

Interactive comment on “Modern silicon dynamics of a small high-latitude subarctic lake” by Petra Zahajská et al.

Anonymous Referee #1

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The manuscript by Zahajská et al provides insights into the silicon dynamics of a small subarctic lake in Sweden. Through this, the authors demonstrate the considerable importance of groundwater in lake silicon cycling in order to account for the changes in their monitoring record.

Whilst the amount of raw data in the paper is relatively low, the findings will be of considerable interest to biogeochemists in future silicon cycling studies (both those working on both large/small as well as high/low latitude lakes). Overall, I'm keen to see this novel study published, however there are some issues (most of them minor) which the authors would benefit from considering:

* Line 57-59: I assume you mean “surface atmospheric” temperature.

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* Line 58: growing season - I assume you mean aquatic growing season.

* Line 118: The assumption of a steady state needs to be explained/justified better

* I would suggest moving Section 4 before Section 3, but this is up to the authors to decide.

* Line 314: “average” - replace with “mean”?

* Line 314: I don't see the need for this sentence - writing about mean sedimentation rates in the core seems unnecessary given the following lines which look at temporal variability in the core.

* Line 317-318: I'm confused here: 1) According to the text in these lines the number of analysed samples is 3 (“n = 3”), but at line 231 n = 25; 2) What ages/depths are the diatom silicon isotopes samples? This data should be plotted in Figure 4. 3) Why is a mean of all diatom silicon isotope samples used in subsequent calculations (see comment further below)? Why not do the mass balance calculations on each sample individually? Doing it individually on the uppermost (core top sample) would be particularly good in providing a value that is more analogous to the modern data used in the rest of the paper.

* Section 6.1 - are modelled seasonal/annual lake level changes feasible and/or supported by observations. Given a modern lake depth of 8 m (line 61), some of these lake level changes seem (to me) fairly extreme.

* Line 337 - this sentences seems very simplistic and would benefit from being explored/interrogated further.

* Line 341-347: some repetition exists within this section of text. * Line 354: “ans” = “and”?

* Line 358-366: What happens if you do this for each sediment depth you have a BSI and diatom d30Si sample for? Or what happens if you do this just for the youngest

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(core top sample)? Would this be better for examining modern silicon fluxes in the lake rather than using mean values over the top 8 cm which covers the last 150 years?

* Line 458: Change “The yearly BSI flux would increase” to “The yearly BSI flux would need to increase”?

* Figure 1: add the year that samples were collected to the legend in the bottom right of the right panel.

* Figure 2: Consider using different colours to show the modelled QGW (line 296) and the measured QGW in August/September and then change the figure caption accordingly. Initially, the same colours on the plot for QGW confused me.

* Figure 6: Use different colours that make it easier to distinguish between each variable.

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