



Multi-point observations of Ion Dispersions near the Exterior Cusp with Cluster

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The exterior cusp is the most external region of the polar magnetosphere in direct contact with the plasma and the magnetic field from the solar wind. Unlike the rest of the magnetopause surface, the exterior cusp is a singular region with small and turbulent magnetic field and where large entry of plasma from solar origin takes place. The main process that injects solar wind plasma into the polar cusp is now generally accepted to be magnetic reconnection. Depending on the IMF direction, this process will take place equatorward (for IMF southward), poleward (for IMF northward) or on the dusk or dawn sides (for IMF azimuthal) of the cusp. We report a Cluster crossing on 5 January 2002 near the exterior cusp on the southern dusk side. The IMF was mainly azimuthal (IMF-By around -5 nT), the solar wind speed lower than usual around 280 km/s and the density around 5 cm⁻³. The four Cluster spacecraft were still in the "magnetotail" configuration with two perfect tetrahedra of 2000 km around apogee and turning into an elongated configuration near the magnetopause. C4 was the first spacecraft to enter the cusp around 19:52:04 UT, followed by C2 at 19:52:35 UT, C1 at 19:54:24 UT and C3 at 20:13:15 UT. C4 and C1 observed two ion energy dispersions at 20:10 UT and 20:40 UT and C3 at 20:35 UT and 21:15 UT. Using the time of flight technique on the upgoing and downgoing ions in the dispersions, we obtain an altitude of the sources of these ions between 14 and 20 RE. Using Tsyganenko model, these sources are located on the dusk flank, past the terminator. In addition, before entering the cusp, the magnetopause crossing was characterized by a large shear in By and bipolar plasma flows, suggesting that reconnection was taking place near the exterior cusp. We will discuss the extent of the reconnection line along the flank of the magnetopause based on these observations.