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Discussions

Interactive comment on "Enrichment of trace metals from acid sulphate soils in sediments of the Kvarken Archipelago, eastern Gulf of Bothnia, Baltic Sea" *by* Joonas J. Virtasalo et al.

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Review of manuscript bg_2020_231

Manuscript title: Enrichment of trace metals from acid sulphate soils in sediments of the Kvarken Archipelago, eastern Gulf of Bothnia, Baltic Sea

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RECOMMENDATION: Accept for publication with minor revision

SYNOPSIS AND GENERAL COMMENTS

Synopsis The manuscript investigates the spatial and temporal distribution of metals in nine sediment cores from the Kvarken Archipelago, which is affected by drainage of acid sulphate soils (ASS) in western Finland. The manuscript assesses the trace metal distribution in Gulf of Bothnia sediments with increasing distance from river mouths. The focus is on sediments deposited before and after the intensive artificial drainage of ASS that began in the 1960s. Focus is also on metals that are leached from ASS (Al, Cd, Co, Cu, La, Mn, Ni, and Zn). There is a lack of investigations regarding metal transport from ASS and through the estuarine zone of rivers in the Gulf of Bothnia, and the topic is well in line with the Aims and Scope of Biogeosciences.

Novelty and scientific merit / significance The study does not present any new methods or novel approaches in the interpretation of data. Although the study primarily may be important from a local point of view, results on the transport of metals from ASS through the coastal zone apparently have not been assessed previously. The study thus has a scientific merit, and is of general interest to researchers studying metal release from ASS.

Methodology and quality of work Sampling and measurements Sampling and analytical methods used in the study are suitable and appropriate.

For metals, the analytical accuracy is reported relative to CRMs and in-house standards. The authors should also report the analytical precision for the metals. This could be critical for interpretation of some of the metal profiles shown in Fig. 2.

Aim, interpretations and conclusions Define the aim/objective more clearly. Was the aim to assess the metal distribution in sediments with increasing distance from rivers? This is what the interpretations and conclusions are linked to.

In general the interpretations are supported by the results. However, the manuscript should briefly state the arguments supporting that the metal increase from the 1960s is

really caused by leaching from ASS, and not from industrial sources. These arguments are probably reported in some of the cited references (e.g. Nordmyr et al), but could be briefly mentioned in the manuscript to strengthen the conclusions.

Readability and language The manuscript is well written and easy to read, and the abstract accurately reflects the content of the manuscript.

SPECIFIC COMMENTS

Line Comment 57 Should read: The metal distribution ... 134 I cannot se that Hg is discussed in the manuscript, so it can be removed from the methods section. 247–249 Lines can be deleted. This is already mentioned in the Introduction. 345 The fact that Cd, Co, Cu, Ni, Zn correlate with the same grain sizes as C and N does not automatically imply a causal correlation. This may well be the case, but I suggest using the term “suggest” instead of “indicate”.

Supplementary file Title in Supplement should agree with title of the manuscript (“trace” and “Baltic Sea” are missing)

Figures Figure 5: Show “contained dark red dots” in another colour. They are now very difficult to see. This also applies to the figures (maps) in the Supplement.

Tables Table 1: Report the sedimentation rate (cm/year) for each core

References Line 323: Should Cook et al. be 1997 or 2000?

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