Adsorption of Water Vapor by Soils: Investigations of the Influence of Organic Matter, Iron, and Aluminum on Energetic Heterogeneity of Soil Clays

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Abstract: Water vapor adsorption isotherms were measured for samples of loessial soil clays modified by removing organic matter and Fe and Al compounds. The isotherms were analyzed by the exponential adsorption isotherm equation. The distribution functions of adsorption energy, average adsorption energies, and surface areas were evaluated simultaneously. The surface areas were the highest for samples after organic matter removal and the lowest when all considered components were removed. Values of the average adsorption energies decreased consecutively after each of the subsequent removal steps while the energy distributions became narrower, indicating in general less variety in surface adsorbing centers.

Key Words: Soil constituents • Surface heterogeneity • Water adsorption

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