



CRUISE REPORT

R/V Brooks McCall
September 27th to October 8th
2018

for

DEEP SEARCH

**DEEP Sea Exploration to Advance Research on
Coral/Canyons/Cold Seep Habitats**

**Deepwater Atlantic Habitats II: Continued Atlantic Research
and Exploration in Deepwater Ecosystems with Focus on
Coral, Canyon and Seep Communities
Contract – M17PC00009**

Scientific Goals and Expectations

The pre-cruise goals this research cruise were:

1. Conduct CTD casts to collect sediment (monocore) and water samples (down to 2000 m). Niskin bottles on the rosette will be used to collect water for aragonite saturation, particulate organic matter, eDNA, suspended sediment concentration, and nutrients. The CTD will have a prototype digital video camera and lights mounted to the rosette to image the seafloor at collection locations above 1750 m. A monocore will be attached on a line to the base of the CTD rosette to collect sediment samples for each cast and the use of the monocore will be up to the discretion of Furu Mienis and the chief scientist. Focus would be on Canyon and Seep soft bottom areas.
2. Deploy two deep-sea instrumented landers (Appendix C). Plans called for four deployments in all, two short-term (4 days) and two long-term (~ 1 year).
3. Conduct replicate trawling operations using a midwater trawl (see Appendix D) from the stern A-frame. Target depths will be approximately 200-300 m, 350- 500 m, and 550-650 m, with target depths based on the depth of the Deep-Scattering Layer (DSL; as determined using the ship's system, particularly the 38-kHz signal). Ideally trawls would be conducted above, within, and below the DSL.
4. Collect sediment samples from seep and canyon sites using a piston corer outfitted with a USBL beacon.

Science Party

Tracey Sutton	Chief Scientist	Novel Southeastern University (NSU)
Nina Pruzinsky (TS)	Trawling data management	NSU
Natalie Slayden (TS)	Trawling/tissue processing	NSU
Ryan McGonagle (TS)	Trawling/tissue processing	NSU
Furu Mienis	Principal Investigator-landers	NIOZ
Sofia Ledin (FM)	Landers	NIOZ
Hannah Choi (MJ)	PI - sediment	UG
Nora Dohrmi (MJ)	Joye sample processing	UG
Zac Marinelli (MJ)	Joye sample processing	UG
Sarah Cahill (AD)	Core processing	USGS
Will Jenkins (AD)	Tissue processing	USGS
John Schiff (NP)	CTD processing	TAMU
Dylan Wilford (JMO)	Passive acoustics	UNH
Alexis Weinnig (EC)	Database Manager	Temple
Katheriine Coykendall (CM)	CTD processing	USGS

Daily Summaries (note: all times listed as local time [EDT])

Sept 27th - 30th

A portion of the science party began arriving in Jacksonville on Sept 27th and began mobilizing and building the landers. The chief scientists and the remainder of the science party, as well as the TDI technical crew, arrived and mobilized the rest of the science gear on Sept 29th. Once on the ship, the science party spent the 30th trying to partition and organize the lab space for everyone's various needs.

Oct 1st

A Jacksonville Port Authority reporter came by the ship on the morning of October 1st and interviewed the chief scientists and a few others of the science party. The ship left port at 10:55. The first way point was the Million Mounds station, with a late-night (03:00) arrival expected. However, the sea state was too rough for operations, and with no immediate weather break forecasted we bypassed Million Mounds and continued to the next site (Richardson Bend). During transit, the science party held a planning meeting to discuss and partition water and sediments needs. Many of the science party and three of five TDI technical crewmembers were seasick at this time.

Oct 2nd

We arrived at Richardson Bend and planned two CTD casts and one midnight trawl. We found out the ship had no capacity to determine bottom depth or the depth of the deep scattering layer for trawling because the Furuno acoustic unit was not operable, and had not been for quite some time before the cruise. All bottom depths for the remainder of the cruise were estimated from the nearest point on a paper chart in the wheelhouse (± 1 fathom, age and accuracy of the chart unknown). The first CTD (CTD 001) was deployed at 19:15, but none of the bottles fired. A second CTD (CTD 002) was deployed and the bottles fired at depth and on the surface. We postponed the next CTD until morning so a midnight trawl could be conducted. The trawl at that point was located near the gunwale (secured for the transit). The chief scientist requested the trawl be craned into a mid-deck position for trawling. He was informed that the crane operator was asleep and it was suggested that the trawl be manually carried to mid-deck. Given that the trawl weighs ~500 lbs when ballasted, this option was rejected by the chief scientist, curtailing the first trawl operation.

