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Soil texture prediction at a regional scale with the use of remote sensing

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The current availability of quantitative soil information does not meet the requirements with respect to quality, cost and coverage for environmental monitoring and modelling for regional to global scale studies. More specifically, for countries where adaptation to global climate change and improvement of production systems is crucial for human wellbeing, such as most parts of Africa, general qualitative soil information is available at reconnaissance scale only. Fortunately, remote sensing, an efficient data source proven by its long track record, can provide relevant data over vast areas. However, for regional scale studies in development and transitional countries, the overall problem is how to use remote sensing for soil property mapping with few existing soil data available. Current methods focus on property mapping at the plot scale. However, they do not work beyond the plot due to local calibration of models. For operational use, these methods have to be extended beyond the plot level. Therefore, in this study we aim to correlate local soil observations to an exhaustive covariate dataset in order to predict soil texture on a regional scale. Based on the soil-landscape paradigm physical meaningful covariates are being used such as ASTER imagery, DEM-derived variables and additional climate data (precipitation, surface temperature and soil moisture). Three different methods have been tested for the prediction of soil texture; (1) multiple linear regression, (2) stepwise regression and (3) regression trees. The relationships resulting from the three different models are being applied to the entire study area, resulting in a soil texture map of the study area. This on-going research demonstrates that remote sensing has a fundamental role for delivering detailed soil data on global and regional scale which is required for research focussing on environmental monitoring and modelling for regional to global scale studies