First observations of the Search Coil Magnetometer on Solar Orbiter / RPW: results and performances

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RPW / SCM

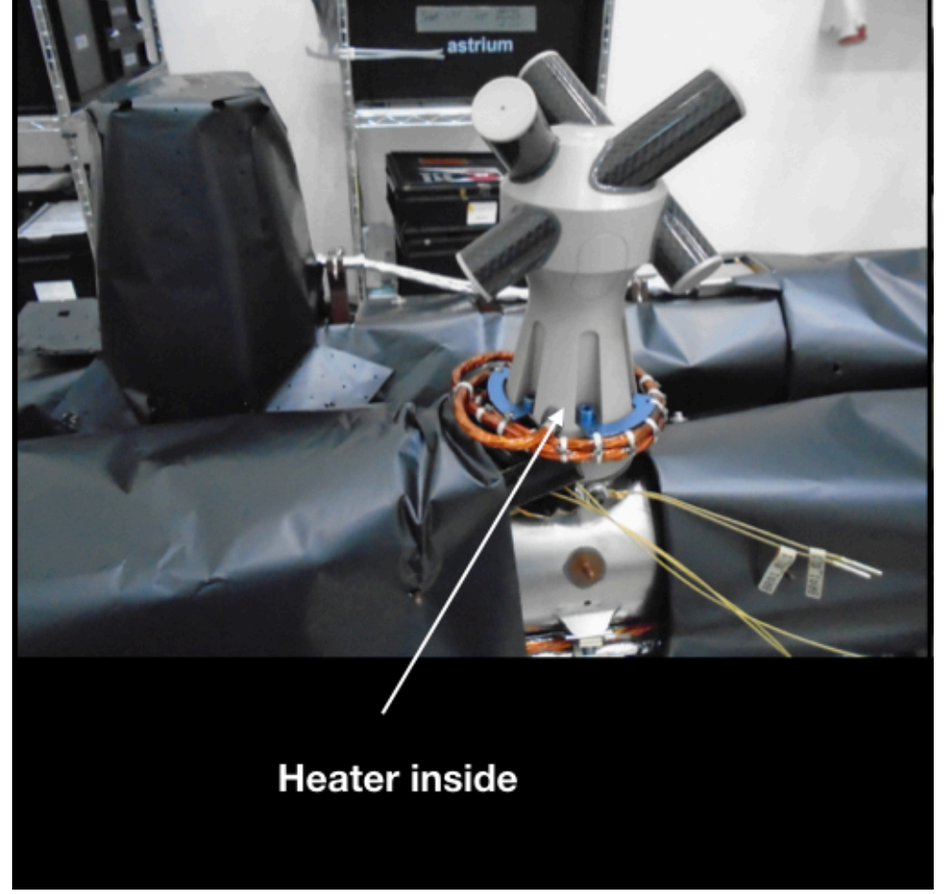
The Search Coil Magnetometer onboard Solar Orbiter

