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AN EXPLORATION OF ICY WORLD HABITABILITY: THE EUROPA CLIPPER

Abstract

After many years of study, NASA has approved a new start for a spaceflight mission to investigate the mysteries of Jupiter's moon Europa. Galileo spacecraft data suggest that an ocean most likely exists beneath Europa's icy surface and that the "ingredients" necessary for life (liquid water, chemistry, and energy) could be present within this ocean today implying that Europa may be a habitable world. Because of the potential for revolutionizing our understanding of life in the solar system, future exploration of Europa has been deemed an extremely high priority for planetary science. For the past two years, NASA has funded the California Institute of Technology's Jet Propulsion Laborato-ry and The Johns Hopkins University Applied Physics Laboratory to mature a mission concept named the Europa Clipper. This concept, consisting of a flight system in Jupiter orbit making multiple flybys of Europa, would concentrate on remote sensing and in-situ analysis instrumentation to explore the moon. The design enables globally distributed regional coverage of the moon's surface, nominally with 45 close flybys at altitudes from 25 to 100 km. We will present scientific and programmatic goals and objectives, a mission design overview, and the notional flight system for this concept. In addition, in anticipation of the selection of the science payload for this mission, the details of the exciting investigations will be discussed (pending completion of the NASA competitive selection in the Spring of 2015). The Europa Clipper concept provides a cost-efficient means to explore Europa and investigate its habitability through understanding the satellite's ice shell and ocean, composition, and geology. The mission would also perform reconnaissance for future Europa landers. Reconnaissance instruments, in tandem with a notional payload for science, would assess the science value and surface properties of potential sites.