

Title: Searching unique signatures of (pre-)historical human impact on East African ecosystems: the charcoal record of changing fire regimes in western Uganda

Contact person: dirk.verschuren@UGent.be

Research group: UGent-WE11-Limnology

Promotor(s): Prof. Dirk Verschuren

Supervisor: Mike Creutz

Summary: Uncertainty of whether global warming will cause drier or wetter tropical climates increases the urgency to understand the relative impacts of climate change and local human activities on the functioning of natural tropical ecosystems, and its effects on the global carbon cycle. This is particularly challenging in regions such as equatorial East Africa, where large natural rainfall variability has driven major long-term ecosystem changes independent of human activity even within the last few centuries. This complicates assessment of how much of the massive ecosystem changes which are occurring today are in fact due to human activities. Assessing the relative magnitude of modern (i.e., post-independence), historical (i.e., during the colonial period) and indigenous (i.e., pre-colonial) human impacts on East African ecosystems requires high-quality paleoenvironmental records sufficiently long and detailed to document local ecosystem response to natural climate variability, on which human impact was superimposed. Also essential are a toolkit of paleo-environmental proxies which can reliably identify and quantify the unique fingerprint of human activity, such as land-cover change and biomass burning. This study focuses on reconstructing the history of natural and anthropogenic biomass burning over the past ca.1000 years in a savanna woodland area of western Uganda, using variation in the concentration and flux of macrocharcoal (>150 μm) particles preserved in crater-lake sediments as indicator of regional fire frequency and intensity. The recorded temporal patterns are then compared with independent reconstructions of climate and vegetation change to discern natural from anthropogenic signatures of biomass burning and to place the modern-day fire regime in a solid long-term perspective.

Keywords: paleoecology, Africa, climate-human-ecosystem interaction

Practical info: This thesis involves work with lake-sediment cores, sieving charcoal particles from the sediment, and counting them under a binocular microscope at low magnification.
