Geophysical Research Abstracts
Vol. 14, EGU2012-9655-1, 2012
EGU General Assembly 2012

Two Possible but Unconfirmed Palaeomagnetic Excursions in Pleistocene Lacustrine Sediments in North America and Mexico

J. Liddicoat (1), R. Coe (2), and J. Oviatt ()

(1) Barnard College, Columbia University, New York , United States (jliddico@barnard.edu), (2) University of California, Santa Cruz, Santa Cruz, United States (rcoe@pmc.ucsc.edu)

The palaeomagnetic literature is replete with reports of investigations of continuous field behaviour (secular variation) using volcanic rocks and lacustrine and marine sediments, and some of the reports are about palaeomagnetic excursions. The Laschamp Excursion in volcanic rocks in the Massif Central of France (Bonhommet and Babkine, 1967) and Mono Lake Excursion in exposed lacustrine sediment in California (Denham and Cox, 1971) are two excursions that generally are accepted as having occurred in the late Pleistocene. At other localities and for different time intervals, confirmation of some excursions in sediment has not been successful at nearby sites where the deposits are believed to be the same age. An example is in the Basin of Mexico at Tlapacoya (19.4˚ N, 261.2˚ E) in lacustrine sediments about 14,500 years old (Liddicoat et al., 1979). Another excursion that has not been confirmed but might have occurred is recorded in Lake Bonneville sediments that are exposed in the bank of the Sevier River near Delta, Utah (39.4˚ N, 247.6˚ E). In Mexico and Utah, the excursions are in a single, fully-oriented hand sample that was prepared into consecutive, 2-cm-thick horizons, each consisting of six subsamples. The subsamples were demagnetized in an alternating field to at least 60 mT or when possible because of consolidation, thermally demagnetized to 600˚ C; for each Lake Bonneville horizon, the scatter of palaeomagnetic directions is 4˚ or less. Several possibilities for why the excursion at Tlapacoya could not be confirmed were presented (Liddicoat et al., 1979), leaving open the possibility that the excursion might have occurred in Mexico.

The field behaviour in Utah where the sediments are older than those at Tlapacoya by several tens of thousands of years (Oviatt et al., 1994) is nearly identical to the behaviour recorded at Tlapacoya. At both localities, a path of the Virtual Geomagnetic Poles during the excursion is confined to a narrow meridional zone centered at about 200˚ E longitude and that descends to about 15˚ N latitude. The difficulty of confirming the anomalous field behaviour at Tlapacoya and in Utah emphasizes the caution that is necessary in documenting excursions that might have occurred in the geologic record. Also, it is equally important to recognize that some excursions that cannot be documented easily might actually be real.