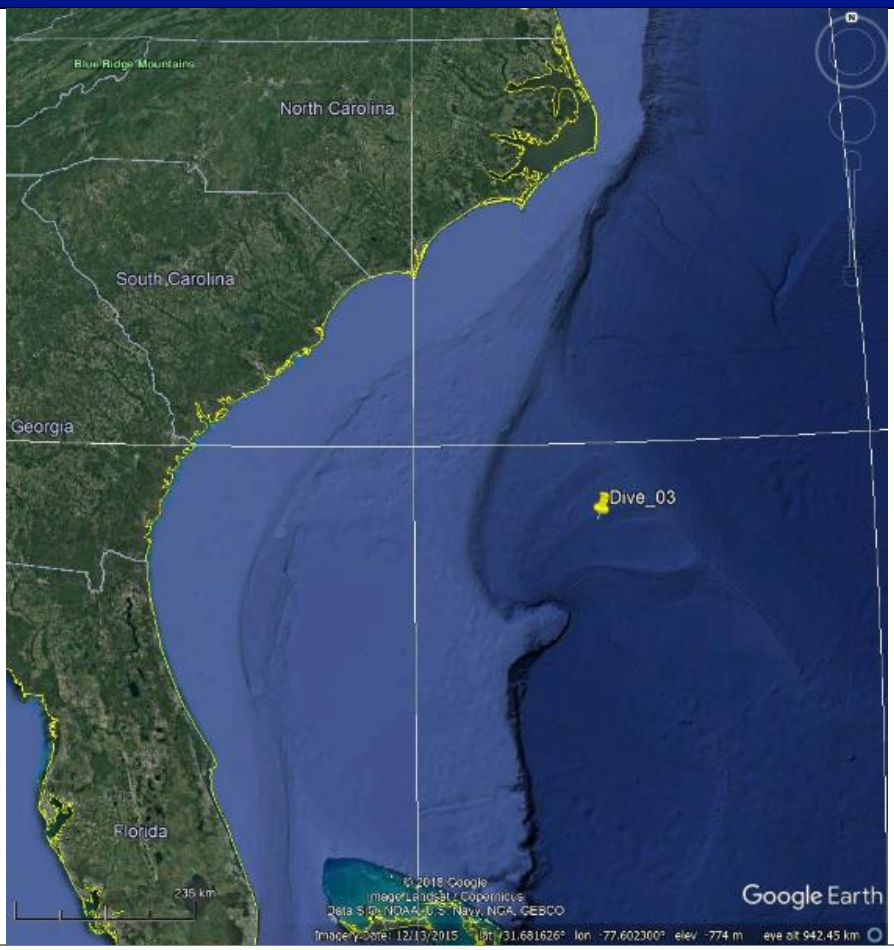
Ocean Exploration and Research

Okeanos Explorer ROV Dive Summary

Dive Information	
General Location	
General Area Descriptor	Blake Ridge, Southeast US Continental Margin
Site Name	Giant Bedforms
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	DIVE03

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

During power-on predive, one of the LEDs on Seirios went out after a few seconds. We removed the light and dummied, and then proceeded with the dive. *Seirios* had a ground fault on the DC bus. We investigated, but could not yet determine the cause. *Seirios* CTD DO data also appears to be having an issue, but we have yet to find a smoking gun. The CTD did not seem to be the source of the ground fault. ROV team replaced the DO sensor with the spare.

ROV Dive Summary (from processed ROV data)

Dive Summary: EX1806_DIVE03

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In Water:	2018-06-16T12:25:08.508422 31°, 9.352' N ; 75°, 39.655' W
On Bottom:	2018-06-16T14:14:10.781698 31°, 9.506' N ; 75°, 39.725' W
Off Bottom:	2018-06-16T18:45:28.253538 31°, 9.949' N ; 75°, 39.759' W
Out Water:	2018-06-16T20:49:15.797093 31°, 9.538' N ; 75°, 40.778' W
Dive duration:	8:24:7
Bottom Time:	4:31:17
Max. depth:	3358.0 m

