



Effect of exogenous organic matter on the thermal properties of two loamy soils in Poland and Czech Republic

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Organic matter improves soil structure and fertility and associated processes and functions of the soil, however its content in tilled soils gradually decreases. Addition of organic materials can modify the thermal properties of a given soil through changes in relative quantities of textural fractions, soil water content as well as in bulk density. The aim of this study was to assess the effect of exogenous organic materials (EOMs) including compost from manure and slurry (Ag), industrial compost (Ra), animal meal from animal by-products (Mb), digestate from biogas plant fed by wastes from fries factory (Dg) on the thermal conductivity, diffusivity and heat capacity of two loamy soils in Polish-Czech borderland. All plots received the same level of nitrogen that is 200 kg ha⁻¹ of N of which 50, 75 or 100% was from the EOMs and the rest from mineral fertilizer. Mineral nitrogen fertilizer alone was applied on control plots. The results were analyzed using classic statistics and geostatistics by creating semivariograms and 2D kriging maps. There was a different trend of increase in soil thermal conductivity and heat capacity and of increase or decrease in thermal diffusivity after addition of the EOMs. The changes were more pronounced in Czech soil and were attributed mostly to increase in soil water storage capacity. The kriging maps allowed to determine the short-scale spatial pattern of the thermal soil properties in the study areas. Irrespective of experiment location all the soil thermal properties were related with soil wetness and type and application rate of the EOMs.

Acknowledgements

The work was partially funded by the by HORIZON 2020, European Commission, Programme: H2020-SFS-4-2014: Soil quality and function, project No. 635750, Interactive Soil Quality Assessment in Europe and China for Agricultural Productivity and Environmental Resilience (iSQAPER, 2015–2020) and Operational Programme Cross-border Cooperation Czech Republic - Republic of Poland within the project “Risks and benefits of introducing exogenous organic matter into the soil” (CZ.3.22/1.2.00/12.03445, 2013-2015).