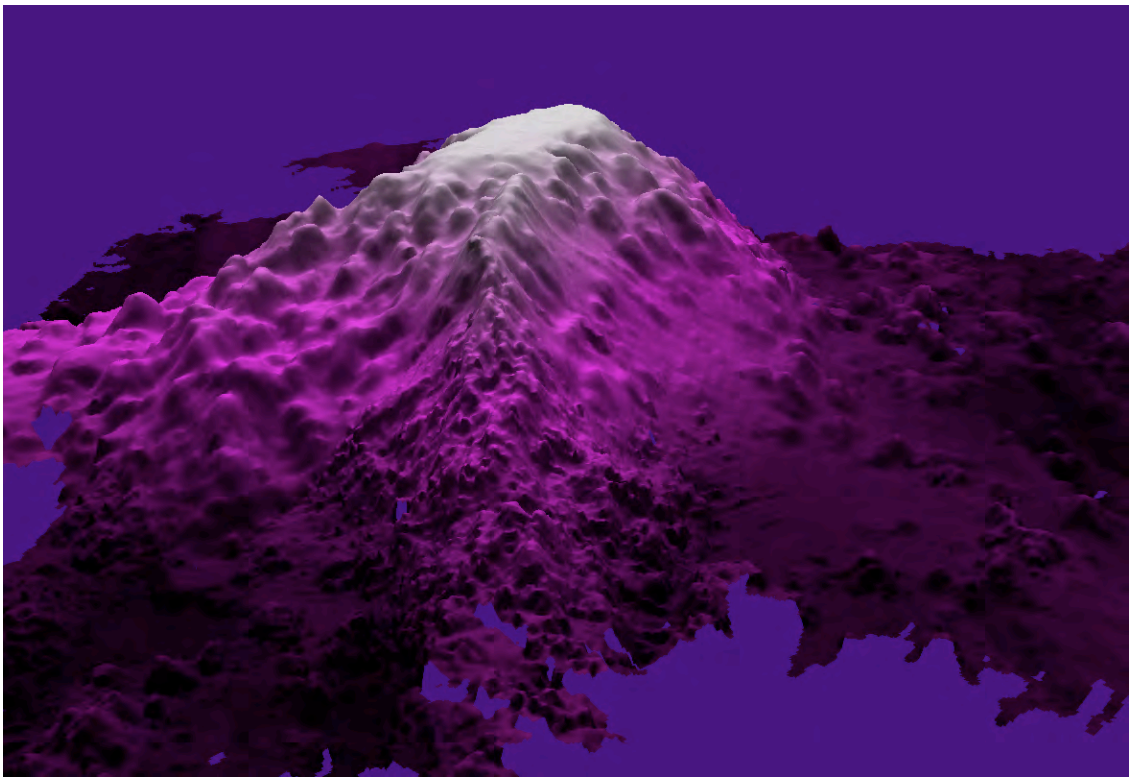
RVIB *Nathaniel B Palmer* Cruise 11-03, May 09- June 11 2011

Punta Arenas, Chile – Punta Arenas, Chile

Cruise Report



Historic perspectives on climate and biogeography from deep-sea corals in the Drake Passage

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Collaborative Research:
Historic perspectives on climate and biogeography from deep-sea corals in the Drake Passage

Cruise Report

Laura Robinson (Woods Hole Oceanographic Institution)
Rhian Waller (Darling Marine Center, University of Maine)

Cover image: Sars Seamount 3D image made in CARIS by Shannon Hoy.

Contents

1: Executive Summary: RVIB *Nathaniel B Palmer* Cruise NBP11-03 took place between May 09 and June 11 2011 starting and ending in Punta Arenas, Chile. The two principal investigators were Laura Robinson (Woods Hole Oceanographic Institution and Rhian Waller (University of Maine). The science party consisted of 19 NSF grantees, 11 RPSC support staff and an Argentine observer.

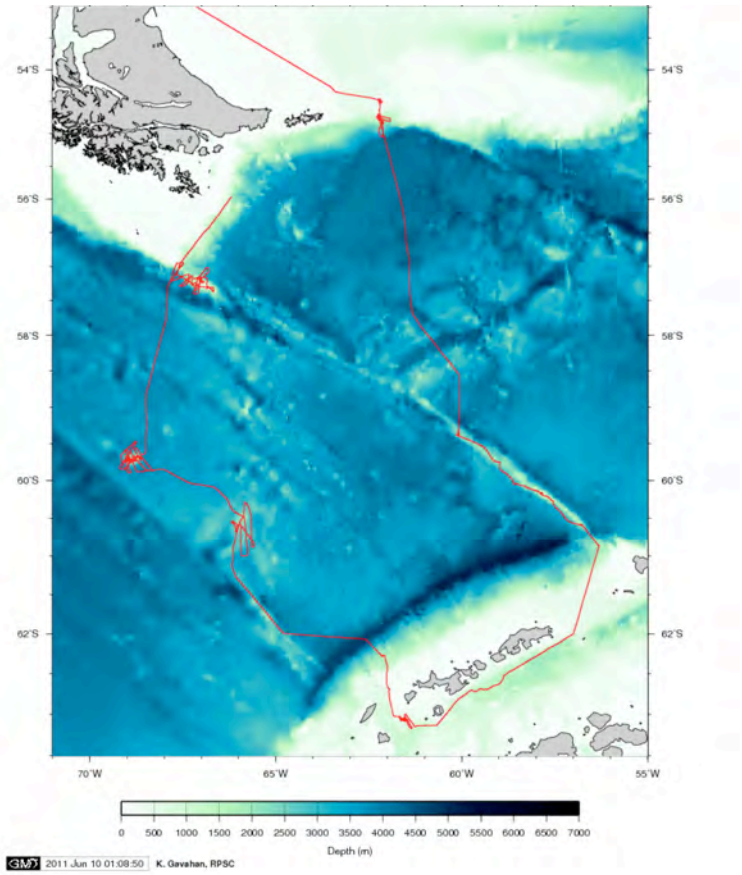
The science aims of the project included a combined study of the past and present biogeography of cold water corals in the Drake Passage, investigations into their major controls and paleoclimate reconstruction using skeletal remains. As such the cruise was designed to image and collect samples from coral habitats and their environments stretching from the continental Shelf of South America, across fracture zones and seamounts in the Drake Passage and down to the West Antarctic Peninsula. We were able to collect Multibeam bathymetry, seafloor photographs (towed and drop camera systems) seafloor benthic fauna (live and dead) and complementary water samples. The work was carried out in six regions: Burdwood Bank (Argentine EEZ), Shackleton Fracture Zone, West Antarctic Peninsula, Interim Seamount, Sars Seamount (Chilean EEZ) and Cape Horn (Chilean and Argentine EEZs). Over-the-side operations consisted of 147 discrete stations, the majority of which were successful (75 Hein Dredges, 1 Box dredge, 1 Otter trawl, 7 Blake trawls, 8 box cores, 4 Kasten cores, 5 CTDS, 39 DropCams and 7 TowCams).

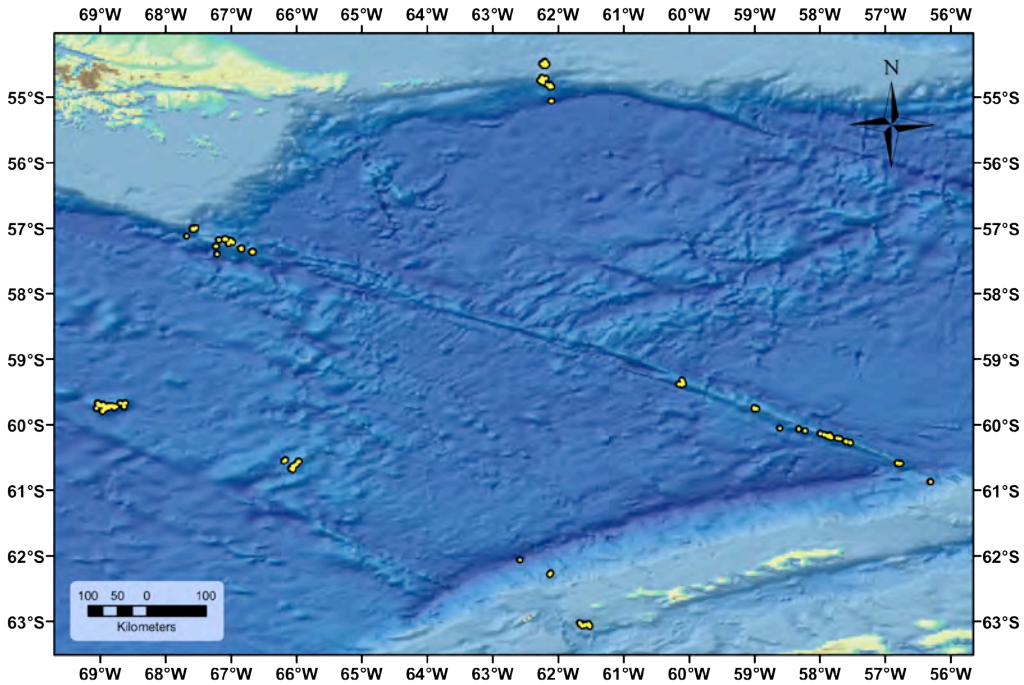
The skeletal remains of corals were collected in trawls, dredges and corer. The most effective sampling on shelf areas was with the Blake Trawl and the most effective sampling on seamounts and fracture zones was the newly contrasted Hein dredge. With regards sub-fossil coral skeletons we collected 14,408 solitary corals, 16kg of colonial corals, 28kg of bamboo corals and 106kg of stylasterid corals covering a depth range of 320m to 2480m. The material ranged in preservation status to shiny white carbonate to pitted and coated in ferromanganese crusts. More than 500 corals were sub-sampled and cleaned on board for preliminary age screening back at WHOI. In addition to coral samples we also collected bivalve shells, barnacle plates, gastropods shells, sponges and bryozoans. Over 11475 biological samples were collected during the cruise, primarily using the Blake and Otter trawls, though also using the Hein dredge. The greatest number of biological collections were made from Burdwood Bank and Cape Horn at depths of 500-1000m, though these are the areas and depths where trawls as opposed to dredges were used. Cnidarians were common across all six sites, but the composition of genera were very different. In total 649 live solitary corals were collected and 378 lots of octocorals (representing over 1600 individuals) including 2 new species to science. All corals and most associated fauna collected were subsampled for genetics and morphological taxonomy back at the University of Maine. In addition to these physical collections over 22,000 seafloor images were collected during this cruise from 46 discrete locations, and will be analyzed for species composition.

There were several areas in which the support of the science program fell short: 1. There were significant and potentially critical failures in the process of obtaining diplomatic clearance for work planned in the Exclusive Economic Zones of Chile. Prior to cruise start NSF/ US Embassy in Chile advised us to proceed with sampling without Chilean clearance as SHOA had said that we would not be sampling in Chilean EEZ. MPC, Captain and PIs not willing to sample without official permits from Chile as sites were clearly within the EEZ. Permission paperwork was resubmitted, and eventually received immediately prior to moving into Chilean waters (at first with incorrect dates which were rapidly amended). This situation meant that we could not sample at Cape Horn as our first station (despite the excellent weather) and added considerable stress and extra work for personnel both on and off board. We suggest that in future a more proactive stance should be taken in gaining clearance prior to the cruise departure, and that grantees should not be advised to sample within another country's EEZ without explicit permission. 2. There were insufficient RPSC communications between office and onboard personnel prior to the cruise. One particular issue arose with planning for weather contingencies, with RPSC staff in PA unaware of a potentially longer cruise despite knowledge of this scenario in the Denver Office. We recommend that the MPC and/or head MTs are involved in the planning process for future cruises to avoid this kind of problem. 3. Due to a reassignment of equipment in February the Yo Yo camera system we requested was sent on the LMG instead of with our cruise. A new system was rigged up comprising parts brought from the WHOI MISO camera team, and a frame built by RPSC. As expected, the system proved to be an essential part of the science mission, though there were definite issues arising from its dual ownership (i.e. who would have ultimate responsibility for the system – maintenance, downloading etc.). We fully appreciate the lengths that were gone to in PA to make the system work, but also point out that this would not have been necessary had the RPSC camera system been made available as requested, and confirmed, by our POC in December.

Overall the cruise can be considered a success. The 34 days were fully utilized, with only a few days where over the side operations were cancelled due to bad weather conditions. The teamwork between NSF grantees and on board RPSC personnel was extremely effective, all equipment worked well, and appropriate samples were collected for the successful completion of the science goals of the proposed project.

Figure 1 Cruise track and sample locations





2. Personnel

Science Party
Mercer Brugler (American Museum of Natural History)
Andrea Burke (WHOI)
David Case (California Institute of Technology)
Kais Mohamed Falcon (WHOI / University of Vigo)
Katharine Hendry (WHOI)
Shannon Hoy (College of Charleston)
Suzanne Jennions (University of Bristol)
Andrew Margolin (WHOI / University of Colorado)
Eric Pante (University of Louisiana, Lafayette)
Benjamin Pietro (WHOI)
Laura Robinson (WHOI)
Christopher Roy (University of Maine)
Kathryn Scanlon-Catanach (United States Geological Survey)
John Swartz (WHOI / University of Pittsburgh)
Marshall Swartz (WHOI)
Michelle Taylor (Zoological Society, London)
Tina van de Flierdt (Imperial College, London)
Sebastian Velez (University of Maine)
Rhian Waller (University of Maine)

Argentine Observers:
Mariana Escolar Instituto Nacional de Investigaciones y Desarrollo Pesquero

Raytheon Polar Services Company:
Harold 'Skip' Owen (Marine Projects Coordinator)
Stian Alesandrini, (Marine Technician)
Sandra Aylesworth (Marine Technician)
Mark Zajkowski, (Marine Technician)
Lindsey Loughry (Marine Science Technician)
Melissa Paddock (Marine Science Technician)
George Aukon (Electrical Technician)
Sheldon Blackman (Electrical Technician)
Kathleen Gavahan (Multibeam specialist)
Dixon, Scott (Information Technician)
Joe Tarnow (Information Technician)

Edison Chouest Offshore/RVIB *Nathaniel B. Palmer*

Yousri Maghrabi (Captain)	Rachelle Pagtalunan (Chief Mate)
Gary Talbot (Second Mate)	Brandon Bell (Third Mate)
Dave Munroe (Chief Engineer)	Johnny Pierce (First Engineer)
Robert Morris, (Second Engineer)	Richard Johnson, (Third Engineer)
Rolly Rogando, (Oiler)	Rogelio Pagdananan (Oiler)
Elbert Bataller (Oiler)	Danilo Plaza, (Oiler)
AB Sam Villanueva	AB Ronne Carpio
AB Bienvenido Aaron	AB Fernando Naraga
AB Lauro Garde	AB, Paul Wedel Soto
Alejandra Monje Miranda, (Cook)	Nestor Silverio, (Cook)
Lorenzo Sandoval, (Galley Ut)	Jermaine de la Cruz, (Galley Ut)

3. Science Goals:

The Southern Ocean plays a crucial role in modulating global climate, and exhibits a sensitive response to perturbations. Today, some of the most obvious symptoms of changing climate, such as ice shelf melting and ocean temperature rise, are being observed in the Southern Ocean and coastal Antarctica. In the past, leading hypotheses for the cause of the low atmospheric CO_2 levels at the last glacial maximum (LGM) include Southern Ocean processes such as changing productivity or enhanced stratification. Constraining the rates and amplitude of environmental change (on both millennial and decadal timescales) in the Southern Ocean is, therefore an important goal of climate science. This sensitivity of the Southern Ocean to climate perturbation means that the fauna that live there are likely to experience large changes in their environments. Carbonate organisms are at risk from ocean acidification, with deep-sea corals being a group that is likely to be particularly vulnerable. However, our understanding of how climate change may affect the distribution and health of cold-water corals is inadequate and improving this understanding is a concern for conservation efforts.

NBP1103 brought together an interdisciplinary team to use deep-water corals and other benthic organisms to reconstruct Southern Ocean conditions during the last glacial and deglaciation and to use these data to investigate their past and present biogeography in the Drake Passage. The cruise crossed the Drake Passage, sampling the South American and Antarctic shelves, and bathymetric highs at Seamounts and Fracture Zones within the Drake Passage itself.

There are two major science goals for the project:

- ***Determine the radiocarbon content of the Southern Ocean during the last glacial maximum and during past rapid climate change events***
- ***Determine the major controls on the past and present distribution of cold-water corals within the Drake Passage and adjacent continental shelves***

Our systematic collection of environmental parameters, images, maps and samples will be used to

(a) test new geochemical proxies for climate reconstructions

(b) build a coherent picture of the habitat and environmental controls on coral ecosystems

(c) provide a sample set for researchers interested in climate and deep-water coral sciences from rarely (and never before) sampled locations

4. Cruise Narrative

Monday 09 May 2011: ECO safety meetings and RPSC orientations held from 1300-1545 local time
Departed Punta Arenas 1600 hours local time on guidance from Captain to maximize tidal compatibility.

Tuesday 10 May 2011: Steamed SE towards first site on southern edge of Burdwood Bank. Multibeam started after exiting Strait of Magellan and passing 65 30.0 degrees E longitude. Underway science watch-standing began during the morning with observations recorded at 60 minute intervals (Lat, long, depth, CMG, systems checks, comments). Weather good for transit of Strait and reasonable thereafter. Multibeam processing training and continued lab preparations. *Summary:* Transit. Hereafter reports are in GMT.

Wednesday 11 May 2011
Arrived at Burdwood Bank site at 54°28.88'S 62°18.08'W and around 300m water depth. This site was Multibeam surveyed in 2008 by NBP0805. We commenced sampling plan with two deployments of Blake trawls, the first, STN 001 at 0753 GMT, the second, STN 002 at 0956 GMT. Both recovered live and fossil corals including the scleractinian target groups *Caryophyllia*, *Balanophyllia* and stylasterid corals. Sponges, soft corals and brittle stars were amongst the additional fauna recovered. In an attempt to collect fossil corals from below the surface layer the box core was deployed two times (STNs 003 & 004), but only a sandy wash was recovered each time. The TowCam was deployed successfully at STN 005, with excellent team work between RPSC, ECO and science crew. The run included three hours on-bottom time, with real time streaming of images to Aft Control Lab. Eight Niskin bottles were fired (4 on bottom, 4 during recovery) to provide environmental data over coral habitats. *Summary:* Excellent recovery of fossil and live material from 300m at Burdwood Bank, with a full transect of images from TowCam.

Thursday 12 May 2011: STN 006 was a third attempt at Box coring at 54°31.37S, 62°11.27W and did not recover sediment beyond a sandy wash. The newly designed Hein dredge was deployed as STN 007 in 'trawl' towed-mode and recovered a large selection of fossil and live material, mixed in with basalt gravel In a last attempt to collect sediment the Kasten core was deployed as STN 008 at 54°29.18S 62°13.79W and we were able to recover about 15" of sediment core. The core appeared intact with sand, gravel and mud layers containing fossil corals.
We transited to our 800m target site, a knoll (54°42.62S, 62°11.17W) on which live reef building coral have previously been recovered by NBP0805. The first deployment at STN 009 was the Hein dredge over a depth range of 856 to 796 m. Here the Hein dredge was deployed in a regular dredge mode rather than trawl, because of the steep topography. Despite large amounts of fossil specimens, no live *Solenosmillia* was recovered from this side of the mound. In addition we recovered fossil solitary corals, including *Desmophyllum dianthus,* and stylasterid corals. At STN 010 we deployed a Blake Trawl ~300m due north of the reef at about 700m water depth. The trawl recovered abundant octocorals, some live scleractinian corals and hundreds of fossil solitary corals. This time no live or fossil reef building corals were recovered, indicating the live part of the reef to be tightly constrained to specific parts of the mound feature in the bathymetry. STN 011 was a deployment of the Hein dredge at 823m water depth 54°44.23S 62°14.00W. The dredge contained both live and fossil material, although not in great abundance. After intense effort from RPSC and TowCam staff the newly constructed DropCam system was deployed as STN 012 at 681m water depth over the bathymetric feature. Unfortunately there appeared to be a malfunction in the bottom contact switch / alarm system and so was immediately recovered. A second attempt (STN 013) saw the bottom contact alarm continuously sounding, so the mission was aborted with only 10m payout. At the end of 12 May, at 2306, STN 014 was a Hein Dredge in 744m of water. This dredge was designed to cross the earlier Blake trawl (STN 010) and collect fossil material. *Summary:* Excellent success for recovery of benthos from 800m at Burdwood Bank. DropCam unsuccessful.

Friday 13 May 2011: Recovery of Hein Dredge (STN 014), half filled with fossil and live material embedded in sand. STN 015 saw the Hein Dredge deployed at 940m, down slope form the bathymetric high. The dredge hit bottom, and although recovery was low it did include both live and fossil material. STN 016 was even deeper, at 1412m water depth. Again fossil and live corals were both recovered. A type specimen of a new species of *Primnoella* was collected in this dredge. We then deployed the Hein Dredge at 2149m water depth at 54°50.38S 62°05.93W as STN 017. This dredge was on steep terrain and recovered rocks and stylasterids, with one live solitary scleractinian which appeared to be a *D. dianthus*, although it was too crushed to identify. STN 018 DropCam was deployed on the bathymetric mound. The camera deployment was successful, but unfortunately the ship positioning gave excessive drift, so we were unable to capture images of the top of the knoll. One image, in particular was exceptionally clear showing abundant live corals, scleractinians, octocorals and stylasterids. STN 19 at 1538m.

54°48.57S 62°10.02W was a Hein Dredge deployed in dredging style. Beautifully preserved coral assemblages fastened to rocks were recovered. In addition fossil solitary corals were collected. STN 020 was a Hein dredge at 1930m, 54°50.50S 62°07.55W. Very little material was recovered, perhaps because too little time on the seafloor. After securing the dredge we steamed 1.5 hours due south, improving Multibeam data until deep water (4000m) for STN 021 full CTD cast at 55°3.27S 62°6.63W. The mini-corer was used in place of the bottom contact switch in order to try and collect sediment, but it was not successful. *Summary:* We collected deeper coral samples down to 1900m, imaged the corals with a high resolution DropCam camera and deployed the CTD at 4000m water depth.

Saturday 14 May 2011: CTD recovered with all 24 bottles successfully triggered, but no sediment in the mini corer. Samples were taken for a wide variety of environmental parameters including macronutrients, carbonate chemistry and organic carbon. STN 022 was a repeat attempt at the same location as STN 020 using the Hein Dredge to sample at ~2000m water depth. This time the deployment was extremely successful with live and fossil solitary scleractinians. This is the deepest site sampled on the Burdwood Bank and will provide an excellent comparisons to the shallower sites, and will allow us to achieve our aims of reconstructing depth profiles on the water column in the past. Significant numbers of rocks were also recovered, not surprising in this steep terrain. At 0854, STN 023, the DropCam was deployed again at ~700m water depth on top of the bathymetric feature or "knoll." This time the ship position was held successfully and we recovered 38 high resolution images that showed the knoll to be a dominated by stylasterids and sponges. This type of assemblage has previously been found at high northern latitudes. The location and extent of the live *Solenosmillia* is not as large as we had anticipated, and highlights the importance of seafloor imagery in determining ecosystem type. On completion of STN 023 we began our transit to the Shackleton Fracture Zone towards the South. We adjusted our route to optimize Multibeam recovery. *Summary:* Successful recovery of CTD, additional sampling of live and fossil corals at 2000m water depth and transect of coral mound using high resolution DropCam camera. Transit due South.

Sunday 15 May 2011: Transit continued. Arrival at North end of Shackleton Fracture Zone with original plan of deploying TowCam on 2200m plateau. The barometer had been falling raising concerns that the sea state could worsen, so deployment was delayed to assess the situation. STN 024 was a Hein Dredge at 2300m (59°23.26S, 60°06.77W) on the west side of the Fracture Zone, and amongst a large haul of rocks we recovered one live solitary *Balanophyllia*, a few pieces of fossil scleractinian and a few other biological specimens. These are some of the deepest corals that we have collected, reaching almost as deep as the expected depth of lower circumpolar deep water. Surprisingly the mud brought up in the dredge was comprised almost entirely of well preserved foraminifera. The barometer and sea state steadied so TowCam was deployed at 2200m (59°23.02S, 60°05.05W) across the plateau. Real time images showed a sediment bottom with drop stones and occasional benthic organisms. *Summary:* Complete transit to north end of Shackleton Fracture Zone, collect corals from 2300m and deploy TowCam along plateau at 2300m.

Monday 16 May 2011: TowCam was run through to 0859 and recovery was smooth. STNs 026 and 027 were Box Cores deployed on the plateau (59°21.92S, 60°05.44W) where sediment was observed in the photo images. Despite two attempts no sediment core was recovered, although a small sandy wash indicated that the bottom had been reached. At STN 028 the Hein Dredge was deployed at 2564m water depth (59°23.01S, 60°09.03W). Recovery at 1917 with primarily rocks, mud, a few fossils and some benthic fauna, moved to new dredge site (59°45.24S, 59°00.00W). *Summary:* TowCam recovered after six hours capturing images at 2300m on Shackleton Fracture Zone (SFZ). Attempt to collect sediment using Box cores. Deploy Hein dredge at 2600m.

Tuesday 17 May 2011: Hein Dredge (STN 029, 59°45.24S, 59°00.00W) was deployed at 0018 and recovered at 0302, but collected just a few small rocks. A high tension spike during the tow (7000lbs) leads us to believe the basket was may have emptied from contact with a large rock or boulder. The dredge was redeployed at 0312 at the end point of the previous tow (STN 030, 59°44.96S, 59°00.24W) to try a shallower tow. The dredge was recovered at 0640 and was over half full of small basalt rocks with a few small octocorals and small fossil shells and octocoral skeletons. Moving a short distance down the ridge, the Hein Dredge was deployed at 0720 in 1700m of water (STN 031). Although the dredge received a hit of 11400lbs, it came back unscathed at 1045 with primarily small basalt rocks and some fossils. We transited to a 3500m CTD site (STN 32) to the west of the ridge (60°03.17S, 58°30.60W), and all 24 bottles were fired at 12 depths. The mini-corer recovered 6cm of mud with small pebbles. We transited one hour back to the crest of the ridge. The area is a series of three small 1800m knolls. STN 033 was a Hein dredge at 1900m (60°04.13S, 58°19.50W). The maximum tension was only 5300lb, and the dredge was recovered with rocks, a few holdfasts, a large anemone and brachiopod. Deployment of TowCam was delayed

because of steadily climbing winds (30+ knots), so STN 034 was a Hein Dredge at 1800m (60°05.80S, 58°13.50W) and here we continued to dredge up and over a plateau. *Summary:* Hein Dredges on the northern end of the SFZ recovered mainly rocks. The CTD was deployed at 3500m and recovered 24 bottles and a 6cm mini-core.

Wednesday 18 May 2011: We recovered Hein Dredge with rocks with holdfasts and two large fossil corals. We transited 4 miles towards the part of the SFZ with the highest topography (around 60°08.20S) and deployed the Hein Dredge as STN 035 in 1200m water depth. This time we added a burlap sack to the inside of the dredge to ensure no small material was lost since the Hein Dredge has warped at the back edge. Sand and pebbles were recovered. Slightly further along the SFZ we re-deployed the Hein Dredge (STN 036, 60°09.00S, 57°55.96W) at 1230m and recovered sand, rocks, a few solitary fossil corals and ophioroids. STN 37 was slightly shallower, on a small plateau at ~850m water depth. The dredge brought up fossil stylasterids and *Caryophyllia* sp. scleractinians. Live recovery included ophiuroids, polychaetes, stylasterids and many brachiopods. The inner lining bag was difficult to clean, so it was removed and repairs were made to the back end of the dredge (wired shut). At STN 038 we deployed the Hein Dredge on the upper slopes of the highest peak of SFZ, on the west flank. The dredge recovered fossil *Caryophyllia* sp. scleractinians, stylasterids and octocoral bases, as well as live sponges and stylasterids and not as many rocks as earlier dredges on the SFZ. STN 039 was Hein Dredge at 800m (60°10.51S, 57°51.02W). Only a small haul was recovered, but it included fossil *Caryophyllia* sp., two small live *Caryophyllia antarctica* and brachiopods. Dredge STN 040 was deployed close to the location of a successful dredge from NBP-0805 at 960-777m water depth (60°10.90S, 57°50.40W). The dredge was recovered half full. Several large rocks were removed, and the rest of the haul included sandy sediment with live and fossil material embedded in it. Hundreds of fossil *Caryophyllia*, stylasterids and shells were recovered. The biological haul included bamboo corals, octocorals, bryozoans, sea urchins, pycnogonids, hydroids and brachiopods. The sea state had been too great to deploy the DropCam, but by 1746 it has settled such that we felt confident to deploy in stationary mode. STNS 041 and 042 were both unsuccessful as the alarm continuously sounded in both cases. To allow time to assess the problem we repeated a Hein dredge (STN 043) at the same location as STN 40. Again this haul was large with extensive collections of fossil corals, and a similar biological fauna. The alarm issue on the DropCam was resolved so we began a series of five DropCam deployments starting at 666m on the summit of the SFZ. The images from STN 044 were downloaded immediately on landing using a long USB cable to a laptop in the Baltic Room. The images were clear, and showed a flat terrain with brachiopods, sediment, bedrock, tunicates, sponges and ophiuroids, amongst other benthic fauna. DropCam was deployed at STN 045, on the plateau sampled on STN 037, on the west flank of SFZ (850m). The images showed extensive stylasterid growth, as expected from the dredge recovery. *Summary:* We transited to the highest peaks of the Shackleton Fracture Zone (~700m) and recovered extensive fossil material in the Hein Dredge. Drop Cam was deployed on the summit and sides of SFZ.

Thursday 19 May 2011: DropCam was deployed as STN 046 at 900m on the east flank of SFZ to provide a comparison to STN 045. The images showed bedrock, boulder and benthic fauna including ophioroids, tunicates and brachiopods. STN 047 DropCam was aborted at 80m wire out because we were too far up slope. We moved the ship 0.3nm to the south so that we could image the site at which we recover the most corals (live and fossil). STN 48 (60°10.79S, 57°49.99W) was successful up to 6 images, then the bottom contact switch began to alarm continuously. We brought the camera on deck and found that the string was tangled. The string was replaced and the camera rapidly re-deployed (STN 049) in the same place as STN 048. Twenty pictures were taken and showed swept sediment and gravel with scarce boulders with a few coral sand tunicates. The ship held station so well that the pictures all captured the same part of the seafloor. For subsequent deployments we will allow the ship to drift while taking images. STN 050 was a Hein Dredge at 1000m below the successful STNs 039 and 041. The dredge was three quarters full of rocks with a few fossils and a few biological specimens (ophiuroids, brachiopods). STN 051 was at ~1400 (60°11.70S, 57°49.8W) and recovered nearly a full dredge of rocks, together with a few small biological specimens, a clam, brachiopod, sponge and 2 tunicates. STN 052 was at 900m on another small knoll, due south-east of the main SFZ peak (60°12.5S, 57°43.8W). A few rocks, 1 fossil *Caryophyllia* sp., and a few stylasterids were recovered. Live material included ophiuroids, brachiopods, octocorals and stylasterids. STN 53 was further south east at 1000m (60°13.00S, 57°41.20W) and recovered lots of rocks, assorted biology predominantly ophioroids, and a few fossil stylasterids and bivalve shells. Transiting further south east we deployed the Hein Dredge at STN 054 at (60°15.39S, 57°36.00W) in 1000m water depth. The dredge was half full of rocks, but the rocks had many large holdfasts, and we also recovered some pieces of fossil solitary corals. Benthic fauna included octocorals stylasterids, gastropods, brachiopods and sponges. STN 055 was a CTD (60°15.69S, 57°35.49W) taken down to 1324m on peak of the ridge. *Summary:* A series of DropCam photos were taken around

the peak of the SFZ. The Hein Dredge was deployed at a range of depths to recover material from deeper water masses with some success. Water was collected down to 1300m.

Friday 20 May 2011: STN 056 saw the Hein dredge deployed on the SFZ in 1589m water depth (60°16.6S, 57°32.00W). It recovered some rocks with small holdfasts and a few stylasterid corals. Traversing to deeper water at the end of the SFZ the Hein Dredge was deployed at 1863m (STN 057, 60°36.00S, 56°46.99W) and recovered large boulders covered in sponges, hydroids and coral holdfasts together with a few shells. The Drop Camera was deployed as STN 058 at the same location as 056, but the drop had to be aborted due to a constantly sounding alarm. Whilst the DropCam was being repaired the Hein Dredge was re-deployed at 1800m, STN 059. At 1516 the DropCam issues were resolved by eliminating the beeper alarm and using a voltmeter to read contact with the seafloor. A series of pictures were taken three at a time, moving one ship's length (~93m) between each set up to a total of 21 pictures. We commenced a two hour transit across to the Antarctic slope to a knoll at a similar depth. At STN 061 (60°52.10S, 56°18.60W) we deployed the Dropped Camera system. Unfortunately no bottom contact was observed, so we brought the camera to the surface and saw that the bottom contact tether had become tangled on the frame. The camera was redeployed at 2357 as STN 062. *Summary:* Hein Dredge deployed at depths greater than 1500 and DropCamera used to obtain comparable seafloor images on SFZ and Antarctic slope.

Saturday 21 May 2011: The Drop Camera was recovered at 0226 with 25 pictures taken of the seafloor. The camera was recovered and transit to our Western Antarctic Peninsula site (Station AA) commenced at 0307. *Summary:* DropCam recovery and transit.

Sunday 22 May 2011: At 0100 started a Multibeam survey of site "AA" in the region around 63°03S, 61°35W, prior to gear deployment. At 0644, STN 063 a box core was deployed in 600m of water and successfully recovered a full core of brown mud with a slightly disturbed seawater interface. At 0834 the TowCam (STN 064) was deployed for a 3 hour tow across site AA, collecting images and bottom, mid depth and surface water samples. STNs 065 through 067 were three deployments of the Blake Trawl in 500-600m water depth until sufficient *Flabellum curvatum* were recovered from the seafloor. Finally STN 067 was a Kasten Core to collect deep intact sediment to try and retrieve older fossil corals. Although 150cm of sediment were recovered, there were no fossil remains. At 2245 after recovery of the Kasten corer we transited to deep site. Additional Multibeam data was originally planned to be collected. The Captain was however uncomfortable with surveying in full swath mode. *Summary:* Excellent recovery of live scleractinian corals and other fauna from Antarctic shelf. Two cores collected to look for fossil remains, but the best remains were found in the trawls. Issues arising from requirement that all surveying be done within existing Multibeam swath.

Monday 23 May 2011: Continued transit to deep site off the Western Antarctic Peninsula. STN 069 was a DropCam deployment on a 1500m knoll (62°16.26S, 62°07.02W, 1498m) and collected 38 images of a sedimented seafloor. STNs 70 and 71 were Box Core deployments, but a large swell caused pre-triggering and no sediment was recovered. We transited to deeper water for a full depth CTD (62°04.00S, 62°35.00W) in 4732 m of water. CTD recovered with 7cm core in mini-corer. It was evident that continued Multibeam data coverage collection in the area would be problematic (see note), so decided to transit to seamount site where there could be no question of marine hazards. Transit to Interim seamount began at ~20:10 after recovery of the CTD, 130 nautical miles direct route. Continuing issues arising with respect to collecting more than a half swath of Multibeam data. To aid communication for enabling future sampling we provided the bridge with delimited areas within which we would like to be able to freely pursue our science goals. *Summary:* DropCam images of the shelf slope and a full depth CTD cast.

Tuesday 24 May 2011: Transit continues. Arrival on station was at 1317 with the Hein Dredge deployed at 1332 at STN 073 (60°36.3S, 60°36.46W) in 1125m of water near the summit on one of Interim Seamount southern peaks. The dredge continued just a few fossil stylasterid and bamboo coral remains. We re-deployed along the same dredge track (STN 074) and this time recovered about 1/3 of a dredge full of ferromanganese coated fossil coral remains, mainly bamboo corals with a few stylasterids and our target species *Desmophyllum dianthus*. In addition we recovered sponges and a few small octocoral pieces. STN 075 was a Hein Dredge deployed just north east of the south peak, at 1260m water depth, and had a similar recovery. The excellent weather conditions (<5knot winds) allowed us to deploy TowCam as STN 076 due west of the seamount in ~3000m of water (60°36.16S, 66°00.28W). *Summary:* Transit to interim seamount. Three dredges recover fossil corals remains. TowCam deployed at 3000m water depth.

Wednesday 25 May 2011: TowCam recovered at 0425 having taken images over 2km distance and seven full Niskin bottles. Sediment observed in TowCam was sampled using the Kasten core at STN 077 (60°32.65S, 66°10.30W, 3059m water depth) and 105 cm of sand/mud recovered. On careful sifting one small piece of coral (stylasterid?) and a scaphopod skeleton were extracted from the sediment. STN 078 was a Hein Dredge up on the southern ridge of Interim Seamount (60°38.04S, 66°03.08W, water depth 1574m) and recovered 10 medium sized boulders one of which had several fossil *Desmophyllum dianthus* encrusted upon it. We also recovered live sponges, brachiopods. Very close by we deployed the DropCam as STN 079, taking 24 images of this peak of the ridge. STN 080 was a Hein Dredge at 1513m water depth (60°38.20S, 66°02.60W). We recovered brown and black rocks (basalt and scoria?) with fossil corals, a scallop shell, a crab and sponges. STN 081 was a Hein Dredge slightly downslope on a shoulder between two peaks at 1641m water depth (60°39.22S, 66°02.81W). Very little was recovered, a few fossil stylasterids and a ctenophore. The weather was worsening, with 30 knot winds, so we decided to deploy DropCam before the weather turned worse as STN 082 on a mini-peak of ~ 1565m water depth.

Thursday 26 May 2011: DropCam was recovered at 0110 with 20 images of pillow basalts, pockets of sand and fossil corals and benthic fauna. The Hein Dredge was deployed as STN 083 in 1811m water depth (60°41.25S 66°03.20W). A large tension peak (12200lb) was recorded during the pull in. Only three fossil bamboo corals were recovered and we speculated that the dredge may have emptied out during the high tension event. The DropCam was deployed at a similar location as ST 084, at 1845m water depth, collecting 25 images in six areas. The terrain was similar to STN 083, with basalt pillow bedrock and pockets of loose material. Low recovery may just be artifact of hard-to-sample terrain. The Hein dredge was slightly modified to attempt to reduce loss of coral material if Dredge overturned (entrance lined with "fingers" made from cable ties). At STN 085 we deployed the Hein dredge further up the seamount in 1522m water depth (60°38.3S, 66°03.01W) and recovered mainly rocks with some fossil bamboo corals, sponges and small pieces of stylasterids. STN 086 was a Hein Dredge at 1232m (60°36.9S, 66°00.99W). On recovery it was discovered that the weak link had broken, and the dredge had sustained minor damage (bent at back pillar). The sea state was worsening despite dropping winds, so the back deck was secured and multibeam mapping commenced due south. A half swath was being collected by the bridge, who were unaware that we were free to collect a full swath in the "free box" so the captain was consulted, and permission was granted to collect a full swath. Multibeam continued through the rest of the day, collecting data in the south-east quadrant of our 'Interim" working box. *Summary:* DropCam and Dredging on Interim seamount recovering fossil corals but little live material. Sea-state high so Multibeam survey commenced.

Friday 27 May 2011: At 0933 sea-state was reassessed for the third time during night shift and deemed safe for over-the-side operations. Multibeam survey was ended and 2hr transit to STN 087. The damaged Hein Dredge was repaired for deployment during multibeam survey and was deployed for STN 087 (60°34.00S, 65°58.60W) at 900m water depth on the shallowest knoll of Interim Seamount. The dredge was recovered half full of fossil stylasterid rubble and solitary scleractinians. Slightly deeper (1008m) we deployed the Hein Dredge at STN 088 and again had a good recovery of fossil corals. In addition there was a large live stylasterid corals a crab and sponges. The DropCam was deployed on the top of the same knoll (747m, 60°33.70S, 65°40W) taking 15 images, basalt, sediment with crabs, shrimp, anemones, sponges and fossil coral rubble. The dredge was deployed just below and up onto the same summit (STN 090). The dredge came up full of rocks which were encrusted with large hydroids and stylasterid corals. Some fossil stylasterids were recovered as well. The winds started to gust up to 50-60 knots, so it was decided to abort further sampling at Interim and transit to our next site at Sars Seamount. The Bridge was consulted on route, and transit began as we moved through a small gap in the Multibeam (at midnight GMT). Permission to sample in Chilean EEZ arrived via email. *Summary:* Multibeam continues until sea-state reduced. Further DropCam and dredge work completed before strong winds picked up towards the end of the day. Chilean EEZ permit arrived.

Saturday 28 May 2011: Transit to Sars Seamount. Speed less than 2 knots for long periods of the ~80 mile transit because of high winds and swell (Transit took ~24 hours instead of the anticipated ~8 hours). Winds dropping away to around 25 knots during day, but swell still large. Transiting into Sars working area at around 8.5knots matching north edge of NBP0805 multibeam swath. At about 2320 decide that sea-state is safe for deployment, so complete Multibeam swath and head for next dredging site STN 091. *Summary:* Slow transit to Sars in high winds

Sunday 29 May 2011: Arrival at Sars with first deployment at STN 09 at 0104 (59 43.3 68 51.77, 684m water depth). The dredge came up one third full of coral rubbles including both live and fossil specimens of solitary corals,

and fossil remains for two reef building corals, *Solenosmillia variabilis* and *Madrepora oculata*. The DropCam was deployed at the end of the preceding Dredge as STN 092 (633m water depth, 59°43.09S, 68°52.00W). Eighteen images were taken in sets of three coving about 500m distance. The dredge was then deployed at 1767m due west of Sars summit on the south side of small knoll (STN 093, 59°42.45S, 69°00.39W) but despite reasonable tension pulls the dredge only recovered a few pebbles a barnacle shell and a fossil bamboo coral skeleton. Images taken with the DropCam (STN 094) on the summit and on the north slope of the same knoll showed basalt boulders with fossil solitary corals. At STN 095 the Hein Dredge was deployed on a nose that trends due west from the summit (59°43.76S, 68°53.92W). A large haul of fossil and live material was recovered, with a sandy matrix. Fossil material included at least 3 species of solitary scleractinian corals, stylasterids, bamboo corals, bivalves, brachiopods and sponges. Biological recovery included echinoderms, bryzoa, bamboo corals, bivalves, brachiopods, gastropods, live *Caryophyllia antarctica* and a single *Desmophyllum dianthus*. The winds were steadily increasing towards 40 knots, so it was decided that the next deployment should also be relatively shallow. We deployed the Hein Dredge at 978m as STN 096 (59°44.41S, 68°54.00W) on a small knoll west of the summit. The total recovery was much smaller than the previous dredges, including lots of small pebbles, sponges, fossil *Desmophyllum dianthus*, stylasterids, bivalves, other solitary corals, live echinoderms, gastropods, hydroids, octocorals, sea pens, brachiopods and *Caryophyllia antarctica*. Recovery was smooth, but the sustained winds meant that the sea-state was building to levels where it was decided to commence a Multibeam survey to give time to allow the swell to die down. Multibeam tracks were oriented NW – SE to minimize roll and fill outstanding gaps in our knowledge of the bathymetry of Sars Bank. *Summary:* Arrival at Sars, dredges and DropCam deployments show high benthic diversity and abundance in both fossil and live benthic fauna.

Monday 30 May 2011: Over-the-side operations were stopped until 0541 when weather had subsided enough to dredge a shallow south-west ridge of Sars Seamount. The Hein Dredge (STN 097, 600m depth) returned with a large haul of fossil corals (stylasterids, *Desmophyllum*, *Solenosmillia*, *Madrepora* and *Caryophyllia*) and around 50 small live *Caryophyllia* and several colonies of bamboo corals and *Acanthogorgia*. Moving deeper, the Hein Dredge was redeployed at a 1200m site (STN 098), though returned with a much smaller haul containing mostly rocks, but also some small fossil scleractinian pieces and some very large bamboo skeleton pieces. No biology was recovered. STN 099 was a DropCam on the western summit side of Sars Seamount, and came back with photographs of a stylasterid reef with large spider crabs and sponges. We then moved further west to a deep site to conduct a 3100m CTD cast (STN 100) which was recovered with all 24 bottles fired at 12 depths. STN 101 was a Hein dredge at 1586m (59°43.26S, 68°56.96W). The wire snarled on the way up at about 24m wire out, but the wire was successful untangled and the Dredge safely recovery at 2000. The dredge was about 1/6 full of small rocks with a few small pieces of fossil corals, an anemone, sea pens, sponges and a live bivalve. At 2105 TowCam was deployed on the plateau of Sars on a heading of 300 degrees. *Summary:* When winds abated the Hein dredge recovered samples from 600m-1586m, with larger amounts recovered at shallower depths. CTD operation at ~3000m. DropCam images from 1200m and TowCam deployed.

Tuesday 31 May 2011: TowCam was recovered at 0024 after 2.5hour on bottom, eight Niskin bottles were fired along seafloor and during recovery. At 0119, STN 103 the Hein Dredge was deployed at 1015m water depth (59°44.25S, 68°46.60W) on the south side of Sars and recovered only basalt pebbles. The east side of Sars plateau was sampled during STN 104 using the 18ft Otter Trawl. The majority of the haul comprised sponges, but also fossil stylasterids, live stylasterids, seawhips, fish, crabs and brachiopods. STN 105 was a DropCam deployment on the south edge of Sars at 936m (59°44.2S, 68°47.09W) taking 17 photos. The Hein Dredge was re-deployed at 1001m (59°44.35 68°47.40) as STN 106. On recovery it was discovered that the wire was wrapped around the dredge so 61m of wire had to be removed before re-termination. It was decided to modify the dredging technique to prevent further tangling ((a) wire out speed reduced to 30m/min, (b) ship to move ahead when wire 100m from seafloor). The DropCam was deployed at the west end of Sars at 1347, 1120m (STN107, 59°41.50S, 68°57.25W) capturing 20 images. STN 108 was a Hein Dredge at 1813m (59°42.61S, 68°59.30W). The dredge was mainly empty with a few pebbles and pieces of fossil bamboo coral. It was decided to deploy the smaller BoxDredge with a burlap lining at the same location (STN 109) to try and recover fossil corals that had been seen in DropCam images. *Summary:* TowCam recovered. DropCam images from west end of Sars. Otter trawl on plateau recovered many sponges. Hein dredges contained mostly pebbles.

Wednesday 1 June 2011: The box dredge came up empty. Hein Dredge STN 110 was on a knoll west of the main Sars plateau at 1980m water depth (59°40.31S, 69°02.11W). It was difficult to hold station because of winds veering from north to south west during the dredge. The recovery was small, a few rocks and pieces of bamboo coral. The

wind shift allowed us to re-dredge the 1700m knoll sampled by 108 and 109 from the other direction as STN 111. Again there was little recovery, pebbles, and piece of bamboo, but there was also piece of fossil *Desmophyllum dianthus*. The winds and seas were building so that the ship could no longer hold station so over-the-side operations were curtailed, and additional Multibeam surveying commenced. *Summary:* Deep Hein dredges with small recovery. Weather deterioration with high sea-states. Multibeam survey.

Thursday 2 June 2011: Winds and seas improved so that over-the-side operations could resume at 0228. The wind direction was now from the South West so at STN 112 we were able to sample the 1700m knoll (59°42.00S, 69°08.10W) from the north. The dredge recovered one complete and three pieces of fossil *Desmophyllum dianthus*, the target fossil species. The dredge was repeated slightly higher up the knoll as STN 113 and recovered one whole and many fragments of fossil *Desmophyllum*, pieces of fossil bamboo coral and pebbles. STN 114 was a deeper station (1896m, 59°41.69S, 69°01.69W) but only recovered a few big chunks of pillow basalt and a few fossil stylasterids. The next target was the long ridge coming out of the southwest corner of Sars, in which STN 115 Hein Dredge was deployed (890m, 59°42.03S, 68°54.18W). It was recovered ¼ full of gravel with fossil colonial and solitary corals (*Desmophyllum and Caryophyllia*), brachiopods, bivalves and a few live octocorals and sponges. The Drop cam was deployed on the highest part of the ridge (630m, 59°44.56S, 68°51.95W) and 18 pictures were taken in 6 areas. The photos showed a substrate of basalt, and sediment with abundant basket stars and crabs, and fossil corals. STN 117 was the Hein Dredge deployed at 1034m (59°45.85S, 68°55.97W). It was recovered ¼ full of fossil rubble including ~50 complete fossil *Desmophyllum* specimens, *Caryophyllia*, pieces of bamboo corals, bivalves, gastropods and brachiopods. Live material included crabs and hydroids and sponges. STN 118 was in deeper water due west of STN 117 (1419m, 59°46.95S, 68°57.24W) and recovered a few rocks with encrusting soft corals and hydroids. DropCam was deployed as STN 119 at the end of the dredge line (305m) *Summary:* Over the side operations on the South West Ridge of Sars. DropCam images showed basket stars and live *Desmophyllum dianthus*. Tens of fossil *Desmophyllum* and extensive other fossil material collected from 890m to 1700m depth.

Friday 3 June 2011: DropCam was recovered with 4 sets of three pictures were taken moving southwest down slope. STN 120 was a Hein Dredge at 1732m (59°47.91S, 68°57.62W) near the end of the long ridge. The dredge was completely full of fossil bamboo rubble, with rocks and fossil *Desmophyllum*. A few small pieces of octocorals, ophioroids and brachiopods were also recovered. The next dredge was recovered at 1438m (59°47.15S, 68°57.49W) and was again recovered full, with fine basalt gravel, larger rocks some fossil remains and live brachiopods, primnoid pieces and amphipods. We transited 1 hour to the east side of the seamount and deployed DropCam at 804m on a small ridge (STN 122, 59°40.6S, 68°41.4W). In the first drop the buzzer did not work, so it was brought up to the side of the ship, the bottom contact switch checked for tangles and sent back down. In total 26 photos were taken of 6 areas with 100m spacing. The Hein Dredge was then deployed at 1903m (STN 123, 59 40.38 68 36.47), and was recovered with just one large rock and a few sponges and small hydroids. The DropCam was then deployed at 2256 on a knoll at 1200m depth (STN 124, 59°41.10S, 68°38.97W). The camera run was shortened because of time constraints, so took 21 photos over 3 areas with 100m spacing. A second, deeper, DropCam was deployed (STN 125, 59°40.40S, 68°37.59W), again over 3 areas, taking 17 photos. *Summary:* Four DropCam deployments took 76 photos of the seafloor around Sars Seamount, showing diverse assemblages of coral and other invertebrate fauna. Hein dredges recovered primarily basalt rocks and gravel, with some fossil and live coral fauna recovered.

Saturday 4 June 2011: STN 126 was a Hein Dredge deployed at 0244 on the eastern side of Sars Seamount (59°43.60S, 68°38.06W) at 1900m depth, and returned with a full basket comprising mostly of rocks and gravel, but also fossil *Desmophyllum* pieces and a few small ophiuroids, brachiopods and one stoloniferous octocoral. As soon as this dredge was recovered the decks were secured and a Multibeam surveying commenced at 0627 to fill in data gaps on the eastern side of the seamount. At 0852 this Multibeam line was completed, and full transit to Cape Horn commenced. *Summary:* Hein Dredge at 1900m recovered fossil and live material. Transit to Cape Horn

Sunday 5 June 2011: Arrival at CTD site, but deployment delayed because of strong winds. Multibeam survey commenced. At 1940 we crossed the EEZ from Chilean into Argentinean Waters, and continued the Multibeam survey. *Summary:* Arrival at Cape Horn and Multibeam. High winds and seastate mean no over-the-side operations.

Monday 6 June 2011: Continue Multibeam survey. At 0611 weather was assessed as good for over the side operations, and transit to a 4500m CTD station commenced. STN 127 was a CTD at 4411m depth on the south of the Cape Horn ridge. A Hein dredge was then deployed (STN 128, 57°09.81S, 67°05.38W) at 930m depth on a knoll in the "Warrens" area. This dredge returned fossil coral rubble (primarily stylasterid and *Flabellum curvatum*).

Biological samples included *Flabellum curvatum*. *Balanophyllia,* 3 species of octocorals, stylasterids and sponges. Hein Dredge STN 129 was deployed on a separate bathymetric high at 1257m water depth (57°11.26S 67°00.36W). The dredge was 2/3 full with material similar to STN 128. A short transit to STN 130 (~4 miles) where TowCam was deployed at 1125m water depth (57°12.89S 67°01.64W). *Summary:* Multibeam survey followed by two dredges which came up with fossil and live recovery. TowCam deployed at 2037

Tuesday 7 June 2011: TowCam was recovered at 0010. The Hein Dredge was deployed as STN 131 at 904m water depth (57°12.75S 66°58.59W) and was recovered ¼ full of primarily *Solenosmillia* rubble with fossil and live solitary corals, bamboo, paragorgia and thouarella. DropCam was then deployed on the ridge sampled by STN 127 collecting 28 images over a 700m distance. Next DropCam was deployed on a steep area at 1866m (57°10.85S 67°11.50W). The terrain was so steep it was hard to get a bottom contact, so photos were taken using manual triggering. The Hein Dredge was deployed as STN 134 at 1059m water depth and was recovered 1/4 full with stylasterid and solitary coral rubble with live *F. curvatum*, *Balanophyllia* and Primnoids. STN 135 was a DropCam deployed at 967m (57°09.90S 67°05.91W). A Niskin bottle was attached to the wire to enable collecting of bottom water sample for comparison with the CTD data. Seven sets of three images were taken during the deployment. After the DropCam deployment we transited due south east collecting Multibeam data on the way to a 1500m knoll at the end of the major ridge trending SE off Cape Horn. At STN 136 the DropCam was deployed at ~1400m water depth. Bottom contact alarm not sounding, then it started sounding continuously so we brought it up. The DropCam was deployed as STN 137 in the same place as the end of STN 136. Again there was no bottom contact, so the manual trigger was used over a range of 100m. *Summary:* A series of DropCam and Hein Dredge deployments in the "Warren" area of the ridge trending SE off Cape Horn. Excellent recovery of live and fossil samples.

Wednesday 8 June 2011: DropCam was recovered at 0125 and the images showed many live solitary corals on a gravelly (fossil rubble?) and rocky bottom. The Hein Dredge was deployed at STN 138 at 1420m water depth and was recovered 1/8 full, primarily with fossil solitary corals. The DropCam lasers were discovered to be flooded due to corrosion, so they were removed. DropCam was deployed at STN 139 close to the sites of 136 and 137 at 1395m water depth. The ship had trouble holding station so the photos were taken in drift mode. We then transited about 10 mile NW to a bathymetric high and deployed the Hein Dredge at STN 140 (57°18.40S 66°51.31W). The dredge covered a water depth of 740-556m water depth and was recovered 1/4 full of fossil stylasterids, solitary and colonial corals. The Hein Dredge was redeployed nearby at STN 141 at 938m water depth. A small haul of fossil coral rubble was recovered. The DropCam was deployed as STN 142 at 549m close to the site of STN 140. After a two hour transit due west the Hein Dredge was deployed at 1870m and the dredge was recovered ½ full of fossil barnacle plates with a few biological specimens including *Flabellum*, pieces of octocoral, gastropods and barnacles. DropCam was deployed as STN 144 at the same location. *Summary:* A series of DropCam and Hein Dredge deployments captures seafloor images, fossil and live specimens over a depth range of ~550m to 1870m depth.

Thursday 9 June 2011: DropCam was recovered at 0031. The Kasten Core was rigged and secured and transit west towards the Kasten Core site commenced. Sediment was identified using the Knudsen and the Kasten core deployed at 0310 (4013m, 57°07.36S 67°40.62W). The core was recovered at 0719 but it was empty except for a scrape of sediment on the core catcher. We transited to the shelf edge (57°01.02S 67°34.01W) where we deployed the TowCam at 503m water depth (STN 146). The light winds and opposing current made selection of the TowCam line challenging, but the run was successful over 1.5km. The Blake Trawl was deployed as the final station (STN 147) at 501m water depth (57°00.99S 67°35.47W). The recovery consisted mainly of sponges with a few live solitary corals, broken octocorals, a few octopi and fish and a few fossil corals and bivalves. At 1537 we left the Blake Trawl site to fill in a short Multibeam gap, and then began our transit to Punta Arenas at 1600. *Summary:* The Kasten core was deployed in a 400m basin but recovered virtually empty. TowCam and a Blake Trawl were deployed at ~500m. Transit to PA commenced.

Friday 10 June 2011: Transit to PA.

Saturday 11 June 2011: Arrival in PA

5. Summary of Sites

Bathymetric Maps and GIS

Multibeam bathymetry data were continuously collected while underway by the ship's Simrad EM-120 sonar system. Maps were compiled by Kathleen Gavahan (Raytheon Polar Services) in six areas of interest using the newly collected data together with data collected during NBP0805 for this project and publicly released data collected during other Nathaniel B. Palmer cruises. Bathymetry data were also collected and processed for the transit lines between each area. In all, 4, 210 kilometers of new multibeam data were collected and processed. The newly acquired multibeam data were processed using CARIS HIPS 7.0 ©, whereas the multibeam data collected on NBP0805 were processed using MBsystems©. Those who participated in both the 2008 and the 2011 cruises felt that the ping-editing process was faster and easier with CARIS HIPS© than with MBsystems©. Also, having a dedicated person, Shannon Hoy (in addition to the Raytheon multibeam tech) to do ping-editing and supervise other ping-editors was helpful.

Some of the areas of interest were partially mapped during the 2008 expedition. Whenever possible during the 2011 cruise the previously mapped areas were expanded, gaps were filled, and the quality of the data improved. Using data from two cruises gave us an opportunity to directly compare two datasets collected three years apart and evaluate their quality and compatibility. We found a high degree of consistency in the acquired seafloor depths between the two datasets, which signifies reliable acquisition processes such as sound velocity control as well as calibration.

The maps produced during this cruise were vital to the success of the science and the sampling mission in the following ways:

a. High resolution maps were used to locate useful and safe areas for dredging, trawling, TowCam and DropCam operations. A ~20cm to 1km scale was used on these maps so that the TowCam line could be plotted real-time.
b. Compiled maps were critical for locating habitats suited to coral growth that could be sampled successfully using trawls and dredges.
c. Maps were also used in conjunction with the ship's echo-sounder to locate sedimented areas for coring.

Geographic Information System

We used ESRI's ArcMap 9.3 to organize existing data and to plan sites for new data collection. We used an earlier version of ArcMap during the 2008 cruise; those data were imported into 9.3 along with other datasets listed below. New data incorporated into the GIS include multibeam bathymetry grids, ship's tracklines, sampling locations, and JGOFS oceanographic measurements. Contours and slope maps of the multibeam bathymetry grids were generated as needed. ArcMap proved to be an excellent way to see quickly how our newly collected data relates to existing data, thus minimizing duplication of effort. It is also a useful way to organize cruise data to make it easier to produce map products and for post-cruise analysis. Below are tables of the pre-existing data that we found useful to include in the GIS, the data collected by us in 2008, and the newly collected data collected during NBP-1103.

Pre-existing data in ArcGIS:

layers	source	quantity
Locations of previously collected scleractinians and stylasterids	Cairns, 1982 Cairns, 1983	518 points
Locations of previously collected scleractinians	Waller, unpublished	39 points
Etopo2 bathymetry and topography grids with hillshade	Etopo2	3 grids
Etopo1 bathymetry and topography grids with hillshade	Etopo1	3 grids
Exclusive Economic Zone boundaries	Flanders Marine Institute	1 shapefile
Country borders, lakes, rivers	ESRI	3 shapefiles
Publicly available U.S. multibeam data in Scotia Sea and Drake Passage	Nathaniel B. Palmer	1 grid
BAS multibeam data	British Antarctic Survey	1 grid
Locations of rock dredges	NGDC	1 shapefile
Locations of cores	NGDC	14 shape files

Annualized water temperature (at 0, 800, 2000, 3500, 5500m)	World Ocean Atlas	5 grids
Annualized water salinity (at 0, 800, 2000, 3500, 5500m)	World Ocean Atlas	5 grids
Annualized dissolved oxygen (at 0, 800, 2000, 3500, 5500m)	World Ocean Atlas	5 grids
Plate boundaries	Univ. of Texas PLATES project	3 shapefiles
coastline	Hand digitized by Marcy Davis	1 shapefile
Georegistered chart w/Elephant Is. coastline	navigation chart from the bridge	1 .tif
Hazards to navigation	From various charts	1 shapefile

New data (collected during NBP-0805) in ArcGIS:

Multibeam bathymetry, broad scale	3 grids
High-resolution multibeam data for Burdwood Bank	1 grid
High-resolution multibeam data for Elephant Is. area	1 grid
High-resolution multibeam data for Shackleton Fracture Zone	1 grid
High-resolution multibeam data for Interim Seamount	1 grid
High-resolution multibeam data for Sars Seamount	1 grid
1 minute navigation fixes, ship's track, daily	37 shapefiles
1 hour navigation fixes, ship's track, daily	37 shapefiles
Ship's trackline, based on 1 minute fixes, daily	37 shapefiles
Ship's trackline, composit for Burdwood Bank area	1 shapefile
Ship's trackline, composit for Scotia Sea area	1 shapefile
Ship's trackline, composit for Elephant Is to end of cruise	1 shapefile
JGOFS[1] data every minute along ship's track	37 shape files
Ship's position at beginning and end of trawls and dredges	1 shapefile
Ship's position for beginning and end of TOWCAM lines	1 shapefiles
CTD sites	1 shapefile

New data (collected during NBP-1103) in ArcGIS:

Multibeam bathymetry, broad scale	1 grids
Multibeam bathymetry data for Burdwood Bank	4 grids
Multibeam bathymetry data for Shackleton Fracture Zone	4 grids
Multibeam bathymetry data for WAP sites	4 grids
Multibeam bathymetry data for Interim Seamount	4 grid
Multibeam bathymetry data for Sars Seamount	4 grid
Multibeam bathymetry data for Cape Horn	4 grids
1 minute navigation fixes, ship's track, daily	31 shapefiles
1 hour navigation fixes, ship's track, daily	31 shapefiles
Ship's trackline, based on 1 minute fixes, daily	31 shapefiles
Ship's trackline, composit	1 shapefile
JGOFS[1] data every minute along ship's track	31 shape files
Ship's position at beginnings and ends of trawls and dredges	1 shapefile
Ship's position at beginnings and ends of TOWCAM lines	1 shapefile
Ship's position at CTD and core sites	1 shapefile

[1] **JGOFS data includes:** GMT date, GMT time, NGL latitude, NGL longitude, Speed over ground GPS HDOP, Gyro heading, Course made good, Mast PAR, Sea surface temperature, Sea Surface conductivity, Sea Surface salinity, Sea depth, True wind speed , True wind direction, Ambient air temperature, Relative humidity Barometric pressure, Sea surface fluorometry, Transmissometer, PSP, PIR

References Cited: Cairns, Stephen D., 1982, Antarctic and subantarctic scleractinia. In Kornicker, L.S., ed., Biology of the Antarctic Seas XI, Antarctic Research Series Volume 34, AGU, Washington, D.C., p. 1 -74. Cairns, Stephen D., 1983, Antarctic and subantarctic stylasterina (coelenterate: hydrozoa). In: Biology of the Antarctic Seas XIII, Antarctic Research Series, Volume 38, AGU Washington, D.C., p. 61 - 164.

