



## **Dual nitrate isotopes in the Dutch and German Wadden Sea and its tributary rivers**

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The Dutch and German Wadden Sea is threatened by the river-induced eutrophication due to riverine nitrate. Despite reduction of nutrient inputs to rivers in the past decades, nitrate inputs remain problematic, also because the estuary of one of the main contributing rivers, the Elbe River, has now developed from a net nitrate sink to a nitrate source.

During a sampling campaign in August 2014 we measured nitrate concentration and dual isotope signatures in the Wadden Sea and in two contributing rivers, the Ems and the Elbe River. Our goal was to assess individual riverine contributions and turnover mechanisms of nitrate in the estuaries and the Wadden Sea itself using dual nitrate isotopes as fingerprint signatures.

Nitrate concentration in the Ems River and Estuary twice exceeded that of the Elbe River.  $\delta^{15}\text{N}$  and  $\delta^{18}\text{O}$  of nitrate nevertheless showed that denitrification was active in the Ems estuary, removing nitrate, whereas nitrification produced new nitrate in the Elbe Estuary. Surprisingly, Wadden Sea samples appeared not to be entirely dominated by these two riverine source signatures. This suggests that additional turnover mechanisms in the Wadden Sea itself or inputs of nitrate from the open North Sea additionally affect the isotope composition of nitrate in the Dutch and German Wadden Sea.