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# JUICE (JUpiter ICy moon Explorer): a European-led mission to the Jupiter system

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## Abstract

The former ESA-NASA EJSM-Laplace mission is being reformulated by ESA as a European-led single spacecraft mission to the Jovian system. The concept has been recently renamed JUICE (JUpiter ICy moon Explorer). The new mission is based on the design of the Jupiter Ganymede Orbiter (JGO) – the ESA flight element of EJSM-Laplace.

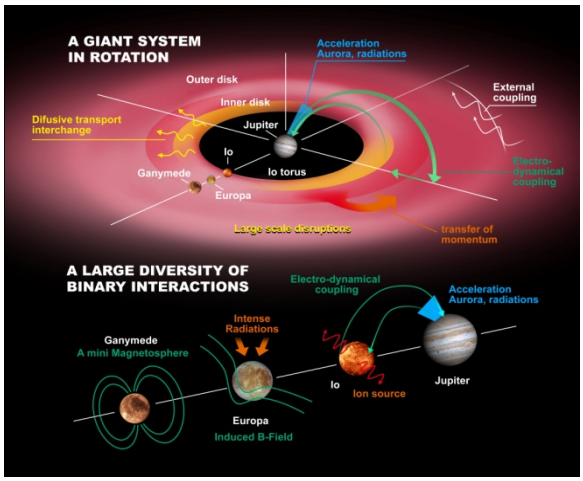
The mission will investigate Jupiter's system as an archetype for gas giants and a paradigm for exoplanetary systems. The jovian system is almost a solar system in miniature, where major scientific targets remain to be explored, including the satellites, the magnetosphere, the planet's atmosphere, and the irregular satellites and rings. The emergence of habitable worlds in the Solar System is the high-priority goal of the mission.

The mission focuses on Ganymede which has an induced magnetic field signature, indicative of a sub-surface (conducting) ocean. Uniquely it also has an intrinsic dipole magnetic field and hence a miniature magnetosphere results. The interaction is complex and highly variable. There are several outstanding questions concerning Ganymede which the mission will aim to answer, such as:

- Is there a subsurface ocean?
- What is the geology, composition and structure of the surface?
- What is the nature of Ganymede's internally driven magnetic field and mini-magnetosphere?
- How does it interact with Jupiter's magnetosphere and atmosphere?
- How does the local plasma environment affect the moons' surfaces, and exosphere?

The mission will also examine the local environment and its interaction with Jupiter's magnetosphere, as well as Jupiter's atmosphere, focusing on:

- The study of global atmosphere dynamics in 4 dimensions.
- Bulk compositional mapping of gases, ices, chemical species and tracers.
- Study of the complex interactions and couplings within the Jupiter atmosphere and magnetosphere.




During the re-formulation study of the mission three options are being investigated, namely: (1) keeping the original JGO scenario unchanged; (2) expanding the science goals by a few Europa flybys; (3) changing from the JGO primary objective to focusing on ocean research at Europa and Ganymede. The prime science requirements for each of these options were developed and feasibilities studied. The results of this study will be presented. The newly defined mission offers great opportunities to enhance our knowledge in the Jovian system and elsewhere, providing great advances in themes identified by ESA's Cosmic Vision Program as of the highest priority.