



Contribution ID: 396

Type: Poster

Novel validation scheme for quality assessment of coronal models

Monday, 6 September 2021 11:11 (13 minutes)

The strive for improving space weather forecasts naturally comes with the need for a standardized validation scheme for the involved models. Especially the performance of coronal (magnetic field) models that form the lower boundary of forecasting simulations is crucial as their errors are further propagated by solar wind models. We therefore developed a benchmarking system, allowing the quality assessment for solar coronal magnetic field models in an easy-to-implement manner. Our system is constructed as a step-wise scheme, incorporating 1) visual inspection with multi-view point white-light data, 2) magnetic topology analysis with EUV on-disk data and 3) a feature matching implementation, also using white-light data from multiple perspectives. The strength of our assessment scheme lies in both the multi-view point aspect as well as the combination of both topological on-disk as well as off-limb structure analysis, providing a very detailed insight into a model's magnetic configuration. A broad applicability is ensured by the possibility for customization of the sub-steps, while providing the framework for comparison. To showcase its application, also to derive ideal parameter sets for the model(s) under investigation, we used the validation system on the coronal model of EUHFORIA. We hereby run the model with 67 different parameter configurations and derive the best performing parameter sets.

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Session Classification: Poster Session 1.6

Track Classification: Session 5 - Solar-Terrestrial Relations, Solar Wind, Space Weather and Space Climate