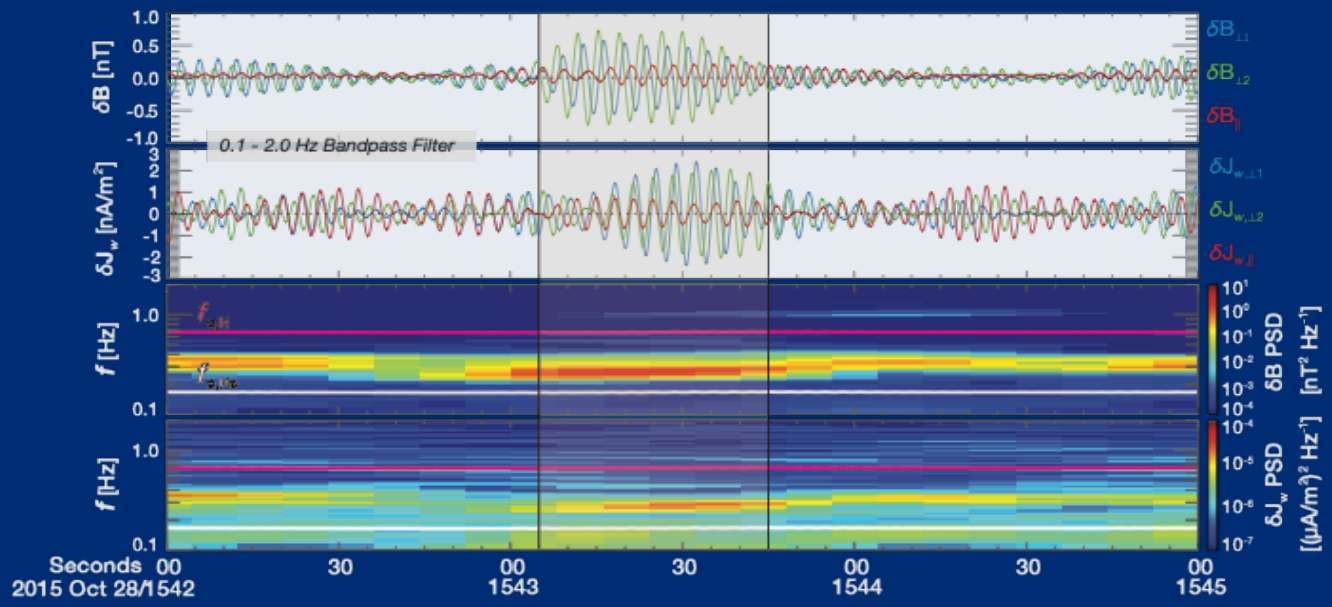
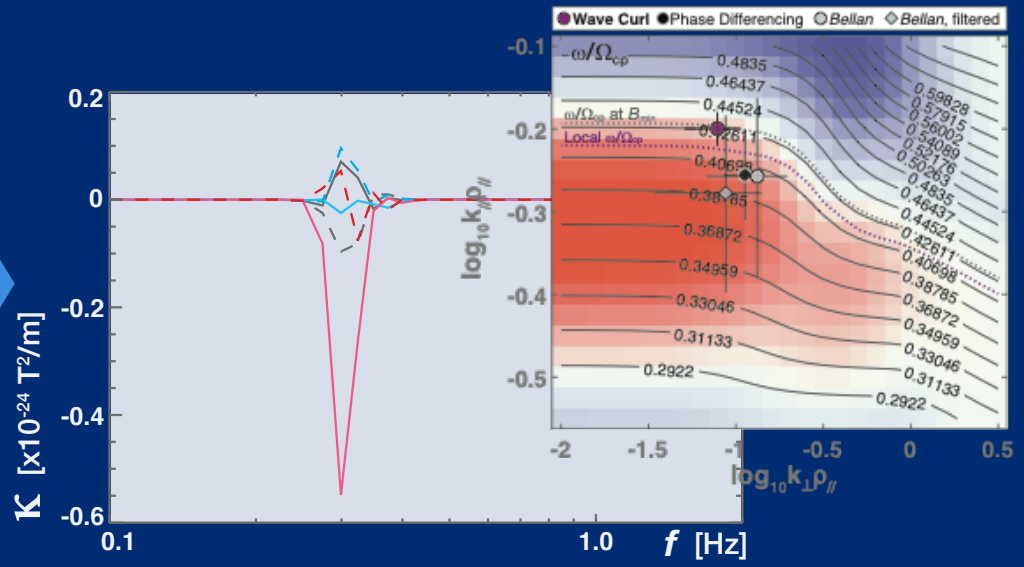
The Wave Curl Analysis

Revealing Fundamental Properties of EMIC Waves with Multi-Point Measurements

EMIC waves are important for many processes in the magnetosphere. But, *the wave vector,* **k**, is not well known observationally. **Because k affects wave growth, propagation, and interactions with local plasma, determining k is a key component in understanding the effects of these waves.**





- Using the 4 MMS satellites to get current density, we tested a new method for determining EMIC wave **k** that applies Ampere's law to the complex wave fields.
- *With this method, we can fully determine the direction and magnitude of **k**.*
- This method provides stable results and can handle user input variations.
- Our method agrees well with theoretical linear dispersion analysis, as well as with other methods for determining **k**.
- **Our results give confidence that we can use this technique for future, large-scale studies to answer outstanding, fundamental questions involving k.**

A newly developed technique based on closely-spaced multi-spacecraft measurements can now unlock critical information missing from our understanding of EMIC waves.

S. K. Vines et al. (2021) *Journal of Geophysical Research – Space Physics*, doi:10.1029/2020JA028922