



Cluster Observations of reconnection along the dusk flank of the magnetosphere

C.-Philippe Escoubet (1), Benjamin Grison (2), Jean Berchem (3), Karlheinz Trattner (4), Benoit Lavraud (5,6), Frederic Pitout (5,6), Jan Soucek (2), Robert Richard (3), Harri Laakso (1), Arnaud Masson (7), Malcolm Dunlop (8), Iannis Dandouras (5,6), Henri Reme (5,6), Andrew Fazakerley (9), and Patrick Daly (10)

(1) ESA/ESTEC, RSSD, Noordwijk, Netherlands (philippe.escoubet@esa.int), (2) Institute of Atmospheric, Czech Republic, (3) UCLA/IGPP, USA, (4) LASP, Colorado U., USA, (5) University of Toulouse, UPS-OMP, IRAP, Toulouse, France, (6) CNRS, IRAP, BP 44346, F-31028, Toulouse cedex 4, France, (7) ESA/ESAC, Spain, (8) RAL, UK, (9) MMSL, UK, (10) MPS, Germany

Magnetic reconnection is generally accepted to be the main process that transfers particles and energy from the solar wind to the magnetosphere. The location of the reconnection site depends on the orientation of the interplanetary magnetic field (IMF) in the solar wind: on the dayside magnetosphere for an IMF southward, on the lobes for an IMF northward and on the flanks for an IMF in the East-West direction. Since most of observations of reconnection events have sampled a limited region of space simultaneously it is still not yet known if the reconnection line is extended over large regions of the magnetosphere or if it is patchy and made of many reconnection lines. We report a Cluster crossing on 5 January 2002 near the exterior cusp on the southern dusk side where we observe multiple sources of reconnection/injections. The IMF was mainly azimuthal (IMF-By around -5 nT), the solar wind speed lower than usual around 280 km/s with the density of order 5 cm⁻³. The four Cluster spacecraft had 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, which leads to energy dispersions, we obtain distances of the ion sources between 14 and 20 RE from the spacecraft. The slope of the ion energy dispersions confirmed these distances. Using Tsyganenko model, we find that these sources are located on the dusk flank, past the terminator. The first injection by C3 is seen at approximately the same time as the 2nd injection on C1 but their sources at the magnetopause were separated by more than 7 RE. This would imply that two distinct sources were active at the same time on the dusk flank of the magnetosphere. In addition, a flow reversal was observed at the magnetopause on C4 which would be an indication that reconnection is also taking place near the exterior cusp quasi-simultaneously.