INSTITUTE OF GEOPHYSICS
OF THE CZECH ACADEMY OF SCIENCES

AASN deployment in Czech Republic

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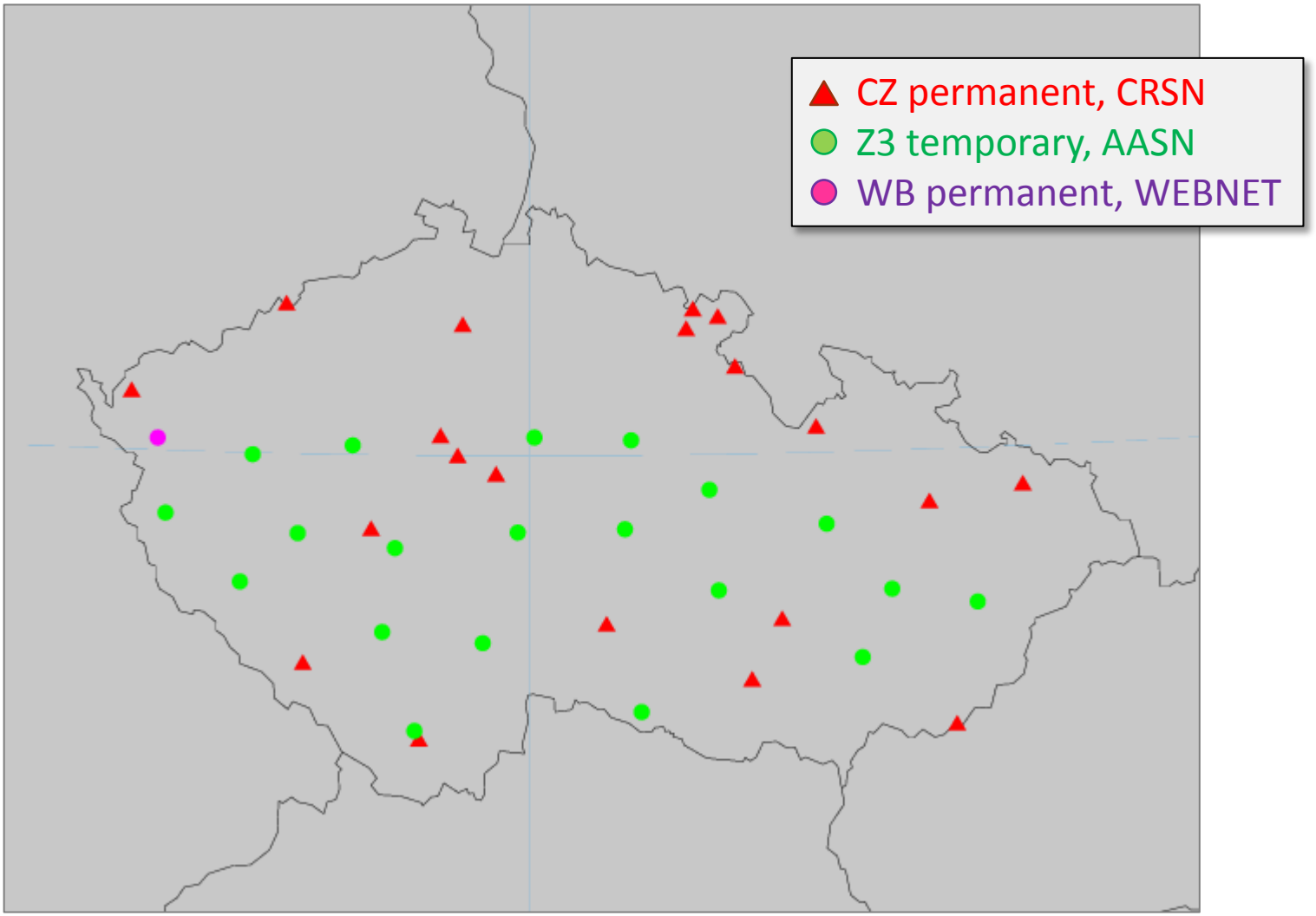
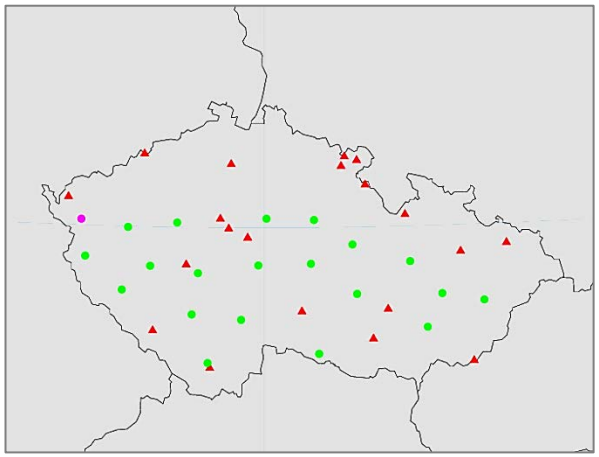
25 - 28 October, 2016, Dubrovnik

Station distribution



Station summary



CRSN

Czech Regional Seismic Network

IG CAS, IRSM ASCR, IPE MU Brno, Geophys. Dept., Charles Uni., Prague, RI GTC Zdiby

- CZ, doi:10.7914/SN/CZ
- **10** BB stations (from 20)
- EIDA node GFZ
- online

WEBNET

West Bohemia Local Seismic Network *(IG CAS)*

- WB, doi:10.7914/SN/WB
- **1** BB station (from 22): LAC
- EIDA node ORFEUS
- (offline)

