The remaining four basement sites, viz. 20 and 21 in granite gneiss, and 32 and 33 in Piksteel Granodiorite, were, however, largely unaffected by AF demangetisation and yielded the Group C direction in Fig 12 (D = 143,2°; I = -43,0°; with R = 3,8; n = 4; k = 17; α_{95}° = 22,6). This direction is not significantly different from the antipole of the Group A direction for the Nosib rocks (and hence for the 500 Ma event; Section 4.3.6) and it could thus be argued that Group C represents a reversal of the Group A direction. This possibility is not favoured since two of the sites (32 and 33) were sampled some 200 km south of the central zone of the belt, and were thus considerably removed spatially from the 500 Ma thermal aureole. Sites 20 and 21, although closer, were both located on the edge of the Central Zone. Jacob (1974a) maintains that temperatures decreased away from the centre of the Central Zone and it is therefore likely that the resetting temperatures were not attained at this locality. In addition, sites 20, 21 and 32 were largely stable to AF demagnetisation both in direction and intensity (sites 20 and 21) of magnetisation. It is thus felt that Group C could represent the true basement direction. A further factor supporting this conclusion is the agreement between the Group C derived age and the radiometrically determined age for the basement rocks (Section 4.3.6). Additional work should be conducted to verify this hypothesis.

Nosib Group rocks and granitic equivalents

The intensity of magnetisation of the specimens from the sites drilled into alaskites and rocks of the Etusis and Khan Formations, remained largely stable to AF demagnetisation. As can be seen from Fig 8 the intensities were typically reduced by a small amount in a field of up to 10 mT and thereafter remained constant or increased slightly.

The directions of magnetisation of these rocks also remained mostly constant and, with the exception of sites 5, 14 and 48, yielded significant results after demagnetisation when grouped at the 95% level of confidence (within site). In a number of cases the grouping showed a statistically significant improvement over its NRM counterpart which was often scattered, e.g. sites 6, 10, 17, 18, 27 and 41 (see stereographic plots in Appendix 2).

The total-field NRM's of the red granite sites (totalling 6), with the exception of site 4, were either mostly scattered or grouped (site 15) with a mean direction significantly different to the expected Group A direction, indicating these rocks to have been subjected to secondary remagnetisation.

Nevertheless, after AF demagnetisation, the magnetisation of 4 of the red granite sites exhibited significant within-site grouping (Group A direction), indicating that the secondary magnetisation had affected only domains of low coercivity.

Of the 35 sites sampled from Nosib Group metamorphites, red granite and alaskite, 29 thus yielded significant directions which fell into three distinct groups. Group A comprised 24 site-mean (or partial site-mean) directions indicative of the 500 Ma metamorphic event (Section 4.3.6), with a between-site direction (i.e. the mean of the site means) of D = 334,4° and I = 54,5° (R = 23,3; n = 24; k = 35; $\alpha95°$ = 5,0). Group E comprised 4 sites with a between-site direction of D = 359,8° and I = -52,2° (R = 3,9; n = 4; k = 42; $\alpha95°$ = 14,3). Group B consisted of one Nosib site and one Swakop site with a between-site direction of D = 158,1° and I = -21,3° (R = 1,95; n = 2; k = 22; $\alpha95°$ = 56).

The significance of these Groups is discussed in Sections 4.3.4 and 4.3.6 respectively.

Swakop Group rocks and granitic equivalents

In view of the relatively small magnetic anomalies observed over rocks of the Swakop Group and granitic equivalents, i.e., certain phases of the Salem Granite Suite (the Donkerhuk granite is also included in this context), these rocks were anticipated to have an extremely low content of magnetic minerals. They were thus not initially considered to be ideally suited for palaeomagnetic measurements in this study particularly in view of the required length of measurement time and the limitations in accuracy of the instrumentation (0,1 - 0,2 x 10^{-3} $A.m^{-1}$). Only 4 sites were therefore sampled from these rocks and did not yield significant groupings either for the total-field NRM or after AF demagnetisation. The random scatter of specimen directions is therefore concluded to result from some secondary magnetisation not measurable with the current apparatus.

Brandberg, Cape Cross and Erongo intrusives

The two Cape Cross sites (37 and 38) remained stable to AF-demagnetisation and yielded statistically significant site-means. With the two Erongo sites (44 and 45) the grouping after AF-demagnetisation showed a statistically significant improvement over the NRM counterpart. Of the two Brandberg sites, site 42 did not yield a significant grouping whereas site 43 changed direction completely after AF-demagnetisation but nevertheless yielded a significant grouping with a direction similar to those of the Cape Cross and Erongo sites.

The five statistically significant site-means were grouped together as Group D in Fig 12 and yielded a between-site direction of D = 322,6° and I = -43,7° (R = 4,7; n = 5; k = 14; $\alpha 95^{\circ}$ = 21,4). Considering the 95% cone of confidence the Group D direction is significantly different from that of the Earth's present day field.

4.3.2 Magnetic mineralogy

Core specimens from the sampled sites were analysed both chemically and using the XRF technique (Jakob, personal communication, Appendix 3) for TiO_2, FeO and Fe_2O_3. In certain areas such as at the Tsaun beacon and the Ida dome, large phenocrysts of what appeared to be magnetite were widespread, both in the rock and scattered about as scree. Fresh samples of these were also collected and analysed. The results are plotted in the ternary composition diagram in Fig 13. A number of sites yielded low concentrations that were close to the limits of detection and are therefore not plotted. A list of the concentrations is given in Appendix 3 (Table A3).

