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Clay content analysis across landscape by means of linear and non-linear empirical models

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In soil science literature there exist many applications that deals with the spatial prediction of soil features by means of a set of statistical techniques. In this work the amount of clay content at level of soil horizon was put in a spatial framework and analyzed using four alternative models for describing its variability in a geopedological complex landscape such as Telese valley (Campania, South Italy) study area.
Three statistical models were involved, that is (i) the multiple linear regression (MLR), (ii) the multicollocated ordinary cokriging (MOCOK), and (iii) a two-layers FFBP (FeedForward Back-Propagation) neural network with topology 6 : 1 (ANN). Apart from these technologies (neurocomputing, and multivariate regression and geostatistics) a polygonal soil map (UDP) was also used for the sake of comparing complex and sometimes cumbersome models with the standard approach of representing the soil spatial distribution. Clay data was splitted in calibration/validation subsets in order to unbiasedly compare the four models (in order of complexity UDP, MLR, MOCOK, ANN). Comparison was based on multi-criteria assessment using six measures of performance: RMSE (root mean square error), MBE (mean bias error), Pearson
ś correlation (r), an efficiency index (eff), SMAPE (symmetrical mean absolute percent error), and Wilmott
ś agreement index (D). Generally all indicators seem to demonstrate that the more complex (from UDP to ANN) the models the better their performance in representing the spatial variability of some pedological parameters. Despite such statement much endeavour should be spent in model comparison by considering also the cost/profit trade off incorporating a cost function.