

JUICE/RPWI/JENRAGE: a low frequency radio imager at Jupiter

B. Cecconi (1), Y. Kasaba (2), J. Bergman (3), P. Zarka (1), L. Lamy (1), S. L. G. Hess (4), H. Rothkaehl (5)

(1) LESIA, CNRS-Observatoire de Paris, Meudon, France. (2) Tohoku University, Sendai, Japan. (3) IRFU, Uppsala, Sweden. (4) ONERA, Toulouse, France. (5) SRC-PAS, Warsaw, Poland.

Email: baptiste.cecconi@obspm.fr

Abstract

The JENRAGE (Jovian Environment Radio Astronomy and Ganymede Exploration) experiment of the Radio and Plasma Waves Instrument (RPWI) on-board JUICE (Jupiter Icy Moon Explorer) is a sensitive, and versatile radio instrument. It will observe radio waves ranging from 80 kHz to 45 MHz at a 100 Msample per second acquisition rate. The instrument is composed of set of 3 electrical dipoles (developed by the Polish team), connected to low noise preamplifiers and conditioning analog filters (built by the Japanese team), then sampled and digitally filtered into ~300 kHz bands (digital part developed by the Swedish team). This international project is coordinated by B. Cecconi and Y. Kasaba, both co-PI of JUICE/RPWI.

Although the radio antenna connected to this instrument have no intrinsic directivity, the JENRAGE measurements can provide instantaneous direction of arrival, flux density and polarization degree of the observed radio waves. Hence, the JENRAGE can be described as an full-sky radio imager. As the instrument provides direction of arrival, radio sources can be located with some assumption on the propagation between the source and the observer. Hence, it is possible to produce radio source maps and correlate them with observations at other wavelengths, such as UV or IR observations of the auroral regions of Jupiter. The flux and polarization measurements together with the time- frequency shape of the radio emissions can also be used to identify the radio emission processes.

These features have shown their capabilities on Cassini, with the RPWS/HFR instrument.

We will present the JUICE/RPWI/JENRAGE design and the science objectives. Additional science topics linked to the icy satellites, which are currently being assessed, will also be presented.