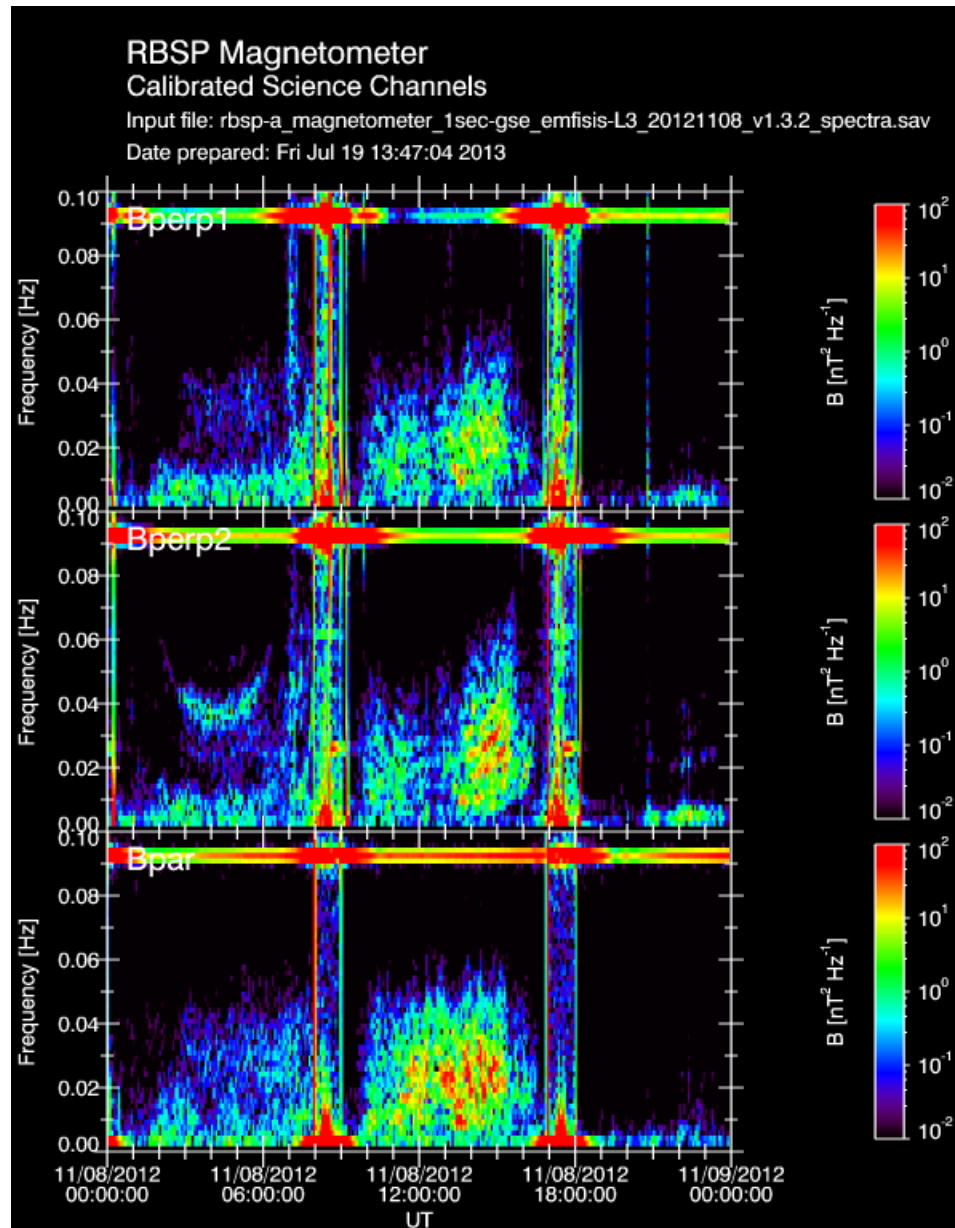


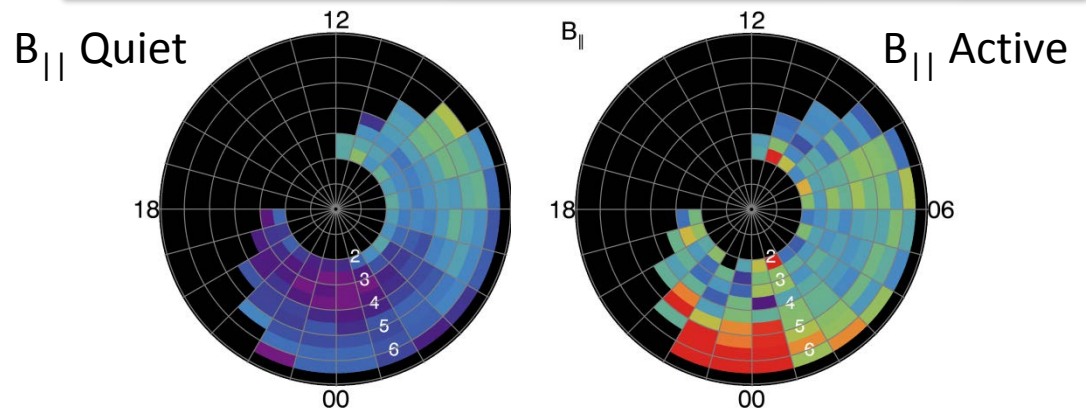