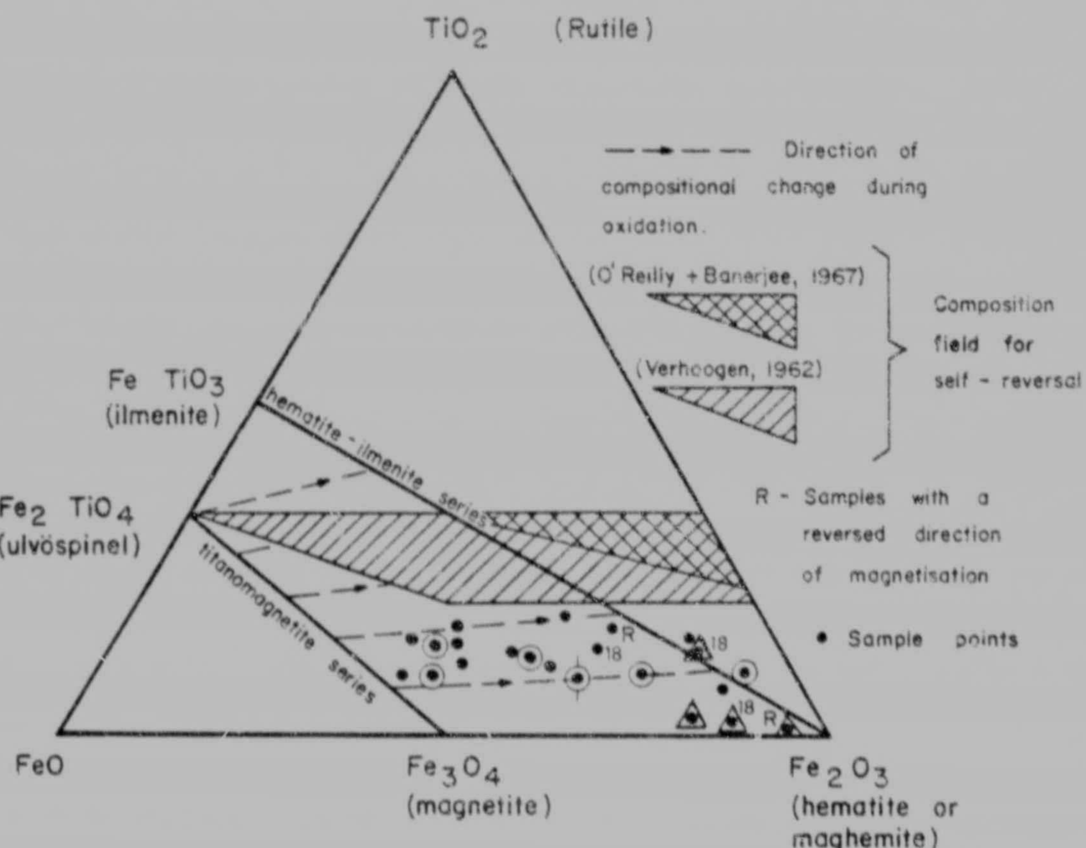

Fig 13 Ternary composition diagram of FeO-Fe_2O_3 - TiO_2 for Nosib Group and basement rocks and granitic equivalents. Sample points enclosed by circles were derived from alaskites; by triangles from massive 'magnetite' samples; and by a marked-circle from the Etusis Formation.

It should be borne in mind that the limited volume of material available in the cores did not justify the separation of magnetic constituents prior to analysis. The results in Table A3 and Fig 13 thus represent bulk analyses which, for the whole-rock samples, may not entirely reflect the characteristics of the minerals which carry the stable remanence. It is felt, however, that samples derived from alaskite and from the Etusis Formation (indicated in Fig 13) would not have been contaminated by ferrosilicates since such minerals are largely absent from these lithological units. Sample points derived from the Khan Formation follow the trend for the alaskites and it is therefore not unlikely that concentrations of magnetic constituents were sufficiently high so as to prevent major distortion of the observed pattern by ferrosilicates. In fact, at one particular site, (18) for which both whole-rock and magnetic-fraction analyses were available, the whole-rock analyses did not deviate from the hematite-ilmenite trend displayed by the magnetic fractions.

Fig 13 thus suggests that the rocks sampled generally contain multi-compositional magnetic mineral phases with some samples lying close to the magnetite end of the titanomagnetite solid solution series but the majority tending to fall within the hematite-ilmenite series. It could be argued that the points falling within the latter series were derived from magnetite by a later period of oxidation to produce a maghemite phase. It is doubtful whether this is entirely so since it implies that the observed NRM's are in fact CRM's. Although CRM was evident at certain sites (Section 4.3.5) the majority of sites yielded NRM's corresponding to the Group A direction (i e. corresponding to the 500 Ma thermoremanent event, Section 4.3.6) indicating no subsequent compositional change by oxidation. The observed hematite phase could, however, have resulted from oxidation at the time of metamorphism in which case it is likely that any maghemite, which is metastable thermodynamically, has reverted to hematite as a result of the high temperatures prevailing at the time.

