Geophysical Research Abstracts
Vol. 19, EGU2017-11403, 2017
EGU General Assembly 2017

On the spatio-temporal and energy-dependent response of riometer absorption to electron precipitation: drift-time and conjunction analyses in realistic electric and magnetic fields

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Riometers are low-cost passive radiowave instruments located in both northern and southern hemispheres that capable of operating during quiet and disturbed conditions. Many instruments have been operating continuously for multiple solar cycles, making them a useful tool for long-term statistical studies and for real-time analysis and forecasting of space weather. Here we present recent and new analyses of the relationship between the riometer-measured cosmic noise absorption and electron precipitation into the D-region and lower E-region ionosphere. We utilize two techniques: a drift-time analysis in realistic electric and magnetic field models, where a particle is traced from one location to another, and the energy determined by the time delay between similar observations; and a conjunction analysis, where we directly compare precipitated fluxes from THEMIS and Van Allen Probes with the riometer absorption. In both cases we present a statistical analysis of the response of riometer absorption to electron precipitation as a function of MLAT, MLT, and geomagnetic conditions.