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Remotely measured magnetospheric ion temperatures during a geomagnetic storm E. SCIME, A. ZANIEWSKI, A. GRIPPER, X. SUN, West Virginia University, J.M. JAHN, C. POLLOCK, Southwest Research Institute — Previous studies have demonstrated that with the MENA instrument aboard the IMAGE spacecraft it is possible to remotely measure the ion temperature of the magnetosphere during periods of strong geomagnetic activity. However, neutral atom imaging of the magnetosphere during quiet intervals is problematic. In this work, we show that by mapping neutral atom fluxes obtained over many days of observation to an equatorial plane fixed in GSM coordinates it is possible to construct neutral atom images of the quiet time magnetosphere. Enhanced neutral fluxes in the range of 1 to 70 keV/nucleon are observed in the quiet-time pre- midnight region. A superposed-epoch analysis of multiple storm intervals also permits imaging of the ion temperature structure as a function of time through a geomagnetic storm. Using nearly forty storms to produce average ion temperature maps as a function of storm phase, we find that there are significant differences between the spatial distribution of neutral fluxes and ion heating. Pronounced ion heating (up to 12 keV) is observed on the dayside the main phase from 5 to 8 Earth radii. During early recovery, the ion temperature on the dayside drops to approximately 9 keV and a colder region of approximately 6.5 keV persists near pre-dawn. In the late recovery, the ion temperature throughout the inner magnetosphere appears to relax to a nearly uniform 8 keV.

E. Scime
West Virginia University

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