

Okeanos Explorer ROV Dive Summary

Dive Information	
General Location	<p style="text-align: center;">Gulf of Mexico 2017</p>
General Area Descriptor	Gulf of Mexico
Site Name	Dauphin Dome (MC388)
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	DIVE16
Equipment Deployed	
ROV	Deep Discoverer

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Purpose of the Dive	<p>The dive target was within a proposed Flower Garden Banks National Marine Sanctuary expansion zone. , We targeted the western-edge of the dome that had a number of BOEM seismic anomalies and water-column bubble targets detected by the NOAA Ship <i>Okeanos Explorer</i>. The primary objective for this dive was to acquire baseline information on the distribution and abundance of benthic fauna, including chemosynthetic communities and corals. This aided in gaining insight into the diversity, biogeography, and connectivity of these communities, which has management implications. Improving the geological understanding of the composition and origin of the area was also of importance. Following the benthic portion of this dive, there were four exploratory midwater transects (900m, 700m, 500m, 300m).</p>		



Description of the Dive

This ROV traversed areas of hydrocarbon seepage and sedimented seafloor at approximately 1900 m depth. Sparsely scattered Vesicomidae sp. and *Bathymodiolus* sp. shells were observed within the sediment. The sedimented fauna comprised of >50 pairs or aggregations of holothurians (*Paroriza pallens*, *Zygothuria* sp., and *Mesothuria?* sp.). Juvenile *Eynpniastes eximia* and Echinothuriidae sp., as well as several *Parapagurus pilosimanus* with *Epizoanthus* sp. were observed. Fishes and skates included *Aldrovandia* sp., *Alepocephalus* sp., *Bathypterois viridensis*, *Hariotta* sp. and *Dipterus linteus*.

'Dauphin Dome' featured at least ten previously-undiscovered methane seeps with small associated chemosynthetic communities. Most of these seeps were small crater-like features (the size of the ROV *Deep Discoverer*) lined with authigenic carbonate. A methane bubble stream was observed at one site. Living within most of the seeps were dense bushes of both *Escarpia* sp. and *Lamellibrachia* sp. Some of these tubeworms had been parasitized by Phyllococidae sp. At the seep and within these bushes were bacterial mats, Chaetopteridae sp., vigorously-moving tube-dwelling polychaetes (possibly Ampharetidae sp.), *Munidopsis* sp., *Phymorhynchus* sp., *Bathymodiolus brooksi* (varying sizes), Polynoidae sp., *Alvinocaris* sp., Zoanthidae sp., ophiuroids, actinarians, hydroids, cirripeds, and large swarms of copepods. At one site, stoloniferans were also observed growing on the authigenic carbonates. The proportions of these species within the communities varied between seep sites. There was also at least one *Cataetyx laeticeps* within each seep.

Other benthic observations included several pieces of marine debris (monofilament line, a can, two possible ROV push cores and caution tape), a swimming Munnopsidae sp., and an *Argonauta* sp. egg case.

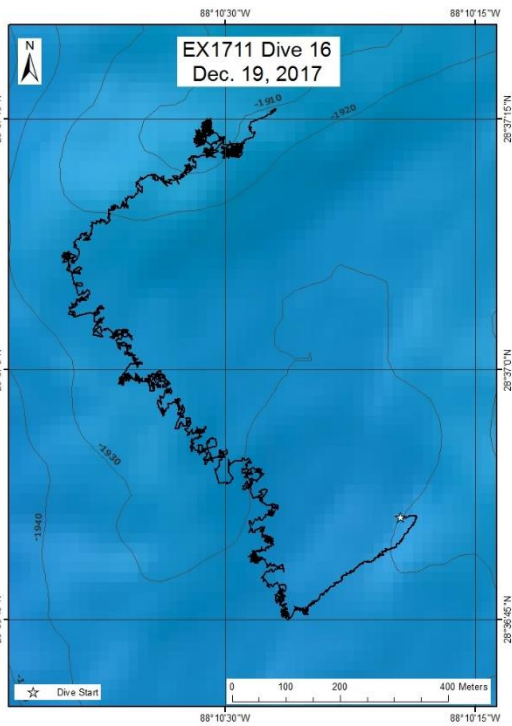
After the benthic exploration of Dauphin Dome, the vehicles positioned themselves for four, 10-minute transects. The midwater ranged from approximately 5°C at 900 m to over 10°C at 300 m. Oxygen hovered at nearly 5 mg L⁻¹ for the dive so there was no focus on lethal hypoxia here. The deep scattering layer (DSL) ranged from 300 m to 500 m and rose to nearly 200 m by the final transect. Altimetry from satellite provided some suggestion that we were diving under the intersection of an anticyclonic eddy and a cyclonic eddy, which might further suggest some increased production at the surface. While NOAA satellites did not report increases in the plant pigment chlorophyll a, we did observe dense marine snow at this site, indicative of at least healthy input of material from some source. Aside from the dynamic surface oceanography, our conditions were consistent with previous dives in EX1711.

