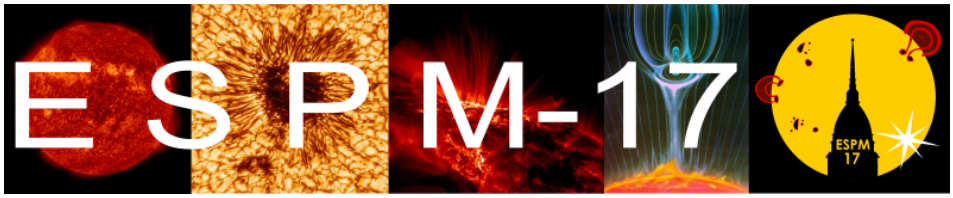

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Solar wind, space weather and solar-terrestrial connection

Friday 13 September 2024 09:25 (25 minutes)

This review talk covers the solar-terrestrial connection, especially from the perspective of space weather modelling and forecasting.

Firstly, we give an overview of the effects of space weather and provide examples of their economic, political, and societal costs. This is followed up by a review of the current state-of-the-art operational space weather forecasting and nowcasting tools, such as the portal of ESA's SSA, the European VSWMC, NOAA's SWPC and NASA's CCMC and the wide variety of models included in them. The three categories of space weather effects, i.e., geomagnetic storms, radiation storms and radio blackouts, will be analysed separately.

Next, we discuss the new developments in the field, such as full 3D global coronal models and advanced CME geometries, and how these could contribute to improving understanding and forecasting space weather.

We conclude the review talk by elaborating on the current biggest challenges and uncertainties in this modelling (including the time-dependency of the solar wind, effects of the smaller scales, coronal heating, and uncertainties in the observations that bound our models) and how these could possibly be tackled.

It is also emphasized that while the research-to-operations link is fairly well-established in our community, thanks to initiatives such as VSWMC, the return link is still limited. Better communication must be established with the end-users for feedback regarding i) how well the models perform in practice and ii) how to better design future models to fulfil the actual user needs.

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