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Elemental and isotopic records of nitrogen in northern boreal lake sediments over the Holocene

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Elemental concentrations and stable isotopes of nitrogen (N) were analyzed in lake sediment cores spanning the past 9 000 years to examine how past variations in climate and soil development may have affected N delivery and preservation in northern boreal lakes. We sampled four lakes in a catchment located near the current latitudinal tree line in Finland. The area has thus experienced climatic and latitudinal vegetation transitions over the Holocene. The sediments were analyzed for carbon (C) and N elemental and isotopic (δ13C and δ15N) compositions and high-resolution sediment chronologies were based on radiocarbon (14C) and lead (210Pb) dating using plant macrofossil and bulk sediment material. These geochemical records will be analyzed to test the hypothesis that spatial and temporal variation in the N content of these lakes is regulated by the degree of allochthonous input. The lakes have had similar climatic forcing, but different positions and water inputs along the catchment. We will apply existing climatic reconstructions for the area and test the coherence in the N records between the lakes. We expect that the Holocene climatic shifts shape the sedimentary elemental and δ15N records through shifts in vegetation cover and hydrology and that the strength of the signal varies between the lakes depending on wetland development in each sub-catchment. We will discuss the impact of landscape patterns on the effects and interpretation of past and future climatic forcing on the lacustrine N regimes.