



Infrasound campaign in Sos Enattos

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XIII Einstein Telescope Symposium (Cagliari, Sardinia, 8-12 May 2023)



Details

- Date: 22 Nov 2022 – 25 Nov 2022
- During these few days, several Astrocent microphones were installed underground and one on the surface
- Hungarian system: ISM1802 microphone + EarthData EDR-209 digitizer
 - Place of installation: SOE2 (-111 m)
- Local system at SOE2:
 - GRAS 47AC Microphone + Centaur digitizer
 - Seismometer + Centaur digitizer
- Environment monitoring at the surface:
 - Wind speed sensor
 - Barometer
- Goals:
 - To test the Hungarian system at the site (with thin plastic covering and silikagel against humidity)
 - To compare ISM1802 to GRAS
 - To see the influence of wind and atmospheric pressure on the ISM and seismometer data measured at SOE2

SOE2 site



GRAS microphone in

Sos Enattos:

network: ET
station: SOE2
channel: HFX
sampling_rate: 250.0
delta: 0.004
npts: 21599927
calib: 1.0
format: MSEED

ISM microphone in

Sos Enattos:

network: GE
station: edl
channel: p0
sampling_rate: 100.0
delta: 0.01
npts: 360000
calib: 1.0
format: MSEED

GRAS 47AC:

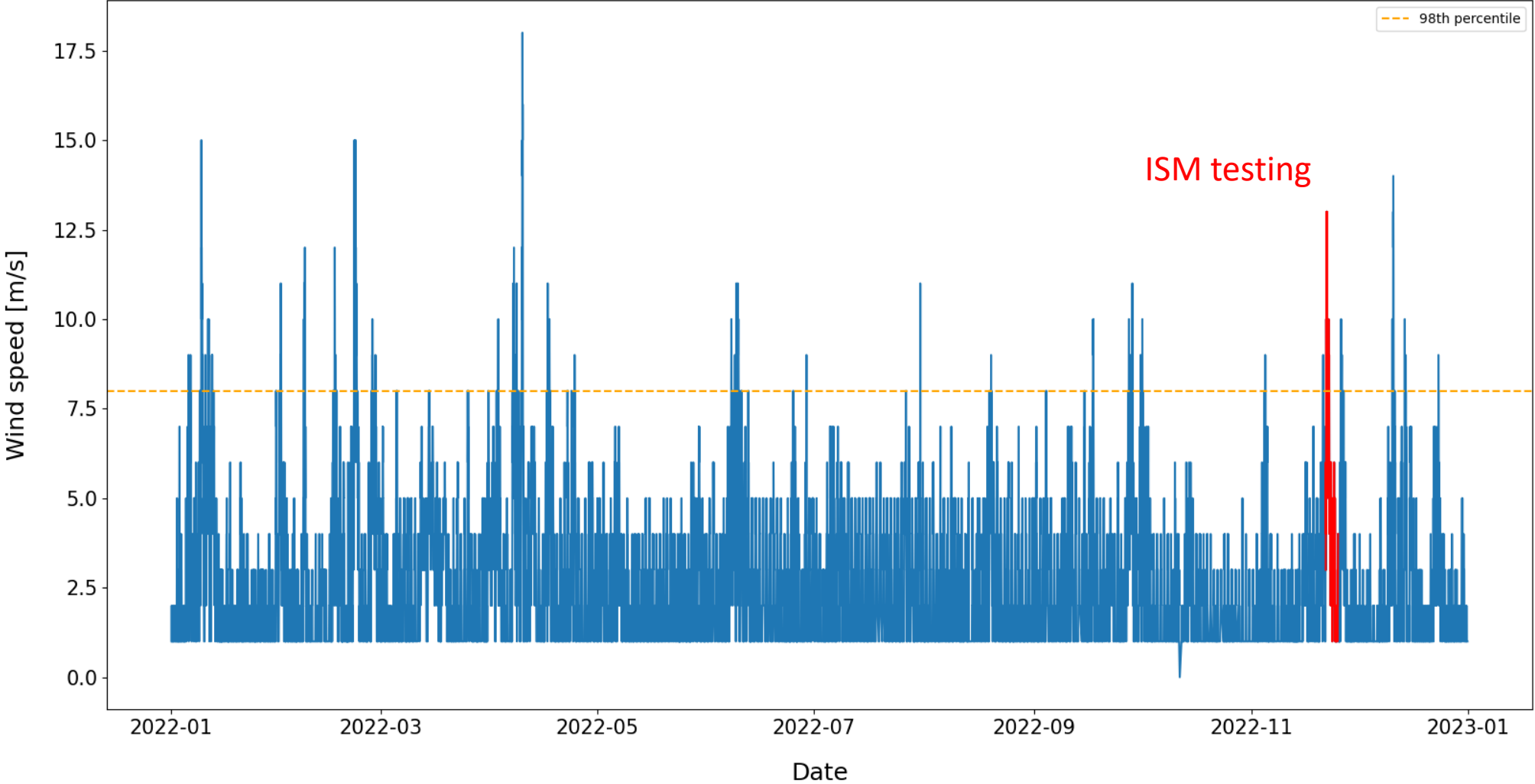
Freq range (± 3 dB): 0.09 Hz to 20 k Hz
Sensitivity: 8 mV/Pa

