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# Observation of relativistic electron loss induced by EMIC waves: Arase, Van Allen Probes, and PWING induction magnetometer array collaboration

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## Extended Abstract

EMIC waves are generated by temperature anisotropy of energetic ions near the magnetic equator and satellite observations show that the waves tend to be observed on the dusk side and noon side magnetosphere [1]. EMIC waves can propagate from the magnetosphere to the ground and they are observed by ground-based magnetometers as Pc1 pulsation [2]. It has been pointed out that EMIC waves can resonate with relativistic electrons through anomalous cyclotron resonance, and cause strong pitch angle scattering of radiation belt electrons [3]. It has been considered that precipitation loss of relativistic electrons by pitch angle scattering induced by EMIC waves is an important loss mechanism of radiation belt electrons [4]. We report on the observation of relativistic electron loss observed by the Arase satellite on the dawn side magnetosphere during a geomagnetic disturbance, which is likely to be related to an EMIC wave activity. During the event, the EMIC wave activity in conjunction with the relativistic electron loss was identified from observation by the ground-based induction magnetometer array deployed by the PWING project [5]. The magnetometer array observation reveals that EMIC waves were distributed in the wide magnetic local time range from the dusk to midnight sector. Comparison between Arase and Van Allen Probes observations at the different local time sector but same L-shell shows that relativistic electron flux decreased an order of magnitude within 30 minutes, which is consistent with the theoretical prediction of rapid loss of MeV electrons through intense pitch angle scattering by EMIC waves. It is suggested that drifting relativistic electrons are scattered into the loss cone by the EMIC waves on the dusk to midnight sector before they arrive at the Arase satellite located on the dawn side. We will discuss on the impact of loss caused by EMIC wave-induced precipitation loss on the overall flux variation of radiation belt electrons during the geomagnetic disturbance.

## References

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