

SPACE EXPLORATION SYMPOSIUM (A3)
Solar System Exploration (5)

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AN EXPLORATION OF ICY WORLD HABITABILITY: THE EUROPA CLIPPER

Abstract

Jupiter's moon Europa may be a habitable world. 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. 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.

NASA has funded the California Institute of Technology's Jet Propulsion Laboratory and The Johns Hopkins University Applied Physics Laboratory to perform studies of the design and implementation of several mission concepts, including an orbiter, multiple flyby, and lander, to explore Europa. A NASA-appointed Science Definition Team (SDT) considered options for a future strategic mission to Europa, with the stated science goal to Explore Europa to investigate its habitability. Together, the group considered the above mentioned mission options, including their full technical development and costing. Technical review boards and the planetary science community then evaluated these concepts. Study results strongly favored an architecture consisting of a spacecraft in Jupiter orbit, making many close flybys of Europa, and concentrating on remote sensing 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 the scientific and programmatic goals and objectives, a mission design overview, and the notional spacecraft for this concept, which has become known as the Europa Clipper. 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 include the capability to perform reconnaissance for a future Europa lander. Reconnaissance instruments chosen for a model payload, in tandem with a notional payload for science, could assess the science value and landing safety of potential sites. The notional payload serves as a proof-of-concept for the Europa Clipper during its formulation stage. The actual payload would be chosen through a NASA Announcement of Opportunity. If NASA were to proceed with the mission, it could launch early in the coming decade, on an Atlas V or the Space Launch System (SLS).