Geophysical Research Abstracts
Vol. 15, EGU2013-12870, 2013
EGU General Assembly 2013
© Author(s) 2013. CC Attribution 3.0 License.

Past and present biogeophysical impacts of land use-land cover changes in West Africa

Souleymane Sy (1), Benjamin Sultan (2), Nathalie De Noblet -Ducoudré (3), Amadou Gaye (4), Ousmane Ndiaye (5), and Damien Kuhn (6)

(1) Cheikh Anta Diop University, LPAOSF, ESP/UCAD, Dakar, Senegal (syslod@locean-ipsl.upmc.fr), (2) IRD - LOCEAN, Paris, France, (3) LSCE, Gif-sur-Yvette, France, (4) LPAOSF, Dakar, Senegal, (5) ANACIM, Dakar, Senegal, (6) KINOME, Paris, France

Tropical Africa has been highlighted as a hot spot of land surface–atmosphere interactions.
In this study, we analyze the outputs of the project Land-Use and Climate, Identification of Robust Impacts (LUCID) over Africa. LUCID uses seven land-atmosphere models with common experimental configurations to explain the strong and constant impact of the land-use change between the preindustrial period and present day. The biogeophysical impacts of land use–land cover change (LULCC) were also compared to the impact of elevated greenhouse gases and resulting changes in sea surface temperatures and sea ice extent (CO_2SST). Focusing the analysis on Sahel and Guinea zone, we found that for a number of variables (available energy, temperature, rainfall, evaporation etc..), the amplitude of the impact of LULCC is than similar to the impact of increased greenhouse gases and warmer oceans, but with opposite sign.
This study showed also the sensitivity of the coupled ocean-atmosphere model of IPSL (and particularly key variables influencing the surface: rainfall, temperature, evaporation) with the changes of LULCC resulting from the expansion of cultivated areas and a significant decrease in tree cover in West Africa, especially in Northern Nigeria and close to the Gulf of Guinea. Composite analyses revealed local reduction of rainfall of about 20mm per month during dry years and about 15mm per month during wet years in the Sahelian zone. In Guinean zone, it is also associated with a decrease of rainfall of about 25mm per month during dry years and about 30mm per month during wet years. The change in vegetation cover also corresponds to a decrease of latent and sensible heat fluxes of about 5 to 7W/m^2 and to an increase of the surface temperature of about 1.9 °C in the period 1965 to 2005.