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Environmental Magnetism and Paleomagnetic Secular Variation of Late Holocene-aged Sediments of Tulare Lake, CA, USA

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The Tulare lake level history over the past 10,000 years is consistent with other paleoclimate records of south-central California. The record from this particular lake, if improved with respect to resolution especially in the latest Holocene, will potentially provide valuable constraints on forecasting runoff from the Sierra Nevada over the next several generations into one of the most important agricultural regions in the world. This project focuses on the magnetic properties of Tulare lake sediments in an attempt to better date the sediments and to determine the relative lake level at the time they were deposited.
Toward this end, four trenches were dug at two localities in the southern end of the Tulare lake bed, totaling approximately six meters in depth. Each trench was sampled at two-centimeter spacing. The samples were analyzed at the UC Davis Paleomagnetics Laboratory and the Institute for Rock Magnetism in Minneapolis, MN for both remanence directions and magnetic properties. The temperature dependent magnetic susceptibility results for the Atwell Island site are consistent with the Poso Canal site in terms of locating the unconformity. For both locations, there is a spike in the cooling curve at the location of the unconformity. However for the Atwell Island site the spike does not decrease with time, which is likely due to the fact that this site is at a higher elevation within the lake, and the period of non-deposition/erosion lasted longer at this site than for the Poso Canal site. In addition, the MPMS data and the S-ratio values suggest that there is less magnetite at the Atwell Island site. The Day plots also indicate larger grains with more multi domain characteristics than the samples from the Poso Canal site. The lack of magnetite and the larger grain size may help to explain why the paleomagnetic secular variation dating was unsuccessful at the Atwell Island site.