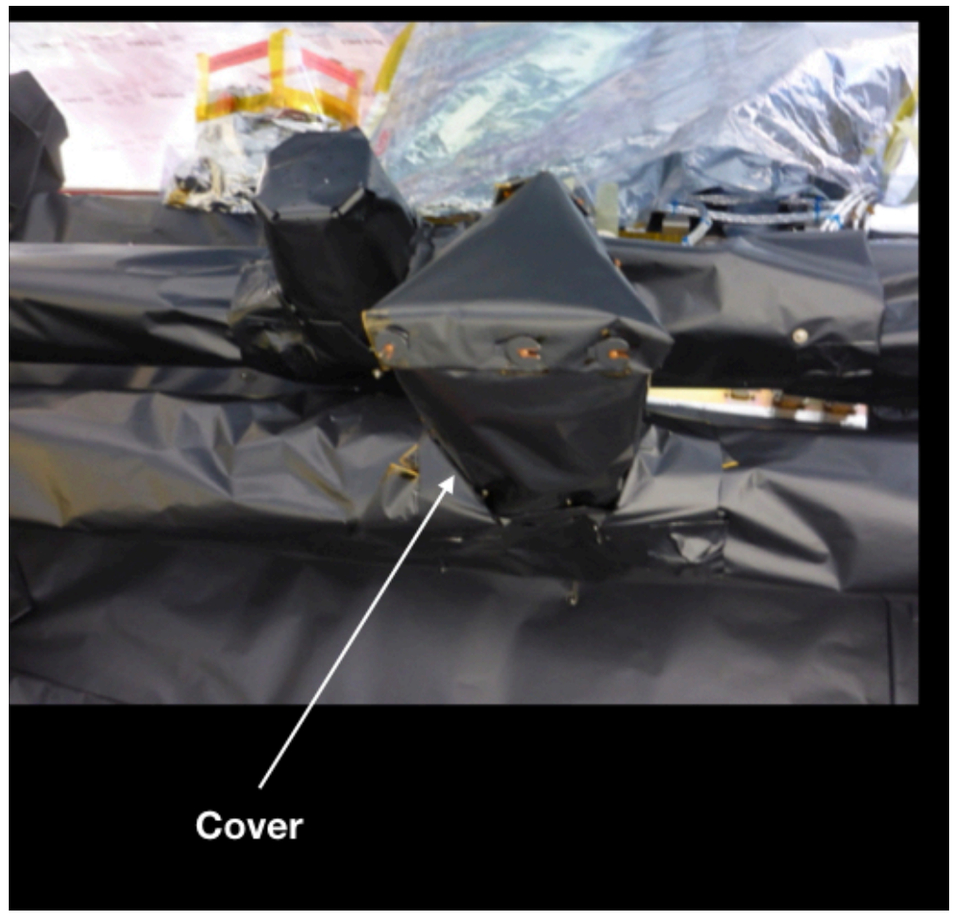
RPW

LPC2E

Basics of SCM (1)

- measures the variations of the magnetic field above ~1Hz
- Principle: $e = \frac{d\Phi}{dt}$
- 2 LF axes: 1Hz to 50kHz
- 1 double band axis: LF + MF (10kHz-500kHz)
- PA + heater within the SCM foot.
- 2m away from the S/C, operating temperature around -50°C