Special Notes

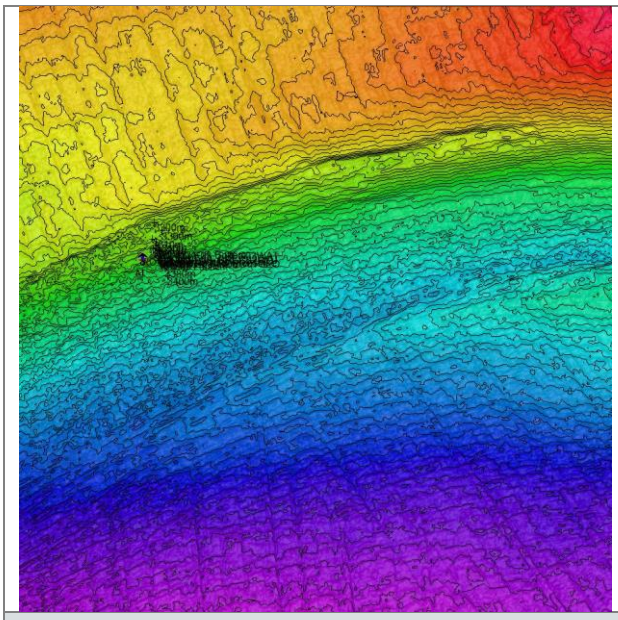
Scientists Involved (please provide name, location, affiliation, email)

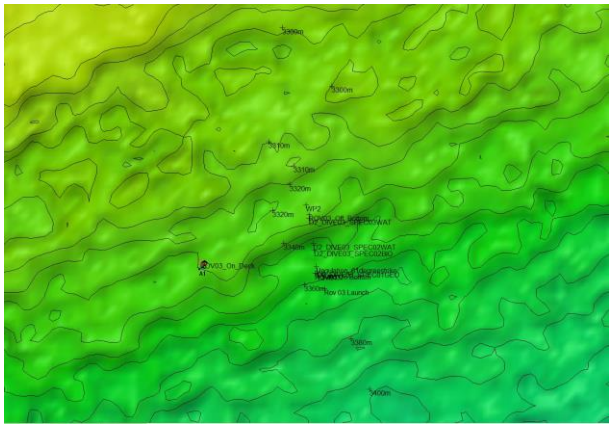
Name	Institution	Email
Adrienne Copeland	NOAA OAR OER	adrienne.copeland@noaa.gov
Amanda Netburn	NOAA/OER	amanda.netburn@noaa.gov
Andrea Quattrini	Harvey Mudd College	aquattrini@g.hmc.edu
Andrew Shuler	NOAA/JHT, inc.	andrew.shuler@noaa.gov

Asako Matsumoto	Planetary Exploration Research Center, Chiba Institute of Technology	amatsu@gorgonian.jp
Charles Messing	Nova Southeastern University	messingc@nova.edu
Christopher Kelley	University of Hawaii	ckelley@hawaii.edu
Christopher Mah	Dept of Invertebrate Zoology, NMNH Smithsonian	brisinga@gmail.com
Daniel Wagner	NOAA-OER	daniel.wagner@noaa.gov
Derek Sowers	OER	derek.sowers@noaa.gov
Enrique Salgado	NCCOS	enrique.salgado@noaa.gov
Erik Cordes	Temple University	ecordes@temple.edu
George Matsumoto	MBARI	mage@mbari.org
Heather Judkins	University of South Florida St. Petersburg	Judkins@mail.usf.edu
Jim Masterson	FAU Harbor Branch Oceanographic ECC	jmaster7@fau.edu
Kate Rose	NOAA NCEI	kate.rose@noaa.gov
Kevin Jerram	UNH	kjerram@ccom.unh.edu
Lauren Walling	Univeristy of Louisiana, Lafayette	c00305146@louisiana.edu
Les Watling	University of Hawaii at Manoa	watling@hawaii.edu
Leslie Sautter	College of Charleston	Sautterl@cofc.edu
Mark Benfield	Louisiana State University	mbenfie@lsu.edu
Matt Dornback	NOAA-NCEI	matt.dornback@noaa.gov
Megan McCuller	North Carolina Museum of Natural Sciences	mccullermi@gmail.com
Michael Vecchione	NOAA/NMFS National Systematics Lab	vecchiom@si.edu
Nicole Morgan	FSU	nbmorgan11@gmail.com
Nolan Barrett	South Carolina Unisersity	barrettnh@g.cofc.edu
Robert Carney	Louisiana State Univ	rcarne1@lsu.edu

