Sediments of the Baltic Sea as a source of C, N, P

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Introduction

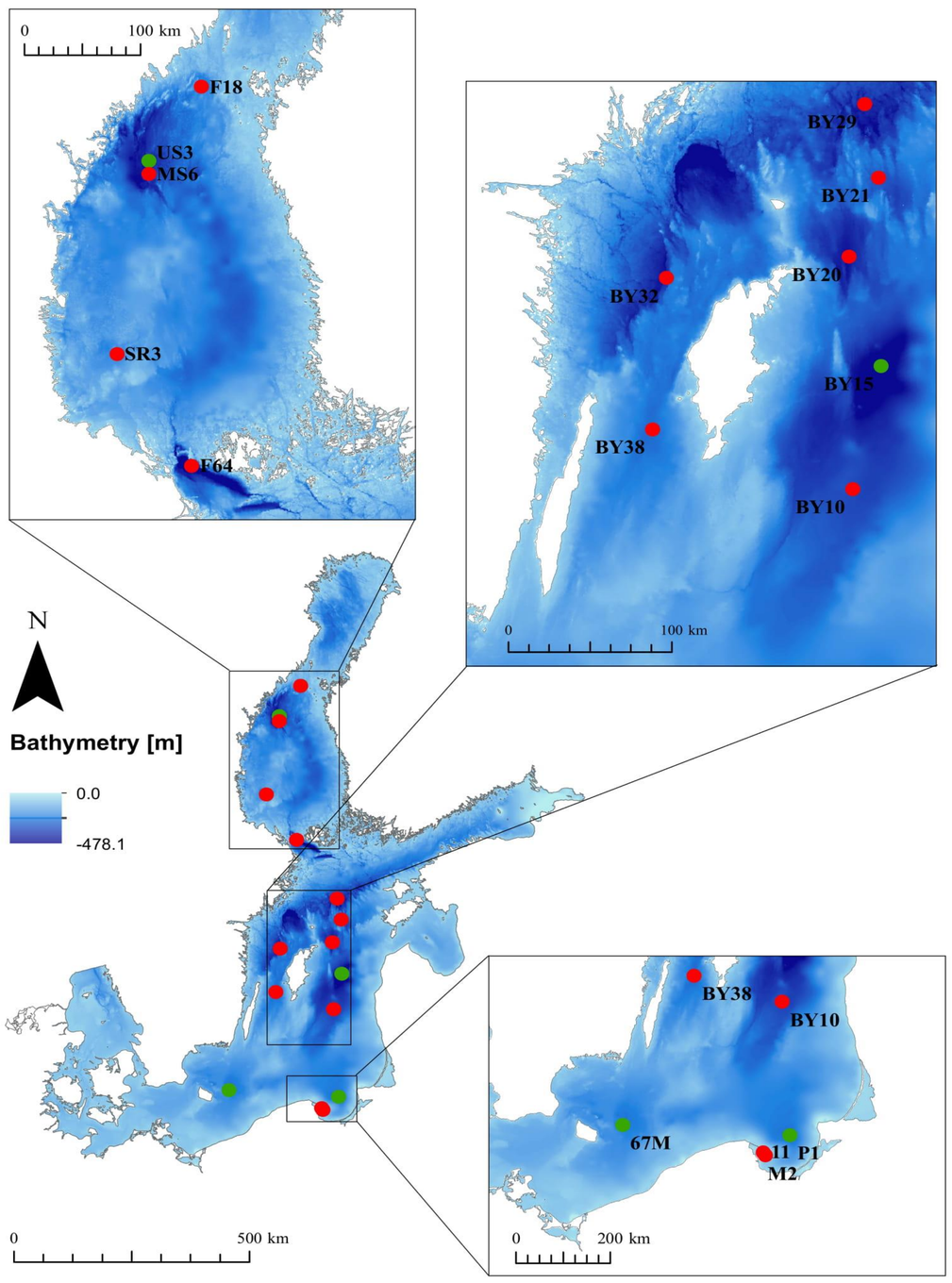
The Baltic Sea is under high environmental stress due to semi-enclosed shelf structure of the basin, large catchment area and nutrients overload, especially from anthropogenic sources. Eutrophication and its consequences are still major concerns within the Baltic Sea ecosystem. This status can be sustained by the release of large amounts of C, N and P stored in the sediments, even though, a decrease of N and P inputs from terrestrial sources has been noted over past years. Return flux of dissolved substances may have a vital impact on the eutrophication status, natural element cycling processes, biota and acid-base system within the Baltic Sea ecosystem.

