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UNIVERSITY OF SOUTHERN MISSISSIPPI | WOODS HOLE OCEANOGRAPHIC INSTITUTION

Hello Ocean Explorers!

As summer winds down the OECI is putting the wraps on several important milestones. OECI cruises on E/V *Nautilus* are in their final stages, Year 3 reporting for OECI is wrapping up, and Year 4 activities are getting underway.

The OECI had an incredibly productive Year 3, having mapped an area of the seafloor equivalent to the whole of New England, conducting 120 vehicle deployments, and collecting over 1000 samples during exploration activities! In addition, we saw a number of technologies advance on their paths to maturity, ranging from vehicle systems such as *DriX* and *Mesobot,* to software systems, including cloud-based data storage and processing and machine-learning algorithms for video processing. Lastly, we were able to support a number of future ocean explorers that included four students from the New England Institute of Technology and five students from Tuskegee University.

All of these accomplishments are possible due to the excellent collaboration between the OECI partner organizations and NOAA Ocean Exploration and the numerous academic, federal, and commercial groups that have partnered with us. The free exchange of resources, technology, expertise, and experience is producing a sum greater than the parts, and OECI is hitting full-stride. We head into year four with even more ambitious goals and I'm certain that we are up to the challenge.

Best,
Adam

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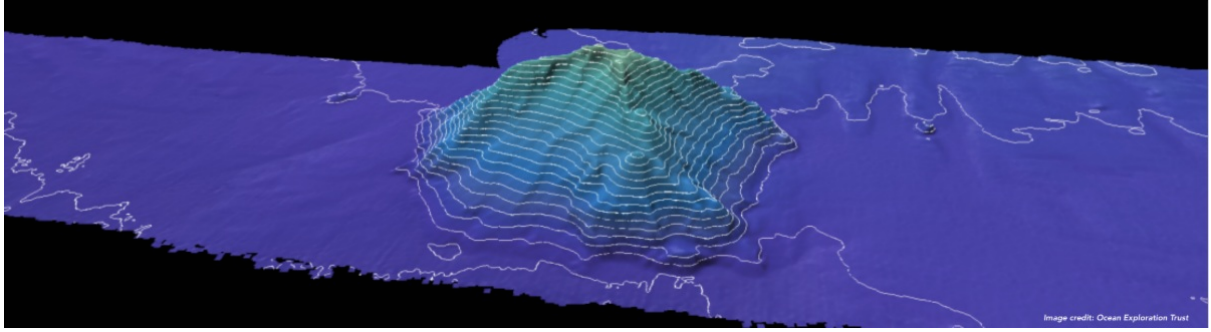
EV Nautilus Update: Lu'uaeaahikiikawawāapalaoa, Dual-Technology Seafloor Mapping

From July 16 – August 8, 2022, the Ocean Exploration Trust's (OET) EV *Nautilus* operated in the southeastern edge of Papahānaumokuākea Marine National Monument (PMNM) near Nihoa Island in the Pacific Ocean basin. The *Nautilus* team again collaborated with OECI partner, University of New Hampshire (UNH), and their uncrewed surface vessel (USV) *DriX*, to better understand the potential of autonomous systems to increase the efficiency and effectiveness of bathymetric mapping and to create high-resolution maps in the PMNM. Building on earlier remote sensing efforts that mapped inaccessible near-shore waters using airborne lidar, the team utilized *DriX* and *Nautilus*' EM302 sonar system to contribute additional data surrounding these islands and shoals, creating more accurate and extensive seafloor maps while benefiting from the increased efficiency of simultaneous dual-vessel operations. Ship-based mapping surveyed deeper waters while *DriX* was deployed for nearshore mapping. These maps will help resource managers better understand the formation of deep-water and shallow-water terrain of the Northwestern Hawaiian Islands, contribute new data to nautical charts and improve safe navigation in these areas, and contribute to the national and international priority to build high-resolution maps of the seafloor, especially in areas needing protection. Data from deepwater surveys will also help identify features in the expanded PMNM boundaries and pinpoint future exploration sites for the global community. The expedition was funded by NOAA Ocean Exploration via the OECI along with the NOAA Office of Coast Survey. For a full expedition summary, please visit the Nautilus Live website.

