Geophysical Research Abstracts
Vol. 21, EGU2019-7776, 2019
EGU General Assembly 2019

N2O and CH4 fluxes of forested floodplains in the Danube National Park, Austria

Andreas Schindlbacher, Erwin Moldaschl, Kerstin Michel, and Barbara Kitzler

Bundesforschungs- und Ausbildungszentrum für Wald, Naturgefahren und Landschaft, Forest Ecology, Vienna, Austria (andreas.schindlbacher@bfw.gv.at)

Favorable hydrological properties combined with periodic input of organic matter and nutrients after flooding dispose floodplain forests as potential hot spots of carbon (C) and nitrogen (N) cycling. Environmental conditions could also be favorable for the production of nitrous oxide (N2O) and methane (CH4). We have measured soil N2O and CH4 fluxes at 18 sites in the Danube National Park ($\sim$ 10.000 ha), spanning natural gradients from frequently to less frequently flooded forest, from 2017 until 2019. Three intensive monitoring sites were additionally equipped with auto-chambers to measure soil greenhouse gas fluxes in daily resolution. Starting in 2018, stem N2O and CH4 fluxes were measured at the intensive sites as well. Against our expectations, floodplain forest soils acted primarily as CH4 sinks. Though we observed CH4 emissions shortly after flooding, the soil at the frequently flooded sites still showed average CH4 uptake of 18 μg CH4-C m-2 h-1 during the first 18 month of our study. Less frequently flooded sites showed soil CH4 uptake rates of on average 54 μg CH4-C m-2 h-1. Nitrous oxide was mostly emitted from soil and fluxes increased shortly after flooding events (30 – 50 μg N2O-N m-2 h-1). Highest soil N2O emissions (> 70 μg N2O-N m-2 h-1) were, however, measured independently of flooding during freeze-thaw periods in late spring. Tree stems fluxes differed among tree species (poplar, ash) and among stem sampling heights. Poplar showed sharply declining CH4 and N2O emissions with increasing stem measurement height. Ash showed opposite trends with regard to CH4 and no distinctive pattern with regard to N2O. Generally, stems mostly emitted CH4 and N2O, but emissions were very low.