

2010 Fall
Meeting
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Cite abstracts as **Author(s) (2010), Title, Abstract xxxxx-xxxx presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec.**

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HR: 1340h
AN: **SM13A-1786 Poster**
TI: [Ground-based estimates of outer radiation belt energetic electron precipitation fluxes into the atmosphere](#)
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AB: The variations of subionospheric VLF amplitudes observed at ground-based receivers can be used to determine the flux of electrons precipitating into the ionosphere along the path between the transmitter and receiver. A network of VLF receivers has been established to observe the upper atmosphere (~40–85 km), and tools are being developed to extract electron precipitation fluxes from the observations of this network, which is termed AARDDVARK (Antarctic–Arctic Radiation–belt

(Dynamic) Deposition – VLF Atmospheric Research Konsortium). AARDDVARK data from a radiowave receiver in Sodankylä, Finland have been used to monitor transmissions across the auroral oval and just into the polar cap from the very low frequency communications transmitter, call sign NAA, (24.0 kHz, 44°N, 67°W, L=2.9) in Maine, USA, since 2004. The propagating signals are influenced by outer radiation belt (L=3–7) energetic electron precipitation. In this study we show that the observed amplitude variations can be used to routinely determine the flux of energetic electrons entering the upper atmosphere along the entire path, and between 30–90 km in altitude. Our analysis of the NAA observations shows that electron precipitation fluxes can vary by three orders of magnitude during geomagnetic storms. Typically when averaging over L=3–7 we find that the >100 keV POES ‘trapped’ fluxes peak at about 10^6 el.cm⁻²s⁻¹sr⁻¹ during geomagnetic storms, with the DEMETER >100 keV drift loss cone showing peak fluxes of 10^5 el.cm⁻²s⁻¹sr⁻¹, and both the POES >100 keV ‘loss’ fluxes and the NAA ground-based >100 keV precipitation fluxes showing peaks of $\sim 10^4$ el.cm⁻²s⁻¹sr⁻¹. During a geomagnetic storm in July 2005 there were systematic MLT variations in the fluxes observed: electron precipitation flux in the midnight sector (22–06 MLT) exceeded the fluxes from the morning side (0330–1130 MLT) and also from the afternoon sector (1130–1930 MLT). The analysis of NAA amplitude variability has the potential of providing a detailed, near real-time picture of energetic electron precipitation fluxes from the outer radiation belts, and we plan to produce a web-based product of precipitation fluxes in the near future. In this presentation we will take the newly developed AARDDVARK measurements of >100 keV electron precipitation fluxes and contrast them with variations in solar wind speed. Our previous case studies [e.g., Clilverd et al. (doi:10.1029/2009JA015204, 2010)] indicate that solar wind drivers play important roles in driving recurrent electron precipitation, and the new observations will allow this to be explored further.

DE: [0342] ATMOSPHERIC COMPOSITION AND STRUCTURE / Middle atmosphere: energy deposition

DE: [2423] IONOSPHERE / Ionization processes

DE: [2431] IONOSPHERE / Ionosphere/magnetosphere interactions

DE: [2455] IONOSPHERE / Particle precipitation

SC: SPA-Magnetospheric Physics (SM)

MN: 2010 Fall Meeting

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