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Rapid MeV electron precipitation and its contribution to radiation belt losses

Lauren Blum and Xinlin Li
University of Colorado, Boulder, CO, United States (lauren.blum@colorado.edu)

Particle precipitation into the atmosphere is a critical part of radiation belt electron loss, and without quantified understanding of this loss mechanism, we are unable to fully understand acceleration mechanisms. In particular, rapid electron precipitation is often observed at low altitude on a variety of timescales ranging from short bursts of less than 1 second (microbursts) to broader regions of precipitation extending a few degrees in latitude (termed precipitation bands). These precipitation features have been hypothesized to be an integral contributor to relativistic electron precipitation loss but quantification of their net effect is still needed. Here we investigate storm-time distributions of both microbursts and precipitation bands, as observed by the SAMPEX satellite at low altitude. We examine the statistical distributions of rapid precipitation features during storm times, to determine during what types of storms, and what storm phases, these mechanisms contribute to radiation belt losses. Additional measurements from the recent CSSWE CubeSat mission in conjunction with the 2013 BARREL balloon campaign help quantify the loss individual precipitation bands can contribute. These investigations help determine the role rapid precipitation events play in radiation belt electron dynamics.