

# STUDIES OF MAGNETIC RECONNECTION USING CLUSTER AND OTHER SPACECRAFT

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Abstract. Cluster, launched in the summer of 2000 and commissioned on February 1, 2001 has completed five years of study of the magnetosphere. The mission has been extended to December 2009. The scientific goals of Cluster include study in three dimensions of plasma structures and boundaries in and around the magnetosphere. The science focus includes the bow shock, magnetopause, polar cusp, current sheets in the magnetotail, and the morphology and dynamics of magnetic reconnection in both the dayside and nightside magnetosphere. The separation of the four spacecraft was changed last summer to a multiscale configuration with three of the spacecraft separated by 10,000 km while the fourth is at a perpendicular distance of 1,000 km from the plane of the triangle formed by the other three. In the configuration at present the spacecraft form a regular tetrahedron at apogee with a separation of 10,000 km between them. In future orbital maneuvers, the orbital phase of two of the spacecraft will be varied so that the distance of the fourth spacecraft from the 10,000 km triangle of the other three can vary from  $\sim 1000 - 10,000$  km, or more. By 2008 and 2009 solar perturbations will have moved apogee southward, which will enable exploration of new regions with four spacecraft, including the subsolar region of the magnetosheath and bow shock, the near-Earth tail where current disruptions are conjectured to occur, and the auroral acceleration region. The complement of instruments and the flexibility of the orbital constellation has enabled Cluster to study the flow of energy and momentum across all the important magnetospheric boundaries. I will concentrate on describing some of the results on the properties of magnetic reconnection at the dayside boundary between the magnetosheath and magnetopause and studies in the nightside in the magnetotail current sheet.