

## Okeanos Explorer ROV Dive Summary

Dive Information			
General Location			
General Area Descriptor	Jarvis Islands Unit of PRIMNM		
Site Name	Western Clipperton Fracture Zone		
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 08		
Equipment Deployed			
ROV	Deep Discoverer		
Camera Platform	Seirios		
ROV Measurements	<input checked="" type="checkbox"/> CTD	<input checked="" type="checkbox"/> Depth	<input checked="" type="checkbox"/> Altitude



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Purpose of the Dive	<p>This dive will investigate the distribution and abundance of benthic 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.</p>	
Dive Summary	<p>While we've been targeting seamounts for all of the dives so far on EX1705, today we took a deep dive into the geologic history of the Pacific Seafloor. The ROV descended to depth of 4600 m (our greatest depth so far) along the far western most edge of the Clipperton Fracture Zone. This feature is among the longest tectonics structures on Earth, extending from here in the Line Islands, all the way back to the modern East Pacific Rise.</p> <p>We dove along the south-facing slope of an east-northeast trending ridge along the fracture zone. The scarp was fairly uniform in slope and was largely devoid of sediment, indicating strong bottom currents. Based on the overall morphology of the seafloor, there was no indication that the ridge was formed by secondary volcanism associated with formation of the Line Islands. Rather, this ridge was likely formed in response to transtension or transpression associated with changes in relative plate motion as this part of the Pacific plate formed. The scarp face therefore likely represents a section of the upper ocean crust formed &gt; 120 million years ago. Unfortunately, the rocks were covered thick ferromanganese crust, which made it difficult to observed any primary features. One rock sample was collected, D2_DIVE08_SPEC04GEO. It consisted of two small (&lt; 10 cm) Mn-crusts rocks. Due to the thick Mn-crusts there were few loose rocks that could be collected with the ROV. We also collected a sample of darker colored sediment (possibly radiolarians) that had collected in mats in some places on top of the thin layer of lighter colored sediment and the Mn-crusts rocks (D2_DIVE08_SPEC01GEO).</p> <p>We saw what appeared to be a Dana Octopus Squid (<i>Taningia danae</i>) at 1009 m on the descent, "beaming" its headlight-like tips of its arms; the bright tips may be tissue reflecting light from the ROV or photophores.</p> <p>On reaching the bottom we saw the first of what would become numerous black corals (Schizopathidae, <i>Bathypathes cf. alternata</i>). At first</p>	



it was unclear if these were anchored in the sediment or attached to rock below a thin veneer of sediments; subsequent observations clearly showed a holdfast attached to rock. The sediments were overlaid by what appeared to be phytodetrital floc, and we saw several accumulations of grape-like spherules; these were hypothesized to be radiolarian skeletons that had gathered detritus or some other organism. Similar spherules were seen during the Marianas expedition and here we were able to collect a sample using the shovel. While the spherules were recovered intact, they appeared to be hollow when examined on deck, and thus perhaps they are merely collections of detritus that have been “blown” over the sediment surface into these rounded shapes.

Given the depth and the layer of sediments, it was no surprise to find a diversity of holothurians: *Psychropotes longicauda*, *Amperima* or *Peniagone*, *Orphnurgus*, *Oneirophanta*, *Paleopatides*, and other unidentified Deimatidae, Laetmogonidae and Synallactidae. In the deeper sediments we saw feeding traces of spatangoid urchins (irregular burrowing urchins), but did not see any individuals on the surface.

On exposed rock we saw feeding traces that led us to find chitons (Polyplacophora) at 4543 m. We saw on rock surfaces many occurrences of a small (<5 cm diameter) snow white actiniarian anemone and octacnematid tunicates (at least one with an associated polynoid scale worm). Several bamboo coral whips (*Bathygorgia*) were seen, and one was sampled. This represents the second-deepest known collection of a bamboo coral. An exciting discovery was made at 4514 m, although the extent of the discovery was not realized until the sample was recovered to the ship. A “starburst” cladorhizid carnivorous sponge, almost 60 cm tall, that was not recognized by participating scientists, was collected; growing off the sponge below the radiating spicules was an anemone, and on the stalk a tube that was presumed to be that of a polychaete. However the tube had a chitinous appearance and so was examined further. It turned out to house another anemone, this likely in the family Galatheanthemidae. Most known samples in this small family come from trenches (widely distributed around the world).