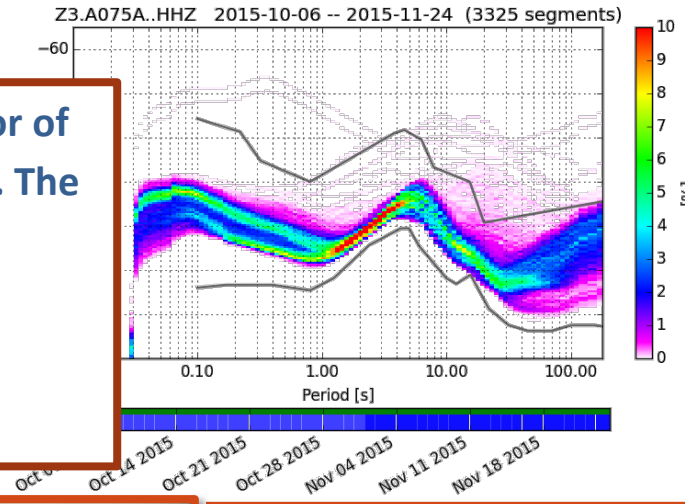
AASN (CZ)

AlpArray Seismic Network *(IG CAS)*

- Z3 (2015-2020), doi:10.12686/alparray/z3_2015
- **20** BB stations A071A-A090A: 15 STS2, 2 CMG-3T (120s), 3 CMG-3ESP (30s)
- installed between August-November, 2015
- EIDA node ORFEUS
- offline

A075A
Křivoklát

The station is located on the ground floor of a former brewery in the castle Křivoklát. The surrounding areas are not used.
Seismometer is built on a concrete floor
Geomorphology: Křivoklát Highlands.
Subsoil: greywacke, siltstone, slate.



A076A

Maková Hora

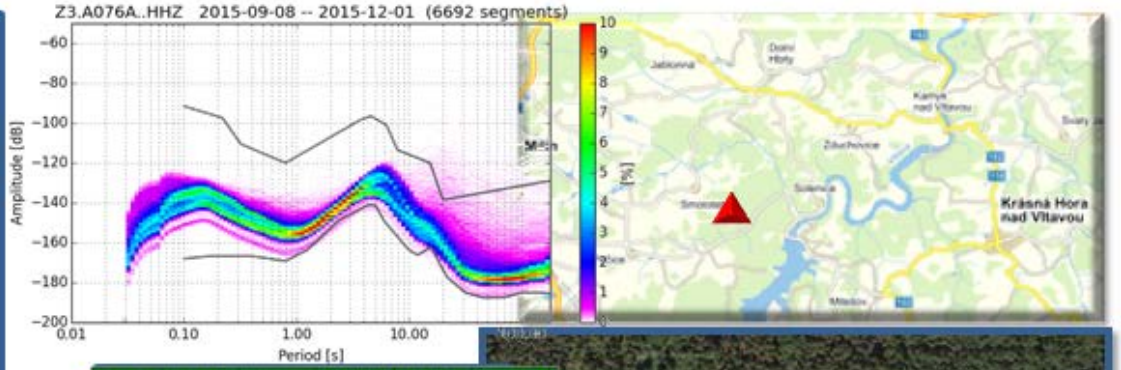
INSTALLATION

Start : 8.9.2015
Lat : 49.6168
Lon : 14.1494
Alt : 532 m

EQUIPMENT

Sensor : CMG-3T 120 s
Depth : 3 m
Recorder : Gaia 1
Power : electricity grid

The station is located on the lower ground floor of the former rectory pilgrimage church at Maková Hora (Poppy Mountain). Upper ground floor is occasionally used for recreational purposes.
Seismometer is installed in the shaft on concrete pillars built on bedrock.
The GPS antenna is brought out through the window, length - 5 m, direction - S, view open.
Geomorphology: Benešov Uplands.
Subsoil: orthogneiss.



A078A

Kleť

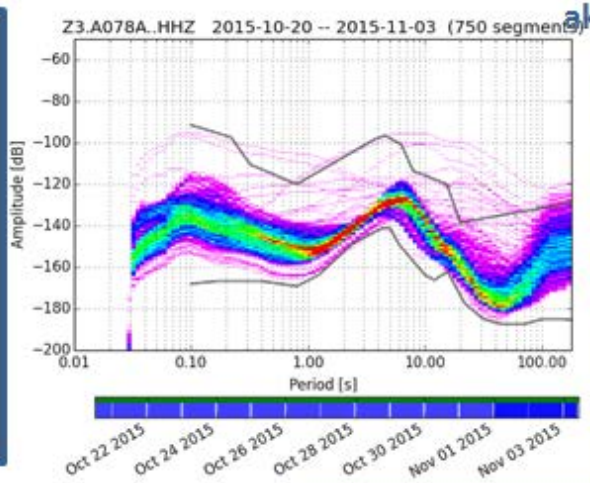
INSTALLATION

Start : 20.10.2015
Lat : 48.8640
Lon : 14.2845
Alt : 1060 m

EQUIPMENT

Sensor : CMG-3ESP 30 s
Depth : 0 m
Recorder : Gaia 1
Power : solar panel, aku 100 Ah

The station is located on the premises of the observatory on Mount Kleť.
Seismometer is built in a plastic box on a concrete background at the ground level.
The GPS antenna is glued onto the underside of the plastic cover, length - 5 m, a circular open view.
Geomorphology: Blansko Forest.
Subsoil: granulit (granulite).



