THE LABORATORY OF TREE-RING RESEARCH

presents a talk by

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Co-varying influences on growth of eastern U.S. deciduous hardwood trees

Wednesday, May 4, 2016 - 12:00pm to 1:00pm
Room: Bannister 110

The assumption that a single dominant climatic factor (e.g. water balance or temperature) in extreme sites and locations limits tree growth allows for annually resolved climate reconstruction. However, the majority of the world's forests are not found in these extreme conditions. Growth in these forests is influenced by a combination of climate and ecological factors, but seldom do we analyze these factors simultaneously. These concurrent interactions are likely responsible for limiting growth in years displaying moderate to large rings. For example, in many forests moisture balance is a dominant limiting factor, and years with low rainfall and high temperatures correspond to small growth rings. However, in years with favorable water balance conditions additional environmental factors, such as light availability or stand composition may restrict annual growth potential. We argue that tree growth through time is not influenced by a single limiting factor, but rather once the primary limiting factor is satisfied, secondary and tertiary factors contribute to annual ring width variability. To investigate this point, we used an ecologically robust sampling design to collect tree cores from four eastern U.S. deciduous hardwood forests. We use generalized additive mixed models to develop a multivariate model of tree growth that accounts for the simultaneous, relative influence that climate and ecological factors exert on growth through time. This analysis allows us to account for non-linear relationships between co-varying environmental factors. Establishing the relationships between multiple factors governing annual ring width will serve to constrain future projections of tree growth under variable climate scenarios.

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