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Interactive comment on “Forcing mechanisms behind variations in total organic carbon (TOC) concentration of lake waters during the past eight centuries – palaeolimnological evidence from southern Sweden” by P. Bragée et al.

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Author Comments to Referee #2

We respect your point of view on data treatment and are well aware of and understand the full potential and value of the use of these types of analyses on stratigraphic data in palaeolimnology. However, we think that for this study such analyses are not entirely motivated as our work with a multiproxy dataset still allows valid interpretations and conclusions based on qualitative assessments. As demonstrated by the very positive

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review provided by referee #1 this is clearly also the view of others.

We could expand the analysis by using a simplified regression approach to identify relationships among the variables and to determine their statistical significance. Moreover, we could use partial analysis to assess potential co-varying effects. We have systematically analysed the multiple stressors on the lake-ecosystems and a figure showing a comprehensive overview of the analysis could be added.

Considering your second point about uncertainties in the data and models we are fully aware of the limitations of inference models. However, we have focused on major trends and step shifts in the inferred records (certainly not face values). Although the uncertainties are already clearly presented to the reader and discussed accordingly, we are willing to go through the manuscript carefully and rephrase so that our interpretations and conclusions are softened in the light of the limitations imposed by the methods applied, and also to express the uncertainties graphically.

Visible near-infrared spectrometry (VNIRS) is a technique that measures attributes of the chemical composition of organic materials, e.g. lake sediments. The tool is very sensitive to both the composition and quantity of organic material. Similar to other transfer functions (e.g. diatom/lake water pH, chironomids/temperature) the application of VNIRS to infer past changes in lake water TOC content is partly indirect and contains of courses uncertainties. But the technique is probably one of the most reliable we have at the moment. Important is that the VNIRS-TOC model has proven to give results that make sense in a large number of multiproxy publications. As always with calibration models, care need to be taken for model errors and small changes should not be interpreted if they are not supported by one or more additional proxies.

We are fully aware of that diatoms respond to other factors than pH and that the results most likely are influenced by other processes. Although, it is a well-established method we can make it more clear in the text what the limitations are, revisit the parts where we discuss pH changes and make sure that the interpretations are well motivated. The

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diatom data can be shown in the paper, or (perhaps more appropriately) added as supplementary material.

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