A PHENOLOGICAL CLASSIFICATION APPROACH FOR THE UPPER OUÉMÉ IN BENIN USING SPOT VEGETATION

J. Röhrig (1), H.-P. Thamm.(1), and B. Orthmann(2)

(1) Remote Sensing Research Group (RSRG), Department of Geography, University of Bonn, Postfach 1147, 53001 Bonn, Germany
(2) Institute of Biodiversity, University of Rostock, Wismarsche Strasse 8, 18057 Rostock, Germany

In regions characterized by high temporal and spatial heterogeneity like the West African savannas, many standard classification approaches of yearly NDVI come out with relatively poor results. Such inhomogeneous vegetation types are located for instance within the Upper Ouémé catchment (100 km x 100 km) in central Benin. The vegetation is part of the transition zone between the Southern Sudanian Zone and the Northern Guinea Zone consisting of various savanna types, areas of small-scale farming, and settlements. Beyond this manifoldness, the vegetation dynamic of this area is characterised by inner-annual, seasonal changes and long-term changes in the vegetation cover caused by climate change or the impact of man. The imaging frequency of SPOT VEGETATION make a phenological approach possible defining classes in terms of their timing, duration and intensity of photosynthetic activity. Analysing NDVI data during the growing season using the method described by Reed et al. 1994 or Lloyd 1990 derives specific phonologic metrics. Hence, essential metrics are for instance the length of vegetation period, maximum, minimum values and maximum increase of NDVI within the vegetation period. For the study area, phenological metrics have been calculated and incorporated within an adapted hierarchical decision tree to identify and separate land cover classes and furthermore, to extract specific seasonal behaviour of each class.

The classification algorithm are set up and evaluated due to broad and detailed knowledge of land cover and land use as well as phenological characteristics for several vegetation types in this region gathered within the interdisciplinary IMPETUS project (An integrated approach to the efficient management of scarce water resources in West Africa; www.impetus.uni-koeln.de). The outcomes of the classification scheme are yearly land cover maps from 1999 to 2002 with a spatial resolution of 1 km x 1 km. The main challenge is to analyse the appropriateness of such a phenological approach compared to standard classification methods with focus on definite separability of land cover types on a 1 km x 1 km scale. The aim is to cope optimal with the heterogeneity of the region and to set up a classification for whole Benin.