DEANSWAY ARCHAEOLOGY PROJECT, WORCESTER, Worcestershire: Archaeomagnetic Dating Report 1988/89

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Summary

Between June 1988 and November1989 the site of Deansway in central Worcester was excavated by the Hereford and Worcester Museums Service prior to redevelopment of the land as a shopping precinct. The excavation was named The Deansway Archaeology Project and scientific support, including archaeomagnetic analysis, was provided by the Ancient Monuments Laboratory. During the fieldwork phase of the project eighteen features were sampled for archaeomagnetic dating and dates were obtained for fourteen of these. The dates ranged from the 7th to the 14th centuries AD, with the majority falling within the 200-year period between 1050 and 1250.

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Introduction

Between June 1988 and November 1989 archaeological investigation was undertaken on four sites within the area of Scheduled Ancient Monument Here. & Worc. 343c (HWCM 3899) in Worcester (SO 849 548, Longitude 2.2°W, Latitude 52.2°N) prior to redevelopment of the site as a shopping precinct. The site was bounded by the High Street (east), Deansway (west), Broad Street (north) and Bull Entry (south) and the excavations, entitled The Deansway Archaeology Project, were undertaken by Archaeology Section of Hereford and Worcester County Museum. At the request of the English Heritage Inspector of Ancient Monuments for the region, Anthony Streeten, the Ancient Monuments Laboratory (AML) was requested to provide archaeomagnetic analysis for any suitable features discovered during the archaeological work. During the fieldwork phase of the project it was visited on six occasions (28/11/88, 15/2/89, 14/3/89, 26-27/4/89, 8/5/89 and 17-18/10/89) to collect samples. After the last of these visits a total of eighteen features had been sampled for archaeomagnetic dating, making Deansway the largest archaeomagnetic project ever undertaken by the AML. All sampling was carried out by the author with the kind assistance of various members of the excavation team and subsequent measurement and evaluation was performed by the author.

Method

Samples were collected from all features using the disc method (see appendix, section 1a) and in all but two cases they were orientated to true north using a gyro-theodolite. The exceptions were features 7DAP and 8DAP which were orientated using a magnetic compass owing to time constraints, the deviation between magnetic north and true north at the site having previously been determined using the gyro-theodolite.

The natural remanent magnetisation (NRM) measured in archaeomagnetic samples is assumed to be caused by thermoremanent magnetisation (TRM) created at the time when the feature of which they were part was last fired. However, a secondary component acquired in later geomagnetic fields can also be present, caused by diagenesis or partial reheating. Additionally, the primary TRM may be overprinted by a viscous component, depending on the grain size distribution within the magnetic material. These secondary components are usually of lower stability than the primary TRM and can thus be removed by partial demagnetisation of the samples.

In the case of tile samples, it is also possible that a TRM is retained relating to the time when the tile itself was manufactured. If the tile was subjected to a very high temperature during its manufacture then all its magnetic domains, even those with high coercivities, would be realigned. When it was later incorporated into an archaeological feature, it is possible that, during the use of the feature, it was not exposed to such high temperatures. Thus, only lower coercivity domains would realign with

the new field direction. In this case the total magnetisation of the tile would consist of two components, one, relating to the time it was manufactured, preserved in the high coercivity domains, the other, relating to the last firing of the kiln, preserved in the lower coercivity domains.

A typical strategy for analysing a set archaeomagnetic samples from a fired archaeological feature is to first measure their NRM magnetisation. These NRM measurements are then inspected and one or more samples are selected for pilot partial demagnetisation. Pilot demagnetisation of a sample involves exposing it to an alternating magnetic field of fixed peak strength and measuring the resulting changes in its magnetisation. The procedure is repeated with increasing peak field strengths to build up a complete picture of the coercivity spectrum of the pilot sample. From these pilot partial demagnetisation results an optimum peak field strength is selected to be applied to the remaining samples. This optimum field strength is selected to remove as much of the secondary magnetisation as possible whilst leaving the primary magnetisation intact. The equipment used for these measurements is described in section 2 of the appendix.

A mean TRM direction is then calculated from the partially demagnetised sample measurements. Some samples may be excluded from this calculation if their TRM directions are so anomalous as to make them statistical outliers from the overall TRM distribution. A "magnetic refraction" correction is often applied to the sample mean TRM direction to compensate for distortion of the earth's magnetic field due to the geometry of the magnetic fabric of the feature itself. Then the mean is adjusted according to the location of the feature relative to a notional central point in the UK (Meriden), so that it can be compared with UK archaeomagnetic calibration data to produce a date of last firing for the feature. Notes concerning the mean calculation and subsequent calibration can be found in sections 3 and 4 of the appendix.

This measurement and calibration strategy was applied to the analysis of all the features from Deansway. Where it was necessary to deviate from it the differences are noted in the descriptions of the results from each feature below. At Deansway all samples were taken from the floors of the archaeological features, hence a magnetic refraction correction of 2.4° was added to the inclinations of all mean TRM directions before calibration.

Results

Table 1 summarises the mean TRM directions and the inferred date ranges for all the features sampled at Deansway. It also cross-references the AML codes for the sampled features with the pertinent site context, context group, archaeological unit and sample numbers. This section provides descriptions of the features sampled, grouped by site, and notes any important points about their archaeomagnetic analysis. TRM measurements for all samples may be found grouped by feature in the tables at the end of the report. These tables also record each sample's composition, the demagnetisation level applied to it and whether it was rejected from the feature's mean TRM calculation.

SITE 1, POWICK LANE SOUTH

1DAP (Context 10051, site sample number 4401)

This was a tile furnace and both tiles and the interstitial dark red/brown clay were sampled. Samples 12 and 14 were laboratory sub-samples of samples 11 and 13 respectively. Sample measurements are recorded in Tables 2 and 3. Figure 1 depicts the distribution of the sample TRM directions before and after partial demagnetisation. Figures 2 and 3 illustrate respectively the results of the pilot demagnetisations on samples 07 (clay) and 12 (tile). Figure 4 shows the comparison of the mean TRM vector with the UK archaeomagnetic calibration curve. The clay samples were demagnetised to 8mT whilst the tiles, which contained a harder, more stable magnetisation were demagnetised to 20mT.

2DAP (Context 10985, site sample number 4403)

This was a sample of orange/brown burnt earth from beneath feature 1DAP. Sample measurements are recorded in Tables 4 and 5. Figure 5 depicts the distribution of the sample TRM directions before and after partial demagnetisation. Figure 6 illustrates the results of pilot demagnetisation on sample 02. The samples were weakly magnetised and their TRM directions are widely dispersed. A mean TRM vector was calculated from the four sample directions that tended to fall in a cluster. Figure 7 shows the comparison of this mean TRM vector with the UK archaeomagnetic calibration curve. As the date range was derived from only four samples, less than the statistically valid minimum of seven samples, its precision is not reliable. The date should be treated only as an indication that the last firing probably occurred around the 13th Century AD.

3DAP (Context 10627, site sample number 4402)

This appeared to be a hearth of burnt orange/brown clay with inclusions of charcoal. Sample measurements are recorded in Tables 6 and 7. Figure 8 depicts the distribution of the sample TRM directions before and after partial demagnetisation. Figure 9 illustrates the results of pilot demagnetisation on sample 09. The samples were weakly magnetised and their TRM directions are widely dispersed. Partial demagnetisation of the samples tended to move their TRM directions away from any direction contained in the UK archaeomagnetic calibration curve. It was concluded that the samples had little stable magnetisation and most of the original TRM had been overprinted by viscous and secondary effects. Hence, a mean NRM vector was calculated from the five sample directions that tended to fall in a cluster. Figure 10 shows the comparison of this mean TRM vector with the UK archaeomagnetic calibration curve. As the date range was derived from only five samples, less than the statistically valid minimum of seven samples, its precision is not reliable. The date should be treated only as an indication that the last firing probably occurred around the 13th Century AD.

