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Earth System Science Data Discussions

Interactive comment on "Remote sensing of lake water volumes on the Arctic Coastal Plain of Northern Alaska" *by* Claire E. Simpson et al.

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The manuscript "Remote sensing of lake water volumes on the Arctic Coastal Plain of Northern Alaska" present an important lake bathymetric dataset across the Arctic Coastal Plain using sonar depth data and modeled lake bathymetry raster's from the Landsat images. It will be served as a baseline for the further studies, such as changes in water resources, energy balance, and ecological habitat. Although the novelty of methodology is comparatively low, but the dataset is of good use and paper was well organized and written. But there are still a lot of issues that need to be resolved before publishing in ESSD. General Comments The authors have measured 17 lakes using the sonar instrument in the study region. However very little is detailed on the measurement part. For example, there should be a table highlighting the number of points mea-

sured in each lakes, what is the minimum measured depth, maximum depth measured, etc. Indeed, this can be incorporated in Table 3. One another major concern is about the dataset itself. There is a little information provided on how the authors carried the field survey such as criteria on selection of transects in each lake (how many transects, which direction). I can see that authors pointed that a depth range from the littoral shelf to the deep central basin was captured. However, since this is a data paper, I would like to see all the lake transects in a Figure format (similar to Figure 2a). This won't be difficult as there are only 17 lakes are studied. Along with this figure, one photograph showing the sonar instrument mounted on the platform will be useful for readers to visualize the process. Authors used Landsat images of 2016 in this study for modeling the bathymetry. Why didn't the authors considered Sentinel-2 images of 2017 July -August, which is having higher spatial resolution than Landsat in this study?. This should be clarified. As mentioned in line 110, authors used TOA reflectance's, which is different from water leaving reflectance. That means, no atmospheric correction algorithm is performed in this work. USGS/Earthexplorer directly providing the atmospherically corrected reflectance products, apart from various other atmospherically corrected algorithms available such as simple DOS, FLAASH, ACOLITE, iCOR etc. Don't the authors believe that atmospherically corrected images may improve the accuracy of predictions as it corrects the haze and specular reflections?. This should be clarified. Refer Vanhellemont, Q., & Ruddick, K. (2015). Advantages of high quality SWIR bands for ocean colour processing: Examples from Landsat-8. Remote Sensing of Environment, 161, 89–106. https://doi.org/10.1080/22797254.2018.1457937 Line 162, "Study lakes were then visually assessed to provide a Boolean turbidity rating for. . .". How to validate this ?. A suggestion is may be used some well known TSM algorithm such as that in Acolite built one (TSM_Nechad) and compare the concentration of TSM in 17 lakes. Validation of the modelled bathymetric results can also be performed by drawing profiles comparing modelled vs measured transects (transects used in training cannot be used for validation). See AP. Yunus, Jie Dou, Xuan Song, Ram Avtar. (2019). Improved Bathymetric Mapping of Coastal and Lake Environments Using Sentinel-2 and

Landsat-8 Images. Sensors 2019, 19(12), 2788; https://doi.org/10.3390/s19122788 Specific Comments Section 2 should be Data and Methods Line 202. “The best models for lakes at which. . .”. Mention which one is the best model here. Line 239. “Depth was accurately derived from Landsat OLI imagery for individual lakes”. How much accurate. Accuracies should be clearly provided in quantified values using RMSE, ME etc. Lake bathymetry is continuously reworked, particularly in glaciated regions. This should be discussed in the light of additional field surveys.

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