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Distribution of ^{129}I in the Baltic Sea using a model approach

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Background

- Characteristics of 129I
- Baltic Sea environments
- Anthropogenic fallouts
- Distribution for 129I





Model Description

- Mass balance model (CoastMab)
- Gulf of Finland and Baltic Proper (SW, MW, DW)
Gulf of Riga and Bothnian Bay and Bothnian Sea (SW, DM)
- Conventional equations

$$M_{\text{Iodine}} = M_{\text{Iodine}} (t-1) + (F_{\text{Inflow}} - F_{\text{Outflow}})$$

- Dynamic processes
- Reasons for adopting this model



Modification and assumptions

- All the ^{129}I inventories in the Baltic Sea are coming from outside of the region.
- The only form considered here is total ^{129}I .
- ^{129}I contributions from sediments, biota, precipitation and river are negligible.

- Why ?



Structure

- Fluxes of water in and out of given compartment.
- Water mixing between nearby compartments.
- Diffusion from ^{129}I in each compartment .
- Turbulence defined by retention rates.



Mixing

This modeling accounts for how water temperature variations regulate mixing.

The greater the difference in mean temperatures between two adjacent layers, the smaller the advective mixing.

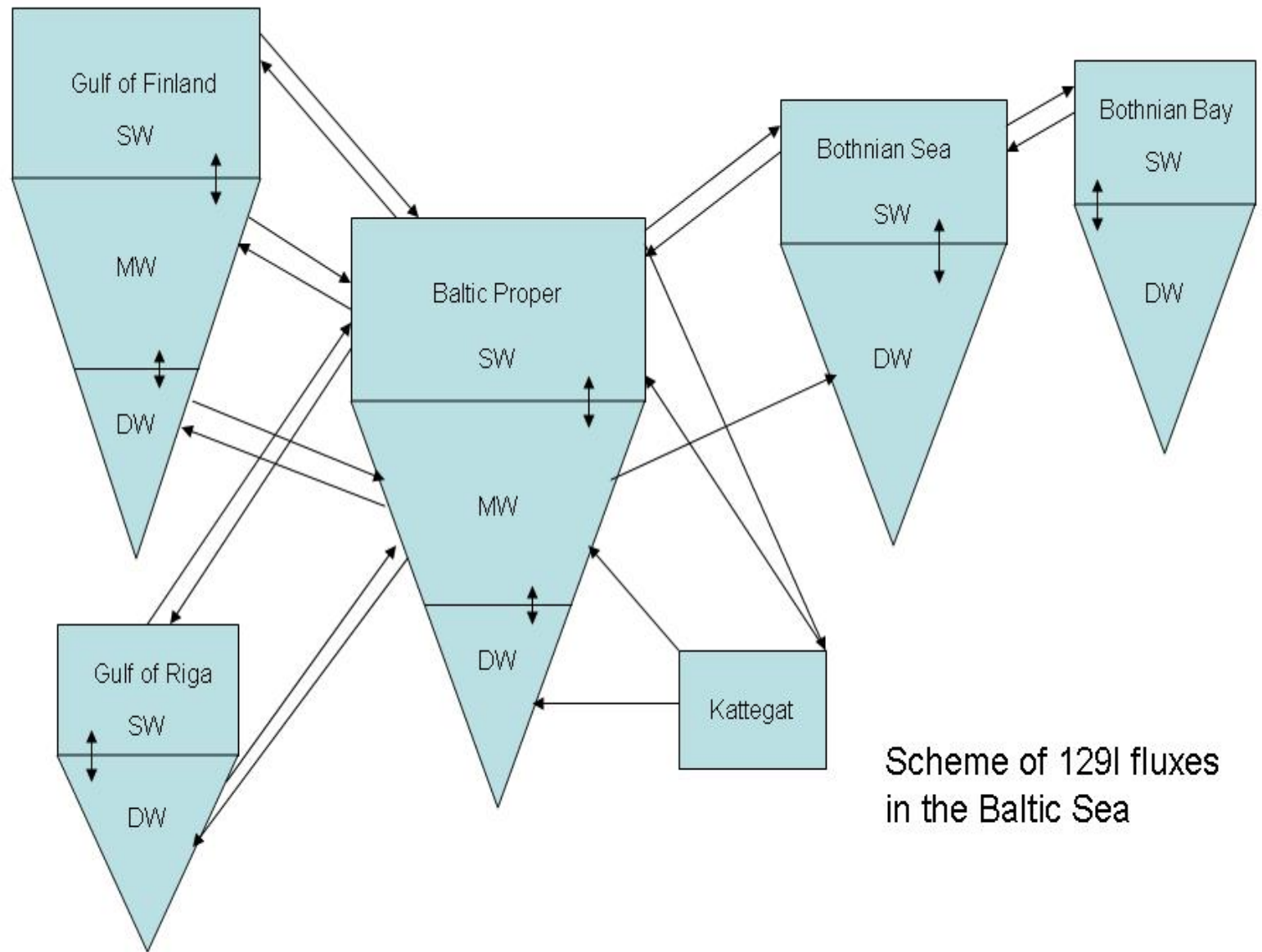


Diffusion

Residual water fluxes (as compared to the large-scale advective mixing processes), which may be referred to as **low-advective or diffusion transport processes regulated by concentration gradients of ^{129}I from high concentration areas to low concentration areas.**



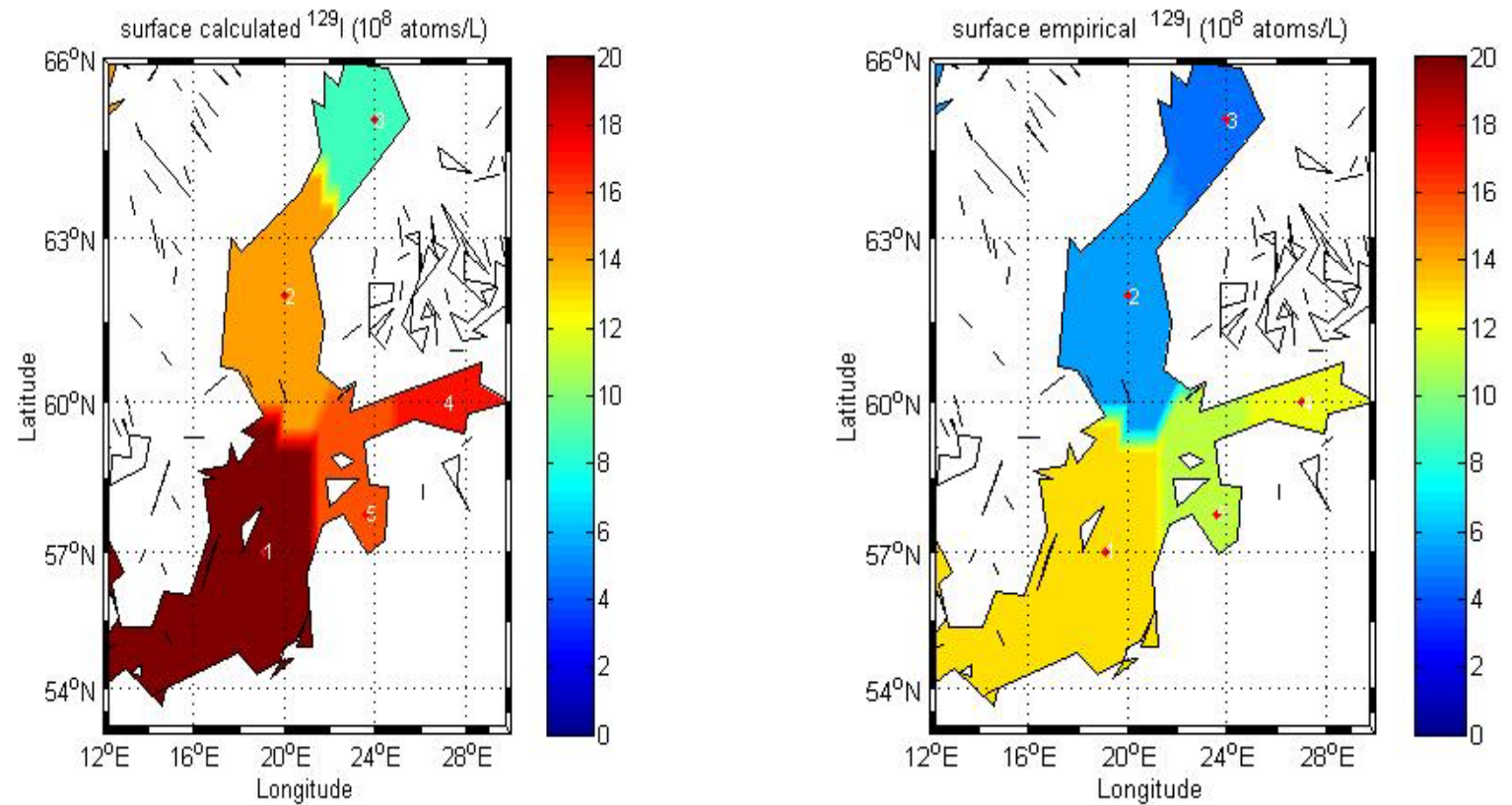
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Scheme of ¹²⁹I fluxes
in the Baltic Sea

