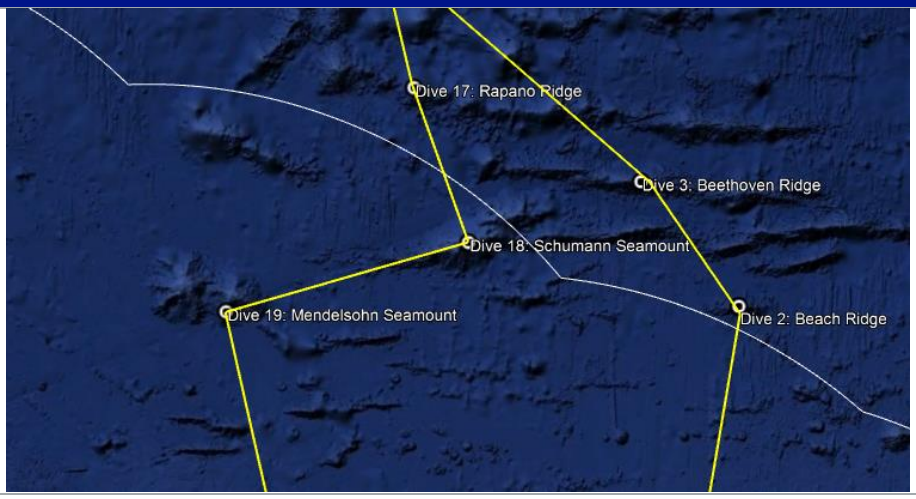
Ocean Exploration and Research

Okeanos Explorer ROV Dive Summary

Dive Information			
General Location			
General Area Descriptor	Musicians Seamounts		
Site Name	Rapano Ridge		
Science Team Leads	John R. Smith/Meagan Putts		
Expedition Coordinator	Kasey Cantwell		
ROV Dive Supervisor	Karl McLetchie		
Mapping Lead	Mike White		
ROV Dive Name			
Cruise	EX1708		
Leg	-		
Dive Number	DIVE17		
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	DO sensor??
ROV Dive Summary (from processed ROV data)	Dive Summary: EX1708_DIVE17 ^^ In Water: 2017-09-23T18:24:02.857000 26°, 35.911' N ; 160°, 40.194' W Out Water: 2017-09-24T04:22:52.561000 26°, 35.679' N ; 160°, 39.836' W Off Bottom: 2017-09-24T01:19:28.710000 26°, 35.703' N ; 160°, 40.388' W On Bottom: 2017-09-23T19:34:17.490000 26°, 35.817' N ; 160°, 40.126' W Dive duration: 9:58:49 Bottom Time: 5:45:11 Max. depth: 2050.3 m
Special Notes	

Scientists Involved (please provide name, location, affiliation, email)

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Purpose of the Dive	The primary objective for this dive is to characterize the distribution and abundance of benthic fauna. The dive is part of a series that will investigate the similarities and differences in community composition between seamounts and ridges in different parts of the Musicians Seamounts. A comparison of the diversity and distribution of coral and sponge communities across the seamounts to the north and to the Hawaiian Ridge and the broader North Pacific is of particular importance to understanding biogeography and connectivity of communities in the Pacific.		
Description of the Dive	**Benthic Exploration** The ROV *Deep Discoverer* (D2) touched down on bottom at time 19:33 at 2050 m water depth on a flat sedimented plain covered by a gravelly surface composed of uniform sized Mn-crusted cobbles. *Anthomastus* sp. and *Hemicorallium* sp. pink corals were seen, along with isolated large talus and boulders. One of the larger boulders or outcrops at 2049 m hosted many biologics including corals. Two squat lobsters on a dual branched black coral were observed at time 19:55 (2046 m). The cusk eel fish, *Eretmichthys pinnatus,* was spotted for the first time this expedition at 2043 m, followed by an especially pink and spiny squat lobster that may be a new genus at time 20:00 (2043 m). Contact was made with the base of the ridge at 2040 m where a ~30° slope ensued, along with many different types of small coral fans. A benthic jellyfish was seen predating on a coral at time 20:18 (2035 m). The first rock collection occurred at 2029 m and was a piece of angular talus near a small pillow outcrop on the slope. Intact pillow flow outcrops with talus in between, along with more and larger corals, were observed beginning at 2021 m and continuing uphill to 2018 m where mostly intact lavas were evident on a ~60° slope. The slope increased again to greater than 60° at 2013 m where low relief pillows and some talus were observed. A high density community was imaged at this depth (time 20:53), after which the slope decreased to ~30° at 2011 m and a large bamboo coral was observed at time 20:56. A contact between an elevated intact flow front ridge and a talus field was observed at 2009 m. The slope steeped to 45-50° at 2002 m where the first sea star, *Hippasteria* sp. of the dive was observed gorging on a Primnoid. Many more such interactions would follow on this dive. A blocky outcrop and blocky talus from it were also seen at this location. Following a large *Poliopogon* sp. sponge at 1999 m, a blocky columnar basalt outcrop, resembling the eroded top of a dike, was observed at 1995m and persisted for quite some time along slope. A massive blocky outcrop with vertical jointing fractures was seen at time 21:41 (1985 m). Biologics including a sea star and an *Astrophiura* sp. brittle star were seen together at time 21:49 (1983 m). A wide shot of corals and sponges oriented in the same direction can be found at 22:29 (1951 m). Similarly, a ledge and drop-off with many corals aligned on the edge was seen at time 22:35 (1944 m). The setting was composed of intact pillow flow units and talus. A contact with sediment and talus to massive boulders with many corals was observed at 1940 m. The first biological collection was made at 1936 m, an unknown Euplectellidae “frilly vase” sponge. An intact pillowed flow area with a		

