

Earth-Affecting CMEs and Associated Geomagnetic Storms

*Yuming Wang¹, Chenglong Shen¹, Yutian Chi¹

1. University of Science and Technology of China

Initially Earth-directed coronal mass ejections (CMEs), which usually look like a halo from the Earth, are believed to be the most probable candidates of Earth-affecting CMEs. However, not all of initially Earth-directed CMEs can encounter the Earth, and moreover, not all of Earth-encountered CMEs can cause a geomagnetic storm. In this talk, starting from a sample of full halo CMEs during 1997 March –2012 May, we show that (1) even for full halo CMEs, they were not necessary to propagate along the Sun-Earth line; the deviation angle could be larger than 45 degrees, (2) the apparent speed observed in a coronagraph may differ largely from the true value for the CMEs propagating within 45 degrees of the Sun-Earth line and slower than 900 km/s, (3) the deflection and interaction of CMEs in interplanetary space may further influence the possibility of a CME encountering the Earth as well as their Earth-arrival time. Further, by investigating the ICMEs and Dst index from 1995 to 2015, we show the statistical properties of these Earth-encountered CMEs and their capability in causing geomagnetic storms. Although isolated CMEs are the major source of geomagnetic storms, shock-CME interacting structures demonstrate an increasing role in causing stronger geomagnetic storms.

Keywords: coronal mass ejections, geomagnetic storms, space weather