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Climate reconstruction in southern Louisiana using carbon isotope measurements of tree rings

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The limited historical precipitation and temperature data for southern Louisiana suggest a stable temperate climate, with hot summers and no dry season, but the long-term natural variability in climate for this region is unknown. Here, we present an annually resolved carbon isotope record spanning from 1857-2014 from three *Pinus palustris* trees sampled near Lake Charles, LA. These data show a decreasing trend in carbon isotope values associated with changes in atmospheric chemistry caused by fossil fuel burning. After correcting for this trend, a significant negative relationship ($r = -0.34$, $P = 0.002$) between summer temperature (April through August) and net carbon isotope fractionation is observed (1931-2014). This result suggests soil drying in response to climate warming, and a subsequent reduction in stomatal conductance. Using the observed relationship between carbon isotope fractionation and summer temperature, a long-term reconstruction of growing season temperature will be produced across the entire study interval (1857-2014). This reconstruction will approximately double the time period for which summer temperature data are available, and extend our knowledge of climate change in the region back to the start of the industrial revolution.