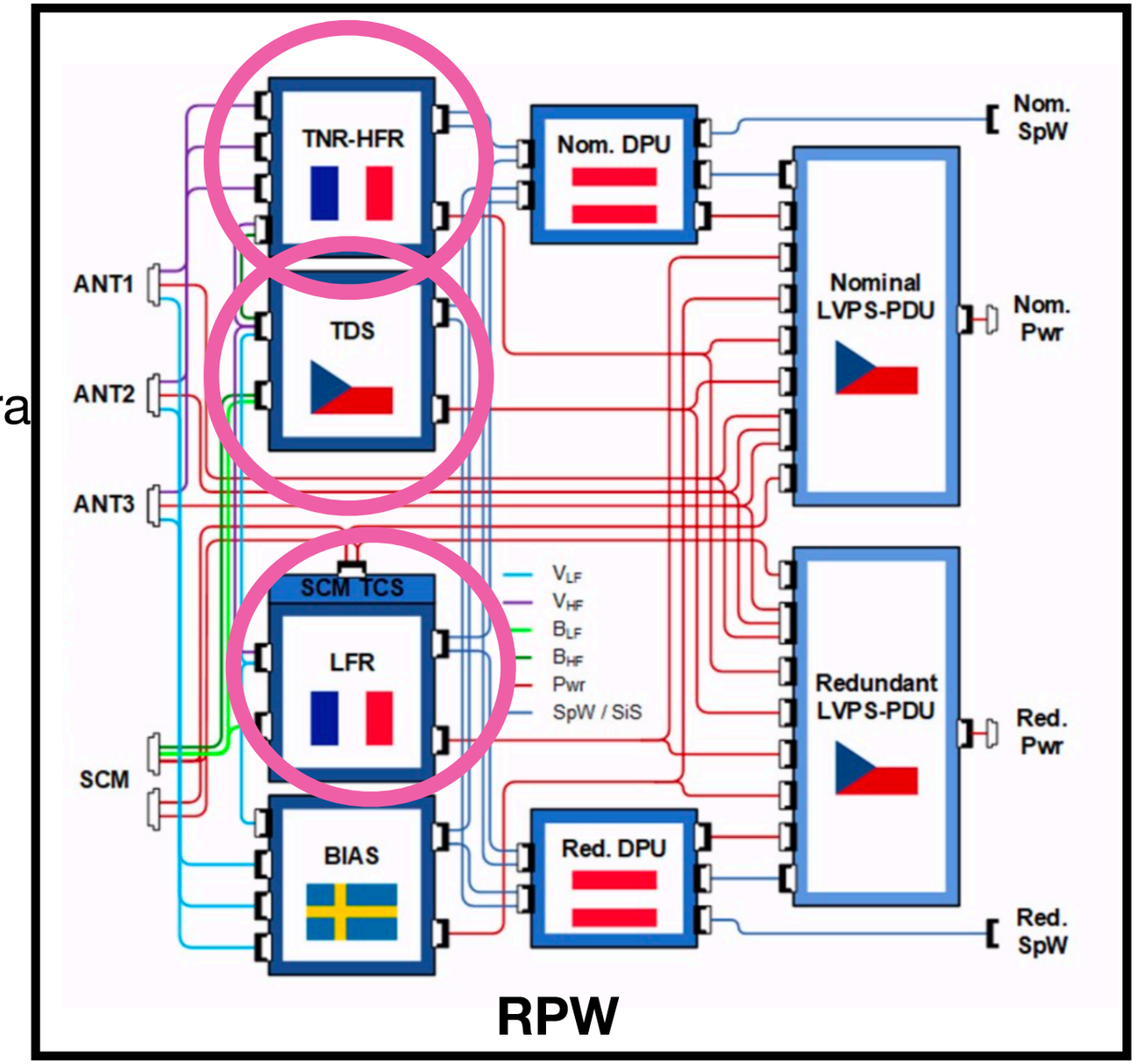


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Basics of SCM (2)

SCM data goes through:

- LFR: 3 LF channels, waveform & spectra products (+onboard calibration)
- TDS: MF channel snapshot waveform. (can receive LF channels if LFR fails)
- TNR: MF channel spectrum

