

ORIENTATION OF DRILLCORE SAMPLES FROM MORANBAH NORTH

M.A. LACKIE

C.S.I.R.O.
Division of Exploration Geoscience
P.O. Box 136
North Ryde NSW 2113

INTRODUCTION

The orientation by palaeomagnetism of four HQ core samples from Moranbah North has been determined. The four samples are:

Drillhole	Depth
DDH04	128.03-127.71m
RDH07C	90.72-90.50m
RDH08C	76.56-76.30m
RDH19C	207.09-206.82m

Samples DDH04 and RDH07C are medium to medium-light grey siltstones, while sample RDH19C is a medium-light grey fine sandstone and sample RDH08C is a medium-light grey fossiliferous mudstone.

RESULTS

The "down-dip" direction of the visible fractures on each of the samples has been marked with a fiducial line. Following this, the remanence of each sample was measured using the longcore magnetometer. All the drillcore samples were then subsampled and the remanence of the subsamples was measured using a more sensitive cryogenic magnetometer. The stability of the remanence was assessed by demagnetising selected subsamples using an alternating field (AF) demagnetiser. Once the remanence of each of the samples was determined, the orientation of the observed fractures could be ascertained by rotation of the measured remanence direction to that of the expected remanence direction for the Moranbah North area (Lackie, 1993).

The longcore results are shown in Fig. 1, with consistent declinations obtained from samples DDH04 (Fig. 1A) and RDH19C (Fig. 1D), less consistent declinations were obtained from sample RDH08C (Fig. 1C) and noisy results were obtained from sample RDH07C (Fig. 1B). Sample RDH07C has the weakest intensity of the four samples.

The natural remanent magnetisation (NRM) of the subsamples (Fig. 2 & Table 1) is similar to the directions obtained from the longcore magnetometer although 30° difference is observed in the results from sample RDH19C (Fig. 2D). After AF demagnetisation it was observed that a small viscous component was removed after 50 Oe, after which the remanence of the subsamples was quite stable. Stereographic plots of the sample remanence directions after 100 Oe demagnetisation are shown in Fig. 3. Samples DDH04 and RDH07 show little difference in remanence declination before and after 100 Oe demagnetisation (Table 1), while a less parallel viscous magnetisation was removed from samples RDH08C and RDH19C. The longcore result for samples RDH19C and RDH08C when compared with the mean declination after AF demagnetisation are similar indicating that a small viscous component was probably picked up during the subsampling of the drillcore.

SUMMARY

Consistent longcore declinations were obtained from three of the drillcore samples (DDH04, RDH08C & RDH19C) with the fourth (RDH07C) showing noisy declination results. The inconsistent result obtained from sample RDH07C was in part due to the weak remanence intensity of the sample. Subsequent subsampling of all four core samples and measurement of the NRM of the subsamples showed consistent directions which were similar to those obtained from the longcore magnetometer. The AF demagnetisation of the subsamples showed that the remanence of the drillcore samples is stable and thus the drillcore samples can be used for palaeomagnetic orientation.

Table 2 shows the orientation of the fractures after palaeomagnetic orientation of the drillcore samples. Three of the samples (DDH04, RDH08C & RDH19C) indicate that the fractures strike in a NNE/SSW to NE/SW direction while the fourth sample (RDH07C) shows an E/W strike of the observed fracture. All observed fractures have steep dips and with the exception of sample RDH07C are flat in appearance. Sample RDH07C shows a slightly curved fracture.

REFERENCES

- Fisher R. 1953. Dispersion on a sphere. Proceedings of the Royal Society A217, 295-305.
- Lackie M.A. 1993. Drillcore orientation using palaeomagnetism: Preliminary results, Bowen Basin. Submitted to Australian Coal Geology.

Table 1. Longcore and cryogenic magnetometer remanence results.

