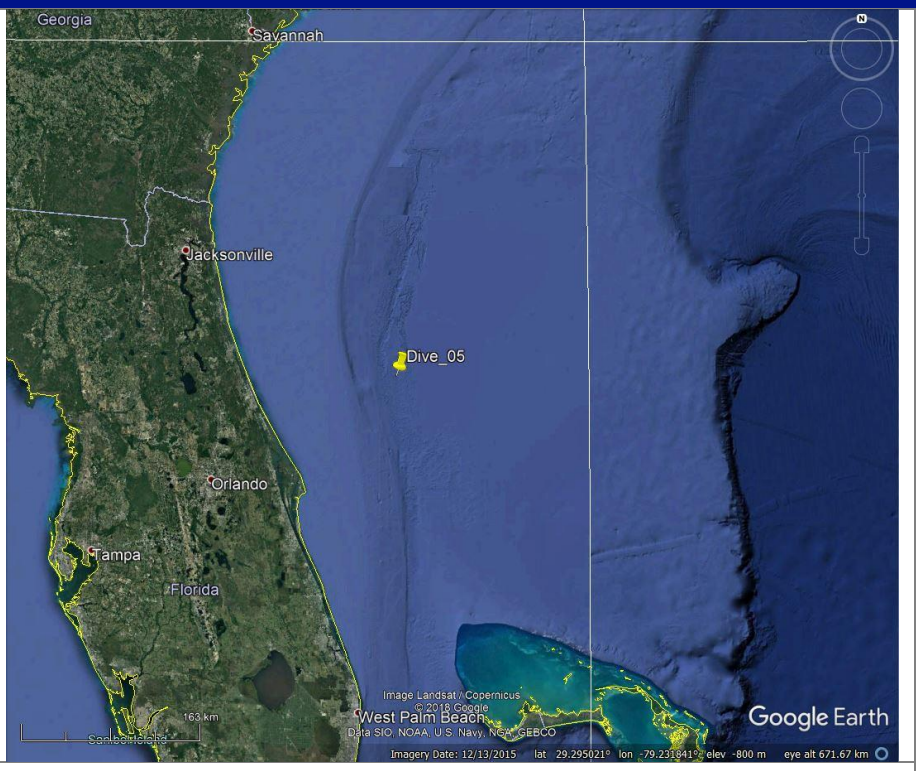
Ocean Exploration and Research

Okeanos Explorer ROV Dive Summary

Dive Information	
General Location	
General Area Descriptor	Blake Plateau (Million Mounds)
Site Name	Stetson Mesa South
Science Team Leads	Leslie Sautter / Cheryl Morrison
Expedition Coordinator	Kasey Cantwell
ROV Dive Supervisor	Bobby Mohr
Mapping Lead	Derek Sowers
ROV Dive Name	
Cruise	EX1806
Leg	-
Dive Number	DIVE 05
Equipment Deployed	
ROV	Deep Discoverer
Camera Platform	Seirios

ROV Measurements	☒CTD	☒Depth	☒Altitude
	☒Scanning Sonar	☒USBL Position	☒Heading
	☒Pitch	☒Roll	☒HD Camera 1
	☒HD Camera 2	☒Low Res Cam 1	☒Low Res Cam 2
	☒Low Res Cam 3	☒Low Res Cam 4	☒Low Res Cam 5

Equipment Malfunctions

ROV Dive Summary (from processed ROV data)

Dive Summary: EX1806_DIVE05

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In Water:	2018-06-19T12:23:44.747950 29°, 21.906' N ; 79°, 43.694' W
On Bottom:	2018-06-19T13:29:37.266074 29°, 22.025' N ; 79°, 43.723' W
Off Bottom:	2018-06-19T20:05:13.200720 29°, 22.249' N ; 79°, 43.759' W
Out Water:	2018-06-19T20:35:58.637497 29°, 22.711' N ; 79°, 43.776' W
Dive duration:	8:12:13
Bottom Time:	6:35:35
Max. depth:	734.0 m