SITE 2, BULL ENTRY

4DAP (Context 16135, site sample number 5036)

This appeared to be the floor of an oven made of a well fired brown/beige clay. Sample measurements are recorded in Tables 8 and 9. Figure 11 depicts the distribution of the sample TRM

directions before and after partial demagnetisation. Figure 12 illustrates the results of the pilot demagnetisation on sample 12. The magnetisation in the samples was extremely stable. However, the mean TRM direction calculated from them was significantly different from any direction recorded in the UK archaeomagnetic calibration curve. Examination of plans of the feature suggested that it had resettled since it was last fired. A bedding correction of strike -174.6° and dip 5.2° was estimated from levels taken at recorded positions on the feature and applied to the mean TRM direction. Figure 13 shows the comparison of this mean vector with the UK archaeomagnetic calibration curve.

5DAP (Context 16165, site sample number 5319)

This appeared to be the original surface of feature 4DAP above. It was also composed of well-fired clay but of a more orange/brown colour. Sample measurements are recorded in Tables 10 and 11. Figure 14 depicts the distribution of the sample TRM directions before and after partial demagnetisation. Figure 15 illustrates the results of the pilot demagnetisation on sample 02. The magnetisation in the samples was extremely stable. The bedding correction calculated for feature 4DAP was applied to the mean TRM direction calculated from the samples. Figure 16 shows the comparison of this mean vector with the UK archaeomagnetic calibration curve. It is interesting to note that the inferred date range (Table 1) is some 40 years earlier than that for feature 4DAP suggesting that the oven remained in use for a considerable period of time.

6DAP (Context 15974, site sample number 5421)

This feature, composed of fired orange clay, was thought to be a medieval burnt surface. Sample measurements are recorded in Tables 12 and 13. Figure 17 depicts the distribution of the sample TRM directions before and after partial demagnetisation. Figure 18 illustrates the results of the pilot demagnetisation on sample 02. The magnetisation in the samples was extremely stable although the distribution of their TRM directions was somewhat scattered. This suggests that the feature has been disturbed since it was last fired. Figure 19 shows the comparison of the mean vector with the UK archaeomagnetic calibration curve. The scattering of the samples' TRM directions has resulted in a less precise date than might otherwise have been achieved.

7DAP (Context 16652, site sample number 5334)

This was a burnt surface composed of fired orange clay and, from its context, it was thought to date from the early medieval period. Sample measurements are recorded in Tables 14 and 15. Figure 20 depicts the distribution of the sample TRM directions before and after partial demagnetisation. Figure 21 illustrates the results of the pilot demagnetisation on sample 06. The magnetisation in the samples was extremely stable and their TRM directions form a tight group (with the exception of sample 8). Figure 22 shows the comparison of the mean vector with the UK archaeomagnetic calibration curve.

8DAP (Context 16634, site sample number 5333)

This was a burnt surface composed of fired orange clay near to a square pit. From its context, it was thought to date from the early medieval period. Sample measurements are recorded in Tables 16 and 17. Figure 23 depicts the distribution of the sample TRM directions before and after partial

demagnetisation. Figure 24 illustrates the results of the pilot demagnetisation on sample 04. The magnetisation in the samples was stable and the TRM directions of most of them form a reasonably tight group. Figure 25 shows the comparison of the mean vector with the UK archaeomagnetic calibration curve.

9DAP (Contexts 15978 and 16383, site sample numbers 5463 and 5464)

This was a burnt surface composed of fired clay varying in coloration between brown/black and orange/pink. In some places the different coloured clays appeared to form distinct layers. Two samples, 04 and 05 were of a brown/pink stone. Sample measurements are recorded in Tables 18 and 19. Figure 26 depicts the distribution of the sample TRM directions before and after partial demagnetisation. Figure 27 illustrates the results of the pilot demagnetisation on sample 09. The magnetisation in the samples was stable and the TRM directions form a reasonably tight group. Figure 28 shows the comparison of the mean TRM vector with the UK archaeomagnetic calibration curve.

10DAP (Context 16386, site sample number 5462)

This was a burnt surface composed of fired sandy brown clay but also incorporating a piece of tile. In some places the different coloured clays appeared to form distinct layers. Sample measurements are recorded in Tables 20 and 21 and Figure 29a depicts the distribution of the sample NRM directions. It was clear that the clay samples, 01-05, did not hold a stable magnetisation, so they were not further analysed. Pilot demagnetisation of sample 09 suggested that the tile samples did hold a stable magnetisation but with some viscous/diagenic effects below coercivities around 20mT (Figure 30).

The distribution of the TRM directions of samples 06-09 after 20mT partial demagnetisation is depicted in Figure 29b. The scatter of these TRM directions is somewhat wider than would be expected for samples from the same piece of tile and the mean TRM direction calculated from them falls some distance from the calibration curve (Figure 31). Examination of the pilot demagnetisation results from sample 09 suggests that a primary magnetisation exists in coercivities above 100mT (see Figure 30c). This primary magnetisation would have been acquired when the tile was manufactured and does not relate to the last firing of the feature. To isolate the secondary component of TRM that was acquired when the feature was last fired, each sample's TRM after partial demagnetisation to 50mT was subtracted from its TRM after partial demagnetisation to 20mT. The resulting mean TRM direction is depicted in Figure 31.

Unfortunately, there was only one tile to sample, so this mean is derived from measurements of just four samples taken from it. This is less than the statistical minimum of seven, so the date for this feature should be treated only as an indication that its last firing probably occurred during the 11th century AD.

11DAP (Context 16384, site sample number 5465)

This was a burnt surface composed of fired brown clay adjacent to feature 9DAP. Sample measurements are recorded in Tables 22 and 23. Figure 32 depicts the distribution of the sample TRM directions before and after partial demagnetisation. Figure 33 illustrates the results of the pilot

demagnetisation on sample 08. The magnetisation in the samples was extremely stable but there are some outliers from the main cluster of TRM directions, suggesting that the feature has been disturbed since its last use. Figure 34 shows the comparison of the mean vector with the UK archaeomagnetic calibration curve. Disturbance since it was last fired has resulted in a less precise date than might otherwise have been expected from such a well fired feature.

12DAP (Context 16599, site sample number 5508)

This was a burnt surface with a slot cut into it, composed of fired clay ranging in colour from beige to orange. Sample measurements are recorded in Tables 24 and 25. Figure 35 depicts the distribution of the sample TRM directions before and after partial demagnetisation. Figure 36 illustrates the results of pilot demagnetisation on sample 04. These results suggest that the magnetisation in the samples is not entirely stable and may have been overprinted by secondary effects since the feature was last fired. However, given the very wide scattering of the TRM directions even after partial demagnetisation, disturbance to the feature must also be considered. Owing to this scattering of TRM directions it was not possible to date this feature.

13DAP (Context 16519, site sample number 5507)

This was a hearth below an area of hammer scale, composed of fired clay ranging in colour from beige to orange. Sample measurements are recorded in Tables 26 and 27. Figure 37 depicts the distribution of the sample TRM directions before and after partial demagnetisation. Figure 38 illustrates the results of the pilot demagnetisation on sample 03. Evidence of a strong viscous component is apparent in these results with little stable remanence remaining at higher coercivities. Thus, owing to the composition of the clay, much of the magnetisation acquired when the feature was last fired has been overprinted. Nevertheless, it has been possible to derive a mean TRM direction and a, somewhat imprecise, date for the last use of the feature (Figure 39).

