The Laboratory of Tree-Ring Research

presents a talk by

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Annually Resolved Forest Biomass Growth in Europe – Observed and Simulated Climate Sensitivity

Wednesday, October 19, 2016 - 12:00pm to 1:00pm

Room: Bannister 110

In light of current and projected increases in global temperatures and atmospheric CO2 concentrations throughout the 21st century, it is crucial to understand the long-term effects of environmental changes and climatic variability on the terrestrial carbon cycle. To complement traditional methods of quantifying carbon cycle dynamics such as forest inventories, eddy-covariance measurements and remote sensing, we established a biomass-oriented tree-ring network along a large climate gradient across Europe. We use this network to i) quantify the inter-annual variability of ABI from European forest ecosystems, ii) assess the climate sensitivity of European forest growth, and iii) evaluate NPP estimates from a DGVM ensemble. We find that the temperature sensitivity of ABI clearly depends on mean growing season temperature (MGST). Our data reveal a threshold temperature between beneficial and detrimental effects of warming and associated increased water demand at 14.6±0.5°C MGST. A similar threshold temperature (13.7±0.9°C) is reflected by the mean of a Dynamic Global Vegetation Model (DGVMs) ensemble, albeit the individual models display substantial spread in threshold temperatures and response slopes. Model-observation and model-model discrepancies of climate sensitivity increase notably towards warmer MGST. The results presented in this talk should further stimulate research to combine and integrate tree-rings with other carbon cycle data streams to extend currently used forest productivity observations back in time and benchmark DGVMs.

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