LABORATORY OF WOOD TECHNOLOGY (UGENT-WOODLAB)

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TOCOWO
# TOMOGRAPHY OF CONGOLESE WOODEN OBJECTS

The TOCOWO project aims to explore the possibilities of X-ray micron- and sub-μ computer tomography (μCT) for the non-destructive identification of tropical wood species in the collection of the Royal Museum of Central Africa (RMCA) in Tervuren.

Wood identification

Identifying the wood species of the Congolese heritage objects held in the RMCA is imperative, as it facilitates their international travel (for travelling exhibitions and loans), contributes knowledge about the collection and helps determine their best preservation and conservation treatment. To date, however, the method for wood species identification is a destructive one: sampling the wood and analyzing the sample under a microscope to view the wood's anatomical features. Micron and sub-μ computer tomography offers a non-destructive alternative for the visualization of the wood structure- without permanently altering the object.

Since the start of the project in September 2020, 109 wooden objects from the museum's collection have already made the journey to the UGent to be scanned at high resolutions. Using HECTOR (High Energy CT scanner Optimized for Research), each Congolese heritage object was scanned twice: first capturing the entire object (overall scan) and secondly targeting only a small part of the object (region of interest scan) to visualize the internal wood structure. The illustration to the right shows the 3D renderings of both the overall (62 μm voxel size) and region of interest (ROI 4,5 μm voxel size) scans of a small bell from the Kongo culture.

The three-dimensional information gathered from the scanned wood not only allows us to render a model of the scanned region, it also enables us to virtually 'cut' through the wood in any direction, getting a detailed look at the wood and its features form any angle. The 3D-model and the cross sections shown to the right reveal the three pertinent wood planes when identifying species: the transverse (horizontal on the tree's axis), the radial (traveling through the center of the wood) and the tangential plane (perpendicular to the radial plane).
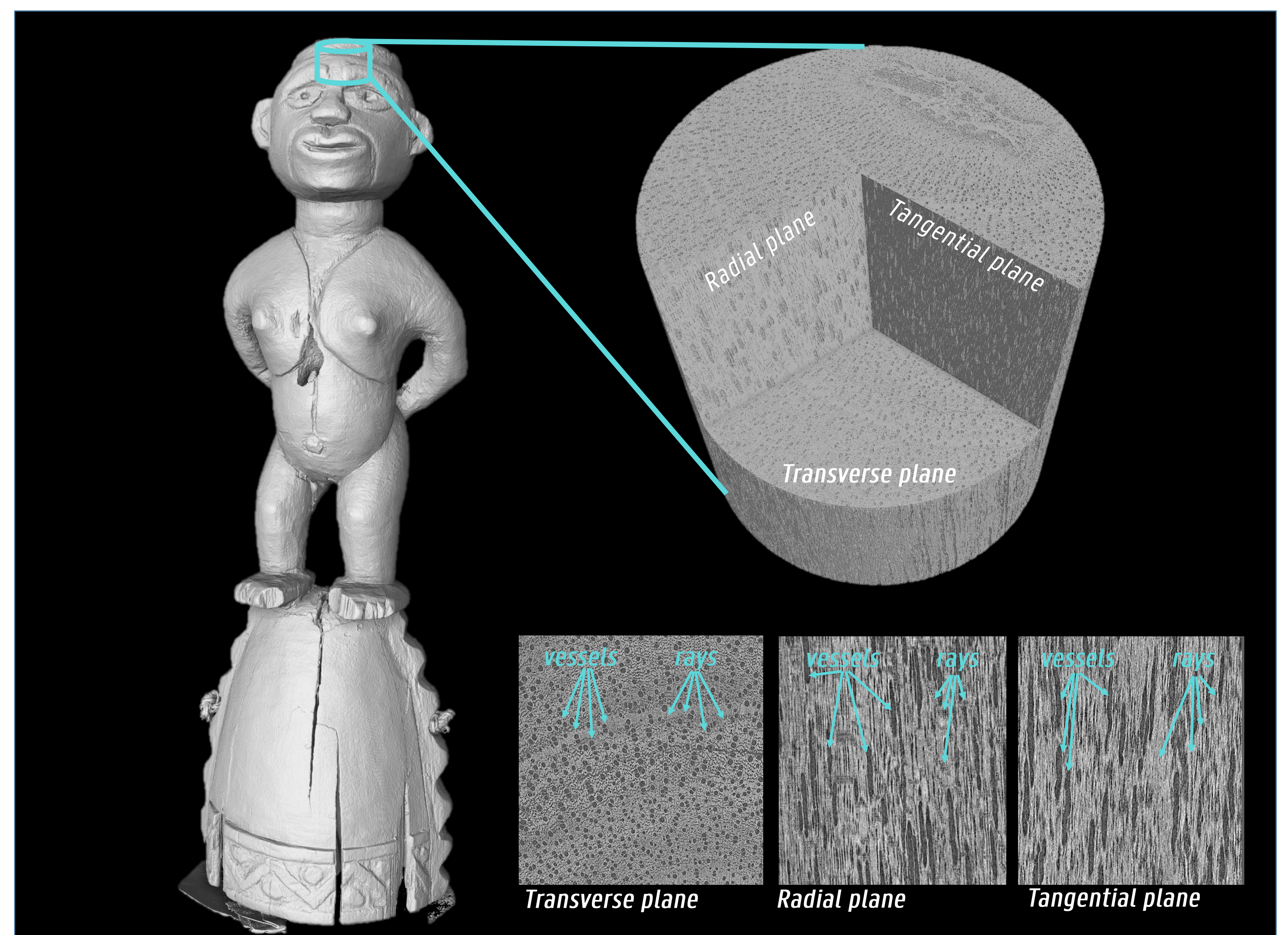
MO.1955.113.17. Bell from the Kongo culture. 10,9 x 3,7 x 2,5 cm
3D model of overall scan (62μm voxel size) and ROI scan (4,5 μm) – VGStudio MAX©
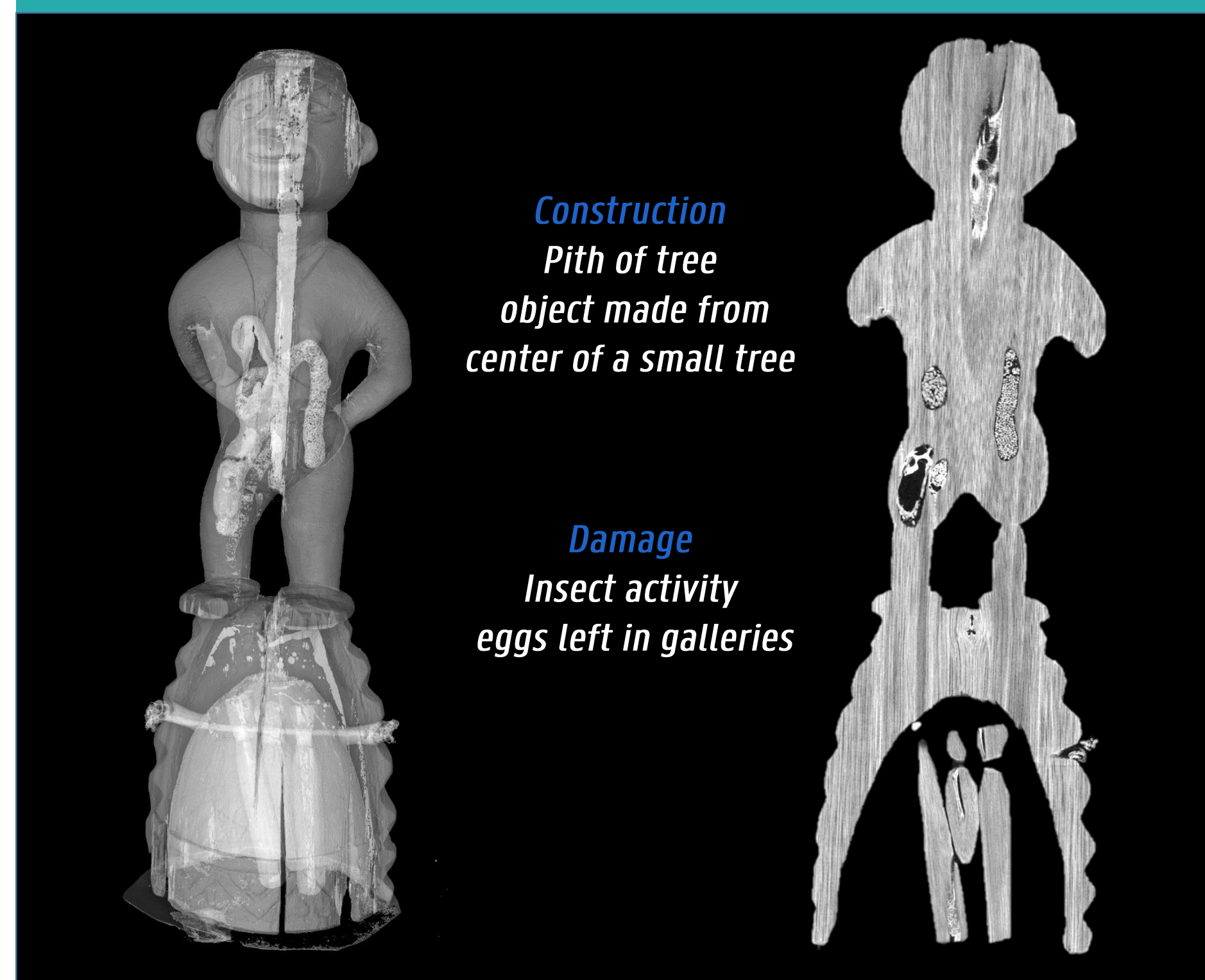*Cross sections of wood planes – ImageJ©*

