

# Simulation of Magnetospheric ULF Waves with an MHD Model

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The BATS-R-US MHD model can simulate large-scale magnetospheric ULF waves. We have examined two events where there is ULF activity in the solar wind and simultaneous, known magnetospheric ULF activity. When driven by the actual solar wind data from these events, the BATS-R-US code runs show: (1) wave propagation away from the sub-solar point in the magnetosheath; (2) large-scale field line oscillations within the magnetosphere; and (3) simultaneous oscillations in the magnetospheric convection pattern. There is a connection between the magnetospheric waves and the interior field line oscillations. Using runs involving idealized solar wind ULF events, we are attempting to determine if the interior field line oscillations are directly driven or are field-line resonances excited by the external waves. We have also examined a third event where the Cluster spacecraft observed 200 second period waves for an extended time along the dusk magnetopause. While BATS-R-US does show magnetosheath waves at the time, the model fails to replicate the waves seen by the Clusters. It is well known that MHD models do not reproduce magnetopause details.