A notable sighting of a fish, a look into the trophic ecology of the midwater, a small medusa, and wonderful protists were the biological highlights for this set of midwater transects. Fish experts on our global midwater team were blown away by the appearance of a fish from the genus *Leptocheilichtys*. The observation placed this fish at a shallow depth of 900 m when typical observations place this fish squarely in the bathypelagic zone at ~2000 m, according to FishBase. The sighting of a narcomedusan species in the genus *Solmissus* at 500 m was one of the most recent glimpses. Experts are currently working on the taxonomy of this jellyfish now and the density of tentacle tips and the internal morphology were excellent new data points for their quest. Two salps (most likely *Thalia democratica*) were clearly visible inside the stomach of this jelly hunter. The ROV encountered a small medusa with a bright red stomach, a mostly clear bell, and curled up tentacles at 700 meters. This species might have been from the genus *Pentachogon*. Lastly, the presence of protists with their almost extraterrestrial body forms was again witnessed during our

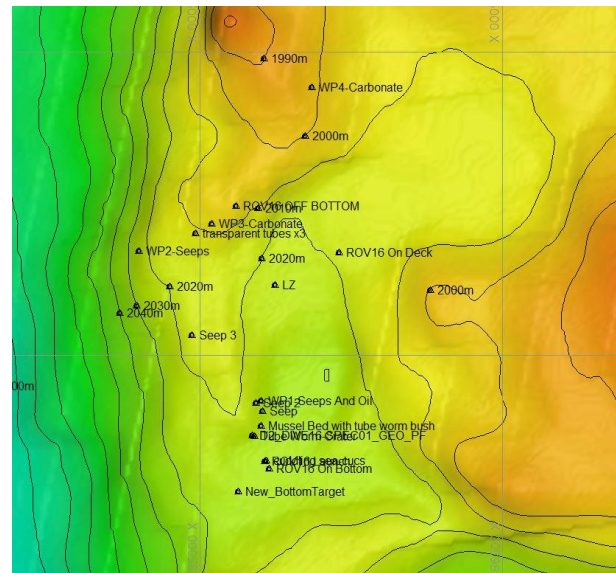


transects. Of note was an observation of a colonial radiolarian in the family Tuscaroridae – our second observation during EX1711, recognized by the size and trailing material hanging from under the spherical aggregation.

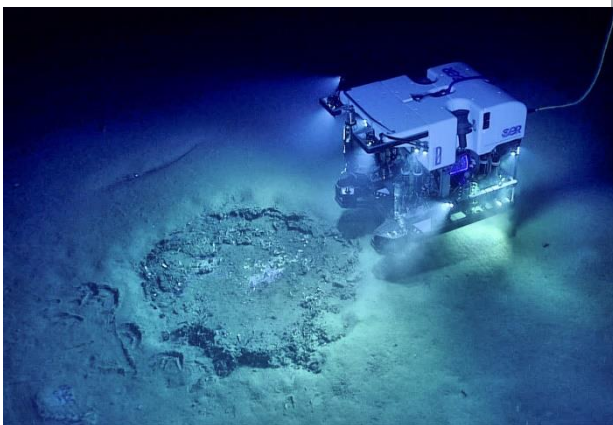
Overall Map of the ROV Dive Area



Close-up Map of Main Dive Site



Representative Photos of the Dive



Deep Discoverer examines a circular cold seep with a rim of authigenic carbonate rock at a depth of 1,931 m.



Hermaphroditic sea cucumbers, *Paroriza pallens*, were the most abundant megafauna seen outside the cold seeps and were often observed in pairs. The nature of their shaggy hanging ornaments remains unknown. Depth: 1,931 m.



A cluster of chemosynthetic organisms at the center of a cold seep dominated by tall *Lamellibrachia* sp. and short *Escarpia* sp. siboglinid tubeworms, and a central cluster of *Bathymodiolus* sp. mussels. Depth: 1,921 m.



A snipe eel, *Avocettina infans*, observed at a depth of 700 m.

Samples Collected

Sample

Sample ID	EX1711_20171219T162756_D2_DIVE16_SPEC01GEO	
Date (UTC)	20171219	
Time (UTC)	162756	
Depth (m)	1930.49	
Temperature (°C)	4.28	
Field ID(s)	authigenic carbonate rock	
Commensal ID and Field Identification	none	
Comments		

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