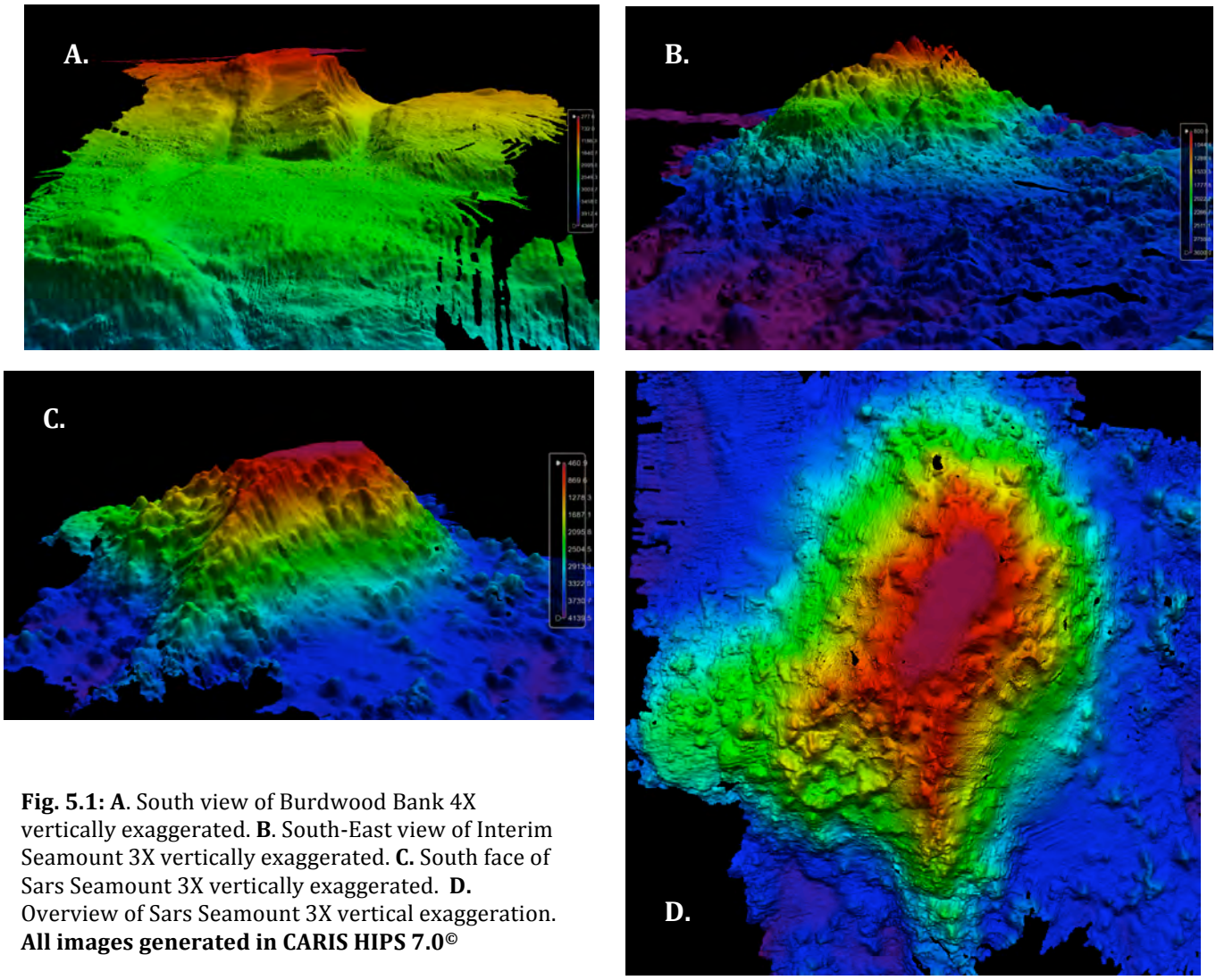


Fig. 5.1: A. South view of Burdwood Bank 4X vertically exaggerated. **B**. South-East view of Interim Seamount 3X vertically exaggerated. **C.** South face of Sars Seamount 3X vertically exaggerated. **D.** Overview of Sars Seamount 3X vertical exaggeration. **All images generated in CARIS HIPS 7.0©**

Figure 5.2 Multibeam collected *by NB Palmer*

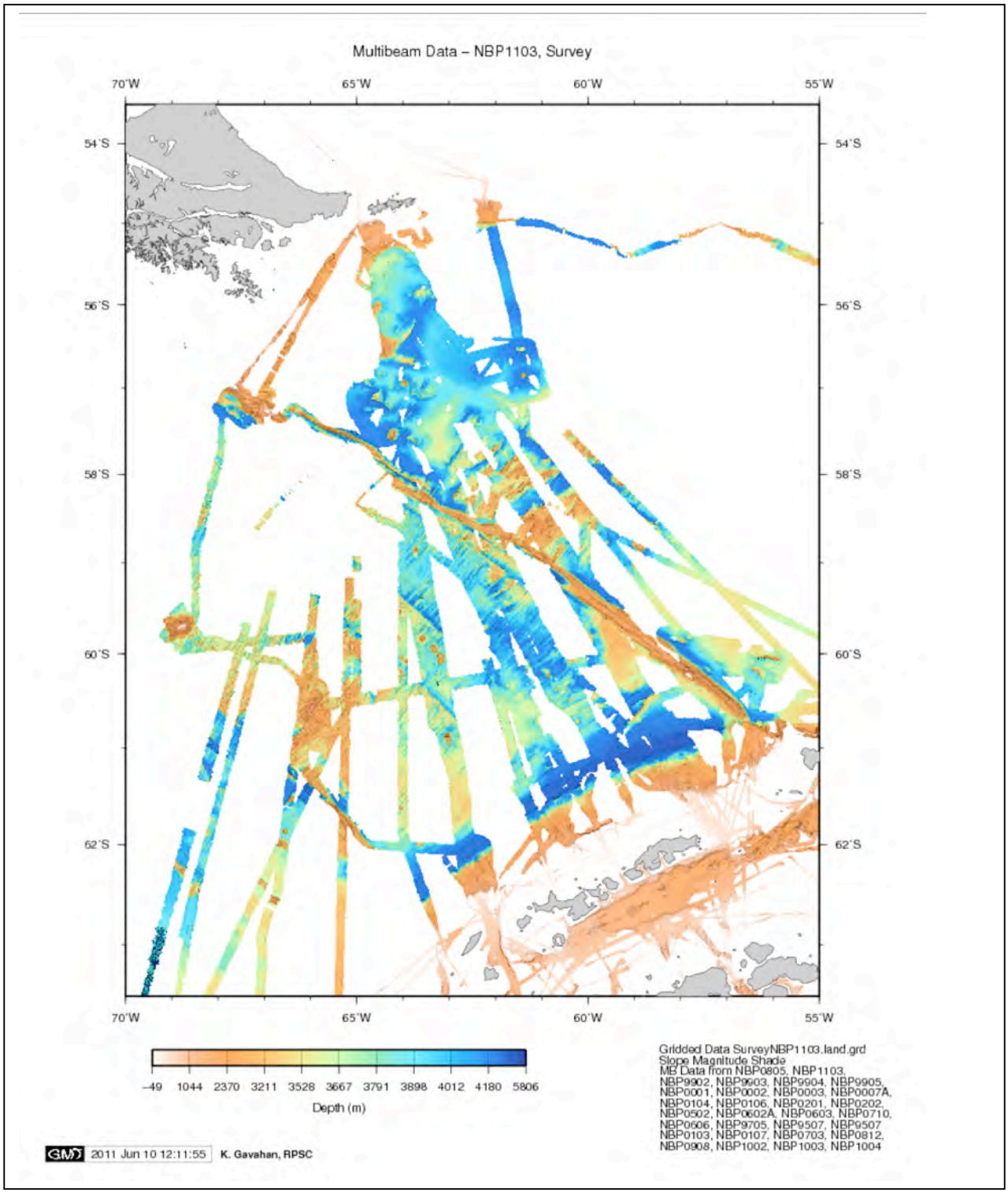


Figure 5.3: Multibeam collected on NBP11-03

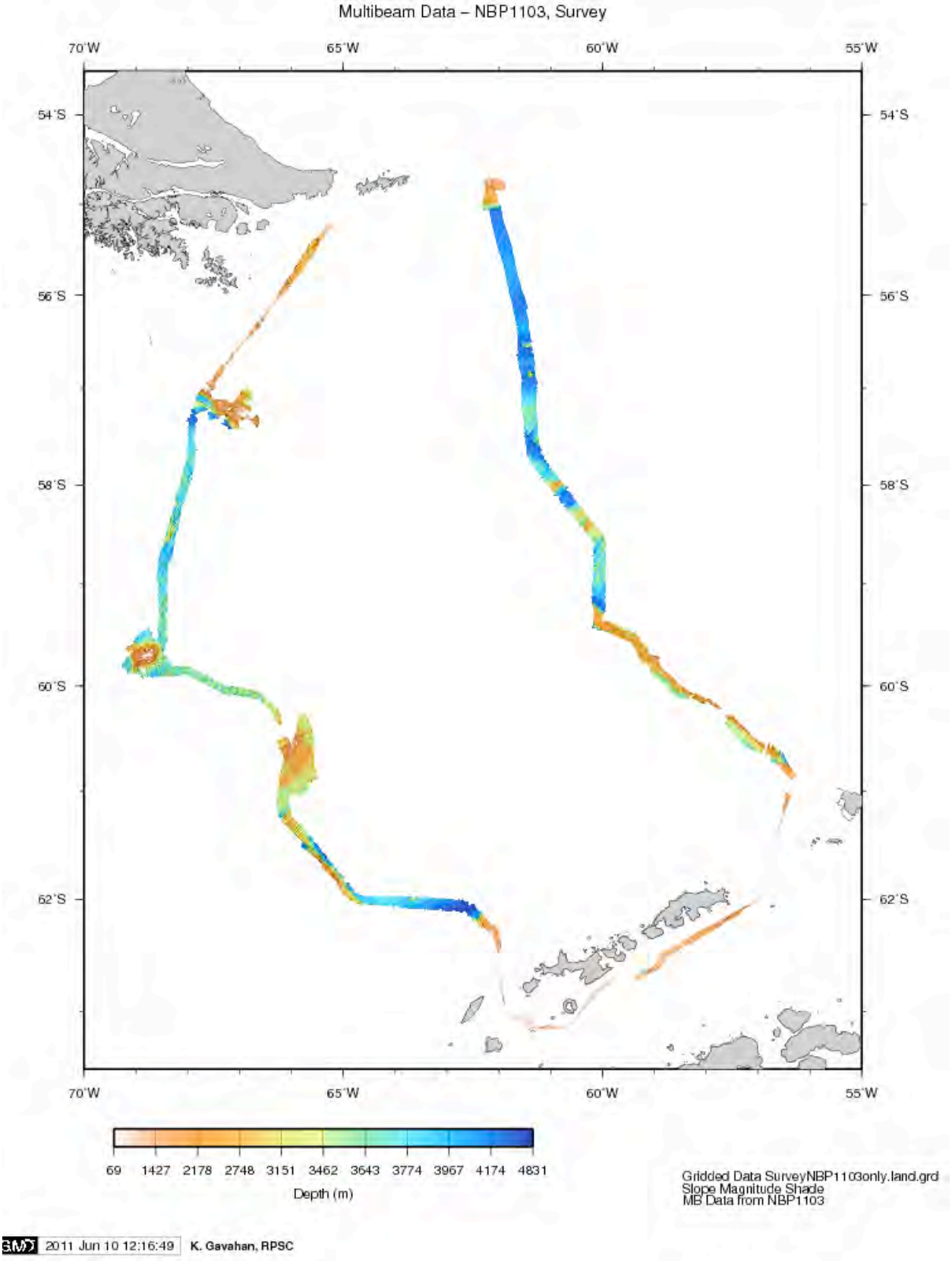


Figure 5.4: Multibeam map of Burdwood Bank

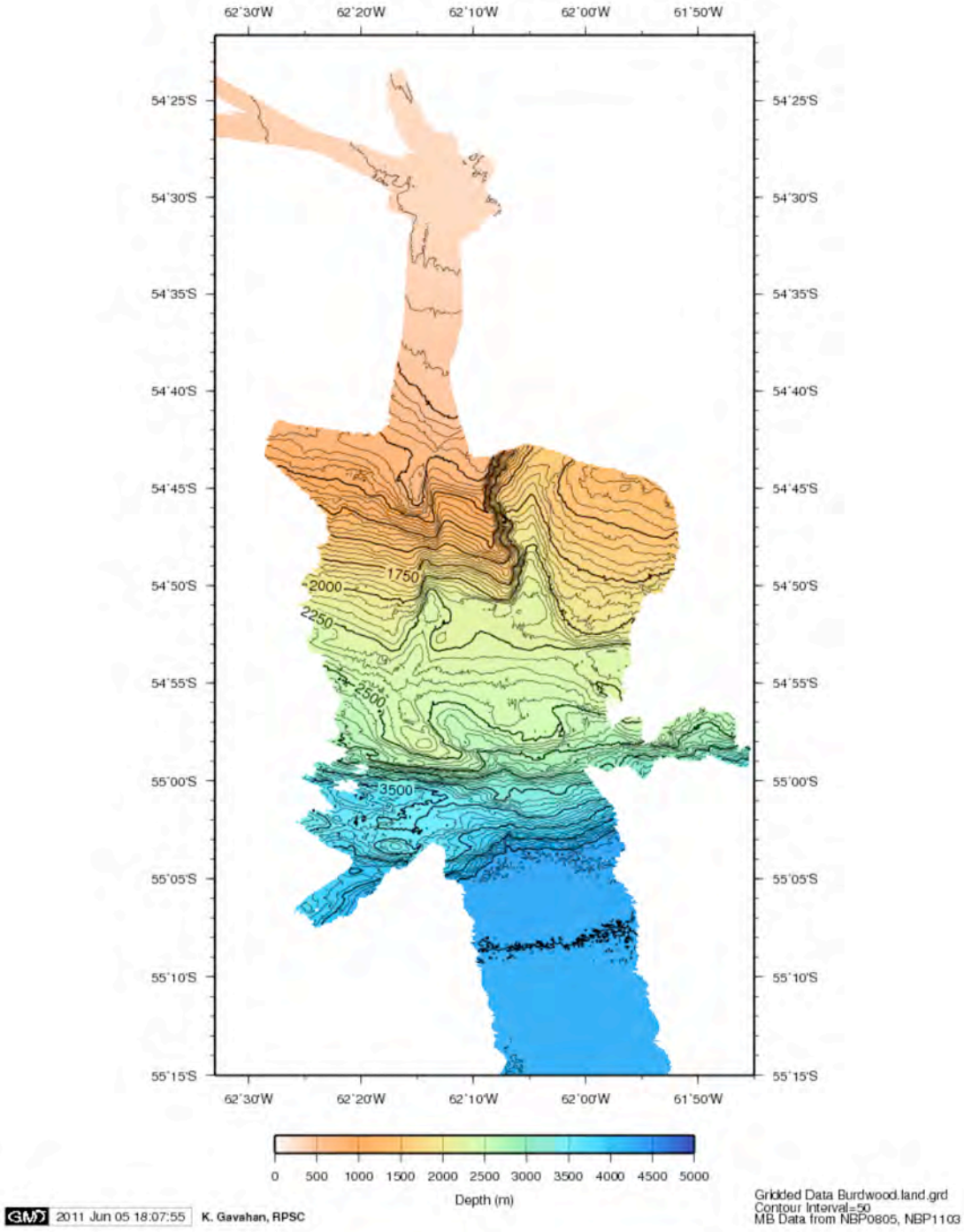


Figure 5.5: Sample map of Burdwood Bank

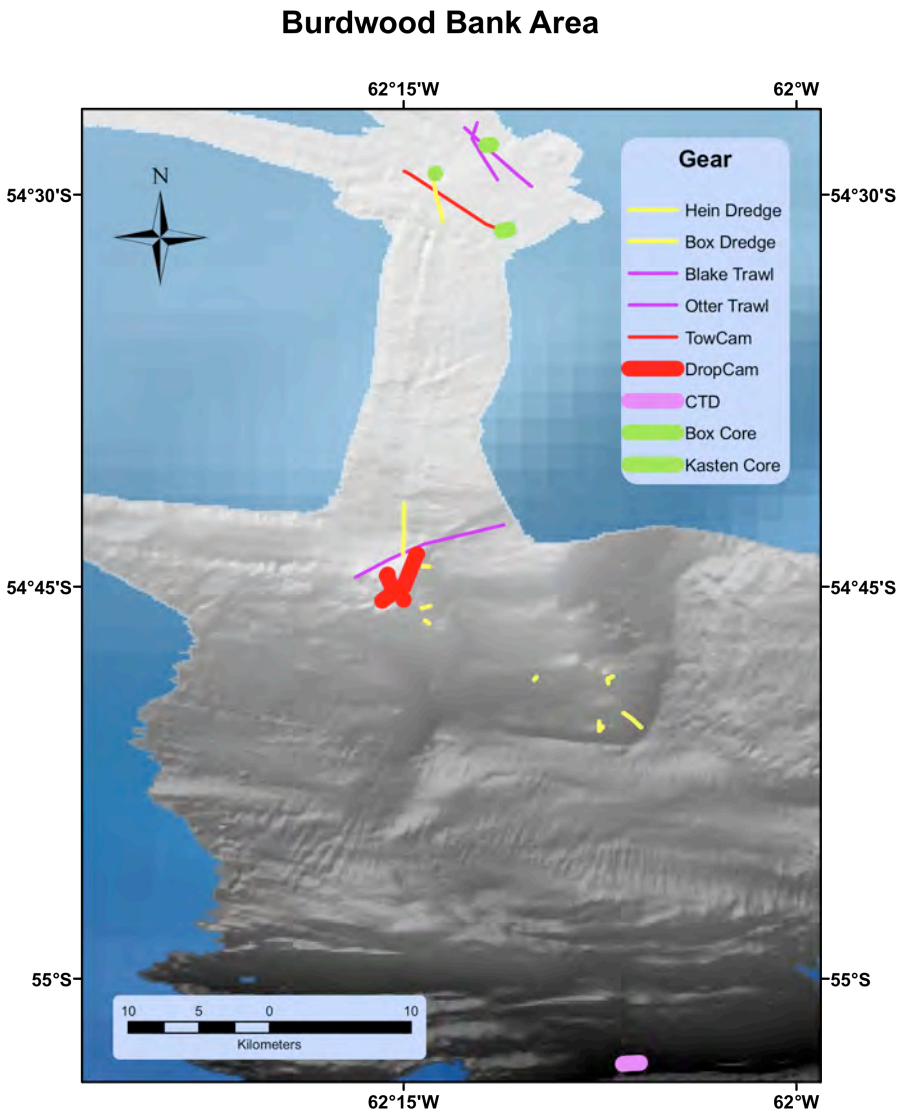


Table 5.1: Sampling at Burdwood Bank

Gear	Number
Box Core	3
Kasten Core	1
CTD	1
DCAM	4
TCAM	1
Hein Dredge	10
Box Dredge	0
Otter Trawl	0
Blake Trawl	3

Figure 5.6: Multibeam map of Shackleton Fracture Zone

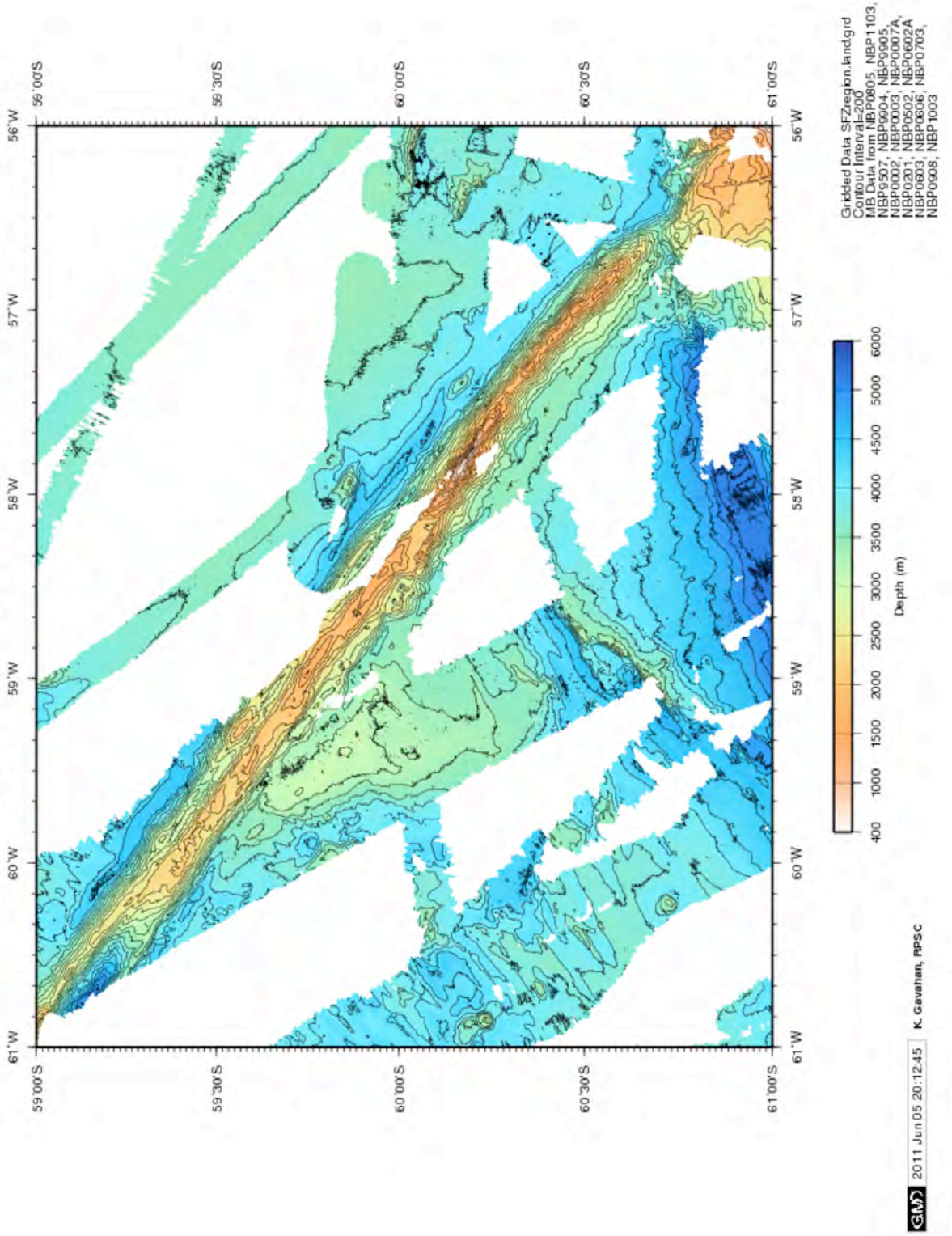


Figure 5.7: Sample maps of Shackleton Fracture Zone

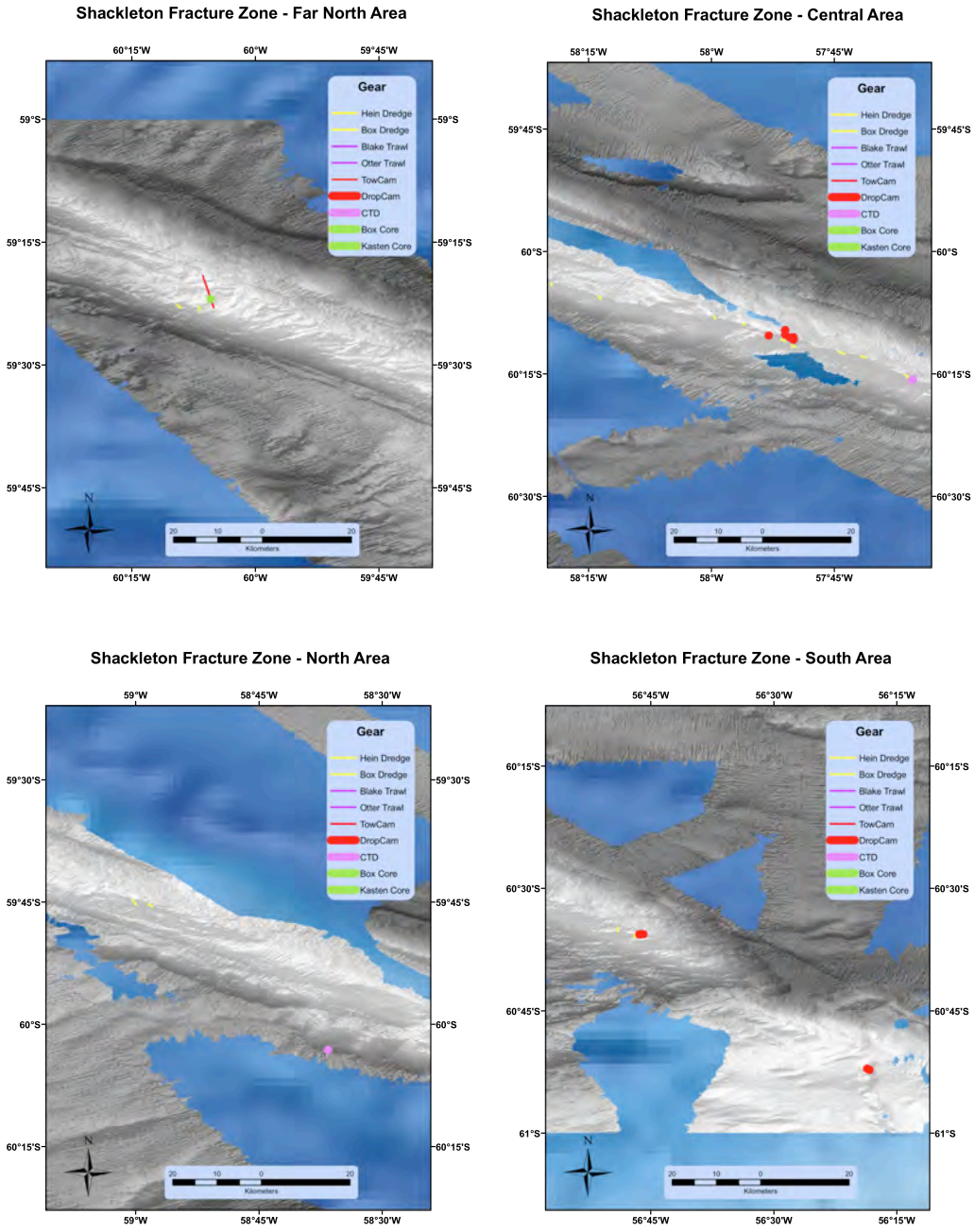


Table 5.2: Sampling at Shackleton Fracture Zone

Gear	Number
Box Core	2
Kasten Core	0
CTD	2
DCAM	12
TCAM	1
Hein Dredge	22
Box Dredge	0
Otter Trawl	0
Blake Trawl	0

Figure 5.8: Multibeam map of West Antarctic Peninsula shelf site

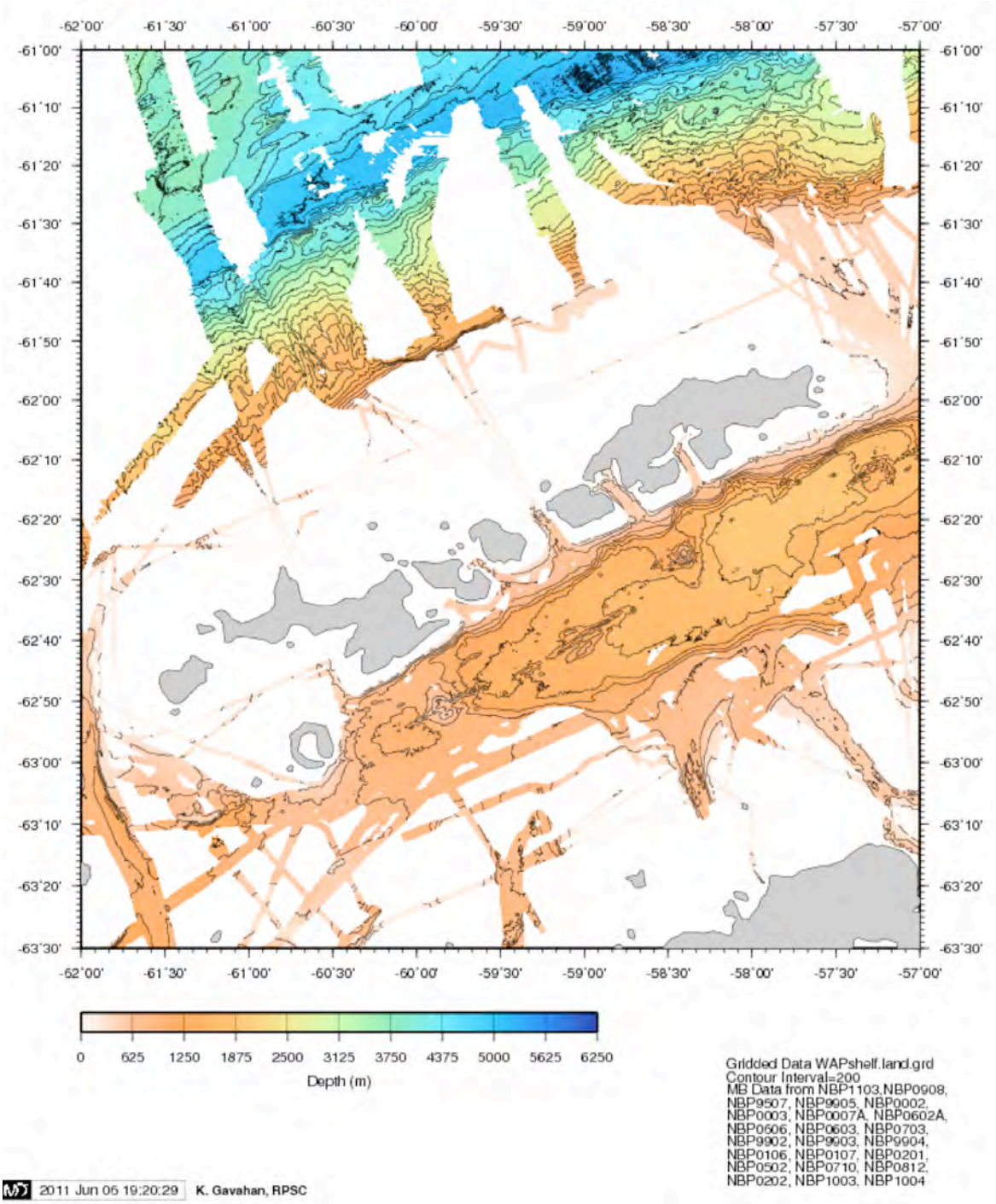


Figure 5.9: Multibeam map of West Antarctic Peninsula slope site

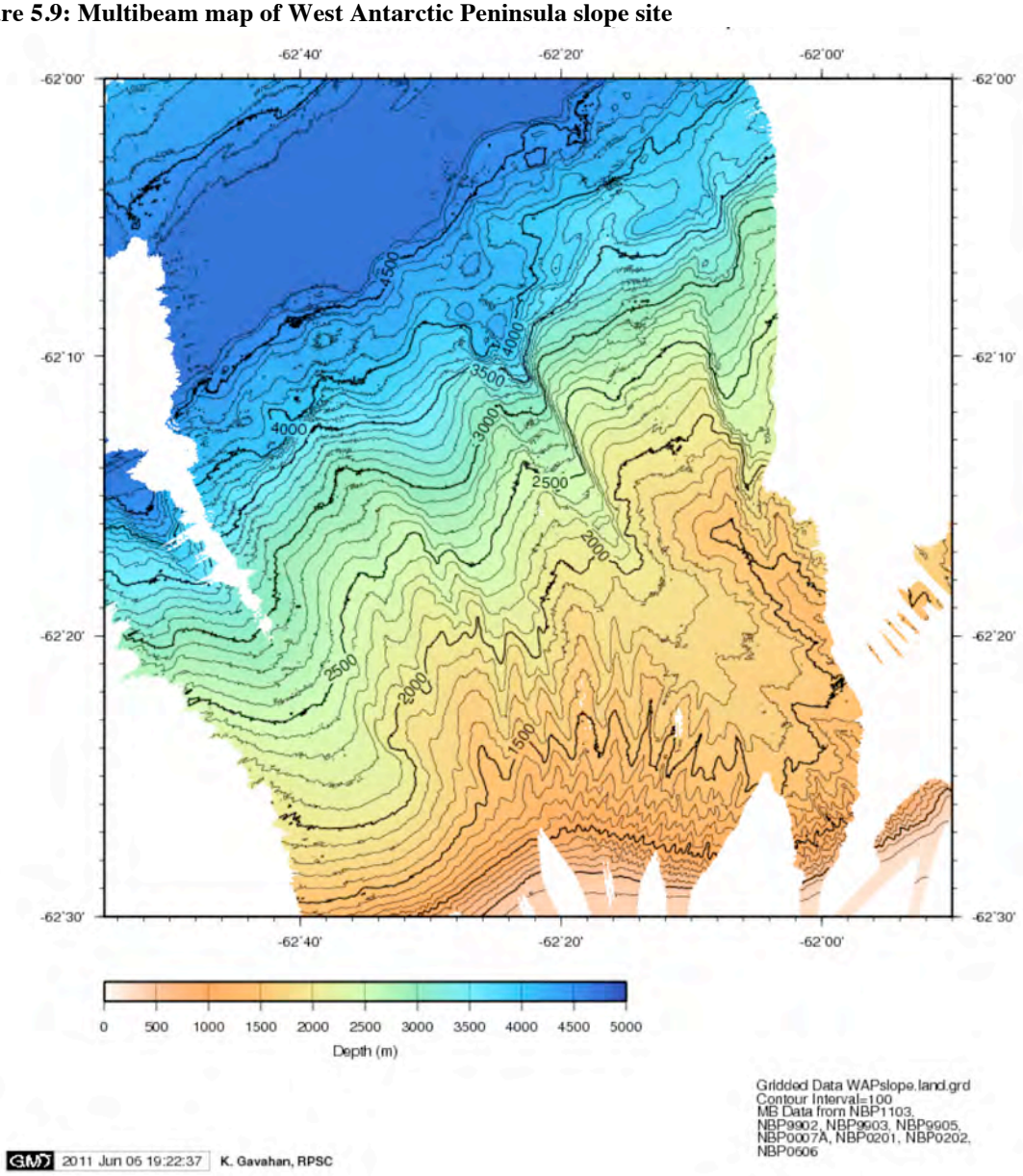


Figure 5.10: Sample map of West Antarctic Peninsula slope site

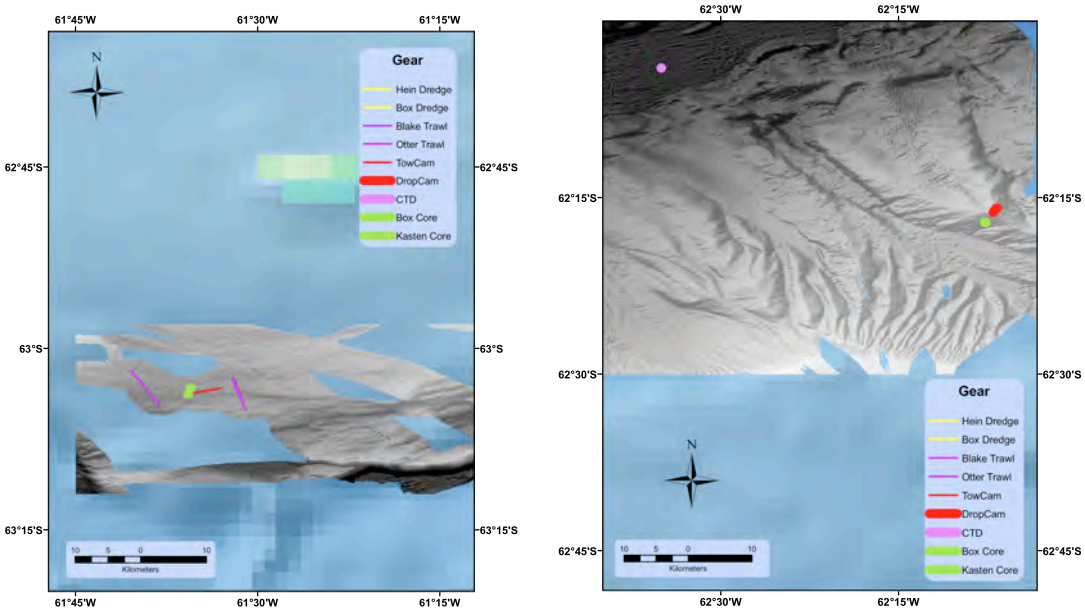
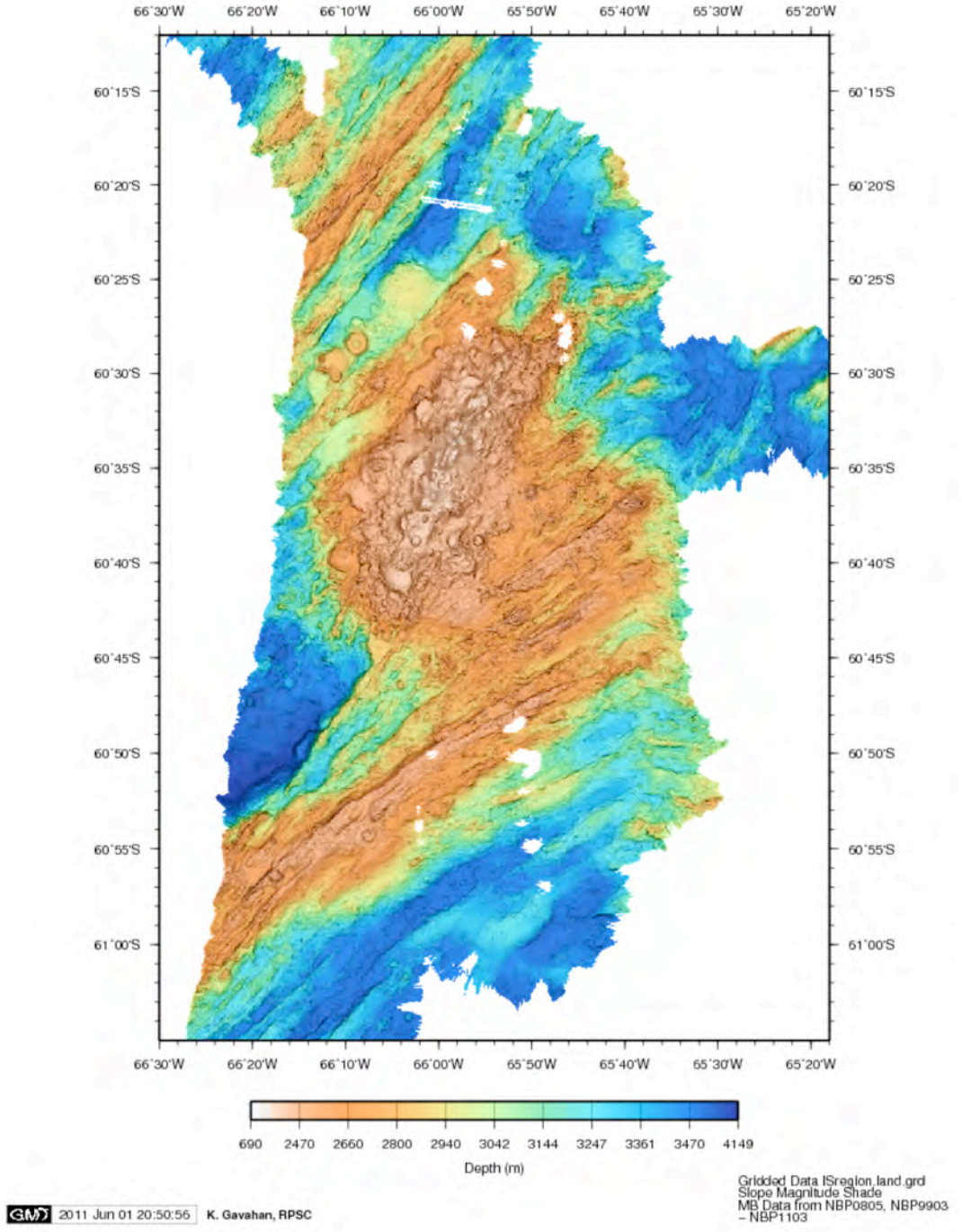


Table 5.3: Sampling at West Antarctic Peninsula

Gear	Number
Box Core	3
Kasten Core	1
CTD	1
DCAM	1
TCAM	1
Hein Dredge	0
Box Dredge	0
Otter Trawl	0
Blake Trawl	3

Figure 5.11: Multibeam map of Interim Seamount



Area

Figure 5.12: Multibeam map of Interim Seamount summit

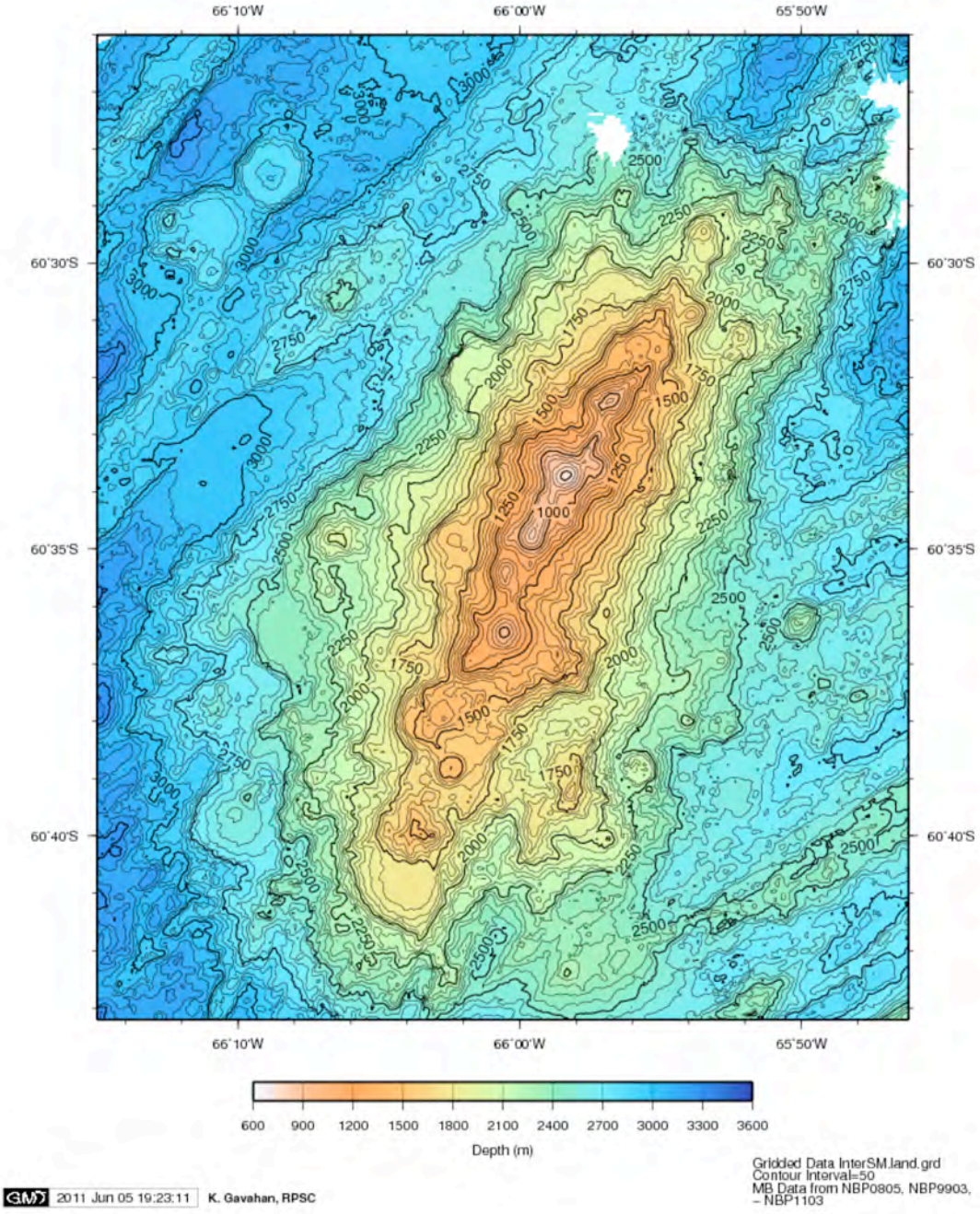


Figure 5.13: Sample map of Interim Seamount

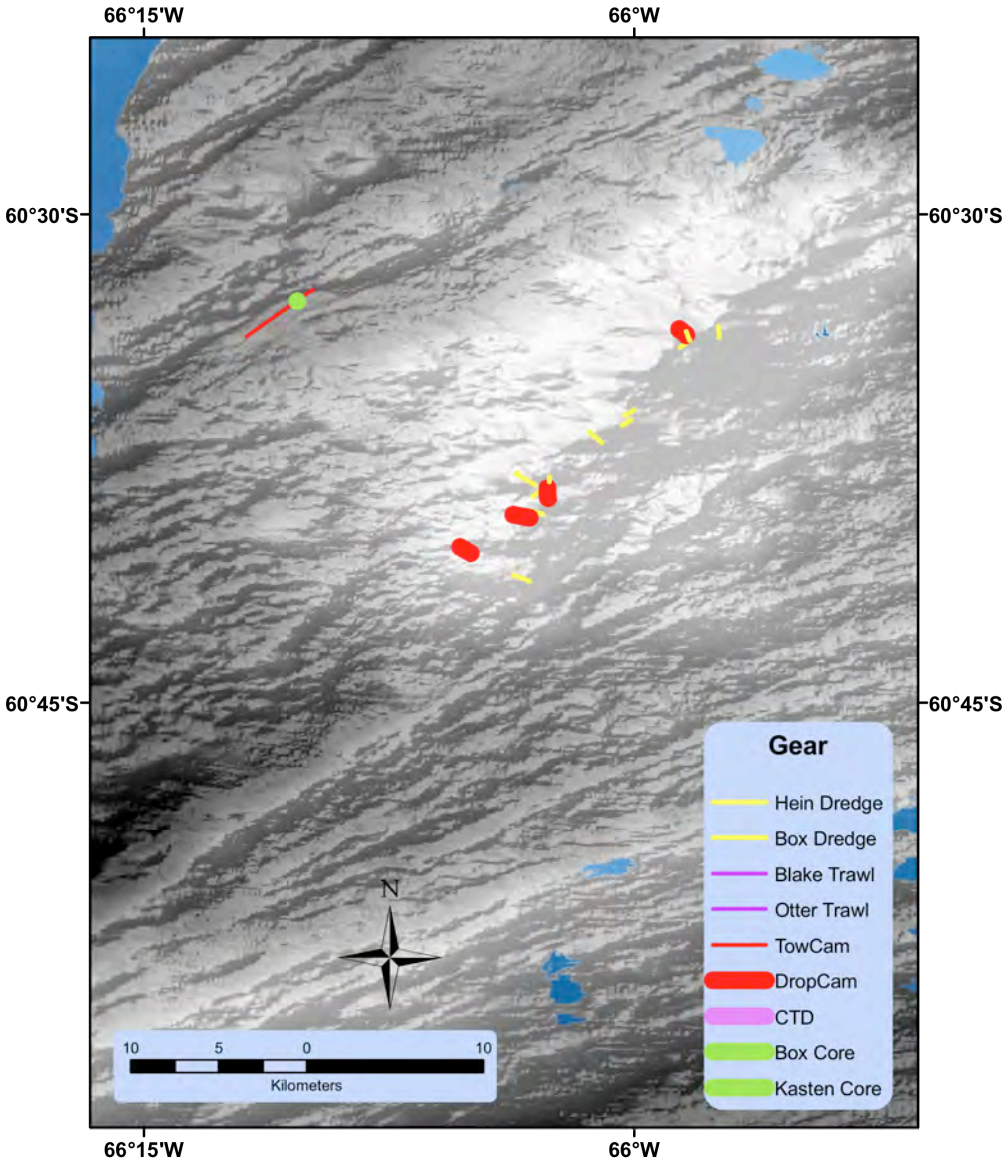


Table 5.4: Sampling at Interim Seamount

Gear	Number
Box Core	0
Kasten Core	1
CTD	0
DCAM	4
TCAM	1
Hein Dredge	12
Box Dredge	0
Otter Trawl	0
Blake Trawl	0

Figure 5.14: Multibeam map of Sars Seamount area

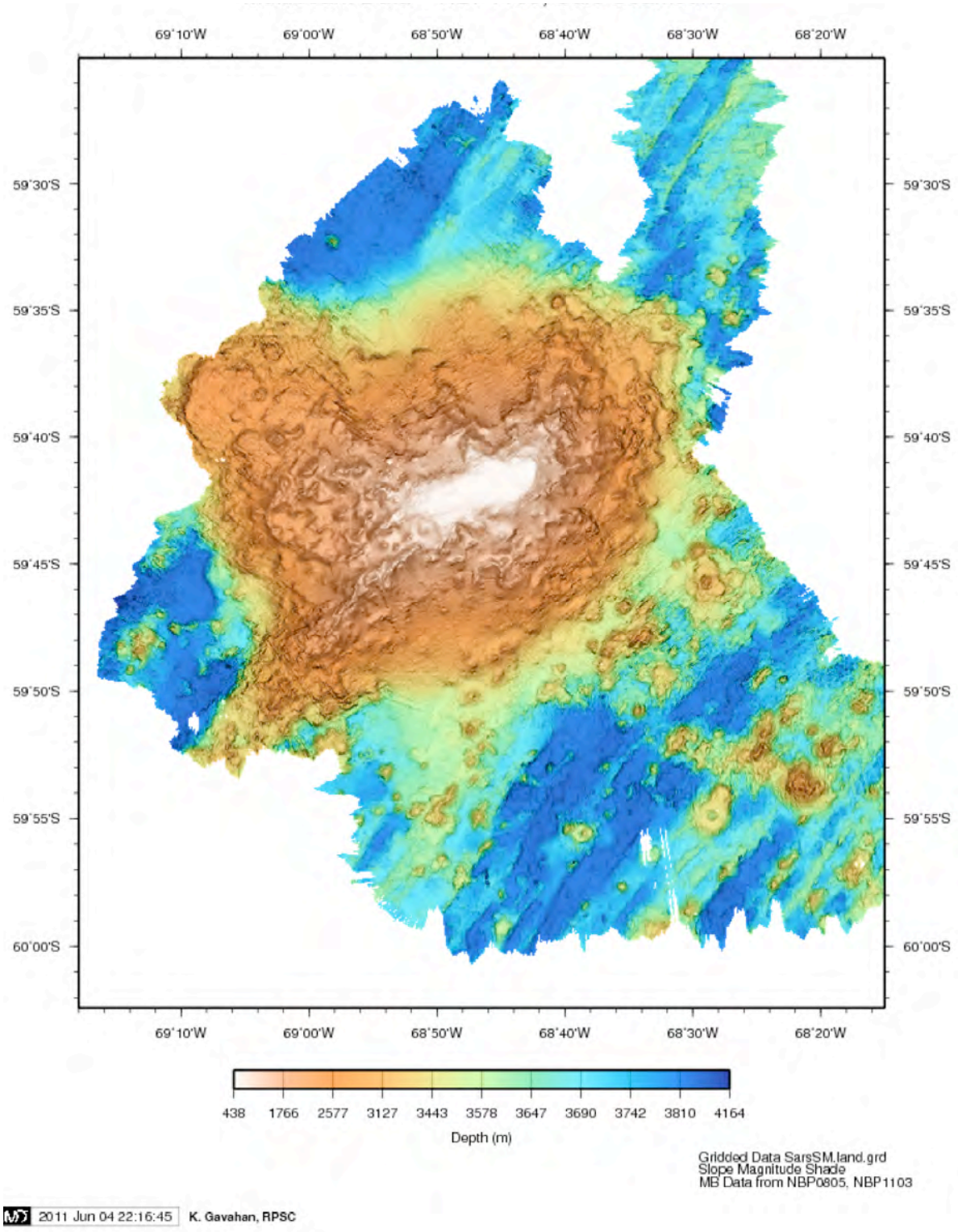


Figure 5.15: Multibeam map of Sars Seamount summit

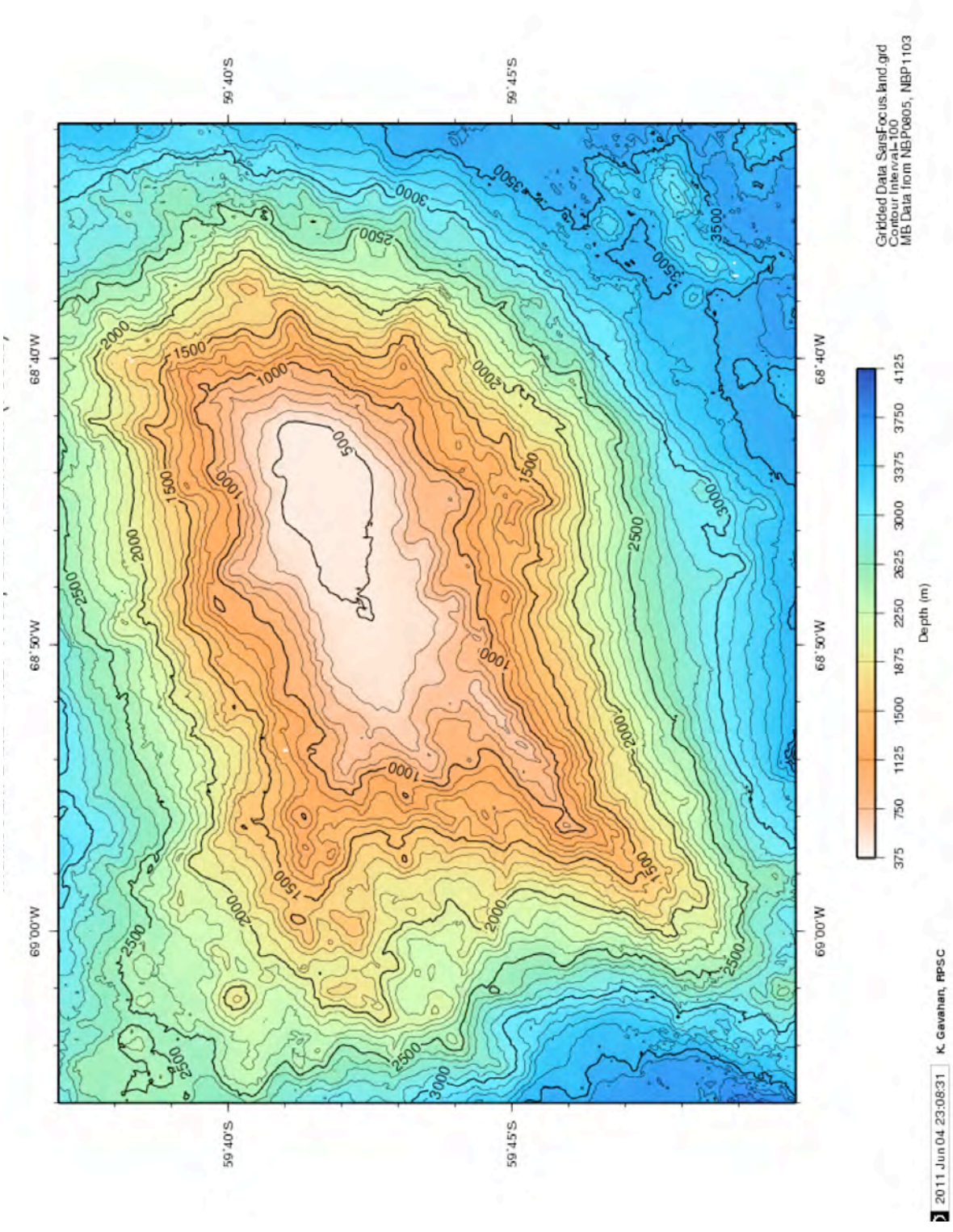


Figure 5.16: Sample map of Sars Seamount

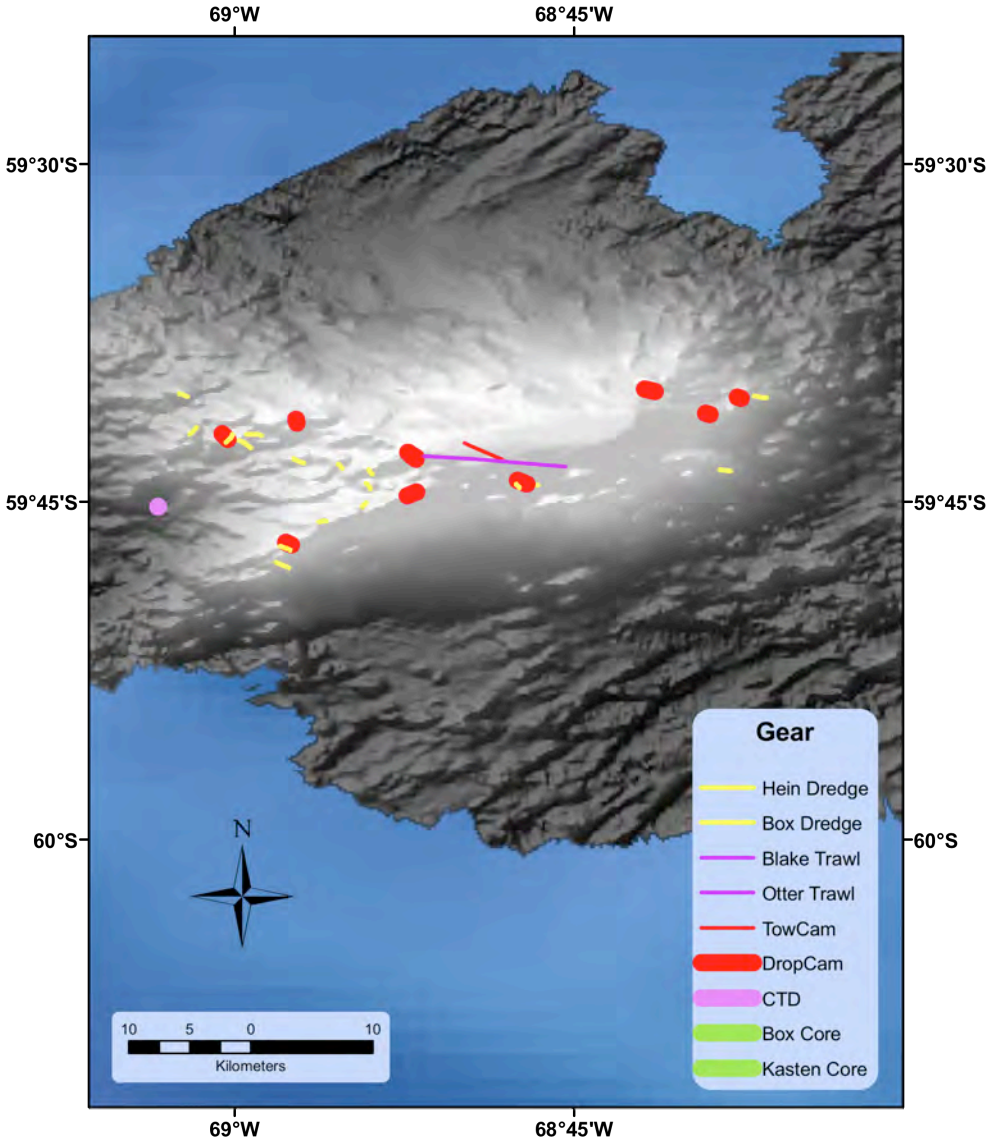


Table 5.5: Sampling at Sars Seamount

Gear	Number
Box Core	0
Kasten Core	0
CTD	1
DCAM	10
TCAM	1
Hein Dredge	22
Box Dredge	1
Otter Trawl	1
Blake Trawl	0

Figure 5.17: Multibeam map of Cape Horn Area

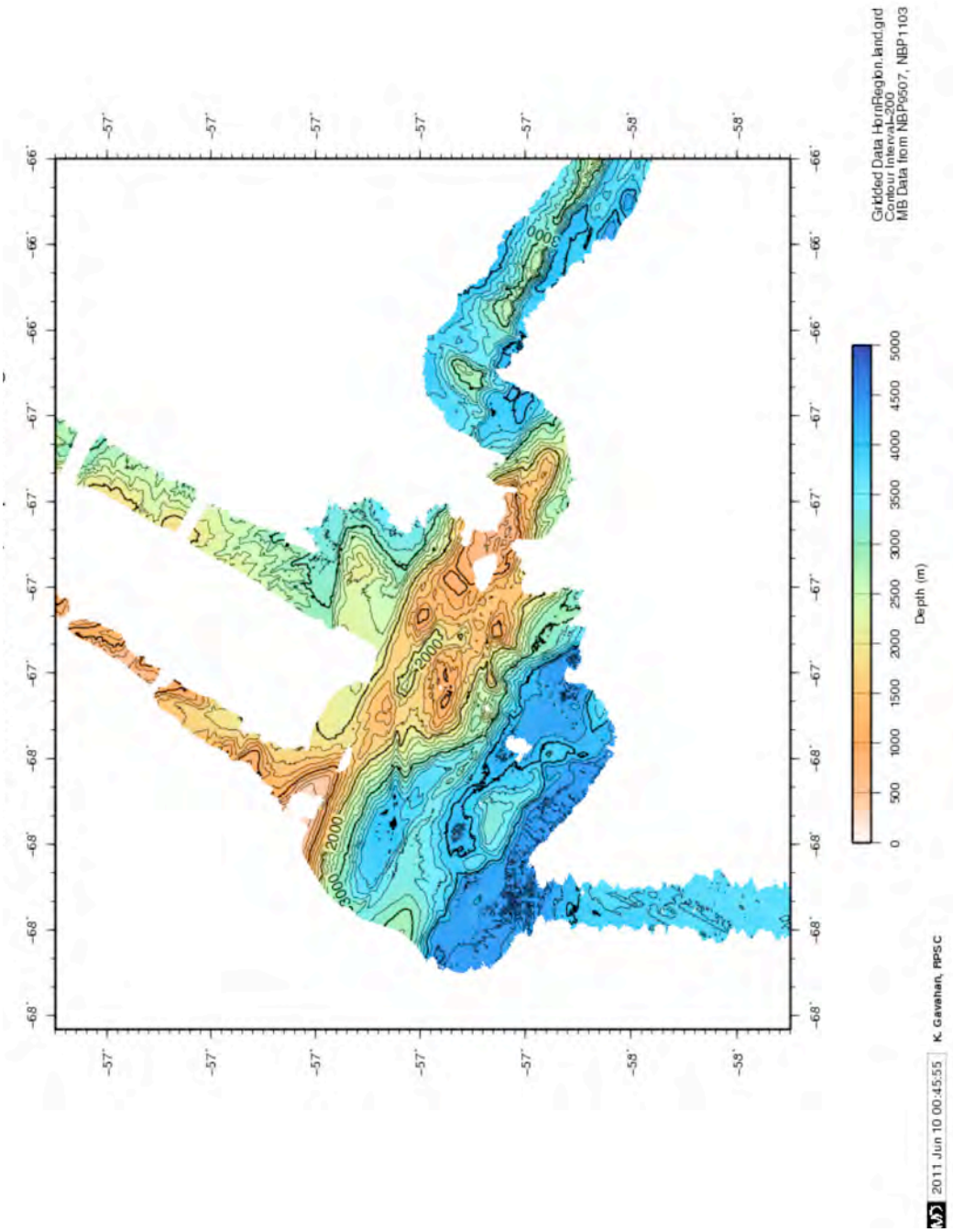


Figure 5.18: Multibeam map of Cape Horn Warren area

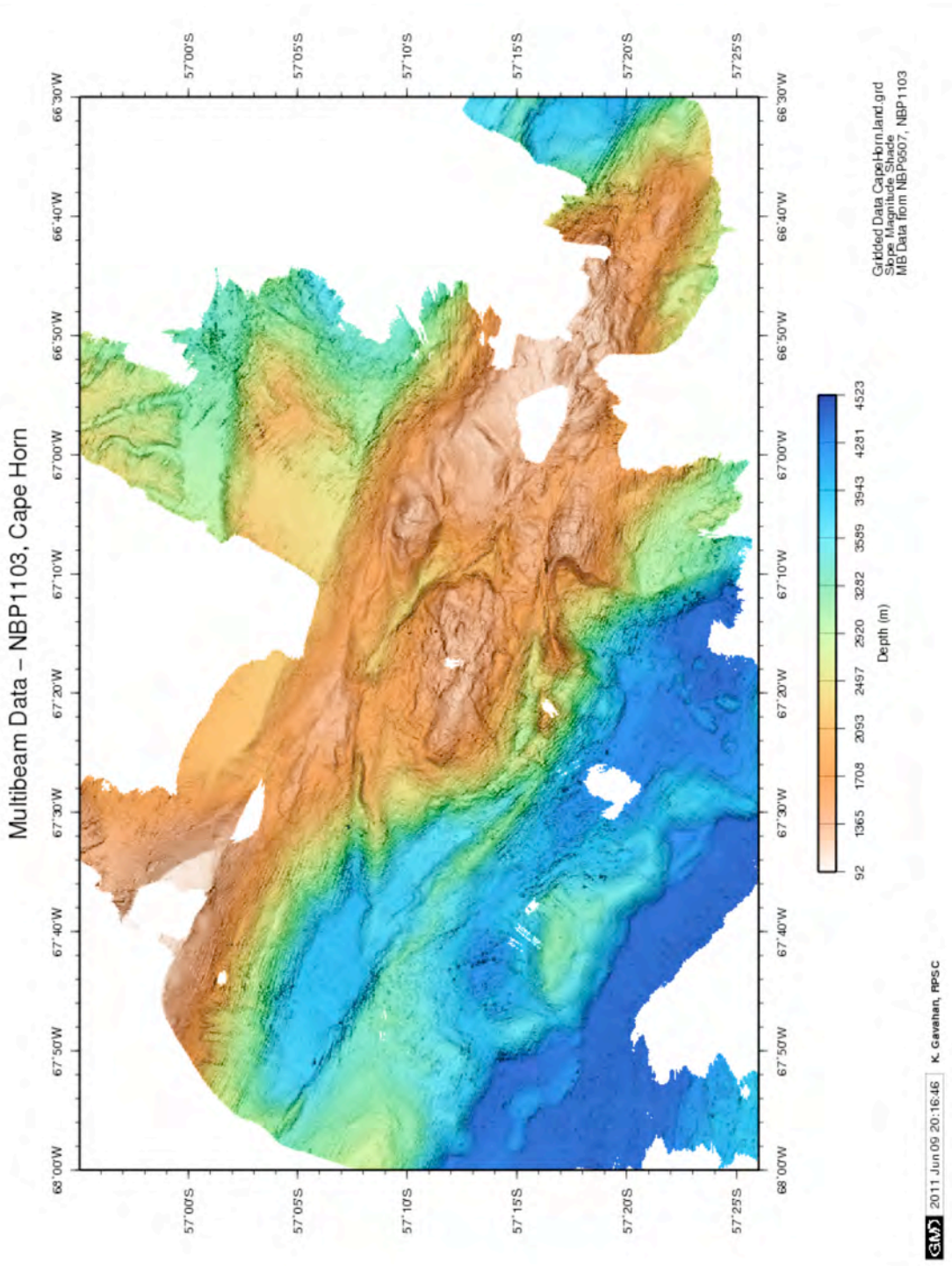


Figure 5.19: Sample maps of Cape Horn

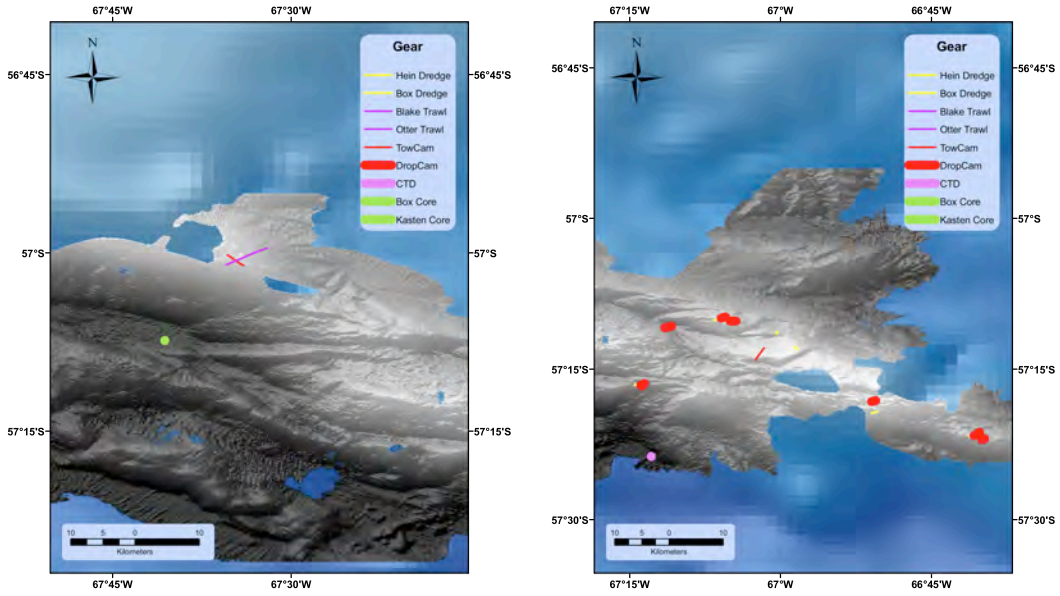


Table 5.6: Sampling at Cape Horn

Gear	Number
Box Core	0
Kasten Core	0
CTD	1
DCAM	10
TCAM	1
Hein Dredge	22
Box Dredge	1
Otter Trawl	1
Blake Trawl	0

6. Sampling Operations

6i. Trawls

Standard research size Blake and 18ft Otter Trawls were deployed during the course of NBP08-05 for collection of fossil and live biota. Both of these trawls were deployed from the aft A-frame. The Blake was able to be deployed without having to open the aft gates, and both required opening aft gates for recovery. The Blake trawl (13ft bridle, 3/8 steel cable) was used primarily on potentially gravelly terrain, whereas the Otter trawl was only deployed on very flat plateaus and soft sediments.

Both trawls were run in a similar manner. A suitable site was selected using geophysical techniques (multibeam / Knudsen). The boat was moved forward at 1.5-2 knots as the trawl was deployed letting wire out at ~20 – 30 m / min depending on wire out. Approximately 2 times the depth of wire was payed out, until the trawl reached the seafloor. Wire tension together with "spikiness" of tension was used to determine the first position at which the trawl reached the seafloor. The winch was stopped and the trawl was then dragged along the seafloor for approximately ten minutes (more in deeper water, less in shallow) then hauled in at 10 m/min. When the trawl left the seafloor it was pulled in at 20-25 m/min.

In total 7 Blake trawls and 1 Otter trawls were deployed during NBP11-03. Trawls were emptied into a RPSC built pallet box and moved by pallet jack to outside tables for sorting.

Fig 6.1. Research trawls used in NBP11-03, A, the Blake trawl; B, the Otter trawl

6ii. Dredges

The newly fabricated "Hein Dredge" was used on steeper and rocky terrain (that could not be trawled) to collect fossil and live corals. This dredge was deployed from the aft A-frame and could be deployed and recovered using two tag lines without opening the aft gates. The dredge was fitted it with a 10 ' long link chain bridle, a 22' 3/8" SS wire safety line attached to the rear tangs and a 9000lbs weak link attached between the line and termination.

The Hein Dredge was deployed in two ways, trawl-mode on flatter terrain, and dredge mode on steeper terrain.

(a) Trawl mode: A suitable site was selected using geophysical techniques (multibeam / Knudsen). The boat was moved forward at 1 knot as the dredge was deployed letting wire out at ~30 m / min. Approximately 2 times the depth of wire was allowed out, until the trawl reached the seafloor. The trawl was hauled along the seafloor for approximately ten minutes then hauled in at 10 m/min. When the trawl left the seafloor it was pulled in at 35 m/min.

(b) Dredge mode: The boat was held still using dynamic positioning. Wire was let out until the dredge reached the seafloor, which was detected using the reduction in tension on the tensiometer, very often coincident with the multibeam depth. An additional ~50m of wire was let out (this was not done later after tangling problems, see below) before moving the ship forward at 1 knot with an additional wire out at 30 m/min. The ship was moved upslope for a total of ~100m vertical, then the wire hauled in a 10m/min to start and then 20m/min until it left the seafloor. The dredge was then hauled in at 35 m/min to sea surface.

In total 75 Hein Dredges were deployed during NBP11-03. Dredges were emptied into a RPSC built pallet box and moved by pallet jack to outside tables for sorting.

On three trawls the wire became tangled either around itself or around the box. These tangles are mostly unexplained, but could be due to the wire gaining memory over the period of the cruise from being laid out and dragged along the seafloor, thus making bends and knots more likely.

The smaller box dredge was deployed at one station, in dredge mode as described in (b) above.

