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Introduction of digital soil mapping techniques for the nationwide regionalization of soil condition in Hungary; the first results of the DOSoReMI.hu (Digital, Optimized, Soil Related Maps and Information in Hungary) project

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Due to the former soil surveys and mapping activities significant amount of soil information has accumulated in Hungary. Present soil data requirements are mainly fulfilled with these available datasets either by their direct usage or after certain specific and generally fortuitous, thematic and/or spatial inference. Due to the more and more frequently emerging discrepancies between the available and the expected data, there might be notable imperfection as for the accuracy and reliability of the delivered products. With a recently started project (DOSoReMI.hu; Digital, Optimized, Soil Related Maps and Information in Hungary) we would like to significantly extend the potential, how countrywide soil information requirements could be satisfied in Hungary. We started to compile digital soil related maps which fulfil optimally the national and international demands from points of view of thematic, spatial and temporal accuracy. The spatial resolution of the targeted countrywide, digital, thematic maps is at least 1:50.000 (approx. 50-100 meter raster resolution). DOSoReMI.hu results are also planned to contribute to the European part of GSM.net products.
In addition to the auxiliary, spatial data themes related to soil forming factors and/or to indicative environmental elements we heavily lean on the various national soil databases. The set of the applied digital soil mapping techniques is gradually broadened incorporating and eventually integrating geostatistical, data mining and GIS tools. In our paper we will present the first results.
- Regression kriging (RK) has been used for the spatial inference of certain quantitative data, like particle size distribution components, rootable depth and organic matter content. In the course of RK-based mapping spatially segmented categorical information provided by the SMUs of Digital Kreybig Soil Information System (DKSIS) has been also used in the form of indicator variables.
- Classification and regression trees (CART) were used to improve the spatial resolution of category-type soil maps (thematic downscaling), like genetic soil type and soil productivity maps. The approach was justified by the fact that certain thematic soil maps are not available in the required scale. Decision trees were applied for the understanding of the soil-landscape models involved in existing soil maps, and for the post-formalization of survey/compilation rules. The relationships identified and expressed in decision rules made the creation of spatially refined maps possible with the aid of high resolution environmental auxiliary variables. Among these co-variables, a special role was played by larger scale spatial soil information with diverse attributes. As a next step, the testing of random forests for the same purposes has been started.
- Due to the simultaneous richness of available Hungarian legacy soil data, spatial inference methods and auxiliary environmental information, there is a high versatility of possible approaches for the compilation of a given soil (related) map. This suggests the opportunity of optimization. For the creation of an object specific soil (related) map with predefined parameters (resolution, accuracy, reliability etc.) one might intend to identify the optimum set of soil data, method and auxiliary co-variables optimized for the resources (data costs, computation requirements etc.). The first findings on the inclusion and joint usage of spatial soil data as well as on the consistency of various evaluations of the result maps will be also presented.

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