Geophysical Research Abstracts, Vol. 8, 09166, 2006
SRef-ID: 1607-7962/gra/EGU06-A-09166

Parametric study of theoretical location of Io-controlled jovian decameter radio sources

P. H. M. Galopeau (1), M. Y. Boudjada (2) and H. O. Rucker (2)

(1) Centre d'étude des Environnements Terrestre et Planétaires, CNRS, IPSL, Vélizy, France, (2) Space Research Institute, Austrian Academy of Sciences, Graz, Austria (Patrick.Galopeau@cetp.ipsl.fr / Fax: +33 1 3925 4922)

Assuming that the cyclotron maser instability is at the origin of most auroral planetary radio emissions, we have developed a model allowing a theoretical location of the Io-controlled decameter radio sources (Io-A, Io-B, Io-C and Io-D) in the central meridian longitude-Io phase diagram. The efficiency of this theoretical mechanism is calculated at the footprint of the Io flux tube during a complete revolution of the satellite around Jupiter. We make the basic hypothesis that electrons are accelerated in the neighborhood of Io and follow an adiabatic motion along an active magnetic field line carried by the satellite. We also assume that the source of free energy needed by the cyclotron maser instability to amplify the waves derives from a loss cone distribution function built up by electrons which have disappeared in Jupiter's ionosphere. Finally we derive the existence of some specific longitudes in the northern and southern hemispheres favoring the radio decameter emission and leading to a higher occurrence probability. We present a study of the effect of several parameters on the theoretical location of the sources in the central meridian longitude-Io phase diagram: jovicentric declination of the Earth, half-angle of the beaming cone, lead angle of the active magnetic field line and frequency of emission.