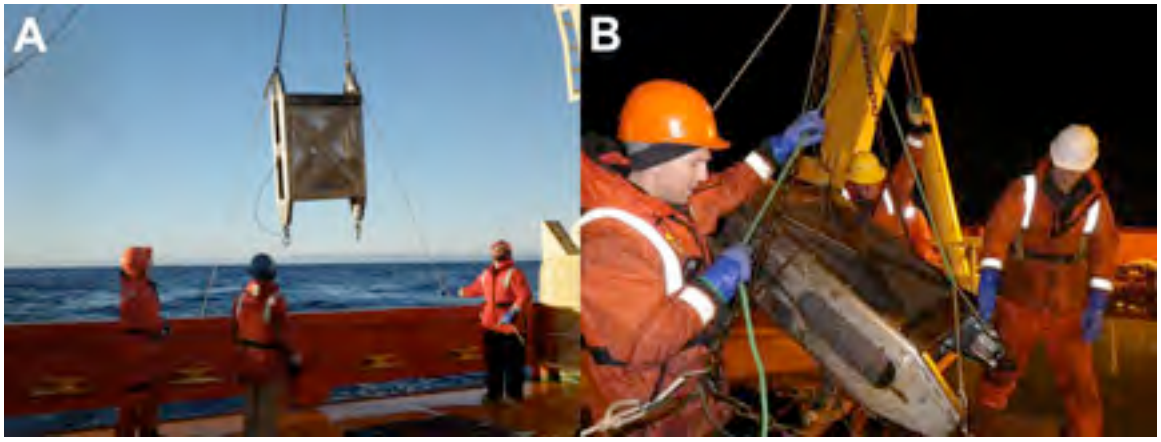


Fig 6.2, The Hein Dredge, A, being recovered; B, being emptied into the purpose made pallet box using a special rigging system.

6iii. TowCam Deployment

The "Towcam" from WHOI-MISO is an internally-recording deep-sea camera system with water-sampling capabilities. The equipment was surface shipped to Palmer in a WHOI-owned 20-foot container van for use on this cruise. The Tow Cam was towed from the ship's standard UNOLS 0.322-inch 3-conductor Rochester CTD seacable, which provided the telemetry from the CTD for height above bottom, collision avoidance, standard CTD data and confirmation of camera operation. On this cruise, WHOI personnel operated the Palmer's upper waterfall winch, wound with over 9500 meters of CTD seacable. Winch control was from the ship's Aft Control Station, an enclosed winch control room situated just aft of the waterfall winch and looking down onto the starboard A-frame and deck. This provided a reasonable view of overboarding, winch condition, seastate and final overboard block behavior. Palmer ship crew operated the winch during deployment and recovery, with selected science personnel taking over when the Tow Cam ran deeper than 50 meters. Upon arriving on station the Tow Cam was removed from the on-deck van onto the deck, where final preparations for launch were made. MTs from Palmer were in charge of deployment and recovery activities. On recovery, the MTs hooked onto the Tow Cam and secured the system on deck. Science personnel then brought the Tow Cam into the van, removed and sampled the water bottles, downloaded the camera and CTD, and prepared the Tow Cam for next use. After image files were recovered from the camera, they were time-corrected and renamed following standard WHOI Tow Cam procedures, backed up and distributed to the PIs. The SBE25 CTD data files were processed with both Sea-Bird and WHOI data processing routines to yield the standard set of Tow Cam CTD data products, including ASCII flash and ctd recordfiles.

6iv. DropCam Deployment

A purpose built DropCam system (similar to RPSC's YoYo Cam) was utilized for this cruise, using a frame and bottom contact switch provided by RPSC and camera, strobe, battery, two green lasers and wiring provided by WHOI-MISO. The OIS camera used for the WHOI TowCam (described above) was utilized for this system.

The DropCam operated using a 3m weighted line attached to a magnetic bottom contact switch. Once triggered this bottom contact switch triggered the camera and strobe, resulting in taking an image.

In total 39 DropCam deployments occurred during NBP11-03, resulting in a total of 908 seafloor images.

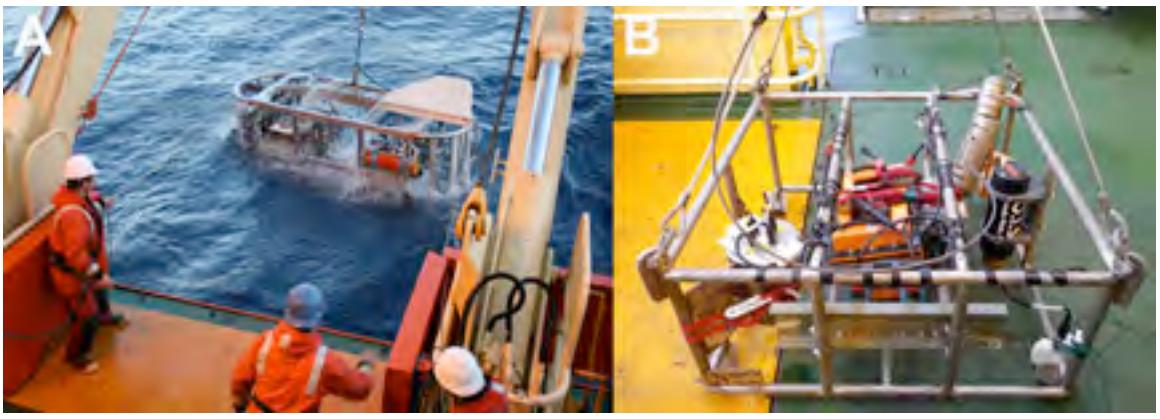


Fig 6.3. Cameras used in NBP11-03, A, the WHOI Towed Camera System; B, The fabricated DropCam system.

6v CTD

The Sea-Bird 991plus CTD (Conductivity Temperature Depth) unit of the Nathaniel B. Palmer was used to sample six full water column profiles during this cruise. The CTD package is made up of a SBE Carousel onto which a rosette of 24 Niskin bottles and sensors were mounted. The PVC Niskin bottles hold 10L of seawater and are fired using a hydrowire. Temperature and conductivity are recorded with two sensors. Additional data are collected with a fluorometer (fluorescence), a SBE43 dissolved oxygen sensor (dissolved oxygen), a transmissometer (turbidity), a pressure sensor, and a sonar. All sensors are connected to a central underwater SBE 911 unit. Deployment took place out of the Baltic room.

Fig 6.4. Recovery of the CTD

6vi Sediment coring

Sediment coring took place during the cruise to try ad recover corals buried within the sediment.
Three systems were used. Their deployment is outlined below and the sampling strategy and yields are described in section 7v.

(a) Box core (Figure 6.5a)

The box core was deployed from the aft A-frame and could be deployed and recovered without opening the aft gates and a pinger was attached to the wire at 20m above the box. Coring locations were chosen based on bathymetry, Knudsen 3.5kHz record and seafloor imagery. The box core was lowered at 30m/s to within 20m off bottom then stopped to let the wire settle and detect the pinger. Once the pinger distance had been confirmed the box was then lowered at 10m/min until the bottom was hit using both the pinger reading and a drop in tension. Around 5-10m of wire was let out and then the box was hauled in at 10m/min paying attention to a spike in tension to show the pull out.

(b) Kasten Core (Figure 6.5b)

The kasten core was deployed from the aft A-frame and could be deployed and recovered without opening the aft gates. Coring locations were chosen based on bathymetry, Knudsen 3.5kHz record and seafloor imagery. The Kasten core was lowered at 30m/s to 50m/s depending on wire out. The corer was held at about 20m above seafloor, then lowered at 10m/s to allow penetration. Recovery was at 30m/s.

(c) Minicorer (Figure 6.5c)

The minicorer was deployed at all locations where the CTD was used. It was attached via a 5m wide and used as the bottom contact switch. The CTD was lowered at 50m/s.

Figure 6.5. Coring devices used during cruise NBP11-03. a) Box core. b) Kasten core. c) CTD Mini core.

7. Paleoclimate Sampling

7i Fossil corals This section describes the fossil coral collections that we made during the cruise, focusing on six target areas: Burdwood Bank, Shackleton Fracture Zone, Antarctic Shelf, Interim Seamount, Sars Seamount, and Cape Horn. We carried out a total of six Blake trawls, one Otter trawl, one box dredge, and 75 Hein dredges to retrieve fossil deep-sea corals. Our overall yield was 14408 fossil solitary scleractinian corals, ~19kg of fossil colonial scleractinians, ~106 kg of fossil stylasterids, 28.5kg of fossil bamboo corals, and 38.3 kg of fossil shells, with samples covering a range in water depths from 311 to 2492m. All samples were water washed, sorted according to species, dried, and packed aboard the *Nathaniel B. Palmer*. All samples are tabulated in Appendix 1

Burdwood Bank

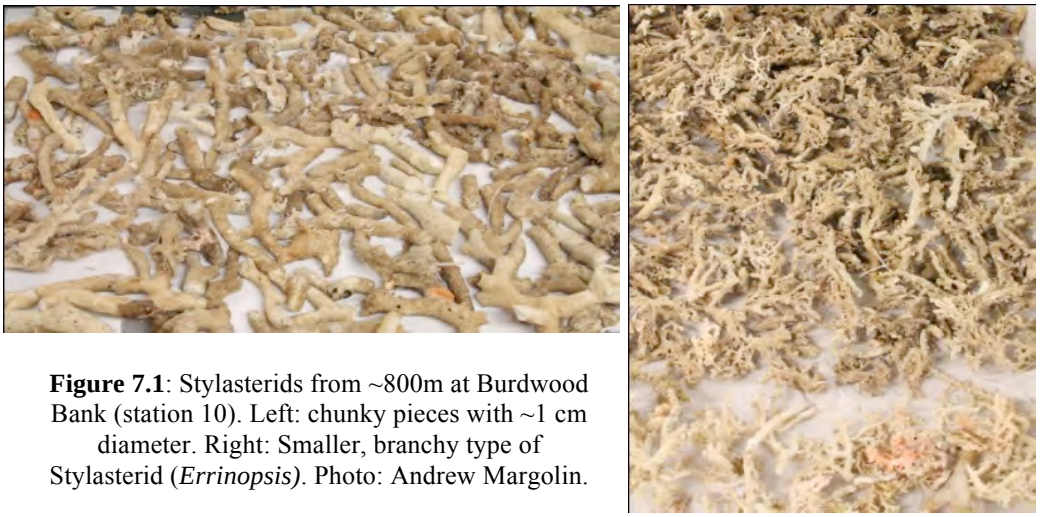


Figure 7.1: Stylasterids from ~800m at Burdwood Bank (station 10). Left: chunky pieces with ~1 cm diameter. Right: Smaller, branchy type of Stylasterid (*Errinopsis)*. Photo: Andrew Margolin.

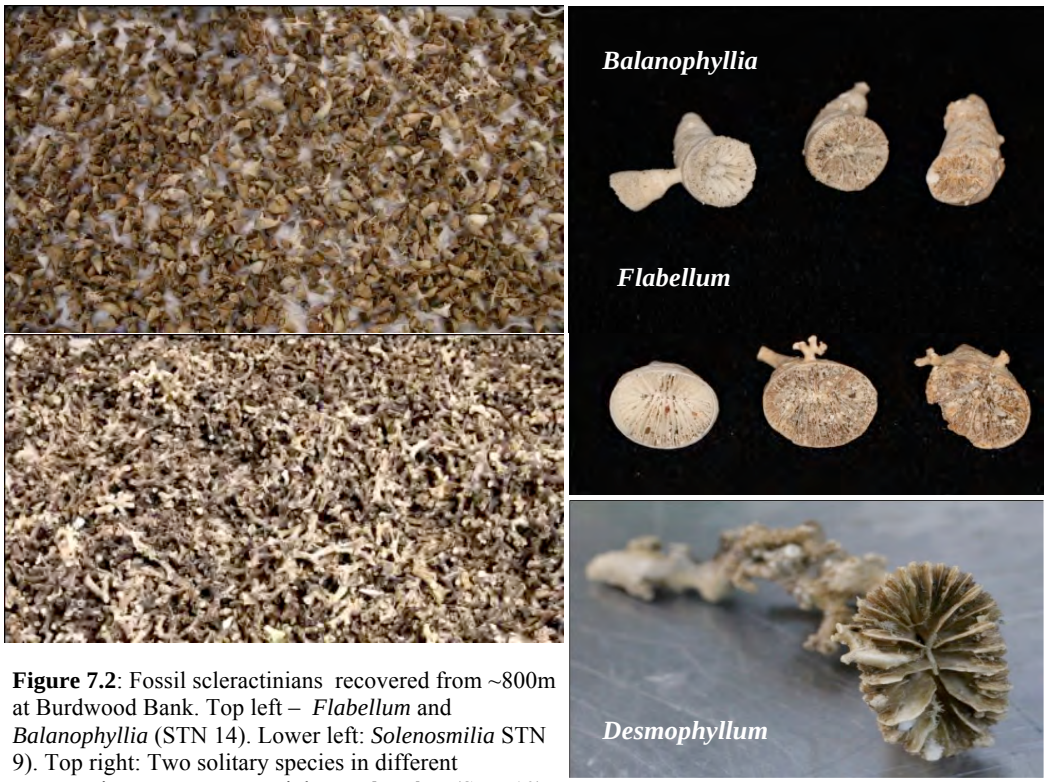


Figure 7.2: Fossil scleractinians recovered from ~800m at Burdwood Bank. Top left – *Flabellum* and *Balanophyllia* (STN 14). Lower left: *Solenosmilia* STN 9). Top right: Two solitary species in different preservation states. Lower right: *D. dianthus* (STN 10). Photo Andrew Margolin.

Three Blake trawls and ten Hein dredges were deployed at Burdwood bank, and each one of them yielded a variety of fossil corals. 3816 individual fossil solitary scleractinians, 9.8 kg fossil colonial scleractinians (*Solenosmilia*), and ~21 kg of fossil *Stylasterids* were recovered, with maximum recovery at mid depth (~700-800m; STNs 9,10,14). Corals were however found in water depths from 311 to 1922m. The dominant solitary scleractinian genus was *Balanophyllia*, but *Flabellum* was also abundant. We also collected a number of corals from a Kasten core (STN 28). Corals extracted from the muddy sediment include *Caryophyllia, Flabellum, Balanophylia* and *Stylasterids* down to 31 cm below surface. Finally, a total of ~2 kgs of other shells were collected at Burdwood Bank (mainly brachiopod and bivalve shells; see separate section on bivalves).

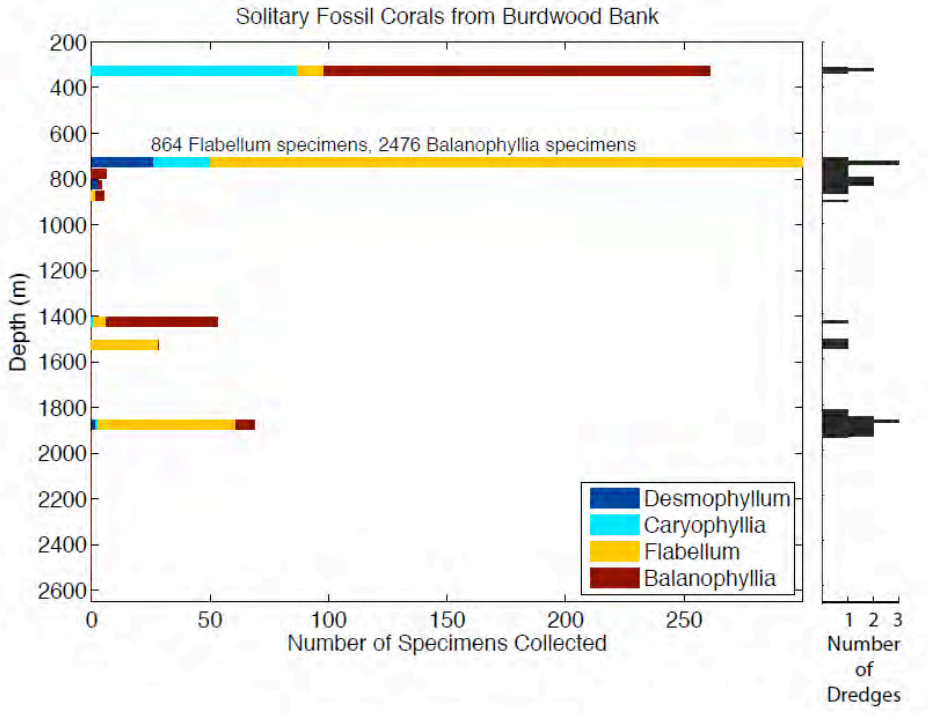


Figure 7.3: Distribution of numbers of different solitary scleractinians recovered at Burdwood Bank versus water depth. Shown on the right is the number of dredges/trawls deployed at each depth.

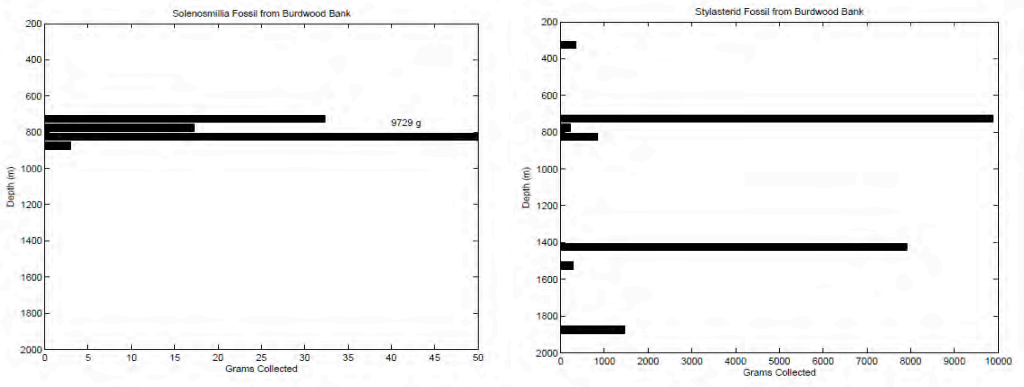


Figure 7.4: Distribution of amount of colonial scleractinians (*Solenosmillia*, left) and Stylasterids (right) recovered at Burdwood Bank versus water depth.

Shackleton Fracture Zone We recovered fossil corals from 19 out of 22 Hein dredges along the Shackleton Fracture Zone. In detail, water depths between 717 and 2492m were dredged, and 624 solitary scleractinians, ~8.4 kg of *Stylasterids*, 132g of bamboo coral, and ~1.3 kg of miscellaneous shells (mainly brachiopods and bivalves) were recovered. Solitary corals were mainly of the species *Caryophylia* and most abundant between 780 and 860m.

Figure 7.5: Left: Stylasterids from the Shackleton Fracture Zone (STN 37). Right: Solitary scleractinian *Caryophylia* from the Shackleton Fracture Zone in different preservation states (STN 40). Photo: Andrew Margolin.

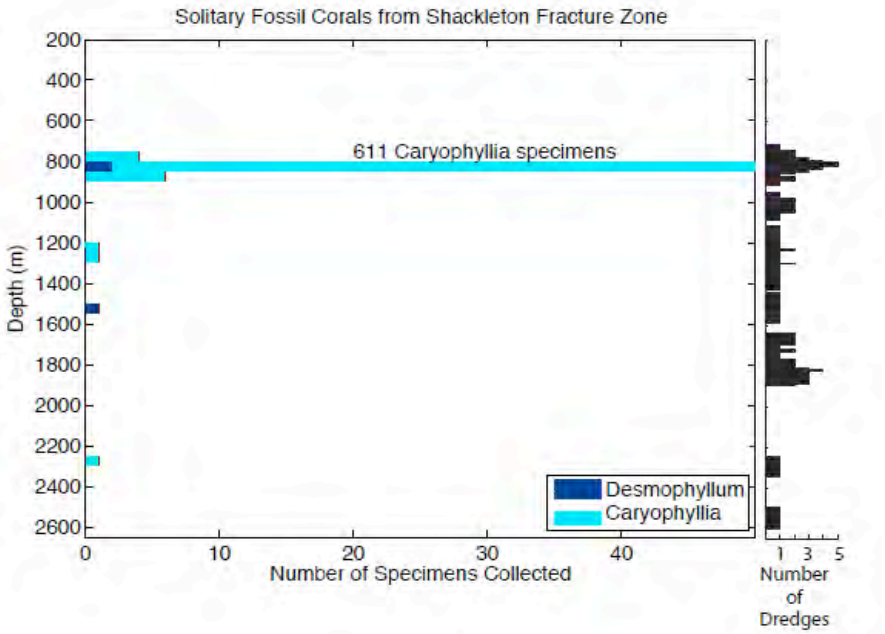


Figure 7.6: Distribution of numbers of different solitary scleractinians recovered along the Shackleton Fracture Zone versus water depth. Shown on the right is the number of dredges/trawls deployed at each depth.

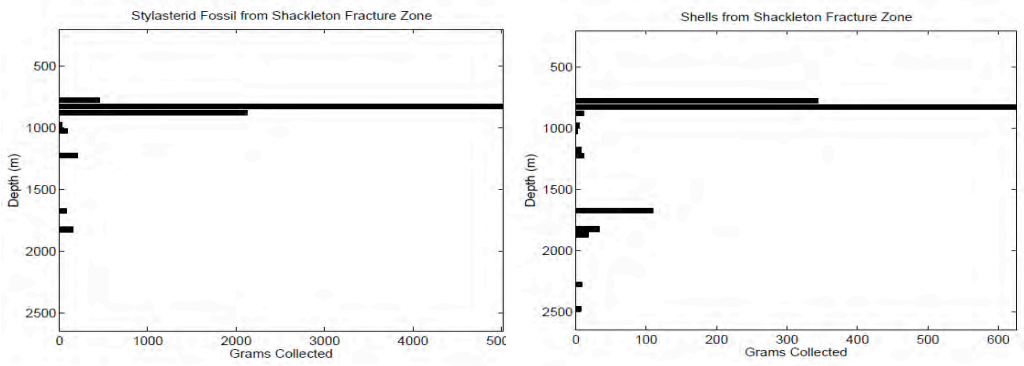


Figure 7.7: Distribution of amount of Stylasterids (left) and shells (right) recovered from the Shackleton Fracture Zone versus water depth.

Antarctic shelf/WAP

Three Blake trawls were deployed on the Antarctic shelf in water depths of 588 to 609 m. Material recovered only contained a small amount of fossil corals, comprising a total of 16 fossil solitary scleractinians (*Flabellum* and *Balanophyllia*), and 149g of fossil Stylasterids.

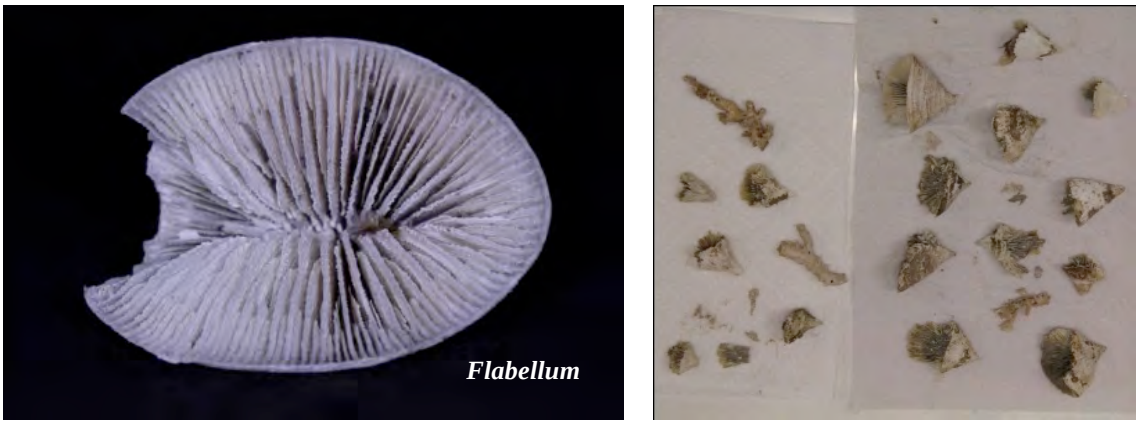


Figure 7.8: Left: Close up picture of the solitary cold water coral *Flabellum* (STN 67). Right: Overview of all fossil corals collected from a Blake trawl at STN 67. Photo: Andrew Margolin.

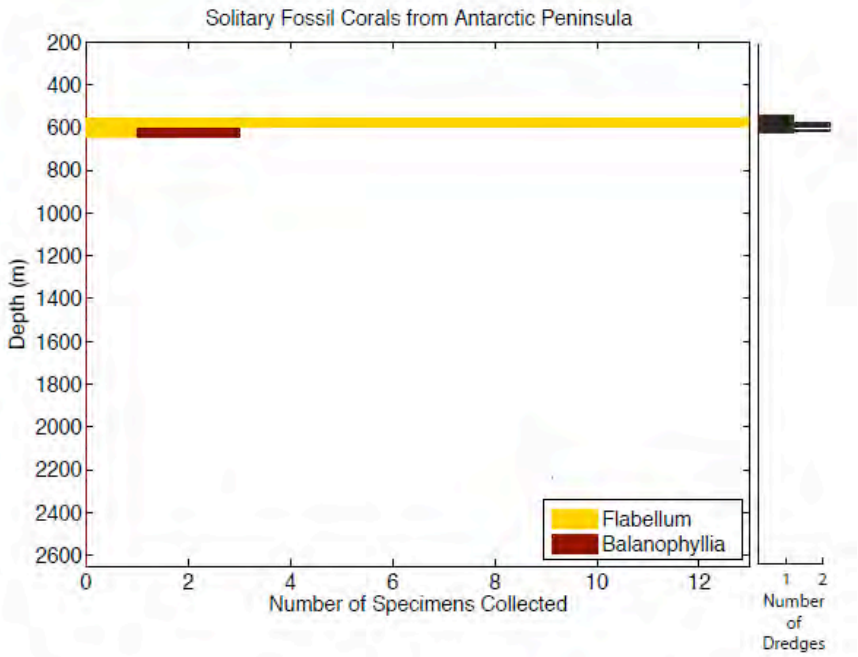


Figure 7.9: Distribution of numbers of different solitary scleractinians recovered on the Antarctic shelf versus water depth. Shown on the right is the number of trawls deployed at each depth.

Interim Seamount

Figure 7.10: Fossil bamboo corals from Interim Seamount (STN 74). Photo: Andrew Margolin.

Twelve Hein dredges were deployed at "Interim" Seamount in water depths of 785 to 1815 m. One dredge failed (weak link broke, STN 86). All other dredges yielded various amounts of fossil corals. Most of them were heavily coated with ferromanganese oxides and hydroxides. Among these, we found 20 *D. dianthus* and a species previously not reported for the middle of the Drake Passage, *Gardeneria Antarctica* (Fig. 7.12). We also dredged about 11.5 kg of bamboo corals at Interim (Figure 7.10). The ~15 kg of Stylasterids yielded about a dozen of large, branchy pieces (Figure 7.11).

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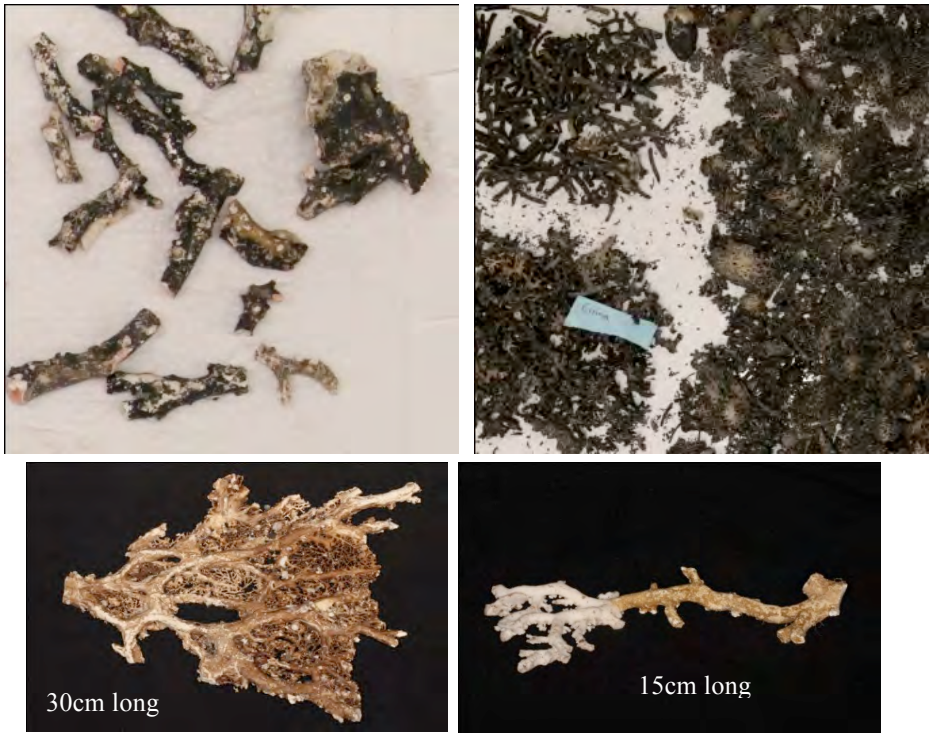


Figure 7.11: Stylasterids from Interim Seamount. Top left: Chunky Stylasterids with pink interior (unidentified species; STN 78). Top right: Three different species of Stylasterids: *Errina* (lower left), *Errinopsis* (right), and unidentified species (upper left). Lower left: Branches of stylasterids from STN 88. Photo: Andrew Margolin.

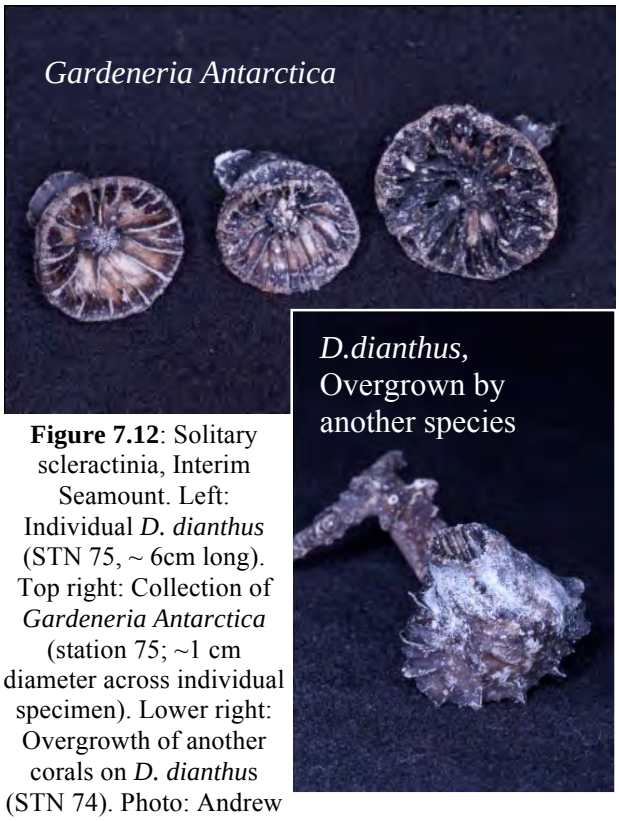


Figure 7.12: Solitary scleractinia, Interim Seamount. Left: Individual *D. dianthus* (STN 75, ~ 6cm long). Top right: Collection of *Gardeneria Antarctica* (station 75; ~1 cm diameter across individual specimen). Lower right: Overgrowth of another corals on *D. dianthus* (STN 74). Photo: Andrew Margolin.

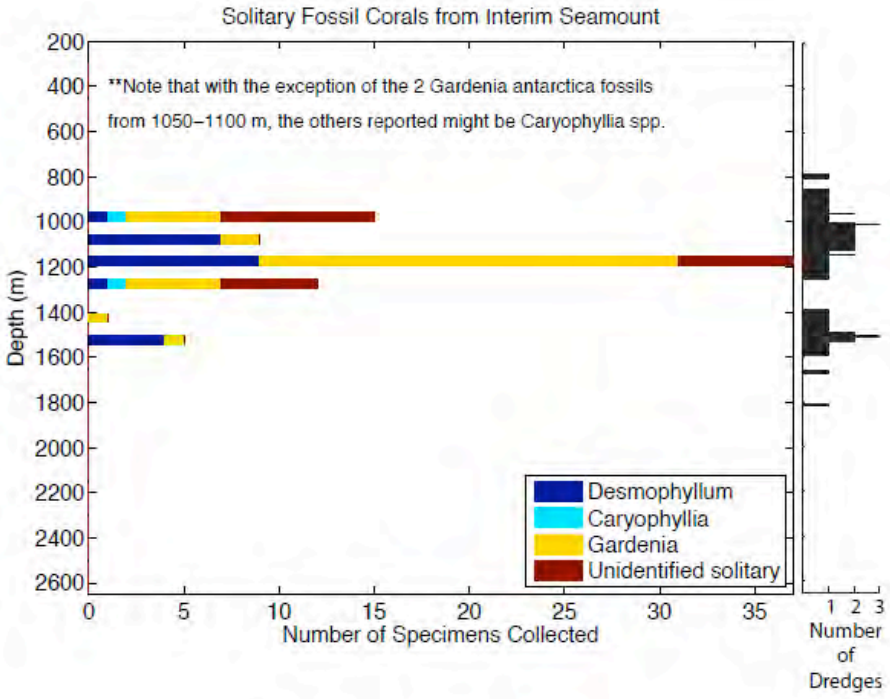


Figure 7.13: Distribution of numbers of different solitary scleractinians recovered at Interim seamount versus water depth. Shown on the right is the number of trawls deployed at each depth.

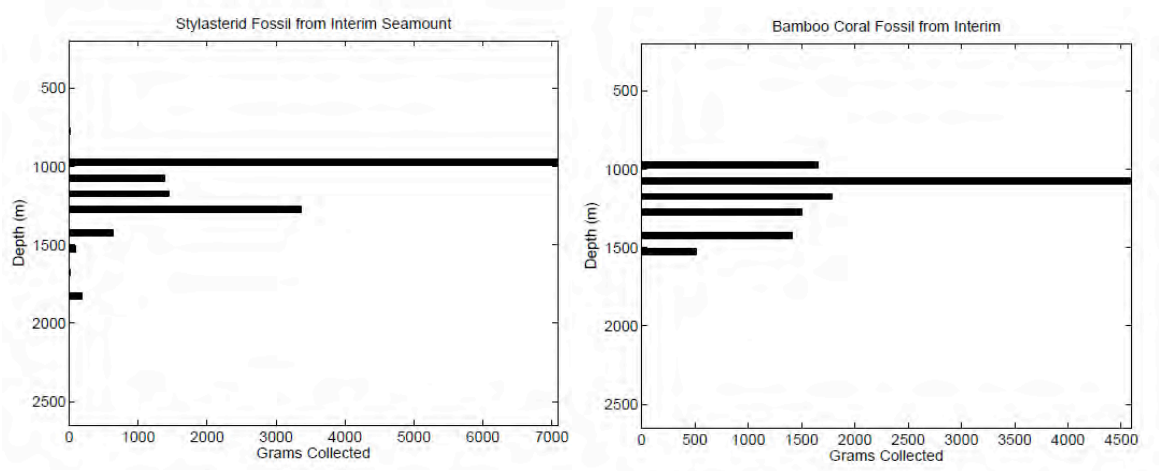


Figure 7.14: Distribution of Stylasterids (left) and bamboo corals (right) recovered at Interim seamount versus water depth.

Sars Seamount

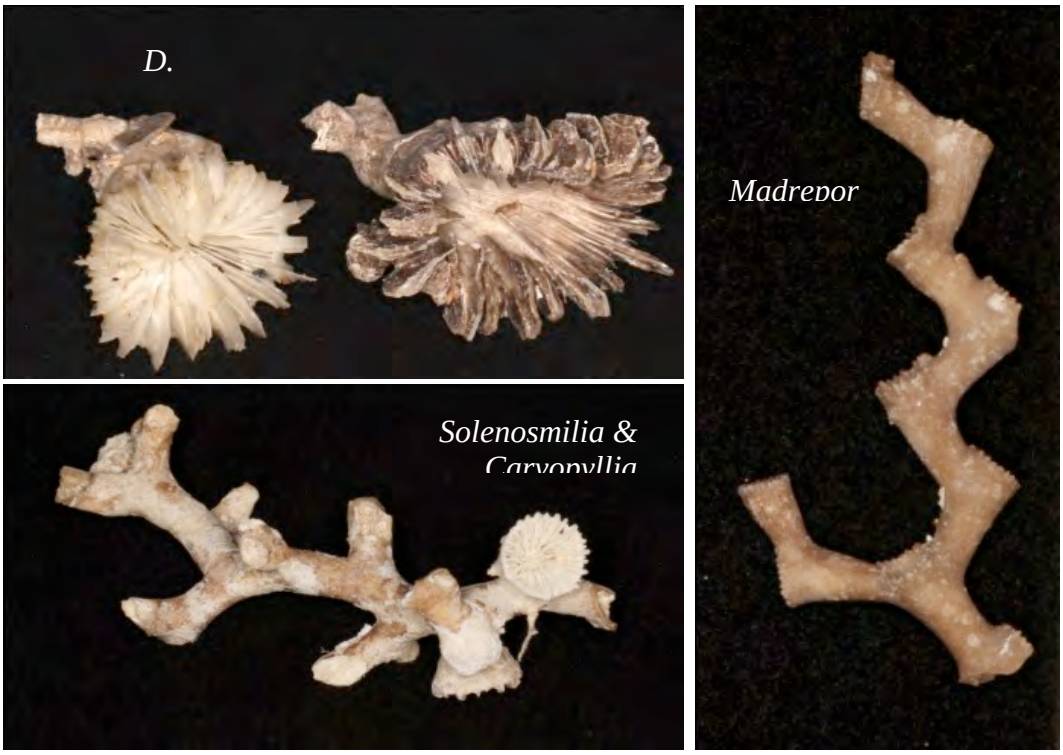


Figure 7.15: Selection of scleractinians found at Sars Seamount. Top left: Two specimen of the solitary species *D. dianthus* in different preservation states (each coral about 2 cm across; STN 97). Right: Colonial species *Madrepora* (4cm long piece; STN 91). Lower left: Community of colonial *Solenosmilia* and solitary *Caryophyllia* (STN 91). Photo credit: Andrew Margolin.

Twenty-two Hein dredges, one otter trawl, and one box dredge were deployed at Sars Seamount covering water depths from 611 to 1925m. Out of these the box dredge and four Hein dredges did not yield any fossil corals, due to technical problems and/or deep water (1306 to 1981m). All other dredges and trawls yielded variable amounts of fossil corals, with excellent coverage of the water column between 600 and 1000m, and at 1700m, and some samples from as deep as 1900m. A total of 2618 solitary scleractinian corals were collected with a count of 188 for *D. Dianthus*, and a count of 2430 for *Caryophyllia*, making Sars seamount the most successful location for collection of these two species. Most solitary corals showed dark brown to black ferromanganese coating (see Figure 7.12). We also recovered about four kgs of colonial scleractinians, of which 40% are of the species *Solenosmilia* and about 60% are of the species *Madrepora*. An interesting find was the potential identification of an *Enallopsamia Marenzellen*, a species so far only reported from very few sub-Antarctic locations, and not from the Drake Passage.

Figure 7.16: Above - piece of *Enallopsamia Marenzellen*, STN 97. Right: Bamboo coral overgrown by octocoral/stylasterid, station 120. Below: Stylasterids collected during an otter trawl at STN 104. Photo: Andrew Margolin.

The collection of fossil corals from Sars seamount is completed by ~17 kg of Bamboo Corals, ~35 kg of Stylasterids, about one third of which is of the species *Errionopsis*, and 2.4 g of shells (mainly bivalves and

brachiopods) and fossilized sponges (collected at STN 104). An interesting observation was the abundant overgrowth of bamboo corals by the octocoral Corallium (see Figure 7.16).

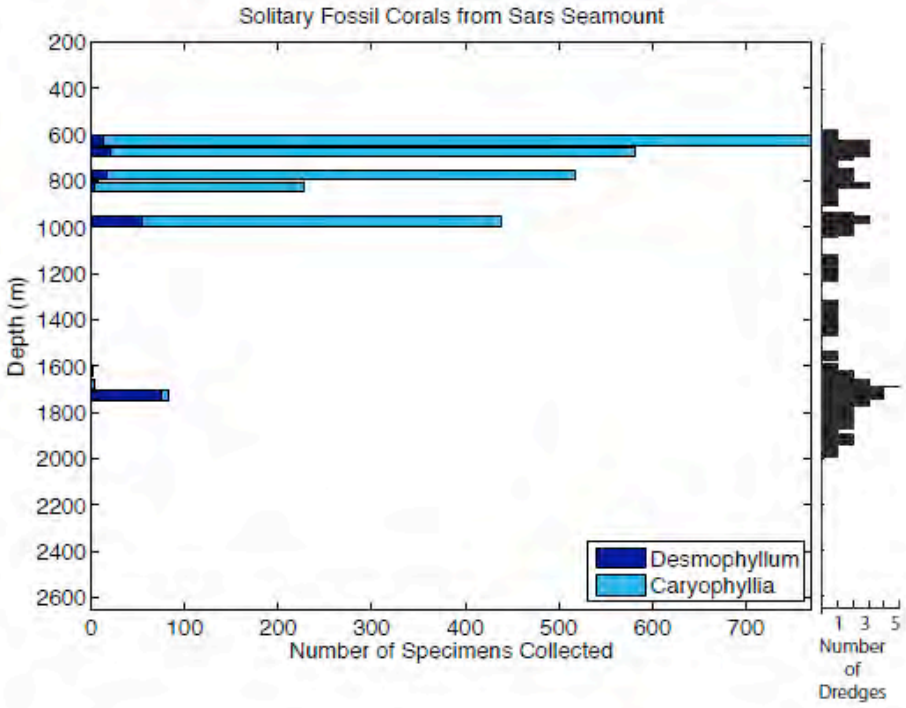


Figure 7.17: Distribution of numbers of different solitary scleractinians recovered at Sars seamount versus water depth. Shown on the right is the number of trawls deployed at each depth.

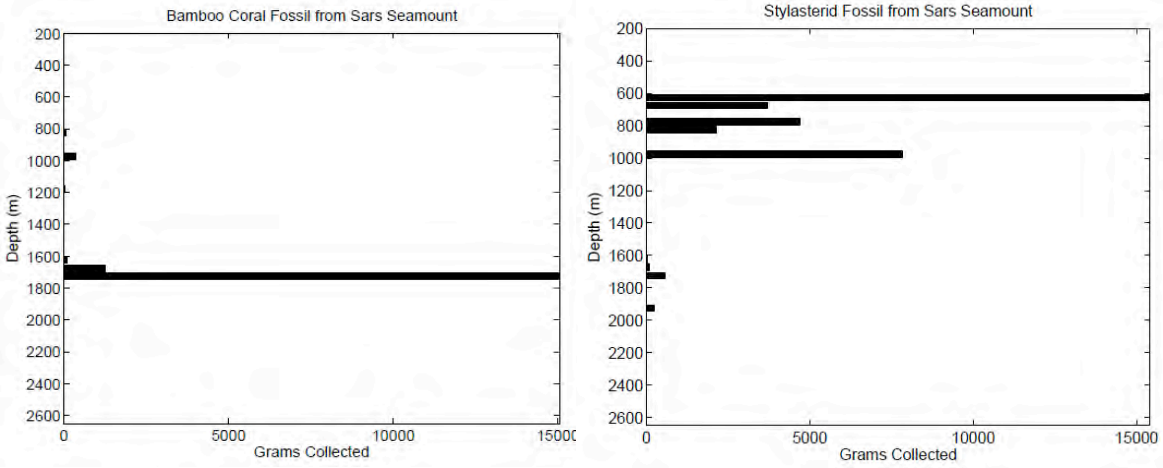


Figure 7.18: Distribution of Bamboo coral (left) and stylasterids (right) recovered at Sars seamount versus water depth.

Cape Horn

Eight Hein dredges and one Blake trawl were deployed around Cape Horn, all of which yielded a variety of fossil corals and shells. 7229 individual fossil solitary scleractinians, 5.3 kg of fossil colonial scleractinians (*Solenosmilia* and *Madrepora*), ~27 kg of fossil Stylasterids and 31.5 kg of fossil shells were recovered. The dredges and trawls covered water depths from 447 to 1869m, and solitary scleractinians were most abundant between 900 and 1400m. The two most dominant solitary scleractinian species were *Balanophyllia* and *Flabellum*., but *D. dianthus* and *Caryophyllia* were also present in sizable amounts. It is however questionable whether all specimens identified as *Caryophyllia* in the data table are actually *Caryophyllia*. For example the specimen shown in Figure 7.19 has features that also could be interpreted to be *Gardeneria Antarctica* – final taxonomy will have to await more work onshore. Furthermore, a total of 26.8 kg of Stylasterids and 31.4 kg of shells were collected. The latter was predominately retrieved during a single deep dredge, which yielded ~31 kg of fossil barnacle shells. While the overall species assemblage recovered was similar to the one at Burdwood Bank, solitary corals were more abundant in deeper water depths.

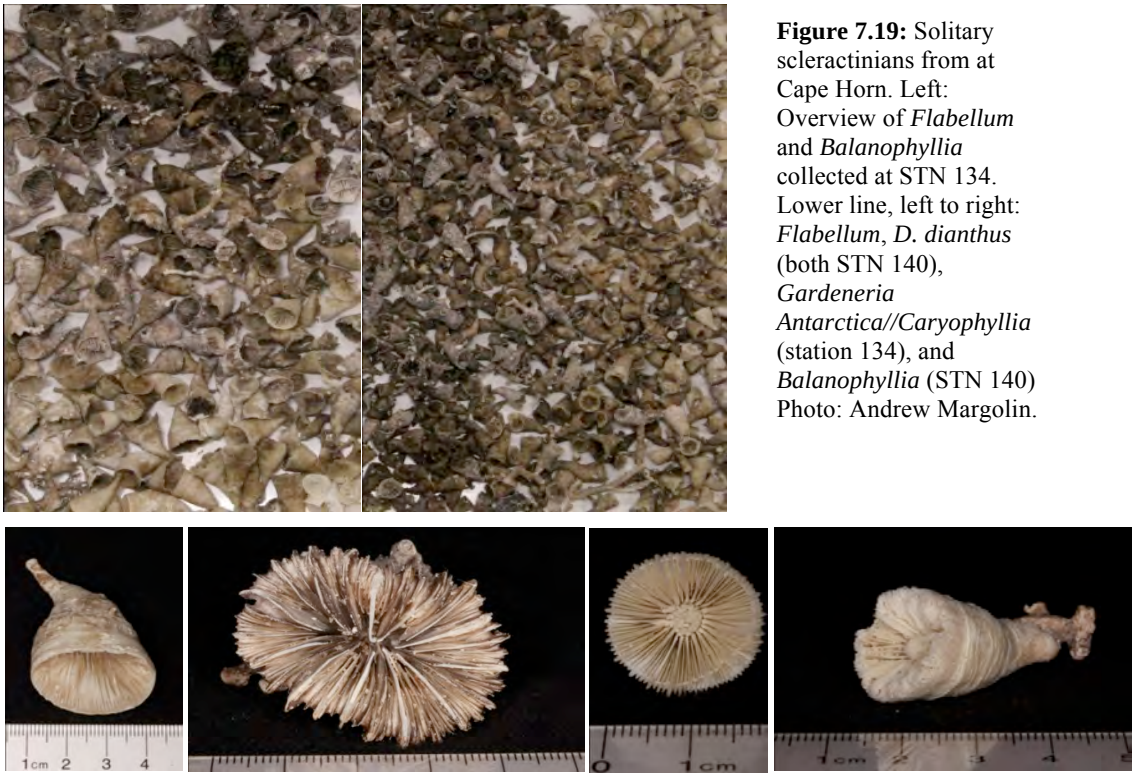


Figure 7.19: Solitary scleractinians from at Cape Horn. Left: Overview of *Flabellum* and *Balanophyllia* collected at STN 134. Lower line, left to right: *Flabellum*, *D. dianthus* (both STN 140), *Gardeneria Antarctica//Caryophyllia* (station 134), and *Balanophyllia* (STN 140) Photo: Andrew Margolin.

Figure 7.20: Fossil Stylasterids (left) and barnacle shells (right) collected at Cape Horn from STNs 140 and 143, respectively. Photo: Andrew Margolin.

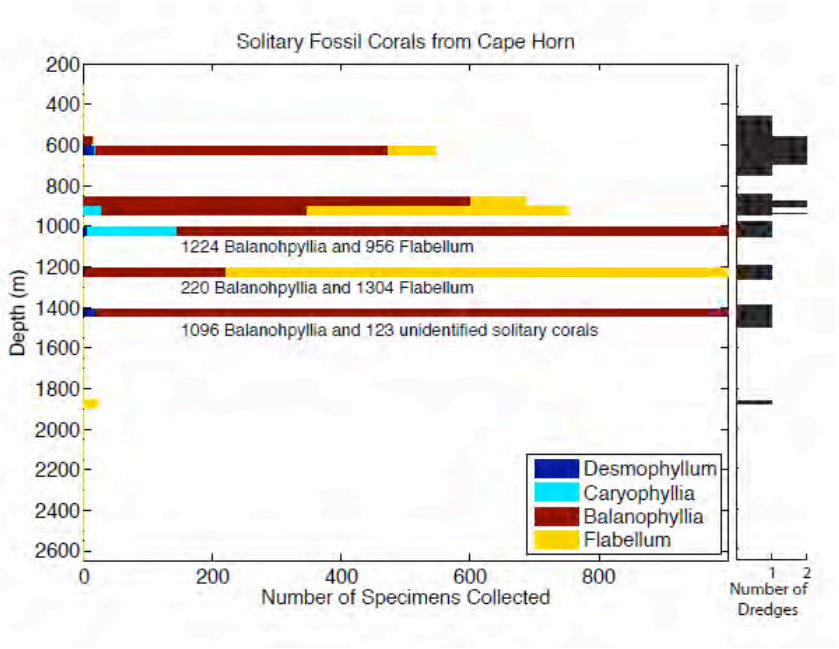


Figure 7.21: Distribution of numbers of different solitary scleractinians recovered at Cape Horn versus water depth. Shown on the right is the number of trawls deployed at each depth

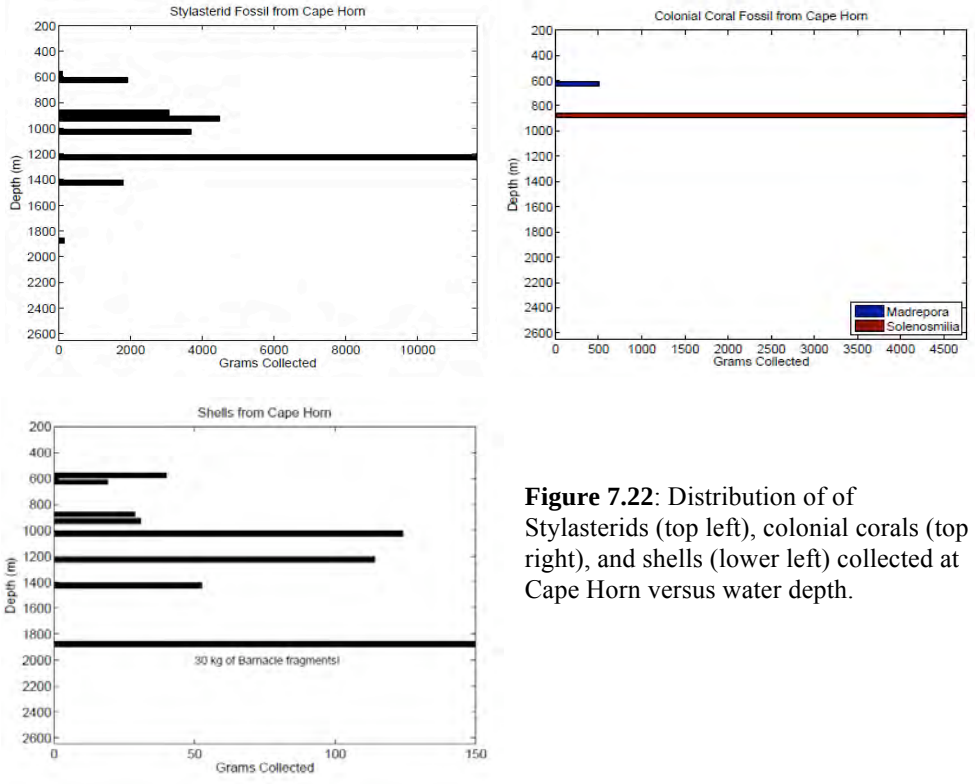


Figure 7.22: Distribution of of Stylasterids (top left), colonial corals (top right), and shells (lower left) collected at Cape Horn versus water depth.

Fossil Coral Subsampling
Subsamples were taken from fossilized calcium carbonate corals that were designated as priority samples based on mass (>5 g), species, location and depth. These subsamples will be dated after the cruise at WHOI using radiocarbon at the National Ocean Sciences Accelerator Mass Spectrometry Facility (NOSAMS).

Methods
Subsamples were cut from the corals using a Dremel tool (Figure 7.23). The Dremel tool was also used to remove corrosion, bioerosion ferromanganese crusts and exposing the carbonate skeleton. Subsamples range in mass from ~10 to ~500 mg and were taken from the top 1 cm of the theca and septa. Where possible, a sketch was made of each sample. Samples were chemically cleaned: 1 mL of Milli-Q water was added to each vials (Figure 7.23) and ultra-sonicated for 15 minutes. After sonication the water was removed using a vacuum pump and the process was repeated. Next, each sample was sonicated in 1 mL of then vials were left under the hood for 12 hours to dry. In total, 591 subsamples were taken, 529 being solitary corals which compose 3.7% of the solitary corals collected. Subsamples corals are tabulated in Appendix 1.

Figure 7.23. David Case subsampling a coral, Suzanne Jennions and David Case add water to subsamples. (Photos: Andrew Margolin)

7 ii Sponges (Porifera)

Silicon (Si) is an essential nutrient for photosynthetic diatoms, which play a key role in the cycling of carbon. In the modern surface ocean, biological formation of amorphous silica (biogenic opal) by diatoms is the dominant process that removes dissolved Si (silicic acid, or $Si(OH)_4$) from seawater. Diatom blooms rely on upwelling sources of $Si(OH)_4$ because efficient utilization strips almost all of the Si from surface waters. Ocean circulation and variations in algal populations result in distinct $Si(OH)_4$ concentrations in different deep water masses. The intermediate waters that form in the Southern Ocean and spread throughout most of the ocean, for example, are characterized by low $Si(OH)_4$, relative to other nutrients. An understanding of past $Si(OH)_4$ is required to reconstruct the supply of nutrients from the Southern Ocean through time.

We have developed a robust new proxy for the $Si(OH)_4$ concentration of seawater using Si isotopes in deep-sea sponge spicules, based largely on work from NBP0805 During NBP1103, our aim was to collect more material, including new regions of the Southern Ocean and repeat collections of existing material.

Sponges (Phylum Porifera) were collected from 7 trawls and 57 Hein dredges, described, photographed, dried and stored for transport back to WHOI. Approximately 10 specimens were frozen from otter trawl TO104. Sponges were typically present in trawls and dredges; larger whole sponges were collected from trawls, whereas dredges largely recovered fragments, smaller and encrusting specimens. Both Demosponges and Hexactinellids were found, the latter being more heavily silicified and so more prevalent in regions of high silicic acid concentrations (e.g. the southern end of the Shackleton Fracture Zone). A greater proportion of Demosponges were recovered from regions of lower silicic acid concentrations, such as Burdwood Bank (Figure 7.24). In total 521 sponges were collected, including over 120 distinct morphotypes.

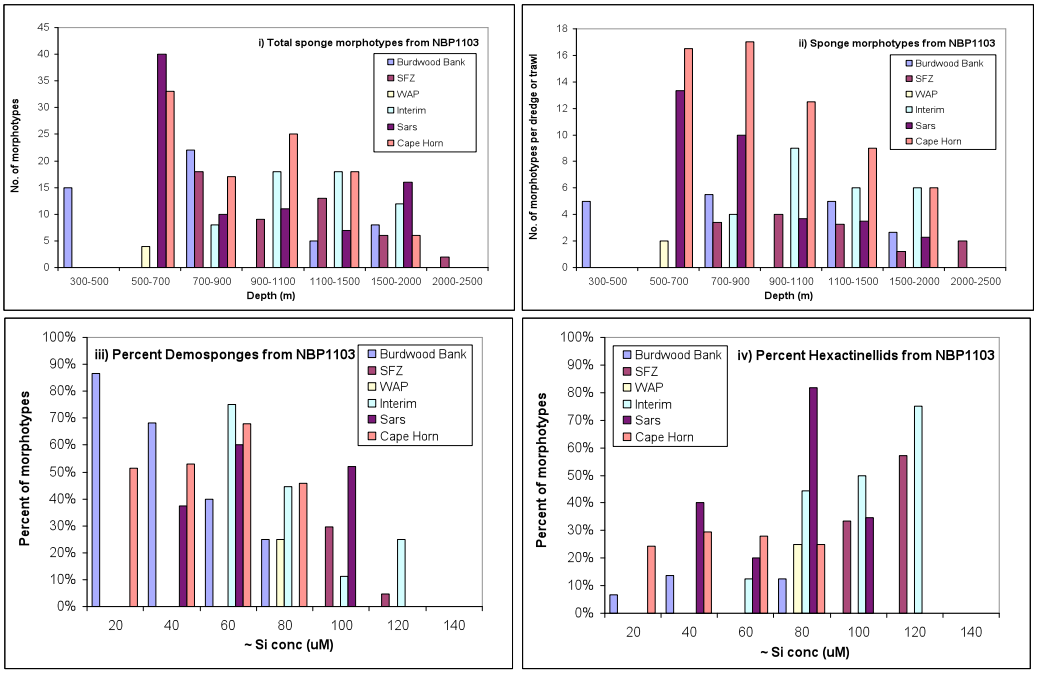


Figure 7.24a: Sponge morphotype distribution from NBP1103 based on preliminary results: i) total sponge morphotypes found at each depth by location; ii) the number of morphotypes normalised to the number of dredges/trawls; iii) percent demosponges and iv) percent hexactinellids. Approximate Si concentration from the GLODAP database and results from NBP0805. All samples are tabulated in Appendix 4.

1) **Burdwood Bank** – the trawls (TB01, 2 and 10) recovered large and diverse specimens of Demosponges and Hexactinellids (e.g. Figure 7.25a). A type of agglutinated sponge, bound together by sand sized particles, was recovered in trawls and dredges (Figure 7.25a) and from kasten core KC08. Unlike NBP0805, sponges were recovered from the deeper sites (≥2000m), which largely yielded branched morphologies, and two species of carnivorous sponges.

2) **Shackleton Fracture Zone** – agglutinated sponges, covered in small cm size rocks, were a common find in dredges and trawls. These unusual sponges were recovered from the Shackleton Fracture Zone during NBP0805 and appear to be unique to this area. Fragments of other sponges (generally very similar to those found in abundance at Interim seamount) were also recovered. Dredges and trawls were generally of lower diversity than other regions.
3) **West Antarctic Peninsula** – very few sponges were recovered in the trawls, and were limited to those found on or associated with dropstones or large pieces of skeletal material.
3) **Interim seamount** – large, platy sponges were recorded *in situ* in DropCam and TowCam images, and fragments (up to 20x20cm) were recovered from dredges (Figure 7.25b). Other small encrusting sponges were also recovered in the same dredges, which were generally diverse in sponge morphotypes.
4) **Sars Seamount** – in addition to material recovered from dredges, the most notable collection was from the Otter Trawl (TO104). Large, spherical sponges up to ~30cm diameter (Figure 7.25b) dominated the trawl, but several other species were also found.
5) **Cape Horn** – The dredges from Cape Horn generally yielded a low volume, but diverse selection, of sponges, including species found only at Burdwood Bank during NBP0805 and NBP1103. Trawl TB147 brought up the greatest diversity of sponges encountered during the whole cruise (Figure 7.25c).

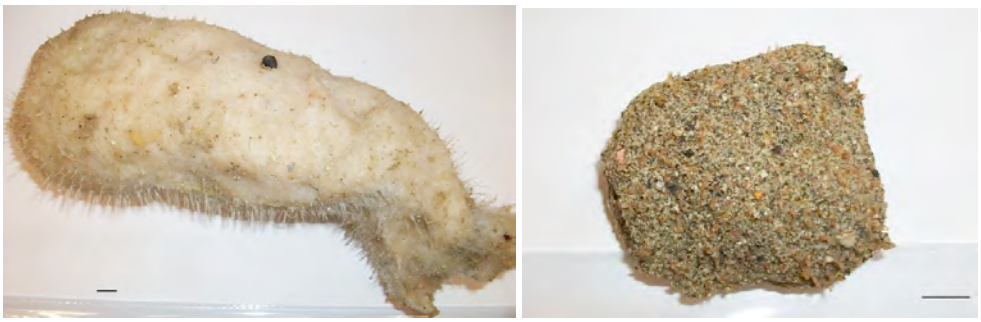


Figure 7.25a: Hexactinellid from TB02, Burdwood Bank (K. Hendry); Agglutinated sponge from DH07, Burdwood Bank (K. Hendry). Scale bars are 1cm.

Figure 7.25b Platy sponge from Interim Seamount (DH88; K. Hendry); Sponges in otter trawl TO104 (S. Jennions).

Figure 7.25c: The diversity of sponges found in trawl TB147, Cape Horn (K. Hendry).

7. iii Other Fossil collections

Gastropods: In addition to the 55 lots of live gastropods accumulated (see the Biology report), gastropod shells were sampled at 22 STNs (over 400 shells, Appendix 2b). These specimens will be sent to Pr. Philippe Bouchet at the Museum National d'Histoire Naturelle in Paris, France, for taxonomic work.

Bivalves: Ocean acidification is a growing global concern, especially in high latitudes which are the most sensitive regions with respect to changing pH. The uptake of anthropogenic CO_2 by the ocean is producing increasingly acidic oceanic waters and as ocean pH decreases, the concentration of carbonate and bicarbonate ions decrease and increase respectively. As many marine calcifying organisms such as bivalves depend on these chemical constituents to produce their shells, there is some concern that changing pH conditions will affect their ability to survive. Here we aim to collect modern bivalve material from the Southern Ocean in order to contribute to a project aimed at establishing whether the effects of ocean acidification can already be detected in marine calcifying organisms. Primarily, crystallographic structure and the distribution of chemical components within live-collected bivalve shells will be mapped. A comparison will be made between recent specimens and those collected before the Industrial Revolution, with the aim of identifying variations in bivalve calcification resulting from changing pH conditions. NBP1103 specimens will provide the opportunity to test the uniformity of biomineralisation in a single species from several different water masses. The relative abundance of aragonite versus calcite in the matrix of valves, and the identification of regions of recrystallization and alteration will establish the extent of natural variation in biomineralisation. Chemically, oxygen and carbon isotope values will be measured to test the suitability of bivalve material for palaeoceanographic reconstructions.

Throughout the cruise we recovered 418 live bivalves and 2159 fossil bivalve valves (Appendix 2a). All six sampling areas yielded material from a variety of water depths, and specimens were collected in six of the seven trawls and thirty three of the seventy five dredges. Bivalves were never the most abundant component of any dredge or trawl. At Burdwood Bank, specimens were collected to a maximum depth of 859 m. A particularly large number of both live and fossil specimens were found at 334 – 323 m depth, the majority of which were *Limopsis knudseni* (Figure 7.26a). Fossil material of the same species ranged from pristine in condition, to extremely corroded. The Shackleton Fracture Zone produced almost half of all fossil specimens collected. Particularly high numbers were found at STN 59 (1823 – 1810 m), which also yielded 100 live specimens. Very few live bivalves were collected at shallower depths along the Shackleton Fracture Zone. Blake Trawls at stations 65 to 67, on the shelf of the western Antarctic Peninsula, produced live bivalve material only. In contrast, Interim Seamount produced only fossil material, but in low numbers. Of particular interest were several very large fossil valves, including an extremely fragile, recent scallop recovered at station 80 (see figures 7.26). Sars Seamount produced approximately one third of fossil bivalve material, the majority was recovered from dredges between 611 – 891 m depth. Bivalve collections from Cape Horn were fewer in number compared to Burdwood Bank, which constitutes the most similar similar sampling environment during NBP11-03. However, both live and fossil bivalves were recovered at a greater variety of depths at Cape Horn. Figure 4 shows the distribution of bivalve material from all sampling areas. Overall, a large number of both fossil and live bivalves were collected, providing a substantial amount of material for further study.

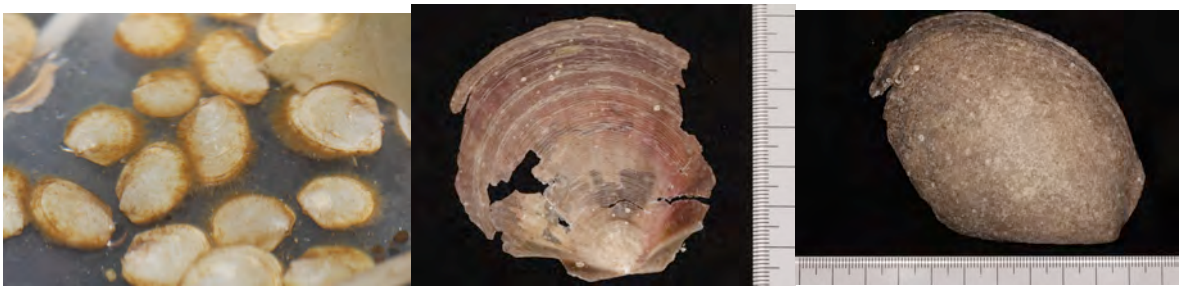


Figure 7.26a. *Limopsis knudseni*, STN 57, Shackleton Fracture Zone at 1895-1805m. (M. Taylor)
Figure 7.26b. Scallop recovered at Interim Seamount, STN 80, at 1510 – 1388 m depth (A. Margolin)
Figure 7.26c. Fossil bivalve shell, STN 87, Interim Seamount at 1246-1326 m depth. (A. Margolin)

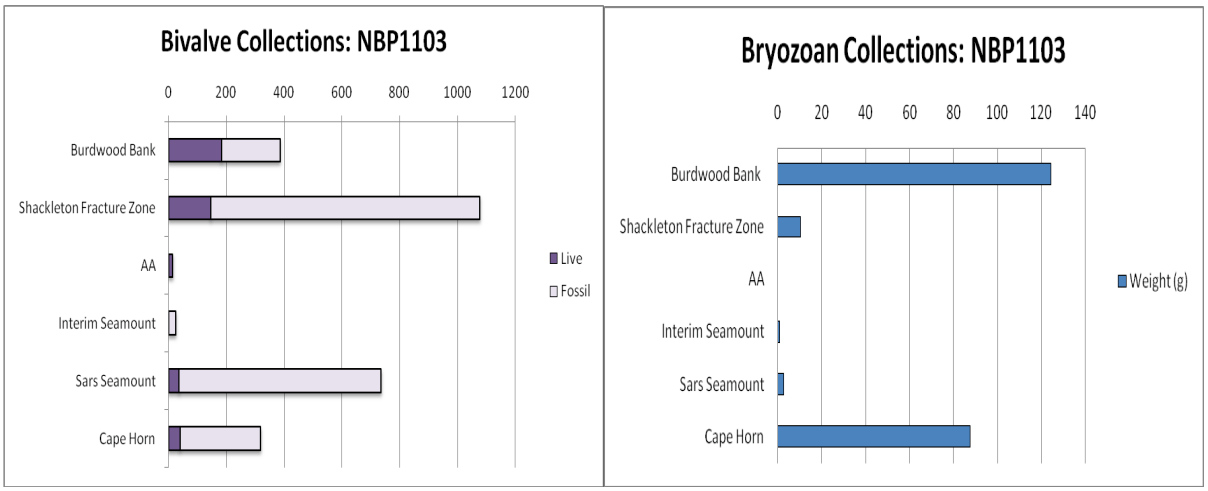


Figure 7.27. Distribution of live and fossil bivalves and bryozoans from all sampling areas during NBP1103.

Bryozoans: Bryozoans were found in a wide range of depths and four of the five sampling areas (Figure 7.27, Appendix 3). In total 225.5 g were collected, of which 211.9 g was from the South American continental shelf sites, Burdwood Bank and Cape Horn. Only shallow depths produced large amounts of bryozoan specimens. No material was collected at AA, and particularly small quantities were recovered from both Sars and Interim Seamounts. Much of the material collected was fragmented and live versus dead specimens were indistinguishable in the majority of cases. Encrusting and non-encrusting varieties were collected. Specimens varied widely from large, lace-like structures to fine branched varieties.

7iv Rocks

Representative rock samples were kept from 41 dredges, from all six study areas. These samples will be used description of seafloor habitats, to aid in identification of materials imaged by the camera systems, and for interpretation of the geologic history of the region. Some samples will be dated if found to be suitable.

