INTERPRETING TREE RING RECORDS USING A PLANT ECOPHYSIOLOGICAL APPROACH

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ABSTRACT: Trees rings record a wealth of information on climate, disturbance, and forest dynamics, and can record these processes from the plot to regional scales. However, extracting plant physiological processes from the tree ring record has proved to be more difficult, as integration of leaf to whole tree processes can often lead to confounding results. My research aims to bring a plant ecophysiological perspective to interpreting the tree ring isotopic record and to ask, what processes are the rings actually recording? My research also examines how topography modulates the sensitivity of tree growth and water acquisition strategies to climate. For example, in temperate forests of the western U.S., tree growth is often tightly linked to water availability. However, because seasonal climate patterns are expected to change, tree dependency on different sources of moisture may also shift (or have already shifted). However, the complexity of the landscape in montane regions creates micro-habitats that often confound otherwise predictable relationships at larger spatial scales among elevation, aspect and hydroclimate. In this talk, I will present several ongoing studies aimed at addressing these questions, including: 1) Where along the soil depth profile are trees sourcing water from and have shifts in source water use occurred over the last 100 years? 2) How do different sources of moisture availability influence forest productivity? and 3) How can we use oxygen isotopes of tree rings to infer source water and atmospheric aridity signals?