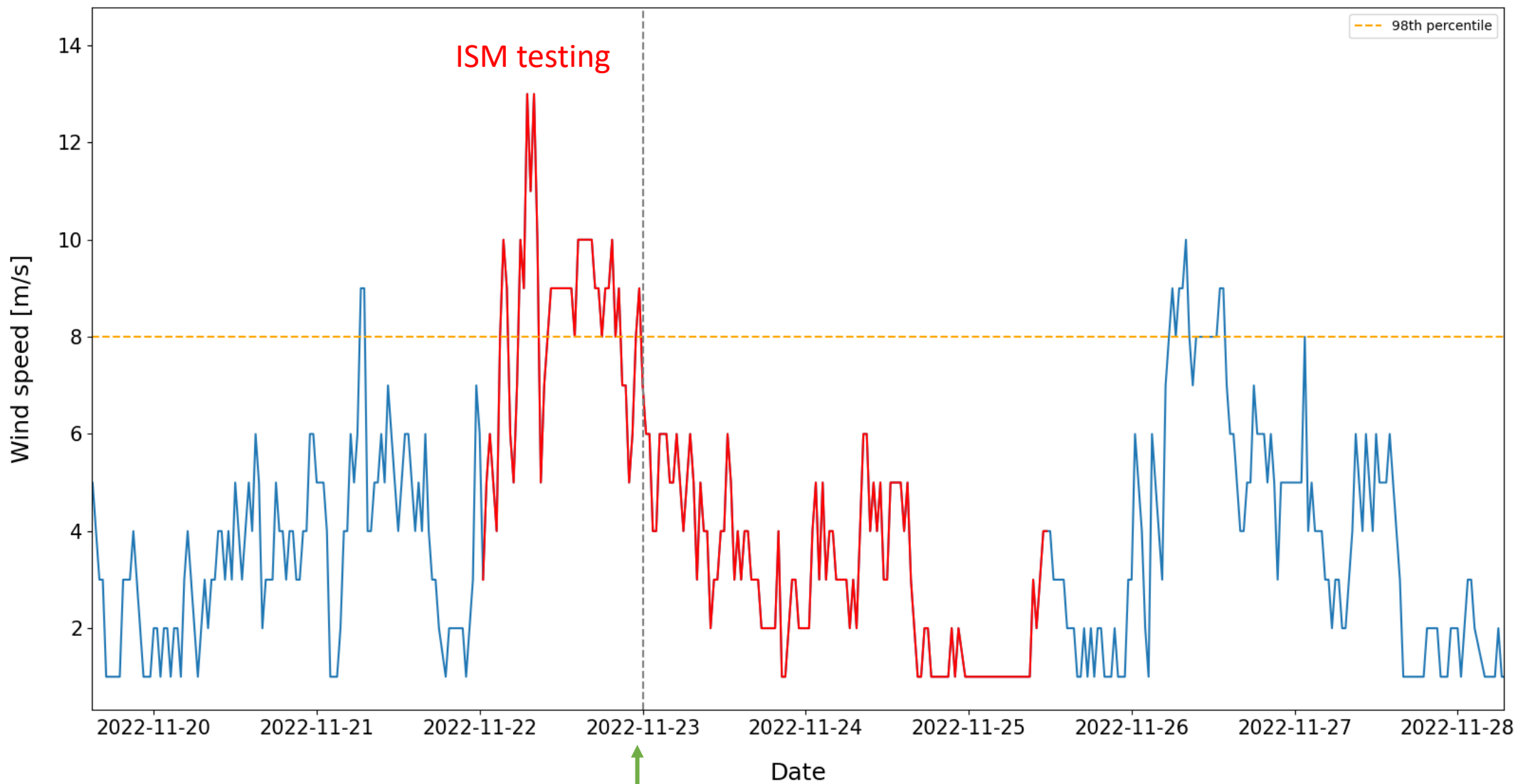
ISM1802:

