The Laboratory of Tree-Ring Research

presents a talk by

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A multimillennial snow water equivalent reconstruction from giant sequoia tree rings

Wednesday, October 6, 2021 - 12:00pm to 1:00pm
Room: Zoom Only

The first dendroclimatic reconstruction of May 1 Snow Water Equivalent (SWE) was developed from a Sequoiadendron giganteum regional tree-ring chronology network of 23 sites in central California for the period 90-2012 CE. The reconstruction is based on a significant relationship between May 1 SWE and tree-ring growth and shows climate variability from inter-annual to inter-centennial time scales. A regression-based reconstruction equation explains up to 55% of the variance of SWE for 1940-2012. Split-sample validation supports our use of a reconstruction model based on the full period of reliable observational data (1940–2012). Thresholds for May 1 SWE low (15 percentile) and high (80 percentile) years were selected based on the exploratory scatterplots relationship between observed and reconstructed data for the period 1940-2012. The longest period of consecutive low-SWE years in the reconstruction is 2 years and the frequency of the lowest SWE years is highest during the period 710-809 CE. The longest high-SWE period, defined by consecutive wet years, is 3 years (558-560 CE). SWE and its reconstruction positively correlate with northeastern Pacific sea surface temperatures, the low-frequency variability of which may provide some predictive ability. Ultimately, the instrumental record and reconstruction suggest that unlike other sites in the region, 20th-century SWE variability in these Sequoia groves has remained within historical boundaries and relatively buffered from extremes and severe declines, though this is likely to change in coming decades with potentially negative effects on water availability for these trees.

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