

Interactive comment on “On the Green’s function emergence from interferometry of seismic wavefields generated in high-melt glaciers: implications for passive imaging and monitoring” by Amandine Sergeant et al.

Naofumi Aso (Referee)

aso@eps.sci.titech.ac.jp

Received and published: 30 December 2019

Sergeant et al. presents multiple approaches to extract Green’s functions from the seismic record on the surface of glaciers. Such an effort is challenging and this study looks technically correct, but the manuscript needs several revisions. One potential major problem is the length of the paper. I found many paragraphs are not necessary after spending time to read through the article. Considering that this is not a dissertation nor textbook, reducing unnecessary texts makes the points of this study clearer. In addition to this, I provide specific comments below.

C1

L36–37: The "crustal" and "local scales" do not look contrary. Probably "local to regional" or "regional to global"?

L39: What are the original observations? Please rephrase.

L60: Rather than theoretically, experimentally? If authors want to claim the condition is met THEORETICALLY, please explain which theory.

L64: The statement looks the opposite. Considering that the next sentence is mentioning the source distribution, it sounds better to say: the condition (i) can compensate for the lack of condition (ii).

L80–81: Brief explanation is expected for "virtual reflector" if authors want to mention it here.

L102: waves that => whose seismic waves

L116: Moment magnitude? Local magnitude? Surface-wave magnitude?

Figure 1: Please label all panels: one panel below b and above d.

L123: brief => short

L151: Please explain why the authors use only the vertical component, while the sensor is three-component?

L164: How long was the experiment? It should be explained beforehand.

L166: Please make the sentence complete. GPS stations were deployed, and the DEM is used for later analyses?

L167: What "GPR" stands for?

L170: Insert space before: from

L187–188: because of instrumental sensitivity => because of low instrumental sensitivity

C2

Figure3: ranging from 150 m to 250 m => either 150 or 250 m

L213: anticausal => acausal *Please use the same word consistently throughout the manuscript

L223: Why is it claimed to be correct?

L236: Fig. 3b => 3c?

L240–241: ICC has limited energy at low frequencies just because spectral whitening is not applied?

Figure 5: What is "all" generated misfit values? Isn't it 2500, as explained in the main text? To calculate deviation around each node line, how long horizontal distance did authors consider?

L282: What is "thickness absolute values"? Probably no need to say "absolute values" here.

L284: Why errors and uncertainties are linked to bedrock velocities? Is there any theory ? or is it just implied based on the result? Please explain.

L315: Taking derivatives should not increase the number of cycles of sinusoids in the theory of math. Please rephrase the sentence.

L319: It should be explained earlier that they calculate "within 250 m of the target point".

L323: Please add explain "transversal crevasses" as "perpendicular to flow" here.

L331–332: The sentence of "However we do not exclude ..." is unclear. It sounds like some excuse for something but needs modifications to make it logical, definitely.

L333: aligned-flow => flow-parallel

L350: Short explanation of MFP is needed here. Especially, providing the direct purpose of the processing helps readers. Here, "to locate specific localize sources" would

C3

be appropriate.

L361: "localized" is better than just dominant.

L380: frequency band of => frequency band between

Figure 7: frequency band of => frequency band between

L403: SVD itself is not a process to decrease the number of information, and therefore it is inappropriate to mention "as few coefficients as possible" in this sentence.

L408: Are eigenvectors normalized to be unit?

L409: Please choose either "singular value" or "eigenvalues" to be consistent throughout the manuscript.

L414: threshold in "singular values / eigenvalues"?

L415: Eigenvector is not a scaler, so it is inappropriate to say "eigenvector" above the threshold.

L426–427: Why it is thought to be related to frequency content differences? Different eigenvector does not necessarily mean they consist of different frequency contents.

L427: SVD => eigenvalue?

L427–428: I do not understand why the number of ambient noise sources is more than the number of receivers based on this observation. Please explain this more logically.

L429: reconstructed => decomposed

L430: Please use a different symbol for K_i , which is different from the previous K_j .

L444–446: This explanation is too redundant: i.e., L431–432.

L461: wavenumber vectors are normalized => wavenumber is normalized

L481: Why only one-day used in this study?

C4

L483: Again, it is too straightforward to apply the same analyses to the other day, but why authors are not interested in doing so as a part of this study?

L493: Subtitle should represent what is done in each section. In this sense, the study site "Gornergletscher" is not necessary and instead making it confusing.

L525: Fig 1c => 1d ?

L532: Fig 1c => 1d ?

L540: Do authors see the potential effect of early aftershock in the coda wave?

L542: Please show the coda window to be used in the figure 1d as an example.

L542 Fig 1c => 1d

L546: Does it mean the authors are applying spectral whitening and 1-bit normalization together?

L572–586: Please explain this as a regular paragraph. In addition, many words are redundant (e.g., N or M is already explained).

L613: Indeed, the arrivals could result from the reflection at the bed. Isn't it easy to calculate and validate?

L629: Surprisingly, there are no further analyses of the GF in this section.

L643: allow => allows

L695: Does SH refer to SH wave?

Naofumi Aso @Tokyo Institute of Technology

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2019-225>, 2019.