SITE 3, AMBULANCE STATION

14DAP (Context 18332, site sample number 7567)

This was a small circular hearth composed of orange/brown clay. Sample measurements are recorded in Tables 28 and 29. Figure 40 depicts the distribution of the sample TRM directions before and after partial demagnetisation. Figure 41 illustrates the results of the pilot demagnetisation on sample 07. These results indicate the presence of a strong secondary component in the magnetisation at lower coercivities and pilot demagnetisation of a second sample, 05, confirmed this. Removal of this secondary component did not improve the distribution of TRM directions. It is possible that the feature has been disturbed since it was last fired but the strong secondary component suggests a second possibility. The hearth floor may have been remade, reusing clay that had already been fired. Subsequent use of the hearth was only at lower temperatures, realigning just the magnetic domains with lower coercivities and resulting in the secondary component detected in the samples. If this was the case, the secondary component must have subsequently suffered from overprinting due to viscous effects, as it was not possible to isolate a consistent TRM direction from the samples using a technique similar to that applied to the tile samples from feature 10DAP. It was thus concluded that the feature is undatable by archaeomagnetic means.

15DAP (Context 18345, site sample number 7568)

This was a stone-lined burnt feature composed of orange/brown fired clay. Sample measurements are recorded in Tables 30 and 31. Figure 42 depicts the distribution of the sample TRM directions before and after partial demagnetisation. Figure 43 illustrates the results of the pilot demagnetisation on sample 07. The magnetisation in the samples was very stable but the TRM directions do not form a particularly tight group. This is perhaps because the feature has been disturbed since it was last fired. Nevertheless, it was possible to derive a mean TRM vector from these measurements and Figure 44 shows the comparison between this and the UK archaeomagnetic calibration curve. Owing to the imprecision of this mean determination, two date ranges are possible (see Table 1); the earlier is perhaps preferable on archaeological grounds.

16DAP (Context 18297, site sample number 7566)

This feature was a substantial burnt clay area beneath a wall. It was composed of fired orange clay. Sample measurements are recorded in Tables 32 and 33. Figure 45 depicts the distribution of the sample TRM directions before and after partial demagnetisation. Figure 46 illustrates the results of the pilot demagnetisation on sample 11. Samples 02 and 04 also underwent pilot demagnetisation with similar results. The magnetisation in the samples was stable but with a strong viscous component at lower coercivities. Figure 47 shows the comparison of the derived mean TRM vector with the UK archaeomagnetic calibration curve.

SITE 4, POWICK LANE NORTH

17DAP (Context 20735, site sample number 9090)

This was a patchy burnt clay spread composed of fired beige clay. Sample measurements are recorded in Tables 34 and 35. Figure 48 depicts the distribution of the sample TRM directions before and after partial demagnetisation. Figure 49 illustrates the results of the pilot demagnetisation on sample 03. The magnetisation in the samples was weak but apparently stable, with evidence of a viscous component at lower coercivities. Partial demagnetisation of the samples did not improve the clustering of their TRM directions and it was concluded that the sample had either been disturbed since it was last fired, or had not been exposed to sufficient heat to fully realign the magnetisation within the clay. The feature was thus undatable by archaeomagnetic analysis.

18DAP (Context 21066, site sample number 9089)

This was a burnt clay spread, possibly representing the floor of a feature. It was composed of fired orange/brown clay. Sample measurements are recorded in Tables 36, 37 and 38. Figure 50 depicts the distribution of the sample TRM directions before and after partial demagnetisation. Figure 51 illustrates the results of the pilot demagnetisation on sample 08. Samples 07, 13 and 14 also underwent pilot demagnetisation with similar results. The magnetisation in the samples was weak but apparently stable, with evidence of a viscous component at lower coercivities. Partial demagnetisation of the samples did not improve the clustering of their TRM directions and it was concluded that the sample had either been disturbed since it was last fired, or had not been exposed to sufficient heat to fully realign the magnetisation within the clay. The feature was thus undatable by archaeomagnetic analysis.

Conclusions

Archaeomagnetic analysis at Deansway has successfully provided dates for fourteen of the eighteen features sampled. Unfortunately, owing to a lack of well fired material, three of the dates (2DAP, 3DAP and 10DAP) are based on sample numbers less than seven, the minimum for which Fisher statistics are valid. Hence, the precise date ranges for these features should be treated with some caution and they should only be viewed as indicative of the approximate time of last firing. One further date (13DAP) was based on a particularly poor distribution of TRM directions. This was probably due to an initially unstable magnetisation in the feature being overprinted by a later viscous component. The date range inferred is thus disappointingly imprecise. However, the other ten features have provided dates of satisfactory precision given the current limitations of the archaeomagnetic technique applied to UK archaeology.

Figure 52 depicts the 63% confidence limits for the mean thermoremanent vectors of all the datable features listed in Table 1, superimposed on the relevant portion of the UK archaeomagnetic calibration curve. It can be seen that the dates range from the 7th to the 14th centuries AD with the majority of features dating from between 1050 and 1250 AD.

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Lab no	Deco	Inco	$\alpha_{95}^{\rm o}$	Ν	Calibrated date range	Calibrated date range	Description	Context	CG	AU	Site sample
					63% confidence	95% confidence					no
1DAP	1.6	54.1	2.9	9	1385 to 1405 cal AD	1370 to 1420 cal AD	Tile furnace wall, Site 1	10051	1512	1125	4401
2DAP	-10.5	57.9	9.2	4	1320 to 1400 cal AD^1	1255 to 1475 cal AD^1	Burnt earth below tile wall, Site 1	10985	1515	1125	4403
3DAP	16.1	58.2	5.4	5	1200 to 1250 cal AD ¹	1160 to 1290 cal AD1	Hearth, Site 1	10627	1504	1115	4402
4DAP	12.9	59.5	2.5	12	1200 to 1225 cal AD	1175 to 1260 cal AD Oven, Site 2		16135	2303	2128	5036
5DAP	15	62.3	2.8	8	1150 to 1195 cal AD	1125 to 1210 cal AD	Oven, Site 2	16165	2300	2128	5319
6DAP	19.8	58.1	5.3	14	1200 to 1265 cal AD	1160 to 1290 cal AD	Burnt surface, Site 2	15974	2565	2135	5421
7DAP	18.2	63	2	11	1110 to 1155 cal AD	1100 to 1165 cal AD	Burnt surface, Site 2	16652	2287	2120	5334
8DAP	10.9	57.7	2.4	8	1230 to 1255 cal AD	1210 to 1270 cal AD	Burnt surface, Site 2	16634	2312	2129	5333
9DAP	16	62.5	3.3	15	1130 to 1190 cal AD	1105 to 1210 cal AD	Burnt surface, Site 2	15978 and	2237	2118	5463 and
								16383			5464
10DAP	22.8	65.5	1.6	4	1055 to 1100 cal AD^1	1035 to 1110 cal AD1	Burnt surface, Site 2	16386	2555	2162	5462
11DAP	16.9	59.2	4.2	12	1195 to 1255 cal AD	1165 to 1275 cal AD	Burnt surface, Site 2	16384	2250	2118	5465
12DAP	-	-	-	-	Undatable	-	Burnt surface with slot, Site 2	16599	2393	2124	5508
13DAP	-4.2	60.4	9.7	9	1270 to 1465 cal AD	1170 to 1550 cal AD	Hearth, Site 2	16519	2338	2153	5507
14DAP	-	-	-	-	Undatable	-	Hearth, Site 3	18332	3018	3008	7567
15DAP	12.7	64.2	5.2	9	1115 to 1205 cal AD or	1055 to 1230 cal AD or	Burnt feature, Site 3	18345	3065	3013	7568
					1500 to 1550 cal AD	1465 to 1570 cal AD					
16DAP	13.1	75.4	2.5	11	605 to 785 cal AD	580 to 805 cal AD	Burnt clay spread, Site 3	18297	3082	3035	7566
17DAP	-	-	-	-	Undatable	-	Patchy burnt clay spread, Site 4	20735	4066	4023	9090
18DAP	-	-	-	-	Undatable	-	Burnt clay spread, Site 4	21066	4034	4021	9089

Table 1: Archaeomagnetic dates from Deansway, Worcester. Dec = declination of mean thermoremanent (TRM) vector; Inc = inclination of mean TRM vector; a_{95} = precision statistic; N = number of samples used to calculate mean; CU = context group; AU = archaeological unit. Note that quoted mean TRM directions have been corrected for magnetic refraction but not corrected to Meriden.

