

Europa Clipper: A Detailed Exploration of an Ocean World

BONNIE J BURATTI¹, ROBERT PAPPALARDO¹, HAJE KORTH², INGRID DAUBER³, CYNTHIA PHILLIPS¹, ALEXANDRA MATIELLA NOVAK², ERIN LEONARD¹, RACHEL KLIMA⁴, SAMUEL HOWELL¹ AND CATE KRAFT²

¹Jet Propulsion Laboratory

²Johns Hopkins University Applied Physics Lab

³Brown University

⁴Johns Hopkins Applied Physics Laboratory

Presenting Author: bonnie.buratti@jpl.nasa.gov

NASA's Europa Clipper spacecraft is scheduled for launch in October 2024 to conduct a detailed exploration of the habitability of Jupiter's moon Europa. This Galilean moon is inferred to contain a salty subsurface ocean under an icy crust. After entering Jupiter orbit in 2030, the spacecraft will collect scientific observations while flying by Europa about 50 times at closest approach distances of 25–100 km. Europa's interior, surface, atmosphere, and near-space environment will be examined to achieve the following core scientific objectives:

- Confirm the existence of, and constrain our knowledge of, the depth to the subsurface ocean, and provide information on its salinity;
- Identify the composition and sources of non-ice material on the surface and in the atmosphere, including carbon-bearing compounds;
- Determine the three-dimensional characteristics of major landforms;
- Search for and characterize current activity including possible plumes.

The remote sensing instruments comprising the payload are the Europa Ultraviolet Spectrograph (Europa-UVS), the Europa Imaging System (EIS), the Mapping Imaging Spectrometer for Europa (MISE), the Europa Thermal Emission Imaging System (E-THEMIS), and the Radar for Europa Assessment and Sounding: Ocean to Near-surface (REASON). The *in-situ* instruments are the Europa Clipper Magnetometer (ECM), the Plasma Instrument for Magnetic Sounding (PIMS), the SURface Dust Analyzer (SUDA), and the MASS Spectrometer for Planetary EXploration (MASPEX). Gravity and Radio Science (G/RS) will be achieved by the spacecraft's telecommunication system, and Radiation Monitoring (RadMon) data will be collected by engineering sensors placed on the spacecraft. The Project has also convened a team of ground-based astronomical observers to support the mission by providing temporal and spatial context, as well as follow-up for active plume searches. The "One Team" philosophy of Europa Clipper prioritizes collaborations among science team members by bridging across the individual instrument-based investigations.

The overarching goal of the Europa Clipper mission is to

explore its potential for habitability. With abundant evidence for both recent geologic activity and a liquid water ocean, reduction-oxidation potentials to provide energy, and bioessential chemicals, the components for a habitable environment all exist on this ocean world.

Government Funding acknowledged