

CPMN ground magnetometers and the Cluster spacecraft: Simultaneous observations of the plasma density along the same field line

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By applying the cross-phase method [Waters *et al.*, 1991] and the amplitude-ratio method [Baransky *et al.*, 1985] to magnetic field data obtained from two ground stations located close to each other, we can determine the frequency of the field line resonance (FLR), or the field-line eigen-frequency, for the field line running through the midpoint of the two stations. From thus identified FLR frequency we can estimate the equatorial plasma mass density (ρ) by using the T05s magnetospheric field model [Tsyganenko *et al.*, 2005] and the equation of Singer *et al.* [1981].

In this study we compare ρ estimated from magnetometer data at two stations in the CPMN (Circum-pan Pacific Magnetometer Network [Yumoto *et al.*, 2001]) chain, *Tixie* (TIK, geographic coordinates: N71.59 deg., E128.78 deg.) and *Chokurdakh* (CHD, geographic coordinates: N70.62 deg., E147.89 deg.), with the plasma electron number density (N_e) observed by the WHISPER (Waves of High frequency Sounder for Probing the Electron density by Relaxation, [Decreau *et al.*, 1997]) instrument onboard the Cluster satellites. For the interval of Jan. 1, 2001 - Dec. 31, 2005, we have identified 19 events in which the Cluster spacecraft were located on the field line running through the midpoint of TIK and CHD when they observed FLR, and statistically compared the simultaneously observed ρ and N_e . In 15 out of the 19 events the ratio of ρ to N_e falls into a realistic range. It is also suggested that the contribution of heavy ions tends to increase when the magnetosphere is disturbed.