

Contribution ID: 421

Type: Poster

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?

Primary authors: DESAI, R.T. (Imperial College London); Mr BATTAILLARD, M (Institute of Physics, École Polytechnique Fédérale de Lausanne, Switzerland); Mr BLUNIER, J (Institute of Physics, École Polytechnique Fédérale de Lausanne, Switzerland); Mr KOEHN, G.J. (Blackett Laboratory, Imperial College London, UK); Mr ZHANG, H (Department of Physics, University of Durham, UK)

Presenter: DESAI, R.T. (Imperial College London)

Session Classification: Poster Session 7.6

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