



## **Long term and short term carbon storage in soils: simplicity or complexity?**

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Long- and short term carbon storage in soils is of great importance for the global carbon cycle. There has been increasing interest in recent years in quantifying the organic C pool in soils, because of its role as a potential sink and source of atmospheric CO<sub>2</sub> over long time scales. Yet the carbon exchange between the atmosphere and terrestrial ecosystems and the fluxes within terrestrial ecosystems are poorly understood and represent a major uncertainty in recent models of the global carbon cycle.

Terrestrial carbon accumulation during the Holocene was controlled by soil formation and floodplain sedimentation. Therefore the soil predominantly represents a carbon sink during long time scales. However, on short time scales the role of soils is much more complex. In addition to long term natural changes, short term carbon stocks in soils are modified by human induced land use and land cover changes. Even though there is an increasing interest on short term carbon changes in soils, it is still unclear whether soils are a major source or sink of atmospheric CO<sub>2</sub>. Thus knowledge of present carbon inventories and fluxes and their variability over small time scales is fundamental for assessing the effect of environmental change in a range of land use conditions.

The aim of this study is to unravel the complex interactions of soil carbon storage and environmental changes in three catchments in China (Yunnan province), Canada (central British Columbia), and Switzerland (Berner Oberland). In each area soil and lake sediments are examined to establish an inventory of the carbon present in the

geomorphologically active surface layer and to reconstruct its development during the Holocene. A special emphasis is to develop sampling strategies, which consider the high variability of carbon stocks resulting from the complex interactions of the soil carbon and its driving factors. The empirical evidences of this study will help to improve our knowledge of regional soil carbon storage in areas susceptible to environmental change and to respond the question about simplicity or complexity in conjunction with terrestrial carbon storage.