



Spatial prediction of soil texture in region Centre (France) from summary data

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Soil texture is a key controlling factor of important soil functions like water and nutrient holding capacity, retention of pollutants, drainage, soil biodiversity, and C cycling. High resolution soil texture maps enhance our understanding of the spatial distribution of soil properties and provide valuable information for decision making and crop management, environmental protection, and hydrological planning. We predicted the soil texture of agricultural topsoils in the Region Centre (France) combining regression and area-to-point kriging. Soil texture data was collected from the French soil-test database (BDAT), which is populated with soil analysis performed by farmers' demand. To protect the anonymity of the farms the data was treated by commune. In a first step, summary statistics of environmental covariates by commune were used to develop prediction models with Cubist, boosted regression trees, and random forests. In a second step the residuals of each individual observation were summarized by commune and kriged following the method developed by Orton et al. (2012). This approach allowed to include non-linear relationships among covariates and soil texture while accounting for the uncertainty on areal means in the area-to-point kriging step. Independent validation of the models was done using data from the systematic soil monitoring network of French soils. Future work will compare the performance of these models with a non-stationary variance geostatistical model using the most important covariates and summary statistics of texture data. The results will inform on whether the later and statistically more-challenging approach improves significantly texture predictions or whether the more simple area-to-point regression kriging can offer satisfactory results. The application of area-to-point regression kriging at national level using BDAT data has the potential to improve soil texture predictions for agricultural topsoils, especially when combined with existing maps (i.e. model ensemble).