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INSTRUMENTS, METHODS AND MISSIONS FOR INVESTIGATION OF EXTRATERRESTRIAL
MICROORGANISMS. Chair: Richard Hoover, NASA Marshall Space Flight
Center

SEARCHING FOR LIFE AND OCEAN BIOGENE (ACTIVITY ON EUROPA AND) EARTH

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ABSTRACT:

One of the more likely places in the solar system for the existence of extraterrestrial life forms is the Jovian moon Europa. It has been postulated that a volcanically-heated ocean exists underneath Europa's icy surface. After a detailed remote-sensing reconnaissance is made of Europa and it is determined that an ocean does exist under the ice, in-situ measurements will be needed to directly explore the European ocean and the ice that lies above it.

In order to make quantitative measurements of the European environment, a lander spacecraft capable of penetrating the surface ice layer by melting through it is proposed. This vehicle, dubbed a "cryobot", will be designed to carry a small deployable submersible (a "hydrobot") equipped with a complement of instruments. The cryobot has heritage in terrestrial ice exploration "Philberth" melter probes, and the hydrobot will draw on autonomous submersible experience in the oceanic community.

This paper will describe a strawman design of this mission. We will particularly focus on instrumentation requirements for such a pair of exploratory vehicles. The design of an instrument package to search for life across the wide range of thermal and pressure environments expected on Europa, the issues in sample handling, and long-term reliability for a potential multi-year transit through the ice all present difficult design issues. Finally, we will discuss opportunities for performing high-value science on earth to test these instruments, and cover synergistic relationships with the pharmaceutical industry and others in the design and deployment of these instruments.

KEYWORDS:

Europa, exobiology, instrumentation, submersibles, ice probes

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Joan Horvath holds a joint appointment between the Technology Transfer and Commercialization Program Office and the Advanced Concepts Program at JPL. Previously she held positions on the TOPEX, Magellan, and Cassini missions. She received a BS in Aeronautics and Astronautics from MIT, and an MS in Mechanical, Aerospace, and Nuclear Engineering from UCLA.