

Integrating Varve and Tree-Ring Time Series for Southern California Climate Reconstruction: A 20th Century Outlook

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Abstract

Our objective is to combine terrestrial and oceanic records for reconstructing West Coast climate. Tree rings and marine laminated sediments provide high-resolution, accurately dated proxy data on the variability of climate and on the productivity of the ocean and have been used to reconstruct precipitation, temperature, sea level pressure, primary productivity, and other large-scale parameters. We present here the latest Santa Barbara basin varve chronology for the twentieth century as well as a newly developed tree-ring chronology for Torrey pine (*Pinus torreyana* Parry ex Carr). Varve thickness was measured both visually and using an image analysis system on the same set of X-radiographs. The year-to-year variation in total varve thickness is mostly a function of the light layer thickness (summer deposition). Interestingly, the linear trend caused by sediment compaction was observed in the total and dark layer thicknesses only; there was no significant trend in the light layer. The Torrey pine chronology is well correlated with other tree-ring chronologies for Southern California. The correlation with local and regional climatic parameters suggests that the dark layers within Santa Barbara varves are mostly related to local rainfall, whereas tree-ring indices reflect regional precipitation. Additional studies are underway to assess the response of varve and tree-ring records to variability in sea surface temperature and coastal sea level height.