



Application of mobile gamma-ray spectrometry for soil mapping

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Gamma-ray measurements have a long tradition for geological surveys and deposit exploration using airborne and borehole logging systems. For these applications, the relationships between the measured physical parameter – the concentration of natural gamma emitters ^{40}K , ^{238}U and ^{232}Th – and geological origin or sedimentary developments are well described. Thus, Gamma-ray spectrometry seems a useful tool for carrying out spatial mapping of physical parameters related to soil properties. The isotope concentration in soils depends on different soil parameters (e.g. geochemical composition, grain size fractions), which are a result of source rock properties and processes during soil genesis. There is a rising interest in the method for application in Digital Soil Mapping or as input data for environmental, ecological or hydrological modelling, e.g. as indicator for clay content. However, the gamma-ray measurement is influenced by endogenous factors and processes like soil moisture variation, erosion and deposition of material or cultivation.

We will present results from a time series of car borne gamma-ray measurements to observe heterogeneity of soil on a floodplain area in Central Germany. The study area is characterised by high variations in grain size distribution and occurrence of flooding events. For the survey, we used a 4 l NaI(Tl) detector with GPS connection mounted on a sledge, which is towed across the field sites by a four-wheel-vehicle.

The comparison of data from different dates shows similar structures with small variation between the data ranges and shape of structures. We will present our experiences concerning the application of gamma-ray measurements under variable field conditions and their impacts on data quality.