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Interactions between Soil related Sciences - Linking Geophysics, Soil Science and Digital Soil Mapping

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The soil degradation driven or exacerbated by human activity is a serious problem in Europe and has a direct impact on water and air quality, biodiversity, climate and the quality of human life. High-resolution soil property maps are one major prerequisite for the specific protection of soil functions and restoration of degraded soils as well as sustainable land use, water and environmental management. However, the currently available techniques for (digital) soil mapping still have deficiencies in terms of reliability and precision, the feasibility of investigation of large areas and the assessment of soil degradation threats at this scale. Therefore, it is necessary to develop new strategies and innovative methods for generating high-resolution and accurate soil property maps and on the other hand to reduce the costs compared to traditional soil mapping.

Our presentation will give a short introduction in the project iSOIL which will be supported by the 7th framework program of the EU.

This collaborative project tackle the challenges, mentioned above, by the integration of three major components: (i) high resolution, non-destructive geophysical (e.g. Electromagnetic Induction EMI; Ground Penetrating Radar, GPR; magnetics, seismics) and spectroscopic (e.g., Near Surface Infrared, NIR) methods, (ii) Concepts of Digital

Soil Mapping (DSM) and pedometrics as well as (iii) optimized soil sampling with respect to profound soil scientific and (geo)statistical strategies.

The objectives of iSOIL research are the development of new and the improvement of existing methods that include geophysical, spectroscopic and monitoring techniques. The progress given by iSOIL would be a further development of known geophysical and spectral methods with a focal point on emerging techniques as spectral induced polarization (SIP), seismics and Near Infrared (NIR).

The focus of the presented project is on improving fast and reliable mapping of soil properties, soil functions and soil degradation threats. This requires not only the improvement but also the integration of different measuring techniques, of pedometrical and pedophysical approaches, enhanced DSM techniques, as well as subsequent modelling approaches. It is expected that only suitable combinations of different geophysical quantities correlate unambiguously with the soil parameters of interest.

The final aim of the project is to provide techniques to make use of geophysical sensor data in terms of producing fast, accurate and high solution digital soil maps at different scales.