Assessing Climate Sensitivity of Two Eastern U.S. Broadleaf Tree Species Using Dendrochronology

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Despite dendrochronology's extensive use in the northern hemisphere during the 20th century, there remain gaps in the body of knowledge, particularly at the interface of certain species and climate analyses. Here we focus on two species, red oak (*Quercus rubra* L.) and tulip poplar (*Liriodendron tulipifera* L.) and perform a multi-site correlation analysis to different climate variables from the PRISM climate database. We use both tree ring width data and isotopic data based on carbon ($d^{13}C$) and oxygen ($d^{18}O$) stableisotopes measured in tree-ring cellulose to assess climate sensitivity across the eastern United States climate gradient. As expected, we found strong correlations between the ring width, $d^{13}C$ and $d^{18}O$ tree-ring data and the climate variables precipitation, maximum temperature, and vapor pressure deficit (VPD) - all seasonally specific to the summer growing season. There was a strong positive correlation between ring width and summer precipitation, but a negative correlation between ring width and summer maximum temperature and VPD. There seemed to be no significant difference in climate responses between the two species. Unexpectedly, we found that the climatic gradient seemed to have little effect on responsiveness to the distinct climate variables: all sites respond equally to all climate variables rather than a few limiting ones. We present a number of hypotheses as to the potential causes of this trend (or lack thereof), all of which serve as a potential springboard for further research.