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Oral
The extreme solar storm of 10 May 2024, occurring during Solar Cycle 25, reached a symmetric H component index (Sym-H) of ?500 nT, making it the most intense event since the 2003 Halloween storm. This event provided a rare opportunity for coordinated multipoint observations of the complex interactions among interplanetary coronal mass ejections (ICMEs) from multiple vantage locations. Using measurements from NASA’s Wind, ACE, THEMIS-C, STEREO-A, MMS, NOAA's DSCOVR, and ISRO’s recently launched Aditya-L1 spacecraft, we conducted a comprehensive analysis of the spatiotemporal variability in interplanetary plasma and magnetic field conditions. Our results indicate the presence of large-scale quasi-steady magnetic reconnection within the ICME flux rope, initiated by interactions among multiple ICMEs. A current sheet develops inside the flux rope, enabling internal reconnection between concentric magnetic surfaces and producing a sharp reversal of the interplanetary magnetic field (IMF), as observed at L1. Simultaneously, reconnection exhaust and enhanced electron and ion fluxes were detected along the current sheet, extending more than 200 RE (approximately 1.3 million kilometers) in the geocentric solar ecliptic y-direction. These findings provide new insight into the significance of internal reconnection in ICME evolution, demonstrating its critical role in reshaping magnetic structure and intensifying space weather impacts on Earth.
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