Freq range (± 3 dB): 0.01 Hz to 30 Hz
Sensitivity: 1 mV/Pa
Self noise: 1 mPa



Wind speed data of 2022



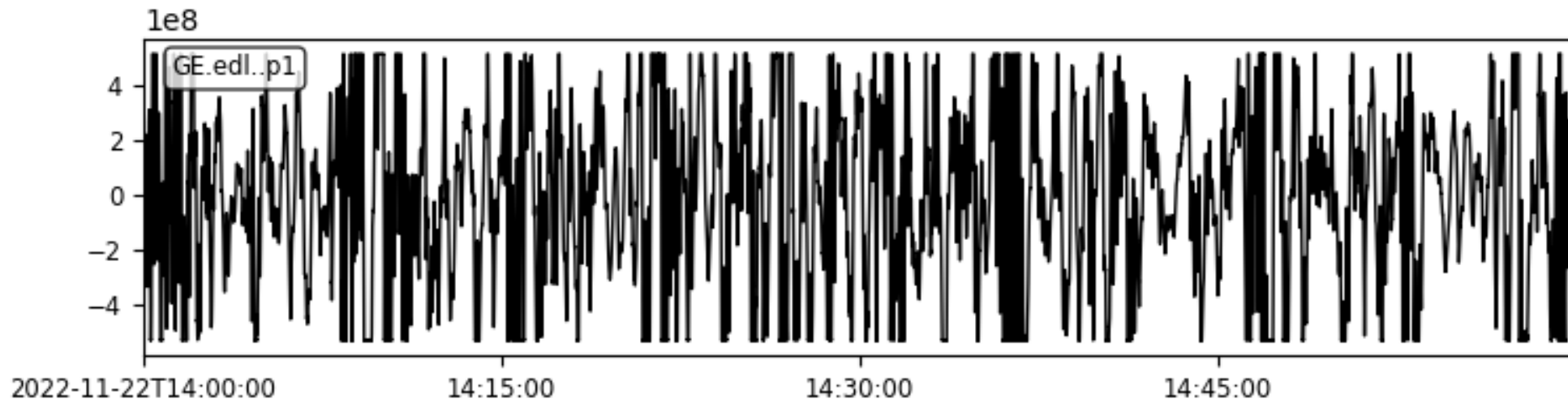


ISM data collected after this times was processed

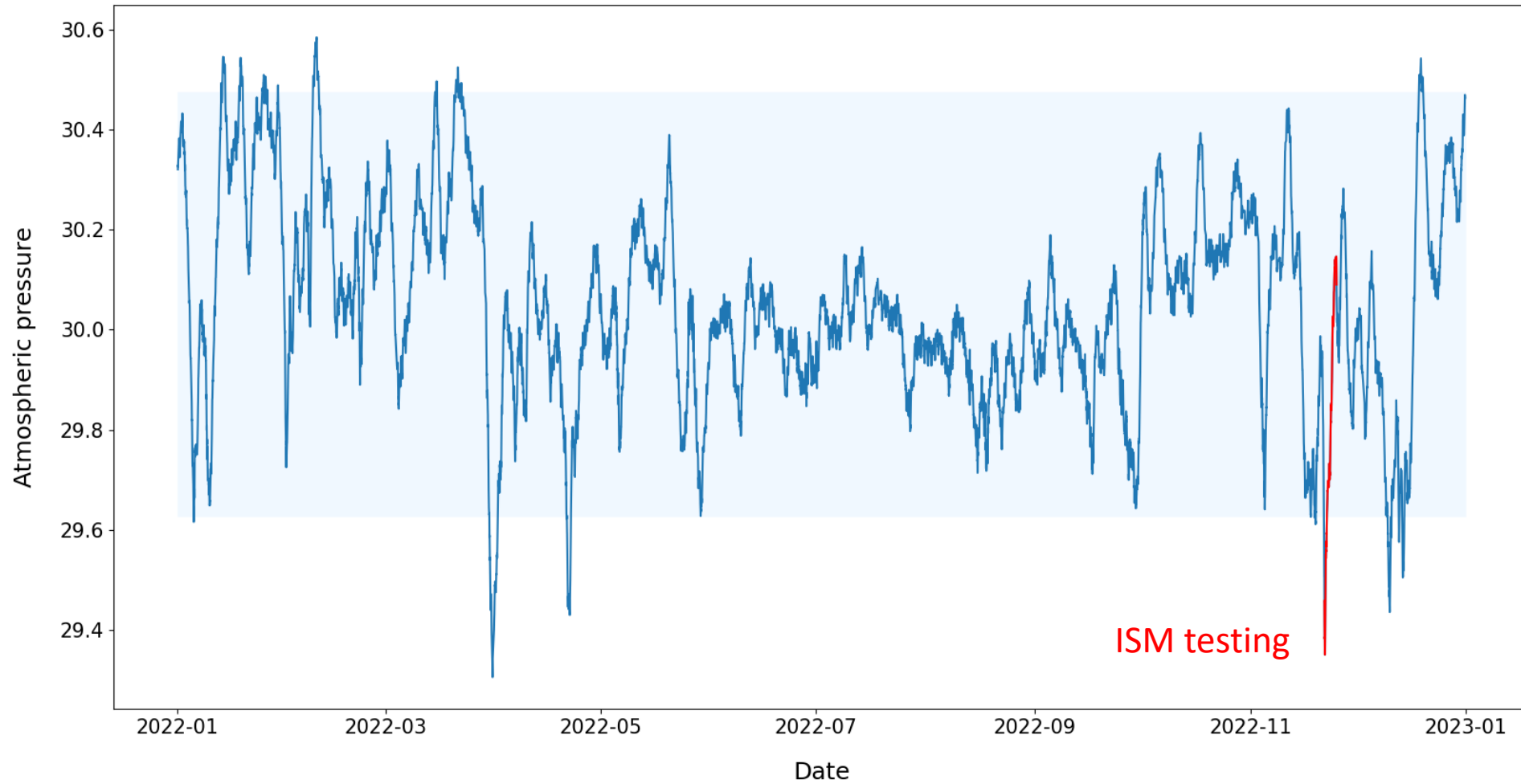
Problem caused by high wind (>8 m/s): data saturated

But only in 2% of the time

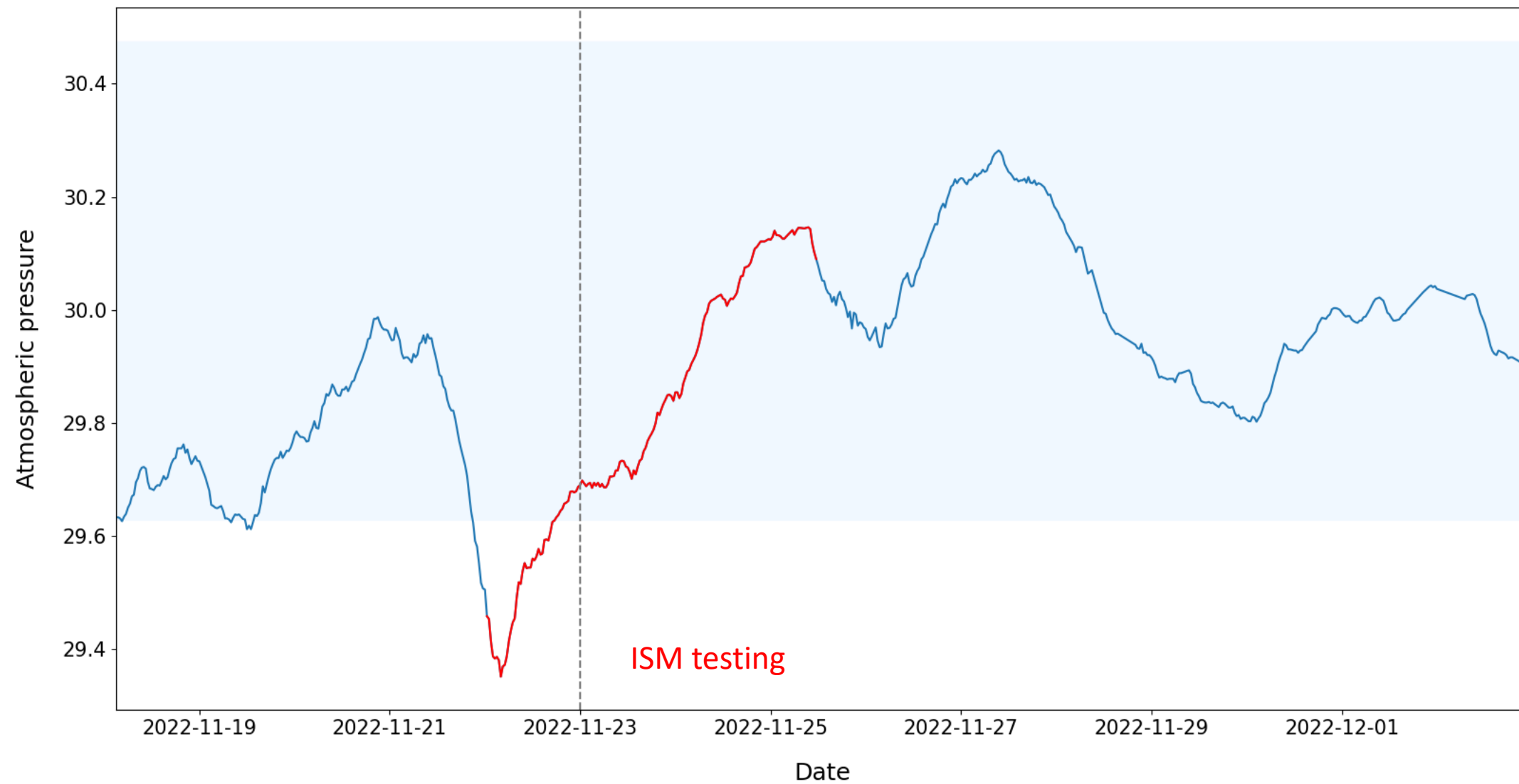
2022-11-22T14:00:00 - 2022-11-22T14:59:59.99



