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Thema
AG Bodengase

Biotische und abiotische Steuerung von Bodengasflüssen

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Titel
Auto- und Heterotrophic Respiration in the Hohenheim Climate Change Experiment – The Importance of Temperature Change and Vegetation Period

Abstract
Current Climate change (CC) research in soil science mainly focusses on natural ecosystems, without considering the potential of agro-ecosystems for feedback mechanisms to CC and CC mitigation through Carbon(C)-sequestration. We expect that CC induces increasing water limitation under elevated temperature, lowers the intensity of soil respiration and changes the ratio between the amount of root-dependent and basal soil respiration. Such changes might be due to differences in the intrinsic temperature and moisture sensitivity of microbial and root respiration and due to altered root exudation. In this project, we focus on CC-induced effects on plant-dependent and basal soil respiration to improve the estimation of long-term soil organic matter stabilization. Within the Hohenheim Climate Change (HoCC) experiment (established in 2008), barley plants were pulse-labelled with 20-atom% $^{13}CO_2$for 4 h using ventilated transparent chambers on warmed and control plots in an agricultural field. The labeling was done during three different stages (advanced tillering, booting and grain-filling) of the vegetation period, at which C-sink strength of shoot and root differs according to plant development. CO_2-fluxes and isotopic composition were measured in real time in the field for the first 50h (post labeling) using a $^{13}CO_2$ isotope analyzer. Results from tracing ^{13}C-fluxes will clarify how soil moisture and long-term elevated temperature affect the overall C-balance in agricultural soils in dependence of the vegetation period. This will allow estimations of direction and strength of feedback mechanisms of terrestrial C-cycling under CC. Overall, insights obtained in this project will provide better understanding of the CC impact on and of temperate agricultural production systems.