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Tentative date based on fewer than the statistical minimum of seven samples.

	NRM Measu	iremen	ıts	After	Partia	al Dem	agnetisa	tion
Sample Mater	${ m ial}$ Dec $^{\circ}$	\texttt{Inc}°	J(mAm ⁻¹)	AF(mT)	\texttt{Dec}°	\mathtt{Inc}°	J (mAm⁻¹)	R
1DAP01 Tile	5.9	57.2	7822.0	20.0	6.0	55.6	3698.4	
1DAP02 Tile	7.2	60.1	7926.6	20.0	7.2	58.5	3937.8	
1DAP04 Clay	-16.0	40.1	250.4	8.0	-15.9	39.4	175.3	R
1DAP05 Clay	4.6	54.1	50.7	8.0	5.3	50.4	37.2	
1DAP07 Clay	-2.5	54.8	107.4	8.0	-0.7	52.4	83.4	
1DAP08 Clay	-3.4	50.3	445.5	20.0	8.2	42.2	76.3	R
1DAP09 Clay	2.6	55.9	895.9	8.0	3.1	52.5	618.3	
1DAP10 Clay	1.7	54.5	459.7	8.0	2.6	51.0	309.6	
1DAP11 Tile	-0.2	49.1	11749.3	20.0	-0.9	48.2	7508.0	
1DAP12 Tile	1.7	50.3	7347.4	20.0	1.1	49.5	4303.7	
1DAP13 Tile	-6.1	47.6	6623.4	20.0	-6.6	46.4	4276.0	
1DAP14 Tile	-6.5	43.0	4575.1	20.0	-9.5	40.7	1980.6	R

Table 2: Sample NRM measurements and measurements after partial AF demagnetisation for feature 1DAP. J = magnitude of magnetisation vector; AF = peak alternating field strength of demagnetising field; R = sample rejected from mean calculation.

		107007			1 1 2 2 2 2 2	
AF(mT)	Dec°	IDAP07	$T(m\Delta m^{-1})$	Dec°	IDAP 12	.T (mΔm ⁻¹)
0 0	_1 0	5/ 1			50 0	7269 1
2.0	- <u> </u>	54.1 52 7	105.0	0.4	10.0	7300.1
2.0	-0.0	53.7	105.4	0.4	49.7	7297.9
4.0	-1.5	53.7	105.2	0.2	50.0	1107.9
6.0	-0.0	52.9	94.0	0.5	49.7	6976.4
8.0	-0./	52.4	83.4	0.5	49.8	6675.2
10.0	-1.1	52.7	/1./	0.5	49.9	6357.5
12.0	-0.6	51.7	60.7	0.8	49.8	6001.6
14.0	-0.7	52.2	49.9	0.8	49.7	5605.1
16.0	0.0	49.7	38.4	0.8	49.6	5108.6
18.0	0.9	49.2	33.0	1.0	49.5	4679.0
20.0	2.9	50.0	27.0	1.1	49.5	4303.7
22.0	1.5	49.5	21.8	1.1	49.5	3917.9
24.0	3.9	46.2	18.6	0.9	49.5	3594.8
26.0	3.2	46.2	15.4	1.2	49.5	3299.9
28.0	2.5	45.7	13.7	1.4	49.7	3025.2
30.0	5.4	43.5	11.9	1.0	49.1	2841.7
32.0	-	-	-	1.0	49.6	2566.7
34.0	-	-	-	1.1	49.3	2403.3
36.0	-	-	-	1.2	49.4	2214.3
38.0	-	-	-	0.6	49.6	2085.5
40.0	-	-	-	1.1	49.5	1961.1
42.0	-	-	-	1.2	49.5	1834.9
44.0	-	-	-	0.8	49.5	1718.8
46.0	-	-	-	0.7	49.3	1624.6
48.0	-	-	-	0.6	49.5	1546.6
50.0	-	-	-	0.6	49.4	1461.4

Table 3: Incremental partial demagnetisation measurements for samples 1DAP07 and1DAP12.

NRM Measurements				After	Partia	l Dem	agnetisa	tion
Sample Materia	l Dec $^\circ$	\texttt{Inc}°	J (mAm ⁻¹)	AF(mT)	$ t Dec^\circ$	\texttt{Inc}°	J (mAm ⁻¹)	R
2DAP01Clay	-11.8	63.6	424.7	8.0	-22.5	64.1	181.8	
2DAP02Clay	-17.9	53.2	119.0	8.0	-6.3	56.4	46.7	
2DAP03 Clay	-8.2	54.2	491.4	8.0	-8.9	54.4	218.3	
2DAP04 Clay	-8.0	50.9	49.0	8.0	-7.8	46.5	22.7	
2DAP05Clay	-104.5	23.6	329.3	8.0	-111.7	3.1	268.0	R
2DAP06 Clay	5.6	27.1	114.8	8.0	4.9	3.1	52.2	R
2DAP07Clay	29.1	57.5	248.6	8.0	33.7	65.9	101.0	R
2DAP08 Clay	-121.4	44.7	15.4	8.0	-92.8	38.8	5.8	R

Table 4: Sample NRM measurements and measurements after partial AF demagnetisation for feature 2DAP. J = magnitude of magnetisation vector; AF = peak alternating field strength of demagnetising field; *R* = sample rejected from mean calculation.

		2DAP02	
AF(mT)	\texttt{Dec}°	\texttt{Inc}°	J (mAm ⁻¹)
0.0	-10.2	56.5	110.3
2.0	-8.3	54.8	97.8
4.0	-6.6	54.9	77.7
6.0	-4.9	55.6	59.2
8.0	-6.3	56.4	46.7
10.0	-7.0	56.5	38.7
12.0	-6.6	56.9	32.1
14.0	-4.6	56.9	27.4
16.0	-7.1	55.9	24.0
18.0	-7.4	59.2	22.3
20.0	-7.9	56.9	19.3
22.0	-10.0	56.5	18.7
24.0	-7.1	55.1	17.7
26.0	-9.4	56.7	16.9
28.0	-7.6	54.6	15.2
30.0	-11.2	57.4	14.6

Table 5: Incremental partial demagnetisation measurements for sample 2DAP02.

NRM Measurements					Partial	Dem	agnetisatio	on
Sample Material	$ t Dec^\circ$	\texttt{Inc}°	J (mAm ⁻¹).	AF (mT)	\texttt{Dec}°	\texttt{Inc}°	J(mAm⁻¹)	R
3DAP01 Clay	23.7	59.2	26.0	10.0	47.2	51.8	9.8	
3DAP02 Clay	14.3	46.2	77.0	10.0	12.6	43.2	53.1	R
3DAP03 Clay	2.4	46.0	66.7	10.0	1.4	40.9	45.1	R
3DAP04 Stone	13.6	45.2	1023.3	10.0	10.3	43.0	649.8	R
3DAP05 Stone	11.5	61.4	25.5	10.0	12.3	55.9	18.4	
3DAP06 Clay	-17.0	42.7	7.0	10.0	-31.5	0.0	2.2	R
3DAP07 Clay	20.9	49.3	77.9	10.0	19.4 4	46.5	51.8	
3DAP08 Clay	15.5	43.3	583.3	10.0	13.7 4	41.5	299.5	R
3DAP09 Clay	10.0	55.5	181.8	10.0	12.0	51.5	85.9	
3DAP10 Clay	13.8	53.0	43.1	10.0	15.0	45.9	21.2	

Table 6: Sample NRM measurements and measurements after partial AF demagnetisation for feature 3DAP. J = magnitude of magnetisation vector; AF = peak alternating field strength of demagnetising field; R = sample rejected from mean calculation.

