



THE LABORATORY OF TREE-RING RESEARCH

presents a talk by

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Spatial and temporal dynamics of forest water-carbon exchange in Northeastern U.S.

Wednesday, May 6, 2015 - 12:00pm to 1:00pm

Room: Bannister 110

Here, we use annually resolved $\delta^{13}\text{C}$ tree rings measurements across a NE-USA forest network to derive intercellular CO_2 (c_i) response caused by increasing atmospheric CO_2 (c_a) trends and climate change over the past two decades, concurrent with direct long-term measurements of ecosystem carbon and water exchange. We find a substantial increase in c_i suggesting that for each one 1 ppm increase in c_a , c_i increased proportionally or at the same rate. This response corresponds to static or moderate increase in water use efficiency-the ratio of carbon gain to water loss, respectively.

The observed c_i trends are consistent with a regional increase in precipitation magnitude and intensity. These results suggest a weak stomatal regulation in response to continuously increasing c_a , and a higher photosynthetic assimilation (uptake) of CO_2 . The trends are associated with increasing ecosystem level carbon uptake and forest productivity. Our findings challenge the hypothesized CO_2 fertilization effect documented at the ecosystem level.