

Interactive comment on “Biogeochemistry of sediments from restricted exchange environments of Kandalaksha Bay, White Sea, Russian Arctic” by S. Koukina et al.

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Authors Comment on Interactive comment from Anonymous Referee #1

The interactive comment from the first referee is greatly appreciated and will definitely be taken into account in the future work on the manuscript. However, certain clarifications from the authors need to be made.

The basins explored represent different stages of separating process and still have exchange with an open sea. Therefore, these basins cannot be discussed as fresh water lakes.

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Present study is dedicated to surface sediments. According to the study aims, first upper centimeters of sediments were of the special interest. If present, the top oxic layer was retrieved following the sampling guidelines (Loring and Rantala, 1992). Within present study, the vertical sediment profiles were not collected due to the littoral location of most of the sampling sites. Within the littoral zone, active hydrodynamic processes may result in permanent sediment resuspension and redeposition.

The cycling between reduced and oxidized forms of Fe, Mn and S certainly regulates trace metal distribution in the sediments -and the data obtained are discussed in relation to these processes in the section 3.2.1 (pages 1319-1320). Moreover, in the present paper not only Fe-Mn oxyhydroxides and sulfides formation but also such major factors as variances in TOC, mineral composition, and possible anthropogenic input were taken into account in relation to trace metal abundance and individual affinity to particular carrier within the sediment solid phase.

Non-parametric Spearman correlations have proven to be specifically informative for the analysis of the limited data sets from the natural systems complicated by biogeochemical gradients and from coastal White sea, in particular (Dmitriev 2010, Koukina et al, 2001, 2003, 2010).

The research questions are clearly presented in the Abstract and Introduction sections as “biogeochemical characterization of surface sediments as a basis of environmental assessment of the region”. Since this work is a first biogeochemical testing of sediments from restricted exchange environments of the region, the authors consider it is not yet time for speculative hypotheses. However, the paper does provide new comprehensive data on TOC, n-alkanes, metals abundance and forms and introduce new methods of investigation. Thus, the performed combining of two selective extractions (weak acid and weak alkali) in order to isolate most labile metals has not only local but methodological and fundamental significance in the light of assessing trace metal bioavailability in the aquatic environments and biogeochemical behavior of contaminants.

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