EPSC Abstracts
Vol. 8, EPSC2013-449, 2013
European Planetary Science Congress 2013

Magnetic field effect on the beaming cone of Io-controlled decameter radio emissions

P. H. M. Galopeau (1) and M. Y. Boudjada (2)
(1) LATMOS-CNRS, Université Versailles Saint-Quentin-en-Yvelines, Guyancourt, France, (2) Space Research Institute, Austrian Academy of Sciences, Graz, Austria (patrick.galopeau@latmos.ipsl.fr)

Abstract

In the CML-Io phase diagram, where the occurrence probability of the Jovian decameter radio emissions is plotted versus the central meridian longitude (CML) and the orbital phase of Io, four zones of enhanced probability emerge: the so-called Io-controlled sources Io-A, Io-B (emitted from the northern hemisphere), and Io-C, Io-D (emitted from the south). Making the hypothesis that the radio emission is generated (by the cyclotron maser instability), near the local gyrofrequency, along a magnetic field line carried away by Io (with a lead angle δ) along its revolution around Jupiter, we study the occurrence probability in a polar diagram linked to the local magnetic field. We make the assumption that the magnetic field intensity gradient plays the role of an optical axis for the wave propagation. Thus, for a given Jovian magnetic field model, we are able to plot the four sources Io-A, Io-B, Io-C and Io-D as a function of the colatitude angle θ relative to the gradient of the magnetic field (radial coordinate) and an azimuth angle ψ linked to the direction of the magnetic field vector. Our previous results revealed that the angle θ is not constant and that the Jovian decameter emission controlled by Io is radiated in a hollow cone which is not axi-symmetrical around the magnetic field gradient but flattened in the direction of the magnetic field vector. In the present paper, we study the effect of the choice of the magnetic field model (in particular the O6, VIP4 and VIT4 models) on the angular distribution of the sources and the consequences for the emission cone. The use of elliptic coordinates in a frame linked to the local magnetic field is very relevant for such a study.