

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	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	<input checked="" type="checkbox"/> CTD	<input checked="" type="checkbox"/> Depth	<input checked="" type="checkbox"/> Altitude
	<input checked="" type="checkbox"/> Scanning Sonar	<input checked="" type="checkbox"/> USBL Position	<input checked="" type="checkbox"/> Heading
	<input checked="" type="checkbox"/> Pitch	<input checked="" type="checkbox"/> Roll	<input checked="" type="checkbox"/> HD Camera 1
	<input checked="" type="checkbox"/> HD Camera 2	<input checked="" type="checkbox"/> Low Res Cam 1	<input checked="" type="checkbox"/> Low Res Cam 2
	<input checked="" type="checkbox"/> Low Res Cam 3	<input checked="" type="checkbox"/> Low Res Cam 4	<input checked="" type="checkbox"/> Low Res Cam 5
Equipment Malfunctions	none		
ROV Dive Summary (from processed ROV data)	Dive Summary: EX1711_DIVE09		
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	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
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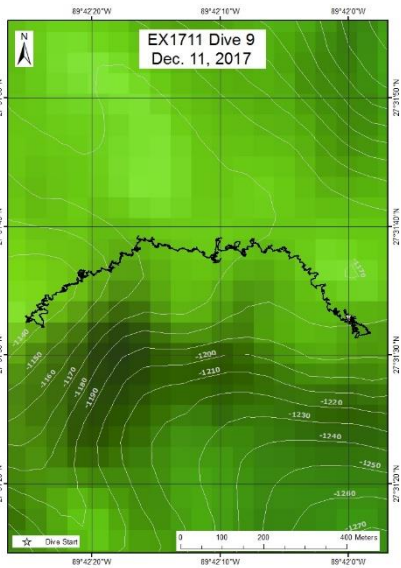
Purpose of the Dive	<p>The dive was within a proposed Flower Garden Banks National Marine Sanctuary expansion zone, and so had significant management implications. The dive explored the main ridge in this area, where multibeam surveys by the NOAA Ship <i>Okeanos Explorer</i> identified five possible 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</p>
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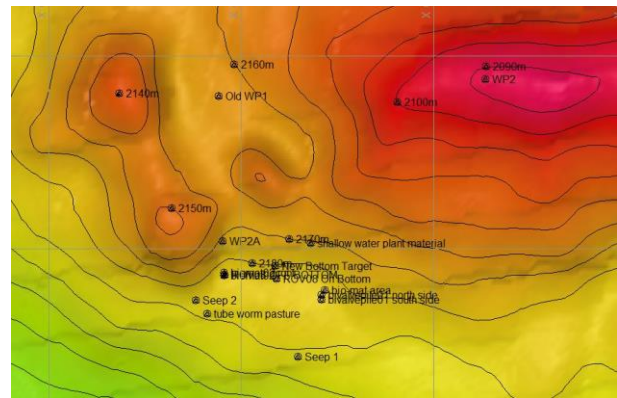
	<p>origin of this area. Additionally, baseline data was collected on the distribution, abundance, diversity, biogeography and connectivity of chemosynthetic and coral communities, as well as surrounding faunal assemblages.</p>
<p>Description of the Dive</p>	<p>EX1711 Dive 9 was on the northern side of 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 <i>Clavularia rudis</i>. We observed the shrimp <i>Glyphocrangon neglecta</i> and the urchin <i>Gracilechinus affinis</i> here and throughout the dive, and <i>Illex</i> sp. shortfin squid. Fish species included <i>Ilyophis brunneus</i>, <i>Stephanoberyx monae</i>, <i>Aldrovandia</i> sp., Nettastomatidae sp., <i>Bathypterois</i> sp., <i>Coryphaenoides mexicanus</i>, and several other macrourid species.</p> <p>The substrate alternated through this area between small carbonate outcrops and sediment with vesicomyid shells (a number of which looked very old), <i>Lepidisis caryophilia</i>, Pennatulacea sp., <i>Gracilechinus affinis</i> and <i>G. alexandri</i>. The carbonate outcrops increased in size as did their associated corals, included <i>Chrysogorgia</i> sp., <i>Swiftia koreani</i>, <i>Bathypathes</i> sp., <i>Clavularia rudis</i>, <i>Acanthogorgia</i> sp., Plexauridae sp., Actiniaria sp. (Hormathiidae sp.), and <i>Paramuricea</i> B3 sp. with accompanying commensals.</p> <p>The carbonate outcrops transitioned to asphalt extrusions, but these continued to host large coral colonies (<i>Paramuricea</i> sp., <i>Madrepora oculata</i>, <i>Clavularia rudis</i> and <i>Enallopsammia rostrata</i>). Near these asphalt extrusions, we observed an area of liquid asphalt seepage supporting a small community of <i>Lamellibrachia</i> sp.</p> <p>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 <i>Bathymodiolus</i> 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, <i>Bathymodiolus</i> spp. (possibly two), <i>Alvinocaris</i> cf. <i>muricola</i>, <i>Pachycara</i> sp., <i>Leptochiton micropustulosus</i>, <i>Kanoia meroglypta</i>, <i>Munidopsis</i> sp., and many ophiuroids. Both <i>Desmophyllum</i> sp. and <i>Solenosimila</i> sp. were observed at the top of the carbonate mound.</p> <p>Spectacular coral gardens appeared as the ROV progressed towards the local high. Some of the corals, especially <i>Madrepora oculata</i> and <i>Paramuricea</i> B3 sp. were over a metre across and hosted very diverse communities of commensal invertebrates (Chirostylidae sp., <i>Bathypalaemonella</i> sp., Scalpellidae sp., <i>Desmophyllum</i> sp., Zoanthidea sp. and <i>Asteroschema clavigerum</i>). We also observed a smaller assemblage of <i>Anthothela</i> sp., as well as a second Stolonifera sp., which encrusted much of the carbonate outcrops.</p> <p>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 <i>Chaceon quinquedens</i> over a nearby female, two <i>Periphylla periphylla</i> coronate medusae, a black swallower (<i>Chiasmodon</i> sp.) with a distended abdomen,</p>

