

COMPLEMENTARY IMAGING TECHNIQUES SUPPORT DETAILED IDENTIFICATION OF CENTRAL AFRICAN CHARCOAL

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Identification of ancient charcoal fragments is a valuable tool in reconstructing past environments and determining natural and anthropogenic disturbances, and for understanding past cultures and societies. Although in Europe such studies are fairly straightforward, utilising charcoal records from the tropics is more complicated due to the species-richness of the natural vegetation. Comprehensive databases have greatly aided identification but identification of charcoal from the tropics often still relies on minute anatomical features that can be difficult to observe due to preservation or lack of abundance.

This poster illustrates the relative potential of different imaging techniques and discusses how they can provide optimal visualization of charcoal anatomy, such that specific difficulties encountered during charcoal examination can be evaluated and fine anatomical characters can be observed enabling high level identification of charcoal taxa. Reflected Light Microscopy is often used to quickly group large numbers of charcoal fragments into charcoal types. Scanning Electron Microscopy and High-Throughput X-ray Computed Tomography are employed to observe fine anatomical detail. Finally, X-ray Computed Tomography at very high resolution has proved successful for imaging hidden or 'veiled' anatomical features that cannot be detected on exposed surfaces but need three-dimensional volumetric imaging.

Furthermore, we present first results from a large charcoal database aiming at untangling past linkages between fire regimes, vegetation shifts, climate change and human disturbances. We applied the complementary imaging techniques presented above to visualize anatomy in detail, describe the charcoal types and end up with state-of-the-art identifications. Our database now contains charcoal fragments from several sites within the Congo basin. Identification results from all these sites together will provide an alternative for palynological and sedimentological long-term records, which are lacking from this region due to a scarcity of stratified lakes or wetlands.