Magnetopause transport due to electromagnetic plasma waves near the ion-cyclotron frequency

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The transport of the magnetosheath plasma into the magnetosphere occurs through the outer boundary of the Earth's magnetosphere, the magnetopause. A possible transport mechanism is diffusion due to resonant interaction of ions with plasma waves. We use CLUSTER magnetic field and plasma data in order to systematically investigate the occurrence of low frequency magnetic fluctuations during magnetopause current sheet crossings. We choose situations where adjacent boundary layers of penetrated solar wind particles are present on the magnetospheric side of the magnetopause. Measured plasma distribution functions are used to confirm the existence of a boundary layer. Using FGM data we investigate the low frequency magnetic field fluctuations during these events and found systematic fluctuations near the proton cyclotron frequency. We quantitively analyze the propagation vectors of the corresponding waves applying the phase differencing technique [Dudok de Wit et al., 1995]. Based on the cross-product of fluctuations of the magnetic field and current density we estimate the diffusion rates and find that the level of the magnetic fluctuations may, indeed, account for the observed boundary.