

Land-cover change and vegetation dynamics across Africa

Marc Linderman, Pedram Rowhani, David Benz, Suzanne Semeels, and Eric F. Lambin

Department of Geography, University of Louvain, Louvain-la-Neuve, Belgium

Received 15 October 2004; revised 10 February 2005; accepted 25 February 2005; published 17 June 2005.

[1] Using improved metrics and recently available MODerate resolution Imaging Spectrometer (MODIS) data, we examined the magnitude, extent, and nature of changes in photosynthetic activity and its timing across Sub-Saharan Africa. Changes in overall vegetation activity and shifts in its timing have considerable implications for a variety of processes including surface-atmosphere energy exchanges, terrestrial sources and sinks of carbon, the contribution of local evapotranspiration to the water cycle, disturbance regimes such as fires and pests, and the food security of societies using these ecosystems. While previous studies have examined broad-scale trends in phenology or provided more detailed estimates of land-cover conversion in the tropics, less is known of the year-to-year dynamics of vegetation. Here we quantified the overall changes in vegetation activity for each year between 2000 and 2004 and examined the proportion linked to differences in phenology and overall photosynthetic activity. In addition, we examined the nature of these changes in terms of frequency and duration, the proportion per ecosystem, identified areas of intensive change, and discuss the potential consequences of these changes. We found that most interannual change was not from shifts in timing or phenology, but rather largely due to differences in the amount of annual photosynthetic activity. In fact, there was as much as a 5% annual difference in vegetation activity across the continent. The changes were likely climate driven with particular vegetation types most susceptible to interannual change with high spatial and temporal variability found across the continent.

Citation: Linderman, M., P. Rowhani, D. Benz, S. Semeels, and E. F. Lambin (2005), Land-cover change and vegetation dynamics across Africa, *J. Geophys. Res.*, 110, D12104, doi:10.1029/2004JD005521.