Ex-Jobb possibilities!

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Forest Harvest Impact on Mercury in Surface Waters:

"Water is a mirror of the landscape" and in Sweden that mirror shows mostly forests. But what happens when we harvest the forest? Plans to dramatically increase forest growth and harvest for biofuels have renewed research on the aquatic effects of forest harvest and how to mitigate them. Changes in the amount and pathways of water flow are believed to underlie many of the environmental affects created by forest harvest, including erosion, pulses of nitrate in runoff, and long-term increases in mercury loading to aquatic ecosystems. In a paired catchment study near Västerbotten, an entire catchment was harvested in 2009. What has happened to the concentrations of mercury in runoff and other chemical constituents after harvest? A thesis project can investigate the data that has collected from this site, with a focus on modelling groundwater levels before and after harvest. As data for the project, a month of field work will complement previous measurements. Additional project employment during the summer of 2011 is possible.

Mercury Evasion from mires

Tens of thousands of Swedish lakes have fish with mercury (Hg) levels so high that they are unsafe for human consumption. International efforts to alleviate this problem are focused on reducing Hg deposition. However, it seems doubtful that these efforts will lessen the burden on Swedish fish, since so much Hg has already accumulated in the superficial organic soils of peatlands. If the only process that removes Hg from the peatland soils were runoff, it would take centuries without any Hg deposition to significantly reduce the amount of anthropogenic Hg available for methylation.

But Hg can evade as a gas. Land-atmosphere exchange over peatlands could significantly alter the estimated time-scale for reducing the present Hg load to aquatic ecosystems. Without knowing the land-atmosphere exchange of Hg from peatlands we cannot predict how effective efforts to cut Hg emissions will be in achieving a timely reduction in the pool of Hg in these peatlands and ultimately the loading of MeHg from peatlands to surface waters. This thesis project will quantify evasion of Hg from a boreal mire using chamber techniques during the summer of 2011

Do Riparian soils define the chemistry of runoff water in the forest landscape?

Our research group has hypothesized that flow paths through riparian soils are the major determinant of water chemistry (including mercury, trace metal and carbon concentrations) in the forest landscape. If this is true, then it will help us predict how forest management and climate will influence water chemistry. To test this hypothesis, a riparian "observatory" was established in the Krycklan Catchment

during the summer of 2007. (www.ccrew.sek.slu.se). During 2011 work will focus on the riparian sources of carbon (both organic and inorganic). A thesis project is sought to spend a month in the field (Vindeln, Västerbotten) collecting data, and then analyse the results. Additional project employment during the summer of 2011 is possible.

Continuous water chemistry in headwater streams: How much more can it tell us about carbon balances in the forest landscape?

Researchers are trying to determine whether boreal forests are a source or sink of carbon in the global carbon cycle. "The aquatic conduit" for carbon has been receiving increasing attention in this work – that is the amount of carbon leaving the landscape in runoff water. One challenge in defining this component of the carbon balance is the possibility for rapid changes in carbon flux and concentrations in conjunction with episodes of high flow. Recent advances in instrumentation may make it possible to continuously register both the organic and inorganic carbon content in runoff. An ex-jobbare is sought to run a field study using new sensors for continuous registration of organic and inorganic carbon in runoff during the summer of 2011. The work would be located in the Krycklan Catchment ((www.ccrew.sek.slu.se) near Vindeln.

Aqua Incognita: Defining climate influence on the output of dissolved carbon and other water quality parameters from headwaters

90% of stream length is in headwaters streams, but there is no systematic estimate of the chemistry of these streams. Several years of work have gone into seeking relationships between downstream chemistry and headwaters, supported by GIS. Now an Ex-jobb could bring this work to fruition by making an estimate of dissolved carbon outputs from all forested headwaters in Sweden. This will be the first test of whether "Aqua Incognita" can be defined. It will also provide useful information on Sweden's carbon balance, since export of organic carbon from soils is not included in regional carbon balances. This aquatic term of the C balance has been missing due to lack of data, which this project could provide.

The Quality of Organic Carbon in the waters of the Congo and its tributaries in the Lake Tumba Landscape, Democratic Republic of the Congo

Transformation of DOC is an important component of the C-balance in the Amazon Basin, and is quite likely also true for the Congo Basin. However, few data are available on the age and composition of organic matter DOC and POC in the Congo system and thus the role it plays in the biogeochemical cycles of this vast region. We will conduct a field campaign to analyze OM character in Lake Tumba and surrounding waters of the landscape during April 2011. Given the scarcity of data from the Congo, these samples from lakes and streams could help to improve the current knowledge of the character of OM in tropical riverine systems. A thesis project could take responsibility for applying a range of OM character analyses on the ca 30 samples from the campaign when they arrive back in Sweden, and then analyzing the results.