Special Notes

Scientists Involved (please provide name, location, affiliation, email)

Name	Institution	email
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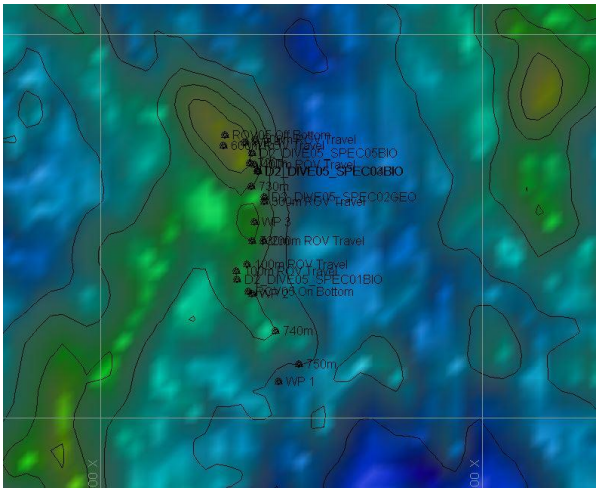
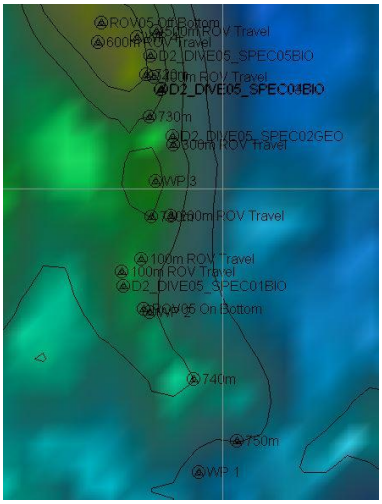
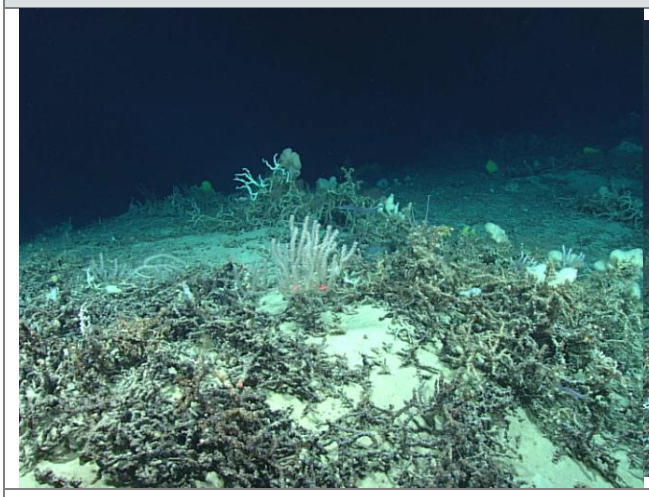
	Zach Proux	College of Charleston	prouxzs@g.cofc.edu
Purpose of the Dive	This dive is part of a series that investigates the similarities and differences in community composition between deepwater habitats of the SE US continental margin. The site was proposed by Tom Hourigan (NOAA Deep Sea Coral Research and Technology Program) and Matthew Poti (NOAA NCCOS) as an unexplored area with potential habitat suitability for deep sea corals. The ROV *Deep Discoverer* explored a trio of mound features located approximately 200 km southeast of Jacksonville, Florida. The three adjacent mounds are located directly in the path of the Gulf Stream. Multibeam data shows many mound features at 400-800 m throughout the Stetson Mesa. These mounds appear to be enormous aggregations of deep-sea coral rubble. This area shows high habitat suitability for deep-sea corals in existing models (Kinlan et al. 2013). The region was first mapped during EX-14-03 and acquiring new information will inform biogeographic patterns in the region. Diving in the area provides important information to groundtruth these models.		
Description of the Dive	Three mounds on the Stetson Mesa were traversed during this dive, with each being successively shallower. The near proximity to the Gulf Stream's axis provided swift currents that often necessitated adjustments in the ROV's position relative to the ship, and the current increased as the ROV ascended to the highest mound. Throughout the dive the seafloor was covered with rubble of dead coral skeleton, most of which had a brown to dark brown color from Fe-oxide precipitation. The sediment matrix was coarse and included shell remains of planktonic microfauna, including pteropods and foraminifera. Little fine grain material is able to deposit in this environment due to the high current velocities. The coral rubble appears to armor the mound crests, while making excellent substrate for growth of coral and sponge communities. Between mounds, coral rubble was buried beneath a thin sediment veneer, indicating possible shielding of currents by the mounds, resulting in increased deposition. In these low swale-like areas, few to no coral/sponge populations were observed. On the first two deeper mounds, live *Enallopsammia profunda* was observed at		

