

TDS observation of Type III bursts + some Earth flyby !

RPW consortium, November 30, 2021

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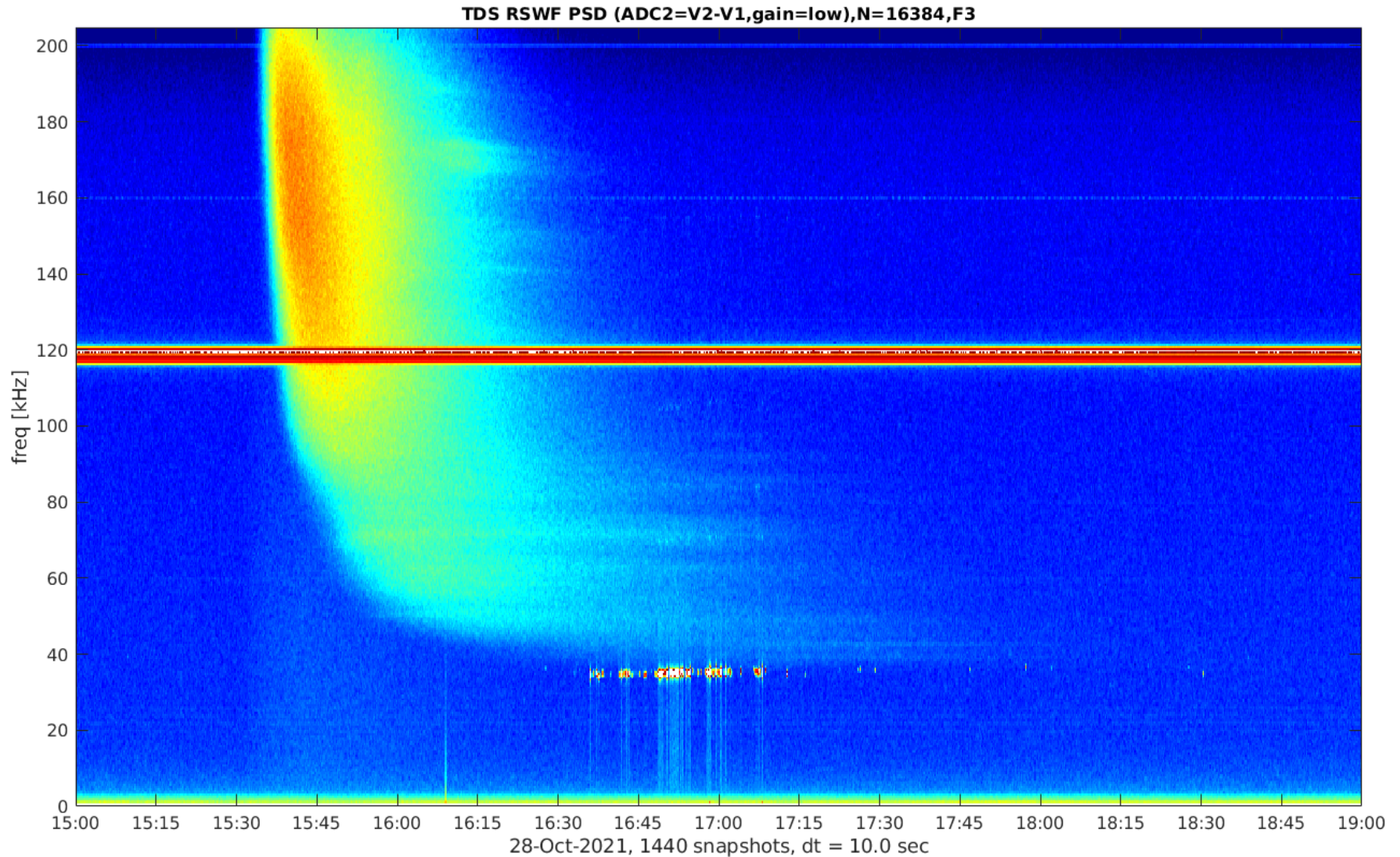
Institute of Atmospheric Physics, Prague

Recent TDS operation

- ❑ Lots of telemetry has been available to RPW recently.
- ❑ For TDS, this allowed operation in unplanned modes designed ad-hoc.
 - This includes regular snapshots being taken very frequently
 - We now sometimes run 16k points snapshots on 2 components every 10 seconds.
 - Such configurations are excellent for type III burst observations
- ❑ Flight software update has been performed on October 19.
 - The new software allows for wave detection in 524 kHz sampling mode.
 - This means we now sometimes have higher sampling rate – also very good for Type III.

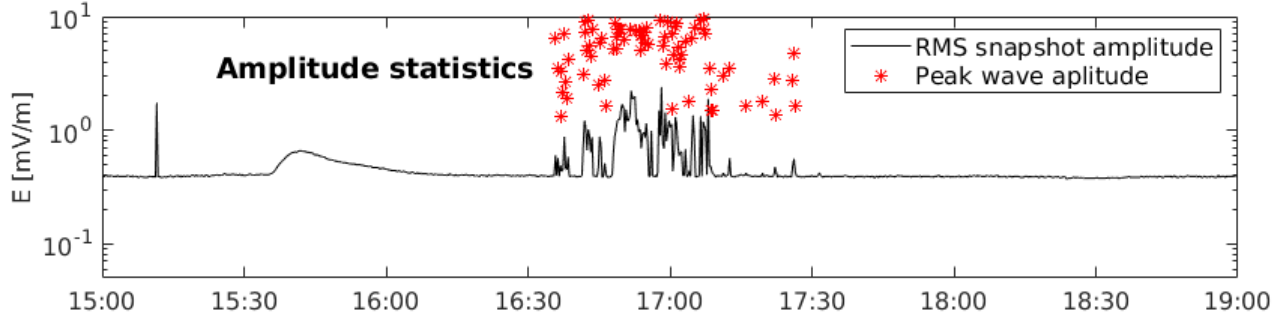
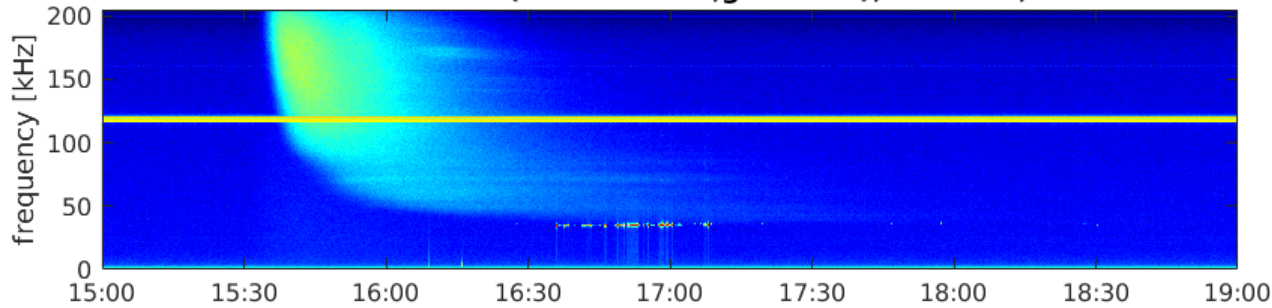
Famous 28th October burst

