Quantifying Drought Vulnerability in Major Western US Tree Species
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Climate predictions for the Western U.S. indicate that more frequent and severe droughts are likely to become increasingly common in coming years (Allen C.D. et al., 2015). With more frequent and severe drought come implications for the timber industry, outdoor recreation, and the general ecology and biodiversity of western U.S. forests. The objective of this research is to increase understanding of the physiology of ponderosa pine (Pinus ponderosa), white fir (Abies concolor), and jeffrey pine (Pinus jeffreyi) in order to determine which species are more and less vulnerable to drought. Roots and stems from plots in the National Science Foundation's (NSF) National Ecological Observatory Network (NEON) in Oregon and California were sampled and tested for hydraulic conductivity and vulnerability to embolism. Vulnerability curves from the roots and stems of each species were then compared in order to determine which species are more likely to be able to recover from drought events. Results indicated that the ponderosa pine root samples, collected in Oregon, are far more vulnerable to drought than stem samples from the same species and plot. The white fir and jeffrey pine samples collected in California, however, showed a far smaller difference in vulnerability from root to stem. This could be due to phenotype adaptation in response to growing in a generally hotter and dryer environment, however further research in genetics is necessary to confirm such speculation.