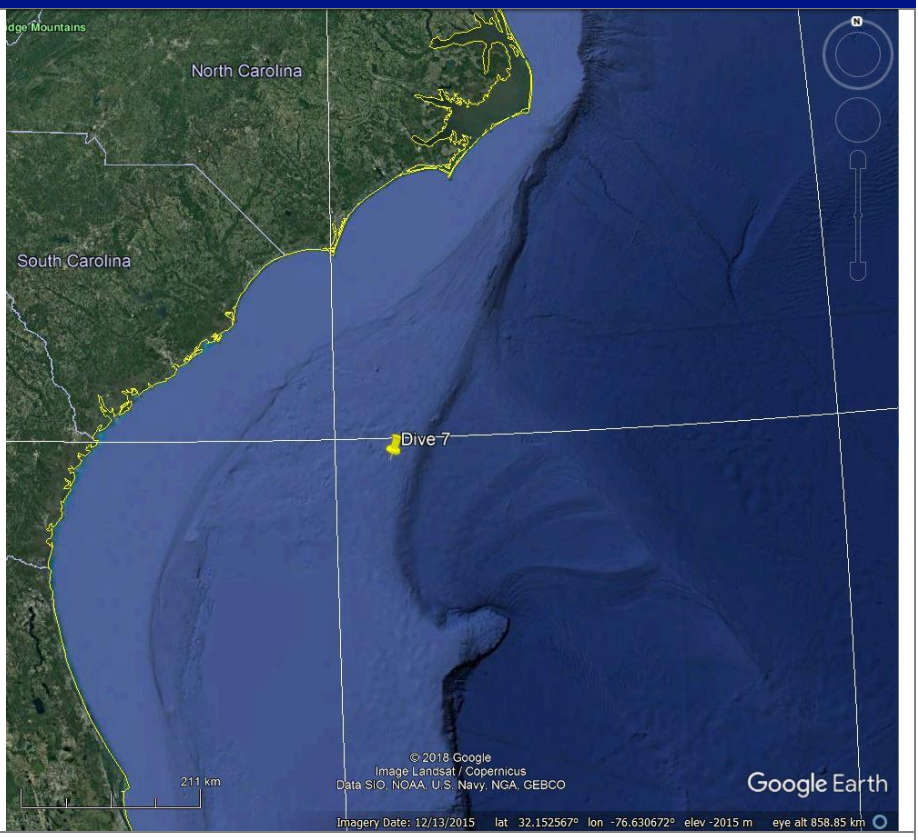
Ocean Exploration and Research

Okeanos Explorer ROV Dive Summary

Dive Information	
General Location	
General Area Descriptor	Blake Plateau
Site Name	Richardson Ridge
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	DIVE07
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_DIVE07 ^^ In Water: 2018-06-21T17:20:15.134557 31°, 45.984' N ; 77°, 21.869' W On Bottom: 2018-06-21T18:25:45.324395 31°, 46.248' N ; 77°, 21.727' W Off Bottom: 2018-06-21T22:02:25.838962 31°, 46.214' N ; 77°, 21.86' W Out Water: 2018-06-21T22:38:41.961283 31°, 46.157' N ; 77°, 21.919' W Dive duration: 5:18:26 Bottom Time: 3:36:40 Max. depth: 873.0 m
Special Notes	We had a delayed start today as we our first site had bad conditions and then move to a backup site that also had bas current, and then to a third site until we found divable conditions.
Scientists Involved (please provide name, location, affiliation, email)	