It was also evident that three of the points closest to the titanomagnetite solid solution line in Fig 13 were derived from red granite and reactivated basement. It is thus likely that the compositional change in magnetic mineralogy is related in part to lithological type.

The existence of a hematite-ilmenite phase could have an important bearing on reversals of magnetisation by a self-reversal process and is dealt with in Section 4.3.4 below.

4.3.3 Thermal demagnetisation responses

Of the 19 thermally demagnetised core specimens derived from Nosib rocks, alaskites, Abbabis Metamorphic Complex and the Brandberg, Cape Cross and Erongo intrusives, 13 remained stable up to temperatures of 550 - 600°C yielding directions essentially unaltered from the NRM directions (Fig 10) One Nosib site (23) and one red granite site (12) did vary with increasing temperature yielding similar directions to those obtained after AF demagnetisation.

The directions of the two basement granite-gneiss sites also varied with temperature and, in particular, site 34 which had yielded a within-site grouping after AF-demagnetisation similar in direction to that of the Nosib rocks (Group A), finally tended at 600°C towards the Group C or anticipated basement direction (Fig 10 iii). This could be an indication that the highest critical blocking temperatures at this site were unaltered by the 500 Ma metamorphic event. Although this tentative result is based on the responses of a single specimen it may be of significance in view of the increase in intensity of magnetisation above 580°C (Fig 11). More detailed sampling and thermal analysis of these rocks would be needed to validate this conclusion.

The most significant result of the thermal demagnetisation work was the change in direction of the two Khan Formation samples from site 46 (Fig 10 iv). This site was specifically chosen for thermal work since it had yielded a direction similar to that of a reversal of Group A for the Nosib rocks. It may be seen from Fig 11 that the intensity of magnetisation dropped rapidly at ± 280°C and thereafter remained more or less constant up to roughly the Curie point for magnetite (578°C). Up to the 200°C level the direction of magnetisation remained stable (Fig 10 iv) retaining its apparently reversed direction. Thereafter the direction varied, tending, at temperatures above 500°C, towards the Group A or normal direction for the Nosib rocks. The intensities of magnetisation of the two specimens were still significant at temperatures of between 500°C and 540°C and the change in direction at these temperatures is therefore considered to be realistic. The thermal demagnetisation carried out on site 19, which was also apparently reversely magnetised, did not however cause the remanent direction to change and the two samples from this site remained stable up to 600°C.

The thermomagnetic responses shown in Fig 11 indicate that magnetite is the chief remanence carrier, since Curie points of roughly 580°C are indicated.

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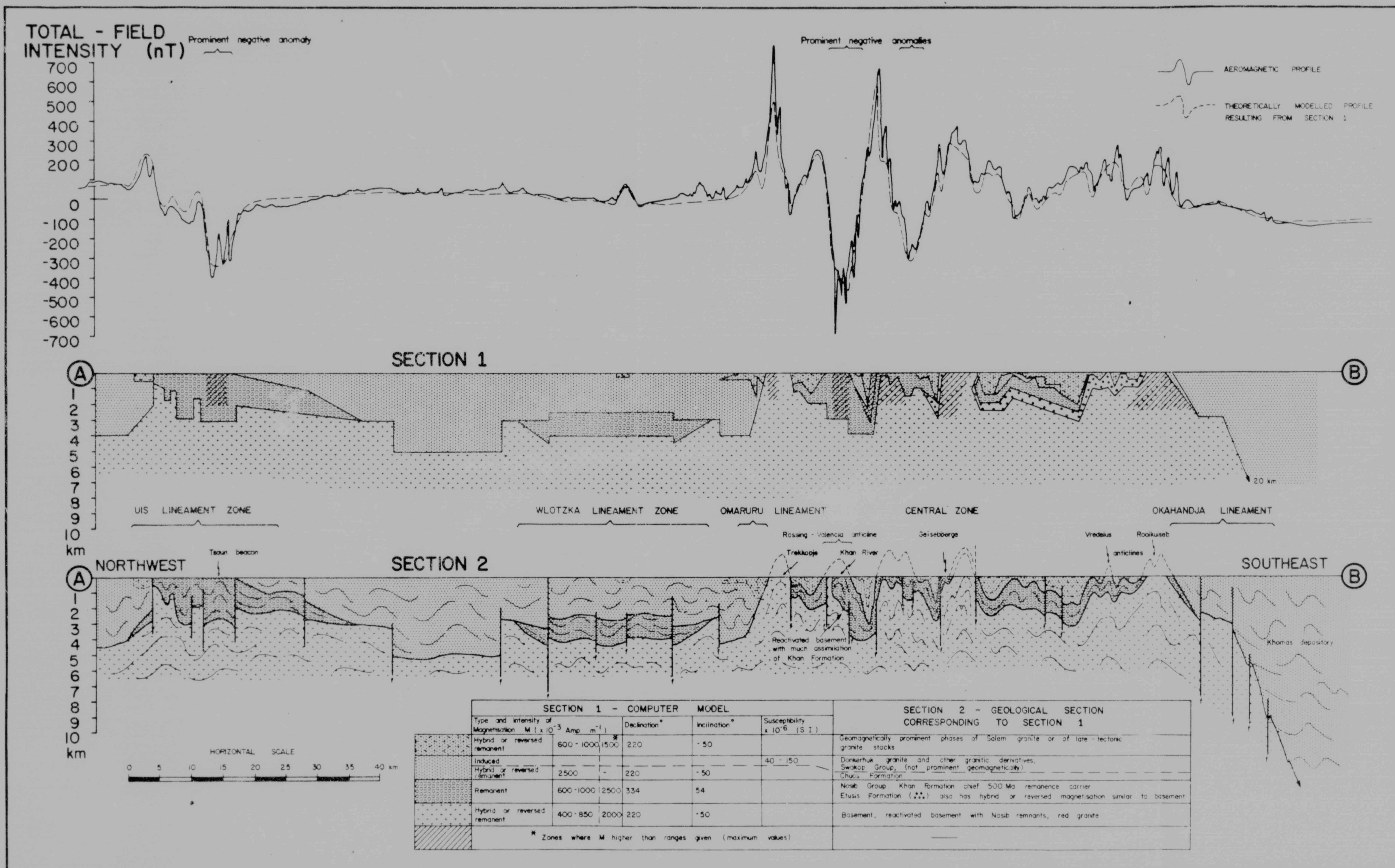

