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Dissolved organic nitrogen (DON) losses from nested artificially drained lowland catchments with contrasting soil types

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Artificial drainage is a common practice to improve moisture and aeration conditions of agricultural land. It shortens the residence time of water in the soil and may therefore contribute to the degradation of peatlands as well as to the still elevated level of diffuse pollution of surface water bodies, particularly if flow anomalies like preferential flow cause a further acceleration of water and solute fluxes. Especially in the case of nitrate, artificially drained sub-catchments are found to control the catchment-scale nitrate losses.
However, it is frequently found that nitrate losses and nitrogen field balances do not match. At the same time, organic fertilizers are commonly applied and, especially in lowland catchments, organic soils have been drained for agricultural use. Thus, the question arises whether dissolved organic nitrogen (DON) forms an important component of the nitrogen losses from artificially drained catchments. However, in contrast to nitrate and even to dissolved organic carbon (DOC), this component is frequently overlooked, especially in nested catchment studies with different soil types and variable land use.
Here, we will present data from a hierarchical water quantity and quality measurement programme in the federal state Mecklenburg-Vorpommern (North-Eastern Germany). The monitoring programme in the pleistocene lowland catchment comprises automatic sampling stations at a collector drain outlet (4.2 ha catchment), at a ditch draining arable land on mineral soils (179 ha), at a ditch mainly draining grassland on organic soils (85 ha) and at a brook with a small rural catchment (15.5 km^2) of mixed land use and soil types. At all sampling stations, daily to weekly composite samples were taken, while the discharge and the meteorological data were recorded continuously. Water samples were analyzed for nitrate-nitrogen, ammonium-nitrogen and total nitrogen.
We will compare two years: 2006/07 was a very wet year (P = 934 mm) with a high summer precipitation, while 2007/08 was considerably drier than average (P = 554 mm). We will present concentrations and losses of all nitrogen fractions and their relationship to the dominating soil type, precipitation characteristics, discharge, and fertilization practice. Furthermore, we will assess whether the determination of DON helps to improve the correlation between nitrogen input and nitrogen losses.