

2017 Laulima O Ka Moana: Exploring Deep Monument Waters Around Johnston Atoll

NOAA Ship *Okeanos Explorer*
July 7 – August 2, 2017

This expedition is part of the three-year Campaign to Address Pacific monument Science, Technology, and Ocean NEeds (CAPSTONE), an initiative to collect deepwater baseline information to support science and management decisions in and around U.S. marine protected areas in the central and western Pacific.



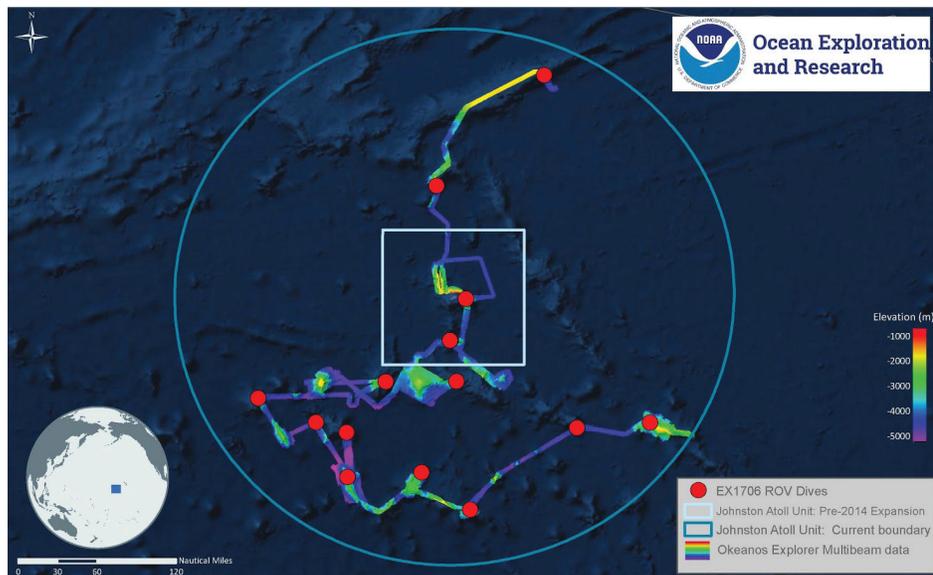
Ocean Exploration
and Research

Summary Accomplishments

The 2017 Laulima O Ka Moana: Exploring Deep Monument Waters Around Johnston Atoll expedition was a two-part 27-day telepresence-enabled expedition. The first part was four days of shakedown operations following the ship's drydock period and the second part was an expedition to collect critical baseline information about unknown and poorly known deepwater areas in the Johnston Atoll Unit of the Pacific Remote Islands Marine National Monument (PRIMNM). The goal of the expedition was to use remotely operated vehicle (ROV) dives and seafloor mapping operations to increase the understanding of the deep-sea ecosystems in this area to support science and management needs. Major accomplishments from this expedition are summarized below.

Conducted 15 ROV dives ranging in depth from 250 to ~2,600 meters to survey the biologic and geologic variability of oceanic habitats, including the water column biome, deep-sea coral and sponge habitats, and manganese-encrusted habitats on seamounts.

- 14 dives were conducted on never before surveyed sites in the Johnston Atoll Unit of PRIMNM. One engineering test dive was conducted offshore of the Hawaiian Island of Oahu.
- 13 dives were on seamounts to investigate deep-sea coral communities and manganese-encrusted seafloor habitats; four dives included focused water column transects to obtain information on animals living in the largest unexplored



Overview map showing seafloor bathymetry and ROV dives completed during the 2017 Laulima O Ka Moana: Exploring Deep Monument Waters Around Johnston Atoll expedition. Map courtesy of the NOAA Office of Ocean Exploration and Research.

biome on the planet; and one dive surveyed for, and documented, precious coral habitats offshore of Johnston Atoll.

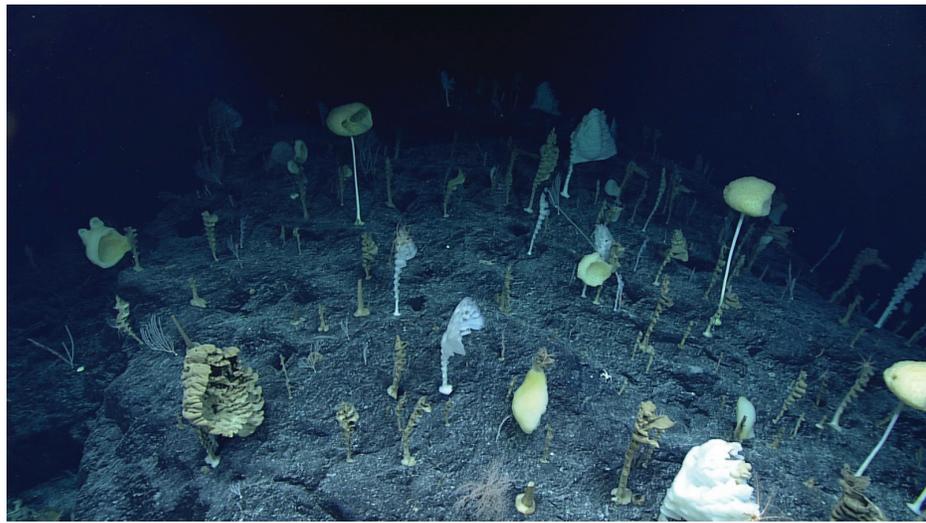
- Collected 73 biological specimens (31 primary specimens and 42 associates), including corals, anemones, zoanthids, hydroids, sponges, sea stars, feather sea stars, brittle stars, squat lobsters, amphipods, shrimp, barnacles, snails, tube worms, bryozoans, polychaete worms, a sea slug, a sea spider, and an isopod. These collections will enable confirmation of new species designations, provide type specimens for descriptions, and enable genetic analyses to establish evolutionary relationships with other known species.
- As many as 44 of these specimens could represent new species, and most of the specimens from known species will represent new range records.
- Documented precious corals in the Johnston Atoll Unit for the first time. Discovered eight high density deep-sea coral and sponge communities, which varied in diversity and species composition.

