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The influence of Lena River water inflow and shelf sediment-sea water exchange for the Nd isotopic composition in the Laptev Sea and Arctic Ocean.

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It has been suggested that the isotopic composition of Neodymium (Nd) in sea water can be affected by chemical exchange processes between water and sediments, which is generally termed boundary exchange. During the International Siberian Shelf Study in 2008 (ISSS-08) filtered (0.22μm) sea water, suspended particles and surface sediment samples were collected from the Laptev Sea and East Siberian Arctic Shelves (ESAS). The ESAS is the world's largest continental shelf and our main objective is to improve our understanding of the vast ESAS influence on trace element and isotope behavior in the Arctic Ocean.

Measurements of Nd isotopic composition (ε_{Nd}) and concentration (C_{Nd}) are presented for filtered seawater samples, sediments and suspended particles. The samples were collected in a transect stretching from the Lena River mouth to 77° N in the Laptev Sea. The surface water above 20 m depth is strongly affected by the fresh water inflow from the Lena River, with a salinity ranging from 0 to 21 PSU.

The Lena River water show high $C_{Nd,}$ ~600 pmol/kg and ε_{Nd} -15, which are similar to previously reported values, though the isotopic composition is slightly less radiogenic. In the Laptev Sea salinity gradient, the C_{Nd}in the filtered water above the halocline, at 3 m depth, drop and reach a C_{Nd} of 294 pmol/kg whereas the value of ε_{Nd} -15 remains similar to the Lena River water. For deeper water samples, below the halocline, the salinity reaches 32 psu showing a C_{Nd} of 52 pmol/kg and ε_{Nd} -11.4. The loss of dissolved Nd along the salinity gradient will be discussed along with the results form sediments and suspended particulate matter.

Sequential leaching, in four steps, was carried out on sediments and suspended particles to determine the potential influence of mobile Nd from the sediment on the concentration and isotopic composition of the dissolved Nd. The sequential leaches include separation of (i) easily exchangeable species (*ii*) reducible species released from a low concentration reducible agent, (*iii*) reducible species released from a high concentration reducible agent and (*iv*) oxidisable species. The major fraction released during leaching of sediments is associated with the reducible fraction, presumably in Fe- and Mn oxyhydroxides, carrying up to ~15% of the total Nd in the sediments. The oxidisable fraction released up to ~5% of the total Nd. If the major part of Nd in the oxidisable fraction comes from Nd bound to organic material, a large part might be released if the organic material is degraded on the shelf. The fraction released as easily exchangeable corresponds only to ~1% of the total amount in the sediments.

The result will be discussed in terms of how the Nd behaves during estuarine mixing and how the underlying sediments modify the isotopic composition of the shelf waters. Data from the sequential leach will be used to constrain the processes controlling Nd interaction with the sediments.