

EGU2020-2622

<https://doi.org/10.5194/egusphere-egu2020-2622>

EGU General Assembly 2020

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Harmonisation of a large-scale historical database with the principles of the World Reference Base for Soil Resources

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The possibility of an adequate use of data and maps from historical soil surveys depends, to a large measure, on their harmonisation. Legacy data originating from a large-scale national mapping campaign, “Systematic soil survey of agricultural soils in Czechoslovakia (SSS, 1961–1971)”, were harmonised and converted according to the World Reference Base 2014 (WRB). Applying three different methods of taxonomic distance computation and quantitative analysis and reclassification of the selected soil properties, the conversion of so-called Basic soil representatives (BSR) – mapping soil units providing information about soil (type, subtype, variety) and lithology (parent material, texture, soil depth, skeleton content) – to their counterparts in the WRB has been effectuated. The results proved the good potential of the used methods for soil data harmonisation. The values of taxonomic distance correspond to the different concepts and settings of the soil classes in the harmonized soil classifications. Classes with specific and narrowly defined diagnostics, often with one or few strong and distinctive features, show close distances with their counterparts, and, often, have only one relevant counterpart. On the contrary, soils with variable soil properties were approximating several related units. The additional information on the soil skeleton content, texture, depth and parent material showed the potential in the specification of some units, though the harmonisation of the soil texture turned out to be problematic due to the different categorisation of soil particles. The resulting soil classes have been presented for each polygon (so-called soil district) as i) one to one conversion, when each BSR is converted to one, most probable, WRB soil class (Reference soil group, RSG) and ii) soil association corresponding to the three closest RSGs. The validation of the results in the study region showed an average overall accuracy for a one-to-one (59.4 %) conversion and a very good accuracy (83.8 %) for the polygons presented as soil associations. The conversion accuracy differed significantly in the individual soil units, and ranged from 92 % in Fluvizems to 0 % in Technosols and Histosols. The extreme cases of a complete mis-classification can be attributed to inconsistencies originating in the historical database and maps. The study showed the potential of modern quantitative methods in the legacy data harmonisation and also the necessity of a critical approach to historical databases and maps.

Supported by the Ministry of Agriculture of the Czech Republic, Project No. QK1820389.

