



EGUsphere, referee comment RC3  
<https://doi.org/10.5194/egusphere-2022-388-RC3>, 2022  
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## **Comment on egusphere-2022-388**

Anonymous Referee #3

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Referee comment on "Bedfast and floating-ice dynamics of thermokarst lakes using a temporal deep-learning mapping approach: case study of the Old Crow Flats, Yukon, Canada" by Maria Shaposhnikova et al., EGUsphere,  
<https://doi.org/10.5194/egusphere-2022-388-RC3>, 2022

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Dear representatives of the TC editorial board  
and authors of the revised manuscript egusphere-2022-388,

Thank You for the interesting topic and manuscript.  
The manuscript will still require reasoning and clarification of the applied methodology and presentation of the results.  
Therefore, I propose a major revision.

Major comments:

My major comments are related to the applied methodology and presentation.

1) As pointed out by the other reviewers, the input data comes from different instruments and they even have different polarizations. The effect of this should be analyzed. Could e.g. the instrument type be fed into the NN as one additional input, or separate NN's used for different instruments? How much would the result improve by taking separate instrument into account (if any)? Also some kind of analysis of the backscattering of the separate instruments for the lake ice (and surrounding land) would be interesting (how do they differ or are they very similar statistically).

2) Selection of TempCNN as a method and parametrization  
TempCNN was selected to be used but it would be useful to compare the performance of TempCNN to some simple method (thresholding) to give evidence

that it performs better (ow much better?). Also more detailed reasoning of the selected structure would be useful to be included, e.g. why there are just three convolutional layers etc.? The selections could also be reasoned by referring to publications where the selections have been justified.

3) Use of data, division to training and test data sets: It should be better reasoned why the model training setup was such complicated. On what are the selections and divisions based? Cross validation is a good way to train and test if there is little data. If You want to continue the time series (with the same training) it would also be good to have a training with good generalization property. In any case, give reasoning for the use of the data sets and division to training and test. Would a more simple approach be feasible or even better?

4) The effect of speckle should be evaluated by comparing the results without and with speckle filtering. Could the filtering be included in the neural network model? Could e.g. a small neighborhood around each pixel be used instead of single pixel values (applying a 2-D convolution)?

5) The reference data are not very good. Is there any way to evaluate the accuracy of the reference data e.g. w.r.t. the existing field measurements?

6) Analysis results: There are a lot of details and figures of selected subregions. What I miss would be a clear conclusion of the analysis indicating by a few numbers or one figure the most essential results of the analysis for the tundra and taiga lakes (in general) and possibly estimated uncertainty estimates. These could be given in a separate shortish subsection

Some detailed comments:

L70-74: There are some studies using the separate between static and drifting sea ice based on ice drift or correlation estimated from (SAR) image pairs. Such method has been applied e.g. in  
Makynen, M.; Karvonen, J.; Cheng, B.; Hiltunen, M.; Eriksson, P.B. Operational Service for Mapping the Baltic Sea Landfast Ice Properties. *Remote Sens.* 2020, 12, 4032. <https://doi.org/10.3390/rs12244032>  
Also provide a reference to this kind of approach where backscattering is not directly used would complement the manuscript.

Table 1: This indicates that VV mode has been used, except for RS-1. Were there not HH mode data available (e.g. S-1 EW mode data in HH/HV)? Would including

cross-polarized channel improve the detection (or has this been studied by anyone)? This is interesting because there exist a lot of HH/HV or VV/VH data acquired by RS-2 and S-1.

L155: Give reference to Lee filter used (there exist variants of Lee filter). On what is the 7x7 window size based?

Figure 2: It would be more clear to show e.g. average and deviation for the classes, now the many curves are shadowing each other.

L254: 330m, how was this elevation threshold selected. Give some reasoning for this selection.

L257: Give the number(s) of field measurements here.

L282: (Date1\*10)+Date2, You probably mean class(date1)\*10 + class(date2) or something similar?

L285-286: experimentally defined threshold, be more specific with this. A simple way to define a threshold statistically (experimentally) would be the Bayesian approach based on class distributions. Was this approach used or how was the threshold defined experimentally?

L291: pyManKendall, give a reference to this python package.

L305: Is linear interpolation really feasible. To get evidence, You could compare linear interpolation of the periods with data to get error estimates of the linear interpolation.

Table 2: Please, give formulas /explanations of the accuracy measures (in the text).

Fig 7: Better distinguishable colors could be used for different classes. Now the blue tones are difficult to distinguish in a printed version.

Fig.8: Are these time series really informative? Maybe only ice thickness and snow depth for certain day(s) could be shown, now it seems these figures include too much information.

L534: SWOT, can You give any reference to this?

Sincerely,