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Purpose of the Dive

Chamorro seamount has no known historical eruptions, but one successful dredge (approximate depth and latitude reported by Bloomer et al., 1989, JGR marked as black circle on map) returned igneous rocks with 65.8 wt% SiO₂, which is among the most compositionally evolved volcanic rocks found in the Mariana arc. We seek to explore Chamorro seamount, including the summit, to observe volcanic stratigraphy *in situ*, sample the rock record

at this location to see if the entire edifice is very compositionally evolved, and explore biological communities at greater water depths than may exist at the summit of other, shallower seamounts in this area.

This dive contributes to each of the five science themes of the CAPSTONE project ***characterize seamounts*** that may contain deep-sea minerals by observing Chamorro seamount *in situ*, ***investigate the geologic history of Pacific seamounts*** by collecting rock samples for laboratory analysis, ***identify and map vulnerable marine habitats*** by collecting high resolution video imagery of biological communities at Chamorro seamount, ***acquire data to support priority monument and sanctuary science and management needs*** by combining the geological and biological observations to inform management policy, and will ***increase understanding of deep-sea biogeographic patterns across the Central and Western Pacific*** by providing observations of Chamorro seamount to place in the context of the rest of the Mariana Trench Marine National Monument.

This dive also contributes significantly to the priorities of the expedition by collecting critical baseline information in deepwater areas and to explore new hydrothermal vent sites and seamounts.

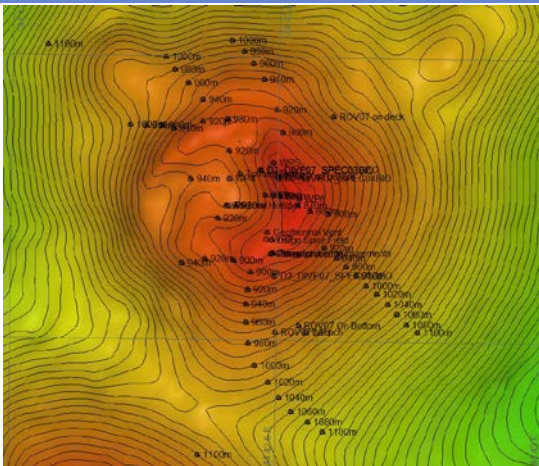
Description of the Dive:

Today's dive rose up the outer southeast slope of the summit crater on Chamorro Seamount and traversed fragmented volcanic ash, cobbles (one was sampled and was white pumice (dacite?) with black phenocrysts (amphibole) and boulders until the ROV encountered small, black, active hydrothermal vents producing 10.5°C fluid. As the ROV made its way upslope, there were some unusual fauna: amphipod families on "sticks" that they constructed; polychelid lobsters (these living fossils are rarely seen; however at least ten were observed during this dive); and 2 species of demosponges. We then found small, black, active hydrothermal vents producing 10.5°C fluid, consistent with the observations made during the NOAA Submarine Ring of Fire 2003 expedition [<http://oceanexplorer.noaa.gov/explorations/03fire/welcome.html>]).

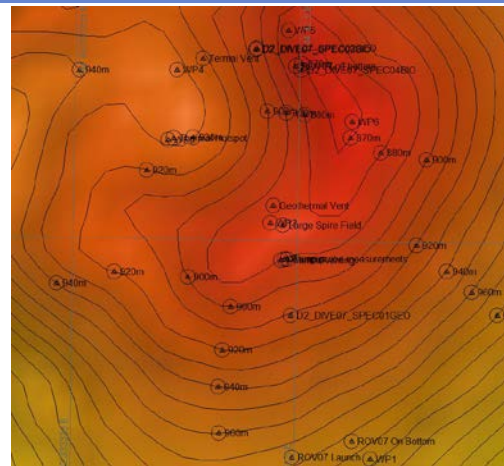
Once D2 reached the top of the crater rim, where there were jagged boulders and a steep drop, D2 descended northward to the crater floor where we found MORE hydrothermal activity; one chimney structure there was venting ~48°C fluids. There were several discrete chimney structures, and the ROV got some great close-ups of them as the vehicle flew north across the crater floor, which was generally smooth and ash-covered. As D2 approached the base of the northern wall of the crater, the seafloor rose up, heavily cracked by up-doming, and more hydrothermal vent structures! These chimney mounds were small (1 to 2 m high), but a temperature measurement taken at one was as high as 31.14°C. Similar structures showed up as D2 ascended northeastward toward the crater rim, and we collected a couple of pieces from the top of one structure very near an active vent (as well as some *Alviniconcha* snails and polynoid polychaetes).

The deep-sea biologists participating in the chat room were excited to see the alvinocaridid shrimps, too! Several interesting fish, including cutthroat eels and rattails, were swimming near the vents. It was hypothesized that the fish may be feeding on the high density of potential food items in the water column near the vents. About halfway up the crater wall the hydrothermal activity disappeared and rubble dominated the substrate again, but this time the rocks were increasingly thickly populated with stylasterid hydrocorals. We collected one of the dominant (and very brittle) stylasterids, along with the rock on which it was growing. The rock is a piece of white pumice with black crystals like the first rock. Patty thinks it's hornblende-rich, dacite pumice with about 3% water content, but this will need to be confirmed after the cruise.

Overall Map of ROV Dive Area



Close-up Map of Main Dive Site



Representative Photos of the Dive





One of the stylasterids that were the dominant fauna as the ROV climbed the rubble covered wall at the end of the dive.



Fish swimming near the vents, including this cutthroat eel, may be feeding on the potentially high density of prey in the water near the vents.

Samples Collected

Sample ID	SPEC01GEO	
Date (UTC)	20160623	
Time (UTC)	224704	
Depth (m)	910.38	
Temperature (°C)	4.55	
Field ID(s)	IGNEOUS ROCK W/ EPIBIONTS	
Comments	19x10.5x13cm, came from field of volcanic rubble	
Sample ID	SPEC02GEO	
Date (UTC)	20160624	
Time (UTC)	032914	
Depth (m)	896.44	
Temperature (°C)	4.57	
Field ID(s)	PIECE OF CHIMNEY	
Comments	Sampled from small hydrothermal chimney in the crater of Chamorro. Grey colored crystals. Samples preserved in ethanol and for DNA.	
Sample ID	SPEC03BIO	
Date (UTC)	20160624	
Time (UTC)	033309	

Depth (m)	896.49	
Temperature (°C)	4.56	
Field ID(s)	GAS (ALVINOCONCHA SP.) ON CHIMNEY	
Comments	5 snails recovered near hydrothermal vent.	
Sample ID	SPEC04BIO	
Date (UTC)	20160624	
Time (UTC)	040404	
Depth (m)	859.01	
Temperature (°C)	4.66	
Field ID(s)	STYLASTERID	
Comments	Volcanic Rubble with stylasterid specimen attached.	
Sample ID	SPEC05GEO	
Date (UTC)	20160624	
Time (UTC)	040404	
Depth (m)	859.01	
Temperature (°C)	4.66	
Field ID(s)	Rock	
Comments	Volcanic rubble field rim of crater. Recovered with SPEC04BIO	
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