

Interactive comment on “Eutrophication and Phosphorous accumulation in sediments of Karlskärsviken, bay in Lake Mälaren” by G. Olli

Anonymous Referee #2

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The present review is organised based on the information provided in "EVALUATION".

SECTION A. GENERAL COMMENTS - Evaluation of the overall quality of the discussion paper using the principal criteria .

A1. Scientific Significance: Does the manuscript represent a substantial contribution to scientific progress within the scope of Hydrology and Earth System Sciences (substantial new concepts, ideas, methods, or data)? Fair (3).

A2. Scientific Quality: Are the scientific approach and applied methods valid? Are the results discussed in an appropriate and balanced way (consideration of related work, including appropriate references)? Fair (3).

A3. Presentation Quality: Are the scientific results and conclusions presented in a

clear, concise, and well-structured way (number and quality of figures/tables, appropriate use of English language)? Fair (3).

SECTION B. SPECIFIC COMMENTS - Addressing the individual scientific questions reported in "EVALUATION". This section includes also some purely TECHNICAL CORRECTIONS.

B1. Does the paper address relevant scientific questions within the scope of HESS?

B1.1 Yes. The paper deals mainly with the use of BSi and TP relations in sediment stratigraphies to determine the historical variation of the concentration of TP in the water column in the Karlskaersviken Bay of the Malaren Lake; the latter can be subsequently used to estimate the historical variation of the trophic state of the Bay.

B1.2 The paper has practical significance, because it can contribute in the definition of "reference (undisturbed) conditions" in lakes (as well as coastal regions), within the framework of the Water Frame Directive, WFD (see also comment B7.1). This issue can also be included in section 1-Intoduction of the revised paper to strengthen the practical importance of the paper.

B1.3 Based on B1.2 and B1.3, the paper is of interest to the HESS readers.

B2. Does the paper present novel concepts, ideas, tools, or data?

B2.1 The author should clarify whether the proposed method is original; this can be performed in section 1-Intoduction (see also comment B7.1).

B3. Are substantial conclusions reached?

B3.1 One of the substantial conclusions reached is that the proposed method enables the determination of the background TP concentration (which is related to the reference conditions) in the investigated Bay; this is determined equal to 0.020-0.022 mg L⁻¹.

B3.2 In section 5 -Conclusions some conclusions in the form of a general discussion (with new information; see comment B13.3), are also reported; these describe (1)

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the occurrence of anomalies in the stratigraphies, which are linked to anthropogenic impacts (see comments B6.1 and B6.2) and (2) the occasional occurrence of eutrophication.

B4. Are the scientific methods and assumptions valid and clearly outlined?

B4.1 No. The scientific method should be clearly described step-by-step in section 2.2.

B4.2 The supporting information is not needed as such; both points 1 and 2 of the supporting information can be included in the paper and briefly described as steps of the proposed method. Certainly, details found in another publication by the author should not be repeated here.

B4.3 The reason to modify DeMaster's (1981) method (Line 16, p.1828) should be explained.

B5. Are the results sufficient to support the interpretations and conclusions?

B5.1 No. A major disadvantage of the paper is that it does not contain any information on the accuracy of the proposed method. Such information should be provided for each step of the method (see comment B4.1), including the dating of the sediments; for example how accurate is the information (i.e. +/- number of years) provided in Table 1?

B5.2 How often were the measurements performed? What are the statistical properties of the values shown in Figs.2, 3 and 4, e.g. standard deviation etc.? Are these values annual averages?

B6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)?

B6.1 Not entirely. It is suggested to extend Section 2.1 to include a brief and systematic information on the anthropogenic pressures (mainly pollution loads) to the Bay, which can permit rough estimations of the TP loads (see comment B13.1); this can be

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relatively easily made based on land uses.