and a number of pieces of marine debris.

Overall Map of the ROV Dive Area



Close-up Map of Main Dive Site



Representative Photos of the Dive



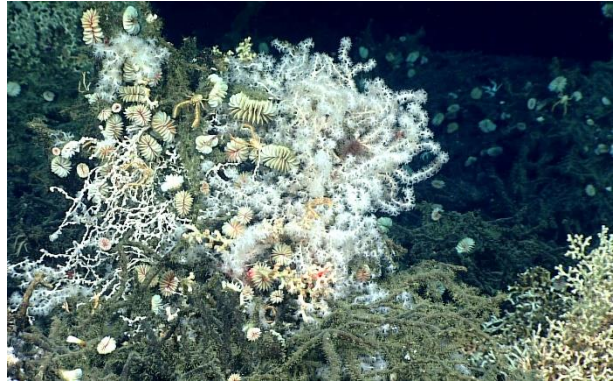
Viscous globs and filaments of tarry asphalt ooze up from a hydrocarbon seep through a thick white bacterial mat at a depth of 1,158 m.



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.



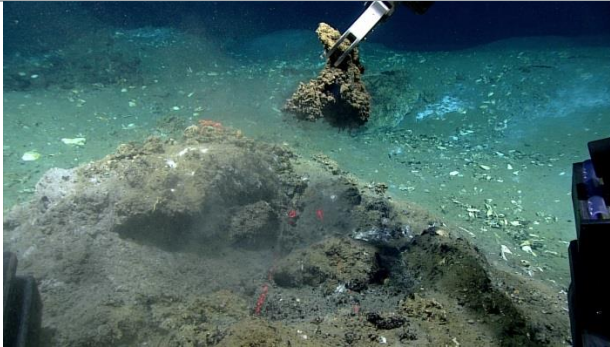
Numerous cup corals, *Desmophyllum* sp., and white bushy *Anthothela* sp. octocorals grow on dead branches of *Madrepora oculata*, accompanied by galatheid squat lobsters. Living *M. oculata* is visible at left rear and right foreground. Depth: 1,132 m.


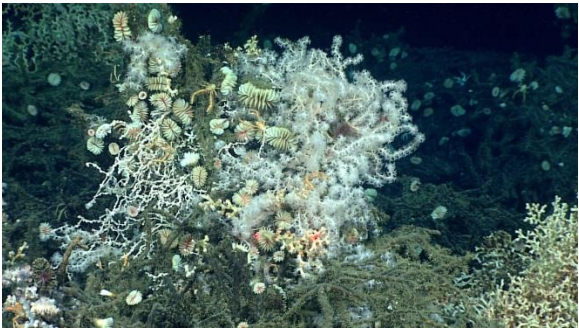
Samples Collected

Sample

Sample ID	EX1711_20171211T155444_D2_DIVE09_SPEC01BIO	
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	
Date (UTC)	20171211	
Time (UTC)	164223	
Depth (m)	1169.1	
Temperature (°C)	4.28	
Field ID(s)	carbonate rock	
Commensal ID and Field Identification	Sipuncularia N=1	

	Polynoidae N=2	
	Bathymodiolus N=3	
	Gastropoda N=1	
Comments		
Sample		
Sample ID	EX1711_20171211T202707_D2_DIVE09_SPEC03BIO	
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	
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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