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Soil classification based on Sentinel-2 Products using HorusApp application

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Soil classification maps (i.e. pedological maps) describe soil characteristics based on observable features in the field such as color or texture, and on the distribution of the different horizons (i.e. layers) within the soil. Such maps are the result of a soil survey consisting in measuring soil characteristics in a very limited number of geographical locations and using them to classify soil in that particular area.
HorusApp supports the development of pedological maps by combining field studies and measurements with Sentinel-2 data. HorusApp integrates ESA's SNAP software tool used to process remotely the sensing data. Soil classification can be performed at different levels (class, type and subtype) based on machine learning techniques. HorusApp consists of several modules: Measurement Points Editor, Soil Classification System, Map Generator and Map Evaluator. Measurement Points Editor allows the editing of the set of measurement points used for calibration of the Soil Classification System. The user specifies a point by selecting a position on the map and a set of attributes such as latitude/longitude, soil class, soil type, soil subtype is automatically computed. Soil Classification System performs soil classification using satellite data extracted from the measurement points based on machine learning techniques. Map Generator infers the soil type for each location in the map. Map Evaluator evaluates the quality of the generated pedological map. The evaluation is done according to a metric that compares two pedological maps.
HorusApp uses the HORUS platform which enables specialists to scale the processing over a cloud infrastructure running Kubernetes and Docker containers. The development of the HORUS platform and application have been supported and funded by the Romanian Space Agency (ROSA).
Several case studies were conducted in the Transylvanian plain using Sentinel-2 images from the ESA repository and existing pedological maps provided by University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca (USAMV).

References

HORUS - Software Toolbox for Pedological Monitoring of Transylvanian Area based on Sentinel-2 Data, [available online] http://cgis.utcluj.ro/horus/.