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Zoom meeting B ：11/2 AM2 (10:45-12:30)
11:00-11:15

A comprehensive study of EMIC (ElectroMagnetic Ion Cyclotron) waves observed by the Van Allen Probes and Arase satellites.

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To understand possible generation processes of electromagnetic ion cyclotron (EMIC) waves in the magnetosphere, we performed a comprehensive study of EMIC waves observed by the Van Allen Probes (RBSP) and Exploration of energization and Radiation in Geospace (Arase) satellite. From 2017 to 2018, we identified EMIC wave events observed by both satellite missions and categorized them with respect to wave bands (H- and He- EMIC waves) and relative locations from the plasmasphere (inside and outside the plasmasphere). We found that EMIC waves show significant characteristics at the four different peak occurrence regions depending on geomagnetic conditions. In the morning sector (5-8 MLT) at L>8 with quiet geomagnetic conditions, H-band EMIC waves are predominantly observed in a higher normalized frequency with very narrow bandwidth, a mixture of linear and right-handed polarity and oblique wave normal angle. In the noon sector (10-14 MLT) at L~4-6, both H- and He-band EMIC waves are frequently observed with strong solar wind dynamic pressure during the recovery phase of the magnetic storm. They mainly have left-handed polarity and higher center frequency with broad bandwidth. In the afternoon sector (12-17 MLT), He-band EMIC waves are dominantly observed with the strongest wave power at L~6-8 during the storm main phase, while they have another peak occurrence region at L>8 in the higher magnetic latitudes during geomagnetic quiet conditions. From these observational facts, we suggest that the major driver of EMIC waves depends on geomagnetic conditions and environments. In this presentation, we will discuss possible free energy sources causing EMIC waves, such as energetic particle input in the afternoon sector during the disturbed conditions, adiabatic heating in the noon sector due to the magnetospheric compressions, suprathermal proton heating by magnetospheric waves in the morning sector, and generation of EMIC waves at off-equator source regions in the afternoon sector.