

Line numbers refer to the original document

Changes after reviewer comments - Gabriel Filippelli

Lines 293/4 and 370 – R2 values have been added to support the statement “SI-TP correlates with measured lake water TP”

Section 2.1 – A statement has been added to clarify that P yield is not calculated from runoff “This means that the calculated P yield values come directly from the sediment record and not from a hydrochemical mass balance, i.e. runoff and inflow TP concentration.”

Section 2.3.3 – Individual methodologies for calculating runoff are now included

Line 349 – we have now made it clearer that runoff refers to modern mean annual runoff

Also line 461 and 465, Fig 9, and Tables 1 and 2 captions – we have made it clear that temperature and runoff refer to modern mean annual values

Section 4.5 – we have added a paragraph commenting on the use of a fixed focussing factor. This paragraph also comments why a variable value for runoff is not used and comments on the resulting impacts of using fixed R_p and q_s values and their effect on the model outcome.

The Figure 7b caption has been amended to include a reference to the 1:1 line and a clarification on the calculation of the SI-TP values

The Figure 9 caption now cross refers to Tables 1 and 2 and vice versa

Changes after reviewer comments - Richard Bindler

Lines 7 and 33 – changed “recovery from glaciation” to “landscape development following glaciation”

Line 36, 207, 212, 219, 220, 228, 233, 238, 253, 259, 262, 270, 388, 403, 619 – changed “as” to “because”

Line 47 – concentrations

Line 81 – Lakes, which

Section 2.2 – at the end of the section we have commented on our use of mg/m³ over ug/L

Line 276/277 - The sentence containing the preconception about climatic impacts on the sediment P record has been removed

Line 408 onwards – we have clarified that neoglaciaton refers to regional neoglaciation

Line 444 – exhibiting the stable phase seen...

Line 545 – ...the total P supply to each of the lakes.

Section 4.5 – we have expanded the paragraph comparing SI-TP to DI-TP to include observational comparisons of the profiles of the three German lakes and have added an observational comparison with the diatom record from Sargent Mountain Pond. We have also included a brief interpretation of the differences in the records.

Author changes

Abstract – Rephrased the reference to comparison of SI-TP with DI-TP

Line 338 – Figure reference changed from Fig. 07 to refer to correct figure (Fig. 08)

Table B1 – added missing data from Jackson pond and Anderson Pond

Table B4 caption – table reference changed from SM1 to B1

To avoid confusion, we have made sure the Moyle and Boyle (2021) model is consistently referred to as the “SI-TP model” throughout (rather than “the model” or “the phosphorus model” etc as previously)