

Interactive comment on “Passive seismic recording of cryoseisms in Adventdalen, Svalbard” by Rowan Romeyn et al.

Anonymous Referee #2

Received and published: 21 August 2020

This is a very well written and thorough presentation of research demonstrating the ability of using passive seismic methods to monitor seasonal changes in an actively changing permafrost environment. The analysis, particularly the source localization seems robust. The differences in Spring vs Autumn dispersion curves (Figures 14 and 15) is intriguing and at a quick glance suggests significant changes in the surface material properties, presumably related to the changing thermal environment, however on closer inspection it's more difficult for a reader to interpret precisely what is happening. The interpretation presented by the authors is of a thin (3.5-4.5 m) high velocity layer over a thicker (30 m) low velocity layer, which is quite thin compared to the presumed topography of the survey site and the source locations appear to have distinct regional variations. This needs to be accounted for in interpreting the differences between the

C1

dispersion curves. A straightforward way to do this would be to see a direct comparison between one or two specific pairs of closely spaced individual events (Autumn, Spring) to see how much they vary with one another. This is especially important as the footprint of the recording nodes is slightly different between Spring and Autumn. It would also be helpful to see the actual model and it's range of variation plotted out.

I agree with the comment of referee #1 that I would typically attempt to invert the set of dispersion curves to obtain a layered velocity model result, if only to determine the range of models that fit the data. It's possible that this would illuminate features of interest and allow more predictive analyses. However, I don't consider this necessary for the acceptance of the paper itself.

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2020-141>, 2020.

C2