

Okeanos Explorer ROV Dive Summary

Dive Information	
General Location	
General Area Descriptor	Kingman Reef and Palmyra Atoll Unit of the Pacific Remote Islands Marine National Monument
Site Name	Kingman Reef Deep
Science Team Leads	Scott France/ Del Bohnenstiehl
Expedition Coordinator	Kasey Cantwell
ROV Dive Supervisor	Bobby Mohr
Mapping Lead	Mike White
ROV Dive Name	
Cruise	EX1705
Leg	-
Dive Number	DIVE 12
Equipment Deployed	
ROV	Deep Discoverer
Camera Platform	Seirios

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Purpose of the Dive	This dive will investigate the distribution and abundance of benthic and mid-water fauna, map substrate composition in order to evaluate the relationship between faunal communities and substrate type, collect rock and crust samples to determine their geological and geochemical properties.		
Dive Summary	<p>The ROV dive began in deep water (2250 m) to the NE of Kingman reef. The dive extended along the slope of small cone to a depth of 1820 m at its summit. Mn-crust rocks with small amounts of light colored (biogenic) sediment characterized the seafloor in this region. The overall morphology of the rocks exposed on the seafloor is consistent with volcanic origin; Short lava tubes, pillows, and small flow terraces because more evident near the top of the cone. An area of collapse was evident at the summit. One rock sample was collected (D2_DIVE12_SPEC03GEO).</p> <p>Fauna were sparse at the landing site. Within camera view we saw only a single <i>Pleurogorgia</i> octocoral (with pedunculate barnacles) and several opiacanthid brittle stars. As we moved we saw a few mobile fauna (possible juvenile slime star <i>Hymenaster</i>, brisingids). Sediment pockets around the exposed rock were home to sea pens (<i>Pennatula</i>, <i>Umbellula</i>, ?<i>Scleroptilum</i>); towards the end of the dive we saw several growth different stages of <i>Umbellula</i>, from a 1 polyp to 2 then 3, etc. A colonial bryozoan – with a morphology reminiscent of a tube-dwelling sabellid</p>		



fan worm – was common on exposed rock along the dive track, as well as a smaller fan-shaped colony. Elsewhere on rock surfaces we observed pale *Bathypathes* black corals (with polynoid polychaete), stalked *Culeolus* ascideans.

At 2253 m depth we encountered a relatively tall stalked carnivorous sponge with thick rays arising from a fleshy body, which had a pink tint to the interior; this was a novel enough morphology that a collection was made. A polynoid polychaete curled around the sponge stalk was also collected. Later in the dive we saw a second of these sponges, and it too had a purple polynoid polychaete on the stalk. A remarkable discovery made first at 2241 m depth, and then observed several times subsequently, was of a gastropod associated with the calyx of a 10-armed stalked crinoid (Bathycrinidae ?*Naumachocrinus*). The snail was at the upper part of the stalk just below the crinoid calyx and had extended a large proboscis onto the upper surface of the calyx. Chris Mah (NMNH) communicated that this was reminiscent of figures he had seen of a coprophagus snail (Platyceratidae) known from paleozoic fossils, but thought to be extinct. The crinoid and snail were collected. Further upslope we observed a different species of Bathycrinidae(?) with only 5 arms; our observation showed no gastropod. Even higher on the slope, we began again to see Platyceratidae-like gastropods on stalked crinoids, some with 5 arms (and one with an arcturid isopod clinging to the stalk). At 1990 m depth we saw another Bathycrinidae(?) with a “Platyceratidae” that was on an egg case, and with a second, much smaller snail on its foot; we speculated whether it was a dwarf male fertilizing the eggs. At least 3 more observations were made later in the dive of “Platyceratid” snails on egg cases on bathycrinids. We also observed comatulid crinoids with parasitic eulimid gastropods. Another rare find was the hydromedusae *Ptychogastris*, which spends more time attached to the bottom than in the water column. We found one clinging to a rock under an overhang at 1898 m.

Corals observed were unbranched isidids (the more common resembling *Bathygorgia*, though the observations are shallow for that taxon, and “long bones” clade B), a yellow “*Keratoisis*”, cf *Candidella gigantea*, red morph *Paragorgia* with zoanthids, white morph coralliid with zoanthids, *Chrysogorgia* with chirostylid crab and an isopod curled around the main axis (specific association seen twice), *Metallogorgia*, *Victorgorgia*, *Swiftia*, paramuriceid, *Stichopathes* black coral, cup coral (Scleractinia), and a *Hydrodendron* hydroid fan. In addition to the collected cladorhizid, sponges seen included a “pipe-cleaner” morph and a small sunburst morph of cladorhizid, an unidentified demosponge with two “chimney” oscula, and glass sponges in the Euplectellidae (*Saccocalyx*, *Bolosoma*) and Hyalonematidae.