On Friday, August 19, E/V*Nautilus* embarked on another OECI-supported expedition, Lu'uaeaahikiikapāpahāku'iwawā. Until September 13, 2022, the team will conduct ship-based, high-resolution mapping surveys in high priority deep water regions in the PMNM expansion zone north of Ko'anako'a (Maro Reef), Kauō (Laysan Island), and Papa'āpoho (Lisianski Island) in PMNM. For more information, and to follow along live with all expedition activities, please visit https://nautiluslive.org/.

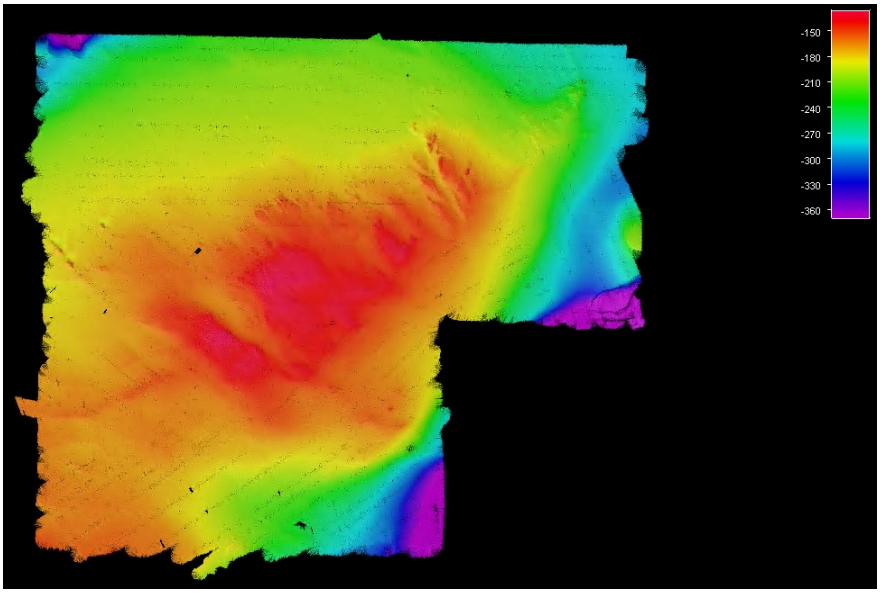
As the ship continues to visit Papahānaumokuākea, the ancestral homeland of the Native Hawaiian people and the largest marine conservation area in the US, OET and the team gratefully acknowledge generations of indigenous Hawaiians and today's stewards of these waters. OET is working closely with PMNM collaborators to inform research priorities at sea and from shore, ensure culturally-grounded data collection protocols, provide paid at-sea opportunities for local students, and connect with island communities.



Aleutians Uncrewed Ocean Exploration: Expedition Overview and Update

The Aleutians Uncrewed Ocean Exploration expedition is a public-private partnership facilitated and led by NOAA OECI partners at the University of New Hampshire (UNH) in active partnership with Saildrone and Monterey Bay Aquarium Research Institute (MBARI). The goal of the expedition is to explore the potential of using an uncrewed, sail-powered vehicle for extended ocean mapping and environmental data collection in unexplored waters around the Aleutian Islands identified as high priority for NOAA, the Bureau of Ocean Energy Management (BOEM), and the U.S. Geological Survey.

After a 2,200 nautical mile transit from San Francisco, CA, and a 2-day port call in Dutch Harbor, AK, the 72-foot, autonomous, uncrewed surface vehicle (USV), *Saildrone Surveyor*, departed Dutch Harbor on August 11, 2022, to begin its ocean mapping and characterization survey. This region is remote with very strong, and rapidly changing tidal currents, as well as other challenging environmental conditions; the *Surveyor* has managed these conditions well, however, collecting high-quality data in predefined survey areas along the Aleutians Archipelago. This highlights the usage of uncrewed platforms as a source of ocean science data in remote locations that cannot be easily accessed by crewed ships of ocean exploration.