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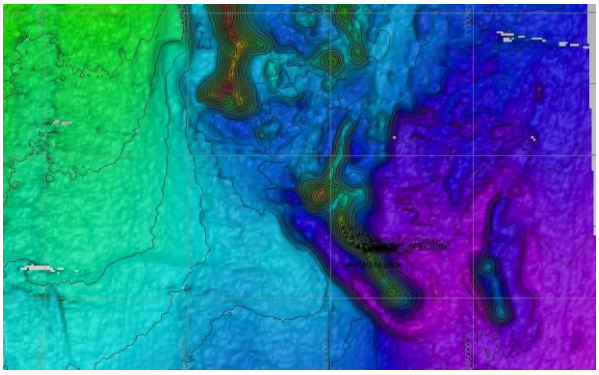
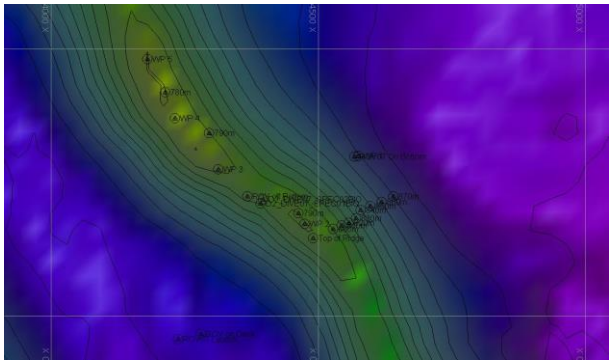
Purpose of the Dive	This dive site was selected for its knife-like ridge at the top of a steep 100 m relief slope that had gradients exceeding 30°. Its position on the outer edge of the Gulf Stream's flow raised the question if it was of biogenic (i.e., coral rubble mound) or geologic (erosional scarp of rock layers) origin. The previous 2 dives explored mound features, revealing origin from massive accumulation of stoney coral skeletons. All 4 mounds explored hosted dense living coral and sponge communities. The Richardson Ridge was explored to compare biological communities on the ridge's slope (in the lee of the Gulf Stream) to those on the ridge crest, and to compare these areas with those of the previous 2 dives. This dive was part of a series that investigates the similarities and differences in community composition between deepwater habitats of the SE US continental margin. This site is within a large under-explored area of the Miami Stetson CHAPC and is a high priority region for the Deep Search project, with the primary objective to identify presence / absence of deepwater corals and benthic communities in areas with the potential for offshore development. This area was first mapped during EX-18-05. New information will inform biogeographic patterns in the region, critical for refining habitat prediction models. Diving in the area will provide important information to groundtruth these models.		

Description of the Dive	The dive ascended the steep slope (>30o at times) of what turned out to be an eroded coral mound. The steep slopes were covered with coral rubble, and as the ROV ascended, more coral communities were observed. The crest of the ridge was covered with 1 to 1.5 m high mounds of *Lophelia pertusa* and *Madrapora oculata*. Eunicid polychaetes were observed in the coral matrix of both framework-building corals. The octocoral *Plumarella* was common, and several colonies of the bamboo coral, *Keratoisis*, and Anthothelidae were observed. Soft corals (Alcyonacea: *Anthomastus* and another Nephtheidae) were also common. Several individuals of a hormathiidae anemone (Actiniaria) were observed. Squat lobsters from the Galatheoidea and Chirostyloidea were observed, along with hermit crabs and the golden crab *Chaceon fenneri.* The large red shrimp *Pleisopenaeus armatus* was observed on coral rubble. Echinoderms included: the Echinothuroid *Aerosoma* (pancake urchin), brittle stars (possibly *Ophicantha bidentata*) in coral rubble, sea stars (Asteroidea) including *Gilbertaster caribbaea* observed feeding on the octocoral *Plumarella* sp. and *Chondraster grandis* (Poraniidae), Echinus and Cidaroid Pencil urchins. The hexactinellid sponges *Aphrocallistes beatrix* (with yellow zoanthids) and *Vazella pourtalesi* were seen, along with *Geodia* sp. (demosponge). The most common fish was *Synaphobranchus kaupii*. Other fishes observed included a skate (*Fenestraja plutonia*), an anglerfish (*Lophioides beroe*), the coral hake *Laemonema melanurum* and a goosefish, *Lophiodes beroe*. The current-facing slope was more densely populated with live *Lophelia* corals as compared to the lee-side slope. The narrowness of the ridge crest appears to be in part the result of erosional slumping on the lee-side. Such slumping over the life history of this mound would result in steep slopes and a narrow ridge crest, rather than the rounded mound morphology seen on earlier dives.	
Notable Observations	Learning that these elongate, steep ridge areas are actually coral mounds is a significant finding, as these features occur in many areas of the region in addition to the rounded mounds seen throughout Stetson Mesa. The amount of live coral was quite high compared to other coral mounds visited. Observation of the seastar *Gilbertaster caribbaea* feeding was a first! *Plumarella* appeared to be this species' food of choice, as we encountered three dining individuals.	
Community Presence/ Absence (*community is defined as more than two species*)	X Corals and Sponges Present ☐Chemosynthetic Community Present ☐High biodiversity Community Present	☐Active Seep or Vent ☐Extinct Seep or Vent ☐Hydrates Present
Overall Map of the ROV Dive Area	Close-up Map of Main Dive Site	

