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Reconnection of Danube Floodplains: Use of stable isotopes to determine the effects on nitrogen cycling

Nina Welti (1,2), Elisabeth Bondar-Kunze (1,2), Matthias Mair (1,2), Wolfgang Wanek (3), Patricia Bonin (4), Gilles Pinay (5), Thomas Hein (1,2)

(1) WasserCluster Lunz, Limnology, Lunz am See, Austria (nina.welti@boku.ac.at), (2) University of Natural Resources and Life Sciences, Vienna, Austria, (3) University of Vienna, Vienna, Austria, (4) Université de la Méditerranée, Marseille, France, (5) University of Birmingham, Birmingham, England

The Danube River and its waters have been changed to fit the needs of society for agriculture and hydro-power. Particularly, there is a significant decrease of hydrologic exchange of surface waters. The secondary channels and various water bodies within the floodplain are disconnected from the main river flow for long periods. In order to counteract these negative impacts on the floodplains, large scale restoration projects aim to increase hydrologic exchange with the floodplain. Yet, the consequences of reconnection on nitrogen cycling are less clear. In this study, floodplain reconnection and disconnection have been mimicked in mesocosm experiments to understand the effect on nitrate uptake and particularly, denitrification. The presented study quantified the rates of denitrification using short term mesocosm incubations with ^{15}N-NO_3 tracing to follow the pathway of nitrate uptake within different floodplain sections. Triplicate sediment samples from two sites were incubated in the laboratory for five days in 25L mesocosms. The nitrate delivery regime and dissolved carbon content where changed to mimic disconnection and reconnection schemes. Denitrification, anammox, and DNRA rates were calculated based on isotopic analysis using a comprehensive mathematical calculation. Water sediment interactions changed which changed the rate of denitrification as well as the relationship between N_2 and N_2O. We present how floodplain disconnection promotes N_2O production, while floodplain reconnection promotes complete denitrification, resulting in N_2 production.