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**Purpose of the Dive**

To observe geology and fauna on a steep slope near a deep subducting seamount just west of Del Cano Guyot and Pigafetta Guyot and directly in the shallow axis of the trench. This feature is of interest in that it may expose part of a subducting seamount or an uplifted (above the subducting seamount) deep section of forearc lithosphere. Further it affords the opportunity to sample the biology of very deep locations in the MTMNM, which are poorly sampled. The dive started in the axis of the trench (though shallow at this location) and moved northwest up the overriding plate.

### Description of the Dive:

The main objective of today's dive was to explore the transition between the abyssal and hadal zones and to document and characterize fauna on a diversity of habitat types. ROV Deep Discoverer (D2) documented primarily soft bottom fauna, beginning (and continuing throughout the dive) with the spiral fecal trails of acorn worms. There was interest from paleontologists in these trails (neiochnologists study extant systems of organism-environment interactions that are preserved in the sediments); based on the findings (see comments below re: the sedimented ridge covering half of one of the trails), the trails may have been there for a very long time!

D2 settled on a sedimented surface streaked with pale sediment (lee sides of ripples?) on a surface covered with pale brown sediment that was strewn with a very few cobbles of angular to rounded rock with dark to white surfaces. The sea floor was undulatory, not perfectly smooth, and had some channels that appeared eroded by debris either being removed by slumping or located between tongues of slumped debris. We zoomed in on 3 very green rocks (mantle peridotite?) at 00:03 UTC. There were patches and sometimes linear arrangements of cobble- and boulder-sized, angular to sub-rounded rocks. Many had black surfaces, but some were white. A zoom on a small white cobble showed a pale surface in the upper right side of the rock (manganocalcite?).

Most of the dive covered what appeared to be a talus slope with intermittent shallower slopes that were completely sedimented. There were numerous spiral and zigzag trails of benthic animals on the darker sediment, and there were areas where the sediment had a fluffy (biotic?) surface texture. D2 traversed patches of rock rubble of various sizes and some small outcrops of rubble enclosed in a fine clay-like matrix. The surface sediment was very fine in some places, as seen when the ROV touched bottom and during sample collections when clouds of fine sediment were released into the water. The few small exposures of outcropping layers beneath the surface sediment were all light colored and contained rubble. These are suggestive of serpentinite mudflows.

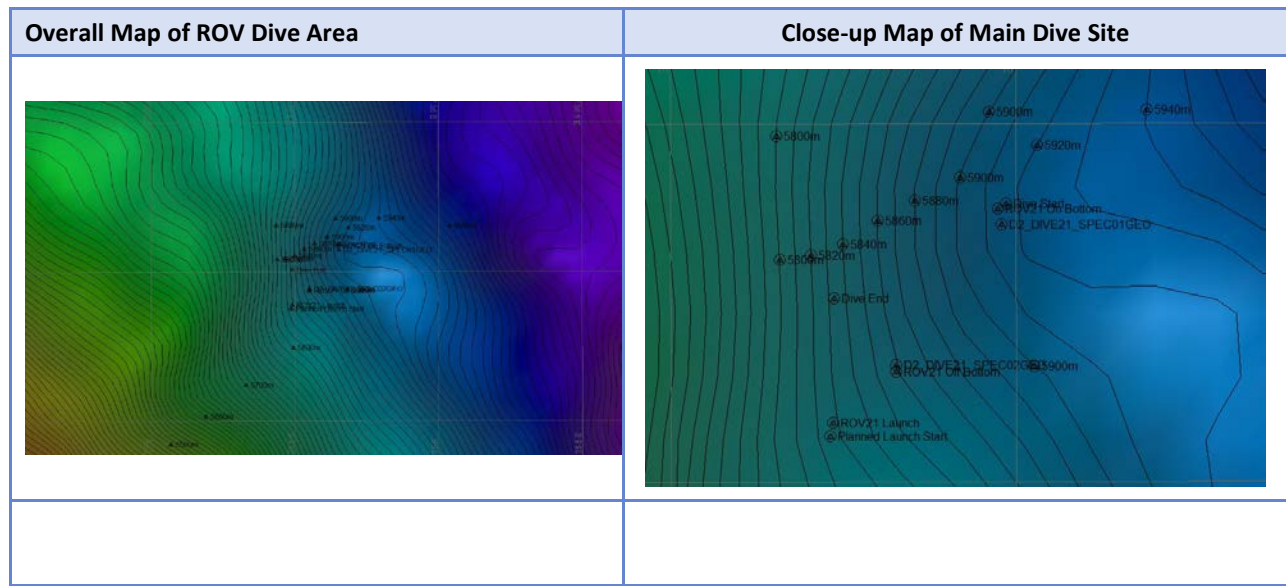
The position of the dive was on the northern slope of a regional "horst" (uplifted footwall block of crust surrounded by normal faults) that has at least 3 large serpentinite mud volcanoes on it, one just west of our dive location. There were also linear trails of large cobbles and small boulders that appeared at the edges of narrow ridges. At 00:28 UTC, there was an outcrop about 2 m high that partially covered a rock strewn lower step on the slope. The outcrop was of mainly pale clay with a small amount of rubble enclosed in it. At 00:39 UTC there was a large boulder with several smaller boulders resting on it and one is definitely peridotite colored. At 00:43:54 UTC there was a ridge of boulders strewn oriented perpendicular to slope that overlies ½ of a spiral worm fecal trail. The trail was still intact, but the ridge is sedimented, indicating that it could not have been emplaced very recently (geologically).

