Geophysical Research Abstracts
Vol. 17, EGU2015-15770, 2015
EGU General Assembly 2015

Soil organic carbon stocks and composition under grazed and ungrazed Kobresia pygmaea pasture of the Tibetan Plateau

Andreas Breidenbach (1), Per Schleuß (2), Yakov Kuzyakov (2), and Georg Guggenberger (3)

(1) Institut für Integrierte Naturwissenschaften, Universität Koblenz-Landau, (2) Department of Soil Science of Temperate Ecosystems, Georg-August-University of Göttingen, Germany, (3) Institute of Soil Science, Leibniz Universität Hannover, Germany

Kobresia pastures represent the world's largest alpine ecosystem and an important sink but also a potential source of CO_2. Specific features of Kobresia root mats provide unique mechanisms protecting against degradation even by moderate overgrazing and leading to large carbon storage in soil. Thus it is necessary to analyse how management- and/or climate-induced changes in above and belowground litter production affect the OC stock and composition in these grassland soils.

We analyzed soils from a grazing exclosure experiment to study alterations using elemental analysis and analysis of solvent extractable as well as hydrolysable aliphatic lipids (e.g. n-alkanes, n-alkanols, n-alkanoic acids, as well as cutin- and suberin-derived hydroxy-fatty acids). We investigated bulk soils and density fractions taken from three different depth increments (0-5 cm, 5-15 cm and 15-35 cm) from two grazed and two ungrazed plots.

Grazing exclosure resulted in an OC gain up to 1.0 kg m-2 at the site where plant community changes after grazing cessation were most pronounced. These OC gains were caused by increased stocks of OC in the particulate fraction of the two deeper soil increments whereas the OC of the mineral associated fraction and the depth increment 0-5 cm showed no changes. Moreover, the concentration of solvent extractable C16 and C18 acids decreased in the particulate fraction whereas the concentration of C24 and C26 acids increased.

Our results show that seven years of grazing cessation increased the OC-pool with short turnover rates and changed its chemical composition, but had no major impact on the more stable OC pools of the mineral soil.