		3DAP09	
AF(mT)	\texttt{Dec}°	\texttt{Inc}°	J (mAm ⁻¹)
0.0	9.7	54.9	176.2
2.0	9.3	53.8	165.7
4.0	10.0	52.9	144.9
6.0	10.7	52.3	124.5
8.0	11.8	52.1	103.4
10.0	12.0	51.5	85.9
12.0	12.4	51.0	67.4
14.0	13.0	51.8	54.3
16.0	13.4	51.0	44.3
18.0	14.4	51.6	36.8
20.0	14.1	50.6	32.7
22.0	13.7	50.3	28.7
24.0	13.8	51.0	26.6
26.0	16.0	50.1	24.5
28.0	14.6	49.7	22.2
30.0	15.1	47.1	21.3

Table 7: Incremental partial demagnetisation measurements for sample 3DAP09.

NR	M Measu	iremen	its	After	Partial	Dem	agnetisa	tion
Sample Materia	l Dec $^\circ$	\texttt{Inc}°	J (mAm ⁻¹) .	AF(mT)	\texttt{Dec}°	\texttt{Inc}°	J (mAm⁻¹)	R
4DAP01 Clay	31.0	57.3	12930.3	8.0	30.5 5	57.5	9885.5	
4DAP02 Clay	23.0	55.9	22588.2	8.0	22.5 5	56.1	18456.0	
4DAP03 Clay	21.0	49.5	19831.5	8.0	21.3 4	19.1	17457.4	
4DAP04 Clay	20.2	58.2	29737.9	8.0	20.7 5	58.6	28360.4	
4DAP05 Clay	17.9	57.7	35434.2	8.0	17.6 5	58.6	31267.5	
4DAP06 Clay	20.4	56.0	33002.8	8.0	21.2 5	57.7	27470.3	
4DAP09 Clay	24.3	49.7	14636.8	8.0	24.8 4	19.0	13006.1	
4DAP10 Clay	16.1	58.8	3011.4	8.0	14.6 5	58.0	1666.3	
4DAP11 Clay	18.6	60.4	11652.8	8.0	19.5 6	50.7	8860.5	
4DAP12 Clay	19.7	57.6	19637.5	8.0	20.3 5	55.0	14655.1	
4DAP14 Clay	39.4	62.5	36330.5	8.0	43.7 6	53.6	28980.1	R
4DAP15 Clay	24.1	59.3	40816.5	8.0	22.8 5	58.9	35529.3	
4DAP17 Clay	11.4	53.1	5942.1	8.0	12.4 5	52.0	4189.2	

Table 8: Sample NRM measurements and measurements after partial AF demagnetisation for feature 4DAP. J = magnitude of magnetisation vector; AF = peak alternating field strength of demagnetising field; R = sample rejected from mean calculation.

		4DAP12	
AF(mT)	\texttt{Dec}°	\texttt{Inc}°	J (mAm ⁻¹)
0.0	19.2	55.7	20929.3
2.0	19.7	55.5	20645.2
4.0	20.0	55.3	19411.4
6.0	20.3	55.1	17229.5
8.0	20.3	55.0	14655.1
10.0	20.3	55.0	11906.2
12.0	20.6	54.9	9510.9
14.0	21.2	54.4	7032.4
16.0	20.8	54.1	5545.2
18.0	20.6	54.0	4596.1
20.0	21.1	53.7	3898.7
22.0	20.8	53.5	3401.2
24.0	20.4	53.7	3051.2
26.0	20.7	53.3	2772.5
28.0	20.5	53.4	2576.8
30.0	22.7	53.2	2430.3

Table 9: Incremental partial demagnetisation measurements for sample 4DAP12.

	NRM	Measu	iremer	lts	After	Partia	l Dem	agnetisa	tion
Sample Mater	ial	\texttt{Dec}°	\texttt{Inc}°	J (mAm ⁻¹)	AF(mT)	\texttt{Dec}°	\texttt{Inc}°	J (mAm⁻¹)	R
5DAP01 Clay		21.8	53.5	20.5	10.0	-7.3	40.9	4.9	R
5DAP02 Clay		21.2	61.2	267.1	10.0	18.3	63.2	101.6	
5DAP03 Clay		47.6	46.7	27.2	10.0	50.5	47.8	16.8	R
5DAP04 Clay		27.2	59.6	1499.5	10.0	33.2	57.4	857.7	
5DAP06 Clay		34.6	64.0	2373.7	10.0	37.8	63.2	1376.6	R
5DAP07 Clay		25.5	57.7	14272.9	10.0	29.6	60.0	10290.3	
5DAP09 Clay		24.3	60.8	2002.6	10.0	25.9	60.3	1502.3	
5DAP10 Clay		15.6	57.6	20477.6	10.0	17.2	56.7	17174.9	
5DAP13 Clay		36.1	34.2	7.1	10.0	28.6	57.8	3.6	
5DAP14 Clay		20.7	55.8	75.4	10.0	19.1	54.8	47.0	
5DAP15 Clay		17.1	58.0	350.3	10.0	16.8	58.2	263.7	
5DAP16 Clay		24.8	25.2	21.6	10.0	17.8	7.1	13.9	R

Table 10: Sample NRM measurements and measurements after partial AF demagnetisation for feature 5DAP. J = magnitude of magnetisation vector; AF = peak alternating field strength of demagnetising field; R = sample rejected from mean calculation.

		5DAP02	
AF(mT)	\texttt{Dec}°	\tt{Inc}°	J(mAm ⁻¹)
0.0	19.2	61.7	251.5
2.0	17.9	62.2	220.4
4.0	18.3	62.4	182.5
6.0	17.2	62.4	148.0
8.0	17.9	62.9	121.5
10.0	18.3	63.2	101.6
12.0	18.7	63.5	84.0
14.0	16.8	65.1	70.7
16.0	17.5	65.1	59.8
18.0	17.2	66.0	53.6
20.0	16.2	66.6	48.4
22.0	18.2	67.5	43.3
24.0	13.6	68.4	39.6
26.0	12.7	67.8	37.2
28.0	15.1	67.3	34.0
30.0	15.4	67.7	32.1

Table 11: Incremental partial demagnetisation measurements for sample 5DAP02.

NRM Measurements					Partia	al Dem	agnetisa	tion
Sample Materia	l Dec $^\circ$	\texttt{Inc}°	J (mAm ⁻¹)	AF (mT)	\texttt{Dec}°	\texttt{Inc}°	J (mAm⁻¹)	R
6DAP01 Clay	26.5	61.1	643.9	16.0	30.1	58.2	157.0	
6DAP02 Clay	26.5	56.2	926.0	16.0	28.0	56.4	402.8	
6DAP03 Clay	42.4	56.3	2668.9	16.0	46.5	55.1	1295.6	
6DAP04 Clay	38.5	60.0	2378.1	16.0	43.1	57.1	829.1	
6DAP05 Clay	27.1	55.1	1538.5	16.0	33.6	56.7	581.9	
6DAP06 Clay	45.8	57.0	5149.4	16.0	48.7	55.9	2599.0	
6DAP07 Clay	62.7	-10.2	1070.9	16.0-	-120.0	-15.5	584.9	R
6DAP08 Clay	6.8	24.7	1090.7	16.0	4.0	3.4	372.6	R
6DAP09 Clay	22.4	57.5	2520.1	16.0	25.8	56.4	1187.7	
6DAP10 Clay	62.2	12.5	42.3	16.0	70.8	20.9	25.9	R
6DAP11 Clay	6.4	50.8	3499.9	16.0	7.8	51.8	2043.1	
6DAP12 Clay	-0.8	12.7	197.2	16.0	12.7	6.1	84.3	R
6DAP13 Clay	-0.8	46.7	3331.7	16.0	-1.4	45.1	1939.3	
6DAP14 Clay	6.2	58.4	14061.1	16.0	5.1	58.0	6830.6	
6DAP15 Clay	11.9	47.1	711.8	16.0	13.3	45.8	385.1	
6DAP16 Clay	-7.5	54.6	9103.0	16.0	-6.2	54.7	4136.5	
6DAP17 Clay	-54.9	79.5	13.4	16.0	-84.0	74.8	5.5	R
6DAP18 Clay	1.3	60.2	977.0	16.0	-0.6	55.3	302.8	
6DAP19 Clay	13.4	58.1	3214.2	16.0	14.7	56.0	1369.9	

Table 12: Sample NRM measurements and measurements after partial AF demagnetisation for feature 6DAP. J = magnitude of magnetisation vector; AF = peak alternating field strength of demagnetising field; R = sample rejected from mean calculation.

