

The Cryosphere Discuss., referee comment RC2
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Comment on tc-2022-214

Anonymous Referee #2

Referee comment on "Brief communication: Monitoring active layer dynamics using a lightweight nimble ground-penetrating radar system – a laboratory analogue test case" by Emmanuel Léger et al., The Cryosphere Discuss.,
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Geophysical methods, and in particular Ground Penetrating Radar (GPR), have been used extensively to study permafrost and frozen subsurface environments, mainly through ad-hoc surveys, i.e. there has been little previously reported on in-situ GPR sensors for time-based monitoring over extended periods. The authors look to address this, and in this contribution present a bespoke GPR for extended monitoring active layer dynamics. The work has potential novelty and impact but it is currently in a very early phase and needs further development and analysis.

The authors compare GPR data from a numerical model with experimental data from a laboratory setup. The latter experimental setup for the active layer (described in Section 2.1) is quite comprehensive and appears to be a very good platform to collect measured GPR data. However, only one experimental dataset has been collected which shows some interesting features from the freezing and thawing cycles, but there is no indication of repeatability and sensitivity of experimental parameters. The numerical model is really too simplified and basic to be of much value. It would have been interesting and much more inciteful to include the GPR antenna and dispersive effects from the water (particularly during freezing/thawing) in the numerical model.

The presentation of the manuscript needs to be improved - there is a lack of consistency of style across the figures and the text contains grammatical errors. The features of the measured GPR data (Figure 3c) could be better highlighted and described in the text.