Propagation and source properties of Jovian quasi-periodic bursts viewed from analyses of Ulysses and Cassini data and ray tracing

Tomoki Kimura[1]; Robert J. MacDowall[2]; Roger A. Hess[3]; Philippe Zarka[4]; Baptiste Cecconi[4]; Yasumasa Kasaba[5]; Fuminori Tsuchiya[6]; Hiroaki Misawa[7]; Akira Morioka[8]
[1] Planet.Plasma Atmos.Res.Cent.,Tohoku.Univ; [2] Goddard Space Flight Center, NASA; [3] Goddard Space Flight Center,NASA; [4] Observatoire de Paris CNRS, LESIA; [5] Tohoku Univ.; [6] Planet. Plasma Atmos. Res. Cent., Tohoku Univ.; [7] Planet. Plasma Atmos. Res. Cent., Tohoku Univ.
; [8] Planet. Plasma Atmos. Res. Cent.,Tohoku Univ.

In early 2004, the Unified Radio And Plasma wave (URAP) experiment onboard Ulysses measured the Stokes parameters of Jovian kilometric radiations at northern high-latitudes (up to +80 deg) during the ””distant encounter”” flyby. We analyzed these observation data and indicated that QP bursts have LH polarization (V˜+1). Therefore, we conclude that these emissions are LO mode waves. This is consistent with several previous polarization measurements and ray tracing studies of QP bursts observed at mid- and high-latitudes (MacDowall et al., 1993; Kimura et al., 2008).

On the other hand, the Cassini spacecraft had the closest approach to Jupiter at the end of 2000, when Radio and Plasma Wave Science investigation (RPWS) onboard the spacecraft performed the polarization measurements and direction findings of Jovian radio emissions at low latitudes. Hospodarsky et al. (2004) studied beaming properties and source direction of QP bursts based on simultaneous observations by Galileo and Cassini during the encounter. They suggested that QP bursts emitted from the polar region undergo a complex propagation process through the magnetosheath and exit from the high-latitude magnetosphere toward the equator over a large angular range. In spite of these observations, details about the source location and propagation process of QP bursts observed at low latitudes are still unclear. In this study, we analyzed polarization and direction of QP bursts observed at low latitudes using the data from Cassini/RPWS and ray tracing. We found that the QP bursts detected in Hospodarsky et al. (2004) have an average source direction at a distance of 45 Rj (with ˜20 Rj ambiguity) north from Jupiter. Besides, the Stokes parameters indicated that QP bursts from northern high latitudes have LH polarization (V$>$0.). These characteristics imply that QP bursts observed at low latitudes are LO mode waves which propagate from the polar region to high latitudes and get refracted toward equatorial region in the magnetosheath. In our presentation, we will show the result in detail and discuss the inferred source location and propagation process based on the ray tracing analysis.