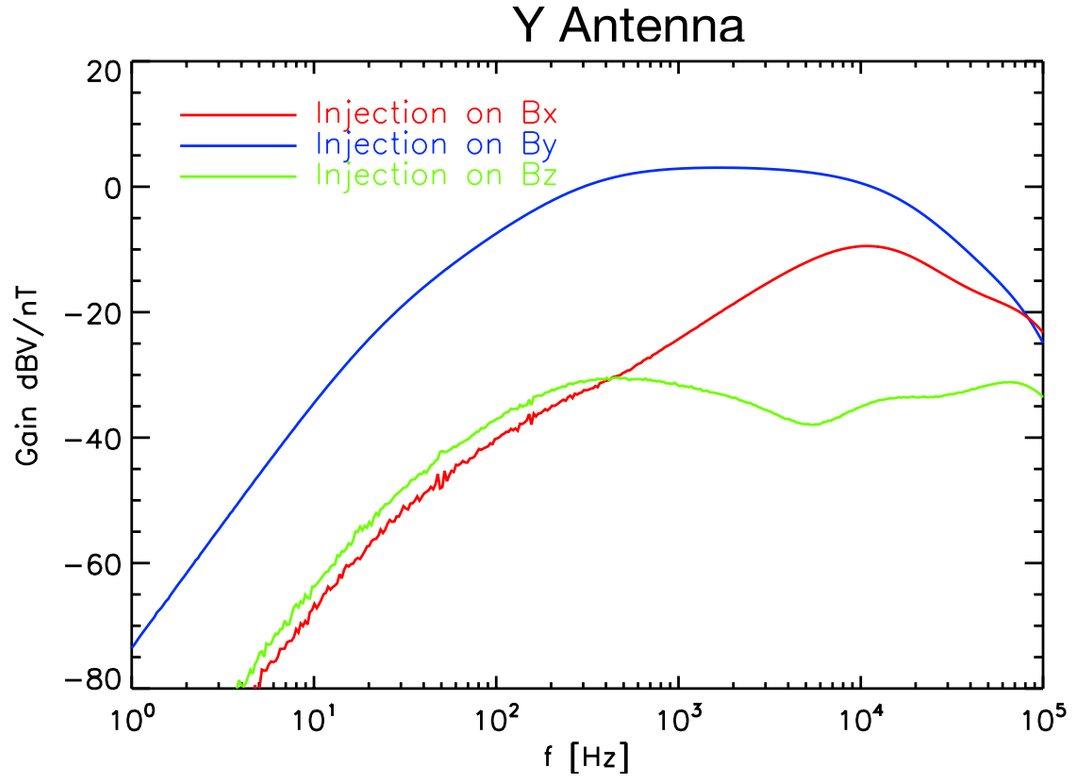


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SCM Calibration

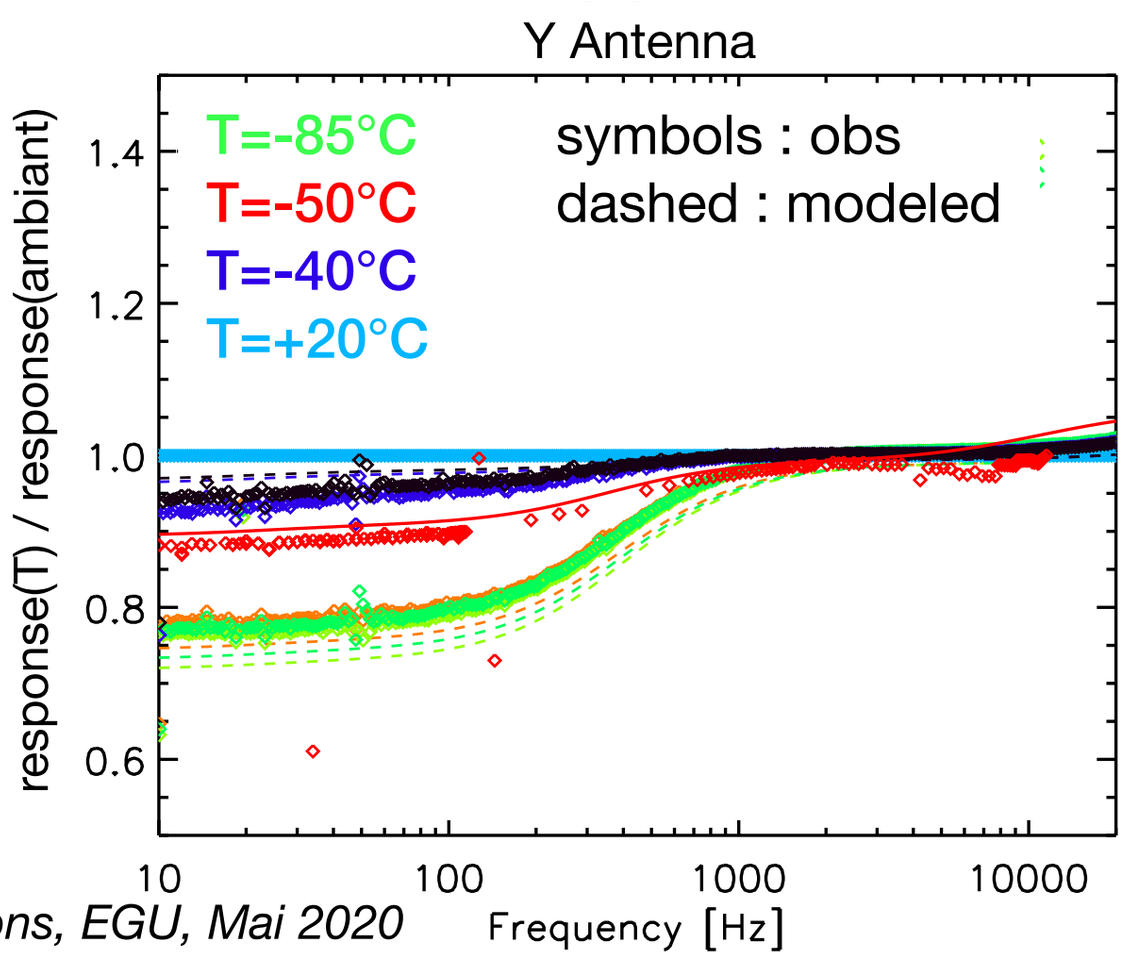
- Matricial calibration:

$$\begin{bmatrix} V_x \\ V_y \\ V_z \end{bmatrix} = \begin{bmatrix} R_{xx} & R_{xy} & R_{xz} \\ R_{yx} & R_{yy} & R_{yz} \\ R_{zx} & R_{zy} & R_{zz} \end{bmatrix} \begin{bmatrix} B_x \\ B_y \\ B_z \end{bmatrix}$$



- Gain is temperature dependent.

