



Cluster Cusp Crossing on 18 April 2002

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On 18 April 2002 the Cluster spacecraft crossed through the northern high altitude (exterior) cusp during 16:25-17:55 UT. The prevailing solar wind dynamic pressure was rather low (< 2 nPa) and IMF Bz was southward (-8 to -12 nT). The Cluster data from the FGM, CIS, PEACE, EFW, WHISPER and STAFF instruments reveal that the cusp is structured with three anti-sunward ion flow events of durations ≈ 1.5 , 17.5 and 19.0 min, with bulk plasma flow roughly parallel to the magnetopause toward north. The ion and electron densities in the events are much greater than those outside the events. The sharp inward boundaries of the ion flow events cross the four spacecrafts in one time sequence, and the outward boundaries of the events cross the spacecrafts in the reverse time sequence. The observations studied using magnetosphere and magnetopause models suggest that the structured cusp is a temporal feature that arised due to three inward and outward movements of the magnetopause by about 1.5 Re so that Cluster, while crossing through the exterior cusp, happend to be in the cusp and magnetosheath (ion flow event) alternately. The magnetopause moved due to three changes in the solar wind dynamic pressure by up to 100% of the same durations as the ion flow events. *Zong et al.* [2004] presented the RAPID data during this cusp event and partly discussed the event in terms of the lateral movements of the magnetosphere due to the changes in the solar wind azimuthal flow and IMF B_y/B_z.