Water isotopes in estuarine lagoons at the German Baltic Sea coast

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Selker Noor, Schleswig-Holstein:

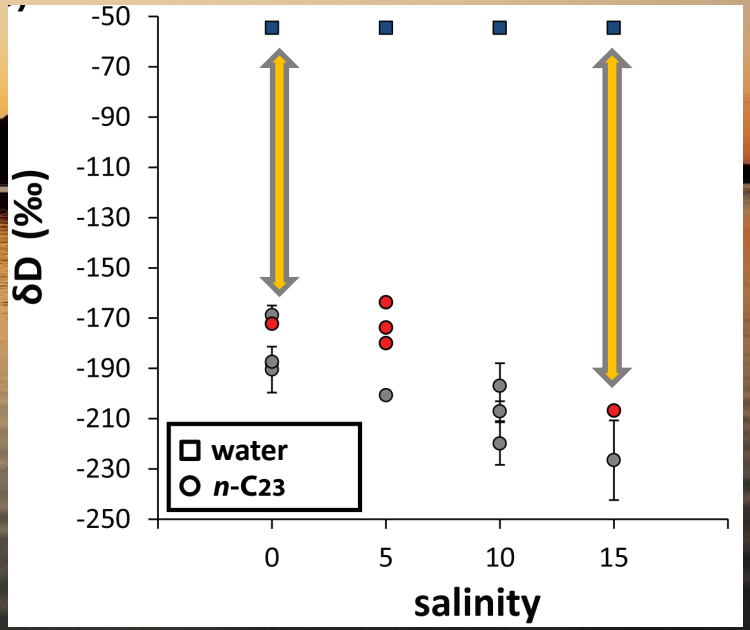
German Baltic Sea coast: characterised by a large number of estuarine lagoon systems

Aim of this study: to study water isotope dynamics within this systems

Wider motivation:

To understand hydrogen isotope dynamics in aquatic plant lipids along salinity gradients (DFG project Ai 134/3-1)

Lab experiment: biosynthetic isotope fractionation between source water and *n*-alkanes is larger at higher salinites



Aichner et al., 2017

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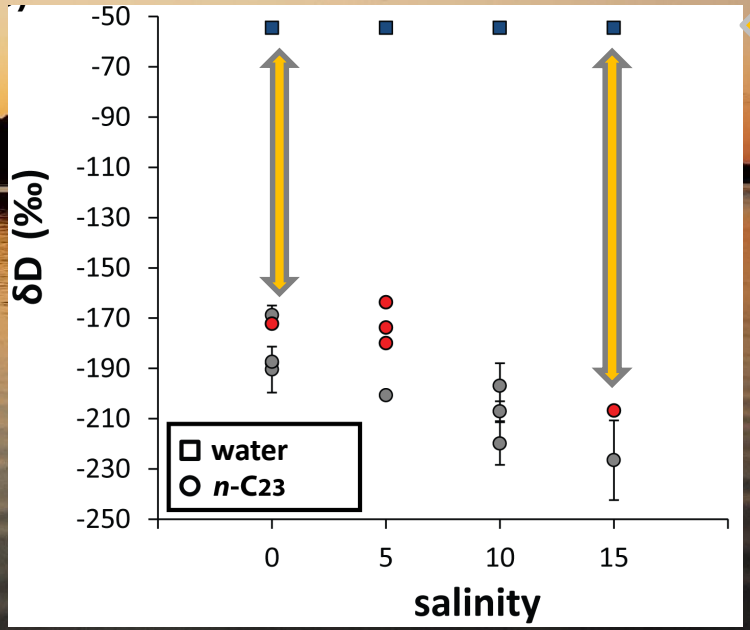


Aichner et al., 2017

In field transect studies:

To interpret δD values in lipids the source water signal must be understood!

