Comment on nhess-2021-205

Anonymous Referee #2

Referee comment on "Hanging glacier monitoring with icequake repeaters and seismic coda wave interferometry: a case study of the Eiger hanging glacier" by Małgorzata Chmiel et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2021-205-RC2, 2021

Review of "Hanging glacier monitoring with icequake repeaters and seismic coda wave interferometry: a case study of the Eiger hanging glacier" by Chmiel et al.

This is a paper examining seismic data collected on a hanging glacier during a time period containing a break-off event from the front of the glacier in 2016. The seismic data are interpreted along with temperature data, surface velocity of the glacier front, and remote cameras. I think the paper is worthy of publication and came away with these comments:

- Figure B1 shows an infrasound array, but there is no mention of those data in the paper. Has there been analysis of the infrasound data and did it show anything besides presumably the signal from the large break-off event?

- The authors mention at line 80 that up to 3 of the seismic stations operated simultaneously at times. Which made me wonder if any array method could be applied to the 3 stations during that time, using the 3 stations as a tripartite array? Such

beamforming (like what is done with infrasound arrays) could complement the polarization analysis.

- In Appendix A5 the authors point out that the seismometers moved on the order of 1 meter during the deployment, which they argue does not affect their interpretation of the coda wave interferometry measurements. However, did the seismometers also happen to rotate at all in addition to the 1 meter of movement? Any rotation of the horizontal components could have an effect on the polarization analysis.

- Regarding the polarization analysis, was the same frequency bandpass used for it as was used for the coda wave interferometry (10-40 Hz)? What if there was significant frequency-dependency of the polarization over the band used? Have the authors looked at polarization in bandpassed data (e.g., 10-20 Hz, 20-30 Hz, 30-40 Hz) to see if the polarization is consistent as a function of frequency?

- I hate to say it, but I wasn't that impressed by the amount of fit in the dt/t plots in Figure A7. I normally like to see much better of a linear fit in this type of plot. Are the ones shown in this figure typical? What could be causing the significant lack of a linear trend in these plots? Have the authors tried different approaches to defining the reference event? I wonder if there could be an improvement by not even having a reference event and just measuring dt/t between all the events and inverting for a continuous function of dv/v, as was done by Hotovec-Ellis et al. (2014, JGR; 2015, JGR). I think that approach is sometimes referred to as the "all doublet" method.

- In research papers over the past decade, I don't often see the measurement of coda-Q but I appreciated it in this paper. How do the authors decide which portion of the event to measure the Qc on as shown in Fig. A6B?

- The authors mention briefly that a period of increased seismicity correlated with the passage of a regional M6.2 earthquake in Fig. 1C. Have the authors looked in detail to see if increased icequake activity is in fact triggered by the regional earthquake? Or is the increased event rate due to distant aftershocks that are not local?