Sample	Longcore		Cryogenic			
	Dec(°)	error(°)	STEP	DEC(°)	INC(°)	α_{95} (°)
DDH04	66	1.5	NRM	53	-70	7
			100 Oe	43	-60	2
RDH07C	330	7	NRM	350	-72	6
			100 Oe	346	-58	20
RDH08C	248	3	NRM	220	-67	-
			100 Oe	249	-63	-
RDH19C	34	2	NRM	68	-73	5
			100 Oe	37	-66	12

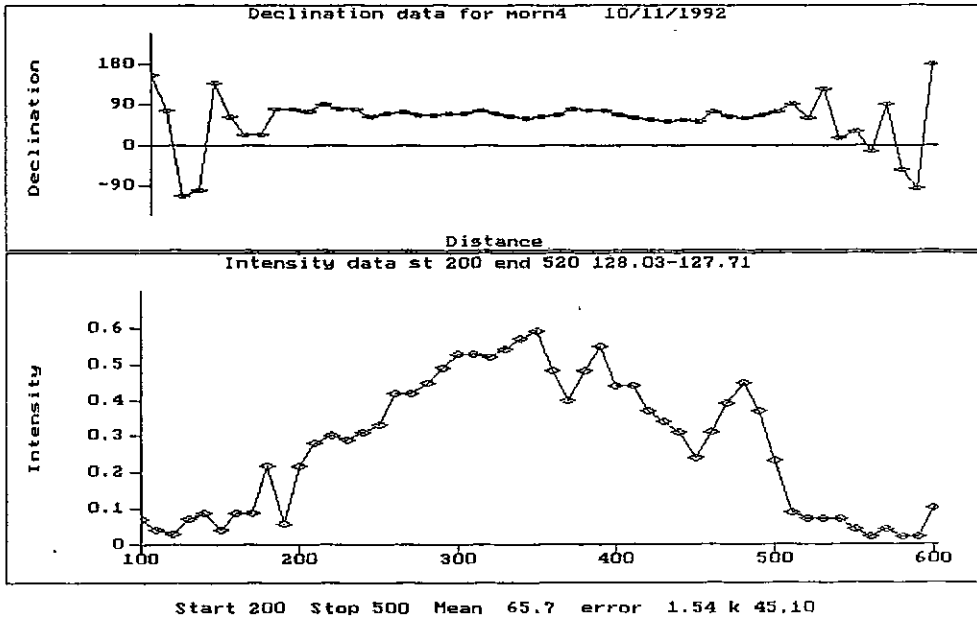
Note. Dec, Inc, declination, inclination of the remanence. α_{95} , radius of the 95 percent confidence zone (Fisher, 1953). The α_{95} for the 100 Oe step of sample RDH07C is large because one of specimens has a shallower inclination than the other two used in the calculation. The declination of all three specimens is similar.

Table 2. Orientation of fractures.

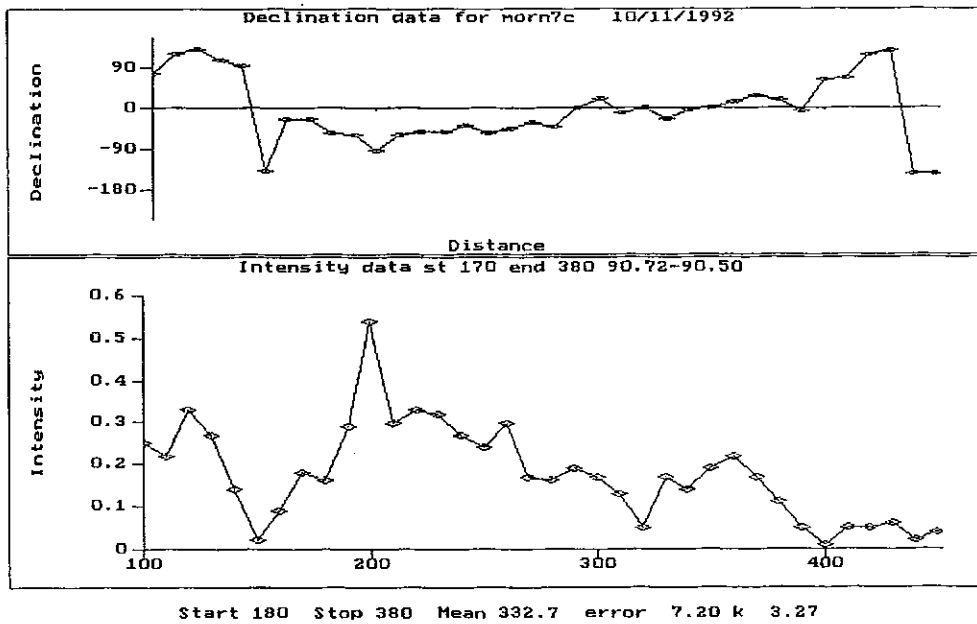
Sample	Mean Remanence	Down Dip Direction	Strike direction
	Declination(°)	of fracture(°)	(°)
DDH04	43	317	227/47
RDH07C	346	14	284/104
RDH08C	249	111	201/21
RDH19C	37	323	233/53