	SECTION 1 - COMPUTER MODEL					SECTION 2 - GEOLOGICAL SECTION CORRESPONDING TO SECTION 1
	Type and intensity of Magnetisation M (x 10^{-3} Amp m^{-1})			Declination°	Inclination°	Susceptibility x 10^{-6} (S I)
	Hybrid or reversed remanent	600 - 1000	1500*	220	- 50		Geomagnetically prominent phases of Salem granite or of late - tectonic granite stocks
	Induced					40 - 150	Donkerhuk granite and other granitic derivatives, Swakop Group, (not prominent geomagnetically)
	Hybrid or reversed remanent	2500	-	220	- 50		Chuos Formation
	Remanent	600 - 1000	2500	334	54		Nosib Group Khan Formation chief 500 Ma remanence carrier Etusis Formation (∴) also has hybrid or reversed magnetisation similar to basement
	Hybrid or reversed remanent	400 - 850	2000	220	- 50		Basement, reactivated basement with Nosib remnants, red granite
	* Zones where M higher than ranges given (maximum values)						——

Fig 17 Computer-model section along an aeromagnetic profile traversing the Damara Orogenic Belt

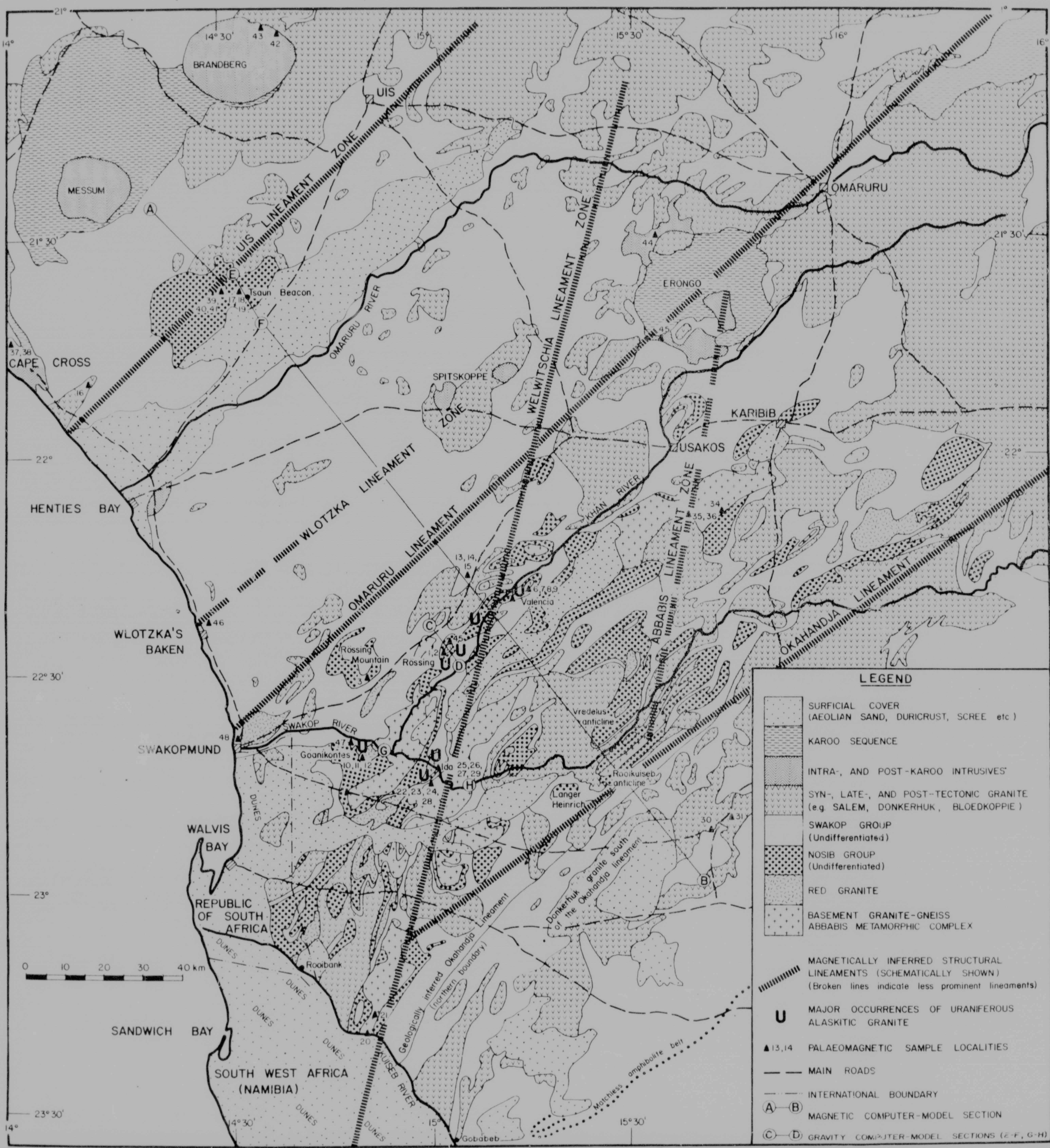

Fig 2 Generalised geology of the western portion of the Damara Orogenic Belt (Simplified from the 1:1 000 000 geological map of S W A, 1980 Edition)

The fall-off in intensities seen from roughly 200°C probably results from the added presence of hematite-ilmenite phases in the specimens. Nagata (1961) has indicated that thermomagnetic responses which change their magnetic moment gradually with increasing temperature (such as occurs with most of the Nosib and associated granitic rocks in the range 200°C - 550°C and with the basement and young intrusive rocks over the entire range of temperatures) can be interpreted as having a simple mixture of two or more magnetic mineral phases. This is supported by the observed magnetic mineralogy (Fig 13) and also by the stepwise responses from site 46 which show two distinct blocking temperatures. In addition, Stacey and Banerjee (1974) have indicated that the Curie points of the hematite-ilmenite solid solution series vary with $FeTiO_3/Fe_2O_3$ ratio, becoming higher with an increase in Fe_2O_3 content. The observed spread of compositions (Fig 13) indicates possible Curie point variations from 500°C to values in excess of 600°C for the rocks sampled (*ibid.*) and could thus also have affected the thermomagnetic responses.

4.3.4 Reversal of the palaeomagnetic field

If the conclusion reached in Section 4.3.1, that the Group C direction (Fig 12) relates to the time of formation of the basement rocks is correct, it is untenable that the Group B direction, derived from the much younger Damara rocks, relates to the basement direction. The possibility that Group B relates to the time of deposition of the Damara rocks, for which directions of magnetisation have been derived (position F on Fig 12, after McElhinny and McWilliams, 1977, and Henthorn, 1978), must also be discounted in view of the high temperatures (750°C, Section 2.5) which prevailed during the 500 Ma metamorphic event. It should be noted here that although positions A and F appear to be similar, this is coincidental since they are in fact separated by a time span of at least 500 Ma. McElhinny and McWilliams (1977) and McElhinny *et al.* (1974) have shown that the pole position wandered considerably from the time of the F position (dated at approximately 1 050 Ma), returning to a similar position (A) at the time of the Damara Orogeny (500 Ma, see also Fig 14).

