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FTIR spectroscopic characteristics of old surface soils as compared to those of recent surface soils to determine to historical land use

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The type of land use affects content and composition of soil organic matter (SOM). The aim of this study is to analyze the composition of SOM from old surface soils buried in Middle Ages and Iron Age respectively, and to compare these results with FTIR characteristics of recent forest, grassland, and arable soils. We investigate soil samples obtained from archaeological excavations at Glasow site (old soils) that are described to be former surface soils. Further recent sandy surface soils with different land use (rAp) were sampled.
According to archeological data (Bork et al. 1998) the old soils are ancient surface soils from the Middle Ages (1Ap), early Middle Ages (fAh) and from the Iron Age (2Ap). SOM fractions were obtained by Na-pyrophosphate extraction and investigated by using FTIR spectroscopy. The SOM from two of the old soils (1Ap and 2Ap) show FTIR signatures similar to those found for SOM from recent arable soils. This is in accordance with archeological findings that detected for the 1Ap and 2Ap horizons traces of old ploughing procedures that were not detected for the fAh horizon.The FTIR signature of the SOM from fAh soil is similar to that found for recent surface soils that are under deciduous forest today. Assuming that the SOM composition is not changed during the last centuries due to soil processes the composition of SOM from the old soils seem to reflect the corresponding former land use. Based on these results we conclude that in the studied old surface soils the effect of land use was conserved in SOM composition.