

# OKEANOS EXPLORER ROV DIVE SUMMARY

<b>Site Name</b>	North of French Frigate Shoals		
<b>ROV Lead/Expedition Coordinator</b>	Karl Mcletchie/ Brian RC Kennedy		
<b>Science Team Leads</b>	Daniel Wagner and Jonathan Tree		
<b>General Area Descriptor</b>	Papahānaumokuākea Marine National Monument		
<b>ROV Dive Name</b>	Cruise Season	Leg	Dive Number
	EX1603	1	DIVE02
<b>Equipment Deployed</b>	ROV:	Deep Discoverer	
	Camera Platform:	Seirios	
<b>ROV Measurements</b>	<input checked="" type="checkbox"/> D2 CTD	<input checked="" type="checkbox"/> Depth	<input checked="" type="checkbox"/> Altitude
	<input checked="" type="checkbox"/> Scanning Sonar	<input checked="" type="checkbox"/> USBL Position	<input checked="" type="checkbox"/> Heading
	<input checked="" type="checkbox"/> Pitch	<input checked="" type="checkbox"/> Roll	<input checked="" type="checkbox"/> HD Camera 1
	<input checked="" type="checkbox"/> HD Camera 2	<input checked="" type="checkbox"/> ROV HD 2	<input checked="" type="checkbox"/> Seirios CTD
	Temperature Probe	<input checked="" type="checkbox"/> D2 DO Sensor	<input checked="" type="checkbox"/> Seirios DO sensor
<b>Equipment Malfunctions</b>	There was a ground fault on the ROV's CTD so the CTD was secured temporarily to allow troubleshooting but then was run continuously for the rest of the dive. The Seirios CTD data had some erroneous spikes in the data.		
<b>ROV Dive Summary (From processed ROV data)</b>	Dive Summary: EX1603_DIVE02		
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	In Water:	2016-02-28T18:41:39.697000 23°, 56.649' N ; 166°, 02.187' W	
	Out Water:	2016-02-29T01:28:43.801000 23°, 56.849' N ; 166°, 02.694' W	
	Off Bottom:	2016-02-29T00:51:18.399000 23°, 56.736' N ; 166°, 02.501' W	
	On Bottom:	2016-02-28T19:31:14.183000 23°, 56.670' N ; 166°, 02.219' W	
	Dive duration:	6:47:4	
	Bottom Time:	5:20:4	
Max. depth:	1407.9 m		
<b>Special Notes</b>			
<b>Scientists Involved (please provide name / location / affiliation / email)</b>	<b>Name</b>	<b>Affiliation</b>	<b>Email Address</b>
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	Katharine Woodard	NOAA/NCEI	katharine.woodard@noaa.gov

**Purpose of the Dive**

This dive, located on the north side of French Frigate Shoals, was carried out to survey the biology and geology of a submarine canyon. Submarine canyons have been largely under-surveyed during previous deep-water surveys in the region, and therefore this dive was carried out to obtain baseline information on these widespread and important deep-sea habitats of the Monument. While limited deep-water surveys have been performed around French Frigate Shoals, most of these have focused on precious coral depth ranges (~300-500 m), and none of them have surveyed submarine canyons. Therefore, this dive was planned to explore both an undersurveyed habitat and depth range for this area of the Monument. The target start point of the dive was a flat surface located at the base of the canyon at a depth of 1430 m. The plan was for the ROV to move towards the west and up the wall of the canyon, documenting the fauna of the canyon wall, as well as opportunistically collecting biological or geological samples. The final target depth of the dive was at the top of the canyon wall at a depth of 1090 m.

**Description of the Dive:**

The ROV landed on a flat area at a depth of 1405 m. The surface was characterized by a heavy sedimentary blanket with scattered Mn-encrusted volcanic boulders and rubble. Three Halosaurid fishes were present at the landing site, but no other animals were present. At a depth of ~1390 m, the first intact lava flows were observed. These flows were laminar sheet flows with jumbled/platy or massive textures. As the ROV moved west towards the base of the canyon wall, a few more fishes were observed and included Snaptobranchid eels and Halosaurids. The density of benthic animals remained very low and included anemones, sponges, gorgonian corals, sea cucumbers and urchins. At the base of the canyon wall was a talus field with sedimentation between volcanic debris. The slope changed to a vertical wall consisting of massive boulders that were covered with isolated aggregations of pink, gorgonian and bamboo corals. The cliff face showed little or no flow differentiation and appeared to be a single flow unit. As the ROV moved up the canyon wall, the benthic fauna remained low with isolated patches of corals. At the top of the wall, the volcanic surface had irregular erosional interconnected features the were 0.5 x 0.5 m (depth x width) in dimension.

