UH-Manoa researchers join study of sea crust

By Helen Altonn

POSTED: 01:30 a.m. HST, Mar 01, 2010

University of Hawaii-Manoa scientists, students, researchers and engineers will have a key role in a $25 million study of the "deep biosphere" beneath the oceans.

The project involves drilling up to 1,000 feet beneath the sea floor and installing subsurface observatories known as CORKs to study microbial life in the oceanic crust.

A Center for Dark Energy Biosphere to be established by a National Science Foundation grant will explore the earth's biomass below the ocean floor in projects at North Pond in the Atlantic, Juan de Fuca Ridge in the Pacific Northwest and the South Pacific gyre, a vortex of currents between New Zealand and South America.

UH oceanographer James Cowen, one of five principal investigators in the project, said a UH group will contribute to the overall science, studying the microbial geochemistry of fluids that circulate within the deep sub-sea-floor rocky ocean crust.

He and UH colleagues Michael Rappe and Brian Glazer pioneered use of CORK observatories for microbial geochemistry and ecology studies. They will design, build and deploy new instruments and samplers specifically "to deal with this very remote and difficult-to-access environment," he said in an e-mail.

The scientists must deal with high pressures 9,500 feet below sea level and temperatures of 147 degrees Fahrenheit as they drill the basalt rocky crust buried under 900 feet of sediment, said Cowen.

The goal is to identify the type of microorganisms, what they metabolize, how active they are and whether they are endemic or are recruited from the bottom sea water, he said.

The researchers will visit the CORK observatories with the submersible Alvin, based at Woods Hole Oceanographic Institution in Massachusetts, to connect sleds with special instrument packages, Cowen said.

"We pump fluids from 900 to 1,200 feet beneath the sea floor to our sea floor sled," he said. "Various sensors measure the temperature, flow rate and some chemical parameters right there."

Fluids also will be collected in special samplers for additional chemical and microbiological analyses and molecular genetics on the surface ship and laboratories on shore, he said.
Cowen said the new center will encourage educational outreach. The UH group will try to improve access by native Hawaiians and Pacific islanders to contemporary science.

He said he and Richard Johnson of the School of Education are planning a more formal process to integrate teachers-in-training into research through the new center, the UH NASA Biology Institute and other science projects at the UH School of Ocean and Earth Science and Technology.

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