

Interactive comment on “Geophysical constraints on the properties of a subglacial lake in northwest Greenland” by Ross Maguire et al.

Anonymous Referee #1

Received and published: 14 November 2020

This manuscript presents a targeted geophysical study of a Greenland subglacial lake which combines seismic and GPR data to constrain the physical properties of a subglacial lake. The seismic portion of the analysis is largely persuasive and provides a depth measurement for a lake that had previously been detected by airborne radar sounding. However, the GPR portion of the analysis is underdeveloped. Specifically:

- The reflectivity of the subglacial lake in the GPR data was not presented or analyzed at a sufficient level of depth. This should be compared and combined with the seismic data to provide a more complete and quantitative picture.

- The GPR reflectivity signal is also not sufficiently compared to the airborne radar sounding data in the Palmer paper that motivated the study or to more recent radar studies of Greenland subglacial hydrology and thermal state like: Chu, W., et al. "Com-

C1

plex basal thermal transition near the onset of Petermann Glacier, Greenland." *Journal of Geophysical Research: Earth Surface* 123.5 (2018) or Jordan, T., et al. "A constraint upon the basal water distribution and thermal state of the Greenland Ice Sheet from radar bed echoes." *Cryosphere* (2018).

- One of the most exciting opportunities from combining seismic and GPR data over lakes is the ability to use the sensitivity of radar attenuation to water conductivity, which the authors mention in the context of EM surveys, to constrain lake salinity/conductivity. The paper would be stronger if this was included.

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2020-321>, 2020.