

MIDWESTERN CLIMATE RECORDS FROM TREE RING $\delta^{13}\text{C}$ AND $\delta^{18}\text{O}$ VALUES

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ABSTRACT

A 504-year tree ring carbon isotopic time series was generated using samples from living and subfossil white oak trees from northern Missouri. Over the interval from 1931-2002 $\delta^{13}\text{C}$ is significantly correlated with summer (June-August) precipitation. The 504-year long record suggests that that numerous past summers had precipitation extremes (wet and dry) larger and longer than any 20th century events, including the 1993 Great Flood and the 1930s Dust Bowl period. These results suggest that precipitation extremes larger than have been seen in the past century are part of the 'natural' variability of the Midwest, regardless of any effects resulting from anthropogenic related climate changes.

An oxygen isotope pilot study from 1975-2002 shows higher correlations to summer drought (PDSI) and precipitation than carbon isotopes over the same interval. Results from this study demonstrate that tree ring $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ measurements can provide a detailed annual isotopic record of climate variability beyond instrumental records in the central Midwest and more importantly beyond human induced anthropogenic influences.