

EGU24-10421, updated on 11 May 2024

<https://doi.org/10.5194/egusphere-egu24-10421>

EGU General Assembly 2024

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Effect of sample preparation on the FTIR DRIFT spectra in the case of soils with different organic material content

Zoltán Szalai^{1,4,5}, Mate Karlik^{2,5}, Gergely Jakab^{1,4,5}, Anna Vancsik^{1,4,5}, István Gábor Hatvani^{2,5}, Dóra Cseresznyés³, and **Csilla Király**^{1,4,5}

¹Geographical Institute, HUN-REN Research Centre for Astronomy and Earth Sciences, Budaörsi út 45, Budapest H-1112, Hungary

²Institute for Geological and Geochemical Research, HUN-REN Research Centre for Astronomy and Earth Sciences, Budaörsi út 45, Budapest H-1112, Hungary

³Geological Survey, Supervisory Authority for Regulatory Affairs, Budapest, Hungary

⁴Department of Environmental and Landscape Geography, Eötvös Loránd University, Pázmány Péter sétány 1/C, Budapest H-1117, Hungary

⁵CSFK, MTA Centre of Excellence, Budapest, Hungary

Diffuse Reflectance Infrared Fourier Transform Spectroscopy (FTIR DRIFT) is a widely used method for investigating soil organic materials. The existing literature suggests variations in sample preparation techniques for soil analysis. Notably, the powdering and drying method may influence the presence of organic materials, clay minerals, and carbonates. These minerals are occasionally found as coatings on different mineral surfaces and sometimes as part of the matrix within soil aggregates. This study examined four topsoils of distinct types from Hungary: Arenosol, Leptosol, Gleysol, and Phaeozem (WRB2022). The samples were pulverized both to < 250 µm and < 63 µm and also various procedures for drying were used: 1-hour drying sessions at 50 °C, 100 °C, 150 °C, 200 °C, and 250 °C, as well as overnight drying at 50 °C, 100 °C, and 150 °C. Additionally, samples were measured without undergoing extra drying at room temperature. This study aimed to focus on significant organic material bands.

Pulverization has a more pronounced effect on FTIR DRIFT spectra in soils with aggregates, furthermore, when the original soils contain a higher proportion of sand fraction. The drying method affects the measured absorbance values at the highlighted wavenumbers with an underlined influence on the aliphatic components range. Support of the National Research, Development, and Innovation Office (Hungary) under contract K142865, and Eötvös Loránd Research Network SA41/2021 are gratefully acknowledged.