- TDS was lucky to be in an almost perfect configuration

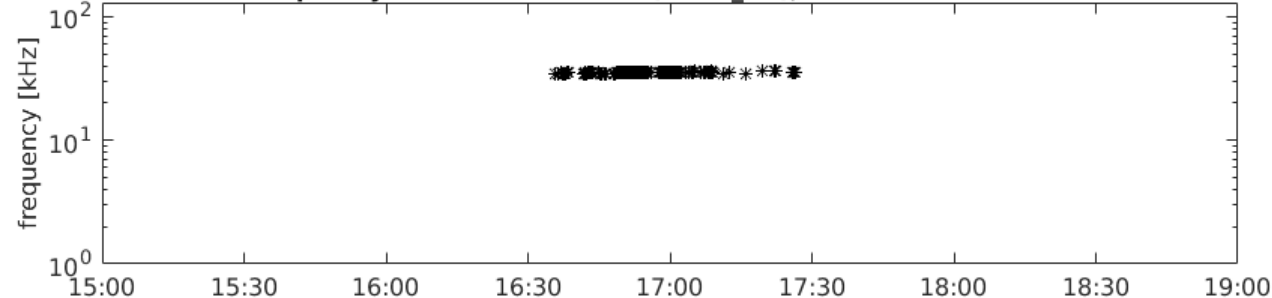


Detection in 524 ksp mode

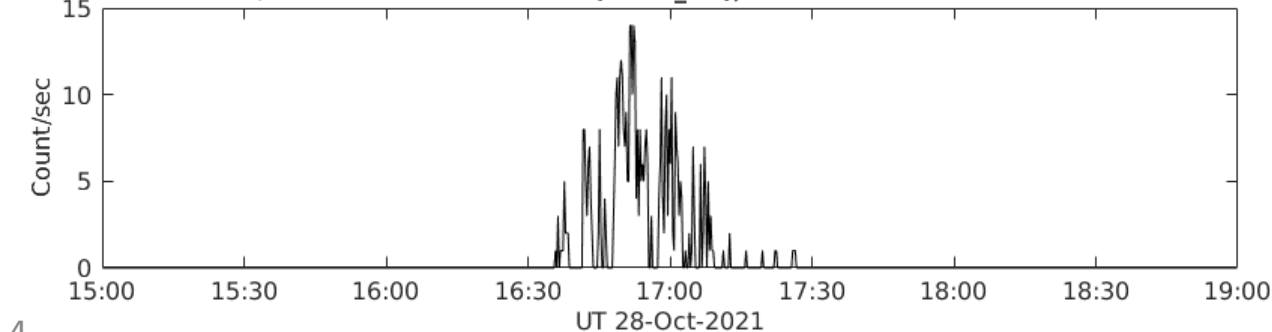
TDS RSWF PSD (ADC2=V2-V1,gain=low),N=16384,F3



SO RPW/TDS frequency of detected waves (XLD1_LO), tstart=2021-10-28 15:00:00.000

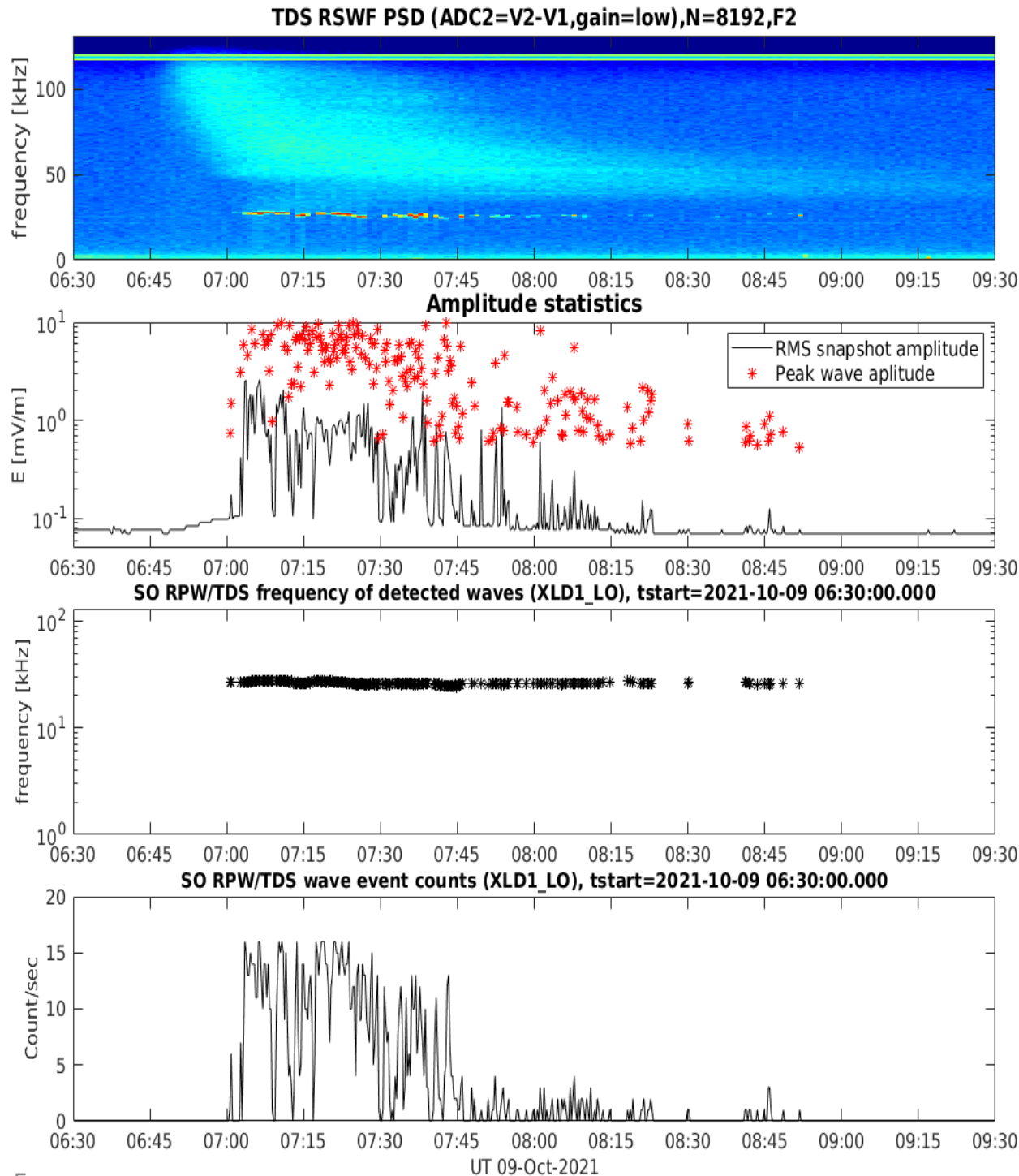


SO RPW/TDS wave event counts (XLD1_LO), tstart=2021-10-28 15:00:00.000



- Wave and dust detection now works in 524 ksp mode – ready for the upcoming perihelion.
- On October 28th, Langmuir waves are observed nearly continuously for 1 hour
- Only 32 captured as triggered snapshots, but others in regular (periodic) snapshots

