

# ***Interactive comment on “Data quality control and tools in passive seismic experiments exemplified on Czech broad-band seismic pool MOBNET in the AlpArray collaborative project” by Luděk Vecsey et al.***

## **Anonymous Referee #1**

Received and published: 23 May 2017

The manuscript gives an overview of possible quality control tools applicable to passive seismic broad-band data which is acquired during temporary deployments, focusing on a subset of the current AlpArray seismic network installations.

The content of the manuscript is twofold: 1) The authors document their way of setting up a total of twenty temporary seismic broad-band stations for the AlpArray project and discuss the station performance in the light of noise levels. 2) The manuscript highlights the importance of hard- and software tools for quality control of passive seismic data from temporary deployments to eliminate and correct misbehavior or malfunction

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of the entire seismic acquisition system. Based on observed instrument failures or erroneous data which were documented within a subset of the current temporary AlpArray installations, the authors present a set of self-developed procedures how such issues could be fixed and suggest similar treatment for temporary seismic experiments in general.

Besides complementing the documentation of current AlpArray seismic installations, I greatly appreciate the attempt to discuss the handling of hardware related data issues – which likely many operators of temporary networks might face as well – and the suggestion of tools how to handle these. Both parts together would certainly warrant publication in this journal. However, in its current shape the manuscript lacks detail or more precise information to really deliver the message intended by the authors and to provide significant impact to the community. For suggestions how to improve the content please see my detailed comments below.

With best regards,

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Detailed comments

Introduction:

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- The first part of the introduction focuses on the general goals of the AlpArray project, which are however only of minor importance for the content of the manuscript. I am missing some background on previous attempt for data quality control in seismic experiments (if the authors are aware of any).

- Page 2, Lines 29ff: This is misleading – the entire AlpArray temporary network has network code Z3, the Czech efforts were undertaken by the authors.

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- It should be briefly be introduced here what MOBNET actually is.
- Details of the data handling/forwarding/storage should not be mentioned in the introduction, but rather in Section 2 (Deployment)
- Mention here already the EASI complementary experiment and how it relates to the AlpArray project.

Deployment:

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- Please try to arrange the paragraphs such that distinction between the EASI and the AASN installations is more clearly separated.
- The authors should describe their technical realization of the installations. In which setting are sensors installed? How are the sensors insulated? Such information would help to judge the noise performance shown in later sections.
- Network geometry restrictions should already be mentioned in this section.
- I suggest to add some comments on the detailed station information given in the supplemental material, otherwise it might evade the readers attention.
- Lines 27ff do mix data format, data set size and scientific goals – please try to rearrange the content so a distinction between scientific goals of EASI (which should be presented in the introduction) and dataset parameters is more clear.
- Please state the AASN noise requirements in this section.
- Page 4, Lines 12ff: CF card capacity was already discussed above.

Control devices:

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- It is interesting to see that the authors built so many self-designed devices for sensor

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and digitizer calibration, yet some words why these are necessary might help to put everything into context. It looks like the GAIA datalogger cannot create such calibration signals by itself?

- Overall, this section is rather brief on the description of the devices, but I wonder if some more technical details might be interesting for some readers, especially if they plan to build similar devices? Is there maybe suitable material to put as supplements?

- I am missing information on when and how you actually use the tools described here. During station installation? During station servicing? During a huddle test? Usually, issues with e.g. gain are discovered during huddle test and I wonder if such test was performed?

- Description in section 3.3 is a bit brief – what does the centering unit actually do? How does it work?

- Page 5, Lines 21ff: I am afraid the common reader will not know what is the “Monitor” connector of “the host box provided by the producer”.

- Page 6, Lines 6ff: Very brief, could use some more explanation/description.

Sensor Orientation:

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- It should be mentioned that only optical gyrocompasses are feasible for temporary deployments and that such devices are still not very common – after all they are expensive.

