

Review of the paper entitled “Investigating limnological processes and modern sedimentation at Lake Żabińskie, northeast Poland: a decade-long multi-parameter dataset, 2012-2021” by Tylmann et al. submitted to ESSD.

This paper presents limnological data collected over a decade in a small lake of Northern Poland. While limnological data are not rare, this dataset is outstanding for two main reasons. First, it is a decade-long continuous monitoring effort with a few short gaps, and this is exceptional. Second, the lake contains an exquisite sedimentary record made of pristine annual laminations, i.e., varves; this kind of record is rare. This sedimentary sequence has been studied in detail in many excellent scientific publications that presented paleoclimatic reconstructions and studies on the anthropogenic impact on lacustrine ecosystems. This dataset allows to decipher how climate influences limnological parameters, and hence the formation and the properties of varves.

I found the manuscript appropriate to support the publication of the dataset.

The dataset is unique as it required continuous funding for 10 years and 130 field campaigns. The dataset was useful to understand the formation of a varved sequence in Lake Żabińskie, a rare record of climate and environmental changes over the last 10 800 years. It can be used for modelling physical and biogeochemical processes in lakes, investigate the links between meteorological and limnological conditions, and hence preservation of sub-seasonal meteorological events in the sediment records, which can be further translated to climatic signal over the longer time scales.

The dataset is complete.

The data are accessible and well presented, easily understandable for most of them. I have not detected any faults.

The article is clear, well written and well presented with readable figures. English looks good, but I'm not a native speaker.

I have a few minor suggestions listed below.

Line 30: (e.g., one or two years, **or even less**).

Line 70: how can the catchment have elevation lower than the lake itself (reported being 117 amsl)?

Line 128: I suggest merging section 3.3 and 3.4 with a different name. The name for section 3.3 is a little misleading, as it could also apply to 3.4, 3.5 and 3.6.

Line 161 and following (Ice cover data): it is strange to give a single date to this parameter. Ice melting and freezing are processes occurring over several days. Maybe should you write something about the duration and/or accuracy (e.g., +/- n days) of this recorded parameter.

Figure 4: specific conductivity colour scheme is not very efficient to show something.

Figure 5: why plotting only the values for surface water when values for bottom waters are also available?

Metadata file (zab\_metadata.pdf).

Hydrochemistry-tributaries: I suggest repeating what I1, I2 and I3 refer to (or a link to Figure 1).

Hydrochemistry: ions, I suggest spelling the elements out (na = sodium; k = potassium ....)

Sediment trap: explain why some data are missing with flags similar to the other datasets.

Remind the depth of the trap in the metadata file.

Full resolution temperature data: the explanation of periods versus series is not clear. Would it be possible to explain this in a different way?

Finally, I tried to get the daily meteorological data from the meteorological stations from the Institute of Meteorology and Water Management – National Research Institute open database (<https://danepubliczne.imgw.pl/>), but the web site is in Polish only, and I have not been able to go further than the home page. Would it be possible to provide a more specific link to the two datasets of interest for this paper?