Hydraulic Conductivity of Soils from Spectral Electrical Measurements: Laboratory Experiments and Models

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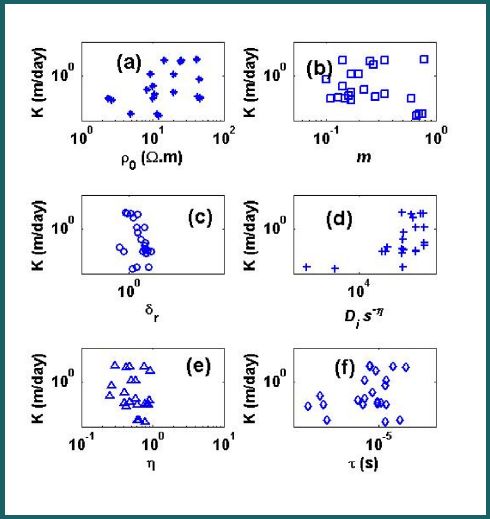
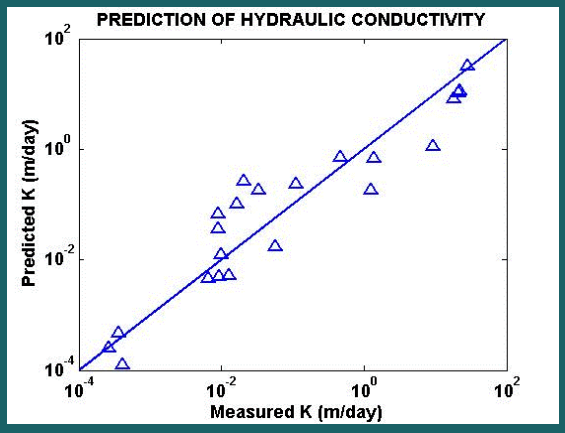


The circuit parameters, δ_r and η, both of which are related to the amount and distribution of polarization sources such as clay minerals present in the soil, increase with a decrease in hydraulic conductivity. However, in general, the bulk resistivity increases with an increase in hydraulic conductivity.

The intrinsic circuit parameters, which describe the soils electrical behavior, are retrieved by inverting the *SER* measured data, and are used in empirical regression models to predict the hydraulic conductivities of the soils.



A regression equation using only four of the descriptors, ρ_0, δ_r, τ and Di. Is developed for the prediction of *K* and given as:

$$\ln K = -19.03 - 2.55\ln(\rho_0) - 1.83\ln(\delta_r) + 3.77\ln(D_i) + 1.18\ln(\tau).$$

Above plot illustrates comparison of the measured hydraulic conductivity versus the computed values using the regression equation above. The statistical parameters associated with this model are R^2 = 0.88, and error variance = 1.99.