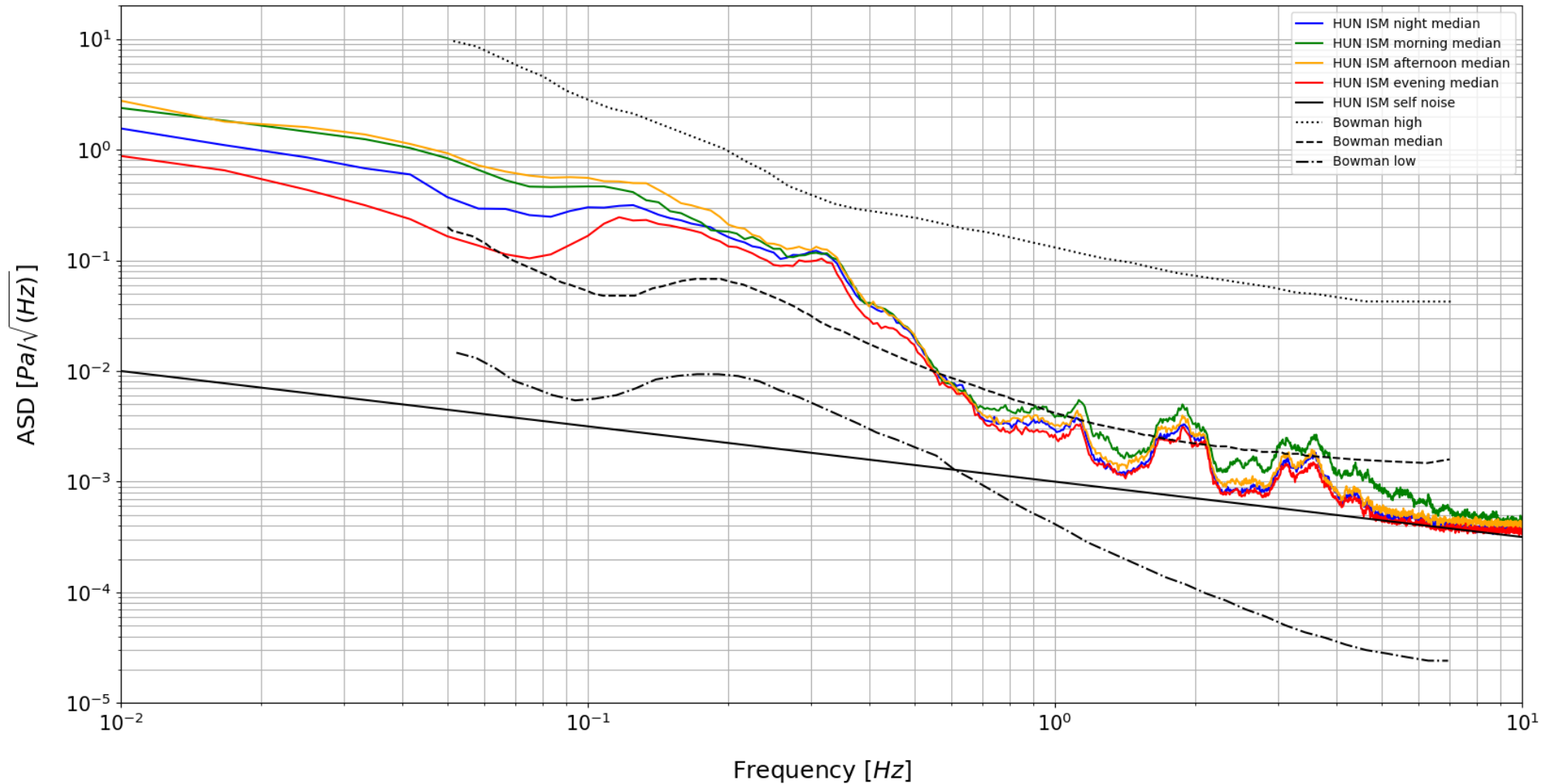
Barometer data of 2022 (surface)



Area between the lines corresponding to 2th and 98th percentiles is shaded with light blue