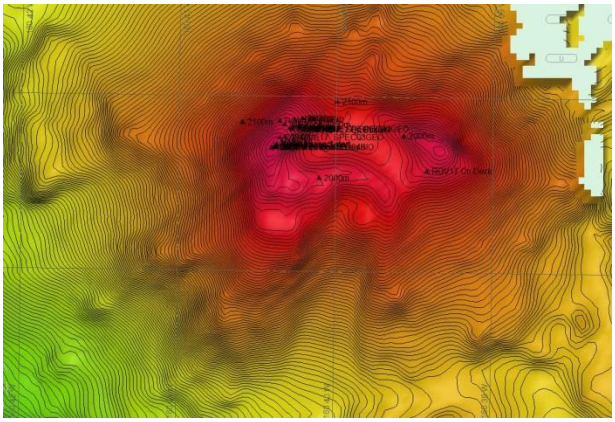
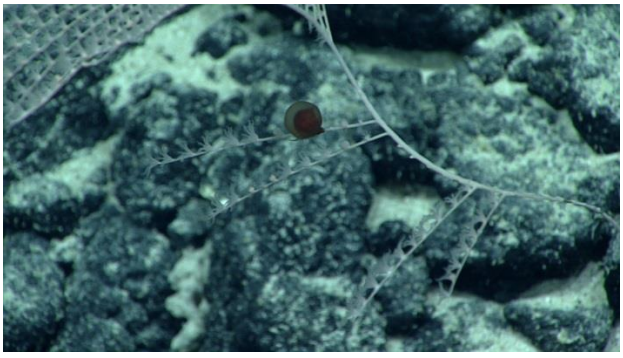
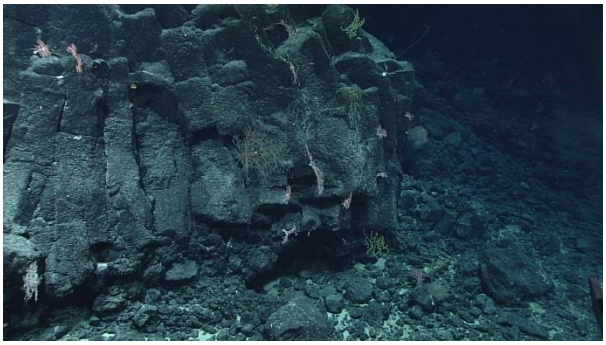
jumbled appearance and some breakage at the base with surrounding talus was observed at 2325 m. The slope flattened out and larger corals and sponges became evident at 1925 m, along with intact flow units, talus, sediment, sea stars, and primnoids. A transition to a greater percentage of angular talus occurred at 1926 m and the corals were observed to be smaller. Shortly after, the slope became ~20° with sediment, talus, and small outcrops and then transitioned again to larger pillow and lobate outcrops at 1917 m. A "sculpted garden" look consisting of outcrops, talus corals (more bamboos, less and smaller primnoids), and a patchy distribution of sponges came into view at time 00:06. Perhaps the largest *Acanthogorgia* sp. ever seen (~0.5 m wide) was observed at time 00:11 (1916 m) and a piece was collected as biological sample #2. The second geological sample was taken at 1960 m, a piece of angular talus from an outcrop base on a ridge near the summit. Small isolated pillow outcrops with angular talus and sediment between were seen at 1903 m, along with numerous huge coral fans. Transition to mostly talus and fewer large corals took place on a broad summit ridge, and it was noted that the corals were larger to either side of the ridgeline. A sea star was seen predating on a *Hemicorallium* sp. that also included zoanthids at time 00:46 (1902 m). Numerous small outcrops of low relief pillow lobes, sediment, and talus along with large coral fans, many being pink coral, were observed at 1903 m along the low summit ridge slope (to either side it was >30°). An unusual wavy primnoid with large disorganized branches was observed and sampled at time 01:16 (1901 m). D2 left bottom at time 01:18 (1901 m).

