



## **Master thesis projects in biogeochemical modelling**

**Dept. of Aquatic Sciences and Assessment, SLU, Uppsala**

### **1. Effect of climate change on soil temperature and snow dynamics in Swedish boreal forest**

Knowledge gap exists in understanding the role of climate change on soil energy balance in snow-covered, northern latitude boreal forest soils. Snow pack is an insulator of heat and change in snow depth as a result of climate change can have large implications on soil temperature. Change in soil temperature can impact carbon biogeochemistry and provide a positive feedback effect on climate change in boreal ecosystems. This is because soil microbial activities that influence biogeochemical processes in the terrestrial-aquatic continuum are both temperature and moisture dependent. Modelling the soil temperature and getting the snow dynamics right is important to reduce the uncertainty in the biogeochemical modelling of boreal water quality and plausible future projections. Opportunities exist for student(s) to model boreal soil temperature and snow dynamics in response to climate change. This modelling exercise will benefit from long term series of temperature (both soil and air), precipitation and snow profiles available in Svartberget catchment.

### **2. The effect of climate change and/or forestry operations on carbon and water balance of a boreal catchment**

Complex interactions exist between hydrology and biogeochemical cycling of elements in the environment. Knowledge gaps still exist in integrating all the known small scale process at plot scale to a modelling framework at landscape scale level. This knowledge gap is further widened with changing climate and intensive forest management practices that characterised the boreal forest catchments. Opportunities exist in the Swedish boreal catchments to assess the impacts of either climate change or forestry operations on forest water quantity and quality (e.g. DOC). Svartberget (a relatively pristine headwater catchment) and Balsjö catchment (a disturbed catchment due to forestry operations) provide a unique opportunity to assess the impact of these environmental stressors on boreal carbon budgets and water balances.

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