All times and dates in this summary are reported in EDT, local time. The sea-bed at 2,199 m was reached at 10:07 hrs and event logging was initiated by the watch-stander on duty using Jason's Virtual Van event logger system. Refer to *Dive Observations* for this dive in the Appendix for a detailed log of the observed events and their times in GMT.

Jason transited to perform a bathymetric survey of the crater that was defined as containing the CRP for this site. Before arriving at the crater, we transited over a very flat seabed surrounding

the crater. This crater-flanking environment was characterized by many tracks and trails made primarily by heart urchins. The edge of the crater appeared very abrupt and the break in slope was noted on the ROV log. The bottom of the crater had dark reducing sediments and scattered white bacterial mats. In some areas of the crater floor holothurians and especially heart urchins were in high-density groupings (**Figure 7-3**) and the crater floor was thoroughly worked by this community.

Figure 7-3. Urchins in bacterial mats

In the northern part of the crater before reaching the lip, some unusual localized hummocky areas were observed. It is possible that these areas were near-surface expressions of shallow gas hydrate. After we confidently located the center of the crater with visual and depth-sensor reconnaissance, we then began an SM-2000 multibeam survey of the bathymetry of the crater. By later comparing the bathymetry reported by the AUV survey with the bathymetric measurements generated by our crater survey using the LBL navigation in conjunction with Jason's Doppler navigation algorithm, we concluded that there was no significant offset between positions measured by Jason and the AUV-reported positions. It also appeared that the crater was a little elliptical as opposed to the beautifully circular feature that appears on the map of the AUV data. At this point, we concluded that we could rely on the positions reported by the Jason navigation system without needing to apply offset corrections to derive accurate working positions.

However, a comparison of the final processed Jason SM2000 multibeam data and the Hugin AUV data shows an apparent positional offset of approximately 20m in the X-axis between the two datasets (see **Figure 7-4**). It is not definitively known whether this apparent offset is an artifact (ie, possible projection error during plotting in GIS) or if the error is real.

We completed the crater survey at 13:49 hrs, and proceeded to try to find BenchMarker #1 that had been deployed last year on Alvin dive 4173. Finding and logging a position fix on this marker would allow us to begin to accumulate a set of comparative position measurements between Alvin navigation and Jason navigation. Because we had already concluded that Jason navigation did not deviate from the AUV-reported positions (which we defined to be the true positions for the sake of this project), any significant variance in measured positions of the BenchMarker #1 between Jason and Alvin gear would tend to indicate an offset error in Alvin's positioning system.

We transited along the sea-bed toward the presumed (Alvin) location of BenchMarker #1 at an altitude of about 2 meters, logging information as we proceeded. As we approached the mound in the eastern part of the study area where BenchMarker #1 was deployed last year with Alvin, the seafloor characteristics changed dramatically. The transit from the crater to the base of the mound was over rather featureless mud bottom with scattered holothurians and occasional urchin communities. Upon arriving at the mound base, the seafloor changed to one dominated by highly variable topography related to the occurrence of large carbonate pavements and blocks. We arrived in its vicinity of the marker about 14:30 hrs. The area had numerous scattered tube worm colonies (**Figure 7-5**) and mussel beds. We looked for the marker until about 15:00 hrs. Not finding it, we proceeded to attempt to find one or more of the other markers we had deployed from Alvin on this eastern side of the site. We found Marker #11 by accident at 15:20 hrs as we were transiting to the presumed location of a group of other markers we deployed with Alvin. We did not immediately have the Alvin position of this marker in our dive plan, so we logged a position fix and proceeded on to the area of the other markers while looking for the logged position in our records. When we obtained the Alvin position from that cruise report, we saw that the Jason position was to the east of the Alvin position about 24 m and to the south of it about 4 m.

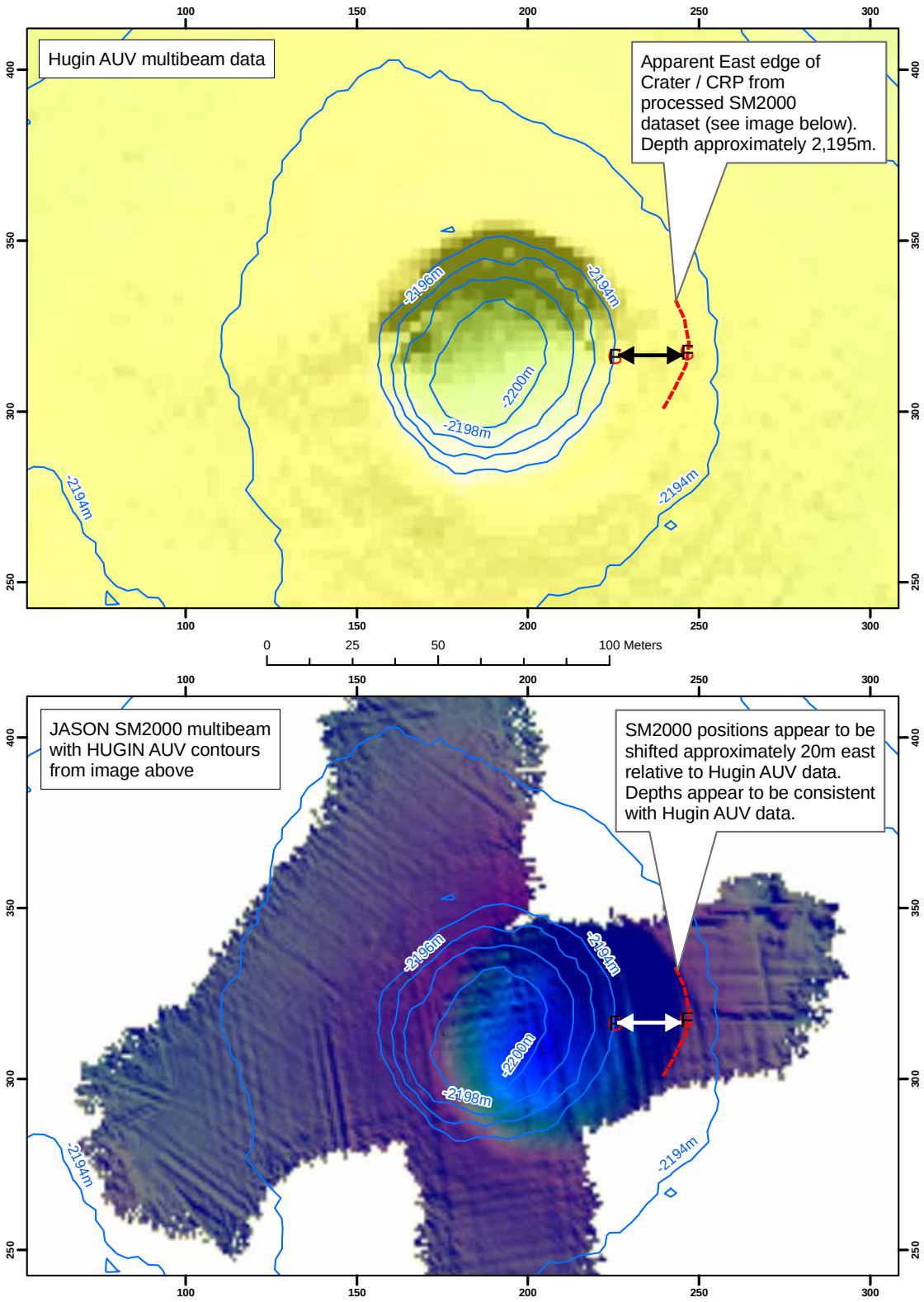

Figure 7-4. Apparent offset between processed SM2000 and Hugin AUV multibeam data

Figure 7-5. Tubeworm colony

We found BallMarker #2 at 16:01 hrs and logged a position fix. We noted that the Jason position was to the east of the Alvin position about 24 m and to the south of it about 8 m. We also noted that the float attached to this marker (intended as an aid in spotting it) was no longer floating, but rather, lying beside the ball-marker. If other such floats were compromised in this way, they would be much harder to find.

With no success finding the other markers in the area, we returned to the vicinity of BenchMarker #1 and looked in the area about 24 m to the east and 5 m to the south of its Alvin position. We found the marker with little effort at 17:12 hrs, and logged a position fix. It was positioned by Jason about 26 m to the east and 3 m to the south of its Alvin position. Now having three sets of comparative points that indicated a fairly consistent error-offset in Alvin's position fixes, we applied an offset correction to all of the remaining Alvin target positions at this site. We added 24 m to their local X value and subtracted 5 m from their local Y value. Presumably, this would help us find the other markers left at this site with Alvin last year.

We began a test of the digital camera systems and their lighting at different altitudes at 17:34 hrs and finished at about 18:00 hrs. On the basis of this test we worked out methods to use the DSC in aperture priority mode adjusting f-stop to optimize for different altitudes. We then transited to an urchin field took a set of 16 cores from about 19:00 hrs to 20:48. This included a set of cores for microbiology and geochemistry (Joye group) and a set for meiofauna and analysis of urchin

impact on meiofauna community. We developed a leak in the highly maneuverable Kraft manipulator arm while coring and decided that we should not use it to acquire any more samples. The remainder of this dive thus involved accumulating information that we could gather with minimal or no collection of physical samples.

We performed an SM-2000 multibeam survey over a 200 x 375 m rectangle in the eastern area of the site from 22:36 hrs until about 07:40 hrs the next day (08 June). The survey grid was set up for east-west lines. During the survey, we developed positioning problems and trouble staying on line. The bridge indicated they were fighting a strong surface current. However, after a software modification we were able to occupy our survey lines. We then transited to the western area of the site to perform a similar 200 x 325 m rectangle survey, and logged visual information while we transited. We began the western SM-2000 survey at 09:20 hrs and completed it at 20:37 hrs, after some problems keeping the mother vessel on track with the survey maneuvering requirements. We had to re-orient the lines to run north-south instead of east-west as an aid to the helmsmen.

We then transited to the vicinity of Marker #12 in the western area to see if we could find it by applying the offset corrections we had derived for the eastern part of the site. The area was characterized by broken carbonate slabs with tube worms occupying most of the cracks. We found the marker at 22:24 hrs and logged a position fix for it. The Jason position was 4 m to the east and 18 m to the south of the original Alvin position, so the offset correction matched the range of the offset correction needed, but did not match the bearing of the correction needed for the east side of the site. In the east, the position had to be moved 24 m essentially to the east, and in the west, it had to be moved the same distance essentially to the south. This difference is potentially explained by considering that the Alvin survey of the western side of this site (when Marker #12 was deployed) was a separate dive (#4180) from that of the eastern side (#4173). Even though the LBL net had been left down for both dives, there could have developed a change in error-offset between these two dives performed more than a week apart. Based on information we have received subsequent to this dive it is also possible that either a different baseline (between three transponders) was used on these two Alvin dives, or that the Jason navigator switched the baseline being used to determine positions on the western and eastern end during this dive. All positions recorded during this dive will be re-navigated to a single baseline for consistency.

Observations of non-seep fauna were made during transits between seep locations. The bottom sediments were very fine and poorly consolidated. Surface color was primarily grey. Bioturbation structures are small except for occasional rings on holes. By far the most common large organisms are holothuroids (*Benthodytes gigantea*, *B. typical*, *B. lingua*, and *Benthothuria sp.*) Shrimp 2-3cm in length were common but often hard to see in the video. Tripod fish were encountered on the mud surface. Other fish seem restricted to rocky areas. Local vagrant fauna at seeps was conspicuously sparse and seemingly limited to very few fish. Large crustaceans were not observed.

We transited to help release the elevator with Jason, and then began ascending at about midnight of 08 June. We left the LBL net in place in anticipation of upcoming dives at this site. **Figure 7-6** shows the dive track for dive 269.

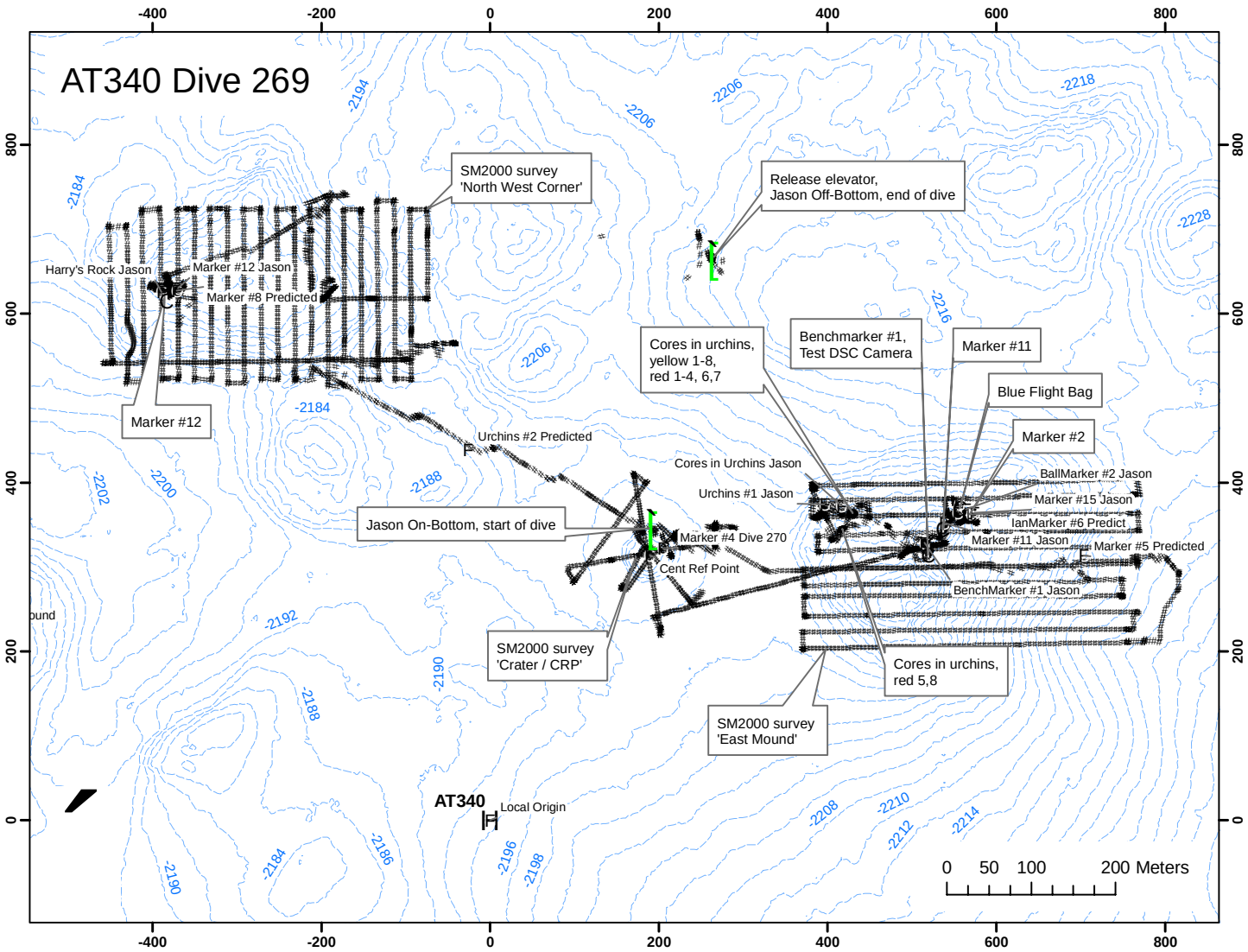

Figure 7-6. Dive 269 dive track.

Dive 270 Summary, AT340

Time in water: 2007/06/09 16:48
Time on bottom: 2007/06/09 18:28
Time off bottom: 2007/06/11 02:50
Time out of water: 2007/06/11 04:30
Water Time: 35 hours 43 minutes
Bottom Time: 32 hours 23 minutes
Min. working depth: 2094.58
Max. working depth: 2213.85
Produced 3.7G of raw vehicle data
Produced ~52 dvds of Science video
Produced ~52 dvds of Archive video

The calibrated LBL net had been left in place at this site from Dive 269 (see *LBL Calibration* section for details of the procedure). Target locations had already been developed for this site during Dive 269 (refer to *Target Selection, AT340* for background).

Jason was deployed into the water at 12:48 hrs local on 09 June. All times and dates in this summary are reported in EDT, local time. The sea-bed at 2,207 m was reached at 14:24 hrs and event logging was initiated by the watch-stander on duty using Jason's Virtual Van event logger system. Refer to *Dive Observations* for this dive in the Appendix for a detailed log of the observed events and their times in GMT.

Jason was launched in the area identified as the most probable location for the missing fish trap. The launch area was a relatively flat stretch of sea floor. Sonar and the Homer beacon receiver were used to search for the fish trap as the Jason made a transit from this area to the location identified for the elevator launch. The elevator was launched at 16:06 hrs and mobile fauna were collected using the suction sampler in this area and during transit to the elevator.

The normal deep-sea fauna in the vicinity of the seeps was dominated by elasipod holothuroids typical of lower slope and abyssal plain environments: *Benthodytes typical*, *Benthodytes lingua*, and a synallactid *Benthothuria sp.* Both *Benthodytes* were collected by slurp sampler for trophic analysis. In addition three seastars and a hermit crab were collected for the same analysis.

The elevator was moved at 17:42 hrs (X585m, Y341m) approximately 25 m SSE of the big mussel bed and Marker #2. A rotary camera, confirmed to be operating, was removed from the elevator, and deployed in a seep community of tubeworms and mussels (**Figure 7-7**). This camera will remain on the sea floor at X557m, Y354m for approximately 2 weeks, taking a picture every 5-6 minutes. We then transited to the mussel bed and set up for acquisition of images for a mosaic of this bed, using the "blue flight bag" marker at the NNW edge of the mussel bed as a beginning location. The mussel bed occurred in a separation between extensive carbonate pavements, slabs, and boulders.

Rotary time-lapse camera L (Louie) is set to record pictures at 6 min intervals with 36deg rotation between shots. Deployment site includes carbonates, mussels and tube worms within

the probable visible area. This camera will be left in place for approximately 14 days. It will be recovered autonomously by releasing its anchor weight with a burn wire.

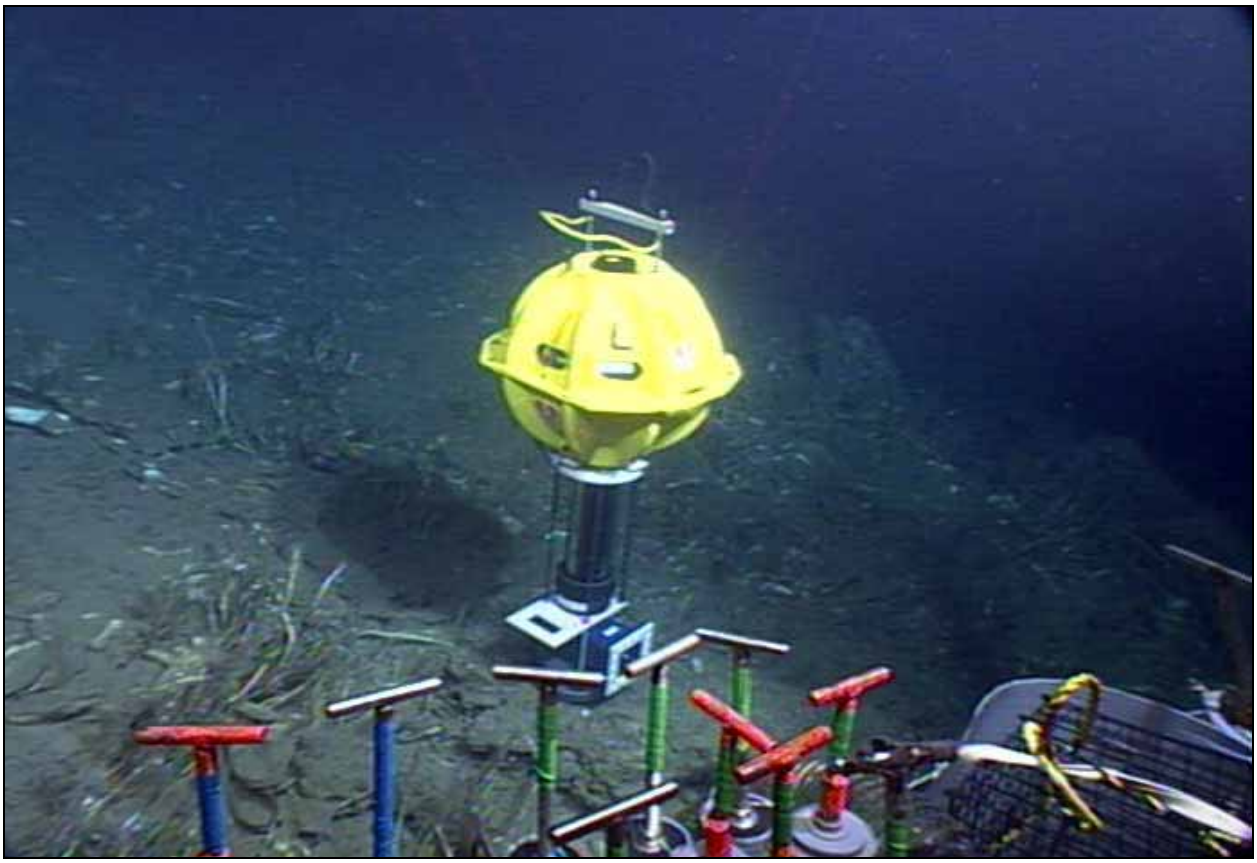

Figure 7-7. Rotary camera 'Louie' deployed in seep community of tubeworms and mussels

After completing the mosaic, a "transplant" experiment was initiated by placing mussels from different parts of this bed in cages and moving them to other parts of the bed. The transplanted mussels will be collected in two weeks and analyzed to determine if the symbiont complement (methanotrophic or chemoautotrophic) changes after movement between different chemical environments. A collection of mussels from each location was also made and loaded onto the elevator. The CONTROS Methane sensor was tested in several locations in this mussel bed and was determined to be unresponsive. A Niskin bottle was triggered over this bed (at 23:36 hrs) at X567m, Y362m and a carbonate collected from beneath the mussels.

The elevator was then moved at 02:24 hrs of 10 June to an area exhibiting a high density of urchins at X356m, Y286m for deployment of the second rotary camera and coring. The urchin beds were located in "calibration crater" where the initial navigation calibration at AT340 was done using the AUV multibeam maps vs. Jason's navigation (see *Target Selection, AT340*). The second rotary camera was no longer functioning and was left on the elevator. Six cores were taken in this urchin area at X366m, Y87m, followed by 8 control cores taken from nearby sediment with no visual indication of seep impact (X408m, Y355m). The 16 cores already taken

were loaded onto the elevator and exchanged for 16 empty core samplers. The elevator was released (with mussel collections, cores, and one rotary camera) from the sea floor at 06:10 hrs and the Jason laid back until 07:37 hrs.

At 08:51 hrs a random set of ten, 40 m photo transects, were initiated over the area of the eastern-most SM-2000 area. This operation proved to be very time efficient and was completed at 10:52 hrs. Each transect was 40 m in length. Control of the DSC was manual with images fired every ~10 sec, while avoiding overlapping images when Jason was stationary. Each transect comprised 15-20 images. DSC images were also recorded in the transit between transects. Orientation of transects was approximately NW-SE. All transects were parallel. Placement was random within a 360m E-W and 200m N-S box at the center of the SM2000 survey area.

Jason then transited to the crater (CRP) to set up experiments and gather images for a photo mosaic to study urchin feeding and movement. The artificial urchin trails were created using a custom tool and cement filled yellow Whiffle balls deployed to mark the ends of the trails (**Figure 7-8**).

Figure 7-8. Creating artificial urchin trails with 'custom tool' (upper right)

An area of approximately 100 sq meters was imaged with a total of 7 markers in the images for

re-visitation of this photo-mosaic site in 2 weeks. The second Niskin was triggered here at 15:50 hrs. After completion of the imaging, an additional 1.5 hours were spent taking push cores of isolated bacterial mats and different mud flows in this crater. A total of 9 cores were taken in the crater. A lone small carbonate was collected from an urchin area of the crater shortly before leaving the crater for transit back to the eastern work area.

We transited back to the eastern work area and began the search for one of the markers associated with stained tubeworms. After careful searching Marker #15 was found within one meter of the location predicted from applying the navigation corrections to the Alvin position, but was not floating. This tubeworm aggregation was collected with the bushmaster collection device. Based on review of last years log and images of the second stained aggregation in this area it was located (even though the marker "Ian 6" was no longer present), and subsequently collected into the port bio box.

The final task under consideration for this dive was another search for the missing fish trap. Before embarking on this search the sonar was tested using the glass ball associated with the rotary camera approximately 25 meters away. This test indicated that a sonar search may not be fruitful as the sonar did not detect the ball unless the vehicle was on the ground and canted down. The Jason dive was terminated at 22:50 when the vehicle lifted off the bottom, initiating its ascent. The dive track for dive 270 is shown in **Figure 7-9.**

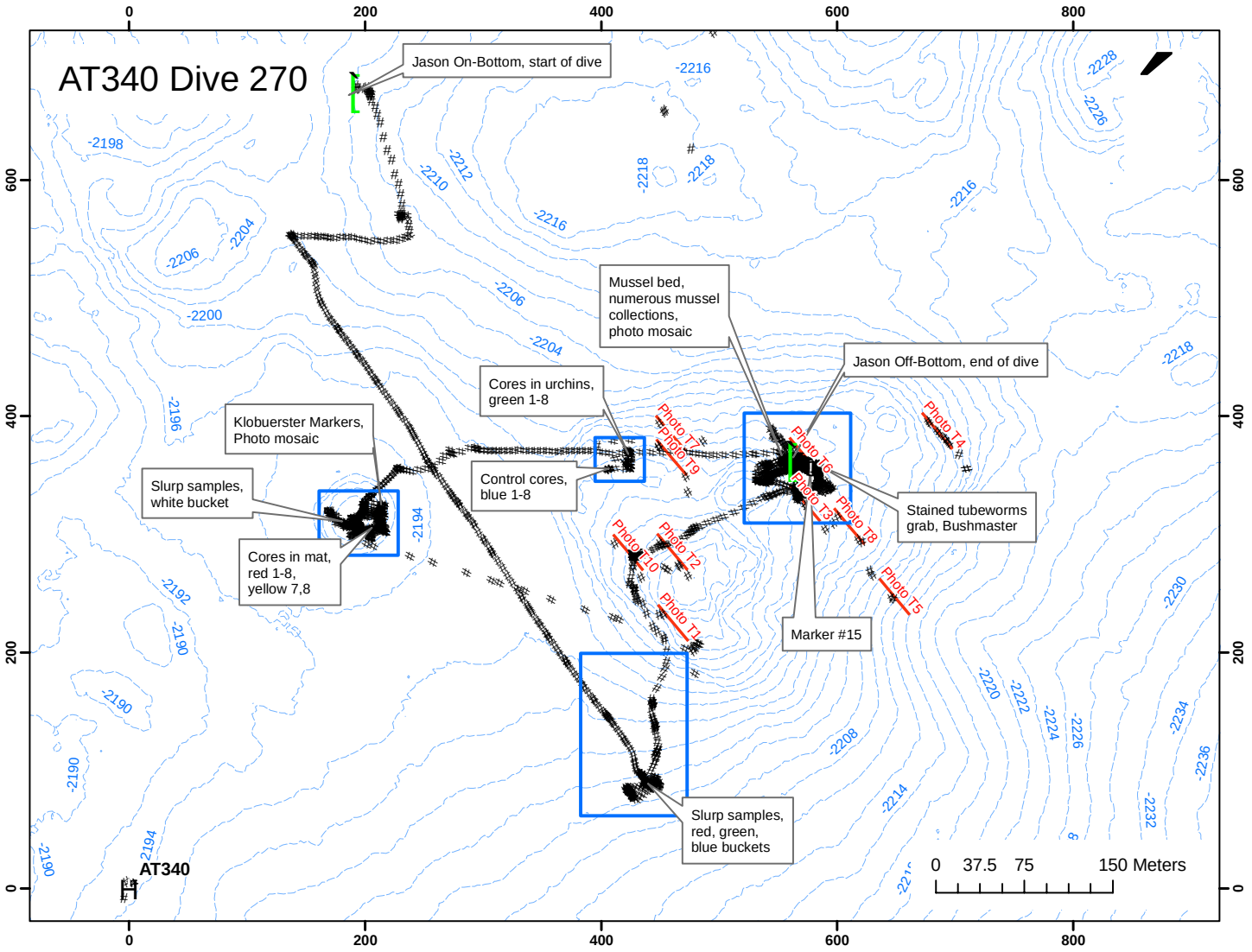

Figure 7-9. Dive 270 dive track

Target Selection MC462

The Mississippi Canyon block 462 (MC462) site is a relatively small potential seep site (~700m by 3,000m) in 950 m to 970 m water depth, located just east of the Mississippi Fan complex. Compared to other areas of the deep water Gulf of Mexico, there are relatively few sites in this immediate area that appear on seismic data to be actively seeping hydrocarbons to the seafloor and potentially supporting chemosynthetic communities.

The site has two distinct bathymetric features: a small, but prominent, mound and an adjacent crater (**Figure 7-10**). The mound has one small area of high positive acoustic amplitude response suggesting the presence of carbonate hard-grounds and/or gas hydrates. The crater has a larger and stronger positive response indicating thicker and more widespread hard-grounds/hydrates. The seafloor reflector on the flank and in the crater weakens and changes phase from a peak (hard spot) to a trough (very soft spot) in a couple of places, indicating an active, high flux vent site with soft, gas saturated mud.

The hard-grounds, if present, provide a substrate for chemosynthetic organisms as well as corals. The gas hydrates would indicate a steady supply of hydrocarbon to the surface sediments as a source of food for the organisms. The two features are different on seismic cross-sections. The high does not show active vertical gas migration (or, a gas chimney), whereas the subsurface expression below the crater does.

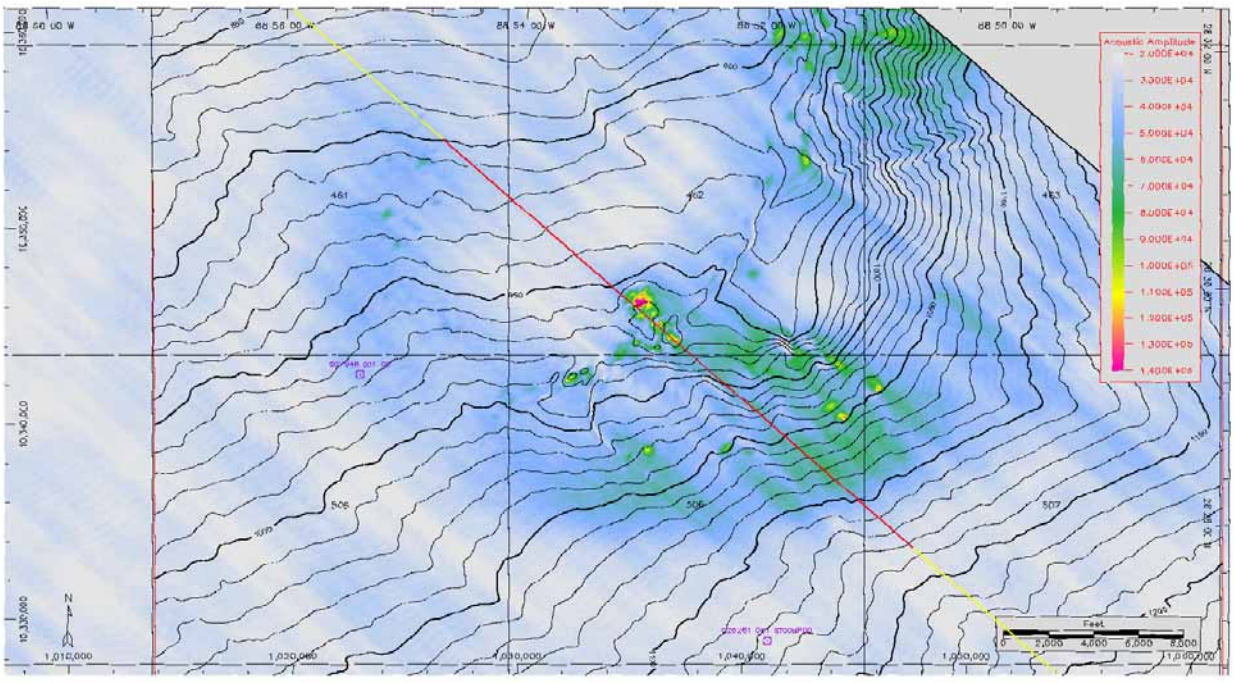

Figure 7-10. 3-D seismically derived bathymetric map (C.I.=10 m) with amplitude overlay used for target selection at site MC462; used by permission, TGS.

We did not visit this site last year with Alvin, so we had not developed a list of targets or a point of local origin. Because we didn't visit this site and designate it as one of our primary sampling sites during the ALVIN cruise, we did not have bathymetry at this site from the AUV-multibeam bathymetric survey dataset acquired for this project in March 2007. We did, however, have access to the MMS bathymetric and surface anomalies maps, so we used these geo-referenced graphics (**Figure 7-10**) to establish a local origin, to define a site CRP, and to select targets for the site. Prior to this year's cruise, the site was selected from review of the MMS 3-D seismic database to meet the needs of the biologists who needed a chemosynthetic community site in the 1,000 m depth range to firmly establish depth-distributions of key species.

We defined the following for this site in WGS84 datum:

Geodetics False Northing: -3,153,114.37m
Geodetics False Easting: 184,345.02m
Local Origin Northing: 3,153,114.37m
Local Origin Easting: 315,654.98m.

These Falsing shifts were selected at this site in order to place a Local Origin in X,Y space near the targets of interest at the site. The latitude of this Local Origin is N28 29.50000 and the longitude is W088 53.00000. We then defined an X,Y in the resulting local coordinate system in meters for the CRP. We did this by applying the geodetic False Northing and False Easting defined above to the standard UTM projection for the WGS84 Datum, then calculating the local X and Y from the latitude and longitude of the site CRP as measured using the MMS map represented by **Figure 7-10**. A requirement of such a defined site is the ability to locate it by visual means with Jason. We identified such a topographic high on the map and chose a location on top of it.

The local coordinates thus calculated and assigned to the site CRP were X = 391 m and Y = 66 m. We placed this CRP target into Jason's navigation system along with targets of interest positioned by a geologic review of the MMS bathymetric/anomaly map. Targets developed for this site are listed in **Table 7-5**.

Table 7-5. Target locations for site MC462

Target	Latitude	Longitude	Local X (m)	Local Y (m)	Depth (m)
Local Origin	N28 29.500000	W088 53.000000	0	0	965
CRP	N28 29.544530	W088 52.755640	400	76	960
geo 1	N28 29.651806	W088 52.867860	220	277	965
geo 2	N28 29.661142	W088 52.897444	172	295	960
geo 3	N28 29.715721	W088 52.905154	161	396	960
geo 4	N28 29.726042	W088 53.019946	-26	418	955
geo 5	N28 29.754366	W088 53.046803	-69	471	960
geo 6	N28 29.828180	W088 53.034020	-46	607	960
geo 7	N28 29.452258	W088 52.889449	179	-91	965

We did not deploy the LBL net at this site because it was a reconnaissance dive and relatively shallow. We felt that we could establish Jason's position on the CRP without the net. The time saved by not deploying and calibrating an LBL net could be better used in the survey of this site.

Our plan for calibrating Jason's navigation system was to position the vessel's stern A-frame sheave directly over the CRP (960^{+} m above it) and allow Medea to settle into a position directly under its sheave, suspended by its main cable. We would then position Jason directly under Medea while within sight of the seabed. We would monitor Jason's stability of position by watching the seabed and by using its seabed-position-hold navigation feature. We would then monitor the lateral movement of Medea using its downward-looking camera aimed at Jason, to confirm that Medea had settled into a stable, equilibrium position with respect to the vessel's stern A-frame sheave.

When we were satisfied that all three vehicles (vessel sheave, Medea, and Jason) were vertically aligned to within one meter, and all directly over the defined CRP position, we would reset Jason's navigation system to re-define it's location as the X,Y of the CRP. Then we would drop a marker on that location in order to physically set a benchmark at this site. The timing of implementation of this plan is outlined in the beginning of the Dive 271 Summary.

The 3-D seismic surface amplitude map of the MC462 site, prepared before the cruise at the New Orleans, LA MMS office, indicates a line of bright anomalies arranged roughly in a line oriented in a northwest-southeast direction. In plan view, the area is a low-relief mound to the southeast and a broad shallow depression to the northwest. The mound rises to a water depth of about 955 m, as determined from seismic data, and the depression reaches a depth of about 965 m. In profile view, the subsurface directly beneath the depression is acoustically opaque and appears a "gas chimney" that extends far into the sedimentary section. Prominent subsurface reflection horizons disappear in the chimney-like zone. The surface reflector is a strong positive and broken into highly reflective segments and there is some suggestion of a small phase reversal. There is a suggestion of a BSR, but this observation is certainly not conclusive.

Dive 271 Summary, MC462

Time in water: 2007/06/11 21:37
Time on bottom: 2007/06/11 22:38
Time off bottom: 2007/06/12 12:27
Time out of water: 2007/06/12 13:16
Water Time: 15 hours 39 minutes
Bottom Time: 13 hours 49 minutes
Min. working depth: 921.95
Max. working depth: 973.96
Produced 1.6G of raw vehicle data
Produced ~21 dvds of Science video
Produced ~21 dvds of Archive video

Jason was deployed into the water at 17:37 hrs local on 11 June. All times and dates in this summary are reported in EDT, local time. The seabed at 953 m was reached at 18:38 hrs and event logging was initiated by the watch-stander on duty using Jason's Virtual Van event logger system. Refer to *Dive Observations* for this dive in the Appendix for a detailed log of the observed events and their times in GMT.

We first determined the top of the topographic high designated as containing the location of our CRP by maneuvering in each direction and monitoring water depth. This area was found to be very flat as suggested by the seismic profile. We deployed Marker U at a top-of-the-mound location suitable for a CRP at 19:33 hrs. We then reset Jason's navigation system at X400m, Y76m using the method described in *Target Selection, MC462*.

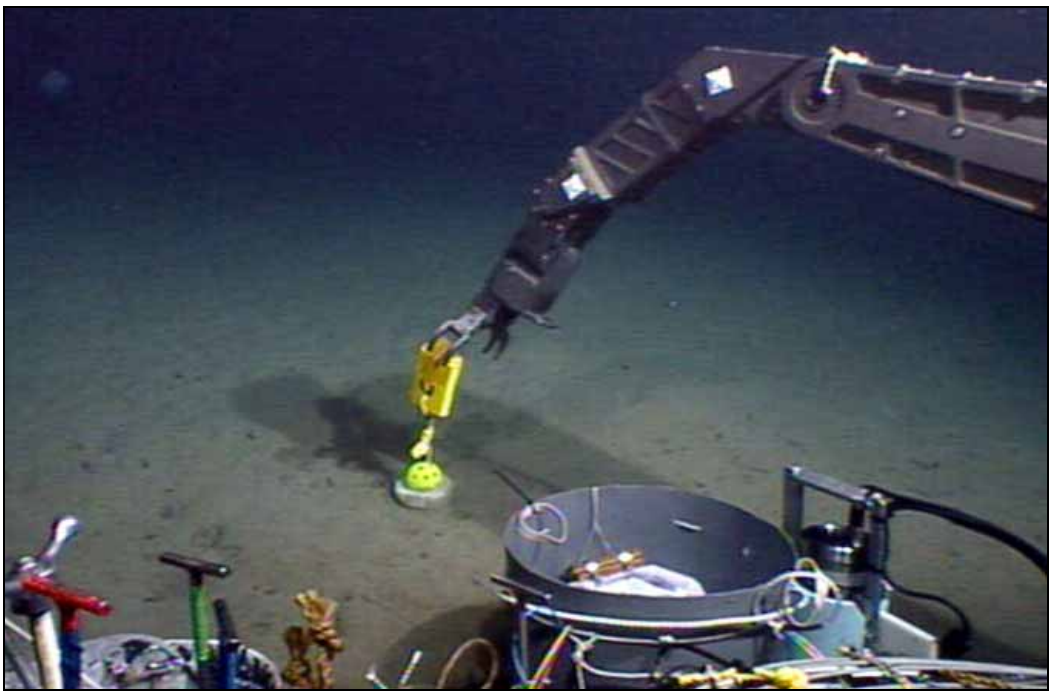

Figure 7-11. Marker 'U' deployed at CRP

After looking around the mound and logging biological observations, Jason headed to target Geo 1 at 21:37 hrs. The surface character of the mound top and flanks appeared to be primarily burrowed hemipelagic mud. After arriving in the vicinity of Geo 1 at 21:55 hrs, we headed for target Geo 2 at 22:03 hrs. We explored and logged observations in this region and then headed to target Geo 3 at 22:14 hrs. We observed and logged a brine seep with a bacterial mat (X168m, Y334m) at 22:19 hrs, before arriving at Geo 3 at 22:26 hrs. We then headed for target Geo 4 while logging observations of rat-tail and other fish, star fish, eels, and holothurians. We then headed for target Geo 5 at 22:41 hrs, logging more fish and eels. At 22:47 hrs we headed for target Geo 6, noticing a few outcropping carbonates with gorgonians on them, and arriving at 22:56 hrs. After logging more fish, we headed south at 23:30 hrs, and stopped at what we were calling the brine seep to take some cores. The bacterial mats **(Figure 7-12)** occurred at the base of a low-relief mound. The mound had a smooth surface with thin bacterial mats and evidence of small slope failures derived by fluid expulsion. We proceeded to core (X172m, Y337m) at 23:55 hrs in the bacterial mat, and disturbed the sediment enough that hundreds of gas bubbles, hydrate fragments, and oil droplets floated up into the water. Some of the oil droplets stuck on the camera lenses. We also saw yellow hydrate floating out of the disturbed coring area and layered gas hydrate in the areas we had cored. We eventually obtained 5 cores out of 8 tried, as we broke 3 of the core rigs with the manipulating arm. We completed the coring at 01:01 hrs of 12 June, and went on to collect some biological samples. During coring, we noticed a few shells on the periphery of the bacterial mat. These were collected and turned out to be *Calyptogena ponderosa*, the same species of chemosynthetic clam that is on the upper slope. We also were sampling with the mass spectrometer and the methane sensor in this area. The high amplitude observed for this area did not result in finding carbonates, mussel beds, or colonies of tube worms in the area. After coring of the bacterial mats and finding abundant gas hydrate, it is likely that the high reflectivity is from shallow gas hydrate under the sizeable areas of high surface amplitude.

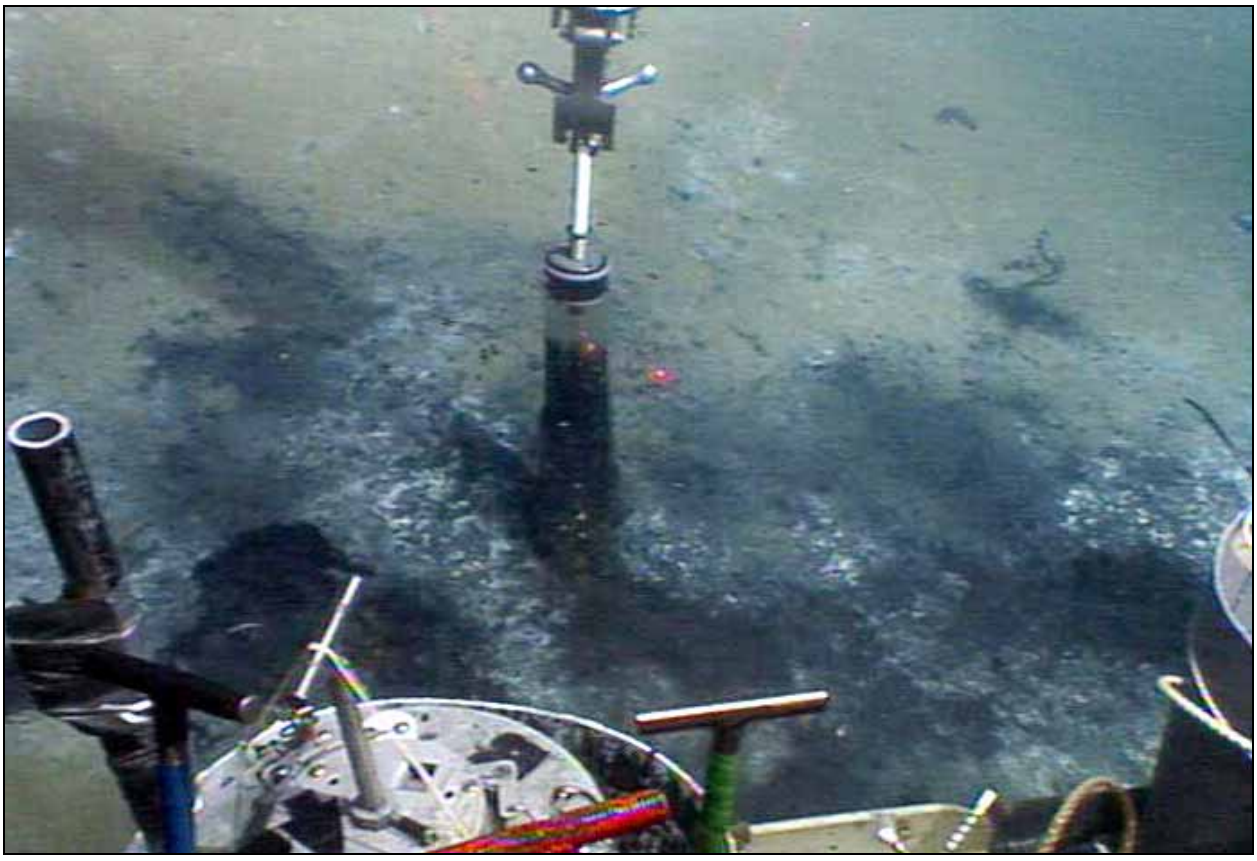

Figure 7-12. Collecting push-core samples in bacterial mat

After physical sampling, we began a photo acquisition at 04:03 hrs, in order to test some of the settings on the down-looking Scorpio camera. We made a series of coral collections in this area including the colonial hard coral *Madrepora oculata*, a purple gorgonian, and a yellow octocoral. We also collected a piece of carbonate that contained two *Caryophila* sp. individuals, a solitary hard coral. We then completed a set of 10 random photo transects distributed in a 200x200 area from 05:53 hrs to 08:04 hrs. We then navigated back to the CRP to check the navigation stability of the Doppler nav over this entire time period, and found that we were within 4 meters (X401m, Y72m) of the original position of this dive. We considered this to be excellent control over our navigated fixes. Jason lifted off of the bottom at 08:21 hrs to begin it's ascent. **Figure 7-13** shows the dive track for dive 271.

Logged soft-sediment megafaunal can be considered typical for this depth in the northern Gulf of Mexico. Rattails and eels were quite common followed by the large white holothurian *Mesothuria lactea* . Less common were Geryoind crabs (red or golden crabs) and Lithodid crabs (cf. *Paralomis*).

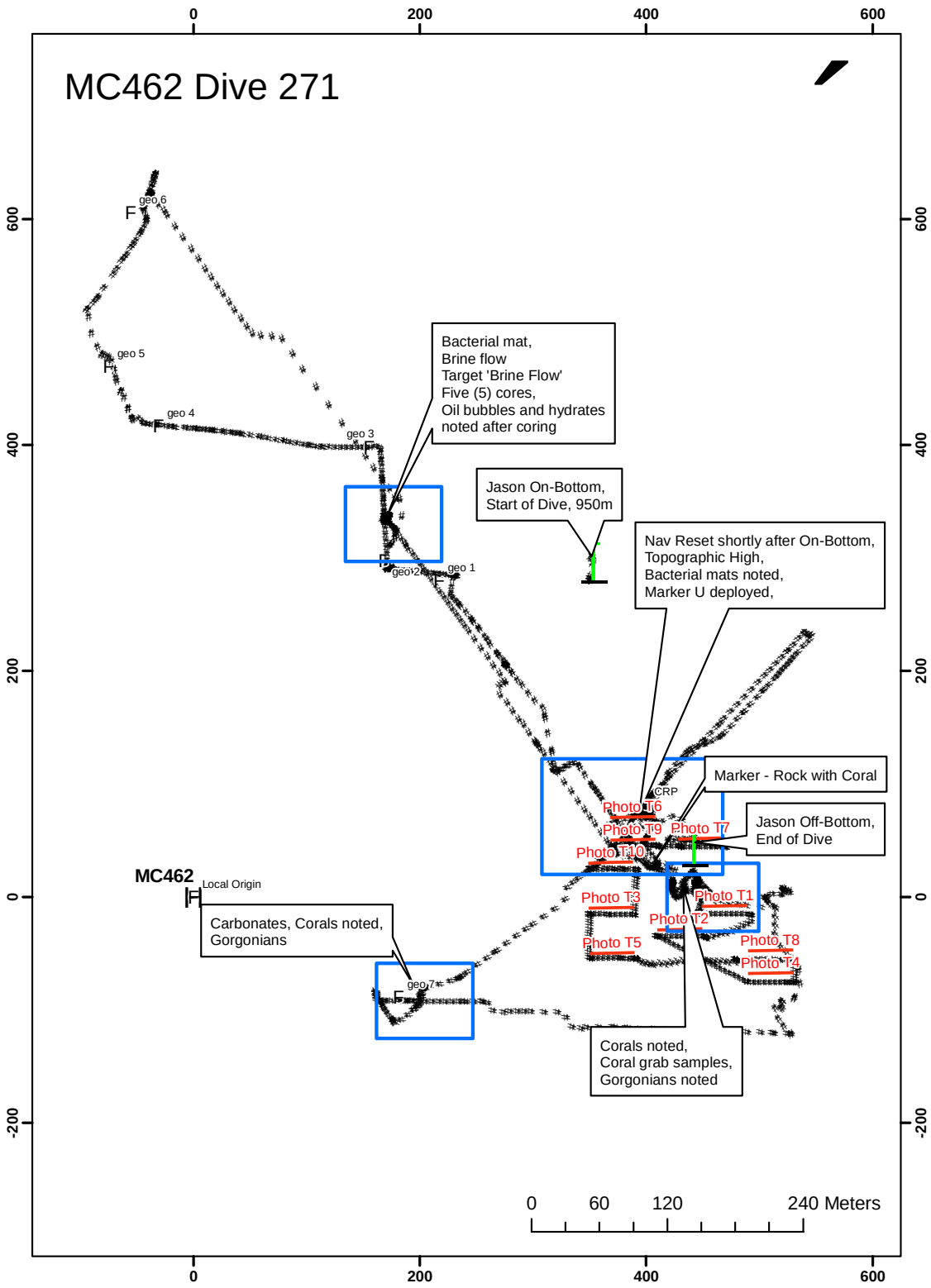

Figure 7-13. Dive track for D271

Target Selection, GC415

Green Canyon block 415 (GC 415) is in an area of the Gulf of Mexico with extensive diapiric salt movement resulting in extreme bathymetric variation and common seepage of hydrocarbons to the seafloor near the flanks of the salt. Extrusion of sediment along with the hydrocarbons from the subsurface out of many of these high-flux vents either build mud volcanoes on areas of low slope or form flows in areas of high slope. Oil slicks are very common, as are outcrops of gas hydrates and chemosynthetic communities around low and moderate flux sites. GC 415 displays the geophysical signature of all these types of seep sites.

There are two separate areas with distinct geophysical characteristics at the GC 415 dive site (**Figure 7-14**). The southern area is a large mound with moderately high positive amplitude response on top of a northeast-southwest trending bathymetric ridge supported by diapiric salt. Sediment flows extend down-slope for over 3 km and pond in the adjacent intersalt basin. The amplitude response is quite consistent across the mound. The northern area is broken up into smaller, discrete highs and lows with highly variable amplitude response. The small highs have the strong positive amplitude response of low to moderate flux seep sites and the intervening lows have the low positive background response of typical, non-seep hemipelagic mud. No flows are associated with the northern amplitude anomalies.

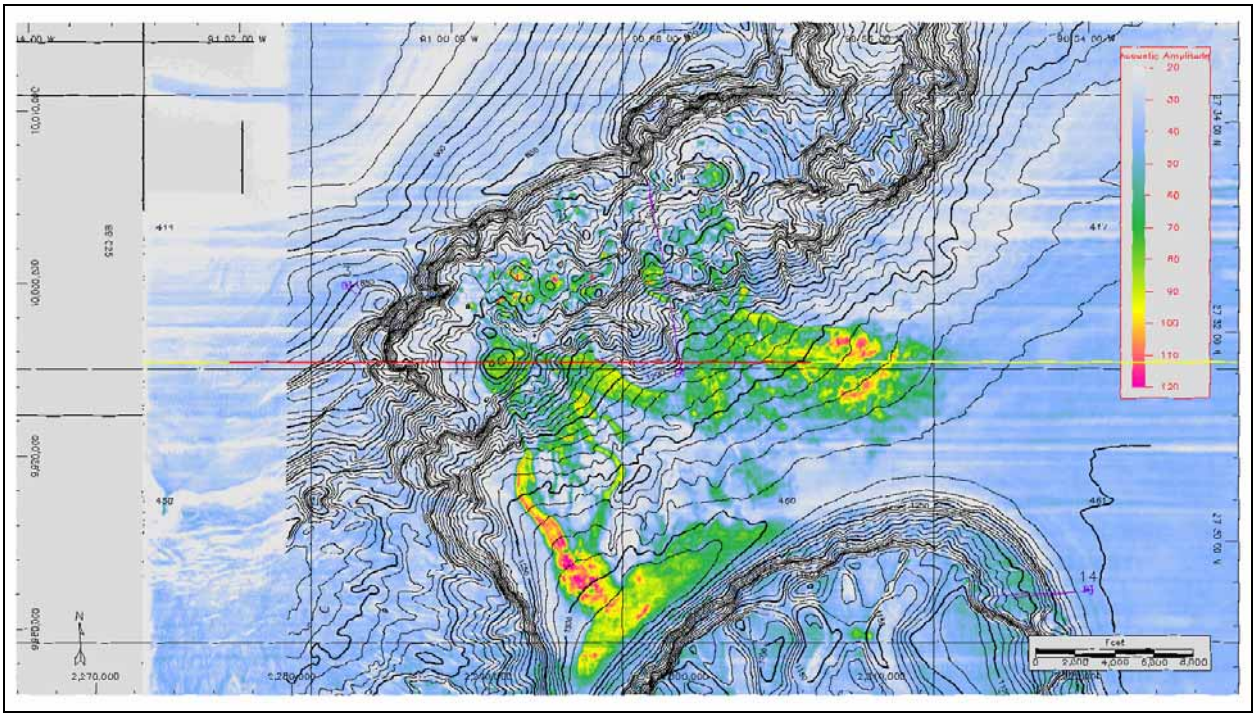

Figure 7-14. 3-D seismically derived bathymetric map with amplitude overlay (C.I.=10m) used for selecting targets at site GC415; used by permission, Veritas.

We did not visit this site last year with Alvin, so we had not developed a list of targets or a point of local origin. We also did not have bathymetry at this site from the AUV-multibeam bathymetric survey dataset developed for this project. We did, however, have access to the MMS bathymetric and surface anomalies maps, so we used these geo-referenced graphics (**Figure 7-14**) to establish a local origin, to define a site CRP, and to select targets for the site.

We defined the following for this site in WGS84 datum:

Geodetics False Northing: -3,046,554.27m
Geodetics False Easting: -197,847.03m
Local Origin Northing: 3,046,554.27m
Local Origin Easting: 697,847.03m.

These Falsing shifts were selected at this site in order to place a Local Origin in X,Y space near the targets of interest at the site. The latitude of this Local Origin is N27 31,70000 and the longitude is W090 59.80000. We then defined an X,Y in the resulting local coordinate system in meters for a southern CRP and a northern CRP. We did this by applying the geodetic False Northing and False Easting defined above to the standard UTM projection for the WGS84 Datum, then calculating the local X and Y from the latitude and longitude of each site CRP as measured using the MMS map represented by **Figure 7-14**. A requirement of such a defined site is the ability to locate it by visual means with Jason. We identified such a topographic high in the north and in the south part of the site on the map and chose a location on top of each.

The local coordinates thus calculated and assigned to the south CRP were X = 345 m and Y = 250 m. The local coordinates thus calculated and assigned to the north CRP were X = 590 m and Y = 1,721 m. We placed these two CRP targets into Jason's navigation system along with targets of interest positioned by a geologic review of the MMS bathymetric/anomaly map. Targets developed for this site are listed in **Table 7-6**.

Table 7-6. Target locations for GC415

Target	Latitude	Longitude	Local X (m)	Local Y (m)	Depth (m)
LocalOrigin	N27 31.700000	W090 59.800000	0	0	1,060
CRP South	N27 31.832310	W090 59.588040	345	250	1,038
geo 1	N27 31.907301	W090 59.419034	621	393	1,055
geo 2	N27 31.730427	W090 59.619657	296	61	1,045
geo 3	N27 31.807676	W090 59.682032	191	202	1,038
geo 4	N27 31.985094	W090 59.631432	269	531	1,055
CRP North	N27 32.626472	W090 59.424777	590	1,721	1,040
geo 5	N27 32.607828	W090 59.146891	1,048	1,694	1,025
geo 6	N27 32.601367	W090 59.074719	1,167	1,684	1,025
geo 7	N27 32.543572	W090 59.121942	1,091	1,576	1,035
geo 8	N27 32.420132	W090 59.310078	785	1,343	1,030
geo 9	N27 32.432605	W090 59.461109	536	1,362	1,045
geo 10	N27 32.434194	W090 59.571031	355	1,362	1,050
geo 11	N27 32.367335	W090 59.853499	-108	1,231	1,045

We did not deploy the LBL net at this site because it was relatively shallow and we felt that we could establish Jason's position on the CRP without the net. This technique had worked at the previous site MC 462. The time saved by not deploying and calibrating an LBL net could be better used in the survey of this site.

Our plan for calibrating Jason's navigation system was to position the vessel's stern A-frame sheave directly over the CRP (1,000^{+} m above it) and allow Medea to settle into a position directly under its sheave, suspended by its main cable. We would then position Jason directly under Medea while within sight of the seabed. We would monitor Jason's stability of position by watching the seabed and by using its seabed-position-hold navigation feature. We would then monitor the lateral movement of Medea using its downward-looking camera aimed at Jason, to confirm that Medea had settled into a stable, equilibrium position with respect to the vessel's stern A-frame sheave.

When we were satisfied that all three vehicles (vessel sheave, Medea, and Jason) were vertically aligned to within one meter, and all directly over the defined CRP position, we would reset Jason's navigation system to re-define it's location as the X,Y of the CRP. Then we would drop a marker on that location in order to physically set a benchmark at this site. At this site there would be two such markers, one in the south and one in the north.

The timing of implementation of this plan is outlined in the beginning of the *Dive 272 Summary* section.

Dive 272 Summary, GC415

Time in water: 2007/06/13 00:14
Time on bottom: 2007/06/13 00:10
Time off bottom: 2007/06/13 11:26
Time out of water: 2007/06/13 12:11
Water Time: 11 hours 57 minutes
Bottom Time: 10 hours 15 minutes
Min. working depth: 786.92
Max. working depth: 1107.06
Produced 1.2G of raw vehicle data
Produced ~16 dvds of Science video
Produced ~16 dvds of Archive video

Jason was deployed into the water at about 20:40 hrs local on 12 June. All times and dates in this summary are reported in EDT, local time. The seabed at 1,076 m was reached at 21:10 hrs and event logging was initiated by the watch-stander on duty using Jason's Virtual Van event logger system. Refer to *Dive Observations* for this dive in the Appendix for a detailed log of the observed events and their times in GMT.

We first determined the top of the topographic high designated as containing the location of our CRP South by maneuvering a few meters in each direction and monitoring water depth. We

deployed Marker #2 at a top-of-the-mound location suitable for a CRP at 21:33 hrs. We then reset Jason's navigation system at X345m, Y250m using the method described in *Target Selection, GC415*. Before the dive the observation of oil on the water was made. Several members of the scientific party confirmed an oil slick over the dive site. This observation was considered a good indication that we would find chemosynthetic communities at the surface reflectivity targets established by analyzing 3-D seismic data from the area.

After looking around the mound where the CRP was established it became apparent that the seafloor was rather featureless and no indicators of seepage were observed. Jason then headed to target Geo 1 at 21:35 hrs. The transit to Geo 1 was uneventful in terms of seepage indicators. After logging biological observations and arriving in the vicinity of Geo 1 at 22:02 hrs, we headed for target Geo 2 at 22:09 hrs. Pockmarks were encountered and clearly displayed on the forward-looking sonar between the CRP site and Geo 1. We explored and logged observations of fish, shrimp, and eels in this region and arrived at Geo 2 at 22:33 hrs. No significant geologic features were observed on the transit. We then headed to target Geo 3 at 22:34 hrs. On the way, observed and logged more fish before arriving at Geo 3 at 22:48 hrs. We then went back to the CRP to check the performance of our Doppler nav, and found the offset to be about 1 meter. This was excellent. We picked up the ball marker because the south area was not worth a permanent marker, and then headed for target Geo 4 at 23:10 hrs while logging observations of fish and bacterial mats. These bacterial mats were the only notable seepage indicators encountered on the transit. We arrived at Geo 4 at 23:32 hrs, and then called the completion of this survey of the south area of the site. The mound we had just observed in recanissance mode was not a highly reflective target on the 3-D seismic data. Observations from Jason confirmed that hydrocarbon and brine seepage associated with the feature was minimal and certainly not sufficient to support abundant and diverse chemosynthetic communities. Occasional small bacterial mats were the only indicatiors that we were in a hydrocarbon seep setting. We put Jason in tow-mode, and headed north for 1.2 km.

After arriving in the vicinity of CRP North, we first determined the top of the topographic high designated as containing the location of our CRP North by maneuvering a few meters in each direction and monitoring water depth. We re-deployed Marker #2 at a top-of-the-mound location suitable for a CRP at 00:44 hrs on 13 June. We then reset Jason's navigation system at X590m, Y1,721m using the method described in *Target Selection, GD415*. This area north of the initial dive site had many highly reflective, but small targets as determined from the 3-d seismic data. We expected these areas and its features to be much more productive interms of hydrocarbon seep features and associated chemosynthetic fauna.

The CRP target area was a low relief mound approximately 300 m diameter that displayed a very bright reflectivity zone on the southern flank. After arriving at the mound and looking around , Jason headed to target Geo 5 at 00:46 hrs. During the transit welogged biological observations of fish, bacterial mat, crabs, clams, and holothurian., We arrived in the vicinity of Geo 5 about 01:07 hrs. While approaching this target, a field of numerous pockmarks was encountered. They were impressively displayed on the forward-looking sonar. We proceeded to core (X777m, Y1,071m) at 01:20 hrs in a large bacterial mat (**Figure 7-15**). We eventually obtained 3 cores at this site. Coring was completed at 01:29 hrs. aWe then went on to the east observing some biology, including holothurians, fish, bacterial mats crab, clams, shrimp, and a shark. We then

acquired 3 more cores at X1026m, Y1695m, in another bacterial mat.

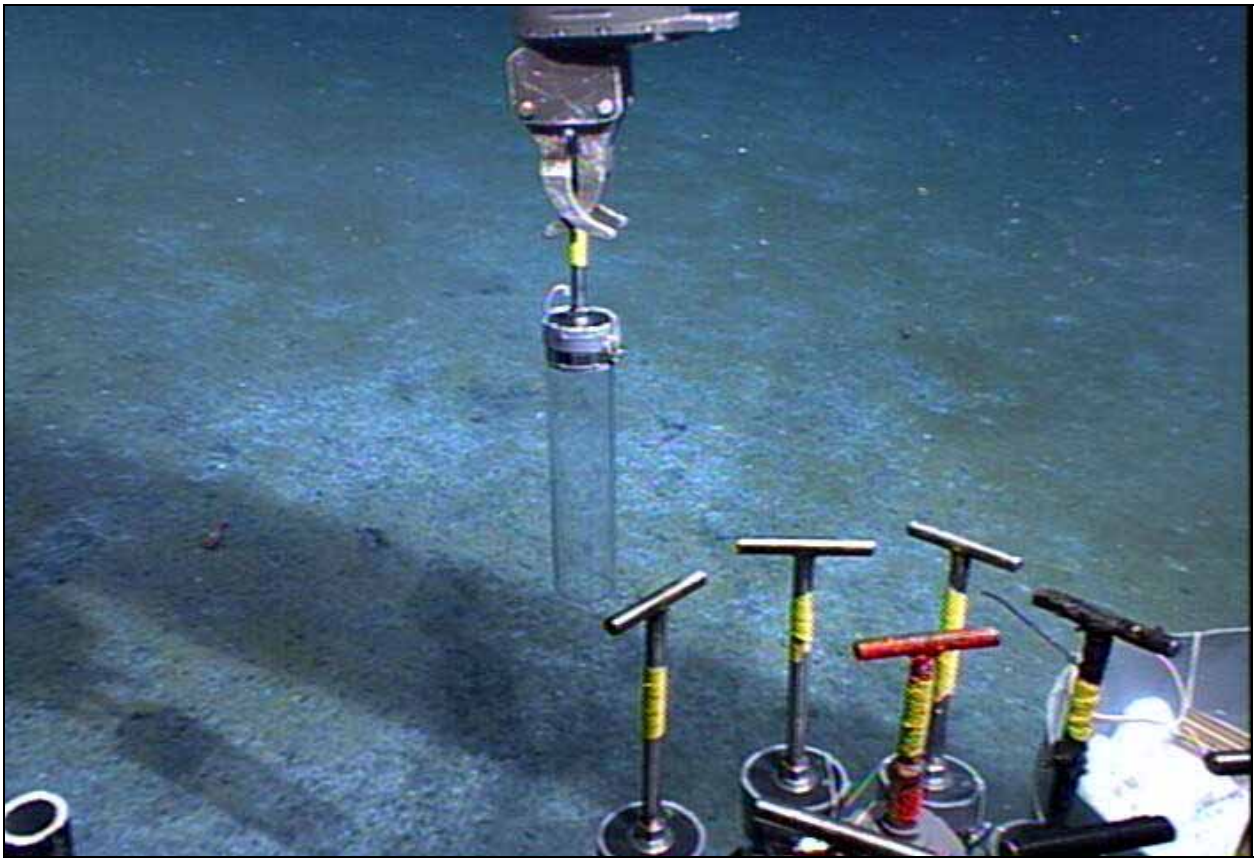

Figure 7-15. Push-cores taken in bacterial mat

We continued on to target Geo 6 at 02:22 hrs, then on to target Geo 7 at 02:32 hrs, and on to target Geo 8 at 02:44 hrs, observing fish and other fauna along the way. We headed to target Geo 9 at 03:31 hrs making more such observations, stopping to take 3 more cores in a mat at X516m, Y1,349m. We also started sampling with the mass spectrometer in this mat.

At approximately 04:00 hrs we arrived at target Geo 9 and a large "bacterial mat" was identified for the last three push cores. When the first core was taken, it only penetrated about 4 inches and gas bubbles were released from the sea floor. Underlying hydrate was suspected. A second core in this central area also stopped hard at 4 inches and released gas. A third core off to what appeared to be near the edge of this mound also hit hydrate and released gas. During the coring operations a small area of about 50 cm^2 of brown fine grain "sediment" with "blue fuzz" around its perimeter was seen in the video. These resembled, and were later confirmed to be, a colonial ciliate in the family Folliculinidae, that is thought to have chemoautotrophic symbionts. The hand held cool pix camera was used to take about 80 close up images of these colonies (insert a cool pix pic or two if you like), bacterial mat, and the push core holes. It became apparent that this area was actually a thin carbonate crust, over 4 inches of sediment, overlying a buried hydrate.

When imaging was complete several unsuccessful attempts were made to core the ciliates. (Although we did not recover these impressive and visible colonies, isolated (tiny) groups were later confirmed in some of the other mat push cores). We then used a push core to break up an area of the crust and scoop mud, followed by scooping with a net lined with linen to collect several liters of the mud (for bulk analyses by the Joye group) and pieces of the carbonate crust. During this operation bubbles were released almost constantly and numerous pieces of white hydrate floated up and past the three cameras (this is most apparent in the down looking "Brow cam"). The net full of mud and carbonate was stored in the port bio box and the sub proceeded to geo target 10 before ending the dive. We deployed Marker #5 here (X505m, Y1378m), then transited to target Geo 10 while logging biological and geological observations. Jason lifted off of the bottom at 07:26 hrs to begin its ascent.

Logged soft-bottom fauna were typical for this depth in the northern Gulf of Mexico. Rattails and eels were common but not notably abundant. Holothurians were dominated by the large white *Mesothuria lactea* although the purple *Paelopatides* was also present. Crabs were dominated by Geryonids.

NOTE: During post-cruise dive track chart creation it was noticed that the latitude and longitude values in the Jason virtual van table appear to be shifted over 300m to the east (**Figure 7-16**). The local XY's appear to be correct relative to the target locations visited during this dive.