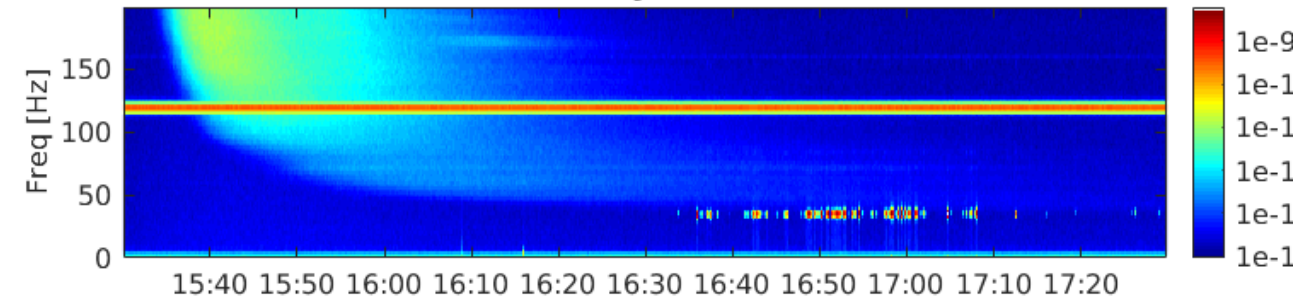
More events like this



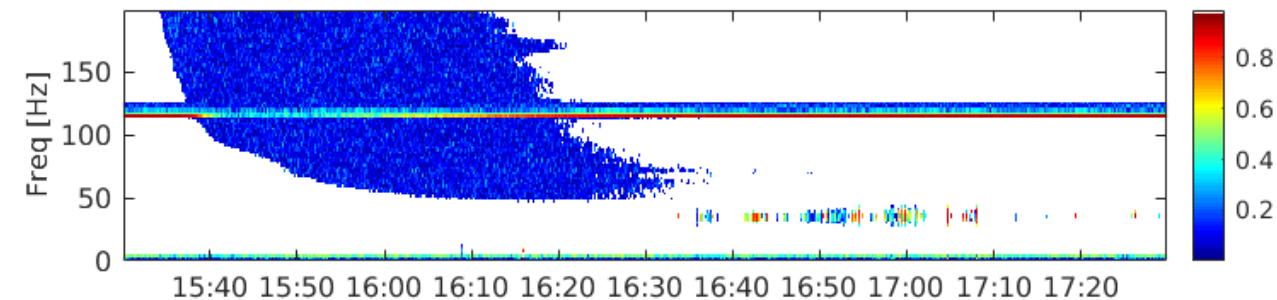
- ❑ October 28 is probably best in-situ burst so far, but there are others .
- ❑ October 9, for instance (in 262 kHz mode, however)

October 28 – phase analysis

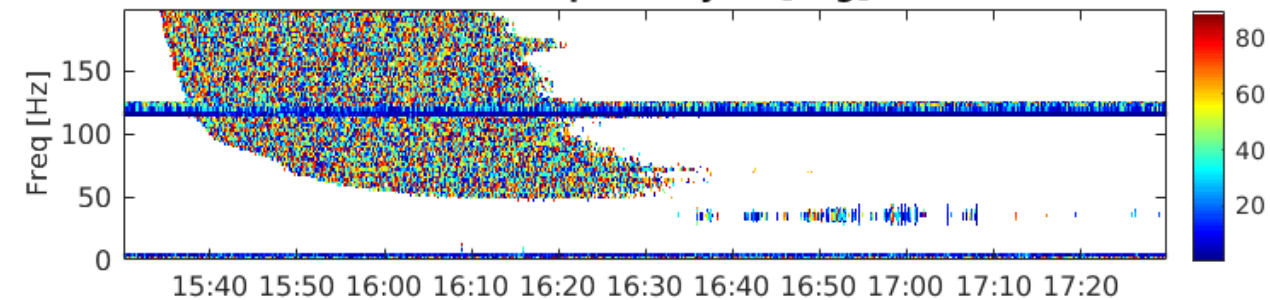
PSD $E_y^2 + E_z^2$



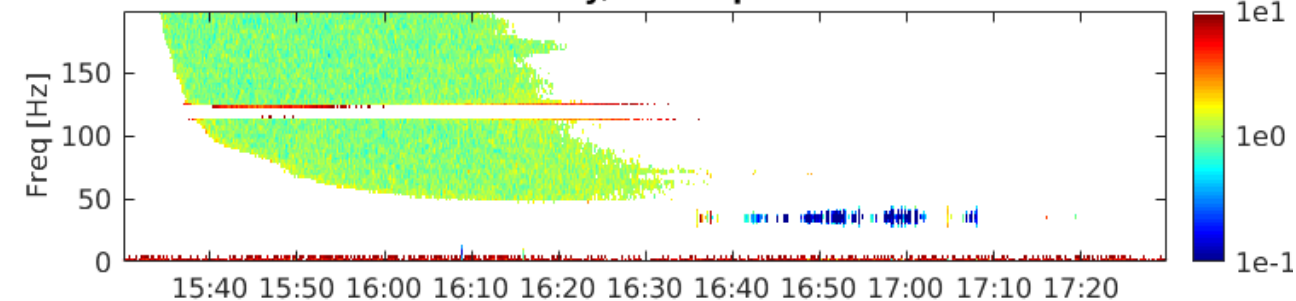
Coherence



Relative phase E_y/E_z [deg]

