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CHARACTERISATION OF SOIL SURFACES IN THE ARID AND SEMI-ARID ZONE OF THE MEGA-LAKE CHAD BASIN BY MEANS OF REMOTE SENSING

Mounkaila M., L. Herrmann., T. Gaiser., T. Maurer., M., Zarei, K. Stahr
Institute of Soil Science and Land Evaluation, Hohenheim University, D-70593
Stuttgart GERMANY (mounkailunihohenheim.de)

In the framework of a study carried out on potential dust sources in arid and semi-arid regions in Chad, it was necessary to undertake a regionalisation according to the physical, geochemical, and mineralogical characterization of soil surfaces in the area. Due to the fact that the sampling locations had been selected already on the basis of Landsat TM data, these satellite images wer also used for the regionalization.

A first screening of the data showed that some spectral bands (e.g. Band 3) are frequently in range of saturation. Therefore, it seemed not to be reasonable to use Landsat data to correlate spectral reflectance with soil surface properties. Instead, correlations between physic-chemical properties of soil surface samples like texture, electric conductivity, free iron primary and clay minerals and Landsat hyper-spectral data and IRIS radiometer signatures were established. IRIS spectral data have been measured on quasi natural surfaces recreated with sampled material.

During the correlation process, it turned out to be necessary to form groups of surface types in order to produce plausible correlation results. Soil surface types like Hamada and Serir surfaces (gravels), Ergs (sand surfaces), or ancient lacustrine surfaces should be separated. This is especially in the case when identifying soil properties using single bands. It seemed not to be necessary to establish soil groups when bands are combined.

Considering the large variety of influencing parameters, statistical analysis (factor

analysis, multiple and partial regression) was applied in order to identify the governing factors of the spectral properties.

Results of this approach will be presented. As a result of this preliminary analysis, it was possible to establish high partial correlation between spectral reflectance of soil surfaces and specific soil properties. However, some problems appear with certain surfaces like Hamada due to their heterogeneity.