A090A

Maruška

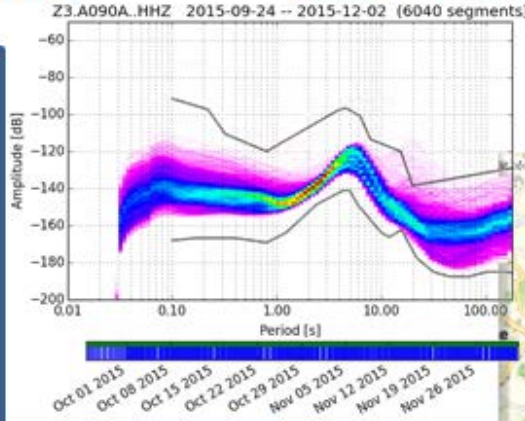
INSTALLATION

Start : 24.9.2015
Lat : 49.3655
Lon : 17.8278
Alt : 659 m

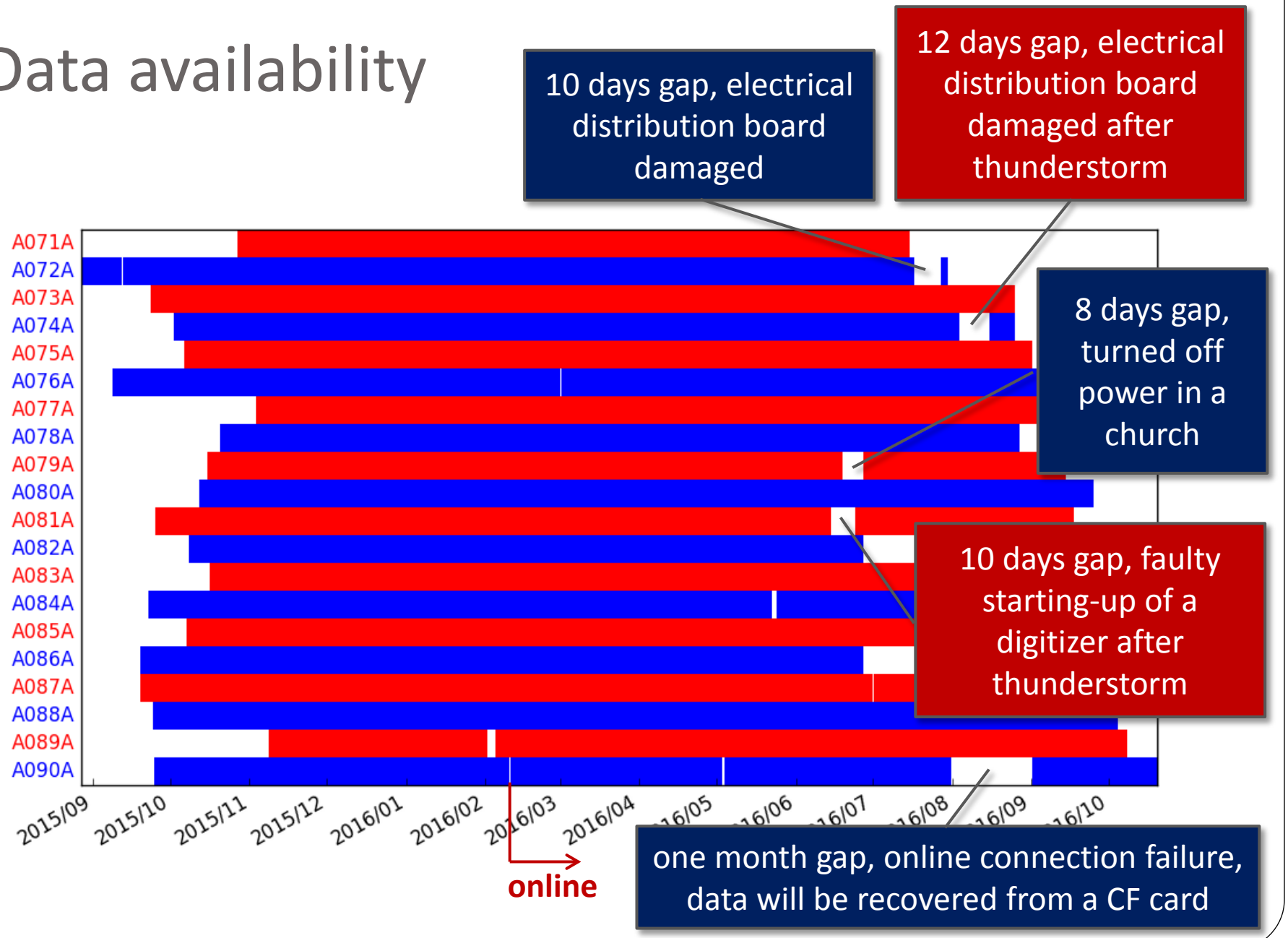
EQUIPMENT

Sensor : CMG3ESPC 30s
Depth : 0.5 m
Recorder : Gaia 1
Power : electricity grid

The station is built in the complex of the meteorological station Maruška.
Seismometer is placed in a buried plastic shaft with a concrete pillar.
GPS antenna is mounted on the inside of the lid, length - 5 m, omnidirectional unlimited view.
Geomorphology: Hostýn-Vsetín Highlands.
Subsoil: sandstone, claystone.