At 00:48:59 UTC, a video clip shows a 1-m-thick light clay-rich sediment (mudflow?) sequence overlying one that seems to contain fewer rock fragments. At 00:59:59 UTC there was what looks very much like a recent serpentinite mud or debris flow, almost entirely unsedimented. At 01:05:30 UTC D2 encountered more pink carbonate boulders in a ridge of mud and rubble that was partially sediment covered but had many large cobbles and boulders on its surface. Above this, the slope was heavily sedimented and showed ripple marks generally oriented perpendicular to slope. This was prime grazing area for holothurians.

Throughout the dive, several different species of holothurians were documented from every angle to enable accurate classification. We learned that *Enypniastes* spp. are bioluminescent, shedding their skin when attacked, and rubbing that bioluminescence off on the attacker. There were a few seastars, and just above the bottom, a narcomedusa jellyfish cooperated with the videographer. Long-legged isopods with very long antennae were documented walking along the bottom.

Once again, cusk eels (*Penopus* sp.) were observed. According to Ken Sulak, the small white drifting fish is the stephanoberycid *Malacosarcus*. These are true deep living fishes, known down to 4500-5500 m.


The dive concluded with a last minute biological collection- a sunburst-shaped carnivorous sponge (likely a new species), attached by a long stalk to a rock (which also landed in the collecting bin). And while the dive didn't get to a rocky slope, the dive did characterize the epibenthic fauna living in this abysso-hadal, soft-bottom zone.

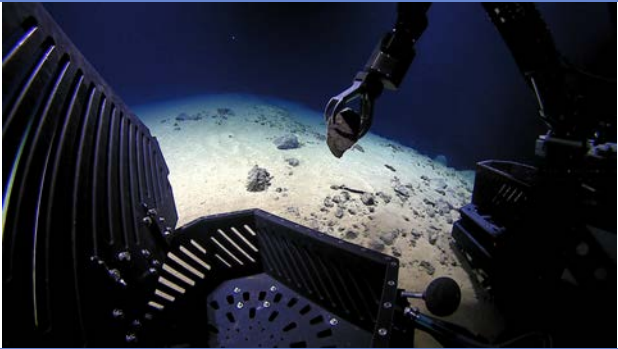


**Representative Photos of the Dive**

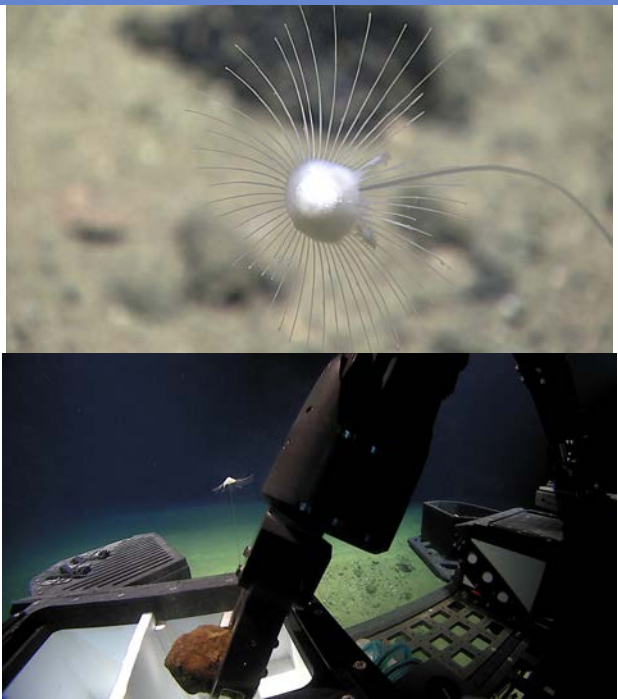


<p>This fragment of carbonate was one of several that we saw that had a coating of pink color. We speculate that the pink areas are possibly manganocalcite as a result of interaction between the calcite and a coating of manganese oxide.</p>	<p>Coiled fecal trails of acorn worms were present throughout the dive. We were lucky to see a few of the acorn worms actually making the trails.</p>
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Samples Collected		
Sample ID	SPEC01GEO	
Date (UTC)	20160707	
Time (UTC)	235525	
Depth (m)	5902.66	
Temperature (°C)	1.59	
Field ID(s)	ROCK	

<b>Comments</b>	11x18x14cm. Course grained igneous rock.	
<b>Sample ID</b>	SPEC02GEO	
<b>Date (UTC)</b>	20160708	
<b>Time (UTC)</b>	023530	
<b>Depth (m)</b>	5817.13	
<b>Temperature (°C)</b>	1.59	
<b>Field ID(s)</b>	ROCK	

<b>Comments</b>	24x13x13cm. Angular massive volcanic rock.	
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<b>Sample ID</b>	SPEC03BIO	
<b>Date (UTC)</b>	20160708	
<b>Time (UTC)</b>	031618	
<b>Depth (m)</b>	5812.67	
<b>Temperature (°C)</b>	1.59	
<b>Field ID(s)</b>	CLADORHIZID SPONGE ON ROCK	

<b>Comments</b>	Unusual starburst head. Top was like an inverted cone with a spicule fringe.	
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<b>Please direct inquiries to:</b>	NOAA Office of Ocean Exploration & Research 1315 East-West Highway (SSMC3 10 <sup>th</sup> Floor) Silver Spring, MD 20910 (301) 734-1014
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