

Universität für Bodenkultur Wien

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COST-STSM-IE0601-02915 "Neutronradiography for dendrochronology"

The purpose of the visit was to test the usability of Neutronradiography for the non-destructive measurements of tree-ring width for dendrochronological dating.

Description of work:

Wooden samples from the Bronze Age salt mine at Hallstatt, Austria, were used to check the usability of Neutronradiography. Transmission-images were produced using image-plates. Afterwards 3D-tomographs were produced. Both procedures were done using neutrons and x-rays. The tomographs were reconstructed and checked for the usability of measuring ring width.

Description of the main results:

X-ray CT images of wooden samples of several centimeters in diameter were successfully produced and used to measure ring-width. It's possible to use x-ray CT images of softwoods in dendrochronology. The limiting factor is the size of the objects, resulting in decreasing resolution with increasing diameter. This is mainly a problem of hardwoods (for example maple), where tree-ring borders are not assigned by density gradients. Therefore the anatomical structure has to be visualized.

Neutron CT images were produced for samples up to two centimetres in diameter. Sample size is limiting the neutron CT stronger due to transmission limits and the detector size, than x-ray CT. The tree-rings of waterlogged trees, which were bacterial degraded, were successfully visualized, using thin strips.

The strength of neutron radiography is for scanning degraded wood, or covered wooden samples (for example covered by iron or stone).

Future collaboration:

More CT images will be done at PSI, to improve the spatial resolution of the scans. Further discussions on the diameter-resolution trade-off will take place.

Projected publications:

There will be a report (oral presentation) by M. Grabner at the next IE0601 meeting at Tervuren, Belgium; June 8th to 9th 2007.


Michael Grabner

Confirmation by the host:



universität des lebens