Researchers to embark on extraordinary expedition to Loihi Seamount

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Schmidt Ocean Institute's R/V Falkor. Credit: SOI.

Starting June 25, UH Mānoa will lead an expedition to Loihi Seamount, southeast of the island of Hawai'i, whose base remains largely unexplored. Dr. Brian Glazer, lead scientist and Associate Professor of Oceanography, his team from UHM, and colleagues from the University of Minnesota, IFREMER Centre de Brest and Woods Hole Oceanographic Institution (WHOI), will map the Seamount's deeper reaches using WHOI's Sentry autonomous underwater vehicle. The team will also collect water column samples and explore Loihi's extraordinary mats of iron-oxidizing bacteria—microbes that are able to use iron as an energy source, creating rust in the process.

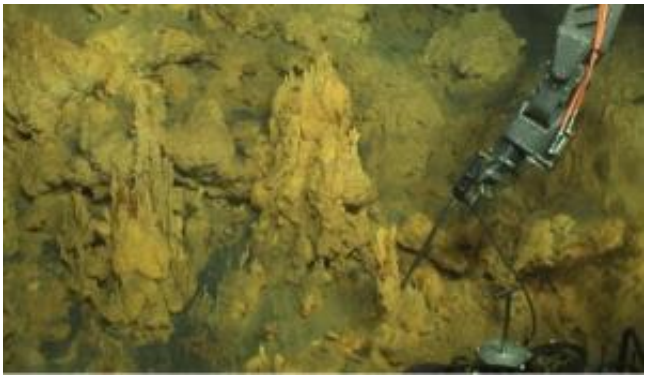
Including the current expedition, UHM School of Ocean and Earth

Science and Technology scientists have been awarded nearly 100 days at sea aboard the R/V Falkor, operated by the Schmidt Ocean Institute (SOI). This opportunity, along with the past UH research cruises on the R/V Falkor, has supported ocean research in Hawai'i, contributing to enhanced understanding of these important marine ecosystems.

Mats of iron-oxidizing bacteria are not uncommon in hydrothermal vent fields. However, the microbial mats at the base of Loihi are extensive and impressively thick—a meter or more deep at some sites.

Processes at Loihi have the potential to provide iron to a large area of the Pacific Ocean. As Glazer noted, in reference to the iron-rich hydrothermal vent fluid, "Loihi is a giant leaky iron mountain, providing plenty of energy for iron-eating bacteria near the vents, and pumping iron out into the ocean as the hydrothermal fluids disperse."

In the upper ocean, the growth of microscopic organisms, which produce oxygen we breathe and form the base of marine food webs, is limited by the availability of iron in about one-third of the global surface ocean.



Sampling mats of iron-oxidizing microbes. Credit: B.Glazer, courtesy of WHOI ROV Jason II.

"Iron-oxidizing microbial activity like what is occurring at Loihi could be an important component in the ocean's iron and carbon cycling—a critical driver in overall ocean balance—particularly if exploration proves the activity is more widespread than previously thought," said Glazer.

Further, the work aboard the R/V Falkor could have implications for the search for life elsewhere in the solar system.

"At various times in Earth history, much of the world ocean was dominated by processes that are occurring at Loihi today. In accessing Loihi, we have a window to the ancient Earth that also provides clues about the potential for life 'out there' in habitats that could exist on places like Mars or Europa," said Glazer.

If researchers can identify a chemical signature for geological features formed by microbes like those around Loihi, that signature could ultimately allow them to decipher whether similar features on other planets were biologically produced—a potentially simpler task than finding living cells.

The upcoming expedition aboard SOI's R/V Falkor will give scientists access to some of today's most advanced deep ocean technologies. Using Sentry's high-resolution camera, sonar systems and chemical sensors, the team will produce more detailed maps than are currently available and assess the extent of the bacterial communities.

Originally, the team was scheduled to use WHOI's innovative Nereus hybrid remotely operated vehicle (HROV), but tragically the vehicle was lost in May of this year exploring the depths of the Kermadec Trench northeast of New Zealand. With so little known about the deepest parts of the ocean, the Schmidt Ocean Institute has partnered with WHOI to develop what is hoped to be the world's most advanced HROV. For more

details on this full ocean depth HROV, visit www.schmidtocean.org/story/show/2705.

More information: To read more about the Iron Eaters of Loihi Seamount, visit www.schmidtocean.org/story/show/2225

Provided by University of Hawaii at Manoa