Data availability

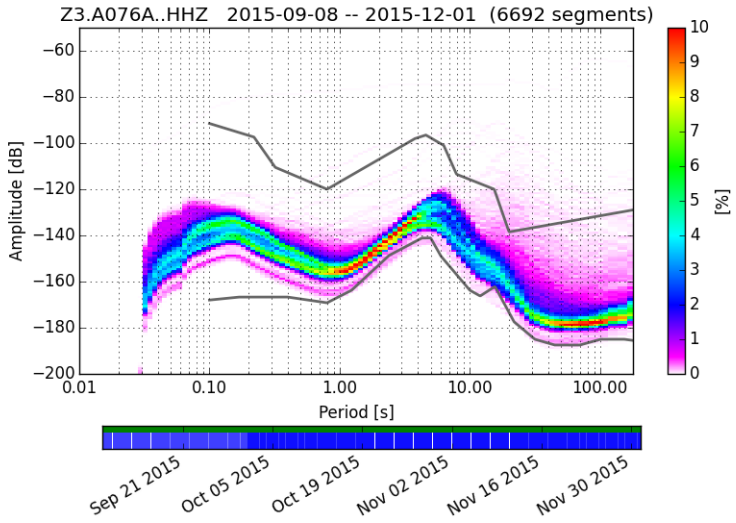


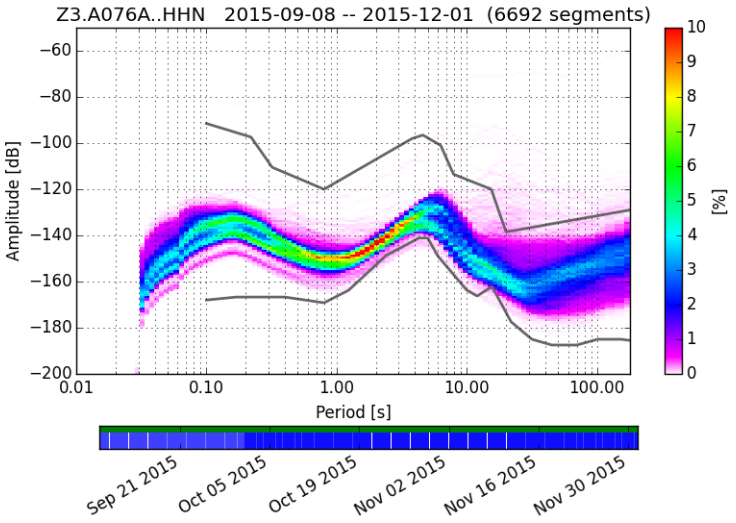
Site quality, PPSD

vertical

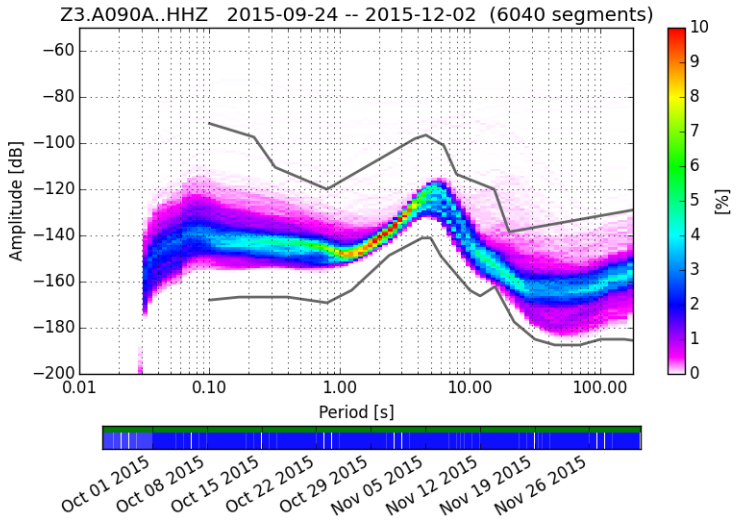
horizontal

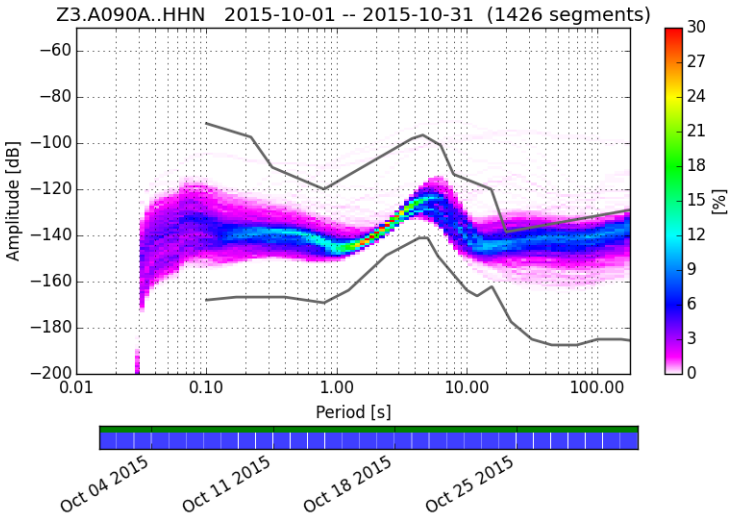
A076A Maková Hora





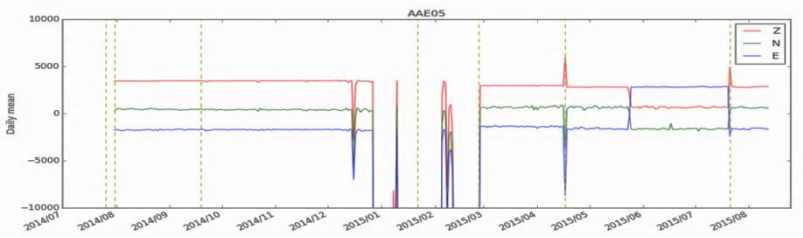
A090A Maruška

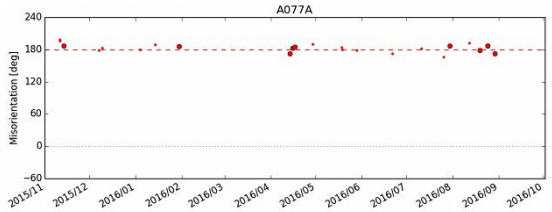


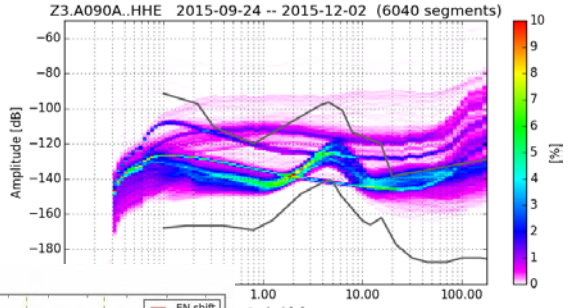


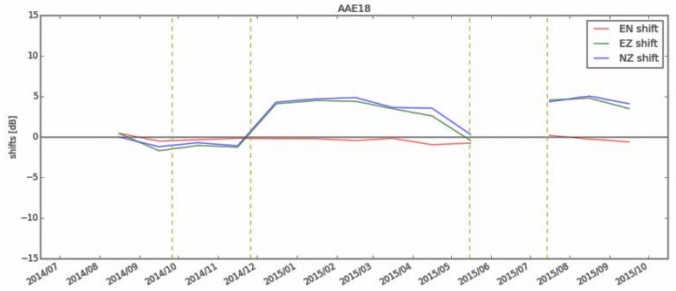
Data quality and assurance

- Timing issues
- Sensor orientation
- Reversed or exchanged components
- Mass centering problems
- Anomalous channel amplitudes
- Glitches in signal
