

EGU24-892, updated on 20 May 2024

<https://doi.org/10.5194/egusphere-egu24-892>

EGU General Assembly 2024

© Author(s) 2024. This work is distributed under the Creative Commons Attribution 4.0 License.



Mid-Holocene environmental change in the Central Highlands of Madagascar: pre- and post-human settlement

Andriantsilavo Hery Isandratana Razafimanantsoa^{1,2}, William Bond², and Lindsey Gillson²

¹University of Cape Town, Geological Sciences, Cape Town, South Africa (tsilavo.razafimanantsoa@uct.ac.za)

²University of Cape Town, Biological Sciences, Cape Town, South Africa

The climate in the tropic is favourable for forest development and the presence of open and mosaic ecosystems in this region lead to confusion and controversies. The Central Highlands of Madagascar is dominated by a matrix of grassland with forest patches, but whether these open ecosystems are ancient or anthropogenically derived is still scientifically debated. Understanding the landscape history including vegetation history and its drivers of change is therefore required to identify the nature and origin of the vegetation particularly prior to and after human settlement to inform appropriate conservation and management plans in the region. Here we provide a high-resolution environmental reconstruction of the last 6300 years from a sediment core collected at a lake called Dangovavy from the Central Highlands. Pollen and stable carbon isotopes were used to reconstruct vegetation history, while charcoal and coprophilous spores were used for fire frequency and herbivory activities, respectively. The data showed that open and mosaic ecosystems comprising forest patches of variable extent in a matrix of open montane grassland and ericoid shrubland occupied the area surrounding the lake from at least 6000 years ago, i.e. 4000 years before human settlement suggested around 2 cal. ka BP. Variations in forest extent and montane possibly C3-dominated grassland were recorded until 1 cal. ka BP., associated with fluctuations in fire, herbivory and rainfall. However, an expansion of the grassland ecosystem supported by C4 plant dominance, as shown in the stable carbon isotopes ($\delta^{13}\text{C}$) results, was recorded in the last millennium. This change was also associated with highly increasing fire frequency and herbivory activities most likely linked to human influence. Based on these findings, the natural presence of open and mosaic ecosystems in the Central Highlands of Madagascar should be considered, as well as their validity as conservation targets other than closed forests.