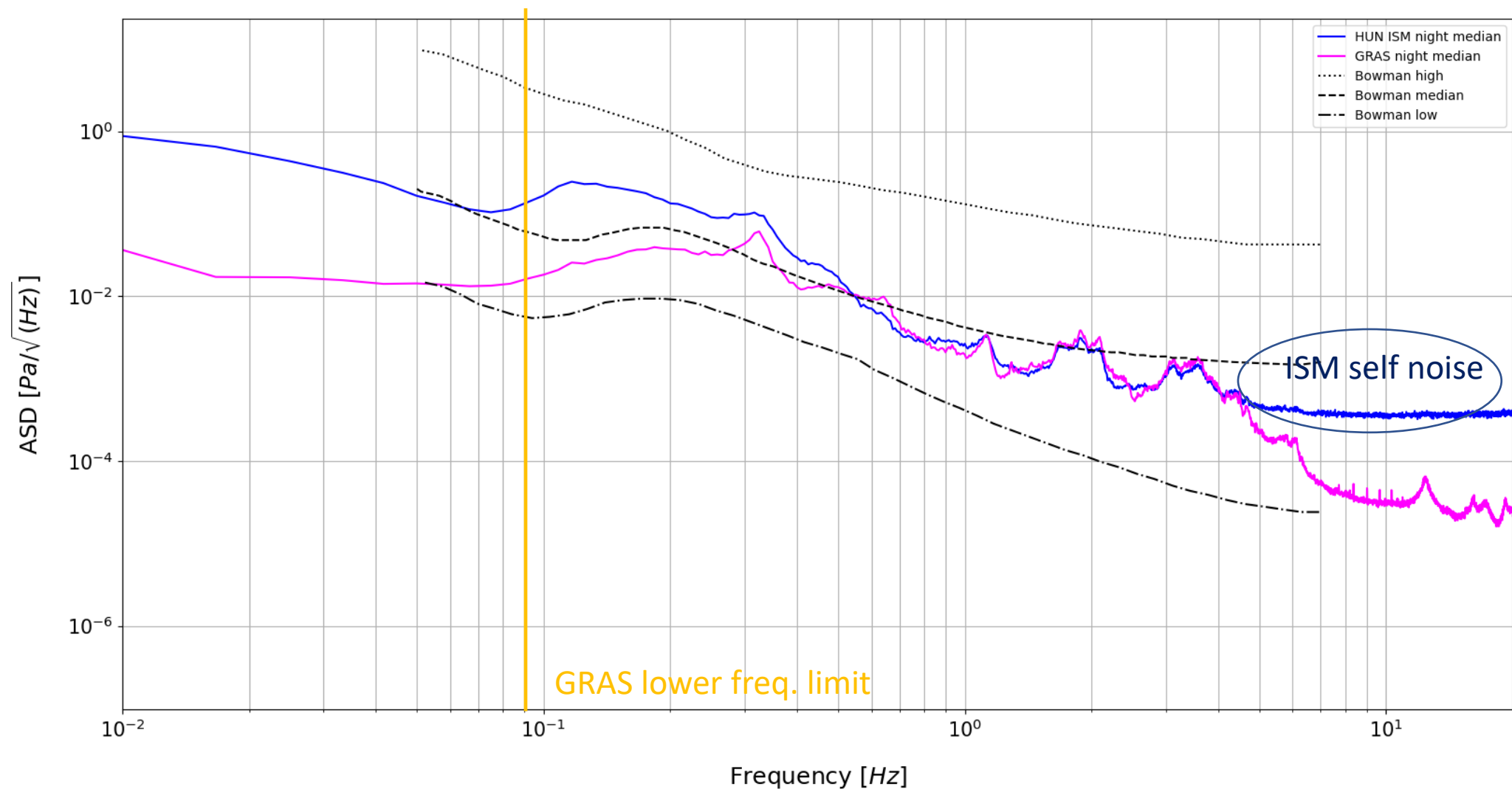


Results for different parts of days

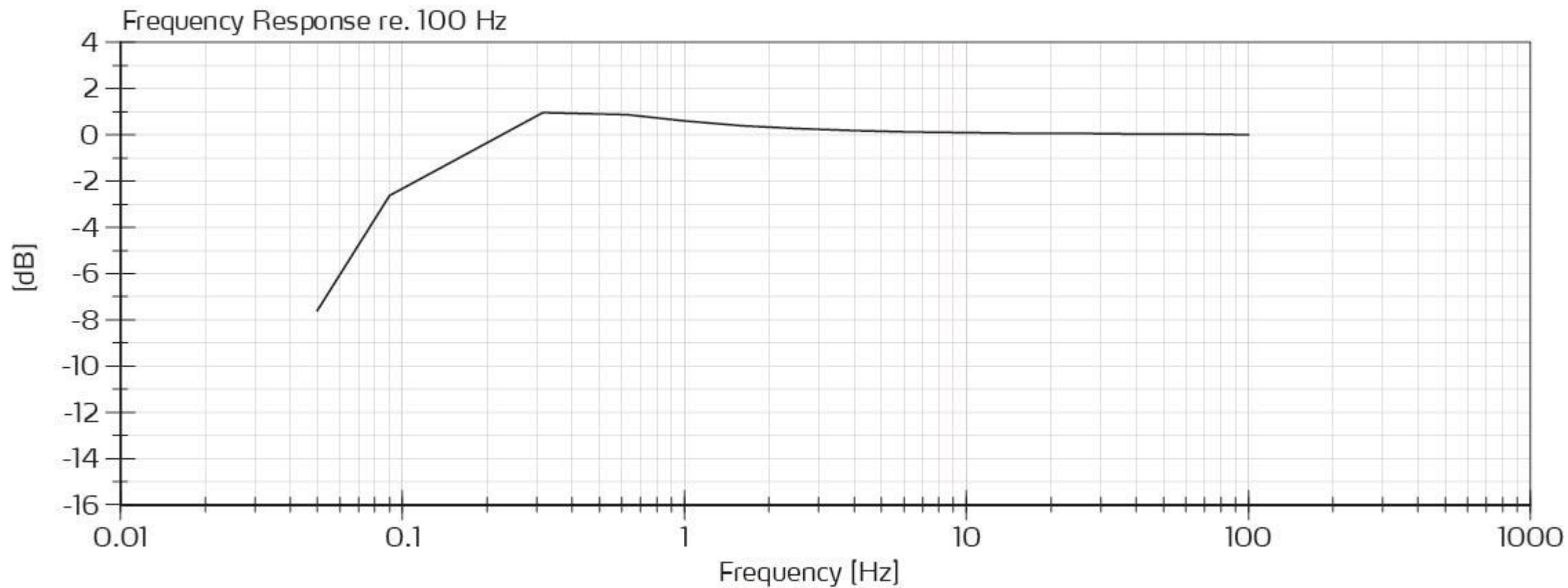


Night: 00:00 – 06:00, morning: 06:00 – 12:00, afternoon: 12:00 – 18:00, evening: 18:00 – 24:00