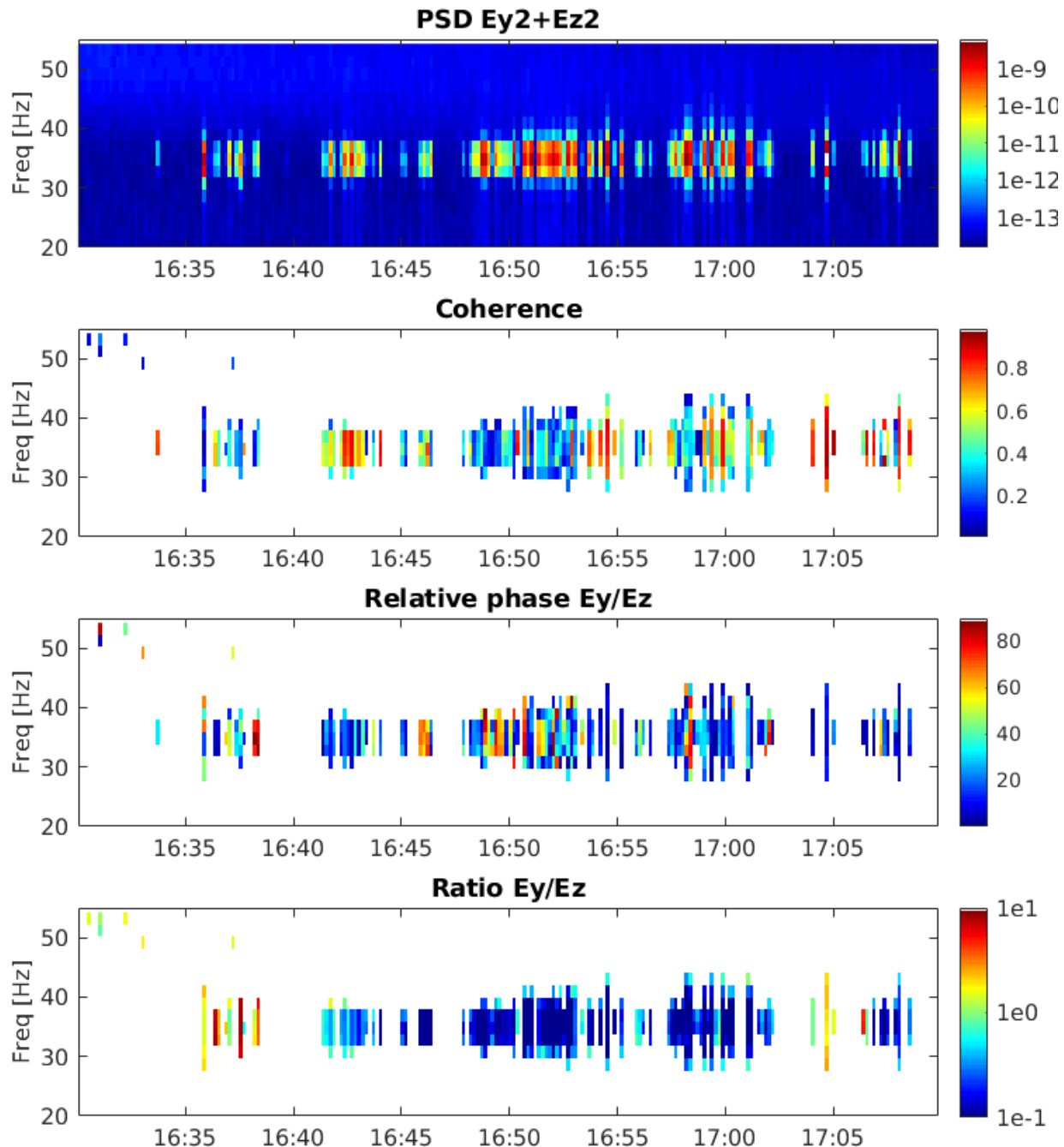


Ratio of E_y/E_z components



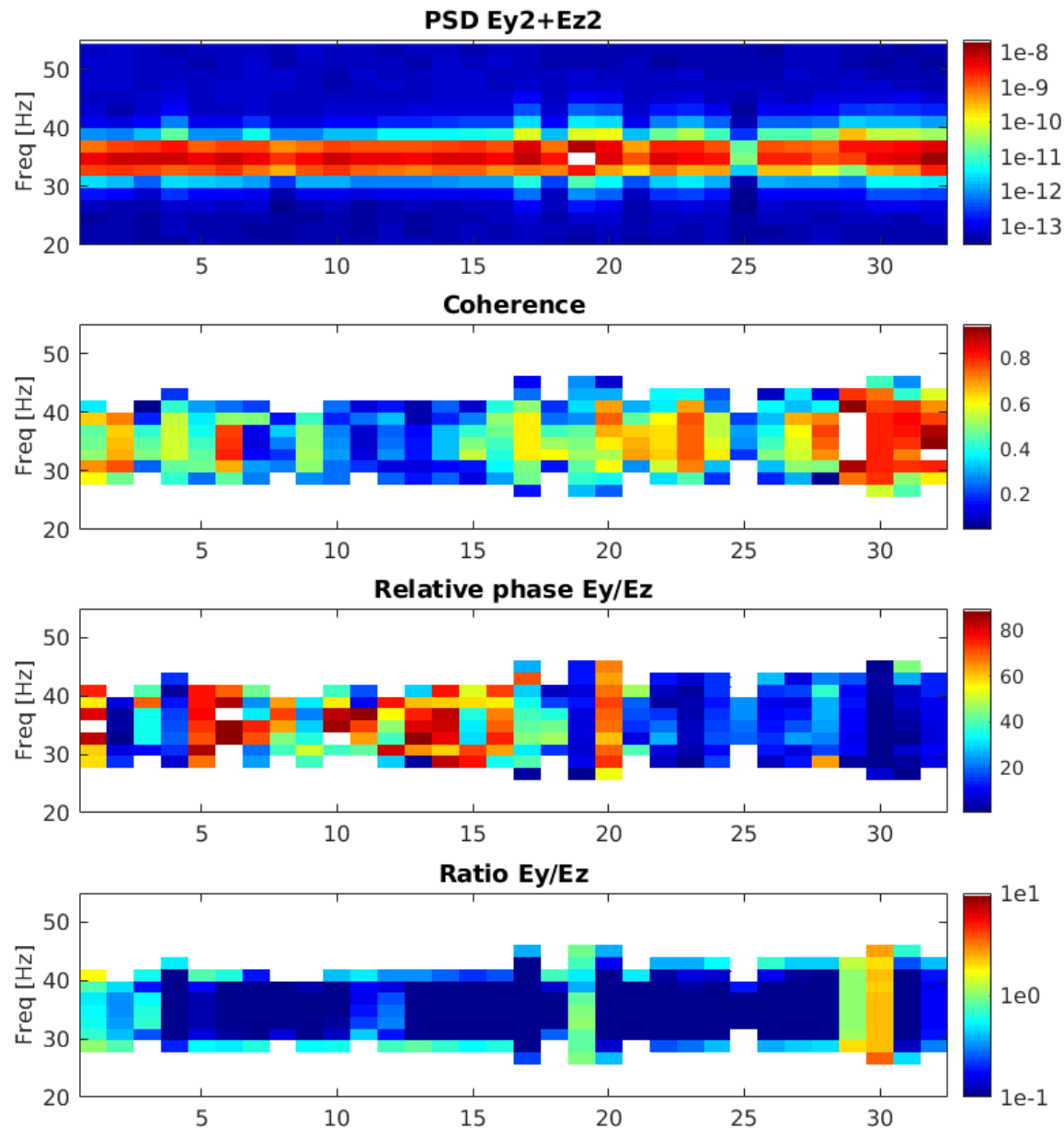
- ☐ Transformed from two dipole measurements to orthogonal E_y/E_z spacecraft coordinates.
- ☐ Coherence of the radio burst is low, indicating weak polarization.
- ☐ Langmuir waves, are of course more coherent

