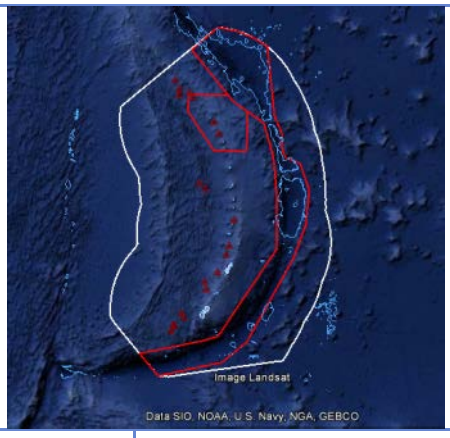
OKEANOS EXPLORER ROV DIVE SUMMARY

Site Name	Subducting Guyot 2	
ROV Lead/Expedition Coordinator	Jim Newman/ Kasey Cantwell	
Science Team Leads	Shirley Pomponi (HBOI-FAU, CIOERT) Patty Fryer (UH)	
General Area Descriptor	Areas in and around the Marianas Trench Marine National Monument	

ROV Dive Name	Cruise	Leg	Dive Number
	EX1605	3	DIVE20
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 2
Equipment Malfunctions			

ROV Dive Summary (From processed ROV data)

Dive Summary: EX1605L3_DIVE20

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In Water:	2016-07-06T20:18:35.035000 18°, 26.836' N ; 147°, 49.778' E
Out Water:	2016-07-07T04:34:04.903000 18°, 27.061' N ; 147°, 50.342' E
Off Bottom:	2016-07-07T02:22:47.325000 18°, 27.083' N ; 147°, 50.051' E
On Bottom:	2016-07-06T22:37:51.512000 18°, 27.071' N ; 147°, 49.807' E
Dive duration:	8:15:29
Bottom Time:	3:44:55
Max. depth:	4438.7 m

Special Notes			
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Purpose of the Dive

This dive was on an un-named guyot that's in the process of being subducted below the Mariana tectonic plate and provides the means to document the "death" of a seamount, being cracked apart and dragged down thousands of meters until it ultimately disappears below the adjacent plate. The guyot is presumably a Cretaceous seamount, located within the Trench Unit of the Monument. The dive addresses two of the CAPSTONE priorities and has objectives that include exploring for high density communities of deep-sea corals and sponges and doing an initial characterization of Mn-crust habitats on one of the presumed oldest seamounts on the Pacific Plate. However, this guyot and Subducting Guyot 1 (Dive 16) are very unusual features and offer a unique exploration opportunity. Due to the flexure of the Pacific plate as it is being subducted, stress fractures have cracked the plate starting at a distance of about 45 kilometers from the edge of the Asia plate. These fractures have continued not only on the seafloor but through the guyots as well, splitting open these seamounts to a depth of hundreds of meters from the surface of their summits. On this particular seamount, a "scissors fault" occurred right in the center of summit with the southern part of the fracture being expressed as a 460 m high wall. This dive starts at the base of this wall and transits up to the top of the fracture, providing a unique look at the inside of a Cretaceous guyot potentially showing a "road cut" view of millions of years of Cretaceous reef growth that would otherwise not be possible to see.

Description of the Dive:

Dive 20 started out on a talus slope with enormous boulders, many bigger than the ROV. The boulders were present for the entire first half of the dive. Many were "massive" looking in terms of texture, but some were clearly breccias with pebble- and cobble-sized rock fragments imbedded in an enclosing matrix. The matrix looked sheared in some boulders and looked more sedimentary in others. The boulders with a sheared matrix are likely composed of fault gouge (rock that is ground up between the faces of a fault trace when movement on the fault takes place at greater depth) and the more sedimentary matrix may indicate a shallower fault gouge (brittle ductile transition does occur in deep-penetrating faults).

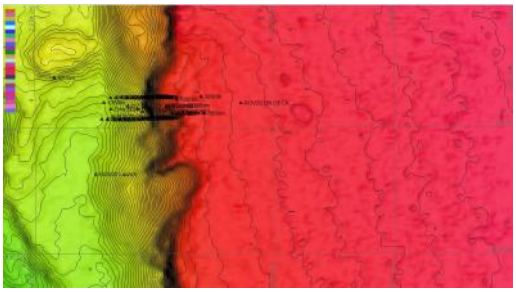
Near the beginning of the dive, at 4387 m, we collected an angular rock fragment that when recovered revealed a glassy surface. It was a classic, very angular pillow fragment and had only a very thin veneer of MnO coating (SPEC01GEO). There were many fractures in the steep-to-overhanging wall up which we rose on the second half of the dive. The wall was cut by near vertical, columnar-jointed dikes. The exposed dikes in the upper part of the wall were multiple intrusions (side-by-side dikes). Much of the exposed rock surface in the wall had only a thin coating of MnO. There were places, however, where the MnO had been removed. Presumably its removal had been by collision with falling boulders from above. Where exposed on the more rough-surfaces boulders, the underlying rock was a lighter color.