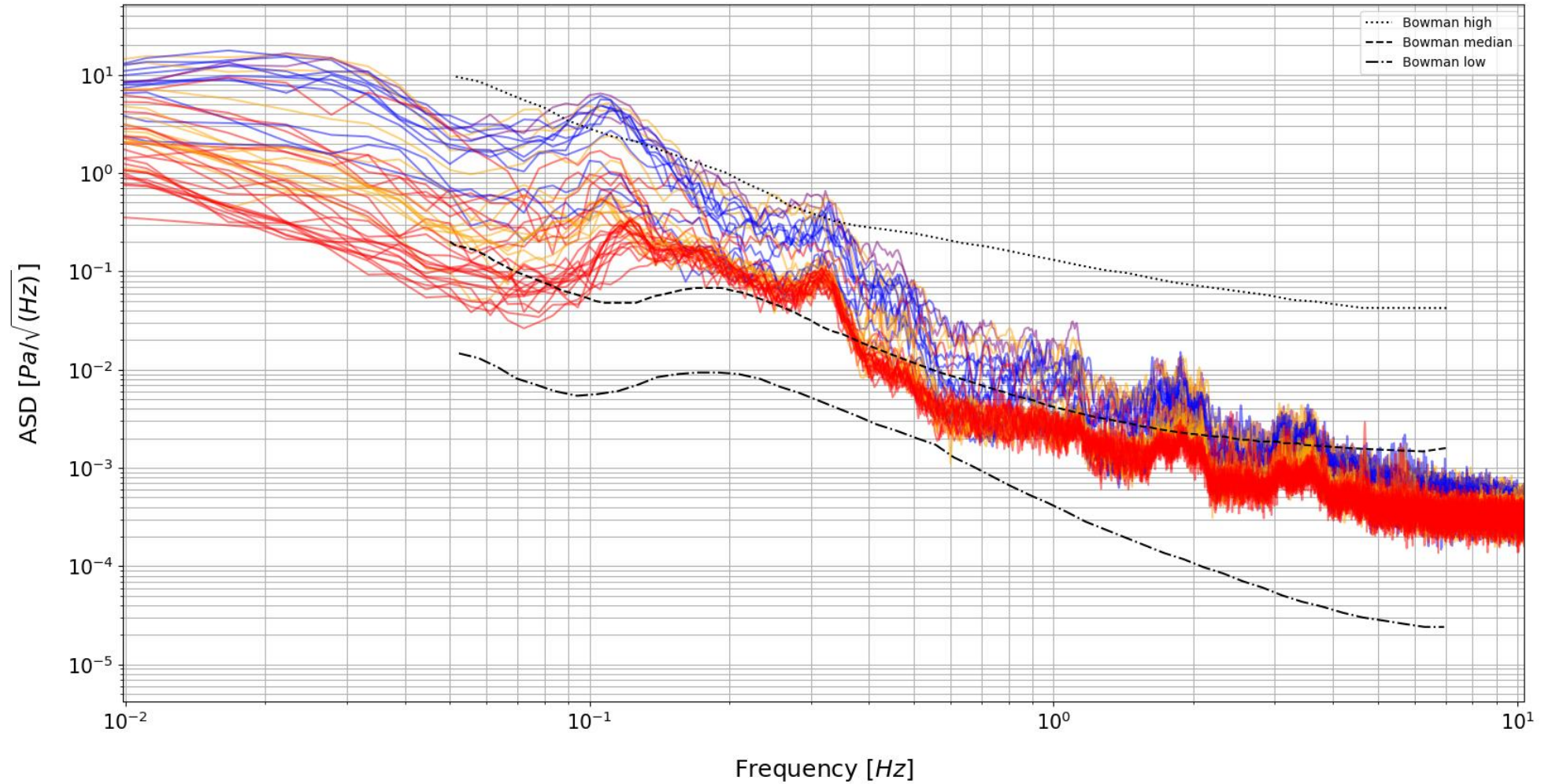
Comparing GRAS 47AC and ISM1802



Frequency response of GRAS 47AC

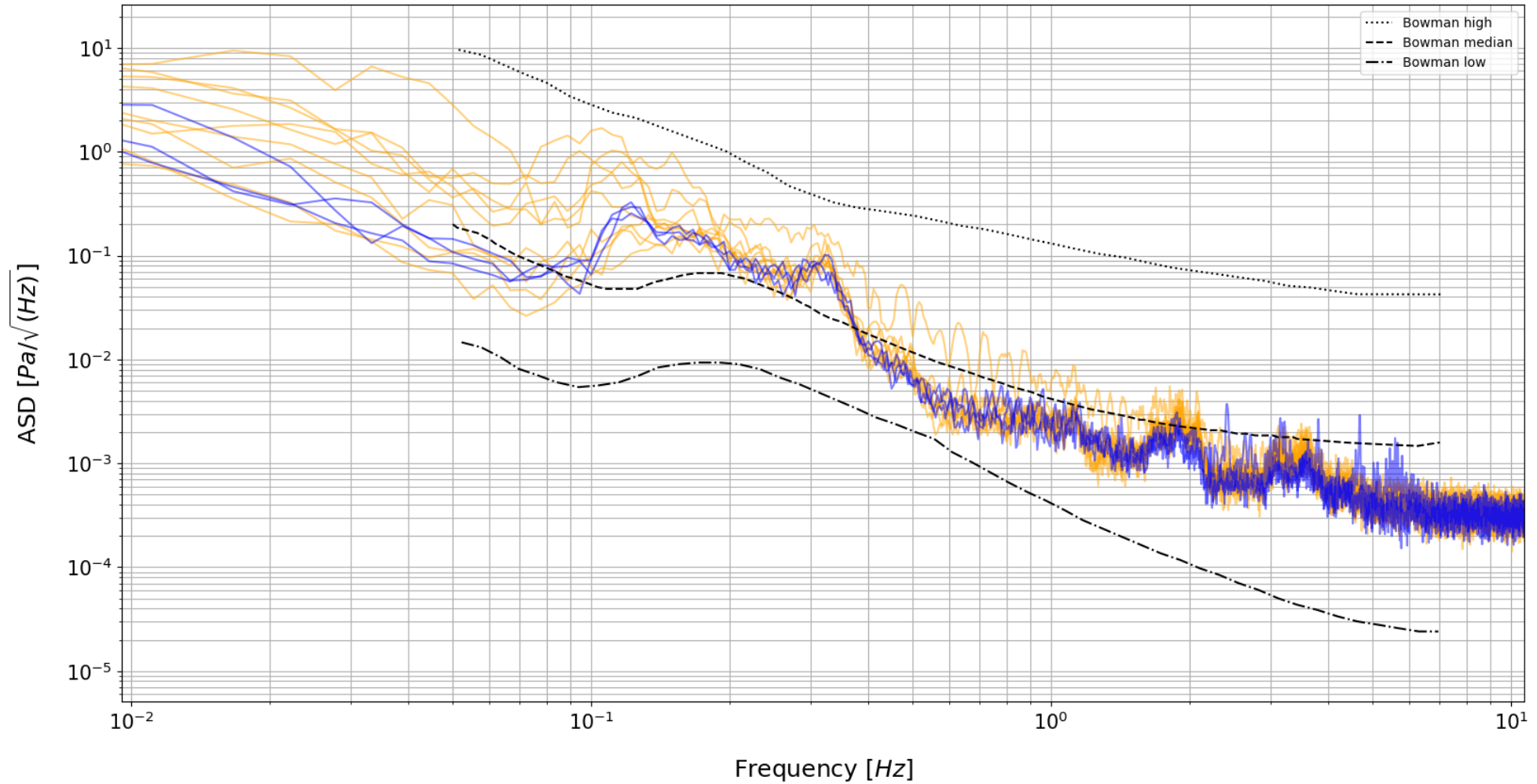


The effect of wind on ISM data



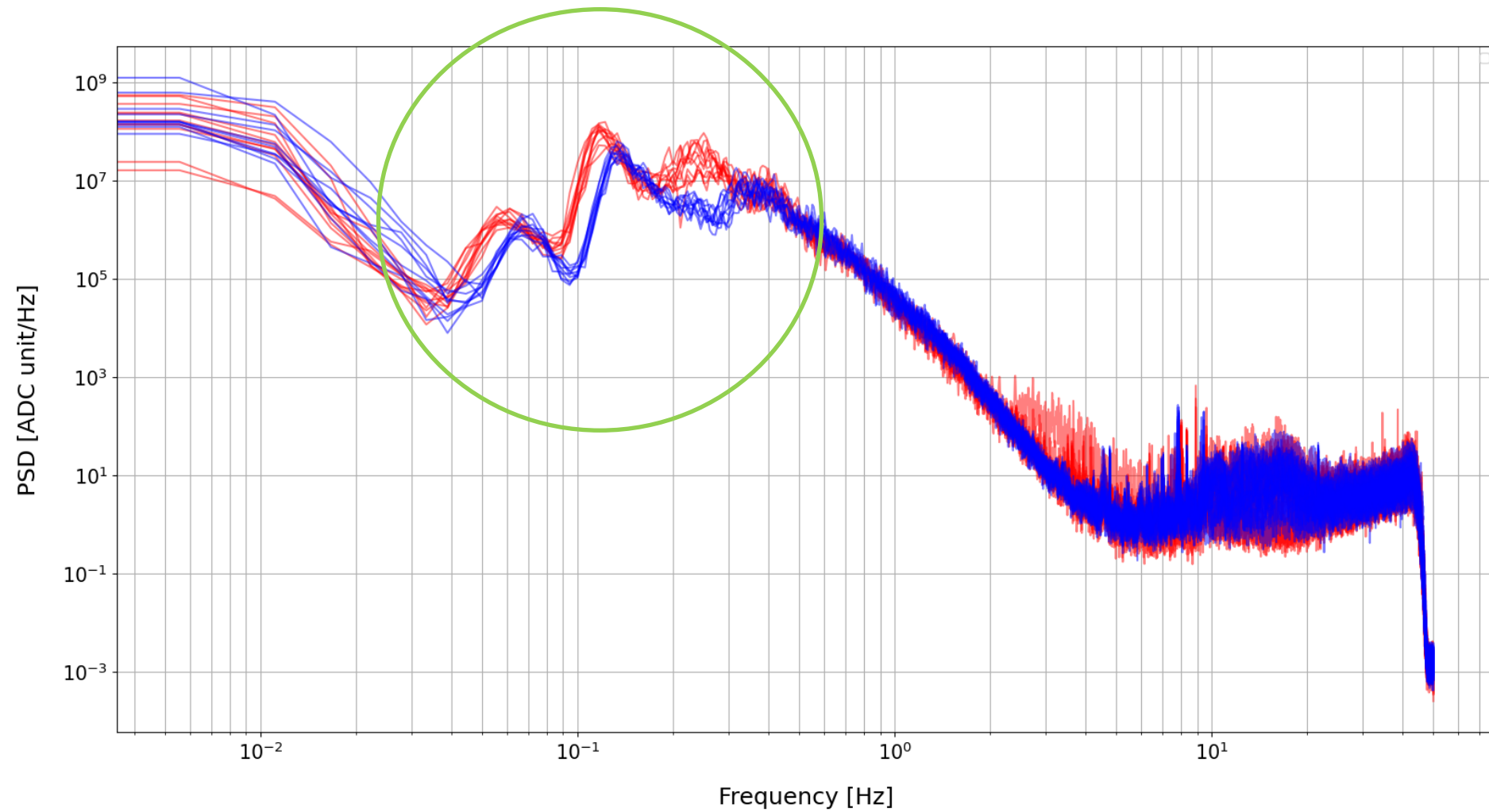
Colouring according to wind speed: red: 1 m/s - 2 