Oct 3rd

On the morning of October 3rd the next CTD cast (CTD003) was conducted at Richardson Bend around 11:00. Following the CTD cast, a piston core was deployed twice at Richardson Bend (first unsuccessful - crew forgot to attach beacon; second attempt was successful, PC01). We transited to the next station, Richardson Hills, arriving after a 4-h delay (ship went to wrong station initially). At Richardson Hills, we then collected another piston core (PC02), which was quite long (~ 6 m). The plastic tubing jammed into the corer, resulting in a portion of the core needing to be extruded into plastic bags. We then transited one hour to the Richardson Hills lander deployment site. Once on site, we conducted CTD

cast (CTD004) at 21:30. The winch failed while the CTD was at ~830 m depth (alternator needed replacement), resulting in extensive delay. We postponed the remaining CTD and lander deployment until morning because the deck crew's shift time had expired.

Oct 4th

On the morning of October 4th a second CTD cast (CTD005) was conducted at Richardson Hills 08:00. Following the CTD cast, we deployed the first lander, though miscommunication between deck crew and wheelhouse resulted in the deployment site being ~0.4 km off target. At 11:00 we began a 24-h transit to Pamlico Canyon. En route, the health condition of a member of the science party continued to deteriorate so a decision was made around 14:30 to change course and head to port in Morehead City, NC, to drop that person ashore for medical attention.

Oct 5th

The ship arrived at Morehead City at ~09:00 and two of the science party (Zac and Nora) were transferred off. The two were met by Kerry Ireland of the UNC Institute of Marine Science, who kindly offered to take Zac to seek medical attention and to house both until travel arrangements were made. [POSTCRUISE NOTE: Zac was taken to ER, where we was diagnosed with severe dehydration. He was given IV treatment and is now doing fine.] The ship then started a 10-h steam back to Pamlico Canyon. Once on the Pamlico site, we conducted a CTD cast (CTD 006) and a piston core deployment (PC03). During preparation of the piston core, an error in A-frame manipulation caused the piston core to be disassembled, delaying the operation, and eliminating the possibility for a nighttime midwater trawl operation.

Oct 6th

The second lander was deployed at ~01:00, on target. After the deployment, the ship began a 48-h transit back to Jacksonville, Florida.

Scientific Accomplishments

CTD Casts

Over the course of the cruise, six CTD casts were conducted. Two CTD casts were conducted at both Richardson Bend and Richardson Hills to collect water throughout the water column at each site (but not near bottom given the inability to determine water depth). The video camera on the rosette successfully imaged the seafloor at Richardson Hills. One CTD cast was conducted at Pamlico Canyon to collect surface and bottom water before the lander deployment. The water collected was subsampled for aragonite saturation, particulate organic matter, eDNA, suspended sediment concentration, and nutrients.

Multicoring

The multicore was not deployed at any sites due to lack of bottom depth information.

Piston cores

Sediment cores were collected using a piston corer with a 725-kg head weight and fitted with a 6-m barrel with 7.2-cm diameter liners. On deck the liner was cut into pieces of 100 cm or shorter, if necessary, capped, labelled, and stored at 4 °C.

The first piston core was taken at Richardson Bend with a recovery of 3.23 m. The sediment mainly consisted of coarse carbonate (foraminiferal) sand with some coral fragments, suggesting that this core was taken off-mound. The second core was collected from the Richardson Hills cold-water coral area. This core was taken at an on-mound site and was characterized by the presence of *L. pertusa* fragments in a fine sediment matrix. Due to movement of the inner plastic liner, the deepest part of the core could not be retrieved in one piece. The top part, which was still present inside the plastic liner, consisted of 4.85 m of sediment. The third core was taken in the Pamlico Canyon at a depth of 1940 m. A full core was retrieved (>5.85 m), consisting of silty clay. A large pebble was found in the core catcher.

Station	Lat (N)	Lon (W)	Depth	Core length (cm)
BMCC-3Oct18-04-PC1	31 48.41	77 35.62	655	323.5
BMCC-3Oct18-05-PC2	32 00.22	77 23.76	655	>485
BMCC-6Oct18-10-PC3	34 55.41	75 09.07	1940	>585

Benthic landers

Two benthic landers were deployed to measure near-bed environmental conditions over longer time scales (~year) at a cold-water coral reef and a canyon site, respectively. The initially planned short-term deployments were aborted due to the 12-h reduction in daily crew capacity and concerns about deployment/recovery ability. Only long-term deployments were conducted. Below the configuration of both lander systems is described.

