The Laboratory of Tree-Ring Research

presents a talk by

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(University of Arizona MS thesis defense)

A tree-ring based assessment of climate-growth relationships in the Miombo region in Tanzania

Wednesday, March 26, 2014 - 8:30am to 9:15am

Room: Bannister 110

Drought events have significant impacts on domestic use, agriculture, and ecosystems. Water shortage is projected to increase with globally rising temperatures and the increasing demand for this resource. This will likely be one of the major limitations for future development in drought limited regions like Tanzania. Socio-economic development and natural resource productivity in Tanzania are mostly depending on water availability. Long-term drought records are necessary for understanding the past trend of climate variability, but their availability is limited in time-span and area in Tanzania. Tree-ring data can be used to provide reliable water availability records which are useful for drought reconstruction. This study examines the potential of tree-ring widths for building a chronology and studying climate-growth relationships. I here present a drought-sensitive tree-ring chronology based on 29 Brachystegia spiciformis (Burps) trees from Tabor region in Tanzania. Annual growth ring boundaries were distinct and marked by terminal parenchyma. Brsp samples were successfully cross-dated despite an absence of a dated reference chronology for Tabora and frequent occurrence of false (8.4 %) and missing rings (3.4 %) per tree. Brsp trees have a strong common signal that resulted in a high mean sensitivity (0.6) and series intercorrelation (0.5). These increased the reliability and possibility for developing the Tabora regional chronology. The chronology was compared to monthly and seasonal meteorological station and gridded climate data. The influence of precipitation on annual increment was significantly positively ($r=0.3$; $p<0.01$) in the early growing period (December), when amounts of rainfall are the highest. The Brsp chronology provides a better benchmark for understanding and extracting long-term variability of precipitation records. Therefore a long tree-ring chronology of Brsp is a promising and reliable source for drought reconstruction and may contribute to the drought prediction efforts, management, and precaution measures that are needed for sustainable agriculture and livelihood in Tanzania.

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