m/s, orange: 3 m/s - 4 m/s, blue: 5 m/s - 6 m/s, purple: > 6 m/s

The effect of atmospheric pressure on ISM data



Orange: $p < 30$ inHg, blue: $p > 30$ inHg

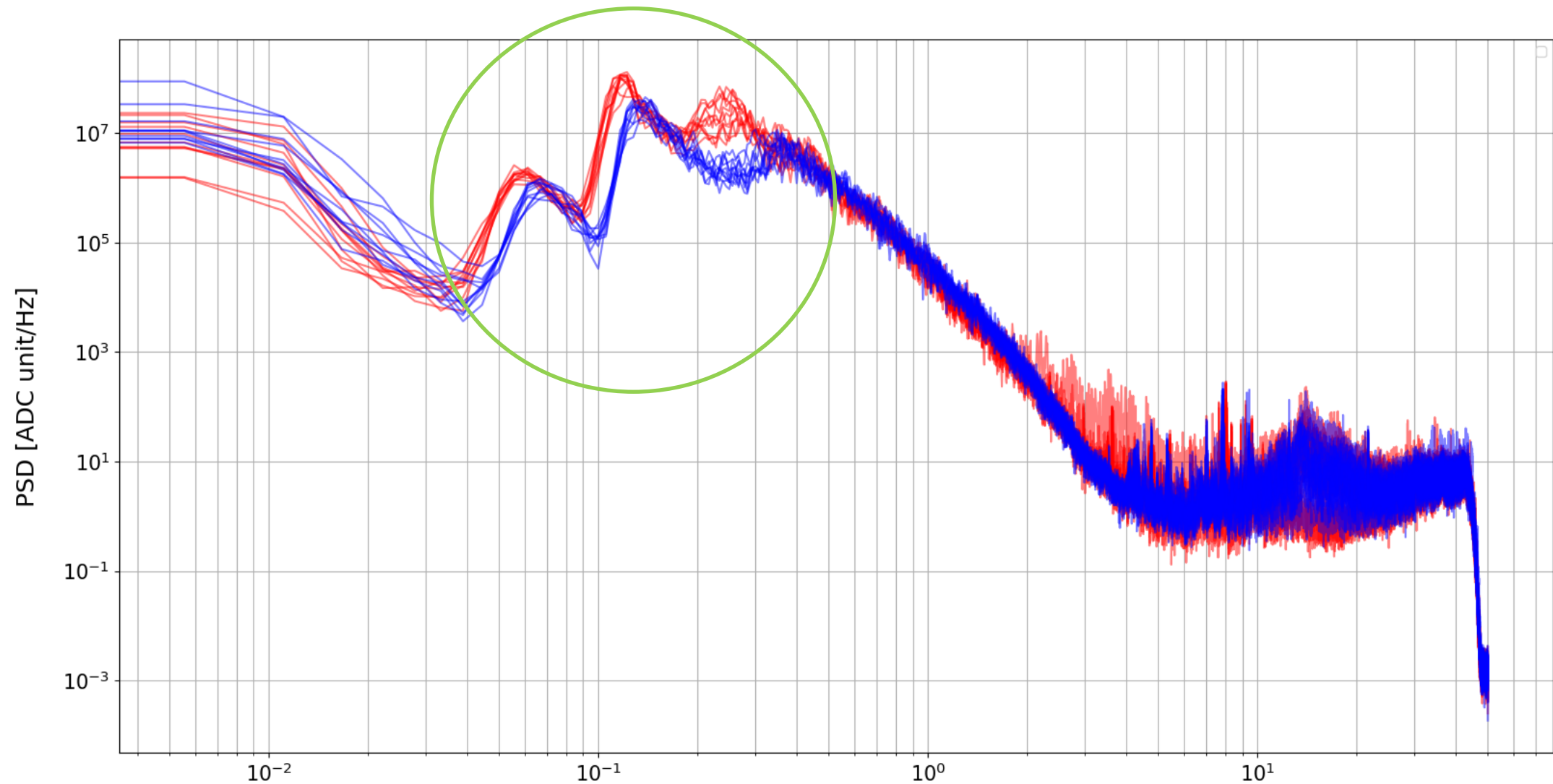
The effect of atmospheric pressure on the HHE channel of the seismometer