		6DAP02	
AF(mT)	\texttt{Dec}°	\mathtt{Inc}°	J(mAm ⁻¹)
0.0	25.7	56.0	913.0
2.0	25.6	55.9	890.5
4.0	25.8	56.2	844.9
6.0	26.9	56.6	799.2
8.0	27.1	56.7	711.4
10.0	27.5	56.7	647.4
12.0	27.6	56.8	557.9
14.0	27.6	56.3	477.8
16.0	28.0	56.4	402.8
18.0	28.2	56.3	342.7
20.0	28.0	56.3	284.3
22.0	29.0	56.8	242.3
24.0	28.8	57.2	204.7
26.0	30.2	57.3	168.7
28.0	29.5	57.8	146.2
30.0	29.3	57.5	120.7

 Table 13: Incremental partial demagnetisation measurements for sample 6DAP02.

	NRM Measurements				After	Partia	al Dem	agnetisa	tion
Sample Mater	ial	\texttt{Dec}°	\texttt{Inc}°	J(mAm ⁻¹)	AF(mT)	$ t Dec^\circ$	\texttt{Inc}°	J (mAm⁻¹)	R
7DAP01 Clay		17.9	59.9	669.1	8.0	16.8	58.6	514.4	
7DAP02 Clay		16.8	62.1	4634.4	8.0	17.9	61.5	3664.7	
7DAP03 Clay		16.5	61.2	4428.2	8.0	16.9	60.6	3625.8	
7DAP04 Clay		15.0	60.8	1429.1	8.0	16.6	59.8	1048.3	
7DAP05 Clay		18.3	67.9	1492.8	8.0	19.9	66.5	875.5	
7DAP06 Clay		17.3	59.3	619.2	8.0	12.7	60.3	724.0	
7DAP07 Clay		11.1	66.5	176.9	8.0	18.4	65.5	109.1	
7DAP08 Clay		7.3	38.5	460.5	8.0	6.8	35.8	348.9	R
7DAP09 Clay		11.0	60.6	1133.5	8.0	16.0	56.4	419.4	
7DAP10 Clay		21.7	59.5	33.8	8.0	17.2	57.9	22.1	
7DAP11 Clay		23.0	56.4	117.7	8.0	24.8	57.3	65.4	
7DAP12 Clay		21.1	63.4	1142.6	8.0	23.1	62.0	847.7	

Table 14: Sample NRM measurements and measurements after partial AF demagnetisation for feature 7DAP. J = magnitude of magnetisation vector; AF = peak alternating field strength of demagnetising field; R = sample rejected from mean calculation.

		7DAP06	
AF(mT)	\texttt{Dec}°	\texttt{Inc}°	J (mAm ⁻¹)
0.0	11.1	60.6	1107.6
2.0	12.2	60.3	1003.3
4.0	13.1	59.8	913.4
6.0	12.8	60.2	822.1
8.0	12.7	60.3	724.0
10.0	12.7	60.2	643.2
12.0	12.4	59.6	571.8
14.0	11.8	59.7	495.8
16.0	12.0	59.2	423.3
18.0	11.8	59.1	375.5
20.0	11.5	59.1	332.0
22.0	12.0	59.5	302.8
24.0	11.7	59.3	270.5
26.0	11.3	58.8	244.4
28.0	9.3	58.9	221.5
30.0	10.7	58.5	198.3

Table 15: Incremental partial demagnetisation measurements for sample 7DAP06.

NRM Measurements						Partia	l Dem	agnetisa	tion
Sample Ma	terial	\texttt{Dec}°	\texttt{Inc}°	J(mAm ⁻¹)	AF(mT)	\texttt{Dec}°	\texttt{Inc}°	J (mAm⁻¹)	R
8DAP01 Cl	ay	-55.0	37.9	21.3	6.0	-79.2	3.6	14.5	R
8DAP02 Cl	ay	39.2	37.2	10.4	6.0	43.0	24.2	4.5	R
8DAP03 Cl	ay	-0.8	42.1	401.0	6.0	-1.7	32.5	154.5	R
8DAP04 Cl	ay	7.1	60.0	902.7	6.0	7.4	56.6	424.4	
8DAP05 Cl	ay	30.1	61.1	936.1	6.0	37.9	57.4	506.3	R
8DAP06 Cl	ay	4.0	57.8	1832.1	6.0	9.4	52.3	956.1	
8DAP07 Cl	ay	-6.8	59.4	826.4	6.0	-1.1	54.1	399.9	
8DAP08 Cl	ay	15.7	59.3	238.3	6.0	15.3	55.4	138.5	
8DAP09 Cl	ay	11.3	59.3	451.8	6.0	14.0	56.7	224.9	
8DAP10 Cl	ay	20.9	59.4	1469.0	6.0	17.1	55.7	686.0	
8DAP11 Cl	ay	14.4	60.4	2797.6	6.0	14.3	56.6	1382.1	
8DAP12 Cl	ay	11.4	56.7	319.5	6.0	11.4	53.9	152.4	

Table 16: Sample NRM measurements and measurements after partial AF demagnetisation for feature 8DAP. J = magnitude of magnetisation vector; AF = peak alternating field strength of demagnetising field; R = sample rejected from mean calculation.

		8DAP04	
AF(mT)	\texttt{Dec}°	\tt{Inc}°	$J(mAm^{-1})$
0.0	5.4	61.1	881.2
2.0	7.4	58.2	727.7
4.0	7.5	57.3	572.3
6.0	7.4	56.6	424.4
8.0	6.9	56.0	329.5
10.0	7.4	55.3	229.2
12.0	8.0	54.8	174.2
14.0	9.5	52.5	132.2
16.0	12.1	53.5	104.4
18.0	12.8	52.7	84.1
20.0	11.7	50.4	72.5
22.0	10.0	51.6	62.3
24.0	7.7	50.8	57.1
26.0	12.5	51.1	50.9
28.0	12.7	52.4	45.0
30.0	11.7	52.7	40.3

Table 17: Incremental partial demagnetisation measurements for sample 8DAP04.

NRM	I Measu	Measurements			Partia	L Dem	agnetisa	tion
Sample Material	\texttt{Dec}°	\texttt{Inc}°	J(mAm ⁻¹)	AF(mT)	\texttt{Dec}°	\texttt{Inc}°	J (mAm ⁻¹)	R
9DAP01 Clay	24.0	57.7	2987.6	10.0	27.8	55.4	1940.8	
9DAP02 Clay	18.0	63.1	746.9	10.0	20.9	58.6	425.5	
9DAP03 Clay	9.1	53.9	602.2	10.0	20.3	53.3	225.6	
9DAP04 Stone	23.5	62.0	69.9	10.0	27.1	62.5	29.5	
9DAP05 Stone	18.3	62.7	932.1	10.0	16.7	61.4	841.4	
9DAP06 Clay	7.6	56.7	5758.3	10.0	7.0	56.0	5370.9	
9DAP07 Clay	14.8	58.8	2605.5	10.0	15.7	58.7	2391.0	
9DAP08 Clay	5.1	53.5	6079.7	10.0	5.5	52.9	5128.6	
9DAP09 Clay	25.6	66.0	1704.1	10.0	26.5	66.1	1536.3	
9DAP10 Clay	8.3	56.0	2688.2	10.0	7.3	55.3	2293.0	
9DAP11 Clay	19.0	69.8	611.5	10.0	19.0	69.9	536.4	
9DAP12 Clay	13.6	68.9	3160.8	10.0	18.2	69.1	2656.9	
9DAP13 Clay	2.4	65.8	2262.7	10.0	0.8	65.8	1958.1	
9DAP14 Clay	24.8	596.2	4494.9	10.0	24.0	59.0	3988.8	
9DAP15 Clay	9.3	54.1	3786.4	10.0	8.5	54.0	3004.4	

Table 18: Sample NRM measurements and measurements after partial AF demagnetisation for feature 9DAP. J = magnitude of magnetisation vector; AF = peak alternating field strength of demagnetising field; R = sample rejected from mean calculation.

