

# Simulation of Geo-Effective Small-to-Mesoscale Solar Wind Structures as Viewed by PUNCH.

Chip

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Oral

We investigate the interaction of a coronal mass ejection (CME) with a corotating interaction region (CIR) that results in the intensification of magnetic field and formation of geoeffective meso-scale flux ropes. We simulate the CME-meso-scale system with the Alfvén Wave Solar Atmosphere Model (AWSoM) by first producing the background solar wind condition for solar maximum conditions occurring September 2014. The CME is initiated from the originating active region with a Gibson-Low magnetic flux rope with parameters chosen to simulate an energetic event. With the use of high-resolution grids, we capture magnetic reconnection within the erupting flux rope as it impacts the CIR leading to the formation of meso-scale flux ropes containing sufficiently strong magnetic fields ( $\sim 40$  nT) to be geoeffective. We provide wide-angle synthetic PUNCH images to show the viability of capturing meso-scale structures in the inner heliosphere. We also present the magnetic field and plasma quantities are extracted in the location of four virtual probes arranged in a tetrahedral configuration with an average spacecraft separation of 1 Rs at Lagrange point L1. The constellation, corresponding to Space Weather Investigation Frontier (SWIFT) mission, is shown to resolve the spatial characteristics and temporal evolutions of magnetic reconnection at and small- to meso-scale current sheet structure within the ICME.

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