

Simultaneous Global Observations of Ring Current Dynamics

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Studying the structure and evolution of magnetospheric plasmas is fundamental to understanding our near Earth space environment. The Two Wide-angle Imaging Neutral-atom Spectrometers (TWINS) mission provides a unique opportunity to image global ring current plasmas by measuring energetic neutral atoms (ENAs) created when ions trapped on geomagnetic field lines undergo charge exchange with cold neutral hydrogen. The ion distribution can be deconvolved from the ENA images using a modern inversion technique. In this talk, we use data from a variety of orbiting spacecraft to investigate ring current ion dynamics during the main and early recovery phases of several recent ICME-driven geomagnetic storms. Global proton distributions deconvolved from simultaneous TWINS ENA observations are used to provide context to GOES and THEMIS in-situ energetic particle and magnetometer observations of the ring current. Several aspects of inner magnetospheric dynamics are quantified from a global perspective, including equatorial ion pitch angle anisotropy, density and temperature throughout a typical ICME-driven storm.

Keywords: ring current dynamics, proton pitch angle anisotropy, inner magnetosphere, energetic neutral atoms