Energy Flux and Conductance from Meso-Scale Auroral Features

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Earth’s Atmosphere-Ionosphere system is inseparably coupled, with both regions driven from above and below by various terrestrial and space weather phenomena. Global models have done well at capturing large-scale effects, but currently do not capture the meso-scale (~10s-500 km) phenomena which often are locally more intense. As computing power improves, and modeling meso-scales now becomes possible, it is vital to provide data-informed inputs of the relevant drivers. In this presentation, we focus on the energy flux deposited into the ionosphere from the magnetosphere by precipitating particles that result in the aurora, specifically at meso-scales, and the resulting conductance. Thanks to NASA’s THEMIS mission, an array of all-sky-imagers (ASIs) across Canada monitors the majority of the nightside auroral oval at a 3 second cadence, providing a global view at temporal & spatial resolutions required to study the aurora on meso-scales. Thus, we present 2-D maps over time of the energy flux, energy, and conductance that result from the aurora during solar storms and substorms, including those features at meso-scales. Our results can be utilized by the broad community, for example, as inputs to atmospheric models or as the resulting conductance from precipitation inferred by magnetospheric models or missions like THEMIS, Van Allen Probes, or Arase.

Keywords: conductance, aurora, mesoscale, energy, precipitation

