

JUICE-SWI Submillimeter-wave instrument

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In the JUICE mission, we are developing the Submillimetre Wave Instrument(SWI) which is a spectrometer with two frequency bands in 600 GHz and 1.2 THz region to observe submillimeter-wave emission from molecular species in atmosphere such as CH₄, H₂O, 17-O, 18-O, D/H ratio, CS, HCN and CO, as well as surface emission of satellites and the planet. Japanese contribution is the main- and sub- reflector of the antenna, and motors.

The chemical and isotopic compositions of volatiles on geologically non-active Callisto may preserve information of the composition of icy planetesimals formed in the Jupiter-forming region. Based on the observations of Callisto's atmosphere, the SWI Japan will try to constrain dynamics and chemistry of both the outer solar nebula and circum-Jovian subnebula, using their chemical model of protoplanetary disks and N-body simulations.

Also, the compositions of the atmospheres (and plumes) of Europa and Ganymede would provide information on particular geochemical processes in their subsurface oceans. Using results of the observations, the SWI Japan team will be able to investigate the availability of biogenic elements, conditions of geochemical reactions, and habitability, based on their high-pressure hydrothermal experiments and chemical models of subsurface oceans.

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