October 28 – Langmuir waves



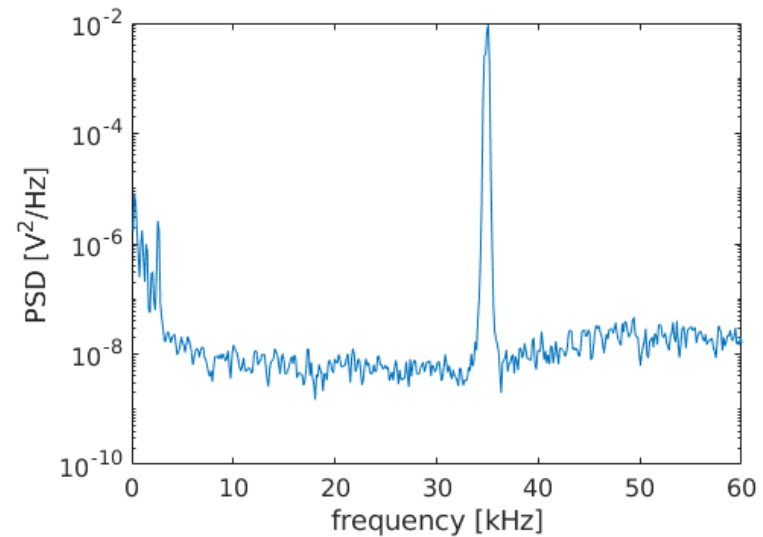
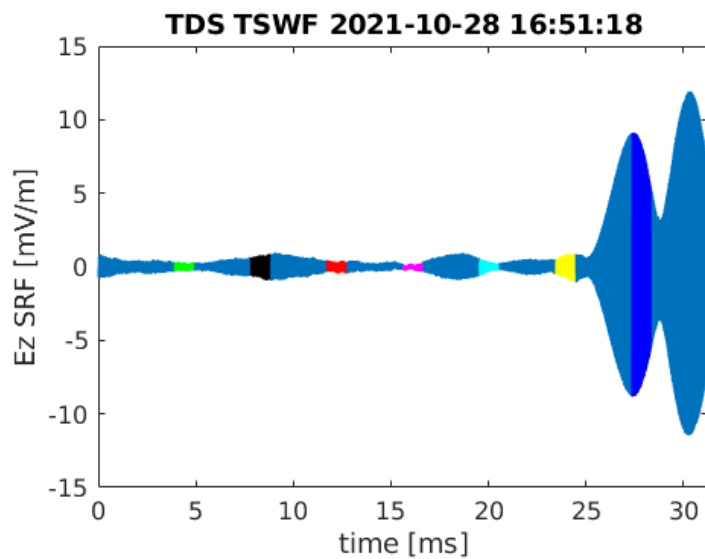
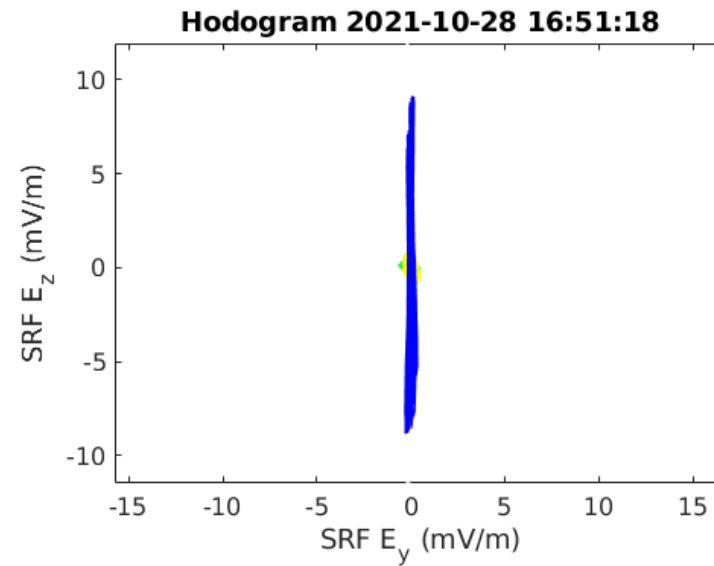
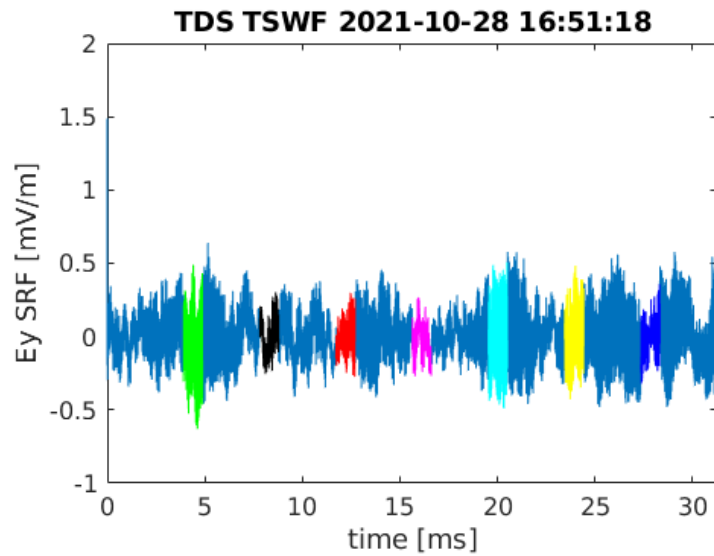
- Regular snapshots (detail of a previous plot). Mix of weak and strong waves.
- Some waves are very coherent and linearly polarized, some not.
- E_y/E_z ratio generally small – polarization predominantly along Z axis in this event.
- Coherence calculated by averaging over entire snapshot (30 ms).