	the top of dead skeleton matrix. A neonate chimaera, possibly *Chimaera bahamensis*, made it's way around the coral framework, and cutthroat eels (*Synaphobranchis* sp.) were commonly seen, along with one observation of a duckbill eel, possibly *Nettenchelys exoria*. Several sponge species were observed, as well as the alcyonacean *Duva florida* and several *Stylaster* hydrocorals. Zooming in on the coral matrix revealed many species living within it, including small crinoids, ophiouroid brittle stars, plumulariid hydroids, amphipods, pagurid hermit crabs,and an Aplacophoran mollusk. As we approached the crest of the second mound, the framework-building corals became mixed between *E. profunda* and *Lophelia pertusa.* Standing dead coral framework was inhabited by *D. floridana, Anthomastus and/or Pseudoanthomastus,* and other octocorals such as bamboo corals *(Keratoisis spp., Cladarisis spp.),* and possibly *Swiftia, Plumarella, and Paramuricea* and black corals *such as Leiopathes* cf. *glaberrima*, *Bathypathes*, *Heteropathes* and *Parantipathes*. A second neonate chimaera was observed, along with reef codling *(Laemonema melanurum)* and rattails *(Nezumia sclerorhynchus)* and two *Chacean* golden crabs. Several pancake urchins (Echinothuridae: *Areosoma) w*ere observed, along with ophiuroid brittle stars, *Plintaster dentatus* cookie cutter asteroids, and pencil urchins *(Cidaris abyssicola).* A small, 50 m section of the tallest mound's steep slope revealed outcrops of flat-lying consolidated coral rubble. A rock collection verified that the rubble is cemented together by iron-oxides and compacted sediments. These small outcrops were densely populated with organisms, whereas the adjacent unconsolidated sediments had low densities. These biogenic rubble rocks are likely thousands of years old and may represent a location that was once more heavily sedimented, possibly indicating lower current velocities. A coral rubble sample verified occurrence of epibiotic agglutinated foraminifera that were observed during the dive. The topography of the highest (third) mound was far more dramatic, the result of large skeletal structures of dead *Lophelia* branches, which was more prevalent than *E. profunda*. A colony of *Madrepora oculata* occurred near the crest. Sediments and coral rubble were concentrated in small gullies and between these structures.the standing coral framework and the covering of dead skeletal matrix on the sea floor dramatically increased. Numerous cup corals (*Bathypsammia*, others) and sponge species were present, including both hexactinellid glass sponges (*Atlantisella* (a Euplectellidae) or a Rossellidae), and demosponges of various species and sizes. A third neonate chimaera was observed, along with coral hake *(Laemonema melanurum),* rattails *(Nezumia sclerorhynchus),* a skate and a shark, *Squalus cubensis,* and a juvenile *Mussoctopus* sp. octopus.
Notable Observations	Throughout the dive, dead coral rubble and coarse-grained calcareous sediments were found, however clear differences in substrate were observed. Areas of high skeletal framework (dead *Lophelia*) were seen in high-velocity, mound crest areas, whereas lower-relief framework was found on deeper mound crests (dead *Enallopsammia profunda*) where moderate currents were encountered. Mound slopes had less framework and often appeared 'armored' with flat coral rubble. The low-lying swales between mounds that seemed to be shielded from the currents contained significantly more calcareous sediment, which infilled voids and buried the dead coral rubble. These areas were sparsely populated. Species utilizing the coral matrix included many that are known from this habitat type.

