

Radio and Plasma Wave Observations at Saturn and Jupiter

W. S. Kurth^{*(1)}, D. A. Gurnett⁽¹⁾, G. B. Hospdarsky⁽¹⁾, S. Ye⁽¹⁾, J. D. Menietti⁽¹⁾,
A. M. Persoon⁽¹⁾, A. Sulaiman⁽¹⁾, M. Imai⁽¹⁾, S. Tetrick⁽¹⁾, P. Zarka⁽²⁾, L. Lamy⁽²⁾,
B. Cecconi⁽²⁾, C. Louis⁽²⁾, A. Lecacheux⁽²⁾, W. M. Farrell⁽³⁾, G. Fischer⁽⁴⁾, J.-E.
Wahlund⁽⁵⁾, M. Morooka⁽⁵⁾, L. Hadid⁽⁵⁾, S. J. Bolton⁽⁶⁾, J. E. P. Connerney⁽³⁾, S. M.
Levin⁽⁷⁾, P. Valek⁽⁶⁾, F. Allegrini⁽⁶⁾, P. Louarn⁽⁸⁾, B. H. Mauk⁽⁹⁾

(1) University of Iowa, Iowa City, IA, USA

(2) Observatoire de Paris, Meudon, France

(3) GSFC, Greenbelt, MD, USA

(4) Austrian Academy of Sciences, Graz, Austria

(5) IRF-U, Uppsala, Sweden

(6) Southwest Research Institute, San Antonio, TX, USA

(7) Jet Propulsion Laboratory, Pasadena, CA, USA

(8) IRAP, Toulouse, France

(9) Johns Hopkins University, Applied Physics Lab, Laurel, MD, USA

Cassini has completed its orbital investigation of the Saturnian system. The final phase of the mission was spent in “Grand Finale” orbits begun in late April 2017 with perikrones between the atmosphere and the D ring. The orbit inclination was approximately 63° , hence, could take Cassini through source regions of Saturn Kilometric Radiation (SKR). The Grand Finale orbits carried the spacecraft across magnetic field lines connecting the ring system with the planet, a region only briefly and partially sampled during the Saturn orbit insertion perikrone in 2004. In a rather amazing coincidence, Juno has been simultaneously orbiting Jupiter in an orbit similar to those in Cassini’s Grand Finale. Juno is in a 90° inclination orbit with perijoves between Jupiter’s atmosphere and its ring system. Juno has already skimmed through or close to Jupiter’s auroral radio emission sources and provided in situ examples of the cyclotron maser instability (CMI) in operation. And, Juno has scanned, pole-to-pole, the very innermost region of Jupiter’s magnetosphere, inviting comparisons of radio and plasma waves within the inner magnetospheres of these two giant planets.

In this presentation we discuss radio and plasma waves in these two giant planet magnetospheres, highlighting both similarities and differences using these two well-placed spacecraft. In addition to in situ observations of auroral radio emissions, we will discuss whistler-mode hiss, VLF saucers, lightning whistlers, and wave cutoffs and resonances that give the electron densities in the Saturnian and Jovian magnetospheres. Also, both spacecraft passed through the near-equatorial ionospheres of these two planets, providing the first in situ observations of these. Both missions provide a first look at linkages between the ring system and the planets’ atmospheres.