The Cryosphere Discussions

The Cryosphere Discuss., referee comment RC1
https://doi.org/10.5194/tc-2021-210-RC1, 2021

Comment on tc-2021-210

Anonymous Referee #1

Referee comment on "Wave dispersion and dissipation in landfast ice: comparison of observations against models" by Joey J. Voermans et al., The Cryosphere Discuss., https://doi.org/10.5194/tc-2021-210-RC1, 2021

This is a well-written manuscript with a thorough analysis on a set of difficult to obtain field data. The topic is of significant climate interest. This reviewer strongly supports its publication.

All comments below are on minor issues, but should be addressed before publication.

1. Proofread the whole manuscript to eliminate some typos. For example: line 54, remove "be"; line 335, change "smaller the" to "smaller then".

2. Questions on some reference.

2a. The reviewer could not find the spectral attenuation data from Thomson et al. 2018 as mentioned in Fig. 4. The figure caption says that these data were in Liu et al 2020. However, in the Liu et al paper (Fig. 10) one clearly sees 10(c) corresponds to the pancake group in the present manuscript, and 10(f) corresponds to the broken pack ice group in the present manuscript, but no where can the grease ice data be found in Liu et al 2020. Please clarify or revise since this is an important dataset for many readers.

2b. Line 45, the reference Liu et al 2020 is on comparison of different Sice models, not on model calibration. There are two other papers both exactly on calibration: one using in-situ data and the other using satellite observations. Replacing Liu et al 2020 by these two (and maybe other too) is appropriate: Cheng, S., Erick Rogers, W., Thomson, J., Smith, M., Doble, M. J., Wadhams, P., . . . Shen, H. H. (2017). Calibrating a viscoelastic sea ice model for wave propagation in the Arctic fall marginal ice zone. Journal of Geophysical Research: Oceans, 122, 8770–8793. https://doi.org/10.1002/2017JC013275 and Cheng, S., Stopa, J., Ardhuin, F., and Shen, H. H.: Spectral attenuation of ocean waves in pack

ice and its application in calibrating viscoelastic wave-in-ice models, The Cryosphere, 14, 2053–2069, https://doi.org/10.5194/tc-14-2053-2020, 2020.

2c. Line 57. The following paper is on ice tongue measurements. It should also be included as in situ data for landfast ice: Squire, V., Robinson, W., Meylan, M., & Haskell, T. (1994). Observations of flexural waves on the Erebus Ice Tongue, McMurdo Sound, Antarctica, and nearby sea ice. Journal of Glaciology, 40(135), 377-385. doi:10.3189/S0022143000007462.

3. In section 2, for completeness, a brief description of the meteorological conditions would be helpful.

4. Appendix C. All models here have alpha explicitly given except C1. For completeness the authors should also obtain alpha from Eqs. (C1&C2) and provide it here.

5. Lines 112-113. "For the Antarctic experiment, this assumption was tested using ERA5 re-analysis data in the open water just north of the marginal ice zone indicating a relative bearing of approximately 15 degree." What does this mean? A 15 degree off the line between the buoy pair? How was this accounted for? Did the authors modify the distance in Eq. (3) accordingly? In fact, since each frequency might have its own direction, in fact a directional spectrum is needed. Can the authors discuss this in the manuscript?

6. Lines 122-126. The authors remind us that ice viscosity is a parameter, which value depends on the spring-dashpot model used. Hence, it is also necessary to remind us which model was used in Tabata 1958 and Lindgren 1986 when they reported their measured ice viscosity values. The model Marchenko et al 2020, 2021 used is already given in the present manuscript.

7. Lines 219-222. This discussion on the source of turbulence triggers a question: what is the tidal condition in the fjord?