

Spatial Variability of Some Soil Physical Properties

I. Autocorrelation, Variogram, Cross-Correlation and Cross-Variogram

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Abstract. A field experiment was designed to investigate the spatial variability of some soil physical properties of calcareous soils at the Agricultural Research and Experimental Station, King Saud University at Deirab. Geostatistical techniques were introduced to estimate the spatial variability. One transect was sampled from south to north every 5m for 500m long. Measurements were made for infiltration rate, bulk density, texture and $\text{CaCO}_3\%$.

Autocorrelation, cross-correlation, variogram, and cross-variogram were calculated for the data. The results indicated that there was significant spatial correlation for all parameters measured and analyzed, and the geostatistical techniques were useful to estimate the correlation length for those parameters. For the infiltration rate the correlation length was 30m, while the range for the infiltration rate using variogram was 50m. The same calculation was done for bulk density, sand % and $\text{CaCO}_3\%$. The results suggested that for future research in that field one should consider the spatial differences along the field for different properties of the soils, and distance between each observation should not exceed 50m along the transect.