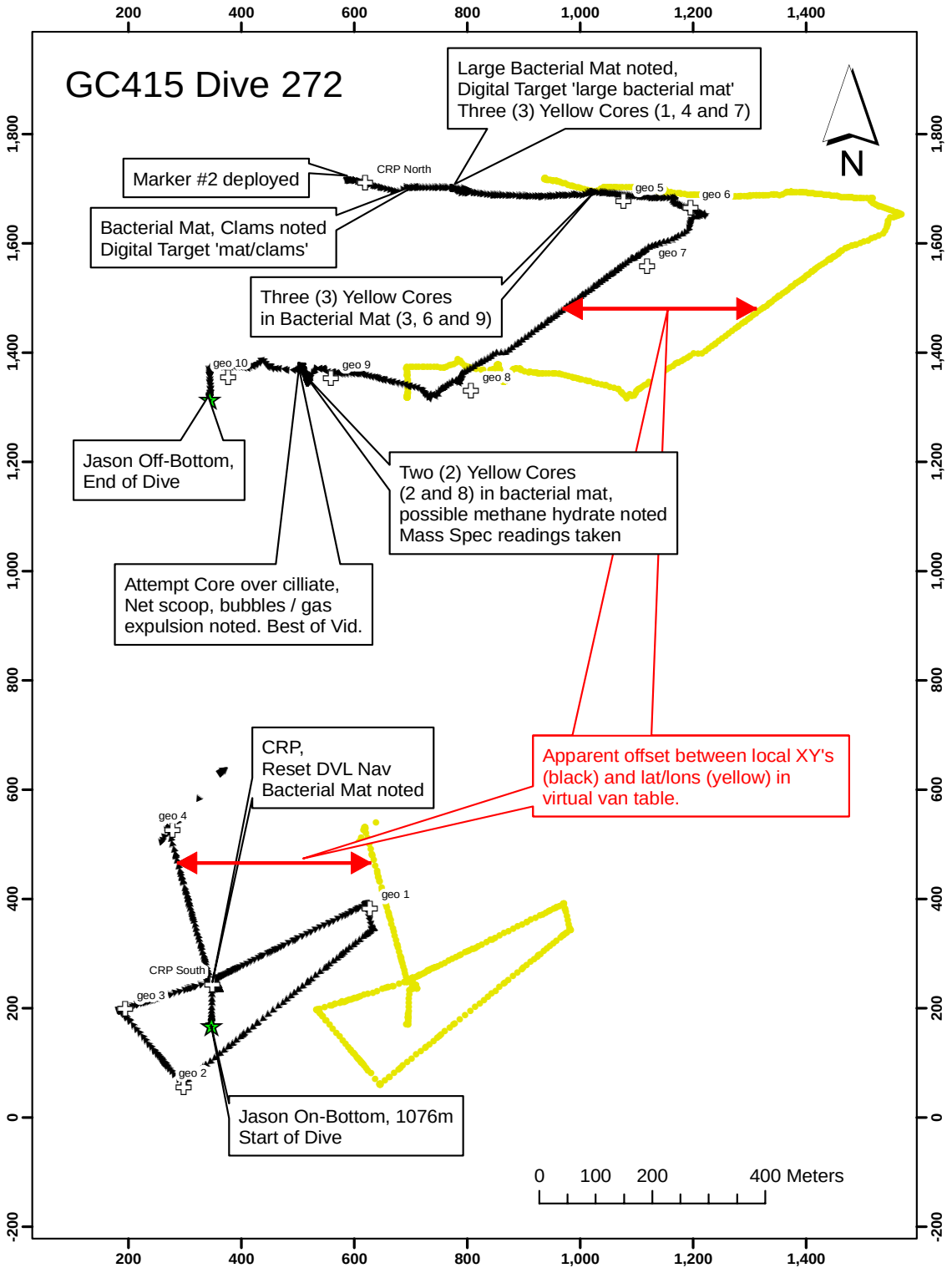

Figure 7-16. Dive track for D272

Target Selection, GC852

Prior to last year's exploration of Green Canyon block 852 (GC852) using a camera sled in March 2006 and the Alvin submersible dives in May 2006, we reviewed the 3-D seismic data to choose this site to explore for natural oil and gas seeps likely to have chemosynthetic communities living off the hydrocarbon and the associated hydrogen sulfide. The bathymetry maps generated from the GC852 seismic data highlighted areas with distinct highs and lows that were likely formed by salt diapirism (**Figure 7-17**). These same areas showed subtle anomalous variation in the amplitude.

The GC852 salt-supported structure is a narrow north-south trending narrow ridge (~3,000 m long and 150 to 300 m wide at the top, which varies from 1,440m to 1,420 m water depth). The site was chosen more for the obvious subsurface migration routes and the disruption of stratigraphic bedding on the seismic from apparent gas effects than for the amplitude response on the seafloor. For some unknown reasons, the background amplitude of the soft bottom mud is elevated in this area on this seismic survey, which tends to attenuate the amplitude of the strong positive anomalies on the GC852 ridge. The steep slope of the flanks and its narrow crest will also tend to attenuate the amplitude response from this feature. Thus, the amplitude anomalies are quite subtle and this dive site was considered a higher risk of not having carbonates and, therefore, chemosynthetic communities and corals. It's location in a seep prone area and the obvious gas migration effects on the seismic cross-sections warranted further investigation on the pre-dive reconnaissance cruise.

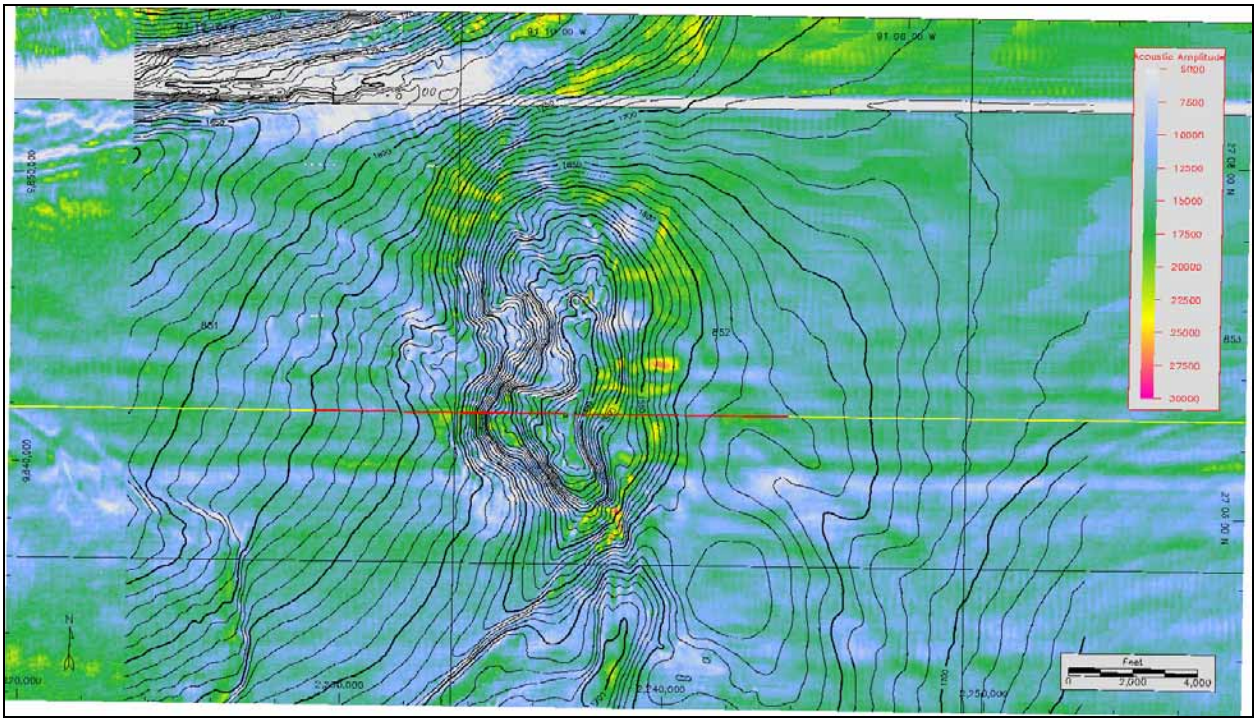

Figure 7-17. 3-D seismically derived bathymetric map with amplitude overlay (C.I.=10m) used for selecting targets at site GC852; used by permission.

The reconnaissance cruise in March 2006 and the Alvin dives in May 2006 confirmed that the locations chosen from the 3-D maps were active seeps that contained variable population sizes and diversity of chemosynthetic organisms. The major drawbacks of 3-D data, though, are the horizontal and vertical resolution. Most 3-D data have horizontal sample sizes of around 15 meters by 30 meters and vertical resolutions of 5-10 meters (the contour interval used on the map below is 10 meters); many of the sub-environments of chemosynthetic communities are smaller than the horizontal sample of 3-D data and bathymetric changes are in the 1-2 meter range. To identify these subtle features at the more interesting sites from last year's Alvin dives with improved bathymetry maps to aid in navigation, we obtained high resolution bathymetry surveys over GC852 and three other sites using the Autonomous Underwater Vehicle (AUV) "Hugin."

Before our first Jason dive at this site we located a prominent geologic feature revealed by our recent AUV survey. This feature is shown as a topographic high labeled as ***-1420 m*** in **Figure 7-18** below, as mapped from the AUV dataset. We were confident that we could find the center of this topographic high using Jason, so we defined its center as our CRP for the site work.

We determined the Northing (Y) and Easting (X) in meters for this selected CRP in the local coordinate system in which Jason would work. We did this by applying a geodetic False Northing and Easting to the standard UTM Zone 15 projection for the WGS84 Datum, then calculating the local X and Y from the latitude and longitude of the site CRP as measured from the AUV survey. These are the same Falsings used for the local projection of the dives at this site with Alvin last year. The local coordinates thus calculated and assigned to the site CRP were X = 424 m and Y = 2,190 m. We placed this CRP target into Jason's navigation system along with targets of interest positioned by Alvin last year and targets positioned by a geologic review of the AUV contour map.

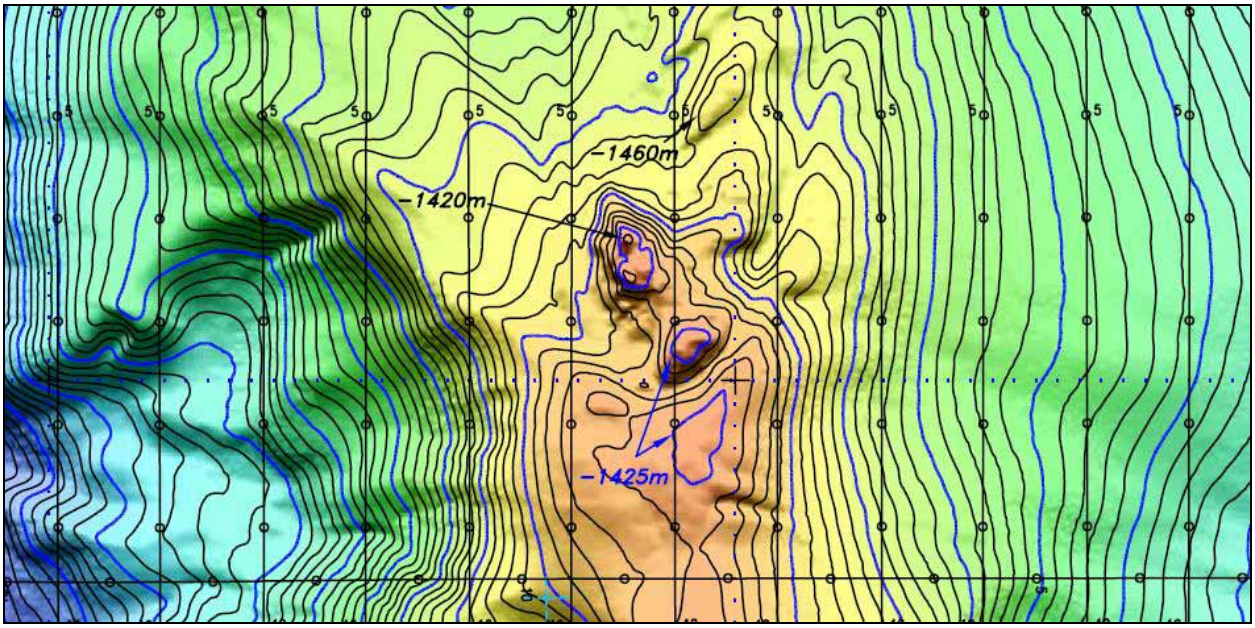

Figure 7-18. The topo-high used for defining a Central Reference Point at site GC852

We defined the following for this site in WGS84 datum:

Geodetics False Northing: --2,999,016.02m
Geodetics False Easting: -181,418.40m
Local Origin Northing: 2,999,016.02m
Local Origin Easting: 681,418.40m.

Targets developed for this site are listed in **Table 7-6**.

Table 7-6. Target locations for site GC852

Target	Latitude	Longitude	Local X (m)	Local Y (m)	Depth (m)
Local Origin	N27 06.100000	W091 10.200000	0	0	
1-tubes_mussels	N27 06.320018	W091 09.962236	387	412	1400
Marker #1	N27 06.378595	W091 09.969147	374	520	1407
Marker #2	N27 06.639749	W091 09.937658	419	1,003	1405
Marker #5	N27 06.662141	W091 09.910665	463	1,045	1409
Marker #6	N27 06.370928	W091 09.962616	385	506	1407
Marker #8	N27 06.649550	W091 09.941734	412	1,021	1405
Coral Site	N27 06.600533	W091 09.961898	380	930	1398
CRP	N27 07.282385	W091 09.924148	424	2,190	1420
geo 1	N27 07.223863	W091 09.921471	430	2,082	1440
geo 2	N27 07.198850	W091 09.872252	512	2,037	1423
geo 3	N27 07.121873	W091 09.866247	524	1,895	1428
geo 4	N27 07.152695	W091 09.945630	392	1,950	1422
geo 5	N27 07.049405	W091 09.915240	445	1,760	1433

Targets listed prior to the CRP are targets from the Alvin cruise last year. Targets listed after the CRP (the "geo" targets) are ones selected on this cruise by a review of the geophysical information available to us on the cruise.

Dive 273 Summary, GC852

After the LBL net was calibrated at this site (see *LBL Calibration* section for details of the procedure), Jason was deployed into the water at 20:44 hrs local on 13 June. All times and dates in this summary are reported in EDT, local time. The sea-bed at 1,457 m was reached at 20:55 hrs and event logging was initiated by the watch-stander on duty using Jason's Virtual Van event logger system. Refer to *Dive Observations* for this dive in the Appendix for a detailed log of the observed events and their times in GMT.

We occupied the location of the tentative CRP at 21:01 hrs and reset the Doppler nav to this point. We then verified that we were on the top of the topographic dome and deployed Marker #3 at this revised CRP point (X470m, Y2,183m) at 21:31 hrs. We then headed for target Geo 1 at 21:34 hrs while logging observations of fish, gorgonians, anemones, and shrimp. We occupied Geo 1 at 21:53 hrs, and then headed to target Geo 2. We arrived in the vicinity of Geo 2 at 22:24 hrs, continued to explore, and stopped to collect a Munidopsis with the suction sampler at

X538m, Y2,034m. We also grab-sampled an Anemone, a crab, and a small branch of bamboo coral (**Figure 7-19**). We logged a "best-of" marker for the video footage we gathered in this process. We headed toward target Geo 4 at 23:35 hrs. We started moving to target Geo 3 at 00:00 hr of 14 June, while logging observations of skate, bacterial mats, ctenophores, shrimp and black coral. We collected a carbonate collection with apparently attached tubeworms (X188m, Y1795m) at 01:48 hrs. We made collections of various benthic fauna by suction sampler from 03:18 (X389m, Y968m) until about 04:20 hrs

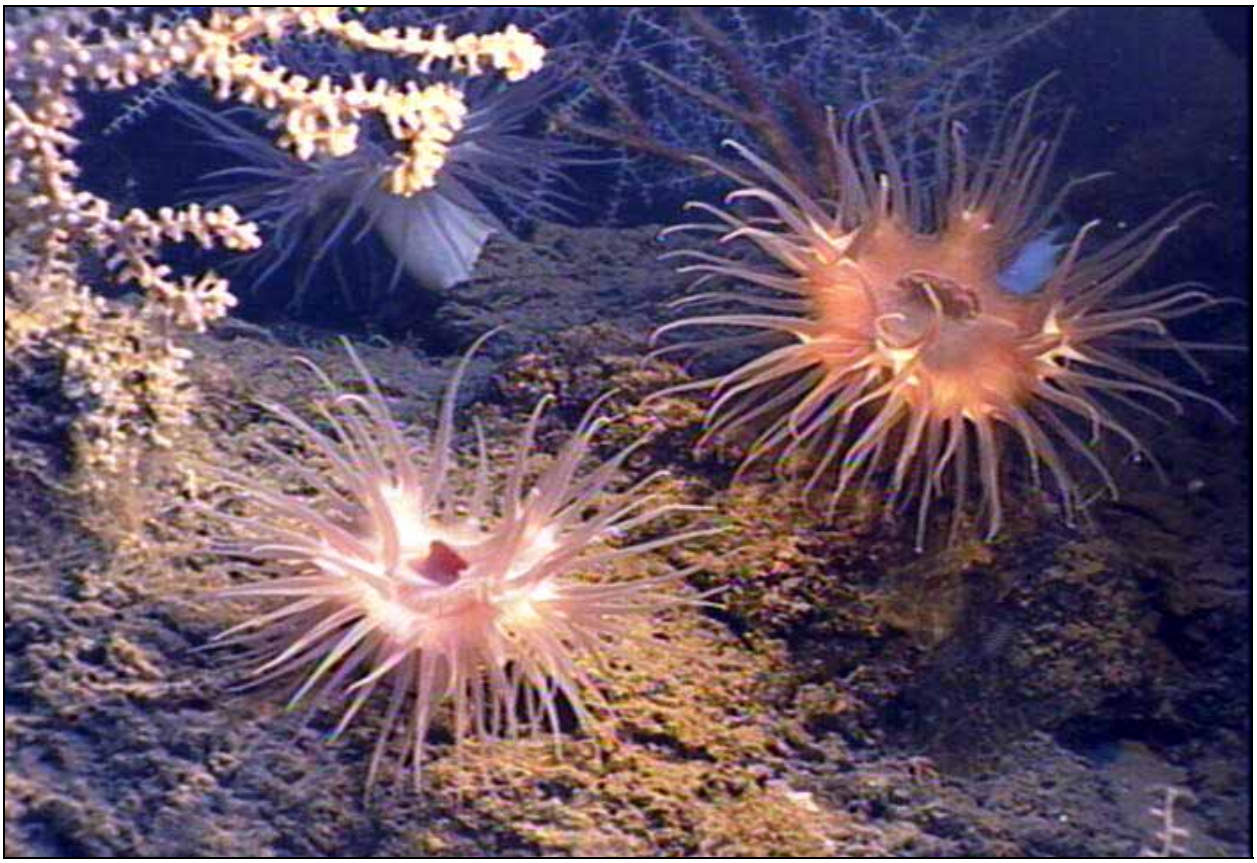

Figure 7-19. Anemones and coral

Shortly after this we arrived at the central coral site and then took a navigation fix on some golden coral (X361m, Y918m) at 04:53 hrs. We began to head for the elevator at 05:18 hrs. The elevator was located at 06:10. The Camera on the elevator is NOT functioning and will not be deployed. We helped the elevator come free of the sea-bed at 06:36 hrs and moved it to the vicinity of Ian's camera where it was set on the bottom at 07:18 (X 387, Y 1029) We then looked for Ian MacDonald's camera previously deployed at Marker #8, and came across Marker #2 at 08:12 hrs (X425m, Y1026m). We spotted Marker # 8 and occupied it (X454m, Y1038m) at 08:16 hrs. Mussels were collected into the white net from the bed within 2 meters of Marker #8 and a Ball Marker with blue tape on the polypro line was deployed at this site [Note that the navigation fixes were off by about 1 km from this point during the dive until after return to the sea floor following the elevator recovery. These were fixed during a second post dive

renavigation of the data] X451m, Y1031m into the spot of our mussel collection. The stained tubeworms associated with marker 8 were then collected (X454, Y1032m) at 09:36 hrs (**Figure 7-20**). We fixed a new position for Marker #8 at X454m, Y1029m, then occupied Marker #5 (X462m, Y1054m) at 09:58 hrs. (After renav, this position is about 20m different from the fix taken on D278)**.**

We collected a "red" core set at X463, **Y1051m** in a bacterial mat, from 10:14 to 10:51 hrs, then acquired video and still pictures of mussels. Mussels were collected into the blue/black net and a Ball Marker deployed here for future chemistry (X466m, **Y1052m)** at 11:46 hrs. We moved to Ian's camera deployed in 2006 and confirmed it was flooded. The homer probe was operational. We retrieved Ian's camera from X442m, Y1,020m at 12:11 hrs, and placed it on the elevator. Confirmed Ian's new camera is not flashing and will be sent back to the surface. We swapped core racks at the elevator so we could take another set of cores at this site. The mussel collections and some of the coral collections were also loaded on the elevator into it's bioboxes. The elevator was released at 13:58 and Jason went into "lay back" mode, waiting for recovery of the elevator. The elevator was secured on the deck of the ship at 15:15 and Jason began transit to the coral site.

We arrive near the northern edge of the main coral site at 15:37 and decide to take a series of fixes to delineate the perimeter of the coral are. For this operation the Jason heading is always in towards the center of the coral site and we "crabbed" around its entire perimeter, using the sonar to watch locations of carbonates and the drop off in elevation, while keeping all significant coral colonies in front of Jason. A total of 12 coral fixes ("coral 1" to "coral 12") were taken between 15:37 and 16:40. Number 12 was adjacent coral 1 (imaging the same carbonate and corals). The corals are abundant and dense on the N, W, and SW edges of this patch. The bathymetry drops off immediately on the W edge (the corals are thick right up to the drop off). On the SW corner of the patch the corals extend off the top of the hill and down off the edge for about 15 meters. On the E edge the corals do not extend to the edge of the topo high, and the density of the corals is generally lower. All of this is well documented on video during this survey. After finishing the "perimeter run" we proceeded to obtain images for a photo-mosaic in the central area of the coral community beginning at 17:17 hrs. Jason was "tugged" off site by the ship at 20:43 and resumed the mosaic at 21:53. The mosaic was completed at 22:22 hrs. We began acquiring macro-camera photographs of corals at 22:24 and used this camera until it was stowed at 00:48. A series of photo transects centered on the coral area was begun at 01:18 hrs of 15 June. This effort was completed at 03:54 hrs. We identified a site suitable for coring of briney sediments at 04:50, took a few DSC images and then triggerd the niskins 1.3 meters off the sea floor at 05:07 hrs, (X449m, Y912m), and then collected 8 cores in this area. We saw gas bubbles emanating from the sediment due to our coring activities. This coring effort was completed at 05:51 hrs and we initiated transit to Marker 5 for a stained tubeworm collection.

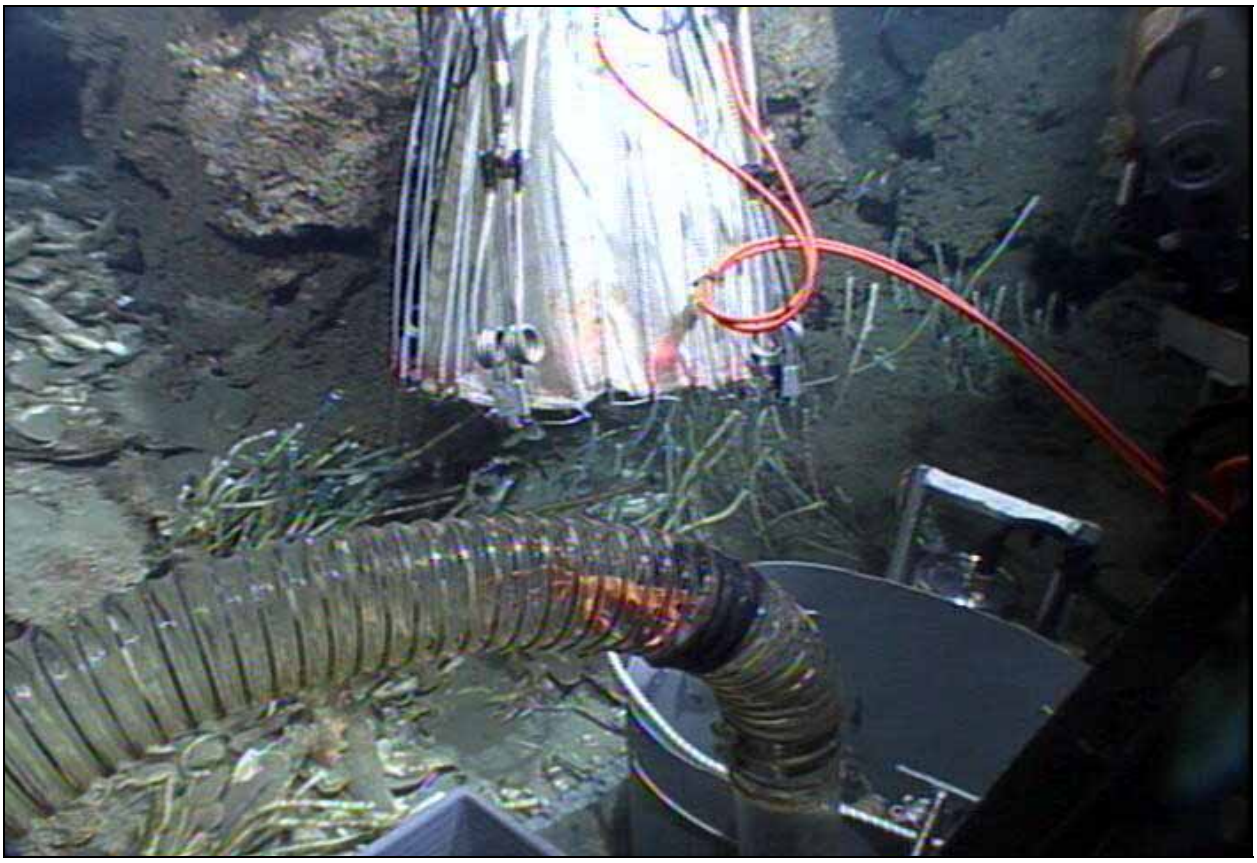

Figure 7-20. Bushmaster collection at stained tubeworm site

The stained tubeworms at Marker 5 were located at 06:15 and macro images were acquired of the stained worms until 06:31. The previously stained tubeworms (from Marker 5, at X448m, Y1066m), were then collected in several grabs and stowed in the starboard biobox, ending at 06:54 hrs. We then transited south towards Marker #1 for other planned collections. We occupied Marker #1 at 08:11 hrs, fixing its position at X378m, Y518m. We then located a site for a mussel-pot collection, but had inadvertently pinned the mussel pot with one of Jason's front-spikes, and ended up shearing the set-screw that engages the T-handle with the sprocket of the mussel pot. This meant that we could not effectively close the pot after insertion, so abandoned this effort at 08:58 hrs. We then found Marker #6 (stained worms) at 09:11 hrs (and identified its location as X380m, Y498m), We used the suction sampler to collect shrimp for hemolymph analyses and also began the collection of a red crab at 09:32. The red crab fought the sampler and remained in the hose for hours, occasionally getting our attention and the attention of the pilot. Although the pilot was unable to force the crab into the chamber of the sampler during the dive, it was recovered in the sampler on the surface. At 09:40 we set up to bushmaster a stained tubeworm collection. The bushmaster collection was completed at 10:13.(X384m, Y499m). One additional stained aggregation remains at this location, about 2 meters away from marker #6. We began our transit to the dead ("ops") transponder at 10:26, and the competition between the Jason pilot and the crab captured our attention for over an hour as we continued to work, with the crab (**Figure 7-21**) finally outlasting the pilot (still in the house at

this time), as the pilot ended his shift at 11:45 hrs. This saga is documented in the Observations log of this dive.

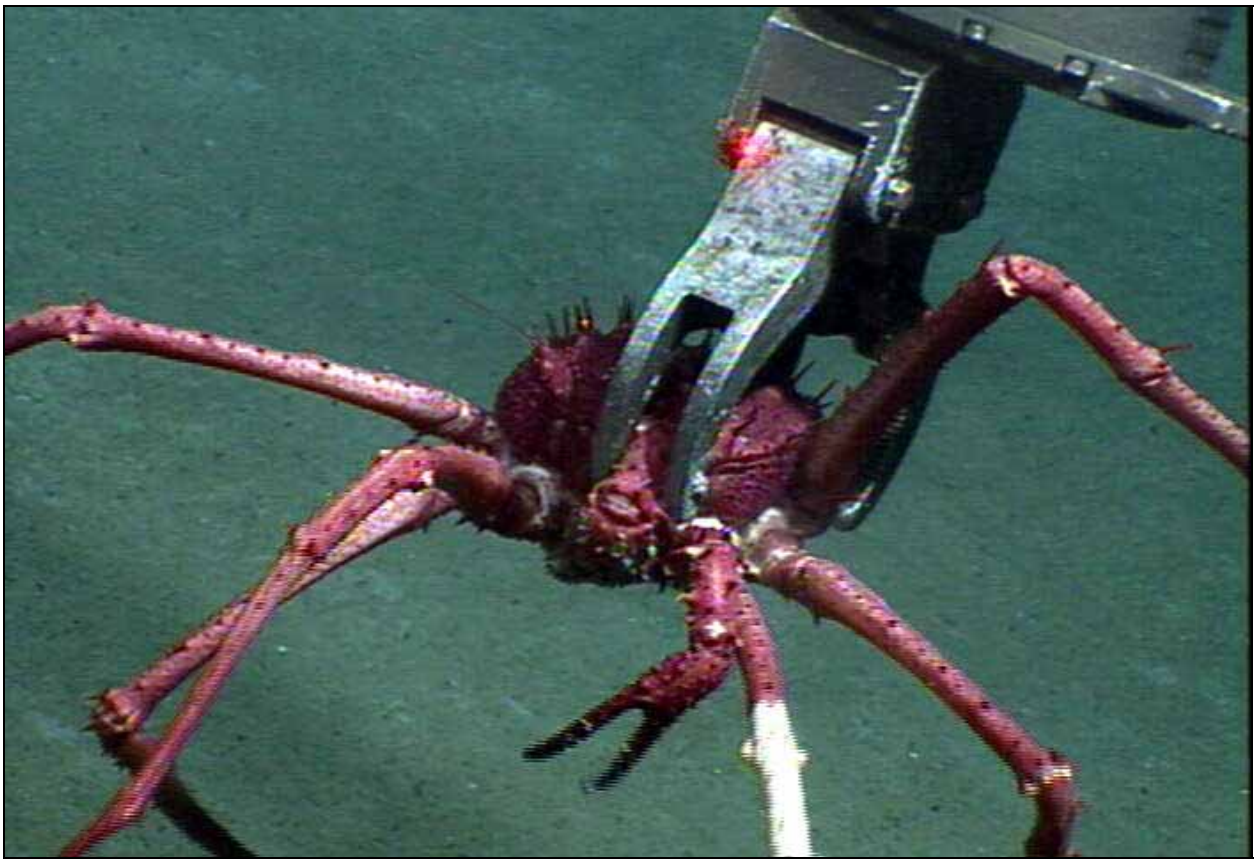

Figure 7-21. The one that got away

The non-responsive LBL transponder was located at 13:17, and the Jason headed to the surface at 13:57 hrs. on 15 June.

The background fauna at GC852 was found to be extremely sparse on mud bottom. On a transect from the southern to northern end only 3 possible holothuroids were observed. Mobile animals were largely restricted to rocky areas. Legs from a large Paralomis-type crab were sampled in a rocky area at the southern end of the transect. At the northern end where corals and chemosynthetic organisms were found, rattails and Geryonid crabs were observed. One crab was sampled along with several galathiids off the rock surfaces. The dive track for dive 273 is shown in **Figure 7-22**.

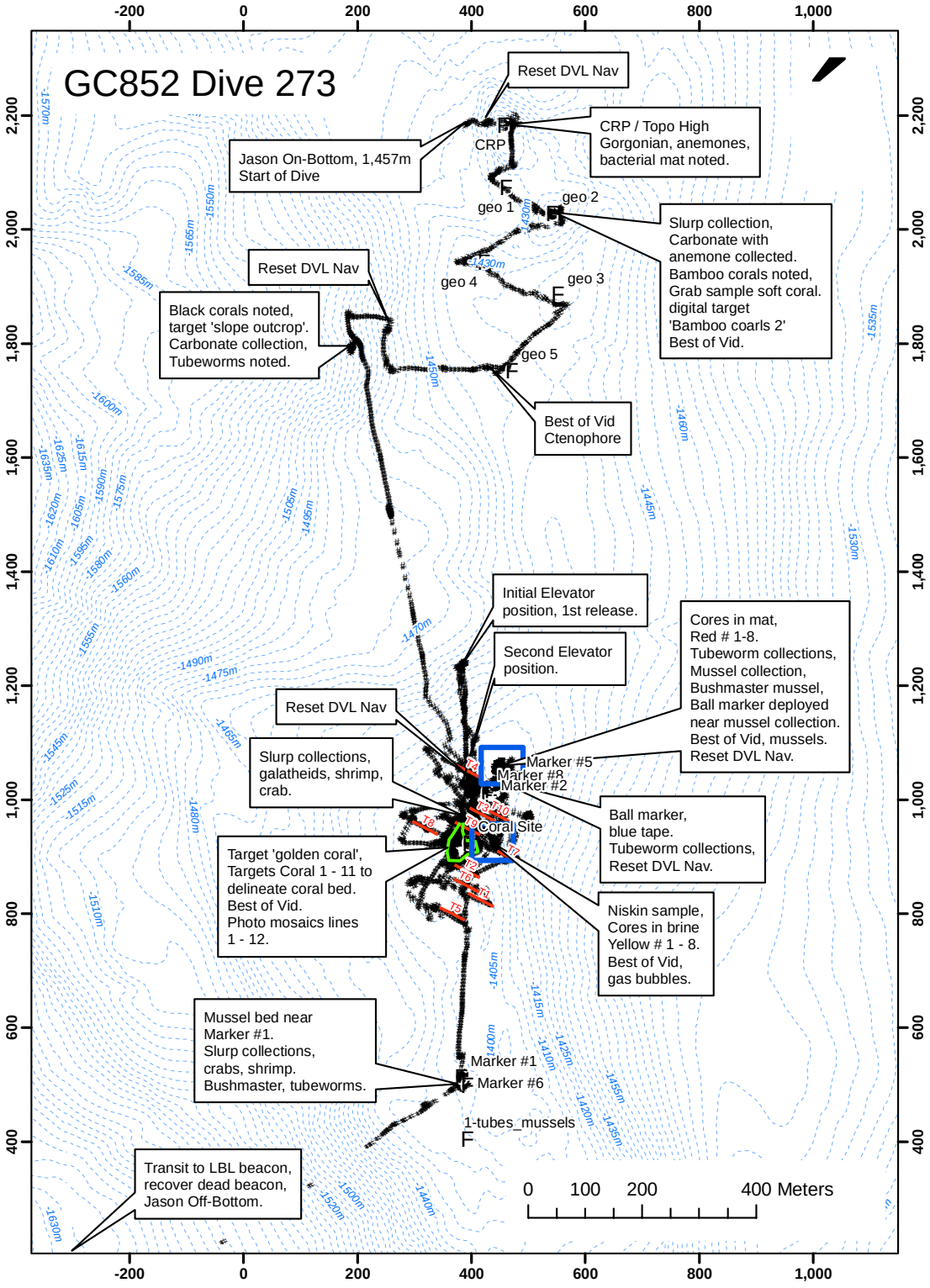

Figure 7-22. Dive track for D273

Target Selection, GB697

Garden Banks block 697 (GB697) is in an area of active salt tectonism and oil and gas seepage along the flanks of salt diapirs and oil slicks on the sea surface (**Figure 7-23**). The first site to be explored is in ~1280 meters of water; the second site is ~1,010 meters.

The first site is small and discrete and is just off the flank of a large salt supported high. The second site has several small, but bright, high positive amplitude anomalies along the top of the salt high that show, in seismic cross-section, clear hydrocarbon migration pathways to the seafloor. The primary dive site appears to be younger and more active than these sites on the large high. It has a clear "gas chimney" (a vertical migration pathway where all sedimentary bedding has been acoustically wiped out by vertical gas migration) emanating off the deep flank of salt that created a small mound at the seafloor between the flank of salt and the adjacent mini-basin. The small mound has a strong positive amplitude anomaly on top and does not have seismic indications of sediment flows on its flank; the lack of flows suggests a moderate flux site with just hydrocarbons seeping and possibly more conducive to chemosynthetic community development.

The individual high positive amplitude anomalies at the second site are smaller than the first site, and are separated by areas of very low positive amplitude response, indicating the presence of very soft, gas saturated muds (fresh flows?) or hemipelagic mud.

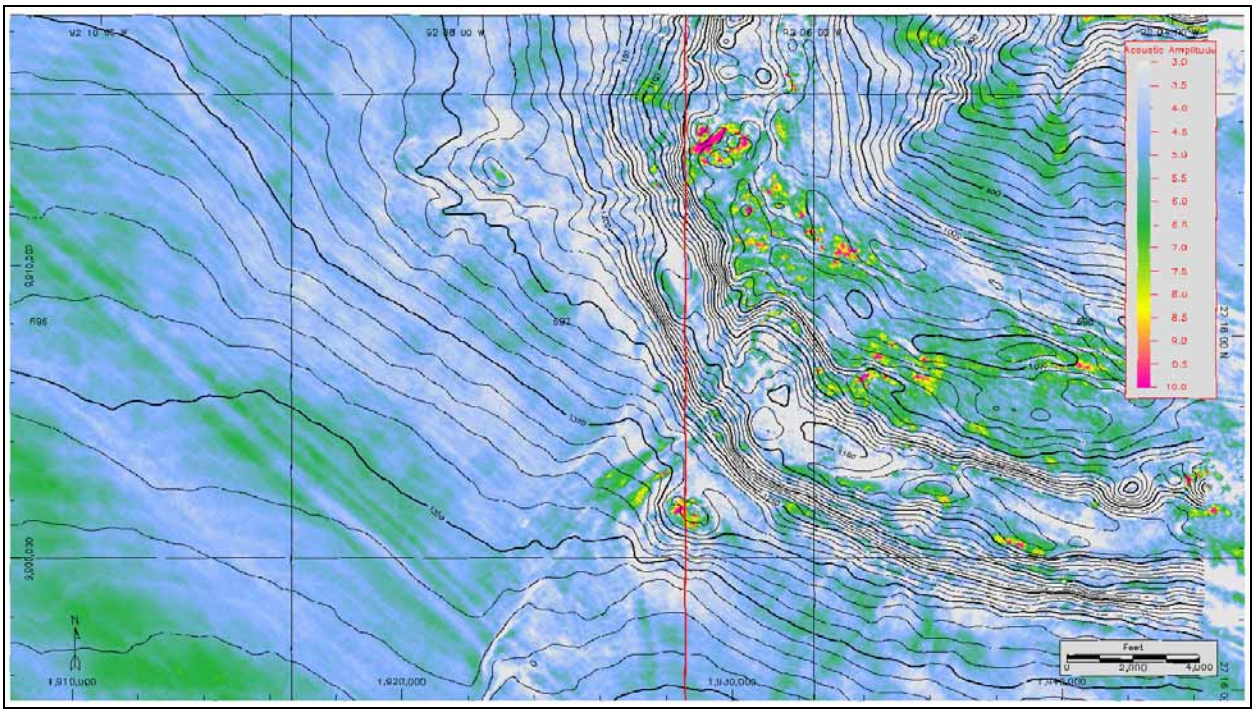

Figure 7-23. 3-D seismically derived bathymetric map with amplitude overlay (C.I.=10m) used for selecting targets at site GB697; used by permission.

We did not visit this site last year with Alvin, so we had not developed a list of targets or a point of local origin. We also did not have bathymetry at this site from the AUV-multibeam bathymetric survey dataset developed for this project. We did, however, have access to the MMS bathymetric and surface anomalies maps, so we used these geo-referenced graphics (**Figure 7-23**) to establish a local origin, to define a site CRP, and to select targets for the site.

We defined the following for this site in WGS84 datum:

Geodetics False Northing: -3,017,944.28m
Geodetics False Easting: -87,752.61m
Local Origin Northing: 3,017,944.28m
Local Origin Easting: 587,752.61m

These Falsing shifts were selected at this site in order to place a Local Origin in X,Y space near the targets of interest at the site. The latitude of this Local Origin is N27 16.90000 and the longitude is W092 06.80000. We then defined an X,Y in the resulting local coordinate system in meters for a northern and a southern CRP. We did this by applying the geodetic False Northing and False Easting defined above to the standard UTM Zone 15 projection for the WGS84 Datum, then calculating the local X and Y from the latitude and longitude of each site CRP as measured using the MMS map represented by **Figure 7-23**. A requirement of such a defined site is the ability to locate it by visual means with Jason. We identified two such topographic highs on the map, one in the north and one in the south, and chose location on top of each.

The local coordinates thus calculated and assigned to the south CRP were X = 153 m and Y = 224 m. The local coordinates thus calculated and assigned to the north CRP were X = 398 m and Y = 3,385 m. We placed these two CRP targets into Jason's navigation system along with targets of interest positioned by a geologic review of the MMS bathymetric/anomaly map. Targets developed for this site are listed in **Table 7-7**.

Table 7-7. Target locations for site GB697

Target	Latitude	Longitude	Local X (m)	Local Y (m)	Depth (m)
Local Origin	N27 16.90000	W092 06.80000	0	0	
CRP South	N27 17.020734	W092 06.706285	153	224	1,278
geo 1	N27 16.959546	W092 06.709196	149	111	1,280
geo 2	N27 17.039112	W092 06.785555	22	257	1,280
geo 3	N27 17.083506	W092 06.782171	27	339	1,280
geo 4	N27 17.084697	W092 06.713657	140	342	1,280
geo 5	N27 17.009848	W092 06.697884	167	204	1,278
CRP North	N27 18.731873	W092 06.544099	398	3,385	1,015
geo 6	N27 18.993458	W092 06.623875	263	3,867	1,025
geo 7	N27 19.179328	W092 06.636946	239	4,210	1,015
geo 8	N27 19.119317	W092 06.399707	631	4,102	1,025
geo 9	N27 19.186951	W092 06.473149	509	4,226	1,025

We did not deploy the LBL net at this site because it was relatively shallow and we felt that we could establish Jason's position on the CRP without the net. This technique had worked at the previous sites that had no LBL positioning. The time saved by not deploying and calibrating an LBL net could be better used in the survey of this site.

Our plan for calibrating Jason's navigation system was to position the vessel's stern A-frame sheave directly over the CRP (1,000^{+} m above it) and allow Medea to settle into a position directly under its sheave, suspended by its main cable. We would then position Jason directly under Medea while within sight of the seabed. We would monitor Jason's stability of position by watching the seabed and by using its seabed-position-hold navigation feature. We would then monitor the lateral movement of Medea using its downward-looking camera aimed at Jason, to confirm that Medea had settled into a stable, equilibrium position with respect to the vessel's stern A-frame sheave.

When we were satisfied that all three vehicles (vessel sheave, Medea, and Jason) were vertically aligned to within one meter, and all directly over the defined CRP position, we would reset Jason's navigation system to re-define it's location as the X,Y of the CRP. Then we would drop a marker on that location in order to physically set a benchmark at this site. At this site there would be two such markers, one in the south and one in the north.

The timing of implementation of this plan is outlined in the beginning of the *Dive 274 Summary* section.

Dive 274 Summary, GB697

Time in water: 2007/06/16 05:05
Time on bottom: 2007/06/16 06:08
Time off bottom: 2007/06/17 11:51
Time out of water: 2007/06/17 12:50
Water Time: 31 hours 45 minutes
Bottom Time: 29 hours 43 minutes
Min. working depth: 674.36
Max. working depth: 1281.50
Produced 3.2G of raw vehicle data
Produced ~48 dvds of Science video
Produced ~48 dvds of Archive video

Jason reached the seafloor at 02:08 EDT and event logging was initiated by the watch-stander on duty using Jason's Virtual Van event logger system. All times and dates in this summary are reported in EDT, local time. Refer to *Dive Observations* for this dive in the Appendix for a detailed log of the observed events and their times in GMT. Upon arrival at the sea floor we started transiting to the southern CRP. Numerous signs of seepage such as mats, carbonates and even tubeworms were seen shortly after arrival on the sea floor (**Figure 7-24**).

Figure 7-24. Bacterial mat / chimney

Marker 2 was deployed at 02:36 for our southern CRP and was adjusted slightly (final logged position X 155m, Y 222m). We then began transit to Geo 2 target. Biological and geological indication of seepage were also logged while in transit to Geo 2. We then transited to geo targets 3 and 4 and continued to see mats and assorted signs of chemosynthetic communities.

The first push core of four to be taken at this location was taken at 03:54 at X 72, Y 341. The fourth core of this setwas completed at 04:08 and a "non-carbonate" rock was collected into the empty milk crate. At 04:16 a brine flow (**Figure 7-25**) was found (the digital target "Brine River" was entered at 04:48 X 143, Y 339). Four additional push cores were taken at this location.

Figure 7-25. "Brine River"

On the way to Geo target 4 we encountered fairly lush communities of tubeworms. Numerous macro camera photographs were taken and several grabs were made from an aggregation (X141,Y 323) into the starboard bio box at 06:00. We then proceeded towards Geo target 5 and the CRP. We reoccupied the Marker 2 at 06:23 X 170, Y 235. This is approximately 20m offset after 4 hours of work without a navigation net: Not Bad. We continued the transit to Geo target 5 and arrived there at 06:38.

We then went into "lay back" mode for the tow to the northern site 3 km away. We arrive on bottom in the northern area and reset our doppler at about 0900 to X 427, Y 3382 (by assuming Medea is under the ship). We decide to head to the topo high about 300 m east to define our CRP. Marker #3 is deployed at 09:36 at X 713, Y 3347 at CRP North. We explore this topo high and find a large community of live mussels, a single tubeworm, and a big ugly fish. We investigate the fish and spend 20 minutes, starting at 10:19 taking macro photos of this sculpin (X 680, Y 3420). We then head to the single tubeworm and shoot macro camera shots of this Escarpid (XX 679, Y 3420). [note that these last two locations are about 10 – 15 m apart, with the fish to the N, although this is not seen in the nav log]. The tubeworm is collected into the port bio box (**Figure 7-26**) and a soft coral of a species not collected before is collected into the starboard bio box. The crater seen in the sonar (incorrectly identified by Ian as a brine pool resulting in Ian buying a round of drinks when we hit port) is investigated and found to harbor

shell hash and perhaps a few living vesicomyids. We begin preparation for a series of photo transects over this chemo area at 12:26 and start the first transect at 12;53. The last transect is completed at 14:23 and a final line is run towards the mussel bed (which did not appear in the random transect lines) and finish photo surveying at 14:47 (X 666, Y 3430). We begin transit to geo target 5 at 14:48 on a heading of 310°.

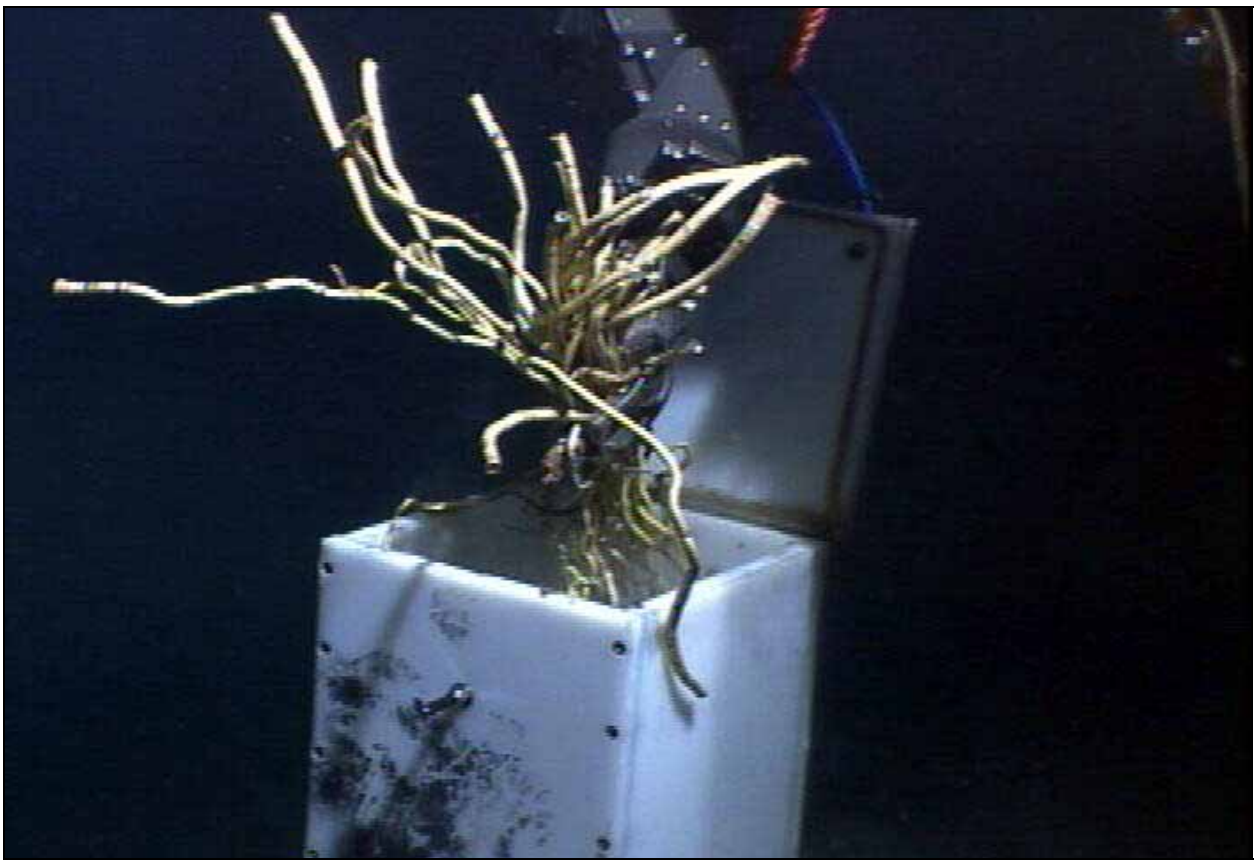

Figure 7-26. Tubeworm collection placed in bio box

After arriving at geotarget 6 at about 15:40, we continued past the target to run over an area of high reflectivity. We began transit to Geo 9 on a heading of 55° along the path of high reflectivity. We stopped at what appeared to be a small outcropping gas hydrate. When Jason came to a halt over the feature, we encountered bad visibility. We waited over that position for 15 minutes for the visibility to improve, but it did not. We continued to Geo 9, approximately 150 m at a heading of 55°. The visibility was still bad at Geo 9 and we changed heading to 250° towards Geo 7. We stayed in bad visibility for about another 200 meters and a mud volcano is hypothesized somewhere between Geo 6 and 9.

Carbonates and scattered seep fauna were observed as we neared Geo 7 and we began to chase sonar targets and found lush seep communities. A digital target “tubeworm carbonates” entered

at 18:12 marked this area (X259, Y 4230) and we stopped to collect tubeworms and a carbonate at this site. In the vicinity of Geo 7, we observe bacterial mats, clam shell hash, and live vesicomyid clams. We arrived at Geo 7 and chased sonar targets to the north. We observe recent mud flows and small mounds (but not the large mud volcano we will discover later). A site with live clams is found at X 283 Y 4309 and we set down to collect a few clams and 3 push cores in the vicinity of the clams. Continuing to chase sonar targets south of Geo 7, a mussel bed is found. The mussel bed consists mainly of *B. childressi*. The upper slope species of *Munidopsis* is also noted, but is not collected. A mussel pot sample is attempted, but is unsuccessful and the scoop is used instead to collect this community. We explore the area more, observing a number of small pockmarks with shell hash and bacterial mats.

We completed a photosurvey of the central portion of the site. Start time for survey was 16:53Z; end time was 18:30. The random survey lines were 40 m in length. They largely overlooked the large mussel bed.

We return to Geo 7 and continue on across our previous track towards Geo 8 at a heading of approximately 100° to look for the mud volcano. We run into cloudy waters again at X 450 Y 4115 in the same area as the previous transit across this area. We then begin the search for the source of the mud plume. After running through the plume for a while, Jason begins to ascend, trying to get out of the cloud. We progress in the direction that we believe is the source, looking for a plume of rising bubbles. We find the top of the volcano, having risen about 30m from the surrounding bottom. At the summit, there are active mud flows, billowing fluidized mud coming out of the crater at the top, and a large column of rising methane bubbles (09:17, X 543, Y 4133). A number of still photographs of the summit are taken and one push core of the mud adjacent to the flowing channel is obtained. The niskins are also fired right above the plume coming out of the volcano. We spend about an hour hear and then begin to transit towards Geo 8 at 00:15.

After arriving at Geo 8 (00:15, X 662, Y 4098) we decide to investigate additional geo targets (areas of high reflectivity) to the SSE before returning to our final CRP and the mussel bed. We transited at 150° down to X 932, Y 3650 (01:20) and the only indication of seepage were occasional bacterial mats and carbonates. We chased sonar targets in this area (and encountered scattered tubeworms, mats and carbonates. Plumes of mud were encountered during this exercise and speculation of another mud volcano ensued. No evidence of such was encountered and review of dive tracks (Fisher) suggests the possibility of encountering Jason silt. We continued in a generally SE direction and continued to encounter scattered and sparse indications of chemosynthetic communities down to about X1350, Y3000 (05:20). We then turned W towards a geo target immediately S of our Northern CRP, about 600 m away. No significant chemosynthetic communities were encountered during this transet west to about X 700 Y 3050, nor during the N 300m leg back to the CRP. We reoccupied the N CRP marker at 07:03 (X716, Y3356). This is less than a 15 m offset from the original logged deployment location 22 hours earlier(X 713, Y 3347), again excellent navigation without a transponder net. A mussel pot collection was made at 07:35 in the mussel bed located here 22 hours ago (current X685, Y3424), the Big Ugly fish (sculpin, **Figure 7-27**) had only moved about a meter and was revisited, and Jason left the bottom at 07:52.

Non-seep mobile fauna was typical for the depth. Holothuroids were dominated by the white

Mesothuria lactea. Fish were common and diverse. Crabs included both Geryonids and lithodids.

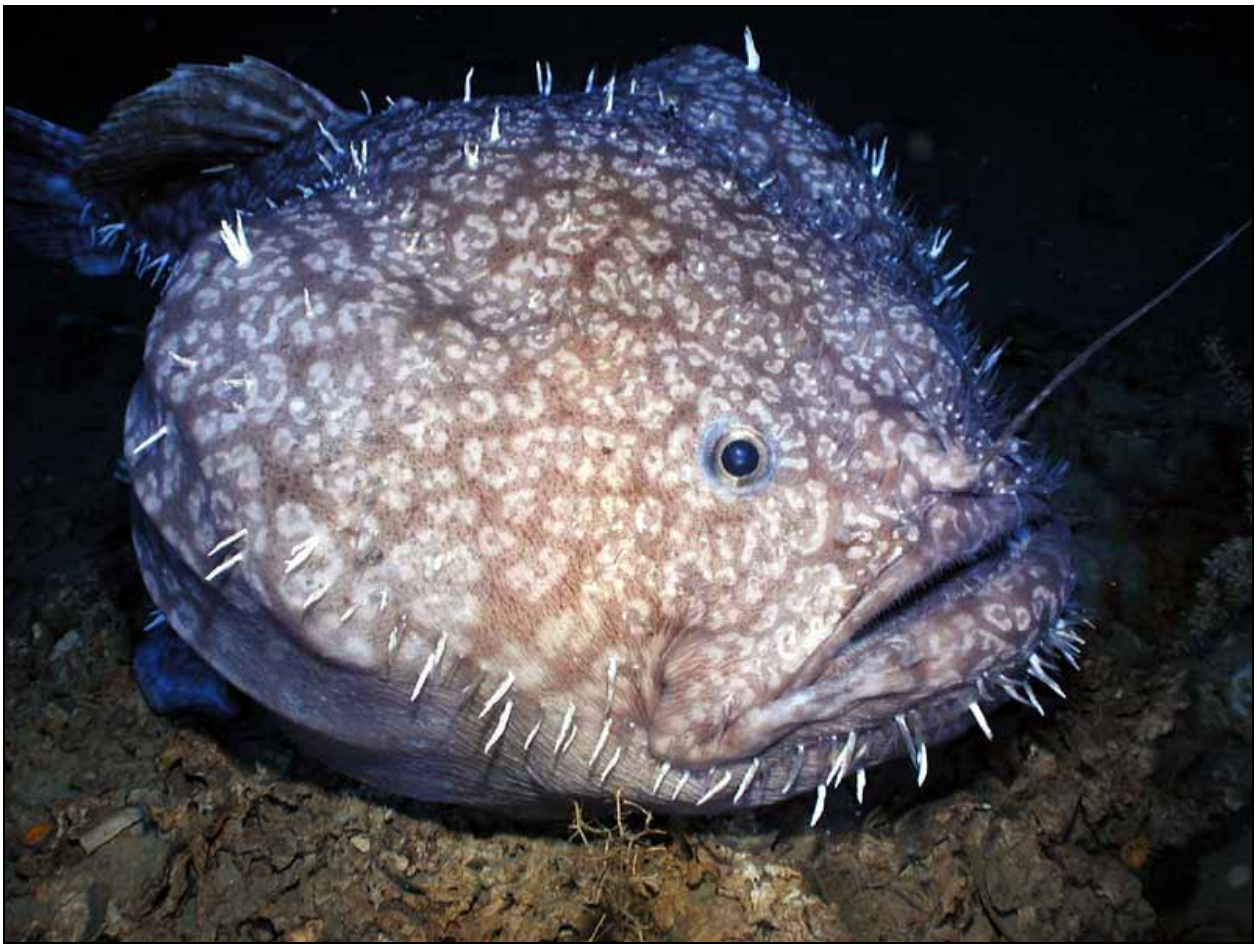

Figure 7-27. 'Big Ugly fish' (Sculpin)

The dive track for dive 274 is shown in **Figure 7-28**.

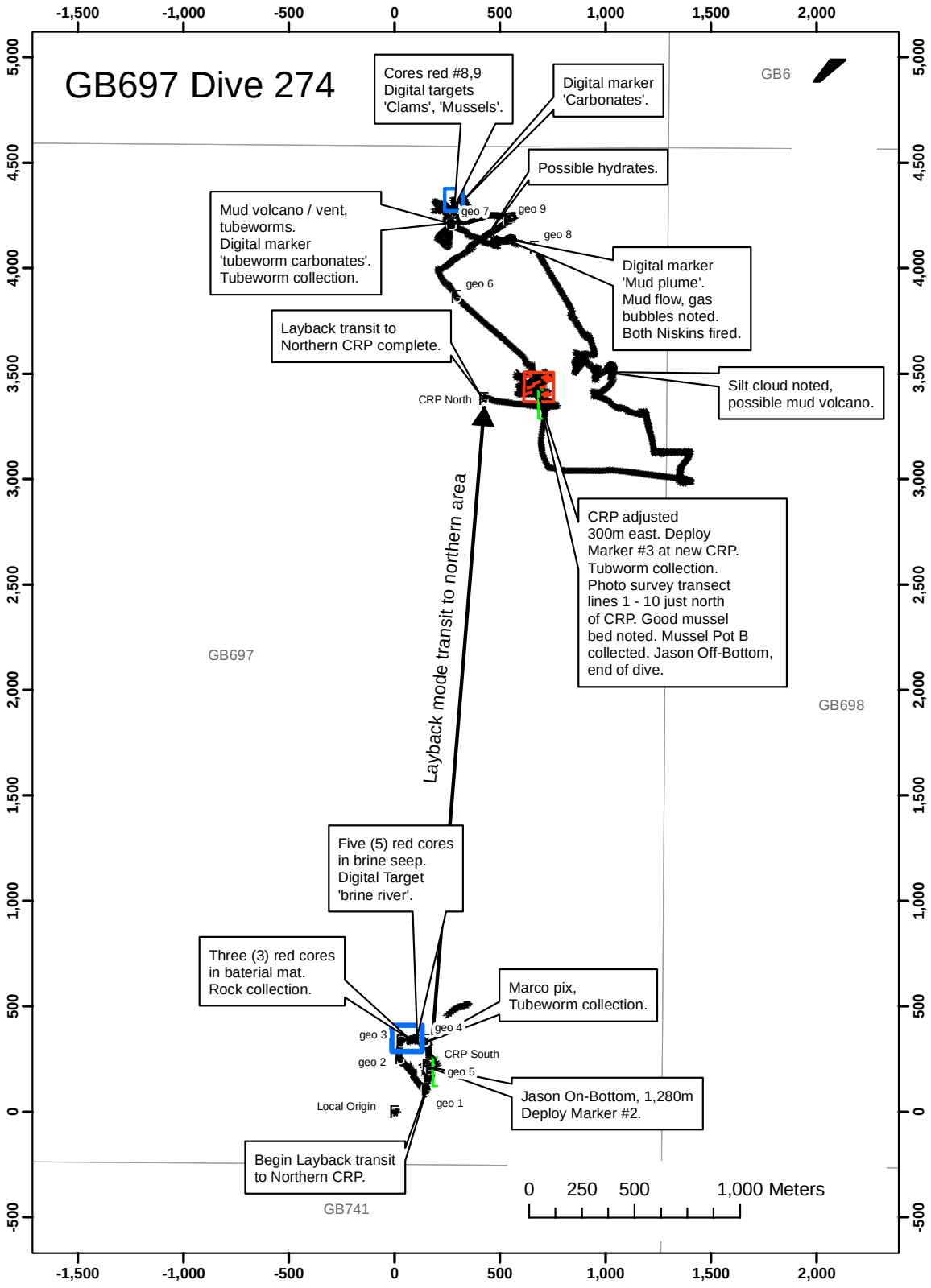

Figure 7-28. Dive track for D274

Target Selection - WR269/270

Prior to last year's exploration of Walker Ridge blocks 269 and 270 (WR269/270) using a camera sled in March 2006 and the Alvin submersible dives in May 2006, we reviewed the 3-D seismic data. The data were used to choose this site to explore for natural oil and gas seeps likely to have chemosynthetic communities living off the hydrocarbon and the associated hydrogen sulfide.

WR269/270 is near the southern extent of the vertical salt diapiric province and north of the area of the Gulf of Mexico where the salt bodies are primarily tabular, or in the form of horizontal sheets that block vertical hydrocarbon migration to the seafloor. Therefore, seismic seafloor amplitude anomalies (hydrocarbon seeps) are rare south of WR269/270 to the Sigsbee Escarpment, where the salt canopy terminates.

This site is 1,910 – 2,000 meters of water and is approximately 3,000 meters long by 1,000 meters wide (**Figure 7-28**). Moderate to high positive amplitude covers the entire feature except at a discrete, circular high that appears to be a mud volcano with distinctly lower positive amplitude (either due to steeper slopes and attenuated return signal or less lithification). Subsurface active gas migration is clear from the blanking of sedimentary bedding below the entire feature.

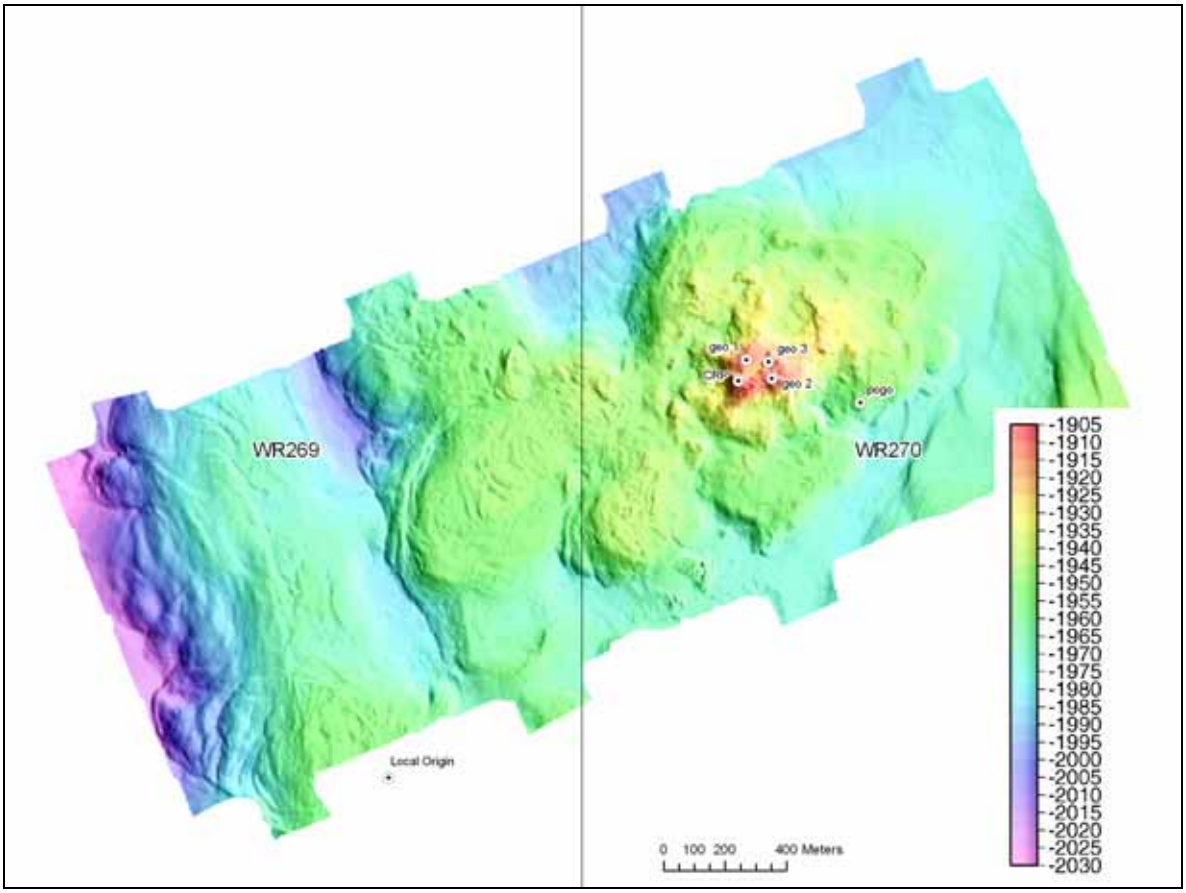

Figure 7-28. AUV derived map of bathymetry at site WR269/270.

The reconnaissance cruise in March 2006 and the Alvin dives in May 2006 confirmed that the locations chosen from the 3-D seismic maps were active seeps that contained variable population sizes and diversity of chemosynthetic organisms. The major drawbacks of 3-D data, though, are the horizontal and vertical resolution. Most 3-D data have horizontal sample sizes of around 15 meters by 30 meters and vertical resolutions of 5-10 meters; many of the sub-environments of chemosynthetic communities are smaller than the horizontal sample of 3-D data and bathymetric changes are in the 1-2 meter range. To identify these subtle features at the more interesting sites from last year's Alvin dives with improved bathymetry maps to aid in navigation, we obtained high resolution bathymetry surveys over WR269/270 and three other sites using the Autonomous Underwater Vehicle (AUV) "Hugin."

Before our first Jason dive at this site we located a prominent geologic feature revealed by our recent AUV survey. This feature is shown as a topographic high labeled as -1920 m in **Figure 7-29** below, as mapped from the AUV dataset. We were confident that we could find the center of this topographic high using Jason, so we defined its center as our CRP for the site work.

We determined the Northing (Y) and Easting (X) in meters for this selected CRP in the local coordinate system in which Jason would work. We did this by applying a geodetic False Northing and Easting to the standard UTM Zone 15 projection for the WGS84 Datum, then calculating the local X and Y from the latitude and longitude of the site CRP as measured from the AUV survey. These are the same Falsings used for the local projection of the dives at this site with Alvin last year. The local coordinates thus calculated and assigned to the site CRP were X = 424 m and Y = 2,190 m. We placed this CRP target into Jason's navigation system along with targets of interest positioned by Alvin last year and targets positioned by a geologic review of the AUV contour map.

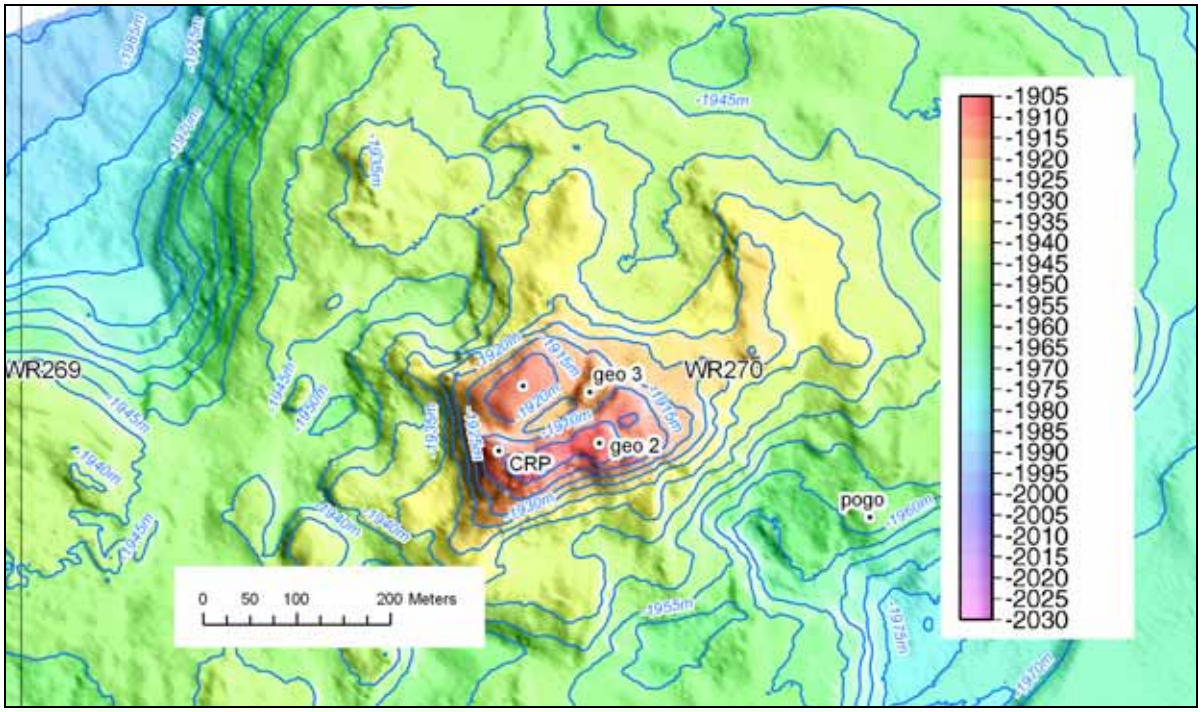

Figure 7-29. The Central Reference Point (CRP) at site WR269/270.