The author is therefore of the opinion that Group B represents the reversed direction of Group A despite the fact that the Group B direction is statistically different from the Group A antipole direction (A', Fig 12). In fact, Irving (1964) states that reversals are commonly not exact. The group B direction is, however, not well defined in view of the paucity of data, and no postulate can therefore be made at this stage as to what addition vector (if any) is required to bring the Group B direction back into alignment.

The fact that site 46 tended to the normal Group A direction after thermal demagnetisation supports not only the above conclusion but also that the reversed direction (Group B) is probably unrelated to Group C, the assumed basement direction.

It is also possible that the Group B direction, in particular site 46, represents a self-reversal. Irving (1964) describes a model for self-reversal whereby the sample contains a mixture of two magnetic constituents in which the magnetisation of one is antiparallel to that of the other and the sign of remanence depends on the magnetostatic interaction between the two constituents. The multiphase magnetic mineralogy indicated for the sampled rocks in Fig 13 would certainly fit in with this hypothesis particularly since the hematite-ilmenite minerals are known to display self-reversal (Stacey and Banerjee, 1974). Fig 13 shows the fields of composition suggested by Verhoogen (1962), and O'Reilly and Banerjee, (1967) for self-reversal. Although none of the sites measured fell within these fields one site (19) that did have a reversed direction of magnetisation plots on the edge of Verhoogen's suggested field, and may therefore represent a self-reversal. This was not the case, however, for site 46.

Stacey and Banerjee also point out that in spite of the multiplicity of possible mechanisms of self-reversal that have been proposed, demonstrated examples of the p[illegible]enon are rare. Reversed directions of magnetisation resulting from pos[illegible]le geomagnetic field reversals should, of course, not be discounted.

4.3.5 Chemical remanent magnetisation

<u>Oxidation Haloes</u>

It has been noted by numerous geologists that the uraniferous alaskitic granites often display ring-like variations in colour, giving the appearance of haloes. These appear as reddish-brown irregular rings, the majority having diameters ranging from 20 - 100 cm, which surround a fresh-looking greyish granite. Outside the rings the granite has a light cream to brown colour and, to the naked eye, a fresh appearance. The cause of this phenomenon is not entirely understood although most geologists feel that oxidation is the cause - hence the term 'oxidation halo'.