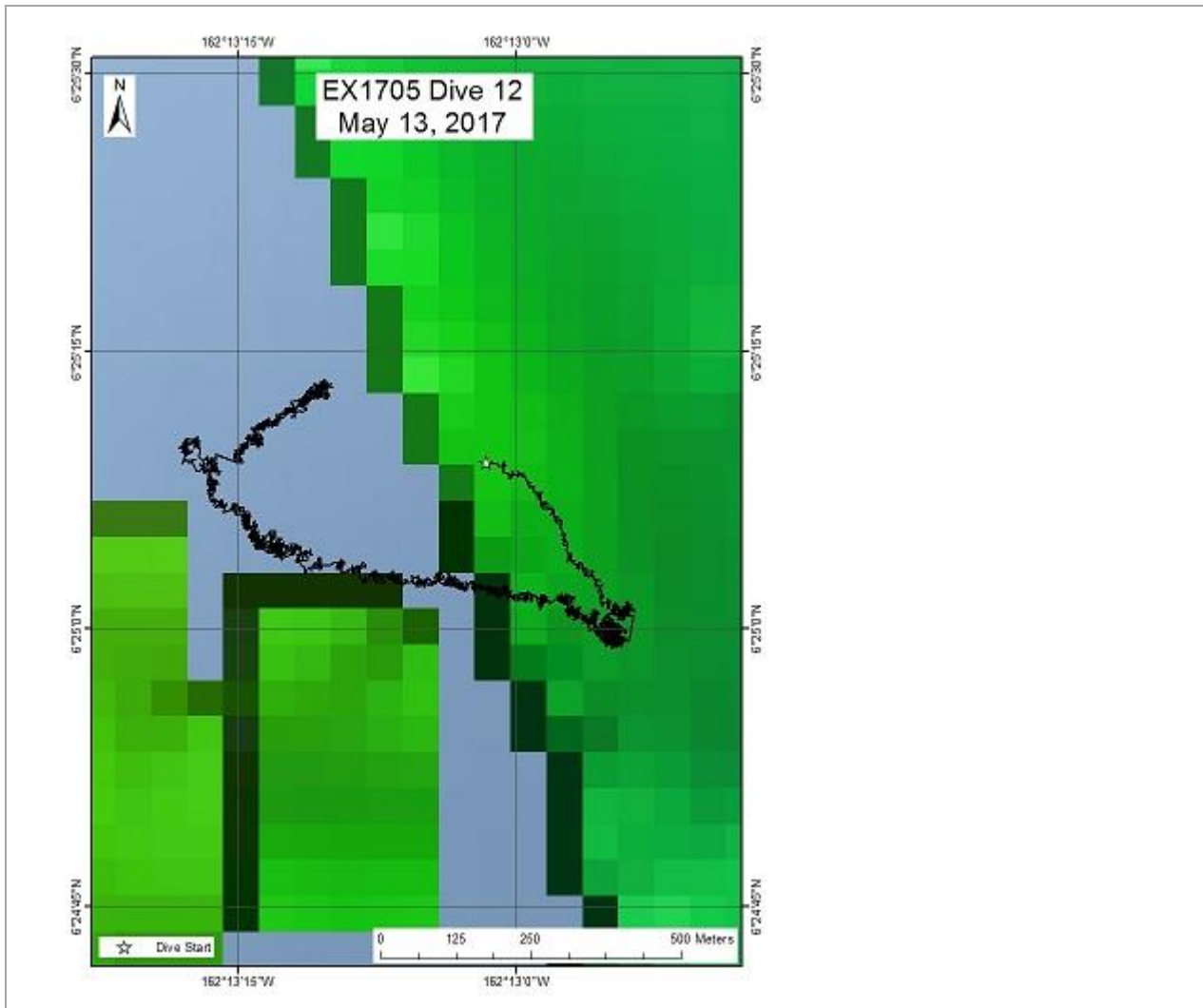
At various points along the dive we observed fecal coils and feeding traces, but it wasn't until 2237 m that we observed our first purple enteropneust (Torquaratoridae). Xx morphs of holothurian were seen (purple few podia; pink warty; deep purple; white purple head; orange; poop covered; *Amperina*). Other fauna included octacnemid tunicates, cidarid urchin, cerianthid tube anemones, red stalked crinoid *Proisocrinus ruberrimus* with pair of amphipods, an unidentified lemon-yellow stalked crinoid, spatangoid urchins (Loveniidae?), pterasterid slime star, pagurid hermit crab, corallimorph, *Relicanthus*, mud stick amphipods (cf *Dyopedos*) and even a swimming polyclad platyhelminth. When we reached the top of the cone feature we were surprised that rather than an increase in the abundance of sessile fauna, it was virtually barren.

