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Possible recording of the Mono Lake Excursion in cored sediment from Clear Lake, California

Joseph Liddicoat (1) and Kenneth Verosub (2)

(1) Department of Environmental Sciences, Barnard College, Columbia University, NY, NY 10027 USA (jliddico@barnard.edu), (2) Department of Geology, University of California, Davis, Davis, CA 95616 USA

We report the possible recording of the Mono Lake Excursion (MLE) in cored sediment from Clear Lake, CA. The locality (39.0˚N, 237.3˚E) is about 120 km north of San Francisco, CA, and 320 km northwest of the Mono Basin, CA, where the MLE first was discovered in North America (Denham and Cox, 1971). The field behaviour at Clear Lake that might be the MLE is recorded in clay and peaty clay about 50 cm below the top of the lowermost 80-cm core slug of a 21.6-m core. The coring was done by the wire-line method (Sims and Rymer, 1975) and the samples (rectangular solids 21 mm on a side and 15 mm high) were measured in a cryogenic magnetometer after demagnetization in an alternating field to 35 milliTesla (Verosub, 1977). The continuously-spaced samples record negative inclination of nearly 20˚ and northerly declination when unnormalized relative field intensity was reduced by an order of magnitude from the mean value. Those palaeomagnetic directions are followed immediately by positive inclination to about 50˚ and easterly declination of about 60˚ when the field intensity is at a relative high. That pattern of behaviour is recorded at three localities (Wilson Creek, Mill Creek, and Warm Springs) in the Mono Basin at the MLE (Liddicoat and Coe, 1979; Liddicoat, 1992). A path of the Virtual Geomagnetic Poles (VGPs) at Clear Lake form a clockwise-trending loop that is centered at 65˚N, 20˚E in the hemisphere away from the locality. The VGP that is farthest from the North Geographic Pole is at 29.3˚N, 337.1˚E, which is close to the path formed by the VGPs in the older portion of the MLE (Liddicoat and Coe, 1979; Liddicoat, 1992). The age of the sediment recording the anomalous palaeomagnetic directions in Clear Lake is about 30,000 years B.P. (Verosub, 1977). That age was determined from six (uncalibrated) radiocarbon dates, three of which are from near the base of the core (Sims and Rymer, 1975) where there are the anomalous palaeomagnetic directions, and linear extrapolation between those dates and the three dates from higher in the core. The age of the possible palaeomagnetic excursion in the Clear Lake sediment is in reasonable agreement with the age assigned to the MLE by Benson et al. (2003; 2008) and is nearly 10,000 years younger than the Laschamp Excursion (Guillou et al., 2004). We believe that is an indication that the anomalous field behaviour known as the Mono Lake Excursion in the Mono Basin (Denham and Cox, 1971; Liddicoat and Coe, 1979) and possibly at Clear Lake is not the Laschamp Excursion.