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## Solar energetic particles entering into the terrestrial magnetosphere

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We investigate the solar energetic particles (SEPs) entering into the terrestrial magnetosphere associated with coronal mass ejections (CMEs), using the POES satellite data at low-earth orbit. The POES satellites have ion detectors, measuring the energetic ions ranging from 30 keV to 7 MeV. We demonstrate the superposed epoch analysis of the MeV ions associated with CME-driven intense storms during solar cycle 23. The zero epoch time corresponds to the interplanetary shock arrival detected by the ACE satellite. The initial results indicate that a significant SEP enhancement is observed for a few hours just before the shock arrival, possibly associated with the energetic storm particles accelerated at CME shocks. The enhancement appeared at the invariant latitudes of larger than 60 deg with a different appearance at dawn and dusk. The significant dawn/dusk asymmetry of the SEP flux entering in the magnetosphere is probably due to so called east-west effect of the gyrating protons at the low altitude. We report further statistical results to contribute for a robust forecast of SEP flux entering into the terrestrial magnetosphere.

Keywords: Solar Proton, low-altitude satellite, interplanetary shock, CME