EPSC Abstracts
Vol. 5, EPSC2010-281, 2010
European Planetary Science Congress 2010

Explanation of dominant oblique radio emission from the Io-Jupiter flux tube .

F. Mottez (1), P. Zarka (2) and S. Hess (3)
(1) LUTH, Observatoire de Paris, CNRS, Université Paris Diderot ; 5 Place Jules Janssen, 92190 Meudon, France (fabrice.mottez@obspm.fr)
(2) LESIA, Observatoire de Paris, CNRS, UPMC, Université Paris Diderot; 5 Place Jules Janssen, 92190 Meudon, France
(3) LASP, University of Colorado, 1234 Innovation Drive, Boulder 80303, USA

Abstract

The Io-Jupiter S-bursts are series of quasi-periodic impulsive decameter radio emissions from the magnetic flux tube connecting Jupiter to its closest galilean satellite Io. We discuss the possibility, suggested by previous works by Hess et al, that the S-bursts are triggered by upgoing electrons accelerated (downward) by trapped Alfvén waves, that have mirrored above the Jupiter ionosphere. According to this theory, the S-bursts would correspond to wave modes that propagate at oblique angles with respect to the magnetic field. Oblique propagation is also inferred for the more slowly varying components of Io-Jupiter radio emissions. Previous works, mainly based on observations of the terrestrial AKR, whose generation process is closely related to those of S-bursts, showed that these waves are emitted on perpendicular wave modes. This discrepancy between the Jovian and Terrestrial cases has led to a controversy about the credibility of the S-bursts model by Hess et al. We show that indeed, the most unstable wave modes for Earth AKR, and Io-Jupiter S-bursts, as they are seen from ground based radio-telescopes, are not the same. Several causes are evaluated : observational bias, the different degree of plasma magnetization above Earth and Jupiter, the role of a cold plasma component and of plasma auroral cavities. Furthermore, we make predictions about what kind of radiation modes a probe crossing the low altitude Io-Jupiter flux tube will see.