		9DAP09	
AF(mT)	\texttt{Dec}°	\texttt{Inc}°	J (mAm ⁻¹)
0.0	24.9	66.1	1697.2
2.0	23.9	66.3	1682.8
4.0	24.8	66.3	1660.4
6.0	25.6	66.1	1633.8
8.0	26.4	66.0	1584.9
10.0	26.5	66.1	1536.3
12.0	26.5	66.1	1484.0
14.0	27.6	66.3	1398.8
16.0	27.7	66.5	1308.3
18.0	28.0	66.6	1222.9
20.0	28.5	66.8	1122.3
22.0	28.6	66.9	1028.2
24.0	28.8	67.1	933.2
26.0	28.5	67.2	846.7
28.0	27.9	66.9	758.8
30.0	29.0	67.3	672.7
32.0	28.9	67.2	600.0
34.0	27.4	67.0	533.7
36.0	27.8	67.0	465.4
38.0	27.4	67.2	417.1
40.0	27.0	66.8	367.4

Table 19: Incremental partial demagnetisation measurements for sample 9DAP09.

	NRM Measurements					Partial	L Dem	agnetisat	ion
Sample	Material	\texttt{Dec}°	\texttt{Inc}°	$J(mAm^{-1})$	AF(mT)	\texttt{Dec}°	\texttt{Inc}°	J(mAm ⁻¹)	R
10DAP01	Clay	148.4	29.0	69.6	-	-	-	-	R
10DAP02	Clay	157.6	53.2	3062.0	-	-	-	-	R
10DAP03	Clay	100.4	42.8	374.7	-	-	-	-	R
10DAP04	Clay	97.2	49.1	1077.9	-	-	-	-	R
10DAP05	Clay	-19.8	-0.4	598.4	-	-	-	-	R
10DAP06	Tile	18.9	66.1	9456.6	20.0	21.5	65.6	7229.7	
10DAP07	Tile	28.7	65.0	10207.9	20.0	26.4	63.3	7866.0	
10DAP08	Tile	15.4	66.2	13803.3	20.0	14.7	65.4	10299.5	
10DAP09	Tile	11.2	65.7	7493.8	20.0	7.2	63.9	5669.1	
1000000					E0 0	20.0		E011 C	
10DAP06		-	-	-	50.0	20.0	(2)	5911.0	
IUDAP07		-	-	-	50.0	27.3	63.3	6203.2	
10DAP08		-	-	-	50.0	11.6	65.9	8032.5	
10DAP09		-	-	-	50.0	3.5	64.3	4445.9	

Table 20: Sample NRM measurements and measurements after partial AF demagnetisation for feature 10DAP. J = magnitude of magnetisation vector; AF = peak alternating field strength of demagnetising field; R = sample rejected from mean calculation.

		10DAP0	9
AF(mT)	\texttt{Dec}°	\texttt{Inc}°	J (mAm ⁻¹)
0.0	9.0	64.2	7334.0
2.5	8.6	64.4	7130.2
5.0	8.5	64.4	6994.2
10.0	8.5	64.1	6512.5
15.0	7.8	64.5	6038.5
20.0	7.2	63.9	5669.1
30.0	5.7	64.1	5032.9
50.0	3.5	64.3	4445.9
100.0	2.5	64.8	4058.0

Table 21: Incremental partial demagnetisation measurements for sample 10DAP09.

	NR	M Measu	rement	s	After	Partial	Demag	ynetisati	ion
Sample	Material	Dec°	Inc°	$J(mAm^{-1})$	AF(mT)	$ t Dec^\circ$	Inc°	$J(mAm^{-1})$	R
11DAP01	Clay	-7.6	67.5	576.0	10.0	0.3	66.7	283.0	
11DAP02	Clay	-37.2	81.6	480.0	10.0	-115.2	52.6	123.0	R
11DAP03	Clay	5.9	71.5	555.1	10.0	4.4	59.3	100.8	
11DAP04	Clay	38.6	62.0	601.0	10.0	49.3	48.7	214.9	R
11DAP05	Clay	20.9	-47.1	175.2	10.0	15.8	-50.5	170.4	R
11DAP06	Clay	3.7	54.1	1105.3	10.0	1.8	51.7	782.4	
11DAP07	Clay	-162.8	41.9	1146.4	10.0	-162.0	36.3	1015.8	R
11DAP08	Clay	22.0	55.2	692.2	10.0	20.8	53.8	410.1	
11DAP09	Clay	-144.5	71.8	86.8	10.0	-130.1	62.8	55.5	R
11DAP10	Clay	24.1	61.1	215.8	10.0	20.5	61.6	95.8	
11DAP11	Clay	4.3	54.0	84.5	10.0	4.5	51.6	39.0	
11DAP12	Clay	-68.1	74.9	823.6	10.0	-81.3	68.4	617.0	R
11DAP13	Clay	-44.8	73.0	388.4	10.0	-51.0	70.3	247.5	R
11DAP14	Clay	-75.7	73.3	104.4	10.0	-49.3	33.7	20.2	R
11DAP15	Clay	35.4	57.9	270.9	10.0	34.8	56.2	188.1	
11DAP16	Clay	19.4	55.8	405.6	10.0	19.7	52.2	281.2	
11DAP17	Clay	19.4	65.0	617.4	10.0	23.4	62.0	412.9	
11DAP18	Clay	19.3	58.4	1249.8	10.0	21.0	57.3	830.1	
11DAP19	Clay	28.3	53.7	1052.5	10.0	31.2	51.0	725.0	
11DAP20	Clay	17.9	55.5	50.5	10.0	16.2	52.9	28.6	

Table 22: Sample NRM measurements and measurements after partial AF demagnetisation for feature 11DAP. J = magnitude of magnetisation vector; AF = peak alternating field strength of demagnetising field; R = sample rejected from mean calculation.

		11DAP08	
AF(mT)	\texttt{Dec}°	\texttt{Inc}°	J (mAm ⁻¹)
0.0	21.1	55.0	677.9
2.0	21.1	54.6	656.2
4.0	20.8	54.3	607.2
6.0	21.2	54.2	542.0
8.0	20.7	53.9	476.7
10.0	20.8	53.8	410.1
12.0	20.4	53.7	338.1
14.0	19.9	53.7	277.7
16.0	19.4	53.7	226.4
18.0	19.3	53.4	184.6
20.0	19.0	54.0	156.7
22.0	18.7	53.9	130.5
24.0	18.1	54.0	114.9
26.0	16.8	54.5	96.5
28.0	17.4	54.4	86.4
30.0	17.3	54.5	79.1

Table 23: Incremental partial demagnetisation measurements for sample 11DAP08.

