

EMIC Wave-Induced Energetic Particle Precipitation in the Earth's Magnetosphere

Abstract

Electromagnetic Ion Cyclotron (EMIC) waves are low-frequency plasma waves (0.1–32 Hz) generated in the minimum magnetic field region of the magnetosphere, where the ring current overlaps with the plasmasphere. These waves play a major role in radiation belt and ring current dynamics. Magnetic field line conjunction analysis between magnetospheric satellites, where EMIC waves are locally observed, and low-Earth-orbiting satellites helps in the identification of EMIC waves and the corresponding particle precipitation caused by EMIC wave scattering. Phase Space Density (PSD) profiles in adiabatic invariant coordinates help differentiate various loss processes associated with the observed particle depletion in pitch-angle resolved energetic particle flux. In this presentation, an overview of magnetic field line conjunctions, EMIC waves, precipitation signatures in satellite observations, and PSD analysis techniques will be discussed, along with their importance in understanding wave–particle interactions in the Earth's magnetosphere.

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