B6.2 In various locations of the paper the anthropogenic pressures are mentioned; however, without providing clear and specific information. For example: (i) Line 29, p.1825 "...expected to be dominated by the loading from its catchment area ..." (What is this loading?), (ii) Lines 27-28, p.1827 "...the water quality in the inner section is dominated by the loading in the catchment area ...", (iii) Lines 24-25, p. 1829 "...The nutritious outflow from a ditch ..." (what is this ditch? Is it described in section 2.1? Is it shown in Fig. 1?), (iv) Lines 15-16, p.1832 "... After that (?), many former rills, small ditches ..." (What are these? Where are these located? Show and explain in Fig.1). (v) Line 22, p.1832 "...the nutrient load has diminished ..." (Where does this load come from?). (vi) In the section of Conclusions (Lines 12-13, p.1834) "...The background P content must be hypothetic (?) as Lake Malaren never had a freshwater stage (?) without anthropogenic impact ...". This information should be provided in the beginning, i.e. in section 2.2?

B7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution?

B7.1 Credit to related work is given in section 1- Introduction and section 2.2- Methods overview. Is the author aware of the Report "Identification of reference lakes and evaluation of palaeoecological approaches to define reference conditions for UK (England, Wales, Scotland & Northern Ireland) ecotypes, WFD08, August 2004"? This report is available for download from the SNIFFER Website. Does the paper include ideas from this Report?

B7.2 The author should specify clearly his original contribution (see also comment B2.1).

B8. Does the title clearly reflect the contents of the paper?

B8.1 No. A new title should be used to reflect the contents of the paper.

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B8.2 An indicative title can be the following “Determination of the historical variation of the trophic state in lakes using sediment stratigraphies”.

B9. Does the abstract provide a concise and complete summary?

B9.1 No. The abstract should be re-written.

B9.2 The aim described in Lines 2-4 of p.1824 is very general, and not the same with the one mentioned in Lines 24-26 of p.1825.

B9.3 The paper does not deal generally with “water quality”, but only with concentrations of TP and thus with the “trophic state” and the “eutrophication”, which is only one aspect of the “water quality”.

B9.4 The main conclusions should be clearly stated in the abstract (see comments B3.1 and B3.2).

B10. Is the overall presentation well structured and clear?

B10.1 Generally, the structure of the presentation is OK.

B10.2 The presentation is not fully clear (see other comments).

B11. Is the language fluent and precise?

B11.1 Yes.

B12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used?

B12.1 No formulae are used in the paper.

B12.2 The same names and symbols should be used throughout the paper for consistency. It is suggested to avoid using the word “content”; the well-defined term “concentration” can be used. Concentrations should clearly refer to TP or P to avoid confusing the readers.

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B12.3 Units should be consistent; this is not valid in certain cases; see for example Fig.2 (mg/g DM or mg g DM-1), Fig.3 and Fig.4.

B13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated?

B13.1 It is suggested to extend Section 2.1 to include additional information on the anthropogenic pressures (mainly pollution loads) to the Bay (see comment B6.1). When the nutrient loads are estimated, it would be of interest to compare the results of the proposed method with simple empirical models, such as this by Wollenweider (1975). Wollenweider, 1975. Input-Output Models with Special Reference to the Phosphorus Loading Concept in Limnology, Schweiz. Z. Hydrol., 37:53-84.

B13.2 Section 3-Results should include only the results and not parts of the discussion; the discussion is performed in section 4-Discussion.

B13.3 Section 5-Conclusions needs significant re-writing; this section should not include new information (see comments B3.1 and B3.2). The main conclusions should also be briefly repeated in the abstract (see comments B9).

B13.4 The quality of the Figures 1-4 should be improved. The legends of the figures should be clear and not lengthy. For example in Fig.2 it is stated that "...TP content increases in the middle of the 18th century ..."; but Fig.2 shows depth and not year. It is suggested to use double y-axis in Figs. 2,3 and 4, where both depth (in meters and not centimeters) and year will be shown. Also, Fig.3 (b) "... an attempt (?)" A figure cannot be an "attempt". In the same figure, how the "epilimnic (the author means epilimnetic) Si deficit" is defined? Can an epilimnion be formed in such a small water depth?

B14. Are the number and quality of references appropriate?

B14.1 There is no need to use many references for the same issue (see for example Lines 17-18 in p.1824, Lines 5-6 in p. 1825, Lines 7-8 in p.1825 and Lines 13-15 in p.

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1825), which in certain cases cannot be accessed or read by English speaking readers.

B15. Is the amount and quality of supplementary material appropriate?

B15.1 No. It is suggested to include the supplementary material in section 2.2 (see comment B4.2).

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