GLOBAL PRESSURE DISTRIBUTIONS AND ELECTRIC FIELDS IN THE INNER MAGNETOSPHERE INFERRED FROM IMAGE/HENA

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IMAGE/HENA has imaged about 30 main phases of geomagnetic storms since its launch in March 2000. All of main phases show that the proton pressure preferentially builds up in the midnight to post-midnight sector, rather than the evening sector as previously expected. The most extreme skewing of the proton distributions occured when the IMF B_y was more than 20 nT it is probably related to the skewing of the merging lines on the dayside magnetopause, which in turn skews the ionospheric potential pattern. However, for small B_y the proton pressure peaks around midnight. Model results from a self consistent kinetic model agrees well with the data. This morphology is seen throughout the 10-200 keV range, which means that protons even in the 100s keV range is governed by electric field drifts. If the magnetic drift velocity of a 100 keV proton at dipole L=4 equals the electric drift velocity, the electric field has to be $\sim$10 mV/m. This electric field is consistent with measurement by e.g. CRRES and is probably produced by the closure of the region 2 current system through the mid-latitude ionosphere where the conductivity is low. We will show examples of the skewing and its effects on the ionosphere as measured by the Millstone Hill Radar and as inferred by field-aligned current (FAC) measured by the Irridium satellites. A method for deriving the current distribution from the global pressure distribution from HENA is currently being developed. We will compare the results of this method to the global FAC maps inferred by the Irridium measurements.