Geophysical Research Abstracts
Vol. 19, EGU2017-4902, 2017
EGU General Assembly 2017

Using Carbon flux network data to investigate the impact of new European greening rules on carbon budgets - a case study.

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In 2015 the European Commission introduced new greening payments as part of their common agricultural practices to address environmental and sustainability issues. The payment is worth about 30% of the total subsidies for European farmers. Sowing nitrogen fixing catch/cover crops in the off season (generally in fall and winter) is one way to achieve the prerequisite for the greening payments.
Therefore it is expected that the proportion of catch/cover crops will increase from 2015 onwards at the expense of bare soil fields. In particular, with regard to more frequently occurring mild weather conditions during fall and winter, we assume that the extensive shift to catch/cover crops will have a significant impact on the carbon cycle of agricultural areas.
In this study we aim to evaluate this change in agricultural practice on local and regional CO_2 fluxes and carbon budgets of the intensively used northern Rur catchment in Germany. In a preliminary study, we observed the daily courses of net CO_2 flux and soil respiration of three different catch/cover crops: greening mix, oil radish, and white mustard (Sinapis alba), by means of a net flux chamber and a soil respiration chamber and compared them against Eddy covariance flux data from fields cultivated with (i) winter barley (Hordeum vulgare), and (ii) without vegetation. In the main study, we compare multi-year measurements of carbon fluxes from a regional network of Eddy Covariance sites, partly included in larger networks like Fluxnet, European Fluxes Database Cluster or ICOS. We especially used site data where comparisons of catch crop seasons and conventional seasons between different sites or years were possible.
To allow an assessment of the change in carbon fluxes and budgets on regional scale, a land use comparison based on satellite images for the years 2014 to 2016 was applied. With these results, a first regional evaluation of the impact of the new greening policies on carbon fluxes and budgets for the northern Rur catchment will be carried out.