Site 29 was selected on a fresh granite face showing abundant haloes, in order to see whether palaeomagnetism could assist in establishing their origin. Eight core specimens were drilled inside the haloes, four outside and one on a halo itself. Refering to the stereo-plot for Site 29 in the Appendix, the eight specimens from inside the haloes yield a mean direction of magnetisation (A) similar to the direction for the other Damara metamorphites, whereas the four from outside the haloes yield a mean direction (B) close to that of the present-day Earth's field. The single specimen, from a halo itself, (westernmost data point) appears to be intermediate.

This indicates that the alaskitic granites suffered a relatively recent period (post-Cretaceous) of alteration during which the initial thermo-remanent magnetisation was destroyed leaving a chemical remanent magnetisation with a direction close to that of the Earth's present day field. It is concluded that sites 6, 13, 23 and 29, making up Group E in Fig 12, were affected in this way. These sites were all derived from, or in close proximity to, rocks containing secondary uranium minerals in varying proportions to the primary uranium minerals. The presence of these brightly coloured secondary (Uranyl(U^{6+})) minerals, characteristic of the majority of uraniferous granite occurrences in the area, arises from the oxidation of the uranium (Hambleton-Jones, personal communication) and is hence further evidence for chemical alteration of the rocks through oxidation.

4.3.6 Palaeomagnetic pole positions

The virtual geomagnetic pole (VGP) positions were calculated for Groups A, C, D and E, using the conventional premise that the earth's field, averaged over a period which is long compared to secular variation, is that of a geocentric axial dipole. These positions are listed in Table V (Section 4.3.1) and the positions for A and C are plotted in Figs 14 and 15, which show the apparent polar-wander paths during the late-Precambrian-to Palaeozoic, and early-Precambrian periods respectively (McElhinny <u>et al.</u>, 1974; McElhinny and McWilliams, 1977). It should be noted that the polar wander swaths shown are generalised paths obtained from numerous, often scattered, previously derived pole positions (omitted from Fig 14 for the sake of clarity) encompassing the majority of results.

The pole position derived for the Damara metamorphites and granites in this study is in good agreement with the five pole positions (McElhinny et al., 1974) shown for that period in Fig 14. In addition, the radiometric ages for these rocks (Kröner and Hawkesworth, 1977) lie in the range 450-550 Ma and agree well with the upper Cambrian-Silurian ages reported for the other five VGP's mentioned.

It can be seen that the pole derived for the basement rocks (Group C) does not fall on the indicated early-Precambrian polar-wander path (Fig 15, McElhinny and McWilliams, 1977) but lies further to the east. However, the data from which the polar wander path was derived are sparse for this period of time and although the Group C direction resulted from only four sites, it is suggested that the curve could be redrawn to pass through the basement VGP as in Fig 15. Further data would, ofcourse, be required to verify the exact position of the basement VGP. From a comparison of this VGP with the above polar wander path, an age of approximately 2 150 Ma is nevertheless suggested for the basement rocks, which is within the limits of accuracy of the radiometric U-Pb age of 1 925 Ma (+330, -280 Ma) obtained by Jacob et al.,(1978) for these rocks (assuming that the attainment of blocking temperatures and commencement of uranium decay were synchronous events).

Pole positions for Groups D and E have not been plotted since they are derived from much younger events occurring during the period when there has been little movement for Africa (Jurassic to recent). The cones of confidence for these groups in fact encompass the present day pole position.

4.4 Conclusions

i) The initial assumption that the alaskitic granites represent

Footnote: Since the completion of this study, more recent data have become available on the African polar wander path. The reader is referred to this work, i.e. Kroner, A., McWilliams, M.O., Germs, G.J.B., Reid, A.L. and Schalk, K.E. (1980): Palaeomagnetism of Late Precambrian to early Palaeozoic mixtite-bearing formations in Namibia (SWA): The Nama Group and Blaubeker Formation. Am. Jour. Sc. Vol. 280, 942-968.

