



Effect of soil surface structure on surface temperature of a bare soil.

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The soil surface temperature is a state variable which can be measured using remote sensors and from which both mass and energy fluxes between the land surface and the atmosphere can be derived. However, the relation between soil surface temperature and mass and energy fluxes depends on the soil properties and the structure of the soil surface layer. In this study, we measured soil surface temperatures of three different soil plots: a ploughed plot, a seedbed plot, and a compacted seedbed plot with an IR camera. The surface roughness and the soil bulk density of the plots were regularly measured during the monitoring campaign. The differences in soil surface structure led to clear differences in soil surface temperature. Using simulations with a coupled heat and water flow model, Hydrus-1D, the effect of different parameters and variables on the soil surface energy balance was evaluated. Considered variables/parameters were: the albedo, the soil bulk density and its impact on hydraulic and thermal soil properties, and the roughness of the soil surface and its impact on the momentum and sensible heat transfer between the soil surface and the atmosphere.