



EGUsphere, referee comment RC3
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Comment on egusphere-2022-108

Anonymous Referee #3

Referee comment on "Ground motion emissions due to wind turbines: observations, acoustic coupling, and attenuation relationships" by Laura Gaßner and Joachim Ritter, EGU sphere, <https://doi.org/10.5194/egusphere-2022-108-RC3>, 2022

In the submitted paper with the title "Ground motion emissions due to wind turbines: observations, acoustic coupling, and attenuation relationships", the authors present results of two measurement campaigns addressing the topic of seismic noise signals from wind turbines, which has been discussed in the seismology community for several years. The authors use established methods to present the results of the analyses of seismic signals from WTs in an appropriate manner. Moreover, they combine data from seismic recordings with acoustic data, which is a new approach in this context. Both the structure and the general form of this work are presented in an understandable and comprehensible way. I recommend minor revisions in terms of content and form before publication. Detailed comments, corrections, and recommendations are provided below, which may overlap with the comments of the other two reviewers.

Abstract:

Line 19: typo – ... can be used to estimate ...

1. Introduction:

Line 25: 10 times the *total* height of the WT (to distinguish between hub height and total height)

2. Measurements:

Line 66: For each campaign... - Where did you place the seismic sensors inside the WT tower? In the center of the foundation or at the outermost edge inside the tower? With regard to the comparison of amplitudes presented later in the study, this should be explained briefly to ensure comparability.

3. Ground motion signals:

Line 129: I agree that the train traffic signals are dominantly visible below 10 Hz, but they can also be detected at higher frequencies over the entire displayed frequency range (fig 3d).

Line 140: Again, where did you place the sensor? (see comment above)

Fig 5: This figure is a bit confusing and it is difficult to assess the shown results. I recommend using four different colors to represent the four sensor data and removing the distance arrow. Please add the distance information in the legend.

3.1 Signals at place of emission:

Line 161 – 165: How exactly did you determine the maximum value of a 10-min segment? Did you simply identify the maximum absolute value of all values within a 10-min segment? How can you ensure that this value is due to WT vibrations and not to any other noise sources? I recommend to calculate the 95 % or maybe 99 % - percentile of all absolute values within each 10-min time window in order to get a more statistically representative value.

3.2 Signals at place of immission:

Fig 8: Please sort the legend labels by distance between seismic station and WT.

3.3 Comparison to acoustic signals:

Line 211 – 221: This part needs more details for clarification. Again, how did you calculate the max values for seismic and acoustic data (see comment above)? Does your method correspond to the method described in Novoselov et al. 2020 (they used the maximum of the envelopes of the respective signals)? What is the outcome of this analysis and what

can we learn from these results?

Fig 11: I recommend to use different colors for each dataset of a given frequency and to include the multiples (32x, 46x and 64x) of the BPF in the legend.

4. Amplitude decay:

Fig 13 and Fig 14: Please include the distance information for each station in the legend.

Fig 16 and related text: I think it doesn't make sense to calculate amplitude decay curves and b-values from PSD data that are obviously not dominated by WT induced signals. How representative are the mean PSD spectra (Fig 14 right side) for periods without WT operation? I do not believe that this short period of only 2.5 h reliably represents the local noise level at the station sites. I recommend to remove Fig 16 and the corresponding text and to keep Fig 14 to describe why a decay value calculation for wind farm Lauterstein is not reasonable at this point.

Most figures: I recommend to change the y-axis labels to a unified unit of "PSD in db rel. to 1 (m/s)²/Hz" for all figures showing PSD spectra. From a seismological point of view, it would also be nice if you could include the global models for high and low noise after Peterson (1993).