



THE LABORATORY OF TREE-RING RESEARCH

presents a talk by

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A Tree-Ring Perspective on the Impact of Climate Change on North American Tree Growth

Wednesday, April 15, 2015 - 12:00pm to 1:00pm

Room: Bannister 110

The fate of forests in a warming world is of major ecological, societal, and economic concern. Forests play a key role in the combined carbon-water-nutrient cycle, including important ecosystem services and feedbacks to the climate system. Historically, forests have been an important carbon sink because of an excess of net primary production (NPP) compared to ecosystem respiration, but the future of this carbon sink is increasingly in question, as NPP may decline in a warming world. We assessed how climate change will affect growth in North American forests, using an extensive network of tree-ring observations to calibrate the relationship between tree growth and climate. In particular, we parsed the effect of changing climate ("exposure") from changing sensitivity to climate ("sensitivity"). The effect of shifting climate sensitivity offsets much of the growth increase that would otherwise be projected for northern latitude forests due to warming. That is, much of the positive effect of 21st century warming on growth rates in temperature-limited forests is counteracted by the degree to which those forests become precipitation-limited in the future. All else being equal (i.e., assuming constant species composition, stand structure), we forecast the net effect of changing climate on North American tree growth rates to be a reduction between -5% and -17% by the second half of the 21st century, with the strongest reduction of growth rates associated with the most carbon-intensive emissions scenario. Geographically, the strongest reduction of growth rates is forecast for interior western parts of the U.S. and Canada, highlighting the vulnerability of these forests to climate change. Our gridded forecasts, based on empirically-determined climate-growth relationships, adds to the emerging evidence questioning the ability of future forests to mitigate global carbon emissions.