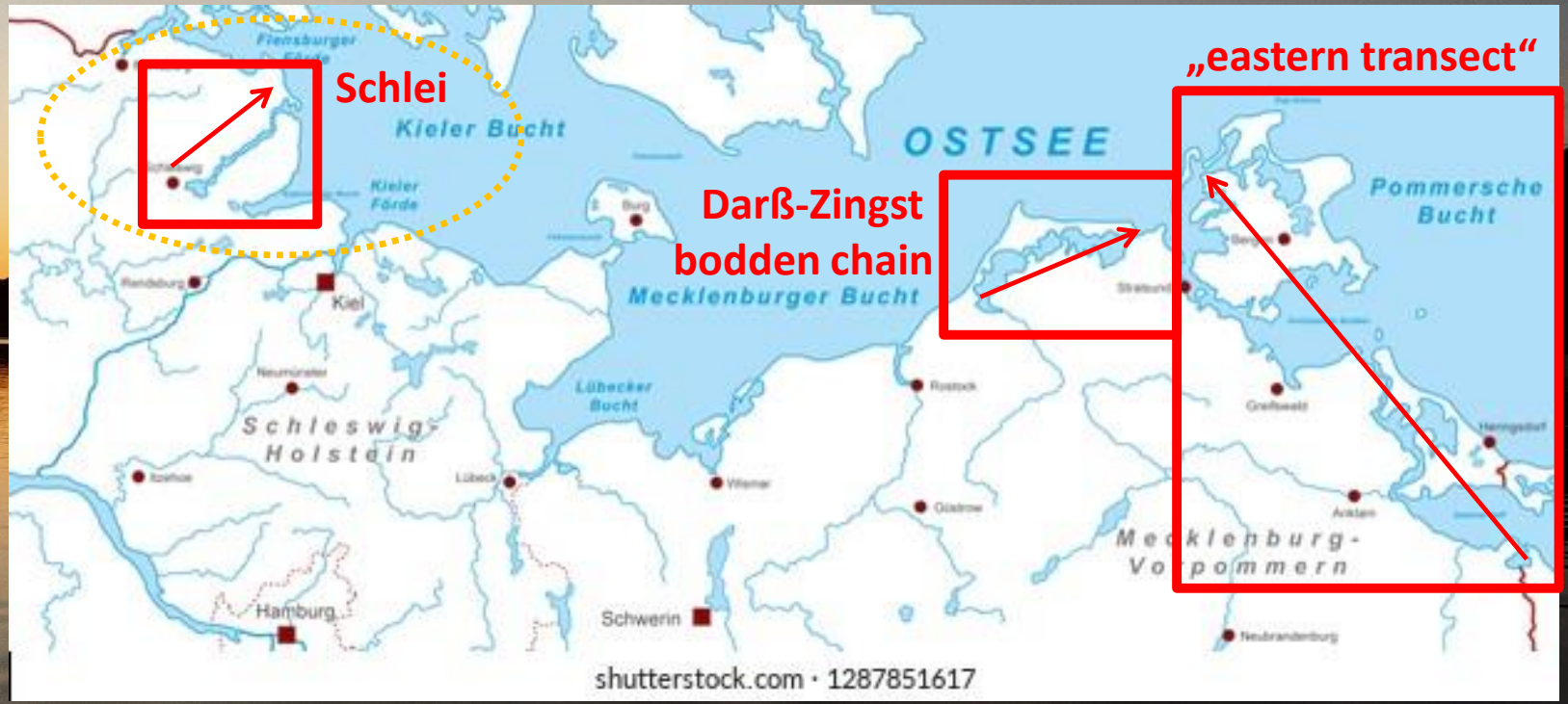
⇒ **seasonal dynamics**

⇒ **salinity – isotope correlations**

Baltic Sea coast:

estuarine systems offer great possibilities to study effects of salinity on plant isotopes

salinity gradients:

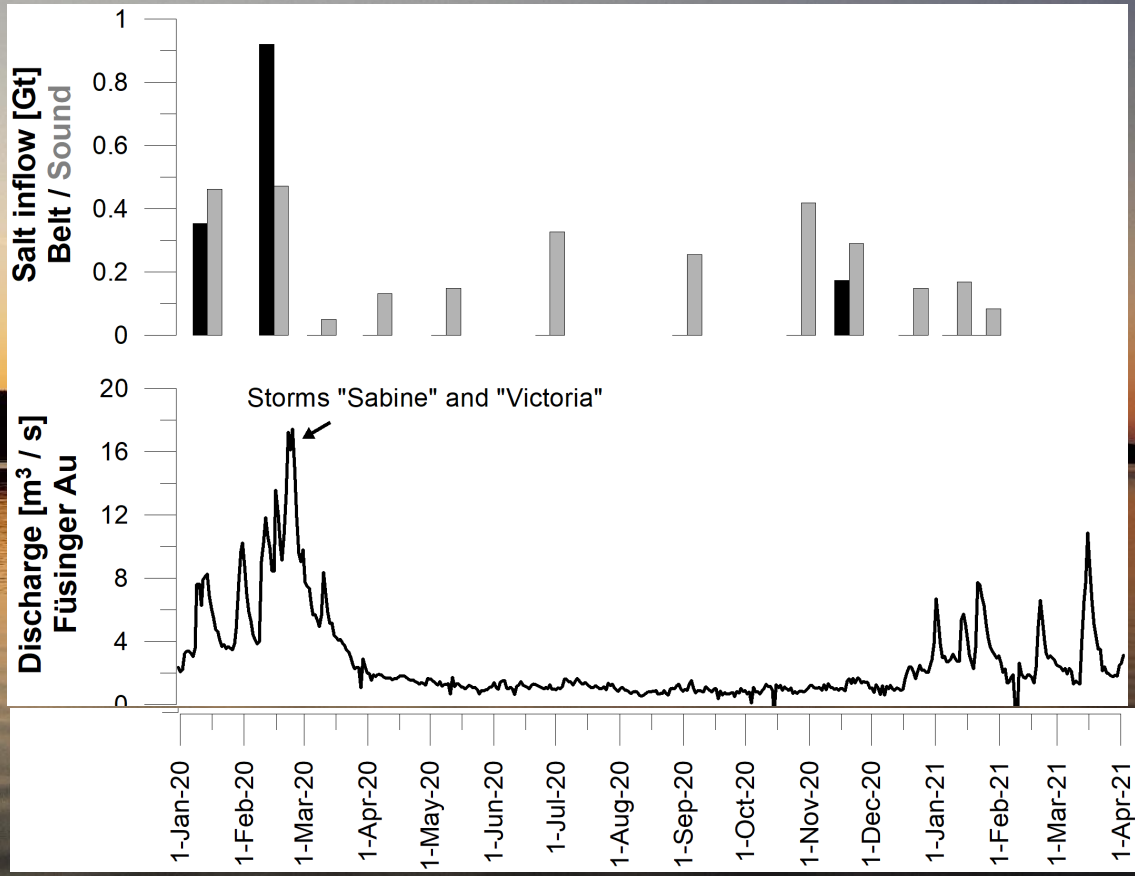


Salinity gradients: highly dynamic

March 2020: steep gradient (ca. 0 – 20 psu)

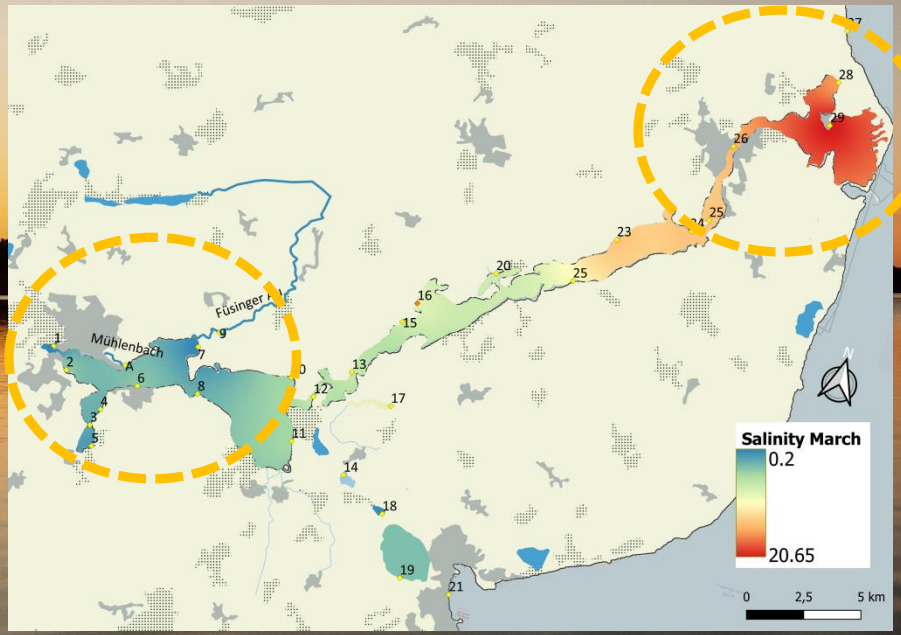
July 2020: less steep gradient (ca. 0 – 14 psu)