Figure 1. Results of Longcore Magnetometer measurements on drillcores from the Moranbah North area. Upper plot shows the variation of declination along the core, with 0° indicating the reference line on the core. Lower plot shows the variation of magnetic intensity along the core. Unit of intensity is $\mu\text{G}/\text{Oe}$ [mA/m]. The beginning and end position of the core is shown by the "st" and "end" values in the core description. Beneath the plots the mean declination is shown for the section of the plot as indicated by the start and stop numbers. The error refers to the standard error of the mean and k is the precision parameter (reflects the amount of dispersion) associated with the mean direction. The deeper section of the core is to the left of the plot.

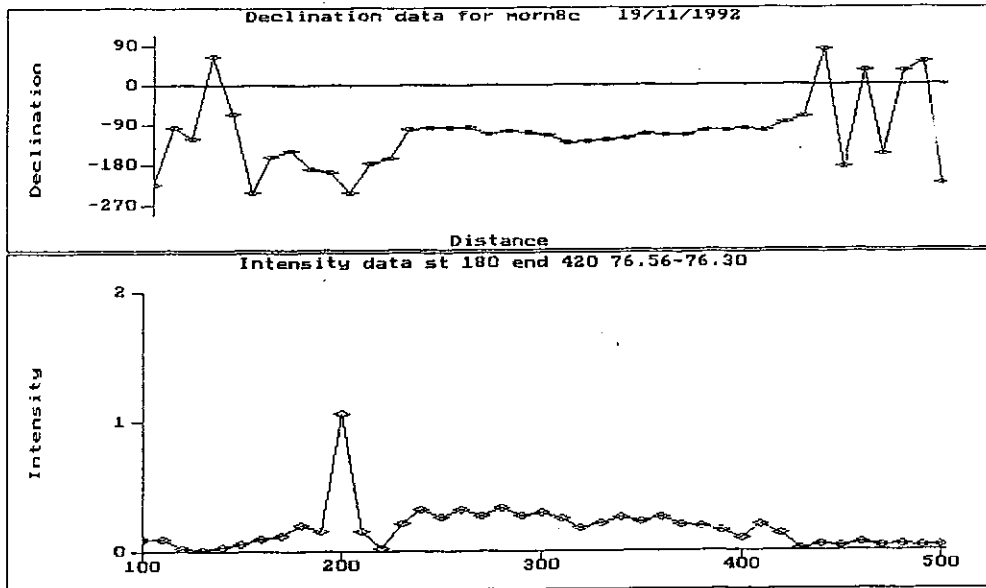
A, DDH04. B, RDH07C. C, RDH08C. D, RDH19C.



