



Okeanos Explorer ROV Dive Summary

Dive Information	
General Location	
General Area Descriptor	Blake Ridge, Southeast US Continental Margin
Site Name	Blake 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	DIVE02
Equipment Deployed	
ROV	Deep Discoverer

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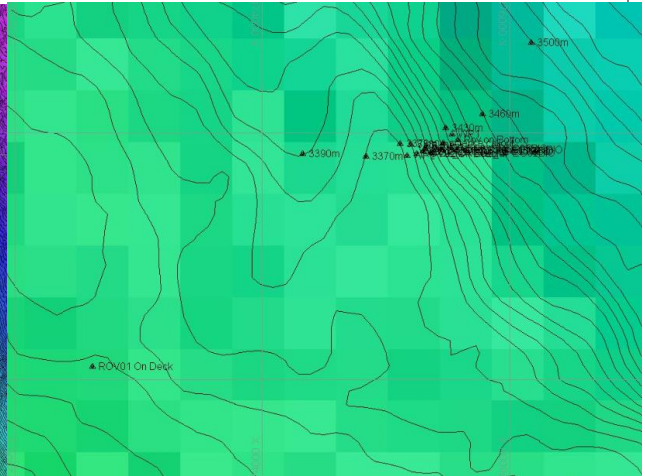
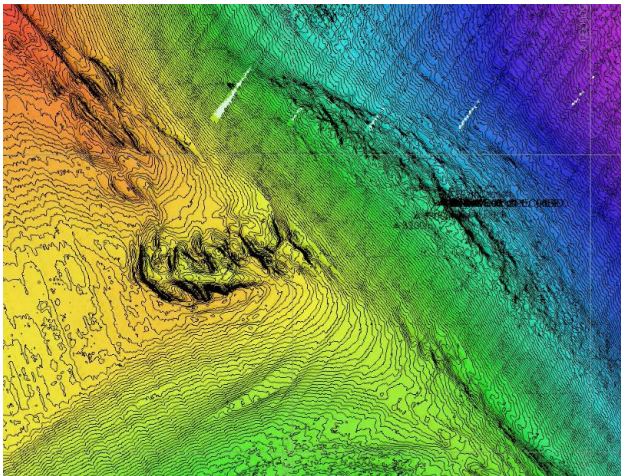
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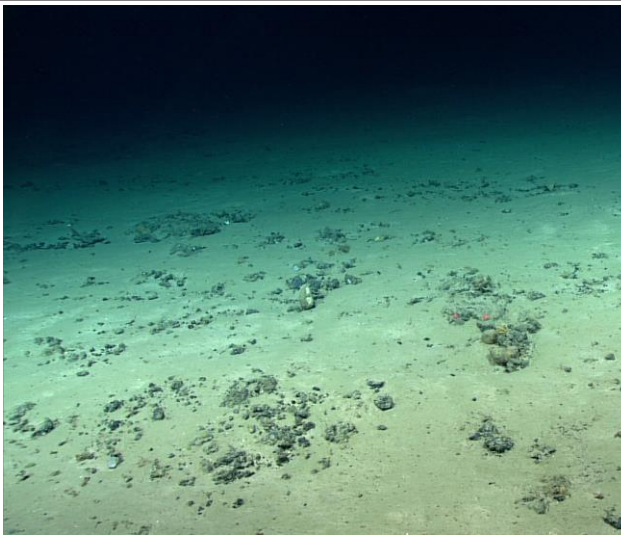
<p>Purpose of the Dive</p>	<p>This dive is part of a series that investigate the similarities and differences in community composition among deepwater habitats of the SE US continental margin. The primary objective for this dive is to characterize the distribution and abundance of benthic fauna at depths greater than 3000 m. A comparison of the diversity/distribution of coral and sponge communities across the region and to the broader Atlantic is of particular importance to understanding biogeography and connectivity of communities in the Atlantic.</p> <p>This site was proposed by Peter Etnoyer in support of SEDCI objectives, as an unexplored area with potential habitat suitability for corals and sponges. This region was first mapped during the Extended Continental Shelf initiative (UNH-CCOM/NOAA), which provided excellent bathymetry and backscatter imagery. New information acquired from this dive will improve understanding of biogeographic patterns and related geologic features in the region.</p>
<p>Description of the Dive</p>	<p>During this dive, ROV <i>Deep Discoverer</i> explored a low-relief (9° maximum slope, approximately 65m of relief) rocky area of the eastern edge of the Blake Ridge. The dive began at the base of what high resolution maps show as a gently terraced landscape. Substrates throughout the dive ranged from flat/planar muds to mud with significant deposits of FE-Mn gravel, to outcrops of tabular mudstones that tilted beneath the muds. The concentrations of gravel were often in the lee of large sponges, and indicate episodes of significant current velocities. The tilted mudstones supported numerous large sponges, whereas the gravel served as substrate for many smaller organisms.</p> <p>This dive had a high diversity of sponges on the outcrops of rock; however, it yielded fewer coral species than expected. A interesting finding came at 3404 meters where the ROV documented a feather star (Antedonidae, possibly <i>Thaumatometra</i>) that might be a new depth record in the Atlantic Ocean. Sargassum was seen on the sea floor in multiple places, as was anthropogenic debris.</p> <p>Organisms observed on this dive included:</p> <ul style="list-style-type: none"> ● Cnidarians such as Octocorallia: Pennatulacea (sea pens, possibly <i>Pennatula</i>), and Primnoidae (possibly <i>Convexella</i>); Hexacorallia: Actinaria (anemones) and Ceriantharia (tube anemones). ● Porifera where mostly Demospongiae, with <i>Phakellia sp.</i> being the most abundant yet several other species observed including <i>Geodia pachydermata</i>, along with Hexactinellida glass sponges that were less abundant than Demosponges; ● Arthropod crustaceans included Cirripedia (barnacles, possibly <i>Glyptolasma</i>) and Decapods including Pleocyemata shrimp and Anomura such as hermit crabs (Paguroidea), and squat lobsters (Galatheoidea: Munidopsidae) ● Echinodermata such as Ophiuroidea (brittle stars), Crinoidea (feather stars- Articulata, Antedonidae, possibly <i>Thaurmatometra</i>); Holothuroidea (sea cucumbers), and Asteroidea sea stars and Brisingida (Freyellidae);

