Global Distribution of the Energetic Neutral Atom (ENA) / Precipitating Ion Particulate Albedo from Low Altitude Emission (LAE) Source Regions Over the Last Solar Maximum

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1. Abstract

Charge exchange between ring current ions spilling into the upper atmosphere and ionized neutral constituents produces a non-uniform distribution of subatomic Energetic Neutral Atoms (ENA). These ENAs are no longer tied to the magnetic field, and can therefore be observed remotely from orbiting platforms. Particular interest is Low Altitude Emissions (LAE) of ENAs. These ENAs are present in the oxygen ionosphere and constitute the brightest ENA signatures during geomagnetic storms. In this study we build on previous work described in Pollock et al. (2003) in which IMAGE-MENA data was used to compute the invariant latitude (IL) and Magnetic Local Time (MLT) distributions of ENAs observed on 26 October 2003. The algorithms developed in Pollock et al. (2003) are updated to compute for IL and MLT of LAE source regions for 71 identified storms at different phases of solar cycle 23. The ENA flux from the source regions is divided by in-situ ion precipitation obtained by DIMPSS-SSL to give a global mapping of the precipitating albedo during storm times.

2. Energetic Neutral Atom Low Altitude Emissions

Charge exchange at the atmosphere near the conjugate antipode during the main and early recovery phases of geomagnetic storms operates as a major ring current loss mechanism (Krupa et al., 1996). Based et al. (2019) predict LAE’s to be the ‘brightest’ ENA signature during geomagnetic storms based on modeling

3. Analysis – IMAGE/MENA ENA Images

4. Analysis – In-Situ Data

5. Qualitative Results

6. Future Work

References

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