- Noise in signals

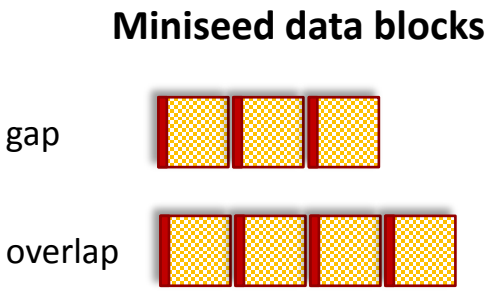








Timing issues



- Source of information:
  - log files
  - service sheets
  - **headers of mseed data**

- Timing issues
  - failure of oscillator tuning station time - A087A
  - leap second (station time corrected with 30-90 minute delay)
  - switch between UTC and GPS times (17 s forth and back, standing for hours) - A086A

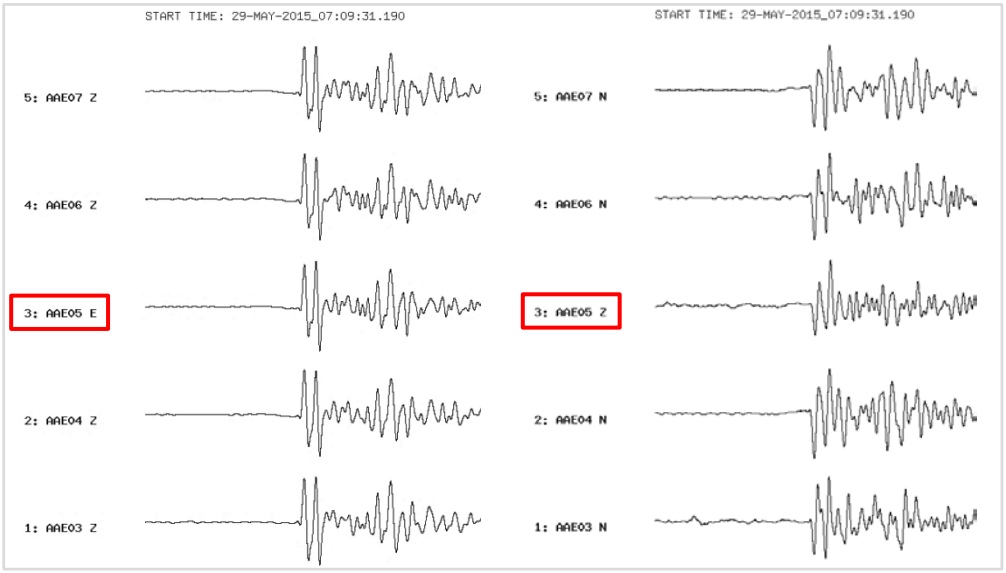
➢ **Corrections for timing issues must be done in MSEEDs.**

Exchange of channels

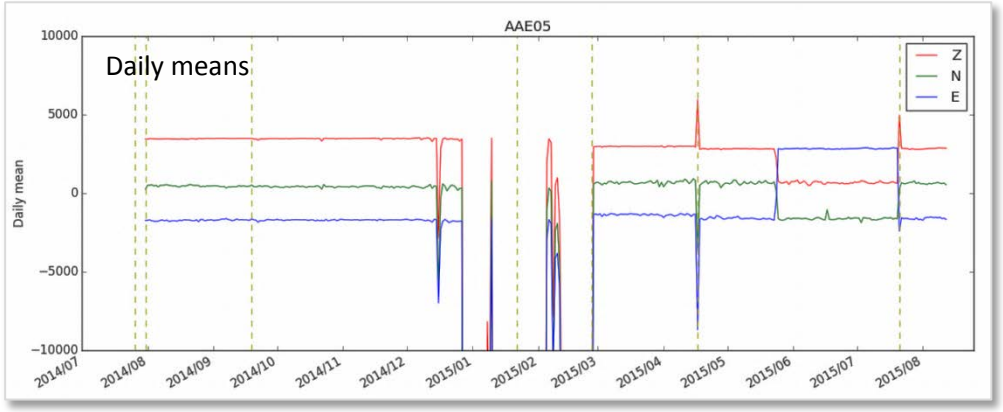
Can be detected by different methods:

- wave similarities in array of stations
- wave polarization
- channel offsets (daily means)
- noise level in PPSD

Found in A087A



➢ Corrections of exchange components can be done either in MSEEDs or in METADA, **we prefer MSEEDs.**



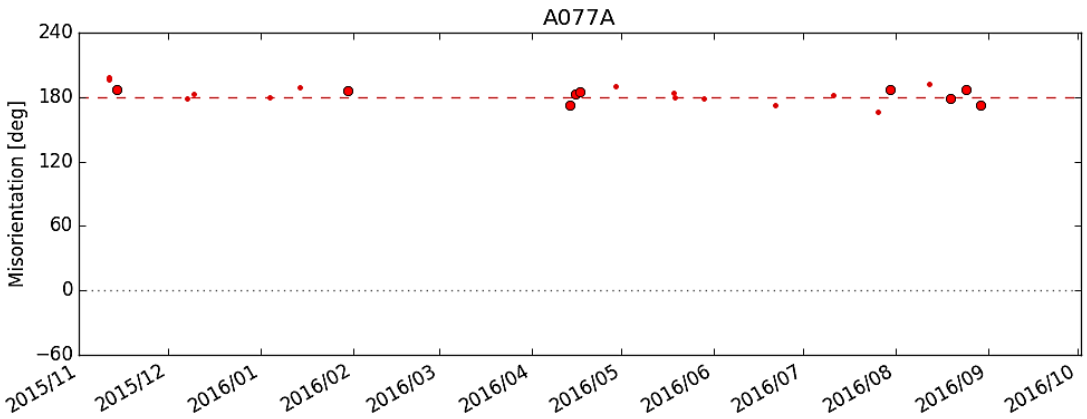
Reversed channel polarity

Can be detected by different methods:

- wave similarities in array of stations
- wave polarization

Found in A077A

Rayleigh wave polarizations



➢ Corrections of reversed polarities can be done either in MSEEDs or in METADA, **we prefer MSEEDs.**

Sensor orientation

Orientation *in situ*:

- gyrocompass

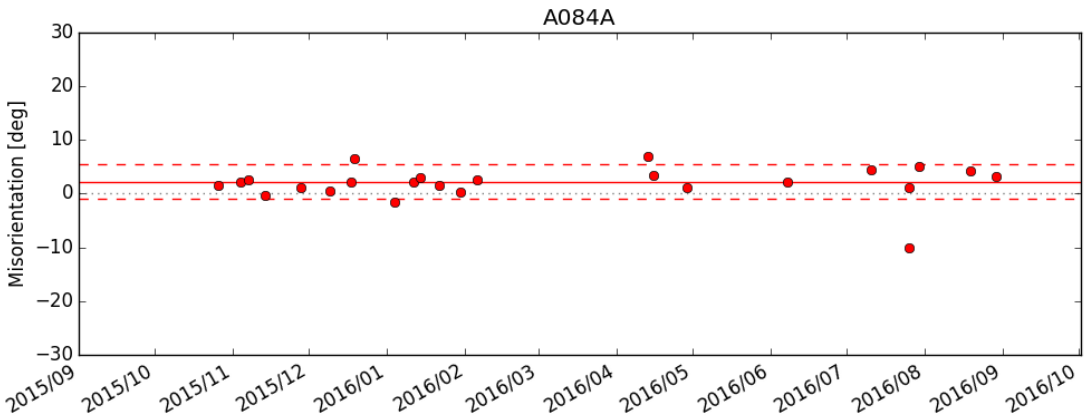
Orientation *ex situ*:

- wave polarization

Disruptions:

