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“Can Coronal Dimming be Used to Forecast CMEs?”

As we become more and more dependent on our satellite-based technology, accurate and reliable space weather prediction becomes increasingly more critical. Flares and Coronal Mass Ejections (CMEs) from solar activity are of primary interest for affecting Earth's environment. Because flare X-ray and extreme ultraviolet (EUV) radiation is first observed, usually hours to days before CMEs arrive to Earth, it can be very useful to implement prediction tools based on relationships of flares with CMEs. Flares with coronal dimming, which is darkening of coronal emission features near the flaring region on the Sun, is usually associated with CMEs. Coronal dimming is most obvious in solar EUV data, such as that from the Atmospheric Imaging Assembly (AIA) and EUV Variability Experiment (EVE) on board the Solar Dynamics Observatory (SDO). Coronal dimming and CME relationships are studied using EVE data of the coronal emissions from Fe IX (17.1 nm, 0.65 MK), Fe XII (19.5 nm, 1.35 MK), and Fe XIV (21.1 nm, 1.86 MK) and CME properties from white light coronagraphs onboard SOHO, STEREO-A and STEREO-B. Coronal dimming parameters, such as depth, duration, and dimming slope, are found to be correlated with CME parameters, such as velocity, angular width, and mass. These relationships between coronal dimming and CMEs could be employed as an early warning forecasting tool for CMEs by using the real-time EVE flare data.