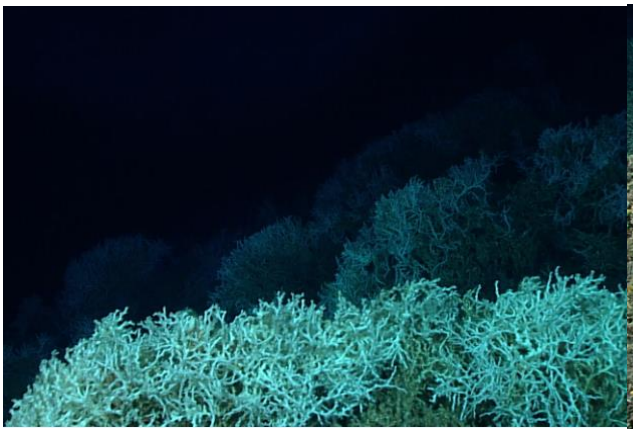




Representative Photos of the Dive

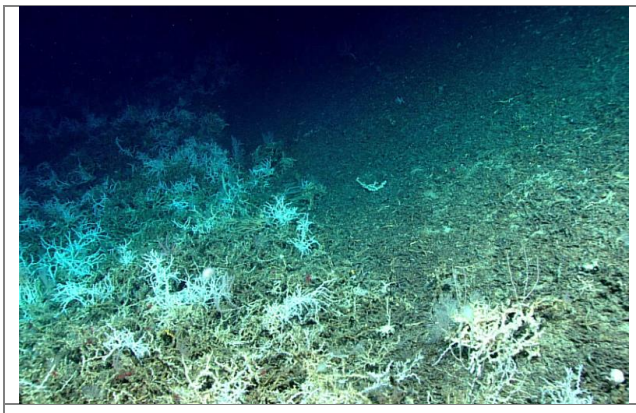
At the beginning of the dive, the substrate was gently sloping and matted with dead *Lophelia* skeletal matter. A *Plesiopenaeus* sp. shrimp was observed here.

On the steeply sloped ascent we encountered larger mounds of skeletal framework, with living *Lophelia pertusa* and the octocoral *Plumarella* sp. A goosefish is also shown in the image.

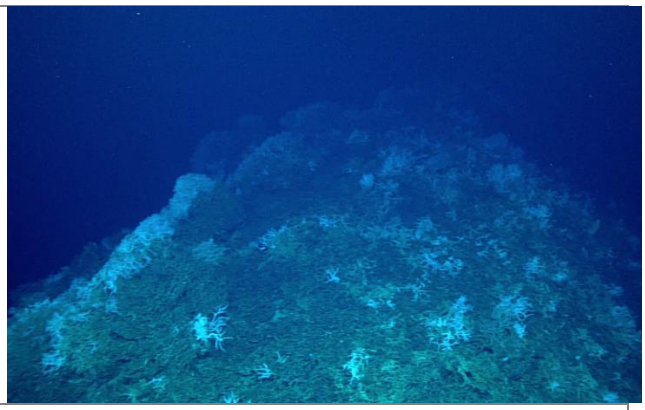


The southwestward-facing slope (into the current) near the ridge crest was covered with large 1 m mounds of *Lophelia*.

