Geophysical Research Abstracts
Vol. 12, EGU2010-10617, 2010
EGU General Assembly 2010

TC-1 observations of a flux rope: generation by multiple X line reconnection.

Lorenzo Trenchi (1), Maria Federica Marcucci (1), Henri Rème (2), Christopher M. Carr (3), and Jinbin Cao (4)

(1) IFSI-INAF, Rome, Italy (lorenzo.trenchi@ifsi-roma.inaf.it), (2) Centre D'Etude Spatiale des Rayonnements, Toulouse, France., (3) Blackett Laboratory, Imperial College London, London, UK., (4) Center for Space Science and Applied Research, Chinese Academy of Sciences, Beijing, China.

The Flux Transfer Events (FTE) are the manifestation of time-varying reconnection at the Earth magnetopause. The original Russell and Elphic (1978) FTE model predicts a pair of elbow shaped flux ropes of reconnected field lines generated by intermitted and localized reconnection. Alternatively, Lee and Fu (1985) proposes that multiple extended reconnection X lines generate flux ropes at the magnetopause, with the axis roughly aligned to the X lines themselves.
On December 29, 2004 the Double Star TC-1 observes several reconnection flow reversals, indicating that the satellite stays close to a reconnection site for about 20 minutes. During the time of observations, TC-1 also detects a flux rope. Because TC-1 observations are made close to the reconnection site, it can be evaluated the direction of the X line as predicted by the component merging model (Sonnerup 1974, Gonzales and Mozer 1974). It is found that the flux rope axis is parallel to such an X line. This fact suggests that the flux rope is probably generated by multiple X lines. The time period under study is characterized by a large and negative Earth dipole tilt and the reconnection line close to TC-1 is found to follow the magnetic equator, passing northward of the subsolar/stagnation point. The interplanetary magnetic field is directed southward and dawnward. Although during the period under study only single point observations are available, the most likely interpretation is that the flux rope is generated when a secondary X line, which has approximately the same orientation of the primary X line near TC-1 and is located south of TC-1 location and passing through the subsolar/stagnation point, is activated.