Geophysical Research Abstracts, Vol. 8, 03699, 2006
SRef-ID: 1607-7962/gra/EGU06-A-03699

Interannual memory effects of vegetation in semi-arid Africa

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Over 15 years of Normalized Difference Vegetation Index (NDVI) data from the Advanced Very High Resolution Radiometers (AVHRR) are used to study the response of vegetation activity to rainfall in three semi-arid regions of Africa, diversified in terms of geography (Western, Southern and Eastern Africa), topography, rainfall regime and vegetation. The relationships between annual NDVI and annual precipitation (PPT) time series are examined using statistical approaches (simple and partial correlations, linear multiple regressions). It appears that annual NDVI highly depends on PPT of the concurrent year and the previous year. An analysis of particularly dry and wet years enables to better diagnose two asymetrical memory effects of vegetation. The first effect represents the difficulty of vegetation to recover from previous two-year drougth conditions. The second effect represents the capacity of semi-arid ecosystems to benefit from a water surplus at a one-year time-lag.