

Prediction and skills of Bz forecasting inside CMEs

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The direction of magnetic vectors within coronal mass ejections, CMEs, has significant importance for forecasting terrestrial behavior. However, forecasting these vectors remains largely elusive and lies predominately with the difficulty in disassociating the predictive skill of the magnetic configuration during the initiation process with the skill of understanding the evolutionary effects of the topology during propagation. Here, we discuss a simplified system for predicting the magnetic vector within CMEs, driven by observations and empirical relationships. Operating under a realtime format, this (Bz4Cast) model can provide a diagnostic threshold to compare against more complex systems. These are first steps to providing operationally reliable estimates of Kp at Earth as a long-lead time forecast. Using skill metrics, we show this model is the most unbiased, while the NOAA and NASA/CCMC tend to over-forecast. We will present preliminary results of evaluating predictive skill of the MHD driven SUSANOO model and display solutions to evaluating skills for the interplanetary magnetic field near Earth. This parameter presents unique complexity over the Kp index skills as it is a time-varying vector rather than a scalar value of fixed 3 hour time period.

Keywords: long lead-time forecast, Coronal mass ejections, skill metric validation