Geophysical Research Abstracts
Vol. 21, EGU2019-9398, 2019
EGU General Assembly 2019

The Search-Coil Magnetometer onboard ESA JUICE mission

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The JUpiter ICy moons Explorer (JUICE) mission is the first large-class (L1) mission in ESA Cosmic Vision. JUICE is planned for launch in 2022 with arrival at Jupiter in 2029 and will spend at least four years making detailed observations of Jupiter's magnetosphere and of three of its largest moons (Ganymede, Callisto and Europa). The Radio and Plasma Wave Investigation (RPWI) consortium will carry the most advanced set of electric and magnetic fields sensors ever flown in Jupiter's magnetosphere, which will allow to characterize the radio emission and plasma wave environment of Jupiter and its icy moons. Here we present the scientific objectives and the technical features of the Search Coil Magnetometer (SCM) of RPWI. SCM will provide for the first time high-quality three-dimensional measurements of magnetic field fluctuations' vector in the frequency range 0.1 Hz – 20 kHz within Jupiter's magnetosphere. High sensitivity ($\sim$4 fT / Hź1/2 at 4 kHz) will be assured by combining an optimized (20 cm long) magnetic transducer with a low-noise (4 nV / Hź1/2) ASICs pre-amplifier for the front-end electronics. Perturbations by the spacecraft are strongly reduced by accommodating SCM more at $\sim$ 10 m away from the spacecraft on the JUICE magnetometer boom. The combination of high sensitivity and high cleanliness of SCM measurements will allow unpreceded studies of waves and turbulence down to electron scales, in particular in key regions such as the magnetopause, the auroral region and the magnetotail current sheet of Ganymede's magnetosphere. This will lead to important advances in understanding plasma transport and particle energization mechanisms in Jupiter's magnetosphere.