



JUICE: a European mission to Jupiter and its icy moons

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JUICE - JUPiter ICy moons Explorer - is the first large mission in the ESA Cosmic Vision 2015-2025 programme that will provide a thorough investigation of the Jupiter system in all its complexity: it will characterize the three ocean-bearing icy worlds, Ganymede, Europa and Callisto, as planetary objects and potential habitats; it will also explore the Jupiter system as an archetype of gas giants, focusing in the study of Jupiter's atmosphere (structure, dynamics and composition) and magnetosphere, and their interactions with the Galilean satellites. Finally, it will be the first mission to orbit a Moon (Ganymede) of a Giant Planet.

The JUICE payload consists of 10 state-of-the-art instruments plus one experiment that uses the spacecraft telecommunication system with ground-based instruments. This payload is capable of addressing all of the mission's science goals [1,2]. A remote sensing package includes imaging (JANUS) and spectral-imaging capabilities from the ultraviolet to the sub-millimetre wavelengths (MAJIS, UVS, SWI). A geophysical package consists of a laser altimeter (GALA) and a radar sounder (RIME) for exploring the surface and subsurface of the moons, and a radio science experiment (3GM) to probe the atmospheres of Jupiter and its satellites and to perform measurements of the gravity fields. An in situ package comprises a powerful suite to study plasma and neutral gas environments (PEP) with remote sensing capabilities via energetic neutrals, a magnetometer (J-MAG) and a radio and plasma wave instrument (RPWI), including electric fields sensors and a Langmuir probe. An experiment (PRIDE) using ground-based Very Long Baseline Interferometry (VLBI) will support precise determination of the spacecraft state vector with the focus at improving the ephemeris of the Jovian system.

The current mission baseline assumes a launch in May 2022. Following an interplanetary cruise of 7.6 years, the Jupiter orbit insertion will take place in October 2029. A Jupiter tour of almost three years will include two close flybys of Europa, fifteen flybys of Ganymede, and twelve flybys of Callisto, together with a high inclination phase of six months in order to characterize Jupiter high latitudes. Finally JUICE will orbit around Ganymede, first in 12h-period elliptical orbits (for about 150 days) and then at low altitude (500 km) circular orbits for about 130 days. The end of mission is currently planned as an impact on Ganymede in June 2033.

The ESA Science Operation Centre (SOC) is in charge of implementing the science operations of the JUICE mission. In collaboration with the Science Working Team (SWT) and the Science Working Groups (WGs), one of the main tasks of the SOC during the mission development phase is to perform studies of science operation feasibility and coverage. High level mission segmentation and detailed science scenarios for specific mission phases are being developed, in order to size both the resource constraints and the science return of the mission.