

# Review of Revisions to: Estimation of degree of sea ice ridging in the Bay of Bothnia based on geolocated photon heights from ICESat-2

## 1 General Comments

### 1.1 Synopsis of Changes

The authors have introduced some more quantitative aspects to their analysis and have evaluated against SAR data, which looks to me to be well done but this should be corroborated by Reviewer 2. New sections have been introduced on ridge anisotropy and cloud-cover in response to my previous comments, which I find to be satisfactory. However several small issues have been introduced within the figures. As with my first review, I recommend this manuscript for publication pending the minor modifications suggested below.

## 2 Specific Comments

### 2.1 Figures

Fig. 3: PDFs have units that are the inverse of the x axis, such that the area under the curves equal to one and are dimensionless. So the y axis shouldn't be % if the x axis is in m.

Figure 5: Colorbar ticks should be coincident with color transitions - this issue was present in the originally submitted manuscript but I didn't pick it up. This should be fixed prior to publication.

Figure 10: The lon/lat ticks here are so small as to be almost unreadable. Please enlarge.

Figure 4: Not a problem that 'up' on your maps aren't orientated North, but it is fairly standard to add a small annotation in the corner to indicate to the reader the North direction (when it is not upward). This is particularly important when your grid lines are feint and other maps (e.g. Fig 10) are North-orientated. Apologies again for not picking this up on the first review.

Figures 2, 6, 7, 8: Much has been written about rainbow color maps (such as `gist-rainbow` used here) in the earth sciences, and they should be avoided (e.g. Borland and Taylor, 2007; Crameri et al., 2020). They have the effect of implying sharp transitions in the data where they do not exist, and are difficult to read for those who are colorblind (0.5% of women and 8% of men worldwide). Many good alternatives are available, see Light and Bartlein (2004); Stauffer et al. (2015); Thyng et al. (2016)

### 2.2 Text

L137: You need units on your plus/minus figure (metres).

L211: Does the thicker snow on fast-ice smooth the surface more? It's not obvious to me that snow bedforms such as dunes and sastrugi would produce a smoother surface than a relatively level, bare FYI, particularly at the radar-wavelength scale. I think you should cite this or instead of 'This is expected as' go for 'we attribute this to...'

L508: It's true that estimating ice type (FYI/MYI) is tricky, I think you're talking more generally about ice

properties. Perhaps change type -i properties.

L509: Change cm to centimeter

L510: It's a nice point that cm-scale roughness can confound radar estimates of large-scale roughness, but it should be cited.

L498: Should be near-real-time

## References

- Borland, D. and Taylor, R. M.: Rainbow color map (still) considered harmful, *IEEE Computer Graphics and Applications*, 27, 14–17, <https://doi.org/10.1109/MCG.2007.323435>, 2007.
- Crameri, F., Shephard, G. E., and Heron, P. J.: The misuse of colour in science communication, *Nature Communications*, 11, 1–10, <https://doi.org/10.1038/s41467-020-19160-7>, URL <https://doi.org/10.1038/s41467-020-19160-7>, 2020.
- Light, A. and Bartlein, P. J.: The end of the rainbow? color schemes for improved data graphics, *Eos*, 85, <https://doi.org/10.1029/2004EO400002>, 2004.
- Stauffer, R., Mayr, G. J., Dabernig, M., and Zeileis, A.: Somewhere over the rainbow: How to make effective use of colors in meteorological visualizations, *Bulletin of the American Meteorological Society*, 96, 203–216, <https://doi.org/10.1175/BAMS-D-13-00155.1>, 2015.
- Thyng, K. M., Greene, C. A., Hetland, R. D., Zimmerle, H. M., and DiMarco, S. F.: True colors of oceanography: Guidelines for effective and accurate colormap selection, <https://doi.org/10.5670/oceanog.2016.66>, 2016.