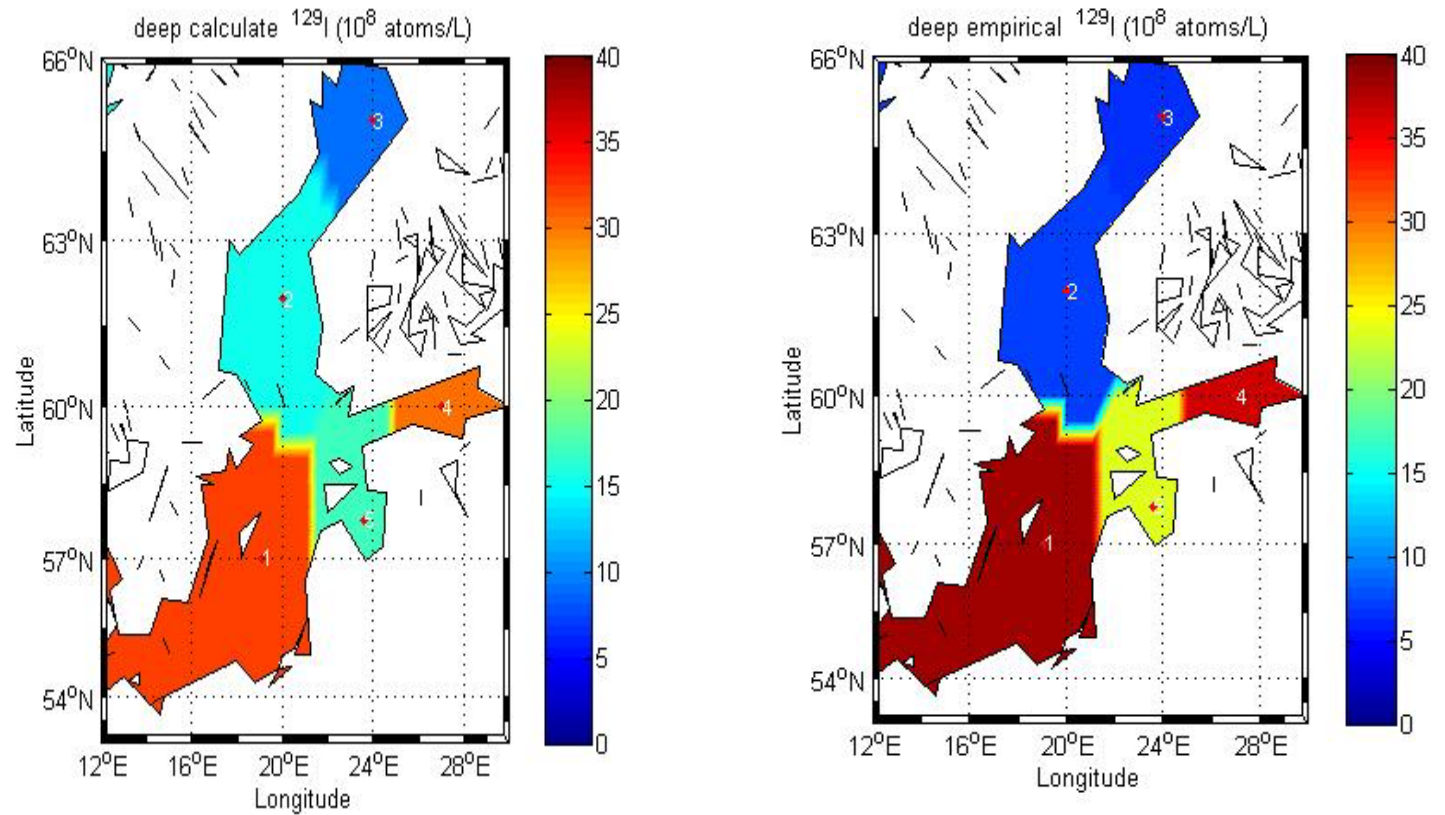


Results for surface water





Results for deep water





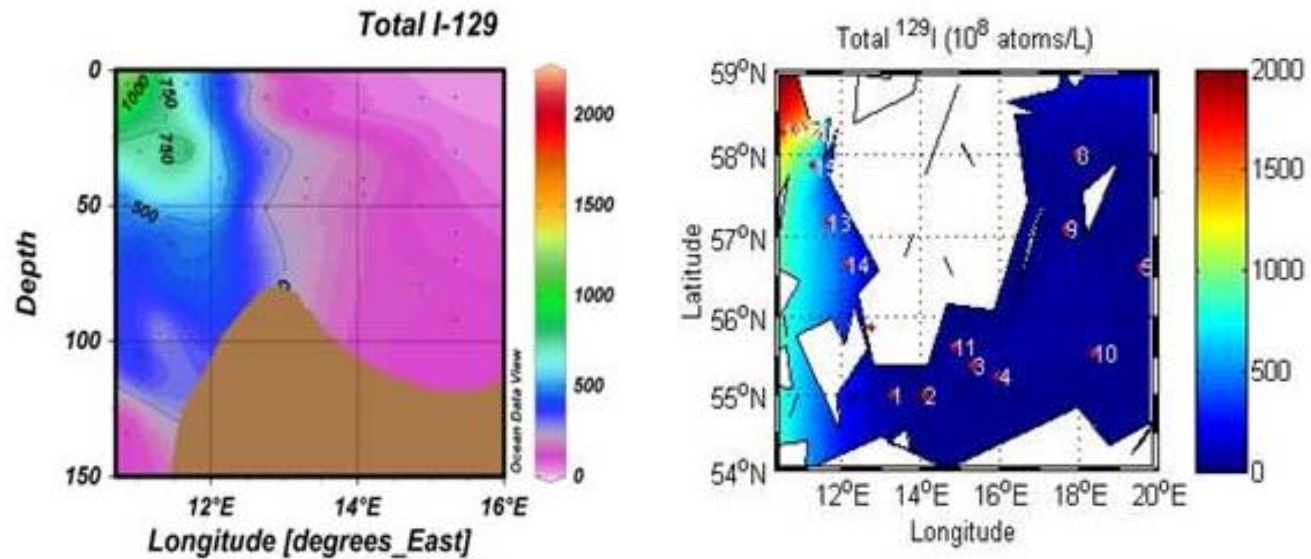
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Is the model valid ?



Validity for assumptions

- Could the model assume that most of ^{129}I existing in the Baltic Sea is carried from outside?



- Could the model ignore the sediment parts ?



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Valid for Results ?



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Thank you !