

## EUROPA CLIPPER MISSION CONCEPT OVERVIEW

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A NASA-appointed Science Definition Team (SDT) recently considered options for a future strategic mission to Europa, with the stated science goal: Explore Europa to investigate its habitability. The team worked closely with a technical team from the Jet Propulsion Laboratory (JPL) and the Applied Physics Laboratory (APL). Together, the group considered several mission options, which were fully technically developed, then costed and reviewed by technical review boards and planetary science community groups. 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 resulting nominal mission design is innovative for its use of gravitational perturbations of the spacecraft trajectory to permit flybys at a wide variety of latitudes and longitudes. 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 science and reconnaissance 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 and ocean, composition, and geology. The set of investigations derived from these science objectives traces to a notional payload for science, consisting of: Ice Penetrating Radar (for sounding of ice-water interfaces within and beneath the ice shell), Topographical Imager (for stereo imaging of the surface), ShortWave Infrared Spectrometer (for surface composition), Neutral Mass Spectrometer (for atmospheric composition), Magnetometer and Langmuir Probes (for inferring the satellite's induction field to characterize an ocean), and Gravity Science (to confirm an ocean). Among the many science investigations addressed, Europa Clipper could potentially characterize plumes linked to Europa's internal lakes or ocean. The mission would also include the capability to perform reconnaissance for a future lander, with the Reconnaissance goal: *Characterize safe and scientifically compelling sites for a future lander mission to Europa*. To accomplish these reconnaissance objectives and the investigations that flow from them, principally to address issues of landing site safety, two additional instruments would be included in the notional payload: a Reconnaissance Camera (for high-resolution imaging) and a Thermal Imager (to characterize the surface through its thermal properties). These instruments, in tandem with the notional payload for science, could assess the science value of potential landing sites. This 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 be possible to launch early in the coming decade, on an Atlas V or the Space Launch System (SLS).

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