Salinity gradients: influenced by river discharge and salt intrusion events



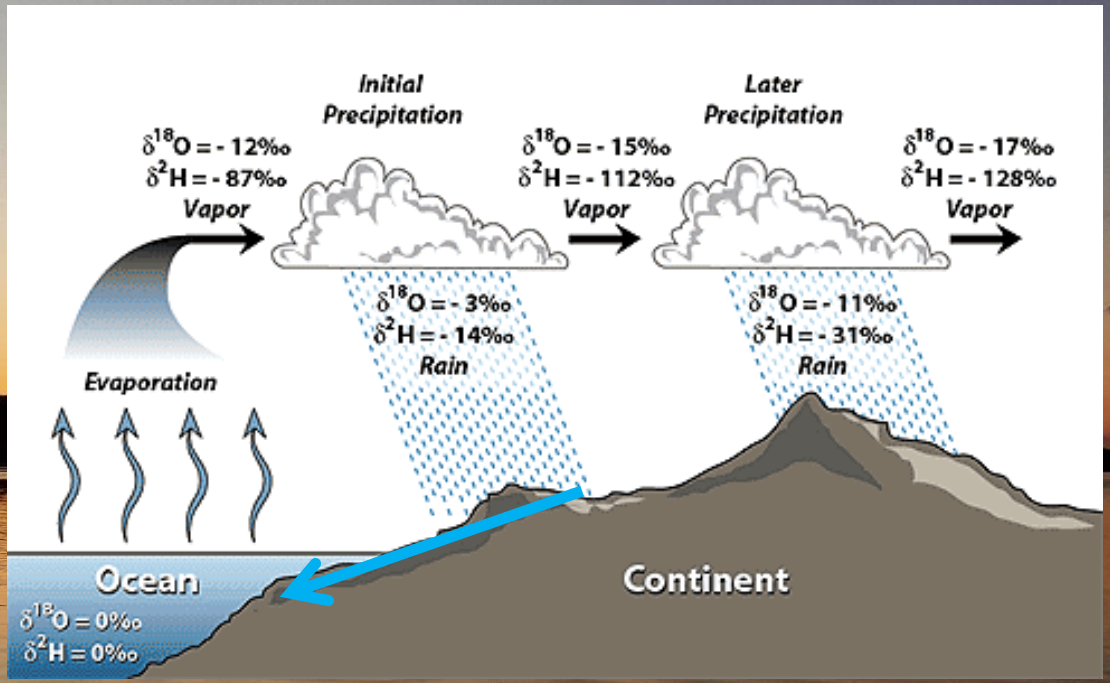
Salinity gradients: highly dynamic

March 2020:



July 2020:

Isotope dynamics:

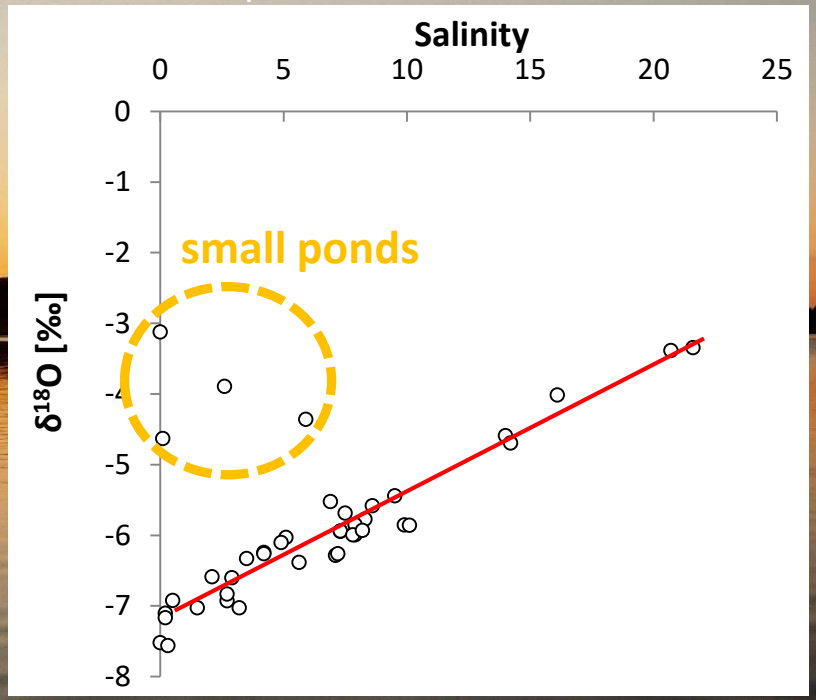


Surface backflow: depleted in heavy isotope compared to the marine realms

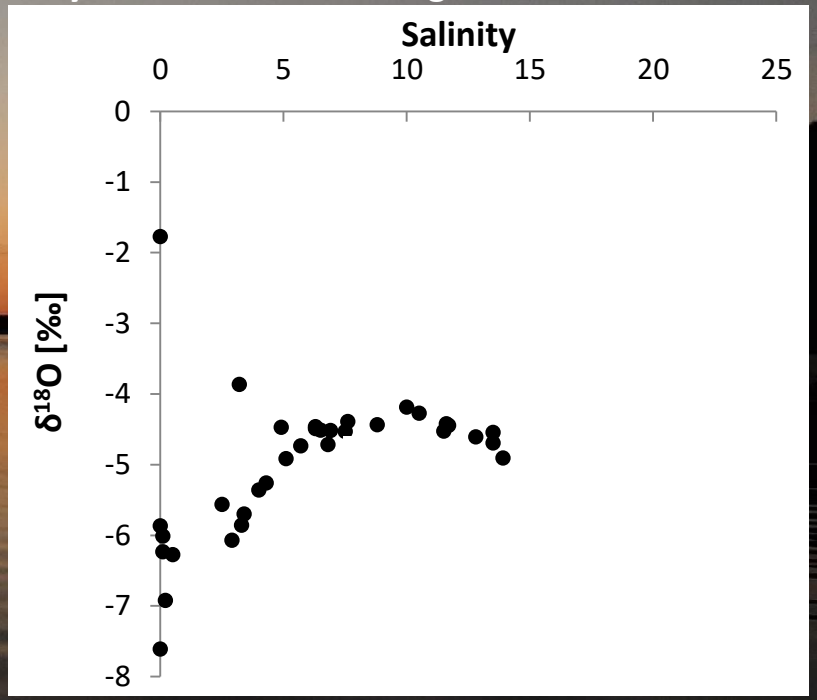
=> positive salinity – isotope correlation in the mixing zone (many studies)

Isotope dynamics along the Schlei: seasonality effects

March 2020: positive linear correlation

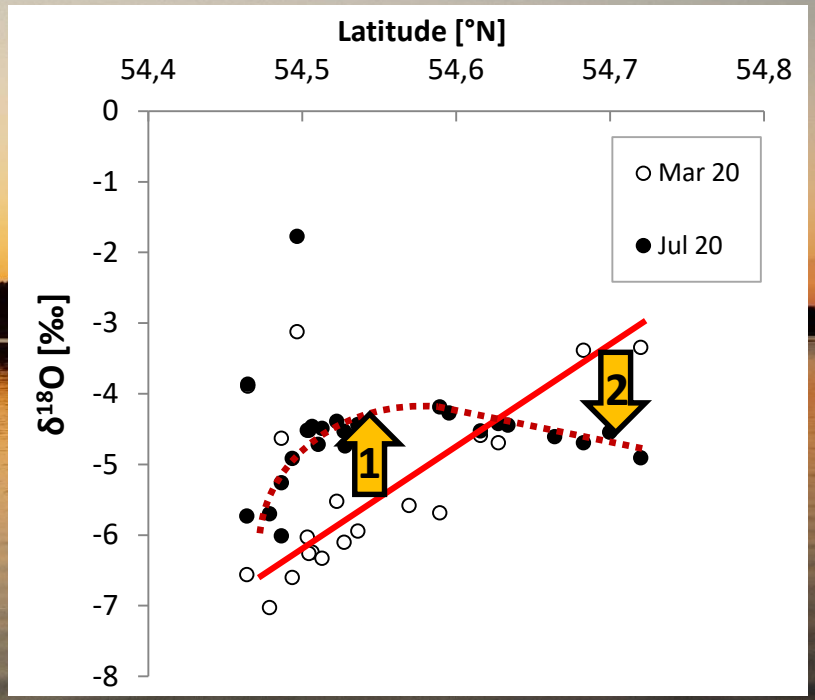


July 2020: reversal at higher salinities



Isotope dynamics

geographic correlation:



1. Inner Schlei:

more positive δ-values in summer

⇒ evaporation effects

⇒ isotope seasonality of inflows

2. Outer Schlei:

more negative δ-values in summers

⇒ Baltic Sea influence (lower salinity in summer)

⇒ lower salinity => lower δ-values

Take home message

A reversal of isotope-salinity correlation in estuarine systems is possible!

In summer:

=> dynamics of Baltic Sea influence the outflows of estuaries

=> evaporation effects in the inner lagoons

Much more related data in the manuscript **„Spatial and temporal dynamics of water isotopes in the riverine-marine mixing zone along the German Baltic Sea coast”** (in review; preprint at Authorea and Research Gate).

For questions / comments please email **bernhard.aichner@igb-berlin.de**


Thanks for your interest!