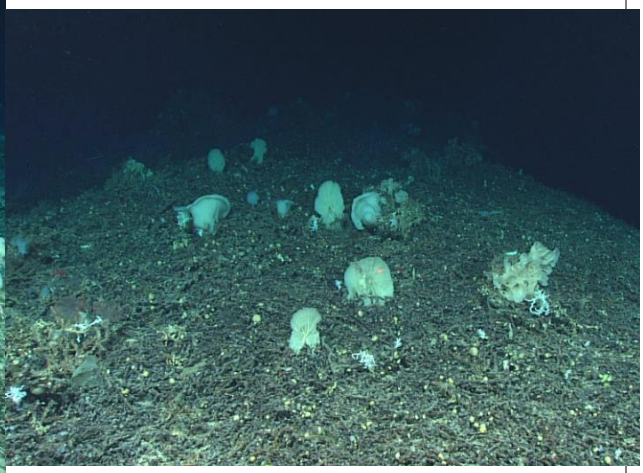
Community Presence/ Absence (*community is defined as more than two species*)	x Corals and Sponges Present	☐Active Seep or Vent
	☐Chemosynthetic Community Present	☐Extinct Seep or Vent
	X High biodiversity Community Present	☐Hydrates Present

Overall Map of the ROV Dive Area	Close-up Map of Main Dive Site
	

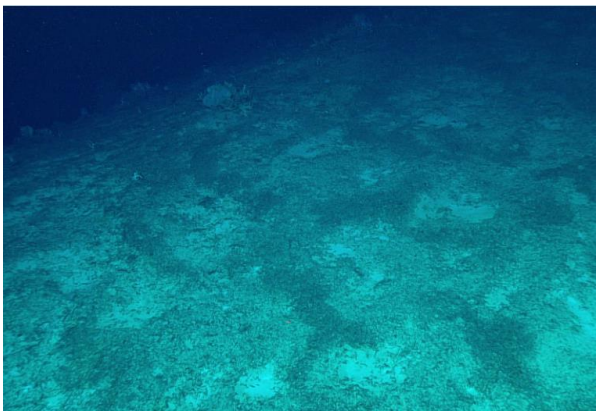
Representative Photos of the Dive



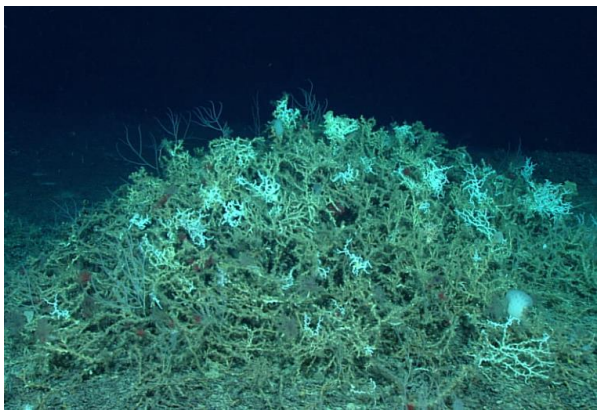
Low-relief framework of dead *Enallopsammia profunda* found on the two deeper mounds provides habitat for octocorals such as *Duva. floridana*, *Anthomastus* and/or *Pseudoanthomastus*, and bamboo corals.