We defined the following for this site in WGS84 datum:

Geodetics False Northing: -2,951,123.79m
Geodetics False Easting: -131,843m
Local Origin Northing: 2,951,123.79m
Local Origin Easting: 631,843m.

Targets developed for this site are listed in **Table 7-8**. Targets listed prior to the CRP are targets from the Alvin cruise last year. Their position fixes are those logged by Jason after each marker or target was found. Targets listed after the CRP (the "geo" targets) are ones selected on this cruise by a review of the geophysical information available to us on the cruise.

Table 7-8. Target locations for site WR269/270

Target	Latitude	Longitude	X (m)	Y (m)	Depth (m)
Local Origin	N26 40.50000	W091 40.50000	0	0	
CRP	N26 41.191685	W091 39.805804	1,138	1,289	1,905
geo 1	N26 41.228907	W091 39.789692	1,164	1,358	1,910
geo 2	N26 41.195399	W091 39.740035	1,247	1,297	1,905
geo 3	N26 41.224710	W091 39.746930	1,235	1,351	1,912
pogo	N26 41.150970	W091 39.566293	1,536	1,218	1,954

Dive 275 Summary, WR269/270

Time in water: 2007/06/18 00:05
Time on bottom: 2007/06/18 00:12
Time off bottom: 2007/06/18 18:54
Time out of water: 2007/06/18 20:06
Water Time: 20 hours 2 minutes
Bottom Time: 17 hours 41 minutes
Min. working depth: 1883.04
Max. working depth: 1964.25
Produced 2.1G of raw vehicle data
Produced ~28 dvds of Science video
Produced ~28 dvds of Archive video

Jason was deployed into the water at about 8 pm hrs local on 17 June. All times and dates in this summary are reported in EDT, local time. The sea-bed at 1,965 m was reached at 21:13 hrs and event logging was initiated by the watch-stander on duty using Jason's Virtual Van event logger system. Refer to *Dive Observations* for this dive in the Appendix for a detailed log of the observed events and their times in GMT.

The core rack was top heavy with two long cores and fell off the basket upon (a slightly rough) arrival on the bottom (**Figure 7-30**). It was fully recovered and at 22:00 we began the transit to

the pogonophoran field that should be near the Marker 1. The CONTROS hydroC Methane sampler was turned on at 22:17 and gave a "spike" as it should, but it developed a ground fault and was giving very high readings at 23:00. The power was cycled but the ground fault got worse and the sensor was turned off at 23:15. Meanwhile, Marker 1 was found at 23:09 (X1483, Y 1222). It was no longer floating. [Note that the Doppler nav is moving quite a lot since event 19736, although the ROV is stationary during these coring operatins]. The large pogonophoran patch extends to the northwest and a little to the northeast of Marker 1. We planned to mosaic the area around Marker 1, so we moved north to do the sampling. We found a patch of pogonophorans that appeared to have white tubes on the camera, which we later found out to be the tubes of another polychaete, possibly a sabellid, whose white tubes were attached to the tops of the pogonophoran tubes. The purple sea cucumber *Chirodota heheva* was fairly abundant in this patch. We took one long core here at 23:29 (logged in the VV under "carbonate collection"; X1528, Y1234). The rubber band was holding the valve open at the top of the core, so it was only half full. We took two wide cores in this same location at 23:34 and 23:37. The rubber bands were broken off of these first, so the cores were filled completely. We used the suction sampler to collect associated fauna into the blue container (started at 23:53). We collected two sea cucumbers, a *Munidopsis*, amphipods and tiny white snails. After slurping for some time, we could see a brittle star near the base of the pogonophorans near the sediment. Attempts to slurp this failed because the fine mesh on the slurp was clogged and the suction was weak. We also failed to collect any anemones with the slurp sampler.

Figure 7-30. Core rack falls off Jason

We then moved to the northwest in search of a non-white-looking patch of pogonophorans. We found a non-white patch at 0:12 (X1502, Y1239; this time is an ASNAP in the VV). This patch lacked the white-tube polychaetes as well as the purple sea cucumber. The small white snails were more visible on these pogonophorans. We took the other long core, two fat cores, and two short cores here. The second short core contained the rarer straight species of pogonophoran. [Unfortunately, all four fat cores were empty upon recovery; they apparently emptied during recovery of Jason on the surface]. There was no large associated fauna, so we generally slurped around the patch to catch the tiny amphipods that were swimming around the pogonophorans (0:55 to 1:20). At 1:27, we fired the red Niskin while still sitting down at this location.

We moved back to Marker 1 and fired the green Niskin over the pogonophorans at 0.7m altitude (1:40; X1493, Y1231). This patch was similar to the patch where the first cores were taken, with white tubes and Chirodota. We did an approximately 2.5 x 2.5-meter Scorpio mosaic of this area (1:52 to 3:02). At 3:11 moved a few meters away from the pogonophoran bed and collected 7 control cores (X1486, Y1228). We returned to the pogonophoran bed around Marker 1 to collect the remaining cores. The vehicle had accumulated a lot of mud during the control coring and a cloud of suspended mud obstructed vision every time the vehicle or manipulator arm moved. The pilot moved Jason up 7 meters and spun it in circles for a few minutes to remove mud. At 4:33 we sat back down and collected 2 pogonophoran cores that were chosen to contain the rare straight-tubed species. We left this area to go back to the second coring location (non-white tubes) and take another mosaic. The VV gave an X,Y that was far to the southeast (used the red Niskin event: 19997), so this objective was aborted at 05:28 to head for the CRP and slurp mobile fauna along the way under the direction of Dr. Carney.

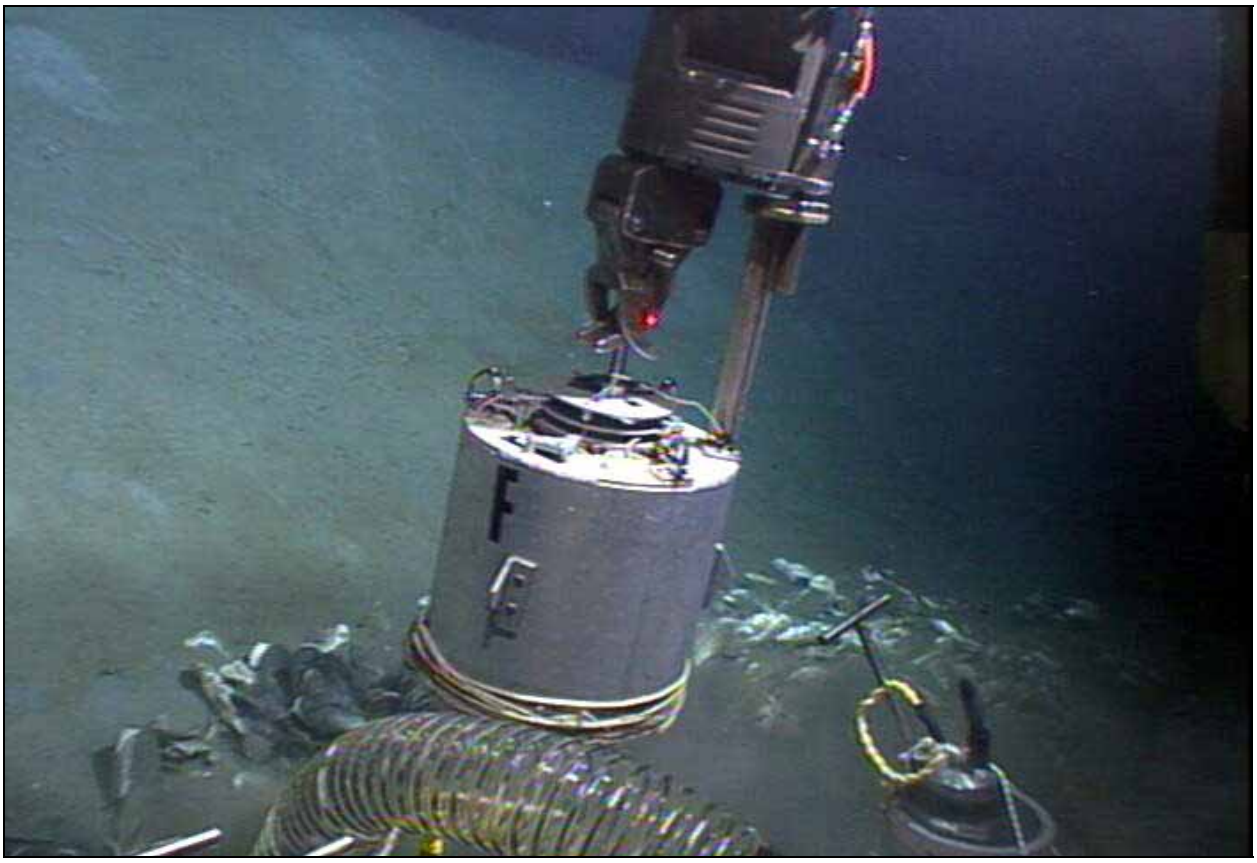

Figure 7-31. Mussel Pot F attempted collection

After collection of mobile fauna and upon arrival in the vicinity of the CRP at 08:15, extensive chemo communities, including dense aggregations of tubeworms and apparently thriving mussel communities were seen on the flanks of the central crater. Mussel Pot F (**Figure 7-32**) was attempted but failed due to clockwise rotation past the anti-rotation post (the handle just spun after this) [to fix this for future dives the antirotation posts were shortened by 1 inch after recovery]. A mussel collection was taken into the Blue net and placed into the starboard bio box. Marker 7 was deployed as a CRP in this mussel bed (X 1155 Y1248). At 09:38 a mussel pot collection (MP A) was taken in a different mussel bed (X 1194, Y 1269). At 10:36 (X1189, Y1266) a tubeworm collection was made into the white net and placed in the port bio box.

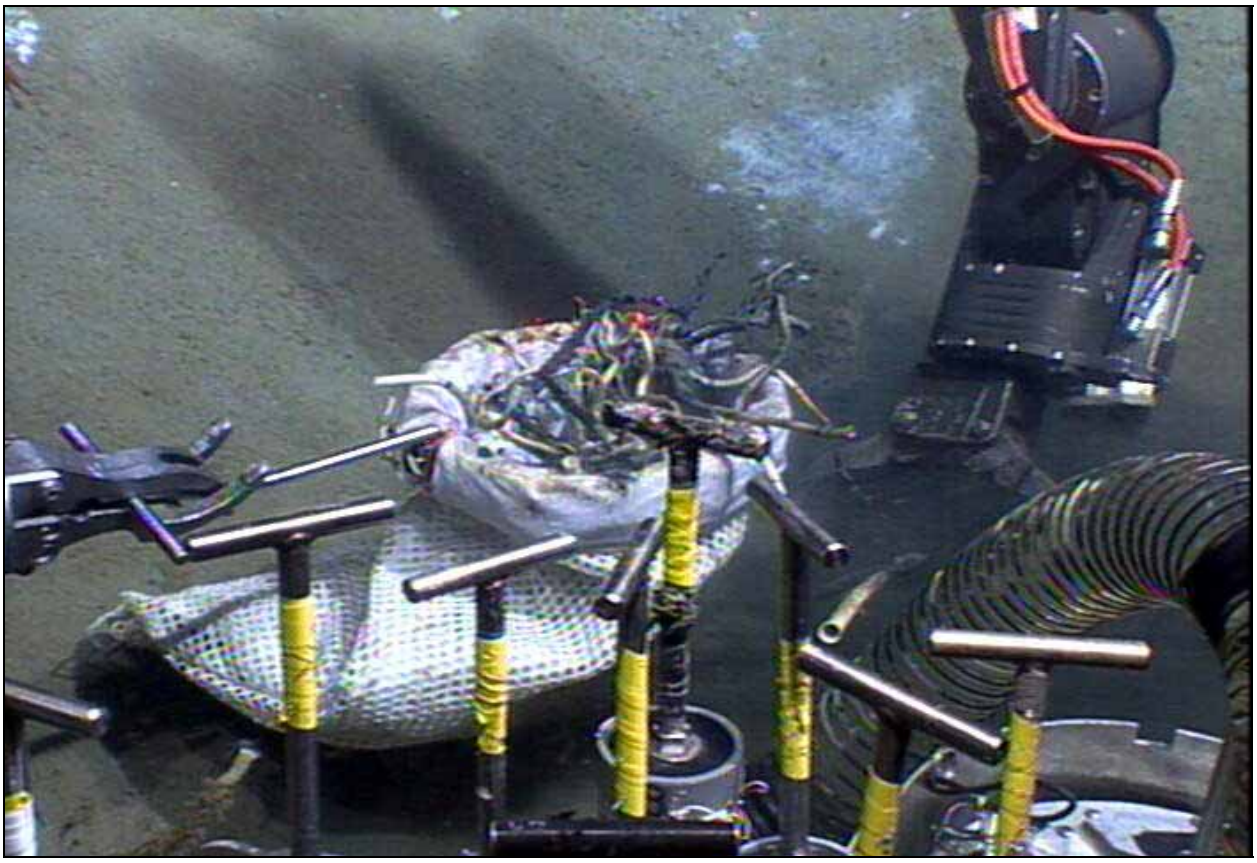

Figure 7-32. Tubeworm collection with net

At this point, transits between geo targets were initiated and Ian was contacted for initiation of Photo transects. The first photo transect started at 12:22. As is normal for the photosuvey there were ten transects. Each transect was 50 m long at this site. The last photo transect ended at 14:49 and the Jason left the bottom at 14:54. The dive track for dive 275 is shown in **Figure 7-33**.

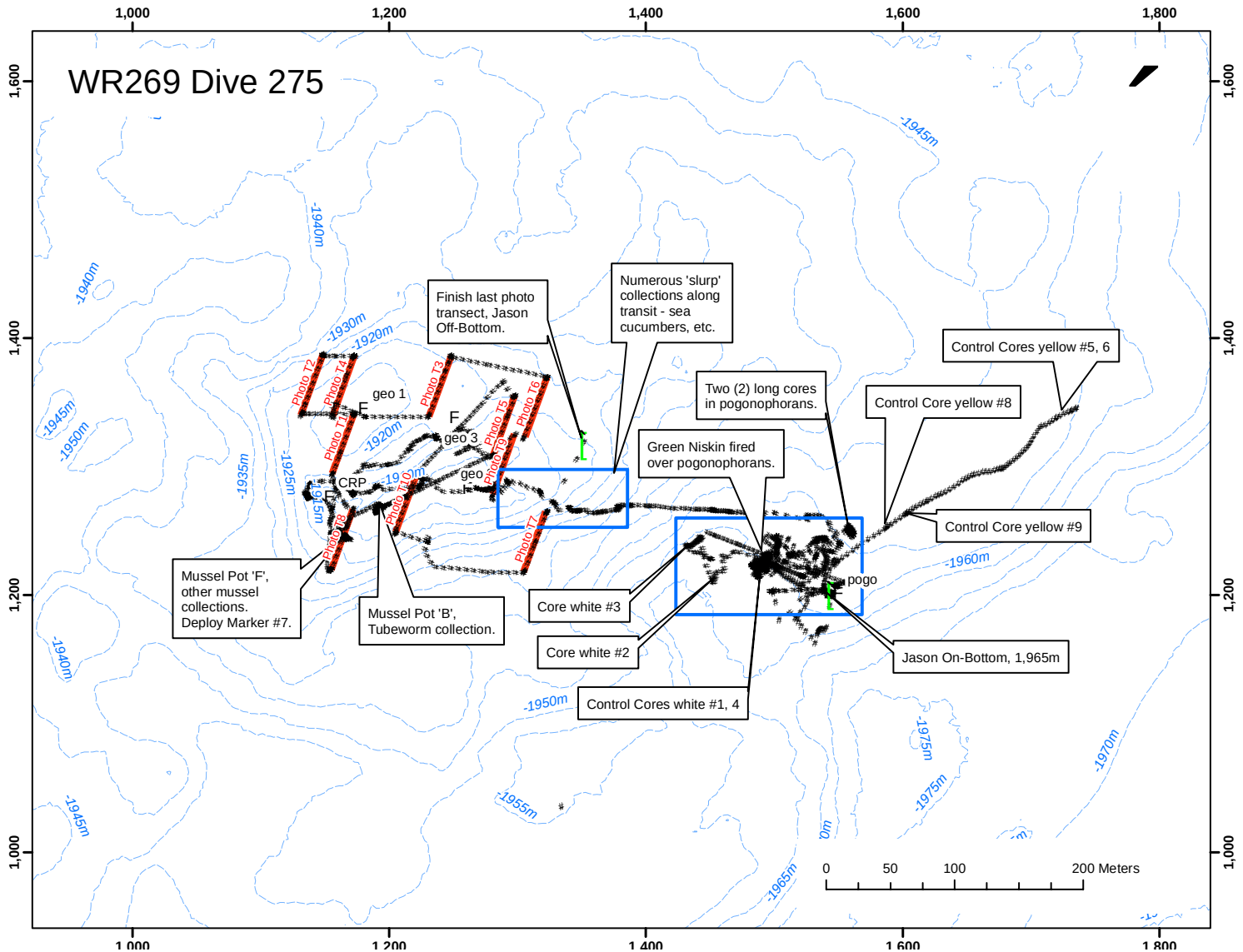

Figure 7-33. Dive 275 dive track.

Dive 276 Summary, AT340

Time in water: 2007/06/19 12:36Z
Time on bottom: 2007/06/19 14:14Z
Time off bottom: 2007/06/20 15:45Z
Time out of water: 2007/06/20 17:21Z
Water Time: 28 hours 45 minutes
Bottom Time: 25 hours 31 minutes
Min. working depth: 2033
Max. working depth: 2213.97
Produced 3.0G of raw vehicle data
Produced ~41 dvds of Science video
Produced ~41 dvds of Archive video

The calibrated LBL net had been left in place at this site from previous dives (see *LBL Calibration* section for details of the procedure). Most target locations had already been developed for this site during Dive 269 (refer to *Target Selection, AT340* for background).

All times and dates in this summary are reported in EDT, local time. Jason reached the seafloor at 10:15 local time and event logging was initiated by the watch-stander on duty using Jason's Virtual Van event logger system. Refer to *Dive Observations* for this dive in the Appendix for a detailed log of the observed events and their times in GMT. We proceeded towards the CRP and the nearby urchin mosaic site. One of the first features noticed on the seafloor was a high-density urchin bed centered at approximately X 193 Y 290. As this bed was explored more, a number of ball markers were found, indicating that this was the site of the photomosaic taken during J2-270. We then took a second photomosaic of the urchin bed at the same location to track the movement of the urchins over the previous 2 weeks. It was obvious that the urchins had traveled more than anticipated, as many had crossed the experimental tracks made a number of times. Therefore, a third, short-term mosaic in this location was planned for the next lowering.

Following the completion of the mosaic, a series of push cores were taken within and next to the experimental trails. While taking this series of cores, the core rack fell off of the basket. It was recovered and stowed over the course of 30 minutes, but was unstable and fell off of the basket again. At this time, we noticed that there was a slight hydraulic fluid leak from the bushmaster. While trying to adjust the position of the slurp hose on the basket, the core rack fell off once again. This time one of the quivers containing an empty push-core fell out of the rack. There were attempts to recover the core, but they were unsuccessful. We relocated the urchin bed and completed the series of cores over the course of the next 2 hours, assuming that the 4 cores taken prior to the core rack fumble were unsuitable for detailed analysis. The left manipulator was used to hold the core rack in place the entire time. At 18:34, Jason transited to the elevator and swapped out the core rack. During this process, the second core rack was dropped and then recovered (**Figure 7-34**). [It was determined that the core-rack fumbles were a result of a combination of overly long bolts securing the core quivers to the rack (and protruding from the bottom), and an insufficient restraining brace in front of the core rack on Jason. Both problems will be addressed before future dives]

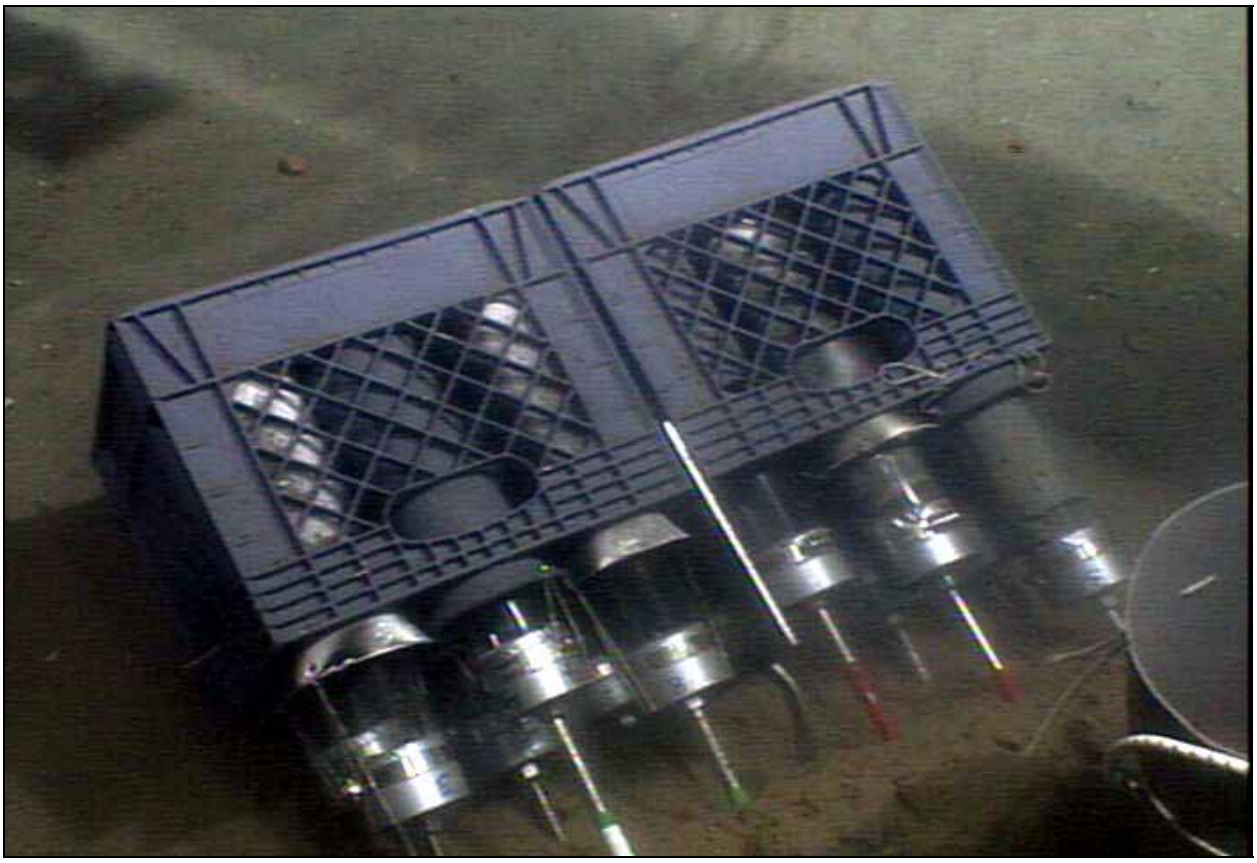

Figure 7-34. Core rack dropped

Once the core rack was in place, Jason picked up the elevator and proceeded to the large mussel bed. We arrived at the mussel bed at 20:50 and found an appropriate place for the elevator. The experimental mussel transplants were located in the mussel bed and a series of down-looking still pictures were taken. The four mussel cages (**Figure 7-35**) were then recovered from the bed and placed in the elevator. The elevator was released at 22:57. Time on deck was not logged

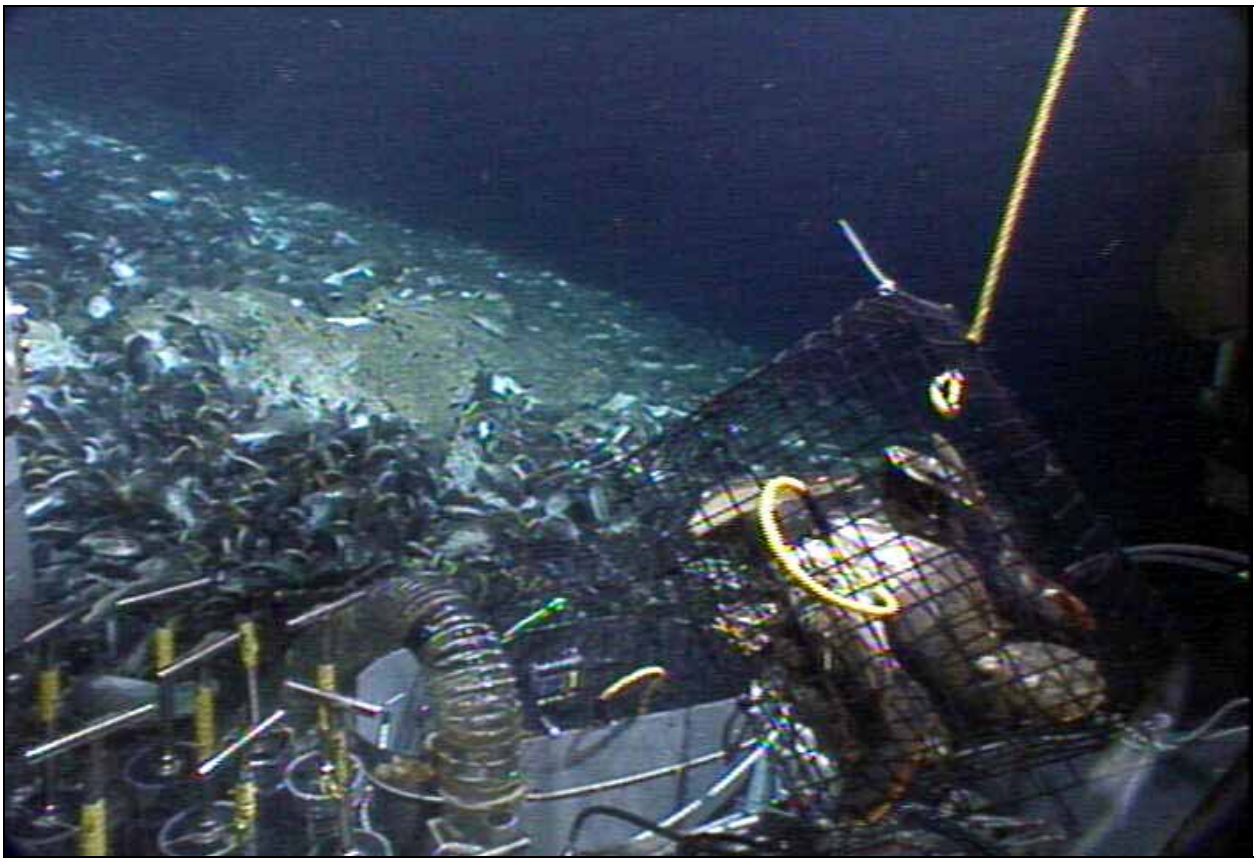

Figure 7-35. Recovering mussel cages

Jason began transit towards the northwest area to look for the fish trap using the homer beacon at 00:45 on 20 June in lay back mode. At about 02:25 observations of the sea floor resumed (X 279, Y 696) and the search for the fish trap continued. While searching, a number of holothurians, mussel beds, and urchin beds were observed. A possible mud vent was also noted and some down-looking still pictures were taken. At 03:31 the search for the fish trap was terminated (XX -336, Y 1100), and Ian was awakened for the photo survey. At 05:13, the photo survey began with transect #T9 (X-368, Y 752). The first five of planned ten transects were complete at 07:28. At this time, the chief scientist decided to postpone the second half of the survey until a future dive and transit back to the southeast corner of the site began.

Jason arrived at the blue bag in the large mussel bed (mosaic site) at 08:45, passing by one of the time-lapse camera deployments on the way (about X 560, Y 352). A mussel pot sample was attempted, but mussel pot B suffered a mechanical failure and the collected was aborted. Jason was moved to another location within the bed and the other mussel pot (F) was used to make a successful collection (**Figure 7-36**). Following the collection, the ring that was left behind was inspected and found to contain a number of small tubeworms and brittle stars. These were subsequently collected with the slurp gun into the white bucket and the mussel pot ring retrieved. One of the small ball markers was deployed in this location to mark the site of collection. A series of down-looking photographs of the mussel bed were taken at different heights to locate the collection in the mosaic.

Figure 7-36. Mussel pot collection

At 10:05 we moved to marker 5 at the edge of the mussel bed at X 555 Y 364 to collect stained tubeworms with the bushmaster collection device (**Figure 7-37**). It was determined that the hydraulic leak was not too severe and this was one of the last tasks on the dive so we proceeded with the bushmaster collection. The collection was successful and the bushmaster was stowed at 10:47 and a small ball marker deployed in the collection location. Down looking images were again collected to locate this site on the mosaic. Two carbonate collections were also made in this location.

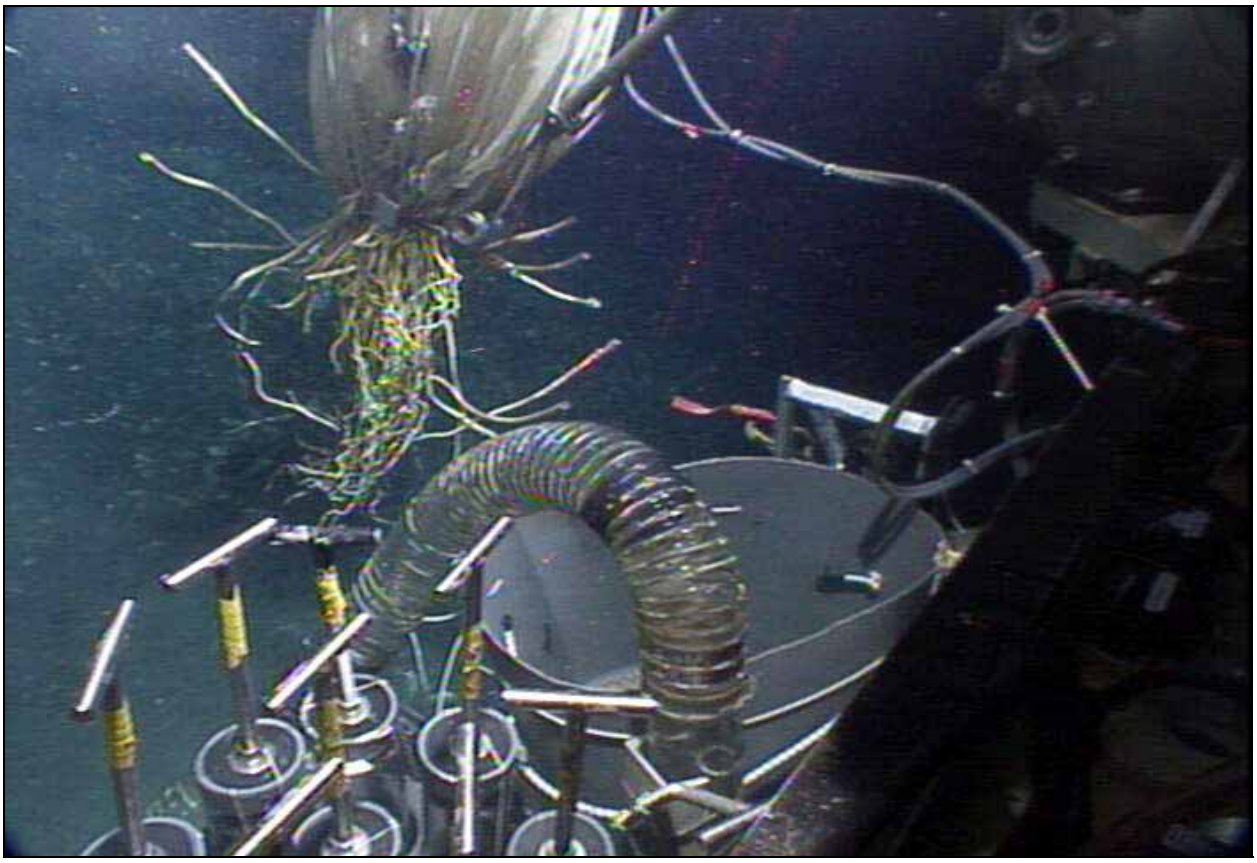

Figure 7-37. Successful tubeworm collection with Bushmaster

Jason moved a short distance to the location of the time lapse camera (X 563 Y 361) and the camera was released from the seafloor. Once the camera was safely away, Jason left the bottom at 11:45.

Non-seep mobile fauna was sparse but typical of the depth. This lower slope fauna was dominated by elasipod holothurians. Fish and crabs were also present. The dive track for dive 276 is shown in **Figure 7-38**.

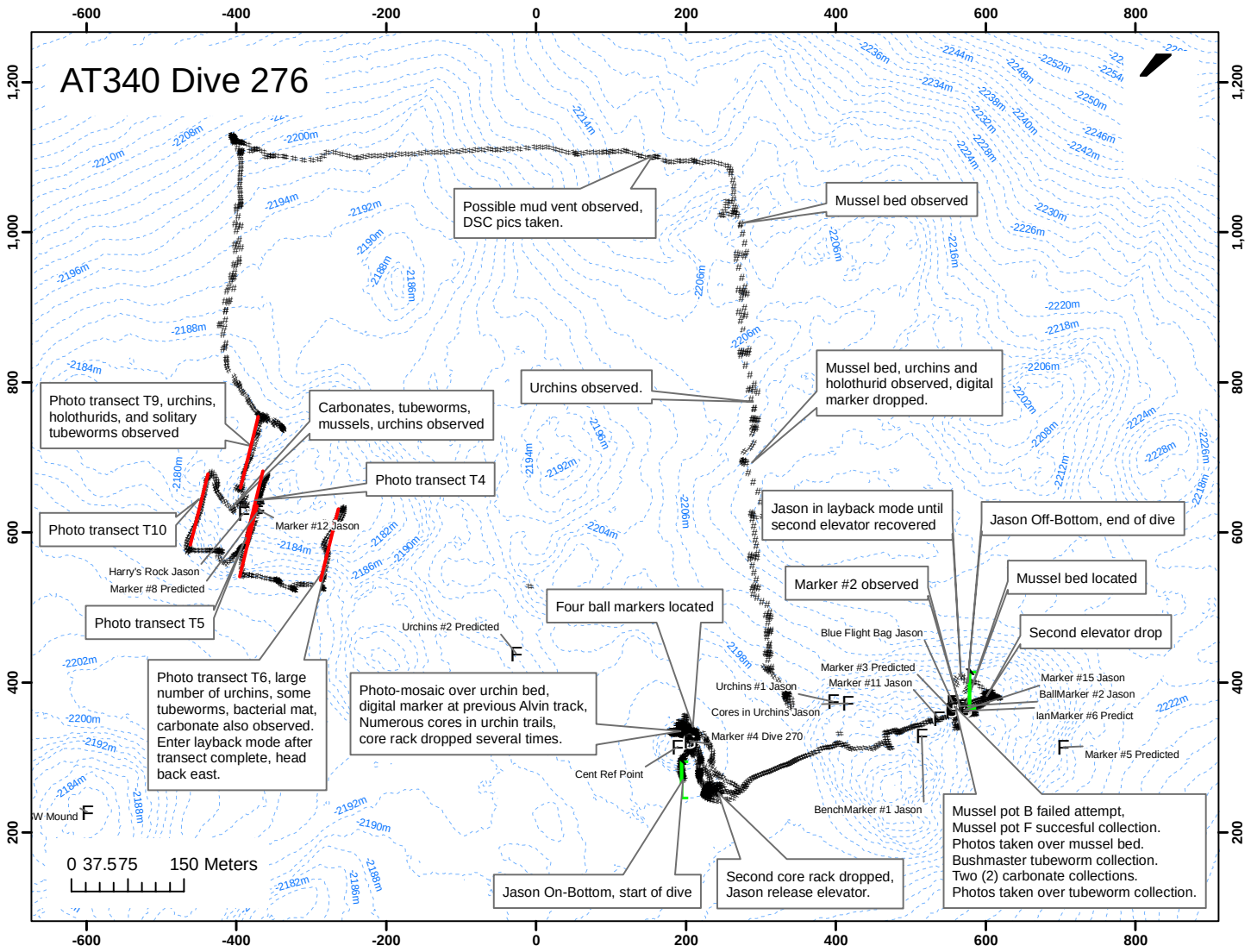

Figure 7-38. Dive 276 dive track.

Dive 277, AT 340

Time in water: 2007/06/21 04:04Z
Time on bottom: 2007/06/21 05:24Z
Time off bottom: 2007/06/22 10:37Z
Time out of water: 2007/06/22 12:10Z
Water Time: 32 hours 7 minutes
Bottom Time: 29 hours 13 minutes
Min. working depth: 2164.28
Max. working depth: 2214.56
Produced 3.3G of raw vehicle data
Produced ~48 dvds of Science video

All times and dates in this summary are local, i.e. UTC minus 4 hours.

The Jason reached the bottom at 01:24 on June 2 and proceeded to the predicted location of marker #5, which marked the Southern End of the "Mussel Brick Road". Marker 5 was found near its predicted location (X 700 Y 290). At 01:54 we began the first objective of this dive; to acquire images to mosaic the portions of this mussel-populated brine flow which we first imaged in 2006. After completing this task (at 02:54) the new CONTROS Methane Sensor was again tested (**Figure 7-39**). (It had been rebuilt since its first dive (#275 at WR 269), because it flooded during that dive.) It appeared to be working and will be used extensively during this dive.

Figure 7-39. Testing CONTROS Methane Sensor

After testing the sensor, attempts were made to core in several locations with apparent brine flows near the mussels. The cores would not penetrate sufficiently at the original site. A site with evident bacterial mats was tried and although core penetration was only about 10 cm, Chris Kellog indicated this was sufficient for analyses of viruses and 2 were taken from this mat location (X 694, Y306; 04:27). We then moved N on the Mussel Brick Road to X706, Y 318 (05:40), an area with more extensive brine flow and mats, and what appeared to be a reddish mud flow overlying some of the brine, mats, and mussels. Five cores were taken in blackish sediment (brine) and the last two in the reddish mud flow.

The Jason then moved to the Big Mussel Bed (site of ball marker 2, the "blue flight bag", and the big mussel mosaic). The methane sensor was used in 9 locations (starting at X539, Y376 at 06:31) and then two mussel pots were successfully taken. These went very smoothly as a result of slight modification (shortening) of the anti-rotation arms to better interact with the Jason hydraulic ram. The ring of the second pot was left in place to give the water a chance to clear, and the Jason left for scheduled "Engineering dive time" to run tests on the new 56 m tether and various navigation tests at 10:15. Science operations resumed shortly after noon, with initiation of a series of photo transects over the SE mounds (and our primary work area). The ten 100m photo transects were completed at 16:13 and Jason returned to the Big Mussel Bed to resume methane measurements. We set up for the first methane scan at 16:56.

The methane sensor gave consistent measurements within locations (**Figure 7-40**), but after extensive testing is was determined that there must be another gas interfering with methane that causes readings to drop significantly in some locations. This will make interpretation of the data either difficult or impossible. The methane sensor was stowed at about 20:15, the previously deployed ring from the mussel pot was collected, and a ball marker left to mark the spot of this collection. The carbonates identified by Harry Roberts on the Big Mussel Bed Mosaic were targeted for collection. The first carbonate on the list (Harry's #1) was too robust to break despite a concerted effort by the Jason pilots, so it (and considerable dust) was left on the sea floor. Harry's carbonate "#2" (as indicated on the print out of the mussel mosaic) was collected at 20:41 into the milk crate. Harry's carbonate "#4" was collected at 20:54. This collection consisted of three small pieces of carbonate placed on top of the starboard mussel pot (A).

Figure 7-40. Methane Sensor deployed in mussel bed

The next objective was to collect mobile fauna while in transit to the Urchin Mosaic area near the CRP. Mobile non-seep fauna was collected under the direction of Dr. Carney during this transit. Lower-slope holothuroids predominated (*Benthodytes typica* and *lingula*) Shortly arrival at the Urchin Mosaic area (at 22:41) it was noticed that the strobes were not evenly illuminating the sea floor. Subsequent inspection (after recovery of the vehicle) confirmed that they had been displaced during one of the times the Jason sat on the sea floor. To assure complete coverage of the mosaiced area images were obtained with increased overlap, which

will allow cropping of the darker area.

After completing this mosaic at 00:23, the Jason transited to the NW working area for completion of the last 5 lines of photo transect imaging under the direction of Ian MacDonald. This effort was completed at 02:30 and the Jason began looking for the stained tubeworms at markers 8 and 12. Marker 8 was located at 03:01 (X-379, Y630:it was not floating, like many of the other markers at this site), and the two stained tubeworm aggregations at this location were collected into the port bio box. Marker 12 was visible (floating) during these collections, and Jason proceeded straight to Marker 12 (X -377, Y630) at 03:40. The stained aggregation at Marker 12 was collected using the bushmaster collection device (**Figure 7-41**). This collection proceeded in text-book perfect fashion.

After the full bushmaster was secured to the vehicle (04:17), we initiated a transit to explore the mound immediately SE of the NW working area. The downlooking scorpio camera was turned on with a 25 second flash interval. Our target ("morning exploration") was the top of this mound. While in transit an area with numerous small carbonates with small (and young appearing) tubeworm aggregations were seen and one was collected along with the carbonate it was attached to at X-248, Y 453 (05:47). [after recovery the mobile fauna was removed by hand and the entire carbonate and tubeworm aggregation pickled].

Figure 7-41. Carbonate / Tubeworm collection

We then proceeded to the top of this mound, where several large carbonates were exposed, but there was only scattered chemosynthetic fauna . The area around the top of the mound was explored (efficiently using the new 56m tether on the Jason) but only scattered tubeworms and chemosynthetic fauna were observed until we proceeded to the Southern flank of this mound. We then discovered an area with lush chemosynthetic communities of both young and old tubeworms and mussels (X-216, Y347). This area had some of the most healthy looking tubeworm aggregations of any area visited at AT 340. This area was imaged and some high quality best of tubeworms and mussel video was obtained during the last 20 minutes of this dive. Noteworthy was the large amount of trash also visible in this otherwise beautiful area: Budweiser can, fanta can, fishing line, bags… The Jason left the bottom at about 0630 local time on June 22 for an "on time" 8 am recovery. After recovery the transponders were recovered and transit to GC 852 begun. The dive track for dive 277 is shown in **Figure 7-42**.

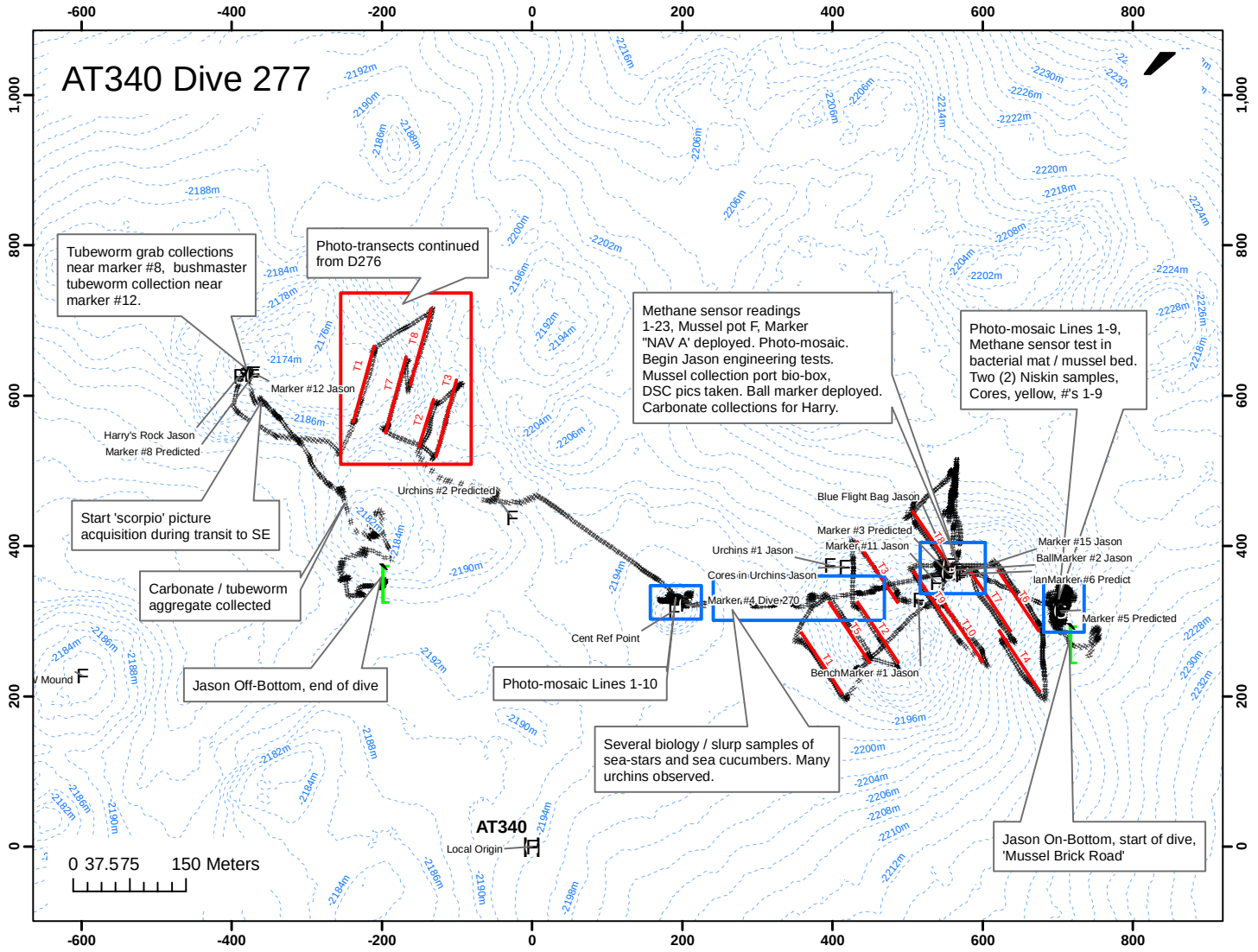

Figure 7-42. Dive 277 dive track.

Summary of Dive 278 in Green Canyon 852

Time in water: 2007/06/23 06:15Z
Time on bottom: 2007/06/23 07:05Z
Time off bottom: 2007/06/24 19:11Z
Time out of water: 2007/06/24 20:09Z
Water Time: 37 hours 55 minutes
Bottom Time: 36 hours 6 minutes
Min. working depth: 1336.89
Max. working depth: 1426.02
Produced: 3.8G of raw vehicle data
Produced: ~59 dvds of Science video
Produced: ~59 dvds of Archive video

We arrived on station for our final planned dive at GC 852 at 0100 local time on 6/23. An elevator was planned to deploy two rotary cameras and recover push cores and a set of hard corals early in the dive. Due to a last minute failure of a connector on one of the cameras the elevator was deployed with only a single camera (**Figure 7-43**) at 0130 local time. Jason was launched shortly after and arrived at the sea floor at about 0300. During descent the Mass Spec was initiated and determined to be functioning.

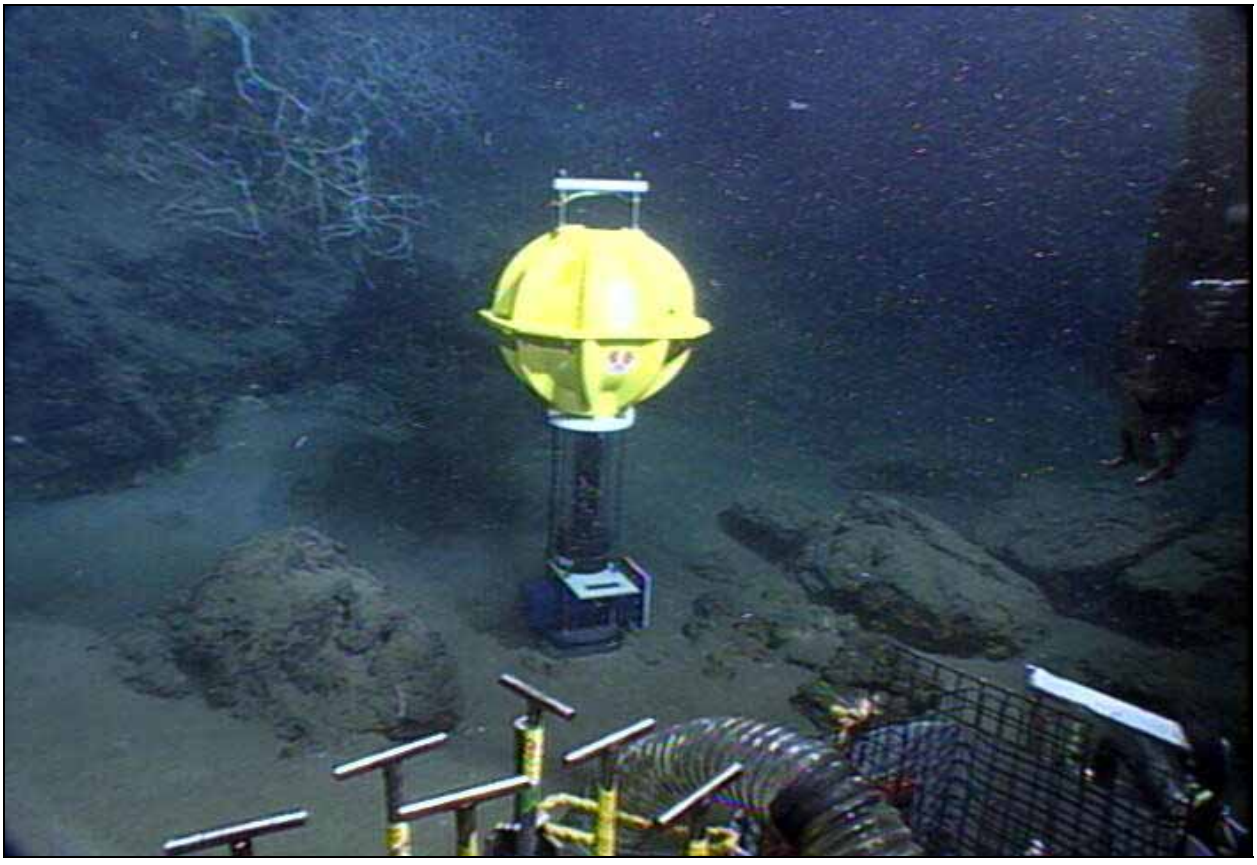

Figure 7-43. Rotary camera deployed for 2 months at coral bed

The rotary camera was offloaded and deployed for a 2 month deployment among corals at 04:49 (X373, Y923.). The decision was made by Ian and Chris in the van to make the coral collections without waking Chuck or Erik because Chris was aware of Cheryl Morrison's project requirements. Attempts were made to collect pieces of different colonies of *Madrepora* and *Lophelia* into separate compartments of the transfer basket, as well as what appeared to be another hard coral (**Figure 7-44**). This did not go smoothly and was rather destructive to the corals due to their extreme fragility. Upon recovery there was one small piece each of living *Madrepora* and *Lophelia* in one compartment of the basket, and a specimen of a calcareous gorgonian in the other side. Coral collections were completed at 06:30. The Jason returned to the vicinity of the elevator and the control pushcores for this site were taken under the direction of Marshal between 06:41 and 06:51. The coral basket was loaded into one of the bioboxes on the elevator, and the pushcores into the wooden box and the elevator released for ascent to the surface at 07:36. While waiting for the elevator a spider crab was collected into the port biobox for Dr. Carney. The elevator was recovered onto the Brown and the Jason got underway back towards the general area of markers 8,5, and 2.

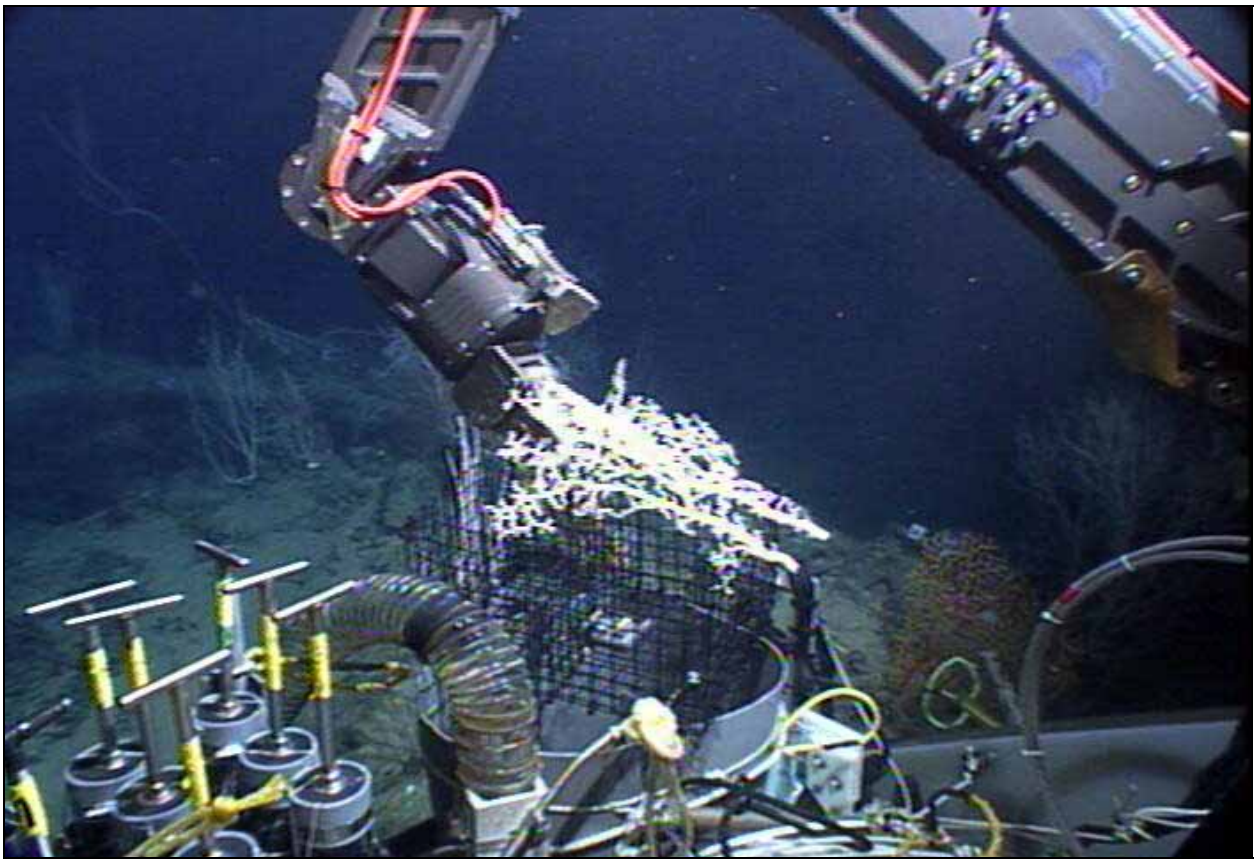

Figure 7-44. Coral collections

We took 3 mass spec scans in a small mussel near marker 5 beginning at 09:40. This fix is approximately 24 m to the east of where it was expected, so we began to look for marker 8 with this offset. Marker 8 was located with about a 17 m offset to the east along with the ball marker indicating the mussel bed sampled on Jason dive 273. This mussel bed was scanned with the

Mass Spec four times from from 10:10 to 10:53. We then moved to X466, Y1034 and began to survey another group of mussels with obvious white staining of the shells. These were surveyed with the mass spec (**Figure 7-45**) from 11:00 until 11:57. It was not possible to achieve a secure set up with Jason to make a mussel pot collection here, although it was attempted for about 10 minutes.

Figure 7-45. Mass Spec readings over mussel bed

After firing both of the niskin bottles in this location. we began the search for another group of mussels with obvious white staining. Most of the mussel aggregations in this area are found among the carbonates and difficult to reach. A likely group was located at X459 Y1051 and the group was surveyed with the mass spec from 13:11 until 14:34. After completing the chemical characterization of this group, a mussel pot collection was made and then the port biobox opened for collection of a few additional mussels under conditions of temperature insulation (for symbiont RNA analyses). Upon opening the box this watch was surprised to find it occupied by the large spider crab. In order to make room for the mussels, a leg was removed from the crab (for stable isotope analyses) and it was let free. The additional mussels from this "white patch" were collected into the small white net and stored in the port bio box. Two additional mass spec scans were completed beneath the mussel collection to determine if the chemistry at the sediment surface beneath the mussels was different from that analyzed previously. Jason then proceeded to another patch of mussels (X457, Y1015) and the group was chemically surveyed from 17:07

until 18:09. After surveying this group, 6-8 of them were collected into the port biobox (on top of the net). During this collection some very young mussels were spotted among the carbonates about 10 meters away.

After the collection the Jason proceeded towards these and found they were in the middle of a very large (approx 8 x 20 m) and thriving patch of mussels on the underside of a small carbonate ledge. Very distinctive in this area were large patches of small mussels apparently partially encased in carbonates and covered with a white fluffy material that appeared to be a sponge. A carbonate ledge covered with small mussels and this "fluff", with good access for the submersible was located (X464, Y1014) and identified for chemical scanning (from 18:44 to 20:01, macro camera photography, and sampling (of carbonates and mussels). We then searched for another group of mussels to chemically survey, passing by marker #2 again en route. During the transit, background readings were recorded with the mass spec wand in the water column. Another small, dark patch of mussels was located at X458 Y1015 and chemically profiled from 21:32 to 22:35.

Following the chemical sampling, Jason transited to the coral site to image and sample another patch of hard corals. We traveled at a heading of approximately 225 in the direction of the western edge of the photomosaic where we had previously observed a large colony of *Madrepora* that had not been previously sampled. In transit, we passed over another carbonate outcrop containing bamboo corals and other gorgonians at X439 Y1008. We reached the coral site at 22:59. We began imaging the corals with the macro camera at X362 Y916. We noticed the area where *Enallopsammia rostrata* had been collected with Alvin the previous year only a few meters away. After taking images, a small piece of *Madrepora* was collected into the starboard biobox at 23:33. Jason lifted off the bottom and a careful survey of the Madrepora was conducted to ensure that it was all part of one colony, and did not consist of separate settlement events. After we were satisfied with this conclusion (indicating that it was unnecessary to continue physical sampling of the same coral colony), we proceeded to the central point for the SM2000 survey.

Calibration of the SM2000 began at 00:01, and the survey began at 00:27 at X279 Y816 at a heading of 0° and 5m altitude. After 12 lines, with the odd numbered lines heading north and the even numbered lines heading south, the survey was completed at 05:10 and a tie line was run parallel to the rest at a heading of 270°.

After comparing the processed SM2000 and Hugin AUV multibeam data it appears that a positional offset similar to that observed in AT340 (see Figure 3, D269 AT340) exists between the two surfaces – see **Figure 7-46** below.

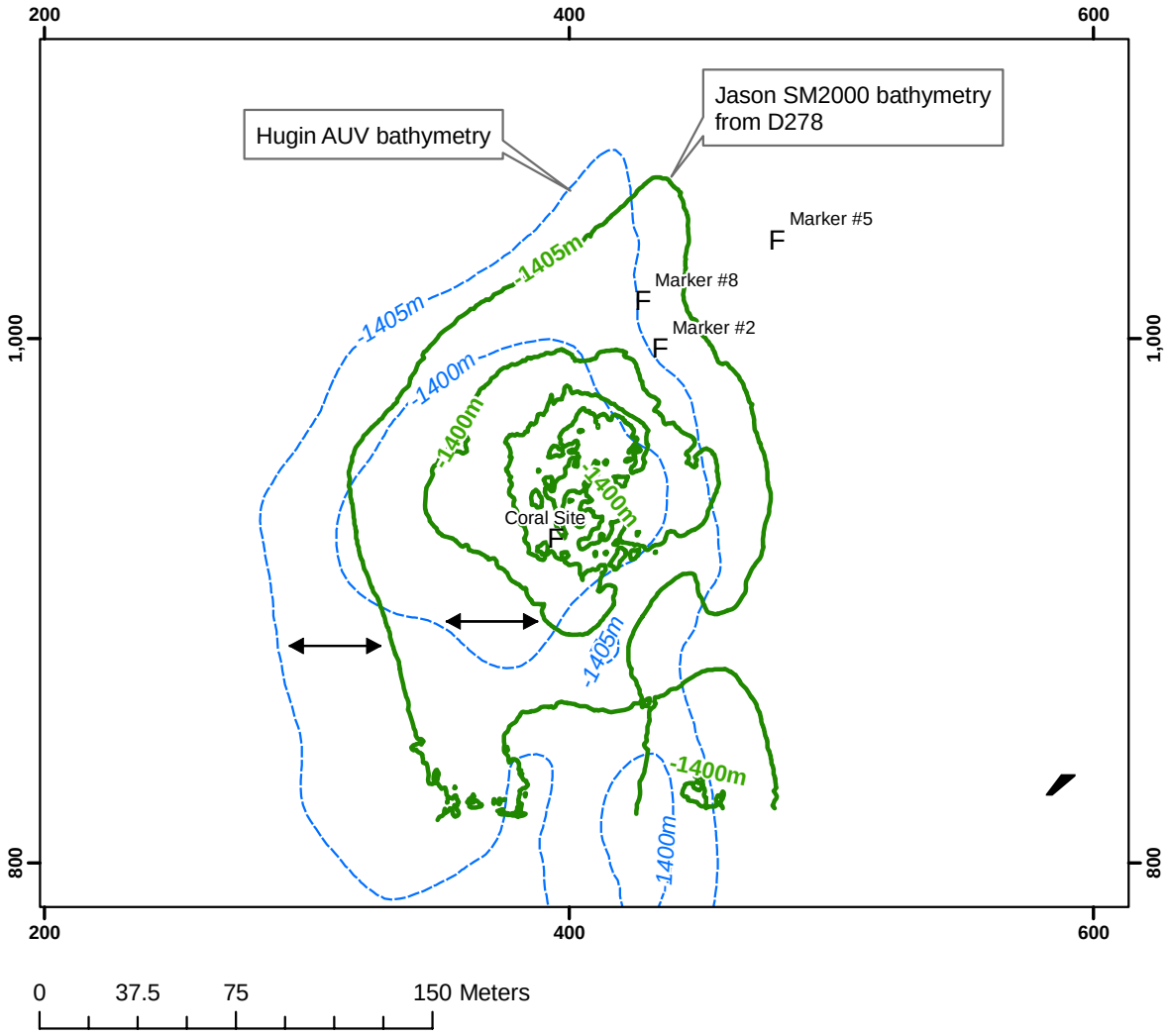

Figure 7-46. Apparent offset between processed SM2000 and Hugin AUV multibeam data

At 6:08, Jason began transit to Marker 1 searching for mobile fauna to slurp on the way under the direction of Dr. Carney. We arrived at Marker 1 at 07:42 (X392, Y 495), then proceeded to Marker 6 and the stained tubeworms. Mass Spec sampling of stained tubeworms began at 08:28 (X 410, Y 492) and finished at 09:13. The stained tubeworms were collected into the starboard bio box at 09:31 and we then slurped shrimp for about 15 minutes. Moved to mussel bed at Marker 1 (previously scooped), for another mass spec followed by collections. First mass spec scan started at 10:11 (position 38) and done with "position 41" at 10:58. Mussel pot F taken smoothly and done by 11:10. We then moved towards the SW and collected a few vesicomyid clams into the bio box (X373, Y 422 at 11:54). At 12:44 a bushmaster collection of a tubeworm aggregation was completed (X381, Y 470) and we began transit to the first of 10 photo-transects (labeled photo-mosaics in the log). These began at 13:07 (X385, Y 469). These were completed at 15:00 and we left the bottom at 15:12. The dive track for dive 278 is shown in **Figure 7-47**.

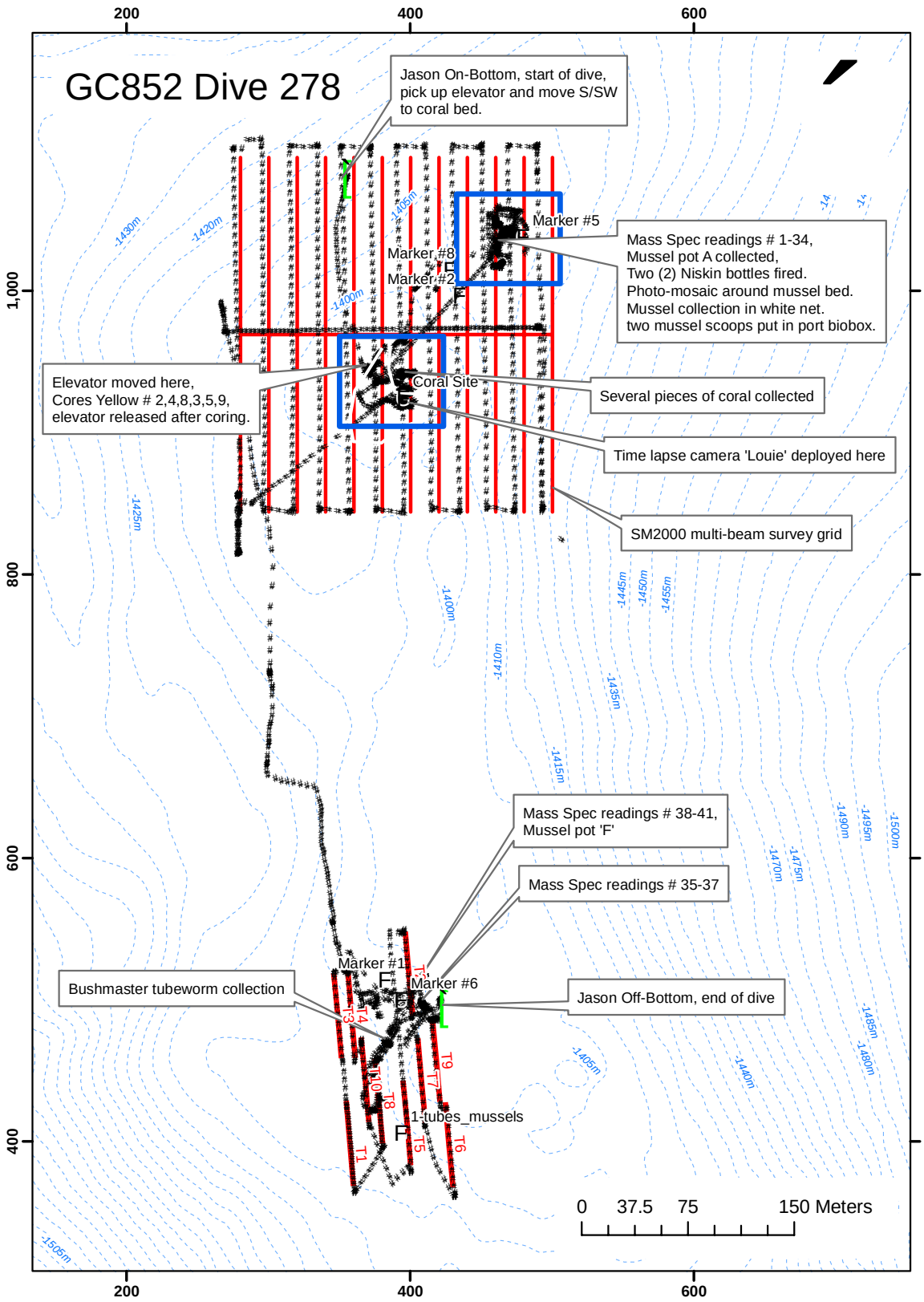

Figure 7-47. Dive track for Dive 278

Target Selection - GB829

Garden Banks block 829 (GB829) is located in the middle slope of the Central Gulf of Mexico (**Figure 7-48**). The target block is located along the southeast margin of a large minibasin that was formed from recent deepwater sedimentation (Miocene, Pliocene, and Pleistocene) and salt withdrawal. A series of seafloor amplitude anomalies are aligned along the eastern margin of the basin and are coincident with locally positive bathymetric features on the seafloor. The features are interpreted to be high-flux vents capable of extruding sediment and hydrocarbons, often resulting in the construction of mud volcanoes. Outcrops of gas hydrate and dense chemosynthetic communities are also associated with these features. The Magnolia Field (GB783), located approximately four miles northwest of GB829, contains oil accumulations in Pliocene and Pleistocene turbidite sand reservoirs ponded near the southern margin of the basin.

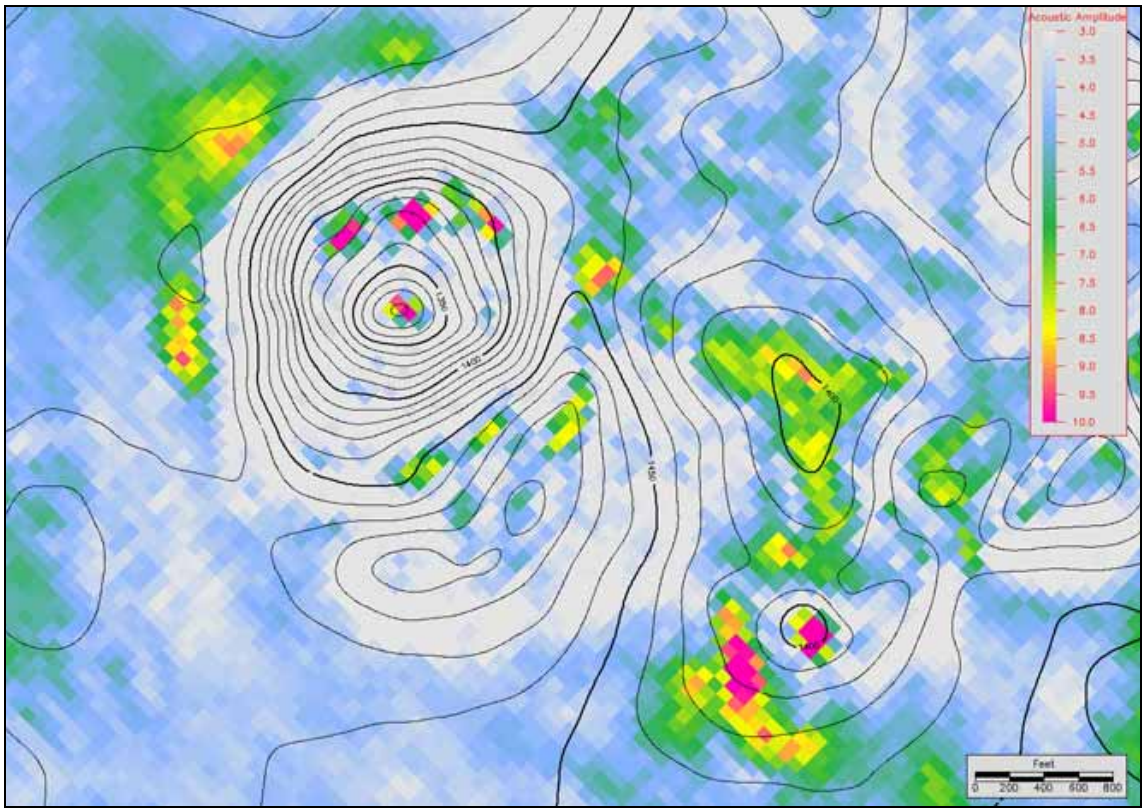

Figure 7-48. 3-D seismically derived bathymetric map with amplitude overlay showing the high relief mound, referred to as the "Christmas Tree", located on GB829; used by permission.

