



High resolution digital soil mapping as a future instrument for developing sustainable landuse strategies

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Climate change, increase in population and intensification of land use pose a great challenge for sustainable handling of soils. Intelligent landuse systems are able to minimize and/or avoid soil erosion and loss of soil fertility. A successful application of such systems requires area-wide soil information with high resolution. Containing three consecutive steps, the project INE-2-H („innovative sustainable landuse“) at the University of Tuebingen is about creating high-resolution soil information using Digital Soil Mapping (DSM) techniques to develop sustainable landuse strategies. Input data includes soil data from fieldwork (texture and carbon content), the official digital soil and geological map (1:50.000) as well as a wide selection of local, complex and combined terrain parameters. First, soil maps have been created using the DSM approach and Random Forest (RF). Due to high resolution (10x10 m pixels), those maps show a more detailed spatial variability of soil information compared to the official maps used. Root mean square errors (RMSE) of the modelled maps vary from 2.11 % to 6.87 % and the coefficients of determination (R^2) go from 0.42 to 0.68. Second, soil erosion potentials have been estimated according to the Universal Soil Loss Equation (USLE). Long-term average annual soil loss ranges from 0.56 to 24.23 [t/ha/a]. Third, combining high-resolution erosion potentials with expert-knowledge of local farmers will result in a landuse system adapted to local conditions. This system will include sustainable strategies reducing soil erosion and conserving soil fertility.