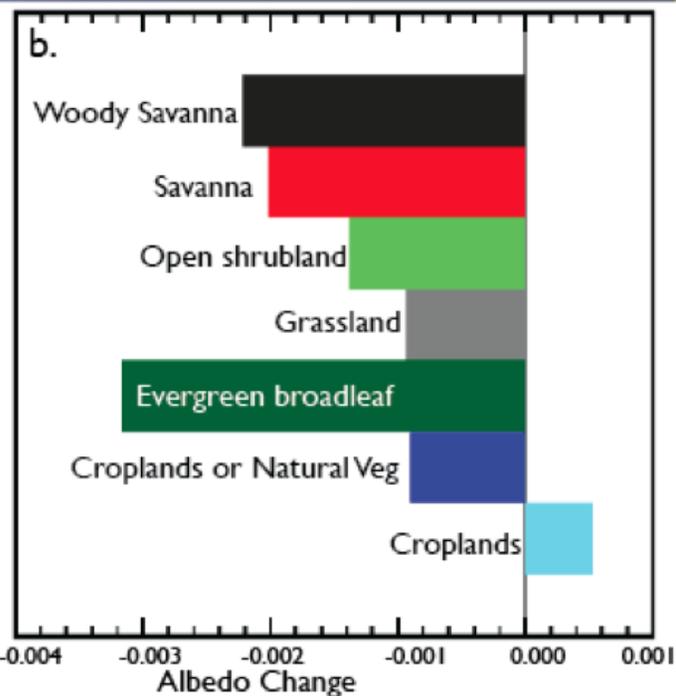
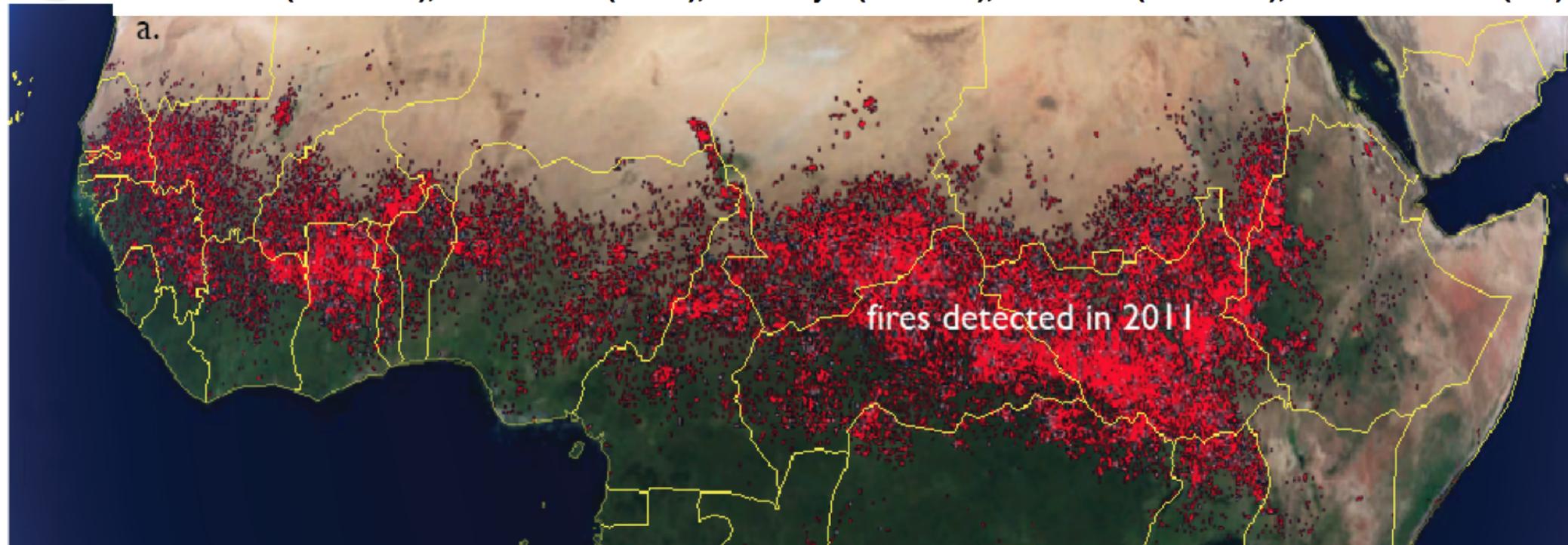