The northeast corner of GB829 contains several distinct mounds on the seafloor with a corresponding positive acoustic amplitude response. Three low relief mounds on the southeast margin of the complex contain fairly widespread accumulations of positive amplitude returns. The high relief mound (**Figure 7-48**) on the western margin of the complex (referred to as the *"Christmas Tree"*) is the primary zone of interest, largely due to the unusually steep gradient

(>40 degrees) and high vertical relief (130 meters). A very small strong positive amplitude response is noted on the crest of the feature, and a few associated strong anomalies are noted on the north slope at the vertical midpoint. A weak positive response at the toe of the slope on the northwest side could represent a recent flow. The conventional seismic data beneath the *Christmas Tree* is wiped out, indicating an abundance of gas in the shallow section.

An approximate target location for the high relief mound was selected from a paper MMS chart (no digital MMS chart was available prior to the dive) and digital bathymetry data from the NOAA NGDC database. Prior to ROV deployment a single pass over this approximate dive site was made using the SeaBeam multi-beam system on the Ron Brown starting at 05:30 EDT. Based on the multibeam data a slightly revised dive target location was selected. A local origin was selected just to the SW of the CRP (see **Table 7-9** and **Figure 7-49**).

Table 7-9. Target locations for site GB829

Target	Lat	Lon	Depth m	LatDD	LonDD
Local Origin	27 10.650 N	92 7.820 W		27.177500	-92.130333
Peak - CRP	27 11.0844 N	92 7.4302 W	1,291	27.184740	-92.123837
East Mnd	27 10.8689 N	92 6.9784 W	1,326	27.181148	-92.116307

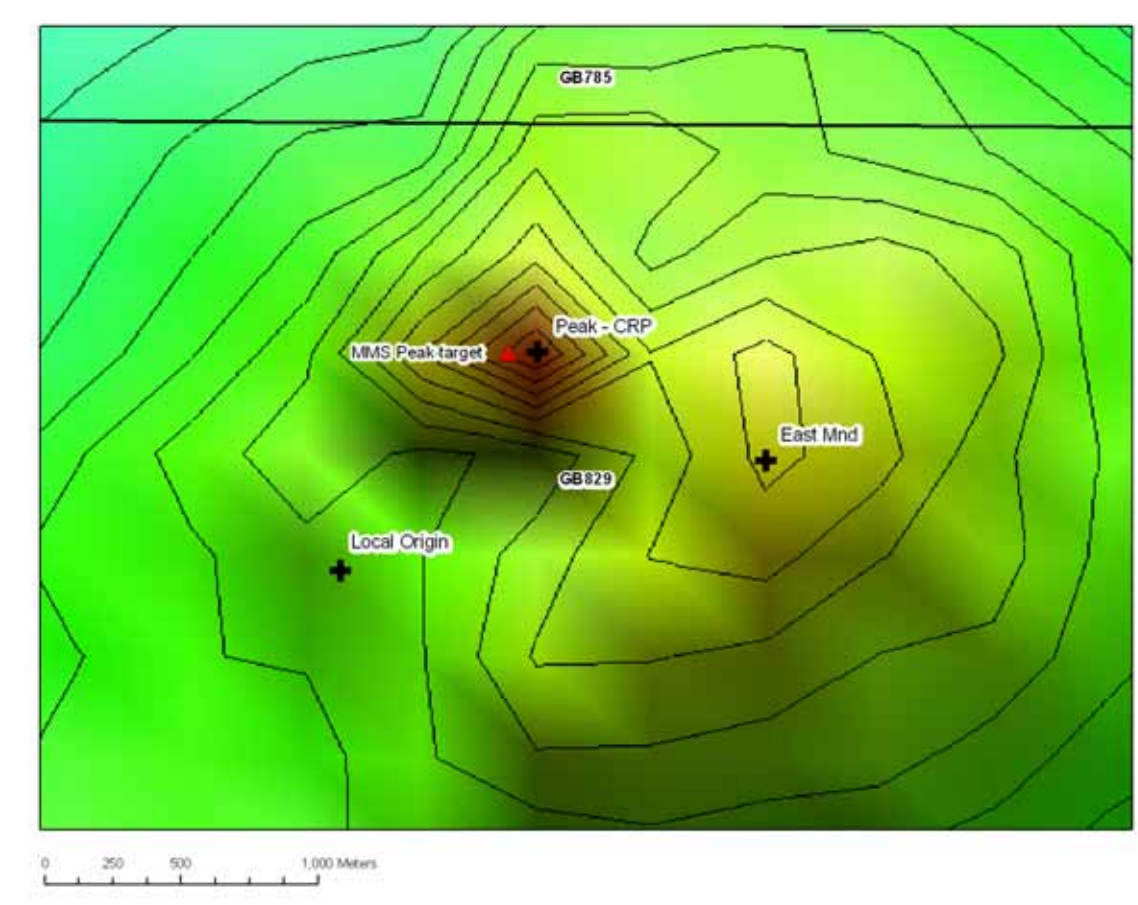

Figure 7-49. SeaBeam multi-beam data used to confirm dive target.

Dive 279 Summary, GB829

Time in water: 2007/06/25 12:09Z
Time on bottom: 2007/06/25 13:14Z
Time off bottom: 2007/06/25 21:32Z
Time out of water: 2007/06/25 22:31Z
Water Time: 10 hours 22 minutes
Bottom Time: 8 hours 18 minutes
Min. working depth: 1216.46
Max. working depth: 1303.88
Produced 1.1G of raw vehicle data
Produced ~13 dvds of Science video
Produced ~13 dvds of Archive video

At 9:06 EDT hours Jason reached the seafloor at the CRP. Depth was approximately 1,255m. Jason then began a transit to the W-NW up a steep slope (approximately 30 degrees) and reached a local high of approximately 1,222m which was believed to be the top of the 'Christmas Tree' high relief mound. Marker # XX was placed here, near the summit of the mound. Jason then transited approximately 200m meters to the north and then descended to find the sea floor (this avoided dragging the tail of the ROV down the mound and creating mud clouds). Jason turned 180° and proceeded approximately 100m back up slope to the south in search of the source of the a high reflector indicated on the MMS charts.

A dense mussel bed extending over approximately 3.5 m W-E and 2 m S-N was located on a slope near the expected location of the high reflector at a depth of approximately 1,260m. The mass spec unit was then deployed to take readings in 5 locations (#42 – 46) in the mussel bed from 11:00 to 12:40 (**Figure 7-50**). At 12:45 mussel pot A was collected for analysis of the community composition and samples were also collected with a net into the temperature insulated bio box for genetic analyses. The bed and surrounding briney sediments were imaged via a photo mosaic from 1:11 to 1:51 in order to allow future measurement of the bed dimensions.

Figure 7-50. Mass Spec readings taken over dense mussel bed

At 1:52 Jason began to move W-SW towards the next suspected high reflector noted on the MMS amplitude anomaly map. After approximately 140m an area of carbonate outcrops, mussel and tubeworms was found. From 2:26 to 2:43 a series of macro camera photos was taken (tubeworms and mussels). Between 2:47 to 2:54 a carbonate sample with a sponge attached, a tubeworm grab sample, and another carbonate sample (associated with the tubeworms) were collected. Scientists in the Jason Van speculated that the sponges covering the carbonates might facilitate carbonate deposition above the sediment surface here as was also speculated in the community of young mussels at AT340.

At 3:05 the Jason returned east to the large mussel bed and at 3:31 mussel pot F was collected in the same mussel bed visited 4 hours earlier.

At 3:51 Jason proceeded east on a heading of approximately 90 degrees to find the third high amplitude anomaly. After approximately 140m Jason turned to a heading of 145 degrees following a sonar target. Several large carbonate outcrops were noted. Tubeworms and mussels were also noted in these areas. Jason then headed NW upslope towards the topo high. A carbonate was collected near the summit and at 5:32 Jason began it's ascent to the surface.

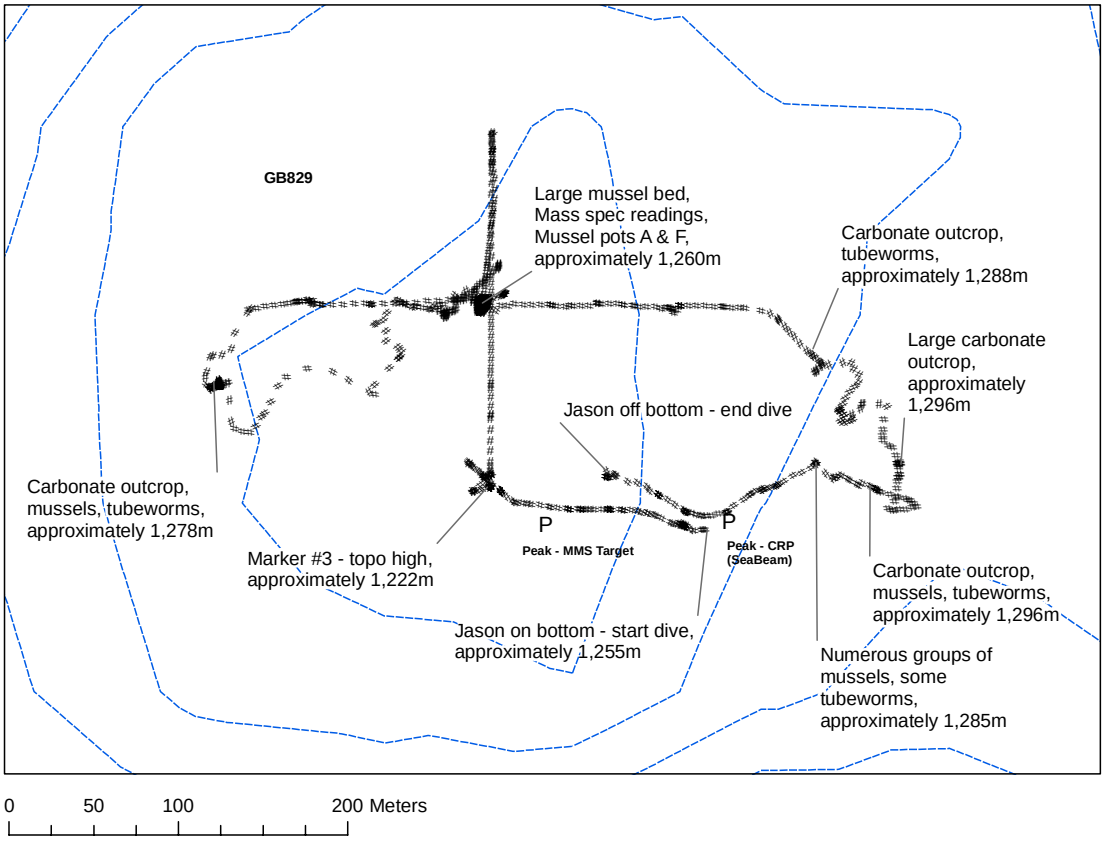

Figure 7-51. Dive track for Dive 279

Target Selection - GB647

The Garden Banks block 647 (GB647) site is in an area of Garden Banks where most of the subsurface production is more likely to be gas than oil and oil slicks are less common than to the east; therefore, seeps in this area are more likely to be gas than oil. Many of the salt diapirs in the area are relatively shallow, as is the case with GB467; salt comes within as close as 15 m to the seafloor, but averages ~250m of sediment thickness above salt. Brine flows are, therefore, possible at this site.

The study area is the crestal portion of a northeast-southwest trending salt ridge that connects two large salt highs. It is in 950-980 m of water and is ~700 m wide by ~2000 m long; the entire ridge is 1500 m by ~6000 m. There are many small, discrete, and bright high amplitude anomalies scattered across the top of the ridge; the ones chosen for exploration (targets 'geo1 through geo6') appear in seismic cross-section to have the best migration conduits below them, thus, are probably the most active (see **Figure 7-52** and **Table 7-10**). Lithified flows on the flanks of the ridge are not apparent on the amplitude map. The CRP was located on an apparent local topographic highpoint slightly north of geo 1 – 6.

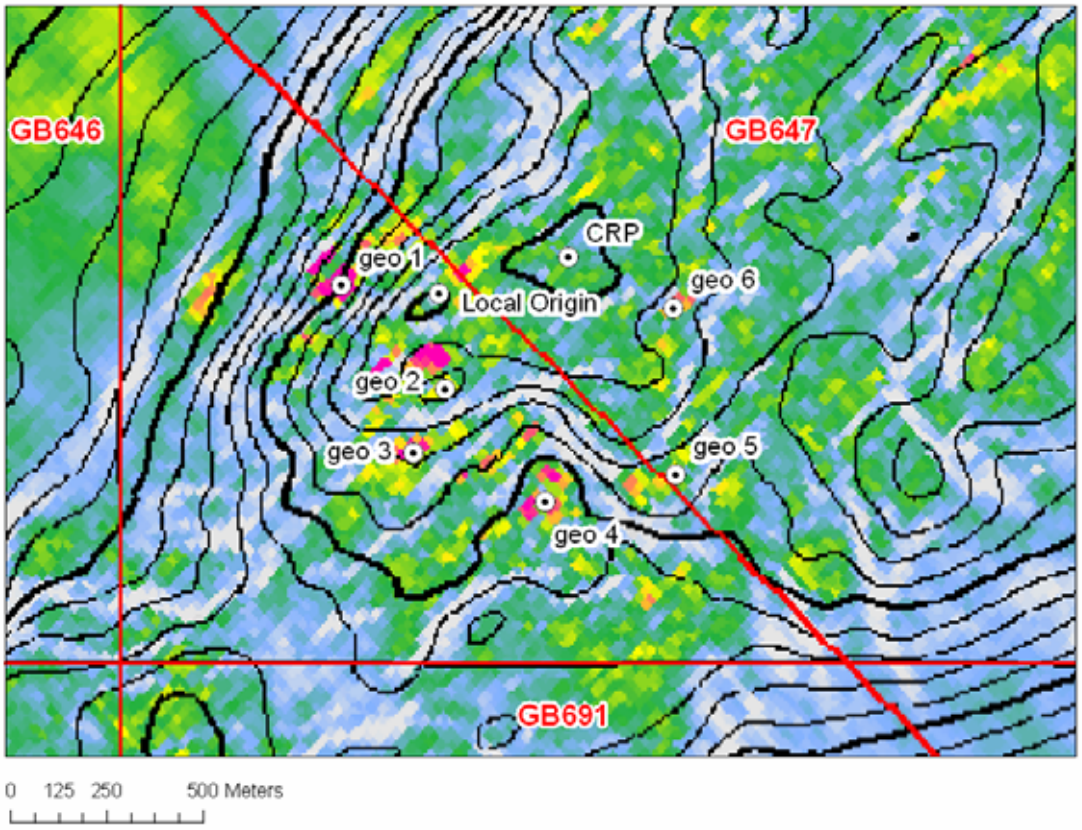

Figure 7-52. Target locations for site GB647 on 3-D seismically derived bathymetric map with amplitude overlay (C.I.=10m); used by permission.

This area has characteristics in common with both GC 852 and AT340. Like GC852, it is a

prominent ridge exposed on two sides by open water and currents from the east or the west that could carry larvae and plankton for filter feeders like corals. Like AT340, there a number of discrete sites with good indication in the subsurface of active hydrocarbon migration.

Table 7-10. Target locations for site GB647

Target	Latitude	Longitude	Local X (m)	Local Y (m)	Depth (m)
Local Origin	N27 20.00000	W092 26.00000	0	0	
CRP	N27 20.051172	W092 25.796552	335	96	945
geo 1	N27 20.012004	W092 26.155817	-257	21	1,000
geo 2	N27 19.866171	W092 25.991583	15	-247	965
geo 3	N27 19.777003	W092 26.042983	-69	-412	980
geo 4	N27 19.706283	W092 25.835312	274	-541	1,003
geo 5	N27 19.743898	W092 25.628909	614	-470	985
geo 6	N27 19.977914	W092 25.631952	607	-38	965

Dive 280 Summary, GB647

Time in water: 2007/06/26 09:59Z
Time on bottom: 2007/06/26 10:44Z
Time off bottom: 2007/06/26 23:33Z
Time out of water: 2007/06/27 00:17Z
Water Time: 14 hours 18 minutes
Bottom Time: 12 hours 49 minutes
Min. working depth: 932.09
Max. working depth: 1004.95
Produced 1.5G of raw vehicle data
Produced ~20 dvds of Science video
Produced ~20 dvds of Archive video

NOTE: Positions quoted in this summary are not re-naved.

Jason on bottom at 10:44 GMT at a subsea depth of 945 meters, on top of the local high. Immediately next to the landing site was an asphaltic rock with several gorgonian corals growing on it (**Figure 7-53**). The rock was sampled and one coral was taken. Marker #2 was deployed at this site and identified as new CRP.

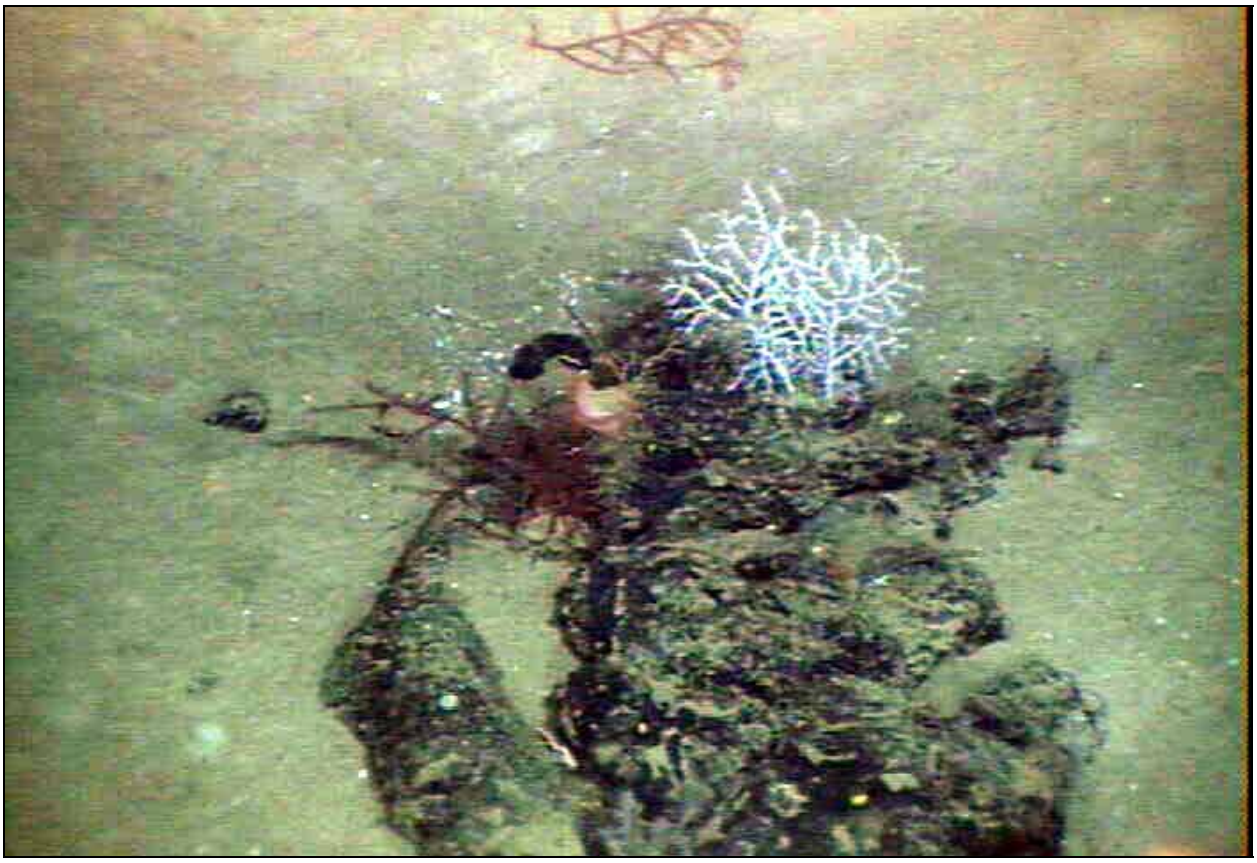

Figure 7-53. Asphalt with coral collected

Transit west to geo-marker #1. At 12:17 a gorgonian was observed prior to geo #1, and a marker was deployed. When we arrived at geo #1, a vast outcrop of both carbonate rocks and asphalt was observed. Samples of asphalt and carbonate rocks were taken. Rock had appearance of laterally elongate burrows (**Figure 7-54**). Several white stained soft bottom patches were observed and cores taken. Possible brine flows and bacterial mats. Regular urchins, gorgonians, and sponges were observed on the outcrops. SM 2000 sonar in side-scanning mode was useful in locating targets. We traversed to the western (downdip) margin of the outcrops, then turned back to the east and headed 159 to geo-marker #2.

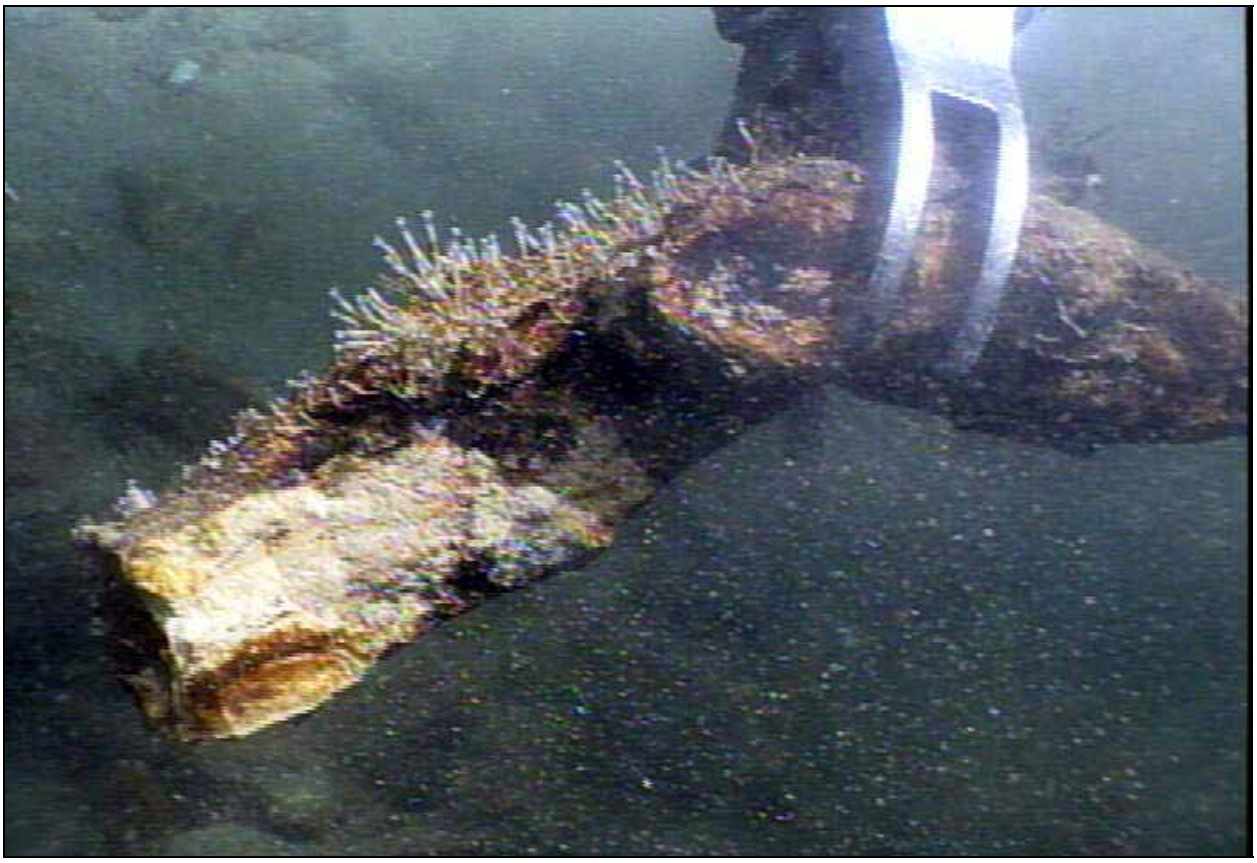

Figure 7-54. Carbonate collection

Geo-marker #2 and #3 yielded very little. Associated sponges and isolated tubeworms were noted in very limited quantities, as well as carbonate rocks and bacterial mats.

In transit to geo-marker #4. Small clusters of 3-5 tubeworms were encountered at 16:17 and were sampled. When one of the tubeworms was pulled, asphalt/tar/oily substance was dripping from the base of the tubeworm. Also, the same black substance was floating up from the disturbed sandy bottom (**Figure 7-55**). Also, some tar/oil landed on the science cam partially blocking vision. This location corresponded nicely with geophysical amplitude anomalies that had not been pre-selected as a geo-target. Also at the pre-geo #4 location, cores were taken in a bacterial mat that yielded a very oily substance.

Figure 7-55. Tar-like substance oozing from site of tubeworm collection

Geo-target #4 had very expansive carbonate outcrops and possible asphalt. Topographically, the outcrops were located in a valley that trends roughly north/south. The exposures were along strike, dipping slightly off the mound. Incisions were noted in the valley indicating flow. Briney flows (bright white) were flowing downhill along the bedding planes. Several cores were recovered from the white bottom. The only live mussel community of the dive was observed living at the base of one of the flows. This small mussel aggregation was mostly buried in the sediment. Samples were taken using the Jason claw into starboard biobox at 18:05. A traverse was made back to the west and muddy bottom was found. Re-calibration of the nav indicates that the large carbonate outcrops in the valley corresponded to the high amplitude response on the seafloor geophysical map.

Traverse east to geo-marker #5. Mostly muddy sediment, with an occasional bacterial mat and sponge, also occasional carbonate outcrop. Turned nearly due north for geo-marker #6 at 21:09. Traversed for nearly 400 meters to north, encountering very sparse carbonate outcrops, bacterial mats, and sponges. Arrived at geo #6 at approximately 22:00. Again, very few organisms or outcrops. Two samples of lone tubeworms were collected to the west of geo #6 at 22:17 and 22:26. Traversed to the west and encountered CRP at 22:48.

Decision was made to traverse west back to geo-marker #1 to attempt to collect Niskin data. As

this was the end of the dive, we transited as quickly as possible to the previous asphalt site. When cobbles of carbonates and asphalt were encountered, both Niskins were fired at 23:23. Once Medea settled out (because of the rapid transit to this location), eight hand-held macro camera images were acquired of the asphalt cobbles. Jason was off of bottom at 23:33.

Asphalt samples collected during dive included soft, malleable material. The dive track for dive 280 is shown in **Figure 7-56**

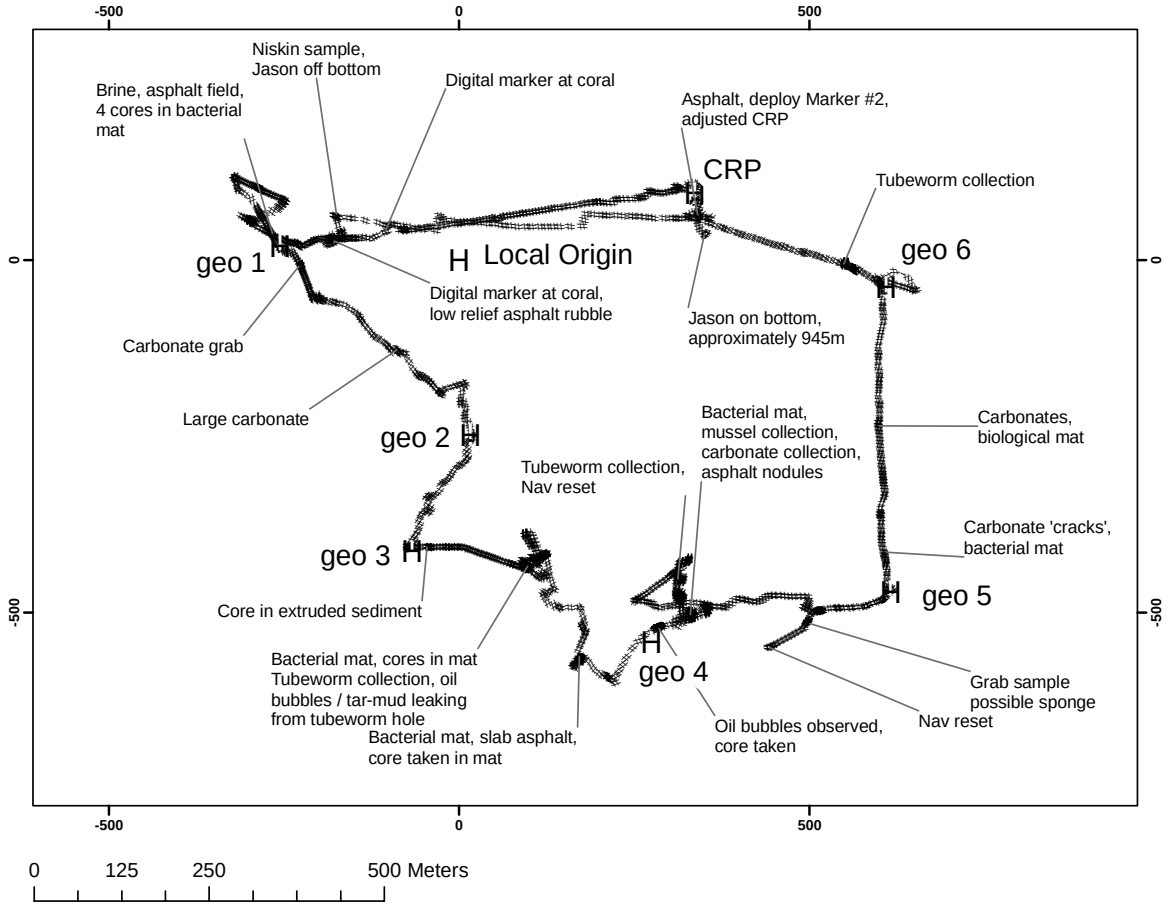

Figure 7-56. Dive track for dive 280

Target Selection - AC645

This previously surveyed, well-documented location is a low, E-W trending ridge with topographic highs at the eastern and western ends (see **Figure 7-57**). It is in the same geological setting as its northern adjacent block AC 601, which was well documented in the 2006 Cruise Report. The AC 645 site does not show evidence of flows or low amplitudes suggestive of high flux, gas saturated mud at the surface, just hard grounds and active subsurface migration on the seismic cross sections.

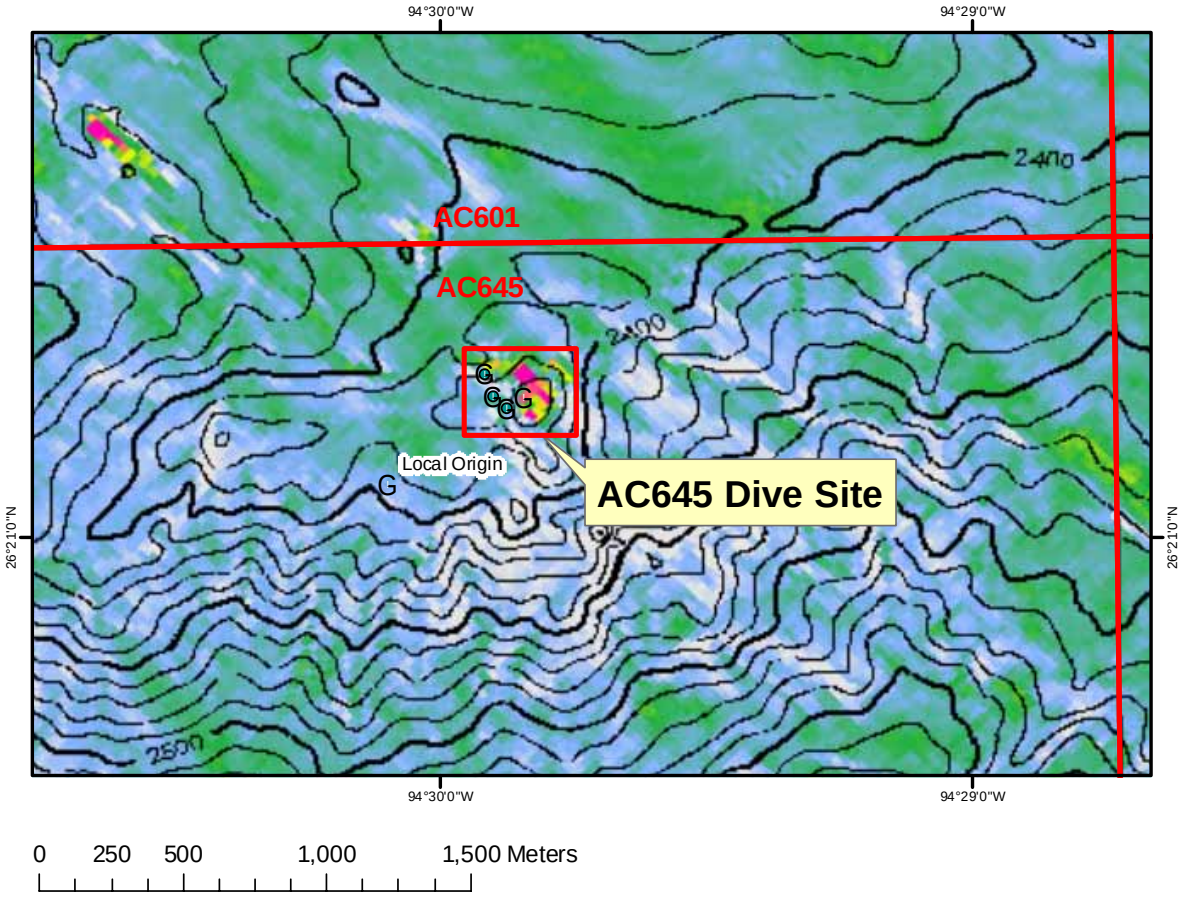

Figure 7-57. 3-D seismically derived bathymetric map with amplitude overlay (C.I.=10m); used by permission, Veritas.

Targets for this dive were selected from the 2006 Alvin dive logs, and the local origin defined for the 2006 Alvin dive was also used (see **Table 7-11**). This area has been extensively explored and mapped since the early 1990's and the current targets were selected to revisit previous sampling areas. An SM2000 multi-beam survey grid was also laid out to cover the target area of interest (see **Figure 5-60**). Prior to 2006, the site had last been visited with ALVIN in 1992. At that time a number of floating markers was deployed. The most abundant markers are rectangular sheets of white, buoyant plastic measuring 15 cm wide and 30 cm high. They have numbers cut into their sides and tops. Hereafter they are referred to as ALVIN-92 markers. Lettered markers

comprising small pieces of syntactic foam were also deployed by the Fisher group during this cruise to indicate locations of banded tube worms.

Table 7-11. Target locations for site AC645

Target	Depth	Lat	Lon	Note
Local Origin		26.351667	-94.501667	From 2006 Alvin cruise
Marker #1	2,208	26.354448	-94.498345	2006 Alvin Dive Logs
Marker # 42 - 46	2,202	26.354088	-94.497959	2006 Alvin Dive Logs
TW and MSL	2,221	26.355165	-94.498652	2006 Alvin Dive Logs
Banded Tubeworms	2,195	26.354396	-94.497264	2006 Alvin Dive Logs

Dive 281 Summary, AC645

Time in water: 2007/06/28 05:36Z
Time on bottom: 2007/06/28 06:47Z
Time off bottom: 2007/06/29 21:17Z
Time out of water: 2007/06/29 23:02Z
Water Time: 41 hours 27 minutes
Bottom Time: 38 hours 30 minutes
Min. working depth: 2176.38
Max. working depth: 2223.54
Produced: 4.2G of raw vehicle data
Produced: ~62 dvds of Science video
Produced: ~62 dvds of Archive video

After the LBL net was calibrated at this site (see *LBL Calibration* section for details of the procedure), Jason was deployed into the water at 00:39 hours on June 28th 2007. All times and dates in this summary are reported in CDT, local time. The sea-bed at 2,225 m was reached at 01:49 hrs, at which point Jason began moving towards the SM2000 multi-beam survey area. Refer to *Dive Observations* for this dive in the Appendix for a detailed log of the observed events and their times in GMT.

After reaching the SM2000 survey area the Doppler navigation was reset, then a series of multi-beam calibration lines were run at 20, 15, 10 and 5m altitudes from 01:57 to 02:13 hours. The Doppler navigation system was then reset again, and multi-beam survey operations began. A total of 17 survey lines (see **Figure 7-60**) were run from 02:24 to 11:21 hours. Doppler navigation was then reset again at 11:28 and Jason descended towards the seafloor to begin observation and sample collection.

Jason began to transit towards the approximate elevator location 200m south of ALVIN-92 markers 42-46. A number of sea pen, sea whip and holothuroid observations were made. Doppler navigation was reset again at 11:44. At 11:48 a small area of pogonophorans was observed, and at 01:51 this area was fixed with a digital marker in DVLNAV. Eight (8) red push cores were taken at this site from 12:08 to 12:22 at a depth of approximately 2,215m. Two of the eight cores were 'control' cores taken just outside of the pogonophoran field. Doppler navigation was then reset at 02:26 and Jason continued its transit to the elevator. Jason arrived at the elevator at 12:49

and began to offload core samples. The elevator was released at 13:27. The elevator was recovered on the surface at 14:49.

Doppler navigation was again reset at 14:56 and Jason began to try to find ALVIN-92 marker 42-46 for camera deployment. A large area of carbonates and tubeworms was observed and the presence of markers deployed during a 1992 dive was noted. These markers were surveyed and at 15:47 a digital marker fix was taken near ALVIN-92 markers 12 and 13 (**Figure 7-58**). Rotary time-lapse camera 'Huey' was deployed at 16:05 in a mussel bed within sight of ALVIN-92 markers 4 and 5 at a depth of approximately 2,197m.

From 16:43 to 19:18 Jason searched the local area for tubeworms that were banded in 1992 as part of a growth study (**Figure 7-59**). During this time, background readings were acquired for the mass spectrometer. Tubeworms B23WS, G57WT, and W3 were found at 16:43 in the vicinity of marker E at XY and were imaged with the macro camera to determine their growth over the last 16 years.

Figure 7-58. Imaging banded tubeworms near Marker E with macro camera

While it was being used, the ground in the macro camera began to worsen until, during the second set of pictures of G57WT, the ground in the camera went to 1.0, indicating that it was a complete ground fault. After consultation with the pilots, we were allowed to continue using the camera for this objective despite the hard ground in the camera. The decision was made to

complete all of the imaging of the tubeworms as quickly as possible, shutting down the camera during transits, then isolate the camera once finished and proceed with the chemistry measurements over the same sites. After the third tubeworm near marker, we shut down the camera and proceeded to marker F at XY at 17:12 and located one tubeworm (R47TS). We proceeded to ALVIN-92 marker 10 at 17:36 (37359) where tubeworms W2WP and B20WG were imaged from 17:39 to 17:57. Two other banded tubeworms near this marker could not be located. Marker A (XY evt37458) was reached at 18:25 and 2 more banded tubeworms (W4 and R8) were located and imaged. An effort was made to locate tubeworm #28 at (evt37555), but it was not found.

Mass spectrometer readings 48-57 were then taken in the same tubeworm aggregations where growth of the banded tubeworms was photographically sampled from 20:04 June 28 to 01:52 on June 29. There was a persistent peak on the mass spectrum in the vicinity of higher hydrocarbons (oil).

Upon recovery, this was discovered to be a spot of some kind of oil on the membrane inlet of the instrument. The membrane and the entire sampling line were replaced and the instrument redeployed. The hydrocarbon peak was still present following this work, but is not likely to interfere with methane or sulfide readings, so it was decided to continue use of the mass spec.]

Figure 7-59. Old marker # 29 in tubeworm bed

Once the chemistry measurements were complete, Jason searched for the markers contained in

the video mosaic obtained in 1992 from 01:56 to 02:31 when ALVIN-92 marker 41 was observed approximately 20m to the north of the area containing the banded tubeworms. At this time, Jason transited back to the location of the time lapse camera deployment, collected the camera from this position (XY evt 38518) at 02:40 and deployed it in the area to be re-mosaicked at 02:46 (XY evt38534). The perimeter was surveyed, and the entire area mosaicked at 4m from 03:07 to 03:33.

A series of 10 photo transects were then run from 03:54 to 07:11. The transect lines were 100 m in length, oriented 345° -- 165°, and contained within a 150x150m perimeter centered at 26° 21' 6.0" -94° 30' 6.0"

We found a suitable mussel bed for mussel pot sampling (XY evt 39324) near the banded tubeworms, within the mosaic to be taken later in the dive. Chemical sampling of the mussel bed proceeded from 08:09 to 09:29, taking samples 62 to 65. During this time, Best Of tubeworm and mussel video was obtained. Following the chemical sampling, Mussel Pot B was used (very successfully) to sample this patch of mussels at 09:34. The remaining mussel pot ring was imaged and nothing was seen to have been left behind (the two mussel shells inside were knocked in by the sub). At 10:10 and XY (evt39591), carbonates associated with tubeworms at the top of the mound were sampled into the starboard biobox.

Jason collected mobile fauna from 10:20 to 11:40 and 5 sea cucumbers, a sea star, a sponge, and a sea whip were collected. We attempted to find the Marker 1 site to continue sampling, but after searching from 11:35 to 12:15, we returned to the main site where we had been working.

Another mussel bed was found and was chemically sampled from 12:45 until 12:51, but due to the high readings for hydrocarbons the decision was made to end the scans early. Two niskin bottles were fired in this location (XY evt39952). An attempt was made to sample the mussel bed, but the handle of mussel pot F spun freely and the mussel pot sample was aborted. Another photomosaic was then initiated over the area containing all of the banded tubeworms and previous chemical measurements. The mosaic contained 9 lines over the northeast corner of the banded tubeworm site and lasted from 13:12 until 14:02. Two different bushmaster samples were attempted, one within the banded tubeworm mosaic and one within the replicate of the 1992 mosaic. However, the support rods connected to the springs on one of the hydraulic cylinders came free, and a portion of the net was not completely connected to the steel drawstring around the bottom of the bushmaster device. This made collection very difficult, and in the end, impossible. [After the dive, it was discovered that one of the brackets connecting the rod to the spring was corroded through and was replaced and the net was reattached.] The second attempt was near the time lapse camera deployment (XY evt 40277), so Jason moved a few meters, released the camera, and it was followed most of the way to the surface. Jason left the bottom at 16:17.

Non-seep fauna was consistent with the depth and was dominated by elasipod holothuroids. Specimens of Benthodytes typical, the seastar Hymenaster, an anemone and a soft coral were collected for background fauna analysis.

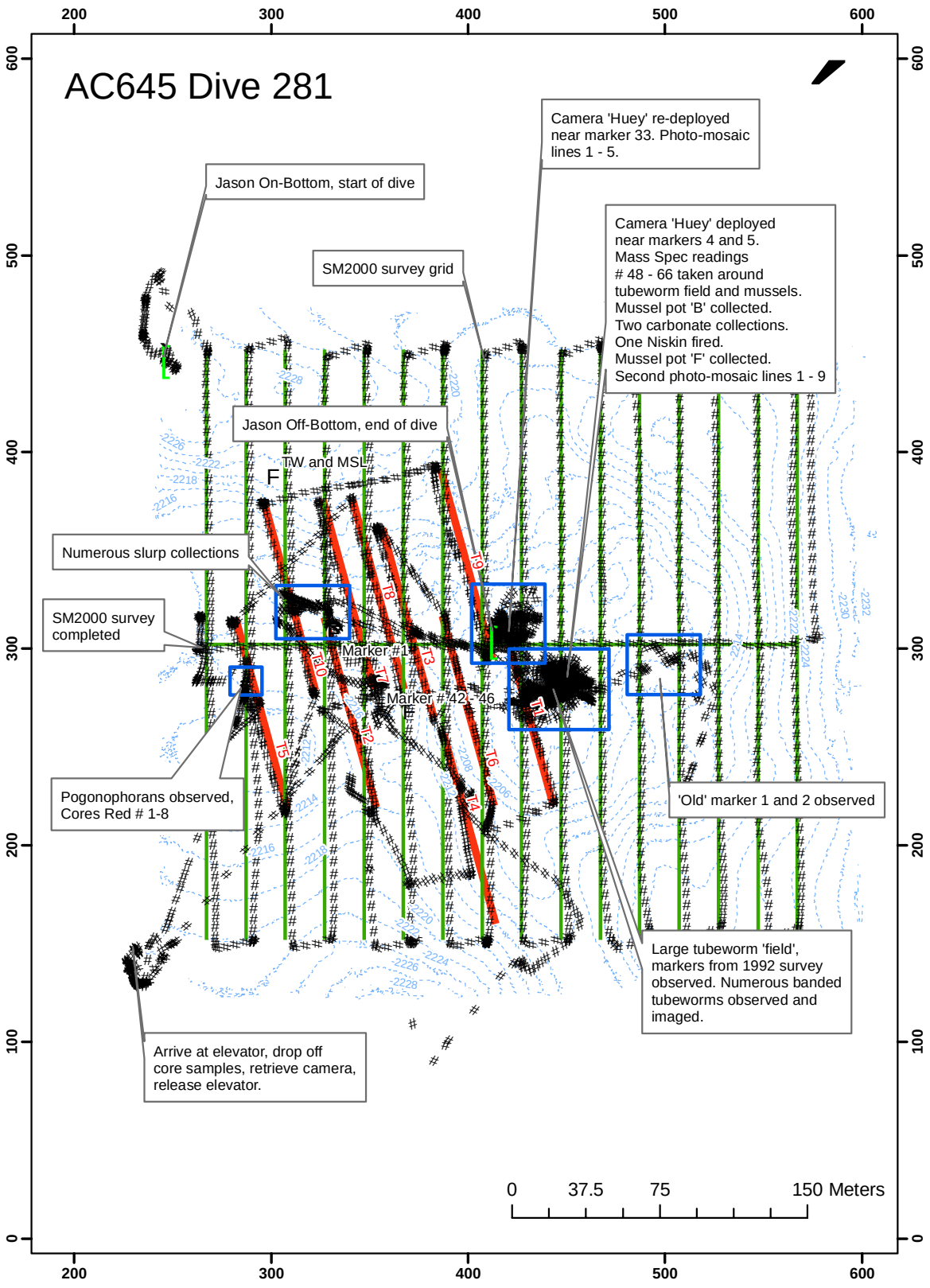

Figure 7-60. Dive track for D281

Target Selection - AC818

This site is defined by a narrow, linear series of patches of stained sediment, bacterial mats, and carbonate ledges aligned roughly north-south and extending at most 150 m north of the Chevron-Texaco wellhead. Nominal water depth of the site is 2745 m. The original indication of the presence of chemosynthetic communities at this site was provided by industry ROV surveys after the drilling of the well on the block. The AC818 site was visited during the 2006 ALVIN cruise. Several tube worm clusters were stained for growth studies. Numbered markers were deployed.

The principal targets at for dive 281 at AC818 were the bench markers (numbers 1, 3, and 4) located north of the well head. Other targets included the elevator drop site and JASON launch site. An array of six survey lines for an SM2000 bathymetric survey was established over the site. Targets information is detailed in **Table 7-12** and illustrated in **Figure 7-61**.

Table 7-12. Targets for dive 281 at AC818. WGS84 except for wellhead.

Target	Latitude	Longitude	Depth (m)	Note
Local Origin	N26° 10.3	W094° 37.7		From 2006 Alvin cruise
Wellhead-Chevron	*26° 10' 47.398" N (NAD27)*	*94° 37' 22.414" W (NAD27)*		Chevron proprietary location given in NAD27, target converted to WGS84
3-geo	N26° 10.87071'	W094° 37.35272'		2006 Alvin cruise target
7-geo	N26° 10.39953'	W094° 37.61391'		2006 Alvin cruise target
2-geo	N26° 10.99434'	W094° 37.36435'		2006 Alvin cruise target
1-geo	N26° 11.10067'	W094° 37.32450'		2006 Alvin cruise target
5-geo	N26° 10.73630'	W094° 37.37069'		2006 Alvin cruise target
WELLHEAD	N26° 10.78663'	W094° 37.37362'		2006 Alvin cruise target
6-geo	N26° 10.60057'	W094° 37.50598'		2006 Alvin cruise target
ROV chemo	N26° 10.80933'	W094° 37.38367'		2006 Alvin cruise target
BenchMkr #1				2006 Alvin Dive Logs
BenchMkr #3			2,744	2006 Alvin Dive Logs
BenchMkr #4			2,745	2006 Alvin Dive Logs
Drop Elevator Here				
Launch Site				

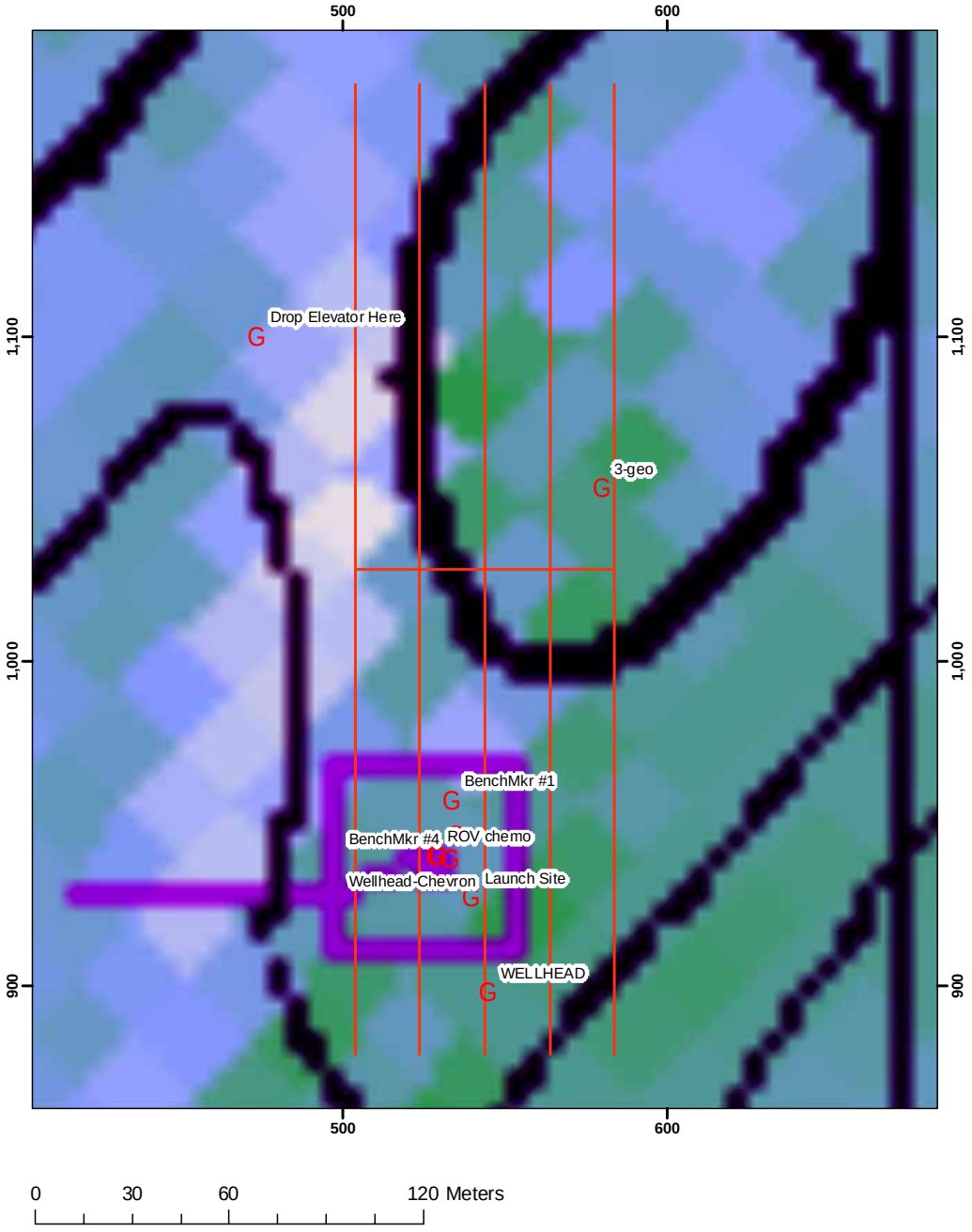

Figure 7-61. Targets for dive 282 at AC818 on 3-D seismically derived bathymetric map with amplitude overlay (C.I.=10m); used by permission, Veritas. Lines are target tracks for SM2000 bathymetric survey. Coordinates are JASON local XY meters.

Dive 282 Summary, AC818

Time in water: 2007/06/30 12:31
Time on bottom: 2007/06/30 14:10
Time off bottom: 2007/07/01 18:01
Time out of water: 2007/07/01 19:41
Water Time: 31 hours 9 minutes
Bottom Time: 27 hours 52 minutes
Min. working depth: 2688.41
Max. working depth: 2750.31
Produced: 2.9G of raw vehicle data
Produced: ~44 dvds of Science video
Produced: ~44 dvds of Archive video

The elevator was launched at about 06:00 with rotary time-lapse camera Huey and a rack of replacement push cores. JASON was launched at 07:30. All times in this summary narrative are CDST, which is UTC minus 5 hours.

The mass spec was tested on the way down and seemed to be operable. JASON reached bottom at 11:10 and began a search for a coring station to collect pogonophorans and associated sediment. The wellhead was occupied at 09:36 (**Figure 7-62**). Comparing the observed Jason position to the Chevron wellhead location provided by MMS (26 10 47.398 N, 94 37 22.414 W NAD27) yielded a difference of approximately 24m to the E-NE (see **Figure 7-63**).

Figure 7-62. Chevron wellhead observed during D282, AC818.

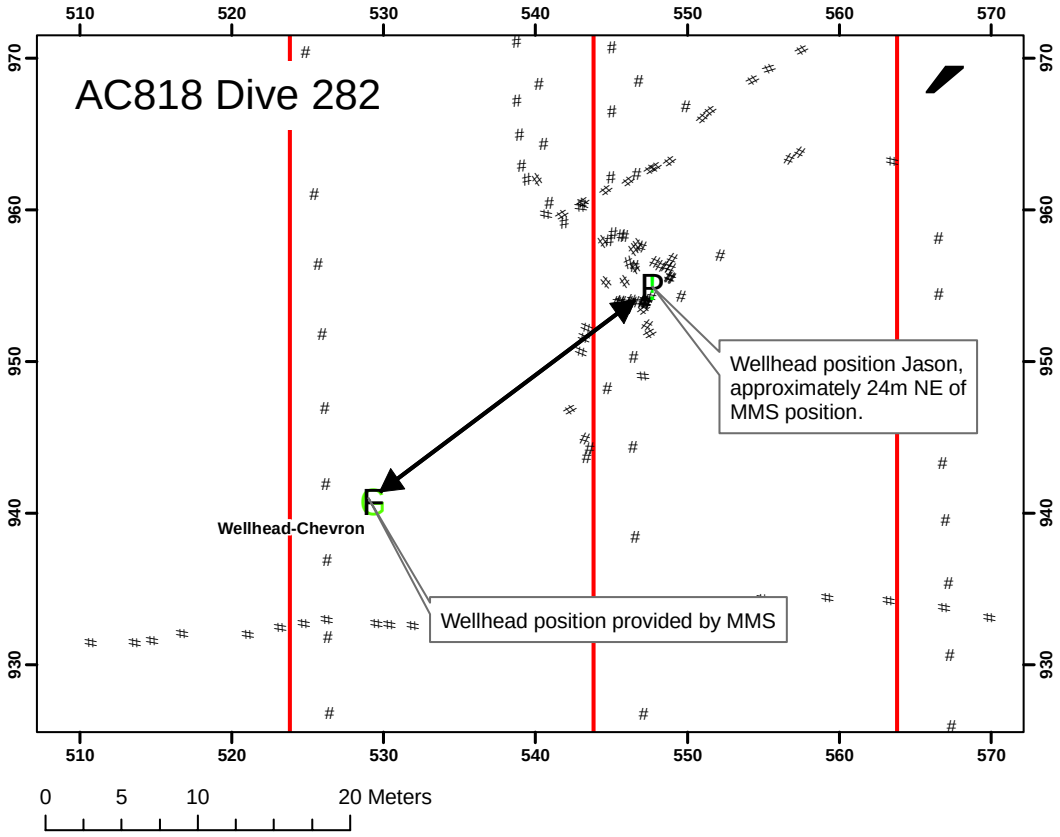

Figure 7-63. Observed Jason position to the Chevron wellhead location.

Marker #4 was found at 09:43. JASON continued north and reached marker #1 at 09:52.

A suitable pogonophoran field was found at 10:40 at position X563 Y1198. Between 10:40 and 11:20, (virtual van events 40744-40917) collection of 11 pogonophoran cores was logged.

JASON then moved to an area of sea urchins and commenced collection of sediment cores in the sea urchin field until 12:07 (virtual van event 40893-40917). At this time JASON moved to the elevator site to send push cores up to surface (**Figure 7-64**) and to remove elevator. JASON arrived at elevator at 12:29. After the cores were loaded and the rotary time-lapse camera was removed, the anchor was released to send the elevator to the surface. Because the elevator legs were buried in mud, the pilot had to grasp the elevator with the Schilling arm to free it from the bottom. When it lifted off, the jaws of the arm were snagged. Freeing the Schilling was a 20 min operation that entailed having to drop the rotary time-lapse camera from an altitude of about 3 m. The arm was freed without damage and the camera remained functional.

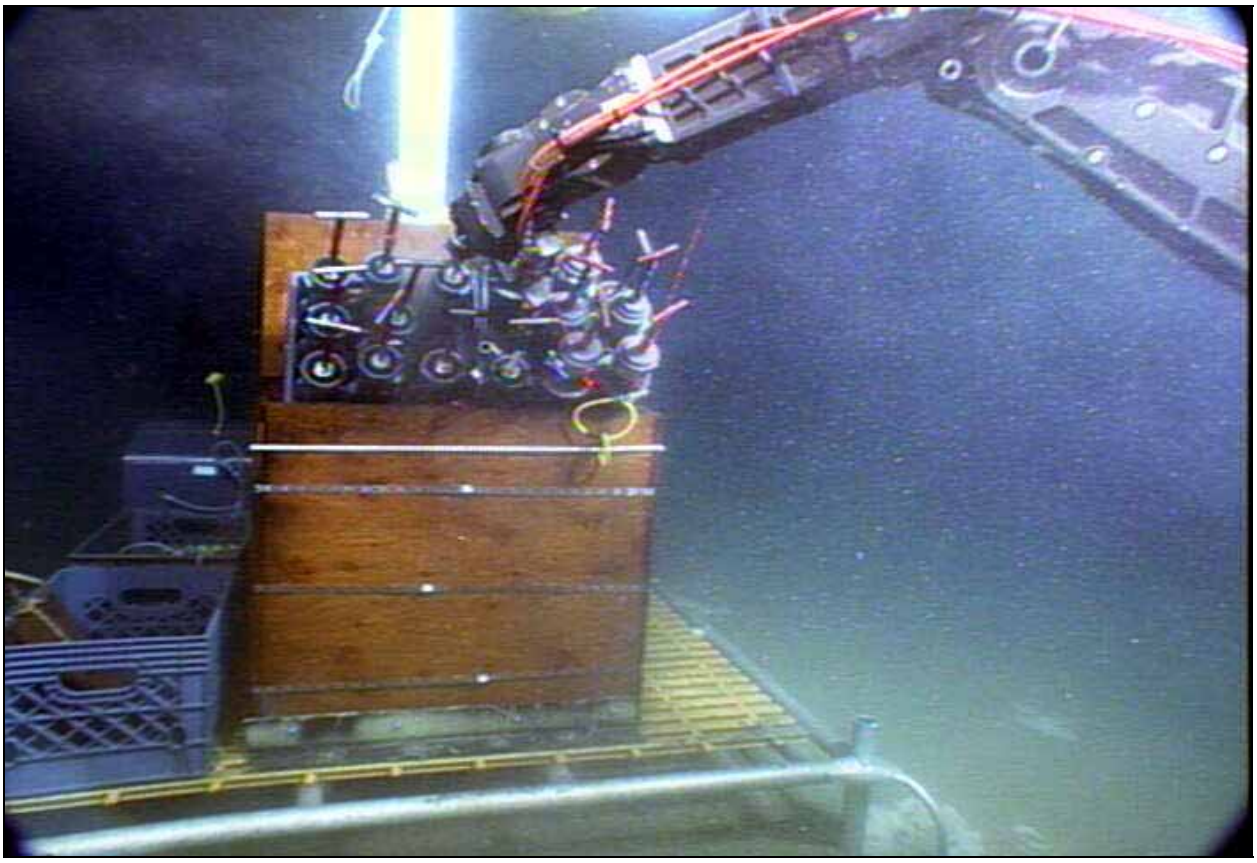

Figure 7-64. Loading core racks onto elevator

Rotary time-lapse camera Huey was deployed next to Marker #1 at 13:34 (virtual van event 41100). Its strobe was observed to flash after deployment.

JASON then went into lay-back mode for elevator recovery. The elevator was taken on deck at 15:04. JASON then positioned to begin SM2000 bathymetric survey. The SM2000 survey was conducted between about 16:32 and 20:02 (virtual van event 41241-41673).

At the conclusion of the SM2000 survey, the rotary time-lapse camera was moved from Marker #1 to a position just north of the well head approximately 4 m from the main structure. Camera was deployed at 20:30 (virtual van event 41709). Flash was observed to fire.

JASON now moved north and prepared a photo-mosaic of the tubeworm, mussel and urchin communities situated from south of marker 4 to north of marker 1. This mosaic will comprise five, long, north-south lines passing through the main axis of the communities. Actual mosaicking began at 20:58 and continued through 21:44 (virtual van event 41802-41901).

At the conclusion of the photo-mosaic, JASON moved closer to the mussel beds to carry out measurements with the mass spec. Position is X536 Y1017; depth is 2744m. Observations with the mass spec commenced at 22:00 and continued through 22:44 (virtual van event 41933-

41951). Readings were logged as position 68 through position 70. At 23:03, mussel pot D was successfully used to collect the mussel community at the position of the chemical measurements. A scoop of mussels was also collected and stowed in the port (insulated) biobox in the vicinity of mass spec readings 72-74. During measurement 72, the probe was accidentally inserted into the sediment, so the valve on the basket was turned and the lines leading to the inlet of the mass spec switched.

JASON continued operations with collection of mussel pot using pot B, commencing 00:50 (virtual van event 42014-42036). Difficulties were encountered with use of this device due to the ram not extending to the stop on the mussel pot. It was stowed at 01:04 and collections of mussels were made with jaws of manipulator, continuing until 01:20. The mass spec wand was then deployed to measure dissolved gases in the sediment scars created by the mussel collection activities. Mass spec readings were collected as positions 74 and 75.

JASON reposition slightly to collect stained tube worms near marker #3. The marked tube worms were collected by the manipulator arm and stowed in the biobox. Collection was completed at 02:28.

JASON then repositioned to a bacterial mat located near position X542 Y1003, depth 2743m. Mass spec readings were collected into positions 76-79. Five bacteria mat cores were collections were logged, followed by three control cores. Coring concluded at 03:58 (virtual van event 42286-42409).

JASON moved about ~20 m east while making biological observation of mobile fauna—eventually locating an area occupied by sea urchins—brine-stained sediment were visible in the vicinity. At 05:01 coring operations collect sediment from urchins were commenced. Coring concluded at 05:17, with 3 core collections logged.

Suction and grab collection of mobile fauna was as well as video observations were carried out until 08:17. At this time JASON moved back to the elevator, which had been relaunched. All cores and mussel pots B and D were stowed on elevator. Elevator was released at 09:09 (virtual van event 43043). JASON then made biological observations and grab samples until 10:31 but was in lay-back mode for elevator recovery. JASON moved to well head at 11:18. At the well head, the rotary camera was picked up and moved to a position north of marker #3 (virtual van event 43353).

JASON then move to near marker #4 to collect stained tube worms with bushmaster. Collection was complicated because there was a tangle of monofilament fishing net partly entangled in the cluster of stained tube worms and in base of marker #4. After consultation with the JASON pilots, an attempt was made to use Marker 4 to clear the net and allow collection. The marker was dragged through the net and the net was moved approximately 5m to the west. MS readings started at 11:59 at position 80. Collection with bushmaster proceeded smoothly from 12:20 to 12:30. [This tubeworm aggregation contained over 100 young, stained tubeworms, most of which exhibited significant growth.]

JASON now moved north toward geo targets 1 & 4. At 12:59 a field of pogophorans was noted.

There were also many clam shells at this site—most appeared to be dead. Position is X567 Y1232, depth is 2738 m. Jason left bottom at 13:01 on 2007-07-03.

Non-seep fauna was typical for the lower slope and was dominated by elasipod holothuroids. Crabs were not observed and fishes limited to a few rattails. Eleven holothuroids and asteroids were collected. The dive track for dive 282 is shown in **Figure 7-65**.

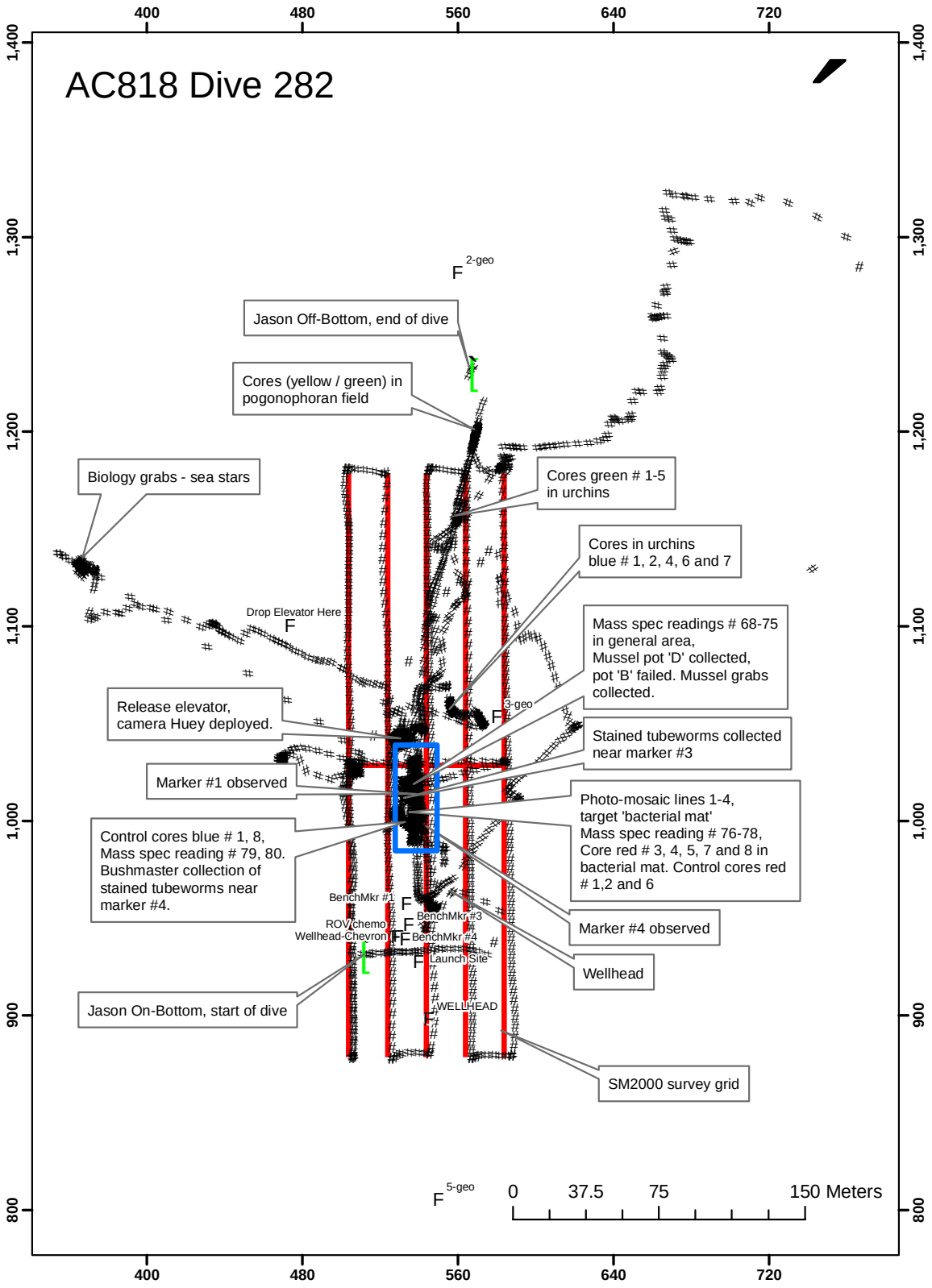

Figure 7-65. Dive track for D282.