Rock samples were collected at the following STNs: 16, 17, 19, 22, 24, 30, 31, 52, 53, 54, 56, 57, 74, 78, 80, 85, 88, 90, 96, 97, 98, 101, 103, 108, 110, 111, 112, 113, 114, 115, 117, 118, 120, 121, 126, 129, 138, 140, 141, 143, 147
All rock samples are being sent to K Scanlon-Catanach at USGS, Woods Hole.

7v Sediments

Marine sediments are a natural archive of past environmental conditions in the oceans, which can be reconstructed through the analysis of its sedimentary characteristics, geochemistry, fossil content, and other characteristics. Frequently, marine sediments are characterized by continuous sedimentation, ensuring good temporal representation and, especially in continental margins, high temporal resolutions.

Fossils in the sediment, such as corals and foraminifera, can provide information about age of the sediment and chemistry of the ocean. Corals recovered in the Drake Passage during cruise NBP08-05 were grouped in two different age groups according to their location. Most of the corals recovered in the Burdwood Bank area were younger than 1,000 years, whereas in Sars Seamount corals were older than 10,000 years. Is this difference caused by a climatic change that inhibited coral growth in the Sars Seamount 10,000 years ago? Did corals settle on the Burdwood Bank area 1,000 years ago, or are older corals buried in the sediments?

To answer these questions and obtain high-resolution archives of climate variability, one of the goals of cruise NBP11-03 was to obtain both high volume, relatively undisturbed box cores, and high temporal coverage Kasten cores In addition, surface sediment characterization was based on Minicores deployed with the CTD rosette and sediments recovered in the Hein dredges.

Coring Core sampling was attempted at locations where multibeam bathymetric information, WHOI DropCam and Towcam images, and dredged sediment suggested a sandy or muddy ocean floor suitable for coring. A summary of the coring operations is provided in the following table.

Table 7.1. Coring during cruise NBP11-03. Numbers in parentheses indicate the total number of coring attempts.

Location	Box Core	Kasten Core	Minicore
Burdwood Bank	0(3)	1(1)	0(1)
Shackleton Fracture Zone	0(2)	-	1(1)
West Antarctic Peninsula Shelf	1(2)	1(1)	1(1)
Interim Seamount	-	1(1)	-
Sars Seamount	-	-	0(1)
Cape Horn	-	0(1)	0(1)

Once on board the cores were visually described and sampled following different protocols depending on the type of device used:

- **Box cores**

Excess water in the box was carefully syphoned out to minimize disturbance of the sediment surface. After core description and photography, a sample of the core top was taken using a PVC sheet. Next, 5 subcores were obtained by pushing PVC and Polycarbonate tubes into the sediment (Fig. 7.28a). One of the subcores was sampled on board every 1 cm and the samples stored at 3 ºC. The rest of the sediment in the box was sieved every 5 cm to look for buried corals.

- **Kasten core**

Kasten cores were photographed and visually described prior to sampling (Fig. 7.28b). Four different types of samples were obtained. First, a subcore was secured along the central axis of the Kasten core by pushing a custom made U-channel of 6 by 6 cm. Subsequently, oriented cubic samples of 2 cm side were obtained from the core every 2-5 cm. Next the U-channel was extracted carefully to avoid disturbance of its contents and the surrounding sediments. An additional bulk sample was obtained afterwards at 5 cm resolution. Finally, the remaining sediment was sieved every 5 cm to search for corals.

- **Mini core (CTD core):**

Minicores recovered during CTD rosette deployments were visually described and samples were taken at variable resolution according to visually identifiable features.

Figure 7.29 shows the preliminary stratigraphic columns based on the visual description made after core recovery. A summary of the types and number of samples obtained during the NBP11-03 cruise is given in table 7.2.

Figure 7.28. a)Box core sediments were subsampled using PVC and polycarbonate tubes. One of the tubes was subsampled *in situ* every 1 cm. The remaining tubes were stored at 3 ºC. b) Kasten cores were initially photographed and described. A subcore was obtained along the axis of the core using a 6x6 cm custom made U-Channel. Oriented and bulk samples were also obtained from the core at 2-5 cm resolution. Finally, the remainder sediment was sieved to search for corals.

Table 7.2.

Area	Core Type	Code	Length (cm)	# sub-cores	# oriented samples	#bulk samples	Sampling interval
Burdwood bank	Kasten	KC-08	35	0	0*	14	2-5
Total			*35*			*14*	
Shackleton F. Zone	CTD Mini core	CTD-32	7	0	0	5	1-2.5
Total			*7*	*0*	*0*	*5*	
West Antarctic Peninsula Shelf	Box Core	BC-63	34	4**	0	35	1
West Antarctic Peninsula Shelf	Kasten	KC-68	145	1	26	30	5
West Antarctic Peninsula Shelf	CTD Mini core	CTD-72	7	0	0	8	0.5-1
Total			*186*	*5*	*26*	*73*	
Interim Seamount	Kasten	KC-77	105	1	33(31)***	21	2-5
Total			*105*	*1*	*33(31)***	*21*	
Sars Seamount							
Total			*0*	*0*	*33(31)***	*21*	
Cape Horn							
Total			*0*	*0*	*33(31)***	*21*	
CRUISE TOTAL			**333**	**6**	**59(57)****	**113**	
* No oriented samples taken, but samples boxes were filled with sediment from bulk samples							
** One subcore sampled in situ at 1 cm interval							
*** Two samples from the core catcher are not oriented							

Additionally, sediment recovered after dredging was also sampled in order to characterize the sedimentary characteristics of the ocean floor. These samples were visually described and sieved at 355 µm, 300 µm, 250 µm, and 125 µm in the case of sandy and muddy sediments. Sieved samples were described and photographed on a binocular microscope. Representative sediment types sampled during NBP11-03 cruise are shown in figures 7.29 and 7.30.

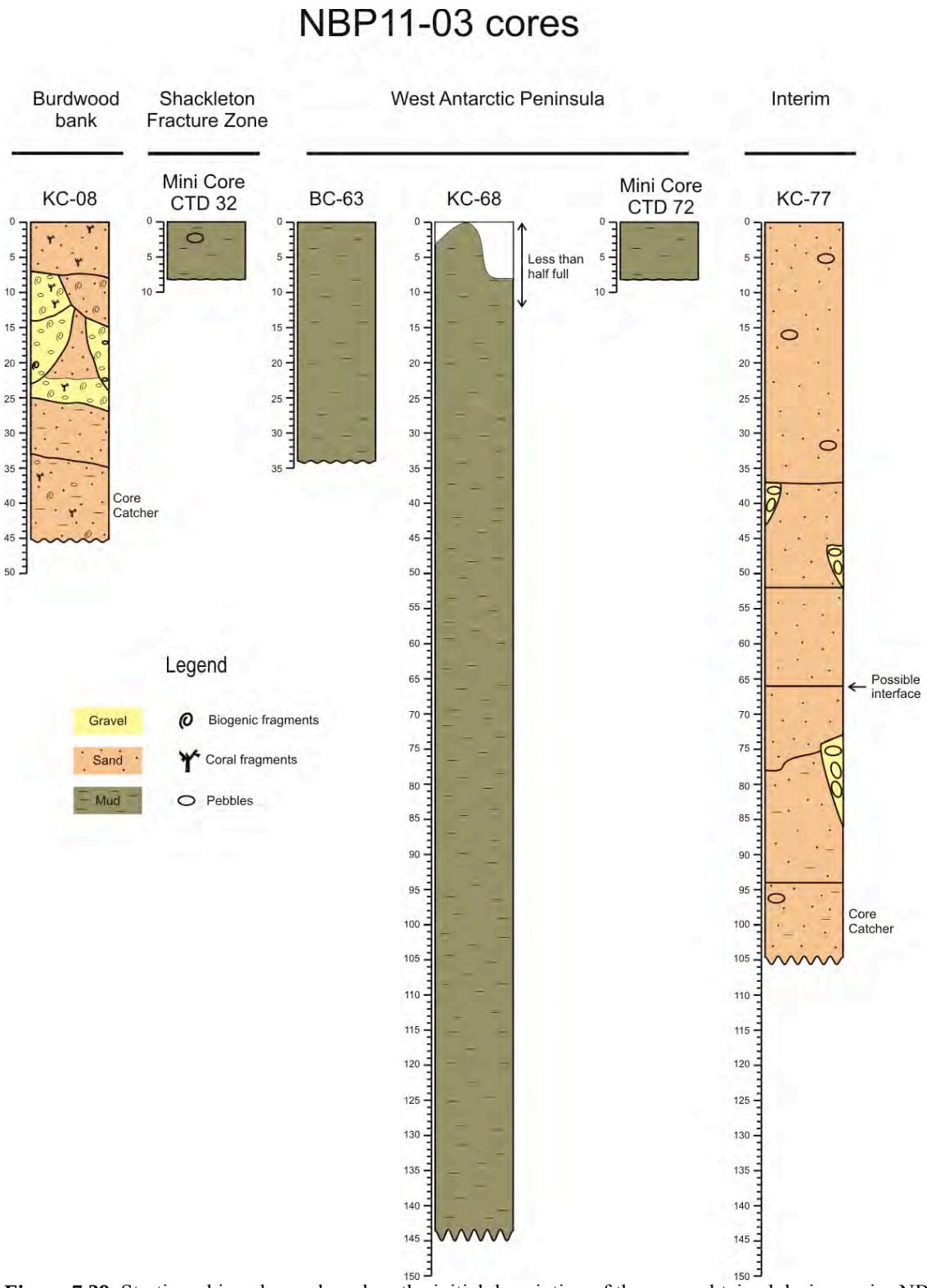


Figure 7.29. Stratigraphic columns based on the initial description of the cores obtained during cruise NBP11-03.

Figure 7.30a. Sediment from dredge DH-24, northwestern Shackleton Fracture Zone. 16x magnification.

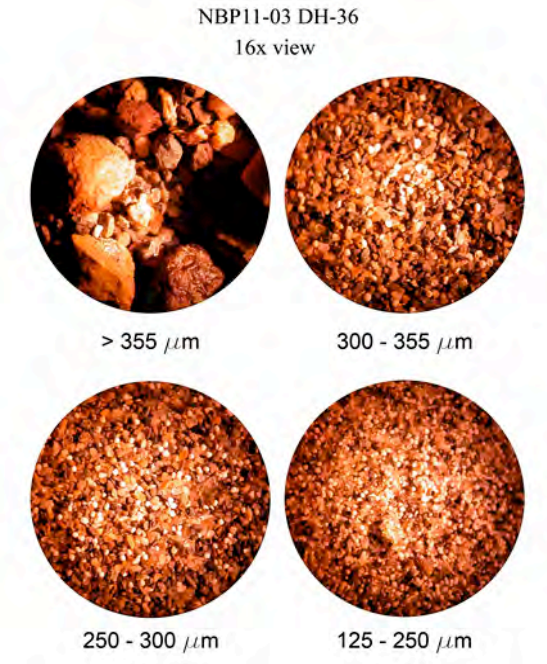


Figure 7.30b. Sediment from dredge DH-36, southeastern Shackleton Fracture Zone. 16x magnification.

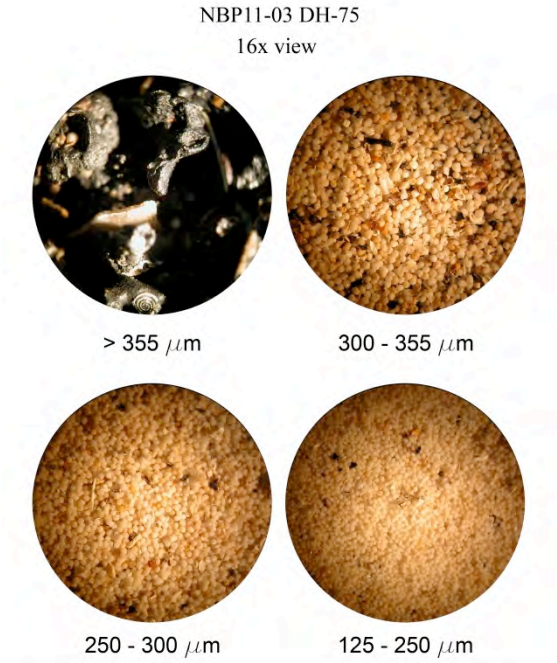


Figure 7.30c. Sediment from dredge DH-75. Interim Seamount. 16x magnification.

8. Biological Sampling

i. Overview

Since the opening of the Drake Passage some 30 million years ago (Huber & Watkins 1992, Barker et al., 2004, Livermore et al., 2005) the Antarctic Circumpolar Current (ACC) is thought to create a biogeographical barrier to species dispersal, limiting the transport of benthic larvae between the South American and Antarctic continental shelves. The Drake Passage in particular is a highly dynamic environment, where fast currents are likely to hinder meridional larval transport (Clarke et al., 2005). Antarctic benthic fauna have been thought to be "cut off" from South American fauna since this time, and therefore have a long history of in situ evolution on the deep continental shelf (Lips & Hickman, 1982, Clarke & Crame, 1989). Despite this separation, faunal similarities have been found in both fossil and live benthic groups bringing into question these theories of larval isolation (Clarke & Crame, 1989, Thompson, 2004).

There are numerous seamounts within the Drake Passage that could act as stepping stones between the Argentinian and Antarctic continental shelves, yet high winds, frequent storms and strong currents make seafloor sampling particularly difficult. As a result, few attempts to collect biological data have been made, leading to a paucity of information on benthic habitats or fauna in this area, particularly those on primarily hard-bottom seamounts and ridges. In 2008 we (Robinson & Waller) had a pilot program to investigate cold-water coral habitats (fossil and live) on seamounts and ridges within the Drake Passage, as well as the opposing continental shelf areas. Understanding the prime constituents of seamounts and ridges inside the Drake Passage in relation to the South American and Antarctic continental shelves can enhance understanding of larval transport and evolutionary processes in this dynamic area. This is especially important as anthropogenic ocean warming and acidification are threatening these delicate polar ecosystems before they are studied fully (Kleypas et al., 2006) and thus biodiversity data are urgently required now to determine the extent of damage that might occur.

	North to South						
Phylum	**Burdwood Bank**	**Cape Horn**	**Sars**	**Interim**	**SFZ**	**WAP**	**Grand Total**
Annelida	133	166	155	7	59	358	**878**
Arthopoda	182	264	108	87	29	322	**992**
Brachiopoda	14	22	245	166	241	5	**693**
Bryozoa	1		58	12	7		**78**
Chordata	17	3	10		2	2	**34**
Cnidaria	1137	1569	1170	698	408	354	**5336**
Ctenophora				1			**1**
Echinodermata	489	341	308	27	239	589	**1993**
Mollusca	286	116	351	69	291	66	**1179**
Platyhelminthes		2					**2**
Porifera	17	40	86	16	73	29	**261**
Sipuncula					1	5	**6**
Urochordata		14	1				**15**
Unknown	1	2	3		1		**7**
Grand Total	**2277**	**2539**	**2495**	**1083**	**1351**	**1730**	**11475**

Table 8.1. Minimum number of individuals collected at each location for each major phyla. Due to corals (and many other phyla's) fragmenting nature true individual numbers cannot be estimated at this time, so this number is to be regarded as a minimum.

That pilot program demonstrated that Drake Passage faunal composition was found to be rich and diverse, particularly with regards to cold-water coral and sponge ecosystems. At each of the sampling locations, corals comprised greater than a quarter of all benthic fauna, demonstrating their importance to these polar communities. During this program we re-sampled 4 of our original areas (using both collections and photography – see Seafloor Imaging Chapter 9), as well as two new areas, on Cape Horn and the Western Antarctic Peninsula. Comparative methods were used to our 2008 program so results can be combined.

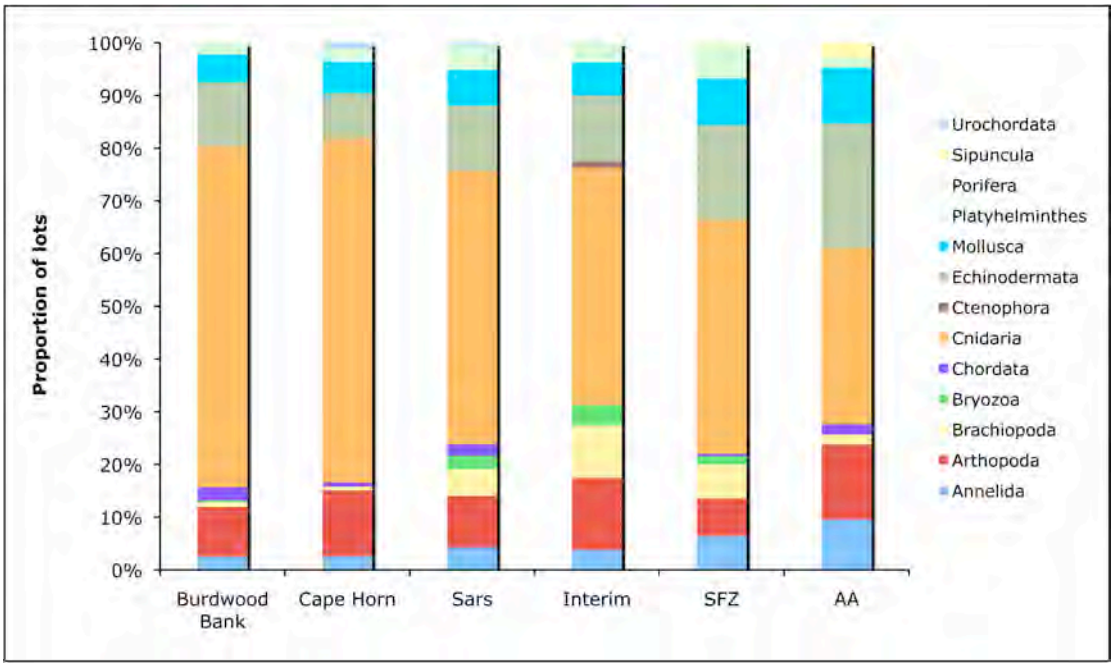


Fig. 8.1, Phyla representation from each sampling location (ordered North – South)

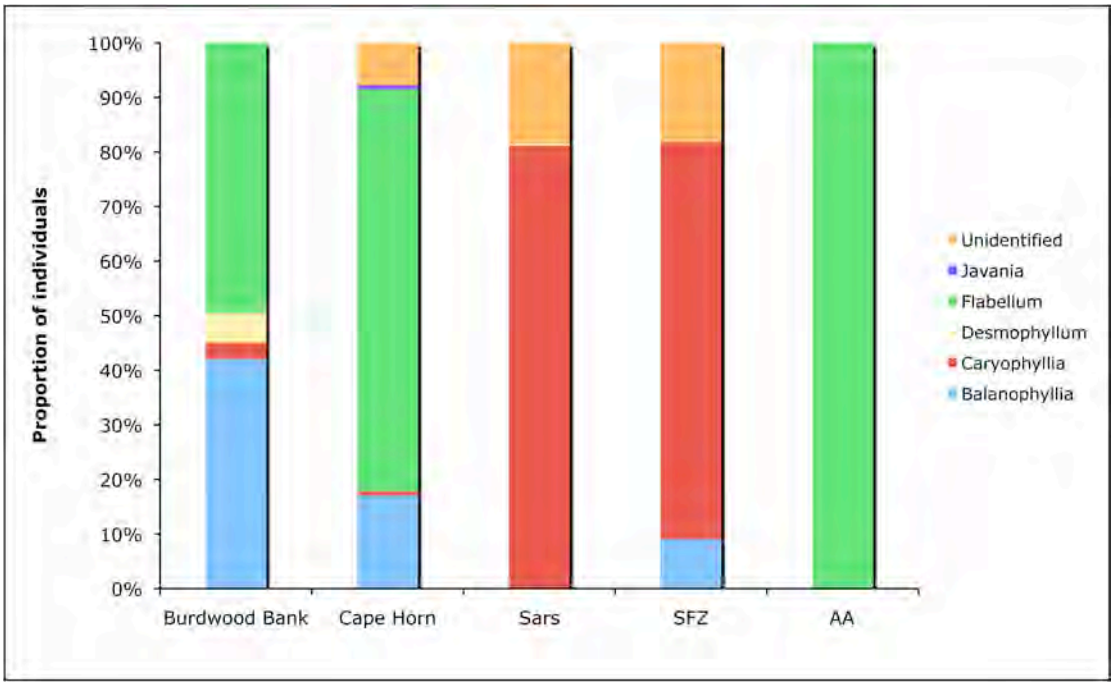


Fig 8.2. Proportions of each type of solitary scleractinian identified from each location. No live solitary scleractinians were collected from Interim Seamount.

Similar

to our findings in 2008, Cnidarians are the most represented phyla at any of our sampling locations (Table 8.1, Fig., 8.1). Octocorals (see Ocotcoral chapter below), Stylasterids and Scleractinians made up a greatest proportion of cnidarians identified.

One of the goals of this cruise was to sample across a large depth range. For biological samples this is particularly problematic. On the sides of seamount, ridges and continental shelves, hard bottom habitat is more abundant, yet unable to be sampled by traditional biological methods. The Hein Dredge was developed for this cruise to be able to sample steeper topography effectively, yet still retain fossil and live material intact (unlike traditional Scripps style dredges). Though live material was scarcer in the Hein Dredges than trawls, they were very successful at gaining biological samples unobtainable by regular methods because of the benthic habitat (Fig. 8.3).

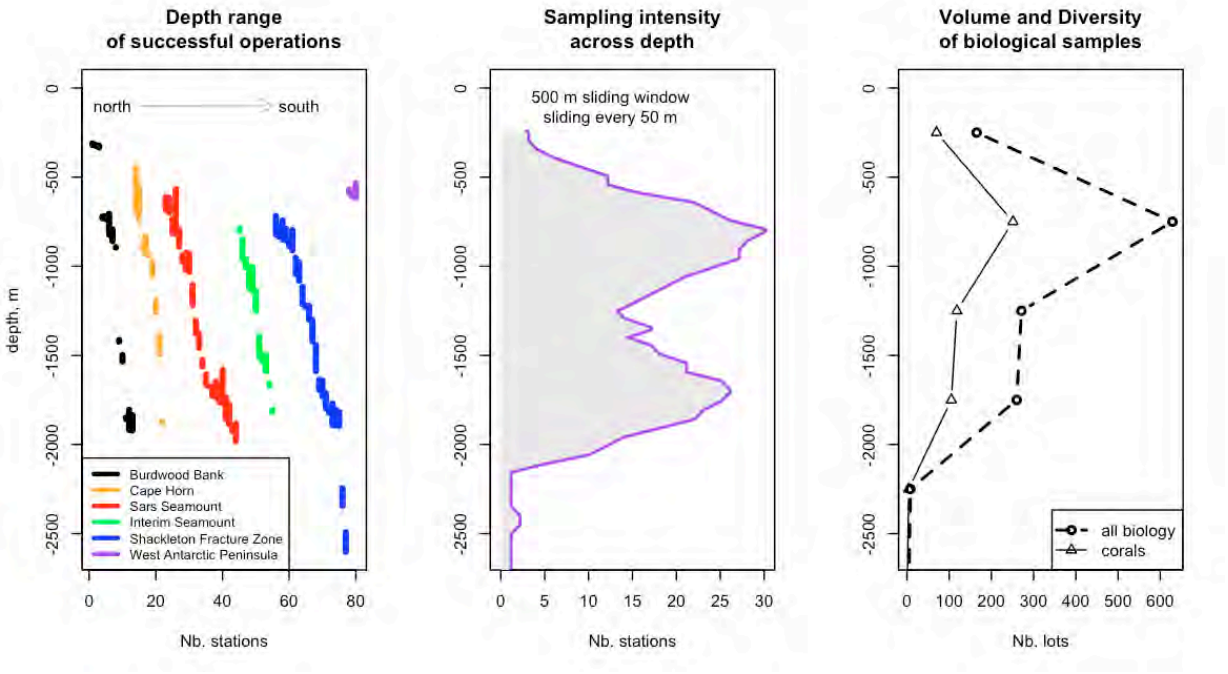


Fig 8.3. Sampling effort across depth at each of the six sites visited during NBP1103. First panel: depth range of each successful sampling station (dredges and trawls; total of 80 stations). Second panel: sampling intensity across depth (the number of stations within a 500 m sliding window was counted every 50 m). Third panel: the volume and diversity of biological samples (using number of lots as a proxy) is represented across depth. Lots include all specimens belonging to the finest taxonomic level that could be determined in the wet lab.

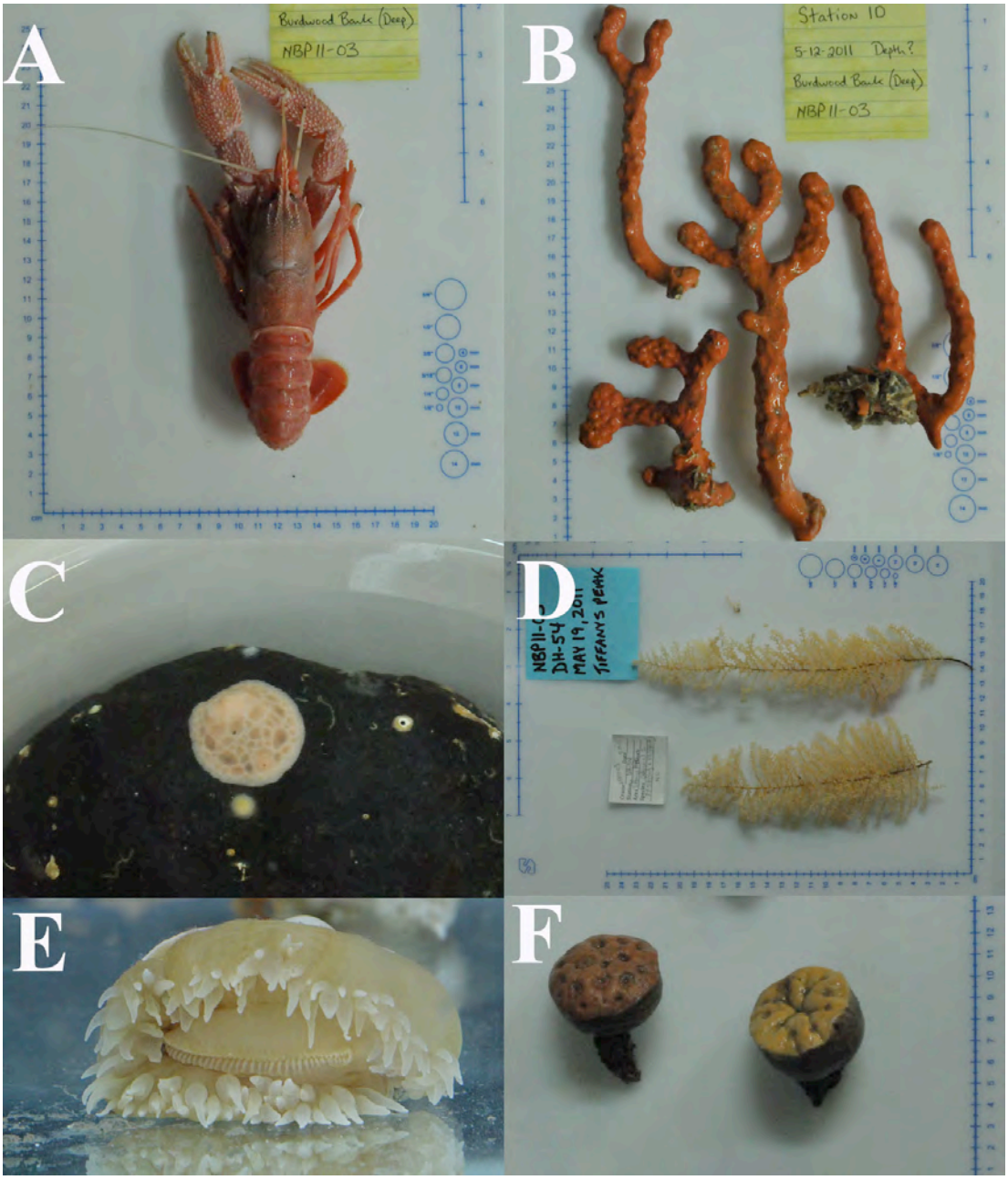


Fig 8.4, Fauna collected in dredges and trawls from NBP11-03 sampling locations – A, Burdwood Bank, Lobster; B, Burdwood Bank, Paragorgia sp.; C, Shackleton Fracture Zone, encrusting holothurian; D, Shackleton Fracture Zone, *Thourarella* sp. octocoral; E, Western Antarctic Peninsula, *Flabellum impensum solitary* scleractian; F, Western Antarctic Peninsula, *Anthomastus* sp. octocoral

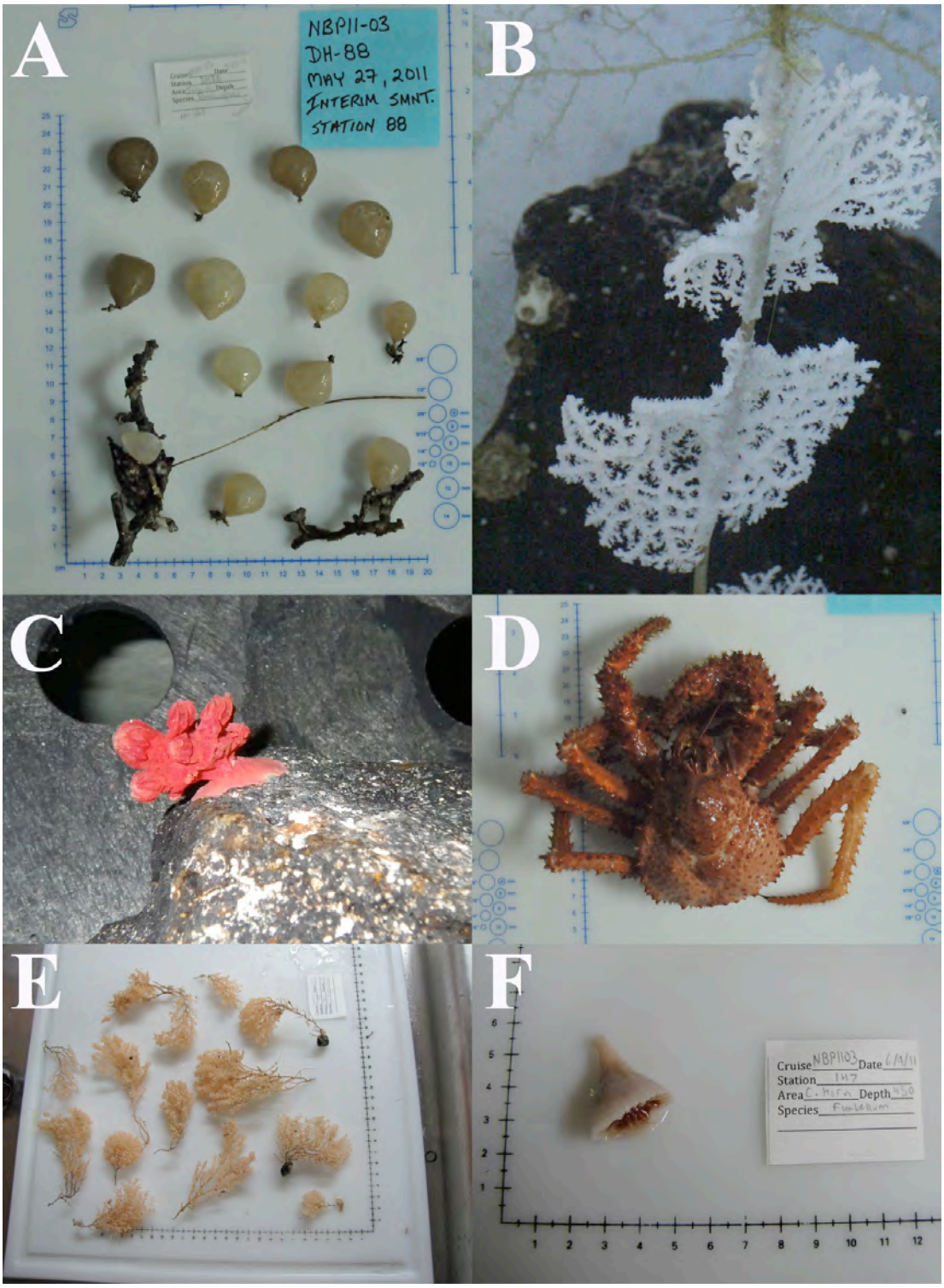


Fig 8.5, Fauna collected in dredges and trawls from NBP11-03 sampling locations – A, Interim Seamount, Brachipods; B, Interim Seamount, Stylasterid sp.; C, Sars Seamount, stoloniferous octocoral; D, Sars Seamount, Majid crab; E, Cape Horn, *Plumarella* sp. octocoral; F, Cape Horn, *Flabellum* sp. scleractinian

ii Octocorallia

Scott France (University of Louisiana, Lafayette), Les Watling (University of Hawaii at Manoa) & Eric Pante (University of Louisiana, Lafayette).

A total of 378 lots of octocorals (>1,600 individuals) were collected from 64 stations. A total of eight families were identified during the cruise. The deep-sea family Primnoidae was particularly well represented in these collections, both in terms of abundance and taxonomic richness: over 55% of all octocorals collected were primnoids (for details, see Michelle Taylor's report). Bamboo corals (Isididae) was the second most represented family, with about 115 collected colonies (many colonies were fragmentary and an exact count would be difficult to provide). These two families were present at all six sites.

Fig 8.6. Examples of octocorals collected during NBP1103. a, b, Isididae; c, stoloniferous octocoral; d, *Thouarella* sp.; e, acanthogorgiid octocoral; f, *Paragorgia* sp.; g, acanthogorgiid octocoral; h, alcyonacean octocoral.

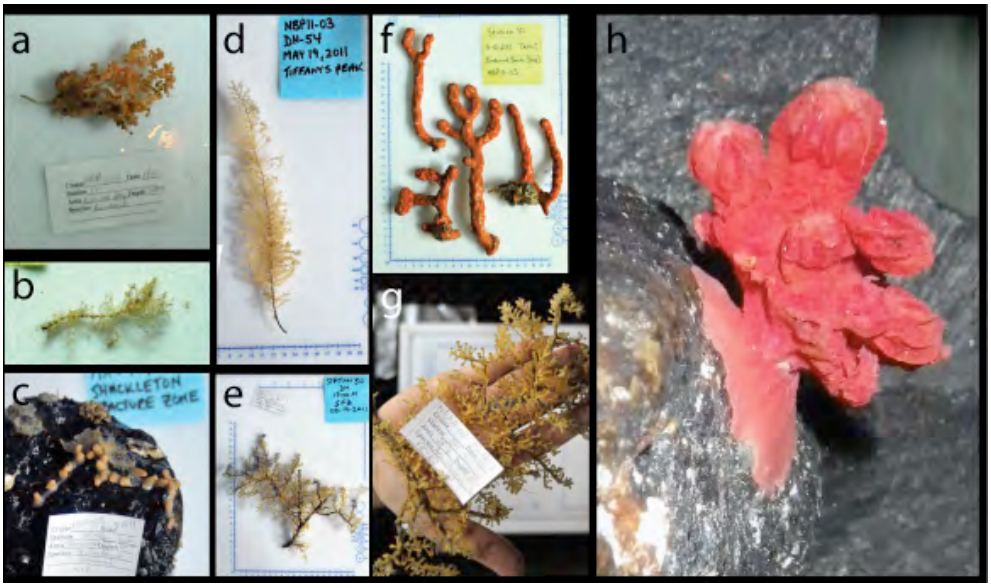


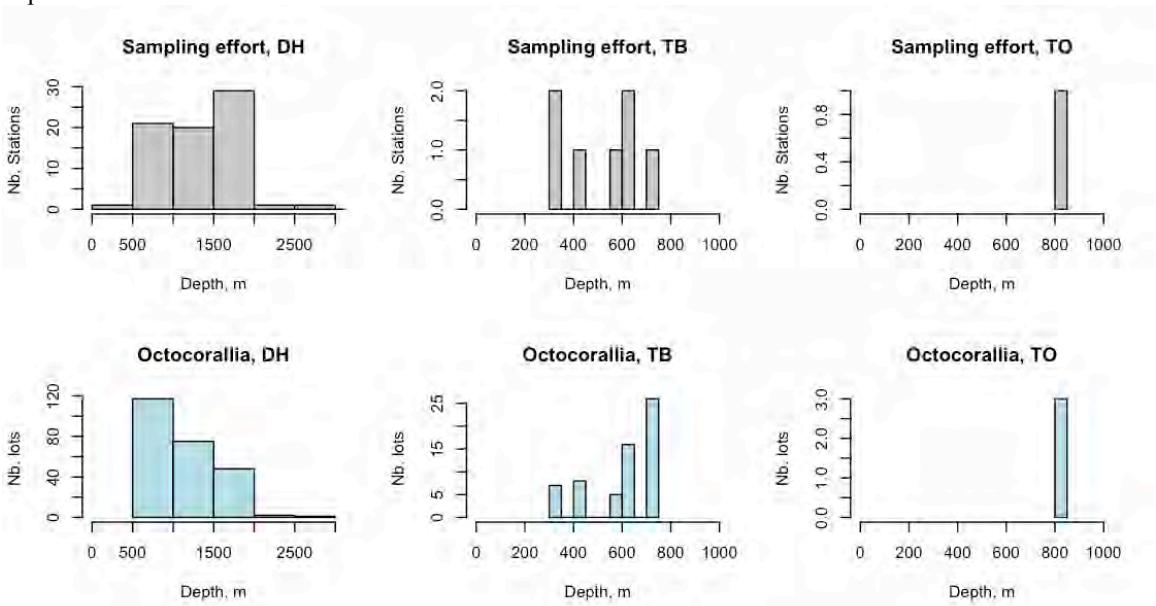
Table 8.2. Number of colonies of each octocoral family collected during NBP1103.

Family	Burdwood Bank	Cape Horn	Sars	Interim	SFZ	AA	Grand Total
Acanthogorgidae	3	8	3	1	3		18
Alcyoniidae		1			5	4	10
Isididae	13	40	25	5	11	21	115
Paragorgiidae	17	8				4	29
Paramuricidae	1						1
Plexauridae	39	8	11		4	1	63
Primnoidae	375	257	101	19	81	72	905
Tubiporidae	2						2
Unidentified	100	226	131	16	12	6	491
Grand Total	550	548	271	41	116	108	1634

Octocorals were found across the entire sampling depth range, between 320 m (Blake Trawl on Burdwood Bank) and 2602 m depth (Hein Dredge on the Shackleton Fracture Zone). Most octocorals were sampled between 500 and 1000 m. Burdwood Bank and Cape Horn were the most productive sites (550 and 548 individuals, respectively), followed by Sars Seamount (271 individuals), the SFZ (116 individuals) and the AA site (108 individuals). Significantly fewer octocorals were collected at Interim Seamount (41 individuals). Burdwood Bank also appears as

the most diverse site, with 7 octocoral families and identified thus far (a pattern that has to be contrasted with sampling effort across depth gradients – see Fig 8.7). All 14 primnoid genera collected during NPB1103 were present at Burdwood Bank.

Fig 8.7. Number of octocoral lots collected using Hein Dredges (DH), Blake Trawls (TB) and Otter Trawls (TO) across depth (total of 80 successful operations). Sampling effort is represented as the number of stations sampled per depth interval.



Exemplars of all morphotypes at all stations were sub-sampled for phylogenetic analysis (preservation in 100% molecular-grade ethanol and freezing at -80°C). Voucher colonies were either fixed in 10% formalin (and transferred to 60-70% ethanol within 24 hours) or frozen at -80°C. The taxonomy of octocorals is particularly antiquated, and most families are polyphyletic (e.g. McFadden et al. 2006). There is therefore a pressing need for a re-appraisal of the classification of most groups, particularly deep-sea ones. Molecular systematics have been proven useful to describe the evolutionary history of deep-sea octocorals, and detect problem with the current taxonomic classification. However, it relies on the successful extraction and amplification of DNA. The availability of fresh tissue is therefore paramount to such studies. All genetic vouchers collected during NBP1103 will be sent to Dr. Scott C. France (University of Louisiana at Lafayette) for an on-going phylogenetic study of Antarctic octocorals. In parallel, the morphological diversity of primnoid octocorals will be assessed by Michelle Taylor (Oxford University; see separate report).

iii Octocorallia: (Family) Primnoidae

Michelle Taylor (Imperial College London, Institute of Zoology, London and University of Oxford), Sample storage: Department of Zoology, University of Oxford.

Octocorals include many well-known orders, such as sea fans, soft corals, sea whips, sea pens, and blue corals. Octocorallia, though not reef-forming, develop into dense 'corals gardens' which are important structural habitats (Krieger and Wing, 2002; Metaxas and Davis, 2005; Stone, 2006) for associates such as worms, ascidians, brittlestars and some commercial fish species (Costello et al., 2005; Stone, 2006). The Antarctic appears to be a treasure trove of diversity for some families of octocorals, in particular Primnoidae (Cairns and Bayer, 2009); they seem to thrive in many deep-sea habitats across this region. Primnoidae are the fourth largest family of octocorals with 39 genera. Primnoidae are distinguished by their golden axis and polyps covered in an armour of calcium carbonate scales (see Figure 8.8).

Fig 8.8. *Thouarella crenelata* scanning electron microscope image. M. Taylor.

Plasticity in morphological characteristics makes octocorals particularly difficult and time-consuming to identify to species level. My Ph.D. focused on by-catch from the longline Patagonian toothfish fishery around South Georgia. By far the majority of specimens caught as by-catch were octocorals, and within octocorals the Primnoidae were seen most frequently. Samples from by-catch tended to be small (under 5 cm length) making identifications all the more complicated. Whole specimens are required to make accurate identifications and fresh specimens improve the success of genetic studies making collections on NBP 11-03 very important. Additionally, NBP 11-03 collections expand sub-Antarctic octocoral collections by sampling from the relatively unstudied areas of the deep Drake Passage and Cape Horn.

With just a dozen deep-sea octocoral experts worldwide (half of whom are retiring in the coming few years) and the expense of working in Antarctica and in the deep sea, little focus is given to this important vulnerable marine ecosystem. My research focuses on taxonomic descriptions, revisions of key genera and phylogenetic analysis of Antarctic deep sea octocorals. And, in the future, I hope to expand my research into population genetic analysis. The samples from NBP 11-03 will be incorporated into my studies. Specific expected results are discussed below.

Materials and methods: Depending on the volume of material collected at each sampling station different methods of preservation were followed. A small volume / number of samples meant genetics samples were taken and the remainder frozen at -80°C. A large volume allowed for the sample to be spilt into two sections; a subsample were preserved in formalin for reproduction studies (and transferred to 70% ethanol after 24hrs) and a subsample were frozen for genetics. Both formalin and frozen samples are suitable for taxonomy. For genetics studies two subsamples of every species / morphotype from each station was preserved; one in seawater then frozen and one in molecular grade ethanol. All samples were photographed and labelled. On ship, as many specimens were identified to species level as possible.

Expected results

1. Collect material to complete haplotype analysis of Primnoidae from the Drake Passage in comparison to South Georgia and the western Antarctic (from where I already have samples).
2. Collect whole specimens for a genus revision of *Dasystenella.*
3. Collect specimens of new species.

Preliminary results: In total, approximately nine hundred and five colonies of Primnoidae were collected from the NBP 11-03 expedition. The first few stations across Burdwood Bank are known for their opulent octocoral communities and this expedition saw the collection of at least 375 samples (see Figure 3 from station breakdown). Across deeper areas of the Drake Passage, the Antarctic Shelf (72 colonies), Sars (101 colonies) and Interim (19 colonies) Seamounts and Cape Horn (257 colonies) the same volume was not seen.

From these samples fourteen genera and 23 species were identified (Table 1). Several of these genera and species have been found around South Georgia and the western Antarctic meaning haplotype comparisons are possible. Several genera and species have also not been previously collected by the author so will add to phylogenetic analyses of this family.

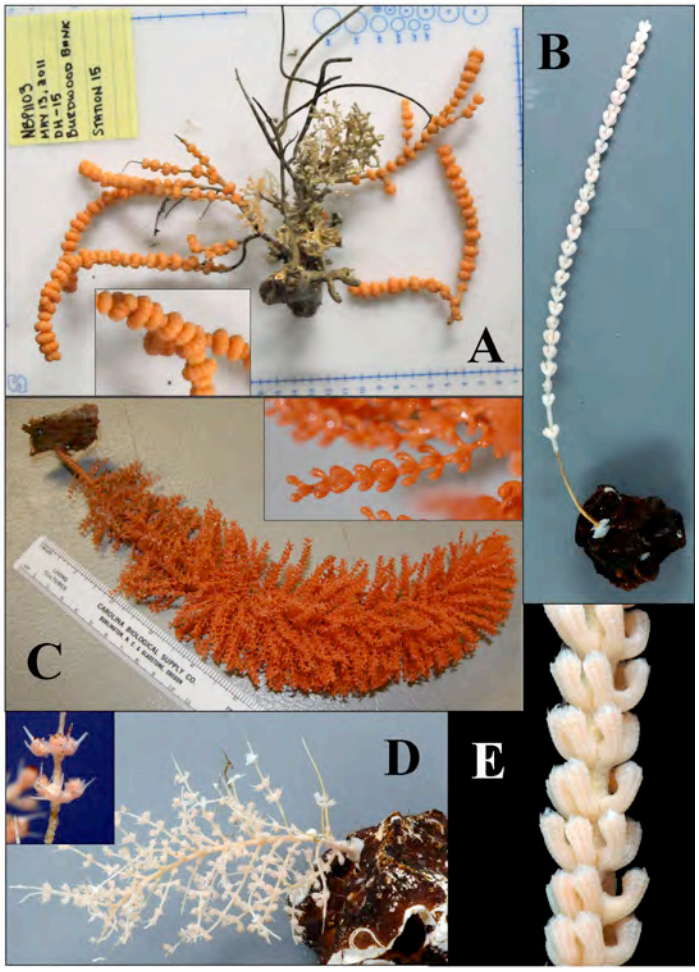


Fig 8.9. A. *Armadillogorgia cyathella*, B. *Primnoella* sp. 1, C. *Digitogorgia* sp. 1, D. *Dasystenella acanthina*, E. *Convexella magelhaenica*.

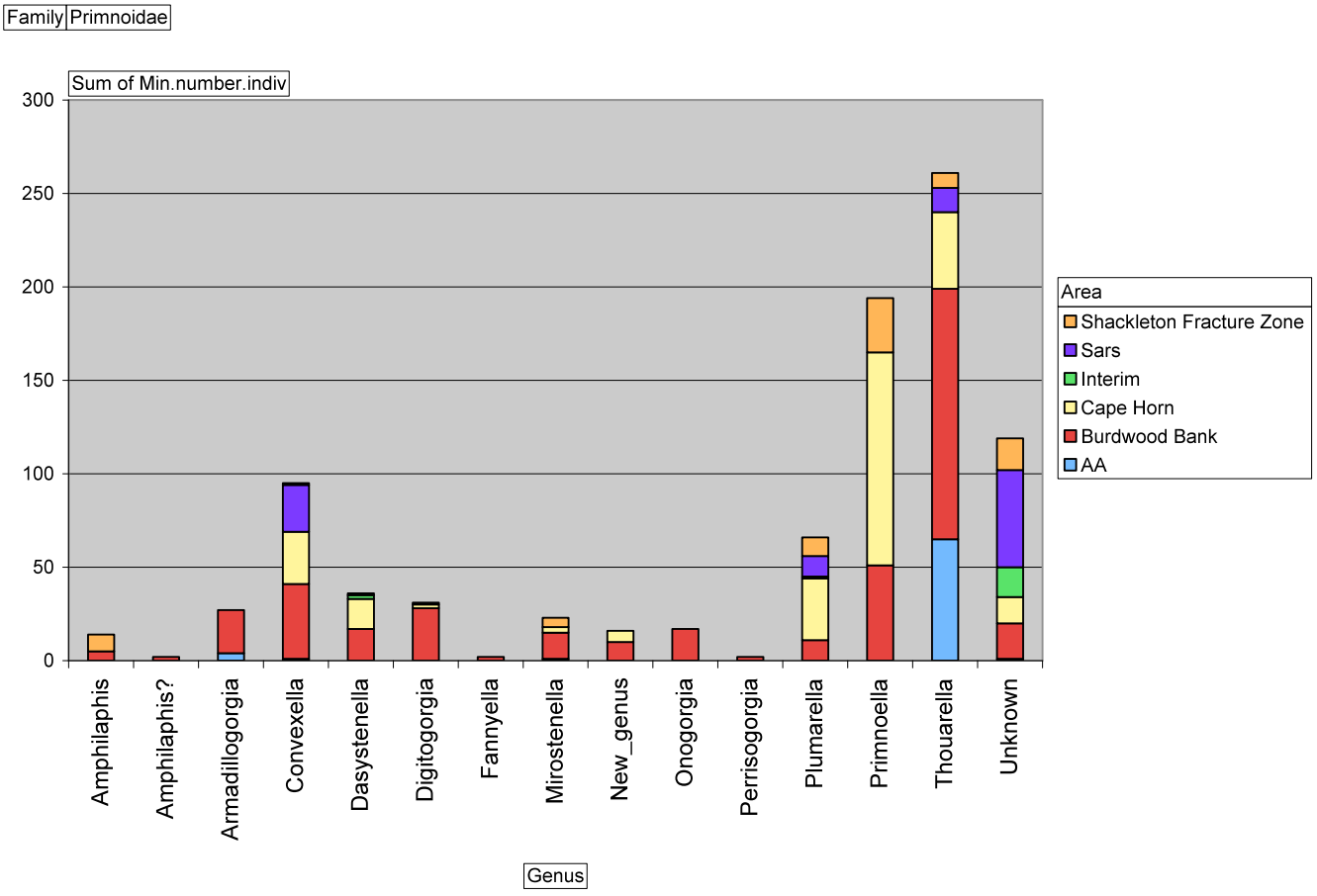
Genus	Species
Mirostenella	new sp.
Perrissogorgia	new sp.
New genus	new sp.
Onogorgia	*nodosa*
Thouarella	*parachilensis*
Thouarella	*crenelata*
Thouarella	*chilensis*
Thouarella	*antarctica*
Thouarella	*variabilis*
Thouarella	*viridis*
Thouarella	*andeep*
Plumarella	*diadema*
Plumarella	*undulata*
Metafannyella	new sp.
Armadillogorgia	*cyathella*
Primnoella	sp. 1
Primnoella	sp. 2
Dasystenella	*acanthina*
Digitogorgia	sp. 1
Digitogorgia	sp. 2
Convexella	*magelhaenica*
Pyrogorgia	*lemnos*
Amphilaphis	sp.

Table 8.3. Preliminary list of Primnoidae genera and species identified from NBP11-03

Of the samples collected two are species new to science (see Table 8.3). These identifications were undertaken on ship and require confirmation through comparisons to type material and closer morphological investigations using scanning electron microscopy. The new genus has been described (Taylor et al., in prep.) but this expedition provided whole specimens one of which will be utilised as the holotype (to be stored in the Natural History Museum, London – paratypes to be sent to the Smithsonian Institution, Washington DC).

At least 36 specimens of *Dasystenella* were procured, ample to complete the revision of this genus.

Fig 8.10, Breakdown of Primnoidae genera found at each station



iv Actinarians

Mercer Brugler & Estefania Rodriguez – American Museum of Natural History, New York, USA

Sea anemones (Cnidaria: Anthozoa: Actiniaria) are among the most diverse members of the anthozoan subclass Hexacorallia (~1,200 species in 46 families), and are considered an emerging model system. However, many basic questions remain unanswered, most important of which is "what defines a species?" Actiniarians possess few unique morphological features and are currently distinguished by mosaics of characters. Relationships among actiniarians are largely based on the absence of features rather than shared, derived characters. To date, only a single study has utilized DNA for species-level identification. Three separate studies have analyzed phylogenetic relationships among the Actiniaria using molecular techniques; however, only half of the family-level diversity within the order was represented. Additionally, current molecular markers (primarily mitochondrial and nuclear ribosomal) are not sufficiently variable to differentiate putative species, nor do they provide a single hypothesis regarding the evolutionary history of, or phylogenetic relationships within, the order Actinaria.

I (Mercer R. Brugler; American Museum of Natural History / Sackler Institute for Comparative Genomics) am currently developing variable, single-copy nuclear markers for species-level identification of two genera of largely Antarctic sea anemones: Hormathia (Hormathiidae) and Isosicyonis (Actiniidae). The genus Hormathia has been described as one of the most distinctive genera within the Hormathiidae, which is one of the richest families of deep-sea anemones (Fautin & Barber 1999; Rodriguez & Lopez-Gonzalez 2001). According to Fautin-Dunn (1983), *H. lacunifera* is the most dominant Antarctic sea anemone, while H. alba is the only known species of luminescent sea anemone (Tur 1993). There are currently three morphospecies within *H. lacunifera* to which novel species-level markers will be applied. *H. armata* will serve as a control as it is sufficiently different morphologically (as compared to *H. lacunifera*) and thus represents a true sister species. The genus Isosicyonis (Actiniidae) is currently only known from the Southern Ocean, and the only two nominal species within the genus live in association with

gastropods of the genus Harpovoluta (Rodriguez & Lopez-Gonzalez 2008; Fig. 1). Within Isosicyonis, there are three morphospecies (all of which are somewhat restricted geographically) but only one can be differentiated based on morphology: brown- striped (I. striata), brown (I. alba), and white (I. alba).

Because of their broad applicability to the scientific community, markers are also being developed for Aiptasia and Metridium, as well as other deep-sea and chemosynthetic anemones. Ultimately, it is the introns and non-coding sequences (which are not subject to the same evolutionary constraints as exons) within nuclear protein-coding genes that will provide the necessary variability to differentiate species. The slower-evolving exons may prove ideal for higher-level phylogenetic reconstructions of the order Actiniaria. To adequately delineate species, genetic sampling will cover the full range of morphological variability as well as geographical distribution of the taxa under consideration. Additionally, the closest-related known species will be included in order to determine whether the hypothesized species is an autonomous evolutionary lineage. To this end, cruise NBP11-03 has been key to obtaining Hormathia and Isosicyonis from new localities, as well as other Antarctic representatives (Fig. 2).

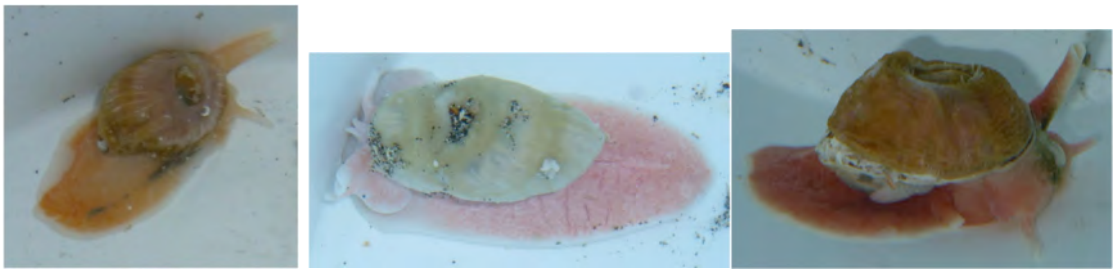


Fig. 8.11. The only two nominal species of anemone within the genus *Isosicyonis* live in association with gastropods of the genus *Harpovoluta* (the retracted anemone completely covers the gastropod shell). Three different colored gastropods have been collected: orange (left photo), pink (middle) and red (right).

Fig. 8.12. Cruise NBP11-03 has been instrumental to obtaining my focal taxa (*Hormathia* and *Isosicyonis*) from new localities, as well as other Antarctic representatives. Left photo: *In situ* photo of anemones from site 'AA' along the West Antarctic Peninsula Shelf. Middle photo: Anemone with a warty cuticle found attached to a large rock. Right photo: Anemone found growing inside one of the focal fossil corals for this cruise, *Desmophyllum dianthus*.

Cruise NBP11-03 was also instrumental in obtaining fresh tissue for an upcoming 454 ultra-high-throughput next generation sequencing project (Roche Applied Science). My goal is the denovo sequencing of the transcriptome of a broad range of anemones to obtain additional molecular markers. To do so, I need fresh tissue to isolate RNA (which degrades rapidly), which is reverse transcribed into cDNA (a more stable molecule). Collaborators at Louisiana State University recently obtained ~25-30K sequences from 1/16th runs (average sequence length: 400 bp), which assembled into >1,000 contigs and provided a large number of single-copy markers for corals (the sister group to anemones). I am also in the process of sequencing forty-four complete anemone mitochondrial genomes to obtain a robust phylogenetic reconstruction of the order Actiniaria (based on ~16,000-18,000 bp per individual).

Complete mitochondrial genomes are being amplified using TaKaRa's LA Taq (Long PCR), hydrosheared into 1.5-3 kbp fragments, ligated into a plasmid cloning vector, and transformed into E. coli to create a plasmid library. Several clones are sequenced, compared, and pieced together like a puzzle to obtain the complete mitochondrial genome.

My advisor, Dr. Estefania Rodriguez (assistant curator of the Cnidaria at the American Museum of Natural History in New York City), is actively describing new species from both Hormathia and Isosicyonis based on morphology (Rodriguez & Lopez-Gonzalez 2001, 2008). Dr. Rodriguez will concurrently assign morphological-based species designations to the anemones collected on this cruise while I attempt the same using molecular techniques. I will use the results of the genetic analyses to help determine which external and/or internal morphological characters are uninformative, and which are species-specific. Defining species and deeper phylogenetic relationships is imperative and represents a critical step in the advancement of our knowledge and understanding of sea anemone taxonomy and systematics.

v Other Biological Studies

Prior to NBP11-03, effort was taken to identify other investigators interested in non-coral fauna brought up during this cruise, so that material could be preserved in an appropriate manner for specific studies. By preserving all biological material from this cruise, rather than just fauna of interest to this project, collection time and effort is maximized and material will be available from this remote and under-sampled area for other investigators in the future. On return from NBP11-03, investigators from other institutions will be sought for other material collected during this cruise, and any remaining fauna will be either donated and housed at the Smithsonian Museum of Natural History (Washington, DC, USA), or in the collections at the Darling Marine Center (ME, USA). The following investigators are being provided material from this cruise to aid in their research.

Echinoderms – Asteroidea & Ophiuroidea

Investigator - Mariana Escolar - National Institute for Fisheries Research and Development, Argentina

Table 8.4. Stations where echinoderms species were e collected. No. of specimens collected brackets.

Station	Class
10	Ophiuroids (3), Asteroids (1) – dry
52	Ophiuroids (2) - ethanol
110	Asteroids (2) - dry

These specimens will be included in the invertebrate collection of the Benthos Lab in the National Institute for Fisheries Research and Development (INIDEP); institute in Mar del Plata, Argentina. The material will be use only as reference on my research on echinoderms taxonomy; I would compare these specimens with their co-generics collected in the Argentine continental shelf. I am interested in Asteroids mainly, because is one of the most diversified group in the Argentine Sea, in addition, there are doubts regarding the status of several species.

Gastropods

Investigator - Philippe Bouchet (pbouchet@mnhn.fr)– Museum National d'Histoire Naturelle, Paris, France.

Site	Nb. Individuals
Burdwood Bank	90
Cape Horn	76
Sars	311
Interim	69
SFZ	37
AA	39
Grand Total	622

Table 8.5. Number of individual gastropods collected during NBP1103.

A total of 55 lots of live gastropods and gastropod shells were collected (622 individuals, Table 8.5). Half of these were collected at Sars Seamount (311 individuals). When possible, live individuals were relaxed in seawater with menthol crystals. Shells were pierced and tissues were preserved in 100% molecular-grade ethanol). These specimens will be sent to Pr. Philippe Bouchet at the Museum National d'Histoire Naturelle in Paris, France.

Crinoidea – Sea Lillies

Investigators: Dr Nadia Ameziane (ameziane@mnhn.fr) and Dr. Marc Eléaume (eleaume@mnhn.fr) - Museum National d'Histoire Naturelle, Paris.

Background - Crinoids are well represented and abundant around Antarctica with around 50 known species. For the last 5 years, we have been collecting and sequencing crinoids only to find that many species are in fact complexes of cryptic entities. *Promachocrinus kerguelensis* is the most famous example of all with as many as 6 species within this morph (seen in Figure 1). Recently, we have demonstrated that the genus *Notocrinus* needs deep revision with 4 new undescribed species collected in the Burdwood Bank - Peninsula vicinity.

Twenty-nine crinoids have been collected on NBP-1103 (Table 8.6, next page). Most were collected from Burdwood Bank

Fig 8.13, *Promachocrinus kerguelensis* (cryptic species unknown) from station 67 on the Antarctic Peninsula.

Expected results - Abundant species like *P. kerguelensis*, *Florometra mawsoni* or *Anthometra adriani* (the 3 crinoids typically found when collecting around Antarctica) are particularly well suited models to investigate the circumpolarity of Antarctic species, the population structure and dynamics within Antarctic species and the links between sub-Antarctic islands, South America and the High Antarctic. With as many as 2500 COI sequences representing at least 30 species, we have built a comprehensive database for Antarctic crinoids and wish to add to it as many new haplotypes as possible making NBP 11-03 collections very important; they will help understand various models of gene fluxes around Antarctica.

					Preservation methods			
Date	**Area**	**Stn**	**Gear**	**Species***	**Freezer (-80C)**	**EtOH****	**Formalin**	**Notes**
10/05/2011	Burdwood	1	TB	Crinoid	2	2 (70%)		
10/05/2011	Burdwood	2	TB	Crinoid	x	X (95%)		
11/05/2011	Burdwood	7	DH	*Digitogorgia* sp 1.	4		x - 2 jars (2 litre jar full)	Crinoid attached Genetics samples: FA44, FA45
11/05/2011	Burdwood	7	DH	*Mirostenella*	x			Crinoid attached
11/05/2011	Burdwood	7	DH	Crinoid	1			
11/05/2011	Burdwood	10	TB	Crinoids on *Thouarella*		x		
11/05/2011	Burdwood	14	DH	Crinoid		1		
12/05/2011	Burdwood	17	DH	Crinoid	4		3	
12/05/2011	Burdwood	19	DH	Crinoid		1		Genetics samples: FE1
13/05/2011	Burdwood	22	DH	Crinoid		1		
21/05/2011	Ant. Pen.	67	TB	Crinoid		12 (60%)		Genetics samples: FG38

*(preliminary identification done in the wet lab)
**100% molecular grade unless otherwise stated.

9. Seafloor Imagery

9i TowCam

Seven successful TowCam deployments occurred during our 34 day expedition and will be used to assess the biogeography of cold-water corals (and other fauna), both live and fossil across the Drake Passage. Near bottom imaging surveys are critical for assessing biological diversity in areas where physical sampling is challenging. Dredges and trawls deployed during this cruise are essential for identifying organisms to species level and collecting vital taxonomic and genetic data, however are not ideally suited for assessing abundances, collecting hard bottom fauna or providing ecological habitat information. Of the two imaging platforms used during this cruise (see DropCam below), the WHOI-MISO TowCam images will primarily be used for assessing biogeography, diversity and abundances of organisms.

We were fortunate enough to have two cameras mounted on the TowCam frame for this cruise – the original DSPL camera, and the new OIS camera. Figure 9.1 shows a comparison of images collected by the two cameras on Burdwood Bank over the same area of seafloor, and clearly shows the higher resolution of the OIS camera for biological work. The DSPL camera is useful for collecting abundance and habitat data on a wider scale, however the OIS camera will be invaluable for identifying organisms to a lower taxonomic level suitable for diversity and biogeography studies.

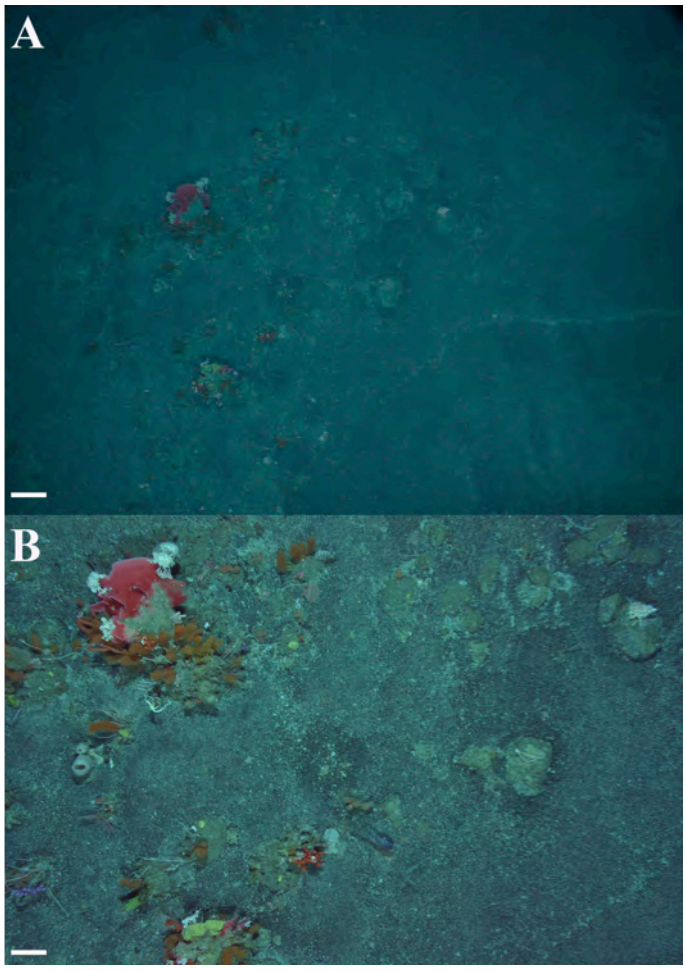


Fig 9.1, Seafloor photographs taken by the WHOI TowCam on Burdwood Bank (Stn 5, 325m depth) to compare the two cameras. Photographs are taken with 10 seconds of each other at the same height above seafloor. A, the DSPL camera and B, the OIS camera.

Area	Station	Depth	Tow Length	# DSPL Images	# OIS Images
Burdwood Bank	5	325m	4.75km	1416	1275
SFZ	25	2221m	5.55km	692	2732
WAP Shelf	64	593m	2.16km	1387	1479
Interim Smt	76	3304m	3.18km	1913	1917
Sars Smt	102	546m	1.71km	1139	1144
Cape Horn	130	1125m	1.70km	1152	1149
Cape Horn Shelf	146	503m	1.57km	868	872

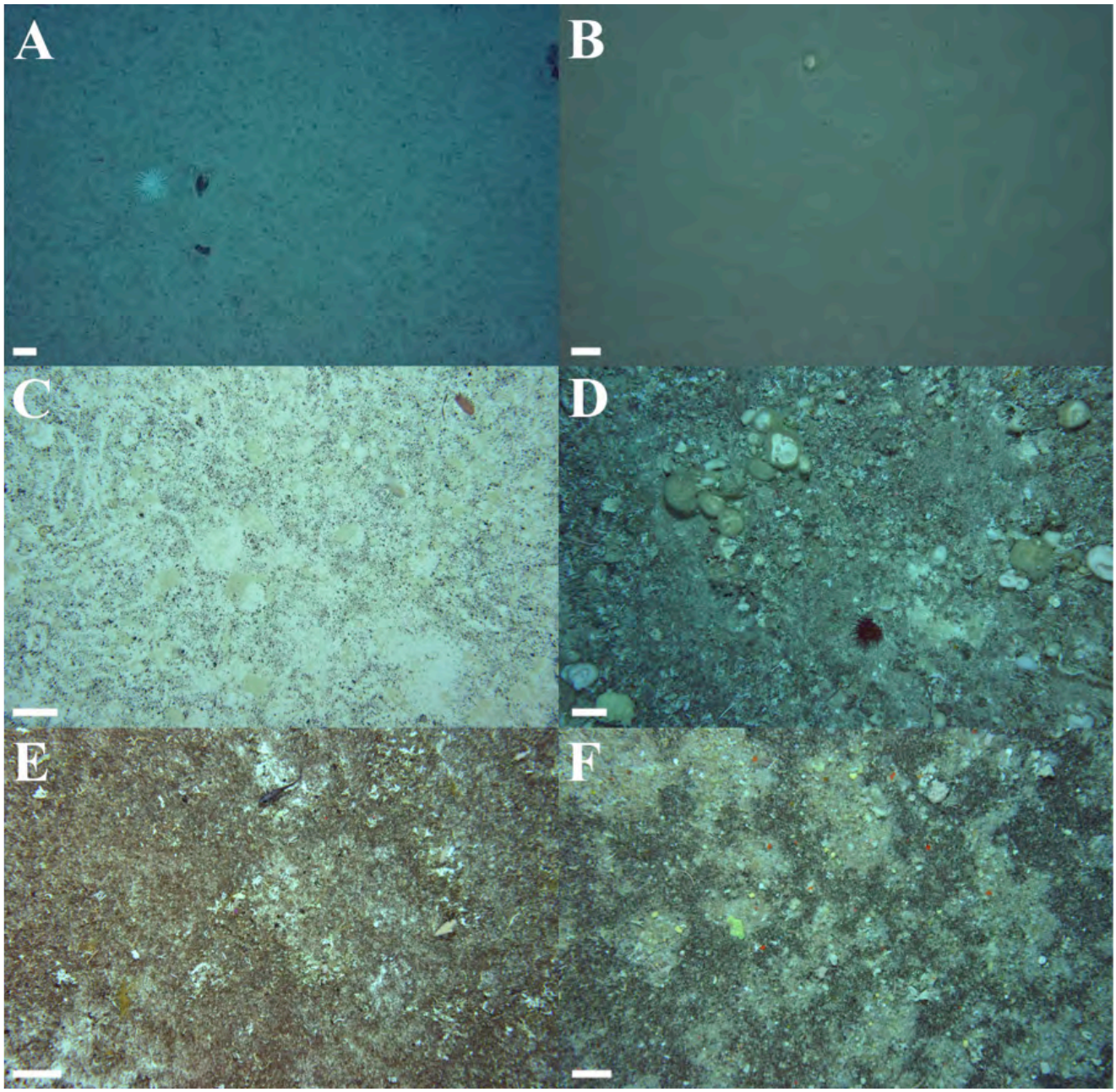


Fig 9.2, Images from the OIS camera mounted on the TowCam. A, Stn. 25, Shackleton Fracture Zone; B, Stn. 64, Western Antarctic Peninsula; C, Stn. 76, Abyssal plain close to Interim Seamount; D, Stn. 102; Sars Seamount; E, Stn. 130, Cape Horn; and F, Stn. 146, Cape Horn continental shelf. Scale Bars = ~20cm

9.ii TowCam Analysis

TowCam Images from this cruise will be used for quantitative analysis of species diversity, distribution, abundance and species richness. Whilst onboard, basic presence/absence analysis was undertaken by multiple members of the science party for comparative site assessment. Images were assessed using the following parameters by two people at a time (one biologist and one geologist/chemist).

