

Past and current forest fragmentation in the Democratic Republic of Congo: exploring ancient charcoal as a natural archive

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Fossil pollen and charcoal fragments are preserved in lake sediments, in forest soils and in ancient human settlements where they can be accompanied by artifacts. As such, vegetation history is remarkably well archived and sometimes closely linked to cultural history. However, direct evidence for Central African vegetation history has been mainly derived from pollen analysis, although charcoal analysis is often spatially and taxonomically more precise than palynology. Charcoal analysis has proven worthwhile for palaeovegetation reconstructions in temperate regions and South America, but the charcoal archive in Central Africa has hardly been explored. Moreover, a transparent charcoal identification procedure based on extensive databases and well defined anatomical characteristics has never been developed.

Therefore, we present a Central African charcoal identification protocol within an umbrella database of species names and metadata, compiled from an on-line database of wood-anatomical descriptions (InsideWood), the database of the world's largest reference collection of Central African wood specimens (RMCA, Tervuren, Belgium) and inventory and indicator species lists (Hubau et al., accepted).

We applied the protocol on charcoal fragments collected in a systematically excavated profile in the Mayumbe forest (DR Congo), a postulated forest refuge area. The charcoal identification results seem to suggest the existence of a forest-savanna mosaic pattern close to the Mayumbe forest boundary during the Holocene Cool period between 2500 and 2000 cal yr BP. Holocene forest regression and fragmentation is thought to be climate-driven. However, human disturbance became increasingly important throughout the Holocene, which might be the reason why the Mayumbe is currently still fragmented and characterized by large patches of savanna and secondary forest.