

Tagungsnummer

P53

Thema

AG Bodengase

Neue Entwicklungen bei Methoden zur Messung und bei der Modellierung von Spurengasflüssen

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Titel

Combining a root exclusion technique with continuous measurements of CO₂ by chambers and inside soil for a pin-point separation of ecosystem respiration in croplands

Abstract

To better assess ecosystem C budgets of croplands and understand their potential response to climate and management changes, detailed information on the mechanisms and environmental controls driving the individual C flux components are needed. This accounts in particular for the ecosystem respiration (R_{eco}) and its components, the autotrophic (R_{a}) and heterotrophic respiration (R_{h}) which vary tremendously in time and space. Therefore, we developed and tested a method to separate R_{eco} into R_{a} (as the sum of $R_{\text{a (shoot)}}$ and $R_{\text{a (root)}}$) and R_{h} in order to detect temporal and small-scale spatial dynamics within their relative contribution to overall R_{eco} . Investigations were carried out for winter wheat (*Triticum aestivum*) during the crop season 2015 at an experimental plot (CarboZALF-D) located in the hummocky ground moraine landscape of NE Germany. R_{eco} was derived from CO₂ flux measurements from plant stand and soil during nighttime using automatic chambers. R_{h} was derived from CO₂ efflux measurements from fallow next to the automatic chambers using CO₂ sampling tubes in 10 cm soil depth. $R_{\text{a (root)}}$ was calculated as the difference between CO₂ efflux measurements in planted soil and R_{h} . $R_{\text{a (shoot)}}$ was calculated as $R_{\text{eco}} - R_{\text{a (root)}} - R_{\text{h}}$. R_{eco} varied seasonally from <1 to 9.5 g C m⁻² d⁻¹, and was higher in adult (a) and reproductive (r) than juvenile (j) stands (g C m⁻² d⁻¹: j 1.2, a 4.6, r 5.3). Observed R_{a}