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Statistical study of CMEs, lateral overexpansion and SEP events

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We present a statistical study on the early evolution of coronal mass ejections (CMEs), to better understand the effect of CME (over)-expansion and how it relates to the production of Solar Energetic Particle (SEP) events. We study the kinematic CME characteristics in terms of their radial and lateral expansion, from their early evolution in the Sun's atmosphere as observed in EUV imagers and coronagraphs. The data covers 72 CMEs that occurred in the time range July 2010 to September 2012, where the twin STEREO spacecraft were in quasi-quadrature to the Sun-Earth line. From the STEREO point-of-view, the CMEs under study were observed close to the limb. We calculated the radial and lateral height (width) versus time profiles and derived the corresponding peak and mean velocities, accelerations, and angular expansion rates, with particular emphasis on the role of potential lateral overexpansion in the early CME evolution. We find high correlations between the radial and lateral CME velocities and accelerations. CMEs that are associated with SEPs tend to be located at the high-value end of the distributions of velocities, widths, and expansion rates compared to non-SEP-associated events.

Student poster?

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