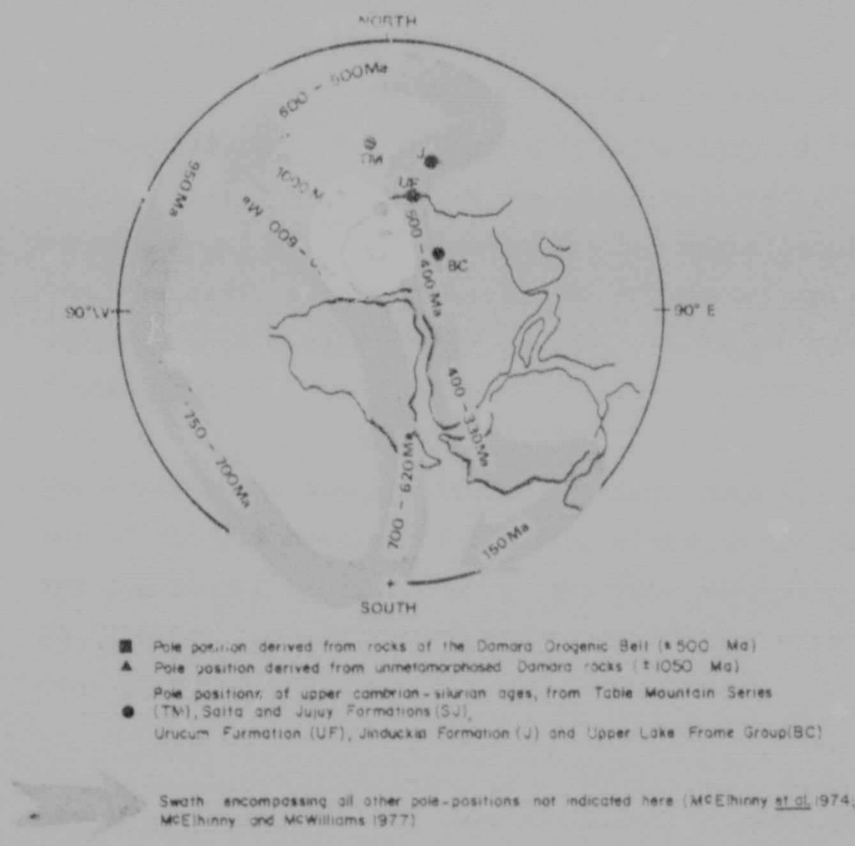

Fig 14 Late-Precambrian to Palaeozoic polar-wander path for Gondwanaland (MdElhinny *et al.*, 1974)

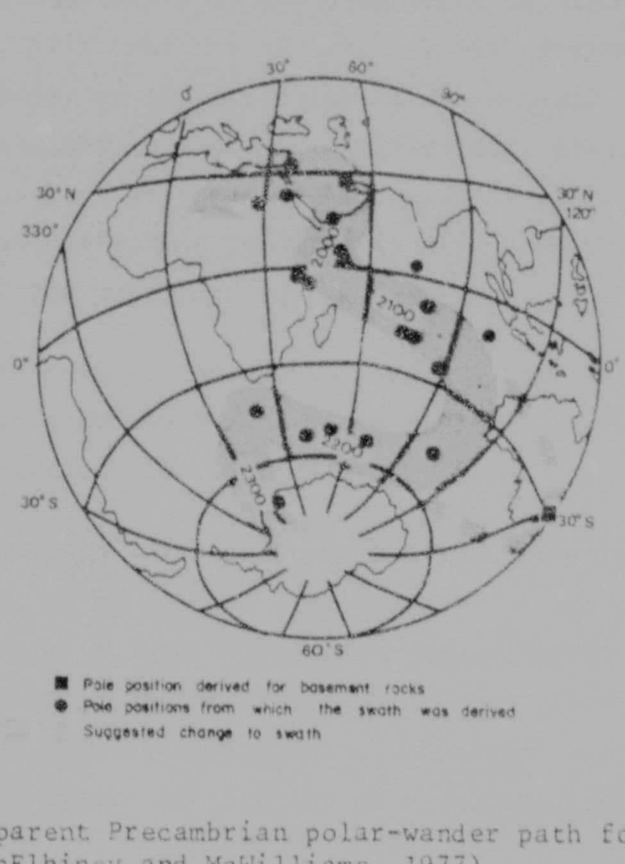

Fig 15 Apparent Precambrian polar-wander path for African cratons (McElhinny and McWilliams, 1977)

the last phase of tectonism and that little or no movement has subsequently occurred, appears correct in view of the good between-site grouping of magnetic directions (with no structural corrections), obtained from the sites selected in the Nosib metamorphites and alaskitic granites. The magnetisation resulting from the last thermal pulse of the 500 Ma metamorphic event, yielding a direction of D = 334,4°, I = 54,5°, is thus post deformational.

The Nosib rocks and granite equivalents have proved suitable material for palaeomagnetic studies, although the same is not true for the Swakop Group rocks and granitic equivalents (Salem and Donkerhuk) which failed to yield significant within-site directions of magnetisation.

ii) The hypothesis that the negative magnetic anomalies, associated on a semi-regional basis with the major uraniferous alaskitic granite occurrences, arose from the remagnetisation of the rocks in a magnetic field considerably different from the Earth's present field, is fully supported by the palaeomagnetic results. A simple demonstration of the dependance of magnetic anomaly form (i.e. largely positive or negative with respect to the normal geomagnetic field) on the direction of magnetisation within a causative body is given in Appendix A4 (Figs 21a, 21b, 22a and 22b). These figures clearly demonstrate the origin of the negative anomalies and these results should be borne in mine when viewing the aeromagnetic map of the area (Fig. 3).

The position of the VGP derived for the 500 Ma Damara Orogeny, which plots on the Moroccan coast, is in good agreement with other pole positions for that period.

Assuming that the Group C direction relates to basement, as is favoured in this thesis, the VGP for the basement rocks suggests a slight change to the polar-wander path of McElhinny and McWilliams (1977). On this assumption, the polar-wander path implies an age for the basement rocks of approximately 2 150 Ma. This is within the limits of accuracy of a radiometric U-Pb age of 1 925 (+330,

-280 Ma) determined by Jacob et al., (1978) for these rocks.

iii) The question arises as to why, if the direction of magnetisation was reset at the time of the Damara orogeny, the entire mobile belt is not characterised by a regional negative magnetic anomaly, rather than just the environs of the uraniferous granite occurrences?