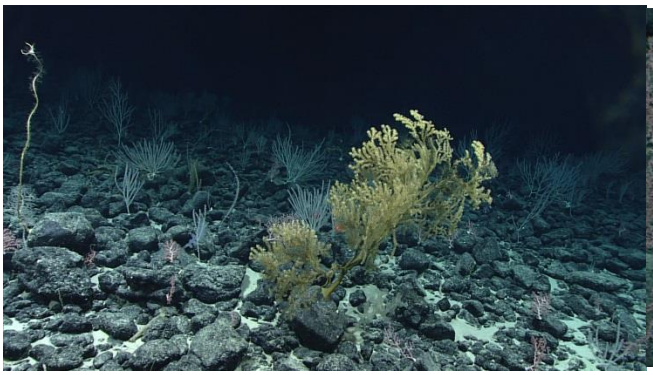
Benthic dive summary and highlights follow. We found another high density coral community here including large *Hemicorallium* sp, Primnoidae, *Acanthogorgia* sp., and glass sponges. There have been many such communities here in the Musicians Seamounts. We also spotted a number of *Hippasteria* sp. sea stars feeding mostly on primnoids, although one was feeding on *Hemicorallium* sp. Other biological highlights included swimming crinoids; *Eretmichthys pinnatus,* cusk eel. Biological collections consisted of a "frilly vase" Euplectellidae glass sponge, possibly the largest Acanthogorgia sp. ever seen, and an unknown primnoid coral.

Mid-Water Transects

A series of mid-water transects at 800, 700, 600, 500, and 300 m took place following the benthic portion of the dive. As we approached the start of the first transect at 800 m, we could see fishes darting off into the distance to avoid the ROV. But not all of the fishes ran away, and we could see a hefty dark fish off in the distance, likely a melamphaid (bigscale), and had an incredible fangtooth (*Anoplogaster* sp.) come right up to the ROV camera, the first ever imaged off of the *Okeanos Explorer*. We also saw chaetognaths (arrowworms), sergestid shrimp, multiple species of ctenophores (comb jellies), and a *Periphyllopsis* sp. jellyfish during the 800 m transect. During the 700 m transect, we encountered multiple siphonophores, a large copepod that tricked us into thinking it was a jellyfish until we got a good focus on it, and an unidentified organism that may have been a nemertean worm, a highly understudied phylum in the water column. We collected some excellent imagery of a piglet squid (*Helicocranchia* sp. in the family Cranchiidae) and a *Solmissus* sp. narcomedusa. At the start of the 600 m transect, we immediately saw a very unusual ctenophore. It had a regular pattern of bright spots that were not familiar to us. This ctenophore could well be a new species. At 500m, we saw a Thalassocalyce ctenophore, a ctenophore that morphologically resembles a true jellyfish. We also saw a hatchetfish and more cyclothone. As we transited

through 400 m on our way to our final transect, we saw numerous siphonophores, *Arctapodema* sp. jellyfish, and other types of jellyfish. Finally at 300 m, we saw several siphonophores, a ctenophore, and chaetognaths. The fauna seemed to be relatively sparse at this depth. The deep scattering layer, as detected using the EK60 sonars, appeared somewhat shallower at this site than it has been on other dives this expedition. We speculate that this could have resulted from the comparatively high concentrations of particulate matter in the water column that was observed at this site, perhaps shading the underlying water and leading to shoaling of isolumes that limit DSL depths.

