Storm-substorm relationship: How much do the substorm injections contribute to the storm-time ring current pressure?

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Abstract

By applying a constrained linear inversion technique to energetic neutral atom (ENA) images obtained by the high energy neutral atom (HENA) imager on board IMAGE, we compute the global pressure distribution for protons in the 10-200 keV range. The linear inversion assumes a dipole magnetic field and pitch-angle isotropy. We compute the equivalent D_{st} for a geomagnetic storm from the Dessler-Parker-Sckopke relation, which we call "D_{ENA}" and then compare the measured SYM-H and the interplanetary magnetic field with the computed D_{ENA}. While the protons show modest enhancements during substorm injections, the oxygen data show rapid increases and decreases initiated by the substorms. We will estimate the contribution of the storm-time substorm injection to the total plasma pressure in the inner magnetosphere and discuss the role of the substorm in storm dynamics.