A

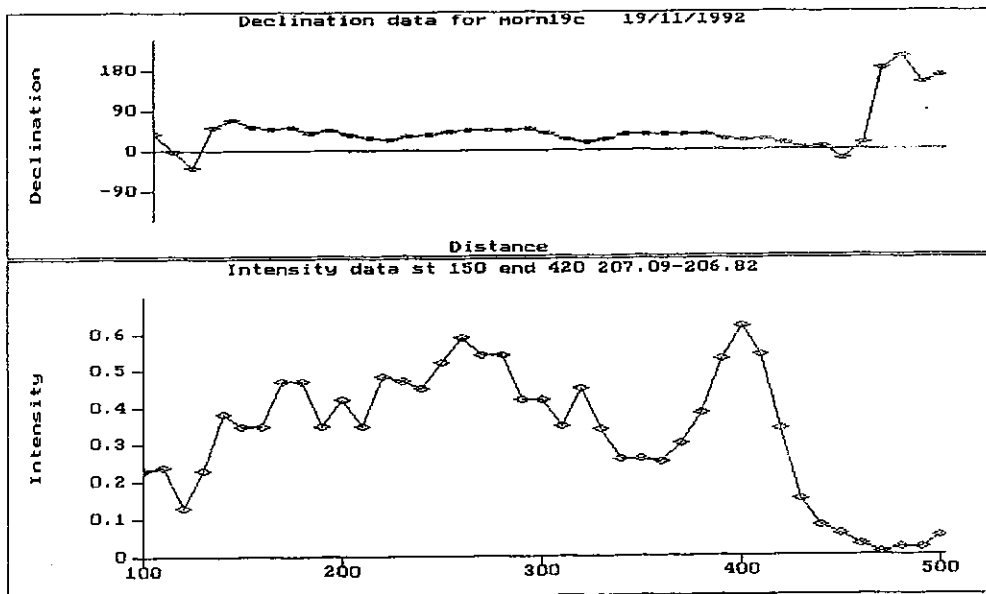


B



C

Start 230 Stop 400 Mean 248.5 error 2.61 k 26.96

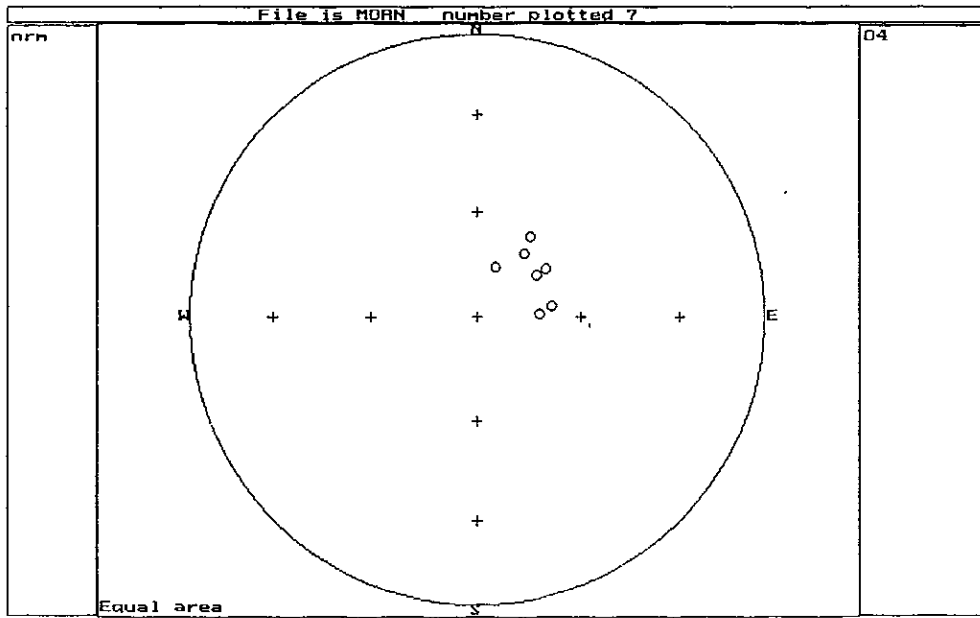


D

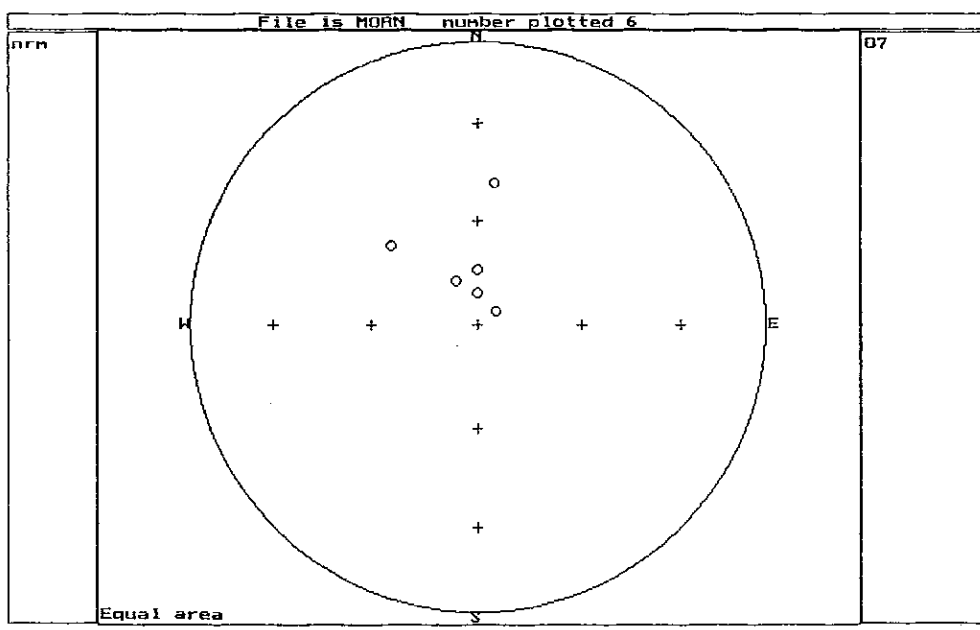
Start 150 Stop 410 Mean 33.9 error 1.78 k 38.58

Figure 2. Equal area stereographic plot of NRM directions from subsamples from the Moranbah North drillcore samples. Closed (open) symbols represent lower (upper) hemisphere.

A, DDH04. B, RDH07C. C, RDH08C. D, RDH19C.