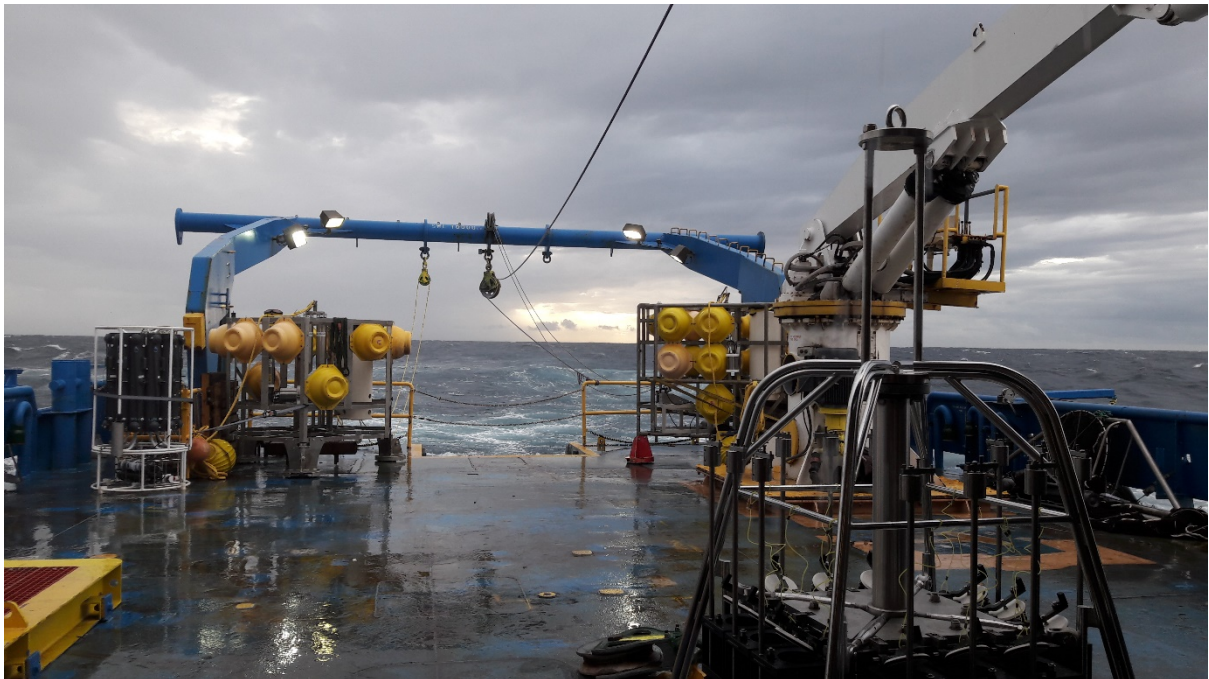
ALBEX

An ALBEX lander was deployed at Richardson Hills for a long-term deployment of a year. The ALBEX lander consisted of an aluminium tripod equipped with 12 glass Benthos™ floats, two IXSEA™ acoustic releasers and a single 270-kg ballast weight, necessary for deployment and recovery. An iridium beacon and large orange flag were attached to the frame to locate it after surfacing. Furthermore, the lander was equipped with a Nortek™ Aquadopp current meter to measure current direction and speed, a combined OBS-fluorometer sensor (Wetlabs™) to measure particle density and fluorescence. These were connected to a NIOZ-built datalogger and a Technicap PPS4/3 sediment trap, with an aperture at 2.20 m and a rotating carousel of 12 bottles, configured to collect material over a 25-day period. In addition, the lander contained a baited experiment to census fishes and

mobile species (e.g., crustaceans) at the study site. For this experiment the lander was equipped with a HD video camera (Sony) with infra-red illumination (LED), directed at the bait fitted in a sediment trap carousel (24 bottles), rotating at 14-d intervals. The camera will film every two hours for 15 seconds throughout the deployment period.

BOBO

The BOBO lander consisted of an aluminium tripod equipped with 13 glass Benthos floats, two IXSEA acoustic releases, one ballast weights of 300 kg, an iridium beacon and an orange flag. The lander was equipped with a Seabird CT sensor to measure temperature and salinity, a down-ward looking ADCP at 2 m above the bottom to measure current speed, current direction and acoustic backscatter in 1 m bins, and a combined Wetlabs turbidity and fluorescence sensor for measuring particle density and fluorescent particles in the water column. Furthermore, BOBO was equipped with a Technicap PPS4/3 sediment trap with the aperture at 1.90 m above the bottom and a rotating carousel of 12 bottles, which will rotate every 25 days. The BOBO lander was deployed at 1940 m water depth in the Pamlico Canyon.



Midwater trawls

Vessel and crew limitations prevented accomplishment of any midwater trawling objectives.