Geophysical Research Abstracts
Vol. 13, EGU2011-8570, 2011
EGU General Assembly 2011

On the acceleration of CMEs during the last solar minimum

Shane Maloney and Peter Gallagher
School of Physics, Trinity College Dublin, Ireland (maloneys@tcd.ie)

Coronal mass ejections (CMEs) are large scale (10^{12} kg) eruptions of plasma and the entrained magnetic field from the Sun into the Heliosphere. The physics governing CME propagation is a long-standing and still unanswered question. As CMEs can cause adverse spaces weather effects at Earth understanding their propagation is not only of great scientific benefit but will also be practical benefit. Observations from the dual perspectives of Sun Earth Connection Coronal and Heliospheric Investigation (SECCHI) on board the Solar Terrestrial Relation Observatory (STEREO) spacecraft were used to reconstruct the three dimensional (3D) trajectories and kinematics of a large number (~ 100) of CMEs during the last solar minimum and increasing phase of current maximum. Analysing these kinematics revealed that a number of CME underwent significant acceleration beyond $30\,R_{\odot}$ contra to the assumptions made by many. The kinematics were then used to test if the aerodynamic drag model could appropriately reproduce the observations. It was found that while the aerodynamic drag could reproduce some of the kinematics but not all. This is most likely due to interactions of the CMEs with slow or fast regions of the solar wind which was could not be accounted for in our solar wind model. Using the kinematics and trajectories it was possible to extract the probable bodies and instruments a CME might interact with as it propagated. This is one of the many goals of the HELIO project, which will facilitate the study of CME propagation further out in the heliosphere, allowing us to test if acceleration continues far out into the Heliosphere.