- What’s the accuracy of the Rayleigh wave polarization method?

- Page 7, Line 16: What kind of changes? Please be more specific.

- How do you handle the strong misorientations in the data/metadata? Are channels renamed?

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- Did you leave the sensors misoriented or did you attempt to restore the correct orientation?

Timing issues:

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- Could you describe how small time shifts ( $< 1\text{s}$ ) could be identified? Please be more specific here, after all this is one key part of the manuscript. How can such time shifts be fixed? What are potential reasons for time shifts?

- How are oscillator failures detected in the data? If found, how can wrong time stamps be fixed afterwards? These are sometimes big issues for temporary installations and I wish the authors could provide more detailed information/instructions here.

Components/Polarity:

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- I wonder how serious issues with polarity or mixed components can actually occur. Such issues should be discovered with the calibration tools described earlier, but apparently for the instrumentation described, changes may happen during operation? What are potential reasons for this? How often does/did this happen for the AlpArray installations?

- Since this manuscript is also a description of the corrections applied to AlpArray data, please state here which options of correcting for issues you actually chose. Metadata corrections or correction of Miniseed data?

- Within the entire section on polarity please be more specific on how you actually discover discrepancies – is it based on a manual scan of data? Is it based on some kind of automatic processing? This is one key aspect of the manuscript and should be described more properly.

Gain:

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- Page 9, Lines 19ff: I am afraid this paragraph is not very comprehensible. Please try to describe more specific how your method of comparing spectra works and how results should be interpreted. The inclusion of surrounding stations seems odd, since with 40 km spacing the noise spectra might have very individual imprints dominated by local site conditions. Please explain why you think it is helpful.

- What is the Gain precision achievable by the comparison of spectral power?

- The Figures show varying spectral ratios over time. Does this resemble varying Gain or spectral effects not associated with datalogger gain? What could be the reasons for this?

General:

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- The authors introduce a variety of methods how to detect potential hardware issues in general, but they miss to describe how it can be done in practice. Do any of the methods work in an automated way or do all of them require manual screening of the entire dataset? How does the workflow look like?

- It looks like many tools described here are based on manual analysis of data, sometimes earthquake data in particular. Do the authors know if there are any methods around (or do you have any ideas/suggestions) how such tools could utilize ambient noise as well?

Typos/Language/Grammar:

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- Use of article “the” seems misplaced throughout big parts of the manuscript.

- Check for consistency of phrases EASI complementary / AlpArray-EASI / EASI field

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measurements among the manuscript.

- Page 1, Line 9+10: Rephrase to "... related to data reliability and network performance of twenty broad-band ... of the MOBNET pool ... within the AlpArray seismic experiments.

- Page 2, Line 14: 50 km → 40 km

- Page 3, Line 16: Rephrase to "The transect spanned a 540 km long region ... "

- Page 3, Line 24: Remove "chateaux"

- Page 3, Line 28: mseed → Miniseed

- Page 4, Line 16: Please state exactly the time period of investigation / data completeness

- Page 4, Line 22: CMG → Guralp CMG

- Page 5, Line 2: centEring

- Page 7, Line 14: on origin times → of epicenters

- Page 7, Line 31: remove "kinematic"

- Page 8, Line 16: the18 → the 18

- Page 8, Lines 25ff: keep it simple ... e.g. Sometimes components of seismograms are interchanged.

Table 1: Maybe add end times for XT stations?

Table 2: Top row descriptions are not clear/confusing. What do the columns represent?

Figure 1: Map in a) is outdated. I suggest to include a more recent one or maybe to put one which doesn't highlight the deployment status.

Figure 5: Caption should describe more precisely the branching seen in the graph.

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Figure 11: Please expand the caption and describe why upper and lower panel show different cases of failure and not just different gain values.

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Interactive comment on Geosci. Instrum. Method. Data Syst. Discuss., doi:10.5194/gi-2017-7, 2017.

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