BOSTON UNIVERSITY

Boston University College of Arts & Sciences
Center for Space Physics

2020—2021 SPACE PHYSICS SEMINAR SERIES

Following solar wind transients between Earth and Mars

The heliosphere is a dynamic environment often characterised by the passage of large-scale solar wind structures, such as coronal mass ejections (CMEs) and stream interaction regions (SIRs), and the injection and transport of solar energetic particles (SEPs). These transient phenomena and their properties have mostly been studied at 1 AU, via spacecraft and ground-based instruments at or near Earth and/or the STEREO mission in heliocentric orbits. Since solar events are capable of driving significant space weather effects at Earth, studies of the solar wind and its transients have been largely centred on a terrestrial perspective. More recently, however, the field of planetary space weather has seen increasing interest, motivating the scientific community to better understand the effects and implications of solar events at other locations than Earth.

Studies of CMEs and their space weather impacts at Mercury and Venus have been possible with data from the MESSENGER and Venus Express missions, which included magnetic field measurements of the solar wind in part of their respective orbits. CMEs at Mercury and Venus have been catalogued and have had their properties compared to their counterparts measured at 1 AU. The MAVEN mission, launched in 2013, provides an extended set of solar wind magnetic field measurements at Mars and thus affords us the opportunity to investigate the configuration and evolution of CMEs and other structures that impact Mars.

In this presentation, we will discuss the evolution of solar transients between 1 and 1.5 AU and present two case studies in which eruptions could be followed to Earth and then Mars. The first is a CME+SEP event that took place in May 2012 (solar maximum and pre-MAVEN era), whilst the second is a CME+SIR event that took place in August 2018 (solar minimum and MAVEN era). We will review the current status of heliophysics science at Mars with respect to other locations in the inner heliosphere and finally present the related current and future challenges.

Thursday, March 4th

4:00-5:00 p.m.

See website for Zoom information

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