Geology

A – Unconsolidated Sediment (A1, Fine Sediment; A2, Sand; A3, Gravel; A4, Coral Rubble)
B – Hard Bottom (B1, Bedrock; B2, Cobble; B3, Boulder; B4, Biogenic)
C – Interface
D – Slope (D1, Level; D2, Sloping; D3, Vertical)
E – Bedforms (E1, Ripples; E2, Scour; E3, Burrows; E4, Tracks; E5, Mounds)
F – Anthropogenic (F1, Fishing Gear; F2, Trawl Marks; F3, Trash)

Biology

G – Cnidaria (G, Other; G1, Scleractinia; G2, Octocorallia; G3, Stylasterina; G4, Antipatharia; G5, Actinaria)
H – Echinodermata (H, Other; H1, Echinoidea; H2, Asteroidea; H3, Ophiuroidea; H4, Crinoidea; H5, Holothuria)
I – Porifera (I, Other; I1, Demospongea; I2, Hexactinellida; I3, Cladorhizidae)
J – Crustacea (J, Other; J1, Decapoda Shrimp; J2, Decapoda Brachyura; J3, Decapoda Anomura)
K – Annelida
L - Mollusca (L, Other; L1, Gastropoda; L2, Bivalvia; L3, Cephalopoda Octopoda; L4, Cephalopoda Decapoda)
M - Chordata

Analysis of the TowCam images complements the biological collections on this cruise. As can be seen from Fig 9.3., the diversity of fauna counted by both methods differs significantly, clearly demonstrating the need for multiple levels and methods of sampling to give us a realistic picture of the biodiversity of regions and the biogeography of species.

9iii DropCam

Towed camera systems have the advantage of being able to collect many overlapping pictures, able to be quantitatively analyzed, and can cover many kilometers distance in a single tow. They do however have the disadvantage of not being able to cover steep terrain, such as that found on seamounts and continental shelf edges, which is often the preferred habitat of many species of scleractinian, octocoral and stylasterid. This type of terrain is also difficult to physically sample – it is not possible to run trawls over steep or rocky terrain, and dredges fragment fragile biology.

As such a single point Drop Camera system is a useful addition to biogeographic studies examining seamount and shelf terrain. This system is able to be dropped onto steep and rocky terrain to take single photos (multiples of 3 were used for this cruise) and then lifted ~20m from the seafloor, the ship moved to the next location (100m distance) and redropped. Using this method we will be able to analyze species living on steep terrain usually overlooked in trawl, dredge and TowCam surveys. Fig 9.3. Shows sample images from each of our six sample areas taken by the DropCam.

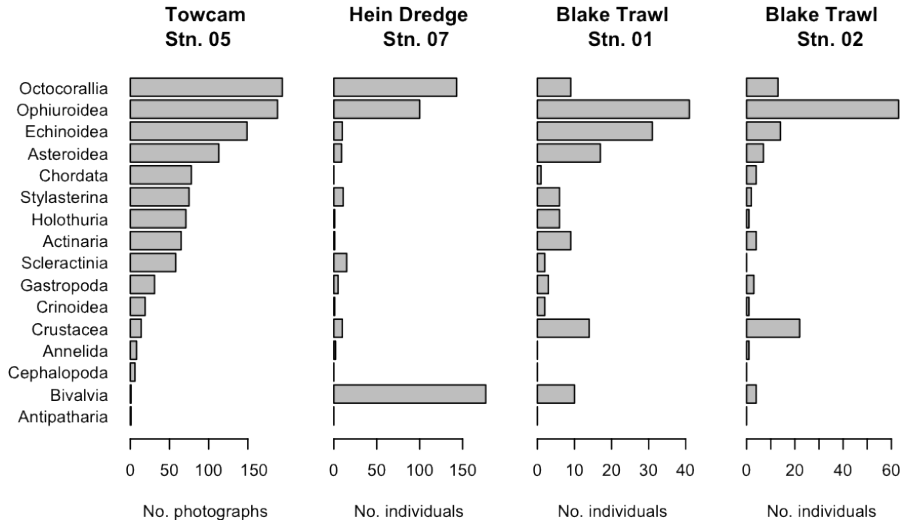


Fig. 9.3, Histograms showing phyla diversity using different biological sampling methods utilized during NBP11-03. All four histograms are from a single area on Burdwood Bank. Left to right – TowCam analysis (presence/absence over 200 images); Number of individuals collected in a Hein Dredge; and, number of individuals of each phyla collected in two Blake trawls.

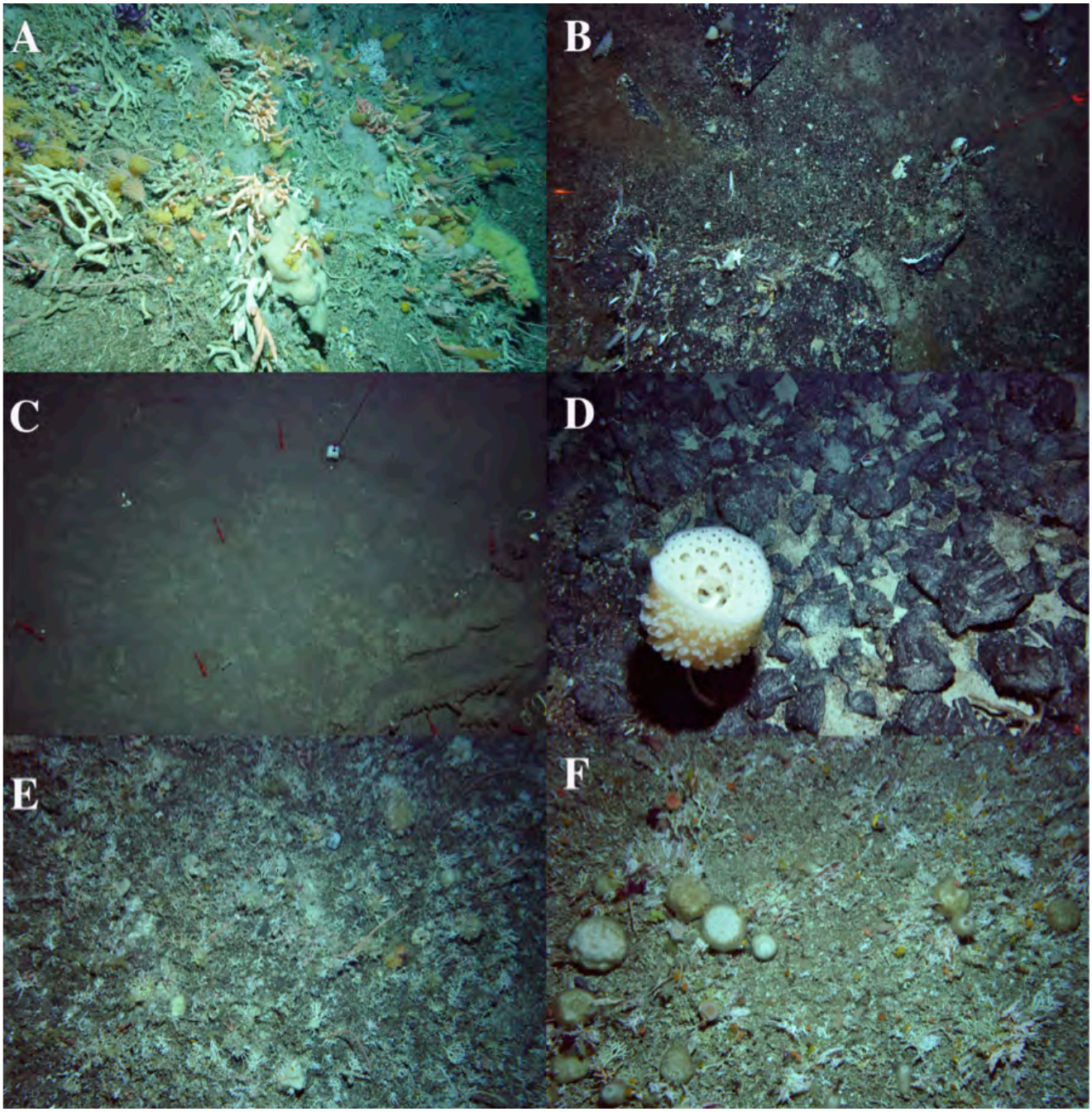


Fig 9.4, DropCam images from NBP11-03. A, Burdwood Bank, B, Shackleton Fracture Zone; C, Western Antarctic Peninsula; D, Interim Seamount; E, Sars Seamount; F, Cape Horn.

10. Water sampling

In order to reliably interpret the paleorecord it is important to characterize and understand the modern oceanography. In the context of paleoclimate work with fossil corals this also means calibrating the trace metal and isotopic composition of the skeletons of modern corals with that of ambient seawater. A good understanding of the regional hydrography and the chemical composition of water masses is a vital component of the project. The main body of water in the Drake Passage is made up by upper and lower circumpolar deep water (UCDW and LCDW). Both of these water masses are circum-Antarctic. While UCDW inherits some of its hydrographic features (e.g. low oxygen content) from Pacific and Indian deep water (PDW), LCDW carries the characteristic salinity minimum of NADW. The main goal of the water sampling campaign was to retrieve waters in close proximity to coral sampling sites. Hence water was collected using two devices, the CTD and the TowCam.

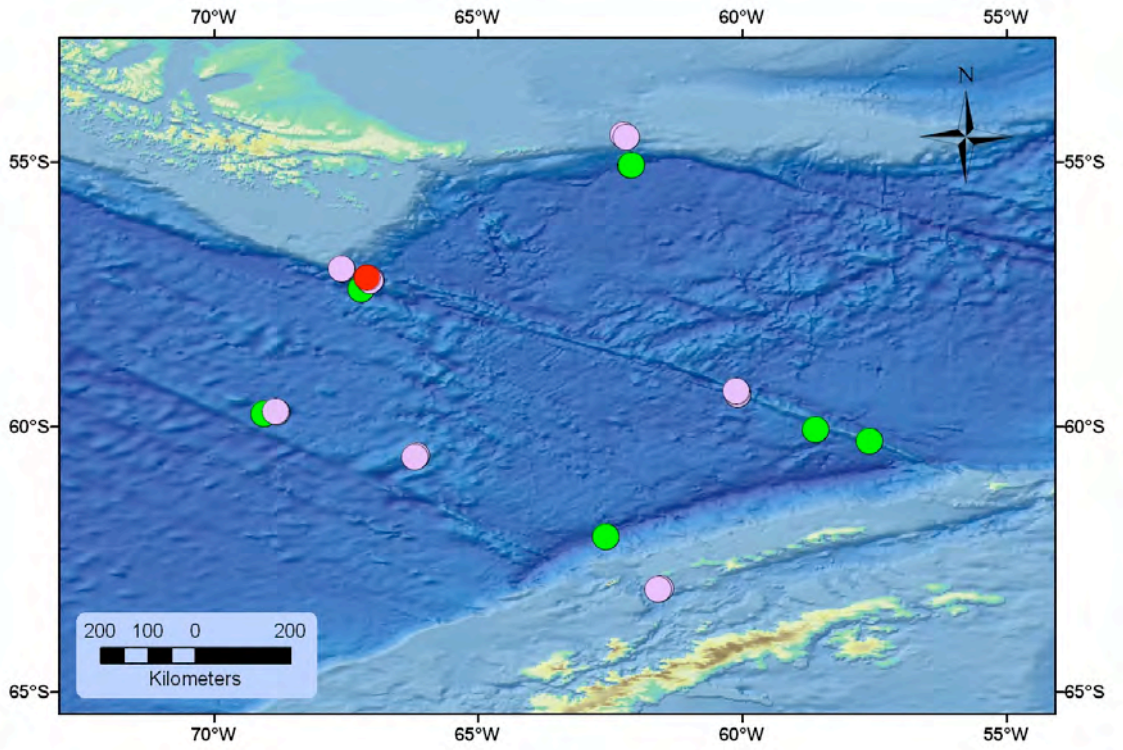


Figure 10.1 Map of water sample locations. Green are CTDs, Green are TowCam and Red is a single niskin bottle attached to a DropCam wire.

Water was collected from fifteen locations, six of which were CTD deployment, seven of which were TowCam deployments and one was a Niskin bottle attached to the wire above the DropCam (Figure 10.1, Appendix 6). Sampling procedures for various analyses are outlined below. Except the alkalinity measurements (see separate section) all analyses will be carried out post cruise in shore-based laboratories.

1) Dissolved Organic Carbon (DOC) – 30ml samples were filtered for subsurface samples (0-250m) and bottom waters only, collected in duplicate in combusted 40ml glass vials; acidified with 60 µl of 6M HCl (Optima grade), and stored refrigerated; filters were saved and stored refrigerated
2) DOC radiocarbon – 1 liter samples were filtered for subsurface samples (0-250m) and bottom waters only, and collected in Teflon bottles, acidified with 2 ml of 6M HCl (Optima grade), and stored frozen; filters were saved and stored refrigerated
3) Dissolved Inorganic Carbon (DIC) radiocarbon – 0.5l samples were taken in glass bottles, using sample tubing making sure the bottles were overfilled 1.5 times; samples were poisoned with 100 µl of mercuric chloride, and sealed using grease stoppers; storage was at room temperature

4) Oxygen isotopes - unfiltered water was collected immediately and sealed into 60ml glass bottles without headspace, and stored at room temperature (two bottles per depth);
5) Alkalinity and pH - water was filtered through a 0.4 μm Acropak filter into two 250ml glass bottle, using a glass rod to reduce bubbles, filling entirely without headspace; a minimum of three analyses per sample were done at onboard (see special section)
6) Nutrients – water was filtered through the Acropak filter via Tygon tubing into a 30ml acid-cleaned plastic bottle; samples were frozen at -20°C;
7) Colloidal thorium – 15ml of seawater was filtered though Acropak filter into a 50ml Teflon centrifuge tube containing an Amicon Ultra Centrifugal Filter (UltraCel – 10K); centrifugation for at least an hour at 4000 rpm separated the colloidal fraction; samples were stored at room temperature
8) Silicon isotopes – 250ml (or 500ml for surface samples) of water was filtered through Acropak filter into an acid-cleaned plastic bottle; storage at +4°C
9) Germanium isotopes – 4l of water was filtered through Acropak filter into an acid-cleaned cubitainer, acidified with 4ml concentrated HCl (Optima grade), and stored at room temperature;
10) Uranium series - 4l of water was filtered through the Acropak filter into an acid-cleaned cubitainer, acidified with 4ml concentrated HCl (Optima grade), and stored at room temperature.

pH and Alkalinity measurements onboard NBP1103

600 mL of filtered seawater were collected for triplicate analysis of pH and alkalinity. Analyses were made on-board using a Metrohm 800 Dosino titrator and Tiamo software. A 100 mL sample was pipetted using a glass pipette into the sample vessel which was connected to a water bath set at 20º C. A 12mm magnetic stir bar was used to keep the sample well mixed. pH was measured for 5 minutes on the XXXX pH scale using a Metrohm combined glass electrode, calibrated with 3 pH buffers at 20 C (4.003, 6.880, 9.228). After pH was measured on the sample, a titration was performed by addition of ~20-400 µL acid aliquots to a total of 4 mL of 0.1 N HCl acid (with 35 g of NaCl to create a comparable salinity). pH was monitored continuously throughout the titration and the software calculated alkalinity by Eq 1 (see below). At least three replicates were measured on every sample. In cases where the range of alkalinity values was larger than 10 µmol/L, up to five replicates were analyzed. Alkalinity values are reported in µmol/L and will be converted to µmol/kg as part of a suite of corrections (including those for in situ temperature and salinity) applied onshore. A typical titration curve included two inflection points at HCl volume additions of ~0.3 and ~2.3 mL (Figure 10.2).

(Volm 0.1 N HCl added at endpoint, in mL) * (Concentration of 0.1 N HCl, in mol/L) * 10^6 / (Volm sample, in mL) = Alkalinity (µmol/L) (Eq 1)

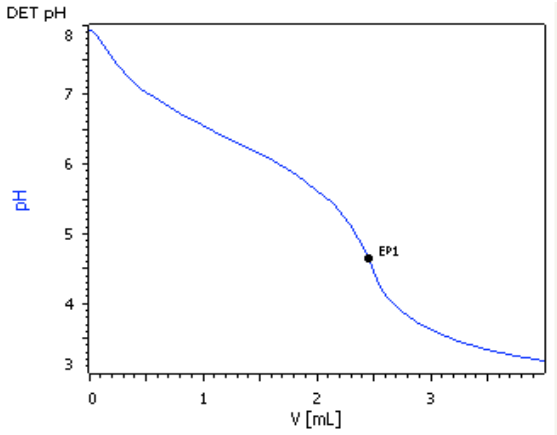


Figure 10.2. Titration curve (volume 0.1 N HCl added vs pH) for the measurement CTD100 N14 Rep#3. Two inflection points are commonly observed at ~0.3 and ~2.3 mL on the abscissa.

The pH and alkalinity of a seawater carbonate Dickson standard were measured each week and for each new 1 L bottle of acid used. This value will be used to correct our shipboard measurements for offsets arising from uncertainty in the normality and salinity of our acid solution. We saved ~200 mL from each batch of 1 L of acid for reanalysis with more Dickson standards after the cruise at Lamont-Doherty Earth Observatory (LDEO). We also measured the pH of our own seawater consistency standards (a total of 7 L) that we made onboard. To make each of these consistency standards, we filtered 1 L of seawater over a 0.4 um polycarbonate filter and stored it in a capped

glass bottle sealed with parafilm in a refrigerator at 4ºC. These were used to evaluate the reproducibility of our measurements. 200 mL of each of the consistency standards were saved for re-analysis back at LDEO.

Throughout the course of analyses we encountered some difficulties in obtaining reproducible and accurate measurements. Ideally we would have had to run only three replicates of each sample, obtaining alkalinity measurements within our pre-determined uncertainty window of 10 µmol/L. In reality, we regularly observed a range of alkalinities such that we had to make 4 or 5 measurements on many water samples. Extra measurements were necessary for 56 of 75 water samples. These statistics only take into account the measurements of water samples from the CTD and TowCam. Dickson standards were not run as often as planned because of volume limitations. Nine Dickson measurements were made onboard. The problems with reproducibility of our measurements appeared to have several potential causes, as described below.

Bubbles in acid hosing. Bubbles cause the amount of acid dispensed to be unknown, which leads to inaccurate and irreproducible measurements. We generally kept track of when bubbles were present and removed them upon observation. Removing bubbles involve removing the acid hose from the sample cup and manually compelling the Dosino to empty 5-10 mL of HCl. During the emptying step, the acid hose was flicked, which helped bubbles to release from the hosing wall. This was repeated as necessary and was effective for large, visible bubbles. The effect of microbubbles was not examined and may have been an additional source of problems.

Leaky caps. The integrity (air-tightness) of 9 bottles became an issue partway through the cruise due to partial melting during oven drying and over-tightening. Two bottles were discarded and 7 sets of bottles were used.

Temperature variations. Measurements of pH are temperature sensitive, such that variations in temperature could cause variations in measured titration endpoints and consequently alkalinities. From the beginning of NBP11-03 through the end of CTD72 the titration setup was located in the hydro lab. This room's temperature varied greatly. It became obvious that the variations in room temperature affected the sample temperature, but the effect was on the order of +/- 0.3 degrees Celsius. Calculations using the Van't Hoff equation suggest this temperature variation would change equilibrium constants by much less than 1‰. After CTD72, the titration setup was moved from the hydro lab to the aft dry lab. Temperature was considerably more constant in the new location, but measurements were not any more consistent. On a separate note regarding temperature, it is worth noting that the water bath was consistent at 20.0 C, but that the measured temperature in samples was regularly higher, varying from ~20.4 to 20.6 C.

Acid bottle concentration uncertainty. The exact concentration of the acid is unknown, as is its NaCl content. This was fully expected and will be corrected onshore at LDEO. For each set of water samples only one acid bottle was used. In order to prevent salt precipitation from affecting our measurements, at the beginning of each new round of water samples the acid bottle was shaken to dissolve any mineralized salts.

pH uncertainty. An imprecise reading of pH from the electrode would change the calculated value of alkalinity. The program uses the volume of HCl added at the titration's endpoint in its calculation of alkalinity (Eq 1). The endpoint is described by pH, so the stability of the pH electrode is important. Our electrode generally measured stable values over time within a single measurement. The slope of our pH calibrations ranged from 99.8 to 100.8, with 100.0 as an ideal value. When we measured the pH buffer solutions as samples, the measured values were close to known values. Additionally, pH calibration issues could cause an overall long-term drift in the measurements, but shouldn't result in sample replicate variability.

Additions of 100 mL sample. We used a 100 mL volumetric burette for all sample and standard measurements, which if used properly ought to be accurate within +/- 0.08 mL. This uncertainty of 0.08% is significantly smaller than the variability seen in our replicate sample measurements, so if used correctly, it is an unlikely source of our inconsistencies. However, ship movement and a bouncing meniscus could result in biases in the volumetric measurement, increasing the uncertainty of the measurement.

The samples and standards that were run are given chronologically in Appendix 6 along with relevant depths and number of replicates.

11. Outreach

http://antarcticcorals.blogspot.com/

A “Blogger” education and outreach site was created prior to the cruise by R.Waller and was updated almost daily by K. Hendry (on board) and L. Healy (at the Darling Marine Center). A total of 35 blogs were created by the science party onboard and emailed to shore to be posted. These posts covered topics ranging from daily activities, onboard science, individuals research projects to ship operations and galley food. 180 photographs were posted, alongside a daily photo of the back deck, showing the working conditions.

The blog was extremely well received, with over 16,000 page views during the cruise, from 55 countries (1. USA (2829 visits); 2. UK (708 visits); 3. Argentina (192 visits); 4, Spain (127 visits); 5. France (108 visits)) and reaching 46 states within the US. The site also attracted 312 ‘Facebook Friends’ and 16 Blogger followers.

In the future, with the new internet system, the at-sea portion of the education and outreach program onboard USAP vessels could be expanded to include systems such as ‘Twitter’ to help advertise the website and attract people to the site.

Appendix 1 Fossil Coral database

Table A1a: Summary of fossil coral collection at Burdwood Bank during NBP1103.

Trawl/ Dredge #	Location	Depth (m)	*Flabellum* count	*Balanophylia* count	*D.dianthus* count	*Caryophylia* count
TB01	Burdwood Bank	324-319 m	-	5	-	5
TB02	Burdwood Bank	320-311 m	2	14	-	2
DH07	Burdwood Bank	334-323 m	9	144	-	80
DH09	Grassy Knoll	859-793m	-	1	3	-
TB10	Grassy Knoll	720-736m	120	152	25	-
DH11	Grassy Knoll	823-705m	-	6	-	-
DH14	Grassy Knoll	732-721m	744	2324	1	24
DH15	Grassy Knoll	895-893m	2	3	-	-
DH16	Grassy Knoll	1423-1414m	5	47	-	1
DH17	Grassy Knoll	1918-1805m	-	fragments		-
DH19	Grassy Knoll	1534-1497m	28	-	-	-
DH20	Grassy Knoll	1859-1850	-	fragment	-	-
DH22	Grassy Knoll	1922-1835m	58	8	2	1
TOTAL			**968**	**2704**	**31**	**113**

Table A1b: Summary of fossil coral collection along the Shackleton Fracture Zone during NBP1103.

Dredge #	Location	Depth (m)	*D.dianthus* count	*Caryophylia* count	*Stylasterids* (g)	*Bamboo Corals* (g)	*Shells/ Others* (g)
DH24	Shackleton Fracture Zone	2345-2245 m	-	1	-	-	9.1
DH28	Shackleton Fracture Zone	2482-2492 m	fragments		-	-	7.7
DH30	Shackleton Fracture Zone	1693-1637m	-	-	-	-	110
DH31	Shackleton Fracture Zone	1731-1643m	-	-	77.9	fragments	-
DH34	Shackleton Fracture Zone	1891-1770m	-	-	149.5	-	-
DH35	Shackleton Fracture Zone	1212-1115m	-	-	-	fragments	7.1
DH36	SFZ, Tiffany's peak	1230-1220m	-	1	202.9	-	11.7
DH37	SFZ, Tiffany's peak	888-868m	-	6	2119.2	-	10.1
DH38	SFZ, Tiffany's peak	849-743m	-	3	363.3	-	342.6
DH39	SFZ, Tiffany's peak	822-717m	-	1	96.9	-	0.8
DH40	SFZ, Tiffany's peak	834-778m	fragments	302	2237.5	130	106.1
DH43	SFZ, Tiffany's peak	856-790m	1	309	2778	-	389.2
DH50	SFZ, Tiffany's peak	1045-952m	-	-	25.8	-	4.9
DH52	SFZ, Tiffany's nose	911-798m	-	1	4.8	-	-
DH53	SFZ, Tiffany's nose	1081-979m	-	-	91.3	-	1.8
DH54	SFZ, SE of Tiffany's nose	1300-1223m	-	fragments	270.1	-	224
DH56	SFZ, SE of Tiffany's nose	1589-1441m	fragment	-	-	-	3.5
DH57	SFZ, southern end	1895-1805m	-	-	2.2	1.8	13.8
DH59	SFZ, southern end	1810-1823m	-	-	-	fragment	34
TOTAL			**1**	**624**	**8419**	**132**	**1276**

Table A1c:: Summary of fossil coral collection on the Antarctic shelf during NBP1103.

Trawl #	Location	Depth (m)	*Flabellum* count	*Balanophylia* count	*Stylasterids* (g)
TB65	AA/WAP shelf	609-602m	1	2	76
TB66	AA/WAP shelf	588-571m	1	-	59.3
TB67	AA/WAP shelf	618-534m	12	-	14
TOTAL			**14**	**2**	**149.3**

Table A1d:: Summary of fossil coral collection at Interim Seamount during NBP1103.

Dredge #	Location	Depth (m)	*D. dianthus* count	*Gardeneria Antarctica* count	*Caryophylia* count	*other solitary coral* count	*Bamboo Coral* (g)	*Stylasterids* (g)	*Shells/ Others* (g)
DH 73	Interim Seamount	1140-1003m	-	-	-	-	-	13.2	-
DH 74	Interim Seamount	1122-1006	7	2	-	-	4593	1377.8	663.4
DH 75	Interim Seamount	1251-1140	9	22		6	1789	1446	184.7
DH 78	Interim Seamount	1588-1502	4	fragments		-	275	90.6	-
DH 80	Interim Seamount	1510-1388	fragments	fragments		-	1416	641.2	42.5
DH 81	Interim Seamount	1657-1671	-	-	-	-	-	10	-
DH 83	Interim Seamount	1815-1807	-	-	-	-	-	186.9	-
DH 85	Interim Seamount	1533-1493	-	-	-	-	238.1	4	-
DH87	Interim Seamount	1246-1326	fragments	6		5	1500	3373.1	124.8
DH88	Interim Seamount	1007-957	fragments	6		8	1654.3	7086.9	135.4
DH90	Interim Seamount	785-803	-	-	-	-	-	655.5	3.7
TOTAL			**20**	**36**		**19**	**11465**	**14885**	**1155**

note: Caryophyllia and Gardeneria Antarctica were often hard to distinguish from another, and are reported jointly unless we were very sure

Table A1e:: Summary of fossil coral collection at Sars Seamount during NBP1103.

Dredge #	Location	Depth (m)	*D.dianthus* count	*Caryophylia* count	*Solenosmilia* (g)	*Madrepora* (g)	*Bamboo Coral* (g)	*Stylasterids* (g)	*Shells/Others* (g)
DH91	Sars Seamount	683-611	13	755	38.4	4.6	-	5032.8	73
DH93	Sars Seamount	1761-1664	-	-	-	-	fragments	-	6.7
DH95	Sars Seamount	816-735	17	501	-	-	-	4719.1	93.8
DH96	Sars Seamount	973-940	1	7	-	-	22.3	76.5	4.7
DH97	Sars Seamount	698-617	20	561	-	2517.6*	-	3723.3	67.8
DH98	Sars Seamount	1217-1106	-	fragments	-	-	32	4.1	12.3
DH101	Sars Seamount	1562-1525	-	-	-	-	6.2	-	12.3
DH103	Sars Seamount	1021-924	-	-	-	-	-	16.7	26.5
TO104	Sars Seamount	~650-550	1	fragments	1346.6	-	-	10382.5	1373
DH108	Sars Seamount	1769-1579	-	-	-	-	93.4	-	-
DH111	Sars Seamount	1735-1647	-	fragment	-	-	220.9	-	-
DH112	Sars Seamount	1662-1607	2	-	-	-	92.8	36.5	15.6
DH113	Sars Seamount	1672-1675	1	fragments	-	-	936.5	85.6	23.7
DH114	Sars Seamount	1886-1772	-	-	-	-	5.4	-	-
DH115	Sars Seamount	891-795	3	224	-	-	60.7	2140.4	154.1
DH117	Sars Seamount	1033-929	54	376	-	24.9	331.2	7735.7	495.2
DH120	Sars Seamount	1727-1675	76	6	-	-	15052	565.7	22.9
DH121	Sars Seamount	1380-1458	-	-	-	-	10.7	fragments	-
DH126	Sars Seamount	~1925-1893	fragments	-	-	-	fragments	229.3	14.3
TOTAL			**188**	**2430**	**1385**	**2547**	**16864**	**34748**	**2396**

Table A1f:: Summary of fossil coral collection around Cape Horn during NBP1103.

Dredge #	Location	Depth (m)	*Flabellum* count	*Balanophylia* count	*D.dianthus* count	*Caryophylia (?)* count	*unidentified solitary corals* count	*Solenosmilia* (g)	*Madrepora* (g)	*Stylasterids* (g)	*Shells/ Others* (g)
DH128	Cape Horn	~931-937	406	321	fragments	27	-	2.3	-	4488.9	30.8
DH129	Cape Horn	1257-1188	1304	220	1	-	-	-	-	11649.5	114.1
DH131	Cape Horn	898-872	26	28	-	-	fragments	4751.1	-	2677.9	1.8
DH134	Cape Horn	1049-975	956	1224	6	138	fragments	-	-	3687.3	124
DH138	Cape Horn	1494-1388	135	1096	18	-	123	-	-	1799.3	52.5
DH140	Cape Horn	741-555	75	454	17	1	fragments	-	507.4	1922.2	19.2
DH141	Cape Horn	934-834	59	574	-	-	fragments	1.7	14	384	26.9
DH143	Cape Horn	1869-1877	20	-	fragments	-	-	-	-	148.3	31079.5
TB147	Cape Horn	447-689	1	17	-	-	1	-	-	21	120.8
TOTAL			**2982**	**3934**	**42**	**166**	**124**	**4755**	**521**	**26778**	**31570**

Table A1 g Subsampled corals

Station	Depth (m)	#	Sample Code
Burdwood Bank			
TB001	324-319	3	NBP1103-TB001-Bc-01, 02, Cc-01
TB002	320-311	3	NBP1103-TB002-Bc-01, Bn-01, Fn-01
DH007	334-323	42	NBP1103-DH007-Bc-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, Bn-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22
KC008	331	10	NBP1103-KC008-0-5cm-Cc, 11-13cm-Fc, 15-17cm-Fc, 17-20cm-Bc-01, 02, Bn, 20cm-Bc, 20-25cm-Bc(f), 29cm-Bc, CC-Bc
DH009	859-793	16	NBP1103-DH009-Sm-9-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16
TB010	720-736	40	NBP1103-DH010-Dn-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, Dp-01, 02, 03, Stc-4-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16
DH011	823-705	4	NBP1103-DH011-Bc-01, 02, Bn-01, 02
DH014	732-721	42	NBP1103-DH014-Bc-998, 999, 1000 1001, 1002, 1003, Bn-41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, Bp,-51, 52, Dn-01, Fc-276, 277, Fn-265, 266, 267, 268, Fp-123, 124
DH015	895-893	2	NBP1103-DH015-Bc-01, 02
DH016	1423-1414	33	NBP1103-DH016-Bc-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, Bn-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, Fn/c-01, 02, 03, 04, 05
DH019	1534-1497	14	NBP1103-DH019-Fc-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14
DH022	1922-1835	24	NBP1103-DH022-Bc-01, 02, 03, 04, 05, 06, Bn-01, 02, Dc(f)-01, 06, 09, 10, Fn-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13
Total		233	
Shackleton Fracture Zone			
DH024	2345-2245	4	NBP1103-DH024-Cn-001, F/B-01, 02, 03
DH034	1891-1770	2	NBP1103-DH034-Stc-1-01, 02
DH036	1230-1220	1	NBP1103-DH036-Cc-01
DH037	888-868	3	NBP1103-DH037-Cc-01, 02, 03
DH038	849-743	1	NBP1103-DH038-Cn/c-01
DH039	822-717	6	NBP1103-DH039-St-1-01, 02, 03, 04, 05, 06
DH040	834-778	49	NBP1103-DH040-Cc-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, Cn-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, Dc-01, 02, 03, 04, 05, O-02
DH043	856-790	49	NBP1103-DH43-Cc-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, Cn-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, Dc-01, 02, 03, 04, 06, 07, 08, 09, 10, 11, 12, St-01, 02, 03, 04, 05, 06, 07, 08
Total		115	
West Antarctic Peninsula Shelf			
TB065	609-602	1	NBP1103-TB065-Bc-01
TB066	588-571	1	NBP1103-TB066-Fc-01
TB067	618-534	2	NBP1103-TB067-Fp/n-01, 02
Total		4	
Interim Seamount			
DH074	1122-1006	7	NBP1103-DH074-Dc-03, 04, 05, 06, 07, Gc-01, 02
DH075	1251-1140	28	NBP1103-DH075-Dc-01, 02, 03, 04, 05, 06, 07, 08, 09, Dc(f)-29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, Gc-01, 02, 03, 04, 05, X-01
DH078	1588-1502	6	NBP1103-DH078-Gc-01, Stc-2-01, 02, 03, 04, 05

DH083	1815-1807	3	NBP1103-DH083-St-1-01, 02, 03
DH087	1246-1326	8	NBP1103-DH087-Dc(f)-01, 02, 03, Gc-01b, 02, 03, 04, St-5
DH088	1007-958	8	NBP1103-DH088-Cc-01, Gc-01, 02, 03, 04, 05, Stp-1-01, 02
Total		60	
Sars Seamount			
DH091	683-611	14	NBP1103-DH091-Dc-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, O-01
DH095	816-735	24	NBP1103-DH095-Cc-01, 02, 03, 04, 05, 142, 143, 144, 145, 146, Dc-01, 03, 04, 05, 06, 07, 08, 09, 10, D(f)-01, 02, 03, 04, 05
DH096	973-940	1	NBP1103-DH096-Dc-01
DH097	698-617	29	NBP1103-DH097-Cc-01, 02, 03, Dc-01, D(f)-01, 02, 03, 04, 05, Dn-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, Dp-01, Stn-2
TO104	~650-550	1	NBP1103-TO104-Dc-01
DH112	1662-1607	2	NBP1103-DH112-Dc-01, 02
DH113	1672-1675	1	NBP1103-DH113-Dc-01
DH115	891-795	17	NBP1103-DH115-Cc-01, 02, 03, 04, Dc-01, 02, 03, Dc(f)-2-01, 02, 03, 04, 05, 06, 07, 08, 09, 10
DH117	1033-929	53	NBP1103-DH117-Cc-341, 342, 343, 344, 345, Dc-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, Dn-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12
DH120	1727-1675	37	NBP1103-DH120-Dc-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, Dn-01, 02
Total		179	
Total		591	

Appendix 2 Mollusc samples
Table A2a, Bivalves sent to Suzanne Jennions (University of Bristol)

Trawl/ Dredge #	Location	Depth (m)	*Live #*	*Fossil #*
TB01	Burdwood Bank	324-319 m	6	6
TB02	Burdwood Bank	320-311 m	5	3
DH07	Burdwood Bank	334-323 m	167	193
DH09	Burdwood Bank, Grassy Knoll	859-793m	5	-
DH24	Shackleton Fracture Zone	2345-2245 m	-	1
DH30	Shackleton Fracture Zone	1693-1637m	-	1
DH31	Shackleton Fracture Zone	1731-1643m	1	-
DH35	Shackleton Fracture Zone	1212-1115m	-	2
DH36	SFZ, Tiffany's peak	1230-1220m	1	5
DH37	SFZ, Tiffany's peak	888-868m	-	2
DH38	SFZ, Tiffany's peak	849-743m	-	4
DH40	SFZ, Tiffany's peak	834-778m	-	205
DH43	SFZ, Tiffany's peak	856-790m	1	220
DH50	SFZ, Tiffany's peak	1045-952m	-	1
DH53	SFZ, Tiffany's nose	1081-979m	-	4
DH54	SFZ, SE of Tiffany's nose	1300-1223m	-	116
DH57	SFZ, southern end	1895-1805m	43	132
DH59	SFZ, southern end	1810-1823m	100	238
TB65	AA, WAP Shelf	609	6	-
TB66	AA, WAP Shelf	618-534	5	-
TB67	AA, WAP Shelf	602-609	3	-
DH 75	Interim Seamount	1251-1140	-	6
DH 80	Interim Seamount	1510-1388	-	4
DH87	Interim Seamount	1246-1326	-	1
DH88	Interim Seamount	1007-957	-	13
DH91	Sars Seamount	683-611	16	196
DH95	Sars Seamount	816-735	8	30
DH96	Sars Seamount	973-940	-	22
DH97	Sars Seamount	698-617	8	96
DH101	Sars Seamount	1562-1525	1	-
DH103	Sars Seamount	1021-924	-	3
DH115	Sars Seamount	891-795	3	301
DH117	Sars Seamount	1033-929	-	51
DH128	Cape Horn	~931-937	4	15

DH129	Cape Horn	1257-1188	-	8
DH134	Cape Horn	1049-975	9	113
DH140	Cape Horn	741-555	20	38
DH141	Cape Horn	934-834	1	-
DH143	Cape Horn	1869-1877	1	6
TB147	Cape Horn	447-689	4	99

Table A2 b Gastropods, sent to Eric Pante (University of Louisiana, Lafayette).

site	st	Station	No. shells
BurdWood Bank	1	TB01	10
BurdWood Bank	2	TB02	4
BurdWood Bank	7	DH07	7
BurdWood Bank	9	DH09	2
BurdWood Bank	11	DH11	2
Interim	75	DH75	10
Interim	87	DH87	3
Interim	88	DH88	10
Sars	97	DH97	14
Sars	103	DH103	10
Sars	115	DH115	20
Sars	117	DH117	20
Sars	120	DH120	10
Sars	126	DH126	1
Cape Horn	128	DH128	20
Cape Horn	129	DH129	95
Cape Horn	131	DH131	2
Cape Horn	134	DH134	40
Cape Horn	138	DH138	11
Cape Horn	140	DH140	20
Cape Horn	141	DH141	150
Cape Horn	147	TB147	2

Appendix 3 Bryazoa, sent Laura Foster (University of Bristol).

BRYOZOANS: NBP1103

Trawl/ Dredge #	Location	Depth (m)	*Bryozoans* weight (g)
TB01	Burdwood Bank	324-319 m	5.2
TB02	Burdwood Bank	320-311 m	57.2
DH07	Burdwood Bank	334-323 m	60.9
DH11	Grassy Knoll	823-705m	1
DH28	Shackleton Fracture Zone	2482-2492 m	1
DH30	Shackleton Fracture Zone	1693-1637m	1.3
DH37	SFZ, Tiffany's peak	888-868m	4.7
DH38	SFZ, Tiffany's peak	849-743m	1
DH43	SFZ, Tiffany's peak	856-790m	1
DH50	SFZ, Tiffany's peak	1045-952m	0.2
DH54	SFZ, SE of Tiffany's nose	1300-1223m	1
DH 74	Interim Seamount	1122-1006	0.6
DH88	Interim Seamount	1007-957	0.2
DH91	Sars Seamount	683-611	1.5
DH95	Sars Seamount	816-735	0.2
DH115	Sars Seamount	891-795	0.5
DH117	Sars Seamount	1033-929	0.2
DH126	Sars Seamount	~1925-1893	<0.2
DH128	Cape Horn	~931-937	2.6
DH134	Cape Horn	1049-975	8.1
DH140	Cape Horn	741-555	6.4
TB147	Cape Horn	447-689	70.5

Appendix 4; Sponge Collections to Dr K Hendry (WHOI)

Station	~Lat	~Long	~Depth (m)	Location	No. of distinct sponge types/morphotypes	No. of specimens taken
TB01	-54° 30’	-62° 10’	320	Burdwood Bank	7	7
TB02	-54° 30’	-62° 10’	310-320	Burdwood Bank	19	18
DH7	-54° 30’	-62° 10’	320-330	Burdwood Bank	5	9
KC8	-54° 30’	-62° 10’	330	Burdwood Bank	1	1
DH09	-54° 50’	-62° 10’	790-860	Burdwood Bank	4	11
TB10	-54° 50’	-62° 10’	720-740	Burdwood Bank	18	29
DH14	-54° 40’	-62° 20’	700-820	Burdwood Bank	9	14
DH15	-54° 50’	-62° 10’	890-900	Burdwood Bank	2	3
DH16	-54° 50’	-62° 10’	1410-1420	Burdwood Bank	5	7
DH17	-54° 50’	-62° 10’	1810-1910	Burdwood Bank	6	15
DH19	-54° 50’	-62° 20’	1500-1530	Burdwood Bank	5	8
DH22	-54° 50’	-62° 10’	1830-1920	Burdwood Bank	3	8
DH24	-59° 20’	-62° 10’	2250-2350	Shackleton Fracture Zone	2	2
DH30	-59° 50’	-59° 00’	1640-1690	Shackleton Fracture Zone	1	1
DH33	-60° 00’	-58° 20’	1820-1900	Shackleton Fracture Zone	1	5
DH34	-60° 10’	-58° 20’	1770-1890	Shackleton Fracture Zone	2	6
DH36	-60° 10’	-57° 60’	1220-1230	Shackleton Fracture Zone	4	14
DH37	-60° 10’	-57° 50’	870-880	Shackleton Fracture Zone	15	19
DH38	-60° 10’	-57° 50’	740-850	Shackleton Fracture Zone	6	6
DH40	-60° 10’	-57° 50’	780-830	Shackleton Fracture Zone	9	40
DH43	-60° 10’	-57° 50’	790-860	Shackleton Fracture Zone	10	33
DH50	-60° 10’	-57° 50’	950-1050	Shackleton Fracture Zone	5	12
DH51	-60° 10’	-57° 50’	1300-1420	Shackleton Fracture Zone	1	1
DH52	-60° 10’	-57° 40’	800-910	Shackleton Fracture Zone	4	5
DH53	-60° 10’	-57° 40’	980-1080	Shackleton Fracture Zone	5	5
DH54	-60° 20’	-57° 40’	1220-1300	Shackleton Fracture Zone	13	24
DH56	-60° 20’	-57° 30’	1440-1590	Shackleton Fracture Zone	10	12
DH57	-60° 40’	-56° 50’	1800-1890	Shackleton Fracture Zone	4	10
DH59	-60° 40’	-56° 50’	1810-1820	Shackleton Fracture Zone	3	8
TB65	-63° 00’	-61° 30’	590-610	West Antarctic Peninsula (“AA”)	1	1
TB67	-63° 00’	-61° 40’	620-640	West Antarctic Peninsula (“AA”)	3	8
DH73	-60° 40’	-66° 00’	1000-1420	Interim Seamount	1	1
DH74	-60° 40’	-66° 00’	1010-1120	Interim Seamount	19	66

DH75	-60° 40’	-66° 00’	1140-1250	Interim Seamount	11	19
DH78	-60° 40’	-66° 00’	1500-1590	Interim Seamount	11	32
DH80	-60° 40’	-66° 00’	1390-1510	Interim Seamount	15	32
DH85	-60° 40’	-66° 00’	1490-1530	Interim Seamount	4	10
DH87	-60° 30’	-66° 00’	850-960	Interim Seamount	1	15
DH88	-60° 30’	-66° 00’	960-1010	Interim Seamount	11	34
DH90	-60° 30’	-66° 00’	790-800	Interim Seamount	8	20
DH91	-59° 40’	-68° 50’	610-680	Sars Seamount	14	51
DH95	-59° 40’	-68° 50’	740-820	Sars Seamount	15	35
DH96	-59° 40’	-68° 50’	940-970	Sars Seamount	3	5
DH97	-59° 40’	-68° 50’	620-700	Sars Seamount	22	45
DH101	-59° 40’	-68° 50’	1530-1560	Sars Seamount	2	6
DH103	-59° 40’	-68° 50’	1000	Sars Seamount	3	7
TO104	-59° 40’	-68° 50’	570-820	Sars Seamount	27	70
DH112	-59° 40’	-69° 00’	1600-1660	Sars Seamount	3	4
DH113	-59° 40’	-69° 00’	1670-1680	Sars Seamount	3	13
DH114	-59° 40’	-69° 00’	1770-1890	Sars Seamount	1	1
DH115	-59° 50’	-68° 50’	800-890	Sars Seamount	2	8
DH117	-59° 50’	-69° 00’	930-1030	Sars Seamount	9	26
DH118	-59° 50’	-69° 00’	1310-1380	Sars Seamount	2	3
DH120	-59° 50’	-69° 00’	1680-1730	Sars Seamount	24	76
DH121	-59° 50’	-69° 00’	1380-1640	Sars Seamount	8	10
DH123	-59° 40’	-68° 40’	1740-1860	Sars Seamount	1	1
DH126	-59° 40’	-68° 40’	1890-1930	Sars Seamount	6	10
DH128	-59° 10’	-67° 10’	930-940	Cape Horn	18	30
DH129	-59° 10’	-67° 00’	1190-1260	Cape Horn	16	47
DH131	-59° 10’	-67° 00’	870-900	Cape Horn	21	50
DH134	-59° 10’	-67° 10’	980-1050	Cape Horn	9	14
DH138	-59° 20’	-66° 40’	1390-1490	Cape Horn	2	2
DH140	-59° 20’	-66° 50’	550-740	Cape Horn	12	33
DH143	-59° 20’	-67° 10’	1870	Cape Horn	6	7
TB147	-59° 00’	-67° 30’	450-690	Cape Horn	30	141

Appendix 5 Biology

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/10/2007	Burdwood Bank	TB#1	1	Anemone (n=1 + many babies)			1
5/10/2007	Burdwood Bank	TB#1	1	Anemone (n=1)			1
5/10/2007	Burdwood Bank	TB#1	1	Anemone (n=1)			1
5/10/2007	Burdwood Bank	TB#1	1	Anemone (n=1)			1
5/10/2007	Burdwood Bank	TB#1	1	Anemone (n=1)			1
5/10/2007	Burdwood Bank	TB#1	4	Anemone (n=4)			4
5/10/2007	Burdwood Bank	TB#1	3	Basket stars (x2 jars, n=2, n=1)			3
5/10/2007	Burdwood Bank	TB#1	10	Bivalves (n=6), Brachipods (n=4)	10		
5/10/2007	Burdwood Bank	TB#1	3	Crabs (n=3)		3	
5/10/2007	Burdwood Bank	TB#1	2	Crinoids (n= 2)	2	2 (70%)	
5/10/2007	Burdwood Bank	TB#1	8	Decapods (n=8)		8	
5/10/2007	Burdwood Bank	TB#1	1	Fish (n=1)			1
5/10/2007	Burdwood Bank	TB#1	2	Flabellum (x2)	2		
5/10/2007	Burdwood Bank	TB#1	3	Gastropods (n=3)		3 (95%)	
5/10/2007	Burdwood Bank	TB#1	6	Holothuroidians (sea cucumbers) (x6)		6 (70%)	
5/10/2007	Burdwood Bank	TB#1	3	Hydroid (x3 morphs, n=3)			5
5/10/2007	Burdwood Bank	TB#1	3	Isopod (n=3, with one amphipod)		3 (70%)	
5/10/2007	Burdwood Bank	TB#1	38	Ophiuroids (x4 jars, n=30, n=5, n=2, n=1)		8 (70%)	
5/10/2007	Burdwood Bank	TB#1	4	Pencil urchins (n=4)			4
5/10/2007	Burdwood Bank	TB#1	1	Primnoids	X	X (100%)	
5/10/2007	Burdwood Bank	TB#1	1	Pycnogonid		X (70%)	
5/10/2007	Burdwood Bank	TB#1	17	Seastars (n=~10, n=~6, n=1)		17 (70%)	
5/10/2007	Burdwood Bank	TB#1	3	Sponges ? (n=3)			3
5/10/2007	Burdwood Bank	TB#1	1	Stylasterid mixed	x		
5/10/2007	Burdwood Bank	TB#1	2	Stylasterids - Errinopsis (n=2)			2
5/10/2007	Burdwood Bank	TB#1	27	Urchins (n=10, n=10, n=~7)		17 (70%)	
5/10/2007	Burdwood Bank	TB#1	8	Whip coral (n~8)	8		
5/10/2007	Burdwood Bank	TB#1	1	White Stylasterid (n=1 frozen)	1		
5/10/2007	Burdwood Bank	TB#1	2	White Stylasterid (n=2 frozen)	2		
5/10/2007	Burdwood Bank	TB#2	1	Alcyonacea (x1)	1		
5/10/2007	Burdwood Bank	TB#2	1	Anemone (n=1)			1
5/10/2007	Burdwood Bank	TB#2	3	Anemones (n=3)		3	
5/10/2007	Burdwood Bank	TB#2	1	Basket stars (n=1)	1		
5/10/2007	Burdwood Bank	TB#2	3	Bayergorgia (n=3 was in F)	3	3 (100%)	3

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/10/2007	Burdwood Bank	TB#2	4	Bivalves (n-4)	4		
5/10/2007	Burdwood Bank	TB#2	3	Brachiopod (n=1 +n=1 frozen), bivalve (n=1)	1	2 (70%)	
5/10/2007	Burdwood Bank	TB#2	62	Brittlestars (x3 jars, n=~4, n=~30, n=2, n=7; n~10 frozen, n=4 frozen, n=5 frozen)	42		X
5/10/2007	Burdwood Bank	TB#2	4	Bushy primnoid 5 (n~4	4		
5/10/2007	Burdwood Bank	TB#2	1	Crinoids (in ethanol frozen)	x	X (95%)	
5/10/2007	Burdwood Bank	TB#2	1	Decapods (hermit crab, n=1)		1 (70%)	
5/10/2007	Burdwood Bank	TB#2	20	Decapods (n=20)		20 (70%)	
5/10/2007	Burdwood Bank	TB#2	4	Fans (n~4)	4	4	
5/10/2007	Burdwood Bank	TB#2	4	Fish (n=4)			4
5/10/2007	Burdwood Bank	TB#2	3	Gastropods (n=3)		3 (95%)	
5/10/2007	Burdwood Bank	TB#2	1	Holothuroidians (sea cucumbers) (x2 jars) - 1jar = n=1 with one sponge)		1 (70%)	
5/10/2007	Burdwood Bank	TB#2	2	Hydroid (x2 jars, n=~2)			2
5/10/2007	Burdwood Bank	TB#2	1	Hydroids (n<3)			3
5/10/2007	Burdwood Bank	TB#2	1	Isopod (n=1)		1 (95%)	
5/10/2007	Burdwood Bank	TB#2	1	Plexauridae (n=1 +some Alcyonacea)	1		
5/10/2007	Burdwood Bank	TB#2	14	Sea urchin (n=1 in F, n=9 in F; n=4 frozen)	4		10
5/10/2007	Burdwood Bank	TB#2	7	Seastars (n=1 frozen, n=6 frozen)	7		X
5/10/2007	Burdwood Bank	TB#2	1	Sponges (1litre fragments)		X	X
5/10/2007	Burdwood Bank	TB#2	1	Sponges (n=?)			X
5/10/2007	Burdwood Bank	TB#2	5	Sponges (n=5)			5
5/10/2007	Burdwood Bank	TB#2	1	Stylasterid (n=1)			1
5/10/2007	Burdwood Bank	TB#2	1	Stylasterids (fragments)	X	X (100%)	
5/10/2007	Burdwood Bank	TB#2	1	Worms (mixed, 2 x 60ml jar)		X (70%)	
5/11/2007	Burdwood Bank	HD#7	7	7 whips, one gorgonian	x		
5/11/2007	Burdwood Bank	HD#7	2	Alcyonacea (n=2 frozen)	2		
5/11/2007	Burdwood Bank	HD#7	3	Alcyonacea (x2, n=2, n=1)			3
5/11/2007	Burdwood Bank	HD#7	1	Alcyonacea 2			2
5/11/2007	Burdwood Bank	HD#7	1	Anemone on Bamboo (n=1)	1		
5/11/2007	Burdwood Bank	HD#7	12	Balanophyllia in F n=1, n=1, n=1, n=1, n=1, n=1, n=6	x		12
5/11/2007	Burdwood Bank	HD#7	1	Bamboo (2 fragments)			2
5/11/2007	Burdwood Bank	HD#7	1	Basketstar (n=1 frozen)	1		
5/11/2007	Burdwood Bank	HD#7	3	Bayergorgia (n=3)	3		
5/11/2007	Burdwood Bank	HD#7	5	Bayergorgia (n=4, n=1)			5
5/11/2007	Burdwood Bank	HD#7	22	Bearded clam (n=10 in F, n~12 frozen)	12		10
5/11/2007	Burdwood Bank	HD#7	155	Bivalves (n~100, ~25, ~30 in separate bags)	155		

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/11/2007	Burdwood Bank	HD#7	3	Brachiopod (3 indiv)			3
5/11/2007	Burdwood Bank	HD#7	2	Caryophyllia antarctica (n=2)	2		
5/11/2007	Burdwood Bank	HD#7	14	Convexella (n=4 in F, n=10 frozen)	10		4
5/11/2007	Burdwood Bank	HD#7	1	Crinoid (n=1)	1		
5/11/2007	Burdwood Bank	HD#7	10	Crustaceans (n=~10)			10
5/11/2007	Burdwood Bank	HD#7	3	Dasystenella acanthina (n=3)	3		
5/11/2007	Burdwood Bank	HD#7	1	Desmophyllum (n=1)	1		
5/11/2007	Burdwood Bank	HD#7	4	Digitogorgia sp 1 (n~4 frozen)	4		x - 2 jars (2 litre jar full)
5/11/2007	Burdwood Bank	HD#7	4	Digitogorgia sp 2 (4 fragments)	4		
5/11/2007	Burdwood Bank	HD#7	4	Digitogorgia sp 2 x 2 colonies (n=4 frozen)	4		
5/11/2007	Burdwood Bank	HD#7	2	Echinoderm (urchins, 2 individuals)			2
5/11/2007	Burdwood Bank	HD#7	2	Fannyella kuekenthali (n=1 in ethanol, n=1 frozen)	1		1
5/11/2007	Burdwood Bank	HD#7	5	Gastropods (n=5)		5	
5/11/2007	Burdwood Bank	HD#7	1	Holothurian (n=1)	1		
5/11/2007	Burdwood Bank	HD#7	7	Hydroids (n~7)			7
5/11/2007	Burdwood Bank	HD#7	5	Hydroids 1, 2, 3, 4, 5 in one 1 litre jar			x
5/11/2007	Burdwood Bank	HD#7	1	Hyrdoid jar 2			x
5/11/2007	Burdwood Bank	HD#7	1	Mirostenella	x		
5/11/2007	Burdwood Bank	HD#7	12	Mirostenella 1 (n~5 in ethanol: n~7 frozen)	7		5
5/11/2007	Burdwood Bank	HD#7	1	Mirostenella 2 (fragments)	2		
5/11/2007	Burdwood Bank	HD#7	5	Misc octcorals (5 morphotypes)	x		
5/11/2007	Burdwood Bank	HD#7	1	Mixed community (n=1)			1
5/11/2007	Burdwood Bank	HD#7	1	new genus (Hedgehog)			1
5/11/2007	Burdwood Bank	HD#7	1	New genus (Hedgehog) n=1	1		
5/11/2007	Burdwood Bank	HD#7	14	Ophidogorgia (actually Onogorgia; n=3 in F, n=~11 frozen)	11		3
5/11/2007	Burdwood Bank	HD#7	99	Ophiuroids (x5 jars - 10, 2, ~7, ~5, ~20 - in F; n=4 frozen, n=10 frozen, n=25, n=2 frozen, n>3 frozen, n=4 frozen. N=7 frozen)	51		45
5/11/2007	Burdwood Bank	HD#7	5	Pencil urchin (n=5)	5		x
5/11/2007	Burdwood Bank	HD#7	1	Plexauridae (n=1)	1		
5/11/2007	Burdwood Bank	HD#7	1	Polychaetes (1 jar)			1 jar
5/11/2007	Burdwood Bank	HD#7	2	Primnoella (n=2)	2		
5/11/2007	Burdwood Bank	HD#7	1	Primnoella sp 1 (n=1 frozen)	1		
5/11/2007	Burdwood Bank	HD#7	2	Primnoella sp 1 (n=2 in F, n=3 frozen)	3		2
5/11/2007	Burdwood Bank	HD#7	4	Primnoella sp 2 (n=4 in F, n=7 frozen)	7		4

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/11/2007	Burdwood Bank	HD#7	8	Primnoella sp 3 (n=8 frozen)	8		
5/11/2007	Burdwood Bank	HD#7	2	Pycnogonid (n=2)			2
5/11/2007	Burdwood Bank	HD#7	1	Ribbon worm (n=1)			1
5/11/2007	Burdwood Bank	HD#7	1	Sponge red (n=1)			1
5/11/2007	Burdwood Bank	HD#7	3	Sponge yellow (~3)			3
5/11/2007	Burdwood Bank	HD#7	9	Starfish (n=4 in F, n=5 frozen)	5		4
5/11/2007	Burdwood Bank	HD#7	1	Stylasterid 1 (fragments in F; large fragments frozen)	x		x
5/11/2007	Burdwood Bank	HD#7	1	Stylasterid 2 (F,n=4 fragments; 7 fragments frozen)	7		4
5/11/2007	Burdwood Bank	HD#7	5	Stylasterid 3 (n=2 in F, n=3 frozen)	3		2
5/11/2007	Burdwood Bank	HD#7	1	Stylasterid 4 (n=1)	1		
5/11/2007	Burdwood Bank	HD#7	1	Stylasterid 5 (n=1)	1		
5/11/2007	Burdwood Bank	HD#7	2	Stylasterid 6 (n=2 + fragments)	2		
5/11/2007	Burdwood Bank	HD#7	4	Thouarella (n=3 in F; n=1 frozen)	1		3
5/11/2007	Burdwood Bank	HD#7	17	Thouarella 2 (n=15, n=2 frozen - marked as Thour sp 2)	2		15
5/11/2007	Burdwood Bank	HD#7	4	Thouarella sp 3 (n~4)	4		
5/11/2007	Burdwood Bank	HD#7	1	Thouarella sp 4 (n=1 frozen)	1		
5/11/2007	Burdwood Bank	HD#7	1	Thouarella sp 4 (n=1 frozen)	1		
5/11/2007	Burdwood Bank	HD#7	2	Thouarella sp 5 (n>2)	2		
5/11/2007	Burdwood Bank	HD#7	3	Thouarella viridis (n=3)	3		
5/11/2007	Burdwood Bank	HD#7	4	Thouarella viridis (n=4)	4		
5/11/2007	Burdwood Bank	HD#7	1	Unknown primnoid	x		
5/11/2007	Burdwood Bank	HD#7	3	Urchins (n=3)	3		
5/11/2007	Burdwood Bank	HD#9	3	Amphipod (n=3)			3
5/11/2007	Burdwood Bank	HD#9	30	Anemone on dead coral (n=30 in F, n=~12 freezer)	12		30
5/11/2007	Burdwood Bank	HD#9	5	Bivalves (n=5)	5		
5/11/2007	Burdwood Bank	HD#9	1	Bryozoan (n=1)			1
5/11/2007	Burdwood Bank	HD#9	2	Crustaceans - Galatheids (n=2)		2	
5/11/2007	Burdwood Bank	HD#9	1	Isopod (n=1)			1
5/11/2007	Burdwood Bank	HD#9	1	Paragorgia sm (n=1)			1
5/11/2007	Burdwood Bank	HD#9	12	Polychaetes (n~12)			12
5/11/2007	Burdwood Bank	HD#9	7	Pycnogonid (~7)			7
5/11/2007	Burdwood Bank	HD#9	15	Seastar / brittlestar (~15)			15
5/11/2007	Burdwood Bank	TB#10	2	Acanthogorgiidae (n=2 + fragments)	2		
5/11/2007	Burdwood Bank	TB#10	11	Alcyonacea (n~11, n>5 frozen)	5		11
5/11/2007	Burdwood Bank	TB#10	1	Alcyonacea (n=1)	1		
5/11/2007	Burdwood Bank	TB#10	1	Anemone pink / brown (n=1)	1		

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/11/2007	Burdwood Bank	TB#10	1	Anemone x 2 big	2		
5/11/2007	Burdwood Bank	TB#10	1	Anemone x 3 - in two bags	3		
5/11/2007	Burdwood Bank	TB#10	1	Anemones	x		
5/11/2007	Burdwood Bank	TB#10	11	Anemones free living (n=11 in F)	x		11
5/11/2007	Burdwood Bank	TB#10	1	Anemones on Primnoids (n=1 in F)	x		1
5/11/2007	Burdwood Bank	TB#10	3	Anemones variety (n=3 in F)	x		3
5/11/2007	Burdwood Bank	TB#10	4	Armadillogorgia (at least 4 frozen)	4	x	x
5/11/2007	Burdwood Bank	TB#10	8	Armadillogorgia (n=~8)		8	
5/11/2007	Burdwood Bank	TB#10	11	Balanophyllia (F,n=1: f, n=10)	x		x n=1, n=10
5/11/2007	Burdwood Bank	TB#10	15	Bayergorgia (n= 15, fragments)	15		
5/11/2007	Burdwood Bank	TB#10	6	Brachiopods (n=6)			6
5/11/2007	Burdwood Bank	TB#10	15	Brittlestar (n= 15)			15
5/11/2007	Burdwood Bank	TB#10	1	Carnivorous sponge (n=1)	1		
5/11/2007	Burdwood Bank	TB#10	1	Crinoids on Thouarella		x	
5/11/2007	Burdwood Bank	TB#10	6	Dasystenella (1 full 1 litre jar in ethanol; n=6 frozen)	6	x	1l jar
5/11/2007	Burdwood Bank	TB#10	1	Dasystenella (1 full 1 litre jar in F)		x	1l jar
5/11/2007	Burdwood Bank	TB#10	1	Desmophyllum (n=1)			1
5/11/2007	Burdwood Bank	TB#10	11	Digitogorgia (1 litre jar was in formalin, n=6 in ethanol; n>5 Frozen)	5	6	1l jar
5/11/2007	Burdwood Bank	TB#10	10	Flabellum (n=~10)			10
5/11/2007	Burdwood Bank	TB#10	1	Flattail fish			1
5/11/2007	Burdwood Bank	TB#10	2	Flounder (n=1 in F, n=1 frozen)	1		1
5/11/2007	Burdwood Bank	TB#10	1	Frogfish (n=1)			1
5/11/2007	Burdwood Bank	TB#10	11	Gastropods (jar - n=~11 in ethan)	n~11	11	
5/11/2007	Burdwood Bank	TB#10	8	Hydroids (jar, n=8)			8
5/11/2007	Burdwood Bank	TB#10	30	Lobster + other crustaceans (n~30)		30	
5/11/2007	Burdwood Bank	TB#10	6	Miscellaneous biology (n=6 individ -Crustacean, polychaete, isopod, copepod)	6		
5/11/2007	Burdwood Bank	TB#10	10	Miscellaneous octocorals (n=10)	10		
5/11/2007	Burdwood Bank	TB#10	1	Nototenia fish x1			1
5/11/2007	Burdwood Bank	TB#10	3	Nudibranch (n=3)	3		
5/11/2007	Burdwood Bank	TB#10	15	Octocoral (n~15)	15		
5/11/2007	Burdwood Bank	TB#10	30	Ophiuroids (n=<30)			n=<30
5/11/2007	Burdwood Bank	TB#10	1	Orange pink globular octocoral mix with sea spiders	x		
5/11/2007	Burdwood Bank	TB#10	10	Paragorgia (over 10 frag in Ethanol, 1 litre in F mixed; 1+fragments frozen with primnoid)	1	x	1l jar
5/11/2007	Burdwood Bank	TB#10	1	Paramuricidae (fragments)	x		

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/11/2007	Burdwood Bank	TB#10	14	Pencil urchin (n=14)			14
5/11/2007	Burdwood Bank	TB#10	7	Pencil urchin (n=7)			7
5/11/2007	Burdwood Bank	TB#10	37	Pink Brittlestars x 37			37
5/11/2007	Burdwood Bank	TB#10	1	Pink Corallium/ actually Stylasterid (fragments were in F, now in ethanol) fragments frozen	x	x	x
5/11/2007	Burdwood Bank	TB#10	10	Pink whip coral (mostly Convexella, n~6 in F, n=4 in ethanol)		4	6
5/11/2007	Burdwood Bank	TB#10	1	Plexauridae (n=1)	1		
5/11/2007	Burdwood Bank	TB#10	4	Plumarella (n=4)	4		
5/11/2007	Burdwood Bank	TB#10	1	Polychaetes			x (in three separate bags)
5/11/2007	Burdwood Bank	TB#10	100	Polychaetes (250ml jar, n>100: jar, n=~50)			250ml jar, n>100: jar, n=~50
5/11/2007	Burdwood Bank	TB#10	1	Primnoids (Thouarella) 4 litre jar			4l jar
5/11/2007	Burdwood Bank	TB#10	3	Pycnogonid (n=3)			3
5/11/2007	Burdwood Bank	TB#10	4	Pycnogonid (n=4)		4	
5/11/2007	Burdwood Bank	TB#10	3	Rattail x 5 (f,n=1:f, n=1, n=1 frozen)	1		n=1, n=1
5/11/2007	Burdwood Bank	TB#10	3	Sea urchins (n= 3)			3
5/11/2007	Burdwood Bank	TB#10	10	Seastars (n>10)			10
5/11/2007	Burdwood Bank	TB#10	1	Small eel-like fish (n=1)			1
5/11/2007	Burdwood Bank	TB#10	1	Small fish (n=1)	1		
5/11/2007	Burdwood Bank	TB#10	1	Sponges (1 litre)			1l jar
5/11/2007	Burdwood Bank	TB#10	2	Stylasterid (250ml jar mixed in F, 2+fragments)	2 +fragments		250ml jar
5/11/2007	Burdwood Bank	TB#10	7	Thick pink whip coral - Armadillogorgia , n =5, n=2)			7
5/11/2007	Burdwood Bank	TB#10	11	Thin pink whip coral (mixed morpho types, n=5 in Ethanol, n~6 in F)		5	6
5/11/2007	Burdwood Bank	TB#10	1	Thouarella (4 litre jar)			4l jar
5/11/2007	Burdwood Bank	TB#10	1	Thouarella andeep (n=1)	1		
5/11/2007	Burdwood Bank	TB#10	1	Thouarella viridis (jar, 1 litre full, in F)		x	1l jar
5/11/2007	Burdwood Bank	TB#10	15	Thouarella viridis (n~15)	15		
5/11/2007	Burdwood Bank	TB#10	10	Thouarella yellow (2 x 2 litre jar full, one F, One Eth; about 10 frozen)	10	2l jar	2l jar
5/11/2007	Burdwood Bank	TB#10	1	Unique organisms (Dasystenella) n=1 + others	x		
5/11/2007	Burdwood Bank	TB#10	1	White Corallium (actually Stylasterid - 1 x 500ml jar was F, 1 x 500 ml jar ethanol)	x	500ml jar	500ml jar
5/11/2007	Burdwood Bank	TB#10	10	Zoanthids (n>10)			>10
5/11/2007	Burdwood Bank	TB#10	100	Zoanthids (n>100)			>100

