Geophysical Research Abstracts
Vol. 12, EGU2010-15305, 2010
EGU General Assembly 2010

On the Multi-spacecraft Determination of Periodic Surface Wave Phase Speeds and Wavelengths

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Observations of surface waves on the magnetopause indicate a wide range of phase velocities and wavelengths. Their multi-spacecraft analysis allows a more precise determination of wave characteristics than ever before and reveal that approximations, which take a predetermined fraction of the magnetosheath speed or the average flow velocity in the boundary layer, can overestimate phase speeds. We show that time-lags between two or more spacecraft can give a qualitative upper estimate, and we confirm the unreliability of flow approximations often used by analysis of a few cases. Using two-point distant magnetic field observations and spectral analysis of the tailward magnetic field component, we propose an alternative method to estimate the wavelength and phase speed at a single spacecraft from a statistical fit at the other site.