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On the calibration of the absolute flux spectra of e-POP suprathermal electron imager

The Suprathermal Electron Imager (SEI) onboard the e-POP satellite is designed to record two-dimensional, energy-angle images of electron distributions for energies up to 350 eV in the topside ionosphere. The SEI was calibrated prior to launch. However, an anomaly in the high-voltage command and monitoring system has made the determination of absolute gain, and therefore absolute flux levels, uncertain. The conversion factor between the SEI raw data count and the real differential flux of electron precipitation is energy dependent. We have made several attempts to calibrate SEI data counts into absolute fluxes. Our previous approaches include, (a) a Monte-Carlo simulation of SEI response to specified electron precipitation; (b) a comparison between SEI observations at noon-time subauroral latitudes, and photoelectron fluxes calculated from an electron transport model. Recently, we have adopted a novel approach, to use the large-scale polar rain precipitation observed concurrently by e-POP SEI and nearby DMSP satellites when they crossed the nightside polar cap. The polar rain precipitation originates from the suprathermal portion of the solar wind electrons that access the polar cap open field lines. We perform a cross-comparison between the polar rain flux spectra measured by DMSP and the SEI date-number spectra, to infer the conversion factors between them in the energy range of ~100-300 eV.

e-POP SEI; flux calibration; polar rain