Wood Conservation at the Gray Fossil Site in Northeastern Tennessee

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What is the best method of drying wood to minimize destruction?

Initial State

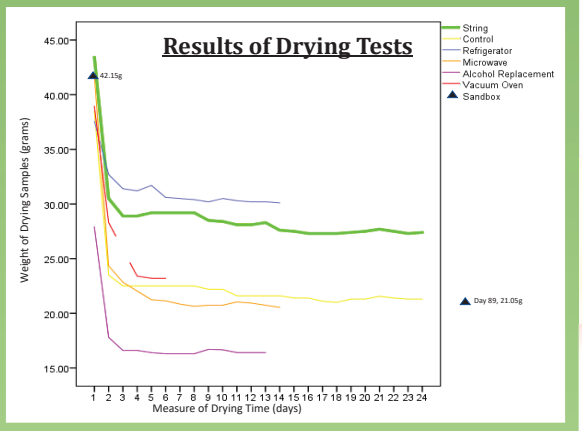
The subfossil wood was saturated with water due to the high water table. Specimens were covered with mud, oxidized and un-oxidized, and had a biofilm.

Cleaning

The specimens were cleaned carefully using brushes and water to avoid losing any pieces. The biofilm was sampled and determined to be harmless algae.

Drying Methods Tests

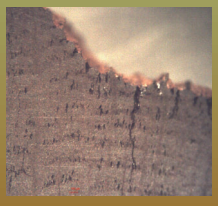
To establish best practices for drying the subfossil wood specimens, sample blanks were created on a band saw and subjected to a variety of industry standard tests to evaluate for length of drying and extent of damage.



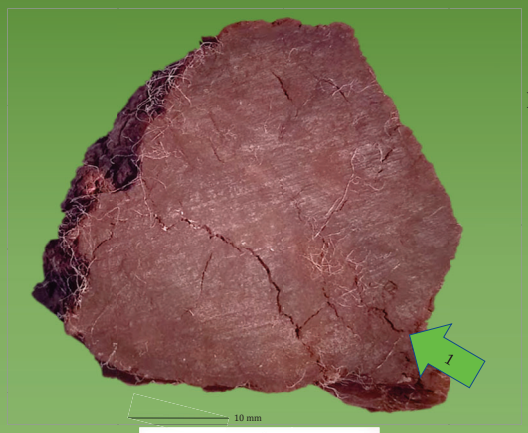
Conclusion

The best drying method is utilizing cotton string, wrapping the specimen entirely, and rotating it every 3 days as it dries in a fume hood. Other methods may be ideal for destructive analysis, like the vacuum oven or the microwave. Refrigeration should be noted as a drying technique, but one that is more variable and unstable in comparison to the other methods tested.

Upcoming Research



The subfossil wood, now dry, does exhibit rings and the associated structures. The wood can now be identified and the trees described. Dendrochronological and dendro-ecological analysis can now be completed using these specimens, providing important data concerning annual fluctuations in temperature and precipitation at the Gray Fossil Site.



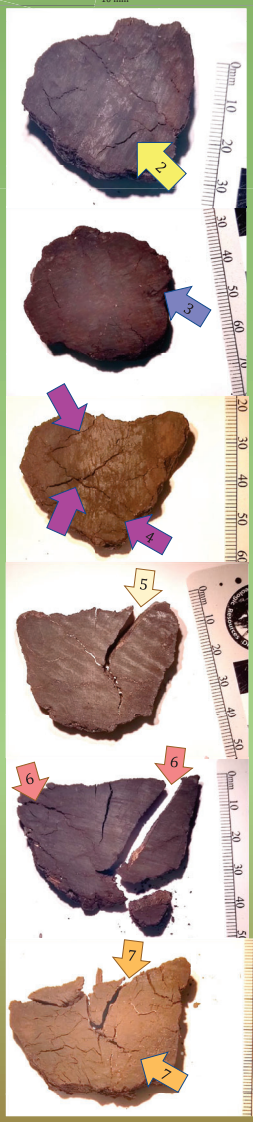
String

Process
- Wrap sample in cotton string, rotate every 3 days as it dries a fume hood

Results
- Minimal cracking
- Shallow cracking (1)

Sample wrapped in cotton string

BEST DRYING METHOD



Control

Process
- Let dry in fume hood

Results
- Minimal cracking
- Deeper cracking than String sample (2)

Refrigerator

Process
- Let rest in refrigerator

Results
- Minimal cracking (3)
- Unknown drying time, sample is drying so slowly and variably that refrigeration cannot be relied upon

Alcohol Replacement

Process
- Replace 70% of the water with alcohol
- Let alcohol and remaining water evaporate

Results
- Many surface cracks (4)
- Alcohol evaporates much faster, drying the sample faster

Sandbox

Process
- Place sample on top of sand
- Bury sample completely with the same amount of sand on top of sample, let dry for 3 months

Results
- Deep cracks, some total separation (5)
- Not able to monitor throughout drying

Vacuum Oven

Process
- Place in vacuum oven at 90 °C with the vacuum applied for 3.5 hours

Results
- Deep cracking, few surface cracks (6)
- Destructive, separation into 3 parts

Microwave

Process
- Microwave on high for 20 second bursts until dry (approx. 8 times)

Results
- Maximum cracking (7), deep and shallow
- Destructive and resulted in separation

WORST DRYING METHOD

References

Hillman, D., & E. Florian, M. L. (1985). A simple conservation treatment for wet archaeological wood. *Studies in conservation*, *30*(1), 39-41.

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