A Simple Model for the Deposition of ULF Wave Energy on the Ionosphere.

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Abstract.

One dimensional (1-D) computational and analytic models for the propagation of ultra low frequency (ULF; 1-100 mHz) wave fields from the Earth's magnetosphere through the ionosphere, atmosphere and into the ground are presented. The models are formulated to include solutions for high latitudes where the Earth's magnetic field, B_0, is near vertical to oblique magnetic fields at low latitudes. The models are used to investigate the partitioning of energy deposition associated with ULF wave interaction with the ionosphere. The results show an asymmetry in the energy deposition in the ionosphere. It is found that the dip angle of the background magnetic field as well as the arrival angle of the incident ULF wave has a significant effect on how the energy from incident ULF wave are reflected back into the magnetosphere or converted into joule heating of the ionosphere. Significantly more Joule heating occurs for waves that propagate in the north-south compared with the east-west direction.