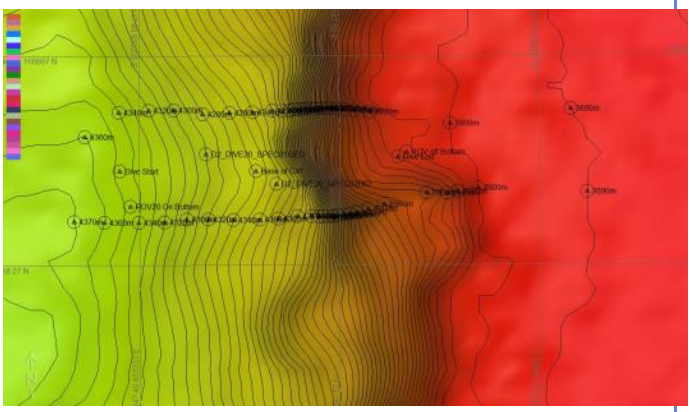
Near the top of the wall there was a sequence of sediments from which protruded some thin slabs of crust (MnO?). The entire sedimentary sequence on the top of the wall looked to be only a couple of meters thick. The uppermost, distinct and somewhat more coherent, sediment layer was only about 20 cm thick. The surface of the upper sediment was ripple-marked. It is most likely that what we dove on today is the deeper eastern extension of an already subducted seamount. That is, the eastern igneous interior of the edifice is exposed on this wall and in the boulders derived from it. Some of the fault blocks on the fractures in the down-going plate do create horst-and-graben structures that also cut through the seamounts, so it is not surprising to be able to see into the deeper flank of the seamount. Bear in mind though that there is a huge down-faulted block in the scarp immediately to the north of our dive location (based on the bathymetry). Today's seafloor transect suggests a relatively recent faulting event evidenced by the many large boulders along the dive track and the thin MnO coating. This may account for the paucity of benthic invertebrates observed on this dive.

And even though the fauna wasn't abundant, many of the organisms we documented were new (species, depths, records, etc.). We started the dive with a hexactinellid sponge that that couldn't be identified into a subclass. We also saw several other unusual glass sponges—at least 5 different species, no doubt all new records for the Marianas. Cnidarians were rare, but the one we did encounter was a huge find: a bamboo coral that is likely to be one of the deepest (if not THE deepest) bamboos ever collected, quite large for this depth and for this part of the ocean! This is likely a 100m depth extension for bamboo corals.

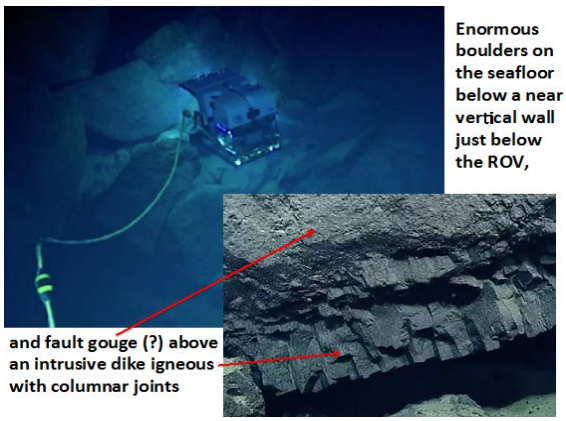
Although not abundant, arthropod diversity was well represented: barnacles, mysids, isopods, shrimp, and squat lobsters. A few brisingid sea stars and crinoids, and a couple of holothurians, and a hooded sea slug (Nudibranchia, Tethyidae, per Scott France) were also observed. Another exciting discovery was an undescribed species of *Pachycara* (or "eelpout"), an abyssal fish genus of the family Zoarcidae. There are only a few described species, and this will definitely be a new record from the Marianas.

Overall Map of ROV Dive Area	**Close-up Map of Main Dive Site**





Representative Photos of the Dive



Composite image of the D2 ROV above the huge boulders at the base of a steep underwater wall(above left) and at lower right two types of rock encountered on the dive. They are a rough-surfaced and possibly cemented mass of ground up rock from along a fault trace (fault "gouge") and an exposure of a narrow (~ 1-m-thick) magmatic intrusion feature (dike) that filled a fracture.

The eelpout, *Pachycara*, is an abyssal fish genus of the family Zoarcidae. There are only a few described species, and this will definitely be a new record from the Marianas.

Samples Collected

Sample ID	SPEC01GEO
Date (UTC)	20160706
Time (UTC)	233809
Depth (m)	4387.29
Temperature (°C)	1.47
Field ID(s)	ROCK; ANGULAR

Comments	38x17x12cm. Pillow lava fragment.

Sample ID	SPEC02BIO
Date (UTC)	20160707
Time (UTC)	004808
Depth (m)	4302.82
Temperature (°C)	1.5
Field ID(s)	ISIDIDAE; BAMBOO CORAL

Comments	

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