

Paper No. 22-5

Presentation Time: 9:10 AM-9:25 AM

IMPROVEMENTS on THE LATE PLEISTOCENE CHRONOLOGY AT MONO LAKE, CA FROM RADIOCARBON DATING OF SEQUENTIAL DISSOLUTION STEPS

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Chronologies for lake-level fluctuations in the Great Basin are critical to understanding western North American climate in a global context, but are frequently based upon radiocarbon dating of shells, tufa, and other carbonates. Published sequential dissolution studies have shown that carbonate dates in the 25-40 ka range increase by as much as 6 ka in 2-3 dissolution steps, but conclude that without an age plateau radiocarbon ages must be treated solely as minimum constraints.

Mono Lake, California provides the most complete and sensitive record of late Pleistocene climate change of all the Great Basin lakes, because it neither dried nor spilled during the last glacial-interglacial cycle. Lacustrine sediments of the Wilson Creek Formation provide stratigraphic evidence for lake fluctuations and can be correlated around the basin with good confidence due to the occurrence of multiple ash layers. Extra-basinal correlation of millennial-scale changes in late Pleistocene Mono Lake level remains impossible, however, due to the contamination of carbonate radiocarbon dates with young carbon from atmospheric CO₂.

Application of a modified sequential dissolution technique to radiocarbon dating of those carbonates shows that bulk radiocarbon ages on ostracodes and thinolite crystals in the upper part of the Wilson Creek Formation are younger than the oldest dated material by 1,000 to 3,000 years, indicating 5-14% modern carbon contamination. Micro-cave calcite collected from near the base of the section yielded a U-series age of 49.6 ± 0.2 ka, a minimum limit clearly demonstrating that the age of the base of the section is beyond the range of standard radiocarbon dating, despite apparently finite bulk radiocarbon ages on ostracodes from that interval. Apparently finite radiocarbon ages ranging from $34,450 \pm 130$ to $40,210 \pm 140$ ¹⁴C yr BP have also been measured on gastropods from shoreline tufas in the overflow to the Owens basin, despite evidence that Mono Lake has not spilled in at least the last glacial cycle. Here we apply sequential dissolution to the micro-cave calcite and the overflow gastropods to confirm that deposition of the Wilson Creek Formation began >50 ka, and that the basin was hydrologically isolated during all of that time.

[2010 GSA Denver Annual Meeting \(31 October –3 November 2010\)](#)
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Session No. 22

[OIS 4 and 3 Were Bigger Than You Think—Geomorphologic Evidence from Glacial, Fluvial, Lacustrine, and Eolian Records](#)
Colorado Convention Center: Room 709/711
8:00 AM-12:00 PM, Sunday, 31 October 2010

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