October 28 – Langmuir waves

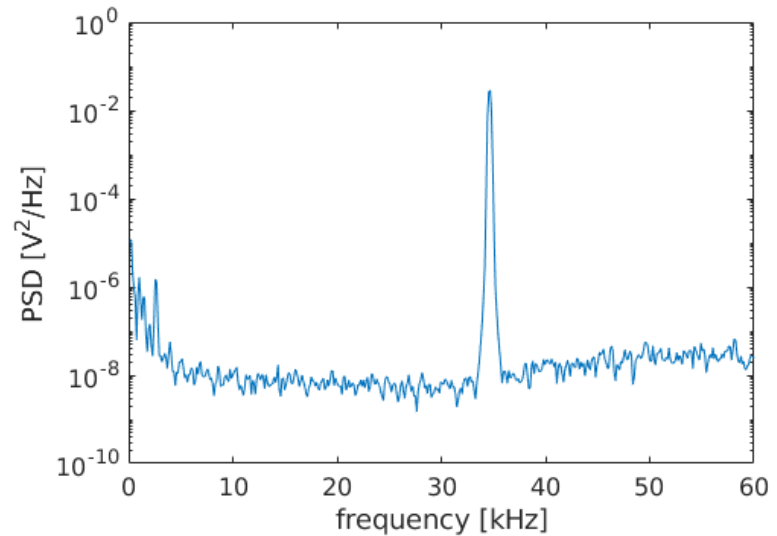
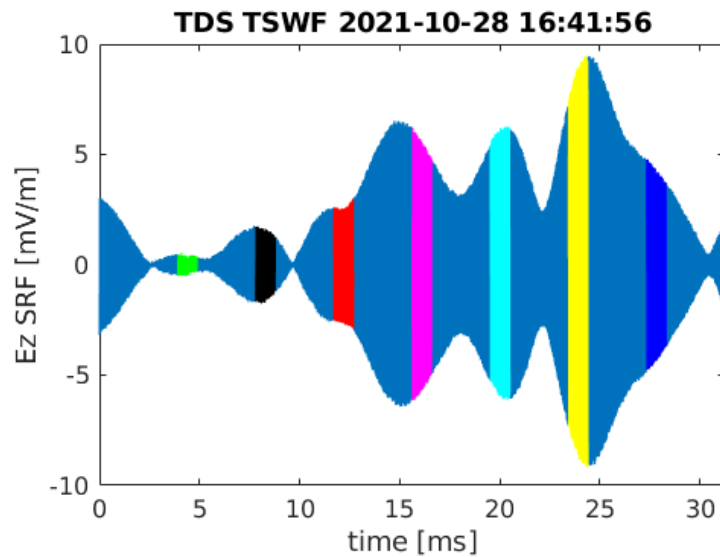
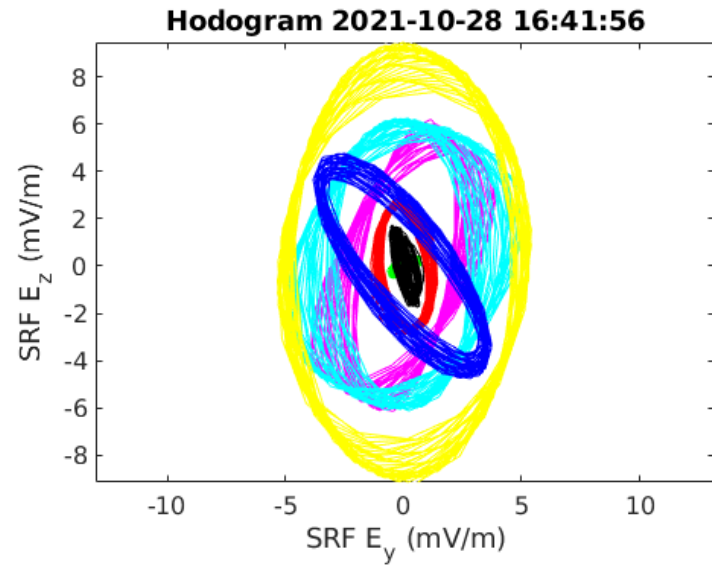
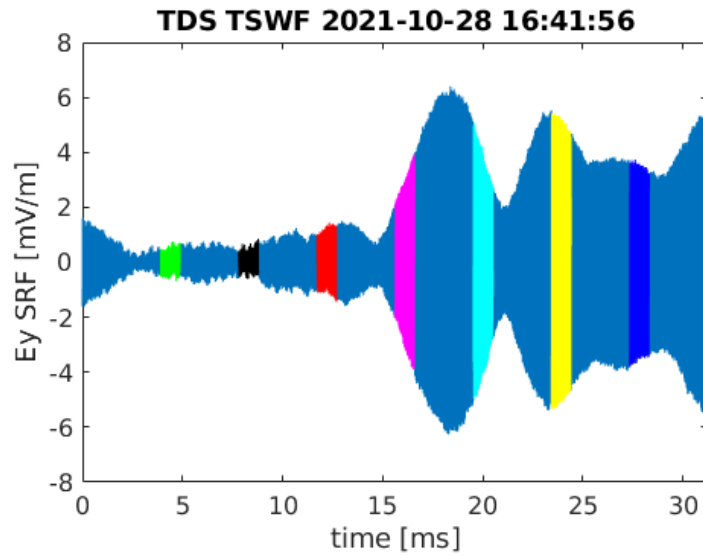


- ☐ Triggered snapshots (all 32 plotted in one picture). Strongest events.
- ☐ Coherent waves are linearly polarized along E_z .

