*Okeanos Explorer* ROV Dive Summary

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| --- | --- | --- | --- | --- | --- |
| Dive Information | | | | | |
| General Location | |  | | | |
| General Area Descriptor | | Gulf of Mexico | | | |
| Site Name | | Henderson Ridge Mid-South (AT401) | | | |
| Science Team Leads | | Diva Amon and Charles Messing | | | |
| Expedition Coordinator | | Brian Kennedy | | | |
| ROV Dive Supervisor | | Dan Rogers | | | |
| Mapping Lead | | Mike White | | | |
| ROV Dive Name | | | | | |
| Cruise | | EX1711 | | | |
| Leg | | - | | | |
| Dive Number | | DIVE09 | | | |
| 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 | | none | | | |
| ROV Dive Summary (from processed ROV data) | | Dive Summary: EX1711\_DIVE09  ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^  In Water: 2017-12-11T13:32:02.152000  27°, 31.549' N ; 089°, 41.999' W  Out Water: 2017-12-11T21:41:43.014000  27°, 31.582' N ; 089°, 42.348' W  Off Bottom: 2017-12-11T20:58:09.469000  27°, 31.551' N ; 089°, 42.419' W  On Bottom: 2017-12-11T14:13:18.690000  27°, 31.529' N ; 089°, 41.984' W  Dive duration: 8:9:40  Bottom Time: 6:44:50  Max. depth: 1182.8 m | | | |
| Special Notes | | none | | | |
| Scientists Involved  (please provide name, location, affiliation, email) | | |  |  |  | | --- | --- | --- | | **Name** | **Affiliation** | **Email** | | Alexandra Avila | Oregon State University / Nancy Foster Scholar (ONMS) | alexandra.m.avila@gmail.com | | Amanda Demopoulos | USGS | ademopoulos@usgs.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 | | Carolyn Ruppel | US Geological Survey | cruppel@usgs.gov | | Charles Messing | Nova Southeastern University | messingc@nova.edu | | Coleman Heather | NOAA | heather.coleman@noaa.gov | | Daniel Wagner | NOAA | daniel.wagner@noaa.gov | | Diva Amon | Natural History Museum, London | divaamon@gmail.com | | Erik Cordes | Temple University | ecordes@temple.edu | | Kenneth Sulak | USGS | ksulak@usgs.gov | | Kevin Rademacher | NOAA/NMFS/MS Labs | kevin.r.rademacher@noaa.gov | | Kristopher Benson | NOAA Restoration Center | kristopher.benson@noaa.gov | | Lauren Jackson | NCEI-Stennis | Lauren.Jackson@noaa.gov | | Les Watling | University of Hawaii at Manoa | watling@hawaii.edu | | Mary Wicksten | Texas A&M University | wicksten@bio.tamu.edu | | Megan McCuller | Southern Maine Community College | mccullermi@gmail.com | | Nolan Barrett | Harbor Branch Oceanographic Institute at Florida Atlantic University | barrettnh@g.cofc.edu | | Robert Carney | Oceanography and Marine Sciences, LSU | rcarne1@lsu.edu | | Scott France | University of Louisiana at Lafayette | france@louisiana.edu | | Thomas Hourigan | NOAA Deep Sea Coral Research & Technology Program | tom.hourigan@noaa.gov | | Tina Molodtsova | Shirshov Institute of Oceanology RAS | tina@ocean.ru | | Daniel Warren | P&C Scientific, LLC | daniel.warren@pandcscientific.com | | | | |
| Purpose of the Dive | | The dive was within a proposed Flower Garden Banks National Marine Sanctuary expansion zone, and so had significant management implications. The dive explored the main ridge in this area, where multibeam surveys by the NOAA Ship *Okeanos Explorer* identified five possible locations of methane bubble plumes. The area showed high habitat suitability for deep-sea corals in models, so observations supported goals of the Southeast Deep Coral Initiative (SEDCI). ROV exploration of these features will also help determine the geological composition and origin of this area. Additionally, baseline data was collected on the distribution, abundance, diversity, biogeography and connectivity of chemosynthetic and coral communities, as well as surrounding faunal assemblages. | | | |
| Description of the Dive | | EX1711 Dive 9 was on the northern side of the feature located at the site ‘Henderson Ridge Mid South’. The ROV touched down on a sedimented gentle slope with a number of strangely shaped rocks (perhaps extruded burrow casts) encrusted by the stoloniferan *Clavularia rudis*. We observed the shrimp *Glyphocrangon* *neglecta* and the urchin *Gracilechinus affinis* here and throughout the dive, and *lllex* sp. shortfin squid. Fish species included *Ilyophis brunneus*, *Stephanoberyx monae*, *Aldrovandia* sp., Nettastomatidae sp., *Bathypterois* sp., *Coryphaenoides mexicanus*, and several other macrourid species.  The substrate alternated through this area between small carbonate outcrops and sediment with vesicomyid shells (a number of which looked very old), *Lepidisis caryophilia*, Pennatulacea sp., *Gracilechinus affinis* and *G. alexandri*. The carbonate outcrops increased in size as did their associated corals, included *Chrysogorgia* sp., *Swiftia koreani*, *Bathypathes* sp., *Clavularia rudis*, *Acanthogorgia* sp., Plexauridae sp., Actiniaria sp. (Hormathiidae sp.), and *Paramuricea* B3 sp. with accompanying commensals.  