Of the sites collected from the Swakop Group and granitic equivalents (i.e. Salem and Donkerhuk granites), none had directions of magnetisation which were significant at the between-site level. Koenigsberger ratios for these rocks show that they have acquired induced components of magnetisation and have lost their thermoremanent magnetisation. No abnormal negative magnetic anomaly can thus be associated with these rocks.

Considering the Nosib rocks and associated granites, however, Koenigsberger ratios were high, indicating a strong remanence set at the time of the 500 Ma metamorphic event. Thus, where these rocks outcrop or have a shallow suboutcrop, an overall negative magnetic anomaly prevails (see Section 5 for the effects of this remenent direction on the geomagnetic field). In view of the fact that the Damara remanent direction is not dominant in rocks overlying the Nosib Group the negative anomaly can be used in the area as a Group stratigraphic marker. Since the uraniferous alaskites are mostly confined stratigraphically to the Nosib Group, these anomalies form an important prospecting criterion as they may be used to delineate target areas for further exploration in areas covered by aeolian sand, scree and duricrust deposits.

iv) Although the majority of Nosib sites yielded directions of natural remanent magnetisation (NRM) coinciding with the 500 Ma direction, certain sites yielded NRM's of either scattered direction or approximating the direction of the Earth's present-day field, indicating that they have taken on some secondary magnetisation. In the former case the secondary magnetisation was easily removed with demagnetisation in an alternating field, indicating that it had affected only domains of low coercivity. In the latter case, however, the secondary magnetisation remained stable to AF demagnetisation making it apparent that the secondary direction is more than the effect of normal weathering (supported by the presence of oxidation haloes) and must be due to hydrothermal/metasomatic alteration possibly associated with the period of post-Karoo granitic intrusion. This secondary magnetisation, which manifests itself locally as a normal or positive geomagnetic field (see also Section 5), is not confined to a particular level within the Nosib Group and occurs apparently haphazardly. Nevertheless, it is apparent that where rocks of the Nosib Group are well developed, particularly the Khan Formation, an overall negative magnetic anomaly prevails.

v) Regarding the phenomenon of the so-called oxidation haloes, it is concluded from the palaeomagnetic results that the alaskitic granite, enclosed by the haloes, is the original fresh rock and that the haloes themselves represent an encroaching alteration front (through oxidation) which has already destroyed the initial thermo-remanent magnetisation of the surrounding rock. A chemical remanent magnetisation has thus resulted. The oxidation haloes are only visible in rocks containing appreciable quantities of uranium and perhaps provide a clue to the nature of the secondary magnetisation described in paragraph iv above, i.e. in the absence of the concentrations of uranium as was mostly the case there are no haloes and therefore no obvious indications of what is oxidised and what is not. It is possible therefore that much of the secondary magnetisation measured in this study is more than just the effect of normal weathering.

vi) A TiO_2-FeO-Fe_2O_3 ternary composition diagram for the rocks sampled shows that more than one magnetic-mineral phase is present, viz. certain samples follow the titanomagnetite solid solution series whereas the majority follow the hematite-ilmenite series. The latter may suggest a self-reversal mechanism for the observed reversed directions at two of the sites.

5 QUALITATIVE AND QUANTITATIVE INTERPRETATION OF THE AEROMAGNETIC DATA

5.1 Regional Structural Interpretation : Structural Lineaments

It is evident from the aeromagnetic colour composite (Fig 3) that the area may be divided up into distinct domains of differing magnetic disturbance. Since the magnetic anomalies are directly related to variations in lithology and structure, the area may thus also be divided up, on the basis of aeromagnetic data, into distinct structural/lithological near-surface domains (within the upper 10 km), separated by major structural lineaments.

Apart from the Okahandja lineament, the remaining structural lineaments discussed below, have been identified from the aeromagnetic data and are named (author's nomenclature) in this text for the first time. Comparison of the interpretative overlay (Fig 20 - rear cover) with the aeromagnetic colour composite (Fig 3) shows how the area has been subdivided into different magnetic/structural domains. It should be borne in mind that the lineaments revealed by their magnetic signature, are not precisely linear features, as indicated schematically in Fig 2 and the interpretative overlay to Figs 3 and 4. Rather, they are narrow linear zones along which regional structural change has taken place.

Due to the variable directions and intensities of magnetisation within the lower stratigraphic units, i.e. basement and Nosib Group, as well as the fact that the Nosib sequence is not necessarily fully developed along particular lineaments, the magnetic surface manifestation of the lineaments may not be in agreement locally with the geologically derived surface expression. This discrepancy is also affected by the fact that the magnetic data reflect magnetic formations in depth which may have no surface geological expression. For these reasons the lineaments are schematically drawn as straight lines. The term lineament zone is used pertinently in this text to indicate broader (i.e. greater than 15-20 km) features of structural change; zones of uplift in particular. A key to the schematic representation of the lineaments and lineament zones in the overlay and in Fig 2 is given in Fig 16. The Uis, Wlotzka, Welwitschia and Abbabis lineament zones are interpreted as broad elongate zones of uplift in which lower stratigraphic levels, i.e. Nosib rocks, have been brought close to the surface, resulting in corresponding local or widespread negative magnetic anomalies. The central zone, due to existing nomenclature, has not been renamed as a lineament zone in this text although it most certainly falls into this category as it is the broadest and most prominent zone of uplift.

5.1.1 The Okahandja lineament

Miller (1979) has described this lineament as being a huge monoclinal-like