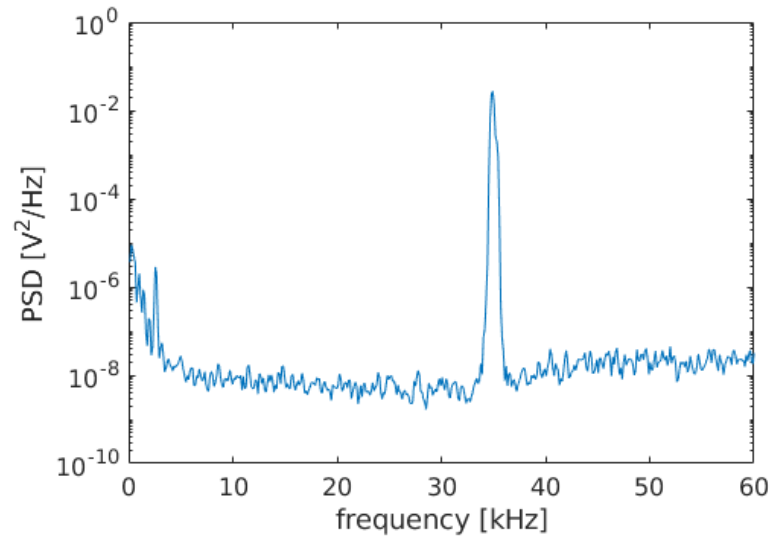
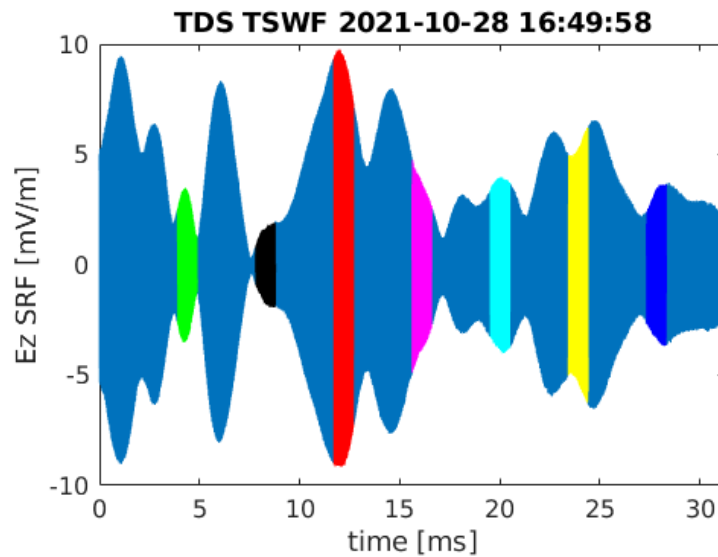
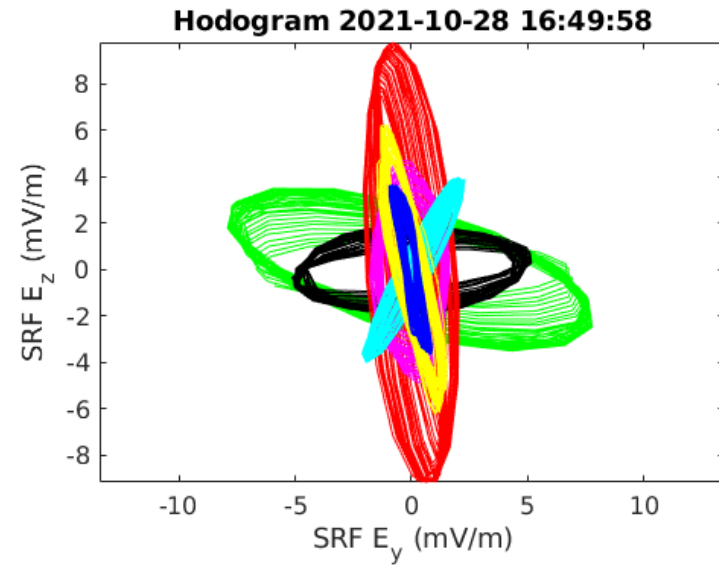
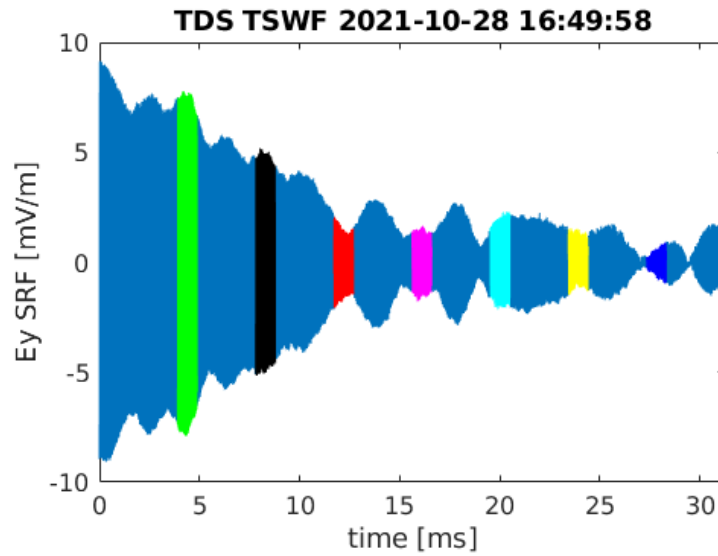
October 28 – Langmuir waves



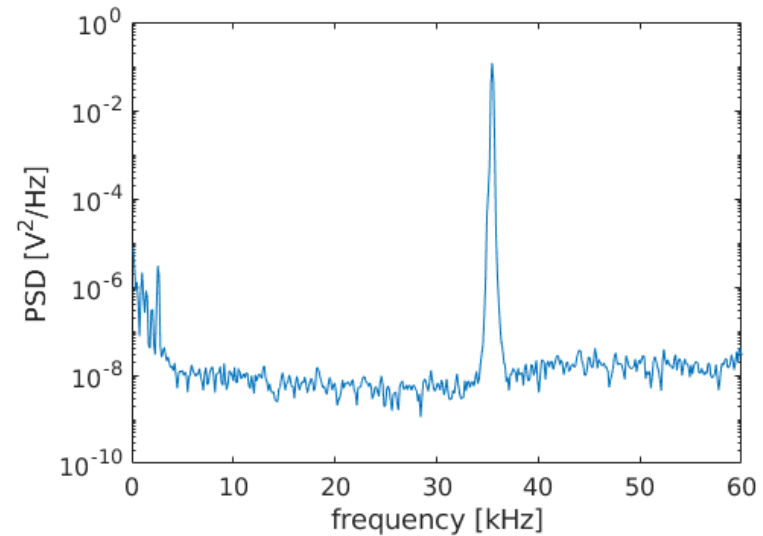
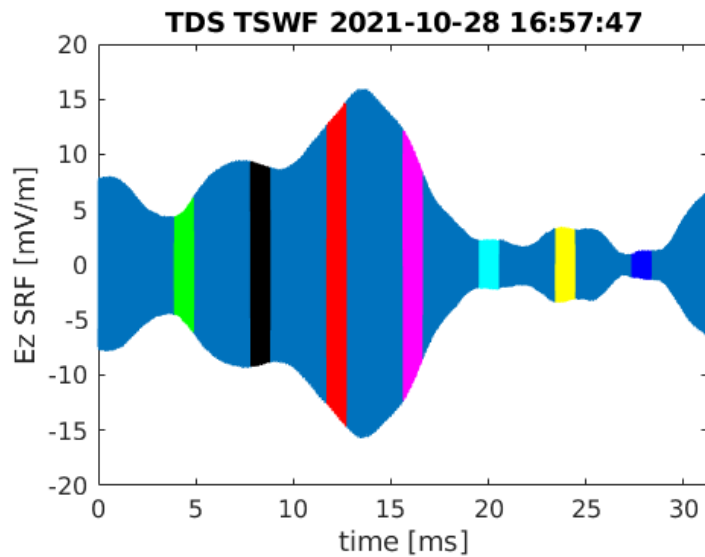
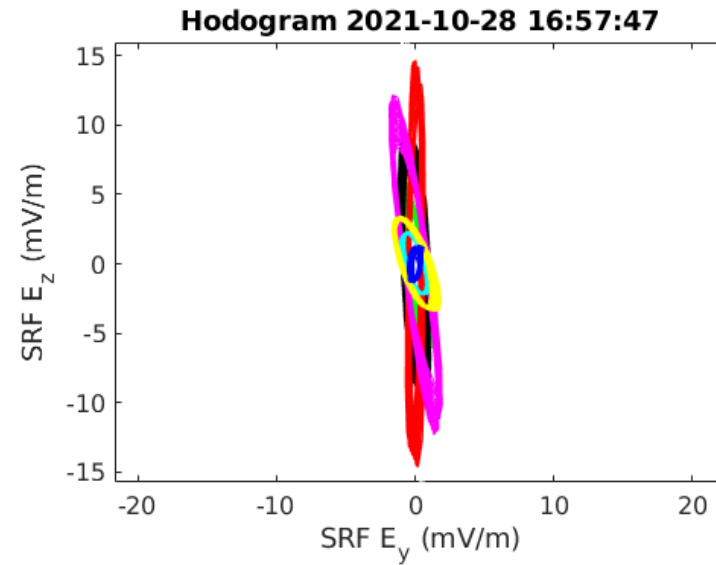
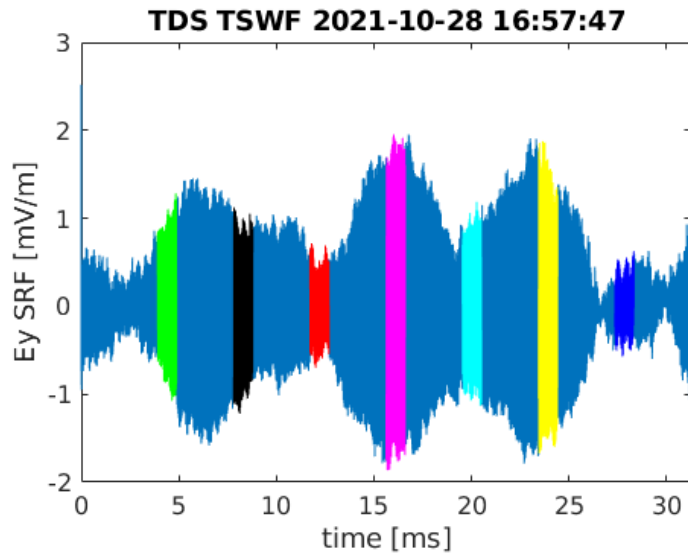
October 28 – Langmuir waves