The slope became more gradual and the substrate consisted of volcanic rubble with heavy interspersed sediment. Sediment transport downhill was apparent by the lapping of sediment on the uphill side of the boulders and sediment deficit on the downhill side. At a depth of 1185, another thick volcanic cliff forming sequence was approached. This flow sequence showed more flow differentiation than the previous downslope, however, individual flow texture was mostly massive internal flow structures were again lacking. The flows were vesicular with oblate spheroidal and flattened vesicles indicating that the flow units were mostly composed of a'a' lava. A small piece of fishing net was tangled on one of the rocks. A Mn-encrusted rock sample with a mass of 2.7 kg was collected at a depth 1234 m. Further up the canyon at the top of the cliff forming volcanics, the slope decreased and the surface was again characterized by irregular interconnected erosional features with pockets of sediment. A hexacoral sponge in the genus *Hyalonema*, which had parasitic zoanths on its stalk, was collected at 1227 m. Shortly thereafter, the ROV collected a specimen of an unknown Chrisogorgid coral at 1221 m. The slope continued to be gentle as the ROV moved up the canyon, and flattened out at 1100 m. After the ROV reached the top of the canyon, it surveyed along the top of the canyon wall, where scattered aggregations of corals were seen. The ROV then came up on a large pinnacle that was covered with high densities of corals and sponges. The overall morphology of the canyon wall resembles those observed in terrestrial analogs in which cliff forming thick sequences are separated by gentler sloping talus and debris fields. Noteworthy was the overall lack of the common flows morphology, pillow lavas as all flows were laminar/tabular sheet flows. The ROV left the bottom at a depth of 1090 m after a total bottom time of 5:18 h.

