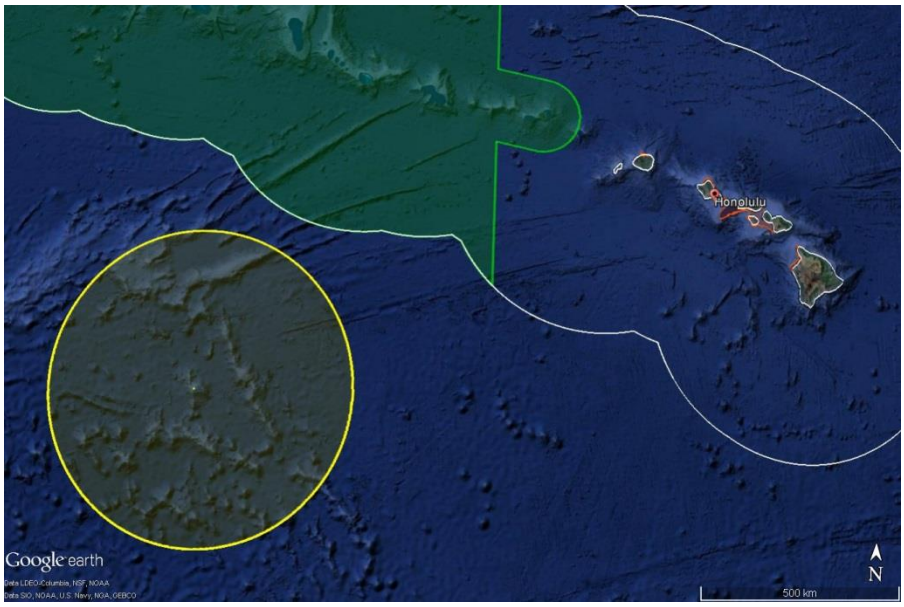
Ocean Exploration and Research

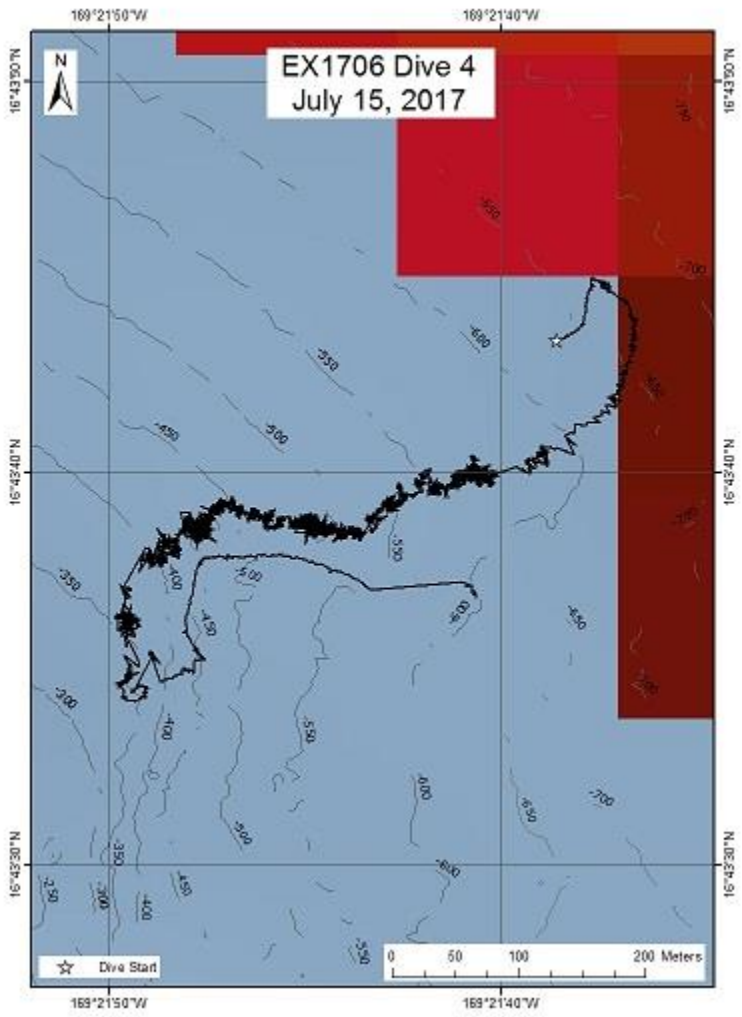
Okeanos Explorer ROV Dive Summary

Dive Information			
Dive Map			
Site Name	Johnston Atoll Site 1		
ROV Lead(s)	Dan Rogers		
Expedition Coordinator(s) / Mapping Lead	Kelley Elliott / Mashkoor Malik		
Science Team Lead(s)	Chris Kelley & Chris Mah		
General Area Descriptor	Johnston Atoll Unit of PRIMNM		
ROV Dive Name			
Cruise	EX1706		
Leg			
Dive Number	4		
Equipment Deployed			
ROV	Deep Discoverer (D2)		
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

