

Verification of a Millennial-Scale Record of Hypothesized Water Surface Elevations of Summer Lake, Oregon, by Grain-Size Analysis

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Computer climate models suggest a correlation between temperature of the north Atlantic region and the northern Pacific Ocean (e.g., Mikolajewicz et al., 1997). Recent studies of a northwestern Great Basin lake-level indicator based on rapidly dependent magnetite concentrations (Zic et al., 2002) have supported this relationship. However, many factors other than lake elevation are capable of affecting the amount of magnetite deposited upon the shore. This study focuses on grain size, a more straightforward, but time-intensive, lake-level-dependent variable, to test the environmental magnetism results. The mean grain size of lake sediments generally varies inversely with lake depth.

Grain-size analysis was performed on sediment from the depocenter of Summer Lake, Oregon. The samples ranged in age from 24 to 23 kyr b.p. A bulk grain-size spectrum for the <180-micron fraction (essentially all of the sediment) was determined for each sample with the x-ray absorption/grainsettling method in a Micromeritics 5100 Sedigraph. Mean grain size typically ranged from 5 to 50 microns, and analyses on split samples demonstrated that individual measurements were reproducible to within 4.22% of the mean. Results have thus far supported the North Atlantic-North Pacific temperature correlation. That is, during time intervals in which results from the Greenland Ice Sheet Project 2 (GISP2) report warmer conditions in the northern Atlantic region, sediment size decreased, indicating a period of substantial lake elevation resulting from higher levels of precipitation which, in turn, are due to increased storm activity originating in a warmer North Pacific Ocean. Our results thus increase confidence in computer-generated climate models.