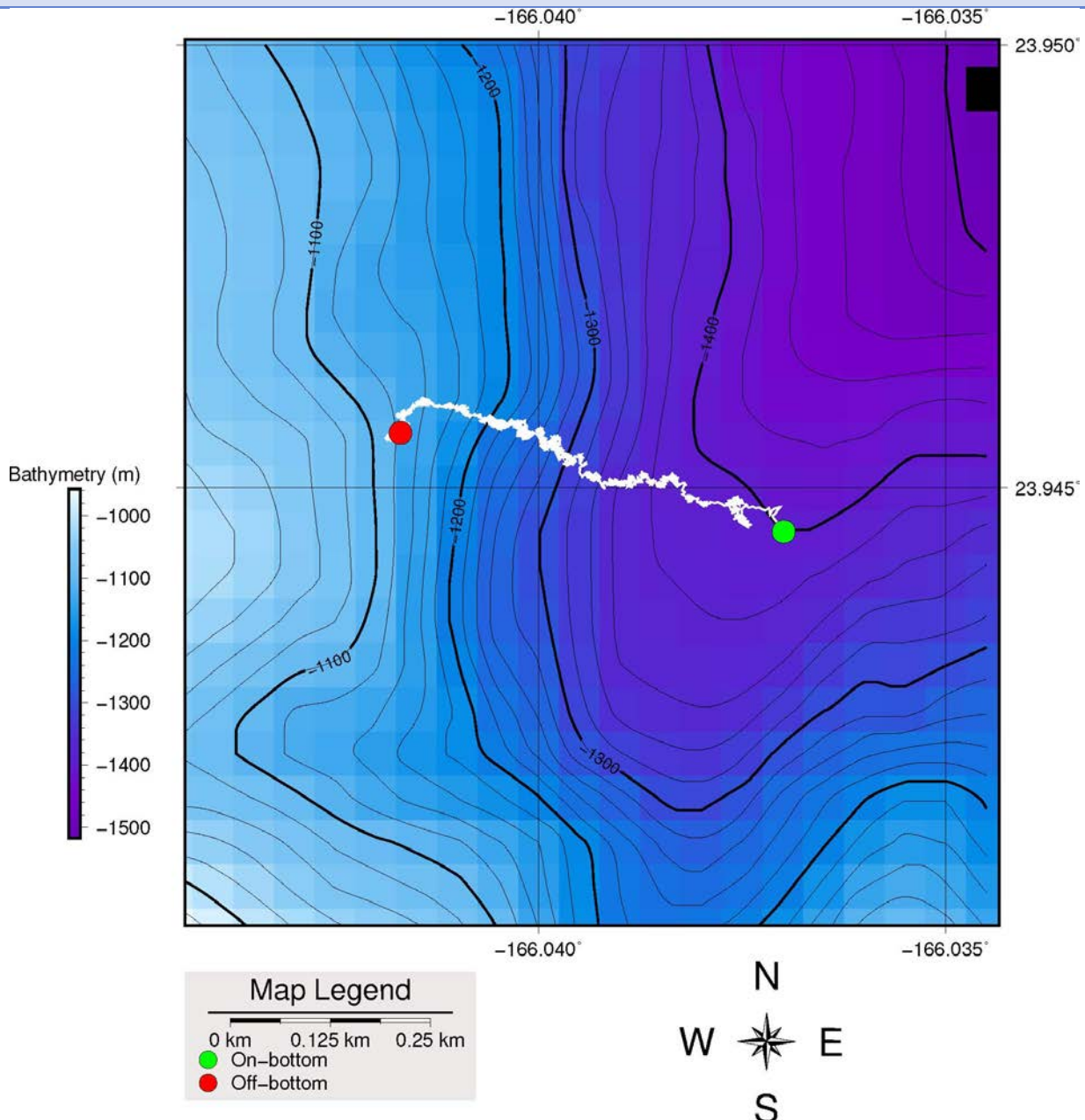
### Animals observed during dive

Phylum	Group	Species
Anellida	Polychaetes	Polychaete? (on sponge)
Arthropod	Crab	Pagurid
Arthropods	Barnacles	Scalpellidae
Arthropods	Shrimp	Unidentified red shrimp
Arthropods	Shrimp	Heterocarpus laevigatus
Arthropods	Shrimp	Mysid
Arthropods	Shrimp	Nematocarcinus tenuisrostris
Arthropods	Squat lobsters	Chirostylidae
Arthropods	Squat lobsters	Pseudomunida fragilis?
Cnidarians	Actinarians	Actinoscyphia sp.
Cnidarians	Actinarians	Exocoelactis sp.
Cnidarians	Actinarians	Phelliactis sp.
Cnidarians	Actinarians	Relacanthis sp.
Cnidarians	Alcyonaceans	Anthomastus sp.
Cnidarians	Antipatharians	Bathypathes cf. alternata
Cnidarians	Antipatharians	Stauropathes stauocrada
Cnidarians	Antipatharians	Trissopathes tetracrada
Cnidarians	Ceriantharian	Ceriantharian
Cnidarians	Gorgonians	Acanthogorgia sp.

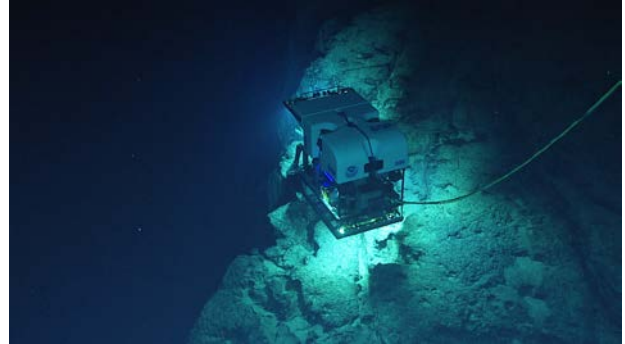
Cnidarians	Gorgonians	Calyptrophora wyvellei
Cnidarians	Gorgonians	Chrysogorgia geniculata
Cnidarians	Gorgonians	Chrysogorgia sp. planar
Cnidarians	Gorgonians	Chrysogorgia stellata
Cnidarians	Gorgonians	Hemicorallium abyssale
Cnidarians	Gorgonians	Metallogorgia melanotrichos
Cnidarians	Gorgonians	Narella dichotoma
Cnidarians	Gorgonians	Narella? sp.
Cnidarians	Gorgonians	Paramuricea sp.
Cnidarians	Gorgonians	Plexauridae sp.
Cnidarians	Gorgonians	Primnoidae
Cnidarians	Gorgonians	Unbranched isidid
Cnidarians	Gorgonians	Victorgorgia nuttingi
Cnidarians	Hydrozoans	Hydroids on Plexaurid
Cnidarians	Hydrozoans	Unidentified branched hydroids
Cnidarians	Hydrozoans	Tabulariidae
Cnidarians	Pennatulaceans	Anthoptilum sp.
Cnidarians	Pennatulaceans	Pennatula sp.
Cnidarians	Pennatulaceans	Protoptilum? sp.
Cnidarians	Scleractinians	Balanophyllia sp.
Cnidarians	Zoanths	Zoanthid overgrowing Hyalonema (Corynonema) sp. (collected)
Ctenophores	Ctenophores	Platyctenidae
Echinoderms	Asteroids	Apollonaster kelleyi
Echinoderms	Asteroids	Calliaster sp
Echinoderms	Crinoids	Unidentified comatulids
Echinoderms	Holothurians	Hansenothuria benti
Echinoderms	Ophiuroids	Asteroschematidae
Echinoderms	Ophiuroids	Ophiuridae
Echinoderms	Ophiuroids	Ophiocantid
Echinoderms	Urchin	Aspidodiadema hawaiiensis
Echinoderms	Urchin	Sperosoma sp.
Fishes	Eel-like	Aldrovandia sp.
Fishes	Eels	Synaphobranchus affinis/kauplii?
Fishes	Eels	Synaphobranchus sp.
Fishes	Gonostomatidae	Gonostomatidae
Fishes	Sharks	Apristurus sp.
Mollusks	Gastropods	Gastropod
Siphonophore	Siphonophore	Rhodaliidae
Sponges	Demosponges	Asbestopluma sp.
Sponges	Demosponges	Cladorhizidae
Sponges	Hexactinellids	Atlantisella sp.
Sponges	Hexactinellids	Bolosoma sp. A
Sponges	Hexactinellids	Corbitella sp.
Sponges	Hexactinellids	Dictyaulus? sp.
Sponges	Hexactinellids	Farrea nr occa erecta
Sponges	Hexactinellids	Hyalonema (Corynonema) sp. (collected)

