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Interactive comment on "Observation and explanation of spurious seismic signals emerging in teleseismic noise correlations" *by* Lei Li et al.

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This is an interesting manuscript that studies a spurious signal observed in the correlograms of seismic noise between two distant seismic networks. The authors employ the double-beam method to estimate the slowness of several seismic phases as a function of distance and thus, track the observed interfering waves and determine the origin of that spurious signal. Furthermore, the authors provide a physical explanation for such signal through numerical simulations and observe it as well in synthetic correlograms.

In my opinion, the study is well addressed and scientifically valuable. However, the presentation of the manuscript should be improved before possible publication. Basically, the manuscript needs to be written with more care and some minor corrections

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Discussion paper

are required. My suggestions and comments are described below.

- In the Introduction, I would have liked a better introduction of spurious signals, why is useful to study them, mention the previous similar studies and, in general, explain better the problematic. Also, I would update some references with new studies and add some in pag. 2, lines 4-9.

- Line 29, pag. 2: Vague sentence. Some readers very likely would not understand what you mean.

- Line 30, pag. 2: It is worth it to specify the amplitude threshold (how many times of the standard deviation) that you consider to clip the waveforms and avoid large transients.

- Line 5, pag. 3: If it is the first time that the kurtosis is employed in seismic noise processing, the authors should explain it better. For example, the equation described is a comparison between the kurtosis of the distribution under study and the kurtosis of a normal distribution, which is 3.

- Line 8, pag. 3: “the segments beyond 1.5 are discarded” why this value? It would be proper a short comment to explain it.

- Line 20, pag. 4: Vague sentence. Which numerical experiments?

- Lines 4-9, pag. 5: I think the proposed slowness-track method to identify the ray paths of the interfering waves is not enough clear. In my opinion, this paragraph can be improved and make easier to follow the idea.

- Line 7, pag. 5: “The pairs of seismic phases are rejected if the difference between the distances from the source to the receivers differs from 63°or if their time delay deviates from 430 s” why? It could be obvious but indicating a reason works out well for a better understanding.

- Line 20, pag. 7: I imagine those results imply a lot of work and they are interesting. So perhaps it is worth adding a supplementary figure.

FIGURES:

- Figure 3: you should use same colours as in Fig 2 to be consistent. Also, the title "after clipping" I would say amplitude clipping or something similar in order to avoid misunderstandings.

- Figure 4: The labels a) b) etc are missing. Moreover, you should explain the overlapped signal in the figure caption.

- Figure 5: From my point of view, it can be added to the supplementary material. If you consider the supplement is already too long, the Figure S1 is dispensable.

- Figure S1: I would change "removed-mean series" for pre-processed series because you correlate after removing the mean, trend, filtering, whitening... Moreover, I would add in the colored bars at the top a label "i" and in the bars at the bottom "i" and "i-τ" (following the notation of the eq) to illustrate the dislocation applied by the correlation. Although, I believe it is better only correlate the "effective samples" instead of adding zeros. In this way, for large lag times you underestimate the correlation.

- Figure 8: is it computed or taken from other study?

- Figure 10: you should describe what the red point represents in the figure caption even if this seems obvious. In my view, figure captions should be auto-explicative and if they are not, one should indicate where the reader could find the information.

OTHER MINOR COMMENTS:

- Line 2, pag. 2: "We refer to (Campillo and Roux, 2015)" without parenthesis.

- Lines 26-29, pag. 5: reference?

- Line 17-20, pag. 6: Those sentences can be improved.

- Line 29, pag. 6: "The ray-based simulation above" would be better like: The above-described ray-based simulation...

- Line 23, pag. 7: In my opinion, this section should be called 'Conclusions'.

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