

Comment on essd-2021-135

Anonymous Referee #2

Referee comment on "Inter-annual variation in lake ice composition in the European Arctic: observations based on high-resolution thermistor strings" by Bin Cheng et al.,
Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-135-RC2>, 2021

This paper used a thermistor string-based snow and ice mass balance apparatus (SIMBA), which is a novel monitoring method for snow and ice thickness, to monitor the temperatures of air, snow, ice and water, and to get the snow and ice products applying a algorithm, finally to reveal the relationship between climate change and snow/ice thickness. Based on the decadal date sets, authors described the snow and ice temperature regimes, snow depth, ice thickness, and ice compositions as well as meteorological variables at the Finnish Space Centre. These decadal data sets provided firstly can also be used for numerical and satellite validation and can be comparable to the results obtained from other cold regions. So, it is important and interesting issue and is worthy of publication after some revisions. Some comments are raised as follows.

- The paper is wrote well entirely. However, there are still some problems in English writing. Such as, "thermal heat conductivity" is suggested to be "thermal conductivity"; Please check "Figure 8" in Line 195 and "Figure 9" in Line 211. It is suggested to revise the English description entirely.
- In Lines 328-329, author described "...a decrease of FDD is expected to result in less formation of columnar ice". Please explain why.
- In Lines 381-383, the increase of air temperature in winter season is highly correlated with seasonal total accumulated precipitation. Please address its reasons.
- In Lines 388-390, the seasonal accumulated FDD is reducing, suggesting reduced formation of columnar ice and, hence, a smaller role of air temperature in controlling the ice thickness. It is a little partial. In cold regions, air temperature is still the dominant factor controlling the ice thickness. Maybe other factor, such as precipitation in winter, play an important role in ice thickening. Please offer the accurate description.