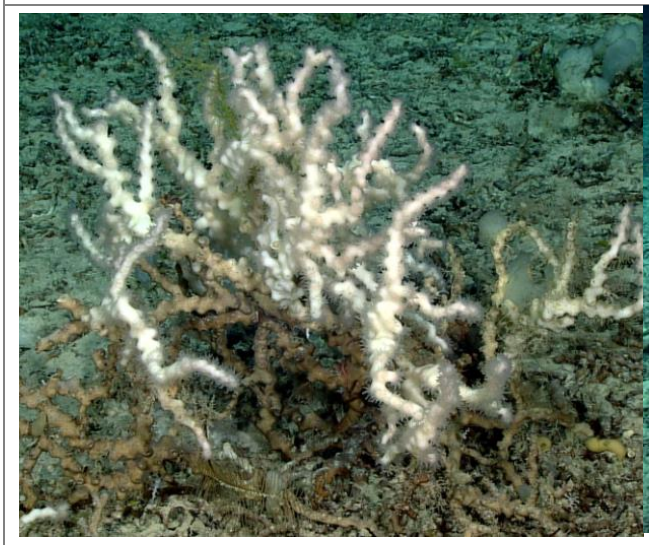
The crest of the second mound shows low-relief framework of dead *Enallopsammia profunda* and the slopes with 'armored' substrate of coral rubble.



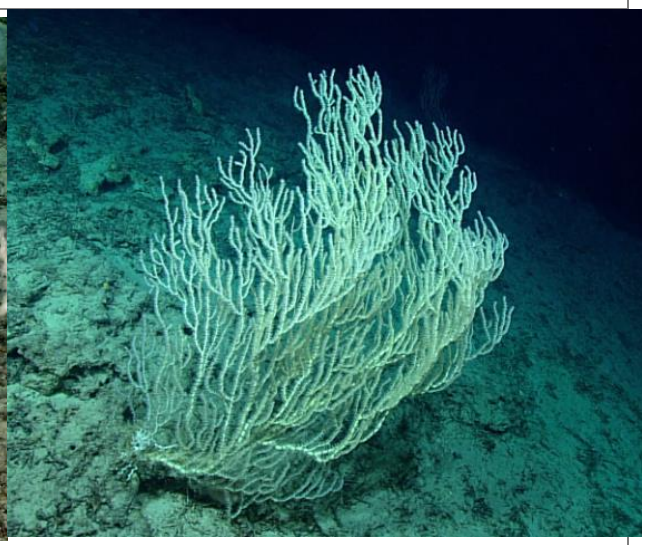
Coral rubble in the between-mound swale areas was often buried by calcareous sediments, indicating lower velocity currents which allow for deposition. Few biota were observed.



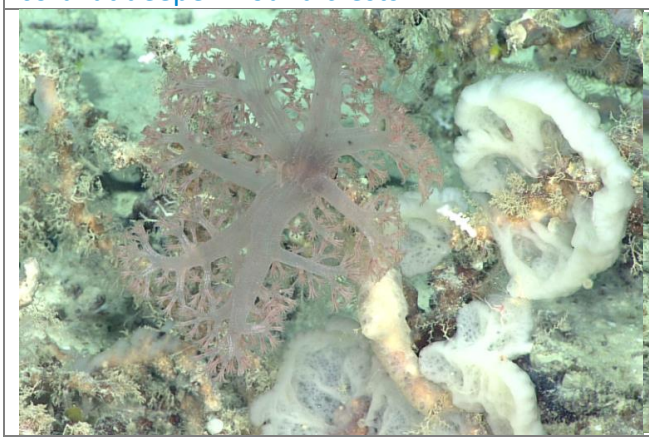
Example of the highest/shallowest mound crest, with numerous high-relief framework of live and dead *Lophelia pertusa.*

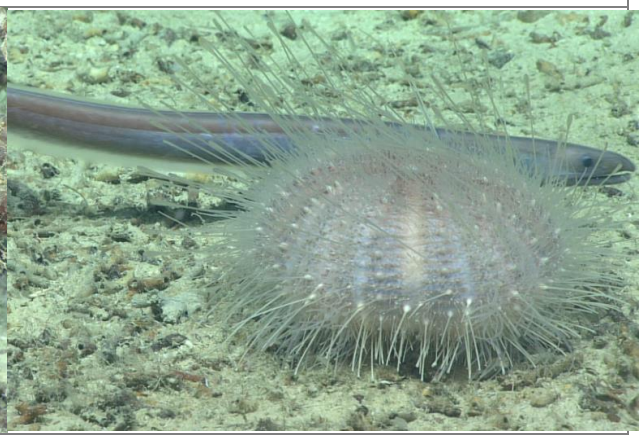


The scleractinian colonial coral *Enallopsammia profunda* was the dominant coral at deeper mound crests.



