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Quantification of Inventories and Fluxes of Trace Elements (Pb, Cd, Cu, Zn) in the Surface Water of a Stratified Water Body, Gotland Basin, Baltic Sea.

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To understand the fate of trace metals in the Baltic Sea, there is a need to quantify the interactions between the trace metal content of the water column, inputs into it, and export out of it. With a quantitative description of these processes the residence times of metals in the water column can be calculated, and they in turn can be used to describe how rapidly the system reacts to increasing or decreasing inputs.

The aim of our study was to quantify the trace metal inventories and transboundary fluxes for the surface waters of the Gotland Basin and to calculate a mass balance for this water body.

For the calculation of the trace metal inventories in the box, a high resoluted sampling was realised at different seasons. Additional, sediment trap studies were performed to calculate the vertical trace metal fluxes through the halocline. The study area was delineated by a box in the Gotland Basin which was bordered vertically by the water surface and the halocline and horizontally by the coast of Gotland and the coast of Lettland/Litauen. For this water body the following transboundary fluxes have been calculated:

- Atmospheric inputs of trace metals
- Lateral transport from adjacent bodies of surface water
- Diapycnical fluxes of dissolved trace metals at the halocline
- Vertical transport of particulate trace metals through the halocline

The lateral transport into and out of the box is important for the metals (Cd, Cu, Zn) with low affinity to particle surfaces. For particle reactive elements like lead, vertical sedimentation and lateral transport out of the box as much as atmospherical input and lateral input into the box are in the same order of magnitude.

Turbulent diapycnical mixing plays a minor role compared to the output caused by advective processes. The calculated residence times are $\sim$0.6 years for Pb; $\sim$2.5 years for Zn and $\sim$14 years for Cd and Cu. This demonstrates that the system reacts very fast for particle reactive elements like Pb.