

Precipitation Loss of Radiation Belt Electrons by Two-band Plasmaspheric Hiss Waves

*Zhaoguo He¹

1. Sun Yat-sen University

A two-band plasmaspheric hiss consisting of an upper band (frequency up to 10 kHz) and a lower band (frequency below 1 kHz) was observed by the Van Allen Probes. The electron scattering effect driven by this two-band plasmaspheric hiss is evaluated by the quasilinear diffusion theory for the first time. The calculated pitch angle diffusion rates of the lower-band hiss exist a "gap" with minimum magnitude at around $\alpha=70^\circ$, a condition not conducive to the transport of large pitch angle electrons toward the loss cone. However, the diffusion rates of the upper-band hiss have peak values at $\sim \alpha=70^\circ$, making up for the "gap" of the lower-band hiss diffusion rates. The wave data-driven quasilinear diffusion simulations demonstrate that the collaborated effect of the lower and upper band hiss can cause significant precipitation loss of energetic electrons of tens to several hundred keV within 1 day.

Keywords: Radiation belt, Two-band hiss, Precipitation Loss