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# Reexamination of the Matuyama-Brunhes Polarity Transition Near Bishop, California

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There is half a century of recorded knowledge of the behaviour of the palaeomagnetic field during a polarity transition beginning with Van Zijl et al.'s 1962 report of a transition in Stormberg lavas, and for the Matuyama-Brunhes polarity transition (MBPT) about 0.78 m.y. ago it has been investigated in marine, lacustrine, and volcanic rocks. Among the earliest of the MBPT investigations was a study of bathyal siltstone on the Boso Peninsula in Japan (Niitsuma, 1971; Okada and Niitsuma, 1989). That investigation was preceded by a report that the relative intensity of the palaeomagnetic field as recorded in a marine core is reduced for a longer period of time than is required for the palaeomagnetic directions to reverse polarity (Ninkovich et al., 1966), a discovery that was summarized for other reversals in cored marine sediment (Opdyke, 1973). Nearly 40 years ago, Hillhouse and Cox (1976) followed the palaeomagnetic directions and relative field intensity during the MBPT using exposed Pleistocene Lake Tecopa sediments in southeastern California. They reported a generally smooth path of the Virtual Geomagnetic Poles (VGPs) as the field changed from reverse to normal that does not coincide with the VGP path for the MBPT in Japan, concluding that the transitional field is predominantly the non-dipole field. At Lake Tecopa, as in the marine record, the reduction in field strength occurred sooner and lasted longer by a factor of at least two the time required for the palaeomagnetic directions to reverse polarity, which was confirmed by Valet et al. (1988) at the same locality.

Soon thereafter, the MBPT was studied in Pleistocene lacustrine sediments exposed beneath the Bishop Tuff (Dalrymple et al., 1965) near Bishop, California (37.4° N, 241.5° E) (Liddicoat, 1982; 1993). The data we report are for directional and normalized relative intensity measurements of additional samples from each horizon at the Bishop locality that indicate the time spanned by the reduction in relative intensity for the full transition exceeds by about 20 percent the time during which the palaeomagnetic directions reverse. Present in the upper third of the MBPT is a partial recovery of the relative intensity, and in the Brunhes Normal Chron there is a brief interval of reversal polarity. Near the onset of the MBPT where the field is reverse, there are about 30 cm of normal polarity that occurs at several sites along strike that might be the precursor to the MBPT recorded in volcanic rocks on Maui, Hawaii (Coe et al., 2004).