Electromagnetic lon Cyclotron Waves and their effect on radiation belt particles using ground, satellite, and balloon data

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Abstract

The interactions between waves and particles drive dynamics in Earth's radiation belts. In particular, Electromagnetic Ion Cyclotron (EMIC) waves are able to resonate with ring current ion populations as well as relativistic electrons causing pitch angle scattering into Earth's atmosphere. Recent experimental studies have shown EMIC wave growth occurs at all local times and can persist for hours and sometimes even days. With such longevity and broad growth regions, the potential for EMIC waves to be a important cause of radiation belt particle loss increases. With an array of satellite instrumentation including the Van Allen Probes, GOES, and POES in conjunction with BARREL balloons and ground based instruments, we explored the spatial and temporal extent of EMIC waves, the propagation from the generation region to satellites and ground instruments, and particle loss processes resulting from interactions with ions and electrons.