Geophysical Research Abstracts
Vol. 17, EGU2015-12660, 2015
EGU General Assembly 2015

Digital Terroir Mapping in the Tokaj Historical Wine Region

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Tokaj is a historical region for botritized dessert wine making, the famed Tokaji Wine Region has the distinction of being Europe's first classified wine region. Very recently the sustainable quality wine production in the region was targeted, which requires detailed and "terroir-based approach" characterization of viticultural land.
Tokaj region consists of 27 villages, the total producing vineyard surface area is 5,500 hectares, and the total vineyard land exceeds 11,000 hectares. The Tokaj Kereskedőház Ltd. is the only state owned winery in Hungary. The company is integrating grapes for wine production from 1,100 hectares of vineyard, which consist of 3,500 parcels with average size of 0.3 hectares. In 2013 the Hungarian Government has decided to elaborate a sustainable quality wine production in the Tokaj region coordinated by the Tokaj Kereskedőház Ltd, the biggest wine producer. To achieve the target it is indispensable to assess the viticultural potential of the land. In 2013 the characterization of the vineyard land potential was started collecting detailed, up-to-date information on the main environmental factors (geology, geomorphology and soil) which comprise the terroir effect and combined with legacy data of climate. The Council of Wine Communities of Tokaj Region has decided to widen the survey for the whole wine region in the year 2014.
The primary objective of our work was the execution of an appropriate terroir zoning, which was carried out by digital terroir mapping. As a start-up we adapted some concepts recently applied in French wine regions. The implementation was however carried out totally in spatial, digital environment. Four main sources of information have been used (i) airborne laser scanning, (ii) hyperspectral imaginary, (iii) digital soil maps compiled based on detailed soil survey and (iv) interpolated climatic data. Based on them pedoclimate, mesoclimate and soil water reservoir were spatially predicted. The operational spatial resolution was set to 25 meters as a compromise between the denser remotely sensed data and the resolution available by the spatial inference of the collected soil information by proper digital soil mapping techniques. Finally the plant available water content, the vigor potential and precocity (earliness) potential was calculated. Based on these three maps the optimal target of production (dessert wine, dry wine, sparkling wine) could be determined and the information could provide a basis for decisions made both prior to planting and during production.

Acknowledgement:
The authors are grateful to the Tokaj Kereskedőház Ltd. and to András Tombor, Head of the Supervisory Board of Tokaj Kereskedőház Ltd. who has been supporting the project for the survey of the state of vineyards. Digital soil mapping was partly supported by the Hungarian National Scientific Research Foundation (OTKA, Grant No. K105167).