Red: $p < 30$ inHg , blue: $p > 30$ inHg

Not calibrated data!

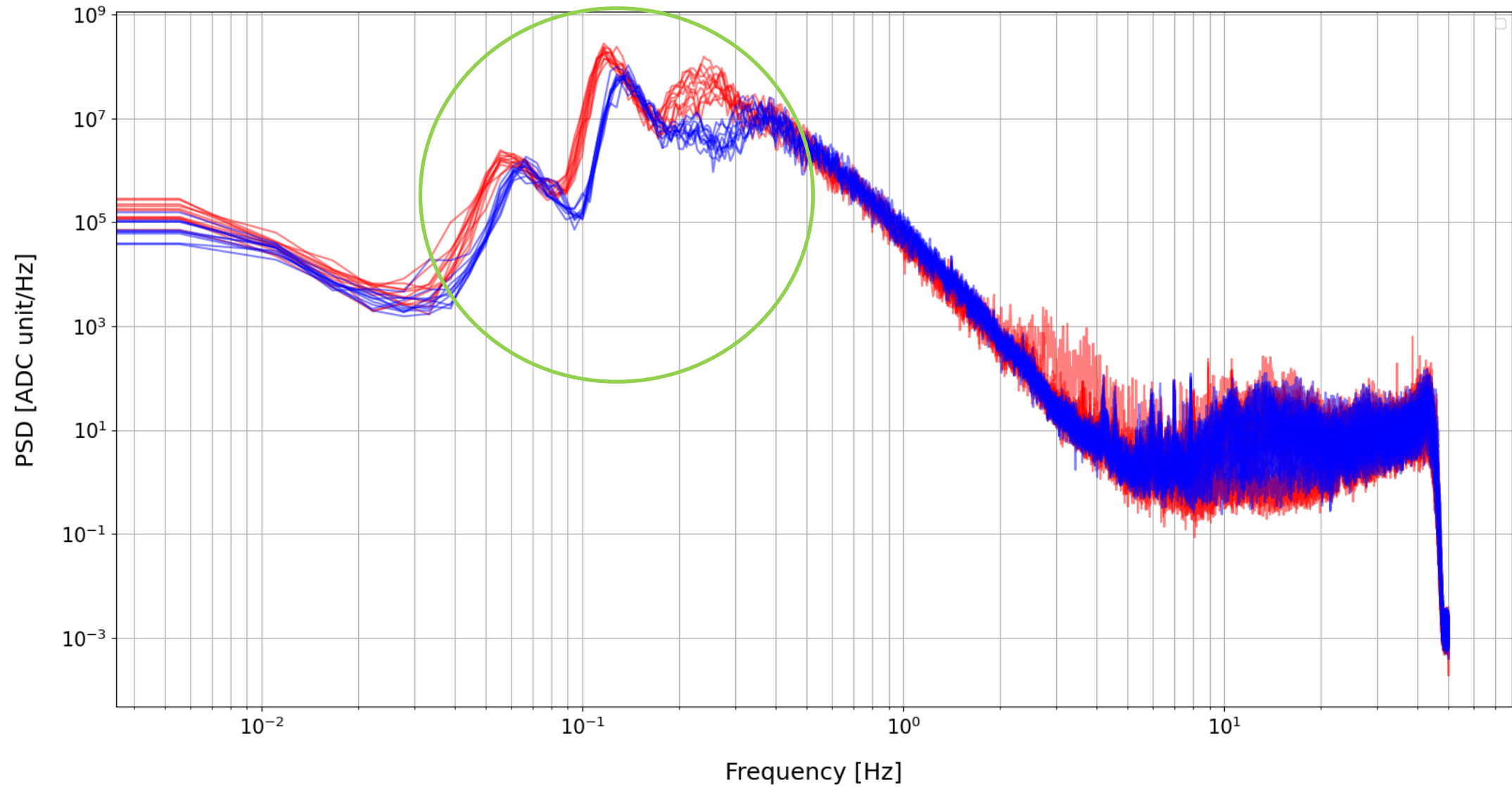
The effect of atmospheric pressure on the HHN channel of the seismometer



Red: $p < 30$ inHg , blue: $p > 30$ inHg

Not calibrated data!

The effect of atmospheric pressure on the **HHZ** channel of the **seismometer**



Red: $p < 30$ inHg , blue: $p > 30$ inHg

Not calibrated data!

Lessons learned

- At SOE2: ISM1802 can provide useful data between 0.01 Hz and 4 Hz
- At the surface, it can detect infrasound above 4 Hz, too (e.g. in Virgo CEB), depending on the ambient infrasound noise
- ISM1802 needs protection against humidity: the silikagel package should be replaced easier in the future, so the covering system has to be upgraded according to this requirement
- The testing period of the Hungarian system was short, and high wind caused data saturations
 - On the long-run, this problems would occur only in 2% of the time
- Interesting phenomena were observed after processing the data ISM1802
 - Longer periods of measurement is needed to make conclusions



Thank you for your attention!

