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Digital soil mapping for the support of delineation of Areas Facing Natural Constraints defined by common European biophysical criteria

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One of the main objectives of the EU's Common Agricultural Policy is to encourage maintaining agricultural production in Areas Facing Natural Constraints (ANC) in order to sustain agricultural production and use natural resources, in such a way to secure both stable production and income to farmers and to protect the environment. ANC assignment has both ecological and severe economical aspects. Recently the delimitation of ANCs is suggested to be carried out by using common biophysical diagnostic criteria on low soil productivity and poor climate conditions all over Europe. The criterion system was elaborated and has been repeatedly upgraded by JRC. The operational implementation is under member state competence. This process requires application of available soil databases and proper thematic and spatial inference methods.

In our paper we present the inferences applied for the latest identification and delineation of areas with low soil productivity in Hungary according to JRC biophysical criteria related to soil: limited soil drainage, texture and stoniness (coarse texture, heavy clay, vertic properties), shallow rooting depth, chemical properties (salinity, sodicity, low pH).

The compilation of target specific maps were based on the available legacy and recently collected data. In the present work three different data sources were used. The most relevant available data were queried from the datasets for each mapped criterion for either direct application or for the compilation a suitable, synthetic (non-measured) parameter. In some cases the values of the target variable originated from only one, in other cases from more databases. The reference dataset used in the mapping process was set up after substantial statistical analysis and filtering. It consisted of the values of the target variable attributed to the finally selected georeferenced locations. For spatial inference regression kriging was applied. Accuracy assessment was carried out by Leave One Out Cross Validation (LOOCV). In some cases the DSM product directly provided the delineation result by simple querying, in other cases further interpretation of the map was necessary.

As the result of our work not only spatial fulfilment of the European biophysical criteria was assessed and provided for decision makers, but unique digital soil map products were elaborated regionalizing specific soil features, which were never mapped before, even nationally with 1 ha spatial resolution.

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