A083A 1x
A085A 2x

Rayleigh wave polarizations

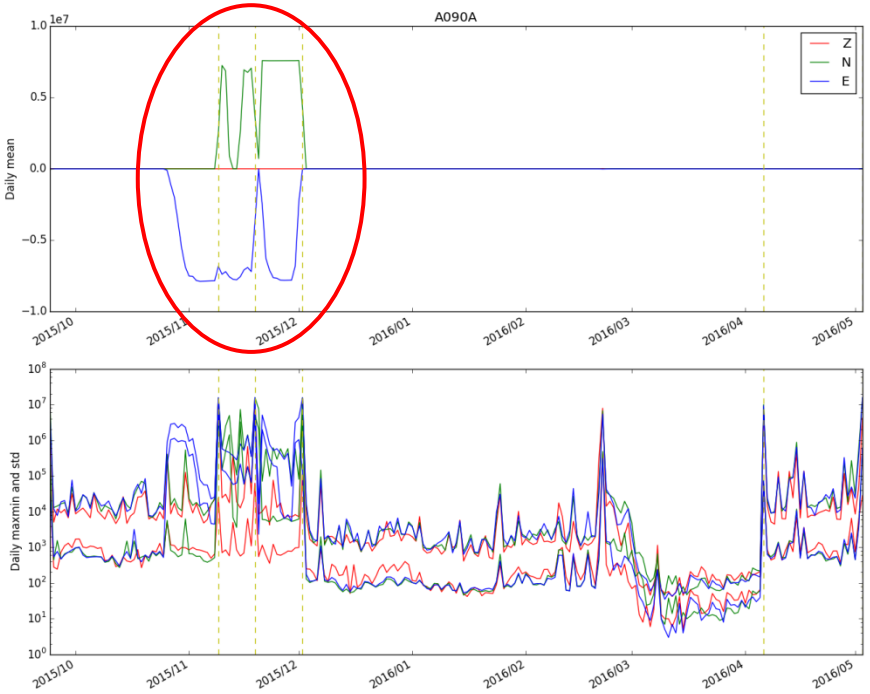


gyrocompass: 0° ± 1° | **RW polarization: 2° ± 3°**

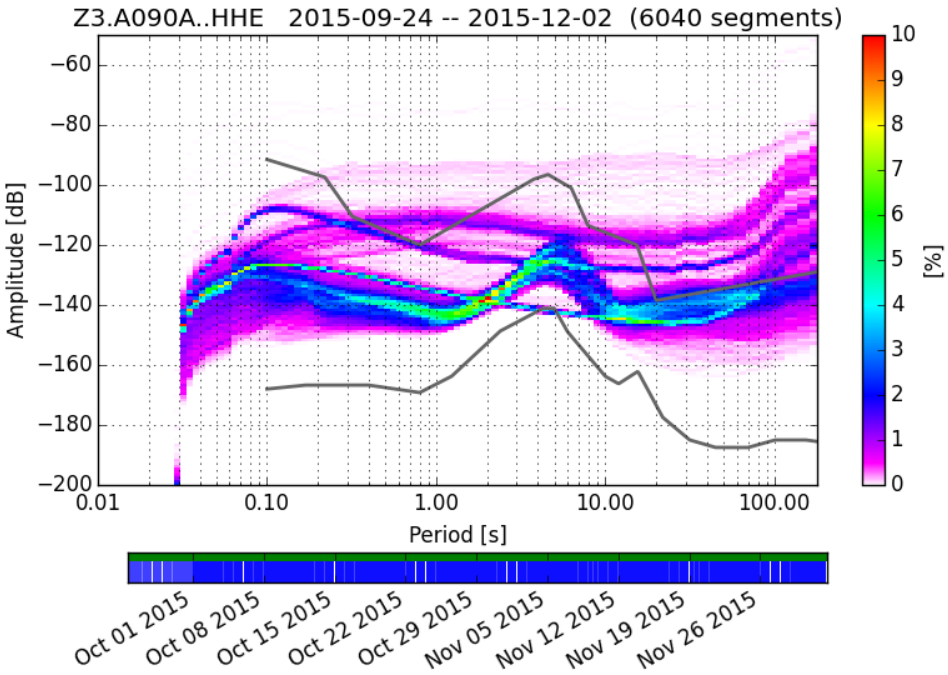
➢ Corrections for sensor misorientations can be done in METADA.

Mass centering problems

Daily means, maxima and std

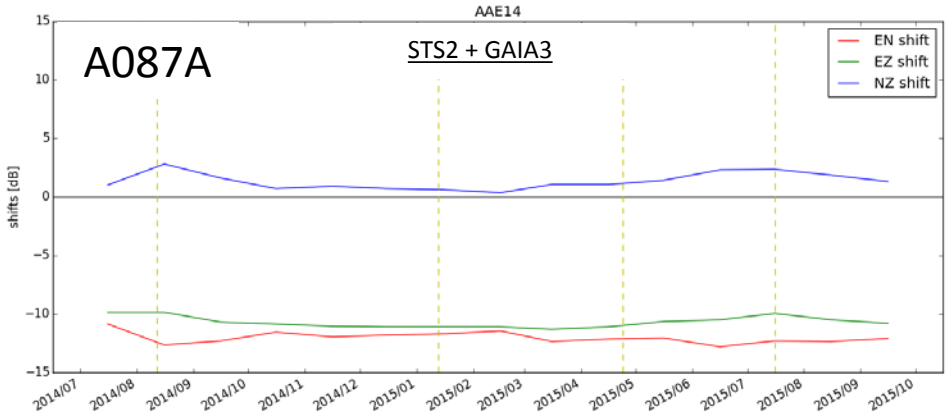


Probabilistic power spectra density



Anomalous channel amplitudes #1

Ratios of power spectra of three channels



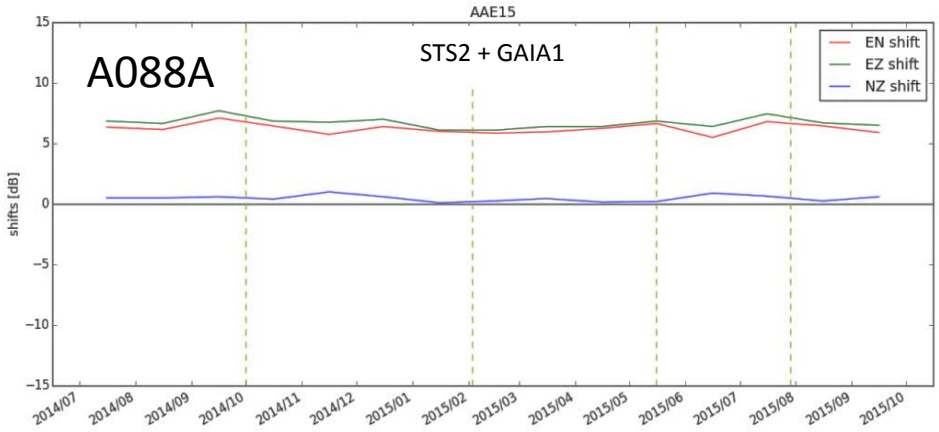
Power spectrum of E component is lower by 11 dB, i.e., E component is 3.6x smaller.

Confirmed by the Gaia gain & calibration box, digitizer issue.

- Correction for wrong amplitude gain implemented to METADA.

Anomalous channel amplitudes #2

Ratios of power spectra of three channels



Power spectra of N,Z components are lower by 6 dB, i.e., N,Z component are 2x smaller.

