



Nature of CME-flare Associated Coronal Dimming

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Coronal mass ejections (CMEs) are often accompanied by coronal dimming evident in extreme ultraviolet (EUV) and soft X-ray observations. The locations of dimming are sometimes considered to map footpoints of the erupting flux rope. As emitting material expands in the corona, the decreased plasma density leads to reduced emission observed in spectral and irradiance measurements. Therefore, signatures of dimming may reflect properties of CMEs in the early phase of eruption. We analyze the event of flare, CME, and coronal dimming on December 26, 2011. Data from the Atmospheric Imaging Assembly (AIA) on Solar Dynamics Observatories (SDO) are used for disk observations of the dimming, and images taken by EUVI, COR1, and COR2 onboard the Solar Terrestrial Relations Observatories are used to obtain height and velocity of the associated CMEs observed at the limb. We also calculate magnetic reconnection rate from flare observations. Dimming occurs in a few locations next to flare ribbons, and is observed in multiple EUV passbands. Rapid dimming starts after onset of fast reconnection and CME acceleration, and its evolution well tracks the CME height and flare reconnection. Spatial distribution of dimming exhibits cores of deep dimming with rapid growth, and their light curves are approximately linearly scaled with the CME height profile. From dimming analysis, we infer the process of CME expansion, and estimate properties of the CME.