Geophysical Research Abstracts
Vol. 14, EGU2012-10583, 2012
EGU General Assembly 2012


# Detecting environmental change using time series, high resolution imagery and field work – a case study in the Sahel of Mali

M. Brandt (1), C. Samimi (2), C. Romankiewicz (3), and R. Spiekermann (4)

(1) Department of Geography and Regional Research, University of Vienna, Austria (martin.brandt@univie.ac.at), (2) Department of Geography and Regional Research, University of Vienna, Austria (cyrus.samimi@univie.ac.at), (3) Department of Geography, University of Bayreuth, Germany (c.romankiewicz@googlemail.com), (4) Department of Geography and Regional Research, University of Vienna, Austria (spiekermann.raphael@gmail.com)

Climatic changes and population pressure have caused major environmental change in the Sahel during the last fifty years. Many studies use coarse resolution NDVI time series such as GIMMS to detect environmental trends; however explanations for these trends remain largely unknown. We suggest a five-step methodology for the validation of trends with a case study on the Dogon Plateau, Mali.

The first step is to monitor long-term trends with coarse scale time series. Instead of GIMMS, we use a combination of LTDR (derived from AVHRR) and SPOT VGT NDVI data, covering the period from 1982-today with a temporal resolution of 10 days and a spatial resolution of 5.6 km. Areas with significant trends are further analysed in a second step. Here we use a decomposed MODIS time series with a spatial resolution of 250 m. Due to the large scaled MODIS dataset, trends can be identified at a local scale / village level. Using very high resolution imagery (e.g. SPOT, Quickbird) areas of interest can be compared with pre-drought Corona-imagery. This offers a detailed overview of the environmental change at tree-level. Yet many explanations for the changes identified remain unclear. On-site field work provides information on the land use systems, vegetation composition and the current environmental condition. Still many explanations for change can only be speculated and hypothesized. For this reason, interviews with the local population are vital for providing missing details.

In this case study, an area near Fiko is introduced and analysed, where significant negative NDVI-trends are observed at a coarse scale. Using the MODIS dataset, the spatial pattern shows areas with both positive and negative trends within the same area. A comparison of high resolution imagery with the Corona images show major land use changes over the past fifty years. What used to be dense bush cover has partially been converted to farmer managed agro-forestry and a significant proportion is now degraded land. Furthermore, an increase of tree cover on the fields can be detected. An initial field trip validated the suspected soil erosion and loss of trees and shrubs outside the fields used for agricultural purposes. On the fields surrounding the village many useful trees of all ages were identified. Interviews with local people showed that good farmer-management using traditional methods, without outside-influence of projects, led to an increase of tree cover on the fields and healthy environmental conditions. The land outside of the current agricultural area is highly degraded, which locals explain by the following points: the extreme droughts in the 1970s and 1980s; lack of protection by farmers; legal and illegal felling by inhabitants of provincial towns in the region and increased livestock numbers. Due to the declining vegetation cover and supported by the unfavourable morphology, the susceptibility to soil erosion increases. Many useful trees and shrubs have become rare in these areas.

This example demonstrates that land use plays a major role and shows the importance of an integrative approach and input of local inhabitants when interpreting environmental change in the Sahel.