
JOURNAL CLUB

OBSERVATIONS AND INTERPRETATION OF DISCRETE AND DIFFUSE WHISTLER MODE ECHOES RECEIVED BY RPI ON IMAGE

by

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ABSTRACT

I will report on observations and analysis of discrete and diffuse whistler mode echoes received by RPI on IMAGE. Discrete whistler mode echoes have been identified on a number of days during the period when IMAGE was at low altitude (\approx 2000-6000 km) near its perigee in the southern hemisphere. The observed whistler echoes have frequencies below local electron cyclotron frequency. The echoes are in the frequency range 13-300 kHz and show time delays of a fraction of a second, and longer time delays at lower frequencies, typical of whistler mode propagation. Out of the 300 cases examined, discrete echoes were detected in 24 cases. Ray tracing simulations performed in a limited number of cases indicate that these echoes are the result of reflections of RPI signals from the Earth-ionosphere boundary. These results indicate that whistler mode propagation analysis performed on discrete whistler mode echoes obtained on IMAGE at high latitude can be used to obtain improved electron density models in the high latitude magnetosphere.

The diffuse whistler echoes have frequencies below local electron cyclotron frequency and are characterized by an apparent spread in their time delays. The echoes are in the frequency range 10-300 kHz and show well defined lower and upper cutoff frequencies. In several instances, the diffuse echoes were accompanied by z-mode radiation and in some cases by free space mode echoes. We propose that these echoes are the result of scattering of RPI signals by field aligned small-scale (\approx 10-100 m) plasma density irregularities, commonly found in the low altitude magnetosphere.

Friday, April 5
Elvey Bldg. Globe Room
3:45 pm