

Earth Syst. Sci. Data Discuss., author comment AC2
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Reply on RC2

Bernhard Aichner et al.

Author comment on "Spatial and seasonal patterns of water isotopes in northeastern German lakes" by Bernhard Aichner et al., Earth Syst. Sci. Data Discuss.,
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Aichner et al (2021) present a dataset of O and H stable isotope measurements in samples collected from lakes in NE Germany in 2020. Such data are much needed if one is to understand (eco)hydrological processes in the water cycle.

However, the dataset offered here by the authors lacks in several aspects, making difficult to be used as potentially intended. As provider and user of similar data I find this dataset lacking several important assets which I highlight below.

Re: we thank the review for the effort of reviewing this manuscript and the positive evaluation about the principal value of the data set. Below we reply to some specific concerns.

1. The variability of isotopologues in lake waters, similar to that in precipitation for example, follow a clear annual cycle. In order to understand these dynamics, at least one full yearly cycle needs to be covered by sampling. The authors collected waters mostly during the (extended) warm season, with several cases in which only two samples/year (warm season) were collected. In the absence of winter samples, it is impossible for the data to "give information about the seasonal isotope amplitude (page1, line 26). I am not sure I understand how this can be done with the present dataset. Further, in the absence of samples collected in winter (except for one case), it is virtually impossible to understand 1) the links between stable isotopes in lake waters on one hand, and stable isotopes in precipitation and weather/climate on the other hand, 2) recharge patterns and their timing.

Re: the measured samples give a good estimate about the seasonal isotope variability in most of the studied lakes. This was considered when conceptualizing the sampling strategy, i.e. we took care that the minimum and maximum of the annual cycle of δ -values will be tracked.

The lowest/highest isotope values in these riverine lakes are reached in late March/early April and early October, respectively. This nicely comes out in the data from lake Müggelsee, which was sampled over a longer period and in higher time resolution (Figure 4).

Therefore, the data derived from the applied sampling strategy in nineteen of the studied lakes (data shown in Figure 5), which were sampled among others in mid March and early October (Table), provide a very good estimate of the seasonal isotope amplitude.

Indeed, the additional shore samples (taken partially from similar lakes, and partially from additional lakes), cannot provide an estimate about the full seasonal amplitude. However, the applied strategy here, i.e. sampling in mid/late March and mid of July, frames the growing period of vegetation. Especially aquatic vegetation relies on source water from such lakes, therefore the "ecological isotope amplitude" constrains the possible range of an isotopic signal which is incorporated into the plant biomass during growth. This is very useful for ecological studies, which depend on that parameter, from either the studied lakes or comparable ones in the closer or wider region.

=> currently Figure 7 only illustrates the "ecological amplitude" i.e. the March-July isotope offset. We suggest to also plot the full seasonal isotope amplitude, for the nineteen lakes mentioned above, plus Müggelsee, from which these data are abundant. In relation to this, also the differences and the scientific values of those two amplitudes will be emphasized.

Concerning relationship to weather/climate and precipitation isotopes, please see below.

2. The stable isotope data is not accompanied by any physical, chemical or hydrologic data so understanding their temporal and spatial dynamics is almost impossible to understand (are these caused by hydrological processes? climatic ones?). For example, seasonal amplitude (see my comment above on seasonality) "can be attributed to multiple catchment characteristics and processes" (page 6, lines 157-158). Of course they can, these are the factors affecting the O and H stable isotope values in all lakes across the Globe, but nothing can be said on the investigated lakes here.

In my view, the sentence quoted above summarizes the maximum value that can be obtained from the dataset as it is now. I don't know if more data is available, but if not, I suggest the authors write a scientific article analyzing their data and append the data to the article. It would better served the wider scientific community.

Re: a range of physical, chemical and hydrological data are available from most of the studied lakes.

Many morphological parameters (depth, area, volume, water residence time, catchment area) are listed in Table 1 and 2 of the data description manuscript. Also, trophic classification to enable ecological contextualization, is listed there.

=> it would be good to know, which additional parameters (i.e. not listed in Table 1 and 2) the reviewer precisely is referring to. It is probably possible to add further columns (e.g. with basic parameters such as water temperature or -at some spots- pH and O₂-conc) to the Pangaea dataset. In the manuscript, those could be visualized exemplarily for one lake (e.g. Müggelsee, which has the longest time series).