Replies to Anonymous Referee #4

Referee: The paper is improved compared the earlier versions. Particularly the figures are much easier to read. I am pleased to see more details of the acquisition and the comparison of the SNRS method with another method for retreiving Green's functions. The numerical modelling is better described but some questions remain, it might be worth describing in the abstract that it is not comprehensive but designed only to verify that their expected geological features could generate scattering. Also the authors should reduce claims about only the SNRS method working in this case, because they did not actually apply it to synthetic data.

Authors: The following sentence from the abstract explains that our modeling is not comprehensive: "To find the way to obtain EGFs, we used numerical modelling in order to investigate properties of seismic noise originating from sources with different characteristics and propagating inside synthetic heterogeneous Earth models representing real geological conditions in the XSodEx study area**".**

Referee: It is interested to see the comparison between the SNRS and conventional method in Fig17. The authors should describe their 'conventional' workflow used.

Authors: A short explanation concerning the "conventional" algorithm and references has been added to the text.

Referee: I still don't like the blocky velocity models. I recommend they are changed to continuous. The authors could read more into how to choose colour scales – e.g. https://www.nature.com/articles/s41467-020-19160-7

Authors: We are thankful to the reviewer for this reference. We modified Figures 12 and 14 and added one more figure (Fig 18 of the revised manuscript) showing the velocity models with continuous colour scale. However, we prefer also to show the models, in which we indicate the range of velocity values corresponding to different rock types. These ranges were selected based on statistically interpreted petrophysical information (Reference is in the text) and in our paper this presentation of velocity models aims to compare the velocity models to major bedrock types, not just to show the difference between sediments and bedrock.

Referee: In the abstract the authors claim that 'This scattered wavefield can be used to retrieve reliable Empirical Green Functions (EGFs) from short-term and non-stationary data, if using a special technique called "signal-to-noise ratio stacking" (SNRS) is applied." This should be rephrased as it is misleading, since they did not actually show that only the SNRS method will work on the synthetic data.

Authors: We reformulated the sentence: "This scattered wavefield can be used to retrieve reliable Empirical Green Functions (EGFs) from short-term and non-stationary data using special techniques. One of the possible solutions is application of "signal-to-noise ratio stacking" (SNRS)."

Referee: There are some sentences in the abstract not needed which would improve its focus.
I may have missed it – was the data acquired during the day and on weekdays?

Authors: The Sercel UNITE system works in such a way that the data is recorder continuously and the data corresponding to necessary time intervals are then extracted using special device called Data Harvester. Passive seismic data corresponding to nighttime and weekend were harvested from

continuous data for Sakatti profiles. The data for other lines harvested from continuous data correspond to workdays. This is described in the text.

Referee: L99 – what is an RAU?

Authors: RAU means Remote Acquisition Unit (added to the text).

Referee: Fig 14 – the difference colour scale is not good. Generally a difference plot should be something like white at 0 and then increase away from this point.

Authors: The difference colour scale was changed as proposed.

Referee: Fig 18 – colour scale.

Authors: We changed the colour scale as proposed.

Replies to Referee #3: Rezaeifar Meysam

Referee: Thanks for your response to my comments and questions. In my opinion the new version is much clear and after some minor correction of the typos (some extra spaces and dots) it would be ready.

I also have another suggestion about using MASW in the text, maybe first time you used it in the text just put the full description as "Multichannel Analysis of Surface Wave (MASW)" as there is also a code called MASW which use the same technique and that's why I was confused.

Congratulations on the work.

With kind regards,

Meysam

Authors: Typos have been corrected. The sentence concerning MASW has been added to the text.