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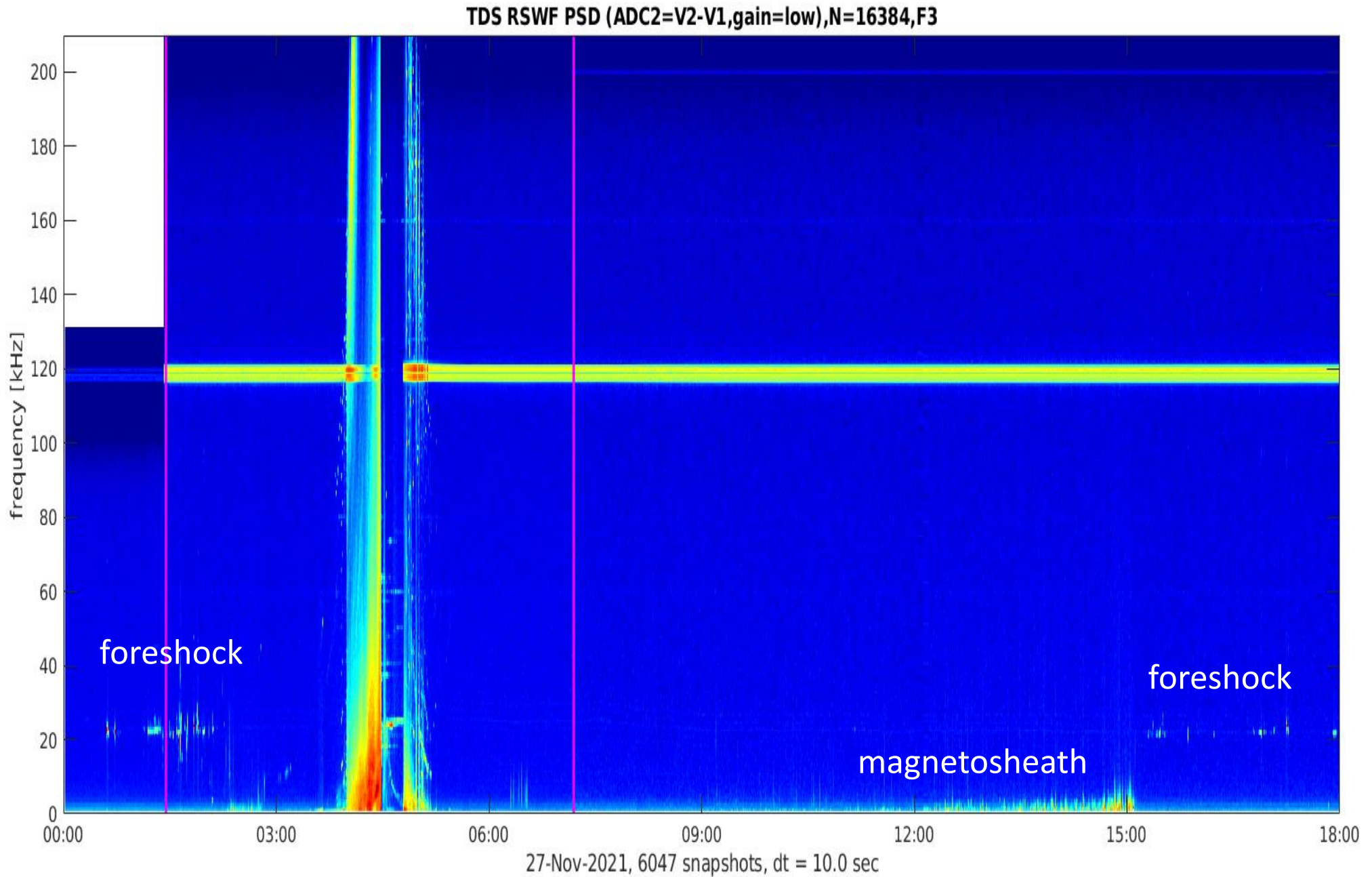
Summary

- ❑ Several nice observations of in-situ Type III.
 - Very high frequency resolution data, showing the internal “striated” structure of bursts
 - Triggered waveforms now available even at 524 kHz sampling, with more such operations near perihelion.
- ❑ Polarization analysis of Langmuir waves shows a relatively short coherence length – typically much less than one snapshot.

Bonus – Earth flyby

- ❑ Earth flyby on November 27 (Saturday)
- ❑ RPW was on (data available since yesterday)
- ❑ Eclipse pass (solar panels in shadow)

November 27 – Earth flyby



November 27 – Inner magnetosphere

TDS RSWF PSD (ADC2=V2-V1,gain=low),N=16384,F3

