



Influence of soil erosion on CO₂ exchange within the CarboZALF manipulation experiment

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Agriculture in the hummocky ground moraine landscape of NE-Germany is characterized by an increase in energy crop cultivation, like maize or sorghum. Both enhance lateral C fluxes by erosion and induce feedbacks on C dynamics of agroecosystems as a result of the time limited land cover and the vigorous crop growth. However, the actual impact of these phenomena on the CO₂-sink/-source function of agricultural landscapes, is still not clear.

Therefore we established the interdisciplinary project “CarboZALF” in 2009. In our field experiment CarboZALF-D we are monitoring CO₂ fluxes for soil-plant systems, which cover all landscape relevant soil states in respect to erosion and deposition, like Albic Cutanic Luvisol, Calcic Cutanic Luvisol, Calcaric Regosol and Endogleyic Colluvic Regosol. Furthermore, we induced erosion / deposition in a manipulation experiment.

Automated chamber systems (2.5 m, basal area 1 m², transparent) are placed at the manipulated sites as well as at one site neither influenced by erosion, nor by deposition. CO₂ flux modelling of high temporal resolution includes ecosystem respiration (R_{eco}), gross primary productivity (GPP) and net ecosystem exchange (NEE) based on parallel and continuous measurements of the CO₂ exchange, soil and air temperatures as well as photosynthetic active radiation (PAR). Modelling includes gap filling which is needed in case of chamber malfunctions and abrupt disturbances by farming practice.

In our presentation we would like to show results of the CO₂ exchange measurements for one year. Differences are most pronounced between the non-eroded and the colluvial soil: The Endogleyic Colluvic Regosol showed higher flux rates for R_{eco} and NEE compared to the Albic Cutanic Luvisol. The eroded soil (Calcic Cutanic Luvisol) demonstrated CO₂ fluxes intermediate between the non-affected and depositional site. Site-specific consequences for the soil C stocks will be also discussed in the presentation.