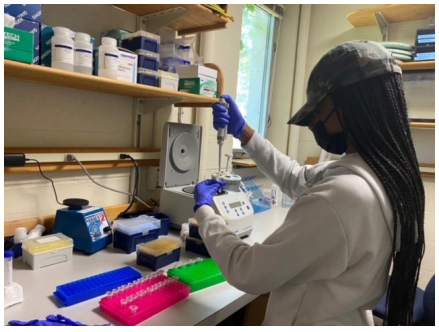


The above image is raw, unprocessed EM2040 data, gridded at 5 meter resolution, collected by Saildrone Surveyor in the Aleutian Islands. The depth range is depicted in the color map, 125-300m. Image credit: Saildrone

Piloted remotely from shore and powered primarily by wind and solar energy, the *Saildrone Surveyor* is the world's largest and most advanced USV for ocean exploration. For this expedition, the *Surveyor* is equipped with a suite of instruments to collect acoustic, oceanographic, and meteorological data to support a wide range of research applications. In addition to sonar equipment for high-resolution mapping of the ocean seafloor, the *Surveyor* is carrying revolutionary technology from MBARI to sample environmental DNA (eDNA), enabling researchers and resource managers to better understand ocean health in remote portions of the global ocean.

NOAA Ocean Exploration and BOEM are the primary sponsors of the Aleutians Uncrewed Ocean Exploration expedition. Additional funding and support comes from the National Oceanographic Partnership Program, NOAA Research, NOAA's Office of Coast Survey, NOAA's Deep Sea Coral Research and Technology Program, and the U.S. Geological Survey. This project will support priorities highlighted in the National Strategy for Mapping, Exploring, and Characterizing the United States Exclusive Economic Zone.

OECI Student Update



That's a wrap on the 2022**Ocean Explorer internship program** facilitated by the University of Southern Mississippi's (USM's) Marine Education Center with partner Tuskegee University (TU)! The 2022 Ocean Explorer intern cohort consisted of 5 undergraduate students who were placed with research mentors at each of the OECI member institutes directly contributing to OECI research efforts.

Name	Class	Major	Intern	Site	Mentor(s)
Nayomi Rapier	Rising Senior	Environmental Science	Phytoplankton Ecology Intern	UNH	Dr. Elizabeth Harvey
Felicia Stoker	Rising Senior	Biology	Underwater Vehicle Development Intern	URI	Dr. Mingxi Zhou
Jessica Barrow	Rising Senior	Plant and Soil Science	Molecular Ecology Intern	WHOI	Dr. Annette Govindarajan
Fernando Billups	Rising Senior	Mechanical Engineering, Minor in Material Science	Marine Robotics Intern	WHOI	Dr. Mike Jakuba
Elijah Logan	Rising Sophomore	Occupational Therapy	Seafloor Mapping Intern	OET / USM	Erin Heffron, Dr. Leonardo Macelloni

The interns completed their 10-week summer programming together in person on the Mississippi Gulf Coast exploring careers, touring facilities, and building connections with scientists of all stages and disciplines. The program officially concluded with a hybrid research symposium with over 60+ people in attendance.

The USM team is very proud of the work these students accomplished and how much they grew over the 10 weeks of the internship program; the students shone bright in their oral presentations (with this being the first scientific presentation for all interns). The USM team is very excited to continue working with program alumni as they enter the new school year and beyond. Thank you to the mentors, host families, OECI partners, and all involved in supporting the TU students this year!

Announcements

NOAA Formally Joins Seabed 2030 International Mapping Effort

In June 2022, NOAA Administrator, Rick Spinrad, signed a memorandum of understanding in conjunction with the United Nations (UN) Ocean Conference that formalizes U.S. participation in Seabed 2030, a collaborative, international project that aims to bring together all available bathymetric data to produce a better-defined, global seafloor map by 2030. All collected data will be available to the public via the NOAA-hosted International Hydrographic Organization Data Center

for Digital Bathymetry.

To read more about this announcement please visit: https://oceanservice.noaa.gov/news/jun22/seabed-2030.html