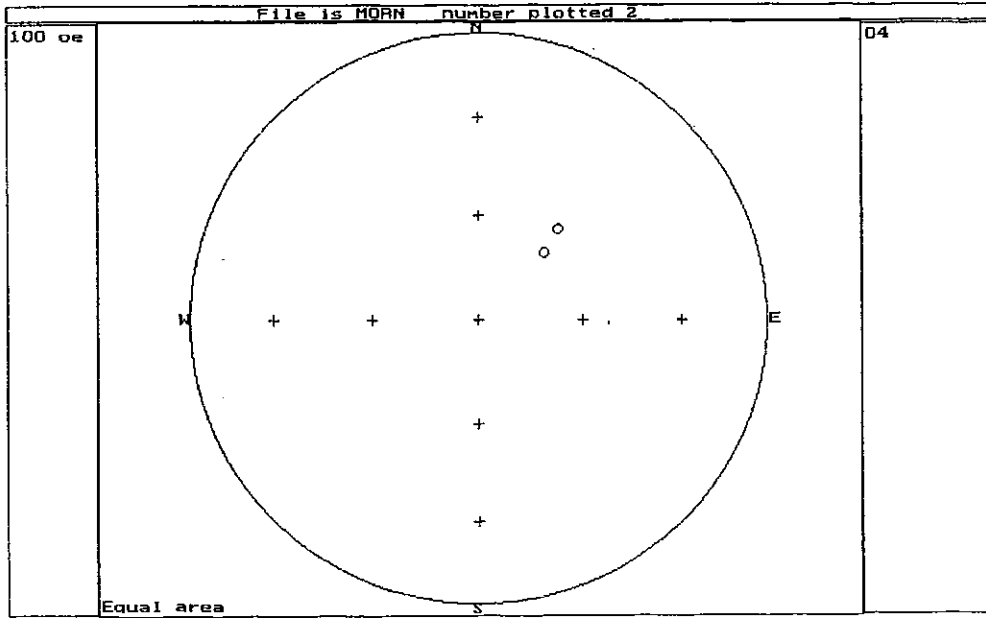
A



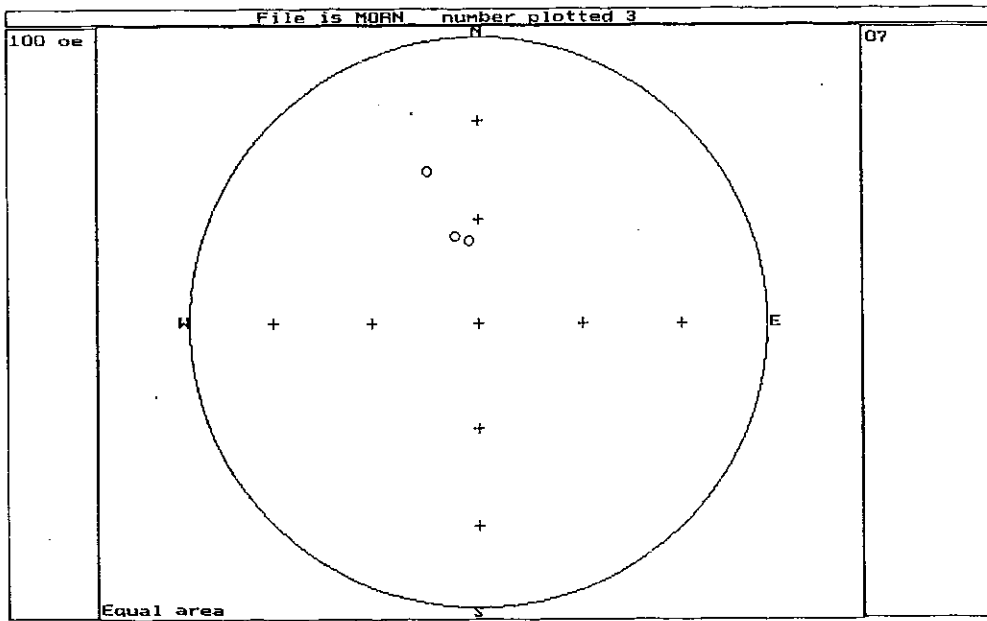
B

Figure 3. Equal area stereographic plot of directions from selected subsamples, after