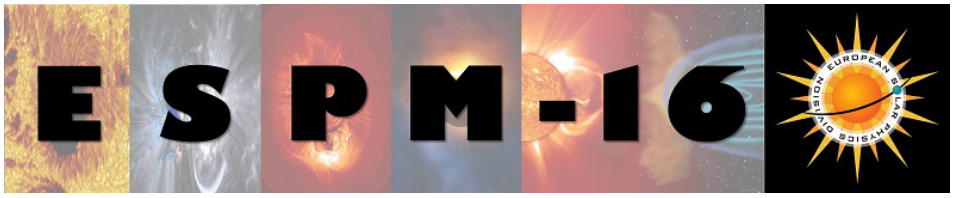

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3-D MHD Simulations of Coronal Mass Ejections in the context of Space Weather Forecasting

Wednesday, 8 September 2021 14:39 (13 minutes)

Coronal Mass Ejections (CMEs) are triggered by kinetic-scale magnetic field topologies within the solar corona and evolve into large-scale structures with sizes of the order of the heliosphere itself. In this paper, we discuss the development of 3-D magnetohydrodynamic (MHD) simulations starting at the solar surface and extending outward through the solar corona and into the inner heliosphere. Using a force-free flux rope implementation in a magnetostatic corona, we are able to self-consistently capture the eruption of various flux rope orientations and subsequent interaction with pre-existing coronal environments. The accurate evolution is therefore highly sensitive to the initial environmental conditions and we demonstrate how the phenomenon of coronal and solar wind pre-conditioning can drastically impact a given CMEs characteristics. Accurately evolving flux rope CME structures beyond the corona presents a formidable modelling challenge and we discuss the advantages and draw-backs of using different CME descriptions for space weather forecasting.

Student poster?

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