	Sandra Brooke	Florida State University	sbrooke@fsu.edu
	Santiago Herrera	Lehigh University	sherrera@alum.mit.edu, sah516@lehigh.edu
	Scott Allen	NOAA Ship Okeanos Explorer	
	Scott France	University of Louisiana at Lafayette	france@louisiana.edu
	Scott Harris	College of Charleston	harriss@cofc.edu
	Shirley Pomponi	CIOERT - FAU HBOI	SPomponi@fau.edu
	Stephanie Bush	Smithsonian	stephalopod@gmail.com
	Tamara Frank	Nova Southeastern University	tfrank1@nova.edu
	Tara Harmer Luke	Stockton University	luket@stockton.edu
	Thomas Hansknecht	Ret. taxonomist (mobile Alabama	tjhansk@comcast.net
	Tina Molodtsova	Shirshov Institute of Oceanology RAS	tina@ocean.ru; tina.molodtsova@gmail.com
	Tracey Sutton	Nova Southeastern University	tsutton1@nova.edu
	Treyson Gillespie	College of Charleston	gillespieta@g.cofc.edu
	Upasana Ganguly	University of Louisiana at Lafayette	upasana.ganguly1@louisiana.edu
	Zach Proux	College of Charleston	prouxzs@g.cofc.edu
Purpose of the Dive	Multibeam maps of the area show a zone of irregular, poorly resolved features that may be current-generated bedforms. The objective of working here is to learn about large bedform evolution under current flow. There is uncertainty as to the origin of these bedforms. Roger Flood of Stony Brook, who proposed the dive interprets the irregular topography as bedforms formed by current flow, while others who are studying this area suggest that underlying gas hydrates may cause faulting and seeps, leading to the topography. Hydrates are known to occur in this general vicinity and there could be venting along faults in the area. Prior Alvin dive sites were nearby (1329-1332), but no dives have been made in this portion of the US EEZ.		
Description of the Dive	This site is within a large region located on the southern extent of the Blake Ridge. The area has an extensive field of enormous undulating giant bedforms that have not been explored. The dive began on the southern slope of a smaller bedform, traversed over the crest and into a broad trough, then up the southern slope of a second bedform that has over 30 m of relief. The crest-to-crest wavelength of these 2 bedforms is approximately 800 m, representative of the area's bedform field. Sediments collected were stiff and cohesive. Clay-sized particles (likely		

<table>
<tr><td></td><td colspan="2">CaCO3 nannofossils) dominate (estimated at >80%), with planktonic foraminifera dominating the silt-size fraction.
Since no hard substrate was found in this area, the fauna observed on this dive generally were stalked to remain off the soft sediment.
Cnidarians such as Octocorallia: Pennatulacea (sea pens, possibly Umbellula), Hexacorallia: Actiniaria (anemones, including Actinodendron on hermit crabs) and Ceriantharia (tube anemones).
Porifera where mostly Hexactinellida glass sponges, possibly Euplectella and Hyalonema, Demospongiae including stalked sponges and and small, round sponges.
Arthropod crustaceans included Cirripedia (gooseneck barnacles, on stalks of sponges) and Decapoda including Anomuran hermit crabs (Paguroidea).
Echinodermata such as Ophiuroidea (brittle stars), Holothuroidea (sea cucumbers), and Asteroidea sea stars and Brisingida (Freyellidae); Although they were not observed, feeding traces in the sediment may have been made by echiurid worms;
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, Coryphaenoides sp., was observed several times.</td></tr>
<tr><td>Notable Observations</td><td colspan="2">Most of the area's substrate was smooth, however linear ripples were observed along a steep face of one of the larger bedforms. These ripples indicate stronger flow velocity. Only a few solitary glass sponges were observed.</td></tr>
<tr><td>Community Presence/ Absence (community is defined as more than two species)</td><td>X Corals and/or Sponges Present
☐Chemosynthetic Community Present
☐High biodiversity Community Present</td><td>☐Active Seep or Vent
☐Extinct Seep or Vent
☐Hydrates Present</td></tr>
<tr><td colspan="2">Overall Map of the ROV Dive Area</td><td>Close-up Map of Main Dive Site</td></tr>
</table>



