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Electron acceleration and loss in the radiation belts at Earth and Jupiter

R. Horne
British Antarctic Survey

Definitive new evidence has recently been published which shows that local electron acceleration is required to understand the variability in the outer electron radiation belt at the Earth. Acceleration by gyro-resonance with whistler mode chorus waves is one of the leading mechanisms for electron acceleration at the Earth. Using quasi-linear theory we show that acceleration by Landau resonance with fast magnetosonic waves is also important at the Earth. At Jupiter, we show that chorus wave emissions are sufficiently strong to cause electron acceleration in Jupiter's radiation belt outside the orbit of the moon Io, on a timescale comparable to the time for transport. We suggest that wave-particle interactions should be included in global models for the Earth and Jupiter and show the results of one such model for the Earth and its ability to model electron flux variations.