



Impact of climate change on water balance, and nutrient leaching of (pre-) alpine grassland soils

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On a global perspective terrestrial biosphere hosts significant pools of carbon and nitrogen. Due to cool and moist climatic conditions alpine grassland soils of moderate elevation (app. 1000m) in particular, are rich in soil organic carbon and associated nitrogen. In the framework of an in-situ climate change experiment we test the hypothesis that soil organic carbon and nitrogen are either volatilized (GHG emissions) or leached with seepage water due to increase in air temperature as induced by climate change. The infrastructure of the in-situ climate change experiment was funded by Helmholtz society and BMBF and allowed IMK-IFU to install a lysimeter network with undisturbed intact grassland soil cores (diameter approx. 1 m, depth 1.4 m, 2-3 t of soil) at three sites (Graswang 860m, Rottenbuch 750m, Fendt 600m) differing in altitude and climate. The lysimeter network consisting of a total of 36 lysimeters is operated since September 2011 and is run for climate change research with a long term perspective (>10years). Lysimeters were partly moved along the altitudinal gradient, with some soil cores still staying at sites as controls and some others translocated from higher elevation to sites at lower elevation with higher temperatures and slightly lower mean annual rainfall. The different components of the water balance i.e. precipitation, evapotranspiration and groundwater recharge of each lysimeter are measured by precision weighing of the lysimeters and a separate container for collection of seepage water at the lower boundary condition (1.4m). In addition, soil moisture (volumetric water content as well as water tension) and temperature are measured with sensors installed in 10, 30, 50, 140cm soil depth. Soil water in 10, 30, 50 and 140cm soil depth is drawn into glass bottles by under-pressurized suction cups. Water samples are collected regularly any 2 weeks and more often (e.g. 3 times a week) during fertilization events, and analyzed for nutrient concentration i.e. dissolved organic carbon (DOC), dissolved organic nitrogen (DON) and ammonium and nitrate.

We will present first results of the impact of climate on grassland water balance, grassland biomass and nutrient leaching regarding the controls but also the translocated lysimeters along the elevational gradient in the Ammer catchment.