Large bamboo octocorals (*Keratoisis* sp.) were observed towards the crest of the shallowest mound.





The alcyonacean octocoral *Duva florida* was commonly observed growing on dead scleractinian coral matrix.

Pancake urchins (*Aerosoma* sp.) and cutthroat eels (*Synaphobranchus* sp.) were often observed.

Three neonate chimaera, possibly *Chimaera bahamensis,* were observed over coral rubble substrate.

Two golden crabs (*Chaceon fenneri*) were observed on coral rubble habitat.

The octocorals *Anthomastus* and/or *Pseudoanthomastus* were commonly observed growing on dead coral framework.

Samples Collected

Sample

Sample ID	EX1806_DIVE02_SPEC01BIO
Date (UTC)	20180619
Time (UTC)	143813
Depth (m)	731.46
Temperature (°C)	9.02
Field ID(s)	*Eunicella*?
Reason for Collection	*There was debate among the shore scientists about the genus and species of this coral, which was fairly abundant at this site. The collection will allow for accurate identification.*

Notes	

Associates	Associate ID	Field Identification	Notes
	A01	Coral rubble	
	A02	Agglutinated Foraminifera	

Sample

Sample ID	EX1806_DIVE02_SPEC02GEO
Date (UTC)	20180619
Time (UTC)	170731
Depth (m)	732.89
Temperature (°C)	9.34
Field ID(s)	Collected in situ. Small, outcropping ledges of hard substrate. Cemented coral rubble, with matrix of biogenic calcareous material. Fe-Mn oxide staining on rubble, suggesting it was long-exposed to water flow at the surface prior to burial.

Reason for Collection	*Substrate characterization*
Notes	This was the only area where rock was observed on the dive.

Associates	Associate ID	Field Identification	Notes
	A01	*Bathypsammia* sp.	
	A02	Demospongiae	
	A03	Demospongiae	blueish-purple branching
	A04	Hydrozoa (hydroid)	
	A05	Polychaeta	tubes of conglomerated sediment including sponge spicules, pteropod shells, etc
	A06	Tunicata	
	A07	Demospongiae	

Sample

Sample ID	EX1806_DIVE02_SPEC03BIO
Date (UTC)	20180619
Time (UTC)	174438
Depth (m)	711.7
Temperature (°C)	9.38
Field ID(s)	*Duva florida*

Reason for Collection	*This species was abundant at this dive site, so was collected to help characterize the site.*
Notes	

Associates

Associate ID	Field Identification	Notes
A01	Demospongiae	
A02	Hydrozoa (hydroid)	
A03	coral rubble	

Sample

Sample ID	EX1806_DIVE02_SPEC04BIO
Date (UTC)	20180619
Time (UTC)	174849
Depth (m)	711.73
Temperature (°C)	9.38
Field ID(s)	*Anthomastus* or *Pseudoanthomastus*

Reason for Collection	*This species was abundant at this dive site, so was collected to help characterize the site. There was also debate about the genus and species, so the collection will allow for accurate identification.*
Notes	

Associates

Associate ID	Field Identification	Notes
A01	*Duva florida*	Upon A02
A02	coral rubble	

Sample

Sample ID	EX1806_DIVE02_SPEC05BIO
Date (UTC)	20180619
Time (UTC)	183625
Depth (m)	710.9
Temperature (°C)	9.4
Field ID(s)	*Swiftia*?

Reason for Collection	*There was debate among the shore scientists about the genus and species of this coral, which was fairly abundant at this site. The collection will allow for accurate identification.*
Notes	

Associates

Associate ID	Field Identification	Notes

	None		

Please direct inquiries to:

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