Heather
Elliott
Southwest Research Institute, San Antonio TX
Maher A. Dayeh, Southwest Research Institute, San Antonio TX
Michael Starkey, Southwest Research Institute, San Antonio TX
Robert Ebert, Southwest Research Institute, San Antonio TX
Poster
With the launch of several new missions, the space weather community will have access to more solar wind observations than ever before. Here, we examine the feasibility of automatically identifying solar wind structures using real-time in situ measurements to produce an initial classification of the solar wind in near real-time with a slight delay to observe enough of a given structure. Such a list can be used to understand the source of space weather impacts in near real-time. For in situ observations, the NOAA SOLAR-1 (formerly known as the Space Weather Follow on at L1 (SWFO-L1) and NASA Interstellar Mapping and Acceleration Probe (IMAP) missions are providing solar wind plasma, composition, and interplanetary magnetic field data in real-time. Here, we explore the possibility of identifying the solar wind structures in real-time using a simple set of criteria for the Interplanetary Coronal Mass Ejections (ICMEs), Stream Interaction Regions (SIRs), Corotating Interaction Regions (CIRs), and High Speed Streams (HSS). Once points are flagged point by point with a set of criteria, we then examine the index values to see if flagged points are adjacent. We explore ignoring small gaps in flagged indices to identify continuous and nearly continuous intervals for which we can produce start and stop times. For ICMEs, we can look for times when the plasma beta ratio for protons is low, the field strength is high, and the proton temperature is low. Many of the new observations have either just come online or soon will come online. Therefore, we do most of our initial testing using prior OMNI solar wind observations that are equivalent to those on IMAP and SOLAR-1 and compare with published event lists. IMAP plasma proton and magnetic field observations recently came online, and the SOLAR-1 plasma and field observations will soon be available. Therefore, if possible, we plan to do some initial case studies comparing identification using public OMNI science observations to new public real-time observations from SOLAR-1 and IMAP. Solar wind heavy ion composition ratios are planned to be a part of the real-time feed for the IMAP mission, which will provide additional criteria to do more definitive solar wind structure identifications, but here we setup an initial framework using the solar wind protons and interplanetary magnetic field measurements.
Poster session day
Thursday, April 30, 2026
Poster location
48
Meeting homepage
2026 Space Weather Workshop
Download to PDF