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Reply

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We would like to comment on the points raised by Westphal as follows:

A. Magnetic Mineralogy

Westphal leans too strongly on the hypothesis that the severe mineral alteration concerned with is of late deuteric origin. This is a too narrow platform which eventually may lead to a biased and entirely unsound palaemagnetic interpretation. In fact, the types of mineral "reconstitution" dealt with may have formed at any time after rock formation, including the late cooling stage (this has been clearly put forth at the end of our Chap. 2), though careful analysis of the remanence build-up may give us an idea of the time span (or time intervals) involved in the mineralogical alteration processes. The latter analysis is not in favour of a deuteric origin of present opaque mineralogy.

Naturally enough, there exist alternative explanations of most of the J_s-T curves but in some cases, like our sample Co 34, the results are in favour of a maghaemite/haematite transformation. Furthermore, the occurrence of perovskite and sphene are not unexpected in a complex mineral assemblage as here encountered – these phases may well have been formed at different times and need not be the product of a common chemical process.

B. Structure of Remanent Magnetization

To avoid that small uncompensated fields inside the furnace should give rise to systematic directional variation versus progressive demagnetization the specimens have been randomly placed and given new orientations before each succeeding demagnetization step. When specimens from different hand samples (after correction for a random field orientation) as well as from the same hand sample give preferred directional variations (as demagnetization progresses) the possibility of spurious components upsetting the natural remanence certainly

do not apply; i.e. the directional trends obtained in our study are likely to reflect inherent palaemagnetic properties. A study of intensity decay patterns coupled with small demagnetization steps have on the whole proved to be an extremely good guideline for assessment of the relative importance of stray components. Polyphase magnetizations caused by prolonged chemical reactions (as encountered in the Corsican rocks) seem to be extremely common in nature. It is an elementary fact that in order to provide a relevant study of such complex magnetizations a careful study of the high stability region of the remanence is of prime importance; if one should follow Westphal's attitude to palaeomagnetic analysis the effect would basicly be to "freeze" the initial bulk magnetization structure which palaeomagnetically may be completely irrelevant. The basic problem is not one of stability (as Westphal apparently believes) but the more difficult task of discriminating between various sub-components having largely overlapping stability spectra. Thus, the experimental work may only show up with directional trends and no stable end points (this is the reason for the few acceptable palaemagnetic results). Westphal's oversimplified view in this respect explains why he has got problems in visualizing the normal magnetization component(s) which they nevertheless claim to have found in their original study (Nairn and Westphal, 1968); in the samples having bulk directions in the NE of NW quadrants, one or more normal magnetization vectors must predominate over existing reversed components producing fairly stable resultants which however are discordant with respect to known late/post Palaeozoic fields.

Finally, it is surprising that Westphal puts so much faith in his more recent palaeomagnetic results from Corsica (Westphal et al., 1976). In fact, the site mean directions exhibit an abnormal linear spread which certainly requires further laboratory tests before any sensible palaeomagnetic conclusion can be drawn.

C. Interpretation

Concerning the postulated rotation of Iberia Storetvedt (1973) has suggested this to be a late Eocene/early Oligocene phenomenon (and not post Oligocene as stated by Westphal). This timing is *not* in contradiction with relevant geological and geophysical information (Storetvedt, 1972). The reference to Watkins and Richardson (1971) is not concerned with the above aspect but with an earlier discussion of data by these authors (Watkins and Richardson, 1968). The movement of Iberia may well have had the effect as we suggest, though remagnetization in the Mesozoic (primarily Triassic) is another possibility to be explored in future work. In any case it is hard to understand how the Permo-Carboniferous andesites could obtain their complex remanence if they had been subjected to surface conditions throughout Kiaman time. A sediment cover and later erosion and weathering (probably in the Tertiary) appears to us to be the most resonable explanation at present. However, we have *not* claimed that Western Corsica was necessarily covered by a *thick* sedimentary pile in Permian-Mesozoic times.

In summary we find no justification for the critisism raised by Westphal. We therefore uphold our conclusions. We would like to point out that we have not excluded the possibility that rotation may have taken place but would like to stress the complex palaeomagnetic record of Corsican formations which may easily give rise to false rotation estimates.

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