



## **Empirical modeling of whistler-mode chorus and hiss in the inner magnetosphere using measurements of the Van Allen Probes**

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Recent studies of the dynamics of energetic in the Earth radiation belts show that whistler mode chorus and hiss play an important role. This especially concerns the slot region and the outer Van Allen radiation belts where empirical wave models are used as a component of existing approaches.

We analyze these whistler-mode waves using a database of survey measurements of the Waves instruments of the Electric and Magnetic Field Instrument Suite and Integrated Science (EMFISIS) onboard the Van Allen Probes. We use multicomponent data to estimate wave polarization and propagation parameters and to assess variability of wave amplitudes as a function of position and geomagnetic activity. Four years of Van Allen Probes EMFISIS Waves survey data give a good orbital coverage in L, latitude, and MLT. Average amplitudes increase with geomagnetic activity but the observed amplitude variations are still much larger than this effect.

Statistics of planarity and wave vector directions are strongly linked to wave amplitudes. The planarity of magnetic field polarization is high for strong chorus and its wave normal directions are well defined. We obtain low planarities of the magnetic field polarization for a substantial fraction of plasmaspheric hiss. This invalidates the assumption of a single plane wave for these whistler mode emissions.