RMCA collection

The exhibition rooms of the Royal Museum for Central Africa show only about 2% of the museum's entire collection of African heritage objects. Over 130,000 historical, art and musical objects are held in the museum's reserves. Although almost half of these are made entirely or partly of wood, the tropical wood species of the collection has barely been studied over the past decades (about 6%).

Conservational insights

Aside from wood species identification, the highly qualitative scans of the objects offer an extraordinary insight into the scanned objects. Visualizing the inside of the objects as well as the outside, we can learn more about their history and original context through their material evidence: how they were constructed, if they suffered any damage or received any treatments. Below, such a conservational analysis is shown of the Kongo bell.

Construction
Pith of tree object made from center of a small tree

Damage
Insect activity eggs left in galleries

Kongo bell rendering at 50% transparency – VGStudio MAX©
Cross section of Kongo bell– ImageJ©

Ethical considerations

Despite our entousiasm about the wealth of knowledge revealed by the X-ray scans of these museum objects, we are also consious of the privilege this insight gives us, especially when studying mankisi (power objects). These objects are inherently shrouded in mystery. When studying the scans, the TOCOWO team commits to treating sensitive information held within these objects with respect and discretion.

E0.0.0.33952. Nkisi from unknown culture
3D rendering – VGStudio MAX©

About me

I graduated as a wood conservator, with a special interest in wood anatomy and dendrochronology. In 2020 I became a research assistant on the BELSPO-BRAIN funded project TOCOWO at the Archives and Collection management department of the Royal Museum for Central Africa, and a PhD student at the Laboratory of Wood Technology at the UGent.

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