



Soil mapping in northern Thailand based on an radiometrically calibrated Maximum likelihood approach

U. Schuler (1), L. Herrmann (2), W. Rangnugpit (1), and K. Stahr (2)

(1) The Uplands Program, Faculty of Agriculture, Chiang Mai University, Chiang Mai 50200, Thailand. , (2) Institute of Soil Science and Land Evaluation (310), Hohenheim University, 70593 Stuttgart, Germany

The highlands of northern Thailand are dominated by the soil reference groups Acrisols and Alisols. The occurrence of these depends mainly on petrography and local climate gradients. The probabilistic Maximum likelihood method locally proved the potential to predict these reference soil groups. However, the available soil information is mostly nested around research stations with vast blank areas in between. Therefore more training data are required. The collection of further soil information is costly and time consuming as the access is often difficult and the determination of the reference soil groups is based on clay content, cation exchange capacity and the organic matter content, which can hardly be determined in the field. Groundbased radiometric data have shown the potential to distinguish Acrisols and Alisols. Therefore, airborne radiometric data, which are available for whole Thailand, might have the potential for regional distinction of those. The airborne data were collected in 1984-89. The sensor was mounted on an airplane flying at approximately 120m altitude, with a distance between the flight lines of approximately 1km and measurements in the flight line of approximately 50m. After orthographic correction a low pass filter (Savitzky Golay) was used for smoothing the data. Corrected output data (grey values) were calibrated and thus transferred to concentration values (K %; Th ppm, U ppm). The standard procedure for interpolation between the flight lines was bidirectional latticing (spline). After interpolation, the data can be presented as a 2D map either as single channel, binary, or ternary presentation. Initial comparisons between the petrography in the field and those ternary maps showed a potential for further subdivision of the existing geological maps. However, smoothing and data interpolation caused numerous artefacts. Therefore it is intended to focus on the primary measuring points. At least, ground measurements of gamma-ray in a limestone area with low background radiation showed different gamma-ray spectra for the respective reference soil groups, so that these points can be used as secondary training data. In conclusion, the calibration of the Maximum likelihood approach with airborne radiometric data offers a promising possibility for efficient soil mapping of larger regions in northern Thailand.