Geophysical Research Abstracts
Vol. 16, EGU2014-16790, 2014
EGU General Assembly 2014

Stable carbon and oxygen isotopes reveal Sahel drought events and ground water fluctuations in sub-Saharan Africa

Aster Gebrekirstos

World Agroforestry Centre, Agroforestry, Climate Change, Dendrochronology, Plant Ecophysiology; Nairobi, Kenya (A.Gebrekirstos@cgiar.org)

Tree rings are important proxies for paleoclimate studies because they contain continuous historical records of inter-annual and intra-annual time resolutions, which range over hundreds of years. This study uses stable carbon and oxygen isotopes in tree rings to understand the drivers and impacts of climate change in sub-Saharan Africa and their ability to reconstruct past regional climate variability and climatic trends. Our approach considers large scale climate gradients and different temporal scales (inter-annual and intra-annual variations) and combines multi- parameter measurements (carbon and oxygen isotopes, whole wood and cellulose measurements). The study species are Faidherbia albida and Sclerocarya birrea from south and West Africa, respectively. Both are very important deciduous trees, and widely distributed in sub-Saharan Africa. Particularly, F. albida has a distinctive phenology; it bears leaves and flowers during the dry season and sheds its leaves during the rainy season. Stable carbon (δ13C) and oxygen (δ18O) mean values showed similar inter annual patterns. In general, both δ13C and δ18O show negative correlations with rainfall, humidity and PDSI. On the contrary, they are positively correlated with sunshine hours, maximum temperature and evaporation. The reverse phenology of Faidherbia and intra seasonal resolution measurements reveals seasonal ground water fluctuations. Both carbon and oxygen stable isotopes showed strong climatic signals including the long Sahel drought events and climatic recovery phases.