Statistical Distribution of Energetic Electron Precipitation due to Hiss Waves In the Earth's Inner Magnetosphere

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We investigate the statistical distribution of energetic electron precipitation from the equatorial magnetosphere due to hiss waves in the plasmasphere and plumes. Using Van Allen Probes measurements, we calculate the pitch angle diffusion coefficients at the pitch angle of bounce loss cone, and evaluate the energy spectrum of precipitating electron flux using quasi-linear theory. Our ~6.5 years survey shows that, during disturbed times, the plasmaspheric hiss mostly causes the electron precipitation at $L > 3$ near the dayside in the plasmasphere, and hiss waves in plume cause the precipitation at $L > 5$ near dayside and $L > 3.5$ near the dusk side. The precipitating energy flux increases with increasing geomagnetic index, and is typically higher in the plasmaspheric plume than the plasmasphere. The characteristic energy of precipitation increases from ~20 keV at $L = 6$ to ~100 keV at $L = 3$, potentially causing the loss of electrons at several hundred keV. Although the total precipitating energy flux due to hiss waves is generally lower than the precipitation due to whistler mode chorus waves, the characteristic energy of precipitation due to hiss is higher, and the precipitation extends closer to the Earth.