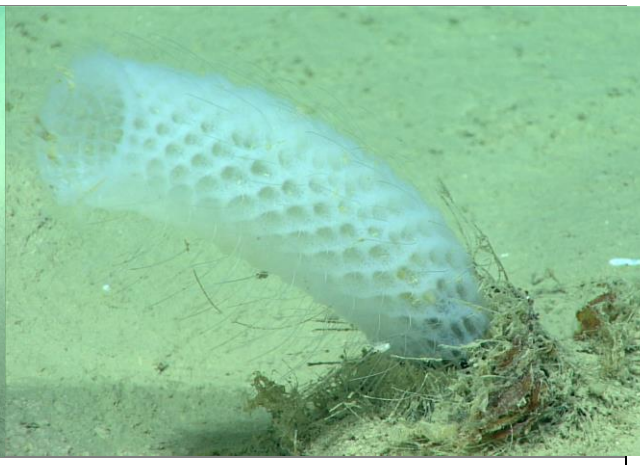


Representative Photos of the Dive

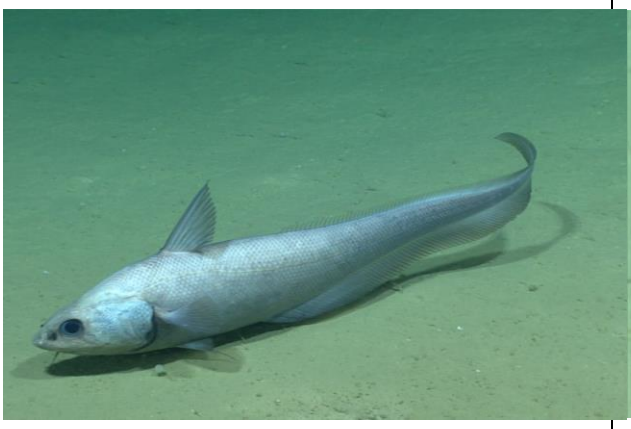
Most of the dive consisted of flat, low-sloped mud substrate. Mounds and burrow traces were observed throughout. As anticipated, no rocky substrate was observed.

10 to 15 scour mark pits were seen. These may be evidence of beaked whale feeding behavior.

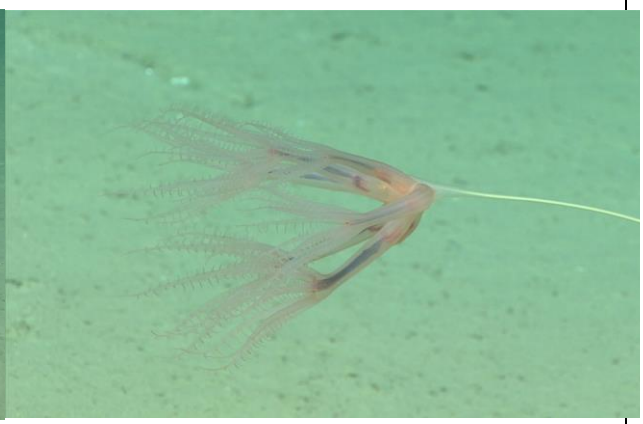
Near to the crest of the first giant bedform, a steep slip-face was encountered. Ripples on this surface were asymmetric and indicate a strong current flow (towards the camera) along its edge. Glass sponges were the only fauna observed.



Glass sponges were the dominant fauna. Each sponge appeared to be anchored into the sediment (or small rock in sediment) with *Sargassum* frequently caught up on the sponge.



Rattails (*Coryphaenoides* spp.) are the dominant fish in this area.



Several stalked sea pens (*Umbellula* spp.) were observed

Samples Collected

Sample

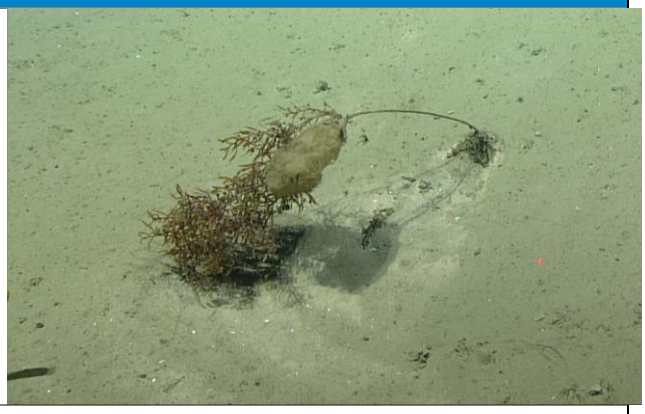
Sample ID	EX1806_DIVE03_SPEC01GEO
Date (UTC)	20180616
Time (UTC)	143326
Depth (m)	3341.88
Temperature (°C)	2.24
Field ID(s)	Mud
Reason for Collection	*Representative substrate for entire dive.*

Notes	These muds are beige in color, with a stiff consistency. They are estimated as having >80% clay size particles. The remaining silt-size fraction is composed primarily of planktonic foraminifera shell remains. The clay did not effervesce with vinegar, but should be tested with HCl for verification of $CaCO_3$, as nannofossil ooze is likely comprising the fine material.
Associates	

Associate ID	Field Identification	Notes
None		

Sample

Sample ID	EX1806_DIVE03_SPEC02BIO
Date (UTC)	20180616
Time (UTC)	164139
Depth (m)	3338.32
Temperature (°C)	2.24
Field ID(s)	Pyuridae (Tunicata)
Reason for Collection	Rare Fauna
Notes	
Associates	



Associate ID	Field Identification	Notes
None		

Please direct inquiries to:

NOAA Office of Ocean Exploration & Research
1315 East-West Highway (SSMC3 10th Floor)
Silver Spring, MD 20910
(301) 734-1014