Geophysical Research Abstracts
Vol. 14, EGU2012-12546, 2012
EGU General Assembly 2012

Key factors determining DOM and colour in boreal forest lakes

G. Riise (1), D. Hongve (2), S. Haaland (3,1), R. Müller (4), and S. Sobek (4)

(1) Norwegian University of Life Sciences, P.O. Box 5003, NO-1432 Aas, Norway (gunnhild.riise@umb.no), (2) Norwegian Institute of Public Health, P.O. Box 4404, NO-0432 Oslo, Norway (dag.hongve@fhi.no), (3) Norwegian Institute for Agricultural and Environmental Research, NO-1432 Aas, Norway (staale.haaland@bioforsk.no), (4) Department of Ecology and Genetics/Limnology, Uppsala University, Norbyvägen 18D, 75236 Uppsala, Sweden (roger.muller@ebc.uu.se, sebastian.sobek@ebc.uu.se)

Proposed drivers for increased dissolved organic matter (DOM) and colour in several boreal lakes include changes in temperature, runoff, atmospheric deposition chemistry and land use. Large annual and regional variations in DOM concentration and reactivity, however, suggest a complex interplay among different processes that is not fully understood. A long term study (1983-2011), in a pristine forest lake area, SE Norway reveals that enhanced values of dissolved organic carbon (DOC) and colour to a large extent can be explained by reduction in sulphate deposition and enhanced precipitation. However, even though the lakes are subject to similar precipitation chemistry and weather conditions, still there are large annual and spatial variations in DOC and colour within the studied area (app. 150 km2). Hence, the response factors for the different lakes vary. Mean values for DOC and colour for the individual lakes (n=24) during the whole study period ranged between 2-15 mg C L-1 and 3-120 mg Pt L-1, respectively. For periods with annual extremes in flow, the concentrations got much higher, where lakes with intermediate to high DOC levels responded more quickly to external changes compared to more clear water lake. Landscape elements such as catchment to lake surface area, elevation and water retention time explained a large part of the vulnerability for long term and short term changes in DOC and colour. Total element concentration of Al, N, P and Si were generally positively related to DOC, reflecting the terrestrial origin of DOM and its ability to carry associated elements.
Even though there was a strong positive correlation between DOC and colour, the ratio between colour and DOC varied for different flow periods, where DOM generally got more coloured during high flow periods. There is also a general increase in the colour to DOC ratio with increased DOC values of the lakes, implying that spectroscopic characteristics of DOM is indicative of flow pattern and the link between the terrestrial and aquatic environment.