



Creation of detailed soil properties maps of the Czech Republic based on national legacy data and digital soil mapping

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Legacy soil data arising from traditional soil surveys are an important resource for digital soil mapping. In the Czech Republic, a large-scale (1:10 000) mapping of agricultural land was completed in 1970 after a decade of field investigation mapping. It represents a worldwide unique database of soil samples by its national extent and detail. This study aimed to create a detailed map of soil properties (organic carbon, ph, texture, soil unit) by using state-of-the-art digital soil mapping (DSM) methods. For this purpose we chose four geomorphologically different areas (2440 km² in total). A selected ensemble machine learning techniques based on bagging, boosting and stacking with random hyperparameters tuning were used to model each soil property. In addition to soil sample data, a DEM and its derivatives were used as common covariate layers. The models were evaluated using both internal repeated cross-validation and external validation. The best model was used for prediction of soil properties. The accuracy of prediction models is comparable with other studies. The resulting maps were also compared with the available original soil maps of the Czech Republic. The new maps reveal more spatial detail and natural variability of soil properties resulting from the use of DEM. This combination of high detailed legacy data with DSM results in the production of more spatially detailed and accurate maps, which may be particularly beneficial in supporting the decision-making of stakeholders.

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