orbits and the injected particle fluxes. We also discuss the dependence of the ion and electron injections on pulse parameters, such as speed, field magnitude and spatial extent. The results with the non-dipolar, time-dependent background field show marginal increase in injection strength for energies of 10 to 400 keVs and typical pulse parameters compared to the case of dipole background, however the differences become more significant for very active events or very high particle energies.

SM31A MCC: 2002-2004 Wednesday 0800h

Multipoint Observations of Reconnection Signatures

Presiding: **R Strangeway,** Institute of Geophysics and Planetary Physics, University of California, Los Angeles**; J D Scudder,** University of Iowa

SM31A-01 0800h

A CLUSTER INVESTIGATION OF THE OCCURRENCE AND CAUSES OF RECONNECTION IN THE VERY NEAR-EARTH TAIL (X > -19Re)

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The Cluster spacecraft cross the plasma sheet at distances of X -16 to -19 Re, significantly earthward of the mean X-line location of -25 Re determined by Geotail. Indeed, transport in the plasma sheet observed by Cluster is usually directed sunward during both quiescent and active intervals. Cluster's polar orbit is ideally suited for the detection of traveling compression regions (TCRs) in the tail lobes and, to a lesser extent, flux ropes in the plasma sheet. TCRs are caused by the rapid motion of flux ropes embedded in high-speed plasma sheet flows generated by multiple X-line reconnection. Hence, they can be used to remotely sense the movement of flux ropes and the plasma sheet flows in which they are embedded. Cluster fluxgate magnetometer measurements taken during the 2001 and 2002 tail seasons have been used to identify and analyze flux rope motion in the near-tail. Earthward moving flux ropes, detected either in situ or remotely as TCRs, are found to outnumber tailward moving flux ropes by a ratio of 3 to 1. Here we investigate the interplanetary and magnetospheric conditions associated with the production of tailward moving flux ropes at Cluster and, by implication, X-line formation in the very near-tail (i.e., X > -19 Re). The results will be discussed in terms of the processes leading to plasma sheet thinning and current sheet filamentation.

SM31A-02 0815h

Near-Earth Magnetotail Reconnection and Plasmoid Formation in Connection With a Substorm Onset on 27 August 2001

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We have examined the magnetic field and ion velocity data from the Cluster spacecraft on 27 August 2001 when the spacecraft were located in the postmidnight magnetotail at $x_{GSM} = -19R_E$ and $y_{GSM} = -2R_E$. Fast earthward flows were recorded at both Cluster sc1 and sc3 ∼32 min prior to a substorm onset at ∼0401 UT, when enhanced tailward flows were detected at both spacecraft. Cluster sc3 also detects earthward directed flows ∼30 min after the onset. These plasma flows are suggestive of slow-mode shocks in a Petschek-type reconnection layer. The negative B_y component of the observed magnetic field coincident with high-speed tailward flows at substorm onset strongly suggest the formation and ejection of a plasmoid. We apply a curvature analysis technique on the magnetic field data to investigate the topology of the plasmoid during its evolution. The indication that reconnection is active prior to the downtail release of the plasmoid at substorm onset may be interpreted as a semi-continuous erosion of magnetic fields in the near-Earth magnetotail region and may provide us with information on the dynamic evolution of the near-Earth neutral line (NENL) to the point of plasmoid release.

SM31A-03 0830h

Cluster Observations of a Near-Earth Neutral Line on August 27, 2001

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At 0400 UT on August 27, 2001 the Cluster spacecraft located near midnight at 19 Re began to observe a tailward flow with southward magnetic field. This flow persisted for several minutes and then both field and flow reversed to northward and Earthward. The event was associated with a rotation of the magnetic field from its usual orientation along the GSM X-axis to nearly antiparallel to the Y-axis. In a principal axis system the Bx' component changed from +12 nT to -12 nT and then back. As the spacecraft passed downward through Bx' = 0 significant current antiparallel to the magnetic field was encountered. At this time the line containing the field and current pointed roughly 45 from gsm Bx towards dawn. The plasma flow was generally tailward orthogonal to the line containing the field and current. While the spacecraft were in the region of negative Bx' the plasma flow was tailward along X. When the spacecraft returned through Bx' = 0 the current and field were again antiparallel at 45 and the flow was still tailward orthogonal to the current and field. Next the flow rotated 180 becoming Earthward with a duskward component. These observations suggest that an x-line formed Earthward of Cluster releasing a structure that was convected tailward past the spacecraft. This x-line remained Earthward of Cluster for four minutes steadily forcing plasma tailward with imbedded southward magnetic field. The x-line then moved tailward past Cluster rotating the field to northward and the flow to Earthward. These observations become particularly important when placed in the context of substorm activity on this day. A major substorm expansion followed the onset of the x-line signatures by about six minutes.

SM31B MCC: Level 2 Wednesday 0830h

Sun-to-Earth Elements and Linkages That Drive Geoeffectiveness I Posters

(joint with SA, SH, NG)

Presiding: **J U Kozyra,** University of Michigan**; L Goncharenko,** MIT Haystack Observatory

SM31B-1105 0830h POSTER

Mass and Speed of the April 21, 2002 CME at 1.64 Solar Radii

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A partial halo CME was associated with an X-class flare on April 21, 2002. It accelerated to 2500 km/s and produced an SEP event. UVCS/SOHO observed the event at 1.64 solar radii, near the peak acceleration. The UV spectra establish the conditions in the pre-CME streamer where much of the mass of the CME originates. Doppler shifts show that a large part of the streamer motion is transverse rather than radial, with an Earth-directed velocity component of 850 km/s. The transverse acceleration is even larger than the radial acceleration. From the density and acceleration we derive a lower limit to the magnetic field at 1.64 solar radii. High temperature emission indicates a probable current sheet, which in some CME models is vital to the CME acceleration. Thus we obtain estimates of the mass, acceleration and magnetic field of the CME in the region of the corona where these quantities are established.

SM31B-1106 0830h POSTER

Source Regions and Storm Effectiveness of Earth-Directed Halo CMEs Between 14 and 24 April 2002

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All three halo CMEs occurred between 14 and 24 April 2002 are found to be associated with flares, interplanetary trasient shocks and geomagnetic storms, and thus are Earth-directed. To understand why the April 15 and 17 Earth-directed halo CMEs cause geomagnetic storms much stronger than the April 21 Earth-directed halo CME, we first determine the central position and the line-of-sight propagation velocity of the three halo CMEs using the cone model (Zhao et al., 2002), and then identify source regions of the halo CMEs and examine the magnetic configuration of those source regions. It is found that the April 15 and 17 halo CMEs originated in a bipolar closed field regions with the bipolar boundary layer being favourable for the occurence of the southward IMF event, and the April 21 halo CME originated in an unipolar region with the