Fish were few on the dive, and all the ones we saw happened in very quick succession – a weirdly clumped distribution. Observations were of a rattail (*Coryphaenoides*), a very large black codling (*Antimora* likely *rostrata*), and two halosaurs (possibly *Halosaurus*). In the midwater we saw some hatchetfish and serrivomer eels, possibly a false cutlass fish and a possible dragon fish. Midwater transects were originally planned for 7 different depths starting at 1500 m. After completing the second transect at 1200 m, the winds started picking up and we were informed we would only have time for two more transect depths before recovering the ROV. We decided to target 600 m, which was the core of the oxygen minimum zone ($[O_2] \approx 0.25$ mg/L), and 300 m, which is where we saw a peak in acoustic backscatter indicating a potentially dense layer of animals. At the bathypelagic depths (below 1000 m) we saw a white copepod, clear chaetognaths, a transparent sergestid shrimp, a halicreatid jellyfish, and a larvacean.

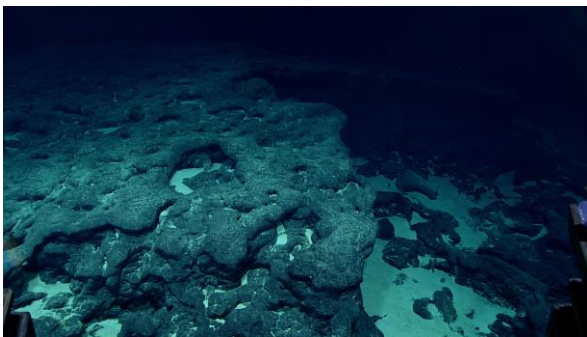
At 600 m, we saw a lot more color and a lot more fish - a bright red shrimp, a dark copepod, a large deep red/brown jellyfish, hatchetfish, serrivomer eel. Many of these animals seemed very active considering the oxygen levels in their environment would be fatal to most other animals. We wrapped up the dive at 300 m, where we saw more fish, some siphonophores, and a hydromedusa jellyfish. Throughout the transects, we encountered multiple targets that we were unable to identify even to phylum.

Map of the ROV Dive Site





Representative Photos of the Dive



Area of collapse on the summit



One of 3 morphs of colonial bryozoan observed during the dive



Mn-crust basalt flows with sediments






Gastropod with proboscis extended onto the surface of the calyx of a stalked crinoid. Several instances of this were observed during the dive as well as multiple instances of the gastropod laying eggs on the crinoid.



Purple enteropneust (*Torquaratoridae*) and its characteristic fecal coils



The hydromedusae *Ptychogastria*, clinging to a rock under an overhang at 1898 m

Samples Collected		
Sample		
Sample ID	EX1705_20170513T211031_D2_DIVE12_SPEC01BIO	
Date (UTC)	20170513	
Time (UTC)	211031	
Depth (m)	2252.44	
Temperature (°C)	2.09	
Field ID(s)	Starburst demosponge	
Commensal ID and Field Identification	EX1705_20170513T211031_D2_DIVE12_SPEC01BIO_A01 Polychaete EX1705_20170513T211031_D2_DIVE12_SPEC01BIO_A02 Barnacles EX1705_20170513T211031_D2_DIVE12_SPEC01BIO_A03 Ophiuroid	
Comments		
Sample		
Sample ID	EX1705_20170513T213544_D2_DIVE12_SPEC02BIO	
Date (UTC)	20170513	
Time (UTC)	213544	
Depth (m)	2241.64	
Temperature (°C)	2.04	
Field ID(s)	Stalked crinoid with snail	
Commensal ID and Field Identification	EX1705_20170513T213544_D2_DIVE12_SPEC02BIO_A01 Snail EX1705_20170513T213544_D2_DIVE12_SPEC02BIO_A02 Crab	
Comments		
Sample		
Sample ID	EX1705_20170513T220250_D2_DIVE12_SPEC03GEO	
Date (UTC)	20170513	
Time (UTC)	220250	
Depth (m)	2237.78	
Temperature (°C)	2.01	
Field ID(s)	Mn crusted rock with bio on it	
Commensal ID and Field Identification	EX1705_20170513T220250_D2_DIVE12_SPEC03GEO_A01 Bryozoan	
Comments		

Please direct inquiries to:

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