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Viewpoints on impacts of climate change on soil quality

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Climate projections indicate a critical increase in temperature and modification of the precipitation pattern for the next century worldwide (IPCC 2007). Higher temperature increase are expected in polar than in temperate and tropical regions. In addition, studies on the response of microbial metabolism to temperature changes showed lower sensitivity at higher temperature level as analyzed by Q10 values (Kirschbaum 1995). The temperature response as indicated by the Q10 value refers to physiological response including enzyme configuration and substrate availability. For soils from an undisturbed forest site in eastern Amazonia, Knorr et al. (2005) observed even that the apparent pool turnover times are insensitive to temperature and received evidence that non-labile soil organic carbon was more sensitive to temperature than labile soil organic carbon. Linking the climate projections and the findings related to Q10 values suggests that the microbial activity may be stimulated to a higher degree at northern latitudes than at lower latitudes. But few studies address the role of temperature changes on soil organic matter pool and microbial biomass and activities although temperature changes may be important (Dilly et al. 2003). On top, the thawing of permafrost soil (24 % of exposed land in the Northern Hemisphere) represents a further threat since erosion processes will occur and captured gases may evolve to the atmosphere. Finally, dryness and drying-rewetting cycling that are affected by climate change are regulating soil organic carbon turnover (Mamilov and Dilly 2001).

The lecture will summarize basic findings and positive feedback on our climate system and also address the concept of 'soil energ-omics' including the interaction between respiration and microbial colonization and the respective metabolic quotient (Dilly 2006).

Key words: Q10, Nitrogen deposition, Permafrost, Carbon turnover, Microbial biomass, adjustment

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