	<p>Although they were not observed, feeding traces in the sediment may have been made by spatangoid heart urchins;</p> <ul style="list-style-type: none"> ● Polychaeta: tubicolous sabellid fan worms ● Bryozoa: white stalked species ● Chordata, Tunicata: both stalked and colonial species were observed on rocks ● Actinopterygii, Gadiformes, Macrouridae: the abyssal rattail, <i>Coryphaenoides</i> sp., was observed several times. <p>Water column: Ten minute exploratory transects were conducted at 5 depths – 800, 700, 600, 500, and 300 meters. At 800 m, we saw <i>Cyclothone</i> (bristlemouth), single-celled organisms called radiolarians, ctenophores (comb jellies), larvaceans, and a salp. At 700 m, there was a pair of another type of single-celled organism called a coelendrid phaeodarian, Siphonophorae (or Siphonophora), krill, shrimp, and a paralipidid fish (barracudina). During the 600 m, we encountered a bi-lobed euphausid and imaged a large copepod. Siphonophores and chaetognaths were abundant at 500 m, where there was also an unidentified worm. The peak water column backscattering was coincident with 500 m, possibly coming from the physonect siphonophores and/or from fishes that may have been avoiding the ROV. The final transect, at 300 m, was fairly sparse, but we did see some siphonophores and a chaetognath.</p>	
Notable Observations	<p>This site was located within a very large area of high backscatter intensity, and we had anticipated seeing much more hard substrate. The tilted mudstones suggest that rock lies just below the muds, and that the acoustic signal was reflecting off the near subsurface. This example should be considered when seeking hard substrate for benthic habitats.</p>	
Community Presence/ Absence (<i>community is defined as more than two species</i>)	<input checked="" type="checkbox"/> Corals and Sponges Present <input type="checkbox"/> Chemosynthetic Community Present <input type="checkbox"/> High biodiversity Community Present	<input type="checkbox"/> Active Seep or Vent <input type="checkbox"/> Extinct Seep or Vent <input type="checkbox"/> Hydrates Present
Overall Map of the ROV Dive Area		Close-up Map of Main Dive Site





Representative Photos of the Dive



Mud was the dominant substrate, but many areas of Fe-Mn gravel rubble were observed.



Some areas had dense gravel with some larger tabular pieces.

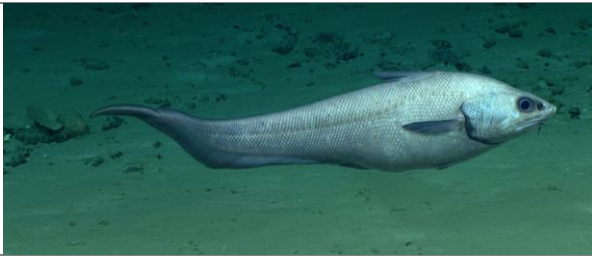


Several *in situ* rock outcrops were observed. These tilted, tabular, lithified mudstones are substrate for



Fauna observed on the dive included many demosponges.

many sponges and other organisms



The abyssal rattail *Coryphaenoides* sp. was also observed.