Fish from 4 families were seen, in order of abundance: Ipnopidae (tripod fishes), Ophidiidae (cusk eels *Leucicorus*, *Bassozetus* and an unidentified), Bathysauridae (deep lizardfishes *Bathysaurus mollis*), and Macrouridae (Rattails *Coryphaenoides yaquinae*). The unidentified ophidiid had a very bulbous head and an almost translucent body. It may have been a juvenile or some other species of cusk eel. All the ophidiids seen had a bicolor pattern such that the head was dark and the body light. One *Leucicorus* observed had a very badly damaged head, likely from a run in with

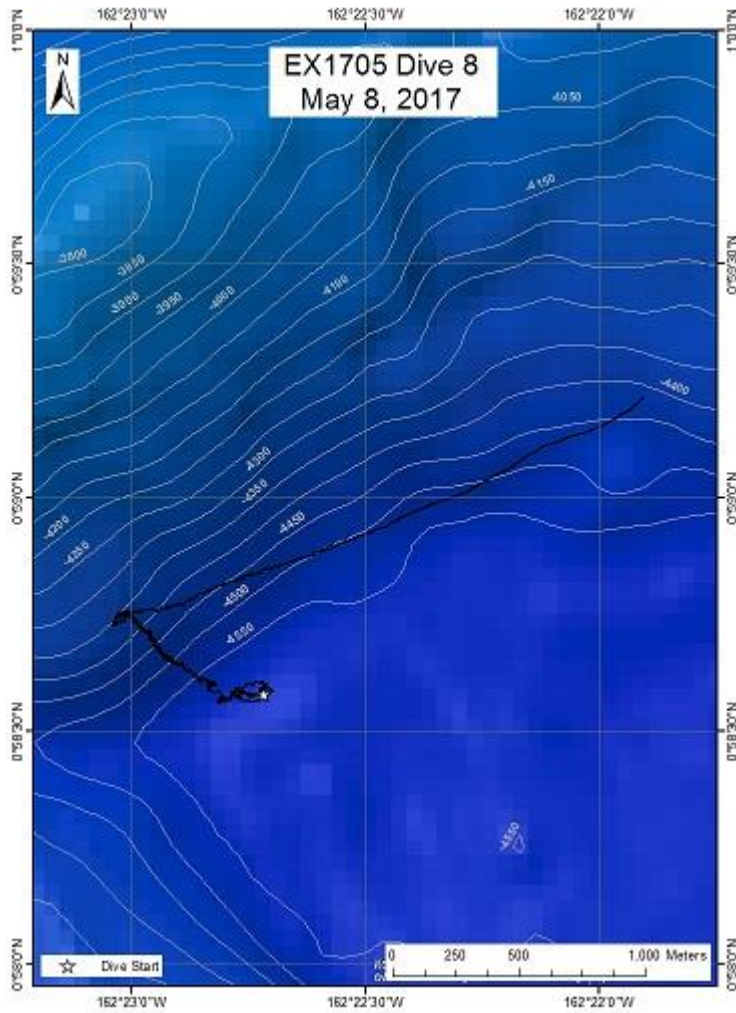
another predator, potentially a *Bathysaurus*. It was remarked as interesting that zoarcids (eelpouts) and synphobranchids (cutthroat eels) were not observed, despite being frequently seen in the CCZ at bait.

Other biological observations included actinarian anemones on sponge stalks, cup corals, brisingids (*Freyastera*), slime star (Pterasteridae) and *Mediaster*, mysids, xenophyophores, aristeid shrimp (possible *Cerataspis monstrosus*), lepaedomorph barnacles, small candelabra-shaped bryozoan colonies, a buccinid snail, and fan worms (Polychaeta). We encountered a fragment of a nylon tarpaulin at 4568 m.

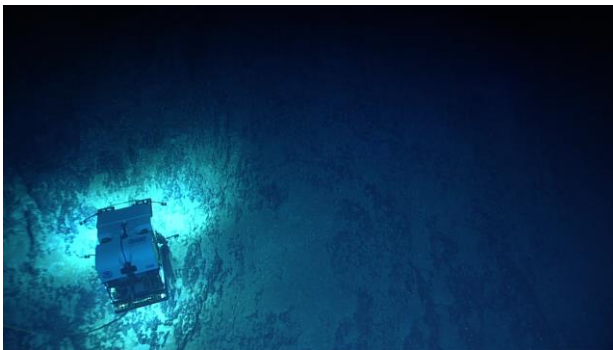
The long transit through the water column afforded opportunities for midwater observations. There was a surprising amount of marine snow and particles throughout the full water column- typically much of it has decomposed by bacteria by the time it sinks below ~2000 m and the water is relatively clear below that. On the descent, we saw a layer of fish and siphonophores at mesopelagic depths (200-1000 m). From 1000-1500 m, we saw chaetognaths, fish, and many large red copepods. We did not see much fauna in the water column below ~1500 m. Because the sun set during our ascent, much of the layer had migrated toward the surface as part of the diel vertical migration by the time we transited through a very active layer of jellies, siphonophores, and fish starting around 600 m and extending into the epipelagic.

