Solid Earth Discuss.,
https://doi.org/10.5194/se-2018-87-AC1, 2018

Solid Earth
Discussions
Open Access
EGU

Interactive comment on "Event couple spectral ratio Q method for earthquake clusters: application to North-West Bohemia" *by* Marius Kriegerowski et al.

Marius Kriegerowski et al.

marius.kriegerowski@uni-potsdam.de

Received and published: 14 December 2018

Dear Sir or Madam,

Thank you very much for your valuable comments. We addressed all your suggestions in the updated manuscript as well as below. Corrections in the manuscript are printed in red.

All references in the comments below refer to the references in the paper.

1. 1. Page 5, Line 23-25, "The size of blue points in Figure 3 represents relative number of pairs based on ray tracing through a 1D layered model": What the blue dots

Printer-friendly version

Discussion paper

in Figure 3 indicate is not clear. Earthquake swarms are indicated by red dots. Please elaborate more on the definition of “event couples” in this figure.
We extended the text in this section as well as in the figure caption to make clear that the blue points’ size scales with the number of arriving ray paths from event couples at theoretical station sites given the geometrical constraints described in the text.

2. Page 8, Line 7-8, “S phase results match the model at NKC but show strong scattering at LBC”. Can you elaborate why this is the case?
We extended the underlying paragraph to clarify this: “[. . .] as a result of the interference with the added noise as well as the P phase coda”.

3. Source time function is half sine shaped but the width depends on the magnitude, which seems realistic. Can you comment on how this source time function is representative in this field?
The source time durations we used in the synthetic modeling are based on estimates for the stress drop and source dimensions taken from the paper by Michálek (2013) for the 2000 - 2008 swarm activity and are therefore assumed to be representative for the given task.

4. Velocity model is 1D (see Fig 4), and high frequency component that is used is C2 SED Interactive comment Printer-friendly version Discussion paper around 80 Hz (see Fig.9c). The short wavelength component is around 60 m assuming Vp=5000m/s in this case. In 1D velocity model used in the test does not include any spatial heterogeneity in the order of this short wavelength. Can you comment on to what extent we can ignore effects of spatial heterogeneity that is sensitive to the high frequency components in the data? I found that the authors discussed the effect of wave scattering in section 4 and 5. It would be good to mention here that these effects will be discussed later
We used the velocity model suggested by Alexandrakis (2014) which we assume is the most realistic 1D velocity model available. Small scale heterogeneities are expensive to model as these effects in the temporal and spectral domain can easily be outweight

by and also cause numerical instabilities. We added a comment on the following discussion in the text and also a sentence with regard to the actual waveforms recorded in NW Bohemia which is typified by clear onsets, as well (see Fischer (2010)).

5. Figure 9: I did not find sentences explaining Fig. 9 in the main text.
We added a sentence and a reference regarding that figure in the text.

6. Page 11, lines 10-11, "It becomes evident that larger incidence angles (> 8 degrees) show a tendency to produce negative QËĘ−1 while results from events with steep incidence angles produce positive QËĘ−1 values." : Please mention that *this refers to Figure 12(b), otherwise it does not make sense. We extended that sentence to highlight that this refers to station NKC and explicitly refer to that figure.*

7. Page 13, Lines 21-22, "Mousavi et al. (2017) assume a highly fractured medium in combination with accumulated free gas or fluids. Our findings support this hypothesis." : I did not see the clear relation between the authors results and this hypothesis. Please elaborate more
We clarified in the text that the hypothesis by Mousavi et al. (2017) would cause high source volume attenuation which is supported by our observations on P-wave attenuation.

Other minor comments:
All mentioned points have been corrected.

Kind regards

Marius Kriegerowski and co-authors

Interactive comment on Solid Earth Discuss., https://doi.org/10.5194/se-2018-87, 2018.