

Role of sediments for dissolved organic carbon (DOC) in lakes and reservoirs

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Increasing dissolved organic carbon (DOC) concentrations have been observed in many surface waters and the increasing trend is expected to continue in the future. This leads to higher water treatment costs to remove the DOC, and to potential formation of toxic, carcinogenic disinfection by-products like trihalomethanes. Ecological status can also be affected since DOC will alter the under water light regime. The sediment water interface is a potential hot spot of DOC turnover in aquatic systems. We investigated benthic DOC exchange for a complete year in two similar reservoirs (Hassel and Rappbode pre-dams, Germany) located in catchments with different land use patterns. We quantified seasonal DOC and other solute fluxes in both the riverine and lacustrine zones of the reservoirs by sediment incubation at in situ conditions. This allowed us to assess the effect of redox conditions and temperature on benthic matter fluxes. Redox conditions appeared to be the primary regulator of DOC exchange, with uptake of DOC under oxic conditions and release of DOC under anoxic conditions. Temperature effects were apparent by the increased DOC fluxes in summer, in the lacustrine zones. The benthic flux of DOC was closely linked to the fluxes of iron and phosphorus, suggesting that adsorption of DOC to Fe mineral surfaces was the major regulating mechanism behind the observed results. The DOC fluxes seem not to be influenced by the trophic state of the reservoirs which indicates that land use differences in the catchments have minimal effects on benthic DOC turnover.