At the ridge crest, large mounds of *Lophelia* and *Madrapora* were found.



The knife-like ridge is likely the result of erosional slumping, shown at right. Debris piles at the base and becomes habitat (left).



A view of both sides of the ridge show the increased abundance of live *Lophelia* on the current-facing side, at left.

Three different *Gilbertaster caribbaea* sea stars were each observed feeding on the octocoral *Plumarella* sp.

The seastar *Chondraster grandis* (Poraniidae) seen on the coral rubble.

Several golden crabs (*Chaceon fenneri)* were seen living within the coral mounds.

An oreo *(Neocyttus sp)* was observed over live *Lophelia.*

This type of crinoid, *Zenometra columnaris*, was observed in abundance, living on the coral skeletal framework.

Samples Collected

Sample

Sample ID	D2_DIVE07_SPEC01BIO
Date (UTC)	20180621
Time (UTC)	212230
Depth (m)	787.54
Temperature (°C)	8.31
Field ID(s)	*Madrepora oculata*

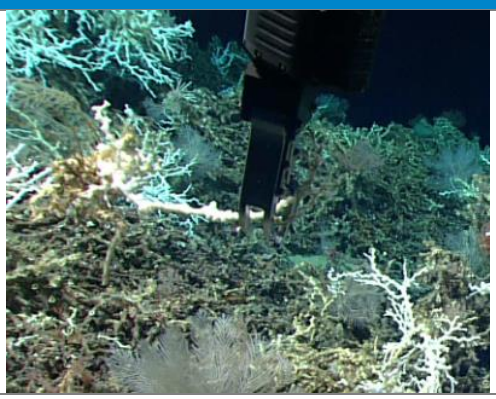
Reason for Collection	*Aspire target species*
Notes	

Associates

Associate ID	Field Identification	Notes
A01	Ophiuroidea	
A02	Polychaeta	
A03	Eunicidae	Include in ASPIRE

Sample

Sample ID	D2_DIVE07_SPEC02BIO
Date (UTC)	20180621
Time (UTC)	212634
Depth (m)	788.25
Temperature (°C)	8.29
Field ID(s)	*Lophelia pertusa*



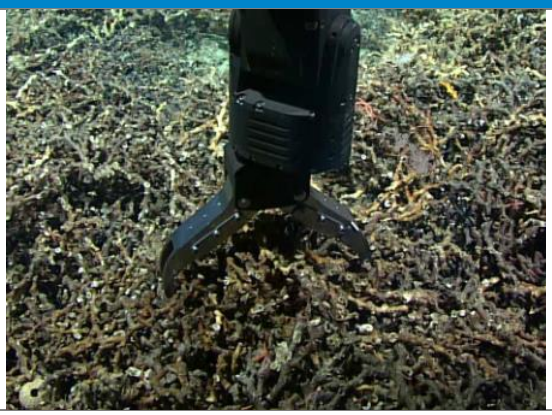
Reason for Collection	*Aspire target species*
Notes	

Associates

Associate ID	Field Identification	Notes
A01	Decapoda	gravid female shrimp
A02	Ophiuroidea	
A03	Hydrozoa	hydroid
A04	Hydrozoa	hydroid
A05	Demospongiae	
A06	Polychaeta	
A07	Eunicidae	Include in ASPIRE

Sample

Sample ID	D2_DIVE07_SPEC03GEO
Date (UTC)	20180621
Time (UTC)	220647
Depth (m)	763.74
Temperature (˚C)	10.45
Field ID(s)	Coral rubble



Reason for Collection	*Site characterization*
Notes	

Associates

Associate ID	Field Identification	Notes
A01	Foraminifera	Agglutinated
A02	Ophiuroidea	
A03	Gastropoda	

Please direct inquiries to:

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