

MASER: A Toolbox for Low Frequency Radio Astronomy

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Abstract

The MASER (Measurements, Analysis, and Simulation of Emission in the Radio range) project provides a comprehensive infrastructure dedicated to low frequency radio emissions (typically < 50 to 100 MHz). The four main radio sources observed in this frequency are the Earth, the Sun, Jupiter and Saturn. They are observed either from ground (down to 10 MHz) or from space. Ground observatories are more sensitive than space observatories and capture high resolution data streams (up to a few TB per day for modern instruments). Conversely, space-borne instruments can observe below the ionospheric cut-off (10 MHz) and can be placed closer to the studied object. Several tools have been developed in the last decade for sharing space physics data. Data visualization tools developed by The CDDP (<http://cdpp.eu>, Centre de Données de la Physique des Plasmas, in Toulouse, France) and the University of Iowa (Autoplot, <http://autoplot.org>) are available to display and analyze space physics time series and spectrograms.

Other tools include EXPRES (Exoplanetary and Planetary Radio Emission Simulator) developed at LESIA. The VESPA (Virtual European Solar and Planetary Access) which provides a search interface that allows the discovery of data of interest for scientific users, and is based on IVOA standards (astronomical International Virtual Observatory Alliance). The University of Iowa has developed the Das2 server that allows the distribution of data with adjustable temporal resolution.

MASER is making use of all these tools and standards to distribute datasets from space and ground radio instruments available from the Observatoire de Paris,

the Station de Radioastronomie de Nançay and the CDDP deep archive. These datasets include Cassini/RPWS, STEREO/Waves, WIND/Waves, Ulysses/URAP, ISEE3/SBH, Voyager/PRA, Nançay Decameter Array (Routine, NewRoutine, JunoN), RadioJove archive, Swedish Viking mission, Interball/POLRAD. MASER also includes a Python software library for reading raw data.

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