Target Selection - AC 601

The plan for this dive was to explore the brine pool discovered last year at AC601 (see 2006 Alvin Cruise Report for a geologic summary of this area) and then sample the pool and its perimeter with push cores and the mass spectrometer (**Table 7-12**). If there was sufficient time remaining in the dive Jason would continue to the south in "tow mode" to explore a mound / high amplitude anomaly noted on the AUV survey data and MMS amplitude anomaly map (**Figure 7-66**).

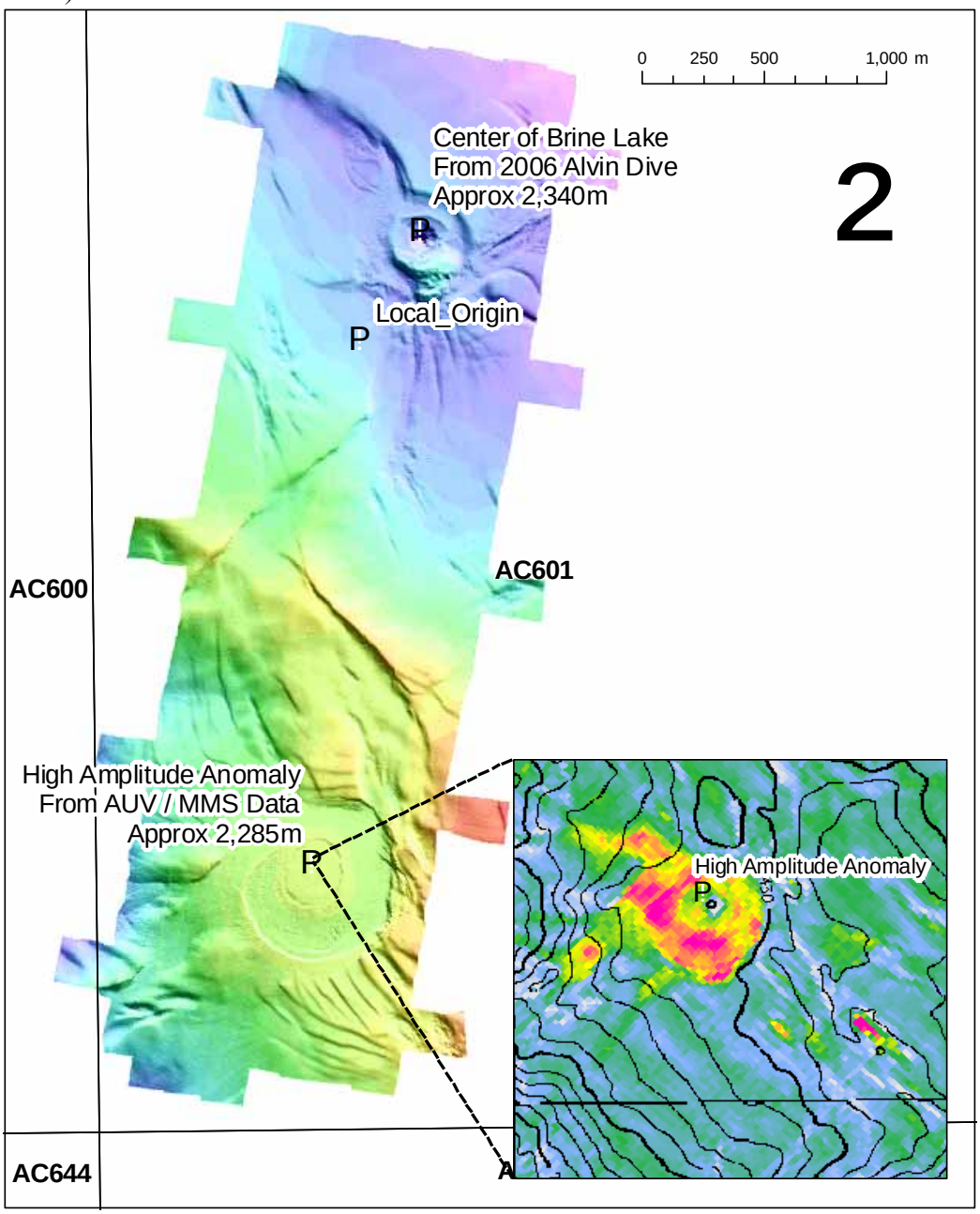

Figure 7-66. Target Locations for AC601; map on lower right, 3-D seismically derived bathymetric map with amplitude overlay (C.I.=10m); used by permission, Veritas; map on left, AUV derived bathymetry.

Table 7-12. Target locations for site AC601

Target	Depth (m)	Latitude	Longitude	Notes
Local_Origin		26.388333	-94.516667	From Alvin 2006 Target Table
Center of Lake	2,334	26.392350	-94.514220	From Alvin 2006 Dive Logs
High Amplitude Anamoly		26.368588	-94.518531	Possible vent w/ carbonates in south AC601

Dive 283 Summary, AC601

JASON launched at 0700 on a dive target selected to be the northern edge of the brine pool at (XY). The bottom was in sight at 0827 and JASON was in the middle of the brine pool. JASON headed due north to the edge of the pool and conducted survey around the perimeter with the DSC on 15 sec intervals. This survey followed the contour of the AUV survey very closely. The survey was completed at 0955 and core sampling commenced. The first set of cores was taken 5m from the barite shore-line from 1011 to 1019 (EVT43746). The second set of cores was taken within the barite zone from 1050 to 1105 (EVT43812). The third set of cores was taken in "knee deep" brine on the edge of the pool from 1145 to 1158 (EVT43938). Both niskin samples were taken in this area by using a t-handle to dip the bottles into the brine from 1212 to 1228 (EVT44000).

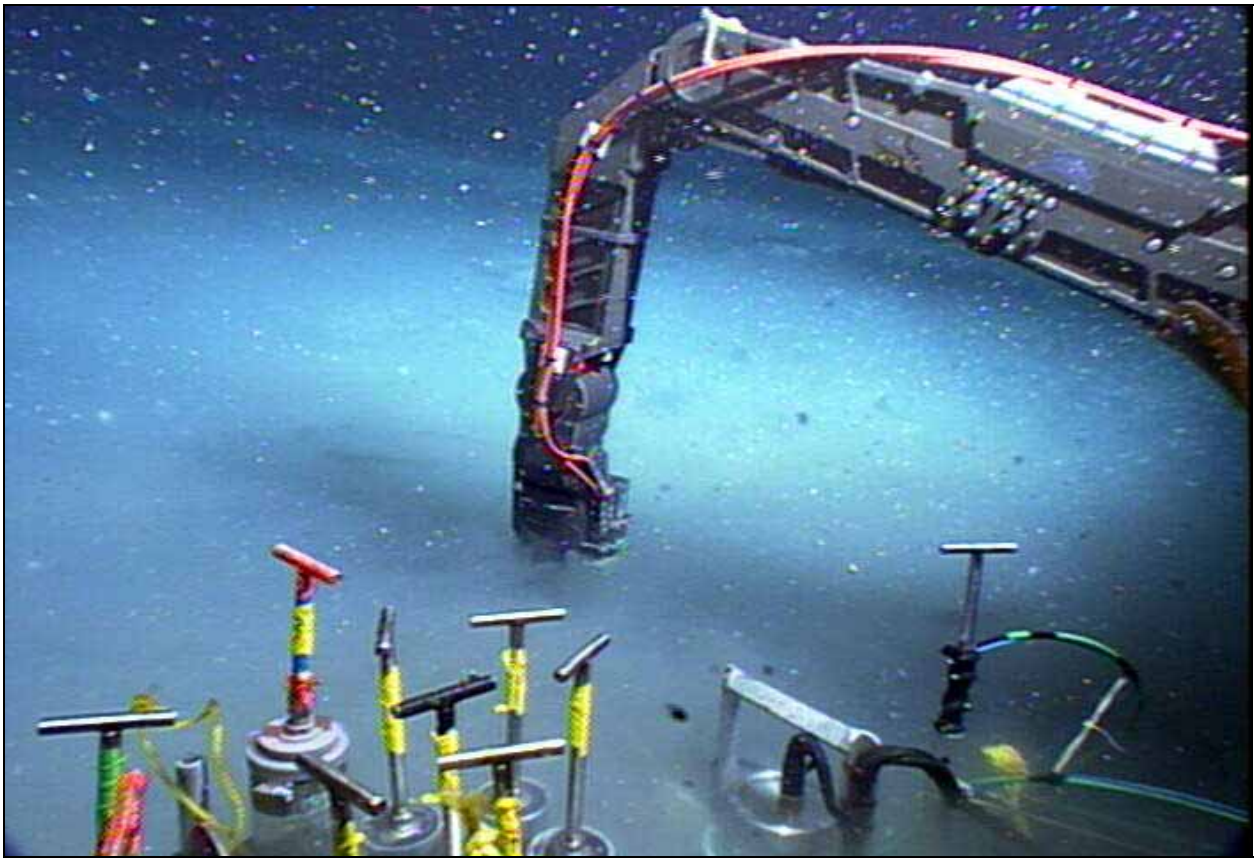

Figure 7-67. Taking cores 'knee deep' in brine pool

JASON transited to the elevator, arriving at 1256 (EVT44097). The core racks were swapped and niskins were deposited on the elevator and the elevator released at 1315. While in lay back mode, 3 sea cucumbers and a sponge were slurped from 1315 to 1451. When the elevator was on deck at 1451, JASON transited to the start of the photo transect survey. This survey was a set of lines centered around the middle of the brine pool and extending from the shore line out. The survey lasted from 1509 to 1830. During the survey, 2 background scans were conducted with the mass spec. At the end of the survey, the macro camera was used in down-looking mode to retrace transect line #9 from the center of the pool to the end of the line. This was begun at 1846 (EVT44723), continued at 1927 with a number of images of the shore-line. It was paused at 1950 and

Slurping and grabbing (in starboard biobox) of mobile fauna proceeded from 2014 to 2140 at which point JASON approached the shore line of the pool once again. Two push cores were taken in the barite zone for Harry Roberts from 2142 to 2149 (EVT45115). The mass spec was then used to take samples above the barite shore line from 2149 to 2246, taking readings in positions 83-85 (EVT45119). JASON then headed towards the interior of the pool and took scans 86-89 within the brine from 2253 on July 02 to 0016 on July 03 (EVT45259). During this time, there were a number of significant hits of methane and sulfide detected within the brine. The mass spec appeared to be working very well.

JASON then transited back to the shoreline to continue following the path of photo transect #9 with the macro camera. A series of macro pictures were taken from 0036 until 0131. A slurp collection of mussels on barite was made at 0136 (EVT45620) [although upon recovery these mussels were not present in the slurp container], and a grab of an urchin was made at 0150 (EVT45660). The macro photo-transect was continued from 0152 to 0223.

JASON then returned to the shore line to core urchins. A series of cores were taken in and out of urchin trails from 0241 to 0336 (EVT45763). A mass spec reading (#90) was taken inside the core hole from the first core at 0309 (EVT45817). A search for pogonophorans began at 0336 passing over the northern, western, and southern edges of the pool and continuing to the south. Three cores were taken in a small patch of pogos at 0635 (EVT46363). Finally, a large, dense bed was found at 0708 (EVT46446) and 3 cores and the 2 fat cores were taken in this location, concluding at 0723. Another patch was found and the remaining 2 fat cores and 2 more pogo cores taken at 0745 (EVT46527). This was followed by macro pictures until 0823.

JASON transited back to the pool and took one urchin core for Harry Roberts at 0844 (EVT46640), a series of pictures were taken of JASON and the brine pool, then JASON transited to the elevator. Five control cores were taken next to the elevator (EVT46763) from 0934 to 0940. The cores were placed on the elevator and the good mussel net removed from one of the wooden boxes. The elevator was released at 1003 at which time the feed from Medea was recorded to get some good video of JASON and the brine pool. The elevator was recovered at 1155 and JASON went back to a position where strange-looking mussels were noted to collect a scoop. The mussel scoops were taken at 1224 in a mussel bed on top of a large barite formation (EVT47121) [Upon recovery, this was found to be slightly radioactive, so the mussels were removed from the barite and the minerals jettisoned overboard. The mussels appear to be the

same species that was sequenced last year and found to NOT belong to the genus *Bathymodiolus*.]

At 0551, JASON came up to 150 m off the bottom and went into tow mode, transiting approximately 1.5 km to the south to a large mound feature in the AUV survey corresponding to a circle of high reflectivity bounding a low reflectivity center. The bottom was back in sight at 1423 (EVT47166) and JASON approached the feature from the north transiting up the side of the mound. At 1440 (EVT47202), JASON crossed over the lip of the crater on the top of the mound and found the border of what appeared to be a large brine lake. This was subsequently named Lake Eerie (**Figure 7-68**) by the JASON pilots due to the very odd appearance of the white "sand dunes" on the edge of the lake.

Figure 7-68. The northern edge of 'Lake Eeire'

JASON traced the outer edge of the Lake with the DSC firing on a 20 sec interval. The perimeter corresponded very well to the bathymetry in the AUV survey. At 1447, a few isolated mussel beds and interspersed urchin trails were noted, and these continued until a very large mussel bed was noticed at 1457 (**Figure 7-69**). The mussel bed extended from (EVT47245) to (EVT47253).

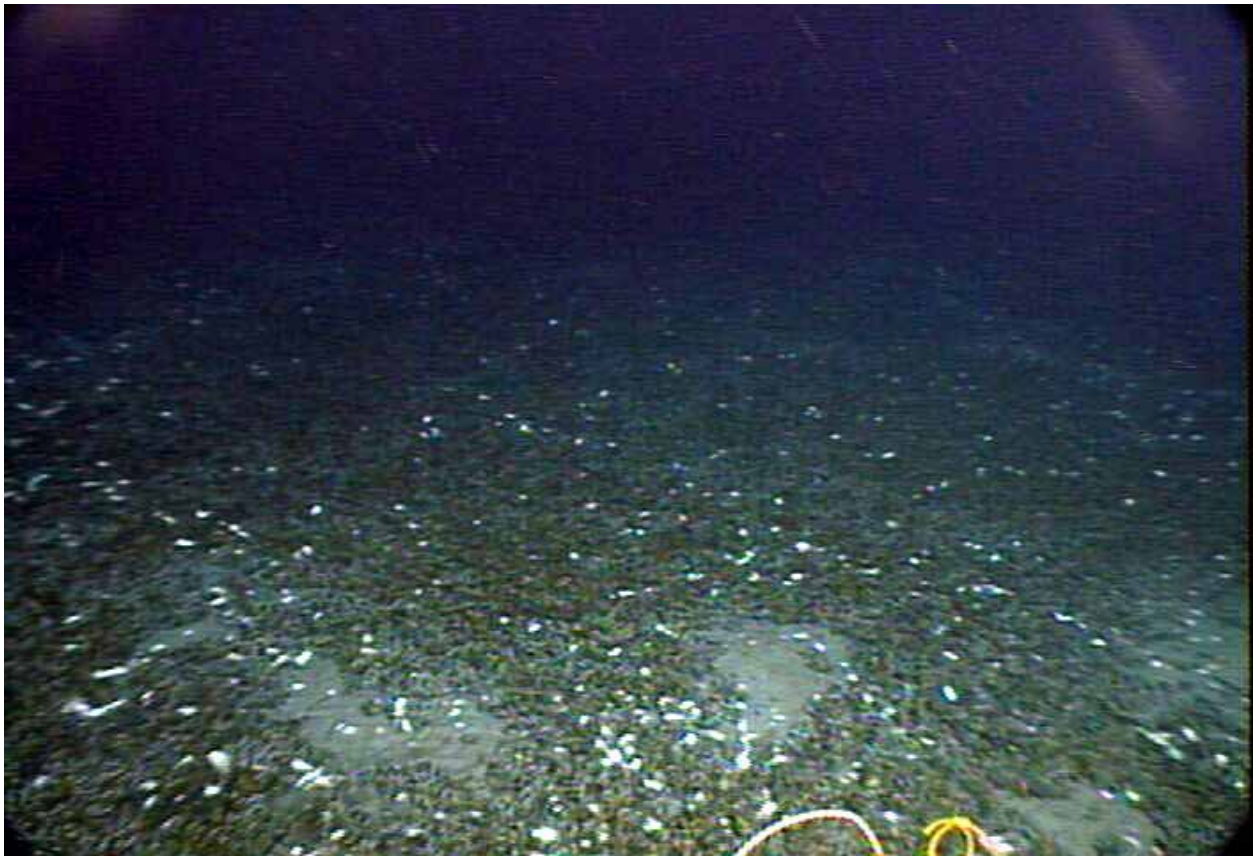

Figure 7-69. After closer review of the AUV data, scientists spotted another geological target of potential interest. They discovered what is probably one of the largest-known mussel beds in the deep Gulf of Mexico – a small portion of the bed is shown in this image.

At this point, it was decided to launch an elevator at this target. The elevator was equipped with 2 mussel pots, 9 cores, a mussel scoop, and 2 hand-held niskins. The survey around the perimeter continued while the elevator was prepped and launched. Patchy mussel beds continued around the western edge of the feature, and became less dense on the southern rim (EVT47343) where large mud flows were noted at a depth of 2283. Stained sediments and strange bed formations continued around the southern and eastern edges of the lake. A series of macro pictures were taken of the shoreline beginning at 1649 (EVT47492) and continuing as JASON traced the shoreline.

Once the perimeter trace was completed (1712, EVT47533), JASON headed to the elevator launch site. The elevator was launched at 1739, and was in site at 1840 (EVT47718). The elevator was picked up at 1850 and moved to the large mussel bed (Mussel Manhattan), arriving at 1929. The mussel pots were retrieved at 1956 (EVT47873). The first (mussel pot D) was taken right next to the elevator in Mussel Manhattan at 2005 (EVT47894), and placed back in its holster on the elevator at 2017, and marker 1 deployed in its location. The second (mussel pot B) was taken at an isolated patch of mussels just to the east near the shoreline at 2037

(EVT47960), marker 2 deployed, and the mussel pot returned to the elevator at 2052. The push core rack and the niskins were then removed from the elevator and placed on the basket at 2122.

Jason then started to look for brine to take pushcores and sample some brine in niskins. On the way south from the elevator, Jason ran over strange formations with "dunes" of mud and dark channels that look like they contained brine (EVT48106). From the shore, Jason headed towards the centre of the crater in search for brine deep enough for cores and niskins. At 2200, Jason was moving over extensive red stains (EVT48133) with some signs of downhill flows (2203, EVT 48141). At 2210, a set of cores was taken in the area. The mud is very fluid and some cores came out of the cores before they were in the holsters. The long slim niskin was used upright in the fluid mud to get a sample (2236, EVT 48217). The lower end of the niskin touched a harder layer underneath while 10 cm were still out of the mud (**Figure 7-70**).

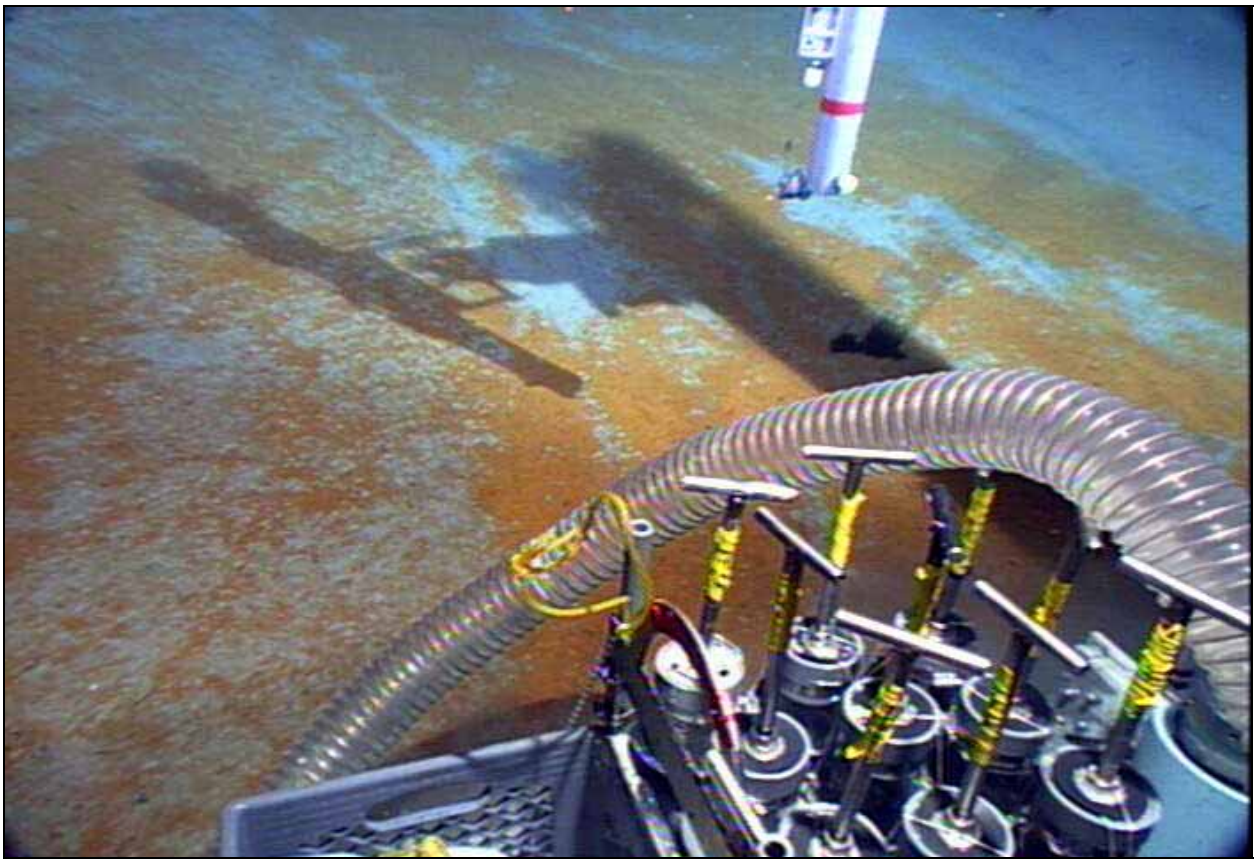

Figure 7-70. Using Niskin to take core sample in soft red-stained sediment

Jason then headed south to follow the flow of brine and find deep brine areas (**Figure 7-71**). At 2253, Jason is back in areas with mud dunes and dark channels between them (EVT48255). A set of 4 cores was then collected in this area in the brine channel (EVT48266-48276). AT 2303, Jason started heading back to the mussel bed. Numerous white shells were observed, many snails and clams, some of these latter alive (EVT48297). A close-by channel is overlaid with a mist (EVT 48315) in which the large niskin was fired, but no obvious interface between the two fluids was observed (2324, EVT48334). Another set of cores was then taken, moving every time to

avoid contamination of the overlying water of the cores by the resuspended mud (EVT48381). Some clams and white snails were then scooped at 0002 (EVT48417). At 0040, Jason is back at the large mussel bed (EVT48497), and some snails were collected in the white net at 0045 (EVT48511). AT 0053, Jason is at the elevator (EVT48530) and the core rack was transferred to the elevator, along with the white net in the core rack.

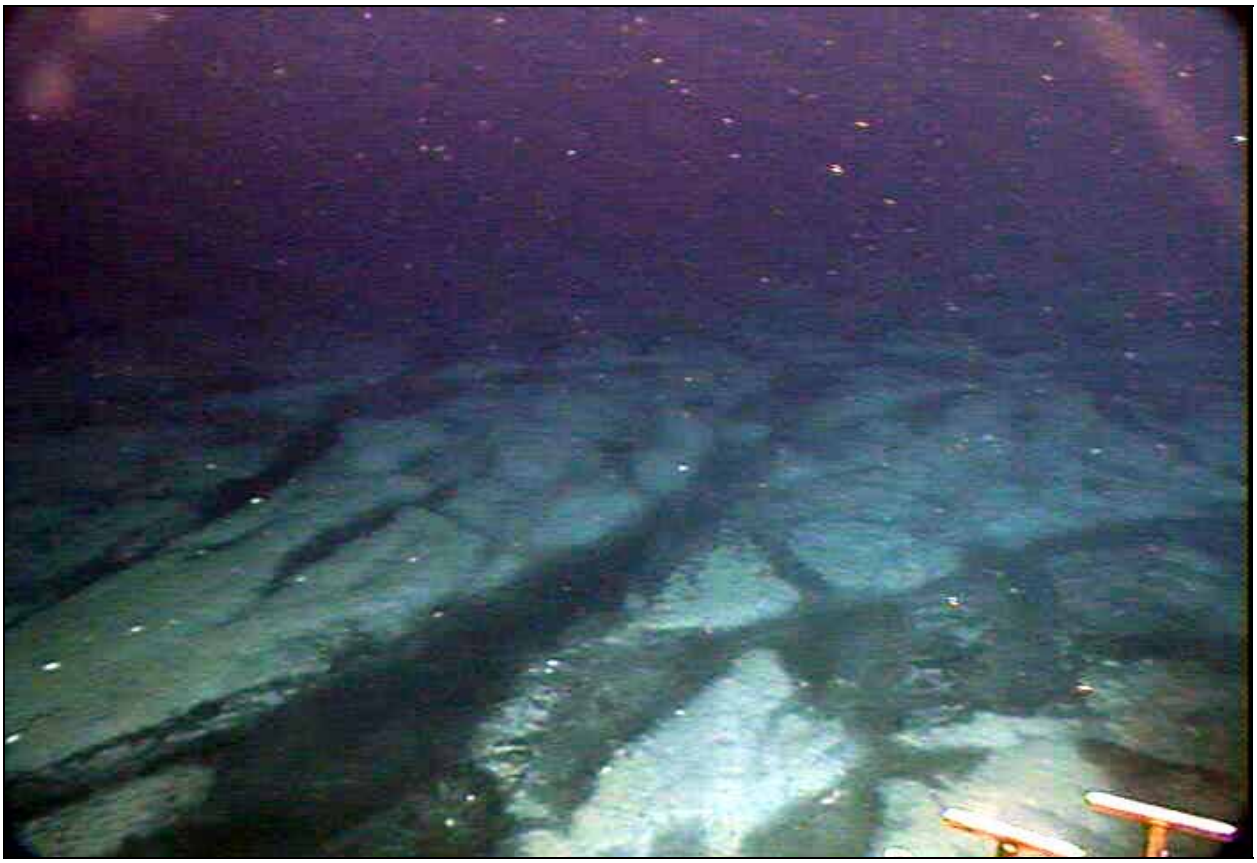

Figure 7-71. Area of apparent brine flows

At 0102 (EVT48552), a mass spectrometry background scan (#91) is started in the water about 1.5 m above the bottom near marker 1 right next to the elevator. At 0120, the MS wand is placed in the mussel pot D sampling scar to scan (#92) (EVT48590). The wand was then placed among mussels (scan #93) at 0137 (EVT48623). The mussels have their siphons very extended (EVT48625). Mussels from location of MS scan #93 were then collected for genetics studies (01:55, EVT48662) and placed into the port biobox. At 0200, Jason then headed to the brine shore area to do some mass spectrometry measurements. At 0228, MS scans began at positions #94 and 95 near some tube polychaetes [likely to be Onuphids] in a transition zone (EVT48728) that may have been a gradual brine interface [both methane and sulfide were present in relatively high quantities here.] At 0248, JASON headed to the elevator to release it and come to the surface. At 0254, JASON was at the elevator (EVT48790), the niskins were transferred, and the elevator released at 0305. JASON left bottom at 0308. During ascent, the MS recorded a depth transect of scans for calibration.

Non-seep fauna at the dive site was typical for the depth and dominated by elasipod holothurians. Ten specimens were collected. Fish were limited in numbers and crabs not observed. The fauna near the crater was not well surveyed, but seemed to be similar to the dive site and dominated by elasipod holothuroids. The dive track for dive 283 is shown in **Figure 7-72**.

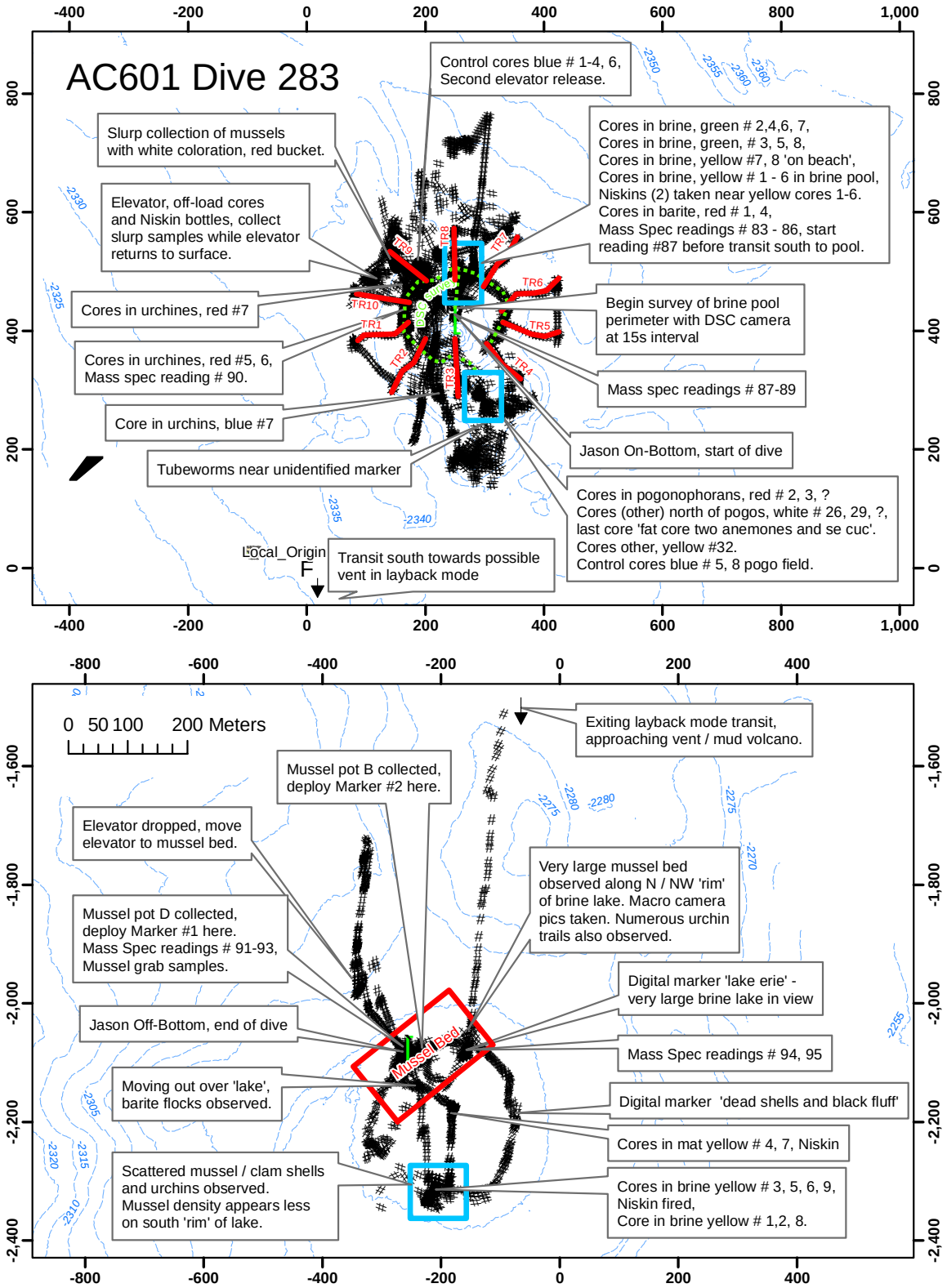

Figure 7-72. Dive track for D283

Target Selection, AC818

Dive 284 will be a repeat dive at AC818 (see Dive Summary 282 for a description of site AC818).

Dive 284 Summary, AC818

JASON was launched at 16:07 and reached the bottom at 17:45 on July 4th. All times in this summary narrative are CDST, which is UTC minus 5 hours. Jason then began to search for camera 'Huey', which was located at 18:10 and released to the surface at 18:19. There was some difficulty in releasing 'Huey' during this time.

Five (5) sea stars were grabbed between 18:28 and 18:51 (one of the five eventually escaped from the bio-box). A 'Best Of' video of a pelagic sea cucumber feeding on the bottom was taken at 19:12. Doppler navigation was reset at 20:04. A sea cucumber was collected at 20:12. Pogonophorans and clams were noted at 20:17, and a digital marker fix was taken on this site at 20:18. The presence of pogonophorans was noted along Jason's path until 20:41.

At 20:44 Jason was in site of Marker #4 and began to run photo-mosaic lines in the area. Four (4) photo-mosaic lines were run from 21:11 to 22:03. Jason then moved to Marker #1, arriving at 22:05. A grab of stained tubeworms was made at 22:09 (a 'Best of Video' of these tubeworms was also taken at 22:11).

Camera 'Huey' was scheduled for a long-term deployment after recovery, but problems with the camera's strobe (possibly caused during the attempts to release 'Huey' at the beginning of the dive) forced this plan to be abandoned and a planned elevator launch was aborted.

At 23:10 Jason arrived at the northern urchin site (EVT49555, X:539m, Y:1,048m) and took eight (8) push cores (yellow) as well as collecting 4 individual urchins from 23:13 to 00:12 on July 5th. Jason then moved a short distance to Marker #1 (X:541m, Y:1018m).

Mass spectrometer readings 96 – 101 were taken within the vicinity of Marker #1 from 00:25 to 02:06. Readings 97 and 98 were taken in an area with brown mussels, reading 99 in an area of white stained mussels. Readings 100 and 101 were taken near a large tubeworm bush. Doppler navigation was reset during reading 101 at 02:05.

After completing the mass spectrometer readings Jason moved to Marker #4 (X:533, Y:1,006). Two Niskin samples were taken over a mussel bed near marker #4 at 02:19. Mass spectrometer reading 102 was taken from 02:29 to 02:44. Mussel pot D and B were collected in the same location (area of white mussels) at 02:55 and 03:20 respectively.

At 03:48 Jason began to head north looking for clams to sample. Numerous biological observations were made from 03:56. Two net scoops of mussels were taken at 04:34 and 04:37 near X:551m, Y:1,078.

Jason then began to move south again, making numerous biological observations and taking

macro camera pictures from 04:56 to 05:28. From 05:30 to 06:26 Jason moved around a small area making biological observations and taking seventeen (17) slurp samples of tubeworms, sea stars and sea cucumbers (**Figure 7-73**). At 06:26 the mass spectrometer was turned on to take readings during the ascent to the surface, and at 06:27 left the bottom to begin it's return to the surface.

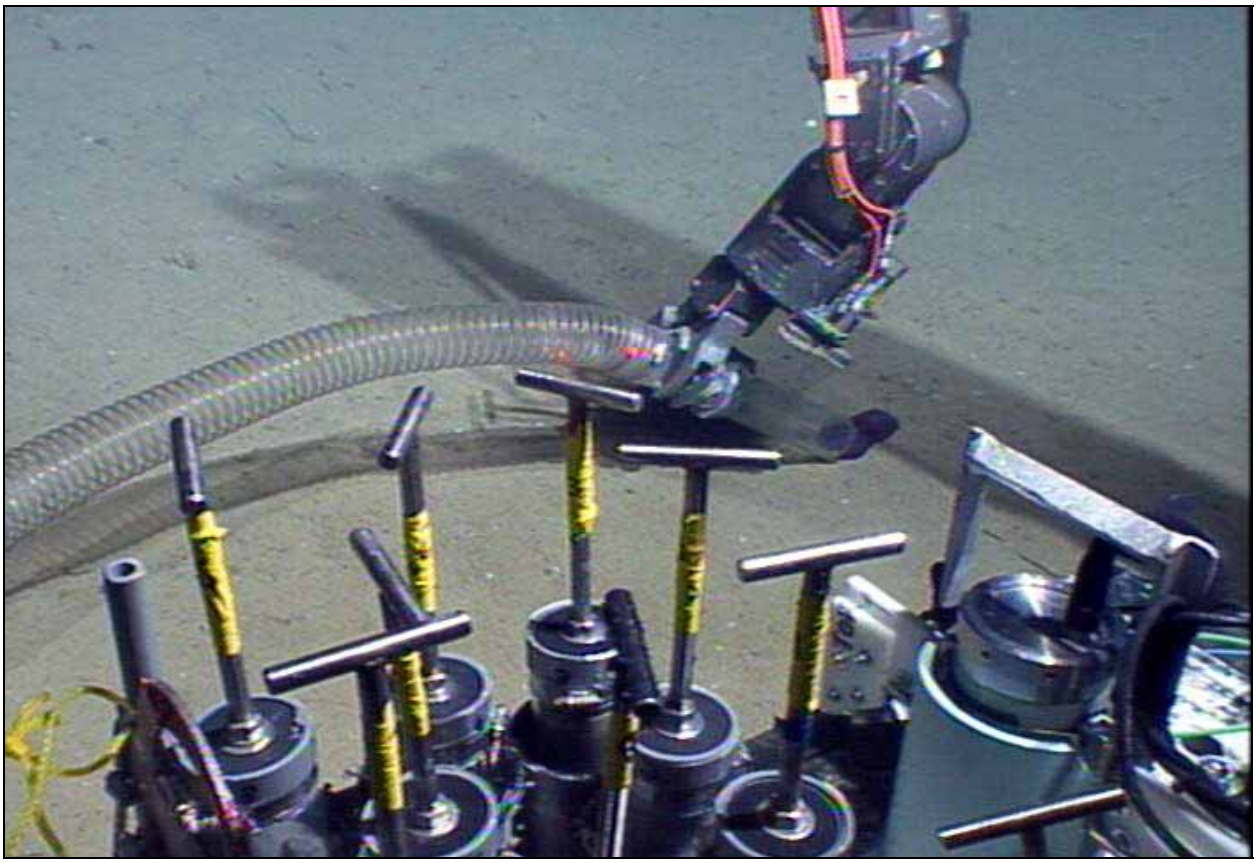

Figure 7-73. Slurp collection of sea cucumber

Non-seep fauna has been previously described. Eighteen samples were taken for background analysis consisting of elasipod holothuroids, and asteroids. The dive track for dive 284 is shown in **Figure 7-74**.

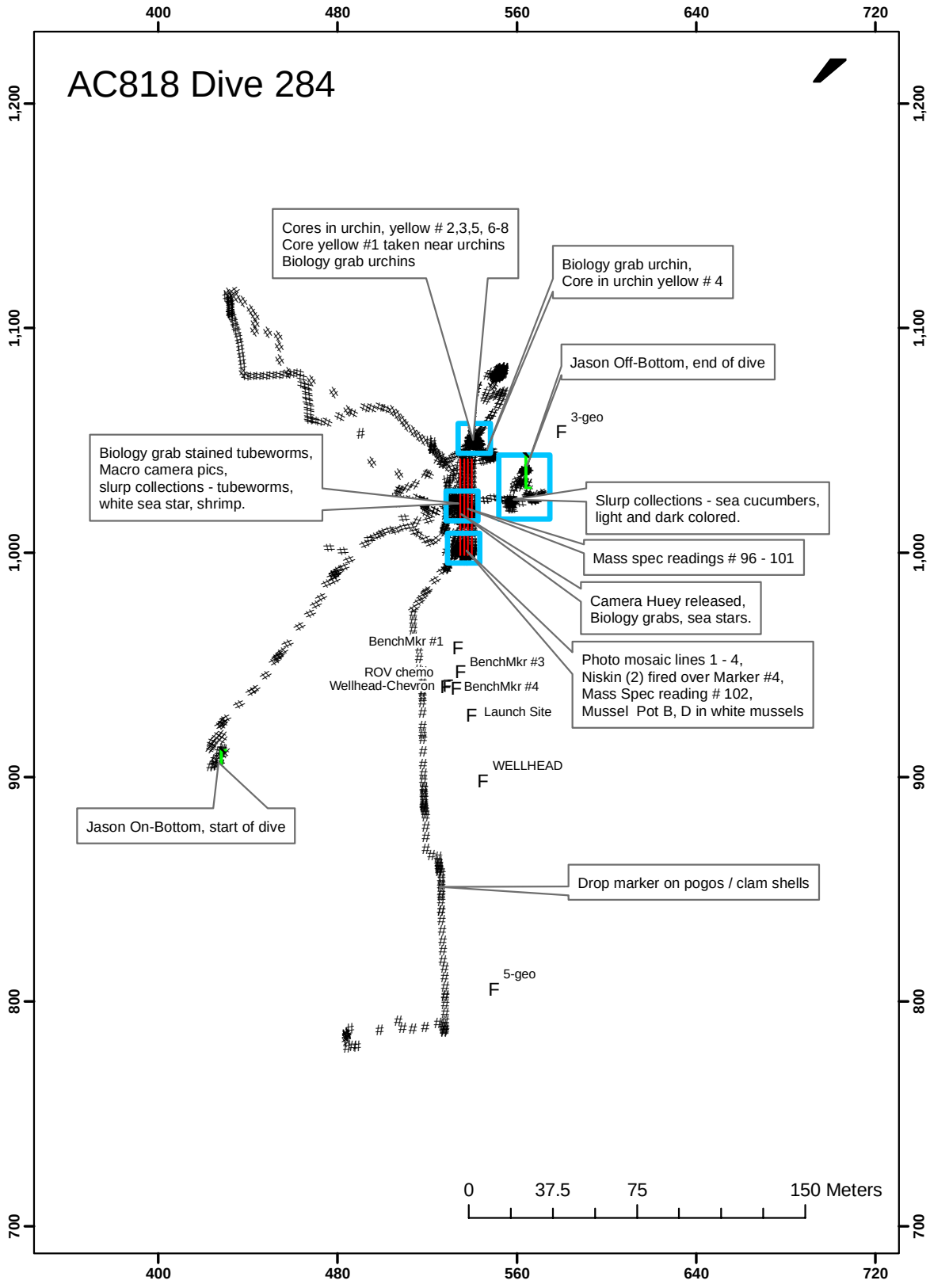

Figure 7-74. Dive track for D284

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APPENDICES

Appendix 1 – Push Core Metadata

Site	Dive #	Event#	Core color	Core #	Collection Date	Description	Use	By	Process Date	Processing Description
AT 340	J2-269	1515	Red	1	6/7/2007	urchin #3 in from of urchin for stephanie			6/9/2007	
AT 340	J2-269	1581	Red	2	6/7/2007	joye lab urchin core	PW	Bowles et al.	6/9/2007	
AT 340	J2-269	1563	Red	3	6/7/2007	joye lab urchine core adjacent to field of reducing mud	PW	Bowles et al.	6/9/2007	1cm oxic, 2cm black, then grey. Has carbonates.
AT 340	J2-269	1534	Red	4	6/7/2007	at urchin for stephanie			6/9/2007	
AT 340	J2-269	1680	Red	5	6/7/2007	collected about 6 inches from urchin	PW	Bowles et al.	6/9/2007	
AT 340	J2-269	1604	Red	6	6/7/2007	about 3 inches from urchin	PW	Bowles et al.	6/9/2007	top 1cm oxic
AT 340	J2-269	1621	Red	7	6/7/2007	failed				
AT 340	J2-269	1658	Red	8	6/7/2007	urchin only for biologists				
AT 340	J2-269	1500	Yellow	1	6/7/2007	urchine set #3 from transect 7				
AT 340	J2-269	1474	Yellow	2	6/7/2007	urchin set #2 in front of urchin for stephanie				
AT 340	J2-269	1446	Yellow	3	6/7/2007	urchin core collected for stephanie				
AT 340	J2-269	1466	Yellow	4	6/7/2007	failed				
AT 340	J2-269	1459	Yellow	5	6/7/2007	urchin core collected for stephanie				
AT 340	J2-269	1434	Yellow	6	6/7/2007	urchin core collected at urchin set #2				
AT 340	J2-269	1454	Yellow	7	6/7/2007	urchin set #2 for stephanie				
AT 340	J2-269	1427	Yellow	8	6/7/2007	urchin core collected in trail for stephanie				
AT 340	~~J2-269~~	6400	Blue	1	6/10/2007	Reference site: joye lab	PW	Bowles et al.	6/10/2007	
AT 340	~~J2-269~~	6403	Blue	2	6/10/2007	Reference site: joye lab				

Site	Dive #	Event#	Core color	Core #	Collection Date	Description	Use	By	Process Date	Processing Description
AT 340	~~J2-269~~	missing?	Blue	3	6/10/2007	Reference site: joye lab	PW	Bowles et al.	6/10/2007	
AT 340	~~J2-269~~	6399	Blue	4	6/10/2007	Reference site: joye lab	PW	Bowles et al.	6/10/2007	
AT 340	~~J2-269~~	6402	Blue	5	6/10/2007	Reference site: overstuffed/ failed				
AT 340	~~J2-269~~	6397	Blue	6	6/10/2007	Reference site: joye lab	PW	Bowles et al.	6/10/2007	
AT 340	~~J2-269~~	6401	Blue	7	6/10/2007	Reference site: failed				
AT 340	~~J2-269~~	6405	Blue	8	6/10/2007	Reference site: joye lab				
AT 340	J2-270	6720	Red	1	6/10/2007	mat core: joye lab	PW	Bowles et al.	6/11/2007	white (thiomargarita) mat with small (3cm diameter) brown mat. Dark sed on top then grey. Collected mat from top. Had shells in it.
AT 340	J2-270	6726	Red	2	6/10/2007	mat core: joye lab				
AT 340	J2-270	6757	Red	3	6/10/2007	mat core: joye lab	PW	Bowles et al.	6/11/2007	
AT 340	J2-270	6758	Red	4	6/10/2007	undistrurbed sediment for harry				
AT 340	J2-270	6759	Red	5	6/10/2007	in mat for harry				
AT 340	J2-270	6792	Red	6	6/10/2007	mat core: joye lab				
AT 340	J2-270	6826	Red	7	6/10/2007	mat core: joye lab	PW and DNF	Bowles et al.	6/11/2007	collected white mat from surface
AT 340	J2-270	6862	Red	8	6/10/2007	mat core: joye lab; bottom fell out				
AT 340	J2-270	6875	Yellow	7	6/10/2007	mat core: joye lab	PW	Bowles et al.	6/11/2007	white mat collected from surface.
AT 340	J2-270	6860	Yellow	8	6/10/2007	mat core: joy lab				
MC 462	J2-271	8350	n/a	1		hydrate mound				
MC 462	J2-271	?	n/a	2		failed				
MC 462	J2-271	8217	n/a	3		mat/ hydrate core				

Site	Dive #	Event#	Core color	Core #	Collection Date	Description	Use	By	Process Date	Processing Description
MC 462	J2-271	8257	n/a	4		mat/ hydrate core:angular hydrates, oil drops also floating up				
MC 462	J2-271	8315	n/a	5		failed				
MC 462	J2-271	8199	n/a	6		mat/ hydrate core				
MC 462	J2-271	?	n/a	7						
MC 462	J2-271	8210	n/a	8		green mat in hydrate area				
MC 462	J2-271	8288	n/a	9		failed				
GC 415	J2-272	9856	Yellow	1		bacterial mat/ brine core; some mud came out of bottom				
GC 415	J2-272	10318	Yellow	2		bacterial mat over hydrate; slightly deep core				
GC 415	J2-272	9983	Yellow	3		bacterial mat; short; when ROV was pushing the core down the ROV moved up (possibly hard underneath)				
GC 415	J2-272	9846	Yellow	4		bacterial mat/ brine				
GC 415	J2-272	10555	Yellow	5		cored but then shaken out to sample ciliate colony				
GC 415	J2-272	9978	Yellow	6		bacterial mat; short; when ROV was pushing the core down the ROV moved up (possibly hard underneath)				
GC 415	J2-272	9839	Yellow	7		bacterial mat/brine; very short; possible methane hydrate underneath				

Site	Dive #	Event#	Core color	Core #	Collection Date	Description	Use	By	Process Date	Processing Description
GC 415	J2-272	10285	Yellow	8		bacterial mat over hydrate; short; when ROV was pushing the core down the ROV moved up (possibly hard underneath)				
GC 415	J2-272	9966	Yellow	9		bacterial mat				
GC 852	J2-273	14992	Yellow	1	6/15/2007	bubbles				
GC 852	J2-273	14945	Yellow	2	6/15/2007	lots of bubbles; leftmost of the brine pool	PW	Bowles et al.	6/15/2007	gassy, black top 1cm, then dark grey, then grey
GC 852	J2-273	14916	Yellow	3	6/15/2007	bubbles, black reduced mud, from leftmost of brine pool	PW	Bowles et al.	6/15/2007	gassy, black top 1cm, then dark grey, then grey
GC 852	J2-273	14924	Yellow	4	6/15/2007	bubbles, black and reducing, from leftmost of brine pool	PW	Bowles et al.	6/15/2007	gassy, black top 1cm, then dark grey, then grey
GC 852	J2-273	14952	Yellow	5	6/15/2007	bubbles, leftmost couple 2, 3, 4, 6	PW	Bowles et al.	6/15/2007	gassy, black top 1cm, then dark grey, then grey
GC 852	J2-273	14936	Yellow	6	6/15/2007	sample as 3 and 4	MOG	Bowles et al.	6/15/2007	gassy, black top 1cm, then dark grey, then grey
GC 852	J2-273	14982	Yellow	7	6/15/2007	rightmost of in reduced mud				
GC 852	J2-273	15004	Yellow	8	6/15/2007	black reducing; couple 8,7,1				
GC 852	J2-273	?	Yellow	9	6/15/2007					
GC 852	J2-273	12479	Red	1	6/14/2007	Mat, deep core with little overlying water, go to harry				
GC 852	J2-273	12516	Red	2	6/14/2007	slight compression; oreo cookie appearance; slight depression	PW	Bowles et al.	6/14/2007	gassy with some mat material, grey throughout
GC 852	J2-273	12540	Red	3	6/14/2007	same spot as #2, about 10cm apart; no compression/good core.	MOG	Bowles et al.	6/14/2007	gassy with some mat material, grey throughout

Site	Dive #	Event#	Core color	Core #	Collection Date	Description	Use	By	Process Date	Processing Description
GC 852	J2-273	12546	Red	4	6/14/2007	Same site at #2 and 3	PW	Bowles et al.	6/14/2007	gassy with some mat material, grey throughout
GC 852	J2-273	12510	Red	5	6/14/2007	compressed; have have hit carbonates; half core	live mud	Bowles et al.	6/14/2007	short; gassy with some mat material, grey throughout
GC 852	J2-273	12469	Red	6	6/14/2007	bacterial mat near mussels; compressed when pushed; shallow core; many bubbles released when cored.	live mud	Bowles et al.	6/14/2007	v. short; gassy with some mat material, grey throughout
GC 852	J2-273	12487	Red	7	6/14/2007	over brown mat; not compressed; good overlying water.	PW	Bowles et al.	6/14/2007	gassy with some mat material, grey throughout
GC 852	J2-273	12549	Red	8	6/14/2007	not long enough for bottom layer; half core; close to 2, 3, and 4.	PW	Bowles et al.	6/14/2007	short; gassy with some mat material, grey throughout
GB 697	J2-274	16006	Red	1	6/17/2007	bacterial mat or barite or mineral				
GB 697	J2-274	18372	Red	2	6/17/2007	took core in mud volcano	PW, MOG, DNF	Bowles et al.	6/17/2007	mud volcano core. Dryish grey mud with lots of air pockets, homogenous throughout
GB 697	J2-274	16047	Red	3	6/17/2007	bacterial mat or barite or mineral				
GB 697	J2-274	16052	Red	4	6/17/2007	brine seep "brine river"	PW	Bowles et al.	6/17/2007	drk brownish grey 0-4cm, light grey to bottom
GB 697	J2-274	16061	Red	5	6/17/2007	brine seep "brine river"	PW	Bowles et al.	6/17/2007	same as R4; no mat visible, collected in small brine pool
GB 697	J2-274	16076	Red	6	6/17/2007	brine seep with fuzzy black material "brine river"	MOG	Bowles et al.	6/17/2007	same as R4; no mat visible, collected in small brine pool

Site	Dive #	Event#	Core color	Core #	Collection Date	Description	Use	By	Process Date	Processing Description
GB 697	J2-274	15998	Red	7	6/17/2007	attempted to shake out core but unsuccessful				
GB 697	J2-274	17989	Red	8	6/17/2007	calyptopeus for meiofauna				
WR 269	J2-275	19764	white	1	6/18/2007	control core (white pogo site)	PW	Bowles et al.	6/19/2007	
WR 269	J2-275	19918	white	2	6/18/2007	rare pogo (white pogo site)	PW	Bowles et al.	6/18/2007	oxidized surface, dark grey beneath. Rare straight pogo sticking out.
WR 269	J2-275	19757	white	3	6/18/2007	rare pogo (white pogo site)	PW	Bowles et al.	6/18/2007	short core, fairly dark
WR 269	J2-275	19905	white	4	6/18/2007	control core (white pogo site)	PW	Bowles et al.	6/19/2007	reference core; top brown, grey below
WR 269	J2-275	19986	white	5	6/18/2007	rare pogo ; short core				
WR 269	J2-275	19872	white	6	6/18/2007	normal pogo	PW	Bowles et al.	6/18/2007	visible pogonoferans; oxidized surface, grey beneath
WR 269	J2-275	19746	white	11	6/18/2007	white pogo				
WR 269	J2-275	19870	white	12	6/18/2007	normal pogo				
WR 269	J2-275	20218	Yellow	1	6/18/2007	control core (white pogo site)				
WR 269	J2-275		Yellow	2	6/18/2007	empty				
WR 269	J2-275	20326	Yellow	6	6/18/2007	control core (white pogo site)				
WR 269	J2-275	20268	Yellow	8	6/18/2007	control core (white pogo site)	PW	Bowles et al.	6/19/2007	reference core; top brown; bottom black/grey
WR 269	J2-275	20275	Yellow	9	6/18/2007	control core (white pogo site)				

Appendix 2 – Macrofauna Metatdata

Dive #	**J2 270**	**event number**	**7162**	**6349**	**6357**	**6283**	
site	**AT340**	**date**	**6/11/2007**	**6/10/2007**	**6/10/2007**	**6/10/2007**	
		time	1:34:37	4:48:25	5:35:42	3:40:14	
		lat	27 38.693722 N	27 38.693727N	27 38.705701 N	27 38.693324 N	
		long	88 21.843468 W	88 21.854118W	88 21.863986 W	88 21.853619 W	
		depth	2192	2189.66	2189.59	2188.6	
	lab	**sample type**	**bushmaster**	**blue scoop**	**white scoop**	**rock**	
	PSU	tubeworm genetics	x				
	PSU	tubeworm stable isotopes	x				
	PSU	tubeworm morphology					
	PSU	tubeworm symbionts					
	PSU	mussel genetics		x	x		
	PSU	mussel stable isotopes		x	x		
	PSU	mussel morphology					
	MPI Bremen	mussel symbionts		x	x		
	PSU	clam genetics					
	PSU	clam stable isotopes					
	PSU	clam morphology					
	MPI Bremen	clam symbionts					
	PSU	coral preserved					
	PSU	coral stable isotope					
	USGS	coral genetics					
	PSU	macrofauna genetics	x	x	x		
	PSU	macrofauna stable isotopes	x	x	x	x	
	PSU	macrofauna preserved	x	x	x	x	
	U. Austria	meiofauna	x	x	x		
	U. Austria	pogonophoran genetics					

Dive #	**271**	**event number**	**8378**	**8895**				
site	**MC462**	**date**	**6/12/2007**	**6/12/2007**				
		time	5:07:19	9:04:17				
		lat	28 29.681789 N	28 29.502356 N				
		long	88 52.895734 W	88 52.725634 W				
		depth	967.66	953.95				
	lab	**sample type**	**clam grab**	**coral grab**				
	PSU	tubeworm genetics						
	PSU	tubeworm stable isotopes						
	PSU	tubeworm morphology						
	PSU	tubeworm symbionts						
	PSU	mussel genetics						
	PSU	mussel stable isotopes						
	PSU	mussel morphology						
	MPI Bremen	mussel symbionts						
	PSU	clam genetics	x					
	PSU	clam stable isotopes	x					
	PSU	clam morphology	x					
	MPI Bremen	clam symbionts						
	PSU	coral preserved		x				
	PSU	coral stable isotope		x				
	USGS	coral genetics		x				
	PSU	macrofauna genetics						
	PSU	macrofauna stable isotopes	x					
	PSU	macrofauna preserved	x					
	U. Austria	meiofauna						
	U. Austria	pogonophoran genetics						
		note: some clam samples damaged during freezer crash						

Dive #	**J2 272**	**event number**	**10575**					
site	**GC415**	**date**	**6/13/2007**					
		time	10:15:08					
		lat	27 32.442733 N					
		long	90 59.281174 W					
		depth	1032.32					
	lab	**sample type**	**ciliate scoop**					
	PSU	tubeworm genetics						
	PSU	tubeworm stable isotopes						
	PSU	tubeworm morphology						
	PSU	tubeworm symbionts						
	PSU	mussel genetics						
	PSU	mussel stable isotopes						
	PSU	mussel morphology						
	MPI Bremen	mussel symbionts						
	PSU	clam genetics						
	PSU	clam stable isotopes						
	PSU	clam morphology						
	MPI Bremen	clam symbionts						
	PSU	coral preserved						
	PSU	coral stable isotope						
	USGS	coral genetics						
	PSU	macrofauna genetics	x					
	PSU	macrofauna stable isotopes						
	PSU	macrofauna preserved	x					
	U. Austria	meiofauna						
	U. Austria	pogonophoran genetics						

Dive #	**J2-273**	**event number**	**15474**	**11040**	**12390**	**15057**	**12650**	**12276**
site	**GC852**	**date**	**6/15/2007**	**6/14/2007**	**6/14/2007**	**6/15/2007**	**6/14/2007**	**6/14/2007**
		time	14:10:12	2:54:11	13:23:52	10:32:55	15:33:36	12:28:31
		lat	27 6.369090 N	27 7.199129 N	27 7.016182 N	27 6.674209 N	27 7.087630 N	27 6.692396 N
		long	91 9.963548 W	91 9.867125 W	91 9.911523 W	91 9.922600 W	91 9.918926 W	91 9.926345 W
		depth	1409.73	1421.96	1407.25	1407.96	1407.47	1406.67
	lab	**sample type**	**bushmaster**	**grab1**	**grab2**	**grab3**	**blue scoop**	**white scoop**
	PSU	tubeworm genetics	x					
	PSU	tubeworm stable isotopes	x					
	PSU	tubeworm morphology	x		x			
	PSU	tubeworm symbionts						
	PSU	mussel genetics					x	x
	PSU	mussel stable isotopes					x	x
	PSU	mussel morphology					x	x
	MPI Bremen	mussel symbionts					x	x
	PSU	clam genetics						
	PSU	clam stable isotopes						
	PSU	clam morphology						
	MPI Bremen	clam symbionts						
	PSU	coral preserved		x				
	PSU	coral stable isotope		x				
	USGS	coral genetics		x				
	PSU	macrofauna genetics					x	x
	PSU	macrofauna stable isotopes	x				x	x
	PSU	macrofauna preserved	x				x	x
	U. Austria	meiofauna	x				x	x
	U. Austria	pogonophoran genetics						

Dive #	**J2-274**	**event number**	**19386**	**18053**	**16691**	**16264**		
site	**GB697**	**date**	**6/17/2007**	**6/17/2007**	**6/16/2007**	**6/16/2007**		
		time	11:35:18	1:23:30	15:10:23	10:00:31		
		lat	27 18.754340 N	27 19.220716 N	27 18.752624 N	27 17.074705 N		
		long	92 6.385012 W	92 6.665978 W	92 6.388831 W	92 6.709280 W		
		depth	1005	1014.92	1003.34	1272.97		
	lab	**sample type**	**mussel pot**	**scoop**	**grab port**	**grab stbd**		
	PSU	tubeworm genetics			x	x		
	PSU	tubeworm stable isotopes			x	x		
	PSU	tubeworm morphology			x	x		
	PSU	tubeworm symbionts			x	x		
	PSU	mussel genetics	x	x				
	PSU	mussel stable isotopes	x	x				
	PSU	mussel morphology	x	x				
	MPI Bremen	mussel symbionts	x	x				
	PSU	clam genetics						
	PSU	clam stable isotopes						
	PSU	clam morphology						
	MPI Bremen	clam symbionts						
	PSU	coral preserved						
	PSU	coral stable isotope						
	USGS	coral genetics						
	PSU	macrofauna genetics	x	x				
	PSU	macrofauna stable isotopes	x	x	x			
	PSU	macrofauna preserved	x	x	x			
	U. Austria	meiofauna	x					
	U. Austria	pogonophoran genetics						

Dive #	**J2-275**	**event number**	**21060**	**20940**	**20972**	**21150**	**19927**	
site	**WR269**	**date**	**6/18/2007**	**6/18/2007**	**6/18/2007**	**6/18/2007**	**6/18/2007**	
		time	13:38:15	12:43:10	12:57:27	14:36:14	4:55:09	
		lat	26 41.187480 N	26 41.174586 N	26 41.174766 N	26 41.185872 N	26 41.149716 N	
		long	91 39.780324 W	91 39.797028 W	91 39.796890 W	91 39.783204 W	91 39.568746 W	
		depth	1909.46	1910.36	1910.38	1909.01	1953.34	
	lab	**sample type**	**mussel pot B**	**mussel pot F**	**scoop**	**grab**	**slurp**	
	PSU	tubeworm genetics				x		
	PSU	tubeworm stable isotopes				x		
	PSU	tubeworm morphology				x		
	PSU	tubeworm symbionts				x		
	PSU	mussel genetics	x		x			
	PSU	mussel stable isotopes	x		x			
	PSU	mussel morphology	x	x	x			
	MPI Bremen	mussel symbionts	x		x			
	PSU	clam genetics						
	PSU	clam stable isotopes						
	PSU	clam morphology						
	MPI Bremen	clam symbionts						
	PSU	coral preserved						
	PSU	coral stable isotope						
	USGS	coral genetics						
	PSU	macrofauna genetics	x		x		x	
	PSU	macrofauna stable isotopes	x	x	x		x	
	PSU	macrofauna preserved	x	x	x		x	
	U. Austria	meiofauna	x	x				
	U. Austria	pogonophoran genetics					x	
		note: MPF was from same mussel bed as scoop						

Dive #	**J2-276**	**event number**	**24437**	**24252**	**24342**		
site	**AT340**	**date**	**6/20/2007**	**6/20/2007**	**6/20/2007**		
		time	14:30:17	13:09:23	13:48:13		
		lat	27 25.199028	27 25:196598	27 25:196598		
		long	88 21.862026	88 21.852594	88 21.852594		
		depth	2188	2190	2190		
	lab	**sample type**	**bushmaster**	**mussel pot**	**slurp**		
	PSU	tubeworm genetics					
	PSU	tubeworm stable isotopes	x	x			
	PSU	tubeworm morphology	x				
	PSU	tubeworm symbionts					
	PSU	mussel genetics		x			
	PSU	mussel stable isotopes	x	x			
	PSU	mussel morphology					
	MPI Bremen	mussel symbionts					
	PSU	clam genetics					
	PSU	clam stable isotopes					
	PSU	clam morphology					
	MPI Bremen	clam symbionts					
	PSU	coral preserved					
	PSU	coral stable isotope					
	USGS	coral genetics					
	PSU	macrofauna genetics	x	x			
	PSU	macrofauna stable isotopes	x	x	x		
	PSU	macrofauna preserved	x	x	x		
	U. Austria	meiofauna	x	x			
	U. Austria	pogonophoran genetics					
					note: slurp was in mussel pot scar		

Dive #	**J2-277**	**event number**	**28226**	**25624**	**25757**	**28083**	
site	**AT340**	**date**	**6/22/2007**	**6/21/2007**	**6/21/2007**	**6/22/2007**	
		time	8:17:50	12:44:19	13:39:14	7:12	
		lat	27.64732084 N	27.64494809 N	27.64499821 N	27.64736293 N	
		long	88.37382119 W	88.36419049 W	88.36431668 W	88.37383181 W	
		depth	2175.06	2190.02	2190.06	2175.31	
	lab	**sample type**	**bushmaster**	**mussel pot A**	**mussel pot F**	**tubeworm grab**	
	PSU	tubeworm genetics	x				
	PSU	tubeworm stable isotopes	x				
	PSU	tubeworm morphology	x				
	PSU	tubeworm symbionts					
	PSU	mussel genetics					
	PSU	mussel stable isotopes		x	x		
	PSU	mussel morphology					
	MPI Bremen	mussel symbionts					
	PSU	clam genetics					
	PSU	clam stable isotopes					
	PSU	clam morphology					
	MPI Bremen	clam symbionts					
	PSU	coral preserved					
	PSU	coral stable isotope					
	USGS	coral genetics					
	PSU	macrofauna genetics					
	PSU	macrofauna stable isotopes	x	x	x		
	PSU	macrofauna preserved	x	x	x		
	U. Austria	meiofauna	x	x	x		
	U. Austria	pogonophoran genetics					

Dive #	J2-278	event number	32173	29818	32009	29002	32069	29870	30626
site	GC852	date	6/24/2007	6/23/2007	6/24/2007	6/23/2007	6/24/2007	6/23/2007	6/24/2007
		time	16:44:08	18:41:02	14:59:39	9:19:19	15:42:51	19:29:55	3:31:44
		lat	27.10591475 N	27.11112856 N	27.10632841 N	27.11009815 N	27.10547927	27.11110378 N	27.10999122
		long	91.16615136 W	91.16536225 W	91.16587699 W	91.16599027 W	-91.16623475	91.16535341 W	-91.16605141
		depth	1412.19	1406.61	1407.93	1396.47	1414.41	1406.73	1399.57
	lab	sample type	bushmaster	mussel pot A	mussel pot F	coral grab 1	clam grab	mussel net	coral grab 2
	PSU	tubeworm genetics							
	PSU	tubeworm stable isotopes	x						
	PSU	tubeworm morphology	x						
	PSU	tubeworm symbionts							
	PSU	mussel genetics		x	x			x	
	PSU	mussel stable isotopes		x	x			x	
	PSU	mussel morphology							
	MPI Bremen	mussel symbionts							
	PSU	clam genetics					x		
	PSU	clam stable isotopes							
	PSU	clam morphology					x		
	MPI Bremen	clam symbionts							
	PSU	coral preserved				x			x
	PSU	coral stable isotope				x			x
	USGS	coral genetics				x			x
	PSU	macrofauna genetics							
	PSU	macrofauna stable isotopes	x	x	x				
	PSU	macrofauna preserved	x	x	x				
	U. Austria	meiofauna	x	x	x				
	U. Austria	pogonophoran genetics							
					mussel RNA			mussel RNA	

Dive #	**J2-279**	**event number**	**33064**	**33418**	**33074**	**33339**		
site	**GB**	**date**	**6/25/2007**	**6/25/2007**	**6/25/2007**	**6/25/2007**		
		time	16:45:28	19:31:28	16:54:33	18:56:39		
		lat	27.1859381 N	27.1858991 N	27.185827 N	27.1854552 N		
		long	92.1252491 W	92.125186 W	92.1253421 W	92.1265595 W		
		depth	1258.08	1255	1258.04	1276.7		
	lab	**sample type**	**mussel pot A**	**mussel pot F**	**scoop**	**tubeworm grab**		
	PSU	tubeworm genetics				x		
	PSU	tubeworm stable isotopes				x		
	PSU	tubeworm morphology						
	PSU	tubeworm symbionts				x		
	PSU	mussel genetics	x		x			
	PSU	mussel stable isotopes			x			
	PSU	mussel morphology						
	MPI Bremen	mussel symbionts						
	PSU	clam genetics						
	PSU	clam stable isotopes						
	PSU	clam morphology						
	MPI Bremen	clam symbionts						
	PSU	coral preserved						
	PSU	coral stable isotope						
	USGS	coral genetics						
	PSU	macrofauna genetics	x	x				
	PSU	macrofauna stable isotopes	x	x				
	PSU	macrofauna preserved	x	x				
	U. Austria	meiofauna	x	x	x			
	U. Austria	pogonophoran genetics						
					meiofauna not quatitative			

Dive #	**J2-280**	**event number**	**33760**	**34454**	**34634**	**34690**	**34508**	**34868**	**35234**
site	**GB647**	**date**	**6/26/2007**	**6/26/2007**	**6/26/2007**	**6/26/2007**	**6/26/2007**	**6/26/2007**	**6/26/2007**
		time	11:11:25	16:17:31	17:41:02	18:05:30	16:42:23	19:27:43	22:17:28
		lat	27.33388838 N	27.32952324 N	27.32862094 N	27.32875067 N	27.32955205 N	27.32923787 N	27.33319485 N
		long	92.4298709 W	92.432205 W	92.43047101 W	92.4299898 W	92.43212448 W	92.4301308 W	92.42763981 W
		depth	944.82	111.67	998.64	1004.36	989.33	1002.5	959.08
	lab	**sample type**	**coral on asphalt**	**tubeworm grab 1**	**snail/mat scoop**	**mussel grab**	**tubeworm grab 2**	**tubeworm grab 3**	**tubeworms & coral on carbonate**
	PSU	tubeworm genetics		x			x	x	x
	PSU	tubeworm stable isotopes		x			x	x	x
	PSU	tubeworm morphology		x			x	x	
	PSU	tubeworm symbionts		x			x	x	x
	PSU	mussel genetics				x			
	PSU	mussel stable isotopes				x			
	PSU	mussel morphology				x			
	MPI Bremen	mussel symbionts							
	PSU	clam genetics							
	PSU	clam stable isotopes							
	PSU	clam morphology							
	MPI Bremen	clam symbionts							
	PSU	coral preserved	x						x
	PSU	coral stable isotope	x						x
	USGS	coral genetics	x						x
	PSU	macrofauna genetics			x				
	PSU	macrofauna stable isotopes			x				
	PSU	macrofauna preserved							
	U. Austria	meiofauna							
	U. Austria	pogonophoran genetics							
					1 snail in RNA later				