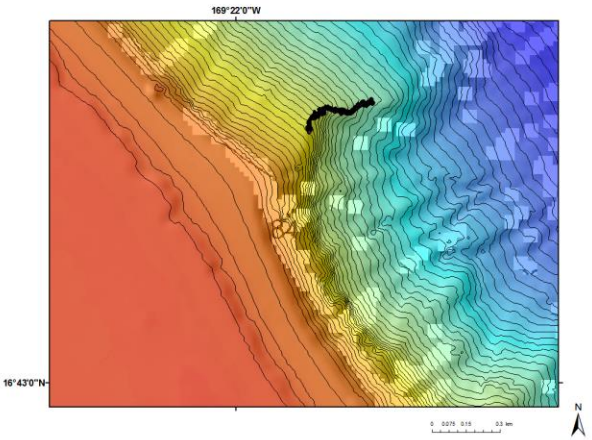
	Low Res Cam 3	Low Res Cam 4	Low Res Cam 5
	LSS	ORP	
Equipment Malfunctions	None		
ROV Dive Summary (from processed ROV data)	Dive Summary: EX1706_DIVE04 ^^ In Water: 2017-07-15T19:24:55.011000 16°, 43.725' N ; 169°, 21.639' W Out Water: 2017-07-16T02:40:35.392000 16°, 43.627' N ; 169°, 21.742' W Off Bottom: 2017-07-16T01:23:44.709000 16°, 43.579' N ; 169°, 21.890' W On Bottom: 2017-07-15T19:51:30.766000 16°, 43.630' N ; 169°, 21.635' W Dive duration: 7:15:40 Bottom Time: 5:32:13 Max. depth: 579.5 m		
Special Notes			
Scientists Involved (please provide name, location, affiliation, email)	Amy Baco Taylor, Florida State University, abacotaylor@fsu.edu Asako Matsumoto, PERC, CIT, Japan, amatsu@gorgonian.jp Chris Kelley, UH, ckelley@hawaii.edu Chris Mah, SI NMNH, brisinga@gmail.com Dhugal Lindsay, JAMSTEC, dhugal@jamstec.go.jp Donald Kobayashi, NOAA NMFS PIFSC, donald.kobayashi@noaa.gov Heather Judkins, University of South Florida St. Petersburg, Judkins@mail.usf.edu John Smith, University of Hawaii/SOEST, jrsmith@hawaii.edu Ken Sulak, U.S. Geological Survey, ksulak@usgs.gov Kevin Kocot, The University of Alabama , kmkocot@ua.edu Les Watling, University of Hawaii at Manoa, watling@hawaii.edu Michael Vecchione, NMFS, vecchiom@si.edu Mike Ford, NOAA Fisheries, michael.ford@noaa.gov Nikola Rodriguez, NOAA EPP, nikola.rodriguez@noaa.gov Nolan Barrett, FAU Harbor Branch Oceanographic Institute, barrettnh@g.cofc.edu Scott France, University of Louisiana at Lafayette, france@louisiana.edu Steven Auscavitch, Temple University, steven.auscavitch@temple.edu Tara Harmer-Luke, Stockton University, luket@stockton.edu Timothy Shank, Woods Hole Oceanographic Institution, tshank@whoi.edu Tina Molodtsova, P.P. Shirshov Institute of Oceanology RAS, tina.molodtsova@gmail.com George Matsumoto, MBARI, mage@mbari.org Sonia Rowley, University of Hawai'i at Manoa, srowley@hawaii.edu Brian Greene, Association for Marine Exploration, bgreene@hawaii.edu		

