EGUsphere, referee comment RC1
https://doi.org/10.5194/egusphere-2022-644-RC1, 2022

Comment on egusphere-2022-644

Anonymous Referee #1

Referee comment on "Subaerial and subglacial seismic characteristics of the largest measured jökulhlaup from the eastern Skaftá cauldron, Iceland" by Eva P. S. Eibl et al., EGUsphere, https://doi.org/10.5194/egusphere-2022-644-RC1, 2022

Review to "Seismic Characteristics of the Largest Measured Subglacial Flood from the Eastern Skaftá cauldron, Iceland" by Eibl and others, 2022

The authors of the manuscript present seismological observations from a subglacial flood that originated in 2015 from the Eastern Skaftá cauldron at the Vatnajökull ice cap in Iceland. Over the course of a few days, they detect various quakes and two types of tremors which they exploit to study the temporal evolution of the flood by means of quake locations, beamforming analysis, spectrograms and tremor amplitude. Guided by complementary measurements of the ice motion and hydrological parameters, Eibl et al. find that the quakes are related to the subsidence of the cauldron and the two tremor types to the subglacial hydrology: the longer lasting type 1 tremor is attributed to the flood wave propagation while the shorter but more impulsive type 2 tremor is attributed to geothermal processes including boiling in response to the flood. The study focuses on type 1 tremor and the authors suggest that this signal is caused by multiple brittle ice cracking as the flood wave propagates between ice and bedrock, lifting the glacier by up to 1 m. This tremor type can be used to track the propagation of the flood and its speed via beamforming analysis (Eibl et al. 2020).

The investigated processes are interesting and highly relevant for the glaciological(/volcanological) community. Furthermore, the results appear robust and the conclusions convincing. However, in my opinion, the submitted manuscript does not provide significant new data and/or processing and thus not significant novel insights into the flood. Most of the eight figures show material, that is already presented in Eibl et al. (2020) (e.g. most of Figs. 1, 3, 4, 6) and the conclusion drawn are the same for both manuscripts. Doubtlessly, the present manuscript contains a more in-depth discussion on the involved processes compared to Eibl et al. (2020), but still concludes that type 1 tremor is caused by the propagating flood wave lifting the ice and type 2 tremor by hydrothermal explosions and subsequent geothermal boiling. Only the quake and water-chemical data are newly introduced but these solely play a side role and do not provide significant novel insights. Overall, the manuscript appears more like a supplementary material to Eibl et al. (2020). For this reason, I unfortunately cannot recommend to consider the article for publication in Earth Surface Dynamics.

Reference

Eibl, E. P. S., Bean, C. J., Einarsson, B., Pàlsson, F., & Vogfjörd, K. S. Seismic ground vibrations give advanced early-warning of subglacial floods. *Nature Communications* **11**, 2504 (2020). https://doi.org/10.1038/s41467-020-15744-5