Dive #	**J2-281**	**event number**	**39509**					
site	**AC645**	**date**	**6/29/2007**					
		time	13:34:21					
		lat	26.3542573 N					
		long	94.49721478 W					
		depth	2197.28					
	lab	**sample type**	**Mussel Pot B**					
	PSU	tubeworm genetics						
	PSU	tubeworm stable isotopes						
	PSU	tubeworm morphology						
	PSU	tubeworm symbionts						
	PSU	mussel genetics	x					
	PSU	mussel stable isotopes	x					
	PSU	mussel morphology						
	MPI Bremen	mussel symbionts						
	PSU	clam genetics						
	PSU	clam stable isotopes						
	PSU	clam morphology						
	MPI Bremen	clam symbionts						
	PSU	coral preserved						
	PSU	coral stable isotope						
	USGS	coral genetics						
	PSU	macrofauna genetics	x					
	PSU	macrofauna stable isotopes	x					
	PSU	macrofauna preserved	x					
	U. Austria	meiofauna	x					
	U. Austria	pogonophoran genetics						

Dive #	J2-282	event number	41953	41961	42014	42053	42192	43430	40744
site	AC818	date	7/1/2007	7/1/2007	7/1/2007	7/1/2007	7/1/2007	7/1/2007	7/1/2007
		time	4:03:33	4:22:21	5:50:06	6:12:11	7:15:00	17:25:17	15:48:12
		lat	26.1812435 N	26.1813317 N	26.1807849 N	26.1805325 N	26.1807128 N	26.1797135 N	26.1823774 N
		long	94.6248392 W	94.6251011 W	94.6243865 W	94.6245109 W	94.6229605 W	94.6214934 W	94.6226593 W
		depth	2744.05	2744.08	2744.81	2744.67	2745.01	2746.2	2745.3
	lab	sample type	Mussel Pot D	Mussel Scoop White	Mussel Pot B	Mussel Grab Port	Tubeworm Grab	Bushmaster	pogo cores
	PSU	tubeworm genetics						x	
	PSU	tubeworm stable isotopes						x	
	PSU	tubeworm morphology							
	PSU	tubeworm symbionts						x	
	PSU	mussel genetics	x	x	x	x			
	PSU	mussel stable isotopes	x	x	x				
	PSU	mussel morphology							
	MPI Bremen	mussel symbionts							
	PSU	clam genetics							
	PSU	clam stable isotopes							
	PSU	clam morphology							
	MPI Bremen	clam symbionts							
	PSU	coral preserved							
	PSU	coral stable isotope							
	USGS	coral genetics							
	PSU	macrofauna genetics	x					x	
	PSU	macrofauna stable isotopes	x					x	x
	PSU	macrofauna preserved	x					x	x
	U. Austria	meiofauna	x					x	
	U. Austria	pogonophoran genetics							x
							just growth		

Dive #	J2-283	event number	48424	47960	47894	46446	46375	46550
site	AC601	date	7/4/2007	7/4/2007	7/4/2007	7/3/2007	7/3/2007	7/2/2007
		time	5:05:27	1:37:58	1:05:32	12:08:57	11:40:27	13:05:05
		lat	26.36732054 N	26.36951505 N	26.36958454 N	26.39101764 N	26.39079524 N	26.39098557 N
		long	94.51888649 W	94.51900165 W	94.51924885 W	94.51372721 W	94.51363248 W	94.51377056 W
		depth	2283.44	2283.57	2284.02	2318.71	2319.94	2318.95
	lab	sample type	clam/snail scoop	mussel pot B	mussel pot D	fat pogo cores	short pogo cores red	short pogo cores blue
	PSU	tubeworm genetics						
	PSU	tubeworm stable isotopes						
	PSU	tubeworm morphology						
	PSU	tubeworm symbionts						
	PSU	mussel genetics		x	x			
	PSU	mussel stable isotopes		x	x			
	PSU	mussel morphology		x	x			
	MPI Bremen	mussel symbionts						
	PSU	clam genetics						
	PSU	clam stable isotopes	x					
	PSU	clam morphology	x					
	MPI Bremen	clam symbionts	x					
	PSU	coral preserved						
	PSU	coral stable isotope						
	USGS	coral genetics						
	PSU	macrofauna genetics	x	x	x			
	PSU	macrofauna stable isotopes	x	x	x	x	x	x
	PSU	macrofauna preserved	x	x	x	x	x	x
	U. Austria	meiofauna		x	x			
	U. Austria	pogonophoran genetics				x	x	x

Dive #	**J2-284**	**event number**	**50031**	**50085**	**49423**	**50266**		
site	**AC818**	**date**	**7/5/2007**	**7/5/2007**	**7/4/2007**	**7/5/2007**		
		time	7:49:51	8:20:07	3:09:07	9:34:31		
		lat	26.18071277 N	26.18071378 N	26.1808836 N	26.18140025 N		
		long	94.62295604 W	94.62297579 W	94.62298803 W	94.62282741 W		
		depth	2745.3	2745.41	2743.8	2742.26		
	lab	**sample type**	**mussel pot D**	**mussel pot B**	**tubeworm grab**	**dead clam scoop**		
	PSU	tubeworm genetics						
	PSU	tubeworm stable isotopes						
	PSU	tubeworm morphology						
	PSU	tubeworm symbionts						
	PSU	mussel genetics	x					
	PSU	mussel stable isotopes	x					
	PSU	mussel morphology						
	MPI Bremen	mussel symbionts						
	PSU	clam genetics						
	PSU	clam stable isotopes						
	PSU	clam morphology						
	MPI Bremen	clam symbionts						
	PSU	coral preserved						
	PSU	coral stable isotope						
	USGS	coral genetics						
	PSU	macrofauna genetics	x	x		x		
	PSU	macrofauna stable isotopes	x					
	PSU	macrofauna preserved	x	x	x	x		
	U. Austria	meiofauna	x	x				
	U. Austria	pogonophoran genetics						
			white mussels	brown mussels				

Appendix 3 – Event List

Event number	Dive_Num	Site	Date	Time	Latitude N	Longitude W	Depth (m)	sample type	tubeworm genetics	tubeworm stable isotopes	tubeworm morphology	tubeworm symbionts	mussel genetics	mussel stable isotopes	mussel morphology	mussel symbionts	clam genetics	clam stable isotopes	clam morphology	clam symbionts	coral preserved	coral stable isotope	coral genetics	macrofauna genetics	macrofauna stable isotopes	macrofauna preserved	meiofauna	pogonophoran genetics
7162	270	AT340	6/11/2007	1:34:37	27 38.693722	88 21.843468	2,192.00	bushmaster	x	x														x	x	x	x	
6349	270	AT340	6/10/2007	4:48:25	27 38.693727	88 21.854118	2,189.66	blue scoop					x	x		x								x	x	x	x	
6357	270	AT340	6/10/2007	5:35:42	27 38.705701	88 21.863986	2,189.59	white scoop					x	x		x								x	x	x	x	
6283	270	AT340	6/10/2007	3:40:14	27 38.693324	88 21.853619	2,188.60	rock																	x	x		
8378	271	MC462	6/12/2007	5:07:19	28 29.681789	88 52.895734	967.66	clam grab									x	x	x						x	x		
8895	271	MC462	6/12/2007	9:04:17	28 29.502356	88 52.725634	953.95	coral grab													x	x	x					
10575	272	GC415	6/13/2007	10:15:08	27 32.442733	90 59.281174	1,032.32	ciliate scoop																x		x		
15474	273	GC852	6/15/2007	14:10:12	27 6.369090	91 9.963548	1,409.73	bushmaster	x	x	x														x	x	x	
11040	273	GC852	6/14/2007	2:54:11	27 7.199129	91 9.867125	1,421.96	grab1													x	x	x					
12390	273	GC852	6/14/2007	13:23:52	27 7.016182	91 9.911523	1,407.25	grab2			x																	
15057	273	GC852	6/15/2007	10:32:55	27 6.674209	91 9.922600	1,407.96	grab3																				
12650	273	GC852	6/14/2007	15:33:36	27 7.087630	91 9.918926	1,407.47	blue scoop					x	x	x	x								x	x	x	x	
12276	273	GC852	6/14/2007	12:28:31	27 6.692396	91 9.926345	1,406.67	white scoop					x	x	x	x								x	x	x	x	

Event number	Dive_Num	Site	Date	Time	Latitude N	Longitude W	Depth (m)	sample type	tubeworm genetics	tubeworm stable isotopes	tubeworm morphology	tubeworm symbionts	mussel genetics	mussel stable isotopes	mussel morphology	mussel symbionts	clam genetics	clam stable isotopes	clam morphology	clam symbionts	coral preserved	coral stable isotope	coral genetics	macrofauna genetics	macrofauna stable isotopes	macrofauna preserved	meiofauna	pogonophoran genetics
19386	274	GB697	6/17/2007	11:35:18	27 18.754340	92 6.385012	1,005.00	mussel pot					x	x	x	x								x	x	x	x	
18053	274	GB697	6/17/2007	1:23:30	27 19.220716	92 6.665978	1,014.92	scoop					x	x	x	x								x	x	x		
16691	274	GB697	6/16/2007	15:10:23	27 18.752624	92 6.388831	1,003.34	grab port	x	x	x	x													x	x		
16264	274	GB697	6/16/2007	10:00:31	27 17.074705	92 6.709280	1,272.97	grab stbd	x	x	x	x																
21060	275	WR269	6/18/2007	13:38:15	26 41.187480	91 39.780324	1,909.46	mussel pot B					x	x	x	x								x	x	x	x	
20940	275	WR269	6/18/2007	12:43:10	26 41.174586	91 39.797028	1,910.36	mussel pot F							x										x	x	x	
20972	275	WR269	6/18/2007	12:57:27	26 41.174766	91 39.796890	1,910.38	scoop					x	x	x	x								x	x	x		
21150	275	WR269	6/18/2007	14:36:14	26 41.185872	91 39.783204	1,909.01	grab	x	x	x	x																
19927	275	WR269	6/18/2007	4:55:09	26 41.149716	91 39.568746	1,953.34	slurp																x	x	x		x
24437	276	AT340	6/20/2007	14:30:17	27 25.199028	88 21.862026	2,188.00	bushmaster		x	x			x										x	x	x	x	
24252	276	AT340	6/20/2007	13:09:23	27 25:196598	88 21.852594	2,190.00	mussel pot		x			x	x										x	x	x	x	
24342	276	AT340	6/20/2007	13:48:13	27 25:196598	88 21.852594	2,190.00	slurp																	x	x		
28226	277	AT340	6/22/2007	8:17:50	27.64732084	88.37382119	2,175.06	bushmaster	x	x	x														x	x	x	
25624	277	AT340	6/21/2007	12:44:19	27.64494809	88.36419049	2,190.02	mussel pot A						x											x	x	x	
25757	277	AT340	6/21/2007	13:39:14	27.64499821	88.36431668	2,190.06	mussel pot F						x											x	x	x	

Event number	Dive_Num	Site	Date	Time	Latitude N	Longitude W	Depth (m)	sample type	tubeworm genetics	tubeworm stable isotopes	tubeworm morphology	tubeworm symbionts	mussel genetics	mussel stable isotopes	mussel morphology	mussel symbionts	clam genetics	clam stable isotopes	clam morphology	clam symbionts	coral preserved	coral stable isotope	coral genetics	macrofauna genetics	macrofauna stable isotopes	macrofauna preserved	meiofauna	pogonophoran genetics
28083	277	AT340	6/22/2007	7:12	27.64736293	88.37383181	2,175.31	tubeworm grab																				
32173	278	GC852	6/24/2007	16:44:08	27.10591475	91.16615136	1,412.19	bushmaster		x	x														x	x	x	
29818	278	GC852	6/23/2007	18:41:02	27.11112856	91.16536225	1,406.61	mussel pot A					x	x											x	x	x	
32009	278	GC852	6/24/2007	14:59:39	27.10632841	91.16587699	1,407.93	mussel pot F					x	x											x	x	x	
29002	278	GC852	6/23/2007	9:19:19	27.11009815	91.16599027	1,396.47	coral grab 1													x	x	x					
32069	278	GC852	6/24/2007	15:42:51	27.10547927	-91.16623475	1,414.41	clam grab									x		x									
29870	278	GC852	6/23/2007	19:29:55	27.11110378	91.16535341	1,406.73	mussel net					x	x														
30626	278	GC852	6/24/2007	3:31:44	27.10999122	-91.16605141	1,399.57	coral grab 2													x	x	x					
33064	279	GB829	6/25/2007	16:45:28	27.1859381	92.1252491	1,258.08	mussel pot A					x											x	x	x	x	
33418	279	GB829	6/25/2007	19:31:28	27.1858991	92.125186	1,255.00	mussel pot F																x	x	x	x	
33074	279	GB829	6/25/2007	16:54:33	27.185827	92.1253421	1,258.04	scoop					x	x													x	
33339	279	GB829	6/25/2007	18:56:39	27.1854552	92.1265595	1,276.70	tubeworm grab	x	x		x																
33760	280	GB647	6/26/2007	11:11:25	27.33388838	92.4298709	944.82	coral on asphalt													x	x	x					
34454	280	GB647	6/26/2007	16:17:31	27.32952324	92.432205	111.67	tubeworm grab 1	x	x	x	x																
34634	280	GB647	6/26/2007	17:41:02	27.32862094	92.43047101	998.64	snail/mat scoop																x	x			

Event number	Dive_Num	Site	Date	Time	Latitude N	Longitude W	Depth (m)	sample type	tubeworm genetics	tubeworm stable isotopes	tubeworm morphology	tubeworm symbionts	mussel genetics	mussel stable isotopes	mussel morphology	mussel symbionts	clam genetics	clam stable isotopes	clam morphology	clam symbionts	coral preserved	coral stable isotope	coral genetics	macrofauna genetics	macrofauna stable isotopes	macrofauna preserved	meiofauna	pogonophoran genetics
34690	280	GB647	6/26/2007	18:05:30	27.32875067	92.4299898	1,004.36	mussel grab					x	x	x													
34508	280	GB647	6/26/2007	16:42:23	27.32955205	92.43212448	989.33	tubeworm grab 2	x	x	x	x																
34868	280	GB647	6/26/2007	19:27:43	27.32923787	92.4301308	1,002.50	tubeworm grab 3	x	x	x	x																
35234	280	GB647	6/26/2007	22:17:28	27.33319485	92.42763981	959.08	tubeworms & coral on carbonate	x	x		x									x	x	x					
39509	281	AC645	6/29/2007	13:34:21	26.3542573	94.49721478	2,197.28	Mussel Pot B					x	x										x	x	x	x	

Appendix 4 –Background Fauna Collection

Dive	Method	ID	Organism
J2-270	slurp	J2-270-01	Benthodytes typica
J2-270	slurp	J2-270-02	Benthodytes typica
J2-270	slurp	J2-270-03	Benthodytes lingula
J2-270	slurp	J2-270-04	Euphronides sp
J2-270	slurp	J2-270-05	Euphronides sp
J2-273	manipulator	J2-273-01	Paralomis crab
J2-273	slurp	J2-273-02	Geryoinid crab
J2-273	slurp	J2-273-03	shrimp
J2-273	slurp	J2-273-04	Galatheid crab
J2-273	slurp	J2-273-05	Galatheid crab
J2-273	slurp	J2-273-06	Galatheid crab
J2-273	slurp	J2-273-07	Galatheid crab
J2-273	slurp	J2-273-08	Galatheid crab
J2-273	slurp	J2-273-09	shrimp
J2-273	slurp	J2-273-10	Brisingidae
J2-273	slurp	J2-273-11	amphipod
J2-275	slurp	J2-275-01	Euphronides sp
J2-275	slurp	J2-275-02	Euphronides sp
J2-275	slurp	J2-275-03	Euphronides sp
J2-275	slurp	J2-275-04	Euphronides sp
J2-275	slurp	J2-275-05	Euphronides sp
J2-275	slurp	J2-275-06	Benthodytes typica
J2-275	slurp	J2-275-07	Benthothuria
J2-275	slurp	J2-275-08	Squid
J2-275	slurp	J2-275-09	Snails (4)
J2-275	slurp	J2-275-10	anemone
J2-277	slurp	J2-277-01	Benthopectin
J2-277	slurp	J2-277-02	Nymphaster
J2-277	slurp	J2-277-03	Benthodytes typica
J2-277	slurp	J2-277-04	Benthodytes typica
J2-277	manipulator	J2-277-05	Benthodytes lingula
J2-277	manipulator	J2-277-06	Benthodytes lingula
J2-277	manipulator	J2-277-07	Benthodytes lingula
J2-278	manipulator	J2-278-01	Paralomis crab
J2-281	slurp	J2-281-01	Benthodytes typica
J2-281	slurp	J2-281-02	Benthodytes typica
J2-281	slurp	J2-281-03	Benthodytes typica
J2-281	slurp	J2-281-04	Benthodytes typica
J2-281	manipulator	J2-281-05	Hymenaster
J2-281	slurp	J2-281-06	anemone
J2-281	manipulator	J2-281-07	Whip coral
J2-282	manipulator	J2-282-01	Benthodytes lingula
J2-282	manipulator	J2-282-02	Euphronites sp.
J2-282	manipulator	J2-282-03	Benthodytes lingula

Dive	Method	ID	Organism
J2-282	manipulator	J2-282-04	Euphronides sp
J2-282	manipulator	J2-282-05	asteroid
J2-282	manipulator	J2-282-06	asteroid
J2-282	manipulator	J2-282-07	asteroid
J2-282	manipulator	J2-282-08	asteroid
J2-282	slurp	J2-282-09	Benthodytes typica
J2-282	slurp	J2-282-10	Benthodytes typica
J2-282	slurp	J2-282-11	Chiridota
J2-283	slurp	J2-282-01	Benthodytes typica
J2-283	slurp	J2-282-02	Benthodytes typica
J2-283	slurp	J2-282-03	Benthodytes typica
J2-283	slurp	J2-282-04	Benthodytes typica
J2-283	manipulator	J2-282-05	Benthodytes lingula
J2-283	manipulator	J2-282-06	Benthodytes lingula
J2-283	manipulator	J2-282-07	Benthodytes lingula
J2-283	manipulator	J2-282-08	Benthodytes lingula
J2-283	manipulator	J2-282-09	Euphronites sp.
J2-283	manipulator	J2-282-10	urchin
J2-283	manipulator	J2-282-11	anemone
J2-284	manipulator	J2-284-01	Euphronites sp.
J2-284	slurp	J2-284-02	Benthodytes typica
J2-284	slurp	J2-284-03	Benthodytes typica
J2-284	slurp	J2-284-04	Benthodytes typica
J2-284	slurp	J2-284-05	Benthodytes typica
J2-284	slurp	J2-284-06	Benthodytes typica
J2-284	slurp	J2-284-07	Benthodytes typica
J2-284	manipulator	J2-284-08	Benthodytes lingula
J2-284	manipulator	J2-284-09	Benthodytes lingula
J2-284	manipulator	J2-284-10	Benthodytes lingula
J2-284	slurp	J2-284-11	Benthodytes typica
J2-284	slurp	J2-284-12	Benthodytes typica
J2-284	slurp	J2-284-13	Benthodytes typica
J2-284	slurp	J2-284-14	Benthodytes typica
J2-284	manipulator	J2-284-15	Dytaster grandis
J2-284	manipulator	J2-284-16	asteroid
J2-284	manipulator	J2-284-17	asteroid
J2-284	manipulator	J2-284-18	asteroid
Muscle or other tissue removed from all specimens and stored at -20 C.			
All specimens in possession of Robert Carney, LSU			
All specimens intended for stable isotope analysis			

Appendix 5 – Dive Logs

Dive Log for J2-269

Date: 06/07/07
Shift: 1130-1600 EDT
Dive: J2-269
Site: AT 340

Watch Leader:
Name: Kathy Loftis

Time	Comments
16:02	off sea-floor. Start SM2000 calibration
17:27	start SM200 survey over pit
17:39	start E/W line
17:49	end line
17:49	move towards benchmark 1
17:50	began all discs 002
17:57	screen shot grab
17:59	seeing sea floor
18:02	urchins
18:16	sea cucumber
18:19	crossing 2194 contour
18:21	" 8192 "
18:22	" 2190 "
18:22	PC-A stopped recording
18:25	mussel shell hatch
18:29	bacterial mat
18:31	mussels
18:31	tubeworms
18:33	" & mussels
18:40	carbonate
18:41	rat tail fish
18:49	end tubeworms, mats
18:52	tubeworms
18:54	mats (white)
18:56	mound with burrows
18:57	squid & tubeworms
18:58	began recording on PC-A again
19:00	search for bm 1
19:07	tubeworms
19:14	tubeworms and carbonates
19:17	holothoria floating
19:18	mussels

19:18 marker 11 found
19:23 tubeworms
19:30 mussel bed
19:32 blue flight bag
19:35 dead mussels
19:36 benchmarker in distance –searching

Summary:

We began the shift by carrying out a survey of a pit. Once completed, we began our search for benchmarker 1. Many beds of mussels and tubeworms were observed, however none were collected. Benchmarker 11 was observed in a mussel bed as well as a previously seeing blue flight bag.

Problems with recording: PC-A stopped recording for an extended period of time.

Date: 06/07/07
Shift: 1600-2000 EDT
Dive: J2-269
Site: AT 340

Watch Leader: Dr. Harry Roberts
Name: Bill Shedd

Time (GMT) Comments
20:31 Searching for markers #6 and #15 – plastic cup on bottom
20:33 Clump of fishing line in tubeworms
20:35 Pelagic deep purple sea cucumber on brow cam
20:42 Lush tubeworm bushes
20:47 Marker #11 found, 10 m
20:52 Mussels, science cam
20:59 Abrupt change in bottom color from light to very dark
21:11 Marker #1 spotted
21:18 DVL Nav reset
22:27 Search for urchins to sample and core
22:34 Found group of urchins, prep to core; PCA DVD deck failed
22:59 Begin coring
23:03 Sample urchin, continue coring

Watch Summary:
Located markers #1 and #11, could not locate #6 and #15, to calibrate Jason navigation with 06 Alvin navigation. Sampled sea urchins and took cores below them, in front of them, and behind them on their trails to determine what they eat.

Date: 6/8/07
Shift: 2000-0000 EDT
Dive: J2-269
Site: AT 340

Watch Leader: Harry Roberts
Name: Irmi Eichinger

Time (GMT) Comments
01:30 Getting ready for SM 2000
20m, starting in NW corner, facing west
Folder J2-269 at 340
01:50 Start of line 1
02:36 End of line 1
02:42 Start of line 2
03:18 End of line 2

Watch Summary:
Nothing interesting to see.

Date: 6/8/2007
Shift: 0000-0400 EDT
Dive: J2-269
Site: AT340

Watch Leader: Harry Roberts
Name: Nicole Morris

Time (GMT) Comments
04:15:31 Start of SM2000 survey line 3
04:52:09 End of survey line 3
04:56:?? Start of survey line 4
05:33:02 End of survey line 4
05:40:59 Start of survey line 5
06:15:32 End of survey line 5
06:23:31 Start of survey line 6
06:46:01 Dropped target (marker)
07:00:58 End of survey line 6
07:04:18 Start of survey line 7
07:39:02 End of survey line 7
07:51:08 Start of survey line 8

Watch Summary:

At the start of watch, the SM2000 survey was continuing. We surveyed lines 3 to 7. A target was dropped during survey line #6. Survey line #8 was started before the end of watch. No DVD recordings were made.

Date: 6/8/2007
Shift: 0400-0730 EDT
Dive: J2-269
Site: AT340

Watch Leader:
Name: Oscar Garcia

Time (GMT)	Comments
08:22:38	End of survey Line 8
08:32:40	Start of Survey Line 9
09:08:57	End of Survey Line 9
09:17:54	Start of Survey Line 10
09:50:10	End of Survey Line 10
09:58:21	Start of Survey Line 11
10:34:48	End of Survey Line 11
10:34:50	Start transiting to repeating survey line 6
10:34:50	Start recording DVD series 007
10:54:12	After 10:52 minutes, DVD BCW 07 fails recording.
10:56:03	DVD BCW07 was replaced and start recording in a new DVD labeled BCW7#2
11:03:54	Start repeating survey line 6
11:27:00	DVD BCA07 fails and it is replaced for a new one it is labeled BCA007#2
11:40:00	Stop Survey Line 6
11:40:00	Transiting to new site northwest.

Watch Summary:
Basically we conducted Survey lines 8,9,10 and 11, line 6 was repeated. Two DVD fails during watch time.

Date: 6/8/2007
Shift: 0730-1130 EDT
Dive: J2-269
Site: AT340

Watch Leader:
Name: Julia Zekely

Time (GMT) Comments
11.40 DVD set 7 recording (still); transit to western targeting site; appr. 2191m depth
11.52 Sea urchin field; many urchins and many trails
11.58 Holothuroids (2)
11.58 JASON hits bottom (sitz mark)
12.22 Sea whip
12.24 Sea whips (2); DVD set 8 started
13.20 Survey starts, short view on JASON instruments
14.20 End of survey (line #2)
14.26 DVDs 8 ends, no other set started due to surveys 20m off bottom
14.37 survey start (line #3); appr 2165m depth, 20m off bottom
14.48 line' track problems; survey stopped
start of survey line#5

Watch Summary:

Date: 6/8/2007
Shift: 1130-1600 EDT
Dive: J2-269
Site: AT340

Watch Leader:
Name: Kathy Loftis

Time Comments
15:33 stop survey line 4
15:35 no DVDs are recording
15:36 start line 5
15:55 end line 5
15:39 start line 6
16:19 end line 6
16:29 start line 7
16:48 end line 7
16:50 start line 8
17:11 end line 8
17:16 start line 9
17:36 end line 9
17:38 start line 10
17:59 end line 10
18:03 start line 11
18:23 end line 11
18:25 start line 12
18:47 end line 12
18:51 start line 13

19:10 end line 13
19:15 start line 14
19:35 end line 14
19:38 start line 15

Summary:

At the start of this shift, an SM2000 survey was already underway. The survey was carried out the length of the shift and still in progress at the beginning of the following shift. No observations were made as the ROV was not near the seafloor.

Date: 06/08/07
Shift: 1600-2000 EDT
Dive: J2-269
Site: AT340

Watch Leader: Dr. Harry Roberts
Name: Bill Shedd

Time (GMT) Comments
19:55 On line #15, SM 200 survey
19:59 End line #15
20:02 Begin line #16
20:24 End line #16
20:35 Begin line #17
20:55 End line #17
20:58 Begin line #18
21:22 End line #18
21:27 Begin line #19
21:50 End line #19
21:53 Begin line #20
22:19 End line #20
22:22 Begin line #20.5 (line change to transit to tie-line #21)
22:38 End line #20.5
22:45 Begin line #21 (E-W tie-line)
23:21 End first part of line #21, waiting on ship to change course
23:24 Begin calibration lines 5 m off bottom, 10 m off bottom, and 15 m off bottom
23:35 End calibration lines, waiting on ship to change course

Watch Summary:
We continued the SM2000 survey and surveyed lines 15 to 21. We performed calibration lines 5,

10, and 15 meters off the seafloor.

Date: 6/9/07
Shift: 2000-0000 EDT
Dive: J2-269
Site: AT 340

Watch Leader: Chuck Fisher
Name: Irmi Eichinger

Time (GMT)	Comments
00:39	tube worms
00:42	mussels
00:56	lamellibrachia
00:57	DvD 009-BC-W stopped after 18min recording
00:59	crab
01:06	carbonate plates + tubeworms
01:20	DvD 009-BC-A stopped after 40min
01:29	mussels
01:47	DvD 009II-BC-W and 009II-BC-A start recording
02:04	marker 12 found
02:09	315 Hdg; y:621; x: 384 marker 12
03:25	weights off from elevator
03:43	elevator goes up
03:59	jason is going up

Watch Summary: many tubeworms, mussels, and carbonate plates

Dive Log for J2-270

Name: Kathy Loftis
Site: AT-340
Date: 6/9/07
Shift: 11:30-4:00
Dive: J2-270

Time	Comments
18:17	Jason is still being lowered
18:28	approaching seafloor
18:28	pc-w behind other dvds
18:42	not yet at seafloor
18:45	search for fish trap
18:52	2203 m depth
18:59	in transit to elevator 2 location
19:05	pc-a stopped recording b/ween 24 and40 minutes
19:06	fat cucumber, clump of cucumbers
19:09	pc-a failed insert new disc
19:12	sea cucumber
19:15	starfish
19:22	2 sea cucumbers
19:22	starfish
19:23	sea cucumber
19:29	floppy urchin
19:36	fish
19:41	sea cucumbers
19:43	sea cucumber
19:51	still in transit to elevator
19:55	sea cucumber collection

Summary:
We began with the lowering of JASON. Once having reached the seafloor, we started a short search for a lost fish trap. The trap was not located during the search and JASON started to transit towards the elevator. During this transit, many biological observations were made, however there were no collections. The most common observation made were sea cucumbers.

Date: 6/9/07
Shift: 16:00-20:00 EDT
Dive: J2-270
Site: AT340

Watch Leader: Harry Roberts
Name: Bill Shedd

Time (GMT) Comments

19:58 slurp sample #1, holothurian, green bucket
20:06 elevator launched
20:13 slurp sample #2, holothurian, green bucket
20:22 start DVD tapes #11 20:27
20:27 slurp sample #3, holothurian, green bucket
20:30 stop DVD tapes #10
20:33 slurp sample #4, sea star, red bucket
20:42 slurp sample #5, holothurian, red bucket
20:52 slurp sample #6, holothurian, red bucket
20:54 slurp sample #7, holothurian, red bucket
21:03 observe octopus, attempt slurp sample
21:05 octopus escapes
21:08 slurp sample #8, holothurian, red bucket
21:11 tripod fish observed
21:13 slurp sampling finished; two empty chambers remain – black and white, black, with green dash
21:15 transiting to elevator
21:21 left carbonate area into mud-prone area where the elevator should be
21:23 found elevator in good shape
21:24 Ian's "Louie" camera working
21:29 weight removed from elevator
21:33 another weight removed from elevator
21:37 move elevator to new site
22:13 deploy elevator at new site
22:21 start DVD tapes #12
22:23 stop DVD tapes #11
22:44 PCA #12 DVD stopped, couldn't finalize, replaced
22:53 deploy "Louie" camera, Target #25
23:08 prep for photo mosaic
23:18 reset nav LBL BC 23m offset, bearing 247 from AC baseline
23:25 begin photo mosaic

Watch Summary:

8 slurp samples were taken, moved elevator, deployed Ian's Louie camera, and started photo mosaic, observed octopus and tripod fish

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Date: 6/9/07
Shift: 2000-0000 EDT
Dive: J2-270
Site: AT 340

Watch Leader: Stephanie Lessard-Pilon

Name: irmi

Time (GMT) Comments

1:02 doing a smaller area at 3m (dense mussels)
1:13 tubeworms, mussels:nice video
1:21 still photomosaic (Stephanie)
1:45 end of photomosaic
1:47 Ian's camera
1:51 start mussel transplant experiment, move to the area
1:55 mussels close up, really nice, depth: 2190
2:01 sensoring starts
2:02 touching the mussels
2:04 anemones on the mussels: nice close up
2:14 opening of the first cage
2:21 filling the mussels inside the cage
2:29 methane measuring
2:39 second cage: start
2:55 opening of the biobox
2:59 start of filling the third cage with mussels
3:07 4. cage out of the biobox
3:11 white, long fish and start with filling the cage with mussels
3:19 methane measuring
3:28 end of measuring
3:32 moving the green cage
3:40 grab a rock for Harry, from milk-crate in the back
3:45 making pictures of cages from Stephanie

Watch Summary:

Date: 6/10/2007
Shift: 0000-0400 EDT
Dive: J2-270
Site: AT340

Watch Leader: Stephanie Lessard-Pilon, Stephane Hourdez, Chuck Fisher
Name: Nicole Morris

Time (GMT) Comments

03:56:33 Finished down-looking pictures
03:58:42 Going to elevator to get mussel nets
04:07:46 Photographing tubeworms
04:09:20 Elevator in sight
04:15:00 Fix for elevator position
04:17:37 Grabbing mussel scoop nets

04:19:10 White net/black zip ties mussel scoop net removed from elevator
04:23:56 White/black mussel net in bushmaster bucket
04:26:48 Blue/black net removed from elevator
04:28:17 Blue/black net placed in bushmaster bucket
04:29:55 Going to "the" mussel bed (Marker #2)
04:37:23 At mussel bed, can see Marker #2
04:42:00 Grabbed blue/black net from bushmaster bucket
04:48:20 Attempted mussel collection with blue/black net (inverted net)
04:53:11 Attempted mussel collection with blue/black net (inverted net)
04:54:51 Attempted mussel collection with blue/black net (inverted net)
04:55:25 Attempted mussel collection with blue/black net (inverted net)
04:56:01 Mussel collection with blue/black net- collected a few mussels
05:06:01 Attempted mussel collection with blue/black net (inverted net)
05:08:53 Continuing attempt at mussel collection with blue/black net
05:14:44 Changed grip position, continuing attempt
05:17:09 Mussel collection with blue/black net- collected a few mussels
05:18:34 Mussel collection attempt with blue/black net- brown mussels on hill
05:21:03 Attempting to grab mussels with manipulator arm
05:22:56 Observed gas bubbles
05:23:42 Collected mussels with manipulator, placed in blue/black net
05:29:53 Placed blue/black net in starboard bio box
05:34:08 Grabbed white/black net from bushmaster bucket
05:35:44 Attempting mussel collection with white/black net in same slope area
05:38:00 Grabbing mussels with manipulator arm instead of scooping- have not collected anything yet
05:41:23 Attempted to collect mussels with white/black net
05:42:20 Collected one mussel by scooping mussel net
05:42:59 Collected some mussels by scooping white/black net
05:44:52 Collecting mussels with manipulator arm and placing in white/black net→ successful
05:48:12 Attempting to collect mussels by scooping mussel net→ successful
05:54:26 Taking nets back to the elevator, end of mussel net sampling
05:58:28 Fishing line sighted on mussel bed
06:01:47 Elevator in sight
06:07:25 Placed white/black net in biobox #2
06:10:38 Placed blue/black net in biobox #1
06:12 PCA-16 stopped recording after 18:06; changed disk to PCA-16-2; we think PCA-16 finalized
06:18 Started PCA-16-2
06:21:02 Moving elevator to Urchin 1 area
06:54:58 Push cores almost fell off *Jason*; elevator hit push cores
06:57:05 Using starboard manipulator to hold push cores until elevator is lowered
06:58:49 Placed elevator at Urchin 1 area
06:59:25 Resetting push cores on *Jason*
07:05:32 Removing artificial urchin from elevator
07:08:24 Placed artificial urchin in quiver with meth sensor
07:12:20 Searching for 'good' area to take urchin push cores

07:19:05 Bio observation- small gorgonian in science camera
07:24 Reset DVL- navigation
07:42:00 Getting ready to take urchin cores
07:49 BCW-17 stopped recording at 0749 after approximately 4 minutes
07:52:01 Taking core in urchin trail (green #8)
07:54 Restarted BCW-17-2
07:57 Push core green #5 still has a plug in it
08:01 Taking core in urchin trail (green #3)

Watch Summary:
At the beginning of watch, we started mussel net collections. Mussel net sampling lasted for approximately 1 hour and 45 minutes. There were initial problems with collecting mussels in the two nets; therefore, in order to collect some mussels, *Jason*'s manipulator arm was used. Towards the end of mussel net sampling, there were a couple of successful net scooping collections. The last hour of this watch was spent searching for an appropriate area (urchin trails) to take urchin push cores. Two urchin cores were collected before the end of watch.

Date: 06/10/2007
Shift: 0400-0800 EDT
Dive: J2-270
Site: AT340

Watch Leader: Ian MacDonald
Name: Oscar Garcia

Time (GMT) Comments
8:07 Still workin on core in urchins green 3
8:10 Biology takes a sample of sear urchin in starboard biobox
8:10 Starting work with another core.
8:12 Sample core in green 7
8:17 Sampler core in urchins green 4
8:22 Sample core in urchings green 6
8:34 Sea urchin starboard biobox a sample from manipulator arme.
8:40 DVD SCA 17 fails and it is replaced by a new one
8:44 Sample core with Green 1.
8:51 Core in urchins green 2
8:56 Stop coring Biology observation pelagic PC and BC camera
9:06 Fish on pilot camera
9:10 Sample core with Blue 6
9:14 Control core blue 4
9:15 Control core blue 1
9:18 Control core blue 7
9:19 Control core blue 5
9:21 Control core blue 2

9:23 Control core blue 3
9:26 Control core blue 8
9:30 Start Recording DVD 18 series
9:31 Elevator spoted on camera pilot
9:35 'HUEY' Camera is not working
9:48 Relocate push cores to the elevator
9:55 Empty cores dropped on bottom
10:01 DVD PCA 18 stops recording and it is replaced
10:10 Elevator weights released
11:40 New set of DVD is recording DVD 19 series
11:41 EVT nav reset DVL

Watch Summary:
Finish working with green push cores, all blue cores done,'HUEY' camera not working.

Date: 6/10/07
Shift: 8000-1200 EDT
Dive: J2-270
Site: AT 340

Watch Leader: Ian
Name: irmi

Time (GMT) Comments
12:08 photo transect
12:30 still floating
12:41 on the bottom, preparing for photo transect
12:51 start
12:54 end of transect
12:56 preparation of next transit
13:00 start transit, T4 to T5
13:21 end of transit
13:24 start of photo transect T5
13:26 end of transect
13:29 start of transectT5 to T8
13:22 stop of transect
13:35 start of transect T8
13:41 start transit T8 to T3
13:43 end of line, finish of T3
13:48 start of T6
13:51 end of transect T6
14:11 start of T7
14:14 stop of T7
14:17 start of line

14;20 stop of T9
14;27 start of T2
14:30 stop of T2
14:39 start of T10
14:42 end of line
14;47 reset
14;49 start of line T1
14:52 end of line T1
14:52 heading to CRP looking for urchins
15:01 reset
15:14 start transit to central depression

Watch Summary:

Date: 6/10/2007
Shift: 11.30 – 16.00 EDT (GTM 15.30 – 20.00)
Dive: J2-270
Site: AT340

Watch Leader:
Name: Julia Zekely

Time (GMT) Comments
15.50 Many urchins and trails
16.04 Sea urchins, starfish in between
16.06 looking for site for Stephanies "artificial sea urchin trails"
16.09 complete straight trail in between other trails, Bob takes still
16.35 artificial sea urchin trail set, "Klobuerste" **#1**; ☺, good one
16.40 Klobuerste Mark , **#1** set (2002m depth)
16.42 Doppler reset (2x)
16.57 Klobuerste marker **#2** set
17.00 artificial urchin trail **#2** set; ☺ good one
17.03 Doppler reset
17.17 Klobuerste marker **#3 set**
17.18 artificial urching trail **#3** set; ☺; 2201m depth
[trails 1-3 on DVD set 21]
17.47 artificial urching trail set, but marked with marker #5; ☺
17.49 Doppler reset
17.55 Photo Mosaic
18.15 Marker deployed (mosaic marker); photo mosaic appr. 3m above bottom
18.59 Marker deployed (mosaic marker)
19.15 Marker with small float as corner markers
19.49 Niskin fired above sea urchin field

Watch Summary:

Good view, most of time used for Stephanies “artificial sea urchin trails” experiment with Klobuerste, which was very successful. 4 artificial trails were done and marked. Afterwards the photo mosaics were started, many stills taken during mosaic

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Date: 6/10/07
Shift: 16:00-20:00 EDT
Dive: J2-270
Site: AT340

Watch Leader: Harry Roberts
Name: Bill Shedd

Time (GMT) Comments

20:30 End of photo survey
20:59 slurp sample of 6 legged sea star, white bucket
21:03 observed crab
21:05 sample of crab
21:11 holothurian observed
21:14 attempt, failed to collect anemone
21:24 star fish observed
21:29 star fish collected, port biobox
21:45 mudflow (v. light colored) surrounds pre-existing highs (dark brown); flow is highly disturbed by numerous urchins, dark colored mounds undisturbed
21:50 PCA-24 DVD stopped, would not finalize, replaced
21:59 core in bacterial mat, red #1
22:02 core in mat, red #2 (might have a blue ring)
22:18 core in mat, red #3
22:24 core in in undisturbed dark sediment, red #4
22:28 core in very disturbed, very light sediment, red #5
22:44 core in mat, red #6
22:59 core in mat, red #7
23:14 core in mat, red #8
23:18 start DVD's #25
23:18 core in mat, yellow #8
23:21 core in mat, yellow #5

Watch Summary:
10 cores were taken, 8 in bacterial mats and 2 in geological flow and non-flow features. One holothurian, two sea stars, and one crab were collected. The flow was made up of very light colored sediment on the surface, almost black below, and was full of trails of numerous live sea urchins; the topographically higher, older sediments was dark brown on the surface and below and show little sign of disturbance by urchins.

Date: 6/10/07
Shift: 2000-0000 EDT
Dive: J2-270
Site: AT340

Watch Leader:
Name: Kathy Loftis

Time (GMT) Comments

0:12:18 In transit to bushmaster site
0:33:12 Mussel shell observed
0:35:11 Large mussel bed
0:36:13 Blue bag observed
0:37:14 Ian's camera seen; LED blinking
0:40:31 Start looking for tube-worms→ marker 8 and 15
0:43:50 Bucket (white) seen with tubeworms surrounding
0:48:23 Long-line fishing line observed in tubeworm bed, at 10 m from mussel bed
0:53:29 In mussel bed → benchmarker #2
1:02:22 Found benchmarker #15 observed only; looking benchmarker 6
1:12:15 SCA (red) completely shut off at some time; turned on and pressed record
1:13:37 Bushmaster
1:16:31 Began DVD set 026
1:18:44 DVD set 025 ended
1:27:36 Begin tubeworm collection with bushmaster→ stained tubeworms
1:30:44 Begin closing in on tubeworms
1:41:09 Tubeworms are collected
1:49 Tubeworms on shelf
1:52:49 Collecting small batch of stained tube worms
2:11 Collecting tubeworms into port bio box with rock
2:14 Collecting rock into port bio box
2:17 Collecting tubeworms into port bio box with large rock
2:22 Moving NW to look for fish trap
2:56 Jason going up!
2:51 End recording

Watch Summary:

Dive Log for J2-271

Date: 6/11/07
Shift: 16:00-20:00
Dive: J2-271
Site: MC462

Watch Leader: Harry Roberts
Name: Bill Shedd

Time (GMT) Comments

22:38 on bottom, start DVD #27, mottled, very burrowed bottom, small Beggiatoa mats
22:43 reset Doppler, not moving
22:48 forward heading 190, 10 m
22:49 common, small Beg mats common
22:52 white holothurian, stopped looking for hill with sonar
22:57 fish, vesicomyid clams, forward, course 127
22:59 carbonates, gorgonian corals, large red crab
23:02 carbonates, numerous brittle stars, anoemone
23:05 carbonates, strong current - ~1 knot
23:12 looking for top of mound, course 310, 949.4 m
23:18 looking for top of mound, course 35, 949.8 m
23:25 Beg mats, course 3, 950 m
23:30 prep to deploy marker
23:34 set marker
23:36 trash(?), sign on pole with arrow pointing up and "surface dweller" written on it
23:37 eel
23:40 Beg mats, stopped, waiting for Medea
23:45 forward, course 45
23:58 crossing 960 m contour, depth 959 m

Watch Summary: found top of mound to have common Beggiatoa, large carbonate outcrops with gorgonian corals, some vesicomyid clams, fish and crabs. Geophysical maps found to off by 1 meter in depth

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Date: 6/11/07
Shift: 2000-0000 EDT
Dive: J2-271
Site: MC462

Watch Leader: Harry
Name: Irmi

Time (GMT)	Comments
0:03	end of first transit
0:12	holothurian
0:14	crabs
0:16	holothurian
0:19	marker CRP
0:20	bacterial mat
0:21	holothurian
0:22	bacterial mat
0:35	soft corals, gorgonians
0:37	rocks
0:40	crab on the rock
1:04	holothurian
1:06	crab
1:29	coral
1:29	gorgonians, rocks, ophiuroids
1:34	rocks, gorgonians
1:35	holothurian
1:35	corals, rock
1:38	bacterial mat
1:43	holothurian, crab
1:45	crab
1:46	rocks, coral
1:47	many rocks, dead corals
1:53	trash, crab on top, anemons
1;56	trash
2;02	rock, holothurian
2:04	rat-tail fish, many of them
2:06	crabs
2:07	bacterial mat
2:09	trash, bomb
2:18	bacterial mat, black
2:25	holothurian
2:58	many fish, chimera, close up
3:35	rock, close up, on Birne flow site back
3:51	start of taking a core for Marshal
3:55	taking the core

Date: 6/12/2007
Shift: 0000-0400 EDT
Dive: J2-271
Site: MC462

Watch Leader: Harry Roberts, Bernie Bernard, Ian MacDonald

Name: Nicole Morris

Time (GMT) Comments

03:58:53 Taking push core (green #8) in bacterial mat
04:05:42 Taking push core (green #3) in bacterial mat
04:05:45 Harry/Bernie think oil may possibly be seeping out
04:06:59 Geo Obs: Oil bubbles?
04:18:59 Taking push core (#4) in bacterial mat
04:20:01 Geo Obs: Oil bubbles
04:20:01 Geo Obs: Hydrates
04:27:00 Taking push core (#9) in bacterial mat
04:27:58 Geo Obs: Hydrate
04:30:00 Core 9 failed; returned to basket empty
04:36:21 Geo obs: hydrate mound
04:42:00 Taking push core (blue #5) in bacterial mat
04:41 PCA 30 stopped recording
04:46 PCA 30-2 started recording
04:50:30 Crab picture taken on Scorpio
04:53:56 Moved white core #9 into milk crate
04:58:01 Taking push core (green #1) in bacterial mat
05:02:31 Going to collect mussel/clam shell
05:06:48 Collecting mussel/clam with manipulator
05:07:21 Mussel collected was placed in starboard bio box
05:08:43 Collecting second shell
05:09:38 Placing 2nd shell in starboard bio box
05:10:44 Mass spec has been on while on the ROV; going to test the mass spec
05:12:36 Picked up mass spec probe from ROV; starting test
05:13:30 Placed probe next to sediment (on top of sediment)
05:16:01 Mass spec test continues
05:17:23 Holding probe above sediment
05:27:04 Some indication of propane→ reading from mass spec
05:29:25 Moving probe back to ROV
05:30:05 Moving back to bacterial mat
05:33:33 Placing probe above bacterial mat→ same area as cores were taken
05:45:11 Methane appears to be increasing
05:55:23 Stop testing mass spec
05:55:49 Moving to coral area
06:16:49 Corals sighted (gorgonian)→ new area (dropped a target)
06:32:58 At coral site to collect Lophelia, gorgonian, and other animals; also to take pictures with handheld camera
06:36:00 Grabbed handheld camera
06:37:15 Power to camera
06:45:10 Trying to work camera; having some problems; no pictures yet
06:49:59 Appears to be a connection problem with ROV and handheld camera
06:54:36 Seeing shells embedded in carbonate
07:04:59 Bio obs: coral

07:04:36 Dropped another marker at coral site
07:06:30 Taking pictures with Scorpio→ attempting
07:08:33 Taking pictures of coral-gorgonian with Scorpio
07:10:39 Took picture of gorgonian
07:11:04 Took picture of gorgonian
07:11:22 Took picture of gorgonian
07:11:44 Continuing to take pictures of gorgonian
07:25:02 Searching for Lophelia to sample
07:26:34 Ogcocephalid observed in brow cam
07:28:51 Continuing to take pictures with Scorpio
07:30:38 Lophelia sighted
07:31:12 Still continuing to reconcile connection problems with Ian's handheld
07:37:36 Ian's handheld appears to not be working
07:33:38 Best of video- Lophelia
07:36:13 DV cam recorded of Lophelia
07:39 End of DV cam recording
07:40:40 Still attempting to "fix" connection problem
07:41:35 Taking down looking images of corals with Scorpio→ Lophelia corals
07:42:51 Ian's camera (handheld) is not going to work; power circuit is not working only receiving 5 volts
07:44:32 Starting to take Lophelia Scorpio images
07:46:48 Ian's camera may possibly have power; checking connection, power, volts
07:48:46 Camera is not working
07:50:31 Continuing Scorpio images of Lophelia

Watch Summary:
At the beginning of watch, we were taking push cores in a bacterial mat. While taking push cores, watch leaders sighted oil bubbles seeping from areas where cores had been taken. We then tested the mass spectrometer in different areas for approximately 40 minutes. *Jason* then moved to the coral sight to begin coral collections. The last hour and a half of this watch was spent taking images of coral site with the Scorpio camera and reconciling connection problems with the handheld camera.

Date: 06/12/2007
Shift: 0400-0800 EDT
Dive: J2-271
Site: MC462

Watch Leader: Ian MacDonald
Name: Oscar Garcia

Time (GMT) Comments
7:59 Start Oscar Watching
8:02 Soft Coral in the top of the rock

8:03 Lophelia detected on Scorpio Camera
8:07 DVD Series 032 starts recording
8:09 Ian Macrocamera operation starts
8:13 Manipulator operates camera to a lophelia area
8:15 Stops Recording DVD series 31
8:26 Crab photographed with macrocamera
8:33 PCA DVD 32 stops recording
8:42 Sea urchin observed
8:55 Moving away from the same rock.
8:55 Two different corals observed plain and soft.
8:58 Biol. Observation madrepora coral
9:06 Fail to attempt to sample coral in biobox
9:08 Succesful sample collection of madrepora coral
9:22 Soft coral collection with Biobox
9:28 Carbonate Sample
9:35 Stop samplicg corals and carbonates
9:47 Start transiting to photo transect series
9:53 Start Transect 1
9:58 End of line 1
10:05 Start recording DVD series 33
10:06 Start transect 2
10:08 Stop recording DVD series 32
10:11 End of line 2
10:22 Start transect 4
10:27 End of transect 4
10:30 Start transect 8
10:35 End of transect 8
10:52 Start transect 5
10:57 End of transect 5
11:06 Start transect t3
11:11 end transect t3
11:16 Start transect t10
11:20 end transect t10
11:26 Start transect t9
11:31 End transect t9
11:39 Start transect t7
11:43 End transect t7
12:02 Start transect t6
12:04 end transect t6 stop photransect
12:06 end DVD 33
12:31 DVD series 34 were stopped after 28 minutes because Jason dive finished.

Watch Summary:
Multiple Biol. Observations at the beginning of the watch. Macrocamera was used with the manipulator and the Photo Random Transect were conducted

Dive Log for J2-272

Date: 6/12/07
Shift: 2000-0000 EDT
Dive: J2-272
Site: GC415

Watch Leader: Harry
Name: Irmi

Time (GMT) Comments

1:11 Jason reached the bottom
1:29 stop, shrimp
1:35 we are going to geo1,
1:43 shrimp
2:01 bacterial matt
2:09 going to geo target 2
2:10 fish
2:14 Eel
2:32 at target geo2
2:35 going to geo target3
2:48 at geo target 3
2:50 going back to CRP
3:04 marker2 in sight
3:07 taking marker 2
3:15 going to geo target 4
3:32 at target 4

Date: 6/13/2007
Shift: 0000-0400 EDT
Dive: J2-272
Site: GC415

Watch Leader: Harry Roberts, Erik Cordes, Stephane Hourdez
Name: Nicole Morris

Time (GMT) Comments

03:52:08 Continuing the transit to the upper area
04:41:52 Arrived at northern site
04:44:19 Setting marker #2
04:44:29 Reset DVL nav
04:46:36 Going to Geo target5
04:57:30 Bio obs: holothuroid
04:56:46 Bio obs: bacterial mats

04:58:30 Bio obs: fish
05:01:01 Bio obs: bacterial mat; crab
05:01:40 Bio obs: bacterial mat; clams
05:02:20 Dropping target “mat/clams”
05:07:52 Dropped target “bacterial mat”; possibly brine
05:07:58 Going to take some push cores
05:09:53 Bio obs: 2 white holothuroids
05:10:38 Geo obs: edge of flow
05:15:41 Bio obs: fish
05:17:50 Getting ready to take push cores
05:20:35 Taking push core (yellow #7) in bacterial mat/brine
05:22:56 Taking push core (yellow #4) in bacterial mat/brine
05:27:22 Taking push core (yellow #1) in bacterial mat/brine
05:29:21 Finished coring this area
05:35:01 Bio obs: bacterial mats, holothuroid
05:35:36 Bio obs: 2 fish
05:36:41 Shrimp
05:40:38 Shark; Dalatiidae
05:42:12 Eel
05:44:55 Bacterial mat
05:47:27 Bacterial mat
05:47:57 Dropped target “brine area 2”
05:52:28 Bacterial mats
05:54:10 Pockmark observed on sonar
05:56:52 Getting ready to take 3 push cores at another bacterial mat
06:01:49 Taking push core (yellow #9) in another bacterial mat
06:03:44 Taking push core (yellow #6) in bacterial mat
06:05:15 Taking push core (yellow #3) in bacterial mat
06:07:30 Continuing on to Geo target #6
06:21:39 Geo obs mounds and holes
06:22:21 Field of mounds/holes
06:23:26 Getting close to Geo target 6
06:25:36 Pits/fields
06:32:35 Heading to Geo target 7
06:44:52 Moving to Geo target 8
06:52:17 Geo obs pockmark with bacterial mats
07:03:14 Bacterial mat
07:10 PCA failed
07:15 PCA-2 started
07:21:29 Bio obs: big shrimp
07:24:30 Nautilus
07:36:10 Small bacterial mats
07:39:49 Small bacterial mats
07:42:09 Small bacterial mats
07:44:58 Small bacterial mats
07:47:08 Small bacterial mats

07:53:30 Nice bacterial mat

Watch Summary:

At the beginning of watch, we were transiting to the northern site. Three push cores were taken in a bacterial mat/brine site (marker "bacterial mat"). Three push cores were taken in a second bacterial mat/brine area (marker "brine area 2"). After the second set of three push cores, Jason continued moving along to different Geo targets; this continued through the end of this watch.

Date:	06/12/2007
Shift:	0400-0800 EDT
Dive:	J2-271
Site:	MC462
Watch Leader:	Ian MacDonald
Name:	Oscar Garcia

Time (GMT)	Comments
8:01:29	Taking push core (yellow 8 in bacterial mat over hydrate
8:09:52	Taking push core (yellow 5) in bacterial mat over hydrate
8:15:00	Taking push core (yellow 2) in bacterial mats over hydrate
8:22:55	Mass spec start sampling hydrate
8:35:09	M spec probe calibrated and start over the same hole of pushing core
8:42:09	Biology observation. Other ciliate with sulful symbionts
8:43	Starts recording DVD series 39
8:46	Stop recording DVD series 38
8:55	Macrocamera set up taking ciliate images
9:10	Macro camera taking images of colonia cilia
9:45	macro camera start core hole
9:51	macro camera turned off
9:56	Core 5 yellow, shake out to try cilitate colony
10:00	Sample in core 5 fell out twice.
10:03	Attempt to sample again with core 5
10:06	Put core 5 away with out any sample.
10:13	Scoop net collection mud around ciliate
10:14	Gas below crust is observed
10:17	Hydrate coming out from the bottom
10:21	Use core 5 to break up crust
10:30	Gas bubbles coming out
10:36	Start recording DVD series 040
10:50	Mark 5 deployed
10:50	Moving towards geotarget #10
10:56	Pock marks series observed
11:00	Fish, carbonates, hydrates
11:05	DVD pca 40 fails after 18 min
11:23	Preparing Jason Ascending

Watch Summary:
Pushing Cores 8,5,2 sampling bacterial mats. Mass spec used sampling hydrates. Bubbles observed in several times of the watch.

Dive Log for J2-273

Date: 6/13/07
Shift: 2000-0000 EDT
Dive: J2-273
Site: GC 852

Watch Leader: Harry
Name: Irmi

Time (GMT)	Comments
0:56	floating over the bottom
0:59	fish
1:06	on topo high
1:14	Octopus!!!
1:17	still octopus
1:23	going to drop a marker (3)
1:34	going to geo 1
1:36	gorgonia and anemones (many)
1:39	shrimp
1:52	bamboo coral, funny fish
1:54	going to target 2
2:07	soft coral, anemones (close up)
2:10	anemones, soft coral, (pilot cam +science cam)
2:14	suction sample, close up of anemone with science cam
2:20	start: catching crab
2:32	taking anemone + rock
2:34	taking anemone into milk can with markers (science cam)
2:38	gorgonians!
2:39	troping target `bamboo corals 2`
2:41	large crab(maya)
2:44	catching the crab (science cam)
2:47	taking two legs, into biobox
2:49	coral
2:51	coral, rocks
2:52	taking sample from coral, into biobox
2:07	taking picture with the cool pix
3:10	science cam: close up of coral
3:35	going to geo target 4

Watch Summary:

Date: 6/14/2007

Shift: 0000-0400 EDT
Dive: J2-273
Site: GC852

Watch Leader: Harry Roberts
Name: Nicole Morris

Time (GMT) Comments

04:00:46 Moving to Geo target 3
04:04:48 Skate
04:13:13 Fish
04:15:14 Skate
04:32:47 Bacterial mat
04:39:40 Moving to "Harry's mystery" target, due west
04:47:57 Ctenophore
05:18:12 Reset DVL-nav
05:35:35 Harry's target, carbonate mound
05:36:01 Corals: soft coral, black coral
05:37:41 Solitary tubeworm
05:38:04 More tubeworms
05:41:47 Coral
05:43:23 Dropping target "slope outcrop"
05:45:25 Sitting ROV down to collect carbonate
05:45:46 Collecting carbonate rock with manipulator→ attempt
05:46:36 Collecting carbonate rock with manipulator→ attempt
05:47:29 Collecting carbonate rock with manipulator→ attempt
05:47:42 Collecting carbonate rock with manipulator→ successful
05:49:06 Placed carbonate sample into empty milk crate on basket
05:50:10 Sponge
05:50:30 Continuing to search for Harry's mystery target
05:53:38 Moving to southern site
05:56:40 Shrimp
06:00:39 Tubeworms and carbonate
06:00:34 Small gorgonians
06:34:11 Eel
06:45:01 Isopod
07:11:20 At carbonate mound
07:11:33 Coral observed
07:11:49 Coral observed
07:13:48 Searching for animals to slurp
07:14:36 Solitary tubeworm
07:15:21 Brachyurid crabs
07:17:41 Grabbing suction sampler
07:21:43 Trying to adjust suction sampler
07:31:00 Start slurp sampling
07:35:50 Galatheid crab collection in blue chamber

07:38 Galatheid crab collection in blue chamber
07:45:57 Attempted galatheid crab collection
07:46:25 Galatheid crab collected in blue chamber
07:51:40 Galatheid crab collected in blue chamber
07:55:18 Attempting shrimp collection → successful in blue chamber
07:56:47 Set suction sampler back on basket; searching for more animals to slurp

Watch Summary:
At the beginning of watch, we were transiting Geo target 3. Following this transit, we started transiting to "Harry's Mystery" target. We logged biological and geological features while in transit. A target "slope outcrop" was dropped at a carbonate mound area. While at the carbonate mound area, carbonate was collected. We began slurp sampling toward the end of this watch.

Date: 06/14/2007
Shift: 0400-0800 EDT
Dive: J2-273
Site: GC852

Watch Leader:
Name: Oscar Garcia

Time (GMT) Comments
8:03 Tubeworms observed
8:05 Crab over carbonate rock
8:09 Slurp Collection attempted to use for crab
8:13 Strong crab run away
8:15 Biol observation mobile fauna
8:17 Slurp Collection little crab
8:20 Multiple soft coral observed around carbonate
8:22 DVD starts recording
8:32 Slurp Collection continues around big carbonate
8:42 Anemona recorded with DV camera
8:44 Biol. Observation mobile fauna anemone like
8:53 Golden Coral observed over carbonate
9:01 Multiple coral observed
9:06 Reset DVL now
9:17 Unusual Crab attempted to collect-run away
9:20 Moving towards elevator
9:42 Fish observed during transit
9:49 Snail Fish observed
9:50 eel mobile fish
9:53 Ship elevator communication not working
9:58 Elevator mode navigation is not working. Other navigation is still working
10:11 Elevator observed

10:16 DVD starts recording
10:32 Elevator stuck into the mud
10:35 Elevator freed it.
11:18 Elevator landed in new site
11:45 Still waiting for dust to settle

Date: 6/14/2007
Shift: 7.30 – 11.30 EDT (GTM 11.30-15.30)
Dive: J2-273
Site: GC 852

Watch Leader:
Name: Julia Zekely

Time (GMT) Comments
11.53 looking for Ian´s camera
11.56 Elevator in sight
12.07 Marker #2 in sight (1405m depth)
12.11 carbonates rocks and mussels
12.14 many mussels
12.19 preparing to scoop mussels
12.28 mussel scoop: **WHITE NET**
12.34 still scooping; good site; gas bubbles observed while scooping (near carbonated rocks; 1407m depth)
12.36 scoops right next/underneath rock (with tubeworms on), more gas bubbles
12.40 net ½ full, lots of mussels collected, other manipulator grabs net
12.46 more scooping, gas bubbles
12.57 scooping finished, white net in biobox
13.01 new fix on marker #8 (from loast year)
13.15 ball marker (**BLUE TAPE**) deployed here (on carbonated rock with tubeworms)
13.17 stained tubeworms (close up, Best of)
13.22 grabbing stained tubeworms (port biobox)
13.30 gas bubbles again(where tubeworms were grabbed), still grabbing tubeworms
13.36 wooden port biobox with grabbed tubeworms closed
13.40 Doppler reset
13.45 Marker occupy, fixed new one on #8
13.47 nice overlook over site around #8 (check **BCam!**)
13.53 looking for mussels to collect; difficult because many dead mussels
13.58 Marker #5 fixed
14.00 Carbonated rocks
14.03 Bacterial mats
14.11 Core RED #6 into bacterial mat, just ½ of core full when back out ☹
14.15 bubbles observed (outside core) during core
14.17 core red **#1** ☺

14.21 core red **#7** ☺
14.31 crabs on bact. Mats observed, core taken above crab
14.32 core red #**5** ☺
14.46 core red #**2**
14.47 core red **#4**
14.51 all cores taken
14.55 weight dropped (at marker #5) so that Jason can back up
14.56 Jason 3.5m above bottom looking again for good mussel patch to scoop
15.04 1m above bottom; "where to scoop"
15.05 close up of mussesl; **BEST OF**
15.10 **cool pix (macro cam)** of mussels (Bathymodiolus brooksi + B. cildressi together)
15.23 **BLUE net** for scooping ready
15.26 starting to scoop, 2nd manipulator supports scooping
15.34 still scooping, waiting in between to settlement of sediment

Watch Summary:

Date: 6/14/07
Shift: 1130-1600 EDT
Dive: J2-273
Site: GC852

Watch Leader:
Name: Kathy Loftis

Time (GMT)	**Comments**
15:38	Mussel collection beginning
15:42	Scooped several mussels
15:47	Left ball marker right of where mussel samples were collected
15:55	In transit to Ian's Camera
16:00	Clear bubbles observed
16:02	Spotted Ian's camera
16:10	Retrieve Ian's camera
16:16	Start DVD 049 set
16:14	End DVD 048 no overlap
16:18	Site of elevator reached
16:52	Ian's other camera on elevator not blinking
17:01	Transferring carbonate to elevator
17:14	Transferring red cores onto elevator
17:28	Transferring coral
17:58	Elevator released
17:59	Wait for elevator to surface
19:23	See seafloor; start dvd's again
19:36	X380 Y960→ coral site
19:40	Corals

Watch Summary:

Date: 6/14/07
Shift: 16:00-20:00
Dive: J2-273
Site: GC852

Watch Leader: Harry Roberts
Name: Bill Shedd

Time (GMT) Comments

20:00 Waiting to begin photomosaic, surveying area; PCA-#50 stopped
20:28 All decks stopped, DVD-#50, started #51 20:32
21:06 Getting ready to start photomosaic
21:17 Started photomosaic, 5 m altitude

Watch Summary: Surveyed area, began photomosaic

Date: 6/14/07
Shift: 2000-0000 EDT
Dive: J2-273
Site: GC 852

Watch Leader: Stephanie/Harry
Name: Irmi

Time (GMT) Comments

23:48 start line 10
0:18 start line 12 from end of line 1
0:49 reset
1:46 new target for golden coral
1:53 back to mosaiking
1:58 corals on a rock
2:22 end of photo mosaik
2:26 start making pictures with cool pix
2:27 madrepora getting ready for close up, science cam: close up with crab
2:33 anemone+coral: video!!!
2:36 start Ians camera: anemone
2:42 video of science cam still going on
2:51 close up anemone (science cam)
2:55 bamboo coral

2:59 getting ready for Ians camera for taking pictures of the bamboo coral
3:07 shrimp on the coral, Ians camera
3:18 crab
3:24 moving to Lophelia (with target)
3:26 reset dve
3:32 fly-trap anemone (science cam)!!!!!!!
3:38 reset dve
3:45 Cirripedia (Pedunkeles?) on the coral
3:47 going to Lophelia target
3:54 Lophelia

Watch Summary: wonderful close ups with the science cam!!!

Date: 6/15/2007
Shift: 0000-0400 EDT
Dive: J2-273
Site: GC852

Watch Leader: Ian MacDonald
Name: Nicole Morris

Time (GMT) Comments
03:57:35 Madropora
03:58:31 Collecting macro handheld pictures
03:59:38 Recording DV cam
04:04 Stopped recording DV cam→ end of DV cam tape 001
04:10:23 Start of DV cam 002
04:14 Stopped DV cam 002
04:25 Having problems with DV cam recorder
04:40 Continuing macro handheld pictures
04:45 Fixed DV cam monitor problem→ ready to record
04:47:20 Handheld camera is off, placing back in ROV
04:52:38 Getting ready to start photo transects
04:56:32 Transiting to photo transect start (T5); have been recording Scorpio images
05:18:47 Start of photo transect (T5) line
05:24:09 End of photo transect (T5)
05:44:32 Reset DVL
05:45:55 Moving to start of transect T1
05:54:51 Start of line T1
05:53:29 Mud flow
05:59:13 End of line T1
06:08:40 Start of line T6
06:11:09 End of line T6
06:16:54 Start of line T2
06:23:20 End of line T2

06:39:38 Start of line T7
06:45:09 End of line T7
06:41:26 Shell hash, carbonate rubble
06:49:21 Start of line T9
06:54:30 End of line T9
07:04:47 Start of line T8
07:10:07 End of line T8
07:28:43 Start of line T3
07:32:56 End of line T3
07:38:10 Start of line T10
07:42:16 End of line T10
07:49:40 Start of line T4; last photo transect line
07:53:54 End of line T4; end photo transects
07:55:06 Heading over to near transect T7

Watch Summary:
At the beginning of watch, we were continuing to take close-up images using the handheld macrocamera. Following the close-up images, we started a set of 10 photo transect lines. This was continued toward the end of this watch.

Date: 06/15/2007
Shift: 0400-0800 EDT
Dive: J2-273
Site: GC852

Watch Leader:
Name: Oscar Garcia

Time (GMT)	Comments
8:18	Arriving to target brine pool
8:35	Moving to another area looking for brine pools
8:50	Brine pool observed
8:53	Preparing for taking a sample core
8:57	Firing risking
9:07	Found core marks form alving 2006
9:10	Push core yellow 3 used
9:11	Bubbles observed
9:13	Push core Yellow 4
9:18	Push core Yellow 6
9:22	Push core Yellow 2
9:23	Bubbles observed
9:26	Core in brine Yellow 5
9:40	Core in brine yellow 7

9:42 DVD series 57 start recording
9:45 Core in brine yellow 1
9:51 Core in brine yellow 8
10:13 arrived mark 5
10:23 Macro camera start
10:31 Macro camera stops
10:32 Tubeworm collection in biobox
10:58 Finished tubeworm collection
11:05 Begin transit to south
11:19 Bacterial mats
11:22 Attempt to collect a crab.