The carbonate outcrops transitioned to asphalt extrusions, but these continued to host large coral colonies (*Paramuricea* sp., *Madrepora oculata*, *Clavularia rudis* and *Enallopsammia* *rostrata*). Near these asphalt extrusions, we observed an area of liquid asphalt seepage supporting a small community of *Lamellibrachia* sp.  Progressing through the approximate bubble-stream locations along the dive track, evidence of chemosynthetic activity appeared: reduced sediments, bacterial mats and dead shells of both *Bathymodiolus* sp. and Vesicomyidae sp. At the fourth bubble target on a raised mound of carbonate rock, a concentric cold seep with a methane bubble stream was inhabited by a chemosynthetic community including bacterial mats, *Bathymodiolus* spp. (possibly two), *Alvinocaris* cf. *muricola*, *Pachycara* sp., *Leptochiton micropustulosus*, *Kanoia meroglypta*, *Munidopsis* sp., and many ophiuroids. Both *Desmophyllum* sp. and *Solenosimila* sp. were observed at the top of the carbonate mound.  Spectacular coral gardens appeared as the ROV progressed towards the local high. Some of the corals, especially *Madrepora oculata* and *Paramuricea* B3 sp. were over a metre across and hosted very diverse communities of commensal invertebrates (Chirostylidae sp., *Bathypalaemonella* sp., Scalpellidae sp., *Desmophyllum* sp., Zoanthidea sp. and *Asteroschema clavigerum*). We also observed a smaller assemblage of *Anthothela* sp., as well as a second Stolonifera sp., which encrusted much of the carbonate outcrops.  This dive site hosted incredible deep-sea coral communities confined to asphalt extrusions and carbonate outcrops, indicating how important hard substrates are for increasing the diversity of seafloor communities in predominantly sedimented areas. Notable benthic observations included a yellow ctenophore that had a bubble trapped under one of its lobes, causing it to swim strangely, a possible fight between two *Chaceon quinquedens* over a nearby female, two *Periphylla periphylla* coronate medusae, a black swallower (*Chiasmodon* sp.) with a distended abdomen, and a number of pieces of marine debris. | | | |
| Overall Map of the ROV Dive Area | | | Close-up Map of Main Dive Site | | |
| ../HypackScreenGrabs/DIVE09_Hypack_wide.JPG | | | ../HypackScreenGrabs/DIVE08_Hypack_zoom.JPG | | |
| Representative Photos of the Dive | | | | | |
|  | | |  | | |
| Viscous globs and filaments of tarry asphalt ooze up from a hydrocarbon seep through a thick white bacterial mat at a depth of 1,158 m. | | | A *Paramuricea* sp. sea fan grows in front of a broad “fence” of the stony coral *Madrepora oculata*. Both serve as perches for chirostylid squat lobsters with long slender claws. A serpent star, *Ophiocreas* sp. also finds a home in the sea fan. Depth: 1,129.5 m. | | |
|  | | |  | | |
| Two deep-sea red crabs, *Chaceon quinquidens*, face off claw-to-claw in an apparent dispute over a nearby female. Depth: 1,132 m. | | | Numerous cup corals, *Desmophyllum* sp., and white bushy *Anthothela* sp. octocorals grow on dead branches of *Madrepora oculata*, accompanied by galatheoid squat lobsters. Living *M. oculata* is visible at left rear and right foreground. Depth: 1,132 m. | | |
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| Samples Collected | | | | | |
| Sample | | | | | |
| Sample ID | EX1711\_20171211T155444\_D2\_DIVE09\_SPEC01BIO | | C:\EX_SODA\DIVE09\EX1711_IMG_20171211T154758Z_ROVHD.jpg | | |
| Date (UTC) | 20171211 | |  | | |
| Time (UTC) | 155444 | |  | | |
| Depth (m) | 1167.64 | |  | | |
| Temperature (°C) | 4.35 | |  | | |
| Field ID(s) | Plexauridae | |  | | |
| Commensal ID and Field Identification | Lepadomorpha N=6  Foraminifera N=2  Polynoidae N=1 | | | | |
| Comments |  | | | | |
| **Sample** | | | | | |
| Sample ID | EX1711\_20171211T164223\_D2\_DIVE09\_SPEC02GEO | | C:\EX_SODA\DIVE09\EX1711_IMG_20171211T164111Z_ROVHD.jpg | | |
| Date (UTC) | 20171211 | |  | | |
| Time (UTC) | 164223 | |  | | |
| Depth (m) | 1169.1 | |  | | |
| Temperature (°C) | 4.28 | |  | | |
| Field ID(s) | carbonate rock | |  | | |
| Commensal ID and Field Identification | Sipuncualn N=1  Polynoidae N=2  Bathymodiolus N=3  Gastropoda N=1 | | | | |
| Comments |  | | | | |
| **Sample** | | | | | |
| Sample ID | EX1711\_20171211T202707\_D2\_DIVE09\_SPEC03BIO | | C:\EX_SODA\DIVE09\EX1711_IMG_20171211T202350Z_ROVHD.jpg | | |
| Date (UTC) | 20171211 | |  | | |
| Time (UTC) | 202707 | |  | | |
| Depth (m) | 1133.78 | |  | | |
| Temperature (°C) | 4.57 | |  | | |
| Field ID(s) | Stolonifera coral | |  | | |
| Commensal ID and Field Identification | Polychaeta N=1 | | | | |
| Comments |  | | | | |
| **Sample** | | | | | |
| Sample ID | EX1711\_20171211T205623\_D2\_DIVE09\_SPEC04BIO | | C:\EX_SODA\DIVE09\EX1711_IMG_20171211T205008Z_ROVHD.jpg | | |
| Date (UTC) | 20171211 | |  | | |
| Time (UTC) | 205623 | |  | | |
| Depth (m) | 1130.1 | |  | | |
| Temperature (°C) | 4.62 | |  | | |
| Field ID(s) | Anthothela coral | |  | | |
| Commensal ID and Field Identification | Desmophyllum N=1  Polynoidae N=6  Foraminifera N=1 | | | | |
| Comments |  | | | | |

# Please direct inquiries to:

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