Aim of study

The aim of this study is to provide the C, N, P return flux data for the major part of the Baltic Sea taking into account several features like: type of sediments, salinity and oxygen availability. This study has been divided into two parts:

- Determination of dissolved inorganic carbon (DIC), dissolved organic carbon (DOC) and nutrients (NH_4^+, PO_4^{3-}) concentrations in bottom and pore waters from surface sediments and sediment cores within the whole investigated area
- Calculations of diffusive return fluxes based on C, N, P distribution in the sediment and taking into account two methods (**1**, **2**)

Study area

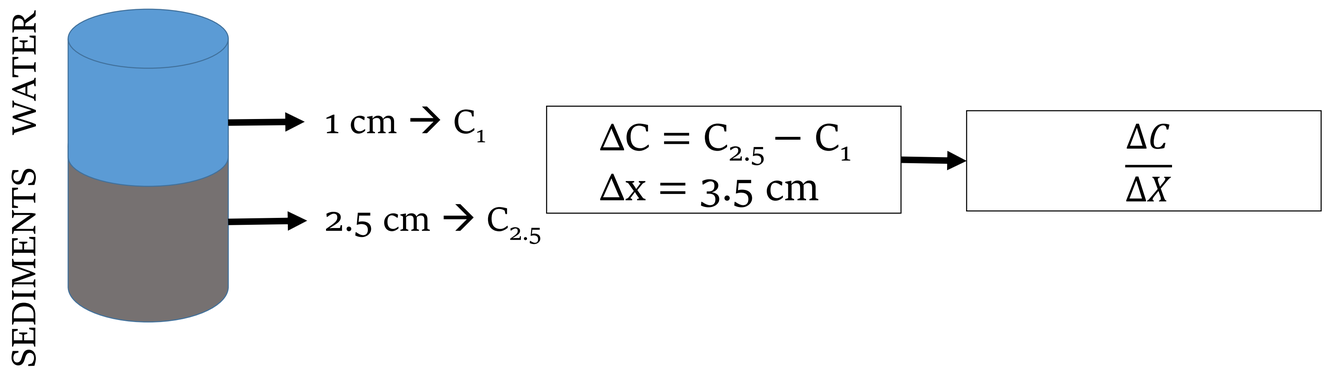


Methods

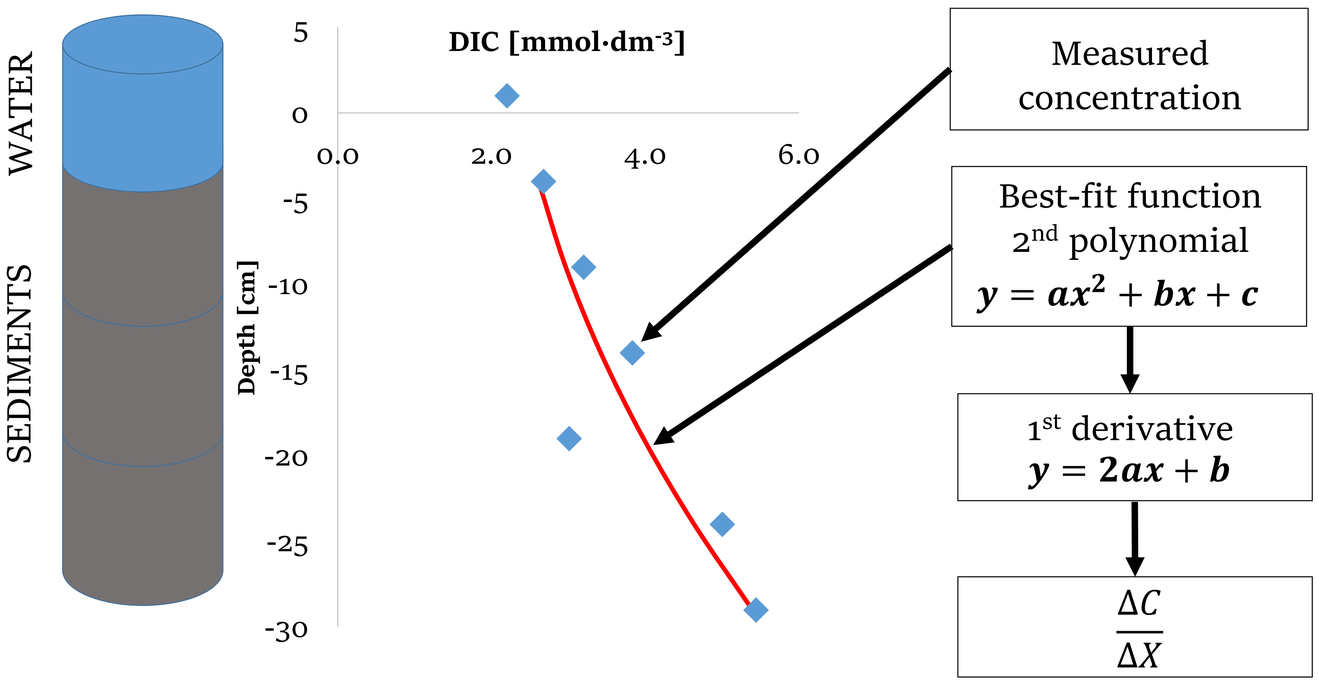
1st Fick's Law of Diffusion

$$J = -\phi \cdot D_{sed} \cdot \frac{\Delta C}{\Delta X}$$

1. Surface sediments (0-5 cm)



2. Sediment cores (0-30 cm)



Summary

- DIC, DOC, NH_4^+ and PO_4^{3-} concentrations in most cases were the highest in the pore water (0-5 cm), exceeding usually the concentrations observed in the overlying bottom water. This indicates that sediments should be considered as a significant source of C, N and P.
- The method and change of depth (Δx) chosen to calculations have great influence on obtained data of return fluxes.
- This study may result in revision of the C, N and P budgets in the Baltic Sea and may lead to better parametrization of sediments' role in the biogeochemical models.

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