Mapped more than 38,300 square kilometers of seafloor.

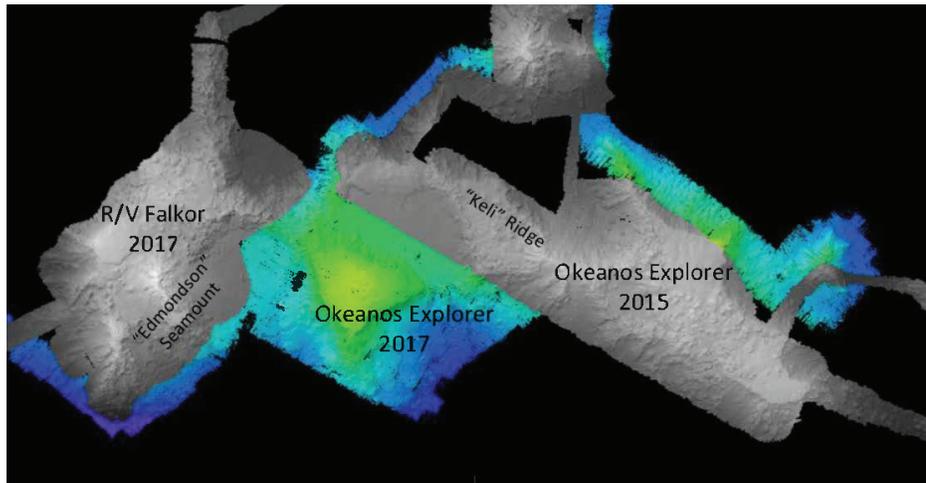
- More than 23,161 square kilometers were mapped inside the Johnston Atoll Unit of PRIMNM. This included full coverage of eight seamounts in JAU mapped for the first time with sonar and partial coverage of three seamounts.
- Operations also included adding coverage to existing mapping data, focused surveys to support ROV dive site planning, and underway transit mapping of unmapped areas.

Investigated the geologic history of central Pacific seamounts.

- Collected 24 rock samples for age dating and geochemical analysis that will help reveal the geologic history of seamount groups in the Johnston Atoll Unit.



A high density community dominated by sponges in the families Euplectellidae and Farreidae was encountered on the summit of “Ridge” seamount at about 2,370 meters. Multiple glass sponges were observed, with some genera attaining unusually large sizes (individuals reaching up to 5’ tall and 2-5’ wide). Many of the observed sponges had their concave sides directed towards the current. *Image courtesy of the NOAA Office of Ocean Exploration and Research, 2017 Laulima O Ka Moana.*



Map showing the bathymetry data acquired during the expedition in the vicinity of “Keli” Ridge and “Edmondson” Seamount. Data collection efforts over several days were designed to complement previous data acquired by R/V *Falkor* in 2017 and *Okeanos Explorer* in 2015. Previously acquired datasets are shown as grayscale, and the data acquired this cruise is shown as color bathymetry. *Image courtesy of the NOAA Office of Ocean Exploration and Research, 2017 Laulima O Ka Moana.*

Collected more than 12 TB of data, including multibeam, single beam, subbottom, ADCP, CTD, XBT, surface oceanographic and meteorological sensor, video, image, and associated dive and video products. All of the data from this expedition is publicly available through national archives.

Engaged with the local community, as well as audiences around the world.

- Shared the live video feeds of the expedition with the public worldwide via the Internet, with the live video receiving more than 1.1 million views via multiple platforms including Facebook and YouTube. Expedition content on the NOAA OER website received about 30,700 views.
- More than 44 scientists and students from the United States, Japan, and Russia participated as members of the science team.
- Conducted four live telepresence interactions with various groups around the U.S. including the Smithsonian National Museum of Natural History, Exploratorium, NOAA Science camps in Honolulu, HI and Seattle, WA, to engage and share the expedition with about 452 teachers, students and the general public. A Facebook Live interaction at the start of the cruise received about 8,700 views.
- One live interaction was conducted with the National Transportation Safety Board (NTSB), Navy, Coast Guard, and Maritime Administration representatives at the Silver Spring, MD Exploration Command Center to demonstrate the use of technology for seagoing investigations. Another was conducted with the new National Centers for Environmental Information (NCEI) Director to introduce her to telepresence operations and how NCEI supports *Okeanos Explorer* operations.
- Received news and media coverage by various media sources including the National Geographic and Gizmodo.



A likely new yellow species of phoronematid, possibly *Poliopogon*, sponge was observed at approximately 2,515 meters (8,250 feet) depth during dive 09 on "Wetmore" seamount. Image courtesy of the NOAA Office of Ocean Exploration and Research, 2017 *Laulima O Ka Moana*.