



The medieval California mega-droughts: reconstructing the Mono Lake low stands

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Well established proxy evidence documents generally dry conditions in the western US during Medieval times, beginning as early as 500 AD and ending about 1300 AD. Among the most dramatic and direct of this evidence is that for two near-centennial periods of very severe drought indicated by carbon-dated drowned trees at Mono Lake, California (a large terminal lake on the east side of the Sierra Nevada) and other nearby sites (Stine, 1994). We use a water balance model [following that used by Vorster (1984) to examine 20th century declines in Mono Lake level] together with tree-ring derived precipitation/runoff reconstructions to reconstruct Mono Lake levels over the past two millennia. The reconstructed lake level record show two deep, sharply defined droughts corresponding closely in timing and duration to those described by Stine (1994) and show that multi-decadal decreases in precipitation on the order of 20-25% were required to produce observed declines in lake level. These findings strongly support the reality of the medieval California mega-droughts suggested by the drown shoreline trees at Mono Lake and allow some quantification of their severity in terms of the magnitude and duration.

Stine, S., 1994: Extreme and persistent drought in California and Patagonia during Medieval time, *Nature*, 369, 546-549.

Vorster, P., 1984: A water balance model for Mono Lake, California. United States Forest Service, Dept. of Agriculture, Region 5, Monograph No. 10, 350 pp. (available from USFS).