Geophysical Research Abstracts
Vol. 19, EGU2017-12421, 2017
EGU General Assembly 2017
© Author(s) 2017. CC Attribution 3.0 License.

Long-term observations of CO_2 exchange over agricultural crops in two regional climates of Southwest Germany

Arne Poyda (1), Hans-Dieter Wizemann (2), Joachim Ingwersen (1), Volker Wulfmeyer (2), and Thilo Streck (1)

(1) Hohenheim University, Institute of Soil Science & Land Evaluation, Biogeophysics, Stuttgart, Germany (a.poyda@uni-hohenheim.de), (2) Hohenheim University, Institute of Physics and Meteorology, Stuttgart, Germany

The impact of agricultural land use on soil organic carbon (SOC) dynamics has been widely studied in the past few decades, particularly in context of the SOC forcing or mitigation potential of global climate change. Grassland utilization can increase or maintain SOC stocks. Arable cropping tends to decrease SOC stocks, at least for some time after land use change (SMITH, 2008). In the long run, it can be assumed that SOC reaches a steady state where the production of roots and aboveground crop residues and possibly organic fertilization level out soil respiration. To study the effects of crop type, year and regional site conditions on CO_2 exchange and C budgets of arable cropping systems in Southwest Germany, eddy covariance measurements were conducted on a total of six sites in the two climatically contrasting regions of Kraichgau and Swabian Alb since 2009. Main crops were winter wheat, silage maize and winter rapeseed but also winter barley, summer barley and spelt were cultivated on the Swabian Alb sites. Cover crops were grown between winter and summer crops on all sites. Net ecosystem exchange (NEE) data were gap-filled following REICHSTEIN et al. (2005) and partitioned into ecosystem respiration (RECO) and gross primary production (GPP) using seasonally differing temperature response functions of nighttime NEE. Furthermore, different approaches for filling long data gaps of several months in winter were evaluated. Considering C inputs by organic fertilizers and C removals by harvest, C budgets were calculated per site and year. First results indicate that the variability of NEE fluxes between different crops is much higher compared to the variability between different years of a certain crop. However, regional differences in soil and weather conditions significantly influence plant growth dynamics and thus CO_2 exchange.