

イオ関連木星デカメータ電波の偏波特性の再考: II. 電磁圏プラズマ環境との融和

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Reconsideration of polarization characteristics of Jupiter's decametric radiation: 2.
Reconciliation with the plasma environment

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The Io-related Jupiter's decameter wave emission (Io-DAM) is known to show clear polarization characteristics: most of the Io-DAM events show highly elliptical and RH dominant polarization, and Io-A and B sources show different ellipticity (Dulk et al, 1994; Misawa et al., 1997). We have made a 3D ray tracing analysis for Io-DAM to investigate the observed polarization characteristics. In the latest analysis, we assumed that 1) source locations of Io-DAM are located on the magnetic field lines in the wide longitudinal range which has been generally adopted in the previous ray tracing studies and supported by the recent imaging observations in UV and/or IR wave ranges for Io's foot print aurora (Clarke et al., 1998; Connerney and Sato, 2000), and 2) plasma continuity is valid in the Io-DAM source and propagation regions (Lecacheux, 1988). As the result of the analysis, it is suggested that the polarization characteristics can be explained by ray propagation in quite tenuous plasma for the highly ellipticity, and the difference of plasma density for the ellipticity difference between Io-A and B (Misawa, 2004).

Concerning the plasma environment in the polar upper ionosphere to plasmasphere, we have shown the mean plasma density is estimated to be approximately 10 elec./cm^3 based on the Faraday fringe analysis using the Cassini/RPWS data (Misawa et al., 2006). This estimated plasma density apparently meets with that expected by the ray tracing analysis. However, the Faraday fringe indicates plasma condition 'after' the termination of plasma continuity along a ray path, while the polarization ellipticity is considered to indicate plasma condition 'before' the termination. The polarization ellipticity, therefore, should be comprehended as the feature which satisfies the plasma condition from ionosphere to magnetosphere where an Io-DAM ray is generated and propagates. Now we have investigated the reconciled feature by 1) development of plasma distribution model which meets with the Faraday fringe results, and 2) reconsideration of definition of plasma continuity. In the presentation, we will discuss how the polarization characteristics should be comprehended, and a plausible plasma density model.