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Cold Plasma Seminar
Speaker: David Hartley.
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Title
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Observations and Modeling of Cold Plasma Density, and How it Impacts Wave Dynamics and Measurements

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Abstract
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Whistler-mode waves are a key driver of variations in the different particle populations in Earth's magnetosphere. The cold plasma density and the orientation of the wave vector are key parameters for quantifying the mechanisms responsible for these dynamics. Both the wave normal angle and plasma density are required for determining the propagation trajectory of the wave, calculating the resonance condition for wave-particle interactions, and determining diffusion coefficients. This makes accurate knowledge of both parameters critical for quantifying the impact and efficiency of wave-particle interactions.

Here, I will present results showing how the plasma density, and gradients in the plasma density, can impact the classification of different wave modes, the propagation trajectory of the waves, and even affect the measured wave properties themselves. Results from the EMFISIS instrument on the Van Allen Probes demonstrate that the orientation of the wave vector of chorus waves is strongly tied to variations in the electron plasma density, such as those associated with plasmaspheric plumes. Additionally, the measured wave electric field is shown to be dependent on the plasma density encountered on-orbit. I will discuss the steps that have been taken to mitigate this effect, and how it impacts different chorus wave properties. I will also present new empirical modeling results of the plasma density at low L shells.