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Letter to the Editor

Comments on "Palaeomagnetism of Upper Cretaceous Volcanics and Nubian Sandstones of Wadi Natash, SE Egypt and Implications for the Polar Wander Path for Africa in the Mesozoic"

by A. Schult, A.G. Hussain, and H.C. Soffel
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The conventional interpretation of African Mesozoic palaeomagnetic data has recently been challenged by Schult et al. (1981; see also Hargraves and Onstott, 1980). Previously it had been believed that the African data showed no significant apparent polar wandering (APW) during the Mesozoic, and indeed it was thought that the Mesozoic represented a 'quasi-static interval' (Briden, 1967).

Similarly Mesozoic APW of Australia was also thought to be minimal (Irving et al., 1963) although as intercontinental comparisons became more accurate through the use of marine magnetic anomalies (Le Pichon and Heirtzler, 1968) and computer matching of continental shelves (Smith and Hallam, 1970), the anomalous nature of the Australian results was soon realised (Irving and Robertson, 1969; Creer et al., 1969; McElhinny and Embleton, 1974). This encouraged further palaeomagnetic research and subsequently it has been shown that contrary to the above, the early Jurassic and Cretaceous Australian poles are quite distinct (Schmidt, 1976) and the Jurassic results are consistent with those from Africa. The discrepant Cretaceous results reflected the disintegration of the Gondwana supercontinent during the late Mesozoic.

More recently Schmidt and Embleton (1981) have shown that a third group of Australian Mesozoic poles exists indicating that eastern Gondwana was much more mobile during the Mesozoic than was earlier thought. Mesozoic APW path for Australia thus forms an anti-clockwise loop (Coral Sea loop) when the south poles are viewed. This is apparently in the opposite sense to those loops proposed for Africa (cf. Fig. 5 of Hargraves and Onstott, 1980 and Fig. 6 of Schult et al., 1981). Schult et al. support their

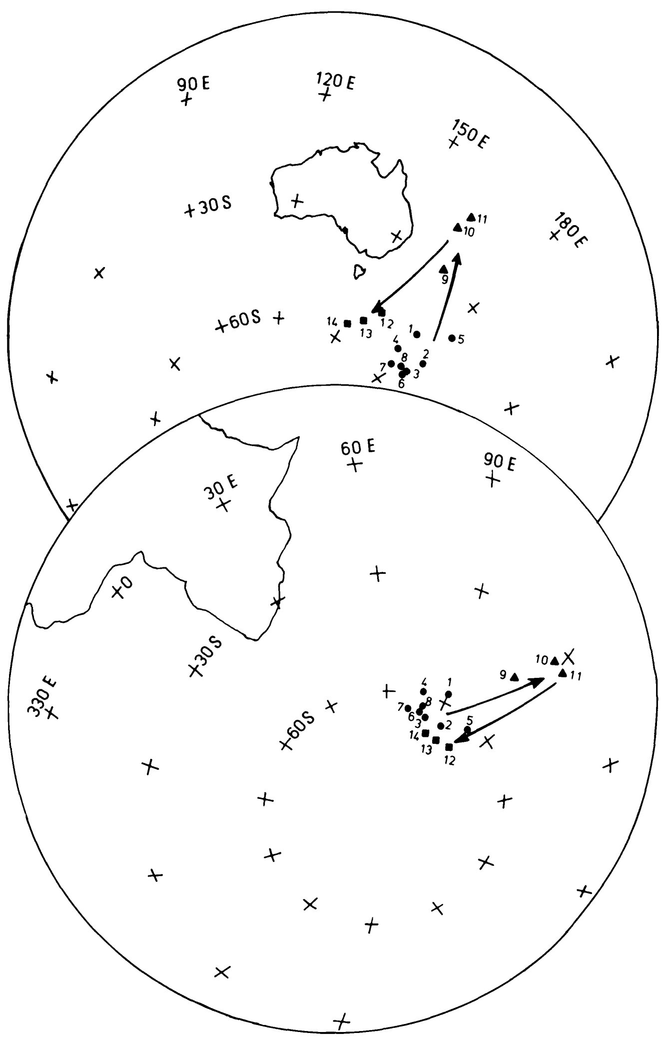

Fig. 1. Mesozoic palaeomagnetic poles of Australia listed in Table 1, **a** plotted with respect to Australia and **b** plotted with respect to Africa after correcting for relative motion between Australia and Africa from rifting to 100 m.y. ago

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Table 1. Mesozoic palaeomagnetic poles for Australia

Pole	Formation	Age m.y.	Pole position			Rotated[a]	
			S	E	α_{95}	S	E
1	Garrawilla volcanics	193	46	175	10	58	90
2	Victorian basalt	190	47	186	18	66	91
3	Jurassic intrusives	185–170	51	186	11	66	81
4	Tasmanian dolerite	170	51	175	6	59	80
5	Kangaroo Is basalt	170	39	183	–	62	107
6	Barrenjoey dyke	<Triassic	53	182	4	64	77
7	Minchinbury dyke	<Triassic	56	179	8	62	70
8	Collaroy dyke	<Triassic	53	180	5	63	77
9	Hornsby breccia	<Early Jurassic	29	166	7	45	110
10	Bendigo dyke	150	17	162	16	34	119
11	Gosses Bluff	133	13	164	4	33	124
12	Bunbury basalt	>100	49	161	10	69	105
13	Cygnet complex	100	53	158	11	69	93
14	Mt Dromedary complex	100	56	153	10	68	82

[a] Euler poles based on Norton and Sclater (1979):
'Fit' 24.6 N, 119.6 E and an angle of −50.0
'100 m.y.' 22.8 N, 97.0 E and an angle of −33.2

interpretation of the African results by comparing them with those from South America. Again they describe a clockwise loop, if the south polar path is observed.

The purpose of the present article is two-fold. First we wish to draw attention to the loop in the Australian Mesozoic APW path, adding our support for the existence of such loops in the paths of Africa and South America and second, we should like to take the opportunity to point out that although the sense of the Australian loop appears to be the reverse of the African and South American loops, the loops are actually compatible when observed in their proper context. As mentioned above, some time between the early Jurassic and the Cretaceous, the Gondwana supercontinent broke up. During the Cretaceous, while Africa and South America remained close together, Australia, Antarctica and India moved eastward thus acquiring APW paths quite independently of Africa and South America. To compare APW paths of continents in relative motion the paths must be reduced to a common reference frame. This is easily achieved using the Euler poles published by Norton and Sclater (1979) which describe the formation of the Indian Ocean. Figure 1 shows the effect of this correction when applied to the Australian data listed in Table 1. The Euler rotation used for the pre-Cretaceous poles is the 'fit' pole of 24.6 N, 119.6 E with an angle of 50°, while that used for the Cretaceous poles is an interpolated rotation, 22.8 N, 97.0 E with an angle of 33.2°, corresponding to 100 m.y. Interpolation is used since Norton and Sclater (1979) give Cretaceous rotations only for the times 80 m.y. and 115 m.y. while the ages of the rock units are thought to be closer to 100 m.y. The transformation converts the anti-clockwise loop as observed with respect to Australia into a clockwise loop with respect to Africa, in agreement with the African and South American loops.

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