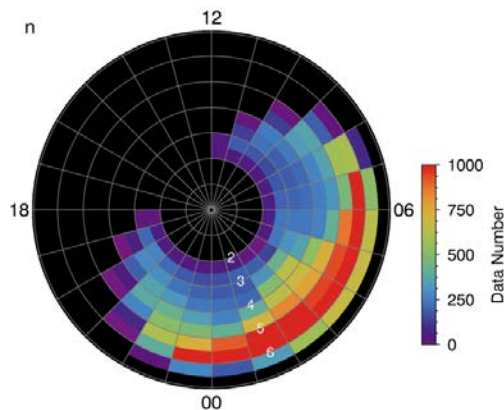
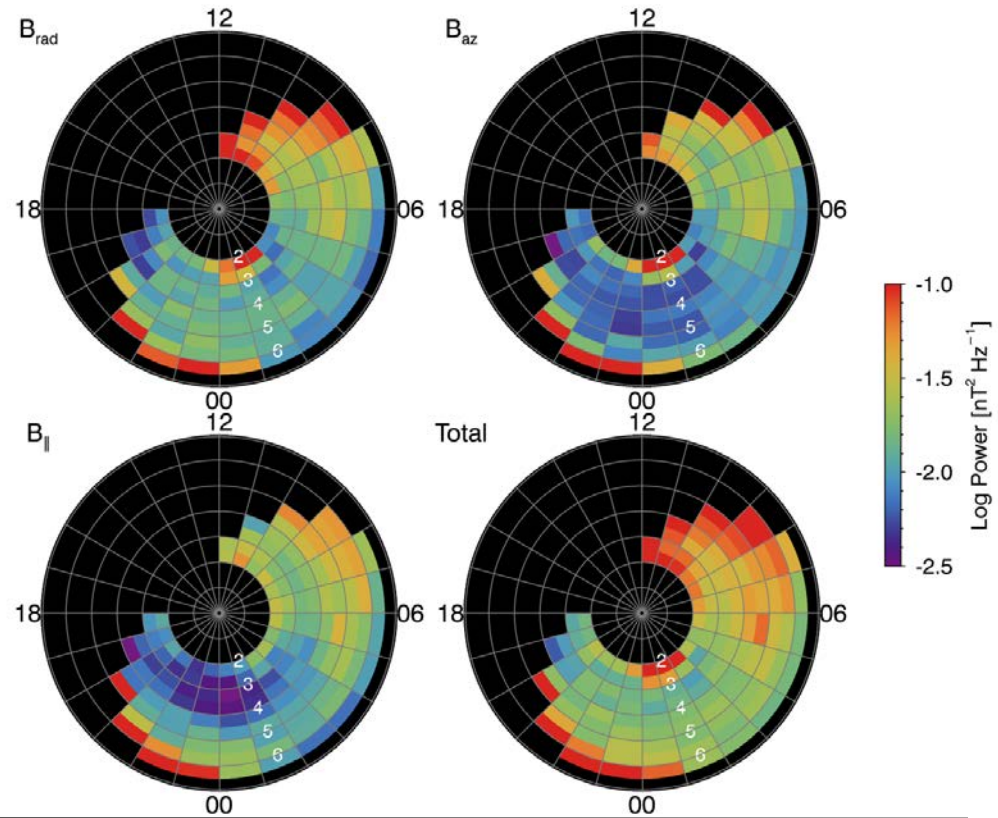
ULF Wave Analysis

