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Mapping specific soil functions based on digital soil property maps

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Quantification of soil functions and services is a great challenge in itself even if the spatial relevance is supposed to be identified and regionalized. Proxies and indicators are widely used in ecosystem service mapping. Soil services could also be approximated by elementary soil features. One solution is the association of soil types with services as basic principle. Soil property maps however provide quantified spatial information, which could be utilized more versatilely for the spatial inference of soil functions and services.

In the frame of the activities referred as “Digital, Optimized, Soil Related Maps and Information in Hungary” (DOSoReMI.hu) numerous soil property maps have been compiled so far with proper DSM techniques partly according to GSM.net specifications, partly by slightly or more strictly changing some of its predefined parameters (depth intervals, pixel size, property etc.). The elaborated maps have been further utilized, since even DOSoReMI.hu was intended to take steps toward the regionalization of higher level soil information (secondary properties, functions, services). In the meantime the recently started AGRAGIS project requested spatial soil related information in order to estimate agri-environmental related impacts of climate change and support the associated vulnerability assessment.

One of the most vulnerable services of soils in the context of climate change is their provisioning service. In our work it was approximated by productivity, which was estimated by a sequential scenario based crop modelling. It took into consideration long term (50 years) time series of both measured and predicted climatic parameters as well as accounted for the potential differences in agricultural practice and crop production. The flexible parametrization and multiple results of modelling was then applied for the spatial assessment of sensitivity, vulnerability, exposure and adaptive capacity of soils in the context of the forecasted changes in climatic conditions in the Carpathian Basin. In addition to soil fertility, degradation risk due to N-leaching was also assessed by the model runs by taking into account the movement of nitrate in the profile during the simulated periods.

Our paper will present the resulted national maps and some conclusions drawn from the experiences.

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