



Elaboration of a 3D, regional scale, spatial dataset for the support of modeling water regime in the unsaturated zone

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Modeling water movement in the unsaturated zone, soil physical data on main hydraulic properties as input parameters are required concerning the water retention curve and the hydraulic conductivity function. Direct measurement of the hydraulic parameters is really cumbersome and time-consuming; the estimation of them can be an alternative, which is most commonly based on the usage of particle-size distribution (PSD) data or texture classes.

In Hungary the top layers of the vadose zone (down to approximately 1 meter) is described pedologically while the deeper layers are investigated by agrogeological methods. As a consequence, the available information on hydrophysical features also differs significantly for the various layers of the unsaturated zone. On the other hand the existing pedo- and agrogeological databases are not able to serve separately the information requirements of modeling, their appropriate integration should be carried out.

The aim of our work was to elaborate a method for the compilation of 3D, regional scale, spatial datasets for the support of modelling the water regime in the unsaturated zone based on the thematic, horizontal and vertical harmonization, fitting and interpolation of hydrophysical parameters originating from standardized pedo- and agrogeological databases. The aimed dataset provides information on the physical properties and stratification of the formations to the depth of the permanent groundwater level. Based on the elaborated method the unsaturated zone was described in a standardized manner which provides suitable input of modeling

Digital Kreybig Soil Information System (DKSIS) has been used as pedological data source of the integrated 3D model. The DKSIS has been compiled in the Research Institute for Soil Science and Agricultural Chemistry of the Hungarian Academy of Sciences, based on the 1:25,000 scale, national soil mapping program in Hungary. The applied agrogeological dataset is maintained by the Hungarian Geological Institute and derives from a net of 10 m depth boreholes. In the boreholes all of the different geological formations were sampled, at least in each meter.

For the harmonization of hydrophysical data, texture classes were used as common interface. Non-equidistant layers were transferred into a regular vertical layer distribution. Categorical point information in each layer was interpolated using indicator kriging. Decisions on categorization were done based on probabilistic class membership values.

The integrated 3D databases serve coupled (deterministic - stochastic) model simulation based analysis of regional water management problems like drought, flood and inland inundation in pilot areas with various physiographical features in the Great Hungarian Plain.