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/11/2007	Burdwood Bank	DH#11	1	Brown / orange octocoral	x		
5/11/2007	Burdwood Bank	DH#11	1	Misc Biology (hydroids, worms, seastar)	x		
5/11/2007	Burdwood Bank	DH#11	1	Misc. Octocorals	x		
5/11/2007	Burdwood Bank	DH#11	1	pink / orange primnoid whip	x		
5/11/2007	Burdwood Bank	DH#11	1	Yellow octocoral	x		
5/11/2007	Burdwood Bank	DH#14	1	6 legged Seastar (n=1)			1
5/11/2007	Burdwood Bank	DH#14	1	Acanthogorgiidae (n=1)	1		
5/11/2007	Burdwood Bank	DH#14	6	Alcyonacea (n=6)	6		
5/11/2007	Burdwood Bank	DH#14	1	Anemone (n=1 frozen)	1		4
5/11/2007	Burdwood Bank	DH#14	1	Anemone on gastropod (n=1)	1		
5/11/2007	Burdwood Bank	DH#14	3	Anemones (n=3)	3		
5/11/2007	Burdwood Bank	DH#14	6	Balanophyllia (1 in F, 1 in F, 1 in F, 1 in F, 1 in F, 1 in F)	rest in x		16
5/11/2007	Burdwood Bank	DH#14	14	Balanophyllia (n=~14)	14		
5/11/2007	Burdwood Bank	DH#14	5	Bayergorgia (n=~5)			5
5/11/2007	Burdwood Bank	DH#14	1	Caryophyllia (was dry - dna extraction)			
5/11/2007	Burdwood Bank	DH#14	1	Cerianthid-like anemone	x		x
5/11/2007	Burdwood Bank	DH#14	14	Convexella (n~14)	14		
5/11/2007	Burdwood Bank	DH#14	1	Crinoid (n=1)		1	
5/11/2007	Burdwood Bank	DH#14	2	Dasystenella (n=2)	2		
5/11/2007	Burdwood Bank	DH#14	3	Digitogorgia (n=3)	3		
5/11/2007	Burdwood Bank	DH#14	5	Flabellum (n=5)	5 (in seawater)		
5/11/2007	Burdwood Bank	DH#14	61	Flabellum curvatum (25 in F, 1 in F, 1 in F, 1 in F,1 in F, 1 in F, 1 in F) n= 30 frozen	n~30 x		rest x
5/11/2007	Burdwood Bank	DH#14	1	Gastropod (actually bivalve, n=1)		1	
5/11/2007	Burdwood Bank	DH#14	20	Gastropod (n~20)		20	
5/11/2007	Burdwood Bank	DH#14	22	Gastropod (n~22)		22	
5/11/2007	Burdwood Bank	DH#14	2	Gastropod (n=2)		2	
5/11/2007	Burdwood Bank	DH#14	3	Gastropod (n=3)		3	
5/11/2007	Burdwood Bank	DH#14	7	Gastropod (n=7)		7	
5/11/2007	Burdwood Bank	DH#14	5	Hydroids (n=5)			5
5/11/2007	Burdwood Bank	DH#14	1	Isopod			x
5/11/2007	Burdwood Bank	DH#14	9	Isopod (n=9)			9
5/11/2007	Burdwood Bank	DH#14	1	Ophidogorgia (actually Onogorgia) (n=1)	1		
5/11/2007	Burdwood Bank	DH#14	3	Ophiuroids (n=3)			3
5/11/2007	Burdwood Bank	DH#14	4	Ophiuroids (n=4)			4
5/11/2007	Burdwood Bank	DH#14	10	Primnoella 1 (n~10)	10		

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/11/2007	Burdwood Bank	DH#14	6	Primnoella 2 (n=6)	6		
5/11/2007	Burdwood Bank	DH#14	2	Pycnogonid (n=2)			2
5/11/2007	Burdwood Bank	DH#14	1	Pycnogonids (n=1)			1
5/11/2007	Burdwood Bank	DH#14	1	Thouarella 3 (n=1)	1		
5/11/2007	Burdwood Bank	DH#14	11	Thouarella liouvelli? (n=1)	1		
5/11/2007	Burdwood Bank	DH#14	2	Thouarella pink (n~2)	2		
5/11/2007	Burdwood Bank	DH#14	20	Thouarella pink (n~20)	20		
5/11/2007	Burdwood Bank	DH#14	1	Thouarella viridis (n=1)	1		
5/11/2007	Burdwood Bank	DH#14	4	Unique anemones (~4)	4		
5/11/2007	Burdwood Bank	DH#14	4	Zooanthid (n~4)			4
5/12/2007	Burdwood Bank	DH#15	3	Armadillogorgia (n=3)	3		
5/12/2007	Burdwood Bank	DH#15	1	Asteroidea (n=1)			1
5/12/2007	Burdwood Bank	DH#15	1	Bamboo (1 litre jar)			1l jar
5/12/2007	Burdwood Bank	DH#15	2	Bayergorgia (n=2)			2
5/12/2007	Burdwood Bank	DH#15	6	Crustaceans (n=~6)			6
5/12/2007	Burdwood Bank	DH#15	2	Dead Primnoid (n=2)	2		
5/12/2007	Burdwood Bank	DH#15	2	Digitogorgia (n=2)	2		
5/12/2007	Burdwood Bank	DH#15	1	Holothurian (n=1)			1
5/12/2007	Burdwood Bank	DH#15	3	Hydroid (n=~3)			3
5/12/2007	Burdwood Bank	DH#15	1	Molluscs (limpet?, n=1)		1	
5/12/2007	Burdwood Bank	DH#15	2	New genus (Hedgehog, n=2)	2		
5/12/2007	Burdwood Bank	DH#15	2	Ophidogorgia (actually Onogorgia, n=2)	2		
5/12/2007	Burdwood Bank	DH#15	4	Ophiuroids (n=~4)			4
5/12/2007	Burdwood Bank	DH#15	3	Paragorgia (n=3)			3
5/12/2007	Burdwood Bank	DH#15	2	Plumarella (n=2)	2		
5/12/2007	Burdwood Bank	DH#15	10	Polychaete (n=~10)			10
5/12/2007	Burdwood Bank	DH#15	2	Primnoella fat (n=2)	2		
5/12/2007	Burdwood Bank	DH#15	1	Pycnogonid			x
5/12/2007	Burdwood Bank	DH#15	1	Pycnogonid (n=1)			1
5/12/2007	Burdwood Bank	DH#15	7	Stylasterid 1 (n=7 + fragments)	7+fragments		
5/12/2007	Burdwood Bank	DH#15	1	Stylasterid 2 (fragments)	fragments		
5/12/2007	Burdwood Bank	DH#15	1	Stylasterid 3 (n=1)	1		
5/12/2007	Burdwood Bank	DH#15	1	Stylasterid 4 (n=1)	1		
5/12/2007	Burdwood Bank	DH#15	2	Thouarella pink (n=2)	2		
5/12/2007	Burdwood Bank	DH#15	1	Thouarella viridis (n=1)	1		
5/12/2007	Burdwood Bank	DH#15	5	Thouarella yellow (n=5)	5		

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/12/2007	Burdwood Bank	HD#16	3	Amphilaphis (n>3)	3	`	
5/12/2007	Burdwood Bank	HD#16	10	Amphipods (n~10)		10	
5/12/2007	Burdwood Bank	HD#16	3	Anemones (n at least 3)	3		x - 2 jars
5/12/2007	Burdwood Bank	HD#16	3	Armadillogorgia (n=3)	3		
5/12/2007	Burdwood Bank	HD#16	1	Bamboo (n=1)			1
5/12/2007	Burdwood Bank	HD#16	1	Bayergorgia (n=1 in ethanol)	1	x	
5/12/2007	Burdwood Bank	HD#16	2	Brachiopod (n=2)	2		
5/12/2007	Burdwood Bank	HD#16	1	Convexella (n=1)	1		
5/12/2007	Burdwood Bank	HD#16	3	Dasystenella (n~3)	3		
5/12/2007	Burdwood Bank	HD#16	2	Galatheid crabs (n=2)		2	
5/12/2007	Burdwood Bank	HD#16	1	Gammarid shrimp (n=1)		1	
5/12/2007	Burdwood Bank	HD#16	1	Gastropod (n=1)		1	
5/12/2007	Burdwood Bank	HD#16	1	Hydroids (2 x1litre mixed in F)		x 100%	2x 2l jar
5/12/2007	Burdwood Bank	HD#16	3	Isopod (n=3)		3	
5/12/2007	Burdwood Bank	HD#16	1	Lobster (n=1)		1	
5/12/2007	Burdwood Bank	HD#16	6	New Genus hedgehog (n=6 frozen)	6		x
5/12/2007	Burdwood Bank	HD#16	17	Ophiuroid (n=~10 n F; n=7 frozen)	7		10
5/12/2007	Burdwood Bank	HD#16	2	Pachyclavularia (n~2)	2		
5/12/2007	Burdwood Bank	HD#16	1	Paragorgia (1 2l jar, mixed fragments)			2l jar
5/12/2007	Burdwood Bank	HD#16	1	Pencil urchin (n-1)		1	
5/12/2007	Burdwood Bank	HD#16	2	Perrisogorgia new sp (n=1; n=1 frozen)	1		1
5/12/2007	Burdwood Bank	HD#16	2	Plumarella (n=2)	2		
5/12/2007	Burdwood Bank	HD#16	1	Polychaete (1 60ml jar)			60ml jar
5/12/2007	Burdwood Bank	HD#16	8	Primnoella (n=3 in F, n=5 frozen)	5		3
5/12/2007	Burdwood Bank	HD#16	4	Primnoella fat (n>4)	4		
5/12/2007	Burdwood Bank	HD#16	20	Pycnogonids (n=20)		20	
5/12/2007	Burdwood Bank	HD#16	3	Shrimps (n=3)		3	
5/12/2007	Burdwood Bank	HD#16	1	Squat lobster		x	
5/12/2007	Burdwood Bank	HD#16	2	Stomatopods (n=2)		2	
5/12/2007	Burdwood Bank	HD#16	1	Stylasterid (n=1 + fragments)	1		
5/12/2007	Burdwood Bank	HD#16	1	Stylasterid (plus n=10 anemones: fragments frozen)	x		x
5/12/2007	Burdwood Bank	HD#16	1	Thouarella (n=1)	1		
5/12/2007	Burdwood Bank	HD#16	1	Zooanthid	x		
5/12/2007	Burdwood Bank	HD#16	15	Zooanthids (n=15)	15		
5/12/2007	Burdwood Bank	HD#17	3	Alcyonacea (n=3)	3		
5/12/2007	Burdwood Bank	HD#17	9	Anemone on rock (n=9)	9		

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/12/2007	Burdwood Bank	HD#17	36	Anemones (f, n=~15, n~20: frozen n= 1)	1		35
5/12/2007	Burdwood Bank	HD#17	5	Anemones (n=5)			5
5/12/2007	Burdwood Bank	HD#17	3	Bamboo 2 (n=~3			3
5/12/2007	Burdwood Bank	HD#17	3	Bamboo 3 (n=~3)			3
5/12/2007	Burdwood Bank	HD#17	2	Bayergorgia (n=1 in ethanol, n=1 in F)		1 (100%)	1
5/12/2007	Burdwood Bank	HD#17	1	Brittlestar (n=1)	1		
5/12/2007	Burdwood Bank	HD#17	1	Carnivorous sponge (n=1)			1
5/12/2007	Burdwood Bank	HD#17	1	Convexella (n=1)	1		
5/12/2007	Burdwood Bank	HD#17	7	Crinoids (n=3 in F, n=4 frozen)	4		3
5/12/2007	Burdwood Bank	HD#17	5	Crustaceans (n~5)		5	
5/12/2007	Burdwood Bank	HD#17	1	Desmophyllum (n=1)			1
5/12/2007	Burdwood Bank	HD#17	1	Desmophyllum/ Flabellum ? Crushed	1		
5/12/2007	Burdwood Bank	HD#17	2	Fish (n=2)			2
5/12/2007	Burdwood Bank	HD#17	1	Flabellum (n=1)			1
5/12/2007	Burdwood Bank	HD#17	6	Gastropods (n=6)		6	
5/12/2007	Burdwood Bank	HD#17	10	Hydroids (n=~10, plus anemones)			10
5/12/2007	Burdwood Bank	HD#17	5	Misc Echinoderms (n=5)	5		
5/12/2007	Burdwood Bank	HD#17	1	Nudibranch (1 individual)			1
5/12/2007	Burdwood Bank	HD#17	2	Paragorgia (n=2)			2
5/12/2007	Burdwood Bank	HD#17	1	Primnoisis (n=1)	1		
5/12/2007	Burdwood Bank	HD#17	2	Pycnogonids (n=2)		2	
5/12/2007	Burdwood Bank	HD#17	1	Seastars	x		
5/12/2007	Burdwood Bank	HD#17	1	Stylasterid (2 x 1litre jar, fragments; fragments frozen)	x		2l jar
5/12/2007	Burdwood Bank	HD#17	1	Stylasterid 1 (fragments)	x		x
5/12/2007	Burdwood Bank	HD#17	1	Stylasterid 2 (fragments)	x		x
5/12/2007	Burdwood Bank	HD#17	1	Stylasterid 3 (fragments)	x		x
5/12/2007	Burdwood Bank	HD#17	1	Stylasterid 4 (n=1 +fragments)	1		x
5/12/2007	Burdwood Bank	HD#17	3	Thouarella (n>3)	3		
5/12/2007	Burdwood Bank	HD#17	3	Thouarella viridis (n=3)	3		
5/12/2007	Burdwood Bank	HD#17	1	Zooanthid	x		
5/12/2007	Burdwood Bank	HD#19	7	Anemones (3 individuals in F, ~4 frozen)	4		3
5/12/2007	Burdwood Bank	HD#19	5	Armadillogorgia (4 litre jar, n>3: frozen n=2)	2		>3
5/12/2007	Burdwood Bank	HD#19	1	Brittlestar		x	
5/12/2007	Burdwood Bank	HD#19	1	Brittlestar (1 indiv)			1
5/12/2007	Burdwood Bank	HD#19	1	Crinoid (n=1)		1	
5/12/2007	Burdwood Bank	HD#19	3	Crustacean (variety, n=3)			3

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/12/2007	Burdwood Bank	HD#19	8	Hydroids (8 mixed morphs)			x
5/12/2007	Burdwood Bank	HD#19	3	Jellies (n=3)	3		
5/12/2007	Burdwood Bank	HD#19	2	Misc. octocorals (small, n~2)	2		
5/12/2007	Burdwood Bank	HD#19	1	Orange octocoral - Thouarella (n=1)			1
5/12/2007	Burdwood Bank	HD#19	4	Pink octocoral - Thouarella parachilensis? (n=2 in F, n=2 frozen)	2		2
5/12/2007	Burdwood Bank	HD#19	1	Pink stylasterid (4 fragments)			4
5/12/2007	Burdwood Bank	HD#19	1	Polychaete (jar of)			jar
5/12/2007	Burdwood Bank	HD#19	4	Spiny pink octocoral - Dasysstenella (n=2 in F; n=2 frozen)	2		2
5/12/2007	Burdwood Bank	HD#19	1	Stylasterid branches (fragments)			x
5/12/2007	Burdwood Bank	HD#19	1	Unique jellyfish /ctenophore	2		Super buffered
5/12/2007	Burdwood Bank	HD#19	2	Whispy pink octocoral - Amphilaphis? (n=2)			2
5/12/2007	Burdwood Bank	HD#19	1	White / pink octocoral (actually Primnoisis, n=1)			1
5/12/2007	Burdwood Bank	HD#19	1	White Stylasterid (fragments frozen)	x		x
5/12/2007	Burdwood Bank	HD#19	5	Yellow octocoral - Thouarella (n=3 in F; n=2 frozen)	2		3
5/12/2007	Burdwood Bank	HD#19	20	Zooanthids (n=~20)			20
5/12/2007	Burdwood Bank	HD#20	2	Hydroid (mixed, min 2 colonies)			2
5/12/2007	Burdwood Bank	HD#20	3	Orange globular octocoral (Alcyonacea - n=3)			3
5/12/2007	Burdwood Bank	HD#20	1	Pale octocoral (n=1)			1
5/12/2007	Burdwood Bank	HD#20	2	White Stylasterid (n=2)			2
5/13/2007	Burdwood Bank	DH#22	2	Amphilaphis (n=2)	2		
5/13/2007	Burdwood Bank	DH#22	1	Amphipod (n=1)			1
5/13/2007	Burdwood Bank	DH#22	3	Anemones (n=3)	3		
5/13/2007	Burdwood Bank	DH#22	25	Balanophyllia (25 individuals)			25
5/13/2007	Burdwood Bank	DH#22	1	Balanophyllia (n=1)	1 (in seawater)		
5/13/2007	Burdwood Bank	DH#22	1	Bamboo (n=1)			1
5/13/2007	Burdwood Bank	DH#22	1	Black coral (n=1)	1		
5/13/2007	Burdwood Bank	DH#22	1	Brittlestar			x
5/13/2007	Burdwood Bank	DH#22	1	Caryophyllia antarctica	x		
5/13/2007	Burdwood Bank	DH#22	1	Caryophyllia antarctica (n=1)			1
5/13/2007	Burdwood Bank	DH#22	1	Crinoid (ethanol n=1)		1	
5/13/2007	Burdwood Bank	DH#22	1	Dasystenella (n=1)	1		
5/13/2007	Burdwood Bank	DH#22	1	Desmophyllum (n=1)	1 (in seawater)		
5/13/2007	Burdwood Bank	DH#22	4	Desmophyllum (n=1, n=1, n=1, n=1 were in F)		n=1 in ethanol	1
5/13/2007	Burdwood Bank	DH#22	1	Flabellum	3	4 (100%)	1
5/13/2007	Burdwood Bank	DH#22	1	Flabellum	x		

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/13/2007	Burdwood Bank	DH#22	1	Gastropod (n=1)			1
5/13/2007	Burdwood Bank	DH#22	12	Hydroid 1 (about 12 individuals)			12
5/13/2007	Burdwood Bank	DH#22	2	Hydroid 2 (n=2), 3			3
5/13/2007	Burdwood Bank	DH#22	6	Hydroid 4 (1 individual, ~5 individuals)			5
5/13/2007	Burdwood Bank	DH#22	1	Hydroid 5 (n~1)			1
5/13/2007	Burdwood Bank	DH#22	1	Hydroid 6 (n=~1)			1
5/13/2007	Burdwood Bank	DH#22	1	Hydroid 7 (n=1)			1
5/13/2007	Burdwood Bank	DH#22	1	Hydroid 8 (1 indiv)			1
5/13/2007	Burdwood Bank	DH#22	2	Plumarella big (n=2)	2		
5/13/2007	Burdwood Bank	DH#22	1	Plumarella fine (n=1)	1		
5/13/2007	Burdwood Bank	DH#22	5	Polychaete (n=5)			5
5/13/2007	Burdwood Bank	DH#22	4	Primnoella (n=4)	4		
5/13/2007	Burdwood Bank	DH#22	1	Primnoisis (n=1)	1		
5/13/2007	Burdwood Bank	DH#22	2	Pycnogonid (n=2)			2
5/13/2007	Burdwood Bank	DH#22	1	Remaining hydroids			x
5/13/2007	Burdwood Bank	DH#22	1	Seastar			x
5/13/2007	Burdwood Bank	DH#22	1	Stylasterid 1 (fragments)	x		
5/13/2007	Burdwood Bank	DH#22	1	Stylasterid 2 (fragments)	x		
5/13/2007	Burdwood Bank	DH#22	1	Stylasterid 3 (n=1)	1		
5/13/2007	Burdwood Bank	DH#22	1	Stylasterid 4 (n=1 +fragments)	1		
5/13/2007	Burdwood Bank	DH#22	3	Thouarella (n=3)			3
5/13/2007	Burdwood Bank	DH#22	6	Thouarella (n>6)	>6		x
5/13/2007	Burdwood Bank	DH#22	1	Thouarella viridis (n=1)	1		
5/14/2007	SFZ	DH#24	1	Bamboo coral (n=1)			1
5/14/2007	SFZ	DH#24	1	Brittlestar (n=1)	1		
5/14/2007	SFZ	DH#24	9	Hydroids (n=9)			9
5/14/2007	SFZ	DH#24	2	Octocoral (n=2)	2		
5/14/2007	SFZ	DH#24	1	Solitary Coral (Balanophyllia; n=1)			
5/14/2007	SFZ	DH#24	2	Sponge (n=2)			
5/14/2007	SFZ	DH#24	2	Stylasterid (n=2)	2		
5/14/2007	SFZ	DH#24	4	Worms (n=4)			4
5/15/2007	SFZ	DH#28	1	Anemone (n=1)			1
5/15/2007	SFZ	DH#28	4	Brittlestar (n=4)	4		
5/15/2007	SFZ	DH#28	11	Hydroids (n=11)			11
5/15/2007	SFZ	DH#28	1	Octocoral (n=1)			1
5/15/2007	SFZ	DH#28	1	Polychaete (n=1)			1

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/16/2007	SFZ	DH#30	1	Acanthogorgidae (n=1)			X
5/16/2007	SFZ	DH#30	5	Bearded clams (n=5)	5		
5/16/2007	SFZ	DH#30	1	Hydroid (n=1)			1
5/16/2007	SFZ	DH#30	1	Primnoella (n=1)	1		
5/16/2007	SFZ	DH#30	1	Primnoisis (n=1)			X
5/16/2007	SFZ	DH#30	1	Sponge (n=1)			
5/16/2007	SFZ	DH#30	1	Stylasterids (n=1)	1		
5/16/2007	SFZ	DH#31	1	Bearded clam (n=1)	1		
5/16/2007	SFZ	DH#33	1	Anemone (n=1)			1
5/16/2007	SFZ	DH#33	1	Brachiopod (n=1)			1
5/16/2007	SFZ	DH#33	1	Possible crustacean part (n=1)			1
5/16/2007	SFZ	DH#34	1	Brachiopod (n=1)			1
5/16/2007	SFZ	DH#34	1	Bryozoan (ID changed to sponge by Kate)			
5/16/2007	SFZ	DH#34	1	Crustacean from fossil coral (n=1)	1	X (100%)	
5/16/2007	SFZ	DH#34	1	Octocoral (Thouarella) (n=1)			1
5/16/2007	SFZ	DH#34	2	Polychaetes (n=2)			2
5/17/2007	SFZ	DH#35	1	Amphipod (n=1)	1 (in seawater)		
5/17/2007	SFZ	DH#35	1	Brachiopod (n=1)	1		
5/17/2007	SFZ	DH#35	4	Brittlestars (large; n=4)	4		
5/17/2007	SFZ	DH#35	7	Brittlestars (small; n=7)	1 (in seawater)		
5/17/2007	SFZ	DH#35	1	Gastropod (n=1)		1 (100%)	
5/17/2007	SFZ	DH#35	1	Holothuroidean (n=1)	1 (in seawater)		
5/17/2007	SFZ	DH#35	1	Miscellaneous small balls (large forams?)		X (100%)	
5/17/2007	SFZ	DH#35	2	Octocoral whip (n=2)	2		
5/17/2007	SFZ	DH#35	1	Seastar (n=1)	1 (in seawater)		
5/17/2007	SFZ	DH#35	1	Stylasterid (n=?)	X		
5/17/2007	SFZ	DH#36	1	Amphipod	X (in seawater)		
5/17/2007	SFZ	DH#36	1	Bearded Clam (n=1)	1 (in seawater)		
5/17/2007	SFZ	DH#36	11	Brachiopods (n=11)	11 (in bottle)		
5/17/2007	SFZ	DH#36	1	Gastropod (dead; n=1)		1 (100%)	
5/17/2007	SFZ	DH#36	3	Holothuroidean (n=3)	3 (in seawater)		
5/17/2007	SFZ	DH#36	1	Hydroid (n=1)			1
5/17/2007	SFZ	DH#36	1	Hydroid fragments			X
5/17/2007	SFZ	DH#36	1	Ophiuroids (large; preservation not noted)			
5/17/2007	SFZ	DH#36	20	Ophiuroids (small; n=20)	20 (in seawater)		
5/17/2007	SFZ	DH#36	6	Polychaete (n=6)			6

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/17/2007	SFZ	DH#36	1	Primnoid (whip; n=1)	1		
5/17/2007	SFZ	DH#36	4	Seastar (n=4)	4 (in seawater)		
5/17/2007	SFZ	DH#36	4	Sponge (n=4 morphs)			
5/17/2007	SFZ	DH#36	1	Stylasterid fragments	X		
5/17/2007	SFZ	DH#36	1	Worm tube			X
5/17/2007	SFZ	DH#37	1	Amphipod		1?	
5/17/2007	SFZ	DH#37	1	Asteroidea	1 (in seawater)		
5/17/2007	SFZ	DH#37	73	Brachiopod (n=73)	73		
5/17/2007	SFZ	DH#37	1	Bryozoans			
5/17/2007	SFZ	DH#37	20	Gastropods (n=20)		20	
5/17/2007	SFZ	DH#37	1	holothurian (n=1)	1 (in seawater)		
5/17/2007	SFZ	DH#37	1	Hydroid (n=1)			1
5/17/2007	SFZ	DH#37	1	Isididae (1 fragment)		100%	
5/17/2007	SFZ	DH#37	6	ophiuroid 1 (n=6)	6 (in seawater)		
5/17/2007	SFZ	DH#37	1	ophiuroid 2 (n=1)	1 (in seawater)		
5/17/2007	SFZ	DH#37	1	ophiuroid 3 (n=1)	1 (in seawater)		
5/17/2007	SFZ	DH#37	2	ophiuroid 4 (n=2)	2 (in seawater)		
5/17/2007	SFZ	DH#37	2	ophiuroid 5 (n=2)	2 (in seawater)		
5/17/2007	SFZ	DH#37	1	peanut worm? (n=1)			1
5/17/2007	SFZ	DH#37	7	polychaetes (n=7)			7
5/17/2007	SFZ	DH#37	1	primnoid (n=1)			
5/17/2007	SFZ	DH#37	1	pycnogonid (n=1)		1 (60%)	
5/17/2007	SFZ	DH#37	1	Sea urchin			x
5/17/2007	SFZ	DH#37	1	Sponge			
5/17/2007	SFZ	DH#37	1	Stylasterid	x fragments		
5/17/2007	SFZ	DH#37	1	stylasteridae	x		
5/17/2007	SFZ	DH#38	1	Acanthogorgiidae	X		
5/17/2007	SFZ	DH#38	1	Bamboo coral		100%	
5/17/2007	SFZ	DH#38	1	Brachiopod	~20		
5/17/2007	SFZ	DH#38	4	brachiopod (n=4)	4		
5/17/2007	SFZ	DH#38	1	Brittlestar 1	X (in seawater)		
5/17/2007	SFZ	DH#38	1	Brittlestar 2	X (in seawater)		
5/17/2007	SFZ	DH#38	1	Bryozoan			
5/17/2007	SFZ	DH#38	1	Caryophyllia antarctica	1 (in seawater)		
5/17/2007	SFZ	DH#38	1	Gastropod		100%	
5/17/2007	SFZ	DH#38	5	Hydroid (n=5)			5

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/17/2007	SFZ	DH#38	1	Hydroid 1 (small)			x
5/17/2007	SFZ	DH#38	1	Hydroid 2 (large)			x
5/17/2007	SFZ	DH#38	3	Polychaetes (n=3)			3
5/17/2007	SFZ	DH#38	1	sea star	1 (in seawater)		
5/17/2007	SFZ	DH#38	1	sea star (n=1)	1		
5/17/2007	SFZ	DH#38	1	sea urchin (n=1)			1
5/17/2007	SFZ	DH#38	1	Sponge			
5/17/2007	SFZ	DH#38	1	Sponge			
5/17/2007	SFZ	DH#38	1	stylasterid	x		
5/17/2007	SFZ	DH#38	1	stylasterid (n=1)	1		
5/17/2007	SFZ	DH#38	2	stylasterid (n=2)	2		
5/17/2007	SFZ	DH#38	1	Thouarella		100%	
5/17/2007	SFZ	DH#39	14	Brittlestars (n=14)	14		
5/17/2007	SFZ	DH#39	2	Caryophyllia antarctica (n=2)	1 (in seawater)		
5/17/2007	SFZ	DH#39	1	sea cucumber (n=1)	1		
5/17/2007	SFZ	DH#39	1	sea star (n=1)	1		
5/17/2007	SFZ	DH#40	1	Anthomastus? (n=1)			all in one bottle
5/17/2007	SFZ	DH#40	1	Anthomastus? (n=1)			all in one bottle
5/17/2007	SFZ	DH#40	1	Anthomastus? (n=1)			all in one bottle
5/17/2007	SFZ	DH#40	1	Anthomastus? (n=1)			in jar with three others
5/17/2007	SFZ	DH#40	1	Bamboo coral (n=1)			
5/17/2007	SFZ	DH#40	53	brachiopods (n=53)			53
5/17/2007	SFZ	DH#40	4	bryozoan (n=4)			
5/17/2007	SFZ	DH#40	3	Crustaceans (n=3)			3
5/17/2007	SFZ	DH#40	30	hydroids (n=30)			30
5/17/2007	SFZ	DH#40	1	Octocoral			1
5/17/2007	SFZ	DH#40	1	octocoral (n=1)			
5/17/2007	SFZ	DH#40	1	octocoral (Plexauridae) (n=1)			1
5/17/2007	SFZ	DH#40	1	octocoral (Plexauridae) (n=1)			1
5/17/2007	SFZ	DH#40	1	octocoral (Plexauridae) (n=1)			1
5/17/2007	SFZ	DH#40	4	polychaetes (n=4)			4
5/17/2007	SFZ	DH#40	5	pycnogonid (n=5)			5
5/17/2007	SFZ	DH#40	1	sea urchin (n=1)	1		
5/17/2007	SFZ	DH#40	1	stoloniferous octocoral			1
5/17/2007	SFZ	DH#40	30	stylasterids (n=30)	15		15

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/17/2007	SFZ	DH#40	1	unique hydroid-white	1		
5/17/2007	SFZ	DH#43	2	Amphipods (n=2)			2
5/17/2007	SFZ	DH#43	1	Anemone, cerianthid-like (n=1)			1
5/17/2007	SFZ	DH#43	1	Anthomastus? (n=1)			1
5/17/2007	SFZ	DH#43	2	ascidians (n=2)			2
5/17/2007	SFZ	DH#43	22	brachiopods (n=22)			22
5/17/2007	SFZ	DH#43	40	Brittlestars (n=40)	40		
5/17/2007	SFZ	DH#43	5	Caryophyllia (n=5)	5		
5/17/2007	SFZ	DH#43	1	Gastropod (n=1)			1
5/17/2007	SFZ	DH#43	1	hydroids (n=?)			x
5/17/2007	SFZ	DH#43	1	octocoral (Plexauridae) (n=1)			1
5/17/2007	SFZ	DH#43	2	octocorals (Thouarella) (n=2; fragments of single colony?)			2
5/17/2007	SFZ	DH#43	7	polychaetes (n=7)			7
5/17/2007	SFZ	DH#43	3	pycnogonids (n=3)			3
5/17/2007	SFZ	DH#43	1	sea cucumber (n=1)	1		
5/17/2007	SFZ	DH#43	1	sea star (n=1)	1		
5/17/2007	SFZ	DH#43	1	shrimp (n=1)			1
5/17/2007	SFZ	DH#43	28	sponges (n=28)			
5/17/2007	SFZ	DH#43	18	stylasterids (n=18)	9		9
5/18/2007	SFZ	DH#50	2	Brachiopod 1 (n=2)	2		
5/18/2007	SFZ	DH#50	22	Brachiopod 2 (n=22)	15		7
5/18/2007	SFZ	DH#50	2	Brittlestar 1 (n=2)	1		1
5/18/2007	SFZ	DH#50	1	Brittlestar 2	5 (in seawater)		10
5/18/2007	SFZ	DH#50	1	Brittlestar 3			1
5/18/2007	SFZ	DH#50	1	Brittlestar 4			1
5/18/2007	SFZ	DH#50	1	Gastropod		2 (100%)	
5/18/2007	SFZ	DH#50	3	Holothurian (n=3)			3
5/18/2007	SFZ	DH#50	1	Hydroid 1	x		
5/18/2007	SFZ	DH#50	1	Hydroid 2	x		
5/18/2007	SFZ	DH#50	1	Hydroid 3	x		
5/18/2007	SFZ	DH#50	7	Polychaetes (n=7)			7
5/18/2007	SFZ	DH#50	1	Primnoella	2		
5/18/2007	SFZ	DH#50	10	Primnoids (n=10)	10		
5/18/2007	SFZ	DH#50	1	Sponge			
5/18/2007	SFZ	DH#50	1	Stylasterids - fragments	1 (in seawater)	1 (100%)	

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/18/2007	SFZ	DH#51	1	Bearded clam (n=1)	1		
5/18/2007	SFZ	DH#51	2	Brachiopod (n=2)			2
5/18/2007	SFZ	DH#51	1	Sponge			
5/18/2007	SFZ	DH#52	14	Brachiopods (n=14)			14
5/18/2007	SFZ	DH#52	41	Brittlestars (n=41)	41		
5/18/2007	SFZ	DH#52	1	Hydroid (n=1)			1
5/18/2007	SFZ	DH#52	1	Octocoral (n=1)			1
5/18/2007	SFZ	DH#52	1	Octocoral (n=1)			1
5/18/2007	SFZ	DH#52	4	Polychaetes (n=4)			4
5/18/2007	SFZ	DH#52	1	Solitary Coral (n=1)	1		
5/18/2007	SFZ	DH#52	7	Sponge (n=7)			
5/18/2007	SFZ	DH#52	9	Stylasterid (n=9)	X		X
5/18/2007	SFZ	DH#53	8	Brachiopods (n=8)			8
5/18/2007	SFZ	DH#53	56	Brittlestars (n=56)	56 (2 bags of 28)		
5/18/2007	SFZ	DH#53	6	Hydroids (n=6)			6
5/18/2007	SFZ	DH#53	1	Isopod (n=1)			1
5/18/2007	SFZ	DH#53	5	Octocoral 1 (Mirostenella) (n=5)			5
5/18/2007	SFZ	DH#53	1	Octocoral 2 (Isididae) (n=1)			1
5/18/2007	SFZ	DH#53	1	Octocoral 3 (Dasystenella) (n=1)			1
5/18/2007	SFZ	DH#53	1	Octocoral 4 (Thouarella) (n=1)			1
5/18/2007	SFZ	DH#53	5	Octocoral 5 (Primnoella) (n=5)			5
5/18/2007	SFZ	DH#53	5	Octocoral 6 (Plumarella) (n=5)			5
5/18/2007	SFZ	DH#53	1	Octocoral 7 (Amphilaphis?) (n=1)			1
5/18/2007	SFZ	DH#53	1	Octocoral 8 (Amphilaphis?) (n=1)			1
5/18/2007	SFZ	DH#53	1	Octocoral 9 (n=1)			1
5/18/2007	SFZ	DH#53	2	Polychaetes (n=2)			2
5/18/2007	SFZ	DH#53	2	Pycnogonids (n=2)			2
5/18/2007	SFZ	DH#53	2	Seastars (n=2)	2		
5/18/2007	SFZ	DH#53	48	Stylasterids (n=48)	26		26
5/18/2007	SFZ	DH#54	1	Bilvalve (n=1)	1		
5/18/2007	SFZ	DH#54	9	Brachiopods (n=9)			9
5/18/2007	SFZ	DH#54	2	Crustaceans (n=2)			2
5/18/2007	SFZ	DH#54	2	Gastropods (n=2)		2 (100%)	
5/18/2007	SFZ	DH#54	6	Gastropods (n=6)		6 (100%)	
5/18/2007	SFZ	DH#54	10	Hydroids (n=10)			10
5/18/2007	SFZ	DH#54	3	Octocoral 1 (Plumarella) (n=3)			3

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/18/2007	SFZ	DH#54	3	Octocoral 2 (Isididae) (n=3 and many pieces)			3
5/18/2007	SFZ	DH#54	7	Octocoral 3 (Amphilaphis) (n=7 and many pieces)			7
5/18/2007	SFZ	DH#54	1	Octocoral 4 (Acanthogorgiidae) (n=1)			1
5/18/2007	SFZ	DH#54	1	Octocoral 5 (actually a Hydroid) (n=1)			1
5/18/2007	SFZ	DH#54	19	Octocoral 6 (Primnoella) (n=19)			19
5/18/2007	SFZ	DH#54	5	Polychaetes (n=5)			5
5/18/2007	SFZ	DH#54	1	Primnoidae (n=1 fragment)	1		
5/19/2007	SFZ	DH#54	1	Primnoidae fragment (n=1)	1		
5/18/2007	SFZ	DH#54	1	Pycnogonids (n=1)			1
5/18/2007	SFZ	DH#54	11	Sponges (n=11)			
5/18/2007	SFZ	DH#54	30	Stylasterids (n=30)	15		15
5/18/2007	SFZ	DH#56	1	Crustacean (smashed; n=1)			1
5/18/2007	SFZ	DH#56	1	Encrusting holothurian (n=1)	1		
5/18/2007	SFZ	DH#56	1	Hydroid (n=1)			1
5/18/2007	SFZ	DH#56	6	Hydroids (n=6)			6
5/18/2007	SFZ	DH#56	2	Octocoral 1 (Plumarella undulata) (n=2)			2
5/18/2007	SFZ	DH#56	1	Octocoral 2 (Convexella) (n=1)			1
5/18/2007	SFZ	DH#56	1	Octocoral 4 (Digitogorgia) (n=1)			1
5/18/2007	SFZ	DH#56	3	Octocoral 5 (Primnoella) (n=3)			3
5/18/2007	SFZ	DH#56	1	Octocoral 6 (Soft coral) (n=1)			1
5/18/2007	SFZ	DH#56	2	Octocoral 7 (Isididae) (n=2)			2
5/18/2007	SFZ	DH#56	1	Shrimp (n=1)			1
5/18/2007	SFZ	DH#56	3	Sponge (originally labelled as Octocoral 3) (n=3)			3
5/18/2007	SFZ	DH#56	6	Sponges (n=6)			
5/18/2007	SFZ	DH#56	8	Stylasterids (n=8)	4		4
5/18/2007	SFZ	DH#56	1	Thouarella andeep (n=1)		1	
5/18/2007	SFZ	DH#56	1	Thouarella andeep (n=1?)		1	
5/19/2007	SFZ	DH#57	1	Baby hard coral (n=1)		1 (100%)	
5/19/2007	SFZ	DH#57	43	Bearded clam (n=43)	43		
5/19/2007	SFZ	DH#57	1	Gastropod (n=1)		1 (100%)	
5/19/2007	SFZ	DH#57	20	Hydroid (n~20)			20
5/19/2007	SFZ	DH#57	1	Isopod (n=1)		1 (60%)	
5/19/2007	SFZ	DH#57	3	Primnoid whip (n=3)	3		
5/19/2007	SFZ	DH#57	1	Sponge			
5/19/2007	SFZ	DH#57	1	Stylasteridae		whole colony in 100%	

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/19/2007	SFZ	DH#59	100	Bearded Clam (n~100)	100		
5/19/2007	SFZ	DH#59	100	Bearded Clam (n~100)	100		
5/19/2007	SFZ	DH#59	1	Brittlestar (n=1)	1		
5/19/2007	SFZ	DH#59	1	Brittlestar (n=1)	1		
5/19/2007	SFZ	DH#59	1	Chiton (n=1)	1		
5/19/2007	SFZ	DH#59	1	Chiton (n=1)	1		
5/19/2007	SFZ	DH#59	1	Gastropod (n=1)		1 (100%)	
5/19/2007	SFZ	DH#59	1	Gastropod (n=1)		1 (100%)	
5/19/2007	SFZ	DH#59	1	Holothurian (n=?)	X		
5/19/2007	SFZ	DH#59	1	Holothurian (n=1)	1		
5/19/2007	SFZ	DH#59	1	Hydroid 1 (n=1)			1
5/19/2007	SFZ	DH#59	1	Hydroid 1 (n=1)			1
5/19/2007	SFZ	DH#59	4	Hydroid 2 (n=4)			4
5/19/2007	SFZ	DH#59	4	Hydroid 2 (n=4)			4
5/19/2007	SFZ	DH#59	2	Polychaetes (n=2)			2
5/19/2007	SFZ	DH#59	2	Polychaetes (n=2)			2
5/19/2007	SFZ	DH#59	1	Sponge			
5/19/2007	SFZ	DH#59	4	Sponge (4 morphs)			
5/21/2007	AA	BC#63	5	Amphipod (n=5)			5
5/21/2007	AA	BC#63	1	Brittlestar (n=1)	1		
5/21/2007	AA	BC#63	1	Gastropod (n=1)		1 (100%)	
5/21/2007	AA	BC#63	2	Insect-like crustacean (n=2)			2
5/21/2007	AA	BC#63	2	Isopod (n=2)			2
5/21/2007	AA	BC#63	8	Polychaetes (n=8)			8
5/21/2007	AA	TB#65	115	Amphipod (n=115)			115
5/21/2007	AA	TB#65	1	Anthomastus orange (n=1)			1
5/21/2007	AA	TB#65	1	Armadillogorgia (n=1)			1
5/21/2007	AA	TB#65	11	Bamboo coral skeleton (n=11 fragments)		80% Ethanol mol-grade	
5/21/2007	AA	TB#65	1	Bathyplates (n=1)			1
5/21/2007	AA	TB#65	6	Bivalves (n=6)	6		
5/21/2007	AA	TB#65	1	Brachiopod (n=1)			1
5/21/2007	AA	TB#65	16	Brittlestars (n=16)	16		
5/21/2007	AA	TB#65	1	Convexella (n=1)	1		
5/21/2007	AA	TB#65	10	Crustaceans (n=10)			10
5/21/2007	AA	TB#65	4	Flabellum (n=4)			

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/21/2007	AA	TB#65	5	Gastropods (n=5)		5 (100%)	
5/21/2007	AA	TB#65	19	Holothurians (n=19)			19
5/21/2007	AA	TB#65	8	Hydroids (n=8)			8
5/21/2007	AA	TB#65	14	Isopods (n=14)			14
5/21/2007	AA	TB#65	1	Mirostenella (n=1)	1		
5/21/2007	AA	TB#65	1	Moipadia (n=1)			1
5/21/2007	AA	TB#65	1	Octopus (n=1)			
5/21/2007	AA	TB#65	3	Paragorgia (n=3)			3
5/21/2007	AA	TB#65	66	Polychaete tubes (n=66)			66
5/21/2007	AA	TB#65	52	Polychaetes (n=52)			52
5/21/2007	AA	TB#65	1	Pycnogonid (n=1)			1
5/21/2007	AA	TB#65	2	Sea anemones (n=2)			2
5/21/2007	AA	TB#65	26	sea urchin, Amphineutes (n=26)	26		
5/21/2007	AA	TB#65	1	Sipunculid (n=1)			1
5/21/2007	AA	TB#65	1	Soft coral 1 (n=1)			1
5/21/2007	AA	TB#65	1	Soft coral 2 (n=1)			1
5/21/2007	AA	TB#65	1	Soft coral 3 (n=1)			1
5/21/2007	AA	TB#65	1	Sponge (n=1)			
5/21/2007	AA	TB#65	8	Stylasterids white and pink (n=8)	X		X
5/21/2007	AA	TB#65	26	Thouarella (n=26)	26		
5/21/2007	AA	TB#66	54	Amphipods (n=54)			54
5/21/2007	AA	TB#66	3	Anthomastus (n=3)			3
5/21/2007	AA	TB#66	2	Armadillogorgia (n=2)			2
5/21/2007	AA	TB#66	1	Asteroidea (n=1)	1		
5/21/2007	AA	TB#66	10	Bamboo coral (n=10)		10 (80% EtOH)	
5/21/2007	AA	TB#66	1	Bathyplates (n=1)			1
5/21/2007	AA	TB#66	5	Bivalves (n=5)	5		
5/21/2007	AA	TB#66	56	Brittlestars (n=56)	56		
5/21/2007	AA	TB#66	4	Crustaceans (n=4)			4
5/21/2007	AA	TB#66	6	Gastropods (n=6)		6 (100%)	
5/21/2007	AA	TB#66	1	Hydroid (n=1)			1
5/21/2007	AA	TB#66	32	Isopods (n=32)			32
5/21/2007	AA	TB#66	12	Moipadia (n=12)	X		X
5/21/2007	AA	TB#66	1	Paragorgia (n=1)			1
5/21/2007	AA	TB#66	100	Polychaete tubes (n=100)			100
5/21/2007	AA	TB#66	6	Polychaetes (n=6)			6

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/21/2007	AA	TB#66	1	Pycnogonids (n=1)			1
5/21/2007	AA	TB#66	12	Scaphopods (n=12)			12
5/21/2007	AA	TB#66	11	Sea anemones (n=11)			X?
5/21/2007	AA	TB#66	2	Sea cucumber Peniagone (n=2)	1		1
5/21/2007	AA	TB#66	11	Sea cucumber, clear (n=11)	X		X
5/21/2007	AA	TB#66	6	Sea urchins (n=6)	6		
5/21/2007	AA	TB#66	5	Stylasterids (n=5)	1		4
5/21/2007	AA	TB#66	30	Thouarella (n=30)	30		
5/21/2007	AA	TB#66	1	Unknown polychaete? (n=1)	1		
5/21/2007	AA	TB#66	40	Worms (n=40)			40
5/21/2007	AA	TB#67	37	Amphipods (n=37)			37
5/21/2007	AA	TB#67	115	Anemones (n=115)			
5/21/2007	AA	TB#67	1	Armadillogorgia (n=1)			1
5/21/2007	AA	TB#67	1	Bathyplates (n=1)			1
5/21/2007	AA	TB#67	1	Bayergorgia (n=1)			1
5/21/2007	AA	TB#67	3	Bivalves (n=3)	3		
5/21/2007	AA	TB#67	4	Brachiopods (n=4)			4
5/21/2007	AA	TB#67	93	Brittlestars (n=93)			93
5/21/2007	AA	TB#67	12	Crinoids (n=12)		12 (60%)	
5/21/2007	AA	TB#67	13	Crustaceans (n=13)			13
5/21/2007	AA	TB#67	1	Fish (n=1)			1
5/21/2007	AA	TB#67	5	Flabellum crushed carcasses (n=5)	5		
5/21/2007	AA	TB#67	5	Flabellum crushed carcasses (n=5)	5		
5/21/2007	AA	TB#67	31	Flabellum impensum (adults and larvae from 31 females)	31		
5/21/2007	AA	TB#67	40	Flabellum impensum (n=40-50)			40-50
5/21/2007	AA	TB#67	2	Gastropod with anemone 7 (n=2)			X?
5/21/2007	AA	TB#67	2	Gastropod with anemone 8 (n=2)			X?
5/21/2007	AA	TB#67	23	Gastropods (n=23)		23 (60%)	
5/21/2007	AA	TB#67	56	Hairy Polychaetes (n=56)			56
5/21/2007	AA	TB#67	210	Irregular sea urchins (n=210)	30		180
5/21/2007	AA	TB#67	14	Isopods (n=14)			14
5/21/2007	AA	TB#67	1	Jelly fish (n=1)			1
5/21/2007	AA	TB#67	9	Moipadia (n=9)			9
5/21/2007	AA	TB#67	2	Octocoral 1 (n=2)	2		
5/21/2007	AA	TB#67	1	Octocoral 2 (n=1)	1		
5/21/2007	AA	TB#67	1	Peanut worm? (n=1)			1

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/21/2007	AA	TB#67	38	Pencil urchins (n=38)	30		8
5/21/2007	AA	TB#67	1	Polychaete tubes (n=?)			X
5/21/2007	AA	TB#67	18	Pycnogonids (n=18)			18
5/21/2007	AA	TB#67	2	Sea cucumber 1 (n=2)			2
5/21/2007	AA	TB#67	8	Sea cucumber 2 (n=8)			8
5/21/2007	AA	TB#67	7	Sea cucumber 3 (n=7)			7
5/21/2007	AA	TB#67	2	Sea cucumber 4 (n=2)			2
5/21/2007	AA	TB#67	49	Sea cucumbers, clear (n=49)			49
5/21/2007	AA	TB#67	5	Sea stars (n=5)	5		
5/21/2007	AA	TB#67	3	Sipunculid (n=3)			3
5/21/2007	AA	TB#67	1	Skate (n=1)			1
5/21/2007	AA	TB#67	28	Sponges (n=28)			
5/21/2007	AA	TB#67	10	Stylasterids (n=10)	4		6
5/21/2007	AA	TB#67	9	Thouarella (n=9)	9		
5/21/2007	AA	TB#67	1	Whip coral (n=1)			1
5/21/2007	AA	TB#67	28	Worms (n=28)			28
5/23/2007	Interim Smt	DH#74	2	Bamboo coral (n=2)			2
5/23/2007	Interim Smt	DH#74	110	Brachiopods(n=110)			110
5/23/2007	Interim Smt	DH#74	8	Brittlestars (n=8)	8		
5/23/2007	Interim Smt	DH#74	6	Bryozoans (n=6)			
5/23/2007	Interim Smt	DH#74	9	Crustaceans (n=9)			9
5/23/2007	Interim Smt	DH#74	29	Gastropods (n=29)		29	
5/23/2007	Interim Smt	DH#74	87	Hydroid(n=87)			87
5/23/2007	Interim Smt	DH#74	10	Octocoral globular (n=10)			10
5/23/2007	Interim Smt	DH#74	1	Octocoral stoloniferous (n=1)			1
5/23/2007	Interim Smt	DH#74	2	Polychaetes (n=2)			2
5/23/2007	Interim Smt	DH#74	2	Pycnogonid(n=2)			2
5/23/2007	Interim Smt	DH#74	1	Seastars (n=1)	1		
5/23/2007	Interim Smt	DH#74	60	stylasterid (n=60)	x		x
5/23/2007	Interim Smt	DH#75	2	Brachiopods (n=2)			2
5/23/2007	Interim Smt	DH#75	24	Crustaceans (n=24)			24
5/23/2007	Interim Smt	DH#75	22	Gastropods (n=22)		22	
5/23/2007	Interim Smt	DH#75	34	Hydroids (n=34)			34
5/23/2007	Interim Smt	DH#75	3	Octocoral (n=3)			1
5/23/2007	Interim Smt	DH#75	1	Polychaete (n=1)			1
5/23/2007	Interim Smt	DH#75	9	Sponge (n=9)			

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/23/2007	Interim Smt	DH#75	33	Stylasterid (n=33)	24		9
5/24/2007	Interim Smt	DH#78	1	Barnacle(n=1)		1	
5/24/2007	Interim Smt	DH#78	1	Brachiopod (n=1)			1
5/24/2007	Interim Smt	DH#78	8	Brachiopod (n=8)			8
5/24/2007	Interim Smt	DH#78	4	Bryozoans (n>4)	x		
5/24/2007	Interim Smt	DH#78	2	Dasystenella (n=2)	2		
5/24/2007	Interim Smt	DH#78	3	Hydroids (n=3 + 1 fragment)			3
5/24/2007	Interim Smt	DH#78	1	Limpet (n=1)		1	
5/24/2007	Interim Smt	DH#78	1	Plumarella (n=1)	1 (entire juvenile in freezer)		
5/24/2007	Interim Smt	DH#78	2	Stylasterid (n=2)	2		
5/24/2007	Interim Smt	DH#80	3	Bamboo coral (n=3)			3
5/24/2007	Interim Smt	DH#80	12	Brachiopod (n=12)			12
5/24/2007	Interim Smt	DH#80	2	Brittlestars (n=2)	2		
5/24/2007	Interim Smt	DH#80	2	Crustaceans (n=2)			2
5/24/2007	Interim Smt	DH#80	11	Gastropods (n=11)		11	
5/24/2007	Interim Smt	DH#80	13	Hydroids(n=13)			13
5/24/2007	Interim Smt	DH#80	2	Octocoral (n=2)	2		
5/24/2007	Interim Smt	DH#80	1	Starfish (n=1)			1
5/24/2007	Interim Smt	DH#80	6	Stylasterid (n=6)	6		
5/24/2007	Interim Smt	DH#81	1	Ctenophore? (n=1)	1 in sw		
5/25/2007	Interim Smt	DH#85	1	Acanthogorgiidae (n=1)		1 (100%EtOH)	
5/25/2007	Interim Smt	DH#85	1	Anemone		(100%EtOH)	
5/25/2007	Interim Smt	DH#85	3	Hydroids (n=3 + fragmnent)			3
5/25/2007	Interim Smt	DH#85	1	Primnoid (n=1)	1		
5/25/2007	Interim Smt	DH#85	1	Sponges			
5/26/2007	Interim Smt	DH#87	4	Brachiopods (n=4)			4
5/26/2007	Interim Smt	DH#87	1	Brittlestar 1 very spiny (n=1)	1		
5/26/2007	Interim Smt	DH#87	4	Brittlestar 2 less spiny (n=4)	4		
5/26/2007	Interim Smt	DH#87	2	Brittlestar 3 smooth (n=2)	2		
5/26/2007	Interim Smt	DH#87	15	Hydroids (n~15)			15
5/26/2007	Interim Smt	DH#87	1	Primnoid (whip; n=1)	1		
5/26/2007	Interim Smt	DH#87	3	Shrimp (n=3)		3 (60% EtOH)	
5/26/2007	Interim Smt	DH#87	6	Sponges (n=6)			
5/26/2007	Interim Smt	DH#87	2	Stylasterid 1 (n=2)	2		
5/26/2007	Interim Smt	DH#87	6	Stylasterid 2 (n=6)	6		

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/26/2007	Interim Smt	DH#88	2	Amphipods (n=2)			2
5/26/2007	Interim Smt	DH#88	1	Anemone (n=1)			1
5/26/2007	Interim Smt	DH#88	2	Anemones on Stylasterid skeleton (n=2)		1 (100%EtOH)	1
5/26/2007	Interim Smt	DH#88	26	Brachiopods (n=26)			26
5/26/2007	Interim Smt	DH#88	4	Brittlestar (n=4)	4		
5/26/2007	Interim Smt	DH#88	2	Bryozoans (n=2)			
5/26/2007	Interim Smt	DH#88	1	Crab (n=1)			1
5/26/2007	Interim Smt	DH#88	6	Gastropods (n=6)		6 (100%EtOH)	
5/26/2007	Interim Smt	DH#88	126	Hydroids (n=126)			126
5/26/2007	Interim Smt	DH#88	4	Polychaetes (n=4)			4
5/26/2007	Interim Smt	DH#88	3	Shrimp (n=3)			3
5/26/2007	Interim Smt	DH#88	2	Starfish (n=2)	2		
5/26/2007	Interim Smt	DH#88	1	Stylasterids (fragments)			X
5/26/2007	Interim Smt	DH#88	121	Stylasterids (n=121)	60		60
5/26/2007	Interim Smt	DH#88	3	Whip octocoral (n=3)			3
5/26/2007	Interim Smt	DH#88	2	Whip octocorals (n=2)	2		
5/26/2007	Interim Smt	DH#90	3	Anemones on stylasterids (n=3)		3 (100%EtOH)	
5/26/2007	Interim Smt	DH#90	3	Anemones? On dead stylasterids (n=3)		2 (100%EtOH)	1
5/26/2007	Interim Smt	DH#90	3	Brachiopods (n=3)			3
5/26/2007	Interim Smt	DH#90	2	Brittlestar (n=2)	2		
5/26/2007	Interim Smt	DH#90	80	Hydroids (80)			80
5/26/2007	Interim Smt	DH#90	2	Pycnogonids (n=2)			2
5/26/2007	Interim Smt	DH#90	38	Shrimp (n=38)			38
5/26/2007	Interim Smt	DH#90	55	Stylasterids (n=55)	X		X
5/26/2007	Interim Smt	DH#90	9	Whip octocorals (n=9)	9		
5/28/2007	Sars Smt	DH#91	2	Bamboo (n=2)			2
5/28/2007	Sars Smt	DH#91	16	Bivalves (n=16)	16		
5/28/2007	Sars Smt	DH#91	8	Brachiopod (n=8)			8
5/28/2007	Sars Smt	DH#91	2	Bryozoans (n=2)			
5/28/2007	Sars Smt	DH#91	73	Caryophyllia (n=73)	31		42
5/28/2007	Sars Smt	DH#91	2	Galatheid crabs (n=2)		2 (60%EtOH)	
5/28/2007	Sars Smt	DH#91	19	Gastropods (n=19)		19 (100%EtOH)	
5/28/2007	Sars Smt	DH#91	21	Holothurians (n=21)	11		10
5/28/2007	Sars Smt	DH#91	25	Hydroid 1 (n~25)			25
5/28/2007	Sars Smt	DH#91	1	Hydroid 2 + unknown (n=1)			1

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/28/2007	Sars Smt	DH#91	21	Ophiuroids (n=21)	21		
5/28/2007	Sars Smt	DH#91	1	Ostracod (n=1)	1		
5/28/2007	Sars Smt	DH#91	45	Polychaetes (n~45)			45
5/28/2007	Sars Smt	DH#91	6	Primnoids (naked) (n=6)	6		
5/28/2007	Sars Smt	DH#91	4	Primnoids (with scales) (n=4)	4		
5/28/2007	Sars Smt	DH#91	1	Red Anemone (lost tentacles) (n=1)			1
5/28/2007	Sars Smt	DH#91	1	Seastar (n=1)		1 (100% Etoh)	
5/28/2007	Sars Smt	DH#91	6	Small pink anemones on coral (n=6)		X (100%EtOH)	X
5/28/2007	Sars Smt	DH#91	21	Soft corals (n~21)			21
5/28/2007	Sars Smt	DH#91	40	Sponges (n~40)			
5/28/2007	Sars Smt	DH#91	1	Stylasterid 1 (errina?) (many fragments)	X		
5/28/2007	Sars Smt	DH#91	1	Stylasterid 2 (many fragments)			X
5/28/2007	Sars Smt	DH#91	1	Stylasterid 3 (few fragments)			X
5/28/2007	Sars Smt	DH#91	100	Zoanthids (100 < n < 200)			100-200
5/28/2007	Sars Smt	DH#95	1	Anemone 1 (n=1)		1 (100% Etoh)	
5/28/2007	Sars Smt	DH#95	1	Anemone 2 (n=1)		1 (100% Etoh)	
5/28/2007	Sars Smt	DH#95	1	Anemone 3 (n=1)		1 (100% Etoh)	
5/28/2007	Sars Smt	DH#95	1	Anemone 4 (n=1)		1 (100% Etoh)	
5/28/2007	Sars Smt	DH#95	2	Anemone 5 (n=2)		1 (100% Etoh)	1
5/28/2007	Sars Smt	DH#95	1	Asteroidea (n=1)	1		
5/28/2007	Sars Smt	DH#95	7	Basket star (n=7)	7		
5/28/2007	Sars Smt	DH#95	11	Bayergorgia (n=11)			11
5/28/2007	Sars Smt	DH#95	8	Bivalves (n=8)	8		
5/28/2007	Sars Smt	DH#95	4	Brachiopod (n=4)			4
5/28/2007	Sars Smt	DH#95	41	Bryozoans (n=41)			
5/28/2007	Sars Smt	DH#95	51	Caryophyllia antarctica (n=51)	21		30
5/28/2007	Sars Smt	DH#95	9	Crabs (n=9)			9
5/28/2007	Sars Smt	DH#95	1	Desmophyllum (n=1)			1
5/28/2007	Sars Smt	DH#95	22	Gastropod (n=22)		22 (60%)	
5/28/2007	Sars Smt	DH#95	69	Holothurian (n=69)	69		
5/28/2007	Sars Smt	DH#95	79	Hydroids (n=79)			79
5/28/2007	Sars Smt	DH#95	15	Isididae (n=15)		8 (60% Etoh)	7
5/28/2007	Sars Smt	DH#95	2	Isopods (n=2)			2
5/28/2007	Sars Smt	DH#95	7	Ophiuroids (n=7)	7		
5/28/2007	Sars Smt	DH#95	4	Orange octocoral (n=4)	4		
5/28/2007	Sars Smt	DH#95	33	Polychaetes (n=33)			33

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/28/2007	Sars Smt	DH#95	1	Sea pen (n=1)			1
5/28/2007	Sars Smt	DH#95	5	Shrimps (n=5)			5
5/28/2007	Sars Smt	DH#95	18	Stylasterid 1 (n=18)	x		x
5/28/2007	Sars Smt	DH#95	15	Stylasterid 2 (n=15)	x		x
5/28/2007	Sars Smt	DH#95	41	Stylasterid 3 (n=41)	x		x
5/28/2007	Sars Smt	DH#95	10	Whip octocoral (n=10)	10		
5/28/2007	Sars Smt	DH#95	16	Zoanthids (n=16)	16		
5/28/2007	Sars Smt	DH#96	2	Asteroidea (n=2)	2		
5/28/2007	Sars Smt	DH#96	2	Brachiopods (n=2)			2
5/28/2007	Sars Smt	DH#96	2	Brittlestar (n=2)	2		
5/28/2007	Sars Smt	DH#96	2	Caryophyllia antarctica (n=2)	2		
5/28/2007	Sars Smt	DH#96	2	Gastropods (n=2)		2 (100%)	
5/28/2007	Sars Smt	DH#96	7	Hydroids (n=7)			7
5/28/2007	Sars Smt	DH#96	1	Octocoral 1 (n=1)	1		
5/28/2007	Sars Smt	DH#96	1	Octocoral 2 (n=1)	1		
5/28/2007	Sars Smt	DH#96	1	Sea pen (n=1)			1
5/28/2007	Sars Smt	DH#96	13	Whip octocoral (n=13)	7		6 (20% formalin)
5/29/2007	Sars Smt	DH#97	1	Acanthogorgiidae (n=1)			1
5/29/2007	Sars Smt	DH#97	1	Amphipod (n=1)			1
5/29/2007	Sars Smt	DH#97	4	Amphipods (n=4)	4		
5/29/2007	Sars Smt	DH#97	7	Anemones (n=7)		3 (100%)	3
5/29/2007	Sars Smt	DH#97	3	Asteroids (n=3)	3		
5/29/2007	Sars Smt	DH#97	8	Bivalves (n=8)	8		
5/29/2007	Sars Smt	DH#97	4	Bivalves shells (n=4)			
5/29/2007	Sars Smt	DH#97	12	Brachiopod (n=12)			12
5/29/2007	Sars Smt	DH#97	48	Caryophyllia (n=48)			48
5/29/2007	Sars Smt	DH#97	84	Caryophyllia (n=84)	84		
5/29/2007	Sars Smt	DH#97	3	Galatheid crabs (n=3)			3
5/29/2007	Sars Smt	DH#97	37	Gastropods (n=37)		37 (100%)	
5/29/2007	Sars Smt	DH#97	6	Holothurian (2nd bag, n=6)	6		
5/29/2007	Sars Smt	DH#97	40	Holothurian (n=40)	40		
5/29/2007	Sars Smt	DH#97	23	Hydroid 1 (n=23)			23
5/29/2007	Sars Smt	DH#97	2	Hydroid 2 (n=2)			2
5/29/2007	Sars Smt	DH#97	1	Hydroid 3 (n=1 +fragments)			1
5/29/2007	Sars Smt	DH#97	3	Hydroid 4 (n=3 +fragments)			3
5/29/2007	Sars Smt	DH#97	3	Hydroid 5 (n=3)			3

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/29/2007	Sars Smt	DH#97	1	Isididae (n=1 +fragments)			1
5/29/2007	Sars Smt	DH#97	1	Majiidae crab (n=1)			1
5/29/2007	Sars Smt	DH#97	14	Ophiuroids (n=14)	14		
5/29/2007	Sars Smt	DH#97	43	Polychaetes (n~43)			43
5/29/2007	Sars Smt	DH#97	5	Shrimp (n=5)			5
5/29/2007	Sars Smt	DH#97	1	Sponge			
5/29/2007	Sars Smt	DH#97	40	Stoloniferous corals (n~40)			40
5/29/2007	Sars Smt	DH#97	8	Stylasterid 1 (n=8)	8		
5/29/2007	Sars Smt	DH#97	1	Stylasterid 2 (n=19 pieces)	19		
5/29/2007	Sars Smt	DH#97	28	Stylasterid 3 (n=28)	28		
5/29/2007	Sars Smt	DH#97	7	Whip coral (no scales) n=7	7		
5/29/2007	Sars Smt	DH#97	8	Whip coral (with scales) n=8	8		
5/29/2007	Sars Smt	DH#97	80	Zoanthids (n~80)	80		
5/29/2007	Sars Smt	DH#101	1	Anemone (n=1)			1
5/29/2007	Sars Smt	DH#101	1	Anemone? (n=1)			1
5/29/2007	Sars Smt	DH#101	1	Bivalve (n=1)	1		
5/29/2007	Sars Smt	DH#101	3	Hydroids (n=3)			3
5/29/2007	Sars Smt	DH#101	1	Sea cucumber (n=1)	1		
5/29/2007	Sars Smt	DH#101	4	Sea pens (n=4)			4
5/29/2007	Sars Smt	DH#101	1	seastar (n=1)	1		
5/29/2007	Sars Smt	DH#101	1	stylasterid (n=1)	1		
5/30/2007	Sars Smt	DH#103	1	brachiopod (n=1)			1
5/30/2007	Sars Smt	DH#103	8	Gastropod (n=8)		8 (100%)	
5/30/2007	Sars Smt	DH#103	6	seapens (n=6)			6
5/30/2007	Sars Smt	DH#103	1	sponges			
5/30/2007	Sars Smt	DH#103	2	stylasterid (n=2)	2		
5/30/2007	Sars Smt	TO#104	2	Amphipods (n=2)			2
5/30/2007	Sars Smt	TO#104	9	Anemones (n=9)			9
5/30/2007	Sars Smt	TO#104	1	basket star (n=1)	1		
5/30/2007	Sars Smt	TO#104	160	brachiopods (n=160)			160
5/30/2007	Sars Smt	TO#104	25	Convexella (n=25~+fragments)	17		8 (20%)
5/30/2007	Sars Smt	TO#104	1	eel (n=1)			1
5/30/2007	Sars Smt	TO#104	1	eel pout (n=1)			1
5/30/2007	Sars Smt	TO#104	6	eel pout2 (n=6)			6
5/30/2007	Sars Smt	TO#104	1	flat fish (n=1)			1
5/30/2007	Sars Smt	TO#104	8	Galatheid crabs (n=8)			8

