

R009-12

B会場：9/26 AM2 (10:45-12:30)

12:00~12:15

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Radio & Plasma Wave Investigation (RPWI) aboard JUICE: The first half year of the long travel to Jupiter and Icy Moons

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Jupiter ICy moons Explorer (JUICE), ESA's first L-class mission, was launched in 14 April 2023 and started the long travel toward Jupiter and Icy Moons. This talk provides the initial operation results of last half year as a view of Radio & Plasma Wave Investigation (RPWI), especially the view from Japanese contributors.

RPWI provides a unique and first opportunity in this huge mission. The RPWI will investigate electromagnetic fields and plasma environment around Jupiter and icy moons with passive and active soundings by 4 Langmuir probes (LP-PWI) and a search coil magnetometer (SCM) + a tri-dipole antenna (RWI) on the long MAG-Boom with JMAG.

For lower frequency side (LP and LF), RPWI enables to investigate electric field and electromagnetic interactions governing Jupiter - moon systems, cold plasmas in the ionospheres of icy moons for investigations of surfaces and salty conductive sub-surface oceans, and cold micrometeorite impacts. The high frequency part (HF), i.e., Preamp of RWI and its High Frequency Receiver HF is procured by the RPWI Japan team, with the colleagues in Austria, France, Poland, and Sweden. This part will enable the characterization of Jovian radio emissions (including gonio-polarimetry), passive radio sounding of the ionospheric densities of icy moons, and passive sub-surface radar measurements.

April, May, and June was Near Earth Commission Period, and JUICE initially executed the deployment operations. We saw some troubles, but 10.7-m MAG-Boom was deployed within 1-week from the launch, and the deployment of 3-dipole antennas of RWI on the MAG Boom also succeeded during the JpGU meeting in May. Now (June 2023) we are checking the performance of whole RPWI system including its high frequency part. This talk will provide a summary of this result. This talk will also show planned activities in commissioning and cruise phases, and the full observations around Jupiter and icy moon system.

Potentially, the HF part of RPWI has an enough capability to detect Jovian radio emissions from magnetosphere (aurora etc.), atmosphere (lightning), and icy moons. Direction and polarization capabilities are first enabled in the Jovian system, to identify their source locations and characteristics. RPWI with other instruments covers the survey of harsh environment around Jupiter, environments and interaction with icy moons, and their surface and subsurface characteristics.

The most key parts of the HF part is the sensing of the ionospheres, surface, and subsurface of icy moons during the flybys and on the orbit around Ganymede. We will do unique remote observations of the ionospheres below the spacecraft orbit by the radio occultation and reflection of Jovian radio signals. It has a capability to detect the ionospheric density not only in usual status but also episodic plume ejections triggered by expected crustal activities. The sensing of surface and subsurface are more challenging. We try the passive subsurface radar (PSSR) concept which sounds the icy crusts of Galilean satellites by the reflections of penetrated Jovian radio emissions (HOM/DAM).