Sponges	Hexactinellids	Saccocalyx sp.
Sponges	Hexactinellids	Tretopleura sp.
Sponges	Hexactinellids	Walteria sp.

Map of ROV Dive Area



**Representative Photos of the Dive**



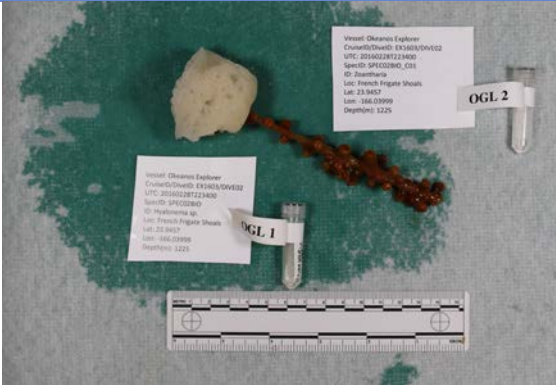
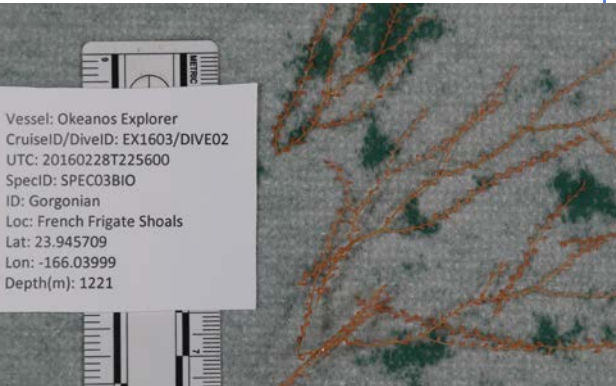
**Samples Collected**

<b>Sample ID</b>	D2_DIVE02_SPEC01GEO
<b>Date (UTC)</b>	20160228
<b>Time (UTC)</b>	22:12:38
<b>Depth (m)</b>	1234
<b>Temperature (°C)</b>	3.15
<b>Field ID(s)</b>	Mn-encrusted volcanic



**Comments**

<b>Sample ID</b>	D2_DIVE02_SPEC02BIO
<b>Date (UTC)</b>	20160228
<b>Time (UTC)</b>	22:34:36

<b>Depth (m)</b>	1226	
<b>Temperature (°C)</b>	3.17	
<b>Field ID(s)</b>	Hyalonema sp.	
<b>Comments</b>	<i>Came with a zoanthid commensal</i>	
<b>Sample ID</b>	D2_DIVE02_SPEC03BIO	
<b>Date (UTC)</b>	20160228	
<b>Time (UTC)</b>	22:56:38	
<b>Depth (m)</b>	1221	
<b>Temperature (°C)</b>	3.28	
<b>Field ID(s)</b>	Gorgonian	
<b>Comments</b>		
<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