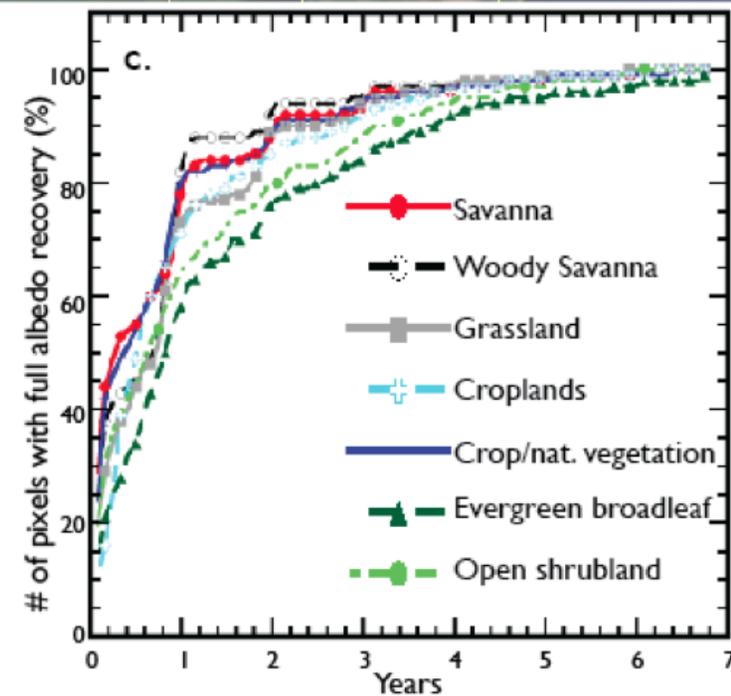


Surface Albedo Changes from Wildfires in Northern Sub-Saharan Africa

C.K. Gatebe (USRA/613), C. M. Ichoku (GSFC), R. Poudyal (SSAI/613), M. Román (GSFC/619), and E.M. Wilcox (DRI)



The study derives new trajectories of post-fire albedo dynamics for sub-Saharan Africa from MODIS multi-year observational data (2003–11).





Name: Charles Gatebe, Universities Space Research Association (USRA) and NASA/GSFC, Code 613
E-mail: charles.k.gatebe@nasa.gov
Phone: 301-614-6228

References:

Gatebe, C. K., C. M. Ichoku, R. Poudyal, M. Román, and E. Wilcox (2014): Surface Albedo Darkening from Wildfires in Northern Sub-Saharan Africa, *Environmental Research Letters.*, 9, doi:10.1088/1748-9326/9/6/065003.

Data Sources: MODIS (Collection 5) albedo product, MCD43A3; MODIS Land Cover product (MCD12Q1); MODIS Level-3, 8-day daily active fire product (MOD14A2); CAR surface reflectance product from CLASIC (Cloud and Land Surface Interaction Campaign).

Technical Description of Figures:

Figure a) shows fires (red dots) detected over northern sub-Saharan Africa (NSSA) in 2011 by MODIS on Terra & Aqua satellites. **Figure b)** shows average decrease of albedo after fires. **Figure c)** shows Post-fire albedo recovery.

Scientific significance:

The study demonstrates simple methods for characterizing and deriving the trajectories of post-fire albedo dynamics from satellite data that is consistent and widely available. Results show that savannas accounted for >86% of the total MODIS fire count between 2003 and 2011 in Northern sub-Saharan Africa. That only a small fraction of the savanna pixels ($\leq 10\%$) burn in two successive years and about 47% had any fire recurrence in 9 years. The evergreen broadleaf shows a different pattern, where there is a peak between the third and fourth year, and a second peak after the eighth year. A total of 15% of the evergreen broad leaf pixels that burned in 2003 had burned again by 2011. Furthermore, we find that the persistence of surface albedo darkening in most land cover types in the NSSA region is limited to about 6–7 years, after which at least 99% of the burnt pixels recover to their pre-fire albedo. These results will provide critical information for deriving necessary input to various models used in determining the effects of albedo change due to wild fires in sub-Saharan Africa region.

Scientific significance, societal relevance, and relationships to future missions:

This study part of a NASA funded interdisciplinary effort (PI: C. Ichoku) to assess surface, atmospheric and water cycle processes in sub-Saharan Africa through remote sensing and modeling approaches that integrate research, systems engineering, and applications expertise to best make the connections between various identified processes and phenomena. Quantifying surface albedo variations due to fire disturbances on time scales of several months to several years using satellites records is a major goal for future NASA missions.