Map of ROV Dive Site

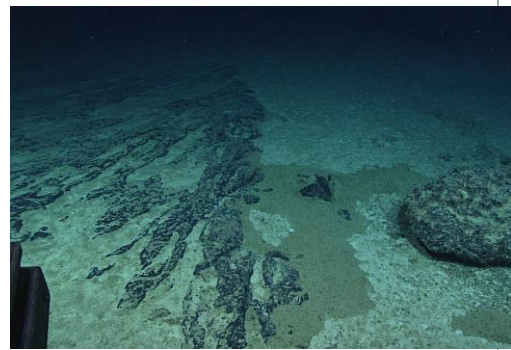




Representative Photos of the Dive



Seirios view of south facing scarp.



Darker sediment collected as

D2\_DIVE08\_SPEC01GEO. It is believed to be remnants of forams.



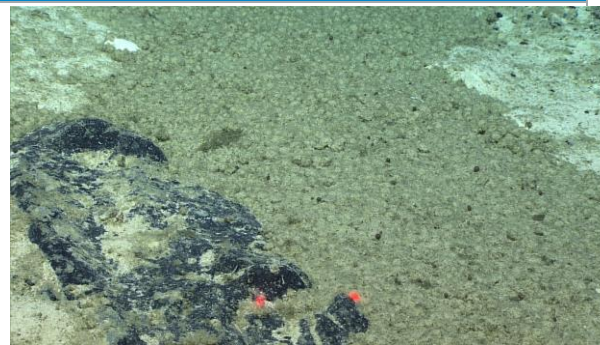
Synallactid holothurian

Bryozoan with lophophores extended

Samples Collected

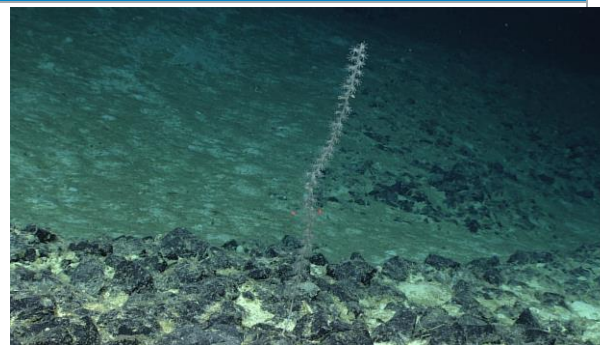
Sample

Sample ID	EX1705_20170508T224803_D2_DIVE08_SPEC01GEO
Date (UTC)	20170508
Time (UTC)	224803
Depth (m)	4572.08
Temperature (°C)	1.31
Field ID(s)	Dark colored biogenic sediments
Commensal ID and Field Identification	
Comments	





Sample

Sample ID	EX1705_20170509T002803_D2_DIVE08_SPEC02BIO
Date (UTC)	20170509
Time (UTC)	002803
Depth (m)	4523.5
Temperature (°C)	1.29
Field ID(s)	Isidid Bathygorgia
Commensal ID and Field Identification	





Comments		
<b>Sample</b>		
Sample ID	EX1705_20170509T005437_D2_DIVE08_SPEC03BIO	
Date (UTC)	20170509	
Time (UTC)	005437	
Depth (m)	4514.16	
Temperature (°C)	1.29	
Field ID(s)	Starburst sponge	
Commensal ID and Field Identification	EX1705_20170509T005437_D2_DIVE08_SPEC03BIO_A01 Anemone EX1705_20170509T005437_D2_DIVE08_SPEC03BIO_A02 Anemone- Galatheanthemidae	
Comments		
<b>Sample</b>		
Sample ID	EX1705_20170509T021722_D2_DIVE08_SPEC04GEO	
Date (UTC)	20170509	
Time (UTC)	021722	
Depth (m)	4420.35	
Temperature (°C)	1.33	
Field ID(s)	2 rocks	
Commensal ID and Field Identification	EX1705_20170509T021722_D2_DIVE08_SPEC04GEO_A01 Sponge EX1705_20170509T021722_D2_DIVE08_SPEC04GEO_A02 Sponge	
Comments		

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