



## UFZ-Seminar „Wasser und Umwelt“

17. Juni 2013, 15.00Uhr

Saal, Brückstr. 3a, Magdeburg

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spricht zum Thema:

### **Carbon and greenhouse gas concentrations in boreal lakes – links to water chemistry, land use and climate**

The role of freshwater ecosystems in landscape carbon (C) cycling and primary drivers behind freshwater C balance have remained poorly known, although lakes and rivers are an important landscape component and cover over 10% of Finland's total area. We have studied CO<sub>2</sub> evasion and average Holocene C accumulation in 209 and 122 lakes, randomly selected from the Nordic Lake Survey data base for greenhouse gas and sediment C stock studies, respectively. Majority of Finnish lakes are supersaturated with CO<sub>2</sub> and CH<sub>4</sub> and our data demonstrate that lakes are important conduits for transferring terrestrially fixed C into the atmosphere. The annual CO<sub>2</sub> evasion from Finnish lakes was estimated as 1.4 Tg C, approximately 20% of the average annual C accumulation in Finnish forest soils and tree biomass in the 1990s. Both carbon pools and fluxes were linked to several drivers reflecting topography, climate, land use and atmospheric deposition, whereas  $C_{\text{evasion}}/C_{\text{accumulation}}$  ratio ( $C_{\text{ev}}/C_{\text{acc}}$ ) was significantly correlated only with nitrogen (N) and maximum depth of the lake. In northern boreal zone atmospheric N deposition is generally low and biological processes are N limited owing to low primary production and slow mineralization of organic matter in cold, nutrient-poor, acidic conditions. Landscape C cycling integrates physical, chemical and biological processes and linkages between atmospheric, terrestrial and aquatic C cycling, and climatic drivers generally play a key role in short term C balance fluctuations. In contrast, our data indicate nitrogen/fertility to be a key contributing factor to long term C balance - increasing  $C_{\text{ev}}/C_{\text{acc}}$  and thus decreasing the role of lakes in landscape C sequestration in boreal zone. Numerous studies have recently shown increasing DOC (dissolved organic carbon) concentrations in lakes and streams in northern mid latitudes. The long term Finnish data bases will be used to study the most important drivers behind trends in DOC. Climate change scenarios predict increasing precipitation and temperature for Northern Europe which together with patterns of N deposition might significantly contribute to freshwater biogeochemical cycles and landscape C balances.