[SO09] The three dimensional structure, heating and energy balances of the 13 December 2001 Coronal Mass Ejection Plasma

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The Ultraviolet Coronagraph Spectrometer (UVCS) instrument onboard the Solar and Heliospheric Observatory (SOHO) satellite observed Doppler shifted material of a partial Halo coronal mass ejection (CME) on December 13 2001. The observed ratio of the [O V]/O V] is an interesting feature that represents a reliable density diagnostic. Earlier UVCS observations of CME by Akmal et al. (2001) and Ciaravella et al. (2001) found evidence that the ejected plasma is heated long after the eruption. We have investigated the heating rates, which represent a significant fraction of the CME energy budget. The parameterized heating and radiative and adiabatic cooling have been used to evaluate the temperature evolution of the CME material with the time dependent ionization state model. The flux rope model for interplanetary magnetic clouds (Kumar and Rust, 1996) is also used to estimate the energy balances of the ejected plasma. We find that continuous heating is required to match the UVCS observations. To match the O VI observation, a higher heating rate is required such that the heating energy is greater than the kinetic energy. The temperatures for the O VI, Lyα and C III emission indicate that different heating rates are required for those ions. About 73 % of themagnetic energy goes into the heating energy for the O VI observation with Kumar and Rust's model, in agreement with their prediction.

[SO10] Predicting geoeffective Coronal Mass Ejections with the earthward direction parameter

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It is generally believed that geoeffective CMEs can be predicted based on their locations and speeds, namely, the fast, frontside halo CMEs are strong candidates for geomagnetic storms. Recently, Moon et al. (2005) refined this idea by employing CME's earthward direction as a new parameter for geoeffective CMEs, and demonstrated the importance of this parameter using observations of 12 very fast halo CMEs. We extended the study to 490 frontside halo CMEs occurred from 1997 to 2003, and carried out a more comprehensive analysis of the CME parameters using the Contingency Table method. Based on the statistical result, we discuss how to utilize the direction parameter in combination with other parameters, location and speed, to maximize our ability to predict the geoeffective CMEs.