

Revealing Secrets of Europa's Ice Shell, Hidden Water and Plume Activity Through Flyby Radar Sounding

SPEAKER: Dr. Don Blankenship (UTIG)

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WPR Building, 2nd Floor
3925 W. Braker Lane, Suite 200, Austin, Texas 78759

ABSTRACT: The Europa Clipper is a NASA mission concept to study Europa, the ice-covered moon of Jupiter, through a series of fly-by observations of the European surface and subsurface from a spacecraft in Jovian orbit. The science goal of the Clipper Mission is to “explore Europa to investigate its habitability”. One of the primary instruments in the strawman scientific payload is a multi-frequency, multi-channel ice penetrating radar (IPR) system. The IPR will play a critical role in achieving the mission’s habitability driven science objectives, which include characterizing the distribution of any shallow subsurface water, searching for an ice-ocean interface and evaluating a spectrum of ice-ocean-atmosphere exchange hypotheses.

The Europa Clipper mission concept presents a range of technical challenges and opportunities for ice penetrating radar science and engineering. The flyby-centric mission configuration is an opportunity to collect and transmit minimally processed data back to Earth and exploit advanced processing approaches developed for terrestrial airborne data sets. Finally, the mission concept also includes using the IPR as a nadir altimeter capable of measuring tides to test ice shell and ocean hypotheses as well as characterizing roughness across the surface statistically to identify potential follow-on landing sites. We will present measurement concepts for addressing these challenges.

The development of successful measurement and data interpretation techniques should also leverage analogous terrestrial environments and processes. Towards this end, we will discuss a range of terrestrial radio glaciological analogs for hypothesized physical, chemical, and biological processes on Europa and present airborne data collected with the UT dual-frequency radar system over a variety of terrestrial targets. These targets will provide context for understanding and optimizing the observable signature of these processes in future radar data collected at Europa.

Coffee & cookies will be served

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