Geophysical Research Abstracts
Vol. 15, EGU2013-9651-1, 2013
EGU General Assembly 2013

Long term patterns in dissolved organic carbon, major elements and trace metals in boreal headwater catchments: Trends, mechanisms and heterogeneity.

Stephen Oni (1), Martyn Futter (1), Kevin Bishop (1), Stephan Kohler (1), Mikael Ottosson-Lofvenius (2), and Hjalmar Laudon (2)

(1) Swedish University of Agricultural Sciences, Dept. Aquatic Science and Assessment, Uppsala, Sweden (stephen.oni@slu.se, +46 18 673156), (2) Swedish University of Agricultural Sciences, Dept. Forest Ecology and management, Umea, Sweden

The effects of climate change are currently apparent in the boreal landscape of northern Sweden. Warmer temperature and declining acid deposition are affecting runoff chemistry. These effects are mediated by landscape type. Markedly different responses are observed in streams draining forest and mire landscape elements. Here, we assess long-term water quality time-series from three nested headwater streams draining upland forest (C2), peat/mire (C4) and mixed (C7) (forest and mire) catchments. Temporal trends in weather and runoff (1981-2008); dissolved organic carbon concentration [DOC] (1993-2010) and other water quality parameters (1987-2011) were assessed. Historically, sulfate deposition is low in the region and is further declining. There was no significant annual trend in precipitation or runoff but a significant monotonic increasing trend existed in air temperature and length of growing season. Stream [DOC] was positively correlated with some trace metals (copper, iron and zinc) and negatively with several other chemical parameters (e.g. sulfate, conductivity, calcium). Both sulfate and conductivity showed declining trends, while a significant increase was observed in pH during winter and spring. Calcium and magnesium showed monotonic decreasing trends. The declining trajectories of stream base cation and sulfate concentrations during other times of the year were not accompanied by changes in pH and alkalinity. Water temperature increased significantly both annually and in most months while iron and DOC concentrations showed significant increases in autumn months. Though all streams showed significant positive trends in [DOC] in autumn, only C2 had a significant annual increasing trend. There was also a shift in the magnitude of variability in spring [DOC] and increasing trend of summer baseflow [DOC] in C2 and C7.