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
5/30/2007	Sars Smt	TO#104	5	hydroids (miscellaneous) (n=~5)			5
5/30/2007	Sars Smt	TO#104	1	Hydroids 1 (n=1)			1
5/30/2007	Sars Smt	TO#104	1	Hydroids 2 (n=1)			1
5/30/2007	Sars Smt	TO#104	1	Hydroids 3 (n=1)			1
5/30/2007	Sars Smt	TO#104	1	Hydroids 4 (n=1)			1
5/30/2007	Sars Smt	TO#104	2	isopods (n=2)			2
5/30/2007	Sars Smt	TO#104	4	Majiidae crabs (n=4)			4
5/30/2007	Sars Smt	TO#104	64	ophiuroids (n=64)	64		
5/30/2007	Sars Smt	TO#104	24	polychaetes (n=24)			24
5/30/2007	Sars Smt	TO#104	1	rat tail (n=1)			1
5/30/2007	Sars Smt	TO#104	20	sea stars (n=20)	20		
5/30/2007	Sars Smt	TO#104	37	shrimps (n=37)			37
5/30/2007	Sars Smt	TO#104	34	stoloniferous corals (n=34)			34
5/30/2007	Sars Smt	TO#104	1	Stylasterid 1 (fragments)	50%		50%
5/30/2007	Sars Smt	TO#104	1	Stylasterid 2 (fragments)	50%		50%
5/30/2007	Sars Smt	TO#104	1	Stylasterid 3 (fragments)	50%		50%
5/30/2007	Sars Smt	TO#104	1	Stylasterid 4 (fragments)	fragments		
5/30/2007	Sars Smt	TO#104	1	Stylasterid 5 (fragments)	50%		50%
5/30/2007	Sars Smt	TO#104	1	whip octocoral (n=1)	1		
5/31/2007	Sars Smt	DH#110	3	Bamboo Skeleton (n=3)	3		
5/31/2007	Sars Smt	DH#110	14	Hydroids (n=14)			14
5/31/2007	Sars Smt	DH#111	1	Bamboo Skeleton with some tissue (n=1)		1 (100%)	
5/31/2007	Sars Smt	DH#111	1	Hydroids on bamboo (n=1)			1
6/1/2007	Sars Smt	DH#112	1	Holothurian (n=1)			1
6/1/2007	Sars Smt	DH#112	4	Sponge (n=4)			
6/1/2007	Sars Smt	DH#112	5	Zoanthid (n=5)			3
6/1/2007	Sars Smt	DH#113	15	Sponges (n~15)			
6/1/2007	Sars Smt	DH#113	6	Zoanthids (n=6)		3 (100%)	3
6/1/2007	Sars Smt	DH#114	1	Barnacle (n=1)			1
6/1/2007	Sars Smt	DH#114	1	Sponge (n=1)			
6/1/2007	Sars Smt	DH#115	2	Bamboo coral (n=2)			1
6/1/2007	Sars Smt	DH#115	3	Bivalves (n=3)	3		
6/1/2007	Sars Smt	DH#115	16	Branchiopods (n=16)			16
6/1/2007	Sars Smt	DH#115	3	Brittlestars (n=3)	3		
6/1/2007	Sars Smt	DH#115	7	Bryozoans (n=7)			
6/1/2007	Sars Smt	DH#115	1	Caryophyllia antarctica (n=1)	1 in SW		

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
6/1/2007	Sars Smt	DH#115	1	Encrusting sea cucumber (n=1)	1		
6/1/2007	Sars Smt	DH#115	45	Gastropods (n=45)		45 (100%)	
6/1/2007	Sars Smt	DH#115	7	Hydroids (n=7)			7
6/1/2007	Sars Smt	DH#115	2	Octocoral (n=2)	2		
6/1/2007	Sars Smt	DH#115	1	Polychaete tube (n=1)			1
6/1/2007	Sars Smt	DH#115	6	Sponge (n=6)			
6/1/2007	Sars Smt	DH#115	5	Stylasterid (n=5)	5		
6/1/2007	Sars Smt	DH#115	2	Whip octocoral (n=2)	1		
6/1/2007	Sars Smt	DH#115	8	Zoanthids (n=8)	8		
6/1/2007	Sars Smt	DH#117	1	Amphipod (n=1)			1
6/1/2007	Sars Smt	DH#117	1	Anemone (n=1)			1
6/1/2007	Sars Smt	DH#117	12	Brachiopod (n=12)			12
6/1/2007	Sars Smt	DH#117	3	Brittlestar (n=3)	3		
6/1/2007	Sars Smt	DH#117	3	Bryozoans (n=3)			
6/1/2007	Sars Smt	DH#117	2	Crustaceans (n=2)			2
6/1/2007	Sars Smt	DH#117	57	Gastropod (n=57)		57 (100%)	
6/1/2007	Sars Smt	DH#117	65	Gastropods (n=65)		65 (100%)	
6/1/2007	Sars Smt	DH#117	17	Hydroid (n=17)			17
6/1/2007	Sars Smt	DH#117	1	Octocoral (n=1)	1		
6/1/2007	Sars Smt	DH#117	1	Octocoral 2 (n=1)	1		
6/1/2007	Sars Smt	DH#117	1	Octocoral 3 (Acanthogorgiidae) (n=1)	1		
6/1/2007	Sars Smt	DH#117	2	Polychaetes (n=2)			2
6/1/2007	Sars Smt	DH#117	1	Sea cucumber (n=1)	1		
6/1/2007	Sars Smt	DH#117	6	Stylasterids (n=6)	6		
6/1/2007	Sars Smt	DH#118	1	Amphipod (n=1)			1
6/1/2007	Sars Smt	DH#118	4	Anemone (n=4)			4
6/1/2007	Sars Smt	DH#118	1	Brachiopod (n=1)			1
6/1/2007	Sars Smt	DH#118	1	Coral (n=1)	1		
6/1/2007	Sars Smt	DH#118	14	Hydroid (n=14)			14
6/1/2007	Sars Smt	DH#118	3	Octocoral (n=3)	3		
6/1/2007	Sars Smt	DH#118	6	Octocoral (pink) (n=6)	6		
6/1/2007	Sars Smt	DH#118	1	Octocoral (purple - Acanthogorgiidae) (n=1)	1?		
6/1/2007	Sars Smt	DH#118	1	Ophiuroids (n=1)	1		
6/1/2007	Sars Smt	DH#118	1	Polychaete			1?
6/2/2007	Sars Smt	DH#120	9	Amphipod (n=9)			9
6/2/2007	Sars Smt	DH#120	26	Branchiopod (n~26)			26

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
6/2/2007	Sars Smt	DH#120	1	Bryozoans (n=1)			
6/2/2007	Sars Smt	DH#120	1	Ctenophore ? (n=1) (Schyphozoan)			1
6/2/2007	Sars Smt	DH#120	46	Gastropod shells (n=46)		46 (100%)	
6/2/2007	Sars Smt	DH#120	1	Hydroid 1 (fragments)			x
6/2/2007	Sars Smt	DH#120	1	Hydroid 2 (fragments)			x
6/2/2007	Sars Smt	DH#120	4	Hydroid 3 (n=4)			4
6/2/2007	Sars Smt	DH#120	1	Isididae (n=1, fragment)			1
6/2/2007	Sars Smt	DH#120	3	Ophiuroid (n=3)	SW 3		
6/2/2007	Sars Smt	DH#120	6	Plumarella (n=6 + fragments)	6		
6/2/2007	Sars Smt	DH#120	4	Polychaetes (n=4)			4
6/2/2007	Sars Smt	DH#120	1	Primnoid whip (n=1, + skeleton)	1		
6/2/2007	Sars Smt	DH#120	1	Sponges			
6/2/2007	Sars Smt	DH#120	1	Stalked barnacle (n=1)		1 (100%)	
6/2/2007	Sars Smt	DH#120	1	Stoloniferous octocoral - 1 polyp		1 (100%)	
6/2/2007	Sars Smt	DH#120	9	Stylasterid (n=9)	9		
6/2/2007	Sars Smt	DH#120	4	Thouarella (n~4)	4		
6/2/2007	Sars Smt	DH#120	1	Thouarella variabilis (n=1)	1		
6/2/2007	Sars Smt	DH#120	1	Zoanthid (n=1)	SW 1		
6/2/2007	Sars Smt	DH#121	5	Amphipods (n=5)			5
6/2/2007	Sars Smt	DH#121	6	Anemones (n=6)			2
6/2/2007	Sars Smt	DH#121	6	Anemones (n=6)			
6/2/2007	Sars Smt	DH#121	1	Brachiopod (n=1)			1
6/2/2007	Sars Smt	DH#121	10	Gastropod (n=10, 2 alive)		10	
6/2/2007	Sars Smt	DH#121	10	Hydroids (n~10, + fragments)			10
6/2/2007	Sars Smt	DH#121	5	Ophiuroids (n=5)	5		
6/2/2007	Sars Smt	DH#121	5	Ophiuroids (n=5)	5		
6/2/2007	Sars Smt	DH#121	5	Plumarella (n=5)	5		
6/2/2007	Sars Smt	DH#121	1	Polychaete (n=1)			1
6/2/2007	Sars Smt	DH#121	1	Sponge			
6/2/2007	Sars Smt	DH#121	2	Stoloniferous corals (n=2)			2
6/2/2007	Sars Smt	DH#121	7	Thouarella 1 (n~7, fragments)	7		
6/2/2007	Sars Smt	DH#121	1	Thouarella 2 (n~2 fragments)	2		
6/2/2007	Sars Smt	DH#121	1	Tunicate ? (n=1)			1
6/2/2007	Sars Smt	DH#121	3	Unknown (n=3)		1 (100% Etoh)	2
6/2/2007	Sars Smt	DH#121	1	Unknown octocoral (n=1)			1
6/2/2007	Sars Smt	DH#123	1	Hydroid (n=?)			x

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
6/2/2007	Sars Smt	DH#123	1	Sponge (n=1)			
6/2/2007	Sars Smt	DH#123	1	Worm / worm tube (n=1)			1
6/3/2007	Sars Smt	DH#126	2	Asteroid (n=2)	2		
6/3/2007	Sars Smt	DH#126	2	Brachiopod (n=2)			2
6/3/2007	Sars Smt	DH#126	4	Bryozoans? (n=4)			
6/3/2007	Sars Smt	DH#126	5	Hydroid (n=5 + fragments)			5
6/3/2007	Sars Smt	DH#126	2	Ophiuroid (n=2)	2		
6/3/2007	Sars Smt	DH#126	15	Sponges (n~15)			
6/3/2007	Sars Smt	DH#126	2	Stalked barnacle (n=2)		2	
6/3/2007	Sars Smt	DH#126	1	Stoloniferous corals (n=1)			1
6/5/2007	Cape Horn	DH#128	6	Balanophyllia (n=6)			6
6/5/2007	Cape Horn	DH#128	5	Bamboo coral (n=5)	3		2
6/5/2007	Cape Horn	DH#128	4	Bivalves (n=4)	4		
6/5/2007	Cape Horn	DH#128	48	Black octocoral (n=48)	20		20
6/5/2007	Cape Horn	DH#128	44	Brittlestars (n=44)	44		
6/5/2007	Cape Horn	DH#128	12	Convexella (n=12)	X		X
6/5/2007	Cape Horn	DH#128	11	Crustaceans (n=11)			11
6/5/2007	Cape Horn	DH#128	1	Dasystenella (n=1)			1
6/5/2007	Cape Horn	DH#128	15	Flabellum curvatum (n=15)			15
6/5/2007	Cape Horn	DH#128	1	Gastropods (n=1)		1 (100% EtOH)	
6/5/2007	Cape Horn	DH#128	1	Globular octocoral, orange (n=1)		1 (100% EtOH)	
6/5/2007	Cape Horn	DH#128	54	Hydroids (n=54)			54
6/5/2007	Cape Horn	DH#128	1	Madrepora oculata (n=1)			1
6/5/2007	Cape Horn	DH#128	1	Paragorgia (n=1)			1
6/5/2007	Cape Horn	DH#128	6	Pink octocoral (n=6)	3		3
6/5/2007	Cape Horn	DH#128	21	Pink stoloniferous octocoral (n=21)	X		X
6/5/2007	Cape Horn	DH#128	10	Polychaetes (n=10)			10
6/5/2007	Cape Horn	DH#128	6	Primnoella (n=6)	3		3
6/5/2007	Cape Horn	DH#128	1	Purple stoloniferous octocoral (n=1)		1 (100% EtOH)	
6/5/2007	Cape Horn	DH#128	1	Pycnogonid (n=1)			1
6/5/2007	Cape Horn	DH#128	2	Sea urchins (n=2)	2		
6/5/2007	Cape Horn	DH#128	6	Seastars (n=6)	6		
6/5/2007	Cape Horn	DH#128	1	Shrimp (n=1)			1
6/5/2007	Cape Horn	DH#128	1	Spicky green octocoral (n=1)			1
6/5/2007	Cape Horn	DH#128	28	Stylasterid, pink (n=28)	X		X

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
6/5/2007	Cape Horn	DH#128	17	Stylasterids, orange (n=17)	X		X
6/5/2007	Cape Horn	DH#128	25	Stylasterids, white (n=25)			25
6/5/2007	Cape Horn	DH#128	4	Thouarella (n=4)	2		2
6/5/2007	Cape Horn	DH#128	6	Thouarella viridis (n=6)	3		3
6/5/2007	Cape Horn	DH#128	3	Worms (n=3)			3
6/5/2007	Cape Horn	DH#128	30	Zoanthids (n=30)	X		X
6/5/2007	Cape Horn	DH#129	2	Acanthogorgiidae (n=2)			2
6/5/2007	Cape Horn	DH#129	34	Amphipods (n=34)	34		
6/5/2007	Cape Horn	DH#129	1	Anemone? (n=1)			1
6/5/2007	Cape Horn	DH#129	3	Asteroid (n=3)	3		
6/5/2007	Cape Horn	DH#129	16	Bamboo coral (n=16)		8+fragments 60%EtOH	8+fragments
6/5/2007	Cape Horn	DH#129	1	Barnacle (n=1)		1	
6/5/2007	Cape Horn	DH#129	1	Convexella (n=1+fragments)	1		fragments
6/5/2007	Cape Horn	DH#129	6	Dasystenella (n=6 + fragments)	3+fragments		3
6/5/2007	Cape Horn	DH#129	1	Digitogorgia (n=1)	1		
6/5/2007	Cape Horn	DH#129	37	Flabellum (n=37)			37
6/5/2007	Cape Horn	DH#129	4	Flabellum (n=4)	3		1
6/5/2007	Cape Horn	DH#129	6	Gastropod (n=6)		6	
6/5/2007	Cape Horn	DH#129	1	Globural octocoral (n=1)			1
6/5/2007	Cape Horn	DH#129	6	Hedgehog, New genus (n=6+fragments)	6		6
6/5/2007	Cape Horn	DH#129	1	Holothurian (n=1)	1		
6/5/2007	Cape Horn	DH#129	84	Hydroids (n=84)			2 jars
6/5/2007	Cape Horn	DH#129	12	Isopods (n~12)			12
6/5/2007	Cape Horn	DH#129	3	Mirostenella (n=3+fragments)	1+fragments		2
6/5/2007	Cape Horn	DH#129	4	Octocoral 1 (n=4)	2		2
6/5/2007	Cape Horn	DH#129	1	Octocoral 2 (n=1)			1
6/5/2007	Cape Horn	DH#129	1	Octocoral 3 (n=1)			1
6/5/2007	Cape Horn	DH#129	1	Octocoral 4 (n=1)			1
6/5/2007	Cape Horn	DH#129	1	Octocoral 5 (n=1)			1
6/5/2007	Cape Horn	DH#129	5	Octocoral 6 (n=5)	X		X
6/5/2007	Cape Horn	DH#129	2	Ophiuroids (n=2)	2		
6/5/2007	Cape Horn	DH#129	12	Ophiuroids (n12)	12		
6/5/2007	Cape Horn	DH#129	14	Plumarella (n=14+fragments)	2+fragments		12
6/5/2007	Cape Horn	DH#129	100	Primnoella (n=100 and fragments)	5 bags of 20, 34, 19, 14, 12 (individualized)		4 jars of 20, 26, 8, 12 (individualized),

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
							plus one whole colony individualized (FK55, FK56)
6/5/2007	Cape Horn	DH#129	2	Primnoella 2 (n=3 fragments)	3 fragments		
6/5/2007	Cape Horn	DH#129	2	Pycnogonids (n=2)			2
6/5/2007	Cape Horn	DH#129	11	Red soft coral (Anthomastus?) (n=11)			11
6/5/2007	Cape Horn	DH#129	1	Sea urchin (n=1)	1		
6/5/2007	Cape Horn	DH#129	18	Sea urchins (n=18)	18		
6/5/2007	Cape Horn	DH#129	2	Stoloniferous coral (n=2)			2
6/5/2007	Cape Horn	DH#129	1	Stylasterids 1 (n=fragments)	half of fragments		half of fragments
6/5/2007	Cape Horn	DH#129	1	Stylasterids 2 (n=fragments)	half of fragments		half of fragments
6/5/2007	Cape Horn	DH#129	1	Stylasterids 3 (n=fragments)	half of fragments		half of fragments
6/5/2007	Cape Horn	DH#129	1	Stylasterids 4 (n=1+fragments)	half of fragments		half of fragments
6/5/2007	Cape Horn	DH#129	2	Thouarella crenelata (n=2 fragments)	2+fragments		
6/5/2007	Cape Horn	DH#129	2	Thouarella pink (n=2)	2		
6/5/2007	Cape Horn	DH#129	6	Thouarella viridis (n=6)	3		3
6/5/2007	Cape Horn	DH#129	6	Whip octocoral 1 (n=6)	3		3
6/6/2007	Cape Horn	DH#131	1	Acanthogorgiidae (n=1)			1
6/6/2007	Cape Horn	DH#131	1	Acanthogorgiidae (n=1)			1
6/6/2007	Cape Horn	DH#131	1	Acanthogorgiidae 2 (n=1)	1		
6/6/2007	Cape Horn	DH#131	12	Amphipod (n~12)			12
6/6/2007	Cape Horn	DH#131	4	Anemones (n=4)			4
6/6/2007	Cape Horn	DH#131	1	Bamboo coral 1 (n=fragments)		fragments in 100%EtOH	fragments
6/6/2007	Cape Horn	DH#131	1	Bamboo coral 2 (n=1+fragments)			1
6/6/2007	Cape Horn	DH#131	2	Bayergorgia (n=2)			2
6/6/2007	Cape Horn	DH#131	1	Convexella (n=1)	1		piece
6/6/2007	Cape Horn	DH#131	2	Dasystenella (n=2+fragments)	2+fragments		
6/6/2007	Cape Horn	DH#131	1	Digitogorgia (n=1)	1		
6/6/2007	Cape Horn	DH#131	1	Flatworm (n=1)			1
6/6/2007	Cape Horn	DH#131	6	Galatheid crabs (n=6)			6
6/6/2007	Cape Horn	DH#131	2	Hydroid 1 (n=2)			2
6/6/2007	Cape Horn	DH#131	10	Hydroid 2 (n~10)			10

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
6/6/2007	Cape Horn	DH#131	2	Hydroid 3 (n=2)			2
6/6/2007	Cape Horn	DH#131	7	Hydroid 4 (n=7)			7
6/6/2007	Cape Horn	DH#131	9	Hydroid 5 (n=9)			9
6/6/2007	Cape Horn	DH#131	1	Hydroid 6 (n=1)			1
6/6/2007	Cape Horn	DH#131	10	Hydroid 7 (n~10)			10
6/6/2007	Cape Horn	DH#131	80	Ophiuroids (n~80)	80		
6/6/2007	Cape Horn	DH#131	5	Paragorgia (n=5)			5
6/6/2007	Cape Horn	DH#131	4	Plumarella (n=4+fragments)	2		2
6/6/2007	Cape Horn	DH#131	33	Polychaetes (n=33)			33
6/6/2007	Cape Horn	DH#131	5	Primnoella (n=5)	3		2
6/6/2007	Cape Horn	DH#131	1	Primnoella 2 (n=1)	1		piece
6/6/2007	Cape Horn	DH#131	1	Pycnogonid (n=1)			1
6/6/2007	Cape Horn	DH#131	3	Pycnogonid (n=3)			1
6/6/2007	Cape Horn	DH#131	2	Shrimp (n=2)			2
6/6/2007	Cape Horn	DH#131	1	Solitary coral (n=1)	1		
6/6/2007	Cape Horn	DH#131	1	Sponge? (n=1)			
6/6/2007	Cape Horn	DH#131	7	Stoloniferous coral 1 (n=6)			6
6/6/2007	Cape Horn	DH#131	6	Stoloniferous coral 2 (n=7)			7
6/6/2007	Cape Horn	DH#131	3	Stoloniferous coral 3 (n=3)			3?
6/6/2007	Cape Horn	DH#131	1	Stylasterid 1 (n=fragments)	half of fragments		half of fragments
6/6/2007	Cape Horn	DH#131	1	Stylasterid 2 (n=fragments)	half of fragments		half of fragments
6/6/2007	Cape Horn	DH#131	1	Stylasterid 3 (n=fragments)	half of fragments		half of fragments
6/6/2007	Cape Horn	DH#131	1	Stylasterid 4 (n=fragments)	half of fragments		half of fragments
6/6/2007	Cape Horn	DH#131	1	Stylasterid 5 (n=fragments)	half of fragments		half of fragments
6/6/2007	Cape Horn	DH#131	1	Stylasterid 6 (n=fragments)	half of fragments		half of fragments
6/6/2007	Cape Horn	DH#131	1	Stylasterid 7 (n=fragments)	half of fragments		half of fragments
6/6/2007	Cape Horn	DH#131	1	Thouarella (n=1+fragments)	1+fragments		
6/6/2007	Cape Horn	DH#131	1	Thouarella viridis (n=8)	8		
6/6/2007	Cape Horn	DH#131	1	Zoanthids 2 (n~20 polyps)	20		
6/6/2007	Cape Horn	DH#131	6	Zoanthids? (n=6)			6?
6/6/2007	Cape Horn	DH#134	4	Amphipods (n=4)			4

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
6/6/2007	Cape Horn	DH#134	10	Balanophyllia (n=10)			10
6/6/2007	Cape Horn	DH#134	6	Bamboo coral (n=6 + fragments)	3+fragments		3+fragments
6/6/2007	Cape Horn	DH#134	5	Bayergorgia (n=5)			2
6/6/2007	Cape Horn	DH#134	9	Bivalves (n=9)	9		
6/6/2007	Cape Horn	DH#134	19	Black octocoral (n=19)	7		7
6/6/2007	Cape Horn	DH#134	9	Brittlestars (n=9)	9		
6/6/2007	Cape Horn	DH#134	1	Crab (n=1)			1
6/6/2007	Cape Horn	DH#134	4	Dasystenella (n=4)	1		3
6/6/2007	Cape Horn	DH#134	26	Flabellum #1 (n=26)	11		15
6/6/2007	Cape Horn	DH#134	2	Flabellum #2 (n=2)			2
6/6/2007	Cape Horn	DH#134	30	Hydroids (n~30)	x		x
6/6/2007	Cape Horn	DH#134	4	Isopods (n=4)			4
6/6/2007	Cape Horn	DH#134	2	Orange globular octocoral (n=2)	1		1
6/6/2007	Cape Horn	DH#134	2	Paragorgia (n=2)	1		1
6/6/2007	Cape Horn	DH#134	6	Pink globular octocoral (n=6)			4
6/6/2007	Cape Horn	DH#134	8	Pink octocoral (n=8)	4		4
6/6/2007	Cape Horn	DH#134	3	Pink octocoral 2 (n=3)			3
6/6/2007	Cape Horn	DH#134	2	Pink octocoral 3 (n=2)			2
6/6/2007	Cape Horn	DH#134	16	Pink Stylasterids (n=16)	8		8
6/6/2007	Cape Horn	DH#134	44	Polychaetes (n=44)			44
6/6/2007	Cape Horn	DH#134	1	Pycnogonid (n=1)			1
6/6/2007	Cape Horn	DH#134	4	Sea stars (n=4)	4		
6/6/2007	Cape Horn	DH#134	1	Sea urchin (n=1)	1		
6/6/2007	Cape Horn	DH#134	1	Shrimp (n=1)			1
6/6/2007	Cape Horn	DH#134	6	Stoloniferous coral 1 (n=6)	x		x
6/6/2007	Cape Horn	DH#134	4	Stoloniferous coral 2 (n=4)	x		x
6/6/2007	Cape Horn	DH#134	6	Thouarella viridis (n=6)	3		3
6/6/2007	Cape Horn	DH#134	1	Tunicate (n=1)			1
6/6/2007	Cape Horn	DH#134	2	Unusual solitary coral (n=2)			2
6/6/2007	Cape Horn	DH#134	1	Whip octocoral (n=1)			1
6/6/2007	Cape Horn	DH#134	1	White octocoral (n=1)			1
6/6/2007	Cape Horn	DH#134	14	White Stylasterids (n=14)	7		7
6/6/2007	Cape Horn	DH#134	2	Yellow Thouarella (n=2)	1		1
6/7/2007	Cape Horn	DH#138	1	Anemone (n=1)			1
6/7/2007	Cape Horn	DH#138	5	Flabellum curvatum (n=5)			4
6/7/2007	Cape Horn	DH#138	1	Hydroid (n=1)			1

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
6/7/2007	Cape Horn	DH#138	1	Isididae (n=1 branch)			1
6/7/2007	Cape Horn	DH#138	1	Soft coral on rock (n=1)			1
6/7/2007	Cape Horn	DH#138	2	Stalked barnacles (n=2)			2
6/7/2007	Cape Horn	DH#138	2	Stylasterid 1 (n=2)	2 + fragment bag		
6/7/2007	Cape Horn	DH#138	1	Stylasterid 2 (n=1)	1		
6/7/2007	Cape Horn	DH#138	1	Thouarella viridis (n=1+ fragments)	fragments		1
6/7/2007	Cape Horn	DH#138	1	Unusual cup coral (n=1)			1
6/7/2007	Cape Horn	DH#140	13	Amphipods (n=13)			13
6/7/2007	Cape Horn	DH#140	4	Asteroids (n=4)	4		
6/7/2007	Cape Horn	DH#140	1	Bamboo coral 1 (n=fragments)			fragments
6/7/2007	Cape Horn	DH#140	1	Bamboo coral 2 (n=1)			1
6/7/2007	Cape Horn	DH#140	1	Bivalve 1 (n=1)	1 with SW		
6/7/2007	Cape Horn	DH#140	2	Bivalve 2 (n=2)	2 with SW		
6/7/2007	Cape Horn	DH#140	16	Bivalve 3 (n=16)	16 with SW		
6/7/2007	Cape Horn	DH#140	1	Bivalve 4 (n=1)	1 with SW		
6/7/2007	Cape Horn	DH#140	1	Caryophyllia (n=1)			1
6/7/2007	Cape Horn	DH#140	1	Crustacean (n=1)			1
6/7/2007	Cape Horn	DH#140	2	Dasystenella (n=2)	2		
6/7/2007	Cape Horn	DH#140	1	Flabellum (n=1)			1
6/7/2007	Cape Horn	DH#140	1	Gastropod (n=1)		1 (100%)	
6/7/2007	Cape Horn	DH#140	2	Holaxonia (n=2)			2
6/7/2007	Cape Horn	DH#140	1	Hydroid 1 (n=1)			1
6/7/2007	Cape Horn	DH#140	10	Hydroid 2 (n~10)			10
6/7/2007	Cape Horn	DH#140	2	Hydroid 3 (n=2)			2
6/7/2007	Cape Horn	DH#140	1	Hydroid 4 (n=1)			1
6/7/2007	Cape Horn	DH#140	2	Hydroid 5 (n=2)			2
6/7/2007	Cape Horn	DH#140	1	Isopod (n=1)			1
6/7/2007	Cape Horn	DH#140	48	Ophiuroids (n=48)	48		
6/7/2007	Cape Horn	DH#140	1	Plumarella (n=1)	1		
6/7/2007	Cape Horn	DH#140	6	Polychaetes (n=6)			6
6/7/2007	Cape Horn	DH#140	1	Pycnogonid (n=1)			1
6/7/2007	Cape Horn	DH#140	1	Red soft coral (n=1)			1
6/7/2007	Cape Horn	DH#140	1	Stalked barnacle (n=1)			1
6/7/2007	Cape Horn	DH#140	3	Stylasterid 1 (n=3 fragments)	1 fragment		1 fragment
6/7/2007	Cape Horn	DH#140	20	Stylasterid 2 (n=20 fragments)	10 fragments		10 fragments

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
6/7/2007	Cape Horn	DH#140	2	Stylasterid 3 (n=2 fragments)	1 fragment		
6/7/2007	Cape Horn	DH#140	9	Stylasterid 4 (n=9 fragments)	4 fragments		4 fragments
6/7/2007	Cape Horn	DH#140	20	Stylasterid 5 (n=20 fragments)	10 fragments		10 fragments
6/7/2007	Cape Horn	DH#140	1	Unknown Primnoidae (n=1)	1		
6/7/2007	Cape Horn	DH#140	1	Unknown solitary coral (n=1)		1 (100%)	
6/7/2007	Cape Horn	DH#140	14	Zoanthid (n=14)			11
6/7/2007	Cape Horn	DH#141	3	Acanthogorgiidae (n=3)			3
6/7/2007	Cape Horn	DH#141	1	Amphipod (n=1)			1
6/7/2007	Cape Horn	DH#141	3	Bamboo coral (n=3)			3
6/7/2007	Cape Horn	DH#141	1	Bivalve (n=1)	1		
6/7/2007	Cape Horn	DH#141	3	Crustaceans (n=3)			3
6/7/2007	Cape Horn	DH#141	1	Dasystenella (n=1)	1		
6/7/2007	Cape Horn	DH#141	8	Gastropods (n=8)			8
6/7/2007	Cape Horn	DH#141	7	Holaxonia (n=7)			7
6/7/2007	Cape Horn	DH#141	11	Hydroids (n=11)			11
6/7/2007	Cape Horn	DH#141	3	Ophiuroids (n=3)	3		
6/7/2007	Cape Horn	DH#141	1	Stylasterid 1 (n=1)	1		
6/7/2007	Cape Horn	DH#141	1	Stylasterid 2 (n=fragments)	50% fragments		50% fragments
6/7/2007	Cape Horn	DH#141	1	Zoanthid (n=1)	1		
6/7/2007	Cape Horn	DH#143	8	Anemones? On rock (n=8)			6
6/7/2007	Cape Horn	DH#143	6	Anemones? On solitary coral (n=6)			4
6/7/2007	Cape Horn	DH#143	1	Anthomastus (n=1)			1
6/7/2007	Cape Horn	DH#143	2	Bamboo corals (n=2)	1		1
6/7/2007	Cape Horn	DH#143	7	Barnacles (n=7)			7
6/7/2007	Cape Horn	DH#143	1	Bivalve (n=1)	1		
6/7/2007	Cape Horn	DH#143	2	Black octocoral (n=2)			1
6/7/2007	Cape Horn	DH#143	1	Brachiopod (n=1)			1
6/7/2007	Cape Horn	DH#143	9	Brittlestars (n=9)	9		
6/7/2007	Cape Horn	DH#143	4	Flabellum (n=4)			4
6/7/2007	Cape Horn	DH#143	3	Gastropods (n=3)		3(100%)	
6/7/2007	Cape Horn	DH#143	1	Globular octocoral (n=1)			1
6/7/2007	Cape Horn	DH#143	1	Isopod (n=1)			1
6/7/2007	Cape Horn	DH#143	3	Pink octocorals (n=3)	1		2
6/7/2007	Cape Horn	DH#143	3	Pink octocorals 2 (n=3)	1		2
6/7/2007	Cape Horn	DH#143	5	Polychaetes (n=5)			5
6/7/2007	Cape Horn	DH#143	1	Sea urchin (n=1)	1		

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
6/7/2007	Cape Horn	DH#143	5	Sponges (n=5)			
6/7/2007	Cape Horn	DH#143	103	Stylasterids (n=103)	51		53
6/7/2007	Cape Horn	DH#143	3	Tunicates (n=3)			3
6/7/2007	Cape Horn	DH#143	1	Unknown solitary coral (n=1)			
6/7/2007	Cape Horn	DH#143	3	Unknown solitary coral (n=3)			3
6/7/2007	Cape Horn	DH#143	4	Whip octocoral (n=4)	2		2
6/8/2007	Cape Horn	TB#147	84	Amphipods (n=84)			84
6/8/2007	Cape Horn	TB#147	1	Anemone (n=1)			1
6/8/2007	Cape Horn	TB#147	1	Anemone on stylasterid (n=1)		1 (100%EtOH)	
6/8/2007	Cape Horn	TB#147	6	Balanophyllia (n=6)	2		4
6/8/2007	Cape Horn	TB#147	3	Bamboo coral (n=3)	1		2
6/8/2007	Cape Horn	TB#147	1	Barnacle (n=1)			1
6/8/2007	Cape Horn	TB#147	1	Bayergorgia (n=1)			1
6/8/2007	Cape Horn	TB#147	2	Bivalves (n=2)	2		
6/8/2007	Cape Horn	TB#147	3	Bivalves (n=3)	3		
6/8/2007	Cape Horn	TB#147	1	Black octocoral (n=1)			1
6/8/2007	Cape Horn	TB#147	21	Brachiopods (n=21)			21
6/8/2007	Cape Horn	TB#147	14	Convexella (n=14)	7		7
6/8/2007	Cape Horn	TB#147	2	Crinoids (n=2)	2		
6/8/2007	Cape Horn	TB#147	2	Fish (n=2)			2
6/8/2007	Cape Horn	TB#147	1	Flabellum (n=1)			1
6/8/2007	Cape Horn	TB#147	1	Flat worm (n=1)			1
6/8/2007	Cape Horn	TB#147	57	Gastropods (n=57)		57 (100% EtOH)	
6/8/2007	Cape Horn	TB#147	4	Hermit crabs w/ zoanthids on shell (n=8)	4		4
6/8/2007	Cape Horn	TB#147	4	Hermit crabs w/ zoanthids on shell (n=8)	4		4
6/8/2007	Cape Horn	TB#147	207	Hydroids (n=207)			207
6/8/2007	Cape Horn	TB#147	14	Isopods (n=14)			14
6/8/2007	Cape Horn	TB#147	1	Javania? (n=1)			
6/8/2007	Cape Horn	TB#147	48	Ophiuroids (n=48)	48		
6/8/2007	Cape Horn	TB#147	3	Orange globular octocoral (n=3)	1		2
6/8/2007	Cape Horn	TB#147	37	Orange-red sponge (n=37)			37
6/8/2007	Cape Horn	TB#147	14	Plumarella (n=14+fragments)	7+fragments		7+fragments
6/8/2007	Cape Horn	TB#147	65	Polychaetes (n=65)			65
6/8/2007	Cape Horn	TB#147	2	Sea cucumbers (n=2)			
6/8/2007	Cape Horn	TB#147	23	Sea stars (n=23)	23		
6/8/2007	Cape Horn	TB#147	18	Sea urchin (n=18)	18		

Date	Area	Station	Minimum # of Individs	Species	Frozen at -80°	Ethanol	Formalin
6/8/2007	Cape Horn	TB#147	1	Serolis (n=1)			1
6/8/2007	Cape Horn	TB#147	11	Shrimp (n=11)			11
6/8/2007	Cape Horn	TB#147	1	Skate egg w/ skate inside (n=1)			1
6/8/2007	Cape Horn	TB#147	1	Sponge 1 (n=1)			1
6/8/2007	Cape Horn	TB#147	1	Sponge 2 (n=1)			1
6/8/2007	Cape Horn	TB#147	90	Stylasterids (n=90)	45		45
6/8/2007	Cape Horn	TB#147	12	Thouarella viridis (n=12)	4		4
6/8/2007	Cape Horn	TB#147	10	Tunicates (n=10)			
6/8/2007	Cape Horn	TB#147	2	Unknown (n=2)			2
6/8/2007	Cape Horn	TB#147	21	Unknown Crustaceans (n=21)			21
6/8/2007	Cape Horn	TB#147	32	White sponge (n=32)			32
5/17/2007	SFZ	DH#36/37	17	brachiopods (n=17)	17		
5/17/2007	SFZ	DH#36/37	1	Brittlestar (n=1)	1 (in seawater)		
5/17/2007	SFZ	DH#36/37	1	Gastropod (n=1)		1 (100%)	
5/17/2007	SFZ	DH#36/37	1	Holothurian (n=1)	1 (in seawater)		
5/17/2007	SFZ	DH#36/37	2	Polychaetes (n=2)			2
5/17/2007	SFZ	DH#36/37	1	Stylasterid	x		
5/17/2007	SFZ	DH#36/37	1	Thouarella	x		

Notes:

Ethanol: 100% indicates molecular grade, 60/70% is denatured

Species: preliminary identification done in the wet lab

Abbreviations:

EtOH: Ethanol; sw: seawater; n: sample size; frag: fragments;

TB: Blake Trawl; TO: Otter Trawl; DH: Hein Dredge;

SFZ: Shackleton Fracture Zone; Smt: Seamount

Appendix 6 Water sampling summary

Bottle	Depth	DOC	DO14C	DI14C	D18O	ALK	D30Si	D74Ge	U ser	UColl	Nuts
1/2	4110	*	*	*	*	*	*	*	*	*	*
3/4	3250	*	*	*	*	*	*	*	*	*	*
5/6	2750								*	*	*
7/8	2250	*	*	*	*	*	*	*	*	*	*
9/10	1750					*	*	*	*	*	*
11/12	1400	*	*	*	*	*	*	*	*	*	*
13/14	800	*	*	*	*	*	*	*	*	*	*
15/16	500					*	*	*	*	*	*
17/18	300	*	*	*	*	*	*	*	*	*	*
19/20	200	*	*	*	*	*			*	*	*
21/22	50					*			*	*	*
23/24	5	*	*	*	*	*			*	*	*

Table A6a: CTD21 – Burdwood Bank CTD Niskin samples

Bottle	Depth	DOC	DO14C	DI14C	D18O	ALK	D30Si	D74Ge	U ser	UColl	Nuts
1	3540	*		*							
2	3540				*	*	*				*
3	3000	*		*							
4	3000				*	*					*
5	2601										
6	2601										*
7	2200	*		*							
8	2200				*	*					*
9	1600	*		*							
10	1600				*	*					*
11	1200			*							
12	1200					*					*
13	801	*		*							
14	80				*	*					*
15	600			*							
16	600					*					*
17	350	*		*							
18	350				*	*					*
19	200										
20	200										*
21	100	*		*							
22	101				*	*					*
23	1.3	*		*							
24	2.9				*	*	*		*		*

Table A6b: CTD32 – Shackleton Fracture Zone Niskin samples

Bottle	Depth	DOC	DO14C	DI14C	D18O	ALK	D30Si	D74Ge	U ser	UColl	Nuts
1	1324					*	*				*
2	1324										
3	1325										
4	1325										
5	1325										
6	1325										
7	1324										
8	1325										
9	1323										
10	1325										
11	1324										
12	1324										
13	1000										
14	1000					*					*
15	800										
16	800					*	*				*
17	600										
18	600					*					*
19	400										
20	400					*					*
21	200										
22	200					*					*
23	2.2										
24	3.5					*					*

Table A6c: CTD55 – Shackleton Fracture Zone "Tiffany's" Niskin samples

Bottle	Depth	DOC	DO14C	DI14C	D18O	ALK	D30Si	D74Ge	U ser	UColl	Nuts
1	4718	*	*	*							
2	4718				*	*	*	*	*	*	*
3	4000										
4	4001								*	*	*
5	3500	*	*	*							
6	3500				*	*	*	*	*	*	*
7	3002										
8	3001								*	*	*
9	2500	*		*							
10	2500				*	*	*	*	*	*	*
11	2000	*	*	*							
12	2000				*	*	*	*	*	*	*
13	1500	*									
14	1498								*	*	*
15	1000	*	*	*							
16	1001				*	*	*	*	*	*	*
17	800	*		*							
18	800				*	*	*	*	*	*	*
19	600	*	*	*							
20	601				*	*	*	*	*	*	*
21	300	*									
22	300						*		*	*	*

23	5	*	*	*							
24	5				*	*	*	*	*	*	*

Table A6d: CTD 72 – Antarctic Peninsula Niskin samples

Bottle	Depth	DOC	DO14C	DI14C	D18O	ALK	D30Si	D74Ge	U ser	UColl	Nuts
1	3100	*	*	*							
2	3100				*	*	*	*	*	*	*
3	2600	*		*							
4	2600				*		*	*	*	*	*
5	2300	*	*	*							
6	2300				*	*	*	*	*	*	*
7	2000	*		*							
8	2000				*		*	*	*	*	*
9	1750	*		*							
10	1750				*	*	*	*	*	*	*
11	1500	*	*	*							
12	1500				*		*	*	*	*	*
13	1300	*		*							
14	1300				*	*	*	*	*	*	*
15	1000	*		*							
16	1000				*		*	*	*	*	*
17	800	*	*	*							
18	800				*	*	*	*	*	*	*
19	650	*		*							
20	650				*	*	*	*	*	*	*
21	300	*	*	*							
22	300				*	*	*	*	*	*	*
23	0	*	*	*							
24	0				*	*	*	*	*	*	*

Table A6e: CTD100 – Sars Niskin samples

Bottle	Depth	DOC	DO14C	DI14C	D18O	ALK	D30Si	D74Ge	U ser	UColl	Nuts
1	4372	*		*							
2	4372				*	*	*		*	*	*
3	3501	*		*							
4	3501				*		*		*	*	*
5	2500	*		*							
6	2500				*	*	*		*	*	*
7	2000	*		*							
8	2000				*		*		*	*	*
9	1501	*		*							
10	1501				*	(*)	*		*	*	*
11	1250	*		*							
12	1250				*		*		*	*	*
13	1000	*		*							
14	1000				*	*	*		*	*	*
15	749	*		*							
16	751				*		*		*	*	*
17	500	*		*							
18	500				*	*	*		*	*	*
19	250	*		*							

20	252				*	*	*		*	*	*
21	100	*		*							
22	100				*	*	*		*	*	*
23	10.5	*	*	*							
24	10.4				*	(*)	*		*	*	*

Table A6f: CTD127 – Cape Horn Niskin samples

Bottle	Depth	DOC	DO14C	DI14C	D18O	ALK	D30Si	D74Ge	U ser	UColl	Nuts
1	320	*				*					*
2	320				*	*			*	*	*
3	320	*				*					*
4	320				*	*			*	*	*
5	145					*					*
6	145				*	*					*
7	25					*					*
8	25				*	*					*

Table A6g: TCAM5 – Burdwood Bank Niskin samples

Bottle	Depth	DOC	DO14C	DI14C	D18O	ALK	D30Si	D74Ge	U ser	UColl	Nuts
1	2290				*	*					*
2	2290					*					*
3	2290			*	*	*					*
4	2290					*			*		*
5	1300					*					*
6	600				*	*					*
7	20			*	*	*					*
8	20					*			*		*

Table A6h: TCAM25 – Shackleton Fracture Zone Niskin samples

Bottle	Depth	DOC	DO14C	DI14C	D18O	ALK	D30Si	D74Ge	U ser	UColl	Nuts
1	595	*	*	*							
2	595				*	*	*				*
3	595								*	*	
4	300				*	*	*				*
5	300	*	*	*							
6	5				*	*	*				*
7	5	*	*	*							
8	5								*	*	

Table A6i: TCAM64 – AA Niskin samples

Bottle	Depth	DOC	DO14C	DI14C	D18O	ALK	D30Si	D74Ge	U ser	UColl	Nuts
1	2990										*
2	3048										*
3	3055										*
4	3055				*	*					*
5	2002				*	*					*
6	1000				*	*					*
7	14				*						*

Table A6j: TCAM76 – Interim Niskin samples

Bottle	Depth	DOC	DO14C	DI14C	D18O	ALK	D30Si	D74Ge	U ser	UColl	Nuts
1	546	*		*	*						*
2	533	*		*	*						*
3	504	*		*	*						*
4	504					*			*	*	*
5	288	*		*	*	*					*
6	10	*		*	*	*					
7	10								*	*	*
8	10										

Table A6k: TCAM102 – Sars Niskin samples

Bottle	Depth	DOC	DO14C	DI14C	D18O	ALK	D30Si	D74Ge	U ser	UColl	Nuts
1	1130	*									
2	1130				*	*	*		*	*	*
3	1082	*									
4	1082				*	*			*	*	*
5	483	*									
6	483				*	*			*	*	*
7	10	*									
8	10				*				*	*	*

Table A6l: TCAM130 – Cape Horn Niskin samples

Bottle	Depth	DOC	DO14C	DI14C	D18O	ALK	D30Si	D74Ge	U ser	UColl	Nuts
1	1000			*			*				*

Table A6m: DCAM135– Cape Horn Niskin samples

Bottle	Depth	DOC	DO14C	DI14C	D18O	ALK	D30Si	D74Ge	U ser	UColl	Nuts
1	456	*									
2	456						*		*		*
3	422	*									
4	422						*		*		*
5	223	*									
6	233						*		*		*
7	10	*									
8	10						*		*		*

Table A6n: TCAM146 – Cape Horn Niskin samples

Table A6n: Alkalinity measurements

Date	Station	Depths (m)	Replicate measurements
7-May	pH calibration	n/a	1
8-May	pH calibration	n/a	1
5/9/11	Filtered seawater	n/a	2
5/10/11	Dickson standard	n/a	2
5/10/11	SW std. 1	n/a	5
5/10/11	Dickson standard	n/a	2
5/11/11	TCam005	25	7
		145	3
		320	16
5/13/11	CTD021	5	3
		50	3
		200	3
		300	3
		500	4
		800	4
		1400	4
		1750	4
		2250	3
		3250	4
		4110	4
5/15/11	SW std. 1	n/a	2
5/16/11	SW std. 2	n/a	2
5/16/11	TCam025	2290	4
5/16/11	SW std. 2	n/a	4
5/16/2011	TCam025	20	4
		600	4
		1300	3
		2290	7
5/17/11	pH calibration	n/a	1
5/17/11	SW std. 3	n/a	2
5/17/11	TCam025	2290	2
5/17/11	Dickson standard	n/a	1
5/17/11	TCam025	2290	2
5/17/11	Dickson standard	n/a	1
5/17/2011	CTD032	2.9	4
		101	5
		800	4
		1200	5
		2200	5
		3000	4
		3540	5
5/18/11	SW std. 3	n/a	4
5/18/11	SW std. 4	n/a	9
5/19/11	SW std. 6	n/a	4
5/20/11	CTD055	0	3
		200	4
		400	3
		600	5
		800	3
		1000	3
		1300	4
5/22/11	SW std. 6	n/a	2
5/22/11	SW std. 7	n/a	2
5/22/11	TCam064	0	3
		300	3
		600	3
5/23/11	SW std. 7	n/a	3
5/24/2011	CTD072	5	5
		800	3
		2500	5
5/24/11	pH calibration	n/a	2
5/24/11	Filtered seawater test	n/a	8
5/24/11	SW std. 7	n/a	1

		601	4
		1001	4
5/24/2011	CTD072	2000	5
		3500	5
		4718	4
5/25/11	pH calibration	n/a	1
5/26/11	TCam076	3055	5
5/26/11	pH calibration	n/a	1
5/26/11	Filtered seawater test	n/a	5
5/26/11	SW std. 8	n/a	2
5/26/11	Dickson standard	n/a	1
5/27/11	TCam076	1000	5
		2002	5
5/30/11	pH calibration	n/a	1
5/30/11	Dickson standard	n/a	2
		0	5
		300	5
		650	5
5/30/2011	CTD100	800	4
		1300	3
		1750	4
		2300	5
		3100	4
		10	5
5/31/11	TCam102	288	4
		504	5
		10.4	5
		100	5
		252	5
6/6/2011	CTD127	500	5
		1000	5
		1501	5
		2500	4
		4372	5
		483	4
6/7/11	TCam130	1082	4
		1130	5
6/7/11	SW std. 8	n/a	3
6/7/11	Dickson standard	n/a	1

Appendix 7: Full Cruise Log

St. #	Date (GMT)	Location/area	Gear	In water						On bottom					
				Time (GMT)	depth (m)	Lat (S)	Long (W)	CMG	speed (kts)	Time (GMT)	Depth (m)	Lat (S)	Long (W)	CMG	speed (kts)
1	11-May-11	Burdwood Bank, shallow	TB	7:53	309	54 27.22	62 12.20	225	1.8	8:14	324	54 27.84	62 12.39		1.9
2	11-May-11	Burdwood Bank	TB	9:56	319	54 27.42	62 12.66	173	0	10:22	320	54 28.10	62 11.93	155	1.6
3	11-May-11	Burdwood Bank, shallow	BC	13:35	320	54 28.09	62 11.84	87	0	13:55	319	54 28.0849	62 11.7725		
4	11-May-11	Burdwood Bank, shallow	BC	14:52	312	54 28.06	62 11.6505	300	1	15.12		54 28.0616	62 11.6693	223	
5	11-May-11	Burdwood Bank, shallow	TCAM	20:00		54 29.09	62 14.99	79.7	0.6	20:19	339	54 29.18	62 14.76		
6	11-May-11	Burdwood Bank, shallow	BC	0:08	321	54 31.37	62 11.27	216		0:27	318				
7	12-May-11	Burdwood Bank, shallow	DH	1:40	331	54 31.00	62 13.52	36	1	2:07	334	54 30.43	62 13.65	353	1.4
8	12-May-11	Burdwood Bank, shallow	KC	5:17	331	54 29.18	62 13.79	36	0.5	5:31		55 29.18	63 13.79		
9	12-May-11	Burdwood Bank, grassy knoll	DH	9:13	856	54 45.74	62 13.99	300	0	9:37	859	54 45.74	62 13.99		0
10	12-May-11	Burdwood Bank, grassy knoll	TB	11:43	660	54 42.62	62 11.17	246	1.5	12:53	720	54 43.35	62 14.21	230	1.7
11	12-May-11	Burdwood Bank, deeper site	DH	14:50	823	54 44.23	62 14.00	49	0	15:22	823	54 44.21	62 14.09	270	1
12	12-May-11	Burdwood Bank	DCAM	20:50	681	54 45.50	62 15.00	91.7	0.5						
13	12-May-11	Burdwood Bank	DCAM	22:20	675	54 45.50	62 15.00	164.4	0.3						
14	12-May-11	Burdwood Bank	DH	23:06	744	54 43.74	62 15.02	25.8	1.1	0:00	732	54 42.84	62 14.99	5.5	1
15	13-May-11	Burdwood Bank	DH	2:27	940	54 46.40	62 14.02			3:00	895	54 46.30	62 14.17	317.4	0.5
16	13-May-11	Burdwood Bank, deep	DH	5:38	1412	54 48.69	62 07.19	238		6:30	1423	54 48.52	62 07.20	58	1
17	13-May-11	Burdwood Bank	DH	8:57	2149	54 50.38	62 05.93	12		10:00	1918	54 50.05	62 06.29	300	1
18	13-May-11	Burdwood Bank, grassy knoll	DCAM	13:09	710	54 44.53	62 15.61	244	0.3	13:41	700	54 44.56	62 15.65	230	0.4
19	13-May-11	Burdwood Bank	DH	16:11	1538	54 48.57	62 10.02	178	0.5	16:43	1534	54 48.57	62 10.02		
20	13-May-11	Burdwood Bank	DH	18:53	1930	54 50.50	62 07.51	149.1	0.4	19:39	1859	54 50.48	62 07.51	28.2	0.9
21	13-May-11	Burdwood Bank	CTD	23:02	4188	55 3.27	62 6.63	6.4		0:36	4110	55 3.24	62 6.48		
22	14-May-11	Burdwood Bank	DH	4:29	2108	54 50.50	62 07.53	109	0.2	5:21	1922	54 50.50	62 07.53		
23	14-May-11	Burdwood Bank; grassy knoll	DCAM	8:54	675	54 45.00	62 15.00		0.1	9:23	675	54 45.00	62 15.00		0.1
24	15-May-11	SFZ	DH	20:07	2344	59 23.26	60 06.744	354	0.6	21:05	2345	59 23.25	60 06.75	342	1
25	16-May-11	SFZ	TCAM	0:35	2221	59 23.022	60 05.052		0.7	1:50	2299	59 22.433	60 05.254	341	0.7
26	16-May-11	SFZ	BC	9:42	2276	59 21.92	60 05.44	241		10:53					
27	16-May-11	SFZ	BC	12:00	2314	59 21.92	60 05.43			13:22	2315	59 21.92	60 05.44		
28	16-May-11	SFZ	DH	14:58	2564	59 23.01	60 09.03			16:11	2602	59 23.01	60 09.03		
29	17-May-11	SFZ, area 2	DH	0:18	1814	59 45.24	59 00.00		0.5	1:07	1797	59 45.24	59 00.04	340	1
30	17-May-11	SFZ	DH	3:12	1731	59 44.96	59 00.24			4:47	1693	59 44.96	59 00.23		
31	17-May-11	SFZ	DH	7:20	1731	59 45.55	58 57.99			8:09	1731	59 45.552	58 58.002		
32	17-May-11	SFZ	CTD	13:49	3565	60 03.17	58 36.60								
33	17-May-11	SFZ	DH	18:12	1871	60 04.13	58 19.50			18:50	1897	60 04.10	58 19.50		

	Off bottom						Out of water						Max w/o (m)	Max T	notes
	Time	depth (m)	Lat (S)	Long (W)	CMG	speed (kts)	Time	depth (m)	Lat (S)	Long (W)	CMG	speed (kts)			
1	8:40	319	54 28.46	62 12.02		2.1	9:14	311	54 29.4230	62 11.41	165		640	3800	Small haul (no major tension spikes); some fossil balanophyllia, caryophyllia and stylasterids; live primnoids, few anemones, lots of sponges
2	11:00	311	54 29.23	62 10.65	142	2.2	11:18	310	54 29.67	62 10.12	150	2	640	4800	Larger haul (still small), medium-large rock; primnoids, stylasterids, sponges, gorgonocephalus, brilttle stars; fossil balanophyllia
3	13:57	319	54 28.07	62 11.73			14:17	321	54 28.07	62 11.69	143.1	0		3600	Pull out tension only 3600; a few grains of mud, reached the bottom but did not get the sediment (washed away?)
4	15:13		54 28.0616	62 11.6693			15:38		54 28.0779	62 11.7474	84	0.6	314	4800	no sample
5	23:22	318	54 31.1135	62 11.8549	158.7	0.9	23:40	319	54 31.2808	62 11.4052				16185	8 bottles fired; bottle 6 failed
6	0:30	318	54 31.35	62 11.11	70	1.5	0:48	323	54 31.31	62 10.98	75		325.4	4000	empty
7	2:22	323	54 30.08	62 13.74	355	1.5	2:55	329	54 29.32	62 13.87	24	1	700	5400	HD haul full of gravel and rocks; lots of fauna - soft coral abundant (100s) live balanophyllia; bivalves abundant (clams) etc.; fossil balanophyllia)
8	5:32		56 29.18	64 13.79			5:47	333	54 29.17	62 13.79			336	3000	1 ft if sediment in kasten core; some fossil corals!
9	10:21	793	54 45.81	62 14.31		0	10:51	796	54 45.81	62 14.30			1362	3600	Fossil solenosmilia reef, few fossil solitaries; live - small anemones
10	13:27	736	54 43.93	62 15.54	230	1.6	14:07	766	54 44.63	62 16.84	230	1.6	1526	6000	Medium haul; lots of octocorals (bottlebrush) and stylasterids, some solitary corals; fossils - fossil solitaries, some stylasterids
11	15:54	705	54 44.20	62 14.26	705		16:19		54 44.21	62 14.27			899	2400	had a few lives and fossil corals in it (two hands full); emptied on way up?
12	21:29	673	54 45.50	62 15.00	164.8	0.7	21:52	674	54 45.50	62 15.00	232	0.4		16185	Camera brought up, alarm not working 21:29
13							22:25	678	54 45.50	62 15.00	171.5	0.8			Problem from station 12 had been corrected, alarms continuously sounding - aborted
14	0:10	721	54 42.74	62 15.00	60	1	1:10	651	54 41.80	62 14.99	4.7	0.6	1726	5800	Full of material (mainly fossil corals and coral gravel), some coarse sand; bio: live Flabellum, Balanophylia; fossil: lots of Flabellum and Balanophyllia
15	3:26	893	54 46.30	62 14.18	215	0.3	3:56	896	54 46.30	62 14.18	66	0.4		2400	Mostly biology, sparse fossils; soft corals abundant, but dredge rather empty
16	7:09	1414	54 48.44	62 07.02	234	0.2	7:58	1417	54 48.44	62 07.03	220	0.2	1778	4600	Mostly stylasterids, some octocorals (Michelle's type specimen!); fossils: primarily stylasterids, ~ 30 fossil solitaries
17	10:42	1805	54 49.83	62 06.58	280		11:37	1749	54 49.83	62 06.60	300	0.4	2330	5800	lots of rocks and stylasterids. One crushed Desmophyllum
18	14:44	710	54 45.17	62 15.37	127	0.9	15:15								Trigger weight 5m below camera, time on deck approximate.
19	17:20	1497	54 48.45	62 09.92			18:12	1497	54 48.45	62 09.93	221.6	0.5	1765	3600	well preserved live corals attached to rock; Aradillagorgia, stylasterids; fossil solitary corals and rocks
20	20:14	1850	54 50.37	62 07.41	270	0.2	21:10	1848	54 50.36	62 07.40	6.8	0.3	2110		Not much material; live: octocoral, hydroid; fossil: four small pieces
21	0:36	4110	55 3.24	62 6.48			2:18	4191	55 3.23	62 5.98	37.9				24 bottles fired
22	6:35	1835	54 50.15	62 07.54	135		7:25	1835	54 50.15	62 07.54	89		2391	7600	Same location as 20; lots of rocks, some Balanophyllia, one live Desmophyllum; stylasterids, few primniods; Fossils: fossil solitary corals
23	12:40	700	54 43.75	62 14.5			1306	708	54 43.74	62 14.49				150	Drop camera run on top of Grassy Knoll. Trigger weight 3m below camera. Stylasterid and octocoral reefs; No solenosmilia!
24	22:32	2245	59 22.90	60 06.88	111	0.4	23:43	2252	59 22.90	60 06.88	111	0.4	3194	6600	Live scleractinian, mainly rocks, piece of fossil coral
25	7:56	2294	59 19.5	60 06.255	276	0.7	8:58	2321	59 19.0885	60 06.3984	354	0.7			8 bottles fired; bottle 8 leaked
26	10:56						11:59	2314	59 21.92	60 05.44			2261	6800	5000 tension on pull out; box core washed - some sediment grains left at spade; going back in for try #2
27	13:23						14:24	2315	59 21.92	60 05.43			2265	6800	5400 tension on pull out; again, some gritty sediment grains in the bottom of the spade, but washed - no more BC's here
28	18:02	2492	59 22.654	60 09.454	28.9		19:17	2486	59 22.654	60 09.454	348		3550	7000	mainly rocks; paleo: some mud and pieces (tiny) of fossil coral; bio: anenome, brittle star, hydroid, octocoral
29	2:14	1714	59 44.96	59 00.23			3:02	1710	59 44.96	59 00.24			2450	8800	a few rocks, a tiny sponge. Did it empty at 8800 lb tension spike?
30	5:57	1637	59 44.69	59 00.33			6:40	1637	59 44.68	59 00.34			2320	7800	tensiometer broken on way down, fixed, reset winch, & sent down. Lots of small basalt rocks & 1 large rock. Few primnoid octocorals, octocorals, keratoisis (?), one sponge
31	10:01	1643	59 45.24	58 58.43			10:45		59 45.24	58 58.43			2564	11400	weak link didn't break, dredge came up fine, 1/4 full. Rocks - mostly basalt. Bio - 1 small bivalve. Fossil - handfull of fossil holdfasts.
32							16:50	3546	60 03.1716	58 36.5996					CTD successfully recovered. Mini-core recovered 6 cm of mud
33	19:50	1817	60 03.8763	58 19.5879			20:43	1810	60 03.8768	58 19.5934			2455	5200	mostly rocks, a few holdfasts, one large anemone, brachiopod, some bryazoa &sponges, all swept clear.

