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Thema
AG Digital Soil Mapping
Nah- und Fernerkundung

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Titel
Gamma spectrometry supported ethnopedological soil mapping in Tanzania

Abstract
Within the framework of the Trans-SEC project, financed by BMBF, two food value chains for the Dodoma region in Tanzania were inspected in order to make propositions for improvements reaching from soil preparation to product consumption. For this purpose, rapid and reliable soil mapping approaches were established to obtain information for site-adapted cropping trials. A combination of local soil knowledge and gamma spectrometry assisted soil mapping was applied to create soil maps of two villages in the Dodoma region. Local farmers possess decade-old experience and knowledge of the terrain; gamma spectrometry is a proximal, non-invasive method delivering quick results in the field which can be related to soil types and soil properties. In the course of the mapping procedure, soil type distributions in the landscape and laboratory data were related to gamma signals and correlations were investigated.

In order to get a first idea of landscape and local soils, focus group discussions were carried out and resulted in a preliminary soil map, drawn together with local farmers on high resolution satellite images. On this basis, reference soil profiles of the major soil types were described, sampled and gamma signatures as fingerprints were recorded. The latter served as reference for later soil distinction in the field. In the next step, transect walks with soil samplings and gamma ray measurements were carried out together with local key informants. In addition, plots for later cropping experiments were investigated with gamma spectrometry and soil sampling. On first hand, gamma signals depended on bedrock composition. The signals were, in second order, altered by weathering processes and led to further interpretation opportunities. Soil gamma signatures served well for soil distinction. In the laboratory, major soil nutrients and properties were determined, i.e. total carbon, total nitrogen, pH and plant-available P and K. Gamma data were explored in detail for interpretation and further information extraction possibilities. Relationships between gamma radiation and soil properties, valid for the study area, but also transferable to other studies were examined.