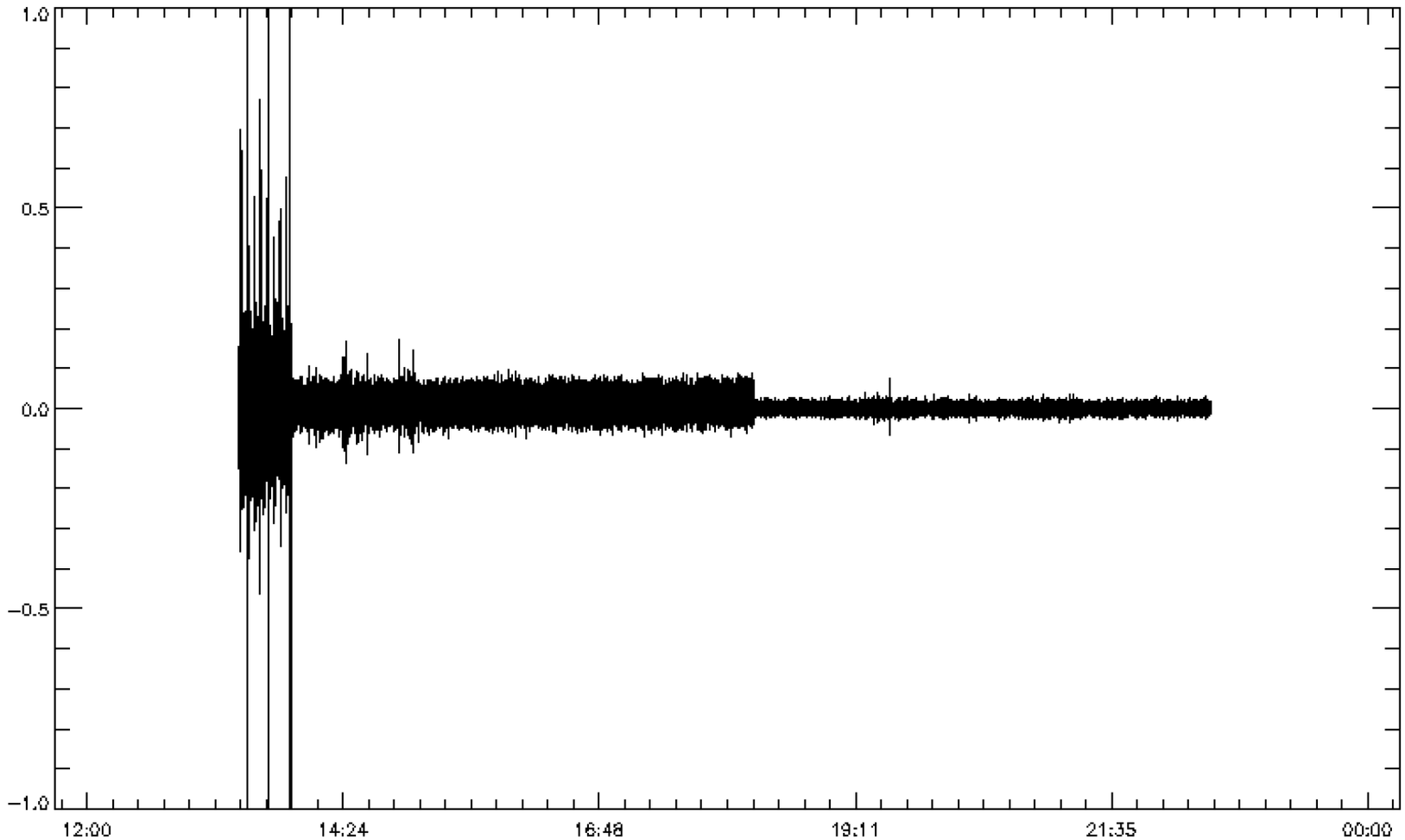
- In space, possibility to trace the frequency response