Date: 06/15/2007
Shift: 0800-1200 EDT
Dive: J2-273
Site: GC852

Watch Leader:
Name: Julia Zekely

Date: 6/15/2007
Shift: 7.30 – 11.30 EDT (GTM 11.30-15.30)
Dive: J2-273
Site: GC 852

Watch Leader:
Name: Julia Zekely

Time (GMT) Comments

11.31 looking for good tubeworm site and patch to sample with Bushmaster

11.43 ?core hole? From last year on bottom<ht

12.03 trying to slurp mobile fauna (rat-tail)
12.05 Marker #1 to be seen
12.08 carbonated rocks; after fish with slurp
12.11 slurp back on basket; Marker #1
12.13 close up at mussels on Marker #1; preparing to take a mussel pot
12.14 **BEST OF mussels**
12.17 moving marker #1 out of mussel bed
12.25 Mussel Pot (B) taken; pushing down into mussels, did not work, “free” mussel pot again
12.33 released mussel patch sampled

12.34 looking for another patch to sample
12.40 Jason 2.2m above bottom
12.43 good overview of site (mussels, carbonated rocks)
12.46 back to mussel patch #1 we tried to sample
12.53 mussel pot into mussel patch, trying to sample
12.58 Mussel Pot collection not successful, troubles with closing mechanism (shear between T-handle and sprocket)
13.05 Marker #6 in sight; 1409m depth
13.13 nice overview / close up of tubeworms to be collected (Pilots Cam)
13.26 Slurp collection of shrimps, crabs (into GREEN slurp chamber)
13.32 fighting to slurp red crab
13.36 end of slurp
13.41 stained tubeworm (red crab still in slurp hose)
13.52 slurp on to get red crab in slurp chamber
13.55 preparing to take a Bushmaster
14.02 attention still on Mr. Crabs too (still trying to escape)
14.04 Bushmaster over tubeworms
14.10 Bushmaster successful ☺
14.13 Bushmaster on basket into bucket
14.26 moving; trying to find LBL transponder, which is not responding (?dead?)
14.35 waiting for Medea to move W
14.41 8m above bottom, moving W (20m /min)
14.43 hose vacuum finally off
14.51 LBL transponder is 300m off seabed
15.51 Doppler reset, still looking for transponder

Summary: very good and successful Bushmaster taken

Date: 06/15/2007
Shift: 1200-1600 EDT
Dive: J2-273
Site: GC852

Watch Leader:
Name: Kathy Loftis

Time (GMT) **Comments**
16:10 Stopped recording→ still looking for transponder
16:50 Started set 061- nearing bottom
17:58 Stopped recording

Dive Log for J2274

Date:	6/16/07
Shift:	0000-4000 EDT
Dive:	J2-274
Site:	GB 697
Watch Leader:	Harry Roberts, Bob Carney
Name:	Nicole Morris

Time (GMT)	Comments
6:08:34	*Jason* on bottom
6:06:47	Reset DVL
6:11:02	Bacterial mat
6:11:06	Mud vents
6:20:20	Rock outcrops; bacterial mats
6:20:43	Tubeworms; small and at base of rock outcrops
6:21:53	Bacterial mats
6:31:06	Gorgonian
6:32:03	Holothuroid
6:32:43	Spiny urchins; regular
6:33:07	Getting ready to deploy Marker #2
6:36:05	Deploying Marker #2
6:37:44	Tubeworm
6:40:09	Holothuroid white
6:42:41	Anemones
6:43:07	Gorgonian
6:44:18	Soft corals
6:46:14	Venus fly trap anemone
6:48:50	Bacterial mat
6:54:51	Video grab
6:55:42	Furow
7:00:48	Moving to geo target 2
7:08:03	Holothuroid purple
7:12:15	Furow
7:13:50	Bacterial mats along furrow
7:16:09	Bacterial mats
7:20:52	No signal from mass spec
7:26:44	Fish
7:28:35	Heading to geo target 3
7:36:30	Heading to geo target 4
7:41:16	Purple holothuroid
7:42:45	Small bacterial mats
7:44:05	Getting ready to take 3 push cores in bacterial mat
7:54:09	Red (bottom right corner) push core; no number; mat or barite

7:58:16 Red (middle right) push core; no number; mat or barite

Watch Summary:
At the beginning of watch, *Jason* was deployed and reached the bottom at 0608. We started transiting to Geological targets of interest (Geo 2, 3, 4). We logged biological and geological features while in transit. We began taking push cores in a large bacterial mat toward the end of this watch.

Date: 6/16/07
Shift: 4000-8000 EDT
Dive: J2-274
Site: GB 697

Watch Leader:
Name: Oscar Garcia

Time (GMT) Comments
8:05 Red (upper right corner) push core
8:09 Geological mineral rock sample
8:14 Geological observation brine flow
8:23 Red (upper center) in brine flow
8:25 Red (center) in brine flow
8:29 Red (bottom center) in brine flow
8:33 Red (upper left) in brine flow
8:35 Nice video of brine flow
8:49 Heading to geo target 4
8:54 Tubeworm observed at brine seep
9:05 Macrocamera operation over tubeworm creek → Pilot cam
9:24 Bacterial mat
9:28 Macro camera stops
9:34 Setting up to sample tubeworms
9:39 Starts recording DVD series 65
9:57 Tubeworms sampled
10:07 Moving to target 5
10:16 Mound observed
10:21 Biological observation after mound
10:23 Benchmark observed
10:29 Heading to geo target 5

Watch Summary:

Date: 6/16/2007
Shift: 7.30 – 11.30 EDT (GTM 11.30-15.30)
Dive: J2-274

Site: GB 697

Watch Leader:
Name: Julia Zekely

Time (GMT)

11.31 transit to target 5 (appr. 700m depth)
12.57 on bottom at area N, 1025m depth
13.03 looking for site; checking of instruments on Jason
13.22 mud but some "craters" to be seen (biological activity, burrows)
13.24 Jason approx. 10m off
13.25 depth 1010m, mussel shells (not dense)
13.28 Bacterial mats; scattered mussel shells
13.31 Medea settle for re-navigation
13.36 Marker #3 set here [CRP North]
13.37 looking around, direction EAST, depth 1008m
13.45 proceedings to go east (~50m)
13.50 passing marker again
13.53 scattered marker again
14.05 **MUSSEL BED;** heading to "hot area"; (315deg)
14.08 good mussel patch; carbonated rock in between tubeworm (single), corals, frog fish (DV CAM, BEST OF until 14.37 best of); fish about 60cm body length!!
14.19 Macro Cam on fish (cool pix)
14.38 back to tubeworm (single tubi)
14.39 **BEST of** single tubeworm (depth 1003m)(sp: Escarpia seepiophila)
more individuals scattered around; crab in the background
14.45 **Best of |tubeworm, macro on tubeworm (cool pix)** (until 14.52)
14.53 **Best of crab, cool pix (Macro)**
14.56 Octocoral; into starboard biobox, very neat one
15.01 Pilots Cam on corals (shortly) with brittle stars
15.04 preparing to sample single tubeworm
15.10 grab collection successful (tubeworm into port biobox)
15.17 Octocoral grabbed (piece of, not entire one); into starboard bio box (to tubeworm grab)
15.19 transit over side; frog fish (**down look pix of frog fish**) other cams all "black scrrens"
15.26 transit to sonor hot spot with craterhole in center
15.28 mussel + clam shells
15.29 moving to crater by shells, maybe blowout hole
15.30 mussel and clam shell harsh inside crater

Watch Summary:
North site very cool, tubeworm and mussel communities as well as corals; very cool frog fish; a lot of good best ofs

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Name: Kathy Loftis

Site: GB697
Date: 6/16/07
Shift: 11:30-4:00 EDT
Dive: J2-274

Time	Comments
15:36	At exploratory site. Gulper fish observed
15:51	Survey area visually
15:55	crab
15:58	mussel bed
15:59	Carbonates
16:03	clams
16:05	mussels
16:20	at crater
17:03	start T1 at 37 m
17:06	clam trails
17:07	end T1
17:18	start line T7 alt 3.2
17:26	holothuroid white
17:32	end T5
17:39	start T2 alt 3.1
17:40	holothuroid
17:42	end T2
17:47	start t9 alt 3.7
17:50	end T9
17:58	start T3 alt 4.0
18:02	end T3
18:05	start T4 alt 2.4
18:08	end T4
18:10	t6 start alt 5 m
18:15	end T6
18:20	start t8 alt 4.8
18:23	end t8
19:28	spider crab & swimming sea cucumber
19:50	bacterial mat
19:53	eel
19:56	at N pt of North site
19:56	approach edge

Summary:
We began to visually survey exploratory site GB697. During this survey, we first observed a large gulper fish sitting on a rock. Just beyond the spot where we observed the gulper fish, there was an area containing carbonates with a large mussel bed nearby. A crater was observed and was the site of the start of a photo-survey. After the photo-survey, we continued with a visual survey of the area, making our way to the northern part of the north site.

Date: 6/16/07
Shift: 16:00-20:00 EDT
Dive: J2-274
Site: GB 697

Watch Leader: Harry Roberts
Name: Bill Shedd

Time (GMT) Comments
20:00 Transiting up seismic valley toward geo target #9, course 55 deg
20:13 Hummocky topo, broad highs, narrow lows, mud
20:31 Small ledge, thinnly bedded w/ white layer between beds, bottom stirred up
20:36 Stopped, waiting for water to clear
20:40 Continue up valley
20:46 eel in fog
20:51 still in fog, bottom barely visible
21:29 out of fog
21:36 starfish
21:54 bacterial mats, shells, dormant mud volcano w/well defined crater on top, carbonates, tubeworms
22:03 small soft coral, dead clams and mussels
22:09 everything has fine layer of mud (from mud volcano erupting)
22:12 stop to observe and collect tubeworms
22:20 sample tubeworms
22:57 mud volcano, heading 195 deg, across anomaly, mud
23:15 heading 297 deg (past anomaly) for 30 m, pockmarks v. common
23:27 heading 48 deg across anomaly mud
23:36 dark red shrimp
23:39 dormant mud volcano w/ one side of crater wall collapsed, large bacterial mat, carbonates
00:06 stopped, adjusting sonar, mounds s0m ahead on sonar

Watch Summary:

Date: 6/17/07
Shift: 2000-0000 EDT
Dive: J2-274
Site: GB 697

Watch Leader: Eric, Harry
Name: Irmi

Time (GMT) Comments
0:13 going to north

0:18 tubworms
0:28 trails, clams
0:32 opening of the biobox
0:34 grabbing the clams (Calyptogena ponderosa), into the biobox
0:40 making ready for getting the cores for Julia
0:42 first core nr.9 red
0:44 second core nr.8 red
0:46 dropping a target “clams”
0:53 crab, shells (close up pilot cam)
0:58 dropped a target “mussel bed”
1:11 taking B.childressi with the mussel pot
1:20 picking up the mussel pot, back into its bucket
1:23 taking the scoop
1:25 filling the blue scoop with mussels, into the bushmaster
1:33 reset dvl
1:41 carbonate, shells
1:58 reset dvl
2:06 back at the rock with the tubworms
2:39 mud clowds
3:09 dropping a target “mud plume”
3:11 crack in the bottom
3:17 source of the mud vulcano
3:21 science cam!

Watch Summary:

Date: 6/17/07
Shift: 0000-0400 EDT
Dive: J2-274
Site: GB 697

Watch Leader: Harry Roberts
Name: Nicole Morris

Time (GMT) Comments
3:30:17 Gas bubbles in brow cam
3:37:54 More gas bubbles
3:40:17 Best of video
3:44:46 Getting ready to take push cores
3:48:42 Tried to shake out push core 8→ unsuccessful
3:51:21 Shaking push core 2→ core is moving up instead of down→ successful, core is out
3:54:18 Taking push core 2 in mud volcano
3:56:58 Bubbles in science cam
4:01:03 Firing both niskins
4:03:35 Great video of mud flow in brow cam
4:04:50 Gas bubbles

4:05:25 Great bubbling
4:06:20 Following mud flow channel→ brow cam
4:12:10 Flowing mud in brow cam
4:14:20 Cloud of mud
4:15:28 Moving to geo target 8
4:18:04 Clouds of mud
4:31:33 Pits and mounds
4:38:29 At geo target→ heading 149 to undisclosed target
4:56:28 Bacterial mats
4:58:49 Holothuroid
4:59:36 Bacterial mats
5:01:13 Holothuroid and shrimp
5:04:04 Bacterial mats and holothuroid
5:07:33 Bacterial mats and carbonates
5:10:59 Carbonates and bacterial mats
5:35:08 Bacterial mat
5:41:28 Carbonate
5:42:28 Solitary tubeworm
5:43:42 Tubeworms
5:44:45 Anemone
5:57:10 Bamboo coral
6:25:12 Lots of silt in the water
6:26:35 Carbonate and crab
6:26:55 Out of silt
6:27:07 Turning back into silt
6:27:17 Back into cloudy water
6:32:23 Turning south to go to "red spot"
6:44:45 Water still appears cloudy
6:50:35 No longer in silt cloud
6:51:40 Scattered mussel shells and bacterial mat
6:52:59 Mussels and clam shells
6:53:04 Mussel bed
6:53:41 Dropped target "mussel bed"
6:53:52 Video grab
6:55:43 Bacterial mat
7:08:38 Bacterial mat
7:15:45 Clam shell
7:21:29 Moving to next "red spot"
7:30:40 Fish

Watch Summary:

At the beginning of watch, we filming and taking push cores at a mud volcano. We also fired 2 Niskins over the mud flow source. *Jason* then started transiting to Geological targets of interest. We logged biological and geological features while in transit. We continued transiting to targets of interest through the end of this watch.

Date: 6/17/07
Shift: 4000-8000 EDT
Dive: J2-274
Site: GB 697

Watch Leader:
Name: Oscar Garcia

Time (GMT)	Comments
8:06	Biological observations while in transit
8:09	Biological observation mobile fauna fish
8:11	Biological observation bacterial mat
8:25	DVD series 76 start recording
8:29	Mussel shell
8:33	Jelly fish
8:43	Biological observation mobile fauna
8:51	Biological observation mobile fauna
9:19	Biological observation mussels dead
9:21	Clams live
9:22	Continuing south
9:26	Eel pout
9:37	Biological observation
9:42	Mussel dead
9:45	Crab
9:47	Biological observation
10:11	Mound
10:12	Mobile fanua
10:39	Still heading to CRP at north
10:49	Mobile fanua
10:25	DVD series 76 stop recording
11:03	Mark observed
11:04	Marker occupy and fix
11:14	Massive mussel bed
11:20	Preparing mussel pot
11:29	Mussel extraction

Date: 6/17/2007
Shift: 07.30 – 11.30 EDT (GTM 11.30 – 15.30)
Dive: J2 274
Site: GB697

Watch Leader: Chuck Fisher
Name: Julia Zekely

Time (GMT)	Comments
11.29	Trying to take Mussel Pot
11.34	Mussel Pot into Musselbed, closing Pot
11.35	Mussel collection with Mussel Pot successful ☺ sample (mussels taken down to sediment)
11.44	leaving site, off bottom, over Frog Fish (still on his rock)
11.51	Jason OFF BOTTOM
11.52	Jason ascending
11.57	drop off weight
12.41	Bubbles out of Harrys core taken at the mud volcano
12.42	Jason on surface

Dive Log for J2-275

Date:	6/17/2007-6/18/2007
Shift:	2000-0400 EDT
Dive:	J2-275
Site:	WR 269
Watch Leader:	Erin
Name:	Irmi

Time (GMT)	**Comments**
1:12	Jason on the bottom, loosing the milk box with the cores
1:19	again on bottom
1:29	milk box found
1;52	all cores on Jason back again
1:59	going to the Pogonophoran field
2:37	dropping a target “fuzzy worms”
2:41	skeleton
2:43	dropping a target “bones”
2:53	fish (pilot cam)
3:00	pogonophorans, dropping a marker
3:08	found the marker 1
3:19	reset
3:26	preparing for taking a long core
3:30	11 long core from white pogos
3:34	large core 3
	large core 1
3:41	sucker
3:41	holoturoid in the pogos
4:05	moving, looking for non white pogos
4:18	long core 12
4:25	normal sized core white 6
4:29	large core 4
4:35	try it again
4:43	large core 4
4:47	large core 2
4:56	suction
5:22	core white 5, rare pogo
5:28	moving back to white pogos
5:39	green niskin over the white pogos
5:43	back at maker
5:52	start of fotomosaik of white pogos
7:02	end of fotomosaik
7:08	taking control cores: white 4
7:13	yellow1

7:19	white 1
7:28	sucktion
7:34	yellow 8
7:43	yellow 9, fell down
7:46	grabbed again
8:00	yellow 6

Watch Summary: sampling Sclerolinum with long and large cores at two sites: with white and nonwhite Pogonophorans

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Date:	06/18/2007
Shift:	0400 – 0800 EDT
Dive:	J2-275
Site:	WR269
Watch Leader:	Erin Becker/Robert Carney
Name:	Christina Kellogg

Time (GMT) Comments

08:44 Preparing to take core White 2. Note per Jeremy that there is not an option for 'white' in the core section of the event logger. Pogonophorans present.
08:47 Making sure a straight pogonophoran is in core White 2.
08:48 Core White 2 begun.
08:49 Core White 2 completed.
08:53 Preparing to take core White 3, more pogonophorans.
09:01 Tried to core a long pogo but it broke; will try another one.
09:03 Collected core White 3, pogonophorans, including a long straight one.
09:09 Reset Doppler.
09:17 Preparing for a photomosaic because Erin saw an area of both white and non-white (new?) pogonophorans.
09:28 Watch leader change from Erin Becker to Robert Carney; Photomosaic plans abandoned.
09:30 Moving slowly to a new location, looking for echinoderms to slurp.
09:46 Observed something that might be a skeleton of something (fish?) since it appeared to be bones in a straight line; however there were no ribs, vertebrae, or skull.
09:48 Small purple octopus, brow camera and then downlooking camera as it passed under the ROV.
09:49 Rattail fish on downlooking camera.
09:51 Thin silver tripod fish, brow camera.
09:55 Black bacterial mat, downlooking camera.
09:59 Brine flow observed.
10:07 Snail, pilot camera; will attempt to collect it.
10:11 Slurping snail into green bucket.
10:13 Large purple/black sea cucumber observed.
10:20 Red shrimp; attempted to collect it; failed.
10:24 Squid (bob-tail?) observed; attempted to collect it by suction but it did not fit into the

tube.
10:25 Slurped first sea cucumber into the green bucket.
10:30 Successfully slurped squid from 10:24 into green bucket.
10:34 Another purple/black sea cucumber observed.
10:36 Slurped second sea cucumber (individual sighted at 10:34) into the red bucket.
10:39 Biological observation: Unsure if it is a bivalve shell, ostracod, or other. Will try to collect it.
10:40 Unknown entity turned out to be a ctenophore; it was slurped into the red bucket.
10:42 Another sea cucumber sighted; preparing to sample.
10:43 Slurped third sea cucumber (individual sighted at 10:42) into the red bucket.
10:45 Slurped fourth sea cucumber into the red bucket.
10:51 Slurped fifth (mistakenly listed as fourth in handwritten log) sea cucumber into the red bucket.
11:07 Attempted to slurp a deeply 'rooted' organism but couldn't get it lose. Bob suggested it might have been a coral remnant attached to rock.
11:12 Tube worms and a crab sighted.
11:15 Sighted a different crab; attempted to slurp him but unsuccessful.
11:18 Marker (took a fix) on the location of the sparse tube worm site.
11:20 Possible echioroid worm; slurping (unclear if this was successful).
11:25 Sighted dead tube worm with two small galatheid crabs on it.
11:28 Slurped the two galatheid crabs into the yellow bucket.
11:31 Sighted fat purple/black sea cucumber, ~15 cm across; did not attempt to collect.
11:32 Sighted another purple/black sea cucumber; since it is very large, attempting to put it into the biobox.
11:35 Sixth (mistakenly listed as fifth in handwritten log) sea cucumber (same individual as 11:32) somehow sucked into hose so deposited in yellow bucket instead of biobox.
11:38 Another large sea cucumber; plan to try to put this one in the biobox.
11:41 A net was removed from the port biobox to clear it for the sea cucumber.
11:43 The sea cucumber jets off the bottom to escape the suction; the suction hose is clogged at this point (probably due to cuke number six) so it will not be used beyond this point.

Watch Summary:
The 06/18/07 0400-0800 watch was split between coring pogonophoran areas and collecting invertebrates. The cores collected were White 2 and White 3, both specifically containing long straight pogonophorans. No photomosaics were done. A bacterial mat and nearby brine flow were observed. A different area that had a few tube worms was marked. The only fishes observed were one rattail and one tripod fish, neither were collected. Successful biological collections were: one snail (green bucket), six sea cucumbers (1 in green, 4 in red, 1 in yellow bucket), one squid (green bucket), one ctenophore (red bucket), and two galatheid crabs (yellow bucket).

Date:	6/18/2007
Shift:	0800-1130 EDT
Dive:	J2-275
Site:	WR 269

Watch Leader: Chuck, Erik
Name: Julia Zekely

Time (GMT)	Comments
11.50	grab swimming pinky sea cucumber
11.53	grab of sea cucumber #2, trying to get it into biobox
12.05	sea cucumber tries to escape, swimming
12.08	wooden biobox closed again
12.12	scoping net fell off basket, back into biobox
12.15	Doppler reset
12.18	climbing on seamount top, tubeworms observed
12.22	more tubeworm
12.23	Mussel bed, beer can within mussel bed
12.26	preparing to scoop mussels, **BLUE** scooping net
12.33	net on basket, because first mussel Pot will be taken
12.38	mussel pot **F** taken, ☺ collection
12.46	Mussel Pot F closed, safe back into bucket on basket
12.49	preparing to scoop now, "where to scoop"
12.51	scooping into mussel bed (starting at an edge), 1sr scoop taken, waiting for sediment to settle
12.57	2nd scoop, large mussels collected
13.06	3rd scoop, net full, large collection
13.11	scoop net BLUE into starboard wooden biobox
13.18	marker #7 set in mussel bed, 1909m depth
13.19	Doppler reset; marker #7occupy and fix; transit to Geotarget 2
13.22	Mussel bed #2 observed
13.23	Tubeworms, many patches / small bushes
13.26	Mussel bed #3 observed
13.28	Trashbag abserved
13.26	preparing to take mussel pot B
13.50	Mussel Pot **B collection**☺, Pot B losses the ourside ring, stucks in mussels, **BrowCam** overlooks ring (nice); too much sediment in water column to work further, waiting to settling
14.02	still waiting for clearing of view
14.14	left over ring removed from mussel bed and Back on basket to mussel pot B
14.30	Erik looks for good patch of tubeworms to grab into scooping net
14.35	**WHITE** scooping net out of port biobox
14.41	grabbed rock + tubeworms into the white scooping net
14.53	tubeworm collection into port biobox

Watch Summary: much fauna to be seen, and a lot of ☺ biological collections: 2 Mussel Pots, scoop of mussels, grab of tubeworms (attached to rock)

Date: 6/18/07
Shift: 1200-1600 EDT
Dive: J2-275
Site: WR 269

Name: Kate Segara

Time (GMT)	Comments
16:11	Saw bentho-pelagic sea cucumber
16:20	Small bunch of tube worms
16:24	began recording photos enroute to beginning of transecting
16:24	Tubeworms
16:32	Carbonates
16:32	begin T8
16:37	mussels, oyster shells, carbonates
16:37	tubeworms
16:38	end of line
16:44	T1 begin
16:49	T1 End
16:57	T2 Start
17:01	T2 end
17:10	T4 Start
17:15	T4 End
17:26	T3 start
17:31	T3 End
17:43	T6 start
17:47	T6 End
17:48	T9 start
17:51	carbonates
17:53	End T9
18:01	start T5
18:03	Spy bacterial mat and brine
18:14	1 solitary tubeworm
18:21	tubeworms
18:25	Start T10
18:29	bacterial mat
18:29	End T10
18:44	start T7
18:49	End T7
18:51	Dropping weights, JASON ascending

Watch Summary:
This was my first and perhaps last watch in the JASON van. It was a rather short shift as JASON ascended about 2.5 hours into it. A few biological observations were made including sea cucumbers, tubeworms, and mussels. The bulk of the watch consisted of a riveting series of photo-transects with Ian.

Dive Log for J2-276

Date: 06/19/2007
Shift: 7.30 – 11.30 EDT
Dive: J2-276
Site: AT 340

Watch Leader: Stephanie, Chuck
Name: Julia

Time (GMT)	Comments
13.40	Jason descending, at 1179m depth
14.15	Doppler reset
14.16	Jason on bottom (2200m depth), starfish observed
14.24	looking for central marker to find Stephanie's sea urchin field + artificial sea urchin trails
14.29	checking of Jason's instruments
14.30	many sea urchin + trails in sight (not Stephs ones)
14.36	marker #5, Jason sets mark on sea urchin field
14.42	very cool and interesting sea urchin trails
14.45	SciCam: marker shortly to be seen< zoom in: shell with red anemone on it
14.50	Sea cucumber + seastar
14.56	Ball marker detected (2201m depth)
14.59	Doppler reset
15.05	all ball markers detected
15.12	Doppler reset
15.15	Photo mosaic starts line #1
15.20	seastar

Watch Summary: Jason descending, reaching bottom (14.16), sea urchins, looking for Stephanie's sea urchin field

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Date: 6/19/2007
Shift: 11:31-16:00 EDT
Dive: J2-276
Site: AT 340

Watch Leader: Bob Carney
Name: Kim Hunter

Time (GMT)	Comments
15:30	Jason on bottom - D=2199m; A=2.9m

15:39 Photo-mosaic in progress – Stephanie over spatangid urchin bed.
16:01 Aperture 4.7, shutter 1/60 – changed to assure flash
16:02 Biol. Observation – mobile fauna – seastar
16:25 Biol. Observation – mobile fauna – hermit crab in anemone in field of photo-mosaic.
16:33 Digital target at marker and alvin track.
17:12 Biol. Observation – mobile fauna – fish & ophiuroid in mosaic area.
18:03 Experimenting with mosaic.
18:19 Photo-mosaic end.
18:24 Push cores in experimental trails – start.
18:31 Push core – red #4 – in trails
18:32 Push core – red #5 – in trails
18:35 Push core – red #2 – near trails
18:37 Push core – red #3 – near trails
18:39 Dropped core rack
19:04 Problems stowing core rack – working on it.
19:09 Fluid leak from bushmaster fitting on Jason.
19:31 Dropped core rack again.

Watch Summary:
Stephanie completed photo-mosaic and 4 push cores were collected before technical difficulties halted dive progress.

Date: June 19, 2007
Shift: 1600 – 2000 EDT
Dive: J2-276
Site: AT 340

Watch Leader:
Name: Matt Frye

Time (GMT) Comments
21:23:00 Sea Urchins
21:34:00 Located Stephanie's marker
21:38:00 core in urchin trail
21:41:00 core in urchin trail
21:45:00 core outside urchin trail
21:51:00 core inside urchin trail
21:53:00 core inside urchin trail
21:56:00 core outside urchin trail
21:59:00 core near ball
22:06:00 core
22:13:00 core in trail
22:45:00 transfer cores to elevator
23:01:00 transfer complete

23:04:00 core basket fell off again

Watch Summary: nine cores retrieved successfully from in and near urchin trails; lost core box several times over the side of the vehicle, resulting in long delays.

Date:	6/19/07
Shift:	2000-0000 EDT
Dive:	J2-276
Site:	AT340
Watch Leader:	Stephane
Name:	Irmi

Time (GMT)	**Comments**
0:12	still transporting elevator
0;24	reset
0:51	lowering of elevator
0:55	mussels
0:57	dropping elevator
1:01	tubeworms
1:05	lowering the elevator, elevator on the bottom
1:06	reset
1:09	fish (science cam)
1:12	still the big fich around the elevator
1:13	start moving
1:20	tubworms and mussels
1:24	found marker 2 in the mussel bed, looking for the mussel cages
1:26	reset
1:29	starting for down-looking pictures of the cages
1:45	close up of mussels (science cam)
1:46	taking the firs cage
1;48	taking the second cage
1:51	third cage
1:54	fourth cage
1:57	going to the elevator
2:05	reach the elevator
2:12	at the elevator
2:14	placing the cages on the elevator into the bioboxes
2:33	still arranging the cages in the bioboxes
2:54	checking the instruments
2:57	release of the elevator
3:24	checking the instruments

Watch Summary: collecting the 4 mussel cages and loading them on the elevator

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Date: 6/20/2007
Shift: 0000-04000 EDT
Dive: J2-276
Site: AT340

Watch Leader: Bob Carney
Name: Nicole Morris

Time (GMT) Comments
04:00:28 Elevator still ascending to the surface
04:44:30 Moving to Northwest site to search for fish trap
04:54:05 Search for fish trap homer probe
05:46:07 Still searching for fish trap
06:25:13 Dropped target "mussel bed"
06:26:03 Holothuroid and urchins
06:52:45 Mussel bed
07:12:20 Sea whip on Scorpio
07:41:56 Search for fish trap end→ unsuccessful
07:44:23 Getting ready to start photo transects

Watch Summary:
At the beginning of watch, the elevator was still approaching the surface. At 0444, Jason started transiting to the Northwest site to search for the fish trap using Homer sonar. At 0741, the fish trap search ended unsuccessfully. At the end of watch, we started getting ready for photo transects.

Date: 06/20/2007
Shift: 0400-0800 EDT
Dive: J2-276
Site: AT340

Watch Leader: Erin Becker/Ian McDonald
Name: Christina Kellogg

Time (GMT) Comments
08:17:28 Watch shift from Erin Becker to Ian McDonald
08:21:53 Moving into position for the photo transects
08:39:19 Seeing a lot of sea cucumbers on the silty bottom
08:53:59 Photo flash; sea cucumber in brow camera upper right corner
08:56:28 Photo flash; at beginning of Transect T9
08:58:57 Photo flashes; white bacterial mats; waiting for Medea to move
09:13:09 Began photo Transect T9, altitude 4.3 m, heading 198 , 2.5 m/s
09:14:05 Solitary tubeworm and sea cucumber on brow camera

09:14:20 Another solitary tubeworm, brow camera
09:14: 44 Two sea cucumbers, brow camera
09:16:40 Urchin trails and urchins
09:17:20 Medea does not want to keep pace with the transect
09:20:42 Sea cucumber, downlooking camera (close up)
09:21:13 End Transect T9
09:23:20 Photos taken of tube worms and carbonate bottom
09:23:51 Mussels on downlooking camera
09:30:32 Momentum problem with Medea, waiting to start next transect
09:34:30 White sea cucumber on brow camera (all others have been dark color)
09:38:45 Began photo Transect T10, altitude 4.4 m, heading 198 , 0.3 knots
09:50:09 Sea cucumber on downlooking camera
09:50:20 End Transect T10
09:52:20 Heading 90 to get into position for Transect T4
09:55:46 Sea cucumber and white starfish on brow camera
09:57:40 ROV dragging on the bottom, need to increase altitude to 3.8 m
10:07:20 Bottom is carbonate, visible rocks, mussels, and tubeworms
10:08:12 Climbing a steep hill
10:09:21 Zooming 3-chip camera into tubeworms
10:09:50 Transect T4 will have altitude 3.9 m, heading 18
10:12:28 Began Transect T4, speed approximately half that of earlier line (1.5 knots?)
10:13:00 Tubeworms and mussels
10:18:50 Some kind of fish (rattail?) on pilot camera, moving towards us
10:22:30 Lots of tubeworms in between rocks
10:30:35 Ended Transect T4
10:31:59 Dark rattail-like fish, upper left of brow camera
10:38:35 Began Transect T5, altitude 3.5 m, heading 198 , back to original speed (3 knots?)
10:40:26 Moved off carbonate to mud bottom
10:47:00 Ended Transect T5
11:15:30 Began Transect T6, altitude 3.6 m, heading 18
11:18:40 Field of urchins
11:20:00 Slowing down so Medea can catch up
11:21:08 Slowing down even more since Medea is falling behind
11:27:55 Tube worms
11:28:12 Ended Transect T6.
11:29:54 Transiting to blue bag marker (estimated time, 1 hour)

Watch Summary:
Photo transects T9, T10, T4, T5, and T6 were completed. Transects T9 and T10 were dominated by mud bottom and sea cucumbers. T4 had lots of carbonate topography, tubeworms, mussels, and other fauna. T5 was mainly mud bottom. T6 was a large urchin field. There were problems all the way through with Medea lagging—having to wait for her or having to slow down during the transect so that she would catch up.

Date: 6/20/2007

Shift: 0800-1130 EDT
Dive: J2-276
Site: AT 340

Watch Leader: Chuck
Name: Julia Zekely

Time (GMT)	Comments
12.25	still transit to "blue bag" marker
12.39	Doppler reset
12.42	Mussel bed (edge) observed
12.43	Mussel bed
12.47	BEST OF mussels; 2198m depth
12.50	Ball marker within mussels; preparing to take mussel pot
12.53	tubeworms within mussels
12.56	looking for large mussels to collect
13.03	Mussel Pot **B** ready to sample
13.10	Mussel Pot into mussel bed next to ball marker
13.15	difficulties with closing mechanism and to getting mussel pot into mussel bed for collection
13.19	MP B over shells with sediment underneath to test mussel pot; mussel pot does not work (closing mechanism, rotate freely); MP B back on basket
13.23	Mussel Pot **F,** looking for another spot to sample, away from marker #2
13.24	BEST OF mussels
13.28	good mussel patch observed, Mussel Pot **F** over it
13.34	Mussel Pot into mussel bed
13.38	Mussel Pot **F** closed, collection successful ☺
13.41	MPot F back on basket, ring again lost in mussel bed
13.42	checking leftover inside ring, many ophiruids, small tubeworms
13.48	slurping of "left over' inside ring
13.51	ball marker set where mussel pot was taken
13.51	ring picked up and on basket
13.56	pictures with down looking camera taken
14.00	Doppler reset
14.06	checking bushmaster, bubbles of hydraulic fluid leak out
14.15	BEST OF tubeworms (esp. 14.19 good shot)
14.25	preparing of Bushmaster sampling
14.30	Bushmaster above tubeworms
14.35	sampling of tubeworms
14.40	almost entire tubeworms aggregation taken
14.45	Bushmaster closed, ☺ collection, back on basket and secured
14.57	ballmarker set at little, stained tubeworm aggregation
15.00	trying to sample (grab) carbonated rock
15.07	near marker #3 more rocks sampled
15.11	nice rock sampled, on basket
15.18	Photomosaic (where bushmaster was taken)

15.20 end of photomosaic

Watch Summary: good biological collection (Mussel Pot F), 1 bushmaster (although leaking), 1 Mussel pot B not taken, due to closing problems, no push cores

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Date: 6/20/2007
Shift: 11:30 – 16:00 EDT
Dive: J2-276
Site: AT 340

Watch Leader: Bob Carney
Name: Kim Hunter

Time (GMT)	Comments
15:25	Discussing Ian's camera – how to bring it up and photograph its departure from the bottom.
15:29	Waiting for the weight to drop off Ian's camera.
15:32	Weight released from Ian's camera – camera on way to surface.
15:33	Jason on bottom at start of shift – D=2185m A=3.5m
15:40	Backed off from Bushmaster collection, heading 220 degrees, shot photoline, both collections and ballmarker.
15:45	Jason off bottom.
16:14	Finished labels of DVD 100 series. Jason at ~1235m depth and rising.

Watch Summary:
Started shift just before Ian's camera was released from bottom and Jason started up. No science – just technical maneuvers. Left DVD racks loaded w/ 101 & 102 series in red and blue decks, respectively.

Dive Log for J2-277

Date: 6/21/2007
Shift: 0000-400 EDT
Dive: J2-277
Site: AT 340

Watch Leader: Stephanie Lessard-Pilon
Name: Nicole Morris

Time (GMT)	Comments
5:24:43	Jason on bottom
5:29:30	Methane sensor (0.765) starting to read data
5:33:14	Reset DVL- nav
5:37:48	Mussel brick road
5:38:09	Searching for Marker 5
5:44:13	Found ball marker 5
5:45:48	Getting ready for photo mosaics
5:47:04	Reset DVL- nav
5:54:38	Start of photo mosaic line 1 (due north); 0.08 m/s
5:55:48	Increasing speed to 0.11 m/s
5:57:02	Increasing speed to 0.13 m/s
5:58:08	Decreasing speed to 0.12 m/s
6:03:23	End of photo mosaic line 1
6:04:39	Moved 0.125 meters right
6:05:01	Moving back to original mosaic line (line 1)
6:05:37	Moving 0.175 meters right
6:06:36	Start of photo mosaic line 2
6:14:57	End of photo mosaic line 2
6:14:58	Redoing mosaic line 1 b/c Fstop was too high
6:15:40	Start of photo mosaic line 1
6:24:20	End of photo mosaic line 1
6:25:17	Start of photo mosaic line 3
6:33:54	End of photo mosaic line 3
6:35:19	Start of photo mosaic line 4
6:43:44	End of photo mosaic line 4
6:45:51	Start of photo mosaic line 5
6:48:36	End of photo mosaic line 5→ reached bacterial mat
6:46:35	Moving to mosaic mussels within bacterial mat
6:49:20	Moving right 1.75 m
6:49:45	Start of photo mosaic line 6 of bacterial mat
6:50:51	End of photo mosaic line 6
6:51:28	Start of photo mosaic line 7 of bacterial mat
6:52:51	End of photo mosaic line 7
6:53:20	Start of photo mosaic line 8
6:54:40	End of photo mosaic line 8

6:56:11 Setting Jason down
7:01:46 Methane sensor test start in bacterial mat → sensor is taken out of ROV
7:02:49 Exact start time of methane sensor over mussels
7:04:10 Directly above mussels
7:06:56 Methane sensor is reacting
7:18:25 Moved sensor over bacterial mat → sensor is still reacting
7:24:59 Scraping sediment with port manipulator
7:26:02 Placing methane sensor in this scraped hole
7:30:27 Methane not changing
7:30:59 Moving to another area within mussel bed to test sensor
7:35:49 Placing sensor above brown patch to test
7:43:03 Moving to another area to test sensor → "large mussels"
7:47:55 Testing sensor in large mussels

Watch Summary: *Jason* reached the bottom at 0524. We started taking a photo mosaic of mussel brick road 0554 and ended at 0654. Following the photo mosaics, we started testing the methane sensor in different areas of mussel brick road. This continued through the end of this watch.

Date: 06/21/2007
Shift: 0400 – 0730 EDT
Dive: J2-277
Site: AT340

Watch Leader: Chuck Fisher
Name: Christina Kellogg

Time (GMT) Comments

07:57:00 3-chip camera close-up and pan includes mussels, a hiding fish, and crab
08:00:50 Same scene/area but there are at least two shrimp near fish and crab
08:02:02 Pilot's camera now close-up on fish and crab in mussels
08:03:52 Pilot's camera now close-up on fish, crab, and shrimp in mussels
08:04:30 Moving 30 m south to marker 5 to take the cores
08:10:00 White bacterial mat visible at top of pilot's camera–plan to core near it
08:11:25 Close-up of white bacterial mat in pilot's camera
08:13:13 Targeting darker gray sediment just outside bacterial mat for brine cores
08:15:00 Seems to be too many mussels in that area, may not be able to core it
08:18:54 Firing both Niskin bottles above mat/brine area to be cored
08:20:00 There doesn't appear to be a pull-down menu choice for 'Niskin' in event logger
08:21:00 Jeremy had to use the new 'modify' button in the event log (NO tubeworms present)
08:22:50 Really long sea cucumber on 3-chip camera; moving to close-up
08:23:00 There are two really long sea cucumbers; white polka dotted on gray body
08:24:00 3-chip camera still on sea cucumbers; the end with tentacles is slightly pink
08:26:00 Prepping for first core in brine, will be core yellow #9
08:27:00 Core yellow #9 taken in white/gray bacterial mat
08:28:37 Core yellow #9 complete, back in milk crate

08:29:40 Brow and pilot cameras filming coring, 3-chip camera is still on a close-up of long sea cucumber
08:36:05 3-chip camera pulled back from close-up of sea cucumber to area view
08:38:16 Core yellow #8, in same white/gray bacterial mat as core yellow #9
08:40:00 Core yellow #8 complete, back in milk crate
08:41:27 Getting ready to move a bit north to brine area with fewer mussels for other cores
08:43:38 Following 'mussel brick road' north looking for brine area to core
09:03:00 Still looking for a good spot to take brine cores
09:05:00 Sea plume on 3-chip camera
09:06:40 Sea plume on pilot's camera
09:10:34 Tried to take core yellow #7, but only penetrated a few millimeters; shook the contents out of tube and will try again elsewhere
09:12:24 Tried core yellow #7 a second time; hit carbonate, caught a shrimp in the tube
09:13:17 The core was too short for Marshall
09:13:30 Shaking core yellow #7 loose again, releasing shrimp and shell hash
09:15:27 Returning empty sed core tube yellow #7 to milk crate
09:19:13 Picking up carbonate rock in brine flow in 'mussel brick road'
09:20:19 Carbonate rock for Harry Roberts, placed into starboard biobox
09:23:49 Moving a bit south and west to the right edge of the mussel bed
09:30:00 Back at a previously sampled site; can see Jason footprint in bottom
09:30:36 Black sediments, green mussels around it, fresh mud flow
09:32:38 3-chip camera shows brown mud flow area we're planning to core
09:35:55 3-chip camera close-up on mud, mussels–suggest recent brine/gas flow
09:38:51 Core yellow #7, in dark gray/black brine sediment
09:40:55 Core yellow #7 complete, returned to milk crate
09:43:43 Choosing next core site, to the right of previous hole (core yellow #7)
09:44:32 Core yellow #6, in dark gray/black brine sediment to the right of core yellow #7
09:47:00 Core yellow #6 complete, returned to milk crate
09:48:57 Core yellow #5, in dark gray/black brine sediment above core #7 and to the left of core #6
09:49:55 Core yellow #5 complete, returned to milk crate
09:52:15 Core yellow #4, in dark gray/black brine sediment just above core #5
09:53:11 Core yellow #4 complete, returned to milk crate
09:54:27 Core yellow #1, in dark gray/black brine sediment to the right of core #4
09:55:09 Core yellow #1 complete, returned to milk crate
09:57:00 Moving slightly to be able to core recent brown mud flow in brine area
09:58:00 Mud looks rust colored in the light; iron?
10:00:14 Core yellow #2, in brown mud (or mat?)
10:01:45 Core yellow #2 complete, returned to milk crate
10:03:45 Core yellow #3 in brown mud (or mat?) to the right of core #2
10:04:43 Core yellow #3 complete, returned to milk crate
10:05:35 Moving 200-300 meters to ball #2, since all coring is complete
10:14:08 Still transiting to ball #2, over carbonate rocks and plates
10:17:20 White garbage bag on the bottom, visible in 3-chip camera
10:18:00 Close-up; looks like a sand bag, next to patch of tubeworms
10:19:00 Black/purple sea cucumber in brow camera

10:23:20 Still transiting, passing over tubeworms
10:24:05 Slowing down, at marker #2
10:25:05 Chuck wants ROV to sit here and test the methane sensor by marker #2
10:26:24 Big mussel bed around marker #2
10:29:52 Reset Doppler (DVL) for marker #2
10:30:28 Putting methane sensor in position1, touching mussels, event 25326
10:31:07 Getting immediate response from methane sensor! Let it run ~ 10 min
10:38:04 Still sampling with methane sensor
10:39:33 Picking up methane sensor, moving away from mussels into the water column
10:40:07 Methane sensor in position 2, water column above mussels, event 25349
10:49:11 Moving the methane sensor away from live mussels but close to bottom
10:49:58 Methane sampler in position 3, dead mussels, event 25370
10:57:40 Methane measurement going down; on down-current side?
11:00:24 Moving methane sensor again; choosing next position
11:03:40 Change heading to due west
11:06:00 Steady stream of bubbles visible rising from the sediment
11:07:38 Putting methane sensor next to little white spot on bottom
11:11:30 Methane sensor position 4, white patch, big mussels, event 25417
11:23:58 Moving methane sensor; position 5, brown mussels, event 25445; also event 25448 (note that text was changed on previous event)

Watch Summary:
During this watch we successfully collected all nine sediment cores from brine seep/microbial mat sites. During transit, a carbonate rock was collected for Harry Roberts. Then the methane sensor was tested and used to sample positions 1.

Date: 06-21-2007
Shift: 07:30 – 11:30 (EDT)
Dive: J2-277
Site: AT-340

Watch Leader: Chuck
Name: Michael Kullman

Time (GMT) Comments
11:53 Methane sensor 6 stop EVT 25507.
11:55 Moving back approx 1.5m, 1m right.
11:59 Methane sensor 7 start EVT 25522.
12:04 Mussel flatulence AKA bubbles observed.
12:08 Methane sensor 8 start (same location), pressed 3m closer EVT 25546.
12:14 Methane sensor 8 stop, start 9, bubbles observed EVT 25564.
12:26 Methane sensor 9 stop, start 10 EVT 25585.
12:35 Methane sensor 10 stop, sensor returned to Jason.

12:40 Ready mussel pot F (Jason has not moved since last methane sensor reading).
12:44 Mussel collection in pot F.
12:49 Return pot F to Jason.
12:53 'Best Of' video – brittle starts.
13:00 Methane sensor 11 in mussel pot, cloudy water.
13:12 Moved Ball marker 2 to edge of mussel bed by accident EVT 25695.
13:18 Ball marker NAV A in pot ring F, recover pot ring F.
13:22 Move a few meters, prepare for mussel pot A.
13:25 Take a series of downward looking photos.
13:38 Deploy mussel pot A EVT 25757.
13:49 Begin engineering ops, methane sensor is still running.
15:19 Squid on vid.

Watch Summary:
Finished methane sensor measurements at mussel bed. Some bubbles / mussel flatulence observed. Two mussel posts (F then A) were deployed. Brittle stars were noted swarming pot ring F after the sample was retrieved. Ball marker A was deployed at pot ring F. Engineering ops / testing begun at 13:49 and continued to end of shift.

Date: 6/21/2007
Shift: 11:30 – 16:00 EDT
Dive: J2-277
Site: AT 340

Watch Leader: Ian MacDonald
Name: Kim Hunter

Time (GMT) Comments
15:57 Recovery of engineering marker.
16:29 Start photo transect T8, alt. 4.1m (Ian's transects)
16:40 Photo transect out of rocks and into urchins.
16:41 Back in the rocks.
16:42 Photo transect end.
16:46 Start photo transect T7, alt. 3.3m
17:00 Photo transect end.
17:03 Start photo transect T4, alt. 3.3m
17:18 Photo transect end.
17:42 Start photo transect T6, alt. 4.4m
17:56 Photo transect end.
18:11 Start photo transect T9, alt. 4.9m
18:24 Photo transect end.
18:32 Start photo transect T10, alt. 3.8m
18:40 Crossing Marker 10
18:41 Climbing 3m ledge
18:41 Photo transect end.

18:56 Start photo transect T3, alt. 3.6m
19:05 Photo transect end.
19:18 Start photo transect T2, alt. 3.2m
19:28 Photo transect end; octopus at end of line.
19:35 Start photo transect T5, alt. 3.7m
19:46 Photo transect end.
19:55 Start photo transect T1, alt. 4.6m

Watch Summary: Photo transects 1 – 10 were completed with Ian MacDonald.

Date: June 21, 2007
Shift: 1600 – 2000 EDT
Dive: J2-277
Site: AT 340

Watch Leader:
Name: Matt Frye

Time (GMT) Comments
20:05:58 still making photo transects
20:12:45 finished line transect T1
20:39:00 transiting to mussel bed; abundant CO3 and worm tubes
21:02:30 methane sensor position #12, near dead open shell "double"; start 26739
21:45:45 start methane sensor #13; 26830
21:53:58 end methane sensor #13; 26847
21:55:19 start reading #14; 26851
22:02:10 end methane reading #14; 26867
22:03:24 start methane sensor #15; 26871
22:09:12 end #15;
22:10:07 start #16 methane sensor; 26886
22:17:36 push sensor down several inches (#17); 26906
22:24:13 end sensor #17; 26922
22:34:00 start #18;
End methane sensor #18
22:49:40 start methane sensor #19; 26973
23:00:00 start methane sensor #20; 26999
23:13:00 ascend 20 meters
23:37:15 start #22 methane in mussel pot ring; 27080

Watch Summary: methane readings taken over mussel bed; start of shift was end of Ian's photo transect. That is all.

Date: June 21, 2007

Shift: 2000-0000 EDT
Dive: J2-277
Site: AT 340

Watch Leader: Bob Carney, Stephanie
Name: Irmi

Time (GMT)	Comments
23:50	methane sensoring in the mussels (#2711), methane sensoring #23
0:11	end of #23 (27150)
0:14	depositing a ball marker in the mussel bed
0:20	start moving
0:23	grabbing a rock #1 (27179)
0:26	grabbing arock, it sticks
0:33	still trying to grab the rock
0:34	it did not work
0:36	we are moving to another rock
0:40	grabbing rock #2, into milk crate (#27218)
0:42	looking for rock #4
0:48	grabbing rock #4
0:53	grabbing a little peace of the rock, on top of mussel pot
0:55	again grabbing peace of rock, on top of mussel pot
0:58	another peace of this rock
1:01	still trying to get the rock
1:04	got a peace of this rock, top of mussel pot
1:10	taking away a weight, putting it down on the seafloor
1:13	moving
1:22	taking the sucker
1:25	suction of an holothuride, did not work, too big
1:29	trying to grab the seacucumber, biobox (27335)
1:36	grabbing another cucumber, biobox (27349)
1:40	traces (bottom cam), starfish
1:42	grabbing a star fish, biobox
1:44	turning off the methane sensor
1:49	grabbing a sea cucumber, into the biobox(27377)
1:58	collecting sea cucumber with the sucker
2:01	suction (27402)
2:05	suction of sea cucumber (27412)
2:09	suction of a sea-star (27420)
2:14	suction of a sea cucumber
2:23	another suction of a sea cucumber (27452)
2:27	end of suction
2:40	at a ball marker
2:43	reset
2:56	start of line 1 (27520) of photomosaic
3:07	end of line 1 (27549)

3:15 start of line 3 (27566)
3:22 start of line 4 (27583)
3:44 start of line
3:49 second start of last line
3:55 at the top of line, start

Watch Summary: collecting rocks, sea-cucumbers, starting photomosaik

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Date: June 22, 2007
Shift: 0000-4000 EDT
Dive: J2-277
Site: AT 340

Watch Leader: Stephanie Lessard-Pilon, Ian MacDonald, Erik Cordes
Name: Nicole Morris

Time (GMT)	Comments
3:58:58	Still doing line 6 for photo mosaic
3:59:51	End of photo mosaic line 6 in urchin bed
4:00:12	Start of photo mosaic line 7 in urchin bed
4:04:26	End of photo mosaic line 7
4:05:03	Start of photo mosaic line 8
4:09:06	End of photo mosaic line 8
4:09:56	Start of photo mosaic line 9
4:13:46	End of photo mosaic line 9
4:14:27	Start of photo mosaic line 10
4:18:07	End of photo mosaic line 10
4:18:51	Start of photo mosaic line 11
4:23:02	End of photo mosaic line 11
4:23:35	Getting ready to perform photo transects in northwest area
5:03:03	Start of photo transect line T2
5:14:58	End of photo transect line T2
5:24:05	Start of photo transect line T3
5:32:45	End of photo transect line T3
5:47:13	Start of photo transect line T7
5:55:45	End of photo transect line T7
6:01:04	Start of photo transect line T8
6:09:40	End of photo transect line T8
6:21:39	Start of photo transect line T1
6:29:32	End of photo transect line T1
6:29:55	Heading to Marker #8 for tubeworm collection
6:53:25	Mussel bed
6:56:58	Marker 12 sighted
7:01:37	Marker 8 sighted

7:05:35 Getting ready for tubeworm collection at Marker 8
7:12:28 Stained tubeworm collection with manipulator in 1st patch
7:13:29 Placed into port biobox
7:14:04 Stained tubeworm collection with manipulator in 1st patch
7:19:26 Moving to another tubeworm patch
7:21:40 Collecting stained tubeworms from other (2nd) patch
7:22:10 Placed into port biobox
7:22:42 Collected stained tubeworms from 2nd patch
7:23:26 Placed into port biobox
7:27:14 Collecting stained tubeworms from 3rd patch
7:28:09 Placed in port biobox
7:28:40 Collected stained tubeworms 3rd patch
7:29:46 Placed in port biobox
7:30:56 Closed biobox
7:37:00 Move to marker 12 to look for stained tubeworms to sample with bushmaster
7:40:27 Getting ready to bushmaster stained tubeworm patch next to marker 12

Watch Summary:
At the beginning of watch, we continued to perform photo mosaics in the urchin field. Follow the photo mosaics, Jason moved to the northwest area to perform a set of 5 photo transects. At 0705, stained tubeworms collections started using Jason's manipulator arm. At the end of watch, we were getting ready to sample stained tubeworms using the bushmaster jr.

Shift: 06/22/2007
Dive: J2-277
Site: AT340

Watch Leader: Chuck Fisher
Name: Christina Kellogg

Time (GMT) Comments
08:00:13 The net on the Bushmaster needs to be recable tied to keep the net spread
08:01:56 Close-up of tubeworm bush at marker 12 on 3-chip camera
08:05:01 Close-up of individual tubeworms, white crab on one, 3-chip camera
08:05:47 'Best-of' video tubeworms and tap worms on 3-chip, event 28202
08:17:49 Bushmaster collection of worm patch at marker 12, event 28226
08:19:07 Good view of tubeworm 'roots' sticking out of Bushmaster bottom, pilot's camera
08:21:28 Looking for bungee handle on Bushmaster, 3-chip camera
08:32:50 Pulling bungee cord over Bushmaster to secure it
08:38:20 Collection of Bushmaster marker 12 complete and successful
08:39:00 Moving 160 meters, heading 140 , 0.2 knots
08:43:30 Using Coolpix to take photos in transit
08:48:50 Increasing speed to 0.4 knots
08:55:27 Purple/black sea cucumber, on brow camera (we've passed over several during the

transit over soft mud bottom)
09:00:43 Urchin field
09:03:35 Shell hash and urchin trails
09:04:24 Tubeworms
09:04:48 Slowing to 0.2 knots to better look around
09:06:09 Turning a bit left; more urchin fields and urchin tracks
09:08:10 Carbonate rock on 3-chip camera; will collect it for Harry Roberts
09:10:13 Picking up carbonate rock with about 100 tubeworms on it; event 28353
09:15:13 Stored carbonate rock on platform next to Bushmaster
09:16:34 Carbonate boulders move into view on brow camera
09:18:50 Jettisoned one of the weights next to carbonate boulders
09:24:09 Moving north to look over top of the mound
09:26:15 More carbonate rocks, small patch of tubeworms
09:26:55 Purple/black sea cucumber on mud bottom
09:27:37 Turning to the southeast
09:28:50 Another purple/black sea cucumber
09:30:45 Urchin field
09:31:48 Urchins and urchin trails on downlooking camera
09:34:58 Urchins and white bacterial mats on brow camera
09:35:30 Also a mound of gray sediment with what look like burrows in it, near the urchins and bacterial mats—what is the associated animal?
09:37:37 White sea star on carbonate rock
09:37:40 Carbonate rocks and sparse tubeworms
09:41:00 More carbonate rocks; rotating ROV to the left
09:42:56 White spots visible in brow camera—what are they? Moving to look
09:46:40 White spots are bacterial mats, on brow camera and pilot's camera
09:47:09 Longline debris wrapped around a tubeworm bush visible on 3-chip camera
09:48:22 Moving further south to keep exploring area
09:50:42 Turning to the east
09:55:40 Purple/black sea cucumber on 3-chip camera; subsequent close-up
09:56:50 Two sets of holes in a circle near the sea cucumber
09:57: 38 Moving east 100 meters
09:58:21 Looks like carbonates to the left on sonar; heading that way
09:59:22 Lush tubeworm community on 3-chip camera
10:00:30 Mussels in pilot's camera and 3-chip camera
10:01:40 Both types of tubeworms, Lamb. and Escarp.
10:02:10 'Best of' video of tubeworms and mussels, event 28478
10:10:00 Small white crab crawling through mussels on pilot's camera
10:11:30 Two white galatheid crabs in pilot's camera
10:21:09 Clump of black mussels on 3-chip camera
10:22:45 Budweiser can in clump of tubeworms on 3-chip camera; event 28523
10:24:07 Clump of black mussels now on downlooking camera
10:27:19 3-chip camera close-up on Budweiser clump of worms
10:43:56 Jason off the bottom

Watch Summary:

Successful Bushmaster collection of tubeworm bush at marker 12. Transited over urchin fields. Collected a large carbonate rock with tubeworms on it for Harry Roberts. Explored new mound that is south of previous mound. Southern part was not too exciting—lots of carbonate rocks, some urchins, sparse tubeworms. However, turned to the east and found lush tubeworm community with both kinds of worms, fast growth, mussels, and crabs. Photogenic clump of tubeworms with a Budweiser can.

Dive Log for J2-278

Date: 6/23/2007
Shift: 0400-0800
Dive: J2-278
Site: GC852

Watch Leader: Ian McDonald
Name: Christina Kellogg

Time (GMT) Comments

07:23:00 Jason had been on the bottom since ~07:05; DVDs started now; they had just reached the elevator at 07:20
07:26:00 Taking elevator to coral site to deploy cameras
07:32:42 Continuing to transit to the coral site with elevator
07:40:50 Corals visible in downlooking camera, so we're near site
07:43:13 Jason sets down on bottom; adjusts camera views
07:50:30 Ian McDonald's camera "Louie" looks like it is working
07:52:00 Jason moving around elevator; kicking up a sediment cloud
07:59:20 Large pale isolpod on pilot's camera, event 28835
08:20:01 Isopod on 3-chip camera
08:07:09 Checking that elevator position had been marked (it had)
08:08:30 Moving "Louie" camera away from elevator
08:09:09 Giant isopod circles elevator on brow camera
08:09:54 Gorgonians visible on pilot's camera
08:10:39 Gorgonians now visible on both brow camera and pilot's camera
08:19:19 Lots of marine snow
08:25:04 Lophelia patch in pilot's camera; then brow and pilot's camera
08:26:40 Clearer picture of Lophelia on 3-chip camera
08:28:20 Looking for a safe place for Louie camera near Lophelia patch
08:31:00 Large red/orange gorgonian (across from Lophelia patch) in pilot's camera
08:32:40 Better shot of red/orange gorgonian in pilot's camera (centered)
08:45:19 Setting down Louie camera in sediment between Lophelia and red/orange gorgonian; event 28933; it will stay here for two months, taking photos every 72 minutes
08:49:01 Flying Jason over Louie camera to photograph camera in situ
08:52:18 Ian does not want to sample Lophelia patch near the camera
09:02:48 Moving north to other Lophelia site to make collections
09:15:20 Small Madrepora sighted to collect for Cheryl {*actually a gorgonian*}
09:19:24 Clear shot of Madrepora about to be sampled; event 29002 {*gorgonian*}
09:23:00 Putting picnic basket under coral
09:24:10 Sampled coral but it is larger than basket opening
09:25:00 Need to get close-up photo before breaking the coral up to fit in picnic basket
09:29:50 Broke up coral to fit in basket, event 29017
09:34:28 Red shrimp perched on broken holdfast of Madrepora coral, on pilot's camera {*gorgonian*}

09:44:20 Sampling broken piece of same Madrepora coral as first sample {*gorgonian*}
09:46:07 Grabbing Madrepora holdfast out from under red shrimp {*gorgonian*}
09:48:33 Adding holdfast to picnic basket, event 29063 {*gorgonian*}
09:55:00 Lophelia bush to be sampled visible on 3-chip camera
09:52:43 Lophelia close-up on 3-chip camera (just before event 29082)
10:01:50 Grabbed a piece of Lophelia
10:02:36 Dropped Lophelia in picnic basket opposite side from Madrepora {*gorgonian*}
10:03:34 Using 3-chip camera to see if that piece is dead or alive—looks dead, event 29093 {*was not dead; confirmed at surface*}
10:05:00 Taking another Lophelia sample from the same thicket; dropped it
10:06:07 Swimming red galatheid crab flees the scene, on pilot's camera
10:09:29 Swimming red galatheid crab in pilot's camera again
10:11:14 More swimming red galatheid; he keeps popping up
10:14:39 Large piece of Lophelia is broken off and falls behind rock
10:15:01 Grabbed smaller piece of Lophelia from a different clump than previous (possibly dead) collection; event 29120 {*not Lophelia; really Madrepora*}
10:15:50 This smaller piece went into the basket, so there are two different pieces of Lophelia on one side and one colony of Madrepora on the other {*Lophelia and Madrepora on one side, gorgonian on the other*}
10:22:22 Close-up of sponge on pilot's camera
10:24:00 Looking for piece of Lophelia that dropped; unsuccessful
10:30:00 Moving back to the elevator's location to take sediment cores
10:35:07 Preparing to collect sediment cores from soft, brown, undisturbed sediments
10:39:58 First core, yellow #2, event 29177
10:42:40 Second core, yellow #4, event 29186, center of milk crate
10:45:30 Third core, yellow #8, event 29188
10:47:28 Fourth core, yellow #3, event 29193
10:49:20 Fifth core, yellow #5, event 29197
10:51:02 Sixth core, yellow #9, event 29202
10:54:05 Coring finished; two cores could not be used because they were stuck in the milk crate
10:59:40 Gray eel, (didn't look like Conger)
11:00:29 Eel visible in 3-chip camera, event 29222
11:02:16 Picnic basket placed in starboard biobox (#2) on elevator
11:10:38 Eel visible in brow camera, event 29242
11:11:49 Doppler reset, event 29245
11:14:10 Put sediment cores in wood box on elevator, event 29251-29252
11:17:22 Ready to release elevator for 8am recover
11:23:00 Looking for a crab to grab while waiting for elevator ok
11:26:15 Crab on pilot's camera

Watch Summary:
Placed Ian McDonald's rotary camera (Louie) on the bottom near a patch of Lophelia. Collected a colony of Madrepora and pieces of two different Lophelia clumps (but first collection may be dead piece). There seemed to be one large thicket of Lophelia but also some smaller clumps along top and sides of rock. Moved back to the elevator location to collect sediment cores. Six

of eight cores collected (two got stuck in the milk crate). Transferred coral picnic basket and core milk crate to elevator.

{*Note: After corals were brought to the surface, it turned out the "Madrepora" was a gorgonian, and the second small piece of "Lophelia" was actually Madrepora*}

Date: 06-23-07
Shift: 07:30 – 11:30 EDT
Dive: J2-278
Site: GC852

Watch Leader:
Name: Michael Kullman

Time (GMT) Comments

11:36 Elevator released.
11:40 Run crab, run!! Vid of crab collection. May not be suitable for children under the age of 12.
13:18 Jason approaching area of markers 2, 5 & 8.
13:20 Nav reset.
13:33 Update target location for marker 2 in DVLNAV.
13:40 Mass spec scan 1 EVT 29293.
13:45 Scan 1 end (end of background scan) EVT 29405.
13:47 Mass spec scan 2 EVT 29411.
13:52 Scan 2 end EVT 29421.
13:54 Scan 3 start EVT 29429.
14:01 Scan 3 end EVT 29444.
14:03 Heading for position approximately 25m east of marker 8.
14:04 Reset nav, marker 8 in sight.
14:08 Ball marker near tubeworms from previous dive sighted.
14:09 Reset nav at marker 8. Apparent offset to east of approximately 20m from marker fix 12247 on dive 273.
14:12 Mass spec scan 4 start (near ball marker / marker 8) EVT 29469.
14:18 Mass spec scan 4 end EVT 29470.
14:19 Mass spec scan 5 start EVT 29471.
14:30 Mass spec scan 5 end EVT 29472.
14:32 Mass spec scan 6 start EVT 29473.
14:41 Mass spec scan 6 end EVT 29478, reset nav.
14:42 Mass spec scan 7 start EVT 29481. NOTE: Virtual Van auto events have not been logging every 30 seconds for mass spec readings 4 – 6.
14:54 Mass spec scan 7 end EVT 29491.
15:01 Mass spec scan 8 start EVT 29506.
15:10 Mass spec scan 8 end EVT 29526.
15:19 Mass spec scan 9 start EVT 29545.

Summary:

At the beginning of this watch the elevator was released, Jason was stationary for a short period, Jason then maneuvered north towards the area of markers 2, 5 and 8. A crab was collected en route 11:40.

After reaching Marker 2 an updated position for the marker was entered into DVLNAV. Mass spec readings 1 - 3 were taken in this area. Jason then maneuvered to a position near marker 8. After a nav reset at marker 8 it was noticed that there appeared to be a roughly 20m offset between the current position and the position logged during Dive 273 (EVT 12247).

Mass spec readings 4 – 9 were taken in the area of Marker 8. It was noted that during scans 4 – 6 the Virtual Van automatic fixes at 30 second intervals were not being logged (apparently sitting on the bottom had confused the program, logging then began normally).

Date: 6/23/2007
Shift: 11:30 – 16:00 EDT
Dive: J2-278
Site: GC 852

Watch Leader: ` Peter Girgius
Name: Kim Hunter

Time (GMT)	Comments
15:32	Mass Spec – end position 9
15:34	Mass Spec – start position 10
15:44	Mass Spec – end position 10
15:45	Mass Spec – start position 11
15:57	Mass Spec – end position 11
16:00	Mussel collection – Pot A – aborted because setup not stable
16:17	2 Niskin bottles fired
16:22	Spotted marker 2
16:23	Reset navigation
16:27	Spotted marker 8
16:31	Reset navigation
16:35	Starting at 16:00 – searching for muddy area to collect mussels
17:04	Reset navigation; still searching for good mussel collection site
17:07	Found spot for mussels & chemical scans
17:11	Mass Spec – start position 12
17:18	Mass Spec – end position 12
17:19	Mass Spec – start position 13
17:29	Mass Spec – end position 13
17:37	Mass Spec – start position 14
17:39	Mass Spec – end position 14

17:40 Mass Spec – start position 15
17:50 Mass Spec – end position 15
17:54 Mass Spec – start position 16
18:06 Mass Spec – end position 16
18:07 Mass Spec – start position 17
18:18 Mass Spec – end position 17
18:34 Mass Spec – end position 18; started position 18 at 18:20
18:40 Mussel Pot A – collection at Mass Spec location
19:30 White mussel net collection
19:50 Mussel collection end
19:51 Beginning scan beneath mussel collection

Watch Summary: Shift covered Mass Spec scans 9-18 and biological collections in mussel beds.

Date: 6/23/2007
Shift: 1600-2000 EDT
Dive: J2-278
Site: GC 852

Watch Leader: `
Name: Matt Frye

Time (GMT) Comments

Time (GMT) Comments
20:03:00 start mass spectrometer #20 (29940)
20:17:20 end sample #20 (29969)
20:20:00 start mass spec #21 (29976)
20:20:20 counter said 30:36 and was reset
20:31:33 end mass spec #21 (30002)
20:35:25 #21 did not stop, continue; methane/ethane/sulfide encountered
20:39:50 meth sensor #21 really stopped (30021)
20:42:00 put white bag of musells away on port side
21:07:33 start mass spec reading # 22 (30061)
21:19:06 stop mass spec reading #22 (30062)
21:19:22 moving probe and a couple of mussels over
21:22:03 start mass spec # 23 (30063)
21:22:40 system is not auto-logging events between manual entries
21:34:08 stop mass spec reading # 23 (30064)
21:37:10 start mass spec reading # 24 (30065)
21:48:29 stop mass spec # 24
21:54:00 mass spec start # 25 (30067)
22:23:48 sample mussels from site 25 into port biobox (30072)
22:44:05 start mass spec # 26 on edge of CO3 ledge in small hole (30109)

22:45:00 sponges on ledge
22:56:17 end mass spec # 26 (30134)
23:04:17 start mass spec reading #27 (30152)
23:22:49 end # 27 (30190)
23:28:00 start # 28 mass spec (30200)
23:40:00 stop mass spec # 28 (30227)
23:48:00 start mass spec # 29 (under CO3 ledge) (30245)

Watch Summary: 10 mass spec readings from mussel bed; one sample of mussels into port biobox; Good readings of mass spectrometer.

Date: 6/23/2007
Shift: 2000-0000 EDT
Dive: J2-278
Site: GC 852

Watch Leader: ` Pete, Erik
Name: Irmi

Time (GMT)	**Comments**
0:07	Ian's camera
0:16	reset
0:19	start close up science cam: mussels
0:22	moving Ian's camera towards the rock with the mussels, making pictures (#30312)
0:26	still positioning of Ian's camera: making pictures: shrimp + mussels
0:38	moving Ian's cam, making pictures of an isopode
0:41	end of Ian's cam (#30357)
0:48	grabbing mussels from a rock, into biobox
0:51	another peace of rock + mussels; biobox (#30383)
0:55	moving to look for another mussel bed
0:57	reset
0:59	marker #2
1:03	reset
1:03	marker #2
1:14	start of mass spec #30 (#30431)
01:23	end of mass spec #30 (#30438)
1:29	#31 start of mass spec (#30444)
1:41	end of mass spec #31 (#30453)
1:44	start of mass spec #32 (#30459)
1:58	end of mass spec #32 (#30483)
2:02	start of mass spec #33 (#30485)
2:13	close up of science cam: crab
2:14	end of mass spec #33 (#30486)
2:20	start of mass spec #34 (#30496), close up: science cam: mussels, crab
2:33	end of #34 (#30496)

2:48 corals (science cam)
2:58 reset
2:59 at coral site
3:01 science cam: coral, calcareous gorgonian!!!
3:02 reset
3:08 fly-trap-anemone (science cam)
3:11 reset
3:14 Ian's cam: making pictures of corals
3:20 fly trap anemone
3:26 crab

3:29 end of Ian's cam
3:31 taking a peace of coral (#30626), biobox
3:36 transit to start the SM2000 survey

Watch Summary: taking pictures with Ian's cam (mussels and corals), making mass spec, taking samples from mussels and corals

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Date: 6/24/2007
Shift: 0000-4000 EDT
Dive: J2-278
Site: GC 852

Watch Leader:
Name: Matt Frye

Time (GMT) Comments
4:00:50 20m 1st line
4:03:23 calibration start
4:05:22 calibration end
4:08:13 reset doppler
4:09:00 re-run 20 m calibration altimeter
4:10:44 end
4:13:30 15 m calibration start
4:15:04 end of line
4:16:48 10 m calibration start
4:18:50 end of line
4:22:39 5 meter calibration start
4:24:26 end of line; end of calibration
4:27:41 start line 1 (north)
4:27:23 stop line 1
4:51:01 start line 2 south
5:10:36 end line 2
5:15:14 start line 3 north
5:34:29 end line 3

5:38:30 start line 4 south
5:57 end line 4
6:04 start line 5 north
6:22 end line 5
6:31 start line 6 south
6:50 end line 6
6:54 start line 7 north
7:13 end line 7
7:17 start line 8 south
7:35 end line 8

Date: 06/24/2007
Shift: 0400-0800 EDT
Dive: J2-278
Site: GC852

Watch Leader: Mike Kullman/Robert Carney
Name: Christina Kellogg

Time (GMT) **Comments**

Mike had been up for several hours running SM2000 multibeam surveys. He continued to keep the log until the surveys were finished. To keep the log consistent, I am including his entries, from 08:03 to 10:03

08:03 Start survey line 10 (south), 31207
08:21 End line 10, 31245
08:26 Start survey line 11 (north), 31256
08:46 End line 11, 31296
08:52 Start survey line 12 (south), 31310
09:10 End line 12, 31351
09:28 Start survey line 13 (west), 31388
10:03 End line 13, 31459

10:06:27 Turning off SM2000 multibeam system
10:08:39 Transiting to Marker 1, 0.4 knots, ~470 knots
10:10:37 Started DVDs again when bottom became visible (series #128)
10:15:09 Dark colored sea cucumber, pilot's camera, event 31484
10:22:15 Crossed a line in the bottom; previous Jason footprint?
10:30:31 Bottom has been soft sediment marked by occasional holes
10:31:42 Getting suction tube in manipulator to prepare for slurping (Bob takes over watch)
10:34:35 Eel visible in downlooking camera
11:00:30 Eel-like fish visible on 3-chip camera
11:04:47 Dark colored fish (rattail?) lying on bottom; 3-chip camera, 31585
11:05:40 Same fish on brow camera, 31587
11:07:06 Another fish, silver, lying on bottom, 3-chip camera, 31591-31592

11:10:59 Large red crab on the bottom, 3-chip camera, 31600-31602
11:12:00 Trying to sample a couple of crab legs from him, 31603-31604, 31607
11:15:00 Putting crab into port biobox, 31612
11:17:30 Crab gets second wind and escapes manipulator instead of entering biobox
11:19:00 Crab is gone
11:24:00 Moving to marker 6
11:32:26 Doppler reset, 31645

Watch Summary:

Mike Kullman completed the SM2000 multibeam survey, running north/south lines 10-12, and then a cross line to the west for survey13. Bob Carney took over and the suction tube was readied for slurping unsuspecting invertebrates. Observed a couple of eels and a couple of fishes. Entertaining but unsuccessful attempt to collect legs from a crab.

