[EE] Evening Poster | P (Space and Planetary Sciences) | P-PS Planetary Sciences

## [P-PS01]Outer Solar System Exploration Today, and Tomorrow

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Mon. May 21, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

The giant planets provide many keys to understanding planetary processes. They play an important role in shaping our solar system, and the physical and chemical processes they harbor also provide a unique opportunity to study the phenomena relevant for studying
Earth and other planets, including exoplanetary systems. In this session, we discuss a wide range of topics encompassing the giant planets and their moons, including their origins, interiors, atmospheres, compositions, surface features, and electromagnetic fields. To advocate for current and future outer planets exploration (Cassini, Juno, New Horizons, JUICE, and beyond), we also call for discussions on future missions to explore giant planet systems, including how to develop better international cooperation. Discussion in this latter category will include progress in developing a solar sail mission concept for observing the Jupiter system and its trojan asteroids.

## [PPS01-P02]The Radio &Plasma Wave Investigation (RPWI) for JUICE for the investigation of Jupiter and Icy Moons System: Contributions from Japan

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Keywords:Jupiter, the JUICE mission, radio observations, magnetosphere, Icy moons

The Radio &Plasma Wave Investigation (RPWI) for the ESA JUICE mission (launch: 2022, Observations: 2030s) provides an elaborate suite of electromagnetic fields and plasma instruments. RPWI focuses on cold plasma studies and will investigate how the transfer of momentum and energy in the Jovian huge magnetosphere and the electrodynamic coupling with the icy Galilean moons. Remote sensing and direction finding of the Jovian radio emissions will be carried out. This capability is also devoted to the ices and the deep interiors of the icy moons. Investigations of the ice shells will be performed by means of a novel passive ground penetrating radar technique, which utilizes Jovian strong radio emissions as the transmitted signal. On the Ganymede orbit, continuous measurements of the electric field with the JUICE Magnetometer (JMAG) measurements will determine the electric coupling between any ocean, the ionosphere, and the magnetosphere, and provide the constraints on the physical characteristics of the subsurface ocean of Ganymede.
For those objectives, RPWI sensors consist of 4 Langmuir probes (LP-PWI) for determination of the vector electric field up to 1.6 MHz and cold plasma properties (including active measurements by LP sweeps and mutual impedance sounding) up to 1.6 MHz, a tri-axial search coil magnetometer (SCM) for determination of the vector magnetic field up to 20 kHz, and a tri-dipole antenna system (RWI) for monitoring of radio emissions (80 kHz - 45 MHz). From Japan, the RWI preamp and its High Frequency receiver with the onboard software will be provided, based on the modifications from the BepiColombo PWI and Arase PWE developments. Since Arase already shows the good performance in the radiation hard environment around

Earth, we have enough confidence for the possible functions and performance on the Jovian hard environment. We will also provide Software Wave-Particle Interaction Analyzer (SWPIA) function to RPWI DPU, for the onboard quantitative detection of electromagnetic field - ion interactions, modifying from the Arase SWPIA which is also activating on the space now.
HF reciever will provide the first highly-resolved information of Jovian radio emissions emitted from Jovian multiple regions including lightning activity and icy moons, by the 3-ch receiver system manufactured by Japan and Sweden connected to the 3-elements 1.25-m E-filed dipole antenna system manufactured by Poland and Japan. Highly matured onboard and ground data processing will also be provided by France and Japan. As a byproduct, reflected Jovian emission can also be expected from the boundary of icy crust and conductive liquid subsurface ocean. Such reflection components could be observed as the Lunar surface reflection of terrestrial auroral kilometric radiation (AKR) seen by Kaguya Lunar Radar Sounder. JUICE has the RIME (Radar for Icy Moons Exploration) instrument, an active radar which emits 9 MHz pulse from 16 m tip-to-tip antenna and tries to detect the ocean under ~10 km icy crust. Since the frequency of Jovian radiation is wider (several 100 kHz to several 10s MHz), RPWI will provide complementary information, including the vertical distributions of conductivity and permittivity in the icy crust.
In the srping 2018, we are finishing the test of Engineering Model (EM) and shifting to the manufacturing of Flight Models which will be shipped in 2019 to Europe. The long road are connected to the first Jupiter and outer planet tour of the hardware from Japan.