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Fate and transport of nitrogen in soils, sediment and water of the Lena Delta, Northeast Siberia

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Soils and sediments in the Lena Delta in Northeast Siberia store large amounts of organic matter including organic bound nitrogen. This nitrogen is not directly available for plants and primary production, but can be remineralised in the soils or in sediments after erosion to the Lena River. Our study aims to estimate the load of reactive nitrogen from terrestrial sources into the Arctic Ocean. Therefore, water and sediment samples were collected along a transect (~200 km) from the centre of the Delta to the open Laptev Sea in summer 2019. On the collected samples, we will measure dissolved organic and inorganic nitrogen, particulate nitrogen and CN ratio. In addition, the ¹⁵N stable isotope values of these components will be determined to identify nitrogen sources, sinks and processes of nitrogen transformation. Additionally, we carried out incubation experiments in the field to determine the potential remineralisation rates of various soil types in Lena water and nutrients fluxes of the sediments. The load of dissolved inorganic nitrogen in the Lena water in the delta was very low and low nitrate and silicate concentration indicate uptake by phytoplankton. Outside the Lena Delta, a lens of nutrient depleted freshwater covered the salty Arctic Ocean water, which had higher loads of reactive nitrogen. The organic matter content of the soils and sediment is highly variable and ranges from 1 to 45 %. This organic matter is the source of reactive nitrogen, which is determined in incubation experiments and using nitrogen stable isotopes. We found that especially the unvegetated soils and sediment are sources of reactive nitrogen in the end of vegetation period, and are potentially sources of nitrous oxide emissions.