Dendrochronological Data Analysis to Measure Climate Sensitivity and to Develop Paleoclimate Reconstructions

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Dendrochronology is a scientific field that uses the annual growth rings on trees to help scientists date events and map environmental change. Understanding past climate helps us to explain how current ecosystems came to be, and how environmental conditions may change in the future. Reconstructions of past climate conditions are attained from climate proxies, natural recorders of climate variability that stand in for data. Climate reconstructions, however, are only useful if the climate variable (ex. precipitation, temperature, topography) being measured is the limiting factor for tree growth in that particular location. I investigate during which intervals of the year is precipitation the limiting factor of tree growth and how we can draw from these conclusions in climate sensitivity to create more accurate climate reconstructions. I observe tree ring growth indexes (trsgi) as a proxy in relation to the climate variable precipitation (ppt). This relationship is explored by graphing data values to see the correlation between precipitation in different seasons and tree growth, thereby measuring climate sensitivity. If the correlation between trsgi and ppt was extremely low for a certain month, I removed that month's data from my reconstruction data, increasing the average correlation. Using these results I created climate reconstructions and predicted precipitation values back to the 1600s, as well as extrapolated data forward in time to anticipate tree growth in the future (adding 40 years worth of new trsgi data to the amount currently available). This expands scientific knowledge on paleoclimates as well as improves the accuracy of future climate predictions or flood and drought cycles.

Awards Won:
American Meteorological Society: Third Award of $500
National Oceanic and Atmospheric Administration - NOAA: Second Award of $500