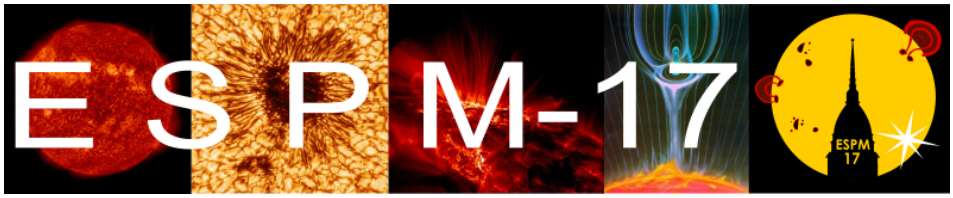

Contribution ID: **50** Type: **Talk**

Predicting geo-effectiveness two days prior to CME impact with EUHFORIA

Friday 13 September 2024 09:50 (15 minutes)

The EUropean Heliospheric FORecasting Information Asset (EUHFORIA, Pomoell and Poedts, 2018), a physics-based and data-driven heliospheric and CME propagation model, can predict the solar wind plasma and magnetic field conditions at Earth. It contains several flux-rope CME models, such as the simple spheromak and more advanced FRi3D and toroidal CME models. This enables the prediction of the sign and strength of the magnetic field components upon the arrival of the CME at Earth and, thus, the geo-effectiveness of the CME impact. EUHFORIA has been coupled to several global magnetosphere models like OpenGGCM, GUMICS-4, and Gorgon-Space. In addition, the synthetic data at L1 (from the EUHFORIA simulation) can be used as input for empirical models and neural networks to predict the geomagnetic indices like Disturbance-storm-time (Dst) or Kp that quantify the impact of the magnetized plasma encounters on Earth's magnetosphere. Hence, we also coupled EUHFORIA to empirical models and machine learning based models to predict the geomagnetic indices. We then compare the results of these models to observational data to evaluate their performance in predicting the geo-effect indices. We obtain the input parameters for running the geomagnetic indices models two to three days in advance.

We perform ensemble modelling considering the L1 monitor precision in its orbit and the uncertainty in the initial CME parameters at launch for error quantification. This study validates various space weather forecasting model chains and checks the best compatibility and predictive capabilities using EUHFORIA data for operational space weather forecasting.

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