St. #	Date (GMT)	Location/area	Gear	In water						On bottom					
				Time (GMT)	Depth (m)	latitude (S)	longitude (W)	CMG	speed (kts)	Time (GMT)	Depth (m)	latitude (S)	longitude (W)	CMG	speed (kts)
34	17-May-11	SFZ	DH	21:36	1884	60 05.807	58 13.502	153		22:33	1891	60 05.8056	58 13.5052		
35	18-May-11	SFZ	DH	2:50	1213	60 08.2050	57 59.5095			3:28	1212	60 08.2027	57 59.5079		
36	18-May-11	SFZ/Tiffany's	DH	5:41	1230	60 09.00	57 55.96			6:18	1230	60 09.00	57 55.96	350	
37	18-May-11	SFZ/Tiffany's Peak	DH	8:21	876	60 10.30	57 53.00			8:51	888	60 10.30	57 53.00	330	
38	18-May-11	SFZ/Tiffany's Peak	DH	10:56	857	60 10.11	57 53.14			11:22	849	60 10.12	57 53.14	340	
39	18-May-11	SFZ/Tiffany's Peak	DH	13:04	808	60 10.51	57 51.02			13:31	822	60 10.51	57 51.02	350	
40	18-May-11	SFZ/Tiffany's Peak	DH	15:16	860	60 10.90	57 50.00		0.5	15:39	834	60 10.90	57 50.00	335	
41	18-May-11	SFZ/Tiffany's	DCAM	17:46	770	60 10.55	57 50.401								
42	18-May-11	SFZ/Tiffany's Peak	DCAM	18:01	780	60 10.5553	57 50.4062								
43	18-May-11	SFZ/Tiffany's	DH	18:47	860	60 10.8996	57 49.9988			19:16	856	60 10.90	57 50.00	332	
44	18-May-11	SFZ/Tiffany's,top of knoll	DCAM	22:00	666	60 10.1992	57 50.9962			22:34	666	60 10.2	57 51.00		
45	18-May-11	SFZ/Tiffany's, stylasterid site	DCAM	23:41	858	60 10.2992	57 53.0063			0:14	857	60 10.2999	57 53.0058		
46	19-May-11	SFZ	DCAM	1:38	922	60 09.6009	57 51.0029			2:19	917	60 09.6009	57 51.0070		
47	19-May-11	SFZ	DCAM	4:01	650	60 10.500	57 50.0036								
48	19-May-11	SFZ	DCAM	4:23	795	60 10.79	57 49.99			4:53	783	60 10.80	57 49.99		
49	19-May-11	SFZ/Tiffany's	DCAM	5:37	783	60 10.80	57 49.99			6:08	783	60 10.80	57 49.99		
50	19-May-11	SFZ/Tiffany's	DH	7:39	1038	60 11.00	57 50.99			8:10	1045	60 10.99	57 50.99	320	
51	19-May-11	SFZ/Tiffany slopes	DH	10:34	1425	60 11.70	57 49.80			11:13	1422	60 11.70	57 49.80		
52	19-May-11	SFZ/Tiffany's Nose	DH	13:47	909	60 12.5	57 43.80			14:15	911	60 12.50	57 43.80	305	
53	19-May-11	SFZ	DH	16:32	1083	60 13.0014	57 41.2003			17:05	1081	60 13.0007	57 41.2006		
54	19-May-11	SFZ/SE of Tiffany's Peak	DH	19:36	1311	60 15.3989	57 36.0006			20:12	1300	60 15.3985	57 35.9988		
55	19-May-11	SFZ	CTD	22:44	1331	60 15.6997	57 35.4911			23:21	1324	60 15.700	57 35.498		
56	20-May-11	SFZ	DH	0:40	1597	60 16.6	57 32.00			1:21	1589	60 16.608	57 32.005		
57	20-May-11	SFZ - south end	DH	6:25	1863	60 36.00	56 46.99			7:18	1893	60 35.99	56 46.99	350	
58	20-May-11	SFZ - south end	DCAM	9:56	1700	60 35.60	56 46.40								
59	20-May-11	SFZ - south end	DH	11:05	1800	60 35.25	56 49.07			11:53	1810	60 35.25	56 49.07	0	1
60	20-May-11	SFZ - south end	DCAM	15:16	1702	60 35.61	56 46.40			16:18	1667	60 35.6074	56 46.4012		

	Off bottom						Out of water						Max w/o (m)	Max T	notes
	Time	depth (m)	Lat (S)	Long (W)	CMG	speed (kts)	Time	depth (m)	Lat (S)	Long (W)	CMG	speed (kts)			
34	0:00	1770	60 05.4458	58 13.7794			0:50	1765	60 05.4476	058 13.7790			2386	7200	tried to dredge up hill and on plateau. Deploy stationary, move forward paying out @ 30m/min to top of plateau. Stop, pull in to 2100 m wire (from 2559), payout & move forward across plateau, stop pull in. Rocks, some with holdfasts. 2 large pieces of fossil coral, ?stylasterids. small octocoral, sponge, worms. small amount of sediment adhered to rock.
35	4:21	1115	60 07.93	57 59.69			4:52	1132	60 07.94	57 59.69			1771		Hein Dredge with inner bag. Small amount of sand & small pebbles. + BAG
36	7:07	1220	60 08.82	57 56.16			7:40	1202	60 08.82	57 56.16			1764	7200	Sandy sediment, some larger rocks. Few solitary fossil corals. Bio - ophiuroids. WITH BAG
37	9:07	868	60 10.11	57 53.14			10:01	832	60 10.12	57 53.14				3600	Hit a plateau - flat. Fossil stylasterids, fossil caryophyllia (6), & stylasterids, ophiuroids, polychaetes, brachiopods, few stylasterids. WITH BAG
38	12:00	743	60 09.99	57 53.22			12:26	717	60 10.00	57 53.23			1155	2800	Several fossil caryophyllia (3) & stylasterid/octocoral bases. Sponges & live stylasterids. Small haul in total (small tension skipes), but well formed! Not many rocks. WITHOUT BAG
39	14:17	717	60 10.32	57 51.24			14:38	717	60 10.33	57 51.24			1236	5000	small haul. Fossil stylasterids & caryophyllia (1). One live caryophyllia. Brachopods WITHOUT BAG
40	17:05	778	60 10.555	57 50.407			17:26	777	60 10.555	57 50.407	66		1695	8000	half full - a few large rocks. Masses of sandy sediment with coral fragments. Fossil caryophyllia. Biology: bamboo coral, octocoral, bryozoan, worms, sea urchins, sea species, hydroids, brachiopods (lots), caryophyllia (1). Fossil: lots of caryophyllia (100s), stylasterids (fine branching), shells.
41															up because lasers on (17:48 redeployment, lasers rechecked). Alarm continuous - put on more weight. ABORTED
42															ABORTED - contact alarm going off @17 m depth.
43	20:30	790	60 10.5775	57 50.3586			20:57	785	60 10.577	57 50.362	138		1665	7000	Biology: hydroids, worms, brittle stars, some octocorals, ascidians, sea spiders, caryophyllia, sea cucumber, sea star, brachiopods, anemone. Paleo: stylasterids, lots of caryophyllia, "Desmo-like"-looking species, shells, brachiopods, bambee corals, bivalves.
44	22:51	665	60 10.1994	57 51.0001			23:15	669	60 10.1987	57 51.0008			66.5	130	tensiometer only going up in 65 lb increments. Eleven photos taken. Brachiopods
45	0:39	854	60 10.3001	57 53.0049			1:08	855	60 10.2999	57 53.0061			857	260	ten pictures taken. Stylasterids.
46	2:47	924	60 09.6023	57 51.0059			3:18	915	60 09.6018	57 51.0056			933.5	260	had to keep easing out even though we were near bottom - stronger current
47							4:02	654	60 10.50	57 50.0003			80	0	too far north and shallow
48	4:57	783	60 10.80	57 49.99			5:25	780	60 10.80	57 50.00			783		6 photos taken before weight wrapped up. Pictures showed beginning of reef/rubble. Putting it back in to take more.
49	6:22	783	60 10.80	57 49.99			6:50	781	60 10.8	57 50.00			770		took >15 pictures
50	9:23	952	60 10.77	57 51.46			9:51	942	60 10.78	57 51.46			1639	6200	Primarily rocks (small - medium), 3/4 full. Fossils: little, few sylasterid pieces. Bio: brittle stars, brachiopods, little.
51	12:21	1300	60 11.49	57 50.18			12:57	1315	60 11.50	57 50.17			1963	4800	Epic fail. 1/4 full. Rocks, rocks, & more rocks. 1 bearded clam, 1 brachiopod & 2 squished tunicates. Sponge for Kate.
52	15:23	798	60 12.30	57 44.40			15:49	800	60 12.30	57 44.40			1642	5000	large rocks with brachiopods. Palaeo: 1 caryophyllia, pieces of stylasterids. Biology: lots of brittle stars, worms, brachiopods, stylasterids, octocorals, sponges, hydroid
53	18:16	979	60 12.8185	57 41.7890			18.43	979	60 12.8201	57 41.7860			1837	6200	large rocks. Biology: brittle stars, sea stars, octocroals,hydroids, brachiopods, stylasterids. Palaeo: some stylasterids (branchy type), a few bivalve shells.
54	21:38	1223	60 15.0449	57 36.4149			22:11	1223	60 15.0455	57 36.4151			2214	5000	lots of rocks ~1/2 full, many large holdfasts, few stylasterids, small pieces of fossil scleratinian coral, octocorals, gastropods, stylasterids, hydroids, sponges, brachiopods
55	23:21	1324	60 15.700	57 35.498			23:58		60 15.697	57 35.442			1325	2062	bottles 1-12 fired at 1325m; bottles 13-14 at 1000m; bottles 15-16 at 800m; bottles 17-18 at 600m; bottles 19-20 at 400m; bottles 21-22 at 200m; bottles 23-24 at 2.2 and 3.5m
56	2:04	1441	60 16.444	57 32.191			2:45	1440	60 16.445	57 32.190			1972	5000	small haul, smaller rocks (10cm size) with some small holdfasts; few stylasterids and a prawn
57	8:35	1805	60 35.7	56 46.99			9:23	1818	60 35.69	56 46.78			2655	5800	half full; few larger boulders -> one covered in sponges/hydroids; smaller holdfasts; bio - sponge, 1 clam; fossils - shells
58															aborted- contact switch going off - ground issue
59	13:15	1823	60 34.87	56 49.07			14:04	1824	60 34.88	56 49.07			2538	5000	very small haul
60	17:39	1711	60 35.5955	56 45.9009			18:37	1838	60 35.5955	56 45.9009					3m tether; 3 pictures then move one ship's length forward; alarm broken so use voltmeter instead of beeper; took ~16 pictures, not quite sure becaue of camera/strobe recharge time

				In water						On bottom					
St. #	Date (GMT)	Location/area	Gear	Time (GMT)	Depth (m)	latitude (S)	longitude (W)	CMG	Ship speed (kts)	Time (GMT)	Depth (m)	latitude (S)	longitude (W)	CMG	speed (kts)
61	20-May-11	Elephant Island Deep	DCAM	21:33	1595	60 52.10	56 18.60	344.2	0.3						
62	20-May-11	Elephant Island Deep	DCAM	23:57	1593	60 52.1008	56 18.6001	358	0.3	0:59	1594	60 52.1207	56 18.5712	150	0.5
63	22-May-11	AA/WAP Shelf	BC	6:44	596	63 03.25	61 35.49			7:13	597	63 03.25	61 35.51		
64	22-May-11	AA/WAP Shelf	TCAM	8:34	593	63 03.24	61 32.99	245	0.2	8:57	598	63 03.26	61 33.04		0.2
65	22-May-11	AA/WAP Shelf	TB	13:16	594	63 05.01	61 31.04	350		13:46	609	63 04.24	61 31.29	350	1.9
66	22-May-11	AA/WAP Shelf	TB	15:26	594	63 05.00	61 31.02		0.3	16:00	588	63 04.2025	61 31.3417	334	1.4
67	22-May-11	AA	TB	18:24	642	63 04.70	61 38.10	341		18:58	618	63 04.1057	61 38.6185	343	1.5
68	22-May-11	AA/Deception	KC	21:50	596	63 03.7580	61 35.7115			22:12	n/a	63 03.756	61 35.712		
69	23-May-11	WAP Shelf edge	DCAM	6:01	1498	62 16.26	62 07.02			6:58	1460	62 16.27	62 07.02		0.3
70	23-May-11	WAP Shelf edge	BC	9:55	1602	62 17.11	62 07.75			10:45		62 17.112	62 07.752		
71	23-May-11	WAP Shelf edge	BC	11:51	1603	62 17.12	62 07.76			12:44		62 17.124	62 07.698		
72	23-May-11	WAP off slope	CTD	16:25	4732	62 04.0013	62 34.9969			18:13	4726	62 04.00	62 35.00		
73	24-May-11	Interim-South	DH	13:32	1125	60 36.3	66 00.1	220		14:05	1140	60 36.312	66 0.108		
74	24-May-11	Interim-South	DH	15:54	1147	60 36.30	66 00.09			16:37	1122	60 36.33	66 00.13		
75	24-May-11	Interim-South	DH	18:34	1235	60 35.999	66 00.00			19:13	1251	60 36.00	66 00.00		
76	24-May-11	Interim deep west	TCAM	22:00	3304	60 32.3076	66 09.8291			23:58	3013	60 32.35	66 09.90		0.6
77	25-May-11	Interim deep west	KC	5:01	3059	60 32.65	66 10.30			6:24		60 32.65	66 10.313		
78	25-May-11	Interim-South	DH	9:33	1574	60 38.64	66 03.08			10:17	1588	60 38.64	66 03.09		
79	25-May-11	Interim-South	DCAM	12:59	1510	60 38.70	66 02.64			13:51	1513	60 38.64	66 02.65		
80	25-May-11	Interim	DH	16:03	1513	60 38.204	66 02.5974			16:41	1510	60 38.2008	66 02.6015		
81	25-May-11	Interim	DH	18:43	1641	60 39.2187	66 02.8075			19:28	1657	60 39.20	66 02.80	74.9	0.6
82	25-May-11	Interim	DCAM	21:50	1565	60 39.299	66 03.197	22		22:51		60 39.30	66 03.198		
83	26-May-11	Southern end of Interim	DH	2:28	1811	60 41.2574	66 03.2076	209.5	0.4	3:10	1815	60 41.25	66 03.20		
84	26-May-11	Interim South	DCAM	6:20		60 40.40	66 05.00			7:23	1845	60 40.39	66 04.99		
85	26-May-11	Interim South	DH	9:56	1522	60 38.3	66 03.01			10:39	1533	60 38.3	66 03.01	310	
86	26-May-11	Interim South	DH	13:32	1232	60 37.002	66 00.996			14:06	1234	60 36.996	66 00.996	340	
87	27-May-11	Interim South	DH	12:17	950	60 34.07	65 58.60			12:47	959	60 34.07	65 58.60	50	1.1
88	27-May-11	Interim South	DH	14:32	1008	60 33.75	65 57.4	0		15:02	1007	60 33.7541	65 57.4036		
89	27-May-11	Interim South	DCAM	17:33	747	60 33.700	65 58.3987			18:01	747	60 33.69	66 58.40		
90	27-May-11	Interim South	DH	20:24	793	60 33.8525	65 58.2957			20:47	785	60 33.851	65 58.298		
91	29-May-11	Sars Seamount	DH	1:04	684	59 43.3086	68 51.7685			1:24	683	59 43.3086	68 51.7700		
92	29-May-11	Sars Seamount	DCAM	3:04	633	59 43.09	68 52.00			3:29	633	59 43.09	68 52.00		

	Off bottom						Out of water						Max w/o (m)	Max T	notes
	Time	depth (m)	Lat (S)	Long (W)	CMG	speed (kts)	Time	depth (m)	Lat (S)	Long (W)	CMG	speed (kts)			
61							23:33	1595	60 52.0981	56 18.6003	306	0.3	1618		ABORTED - voltmeter/ocilliscope not showing bottom contact even with altimieter at 1 m. (drawings of voltage vs. time)
62	1:26	1584	60 52.2505	56 18.3767			2:26	2022	60 52.2736	56 18.3282			1645	325	Deployed stationary. After first picture move forward at 0.5 knots, CMG 150deg. Several pictures taken in quick succession, but all pictures came out fine.
63	7:15	597	63 03.25	61 35.51			7:38	596	63 03.24	61 35.51			575	9200	Full box, mostly clay with a soft mud layer on top. Slightly cloudy water, interface mostly intact. Some mixing while doing box removal (tilted box).
64	12:02		63 03.69	61 35.41			12:30	615	63 03.74	61 35.70	215				~2km, track at AA, ~2000 photos. Flying a little high (~6 meters), flat calm weather, good recovery. All 8 bottles fired - 3 bottom, 2 mid, 3 surface.
65	14:01	602	63 03.77	61 31.44	350	1.9	14:42	577	63 02.65	61 31.91			898	2200	Might have underdone it in an effort not to crush fauna… small amount of corals, sea cucumbers, urchins, octopus. Redeploying.
66	16:37	571	63 03.3728	61 31.6908	334	1.4	17:21	544	63 02.35	61 32.13	344	1.4	1093	2600	Mud with a few (2?) live flabellum, some other biology but not that much.
67	19:56	534	63 02.6855	61 39.6577	345	1.5	20:39	496	63 01.7940	61 40.4615	340	1.5	1925	2400	medium haul of flabellum (live), sea urchins, starfish, octopus, worms, anemones, some fossil skeleton as well.
68	22:12	n/a	63 03.756	61 35.712			22:45	597	63 03.757	61 35.7124			586	3400	Kasten Core location at end of TowCam run, brown mud recovered (~ 140 cm)
69	8:07	1540	62 15.9	62 06.78	35	0.3	9:02	1549	62 15.89	62 06.69			1500	390	
70	10:46		62 17.112	62 07.752			11:39	1602	62 17.12	62 07.73					Empty - pre-triggered?
71	12:44		62 17.124	62 07.698			13:33	1609	62 17.13	62 07.64				5000	Pre-triggered. Aborting further box cores, weather deteriorating.
72	18:14	4726	62 04.00	62 35.00			20:04	4728	62 03.9981	62 34.9986			4750	4312	
73	14:55	1003	60 36.47	66 00.37			15:31	1010	60 36.46	66 00.37			1640		Mostly empty, few small bamboo sticks, going back to start of line to re-dredge
74	18:03	1006	60 36.43	66 00.29			18:03	1006	60 36.43	66 00.29			1691	3600	ferromanganese coated fossils including Desmophyllum and bamboos; brachiopods, few live stylasterids
75	20:13	1140	60 36.158	66 00.278			20:47	1141	60 36.1574	66 00.2765			1848	4400	
76	2:46	3055	60 33.74	66 11.85			4:25	3062	60 33.75	66 11.86			3337		7 bottles fired (1-4 at bottom, 5 at 2002m, 6 at 1000m, 7 at 14m) great photos
77	6:56		60 32.65	66 10.313			8:17	3059	60 32.65	66 10.30				4600	105cm kaston core collected, double bounce (on purpose) as unclear when hit seafloor. Really soupy sediment.
78	11:16	1502	60 38.44	66 02.80			12:13	1503	60 38.44	66 02.81			2164	10400	~10 medium-large boulders, one with a cluster of D. dianthus on it. Bio: assorted sponges, brachiopods - small haul. Fossils: Desmos and very pitted branches. Very rocky terrain, large tension spikes.\
79	14:54	1599	60 38.40	66 02.65			15:49	1558	60 38.41	66 02.65			1583	260	Alarm sounded continuously -> for last few photos, manual trigger was used
80	17:28	1388	60 38.0573	66 02.600			18:13	1407	60 38.0576	66 02.6006			1946	3800	small rocks and scoria, fossil corals (?stylasterids), sponges, scallop, crab
81	20:31	1671	60 39.08	66 03.26	302.3	0.4	21:17	1644	60 39.08	66 03.26	294.5	0.3	2300	10200	ctenophore, few stylasterids, otherwise empty
82	0:14		60 39.21	66 03.69			1:10	1676	60 39.211	66 03.686	75.3	0.8	1648		19 contacts, lots of rocks, fossils?, some sand, cool sponges
83	4:56	1807	60 41.08	66 03.67			5:45	1807	60 41.09	66 03.68			2196	12200	Dredge dumped out? - came up with 3 medium size bamboo corals
84	8:05	1919	60 40.20	66 05.33			9:09	1921	60 40.20	66 05.33			1853		Covered 6 areas (~3-5 photos each) 32 images. Large basalts, sediment waves, some fossil corals attached to rocks
85	12:01	1493	60 37.95	66 03.61			12:45	1528	60 37.94	66 03.54			1528		Mainly rocks, some bamboo fossils, sponge and some small pieces of stylasterid. 1/4 full. Using V.1 coral catcher (1 layer of cable ties).
86	15:34	1167	60 36.67	66 01.37	340		16:24	1173	60 36.68	66 01.34				11400	Weak link broke and back frame bent in, weather deteriorated - 35 knot winds. Moving on to multibeam. Using V.2 coral catcher (2 layers of cable ties).
87	13:26	848	60 33.94	65 58.39			13:57	859	60 33.94	65 58.40			1240	3400	1/4 full -> primarily stylasterid fossil rubble. Fossil: Desmophyllum, Gardineria, Caryophyllia, Balanophyllia (?). Bio: 3 shrimp. Coral catcher insert - worked, when dumping out on deck, hard through catcher, had to break.
88	16:28	957	60 33.4286	65 57.4191			16:59	957	60 33.4193	65 57.4102			1894	11600	fossils: solitary scleractinians and bamboo + stylasterids, large , live stylasterids, crabs, sponges
89	19:28	869	60 33.52	65 58.62			19:58	876	60 33.5248	65 58.6235				195	move 1 ship's length between each 3 pictures; 15 total
90	21:48	803	60 33.579	65 58.404			22:11	808	60 33.579	65 58.406			1464	8400	full of boulders, encrusting hydroids, themselves encrusted with sylasterids; some fossil stylasterids, shrimps
91	2:18	611	59 43.0996	68 52.0029			2:38	612	59 43.098	68 52.000			1249	3600	1/3 full, coral rubble, fossils, live scleracts (~30 Caryophylia); Solenosmilia + Madrepora fossils, ~dozen fossil Desmophylum and hundreds of fossil Caryophylia
92	4:32	596	59 42.92	68 52.21			4:58	596	59 42.92	68 52.20			623.4	260	6 sites, 18 photos

				In water						On bottom					
St. #	Date (GMT)	Location/area	Gear	Time (GMT)	Depth (m)	latitude (S)	longitude (W)	CMG	Ship speed (kts)	Time (GMT)	Depth (m)	latitude (S)	longitude (W)	CMG	speed (kts)
93	26-May-11	Southern end of Interim	DH	2:28	1811	60 41.2574	66 03.2076	209.5	0.4	3:10	1815	60 41.25	66 03.20		1
94	26-May-11	Interim South	DCAM	6:20		60 40.40	66 05.00			7:23	1845	60 40.39	66 04.99		
95	26-May-11	Interim South	DH	9:56	1522	60 38.3	66 03.01			10:39	1533	60 38.3	66 03.01	310	
96	26-May-11	Interim South	DH	13:32	1232	60 37.002	66 00.996			14:06	1234	60 36.996	66 00.996	340	
97	27-May-11	Interim South	DH	12:17	950	60 34.07	65 58.60			12:47	959	60 34.07	65 58.60	50	
98	27-May-11	Interim South	DH	14:32	1008	60 33.75	65 57.4	0		15:02	1007	60 33.7541	65 57.4036		
99	27-May-11	Interim South	DCAM	17:33	747	60 33.700	65 58.3987			18:01	747	60 33.69	66 58.40		
100	27-May-11	Interim South	DH	20:24	793	60 33.8525	65 58.2957			20:47	785	60 33.851	65 58.298		
101	29-May-11	Sars Seamount	DH	1:04	684	59 43.3086	68 51.7685			1:24	683	59 43.3086	68 51.7700		
102	29-May-11	Sars Seamount	DCAM	3:04	633	59 43.09	68 52.00			3:29	633	59 43.09	68 52.00		
103	29-May-11	Sars Seamount	DH	5:50	1769	59 42.45	69 00.39			6:40	1761	59 42.45	69 00.40	340	
104	29-May-11	Sars Seamount	DCAM	9:03	1652	59 42.2	69 00.299			10:01	1654	59 42.2	69 00.3		
105	29-May-11	Sars Seamount	DH	13:44	821	59 43.76	68 53.92			14:06	816	59 43.75	68 53.93	350	
106	29-May-11	Sars Seamount	DH	16:07	978	59 44.4054	68 53.9960			16:34	973	59 44.402	68 53.998		
107	30-May-11	Sars Seamount	DH	5:41	698	59 43.30	68 51.99			6:03	698	59 43.30	68 51.99	335	
108	30-May-11	Sars Seamount	DH	8:04	1217	59 43.50	68 55.24			8:41	1217	59 43.50	68 55.24		
109	30-May-11	Sars Seamount	DCAM	10:52	588	59 43.00	68 52.00			11:13	588	59 43.00	68 52.00	335	
110	30-May-11	Sars Seamount	CTD	13:47	3105	59 45.20	69 03.4			15:00	3141	59 45.21	69 03.402		
111	30-May-11	Sars Seamount	DH	16:57	1586	59 43.2582	68 56.9601			17:41	1562	59 43.2491	68 57.0007	335	
112	30-May-11	Sars Seamount, plateau	TCAM	21:05	546	59 43.1037	68 48.1526			21:26	550	59 43.0568	68 48.2620		
113	31-May-11	Sars South	DH	1:19	1051	59 44.2451	68 46.5981			1:50	1021	59 44.2477	68 46.5981		
114	31-May-11	Sars Plateau West	TO	3:47	817	59 43.4333	68 45.3804	286	2	4:35		59 43.26	68 47.376		
115	31-May-11	Sars South	DCAM	7:51	936	59 44.2	68 47.09			8:24	908	59 44.19	68 47.09		
116	31-May-11	Sars Smt- South	DH	10:46	1001	59 44.35	68 47.40			11:15	1011	59 44.33	68 47.40		
117	31-May-11	Sars - west end	DCAM	13:47	1120	59 41.50	68 57.25			14:30		59 41.50	68 57.24		
118	31-May-11	Sars Seamount	DH	17:02	1813	59 42.6045	68 59.2973			18:11	1769	59 42.51	68 59.41		
119	31-May-11	Sars deep 1700	DB	20:59	1623	59 42.4017	68 59.5020			22:18	1611	59 42.35	68 59.61		
120	1-Jun-11	Sars deep 2000	DH	1:04	1980	59 40.31	69 02.1071			2:04	1981	59 40.303	69 02.0869		
121	1-Jun-11	Sars Seamount / west end	DH	4:48	1735	59 42.04	68 58.83			5:52	1735	59 41.99	68 58.94		
122	2-Jun-11	Sars West	DH	2:28	1656	59 42.00	69 00.1021			3:29	1662	59 42.017	69 00.092		

	Off bottom						Out of water						Max w/o (m)	Max T	notes
	Time	depth (m)	Lat (S)	Long (W)	CMG	speed (kts)	Time	depth (m)	Lat (S)	Long (W)	CMG	speed (kts)			
93	7:42	1664	59 42.32	69 00.59			8:42	1675	59 42.33	69 00.51			2181	7400	1 barnacle shell, fossil bamboo, 8 pebbles; back safety chain came loose, dragging on seafloor --> reason for higher tensions?
94	11:06	1699	59 41.97	69 00.56			12:21	1739	59 41.97	69 00.56			1699	325	28 photos in 6 areas; fossil Desmos towards end of tow --> tumbled down slope?
95	14:53	735	59 43.57	68 54.07			15:19	733	59 43.57	68 54.05				4600	Paleo: many Desmos, at least 2 species of Caryophylia; Gardeneria antarctica?, stylasterids, a few bamboo corals, bivalves, brachiopods. Bio: diverse collection of sponges, starfish, brittlestar, bryozoan, bamboo coral, bivalves, brachipod, gastropod, Caryophylia, Desmophyllum. Sandy, gravelly, rocky matrix
96	17:26	940	59 44.1788	68 54.1754			17:57	940	59 44.171	68 54.183			1530		lots of rocks; paleo: a few pieces of Desmophyllum, a few stylasterids, bivalves, pieces of other solitary corals. Bio: two types of sponge, brittle star, sea star, gastropods, hydroids, whip octocoral, sea pen, brachiopod, Caryophylia antarctica (2)
97	7:06	617	59 43.06	68 52.23			7:27	620	59 43.06	68 52.24			1235	7600	1/2 full. Mostly fossil coral rubble. Fossils - Desmo, solensmillia, madrepora,, small caryophylias. Bio - Caryophylia, Acanthogorgia, other small inverts. ~10 kg of rubble discarded (~2 or 3 buckets).
98	9:31	1105	59 43.31	68 55.41			10:13	1120	59 43.32	68 55.42				4400	v. small haul. Mostly rocks (& pebbles). Bamboo coral skeleton > 3 pieces. Barnacle plates. Pieces of desmo.
99	12:12	623	59 42.80	68 52.34			12:35	625	59 42.80	68 52.33					6 areas surveyed. Giant corals! Stylasterid reef.
100	15:01	3141	59 45.204	69 03.402			16:15	3193	59 45.206	69 03.402					24 bottles fired at 12 depths.
101	18:44	1525	59 43.0815	68 57.3825			20:00	1560	59 43.081	68 57.383			2203	4800	max tension was reached on the way down. Wire snarled up @ 34 m wire out. MTs untangled the wire (re-terminated later in day). 1/5 of rocks (small). Small pieces of fossil coral. Anemone, sea pens, sponges, bivalve.
102	0:05	504	59 42.4587	68 49.6596			0:24	512	59 42.3850	68 49.8331			601		see TowCam book for log. 2.5 hours on bottom. - slow start, continued until on top of plateau. Lots of anemones & sponges, sandy top. Water bottles: #1 to 4: bottom (one start, one middle, two end); #5: ~288m; #6 - 8: ~10m.
103	2:10	924	59 44.2019	68 46.9620			2:56	921	59 44.2030	68 46.9592			1369	4000	knoll on s. side of Sars, pebbles
104	5:21		59 43.104	68 49.32			6:14	566	59 42.95	68 51.62	290	1.4	1221	4400	very large haul of sponges --> giant football and other species, lots of fossil stylasterid rubble and 1 desmo. Bio --> live stylasterids, seawhips, crabs, brachiopods
105	9:28	993	59 44.02	68 47.50			10:07	993	59 44.03	68 47.50			985	340	photos show fossil desmo! 6 areas, 17 photos
106	11:52	980	59 44.2117	68 47.55			12:32	980	59 44.21	68 47.55			1438	4800	massive snarl-a-roo in last 50m of wire; no sample; 61m of wire cut
107	15:05		59 41.34	68 57.30			15:47	1161	59 41.34	68 57.29					
108	18:59	1579	59 42.33	68 59.64			19:50	1597	59 42.3294	68 59.6379			1788	16200	a few rocks (mainly small pebbles), pieces of bamboo coral, pretty empty. Modify dredge technique here - keep boat moving when we pull in, but course not straight so not effective - next time ALL STOP ship before hauling in.
109	23:05	1520	59 42.2644	68 59.7849			0:13	1547	59 42.28	68 59.81			1946	8800	lined with burlap; nothing in there CMG 310.
110	3:06	1884	59 40.17	69 02.456			4:03	1882	59 40.1933	69 02.4664			2318	9400	heading 300, but wind veering SW, very hard to hold station.
111	7:10	1647	59 41.98	68 59.48			7:57	1703	59 42.00	68 59.24			2301	10800	very small haul --> bamboo pieces & small desmo piece & few pebbles.
112	4:09	1607	59 42.1822	69 00.1987			4:58	1656	59 42.18	69 00.19			2016	9200	1/4 full, pebbles, rocks, fossil desmos!!
113	7:32	1675	59 42.36	69 00.40			8:16	1670	59 42.36	69 00.40			2229	9200	1/2 full dredge, fossil desmos - 1 large whole and multipple pieces, fossil bamboo, pebbles (Andrea's dredge)
114	11:44	1772	59 41.99	69 01.98			12:32	1820	59 42.00	69 02.00				10000	2 big chunks of pillow basalts and a few pieces of gravel; sparse fossil stylasterids
115	15:18	795	59 45.20	68 54.35			15:59	800	59 45.21	68 54.35				3600	knot in wire ~60m up, 1/4 full of gravel + fossil reef and fossil desmos (!), fossil caryophylia, live: brachiopods
116	18:16	655	59 44.73	68 52.36			18:39	669	59 44.73	68 52.36			662	195	18 photos, 6 sets of 3
117	20:30	929	59 45.872	68 56.274			21:02	929	59 45.872	68 56.275			1394	3800	1/4 full, fossil rubble, pebbles, >50 full desmos, many fragments, full of fossils, live: crabs, sponges, hydroids
118	22:53	1306	59 46.90	68 57.5134			23:30	1314	59 46.90	68 57.51			1586	3800	a few rocks with encrusting soft corals and hydroids
119	2:03	1449	59 46.80	68 57.75			2:51	1446	59 46.80	68 57.75			1432	260	12 pics in 4 sets of 3
120	6:04	1675	59 47.67	68 58.19			6:57	1635	59 47.67	68 58.20				5400	Totally full dredge, mostly bamboo rubble, fossil desmophyllums! Live: small octocoral pieces, ophioroids, brachiopods
121	9:28	1458	59 46.94	68 57.99			10:10	1455	59 46.94	68 57.99				6000	lots of fine volcanic "soil", larger rocks, full dredge, fossil: desmo pieces + bamboo, live: brachiopods, primnoid pieces, amphipods (Chrysogorgids seen on drop cam here…)
122							15:10	817	59 39.99	68 41.88					6 areas (Buzzer didn't work on first drop, brought up to rail, freed weight, sent back down

				In water						On bottom					
St. #	Date (GMT)	Location/area	Gear	Time (GMT)	Depth (m)	latitude (S)	longitude (W)	CMG	Ship speed (kts)	Time (GMT)	Depth (m)	latitude (S)	longitude (W)	CMG	speed (kts)
123	3-Jun-11	Sars East	DH	16:17	1903	59 40.38	68 36.47			17:29	1859	59 40.376	68 36.619		
124	3-Jun-11	Sars East	DCAM	19:47	1233	59 41.1072	68 38.9726			20:39	1234	59 41.1072	68 38.9726		
125	3-Jun-11	Sars East	DCAM	22:56	1559	59 40.40	68 37.596								
126	4-Jun-11	Sars East	DH	2:44	1950	59 43.6059	68 38.0658			3:50	1925	59 43.606	68 38.066		
127	6-Jun-11	Cape Horn	CTD	8:14	4411	57 23.67	67 12.88			9:53	4405	57 23.67	67 12.88		
128	6-Jun-11	Cape Horn	DH	14:30	931	57 09.81	67 05.38			15:09	948	57 09.864	67 05.416	205	
129	6-Jun-11	Cape Horn/Warrens	DH	17:39	1257	57 11.264	67 00.364			18:23	1240	57 11.298	67 00.306		
130	6-Jun-11	Cape Horn/Warrens	TCAM	20:37	1125	57 12.8941	67 01.6470			21:17	1128	57 12.9668	67 01.6919		0.5
131	7-Jun-11	Cape Horn/Warrens	DH	1:27	904	57 12.7510	66 58.5942			1:59	898	57 12.7833	66 58.5695		
132	7-Jun-11	Cape Horn/Warrens	DCAM	4:38	844	57 10.19	67 05.00			5:09	843	57 10.20	67 05.01	90	
133	7-Jun-11	Cape Horn/Warrens	DCAM	7:22	1866	57 10.85	67 11.50			8:37	2021	57 10.85	67 11.50		
134	7-Jun-11	Cape Horn/Warrens	DH	12:10	1059	57 10.10	67 06.60			12:47	1049	57 10.08	67 06.50		
135	7-Jun-11	Cape Horn	DCAM w/H2O	14:57	967	57 09.90	67 05.91			15:31	974	57 09.9	67 05.91		
136	7-Jun-11	Cape Horn/SE mound on ridge	DCAM	21:05	1395	57 22.0058	66 39.9916			21:57	1395	57 22.0058	66 39.9916		
137	7-Jun-11	Cape Horn/SE mound on ridge	DCAM	23:24	1409	57 21.96	66 39.81			0:16	1409	57 21.96	66 39.81		
138	8-Jun-11	Cape Horn/SE mound on ridge	DH	1:57	1420	57 21.71	66 41.21			2:53	1494	57 21.6763	66 41.0536		
139	8-Jun-11	Cape Horn/SE mound on ridge	DCAM	4:37	1395	57 21.60	66 40.76			5:27	1391	57 21.60	66 40.78		
140	8-Jun-11	Cape Horn	DH	8:33	740	57 18.40	66 51.31			9:00	741	57 18.39	66 51.30		
141	8-Jun-11	Cape Horn	DH	11:09	938	57 19.35	66 50.90			11:40	934	57 19.35	66 50.89		
142	8-Jun-11	Cape Horn	DCAM	13:55	549	57 18.20	66 50.96			14:15	544	57 18.2	66 50.96		
143	8-Jun-11	Cape Horn/Warrens South	DH	17:04	1870	57 16.5775	67 14.4960			18:21	1867	57 16.55	67 14.41		
144	8-Jun-11	Cape Horn/Warrens South	DCAM	20:23	1880	57 16.5992	67 13.88			21:35	1906	57 16.6344	67 13.7480		
145	9-Jun-11	Cape Horn/4000m basin	KC	3:10	4013	57 07.36	67 40.62			4:57	3991	57 07.36	67 40.62		
146	9-Jun-11	Cape Horn/shelf edge	TCAM	10:50	503	57 01.02	67 34.01			11:23	523	57 00.99	67 34.14		0.4
147	9-Jun-11	Cape Horn/shelf edge	TB	13:48	501	57 00.99	67 35.47			14:07	447	57 00.50	67 34.31	50	1.5

	Off bottom						Out of water						Max w/o (m)	Max T	notes
	Time	depth (m)	Lat (S)	Long (W)	CMG	speed (kts)	Time	depth (m)	Lat (S)	Long (W)	CMG	speed (kts)			
123	18:35	1736	59 40.285	68 37.020			19:22	1745	59 40.285	68 37.019			2417	9200	one big rock, + sponge + hydroid, otherwise empty
124	21:22	1290	59 41.0555	68 39.1850			22:21	1290	59 41.0557	68 39.1827			1294	165	3 sets of 5 pictures
125							1:48	1593	59 40.34	68 37.76			1605	325	3 sets of 5 pictures
126	4:54	1893	59 43.56	68 38.54			5:43	1927	59 43.55	68 38.55			2344	6200	full dredge, mainly rocks, gravel to large, tiny bit of mud. Desmo (fossil) pieces, stylasterid (fossil) holdfasts, live: ophioroids, brachiopods, 1 stoloniferous octocoral
127	9:53	4405	57 23.67	67 12.88			12:20	4404	57 23.67	67 12.87				187	24 bottles fired at several depths
128	16:16	935	57 10.1555	67 05.6227			16:45	937	57 10.155	67 05.623			~150 0ish	4600	Live corals - 1 piece madrapora, ~20 f. curvatum, ~5 balanophyllia, ~3 species of octocoral, a few other biospecimens, live stylasterids, fossil solitary corals & stylasterids
129	19:01	1188	57 11.505	67 00.4568			19:34	1189	57 11.5043	67 00.4555			1599	4600	Dredge 2/3 full of live and fossil corals w/other live species, e.g., sponges, urchins.
130	23:36	1085	57 13.8162	67 02.3254		0.5	0:10	1095	57 14.0572	67 02.5026			1187		All other information in TowCam log.
131	3:00	872	57 13.00	66 58.36			3:28	869	57 13.01	66 58.40			1477	3200	1/4 full, primarily solenosmillia fossil rubble, some stylasterid rubble. Fossil solitary corals. Live - paragorgia, thouarella, bamboos.
132	6:05	878	57 10.20	67 04.42			6:37	878	57 10.2	67 04.42			865	195	7 areas photographed, 700m covered, 28 photos taken.
133	10:02	2314	57 10.70	67 10.84			11:25	2342	57 10.71	67 10.85			2250	390	v. steep terrain --> had trouble taking photos. 700 m covered (over 5 drops). 3 areas manually triggered only.
134	13:46	975	57 09.88	67 05.91			14:21	945	57 09.95	67 05.86				4400	1/4 full. Fossil stylasterids & solitary coral rubble. Live --> Flabellum curvatum, Balanophyllia, Primnoids.
135	17:05	1019	57 09.771	67 05.5			17:42	1035	57 09.77	67 05.50			1004		6 sets of 3 taken, +1 extra during messenger deployment for Niskin bottle. Niskin bottle attached to get water for Andrea.
136	22:18	1394	57 21.98	66 39.902			23:18	1410	57 21.96	66 39.82					First no alarm - use manual trigger to get images over 100 m. Then continuous alarm. Ended early. Bottom contact wire tangled.
137	0:33	1413	57 21.94	66 39.73			1:25	1414	57 21.94	66 39.73					no bottom contact, manual trigger over 100 m. Lots of pictures. Fossil corals everywhere & live solitaries.
138	3:26	1388	57 21.61	66 40.76			4:06	1390	57 21.60	66 40.77			1819	5200	1/8 full. Mostly fossil solitary corals.
139	6:12	1449	57 21.45	66 40.47			7:01	1541	57 21.27	66 40.22				390	Ship couldn't hold station (wind) so after 2 discrete stations we moved @ ~1 knot and did 5 more "drops" while moving. No lasers (flooded).
140	9:59	553	57 18.28	66 50.82			10:25	556	57 18.297	66 50.832			1320	6400	1/4 full. Primarily fossil coral rubble (stylasterid/solitary corals). Madrapora oculata fossil rubble.
141	12:43	834	57 19.22	66 50.38			13:12	827	57 19.22	66 50.38			1548	4000	v. small haul. Primarily fossil rubble.
142	14:58	613	57 18.12	66 50.53			15:24	611	57 18.12	66 50.54					DCAM pictures done.
143	19:07	1877	57 16.52	67 14.41			20:05	1864	57 16.55	67 13.94			2335	5000	1/2 full of fossil barnacles, 2 (?) live flabellum, isopod, octocoral pieces, bivalves, gastropods, barnacles.
144	23:21	2034	57 16.4010	67 13.5361			0:31	2052	57 16.4042	67 13.5374			2028	390	33 photos taken over 6 areas.
145	5:04		57 07.36	67 40.62			7:19	4011	57 07.36	67 40.62			4044	9000	Kasten empty - smear of sandy/gritty/mud on core catcher. No significant tension in or out.
146	13:00	422	57 00.33	67 35.10		0.9	13:22	423	57 00.165	67 35.34			535		see TowCam folder.
147	14:51	689	57 00.02	67 33.21	50	1.5	15:25	1128	56 59.57	67 32.00	63	1.6			lots of sponges, fossil solitary corals. Live - few solitaries (flabellum & balanophyllia). Mostly sponges, broken octocorals, a few octopi & fish.

Appendix 8 Short Cruise Log

Station #	Date (GMT)	Location/area	Gear	In Water				Out of water				notes
				Time (GMT)	depth (m)	latitude (S)	longitude (W)	Time (GMT)	depth (m)	latitude (S)	longitude (W)	
1	11-May-11	Burdwood Bank, shallow	TB	7:53	309	54 27.22	62 12.20	9:14	311	54 29.4230	62 11.41	Small haul; some fossil balanophyllia, caryophyllia and stylasterids; live primnoids, few anemones, sponges
2	11-May-11	Burdwood Bank	TB	9:56	319	54 27.42	62 12.66	11:18	310	54 29.67	62 10.12	Larger haul, medium-large rock; primnoids, stylasterids, sponges, gorgonocephalus, briltle stars; fossil balanophyllia
3	11-May-11	Burdwood Bank, shallow	BC	13:35	320	54 28.09	62 11.84	14:17	321	54 28.07	62 11.69	Pull out tension only 3600; a few grains of mud, reached the bottom but did not get the sediment (washed away?)
4	11-May-11	Burdwood Bank, shallow	BC	14:52	312	54 28.06	62 11.6505	15:38		54 28.0779	62 11.7474	no sample
5	11-May-11	Burdwood Bank, shallow	TCAM	20:00		54 29.09	62 14.99	23:40	319	54 31.2808	62 11.4052	8 bottles fired; bottle 6 failed
6	11-May-11	Burdwood Bank, shallow	BC	0:08	321	54 31.37	62 11.27	0:48	323	54 31.31	62 10.98	empty
7	12-May-11	Burdwood Bank, shallow	DH	1:40	331	54 31.00	62 13.52	2:55	329	54 29.32	62 13.87	HD haul full of gravel and rocks; lots of fauna - soft coral abundant (100s) live balanophyllia; bivalves abundant (clams) etc.; fossil balanophyllia)
8	12-May-11	Burdwood Bank, shallow	KC	5:17	331	54 29.18	62 13.79	5:47	333	54 29.17	62 13.79	1 ft if sediment in kasten core; some fossil corals!
9	12-May-11	Burdwood Bank, grassy knoll	DH	9:13	856	54 45.74	62 13.99	10:51	796	54 45.81	62 14.30	Fossil solenosmilia reef, few fossil solitaries; live - small anemones
10	12-May-11	Burdwood Bank, grassy knoll	TB	11:43	660	54 42.62	62 11.17	14:07	766	54 44.63	62 16.84	Medium haul; lots of octocorals (bottlebrush) and stylasterids, some solitary corals; fossils - fossil solitaries, some stylasterids
11	12-May-11	Burdwood Bank, deeper site	DH	14:50	823	54 44.23	62 14.00	16:19		54 44.21	62 14.27	had a few lives and fossil corals in it (two hands full); emptied on way up?
12	12-May-11	Burdwood Bank	DCAM	20:50	681	54 45.50	62 15.00	21:52	674	54 45.50	62 15.00	Camera brought up, alarm not working 21:29
13	12-May-11	Burdwood Bank	DCAM	22:20	675	54 45.50	62 15.00	22:25	678	54 45.50	62 15.00	Problem from station 12 had been corrected, alarms continuously sounding - aborted
14	12-May-11	Burdwood Bank	DH	23:06	744	54 43.74	62 15.02	1:10	651	54 41.80	62 14.99	Full of material (mainly fossil corals and coral gravel), some coarse sand; bio: live Flabellum, Balanophylia; fossil: lots of Flabellum and Balanophyllia
15	13-May-11	Burdwood Bank	DH	2:27	940	54 46.40	62 14.02	3:56	896	54 46.30	62 14.18	Mostly biology, sparse fossils; soft corals abundant, but dredge rather empty
16	13-May-11	Burdwood Bank, deep	DH	5:38	1412	54 48.69	62 07.19	7:58	1417	54 48.44	62 07.03	Mostly stylasterids, some octocorals (Michelle's type specimen!); fossils: primarily stylasterids, ~ 30 fossil solitaries
17	13-May-11	Burdwood Bank	DH	8:57	2149	54 50.38	62 05.93	11:37	1749	54 49.83	62 06.60	lots of rocks and stylasterids. One crushed Desmophyllum
18	13-May-11	Burdwood Bank, grassy knoll	DCAM	13:09	710	54 44.53	62 15.61	15:15				Trigger weight 5m below camera, time on deck approximate.
19	13-May-11	Burdwood Bank	DH	16:11	1538	54 48.57	62 10.02	18:12	1497	54 48.45	62 09.93	well preserved live corals attached to rock; Aradillagorgia, stylasterids; fossil solitary corals and rocks
20	13-May-11	Burdwood Bank	DH	18:53	1930	54 50.50	62 07.51	21:10	1848	54 50.36	62 07.40	Not much material; live: octocoral, hydroid; fossil: four small pieces
21	13-May-11	Burdwood Bank	CTD	23:02	4188	55 3.27	62 6.63	2:18	4191	55 3.23	62 5.98	24 bottles fired
22	14-May-11	Burdwood Bank	DH	4:29	2108	54 50.50	62 07.53	7:25	1835	54 50.15	62 07.54	Same location as 20; lots of rocks, some Balanophyllia, one live Desmophyllum; stylasterids, few primniods; Fossils: fossil solitary corals
23	14-May-11	Burdwood Bank; grassy knoll	DCAM	8:54	675	54 45.00	62 15.00	1306	708	54 43.74	62 14.49	Drop camera run on top of Grassy Knoll. Trigger weight 3m below camera. Stylasterid and octocoral reefs; No solenosmilia!
24	15-May-11	SFZ	DH	20:07	2344	59 23.26	60 06.744	23:43	2252	59 22.90	60 06.88	Live scleractinian, mainly rocks, piece of fossil coral
25	16-May-11	SFZ	TCAM	0:35	2221	59 23.022	60 05.052	8:58	2321	59 19.0885	60 06.3984	8 bottles fired; bottle 8 leaked
26	16-May-11	SFZ	BC	9:42	2276	59 21.92	60 05.44	11:59	2314	59 21.92	60 05.44	5000 tension on pull out; box core washed - some sediment grains left at spade; going back in for try #2

27	16-May-11	SFZ	BC	12:00	2314	59 21.92	60 05.43	14:24	2315	59 21.92	60 05.43	5400 tension on pull out; again, some gritty sediment grains in the bottom of the spade, but washed - no more BC's here
28	16-May-11	SFZ	DH	14:58	2564	59 23.01	60 09.03	19:17	2486	59 22.654	60 09.454	mainly rocks; paleo: some mud and pieces (tiny) of fossil coral; bio: anenome, brittle star, hydroid, octocoral
29	17-May-11	SFZ, area 2	DH	0:18	1814	59 45.24	59 00.00	3:02	1710	59 44.96	59 00.24	a few rocks, a tiny sponge. Did it empty at 8800 lb tension spike?
30	17-May-11	SFZ	DH	3:12	1731	59 44.96	59 00.24	6:40	1637	59 44.68	59 00.34	Lots of small basalt rocks & 1 large rock. Few primnoid octocorals, octocorals, keratoisis (?), one sponge
31	17-May-11	SFZ	DH	7:20	1731	59 45.55	58 57.99	10:45		59 45.24	58 58.43	1/4 full. Rocks - mostly basalt. Bio - 1 small bivalve. Fossil - handfull of fossil holdfasts.
32	17-May-11	SFZ	CTD	13:49	3565	60 03.17	58 36.60	16:50	3546	60 03.1716	58 36.5996	CTD successfully recovered. Mini-core recovered 6 cm of mud.
33	17-May-11	SFZ	DH	18:12	1871	60 04.13	58 19.50	20:43	1810	60 03.8768	58 19.5934	mostly rocks, a few holdfasts, one large anemone, brachiopod, some bryazoa &sponges, all swept clear.
34	17-May-11	SFZ	DH	21:36	1884	60 05.807	58 13.502	0:50	1765	60 05.4476	058 13.7790	Rocks, some with holdfasts. 2 large pieces of fossil coral, ?stylasterids. small octocoral, sponge, worms. small amount of sediment adhered to rock.
35	18-May-11	SFZ	DH	2:50	1213	60 08.2050	57 59.5095	4:52	1132	60 07.94	57 59.69	Hein Dredge with inner bag. Small amount of sand & small pebbles.
36	18-May-11	SFZ/Tiffany's	DH	5:41	1230	60 09.00	57 55.96	7:40	1202	60 08.82	57 56.16	Sandy sediment, some larger rocks. Few solitary fossil corals. Bio - ophiuroids.
37	18-May-11	SFZ/Tiffany's Peak	DH	8:21	876	60 10.30	57 53.00	10:01	832	60 10.12	57 53.14	Hit a plateau - flat. Fossil stylasterids, fossil caryophyllia (6), & stylasterids, ophiuroids, polychaetes, brachiopods, few stylasterids. WITH BAG
38	18-May-11	SFZ/Tiffany's Peak	DH	10:56	857	60 10.11	57 53.14	12:26	717	60 10.00	57 53.23	Several fossil caryophyllia (3) & stylasterid/octocoral bases. Sponges & live stylasterids. Not many rocks.
39	18-May-11	SFZ/Tiffany's Peak	DH	13:04	808	60 10.51	57 51.02	14:38	717	60 10.33	57 51.24	small haul. Fossil stylasterids & caryophyllia (1). One live caryophyllia. Brachopods
40	18-May-11	SFZ/Tiffany's Peak	DH	15:16	860	60 10.90	57 50.00	17:26	777	60 10.555	57 50.407	Biology: bamboo coral, octocoral, bryozoan, worms, sea urchins, hydroids, brachiopods, caryophyllia. Fossil: lots of caryophyllia, stylasterids, shells.
41	18-May-11	SFZ/Tiffany's	DCAM	17:46	770	60 10.55	57 50.401					ABORTED
42	18-May-11	SFZ/Tiffany's Peak	DCAM	18:01	780	60 10.5553	57 50.4062					ABORTED
43	18-May-11	SFZ/Tiffany's	DH	18:47	860	60 10.8996	57 49.9988	20:57	785	60 10.577	57 50.362	Biology: octocorals, caryophyllia, anemone etc. Paleo: stylasterids, lots of caryophyllia, "Desmo-like" species, bivalves etc.
44	18-May-11	SFZ/Tiffany's,top of knoll	DCAM	22:00	666	60 10.1992	57 50.9962	23:15	669	60 10.1987	57 51.0008	tensiometer only going up in 65 lb increments. Eleven photos taken. Brachiopods
45	18-May-11	SFZ/Tiffany's, stylasterid site	DCAM	23:41	858	60 10.2992	57 53.0063	1:08	855	60 10.2999	57 53.0061	ten pictures taken. Stylasterids.
46	19-May-11	SFZ	DCAM	1:38	922	60 09.6009	57 51.0029	3:18	915	60 09.6018	57 51.0056	had to keep easing out even though we were near bottom - stronger current
47	19-May-11	SFZ	DCAM	4:01	650	60 10.500	57 50.0036	4:02	654	60 10.50	57 50.0003	too far north and shallow
48	19-May-11	SFZ	DCAM	4:23	795	60 10.79	57 49.99	5:25	780	60 10.80	57 50.00	6 photos taken before weight wrapped up. Pictures showed beginning of reef/rubble. Putting it back in to take more.
49	19-May-11	SFZ/Tiffany's	DCAM	5:37	783	60 10.80	57 49.99	6:50	781	60 10.8	57 50.00	took >15 pictures
50	19-May-11	SFZ/Tiffany's	DH	7:39	1038	60 11.00	57 50.99	9:51	942	60 10.78	57 51.46	Primarily rocks (small - medium), 3/4 full. Fossils: little, few sylasterid pieces. Bio: brittle stars, brachiopods, little.
51	19-May-11	SFZ/Tiffany slopes	DH	10:34	1425	60 11.70	57 49.80	12:57	1315	60 11.50	57 50.17	Epic fail. 1/4 full. Rocks, rocks, & more rocks. 1 bearded clam, 1 brachiopod & 2 squished tunicates. Sponge for Kate.
52	19-May-11	SFZ/Tiffany's Nose	DH	13:47	909	60 12.5	57 43.80	15:49	800	60 12.30	57 44.40	large rocks with brachiopods. Palaeo: 1 caryophyllia, pieces of stylasterids. Biology: lots of stylasterids, octocorals, sponges, etc.
53	19-May-11	SFZ	DH	16:32	1083	60 13.0014	57 41.2003	18.43	979	60 12.8201	57 41.7860	large rocks. Biology: brittle stars, sea stars, octocroals,hydroids, brachiopods, stylasterids. Palaeo: some stylasterids (branchy type), a few bivalve shells.

54	19-May-11	SFZ/SE of Tiffany's Peak	DH	19:36	1311	60 15.3989	57 36.0006	22:11	1223	60 15.0455	57 36.4151	lots of rocks ~1/2 full, many large holdfasts, few stylasterids, small pieces of fossil scleratinians, octocorals, stylasterids, sponges, etc.
55	19-May-11	SFZ	CTD	22:44	1331	60 15.6997	57 35.4911	23:58		60 15.697	57 35.442	
56	20-May-11	SFZ	DH	0:40	1597	60 16.6	57 32.00	2:45	1440	60 16.445	57 32.190	small haul, smaller rocks (10cm size) with some small holdfasts; few stylasterids and a prawn
57	20-May-11	SFZ - south end	DH	6:25	1863	60 36.00	56 46.99	9:23	1818	60 35.69	56 46.78	half full; few larger boulders -> one covered in sponges/hydroids; smaller holdfasts; bio - sponge, 1 clam; fossils - shells
58	20-May-11	SFZ - south end	DCAM	9:56	1700	60 35.60	56 46.40					aborted- contact switch going off - ground issue
59	20-May-11	SFZ - south end	DH	11:05	1800	60 35.25	56 49.07	14:04	1824	60 34.88	56 49.07	very small haul
60	20-May-11	SFZ - south end	DCAM	15:16	1702	60 35.61	56 46.40	18:37	1838	60 35.5955	56 45.9009	took ~16 pictures
61	20-May-11	Elephant Island Deep	DCAM	21:33	1595	60 52.10	56 18.60	23:33	1595	60 52.0981	56 18.6003	ABORTED
62	20-May-11	Elephant Island Deep	DCAM	23:57	1593	60 52.1008	56 18.6001	2:26	2022	60 52.2736	56 18.3282	Deployed stationary. After first picture move forward at 0.5 knots, CMG 150deg. Several pictures taken in quick succession, but all pictures came out fine.
63	22-May-11	AA/WAP Shelf	BC	6:44	596	63 03.25	61 35.49	7:38	596	63 03.24	61 35.51	Full box, mostly clay with a soft mud layer on top. Slightly cloudy water, interface mostly intact. Some mixing while doing box removal (tilted box).
64	22-May-11	AA/WAP Shelf	TCAM	8:34	593	63 03.24	61 32.99	12:30	615	63 03.74	61 35.70	~2km, track at AA, ~2000 photos. Flying a little high (~6 meters), flat calm weather, good recovery. All 8 bottles fired - 3 bottom, 2 mid, 3 surface.
65	22-May-11	AA/WAP Shelf	TB	13:16	594	63 05.01	61 31.04	14:42	577	63 02.65	61 31.91	Might have underdone it in an effort not to crush fauna… small amount of corals, sea cucumbers, urchins, octopus. Redeploying.
66	22-May-11	AA/WAP Shelf	TB	15:26	594	63 05.00	61 31.02	17:21	544	63 02.35	61 32.13	Mud with a few (2?) live flabellum, some other biology but not that much.
67	22-May-11	AA	TB	18:24	642	63 04.70	61 38.10	20:39	496	63 01.7940	61 40.4615	medium haul of flabellum (live), sea urchins, starfish, octopus, worms, anemones, some fossil skeleton as well.
68	22-May-11	AA/Deception	KC	21:50	596	63 03.7580	61 35.7115	22:45	597	63 03.757	61 35.7124	Kasten Core location at end of TowCam run, brown mud recovered (~ 140 cm)
69	23-May-11	WAP Shelf edge	DCAM	6:01	1498	62 16.26	62 07.02	9:02	1549	62 15.89	62 06.69	
70	23-May-11	WAP Shelf edge	BC	9:55	1602	62 17.11	62 07.75	11:39	1602	62 17.12	62 07.73	Empty - pre-triggered?
71	23-May-11	WAP Shelf edge	BC	11:51	1603	62 17.12	62 07.76	13:33	1609	62 17.13	62 07.64	Pre-triggered. Aborting further box cores, weather deteriorating.
72	23-May-11	WAP off slope	CTD	16:25	4732	62 04.0013	62 34.9969	20:04	4728	62 03.9981	62 34.9986	
73	24-May-11	Interim-South	DH	13:32	1125	60 36.3	66 00.1	15:31	1010	60 36.46	66 00.37	Mostly empty, few small bamboo sticks, going back to start of line to re-dredge
74	24-May-11	Interim-South	DH	15:54	1147	60 36.30	66 00.09	18:03	1006	60 36.43	66 00.29	ferromanganese coated fossils including Desmophyllum and bamboos; brachiopods, few live stylasterids
75	24-May-11	Interim-South	DH	18:34	1235	60 35.999	66 00.00	20:47	1141	60 36.1574	66 00.2765	
76	24-May-11	Interim deep west	TCAM	22:00	3304	60 32.3076	66 09.8291	4:25	3062	60 33.75	66 11.86	7 bottles fired (1-4 at bottom, 5 at 2002m, 6 at 1000m, 7 at 14m) great photos
77	25-May-11	Interim deep west	KC	5:01	3059	60 32.65	66 10.30	8:17	3059	60 32.65	66 10.30	105cm kaston core collected, double bounce (on purpose) as unclear when hit seafloor. Really soupy sediment.
78	25-May-11	Interim-South	DH	9:33	1574	60 38.64	66 03.08	12:13	1503	60 38.44	66 02.81	~10 medium-large boulders, one with a cluster of D. dianthus on it. Bio: sponges, brachiopods. Fossils: Desmos and very pitted branches.
79	25-May-11	Interim-South	DCAM	12:59	1510	60 38.70	66 02.64	15:49	1558	60 38.41	66 02.65	Alarm sounded continuously -> for last few photos, manual trigger was used
80	25-May-11	Interim	DH	16:03	1513	60 38.204	66 02.5974	18:13	1407	60 38.0576	66 02.6006	small rocks and scoria, fossil corals (?stylasterids), sponges, scallop, crab

81	25-May-11	Interim	DH	18:43	1641	60 39.2187	66 02.8075	21:17	1644	60 39.08	66 03.26	ctenophore, few stylasterids, otherwise empty
82	25-May-11	Interim	DCAM	21:50	1565	60 39.299	66 03.197	1:10	1676	60 39.211	66 03.686	19 contacts, lots of rocks, fossils?, some sand, cool sponges
83	26-May-11	Southern end of Interim	DH	2:28	1811	60 41.2574	66 03.2076	5:45	1807	60 41.09	66 03.68	Dredge dumped out? - came up with 3 medium size bamboo corals
84	26-May-11	Interim South	DCAM	6:20		60 40.40	66 05.00	9:09	1921	60 40.20	66 05.33	Covered 6 areas (~3-5 photos each) 32 images. Large basalts, sediment waves, some fossil corals attached to rocks
85	26-May-11	Interim South	DH	9:56	1522	60 38.3	66 03.01	12:45	1528	60 37.94	66 03.54	Mainly rocks, some bamboo fossils, sponge and some small pieces of stylasterid. 1/4 full. Using V.1 coral catcher (1 layer of cable ties).
86	26-May-11	Interim South	DH	13:32	1232	60 37.002	66 00.996	16:24	1173	60 36.68	66 01.34	Weak link broke and back frame bent in, weather deteriorated - 35 knot winds. Moving on to multibeam. Using V.2 coral catcher (2 layers of cable ties).
87	27-May-11	Interim South	DH	12:17	950	60 34.07	65 58.60	13:57	859	60 33.94	65 58.40	1/4 full -> primarily stylasterid fossil rubble. Fossil: Desmophyllum, Gardineria, Caryophyllia, Balanophyllia (?). Bio: 3 shrimp.
88	27-May-11	Interim South	DH	14:32	1008	60 33.75	65 57.4	16:59	957	60 33.4193	65 57.4102	fossils: solitary scleractinians and bamboo + stylasterids, large , live stylasterids, crabs, sponges
89	27-May-11	Interim South	DCAM	17:33	747	60 33.700	65 58.3987	19:58	876	60 33.5248	65 58.6235	move 1 ship's length between each 3 pictures; 15 total
90	27-May-11	Interim South	DH	20:24	793	60 33.8525	65 58.2957	22:11	808	60 33.579	65 58.406	full of boulders, encrusting hydroids, themselves encrusted with sylasterids; some fossil stylasterids, shrimps
91	29-May-11	Sars Seamount	DH	1:04	684	59 43.3086	68 51.7685	2:38	612	59 43.098	68 52.000	coral rubble, fossils, live scleracts (~30 Caryophylia); Solenosmilia + Madrepora fossils, ~dozen fossil Desmophylum and hundreds of fossil Caryophylia
92	29-May-11	Sars Seamount	DCAM	3:04	633	59 43.09	68 52.00	4:58	596	59 42.92	68 52.20	6 sites, 18 photos
93	29-May-11	Sars Seamount	DH	5:50	1769	59 42.45	69 00.39	8:42	1675	59 42.33	69 00.51	1 barnacle shell, fossil bamboo, 8 pebbles; back safety chain came loose, dragging on seafloor --> reason for higher tensions?
94	29-May-11	Sars Seamount	DCAM	9:03	1652	59 42.2	69 00.299	12:21	1739	59 41.97	69 00.56	28 photos in 6 areas; fossil Desmos towards end of tow --> tumbled down slope?
95	29-May-11	Sars Seamount	DH	13:44	821	59 43.76	68 53.92	15:19	733	59 43.57	68 54.05	Paleo: many Desmos, >2 species of Caryophylia; G. antarctica?, stylasterids, etc. Bio: diverse collection of sponges, Caryophylia, Desmophyllum etc.
96	29-May-11	Sars Seamount	DH	16:07	978	59 44.4054	68 53.9960	17:57	940	59 44.171	68 54.183	paleo: a few pieces of Desmophyllum, a few stylasterids, bivalves, pieces of other solitary corals. Bio: two types of sponge, whip octocoral, C. antarctica, etc.
97	30-May-11	Sars Seamount	DH	5:41	698	59 43.30	68 51.99	7:27	620	59 43.06	68 52.24	Mostly fossil coral rubble. Fossils - Desmo, solensmillia, madrepora,, small caryophylias. Bio - Caryophylia, Acanthogorgia, other small inverts.
98	30-May-11	Sars Seamount	DH	8:04	1217	59 43.50	68 55.24	10:13	1120	59 43.32	68 55.42	v. small haul. Mostly rocks (& pebbles). Bamboo coral skeleton > 3 pieces. Barnacle plates. Pieces of desmo.
99	30-May-11	Sars Seamount	DCAM	10:52	588	59 43.00	68 52.00	12:35	625	59 42.80	68 52.33	6 areas surveyed. Giant corals! Stylasterid reef.
100	30-May-11	Sars Seamount	CTD	13:47	3105	59 45.20	69 03.4	16:15	3193	59 45.206	69 03.402	24 bottles fired at 12 depths.
101	30-May-11	Sars Seamount	DH	16:57	1586	59 43.2582	68 56.9601	20:00	1560	59 43.081	68 57.383	Wire snarled up @ 34 m wire out. 1/5 of rocks (small). Small pieces of fossil coral. Anemone, sea pens, sponges, bivalve.
102	30-May-11	Sars Seamount, plateau	TCAM	21:05	546	59 43.1037	68 48.1526	0:24	512	59 42.3850	68 49.8331	Lots of anemones & sponges, sandy top. Water bottles: #1 to 4: bottom (one start, one middle, two end); #5: ~288m; #6 - 8: ~10m.
103	31-May-11	Sars South	DH	1:19	1051	59 44.2451	68 46.5981	2:56	921	59 44.2030	68 46.9592	knoll on s. side of Sars, pebbles
104	31-May-11	Sars Plateau West	TO	3:47	817	59 43.4333	68 45.3804	6:14	566	59 42.95	68 51.62	very large haul of sponges, lots of fossil stylasterid rubble and 1 desmo. Bio --> live stylasterids, seawhips, crabs, brachiopods
105	31-May-11	Sars South	DCAM	7:51	936	59 44.2	68 47.09	10:07	993	59 44.03	68 47.50	photos show fossil desmo! 6 areas, 17 photos
106	31-May-11	Sars Smt- South	DH	10:46	1001	59 44.35	68 47.40	12:32	980	59 44.21	68 47.55	massive snarl-a-roo in last 50m of wire; no sample; 61m of wire cut

107	31-May-11	Sars - west end	DCAM	13:47	1120	59 41.50	68 57.25	15:47	1161	59 41.34	68 57.29	
108	31-May-11	Sars Seamount	DH	17:02	1813	59 42.6045	68 59.2973	19:50	1597	59 42.3294	68 59.6379	a few rocks (mainly small pebbles), pieces of bamboo coral, pretty empty.
109	31-May-11	Sars deep 1700	DB	20:59	1623	59 42.4017	68 59.5020	0:13	1547	59 42.28	68 59.81	lined with burlap; nothing in there CMG 310.
110	1-Jun-11	Sars deep 2000	DH	1:04	1980	59 40.31	69 02.1071	4:03	1882	59 40.1933	69 02.4664	heading 300, but wind veering SW, very hard to hold station.
111	1-Jun-11	Sars Seamount / west end	DH	4:48	1735	59 42.04	68 58.83	7:57	1703	59 42.00	68 59.24	very small haul --> bamboo pieces & small desmo piece & few pebbles.
112	2-Jun-11	Sars West	DH	2:28	1656	59 42.00	69 00.1021	4:58	1656	59 42.18	69 00.19	1/4 full, pebbles, rocks, fossil desmos!!
113	2-Jun-11	Sars West	DH	5:22	1672	59 42.12	69 00.16	8:16	1670	59 42.36	69 00.40	1/2 full dredge, fossil desmos - 1 large whole and multipple pieces, fossil bamboo, pebbles (Andrea's dredge)
114	2-Jun-11	Sars West	DH	9:03	1896	59 41.69	69 01.69	12:32	1820	59 42.00	69 02.00	2 big chunks of pillow basalts and a few pieces of gravel; sparse fossil stylasterids
115	2-Jun-11	Sars West ridge	DH	13:31	890	59 45.03	68 54.18	15:59	800	59 45.21	68 54.35	knot in wire ~60m up, 1/4 full of gravel + fossil reef and fossil desmos (!), fossil caryophylia, live: brachiopods
116	2-Jun-11	Sars long nose	DCAM	16:37	630	59 44.562	68 51.952	18:39	669	59 44.73	68 52.36	18 photos, 6 sets of 3
117	2-Jun-11	Sars long nose	DH	19:12	1034	59 45.846	68 55.968	21:02	929	59 45.872	68 56.275	1/4 full, fossil rubble, pebbles, >50 full desmos, many fragments, full of fossils, live: crabs, sponges, hydroids
118	2-Jun-11	Sars long nose	DH	21:37	1419	59 46.95	68 57.24	23:30	1314	59 46.90	68 57.51	a few rocks with encrusting soft corals and hydroids
119	2-Jun-11	Sars long nose	DCAM	23:42	1305	59 46.90	68 57.51	2:51	1446	59 46.80	68 57.75	12 pics in 4 sets of 3
120	3-Jun-11	Sars long nose	DH	3:25	1732	59 47.91	68 57.62	6:57	1635	59 47.67	68 58.20	Totally full dredge, mostly bamboo rubble, fossil desmophyllums! Live: small octocoral pieces, ophioroids, brachiopods
121	3-Jun-11	Sars West ridge	DH	7:24	1438	59 47.15	68 57.55	10:10	1455	59 46.94	68 57.99	lots of fine volcanic "soil", larger rocks, fossil: desmo pieces + bamboo, live: brachiopods, primnoid pieces, amphipods (Chrysogorgids seen on drop cam here…)
122	3-Jun-11	Sars East	DCAM	11:57	804	59 40.1	68 41.40	15:10	817	59 39.99	68 41.88	6 areas (Buzzer didn't work on first drop, brought up to rail, freed weight, sent back down
123	3-Jun-11	Sars East	DH	16:17	1903	59 40.38	68 36.47	19:22	1745	59 40.285	68 37.019	one big rock, + sponge + hydroid, otherwise empty
124	3-Jun-11	Sars East	DCAM	19:47	1233	59 41.1072	68 38.9726	22:21	1290	59 41.0557	68 39.1827	3 sets of 5 pictures
125	3-Jun-11	Sars East	DCAM	22:56	1559	59 40.40	68 37.596	1:48	1593	59 40.34	68 37.76	3 sets of 5 pictures
126	4-Jun-11	Sars East	DH	2:44	1950	59 43.6059	68 38.0658	5:43	1927	59 43.55	68 38.55	full dredge, mainly rocks, gravel to large, tiny bit of mud. Desmo (fossil) pieces, stylasterid (fossil) holdfasts, live: ophioroids, brachiopods, 1 octocoral
127	6-Jun-11	Cape Horn	CTD	8:14	4411	57 23.67	67 12.88	12:20	4404	57 23.67	67 12.87	24 bottles fired at several depths
128	6-Jun-11	Cape Horn	DH	14:30	931	57 09.81	67 05.38	16:45	937	57 10.155	67 05.623	Live corals - 1 piece madrapora, ~20 f. curvatum, ~5 balanophyllia, ~3 species of octocoral, live stylasterids, fossil solitary corals & stylasterids
129	6-Jun-11	Cape Horn/Warrens	DH	17:39	1257	57 11.264	67 00.364	19:34	1189	57 11.5043	67 00.4555	Dredge 2/3 full of live and fossil corals w/other live species, e.g., sponges, urchins.
130	6-Jun-11	Cape Horn/Warrens	TCAM	20:37	1125	57 12.8941	67 01.6470	0:10	1095	57 14.0572	67 02.5026	All other information in TowCam log.
131	7-Jun-11	Cape Horn/Warrens	DH	1:27	904	57 12.7510	66 58.5942	3:28	869	57 13.01	66 58.40	1/4 full, primarily solenosmillia fossil rubble, some stylasterid rubble. Fossil solitary corals. Live - paragorgia, thouarella, bamboos.
132	7-Jun-11	Cape Horn/Warrens	DCAM	4:38	844	57 10.19	67 05.00	6:37	878	57 10.2	67 04.42	7 areas photographed, 700m covered, 28 photos taken.
133	7-Jun-11	Cape Horn/Warrens	DCAM	7:22	1866	57 10.85	67 11.50	11:25	2342	57 10.71	67 10.85	v. steep terrain --> had trouble taking photos. 700 m covered (over 5 drops). 3 areas manually triggered only.
134	7-Jun-11	Cape Horn/Warrens	DH	12:10	1059	57 10.10	67 06.60	14:21	945	57 09.95	67 05.86	1/4 full. Fossil stylasterids & solitary coral rubble. Live --> Flabellum curvatum, Balanophyllia, Primnoids.

135	7-Jun-11	Cape Horn	DCAM w/H2O	14:57	967	57 09.90	67 05.91	17:42	1035	57 09.77	67 05.50	6 sets of 3 taken, +1 extra during messenger deployment for Niskin bottle. Niskin bottle attached to get water for Andrea.
136	7-Jun-11	Cape Horn/SE mound on ridge	DCAM	21:05	1395	57 22.0058	66 39.9916	23:18	1410	57 21.96	66 39.82	First no alarm - use manual trigger to get images over 100 m. Then continuous alarm. Ended early. Bottom contact wire tangled.
137	7-Jun-11	Cape Horn/SE mound on ridge	DCAM	23:24	1409	57 21.96	66 39.81	1:25	1414	57 21.94	66 39.73	no bottom contact, manual trigger over 100 m. Lots of pictures. Fossil corals everywhere & live solitaries.
138	8-Jun-11	Cape Horn/SE mound on ridge	DH	1:57	1420	57 21.71	66 41.21	4:06	1390	57 21.60	66 40.77	1/8 full. Mostly fossil solitary corals.
139	8-Jun-11	Cape Horn/SE mound on ridge	DCAM	4:37	1395	57 21.60	66 40.76	7:01	1541	57 21.27	66 40.22	Ship couldn't hold station (wind) so after 2 discrete stations we moved @ ~1 knot and did 5 more "drops" while moving. No lasers (flooded).
140	8-Jun-11	Cape Horn	DH	8:33	740	57 18.40	66 51.31	10:25	556	57 18.297	66 50.832	1/4 full. Primarily fossil coral rubble (stylasterid/solitary corals). Madrapora oculata fossil rubble.
141	8-Jun-11	Cape Horn	DH	11:09	938	57 19.35	66 50.90	13:12	827	57 19.22	66 50.38	v. small haul. Primarily fossil rubble.
142	8-Jun-11	Cape Horn	DCAM	13:55	549	57 18.20	66 50.96	15:24	611	57 18.12	66 50.54	DCAM pictures done.
143	8-Jun-11	Cape Horn/Warrens South	DH	17:04	1870	57 16.5775	67 14.4960	20:05	1864	57 16.55	67 13.94	1/2 full of fossil barnacles, 2 (?) live flabellum, isopod, octocoral pieces, bivalves, gastropods, barnacles.
144	8-Jun-11	Cape Horn/Warrens South	DCAM	20:23	1880	57 16.5992	67 13.88	0:31	2052	57 16.4042	67 13.5374	33 photos taken over 6 areas.
145	9-Jun-11	Cape Horn/4000m basin	KC	3:10	4013	57 07.36	67 40.62	7:19	4011	57 07.36	67 40.62	Kasten empty - smear of sandy/gritty/mud on core catcher. No significant tension in or out.
146	9-Jun-11	Cape Horn/shelf edge	TCAM	10:50	503	57 01.02	67 34.01	13:22	423	57 00.165	67 35.34	see TowCam folder.
147	9-Jun-11	Cape Horn/shelf edge	TB	13:48	501	57 00.99	67 35.47	15:25	1128	56 59.57	67 32.00	lots of sponges, fossil solitary corals. Live - few solitaries (flabellum & balanophyllia). Mostly sponges, broken octocorals, a few octopi & fish.