Project Details

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Project Title:
Modeling the Geoeffectiveness of Coronal Mass Ejections

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Summary:
We propose to develop a community tool that would enable users to quickly estimate the likely geo-effectiveness of Coronal Mass Ejections, initiated using an initiation process of their choosing . At present we have a 2.5D MHD model which has enabled us to study the `breakout' initiation process in the inner corona. While this model is ideally suited to study the initiation of the ejection, it is missing some critical components which are needed to enable it to follow the eruption to 1 AU.We propose to extend the model to achieve this. These components include, modifications to the energy balance description, and user interfaces to control set up of both the background magnetic field and the complex field topology required in the initiation region, and the solar wind state into which the eruption occurs. We will add a graphical user interface to allow users to modify the solar wind and initial magnetic field configurations, and the final tool will be made available to the community through the CCMC and through our web site. We will apply it to the `breakout' model, comparing results with those from our completed studies which used a simplistic description of the outer corona, to study the impact that a more realistic solar wind environment has on the evolution of the CME. Our modeling tool will report those properties of CMEs known to be key in determining geo-effectiveness. We will encourage and facilitate proponents of other initiatiation mechanisms in the use of the tool to perform similar studies for those models.

Publication References:

Summary: ''

Reference: Peter MacNeice / Drexel University - Modeling the Geoeffectiveness of Coronal Mass Ejections

Summary: no summary

Reference: MacNeice, P.; Antiochos, S. K.; Phillips, A.; Spicer, D. S.; DeVore, C. R.; Olson, K.; (2004), A Numerical Study of the Breakout Model for Coronal Mass Ejection Initiation, The Astrophysical Journal, Volume 614, Issue 2, pp. 1028-1041, doi: 10.1086/423887

Summary: no summary

Reference: Lynch, B. J.; Antiochos, S. K.; MacNeice, P. J.; Zurbuchen, T. H.; Fisk, L. A.; (2004), Observable Properties of the Breakout Model for Coronal Mass Ejections, The Astrophysical Journal, Volume 617, Issue 1, pp. 589-599, doi: 10.1086/424564