

**Science Return of a hydrophone on-board an Ocean World lander.** H.D. Smith<sup>1</sup>, and A.G. Duncan<sup>2</sup> 1. Space Science and Astrobiology Division, NASA Ames Research Center, Moffett Field, Ca 94035, 2. Desert Systems, Logan, UT, 84341,

**Introduction:**

For this presentation we describe the science return, design and cost of a microphone on-board a Europa lander mission. In addition to the E/PO benefit of a hydrophone to listen to the Europa Ocean, a microphone also provides scientific data on the properties of the subsurface ocean.

A hydrophone is a small lightweight instrument to that could be used to achieve two of the three Europa Lander mission anticipated science goals of: 1) Asses the habitability (particularly through quantitative compositional measurements of Europa via in situ techniques uniquely available to a landed mission. And 2) Characterize surface properties at the scale of the lander to support future exploration, including the local geologic context. [1].

Acoustic properties of the ocean would lead to a better understanding of the water density, currents, seafloor topography and other physical properties of the ocean as well as lead to an understanding of the salinity of the ocean.

The engineering design of the hydrophone instrument will be designed to fit within a portion of the resource allocation of the current best estimates of the Europa lander payload (26.6 Kg, 24,900 cm<sup>3</sup>, 2,500 W-hrs and 2700 Mbits). The hydrophone package will be designed to ensure planetary protection is maintained and will function under the current Europa lander mission operations scenario of a two-year cruise phase, and 30-day surface operational phase on Europa.

The hydrophone is designed to be lowered into the subsurface ocean, the hydrophone is at a TRL six with the prototype demonstrated

in a relevant (cold, salty, and high radiation) environment.

Reference: Pappalardo, R. T., et al. "Science potential from a Europa lander." *Astrobiology* 13.8 (2013): 740-773.