Implementing Properties of Map Delineations in Ordinary Kriging

G. Boucneau*, M. Van Meirvenne*, and O. Thas**

* Department of Soil Management and Soil Care
University of Gent
Coupure 653, 9000 Gent, Belgium
e-mail: geert.boucneau@rug.ac.be

** Department of Applied Mathematics, Biometrics and Process Control
University of Gent
Coupure 653, 9000 Gent, Belgium

Stratification of a region based on soil map delineations, followed by within-stratum interpolation, has been the most frequently used combination of choropleth soil maps and spatial prediction from point observations. Though not all delineations on a soil map are equally suitable to stratify an area and commonly expert knowledge is used to select appropriate map delineations. We developed a procedure to characterise the properties of map delineations to facilitate their selection for stratification. The identified properties of map delineations were: the physical nature of the mapped phenomenon, the mapping accuracy, and the structure of spatial variation of the adjacent mapping units. These properties determined the implementation of delineations in the ordinary kriging interpolation. For inaccurately mapped delineations we modified the ordinary kriging algorithm in order to take account of the uncertainty about the true location of the boundary. The procedure was applied to inventory topsoil sand content within the province of West-Flanders, Belgium. We selected this province as a real-case inventory because of the important textural variation and because both a soil texture map (1:100 000) and a large data base on soil texture were available. We compared ordinary kriging using properties of delineations (OKPD), the method developed in this paper, with the conventionally used stratified ordinary kriging (SOK). SOK handles all map delineations in the same way, i.e. as known sharp discontinuities, whereas in OKPD first the property of each map delineation is identified and subsequently kriging interpolation is performed using the appropriate conditions. We found OKPD gave more realistic experimental variograms and nearby inaccurately located map delineations a higher prediction accuracy and a more realistic prediction error was generated.