Overall Map of the ROV Dive Area	Close-up Map of Main Dive Site
	
Representative Photos of the Dive	
	
Jellyfish predation upon an Irridogorgia colony.	Numerous octocoral colonies on a massive columnar basalt outcrop



Dense coral and sponge community on a pillow and talus substrate.

Hippasteria sp. star predating on a *Hemicorallium* sp. pink coral

Samples Collected

Sample

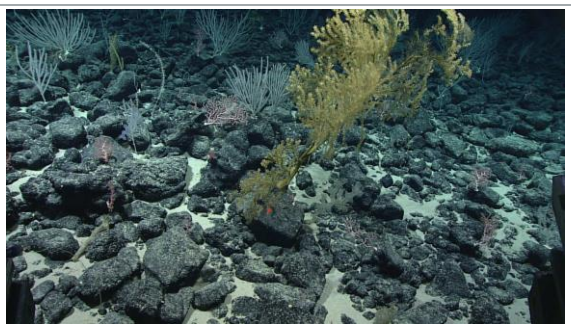
Sample ID	EX1708_D2_DIVE17_SPEC01GEO
Date (UTC)	9/23/2017
Time (UTC)	20:27
Depth (m)	2029.8
Temperature (°C)	2.0
Field ID(s)	Mn encrusted moderately angular basalt talus near small outcrop on slope. Medium sized rock.
Commensal ID and Field Identification	
Comments	

Sample

Sample ID	EX1708_D2_DIVE17_SPEC02BIO
Date (UTC)	9/23/2017
Time (UTC)	23:14
Depth (m)	1937.0
Temperature (°C)	2.0
Field ID(s)	"Euplectellidae" "frilly vase"
Commensal ID and Field Identification	EX1708_D2_DIVE17_SPEC02BIO_A01 Gastropod
Comments	

Sample

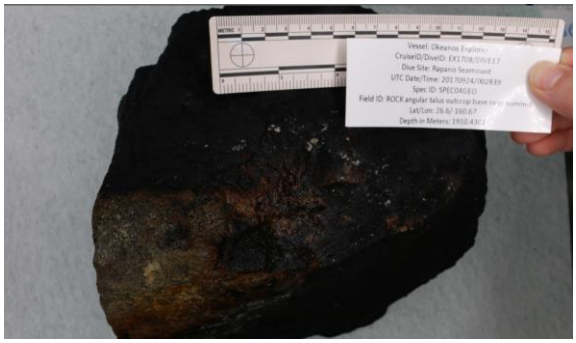
Sample ID	EX1708_D2_DIVE17_SPEC03BIO
Date (UTC)	9/24/2017
Time (UTC)	00:20
Depth (m)	
Temperature (°C)	
Field ID(s)	*Acanthogorgia* sp.



Commensal ID and Field Identification	EX1708_D2_DIVE17_SPEC03BIO_A01 Hydrozoan EX1708_D2_DIVE17_SPEC03BIO_A02 Aplacophoran EX1708_D2_DIVE17_SPEC03BIO_A03 Amphipod
Comments	

Sample

Sample ID	EX1708_D2_DIVE17_SPEC04GEO
Date (UTC)	9/24/2017
Time (UTC)	00:29
Depth (m)	1910.4
Temperature (°C)	2.0
Field ID(s)	Mn-crusted angular talus from outcrop base on ridge near summit. Prismatic shape on bottom. Larger than SPEC01GEO.



Commensal ID and Field Identification	EX1708_20170924T002839_D2_DIVE17_SPEC04GEO_A01 *Hemicorallium* sp.
Comments	

Sample

Sample ID	EX1708_D2_DIVE17_SPEC05BIO
Date (UTC)	9/24/2017
Time (UTC)	01:17
Depth (m)	1901.2
Temperature (°C)	2.0
Field ID(s)	Primnoidae

Commensal ID and Field Identification	
Comments	

Sample		
Sample ID	EX1708_D2_DIVE17_SPEC06BIO	
Date (UTC)	9/24/2017	
Time (UTC)	04:30	
Depth (m)	Unknown, bonus sample	
Temperature (°C)	Unknown, bonus sample	
Field ID(s)	Hemicorallium sp.	
Commensal ID and Field Identification		
Comments	Bonus sample, got caught in the scoop container	

Please direct inquiries to:

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