



Long term pattern in runoff DOC fluxes in two boreal upland forested catchments: does the increasing NEE affect DOC fluxes?

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Part of the carbon fixed in terrestrial ecosystems is transferred through streams and rivers to lakes and the carbon is finally released as CO₂ to the atmosphere through respiration or buried into lake sediments. Recently it has been shown that lake and stream water dissolved/total organic carbon (DOC/TOC) concentrations throughout the boreal zone are increasing. There are several theories which could explain this trend; land use changes, decrease in atmospheric acid deposition, changes in seasonal patterns in temperature and precipitation and increase in below ground C allocation due to increase in atmospheric CO₂ concentration or soil warming.

Here, we tested a hypothesis that increase in photosynthesis is reflected in soil water DOC concentrations and finally in DOC fluxes from the catchment. We used a 15-year-long continuous monitoring data on catchment runoff, DOC concentration in the runoff, GPP, TER and NEE of the ecosystem of two small upland boreal catchment areas in Southern Finland to explain the long term trends in runoff DOC fluxes. We also studied the long term trends in the amount, DOC concentration and pH of throughfall over the study period ranging from 1998 to 2012.

Our results indicate that the DOC concentration and the DOC fluxes have increased over the last 15 years. The DOC flux was mainly determined by the amount of runoff flow but in years when the runoff flow was above the long term average the NEE was a more important explanatory factor for annual DOC fluxes than the annual temperature sum.