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First data

boom deployment, in two parts



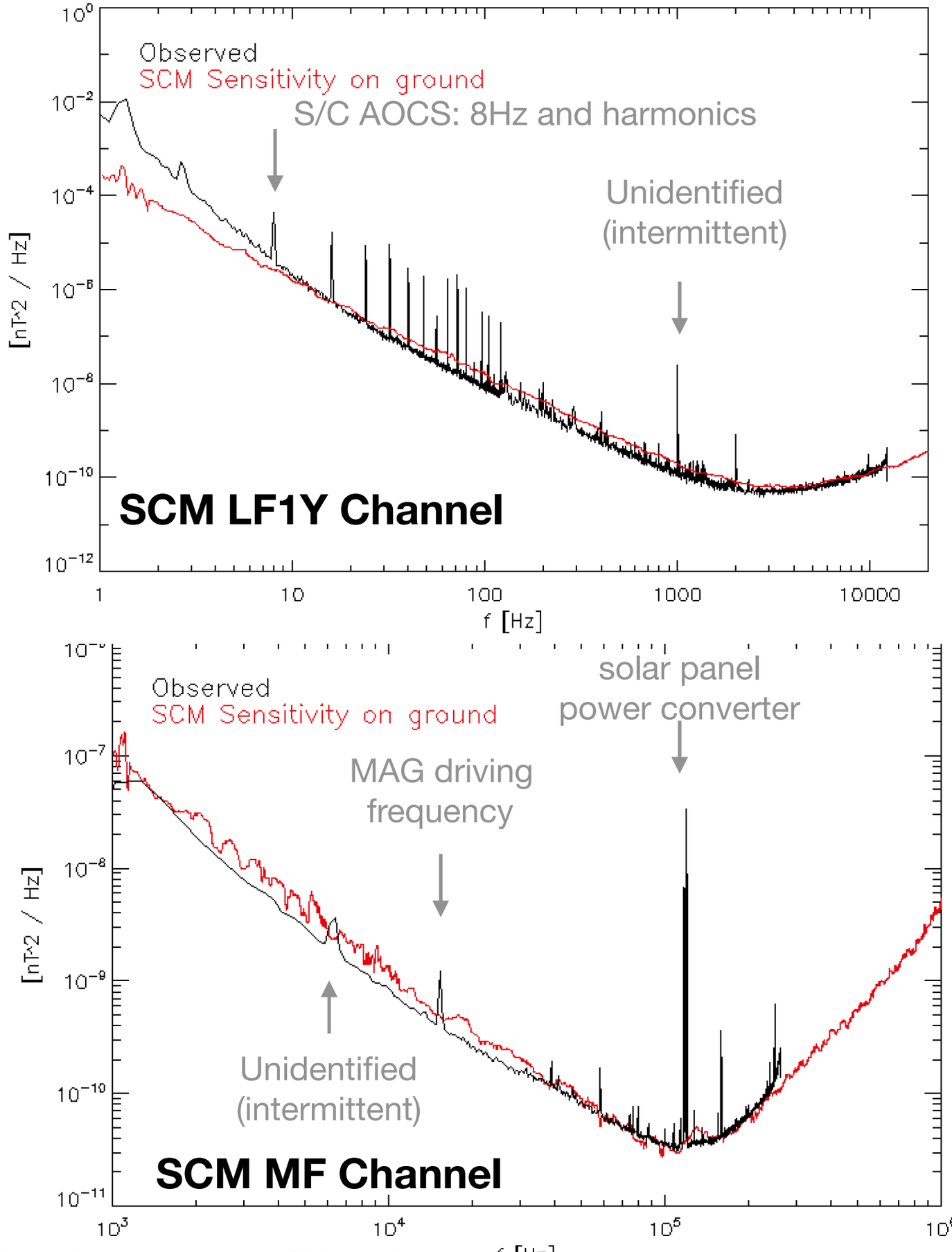
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SCM Sensitivity