Purpose of the Dive	Commercially valuable precious corals in the depth range of 350-600 m have never been documented in this monument. Johnston Atoll itself is the only location shallow enough to support these species and therefore this is one of two dive plans submitted to survey for gold, red, and pink precious corals. Very little topography stands out within this depth range. The two sites chosen are ledges where these corals are likely to aggregate.
Description of the Dive	Deployment of the D2 began at 600m with bottom time at about 10 am (HST). The D2 entered a high southerly directed current region composed primarily of a rocky carbonate bottom. Numerous coral colonies were observed as the D2 descended to the bottom. This area included a community composed predominantly of black corals (*Stauropathes*) and yellow *Acanthogorgia* sp. and *Metallogorgia melanotrichos*, the latter each with a commensal euryalid ophiuroid. Also present throughout the dive were cup corals (*Polymyces wellsi)*, including both living and dead calyxes. Onshore scientist Les Watling commented that the observed cups were "quite old." The goniasterid sea star *Plinthaster* was observed at 477 m on a sandy field adjacent to corals. D2 next encountered a region of karstic rock formations that varied from small boulders and rock that eventually transitioned into massive cliff faces, which were often present in conjunction with high currents, which created significant issues for the D2. Species observed on these karstic rock substrates were predominantly colonial cnidarians (*Acanthogorgia*, several antipatharians, and a *Paragorgia* being overgrown by zoanthids. Most importantly however was the discovery of the precious coral *Hemicorallium*, one of the mission's primary objectives. These were present in low abundance at first but increased significantly when the D2 encountered an area of high current and large carbonate blocks. Some colonies reached large sizes (approximately 1 m across?). Some areas showed terminal populations of *Hemicorallium* at the bottom of several slopes. Further upslope, the *Hemicorallium* bed ended even though larger blocks were still present. At this location, the community transitioned into one dominated by colonies of the scleractinian coral *Enalllopsammia rostrata*. Amongst the living colonies were areas looking like "graveyards" of dead coral skeletons where the colonies had died and fallen to the bottom of the slope or valley. One section on the karstic rock area had significant current flow and the substrate was covered with several different octocorals, antipatharians and sponges. Several genera of goniasterid sea stars were present in this area, including pentagonal "cookie stars" such as *Plinthaster* and *Ceramaster* as well as *Circeaster* and a new record of a rarely seen goniasterid, *Gilbertaster anacanthus*. Ceramaster was observed feeding on a ribbon sponge (demosponge). Multiple individuals of *Circeaster pullus* were observed feeding on different species of cnidarians including isidid octocorals (i.e. bamboo corals) and precious corals (Hemicorallium). One of the "cookie" stars, *Plinthaster* was observed in abundance in this area. On two separate occasions we observed large blocks with one side covered by a huge community of glass sponges in the genus *Farrea* while the other side was covered by numerous colonies of *Acanthogorgia*. It was noted that there was high current along the *Acanthogorgia* side suggesting that the sponge community was more closely associated with non-high current settings. Two unusual communities of highly abundant and dense micro-invertebrates were also observed. One was dominated by thin tube-like projections that were approximately 3-8 cm long and were sometimes so dense that they

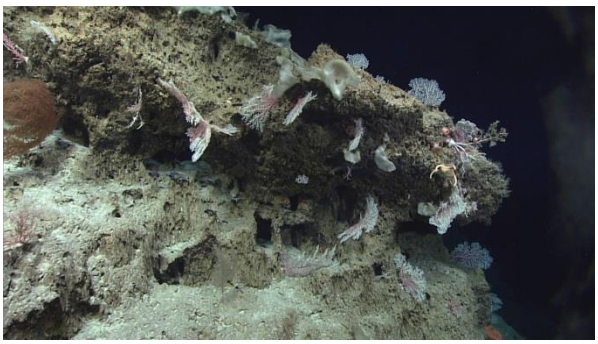
	created a “fuzzy” layer along the surface of the rock. Another large block was almost completely covered by tiny, white zoanthids. One specimen of Ceramaster was observed on this rock in a position which suggested predation on the zoanthids. Different crustaceans were also observed that included a brachyuran inachid crab *Cyrtomaia* with extremely long legs and claws, hermit crabs (*Parapagurus*) with sea anemones replacing their shells, and small xanthid crabs. Two other unusual invertebrate groups were observed: the benthic ctenophore Lyroccteis cf. imperatoris which was often on dead colonies of Enallopsammia, and numerous small white members of the phylum Brachiopoda (aka the lamp shells) with longitudinal notches along each valve. Finally, various fishes were also documented that included the ray, Plesiobatis daviesi, deep water cardinal fishes (Epigonus sp.), alfonsins (Beryx sp), scorpaenids, setarchids (Setarches guentheri), a few gropos (Grammatonotus sp), the spike fish Hollardia goslinei, and two observations of the commercially valuable snapper, Randallichthys filamentosus).
Overall Map of the ROV Dive Area	



Close-up Map of Main Dive Site



Representative Photos of the Dive



Community of precious corals (*Hemicorallium* sp)

Glass sponge wall (Farrea nr occa) and fish (Beryx sp)

Samples Collected

Sample

Sample ID	D2_DIVE05_SPEC01BIO
Date (UTC)	20170715
Time (UTC)	22:50:39
Depth (m)	497
Temperature (°C)	
Field ID(s)	*Hemicorallium* sp

Comments	Associates were found with the specimen that included an Uroptychus sp squat lobster and several as yet unidentified small invertebrates.

Sample		
Sample ID	D2_DIVE05_SPEC02BIO	
Date (UTC)	20170715	
Time (UTC)	23:13:52	
Depth (m)	492	
Temperature (°C)		
Field ID(s)	Ceramaster sp.	
Comments	The initial field id of *Peltaster* sp. was changed to *Ceramaster* sp. after ship lab examination.	

Sample		
Sample ID	D2_DIVE05_SPEC03BIO	
Date (UTC)	20170715	
Time (UTC)	00:34:44	
Depth (m)	430	
Temperature (°C)		
Field ID(s)	Keratoisidinae	
Comments	Intermodal branching. A small crustacean was also found in the box with the coral but there is uncertainty if it was an associate or just swam in the box when it was open.	

NOAA Office of Ocean Exploration & Research
1315 East-West Highway (SSMC3 10th Floor)
Silver Spring, MD 20910
(301) 734-1014