- Spectral analysis:
 - Period: 8 October 2012 – 5 May 2013;
 - Data set: 1 s, GSE coordinates;
 - Processing on 10 min. segments of data, 5 min sliding windows > 60,000 individual spectra;
 - Frequency range: ~2 – 500 mHz.
- Data processing:
 - Detrend magnetometer data using dipole plus T89 with $K_p=3$,
 - Convert to MFA coordinates: radial, azimuthal, parallel.
 - For each B component in 10-min. segment w/o gaps: polynomial detrend, apply Hanning window, compute FFT.
- Spectral selection:
 - Frequency: 5 – 80 mHz to exclude spin/nutation frequencies,
 - Radial distance > $2.3 R_E$ to exclude range-3 data.
 - OMNI database parameters to filter driving conditions.



Spatial Distribution of ULF Wave Power

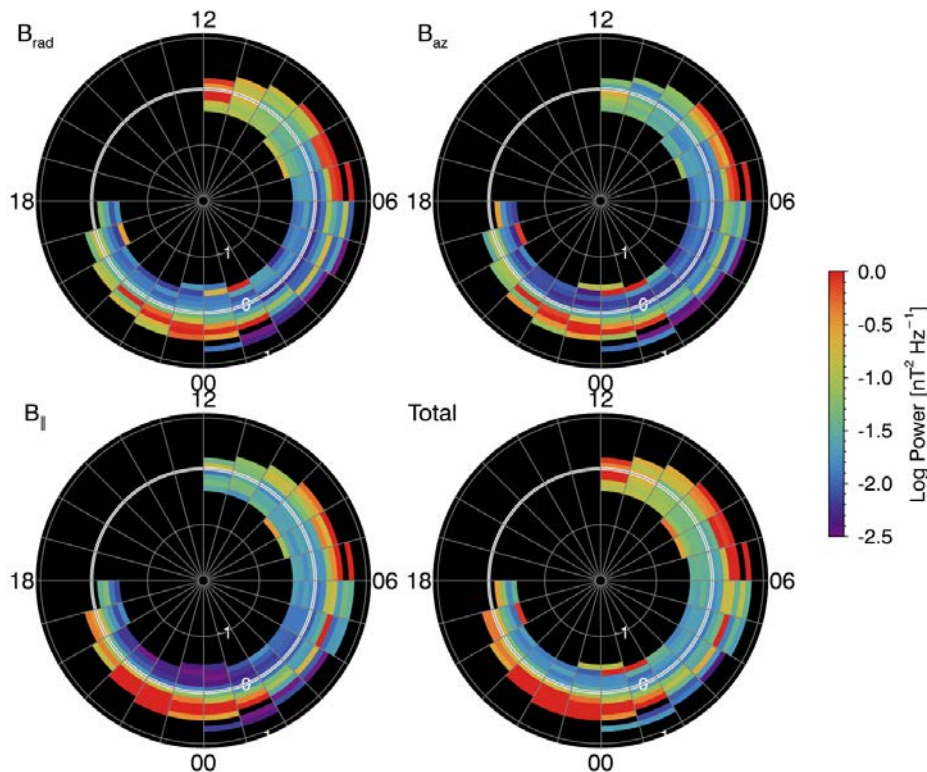
- Frequency range 5-25 mHz (Pc4-5).
- Analysis steps:
 - Sort spectra into 0.5 h MLT by 0.5 L wide bins,
 - Compute median spectrum in each bin,
 - Compute median wave power in 5-25 mHz range.
- Coverage: pre-midnight to post-dawn.
- ULF wave activity most pronounced:
 - Pre-midnight near L=5-6, likely driven by injections/substorm activity.
 - Post-dawn over wide L range, likely driven by variations in solar wind pressure and KH waves.
- Wave power decreases with decreasing L.
- Dayside wave power largely unaffected by AL; nightside wave power changes substantially with geomagnetic activity.



Plasmapause: Boundary for ULF Wave Activity

- Plasmapause from drop in upper hybrid frequency: 665 crossings in 560 orbits.
- Normalize observations wrt plasmapause position: $L_{\text{norm}} = L/L_{\text{PP}}$.
- Plasmapause represents natural boundary for ULF wave power, especially in the nightside.

RBSPA EMFISIS 5-25 mHz Wave Power Distribution



RBSPA EMFISIS Average ΔL Spectrograms

