



## **Statistical study of magnetohydrodynamic fast mode waves outside the plasmasphere**

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Magnetohydrodynamic (MHD) fast mode waves (FMW) are an important mechanism for energy transport in the Earth's magnetosphere. For example, they generate field line resonances and they can affect relativistic electron dynamics via drift resonance. There are few statistical studies of FMW properties due to several observational challenges: in situ observations of FMW outside the plasmasphere are complicated by the presence of other Ultra Low Frequency (ULF) wave modes, while ground-based observations are complicated by the fact that FMW energy can reach the ionosphere/ground through multiple pathways. We use Time History of Events and Macroscale Interactions during Substorms (THEMIS) satellite measurements of the thermal pressure, magnetic field, and electric field near the magnetic equator to identify FMW events and discriminate them from other ULF wave modes. We present preliminary results for the spatial distribution and typical amplitudes of FMW events with frequencies less than 22 mHz. Finally, we compare in situ observations with ground magnetometer observations in case studies, discussing how such comparisons could facilitate the identification of FMW and inform the interpretation of high-latitude ground magnetometer observations in future studies.