Elaboration of digital soil map products for the support of terroir mapping

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A “terroir-based approach” is needed for the characterization of viticultural land and the survey of the state of the vineyards. Soil plays dominant role determining the viticultural potential and terroir delineation. Relevant soil property map products can be created by the application of digital soil mapping (DSM) methods. DSM methods use spatially exhaustive, environmental auxiliary variables related to soil forming processes for spatial inference, which should be in direct or indirect application of digital soil mapping (DSM) methods. Relevant soil property map products can be created by the use of spatially exhaustive, environmental auxiliary variables related to soil forming processes for spatial inference, which should be in direct or indirect application of digital soil mapping (DSM) methods.

1. Our study area is located in Hungary, in the Tokaj Wine Region, which is a historical region for botrytised dessert wine making. Tokaj Mountains was formed mostly by Miozene volcanic activity, where andesite, rhyolite lavas and tuffs are characteristic and loess cover also occurs in some regions.

2. Terroir is a homogenous area that relates to both environmental and cultural factors, that influence the grape and wine quality. Soil plays a dominant role determining the viticultural potential and terroir delineation; the most relevant soil properties are drainage, water holding capacity, soil depth and pH.

3. The soil sampling strategy was designed to be representative to the combinations of basic environmental factors (slope, aspect and geology) which determine the main soil properties of the study area. Field survey was carried on 2 levels:

   1. 200 sites: to obtain a general pedological view of the area.
   2. Further 650 sites: designed by simulated annealing technique to take into consideration the results of the preliminary survey and the local characteristics of the area.

The data collection regarded soil type, soil depth, parent material, rate of erosion, organic matter content and further physical and chemical soil properties.

4. The concept of DSM combines the multiple linear regression (MLR) of the dependent variable on auxiliary variables with regression kriging (RK) and classification trees (CT), which are widely applied in DSM.

5. The spatial extension of soil survey data was performed by two, different spatial predicting methods – regression kriging (RK) and classification trees (CT), which are widely applied in DSM. The resulted soil map products were also used to predict the target soil properties.

6. In the framework of the recent project a total number of 33 primary and secondary soil property, soil class and soil function maps were compiled. 2 examples of these map products are presented below: soil depth and soil drainage representing a continuous and class type soil property respectively.

Continuous type soil property map

Class type soil property map

Conclusion

- A set of the resulting soil map products supports to meet the demands of the Hungarian standard viticultural potential assessment.
- The majority of the maps is intended to be applied for terroir delineation. On our poster we present some examples of the resulting soil map products.
- The resulted soil map products were also used to predict other climatological parameters (e.g. the frequency of frost damage) and agronomic properties (as potential growth rate, earliness, stock selection).
- The soil map products together with the climatological, terrain and agronomic map products enable the terroir delineation in the area.

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