Geophysical Research Abstracts
Vol. 14, EGU2012-1428-2, 2012
EGU General Assembly 2012

Using remote sensing method (spectral measurements) for Assessing infiltration rate (IR) induced by structural crust

N. Goldshleger (1) and A. Chudnovsky (2)
(1) SERS, Israel (goldshleger@gmail.com), (2) Harvard University, School of Public Health, United States

Raindrop energy disintegrates soil aggregates and rearranges soil particles to form a structural crust on the upper soil layer. The structural crust affects the physical properties of the soil, which can be observed by significant colour changes on the soil surface. Spectral differences observed in the structural crust are caused by rearrangement of the soil surface texture, mainly an increase in the clay fraction. Previous studies conducted on crusted soils using reflectance spectroscopy were limited to a certain soil type or area and seemed to be strongly dependent on the small range of soil types. In the study, the influence of raindrop energy on the NIR-SWIR spectral reflectance (1200-2400 nm) of heterogeneous soils was evaluated and used in combination with Partial Least Squares (PLS) regression to construct a model that correlates the infiltration rate (IR) with its reflectance. Four soils from Israel and three soils from USA were studied to provide a single data set. A relatively small Root Mean Square Error of Cross-Validation (RMSECV) of 15.2% was found. A Ratio of prediction to deviation (RPD) value of 1.98 indicates a promising generic model. Additionally, PLS models were run on different combinations of soil types (RPD values ranging between 2.4 and 3.2). For all models, whether all soils were run in one cross-validation data set, or when run for different combinations of soils, the best assessment of IR was achieved when using reduced wavelength range. These results allowed us to conclude that a generic approach aimed at assessing the structural crust for a variety of soils is feasible. A generic model using the suggested spectral approach has the potential to provide NIR-SWIR spectral soil IR predictions with either a local or global data base of soils worldwide and may contribute to improved protection of crusted soils from erosion or water loss by runoff.