Date: 06/24/2007
Shift: 0800-1200 EDT
Dive: J2-278
Site: GC852

Watch Leader: Chuck Fisher
Name: Erin Becker

Time (GMT) Comments
11:42 At Marker 1 – Dropped target "Marker 1 J2-278"
11:59 Dropping target "tubeworms/clams"
12:28 "Mass speculating"
12:29 Position 35: background seawater EVT 31763 ; stop scan 35 EVT 31788
12:46 EVT 31799 start recording position 36
12:58 Moving probe to base of tube worms
13:01 Starting position 37 EVT 31831
13:10 Mussels embedded in carbonate, carbonate covered in white crap
13:11 Best-of video growing carbonate for Harry
13:13 End position 37
13:13 Putting mass spec away and preparing to collect stained tubeworms
13:22 Collecting stained tubeworms into starboard biobox
13:23 Claw loose, difficult to hold tubeworms
13:28 Tubeworm trying to jump out of biobox. Balanced precariously on edge
13:30 Retrieved escaping tubeworm
13:31 Shutting lid w/ some worms hanging out
13:34 Slurping shrimp for Stéphane – one chamber
13:40 Suction seems pretty weak
13:44 Accidental clam slurp
13:49 Putting slurp away

13:56 Setting up at Marker 1 for chem scanning and mussel pot
14:07 Mass spec probe nestled into mussels
14:11 Position 38 on mussels EVT 31967
14:18 Not detecting methane; seawater hit
14:20 Done scanning 31968
14:20 Moving two mussels to the left
14:23 Starting position 39 EVT 31975
14:27 Still looks like seawater
14:27 Stopping position 39; 31985
14:27 Moving 6 in. and placing into mussels. Deeply inserted between little and big mussels
14:28 Setting up position
14:29 Hearing some pounding and what sounds like an engine alarm
14:29 Beginning position 40 EVT 31987 (VV logged at 14:30)
14:30 Detecting some sulfide (a little)
14:41 End position 40 EVT 31989
14:45 Start position 41 EVT 31990
14:48 Little sulfide hits
14:56 Stop position 41 EVT 32006
14:57 Putting away mass spec
14:59 All bungees released on ring as MPF came out of bucket
15:00 Pot scar looks pretty empty; putting MPF away
15:13 Crab eating broken mussel in pilot and science cam. Shrimp came into pot scar. Pot went to sediment. Crab is a "vagrant" species. Shrimp all over dead mussel that crab is eating
15:19 Reset Doppler
15:22 Tried to get DV Cam video but crab turned away
15:23 Going South 100m

Watch Summary: We did some chemical sensing with the mass spec around stained tubeworms and then collected those into the starboard biobox. We then went to Marker 1 and did some more chemistry and collected a mussel pot. There was some interesting video of a crab and a swarm of shrimp eating one of the broken mussels.

Date: 6/24/2007
Shift: 11:30 – 16:00
Dive: J2-278
Site: GC 852

Watch Leader: Ian MacDonald
Name: Kim Hunter

Time (GMT) Comments
15:35 Biological collection underway – clams picked-up with manipulator arm instead of scoop
16:16 Searching for Bushmaster collection site – spotted bubble stream coming from

sediment surface – was told no time to investigate or deploy Mass Spec probe – must continue search for mussels and tubeworms
16:23 Returned to bubble stream for Mass Spec measurements
16:28 Peter is sick so no Mass Spec measurements in bubble stream – going to take measurement in tubeworm clump instead because Eric is not sure what deleterious effect bubbles may have on probe.
16:30 Mass Spec tube is tangled so no measurements taken – probed restowed
16:40 Bushmaster collection of tubeworm clump
16:59 reset navigation
17:03 Starting Ian's photo lines
17:07 T8, alt. 4.1m, H 175 degrees
17:16 end of line
17:23 T1, alt. 3.1m, H 355 degrees
17:32 end of line
17:35 T3, alt. 3.1m, H 355 degrees
17:40 end of line
17:44 T4, alt. 3.5m, H 175 degrees
17:49 end of line
17:53 T10, alt. 4.6m
17:58 end of line
18:06 T5, alt. 3.8m, H 355 degrees
18:11 end of line
18:24 T2, alt. 4.8m, H 175 degrees
18:29 end of line
18:32 T7, alt. 3.6m, H 175 degrees
18:37 end of line
18:45 T6, alt. 4.3m, H 355 degrees
18:50 end of line
18:51 T9, alt. 3.3m, H 355 degrees
18:57 spotted marker 6
18:59 reset navigation
18:59 end of line
19:11 Jason off bottom

Watch Summary: Shift covered end of biological collections for this dive and Ian's photo lines T1-T10. Shift ended early with Jason beginning ascent.

Dive Log for J2-279

Date: June 25, 2007
Shift: 08:00 – 12:00 EDT
Dive: 279
Site: GB 829

Watch Leader:
Name: Matt Frye

Time (GMT)	Comments
13:06	seafloor acquired
13:13	heading 255
13:15	soft bottom mud
13:17	small bacteria mat
13:30	scattered CO3 @ 1223 m
13:51	top of ridge @1224 M
13:56	suspended silt
14:07	deploy marker on top – marker 13
14:14	doppler reset
14:20	head due north 200 meters
14:34	1267 meters
14:40	stop, turn back to south at 1287 meters
14:42	tubeworm, mussel, CO3 @ 1275 m
	Unknown rock, looks like CO3
14:47	dead mussels 1267 m
14:51	dead mussels 1261 m
14:55	mussel jackpot at 1255 m
15:02	start mass spec into live mussels
15:19	start mass spec reading #42 (32881)

Watch Summary: Mostly exploration; found the top of the hill and moved downslope from there; found live mussels @ 1255 m

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Date: 6/25/2007
Shift: 11:30 – 16:00 (EDT)
Dive: J2-279
Site: GB 829

Watch Leader: Group Effort
Name: Kim Hunter

Time (GMT)	Comments

15:44 Mass Spec in mussel bed. Completed Mass Spec position 42, ran ~5.5 min of "best of video" and started Mass Spec position 43 while I was catching up the DVD logs from the previous shift.

15:54 Stop position 43, evt 32955
15:58 Start position 44, evt 32965
16:10 Stop position 44, evt 32990
16:16 Start position 45, evt 33003
16:25 Stop position 45, evt 33023
16:30 Start position 46, evt 33033
16:40 Stop position 46, evt 33055
16:45 Mussel Pot A collected
16:54 Scoop net to be filled and put into port biobox
17:08 Net stowed in biobox
17:11 Ian starting photo imaging
17:12 Reset Doppler navigation
17:51 Stop photo transect, evt 33189
17:52 moving to next mussel bed
18:26 Macro camera start – tubeworm photos
18:30 mussel photos
18:43 Stop macro camera
18:47 carbonate collection with sponge attached
18:48 tubeworm grab collection into port biobox
18:54 carbonate collection from tubeworm site
19:05 Returning to previous mussel bed for second mussel pot collection
19:31 Mussel Pot F collection

Watch Summary: This dive is on a new site – referred to as the Christmas Tree site. An extensive mussel bed was found on the sediment surface – lots of black mud beneath. Would be a good place to get push cores in the future. There are some tubeworm clumps but not abundant. There are large carbonate outcrops here.

Date: June 25, 2007
Shift: 1600 – 2000 EDT
Dive: 279
Site: GB 829

Watch Leader:
Name: Matt Frye

Time (GMT) Comments

19:51 leaving central mussel bed; heading 090 for 60 m
20:22 090 approx 140 m, turned 145 into CO3
20:23 tubeworms and CO3 (big chunks)
20:26 dead mussels downslope

20:27 straggler tubeworms
20:36 steep slope
20:42:39 still large vertical CO3 structures; high relief bottom
20:44:49 white galatheid and tubeworms on 3 chip camera

Watch Summary: 10 mass spec readings from mussel bed; one sample of mussels into port biobox; Good readings of mass spectrometer.

Dive Log for J2-280

Date: 6/26/2007
Shift: 0400-0800
Dive: J2-280
Site: GB647

Watch Leader: Chuck Fisher/Robert Carney
Name: Christina Kellogg

Time (GMT) Comments

10:00:00 Approximate time of Jason launch; expect to be at bottom around 11:00 GMT (7am local)
10:43:00 Jason reaches bottom; soft brown sediment
10:51:00 Started DVDs
10:52:25 Sighted a piece of asphalt (?) that has a white gorgonian on it; will try to collect
10:56:57 Tried to sample small piece of the rock; it broke apart and was revealed to be definitely asphalt; very shiny; eventually got a small piece into the biobox
10:59:00 Tried to collect the bigger piece with the white gorgonian, but dropped it
11:03:30 Shifting some weights around to make room for collection
11:11:20 Successfully collected asphalt piece with white gorgonian into milk crate
11:12:29 Pushed on the asphalt piece to firmly wedge it into milk crate
11:17:17 Moving away to look around at the site before beginning SM2000 surveys
11:20:00 Bob Carney took over as watch leader
11:21:40 Soft brown sediment pockmarked with holes
11:22:20 Moving down the slope on the north side
11:24:46 Moving at 0.2 knots to beginning of survey

Watch Summary:

Beginning of dive J2-280 at site GB647. Discovered a chunk of asphalt with coral on it and sampled it, marking the site with Marker #2. Moving into position to begin SM2000 survey.

Date: 6/26/07
Shift: 0800-1200 EDT
Dive: J2-280
Site: GB647

Watch Leader: Bob Carney
Name: Lara Miles

Time (GMT) Comments

11:46	BIO OBS: fish
11:55	Heading to GEO 1
12:01	TRANSIT: taking pictures @ a rate of 1 min intervals/ downward camera
12:07	BIO OBS: ray: “Bathy raja” (Bob id)
12:13	BIO OBS: corals and brittle stars
12:15	BIO OBS: crab with coral and sea stars/ broken coral and shells
12:23	Possible chain drag mark in sediment?
12:23	GEO OBS: carbonate rubble- probably asphalt
12:33	GEO GRAB: asphalt
12:43	BIO OBS: spiny urchins in possible brine stream (possibles provided by Bob)
12:45	BIO OBS: white and orange bacteria mats
12:45	BIO OBS: fish and crab
12:48	BIO OBS: mussel shells and sea star in asphalt: rock massive (“size of house” Bob)
12:56	BIO OBS: filter feeding starfish
13:00	BIO OBS: pink coral
13:00	BIO OBS: white bacterial mat
13:02	GEO GRAB: Push core (testing bact. Mat to see how deep it goes: successful/full core
13:07	GEO GRAB: Push Core #2 (above 13:02) and core #5 taken on white bact. mat
13:08	GEO GRAB: Push Core #9
13:15	BIO GRAB: urchin in starboard bio box
13:16	DVCAM: start time on tape 20m 13s: tape sampling site
13:28	GEO GRAB: Push Core #6 was tried but sediment not deep enough FAILED
13:29	BIO OBS: fish in pilot cam and filter feeding star fish
13:39	GEO OBS: previously thought to be a chain drag (12:23) now cause unknown
13:46	BIO OBS: starfish (many)
13:56	GEO GRAB: carbonate placed behind the BM for HARRY
14:10	BIO OBS: clam shells
14:11	BIO OBS: tubeworms
14:23	GEO OBS: asphalt
14:26	TRASH: 3 cans and 2 bottles
14:43	Passed geo 2, heading 208 towards geo 3
15:12	GEO GRAB: core yellow (1) right front starboard

Watch Summary:
Passed over a large asphalt/carbonate substrate with many biology observations including: urchins, fish, a ray, starfish and tubeworms. There were four successful push cores taken and one failed (sediment not deep enough). Of the four push cores, three were taken on white bacterial mats. Two asphalt geology grabs were taken as well as, one biology grab of an urchin.

Date: 6/26/2007
Shift: 11:30 – 16:00 EDT
Dive: J2-280

Site: GB 647

Watch Leader: Group Effort
Name: Kim Hunter

Time (GMT) Comments

15:50 Two mat cores (yellow #'s 4 & 8) taken – white bacterial mat cores taken adjacent to rock outcrop, snails feeding on mat, some orange mats w/in white areas – tried to core but mud was not deep enough – only able to core white mat areas.
16:20 Single tubeworm collected – oil oozed out of hole left when tubeworm extracted.
16:30 Tubeworms & carbonate collected into port biobox.
17:20 Collected yellow core #7 near carbonate outcrop – white bacterial mat.
17:40 Using net to collect snails.
17:55 Collected Bernie's core in blue mud, oil bubbles & snail in core.
18:04 Mussel grab into starboard biobox.
18:23 Brachiopod grab in starboard biobox.
18:25 There is some debate as to whether the ledge where the mussels and brachiopods were collected is asphalt or carbonate.
18:30 Chunk of ledge broken off and put into starboard biobox – Matt Frye thinks it's carbonate.
19:27 "Fat" tubeworm grab into starboard biobix.
19:29 Doppler navigation reset.

Watch Summary: This dive is on a new site – hilly topography with many ledges and rock outcrops. Tubeworms are mainly singles or pairs – didn't see any clumps. Mussels are generally associated with rock outcrops. Many bacterial mats are on thin sediment layer over rock. There seems to be a fair amount of oil in these sediments – pulling tubeworms or taking push cores often releases oil bubbles.

Date: 6/26/07
Shift: 1600 - 2000
Dive: J2-280
Site:

Watch Leader: Matt Frye
Name: Matt Frye

Time (GMT) Comments

20:21 heading for geo-marker 5; mud
20:29 sponges, tubeworms, dead mussels, crab, co3
20:36 doppler reset
20:45 lone tubeworm in sandy bottom; stbd biobox
21:03 transiting mud bottom with soup bowl depressions
21:09 fish resting on bottom, 3 chip camera
21;09 track in the mud, 3 chip camera

21:12 another fish, 3 chip
21:15 white bacterial mat, 3 chip
21:17 clump of algae from the surface, 3 chip
21:21 starfish and sponge (stalked), 3 chip
21:21 eel, 3 chip
21:58 site geo #6, nothing; site geo 5, nothing
22:08 west of geo #6, collect tube and coral; stbd side
22:22 west of geo #6, collect tubeworms, stbd side
22:48 marker 2 (CRP) seen again; heading to geo #1
23:22 back @ geo #1; firing niskins

Watch Summary: mostly mud at geomarker #5 and 6; some tubeworm collection west of geo #6; last minute transit to geo #1 to collect some niskin data

Dive Log for J2-281

Date: 6/28/2007
Shift: 0000-4000 CDT
Dive: J2-281
Site: AC645

Watch Leader:
Name: Nicole Morris

Time (GMT) Comments

6:39:59 72 meters from bottom- no dvds recording
6:48:00 Moving to SM2000 survey area
6:50:15 Reset DVL
6:57:14 SM2000 Calibration survey start; 20 m alt 180
6:59:59 SM2000 Calibration survey end 20 m alt 180
7:03:26 SM2000 Calibration survey 15 m alt start
7:05:23 SM2000 Calibration survey 15 m alt end
7:07:27 SM2000 Calibration survey 10 m alt start
7:09:29 SM2000 Calibration survey 10 m alt end
7:11:30 SM2000 Calibration survey 5 m alt start
7:13:29 SM2000 Calibration survey 5 m alt end
7:15:20 Chimera- no video recording
7:17:55 Reset DVL
7:24:44 Start SM2000 line 1
7:53:00 End SM2000 line 1
7:57:15 Start SM2000 line 2
8:25:00 End SM2000 line 2
8:28:17 Start SM2000 line 3

Watch Summary:

Jason was descending to the seafloor at the beginning of my watch. At 0657, we started performing the SM2000 calibration lines. This was completed at 0713. Shortly after, we started performing SM2000 survey lines 1-3. At the end of watch, we were still performing SM200 survey line 3.

Date: 28 June 2007
Shift: 0400-0730 CDT
Dive: J2-281
Site: AC 645

Watch Leader: Jason staff
Name: Eric Hawkins

Time (GMT) Comments

08:53 End of SM 2000 line 3
08:56 Start of SM 2000 line 4
09:22 End of SM 2000 line 4
09:29 Start of SM 2000 line 5
09:54 End of SM 2000 line 5
10:00 Start of SM 2000 line 6
10:26 End of SM 2000 line 6
10:35 Start of SM 2000 line 7
11:00 End of SM 2000 line 7
11:11 Start of SM 2000 line 8
11:36 End of SM 2000 line 8
11:42 Start of SM 2000 line 9
12:07 End of SM 2000 line 9
12:12 Start of SM 2000 line 10

Watch Summary: SM 2000 lines throughout the entire shift.

Date: 6/28/2007
Shift: 0800-1200 CDT
Dive: J2-281
Site: AC 645

Watch Leader:
Name: Mike Cohen

Time (GMT)	**Comments**
12:37:32	End SM 2000 line 10
12:43:48	Start SM 2000 line 11
13:10:29	End SM 2000 line 11
13:13:58	Start SM 2000 line 12
13:34:07	End SM 2000 line 12
13:42:12	Start SM 2000 line 13
14:08:03	End SM 2000 line 13
14:10:56	Start SM 2000 line 14
14:36:27	End SM 2000 line 14
14:41:11	Start SM 2000 line 15
15:06:33	End SM 2000 line 15
15:09:43	Start SM 2000 line 16
15:35:18	End SM 2000 line 16
15:51:50	Start SM 2000 line 17 (East-West)
16:21:08	End SM 2000 line 17 (East-West)

Watch Summary:
During this watch, the pilots used Jason II only for surveying. The last survey line was line number 17, which ran in the opposite direction to all of the previous survey lines.

Date: 6/28/2007
Shift: 11:30 – 16:00 CDT
Dive: J2-281
Site: AC 645

Watch Leader: Group Effort
Name: Kim Hunter

Time (GMT) Comments

16:30 Jason crew attending to navigational issues
16:40 On bottom and heading toward elevator to get Ian's camera.
16:50 Stopping to collect Pogo cores.
17:23 Finished Pogo coring. Collected 6 cores in Pogo bed – 4 long cores for Joye lab and 2 short cores for Chris. Collected 2 control cores – 1 adjacent to Pogo bed and 1 outside of disturbed Pogo coring area.
17:24 Heading to elevator.
17:48 Found elevator.
18:01 Stowing core rack in elevator box.
18:09 Retrieving Ian's camera from elevator.
18:22 Camera is on Jason.
18:26 Elevator released from bottom.
19:30 Elevator spotted 100m off starboard bow.
19:49 Elevator on deck.
19:54 Moving to target #8 at marker #'s 42-46 to deploy Ian's camera.
20:35 Marker #12 from 1992 spotted.
20:36 Markers 14 & 15 from 1992 spotted.
20:37 Marker A spotted.

Watch Summary: Most of this watch involved collecting Pogo cores and waiting for the elevator to surface. The banded tubeworm site was located and Ian was still searching for marker 10, where he wants to deploy his camera, when the shift ended.

Date: 06/28
Shift: 16.00 – 20.00 CDT
Dive: J2-281
Site: AT 340

Watch Leader: Erik, Stephanie
Name: Julia

Time (GMT) Comments

20.58 preparing to deploy Ian's camera
20.59 looking for the musselbed
21.01 observing marker #4,5
21.05 deploying Ian's camera HUEY in musselbed
21.12 marker E observed (deployed 15 years ago)
21.13 marker #8
21.22 HUEY deployed within tubeworm aggregation (2195m depth)
21.27 Ian takes pix around HUEY with down looking camera
21.30 test of mass spec
21.36 stop of mass spec
21.37 looking for banded tubeworms for cool pix macro shots (around marker E)
21.41 JASON landed, closer look to find banded tubeworms -> **B23WS black**, banded tubeworm
21.47 Macro cam on BANDED TUBEWORM
21.54 Identification of **Green57WT**
21.55 pictures taken of shrimp on tubeworm (black23)
21.58 mussel on tubeworm (7 at least, growing on tubes)
22.02 macro cam on banded tubeworm G57
22.11 Doppler reset
22.12 Marker F observed
22.19 Macro cam on banded tubeworms **R47TS**
22.36 banded tubeworms close to marker F not detected, heading to marker #10
22.39 **W2WP** near Ian's camera, macro on it
22.41 Best of tubeworm (banded tw)
22.43 tubeworm dead (?) Best of **black 20**
22.48 Macro back on basket, then on **W2** again
23.11 macrocam stop (back on basket)
23.17 moving to marker A
23.25 at marker A, found other banded tubeworms: **white 4** and **red 8**
23.27 macro cam start again
23.31 Best of tubeworm
23.36 macro of of red8
23.40 Doppler reset
23.55 – 0.00 Best of SITE (fine overlook of site, tubeworms etc)

Watch Summary: deployed Ians camera, looking for banded tubeworms (some found), many7 best of and macro pix taken, especially macros of banded tubeworms

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Date: 6/28/07
Shift: 2000-0000 CDT
Dive: J2-281
Site: AC 645

Watch Leader: Stephan

Name: Irmi

Time (GMT)	Comments
1:04	#48 start mass spec (#37665) in a tubeworm bush
1:19	#48 end mass spec (#37698)
1:24	#49 start mass spec(#37708)
1:39	#49 end mass spec (#37740)
1:45	#50 start mass spec (#37752)
1:49	#50 end mass spec (#37782)
2:07	#51 start mass spec (#37797)
2:21	#51 end mass spec (#37827)
2:26	#52 start mass spec (#37837)
2:42	#52 end mass spec (#37827)
2:47	looking for a marked bush of tubworms
2:48	R47TS red found
2:54	science cam: shrimp in tubworms
3:01	#53 start mass spec (#37911)
3:01	still close up science cam, looking for the next marker
3:15	#53 end mass spec (#37942)
3:18	great close up of shrimp!!!!!!
3:20	#54 start mass spec (#37951)
3:35	#54 end mass spec (#37984)
3:38	looking for marker F, grabbing it
3:40	looking for marker A
3:56	giving up
3:58	reset
4:01	white a banded tubeworm found
4:02	marker A
4:11	start mass spec #55 (#38061)
4:26	end mass spec #55 (#38092)
4:33	start mass spec #56 (38107)
4:46	end mass spec #56 (#38134)
4:50	start mass spec #57 (#38144)

Watch Summary: Mass spec # 48-#57

Date: 6/29/2007
Shift: 0000-4000 CDT
Dive: J2-281
Site: AC645

Watch Leader:
Name: Nicole Morris

Time (GMT)	Comments

5:05:09 End of mass spec position 57
5:05:15 Putting wand back onto Jason
5:10:01 Getting ready to image banded tubeworms (Red 8)
5:11:12 Found (green 29) banded tubeworm under rock
5:14:30 Imaging Red 8 tubeworm
5:15:10 Trying to fix the camera
5:23:23 Fixed camera→ moving back to image
5:26:30 Capturing images of red 8 tubeworm
5:38:20 Finished imaging red 8
5:39:01 Looking for green 29
5:41:10 Imaging green 29 tag
5:44:13 Putting camera back onto Jason
5:47:55 Moving Marker 5 to another location
5:48:51 Moving to marker 10
5:58:53 At vicinity of Marker 10
5:59:43 Setting up to perform mass spec scans
6:05:35 Start mass spec position 58 near tip of tubeworm white 2
6:16:47 End mass spec position 58
6:16:58 Moved to tagged black worm
6:20:10 Start mass spec position 59
6:34:05 End mass spec position 59
6:37:00 Start mass spec position 60
6:51:15 End mass spec position 60
6:51:42 Putting wand back onto Jason
6:54:33 Getting ready to start photo mosaic
6:57:30 Marker 25 sighted
6:58:03 Dropped target at Marker 10
6:58:35 Reset DVL
7:03:15 Markers 17 and 18 sighted
7:03:57 Marker 16 sighted
7:15:41 Looking at Ian's camera→ working
7:30:50 Searching for other targets
7:31:33 Marker 44 sighted
7:32:40 Marker 45 sighted
7:32:50 Marker 42 and 43 sighted
7:33:06 Marker 33 sighted
7:36:55 Moving to pick up Ian's camera to move to the "new" marker area- where 43, 43, 44, 45 were sighted
7:39:53 Picking up Ian's camera
7:45:20 Dropping camera in new area
7:52:07 Moving around area to see the extent before the photo mosaic
8:03:59 Setting up for a 5 m alt mosaic
8:07:32 Changing alt to 4 m
8:10:54 Start of photo mosaic line 1
8:14:27 End of photo mosaic line 1
8:17:59 Start of photo mosaic line 2

8:20:55 End of photo mosaic line 2
8:21:32 Start of photo mosaic line 3
8:25:21 End of photo mosaic line 3
8:26:15 Start of photo mosaic line 4
8:29:48 End of photo mosaic line 4
8:30:13 Start of photo mosaic line 5
8:33:55 End of photo mosaic line 5; end of mosaic

Watch Summary:
At the beginning of watch, we continued to image banded tubeworms. After this task, we continued performing mass spectrometer scans. The next task was to perform a photo mosaic over an area where Ian had previously performed a video mosaic. We first started searching for markers 42, 43, 44, and 45. Once these we found, we moved the rotary camera to this area and then performed a photo mosaic (set of 5 lines). At the end of this watch, we were preparing for a photo transect survey.

Date: 29 June 2007
Shift: 0400-0730 CDT
Dive: J2-281
Site: AC 645

Watch Leader: Ian MacDonald
Name: Eric Hawkins

Time (GMT) Comments
8:58 Start photo Transect #1, alt. 3.5m
9:00 Small clump of tubeworms
9:00 Additional clump of tubeworms
9:01 Carbonate
9:01 Large bed of tubeworms
9:03 Return to soft sediments
9:03 More carbonate outcrops
9:04 Tubeworms
9:07 End of T1 transect
9:08 Line/scar in sediment
9:19 Begin photo transect T6, altitude 4.3m, heading 345 deg.
9:23 Carbonate
9:24 White bacterial mats
9:25 Carbonate
9:26 Small tubeworm clump by carbonate
9:28 White bacterial mat
9:28 Carbonate pavement
9:28 End of T6 transect
9:29 Mussel cluster at the end of T6
9:30 Jason continuing along T6 path post-transect
9:30 Tubeworms

9:31 Tubeworms
9:31 Carbonate
9:33 Bacterial mat
9:41 Begin photo transect T3, altitude 3.4m, heading 165 deg.
9:41 Tubeworms
9:41 Carbonate
9:43 Mussels w/ few tubeworms
9:43 Pogonophorans
9:46 Back to soft sediments
9:49 Carbonate
9:49 End T3 transect
9:51 Holothuroid, dk purple/black
9:52 Start T4 transect, altitude 3.4m, heading 165 deg.
9:53 Single carbonate
9:55 Long stretch of soft sediments
9:56 Track/line in sediments, left of brow cam
9:57 More tracks
9:59 Holothuroid, dk purple/black
10:01 End T4
10:03 Holothuroid, dk purple/black
10:06 Fish
10:16 Start transect T2, altitude 3.0 m, heading 345 deg.
10:19 Holothuroid, dk purple/black
10:24 End transect T2
10:25 Moving to next transect
10:26 Line/track in sediments, left of brow cam
10:28 Octopus on downlooking camera out in the middle of the sediments, at least 28 cm (based on laser guides)
10:33 Begin T7, altitude 4.2 m, heading 165 deg.
10:33 Mussel beds with tubeworms
10:39 Holothuroid, dk purple/black
10:41 End transect T7
10:42 Heading east to next transect
10:49 Begin T8, alt. 3.8 m, heading 345 deg.
10:54 Mussels and tubeworms
10:55 Carbonate
10:56 Smaller clumps of tubeworms
10:57 End T8
10:58 Transitioning to T5
11:15 Begin T5, alt. 3.9m, heading 165 deg.
11:18 Single stalk of soft coral
11:19 Single stalk of soft coral
11:19 Single stalk of soft coral
11:20 Holothuroid, dk purple/black
11:20 Single stalk of soft coral
11:21 Holothuroid, dk purple/black

11:22 Holothuroid, dk purple/black
11:23 End T5
11:23 Single stalk of soft coral
11:24 Holothuroid, dk purple/black
11:27 Holothuroid, dk purple/black
11:28 Holothuroid, dk purple/black
11:29 Single stalk of soft coral
11:30 Single stalk of soft coral
11:36 Start T10, altitude 3.4m, heading 345 deg.
11:37 Pale sediment mounds
11:39 Holothuroid, dk purple/black
11:45 End T10
11:52 Large track in sediment, left of brow cam
11:54 Small patch of tubeworms
11:54 Carbonate
11:55 Tubeworms
11:56 Carbonate
11:57 Monofilaments (trash)
11:57 Long line of tubeworm clumps
12:02 Start T9, altitude 3.6 m, heading 165 deg.
12:02 Carbonates
12:03 Isolated tubeworm patch
12:05 Carbonates
12:05 Isolated tubeworms
12:06 Carbonate plates
12:08 White bacterial mat
12:09 Carbonate
12:10 Tubeworms
12:11 End of T9
12:14 On hold – waiting to determine next location as transects have ended
12:16 Heading for photo mosaic – aiming for middle of mussel bed
12:16 Large patches of tubeworms
12:18 Mussels and tubeworms
12:20 Cordes and Shah assuming operations
12:24 Small crab and shrimp on science cam
12:25 Numerous white shrimp atop mussels

Watch Summary: This portion of the AC 645 dive (J2-281) primarily involved Ian's photo transects, which were underway when we went on watch at 0400. As we were finishing our shift, Erik Cordes was just beginning reconnaissance of mussel beds.

Date: 6/29/2007
Shift: 8000-1200 CDT
Dive: J2-281
Site: AC645

Watch Leader: Bob Carney
Name: Michael Cohen

Time (GMT)	Comments
12:58	Bio obs tubeworms
13:05	Bio obs tubeworms and mussels at marker 9
13:10	Mass spec start background, EVT#:39324
13:24	Mass spec end background, EVT#:39355
13:30	position at marker 62 near bed of musssels, Mass spec start background EVT#: 39367
13:44	end scan at maker 62, EVT#: 39399
13:46	fish hiding in mussels
13:50	Mass spec start background at position 63, EVT#: 39413
14:05	Mass spec end background at position 63, EVT#: 39443
14:08	Mass spec start background at position 64, EVT#: 39452
14:14	Mass spec end background at position 64, EVT#: 39464
14:18	Removed probe from tube on sub
14:27	DVR cam used – mussel moving up tubeworm
14:27	Mass spec start background at position 65, EVT#: 39493
14:29	Mass spec end background at position 65, EVT#: 39499
14:30	End DVR cam use. Length = 2:38:27
14:34	Mussel pot B collection
14:37	Lift up mussel pot B
14:40	Dropped mussel pot B back in location on sub
14:47	Dead mussels knocked into ring by ROV
14:50	Reset DVL
15:04	Starboard box opened up
15:07	ROV breaking rocks
15:23	Found calibrated Carney rod
15:34	Looking for mobile fauna at marker 1
15:42	Slurp – sea cucumber, single chamber
15:45	Slurp – sea cucumber
15:47	Looking for more mobile fauna
15:51	Slurp – sea cucumber
15:56	Slurp – anemone
16:05	Returned slurp tube to sub
16:08	ROV grabbed sponge
16:15	Soft coral Sea Whip put in starboard bio box
16:20	Reset DVL

Watch Summary:

Date: 6/29/2007
Shift: 11:30 – 16:00 CDT
Dive: J2-281
Site: AC 645

Watch Leader: Group Effort
Name: Kim Hunter

Time (GMT)	Comments
16:30	Bob is doing mobile fauna slurping and grabs.
16:42	Mass Spec – start scan, evt 39796
16:51	Reset Doppler
16:59	Mass Spec – stop scan, evt 39833
17:47	Mass Spec – started scan in mussel bed, position #66
17:52	Niskins fired at Mass Spec position #66, mussel bed surrounded by tubeworms
17:56	Mussel pot F collected at Mass Spec position #66
17:58	Mass Spec wand was stowed at 17:50 but scan is still going – trying to flush system.
18:05	Mass Spec stopped.
18:12	Stephanie starting photo mosaic line 1
18:17	end line 1
18:19	start line 2
18:23	end line 2
18:24	start line 3
18:29	end line 3
18:30	start line 4
18:34	end line 4
18:35	start line 5
18:39	end line 5
18:40	start line 6
18:44	end line 6
18:48	start line 7
18:52	end line 7
18:53	start line 8
18:57	end line 8
18:58	start line 9
19:02	end line 9
20:10	Bushmaster tubeworm collection attempted
20:17	Bushmaster collection aborted – couldn't close on clump
20:35	Giving up on collecting with Bushmaster – it needs maintenance

Watch Summary: This watch covered a period in which some things went right (e.g., sea cucumber collection and photo mosaic) and some things went wrong (e.g., Mass Spec may be clogged and Bushmaster won't open and close properly). Such is life.

Date: 06/29
Shift: 16.00 – 20.00 CDT
Dive: J2-281
Site: AC 645

Watch Leader: Erik
Name: Julia

Time (GMT)	**Comments**
21:00	heading to Ian's camera, camera in sight
21.16	Ians camera released
21.17	21.17 JASON OFF bottom, ascending
21.18	Mass spec off

DVD set off: 21.30

Dive Log for J2-282

Date: 6/30/2007
Shift: 8000-1200 CDT
Dive: J2-282
Site: AC818

Watch Leader: Bob Carney
Name: Michael Cohen

Time (GMT)	Comments
13:00	Start mass spec scan at position 67 – event #40441
14:04	end mass spec at position 67 – event #4051
14:10	Jason II reached ocean floor desination
14:10	reset DVL
14:15	shrimp visible on all cameras
14:22	well head found on ocean floor
14:40	heading north
14:43	reached marker 4
14:50	mussel bed, tubeworms and sea urchins all found together
14:52	trash discovered – bag and fishing line
14:54	elevator seen in camera
15:10	sea-cucumbers and eels found among mussel bed
15:18	fish seen in camera

Watch Summary:
During this watch, much of the time was spent getting to the desired location thousands of meters below sea level. The time that was spent at this location was used for the mass spec, and seemingly overall exploration of the area.

Date: 6/30/2007
Shift: 11:30 – 16:00 CDT
Dive: J2-282
Site: AC 818

Watch Leader: Group Effort
Name: Kim Hunter

Time (GMT)	Comments
17:10	Started collecting push cores in urchin bed at start of shift. Finished collection at this time and now heading to elevator.
17:28	At elevator – will be sending up Pogo and Urchin cores and retrieving Ian's camera.
18:01	Elevator off bottom but Jason's arm is caught on elevator frame.
18:24	Elevator has been released from Jason's death grip and is surfacing.

18:32 Setting Ian's camera out to get photos while waiting for elevator to come to surface – camera was placed next to Marker #1.
20:04 Elevator is on deck.
20:05 Moving to SM 2000 survey start point.
20:31 Leaving shift ~30 early to process push cores. Jason on way to survey site and no DVD's running.

Watch Summary: Urchin push cores were collected at start of shift in muddy area with shell debris. All Pogo and Urchin cores were sent up on elevator. Jason arm was stuck on elevator rail for an unfortunate half hour.

Date:	06/30/2007
Shift:	16.00 – 20.00 CDT
Dive:	J2-282
Site:	AC818
Watch Leader:	Erik, Stephanie
Name:	Julia

Time (GMT)	**Comments**
21.25	reset Doppler; waiting to MS 2000
21.32	SM-2000 survey line #1 start
22.03	SM-2000 survey line #1 end
22.08	SM-2000 survey line #2 start
22.39	SM-2000 survey line #2 end
22.44	SM-2000 survey line #3 start
23.14	SM-2000 survey line #3 end
23.18	SM-2000 survey line #4 start
23.48	SM-2000 survey line #4 end
23.53	SM-2000 survey line #5 start
00.31	SM-2000 survey line #5 end
00.55	start of 'cross-line"
01.02	end of "cross-line", end of survey
01.06	Ian's camera in sight
01.08	at Ian's camera, bushes of tubeworms, sea urchin trails and mussels around
01.13	Ian's camera taken to another place (at well head)
01.27	at well head, Ian's camera deployed
01:32	Best of well head ☺
01.35	back to marker #1
01.39	getting ready to photo mosaic
01.40	dropping target at southern end
01.58	photo mosaic start
02.03	dropping target "bacterial mat"

02.10	photo mosaic line #1 end
02.11	moving to the right
02.12	start of photo mosaic line #2
02.21	end of photo mosaic line #2
02.22	start of photo mosaic line #3
02.31	end of photo mosaic line #3, moving 1.5m to the right
02.33	start of photo mosaic line #4
02.43	moving to marker #1, photo mosaic line #4 end -> end of photo mosaic
02.53	looking for whitish mussels to sample and to do mass spec (at marker #1)
03.00	start of mass spec
03.15	end of mass spec

Summary: SM 200 0 surveys (5 lines + cross line); moving Ian's camera to well hell (out of photo mosaic area), photo mosaic done, start of mass spec measurements

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Date:	07/01/07
Shift:	2000-0000 CDT
Dive:	J2-282
Site:	AC 818
Watch Leader:	Stephan
Name:	Irmi

Time (GMT)	**Comments**
3:40	end of mass spec (#41947)
3:44	start of mas spec #70 (#41948)
3:59	end of mass spec #70 (#41950)
4:02	mussel pot D
4:10	taking out the net from port biobox
4:15	pick up the ring
4;18	filling net with mussels
4:21	grabbing mussels; into the net
4;30	net into biobox port
4:40	start of mass spec #71 (#41964)
4:55	end of mass spec #71 (#41965)

Watch Summary: Mass spec # 70-#71, mussel sampling

Date:	07/01/2007
Shift:	0000-4000 CDT
Dive:	J2-282
Site:	AC818
Watch Leader:	Stephane
Name:	Nicole Morris

Time (GMT)	Comments
5:03:31	Mass spec placed back onto Jason
5:12:47	Removing wand from Jason
5:17:12	Start mass spec position 72 in mussels
5:19:09	Wand in sediment—took out
5:21:49	Stop mass spec position 72
5:22:30	Placing wand back onto Jason
5:24:11	Switched to pump water through green filter
5:24:58	Removed wand from Jason
5:29:38	Start mass spec position 73
5:45:58	End mass spec position 73
5:46:45	Placing wand back onto Jason
5:48:46	Removed mussel pot B
5:50:06	Mussel pot B collection
6:02:10	Mussel pot B back onto Jason
6:12:10	Mussels collected using Jason manipulator arm; placed in port biobox
6:14:03	Mussels collected using Jason manipulator arm; placed in port biobox
6:15:10	Mussels collected using Jason manipulator arm; placed in port biobox
6:16:26	Mussels collected using Jason manipulator arm; placed in port biobox
6:17:20	Mussels collected using Jason manipulator arm; placed in port biobox
6:18:12	Mussels collected using Jason manipulator arm; placed in port biobox
6:20:36	Closed port biobox
6:21:49	Removing wand from Jason
6:25:30	Start mass spec position 74 in mussel pot scar
6:41:11	End mass spec position 74
6:43:30	Start mass spec position 75, background scan
6:58:16	End mass spec position 75
7:00:17	Reset dvl→ searching for marker 2/3 for stained tubeworms
7:06:13	At marker 3
7:14:59	Tubeworm grab using manipulator at marker 3 → starboard biobox
7:16:28	In biobox
7:18:11	Tubeworm grab using manipulator at marker 3 → starboard biobox
7:18:28	In biobox
7:19:16	Tubeworm grab using manipulator at marker 3 → starboard biobox
7:19:57	In biobox
7:28:50	Closing stbd biobox
7:30:03	Moving to bacterial mat marker
7:32:52	Grabbing mass spec wand from Jason
7:36:19	Start mass spec position 76, background scan
7:51:31	End mass spec position 76
7:53:23	Putting wand back onto Jason
7:56:55	Push core red 8 taken
7:59:36	Push core red 5 taken
8:04:50	Push core red 3 taken
8:06:35	Removing wand from Jason

8:09:00 Start mass spec position 77 in core red 3 hole
8:24:06 End mass spec position 77
8:26:08 Push core red 7 taken
8:28:27 Push core red 4 taken
8:30:35 Removing wand from Jason
8:33:23 Start mass spec position 78 in core red 4 hole
8:47:01 End mass spec position 78

Watch Summary:

At the beginning of watch, we were performing mass spec scans in a mussel bed. We had to change to the green filter b/c the blue filter was placed into sediment. We collected mussels using mussel pot B and the Jason manipulator arm. We also performed a couple of stained tubeworm grabs. Toward the end of watch, we started collecting push cores in a bacterial mat. We performed a couple of mass spec scans within push core holes.

Date: 1 July 2007
Shift: 0400 – 0730 CDT
Dive: 282-1
Site: AC 818

Watch Leader: Suni/Stephanie/Bob Carney
Name: Eric Hawkins

Time (GMT) Comments
8:54 Core control – red #2
8:56 Core control – red #1
8:58 Core control – red #6
9:00 Moving core crates off of Jason
9:00 Flipped core crates around and returned to Jason
9:05 Blue short core (#1) for Christine
9:05 Blue #7 core
9:08 Blue #8 core
9:11 Mass Spec start in blue #8 core hole (#79)
9:16 Orange sea star on science camera
9:20 Operational note from Jason crew about core organization when small and large core barrels are both used
9:28 End mass spec #79
*****END SUNI/BEGIN STEPHANIE*****
9:29 Navigation change – moving ~100m north to find urchins for coring
9:31 Purple holothuroid
9:31 Nav reset DVL
9:32 Yellow marker #1 in mussel bed
9:34 Purple holothuroid

9:37 White sea stars
9:40 2 purple holothuroids
9:40 moving 20m east, looking for urchins
9:41 2 purple holothuroids
9:43 Deploy doppler target for urchins
10:01 Core #2, next to first urchin
10:04 Picking up first urchin – placed in starboard biobox
10:06 Blue #3 core in position occupied by first urchin
10:12 Blue #4 core, next to second urchin
10:15 Picking up second urchin – placed in starboard biobox
10:17 Blue #7 core in position occupied by second urchin
10:27 #6 core for Christine, next to urchin
10:32 White sea star on science camera
10:32 Purple holothuroid
10:40 Bob Carney – slurp collection of purple holothuroid
10:43 Bob Carney – slurp collection of purple holothuroid
11:00 Seaweed
11:04 2 purple holothuroids
11:15 Purple holothuroid
11:18 Slurped a mobile, large purple holothuroid
11:22 2 purple holothuroids
11:24 Purple holothuroid
11:25 Purple holothuroid
11:34 Swimming of a swimming pelagic sea cucumber
11:35 Good visual of the swimming pelagic sea cucumber
12:09 Fish

Watch Summary: This watch involved three tasks: The end of mass spec analysis for Suni, the collection of urchins and cores for Stephanie and the collection of holothuroids for Bob Carney.

Date: 7/1/2007
Shift: 8000-1200 CDT
Dive: J2-282
Site: AC818

Watch Leader: Bob Carney
Name: Michael Cohen

Time (GMT) Comments
12:53 Looking for Sea Stars
12:58 Sea Star placed in bio box, grab
13:11 Opened bio box
13:12 Sea Star placed in bio box, grab
13:13 Sea Cucumber tries to escape bio box

13:16 More Sea Stars put in bio box
13:17 Sea Star escaped, thrown out of bio box by accident
13:19 Removing weight
13:34 Elevator spotted in cameras
13:38 Bio box opened on elevator
13:42 Cores from sub place in bio box on elevator
13:44 Core fell off of sub, had to be placed back on
13:53 Opened boxes 1&2 on elevator
13:54 Mussel pot B placed in box 1 on elevator
13:56 Mussel pot D, placed in box 2 on elevator
13:59 Boxes 1&2 closed with cords
14:05 Removed weight from elevator, fell into sediment
14:08 Jason lifted elevator up from ocean floor, floated up towards surface
14:22 Slurp – Bat Star
14:24 Jason hose punctured, sediment leaking out
14:35 Port bio box opened
14:37 Sea Cucumber put in port bio box, grab
14:45 Sea Star put in port bio box, grab
14:47 Sea Star put in port bio box, grab
15:07 Sea Cucumber put in starboard bio box, grab
15:18 Sea Cucumber put in starboard bio box, grab
15:24 Sea Cucumber put in starboard bio box, grab
16:18 Located well head

Watch Summary:
This watch was primarily focused on fauna collection. Bob Carney guided the pilots for the majority of the watch, as he was interested in collecting a solid amount of sea stars and sea cucumbers for his research. In addition sub cores were added to the elevator and then the elevator's weight was released in order for it to reach the ocean surface to be put back on the ship.

Date: 7/1/2007
Shift: 11:30 – 16:00
Dive: J2-282
Site: AC 818

Watch Leader: Group Effort
Name: Kim Hunter

Time (GMT) Comments
17:00 Checking on Ian's camera at start of watch then clearing fishing net from stained tubeworm bush and using Mass Spec in tubeworm bush before bushmaster collection.
17:25 Bushmaster collection of stained tubeworms at Marker 4.
17:36 Heading north towards target geol.

17:37 Reset Doppler Nav.
18:05 Jason heading to surface, end of dive.

Watch Summary: Uneventful shift other than the collection of the stained tubeworm bush. It was a very nice bushmaster collection – textbook technique.

Dive Log for J2-283

Date: 7/2/07
Shift: 8000-1200 CDT
Dive: AC601
Site: J2-283

Watch Leader: Bob Carney
Name: Mike Cohen

Time (GMT)	Comments
13:17	reset doppler
13:28	heading north in search of brine shoreline
13:31	turned on downward looking camera, shooting every 15 seconds
13:40	radioactive barium sulfate discovered
13:45	shore located
13:47	north shore named
13:57	urchin at brine shoreline
14:01	sea cucumber in downward looking camera
14:02	brine on right, water on left
14:09	shoreline becomes complicated, many indentations
14:10	fish seen in cameras
14:14	large indentation in brine pool
14:20	inside brine cove
14:20	urchin at brine shoreline
14:30	old beach shoreline visible
14:34	fish
14:41	strange oscillation in water in downward looking camera
14:56	circumnavigated brine pool one time
14:56	downward camera turned off
15:11	core number 1, Vladimir
15:13	core number 2, Vladimir
15:14	core number 4, Vladimir
15:16	core number 6, Vladimir
15:19	core number 7, Vladimir
15:22	reset dopler
15:49	core number 3
15:50	core number 5
15:52	core number 8
15:55	cores too large for Jason to spin crate
15:57	removed hindering core, rotated crate and returned
16:02	core number 8 (yellow)
16:05	core number 7 (yellow)
16:08	reset dopler

Watch Summary:

The primary purpose of this dive, and specifically this watch, was to explore a brine pool on the ocean floor. The pilots first circumnavigated the pool before doing anything else. This allowed both the pilots and scientists to have a good understanding about the spatial setting of the pool in order to take samples (specifically core samples) at desired locations.

Date: 07/02/2007
Shift: 1200-1600
Dive: J2-283
Site: AC 601

Watch Leader:
Name: Kim Hunter

Time (GMT)	Comments
17:00	Cores in brine pool are finished
17:16	Small Niskin fired in brine pool
17:27	Big Niskin fired in brine pool
17:30	On way to elevator
18:14	Elevator released from the seafloor with core rack from brine pool and niskins
18:20	Cucumber slurping while waiting for elevator
19:59	Prepare to run photo transects
20:09	Start photo transect line 8
20:16	Stop line 8
20:21	Start photo transect line 9
20:29	Stop line 9
20:49	Start photo transect line 10

Date: 07/02/2007
Shift: 16.00 – 20.00
Dive: J2-283
Site: AC 601

Watch Leader: Ian
Name: Julia (+ Stephanie)

Time (GMT)	Comments
20:54	approaching brine pool
21:02	end of photo transect line 10, transit to line 1
21:02	start of photo transect T1
21:16	end of photo transect T1

21:24 start of photo transect T2
21:42 shore line in sight
21:45 sea urchins with trails at shore
21:46 end of photo transect T2
21:51 over brine pool transit to T3
21:55 start of photo transect T3
22:01 end of photo transect T3
22:04 swimming sea cucumber
22:18 start of photo transect T4
22:22 sea cucumber
22:25 end of photo transect T4
22:30 lots of urchins, on shore of brine pool
22:35 start photo transect T5
22:39 background mass spec starts
22:44 end of photo transect T5
22:55 stop mass spec background
23:01 start photo transect T6
23:07 approaching brine pool
23:09 start mass spec
23:10 end of photo transect T6
23:14 swimming holothuroid hits Jason basket
23:21 start of photo transect T7
23:23 stop of mass spec background
23:28 end of photo transect T7
23:36 picking up light for macro cam
23:46 setting up to do macro documentation of features and fauna along photo transect T9
23:57 taking macro pix of brine flocculent material in center of brine lake
00:06 macro pix of brine lake shore
00:16 sediment on macro cam
00:34 cleaning camera lens
00:42 macro pix of sea urchins

Summary: taking many photo transects

Date: 7/2/07
Shift: 2000-0000 CDT
Dive: J2-283
Site: AC 601

Watch Leader: Bob
Name: Irmi

Time (GMT) **Comments**
1:19 sucking a holothuroid
1:47 grabbing a sea cucumber, into wooden biobox
1:49 anemone, big, red

1:55 grabbing anemone, into wooden biobox
2:12 grabbing a sea cucumber
2:16 big fish
2:31 grabbing a sea cucumber, wooden biobox
2:37 grabbing a sea cucumber, wooden biobox
2:41 at the shore, many sea urchins
2:42 red core #4 taken at the shore, for Harry
2:42 red core #1 taken at the shore, for Harry
2:49 start mass spec #83, background (#45119)
3:03 end mass spec #83 (#45147)
3:08 star mass spec #84 above the white shore
3:09 stop mass spec
3:11 restart mass spec #84 (#45168)
3:25 end mass spec #84 (#45197)
3:31 start mass spec #85 (#45210)
3:32 sea cucumber floating in the brine pool (science cam)
3;46 end mass spec #85 (#45242)
3:53 start mass spec #86 in the brine pool (#45259)
4:15 end mass spec #86 (#45303)
4:16 start mass spec #87 (#45306)
4:16 transit to the center of brine
4:36 end of mass spec #87
4:39 start mass spec #88 (#45355), in the middle of brine pool
4:54 end of mass spec #88 (#45387)
Start of mass spec #89
5:16 end mass spec #89 (#4534)

Watch Summary: sampling sea cucumbers, taking red cores #4 and #1for Harry, mass spec # 83-#89,

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Date: 7/3/2007
Shift: 0000-4000 CDT
Dive: J2-283
Site: AC601

Watch Leader: Ian MacDonald
Name: Nicole Morris

Time (GMT) Comments
5:35:14 Getting ready to image transect T9 with macrocamera
5:40:30 Imaging T9 with macrocamera
6:09:16 Red octopus on macrocamera
6:26:46 Still imaging T9 with macrocamera
6:31:37 Placing macrocamera back onto Jason
6:35:18 Slurp collection of mussels→ picking up slurp

6:38:20 Mussels collected using slurp→ start
6:40:59 Slurp of mussels end
6:41:38 Slurp back on Jason
6:49:52 Collecting urchin using Jason manipulator→ starboard biobox
6:52:36 Removing handheld macrocamera from Jason
6:53:10 Continuing to image T9
7:23:00 Put macrocamera back onto Jason
7:23:53 Getting ready to start urchin coring
7:40:50 Push core red 7 taken in urchin area
8:00:31 Push core red 6 taken in urchin area near brine pool
8:01:25 Picking up wand from Jason
8:09:25 Start mass spec position 90 in push core 6 hole
8:24:08 End mass spec position 90
8:25:35 Getting ready to taken another push core
8:34:37 Push core red 5 in urchin area near brine pool; last core in urchins
8:40:16 Getting ready to transit to digital target 40 to search for pogos

Watch Summary:
At the beginning of watch, we starting imaging transect T9 with the handheld macrocamera. We collected some mussels using the Jason slurp. Three push cores were taken in an urchin area. At the end of watch, we started transiting to digital target 40.

Date: 3 July 2007
Shift: 0400-0800 CDT
Dive: J2-283
Site: AC 601

Watch Leader: Irmi
Name: Eric Hawkins

Time (GMT)	**Comments**
	Looking for pogos for Irmi
8:45	Nav Reset DVL
9:08	Urchins and trails
9:19	Previous Jason footprint
9:58	Small tubeworm clump
10:01	Trash – pallet?
10:30	Trash – pallet? (again)
10:32	Marked a location with tubeworms and the pallet
10:38	Zig zagging back to brine pool
10:53	Fish lying in burrow on downlooking camera
10:55	Carbonate
10:56	Yellow marker lying on its side – can't see number
11:03	Mussels

11:17 Small white crab
11:30 Swimming red shrimp
11:35 Red Core #2, Pogo for Irmi
11:37 Another core – Red #3, Pogo for Irmi
11:40 Another core – Red #? (didn't get) – Pogo for Irmi
11:44 All cores removed and returned to their respective sheaths
11:51 Turned core crate around so blue cores are ready
11:59 Three orange crabs
12:08 Blue Core #26
12:09 Numerous amphipods visible inside core
12:15 Blue Core #29 – straight pogo
12:24 Nav Reset DVL

Watch Summary: This shift focused on Irmi's attempts and success at locating and sampling pogos at the AC 601 brine pool.

Date: 7/3/07
Shift: 8000-1200 CDT
Dive: AC601
Site: J2-283

Watch Leader: Bob Carney
Name: Mike Cohen

Time (GMT) Comments
12:37 anemones seen in cameras
12:45 fat core number 1, Erin
12:54 fat core number 2, Erin (included sea cucumber)
13:16 Ian's camera
13:18 macro camera images of pogo
13:23 end macro camera images of pogo
13:26 reset dopler
13:43 urchin core near brine boundary (number 7)
13:52 diving into brine, made waves on shoreline
13:55 taking pictures of brine
13:55 immersed in brine pool
14:06 deeply immersed in brine, camouflaged entire core basket
14:19 at the elevator
14:25 jumped over elevator
14:33 control core, number 4, event number 46763
14:36 control core, number 2
14:37 control core, number 3
14:39 control core, number 1
14:41 control core, number 6
14:46 put cores in elevator

14:47 removed net from bio box on elevator
15:03 elevator lifted off ocean floor by Jason
15:07 heading back towards brine pool
15:08 grab net off of sub
15:11 squid seen in cameras
15:30 adjusted Madea camera to zoom in on Jason
15:38 altitude jumped suddenly to 4 meters
15:39 dopler not working correctly
15:45 Jason moves further out from Madea
15:49 PC-W DVD recorder from red deck stopped and finalized
15:50 PC-W DVD recorder from blue deck started
15:54 100 meters above floor
16:02 impressive dive into pool
16:04 water tsunami
16:07 located where elevator was, mussels present
16:09 grabbed net to try and get mussels, none were caught
16:13 elevator reached surface

Watch Summary:

The primary purpose of this watch was to further explore the brine pool. The Jason pilots completely immersed Jason into the brine several times in order to further understand the pool's characteristics. The elevator was also released an floated to the surface, followed by the collection of several control cores.

Date: 7-3-2007
Shift: 1200-1600 CDT
Dive: J2-283
Site: AC601

Watch Leader: ?
Name: Michael Kullman

Time (GMT) Comments

17:10:00 Mussel collections.
17:24:00 Mussel collection failed – making another attempt.
17:29:00 Mussel collection blue net.
17:50:00 Heading south towards possible vent.
19:23:00 Approaching possible vent.
19:40:00 Entering north side of vent area.
19:50:00 Vent area appears to be an old brine pool, many urchins and mussels noted along 'shoreline' on north side.
20:01:00 Extremely large mussel bed seen along north / northwest side of 'shoreline'.
20:14:00 After transiting south around the west side of 'shoreline' made a short excursion over the brine lake interior. Presence of barite 'flocks' noted.

20:16:00 Continuing south along west side of ‘shoreline’.
20:17:00 Jason ran into the bottom, cleaning mud from working end.
20:32:00 Cleaning finished, continuing transit around ‘shoreline’.
20:37:00 Mussel distribution noticeably less dense towards southern end of ‘shoreline’, urchins and mussel shells noted.
20:55:00 Mussel density now down to solitary mussels.

Watch Summary:

After making a final mussel collection at the primary dive site (northern brine lake) Jason went into tow-mode and made an approximately 2.6km transit to investigate a large high amplitude anomaly in southern AC601. Upon arrival the area appeared to possibly be an old brine lake. Jason began to make a transit around the apparent ‘shoreline’ of the lake, starting at the north and heading south along the western edge. A very large mussel bed was observed along the northwest ‘shoreline’ of the lake. Mussel density decreased as Jason continued it’s transit south along the ‘shoreline’. Some barite ‘flocks’ were observed when Jason moved out into the lake.

Date:	07/03
Shift:	16.00 – 20.00 CDT
Dive:	J2-283
Site:	AC 601
Watch Leader:	Ian, Erik
Name:	Julia (+ Stephanie)

Time (GMT)	**Comments**
21:07	brow cam video much better
21:09	urchins trails very long, well defined
21:11	dark stained sediment t, target dropped (dead shells = black fluff)
21:18	rattail fish (sci cam)
21:29	thick black river of brine with urchins
21:39	mussels in brine pool
21:47	attempt to take coolpix of mussels, sediment cloud
21:58	Jason stopped, changing pilot (dinner relief)
22:00	mussel clusters along brine edge, swimming holothuroid
22:02	holothuroids on mussels (macro), many shrimps, pix taken
22:08	numerous pink (with white dots) holothuroids in mussel bed photos taken with coolpix
22:12	moving towards elevator site (where it is supposed to land), Doppler reset
22:16	traveling over large mussel bed
22:39	elevator in water
23:40	elevator in sight
23:41	dropping weights
23:48	picking up elevator, sunk in the mud
00:23	arrived at mussel “manhatten”, very large mussel bed
00:31	dropped elevator

00:34 over very dense mussel aggregations
00:40 dropping weight onto the elevator

Summary: very cool huge brine lake, with many many mussels on shore line, taking pictures (cool pix)

Date: 7/3/07
Shift: 2000-0000 CDT
Dive: J2-283
Site: AC 601

Watch Leader: Eric, Kim
Name: Irmi

Time (GMT) Comments

0:56 picking up a mussel pot, from elevator to jason
0:59 picking up second mussel pot, from elevator to jason
1:02 picking up a weight
1:03 moving away from elevator
1:04 taking mussel pot D
1:11 dropping a marker at the mussels (1)
1:12 picking up the ring, back to elevator
1:27 reset
1:27 moving to smaller mussels, down looking cam: sea urchins trails and mussels
1:33 at the mussels
1:37 taking mussel pot B
1:44 picking up the ring
1:44 dropping marker 2
1:50 at the elevator
1:51 picking up mussel pot B, on elevator
1:54 picking up a weight
2:02 core rack from elevator to jason
2:15 niskin from elevator to Jason
2:36 searching for an area for push cores and niskins
2:59 moving along the shore
3:02 many red mats
3:09 yellow core 7; sampling red mud, mud is falling out of core
3:18 yellow core 4; sampling red mud; core will be retaken
3:21 taking yellow core 4 a second time
3:23 taking yellow core 4 a third time
3:36 niskin, from red mud
3:46 moving along a crack
3:53 tubes of worms sticking out of black field
3:57 yellow core 3; sampling black mud and tubes

3:58 yellow core 6; sampling black mud and tubes
3:59 yellow core 9; sampling black mud and tubes
4:01 yellow core 5; sampling black mud and tubes
4:02 going back to the mussels along the edge
4:06 big snails, shells, pogos, clams
4:12 niskin, from brine pool
4:25 firing the niskin (#48334)

Watch Summary: mussel pot D, B; taking yellow cores 7, 4, 3, 6, 9, 5, firing two niskins

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Date: 7/4/2007
Shift: 0000-4000 CDT
Dive: J2-283
Site: AC601

Watch Leader: Kim Hunter, Bob Carney
Name: Nicole Morris

Time (GMT) Comments

4:39:25 Took push core yellow 8 in brine
4:41:07 Taking push core yellow 2 in brine
4:41:25 Core is too short; shaking out
4:42:23 Taking push core yellow 2 again in brine
4:43:17 There is too much sediment in the core; shaking out
4:46:41 Taking push core yellow 2 again in brine
4:49:10 Taking push core yellow 1 in brine
4:58:47 Clam shells
5:02:26 Mussel net collection of clams
5:12:15 Clam collection using mussel net
5:13:57 Snail collection using mussel net
5:14:56 Moving to mussel bed → moving to elevator
5:42:05 At mussels→ moving to Marker 1
5:45:55 Snail collection with mussel net
5:53:05 Placed core rack/mussel net onto elevator
6:00:24 At marker 1
6:00:59 Removing wand from Jason
6:02:03 Start mass spec position 91, background scan
6:17:35 Placing wand into mussel pot scar
6:17:50 End mass spec position 91
6:20:32 Start mass spec position 92 in mussel pot scar
6:34:52 Moved wand into mussels
6:35:04 End mass spec position 92
6:37:01 Start mass spec position 93 in btwn mussels
6:52:14 End mass spec position 93
6:52:30 Placed wand back onto Jason

6:53:52 Sampling mussels using manipulator
6:57:12 Stopped mussel collection
7:02:57 Searching for brine to perform mass spec scan
7:28:18 Start mass spec position 94 or 95 in brine pool
7:45:24 End mass spec position 94 or 95
7:45:43 Moving to elevator to release
7:50:56 At elevator
7:54:18 Placing Niskin on elevator
8:04:29 Using manipulator to lift elevator from seafloor
8:04:48 Elevator released from seafloor
8:05:50 Releasing Jason weights
8:08:20 Mass spec scanning while ascending
8:08:21 Jason off bottom

Dive Log for J2-284

Date: 07/04
Shift: 16.00 – 20.00 CDT
Dive: J2-284
Site: AC 818

Watch Leader: Bob
Name: Julia (+ Stephanie)

Time (GMT)	Comments
21:40	Jason descending, at 864m depth
22:10	pass 2000m
22:31	doppler reset, still descending
23:11	Ian's camera in sight, no water inside (comment Ian)
23:17	giving Ian's camera a shake, worked -> camera released
23:23	Ian's camera surrounded by white shells and urchins
23:27	picking up sea star #1, put in wooden starboard biobox
23:34	2 holothuroids, anemone and mussels (Best of)
23:36	2nd starfish into starboard biobox
23:46	picked up 3rd sea star, also starboard biobox
23:50	sea star #4
23:51	sea star #5
23:57	closing biobox
00:04	rattail
00:10	big purple holothuroid
00:12	pelagic sea cucumber feeding on the ground (Best of) very cool
00:14	grab of sea cucumber
00:16	sea star escapes from starboard biobox
00:19	in sight of marker #3
00:22	Ian's camera on surface, Jason into tow mode

Date: 4 July 2007
Shift: 2000-0000 CDT
Dive: J2-284
Site: AC 818

Watch Leader: Bob, Erik
Name: Irmi

Time (GMT)	Comments
1:14	moving to photo mosaic (Stephanie)
1:17	pogos + clams, dropping a target ("pogos + clams")
1:21	grabbing a sea cucumber; wooden biobox

1:23 bacterial mats
1:27 grabbing a sea star; wooden biobox
1:28 pogos, large field
1:37 fish
1:41 pogo patches
1:43 marker #4 in sight
2:11 start of line #1
2:12 moving back to beginning of line #1
2:16 restart of line #1
2:28 pelagic sea cucumber floating
2:40 end of line #2
2:41 start of line #3
2:51 end of line #3
2:53 start of line #4
3:03 end of line #4 and of mosaic
3:05 at marker #1
3:08 close up of tubeworms + anemone
3:09 grabbing stained tubeworms; wooden biobox
3:13 second grab of tubeworms; wooden biobox
3:15 third grab of tubeworms; wooden biobox
3:16 fourth grab of tubeworms; wooden biobox
3:49 grabbing a sea cucumber; port biobox
4:00 grabbing a sea cucumber; port biobox
4:07 large field of pogos and some clams
4:10 at the urchin field
4:13 core yellow #3: next to an urchin (#49564)
4:15 grabbing the urchin; port biobox
4:17 core yellow #2; where urchin has been before (#49572)
4:22 core yellow #6; beside an urchin (#49484)
4:24 grabbing the urchin; port biobox
4:27 core yellow #8; beside an urchin
4:32 core yellow #5; really disturbed area (#49612)
4:34 grabbing the urchin; squashed
4:36 core yellow #7; place where urchin has been before (#49618)
4:48 core yellow #1, urchin filed

Summary: making photo mosaic (Stephanie), grabbing sea cucumbers, grabbing tubeworms, taking cores in urchin filed (Stephanie)

Date: 5 July 2007
Shift: 0000-4000 CDT
Dive: J2-284
Site: AC 818

Watch Leader: Bob Carney

Name: Nicole Morris

Time (GMT)	Comments
5:04:08	Core yellow1 taken beside urchin
5:05:58	Urchin collected- port biobox
5:12:02	Core yellow 4 taken under urchin that was collected
5:21:45	At Marker 1
5:25:19	Start mass spec position 96
5:40:12	End mass spec position 96
5:43:20	Start mass spec position 97 in mussels
5:58:16	End mass spec position 97
5:58:17	Moved to another area of mussels within same bed
5:59:39	Start mass spec position 98
6:12:57	Moving wand further btwn mussels in musselbed
6:14:43	End mass spec position 98
6:16:19	Start mass spec position 99
6:31:20	End mass spec position 99
6:34:09	Start mass spec position 100 in tubeworms near base
6:49:17	End mass spec position 100
6:50:20	Start mass spec position 101 in tubeworms
7:03:50	Moving to Marker 4
7:06:11	End mass spec position 101
7:07:48	At Marker 4
7:18:53	Firing Niskins over marker 4 mussel bed
7:29:34	Start mass spec position 102 in white mussels (marker 4)
7:44:06	End mass spec position 102
7:55:01	Mussel pot D collected
8:20:01	Mussel pot B collected

Watch Summary:
At the beginning of watch, we were finishing urchin cores. We then started performing mass spec scans in a mussel bed and tubeworm patch. Both Niskins were fired over Marker 4. Mussel pot B and D were also both taken near Marker 4 mussel bed.

Date: 5 July 2007
Shift: 0400-0800 CDT
Dive: J2-284
Site: AC 818

Watch Leader: Erik Cordes
Name: Eric Hawkins

Time (GMT)	Comments
8:48	Heading north to look for clams

8:49 Nav Reset DVL
9:01 Previous Jason footprint visible
9:07 Located large patch of shells and hash
9:19 Moving forward, scanning for live clams
9:24 Identified better clam target
9:33 Used mesh bag to scoop shells and hash
9:37 Second scoop with mesh bag
9:46 Moving to new location
10:11 Begin using macro camera to ID shrimp on tubeworms
10:26 End macro camera
10:30 Begin slurping – first shrimp and tubeworms
10:47 Continue slurping – moving onto holothuroids
10:49 Nav Reset DVL
11:13 Nav Reset DVL
11:26 Mass Spec started for water column samples as dive ends
11:27 Begin final ascent to surface to end Dive 284

Watch Summary: This shift involved Erik sampling clams with the mesh bag and continued holothuroid (and other mobile fauna) slurping as Dive 284 came to a close.

Appendix 6 – Niskin Logs

Site	Date	Dive	Type	Comments
GC852	6/15/2007	273	5L, 1L	
GB697	6/17/2007	274	5L, 1L	
WR269		275	?	Appears that two Niskins were taken
AT340	6/22/2007	276	1L	5L failed
GC852	6/24/2007	278	5L, 1L	
GB647	6/26/2007	280	5L, 1L	asphalt volcano
AC601	7/3/2007	283	5L, 1L	
AC601	7/3/2007	283	1L	Taken at south brine lake / vent, 5L failed
AC818		284	TBD	Will attempt 5L and 1L

Appendix 7 – DVD Log

The following table describes the data that was collected on DVDs during the course of the cruise. The totals and distribution numbers are subject to change.

Jason Data	**DVDS**	**Custodian**
Raw SM2000 Data	36	TDI Brooks
Processed SM 2000 Data	1	TDI Brooks
Raw Jason Data	17	TDI Brooks
Raw DVLNAV	8	TDI Brooks
Processed Lowerings	16	TDI Brooks
DSCPics(raw and time-stamped)	8	TDI Brooks
Virtual Van	2	TDI Brooks
ESC Pics	1	TDI Brooks
Documentation	1	TDI Brooks
Nav Data LBL and Nav Disp	1	TDI Brooks
Jason DVDs	**DVDs**	**Custodian**
Total DVD Series	200	Fisher
Total DVDs (Brow, Pilot, Science)	600	Fisher
Copied DVDs, Series 1 – Series 171		NOAA OE, TDI Brooks, LSU)
3 copies		TDI Brooks, LSU, NOAA
Ron Brown Data		
Raw Data, Events, PCO2, Seabeam, Samos	3	TDI Brooks, NOAA, Fisher
MOA Sheets		TDI Brooks, NOAA, Fisher
Deck Weather Log		TDI Brooks
Total*	**894**	

*Total DVDs subject to change