AF demagnetisation of 100 Oe. Closed (open) symbols represent lower (upper) hemisphere.

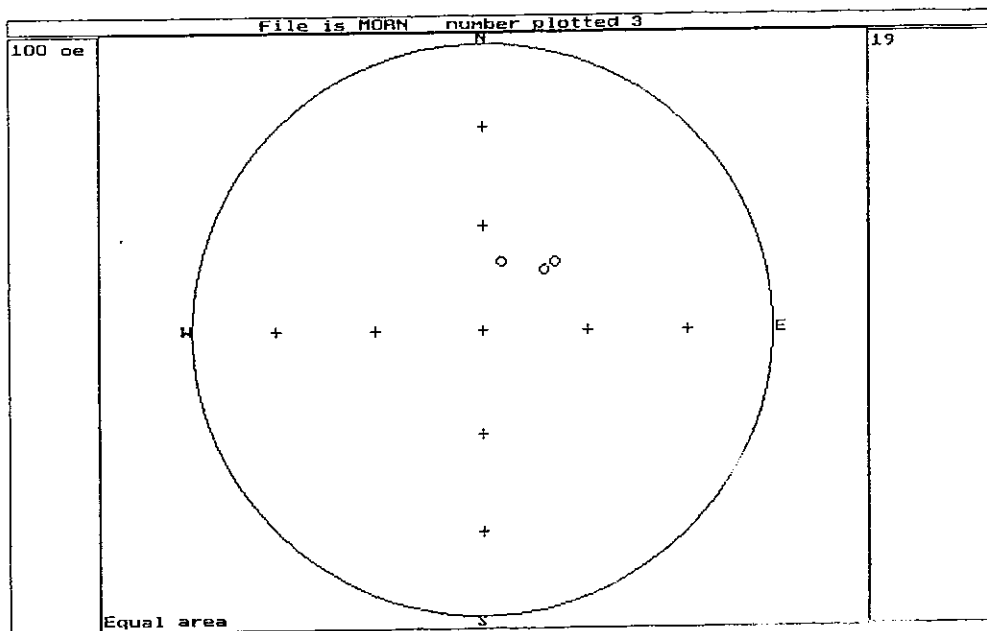
A, DDH04. B, RDH07C. C, RDH19C.



A



B



C