Samples Collected

Sample

Sample ID	D2_DIVE02_SPEC01BIO	
Date (UTC)	20180615	
Time (UTC)	161329	
Depth (m)	3394	
Temperature (°C)	2.20	
Field ID(s)	Bryozoa	

Reason for Collection	<i>Collection required for identification</i>
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Notes	
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[Notes section here can include number of organisms, condition of organism(s) upon retrieval or photos as needed]

Associates	Associate ID	Field Identification	Notes
	A01	Fe-Mn encrusted mudstone gravel	Several small irregular pieces, ranging 4 to 7 cm. Heavily encrusted.
	A02	Tunicata	Encrusting on same rock primary specimen was attached to


Sample

Sample ID	D2_DIVE02_SPEC02BIO	
Date (UTC)	20180615	
Time (UTC)	170237	
Depth (m)	3380.32	
Temperature (°C)	2.2	






Field ID(s)	Demospongiae		
Reason for Collection	<i>Collection required for identification</i>		
Notes			
Associates	<i>[Notes section here can include number of organisms, condition of organism(s) upon retrieval or photos as needed]</i>		
	Associate ID	Field Identification	Notes
	None		

Sample

Sample ID	D2_DIVE02_SPEC03BIO		
Date (UTC)	20180615		
Time (UTC)	172224		
Depth (m)	3378.53		
Temperature (° C)	2.2		
Field ID(s)	<i>Geodia pachydermata</i>		
Reason for Collection	<i>Possible inclusion in ASPIRE connectivity studies, but also for confirmation of identification</i>		
Notes	Long spicules, organism consistency tough, maintains shape		
Associates	Associate ID	Field Identification	Notes
	A01	Fe-Mn Mudstone Gravel	single small irregular piece, 9 cm, heavily encrusted.
	A02	Demospongiae	Spherical

Sample

Sample ID	D2_DIVE02_SPEC04BIO		
Date (UTC)	20180615		
Time (UTC)	172642		
Depth (m)	3878.61		
Temperature (° C)	2.2		
Field ID(s)	Demospongiae		
Reason for Collection	<i>This was characteristic of the dive site and collection was required to confidently identify it</i>		
Notes	Specimen consistency not dense (as compared to SPEC03BIO), easily damaged if not careful. Only one of three Ophiuroidea associates was retained for collection, others fell off.		
Associates	Associate ID	Field Identification	Notes
	A01	Ophiuroidea	Two arms only

Sample									
Sample ID	D2_DIVE02_SPEC05BIO								
Date (UTC)	20180615								
Time (UTC)	175413								
Depth (m)	3371.33								
Temperature (°C)	2.2								
Field ID(s)	Tunicata								
Reason for Collection	<i>Collection required for identification</i>								
Notes	Specimen was somewhat deflated upon arrival at the surface, tissue subsamples for DNA analysis will be important for ID. A large scoop of mud for sediment analysis was also collected.								
Associates	<table border="1"> <thead> <tr> <th>Associate ID</th> <th>Field Identification</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>A01</td> <td>Mud (>80% clay); beige</td> <td>May be calcareous ooze - needs HCl test. The non-clay component of this mud is >90% planktonic foraminifera</td> </tr> </tbody> </table>			Associate ID	Field Identification	Notes	A01	Mud (>80% clay); beige	May be calcareous ooze - needs HCl test. The non-clay component of this mud is >90% planktonic foraminifera
	Associate ID	Field Identification	Notes						
A01	Mud (>80% clay); beige	May be calcareous ooze - needs HCl test. The non-clay component of this mud is >90% planktonic foraminifera							
Sample									
Sample ID	EX1806_DIVE02_SPEC06_GEO								
Date (UTC)	20180615								
Time (UTC)	180600								
Depth (m)	3364.77								
Temperature (°C)	2.2								
Field ID(s)	Mudstone - tabular and lithified								
Reason for Collection	Representative of hard-bottom habitat for this location.								
Notes	Comprised of lithified fine clays and silts, perhaps of biogenic origin. It did not effervesce with vinegar, however (no HCl on board). It has a reddish color indicating oxidized Fe. This rock was found in numerous outcrops as tabular layers tilting into the muds that occur at this location. Numerous large sponges were found on every outcrop. There were no organisms on this rock other than a few very small hydroids (not preserved)								

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