



Sustained stimulation of soil respiration and CO₂ release from an agricultural soil after 10 years of experimental warming

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A number of forest and grassland studies indicated that stimulation of the soil respiration by soil warming ceases after a couple of years (Luo et al 2001). A long-term soil warming lysimeter experiment (soil monoliths from an agricultural field, 1m² x 2 Meter depth, temperature = ambient + 3°C; with a regionally usual crop rotation with 5 crops) was conducted in southern Germany. It results in a sustained stimulation of soil respiration after 10 years. Moreover, both warmed and control treatments exhibited a similar temperature response of soil respiration indicating that adaptation in terms of temperature sensitivity was absent. Carbon dioxide concentration measurements within the profiles are supporting these findings. The increased soil respiration occurred although vegetation productivity in the warmed treatment was not higher than in the control plots. These findings strongly contrast current soil carbon modeling concepts, where carbon pools decay according to first-order kinetics, and thus a depletion of labile soil carbon pools leads to an apparent down-regulation of microbial respiration (Knorr et al 2005). Consequently, the potential for positive carbon-climate cycle feedback may be larger than represented in current models of soil carbon turnover and in general assessments.

Literatur

Knorr W, Prentice I C, House J I and Holland A 2005 Long-term sensitivity of soil carbon turnover to warming Nature 433 298-301

Luo Y, Wan S, Hui D and Wallace L L 2001 Acclimatization of soil respiration to warming in a tall grass prairie Nature 413 622 - 5

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