- below 10Hz: mixed of spurious and natural (turbulent) signals

- Ground sensitivity is matched, but several spurious

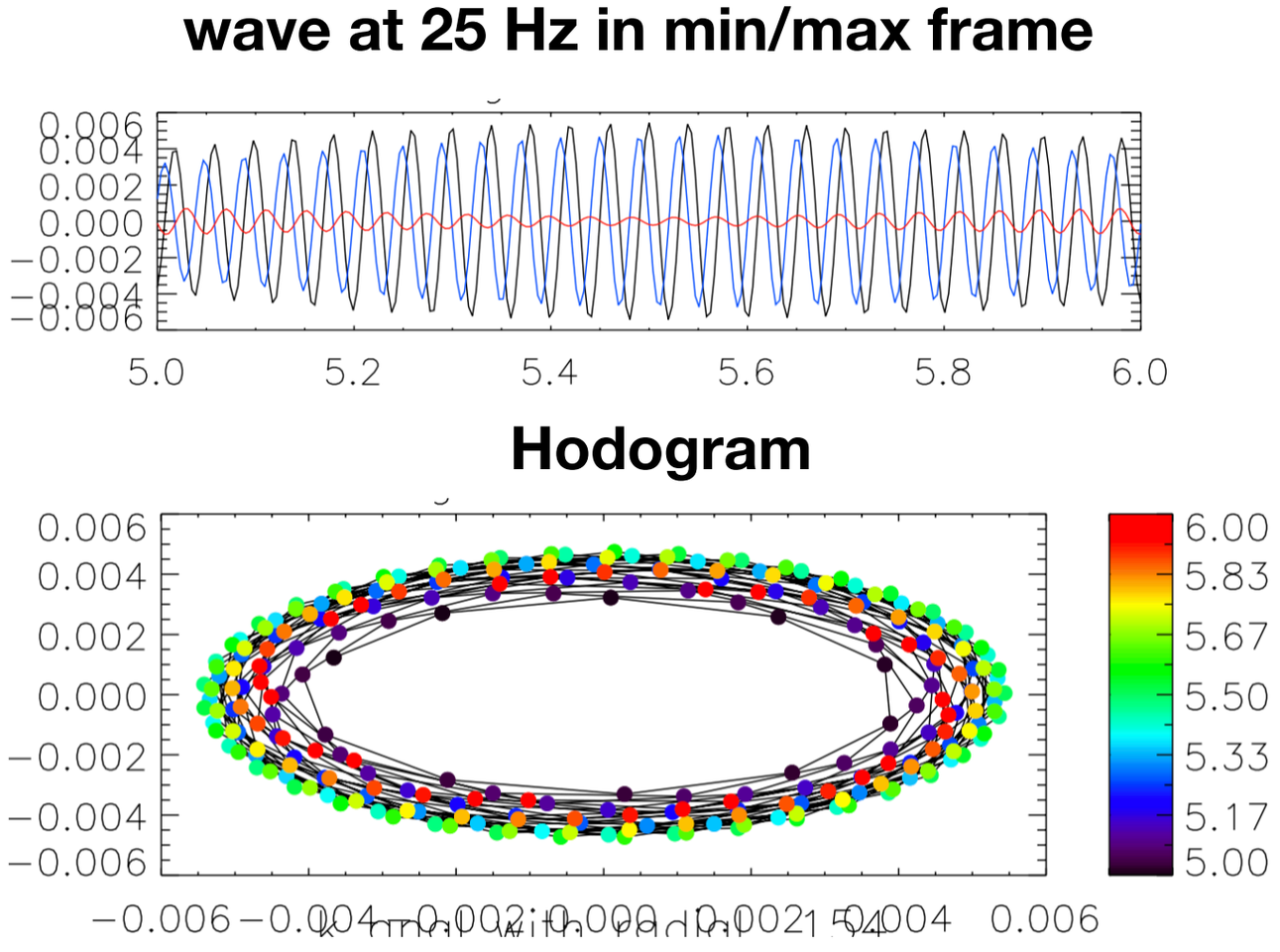
- Other intermittent artefacts from SCM Heaters



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Waves

- Waves (possibly whistlers) are observed



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take home message

- SCM is working well, and on ground sensitivity is matched

- Several artefacts signals, not all well known yet. Get in touch

- Turbulent spectrum below sensitivity above around 10Hz. Waiting for being closer to the Sun (or more active wind)

- Several waves events have been observed

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