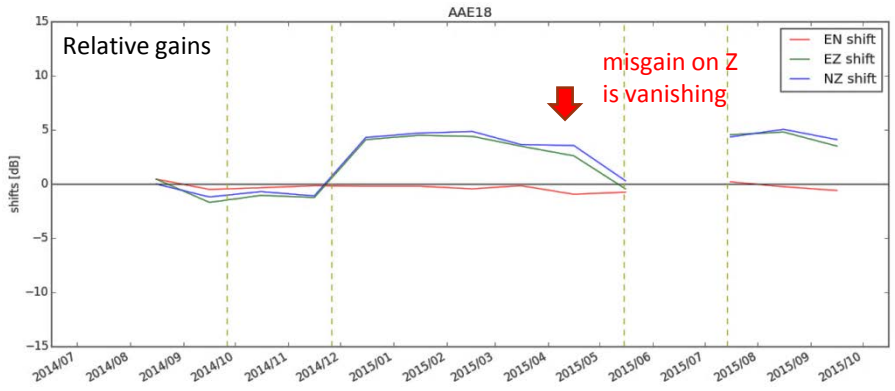
Confirmed by the STS2 calibration box, cable issue.

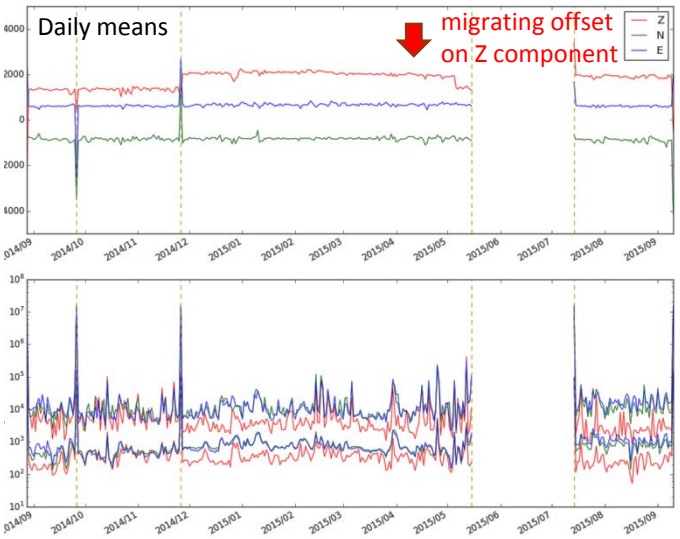
- Corrections for wrong amplitude gains implemented to METADA.

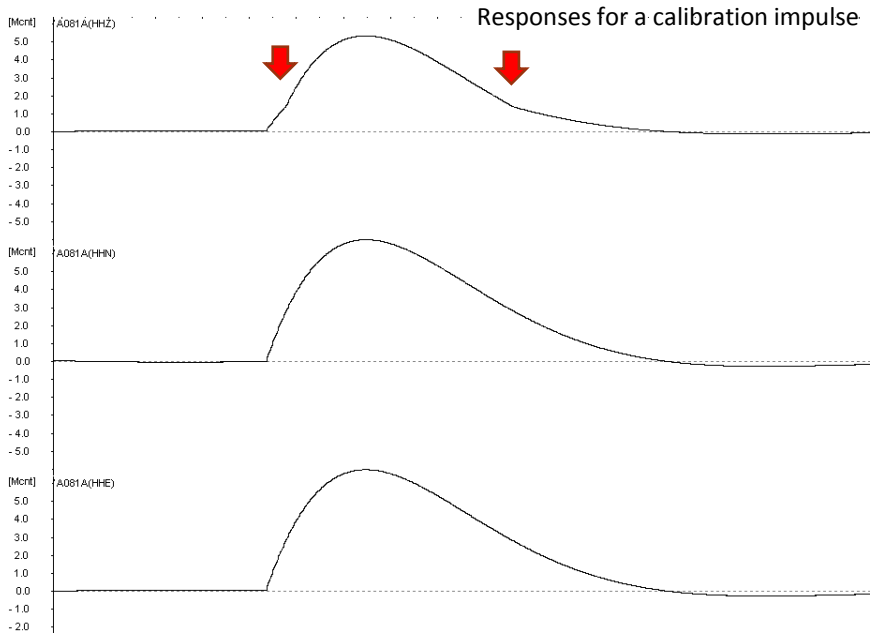
STS2 calibration box

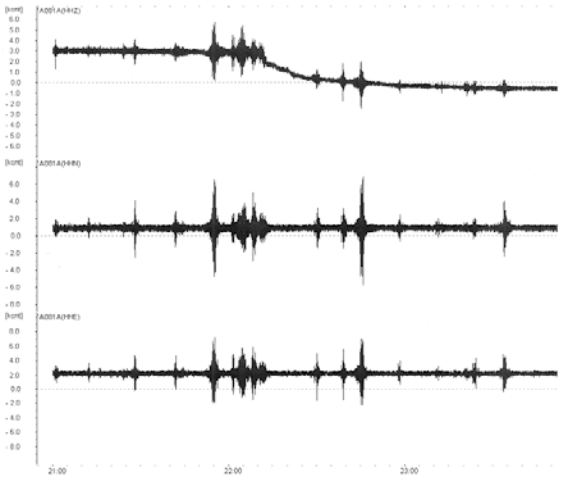
GURALP calibration box

Amplitude gain issue (complex)









Conclusions

- 20 temporary stations started from autumn 2015 can be completed by one Webnet station and 10+ permanent stations
- Data from offline stations are batched and sent to ORFEUS EIDA node after QC procedures
- QC includes checking for, e.g., time issues, sensor orientations, exchanged or reversed components, mass centering, data glitches, level of noise, anomalous channel amplitudes, …
- Data backward QC procedures are complemented by direct technical measurements, such as by a gyrocompass or gain & calibration boxes for digitizers and seismometers