	NRM	Measu	remen	ts	After	Partial	Demagnet	isation
Sample	Material	$ t Dec^\circ$	\texttt{Inc}°	J(mAm⁻¹)	AF (mT) Dec	° Inc°	$J(mAm^{-1})$
12DAP01	Clay	38.3	58.3	115.8	10.	0 39.2	48.6	52.5
12DAP02	Clay	171.1	69.5	108.4	10.	0 166.5	5 41.1	36.8
12DAP03	Clay	18.3	46.5	292.3	10.	0 23.0	49.0	147.3
12DAP04	Clay	48.1	65.0	132.8	10.	0 34.5	60.8	62.5
12DAP05	Clay	-108.8	11.4	345.8	10.	0 -110.2	2 7.0	293.0
12DAP07	Clay	1.8	48.6	36.7	10.	0 4.5	5 50.7	18.9
12DAP08	Clay	156.3	35.8	73.9	10.	0 155.0	28.3	32.8
12DAP09	Clay	-59.9	-1.6	310.6	10.	0 -58.4	-12.5	189.8
12DAP10	Clay	73.4	66.2	44.3	10.	0 91.1	62.6	26.7
12DAP11	Clay	13.0	49.5	35.0	10.	0 15.2	46.9	19.7
12DAP12	Clay	-44.3	44.7	40.5	10.	0 -80.3	63.6	17.3
12DAP13	Clay	-51.8	-12.1	67.8	10.	0 -50.7	43.4	19.9
12DAP14	Clay	153.7	5.9	229.4	10.	0 -175.8	-2.8	231.4
12DAP16	Clay	-21.4	5.9	114.6	10.	0 -63.9) 15.0	58.4
12DAP17	Clay	-88.7	-38.1	79.7	10.	0 -65.8	-38.6	26.4
12DAP18	Clay	-170.2	45.3	28.4	10.	0 -72.4	66.7	20.1
12DAP19	Clay	-136.2	78.8	10.8	10.	0 146.1	70.4	13.6

Table 24: Sample NRM measurements and measurements after partial AF demagnetisation for feature 12DAP. J = magnitude of magnetisation vector; AF = peak alternating field strength of demagnetising field.

		12DAP04	
AF(mT)	\texttt{Dec}°	\mathtt{Inc}°	J (mAm ⁻¹)
0.0	44.7	66.3	129.7
2.0	45.8	64.3	127.1
4.0	45.5	63.5	106.0
6.0	41.6	61.9	86.0
8.0	36.3	61.1	70.4
10.0	34.5	60.8	62.5
12.0	33.1	61.4	54.9
14.0	30.0	61.8	49.4
16.0	29.6	60.8	46.0
18.0	29.9	60.8	41.2
20.0	25.8	62.9	37.4
22.0	26.2	61.1	34.1
24.0	24.3	61.0	32.0
26.0	20.9	61.5	30.5
28.0	20.7	62.9	29.5
30.0	21.3	63.5	27.4

Table 25: Incremental partial demagnetisation measurements for sample 12DAP04.

	NRM	iremer	nts	After	Partia	l Dem	agnetisat	ion	
Sample	Material	\texttt{Dec}°	\texttt{Inc}°	J (mAm ⁻¹) /	AF(mT)	\texttt{Dec}°	\texttt{Inc}°	$J(mAm^{-1})$	R
13DAP01	Clay	-26.9	61.6	44.9	10.0	-36.4	58.7	19.0	
13DAP02	Clay	5.9	26.9	4.4	10.0	1.6	9.0	3.1	R
13DAP03	Clay	17.6	68.0	149.5	10.0	16.6	51.2	31.5	
13DAP04	Clay	-8.3-	-23.3	47.3	10.0	-7.4	-9.6	11.8	R
13DAP05	Clay	57.9	73.0	68.2	10.0	-27.7	83.3	26.0	R
13DAP06	Clay	26.7	44.5	29.1	10.0	12.7	35.1	15.2	R
13DAP07	Clay	39.9	52.9	78.0	10.0	34.2	27.5	38.9	R
13DAP08	Clay	-87.4	74.3	128.0	10.0	-39.7	70.0	40.3	
13DAP09	Clay	-32.9	49.7	25.2	10.0	-17.5	46.0	5.3	
13DAP10	Clay	43.7	73.4	63.4	10.0	38.5	65.1	26.7	
13DAP11	Clay	17.6	64.5	160.9	10.0	18.5	55.7	38.3	
13DAP12	Clay	-49.9	63.0	254.4	10.0	-87.4	30.4	68.7	R
13DAP13	Clay	3.3	64.6	1466.6	10.0	7.1	48.7	136.8	
13DAP14	Clay	5.1	64.9	69.1	10.0	-26.7	60.0	13.6	
13DAP15	Clay	-11.5	50.1	37.9	10.0	-7.2	47.6	17.1	

Table 26: Sample NRM measurements and measurements after partial AF demagnetisation for feature 13DAP. J = magnitude of magnetisation vector; AF = peak alternating field strength of demagnetising field; R = sample rejected from mean calculation.

		13DAP03	
AF(mT)	\texttt{Dec}°	\texttt{Inc}°	J(mAm ⁻¹)
0.0	12.9	71.3	132.1
2.0	18.1	61.3	89.4
4.0	20.0	55.8	60.5
6.0	15.8	53.8	44.9
8.0	20.1	52.4	36.5
10.0	16.6	51.2	31.5
12.0	17.1	50.4	28.8
14.0	14.8	50.9	27.2
16.0	14.2	50.7	23.5
18.0	16.3	47.7	23.1
20.0	13.8	49.9	21.8
22.0	18.6	50.5	19.0
24.0	13.9	49.3	19.2
26.0	11.9	49.9	18.6
28.0	19.7	51.6	17.4
30.0	13.6	55.6	16.4

Table 27: Incremental partial demagnetisation measurements for sample 13DAP03.

	NRN	/ Meagur	remen	ta	After	Partial	Demagnet	isation
Sample	Material		Tna°	$T(m\Lambda m^{-1})$	ΔΕ (mT		° Inc°	$\frac{10000001}{1000000000000000000000000000$
bampre	Material	Dec	THC	U (IIIAIII)	AL (IIII) Dec	TIC	U (IIIAIII)
14DAP01	Clay	123.6	45.8	14.7	4.	0 124.5	5 24.7	12.5
14DAP02	Clay	143.1	66.1	30.1	4.	0 164.8	3 26.1	18.7
14DAP03	Clay	-113.7	35.0	0.2				-
14DAP04	Clay	-25.6	51.4	56.9	4.	0 -31.4	1 35.9	28.5
14DAP05	Clay	-168.1	23.0	1537.2	4.	0 -168.6	5 20.7	1485.8
14DAP06	Clay	25.8	34.8	15.3	4.	0 39.7	7 19.4	11.6
14DAP07	Clay	-146.3	-1.7	460.3	4.	0 -149.6	5 -11.1	482.8
14DAP08	Clay	-30.0	61.7	76.8	4.	0 -32.6	63.7	66.1
14DAP09	Clay	29.8-	-13.5	238.9	4.	0 29.3	3 -16.3	229.5
14DAP10	Clay	-171.4	24.0	94.3	4.	0 -177.2	2 5.2	82.1
14DAP11	Clay	-3.0	21.8	274.1	4.	0 -1.5	5 23.7	260.8
14DAP12	Clay	-93.7-	-13.2	32.2	4.	0 -88.8	3 -16.9	29.9

Table 28: Sample NRM measurements and measurements after partial AF demagnetisation for feature 14DAP. J = magnitude of magnetisation vector; AF = peak alternating field strength of demagnetising field.

		14DAP05			14DAP07	
AF(mT)	\mathtt{Dec}°	\tt{Inc}°	J (mAm⁻¹)	$ t Dec^\circ$	\texttt{Inc}°	J (mAm⁻¹)
0.0	-168.0	22.9	1557.9	-146.1	-0.1	455.1
2.0	-168.0	22.1	1520.2	-148.0	-7.6	470.6
4.0	-168.6	20.7	1485.8	-149.6	-11.1	482.8
6.0	-168.5	20.0	1437.3	-151.1	-12.9	485.9
8.0	-169.2	18.8	1353.5	-153.2	-13.8	478.6
10.0	-168.6	18.7	1250.3	-154.9	-14.2	461.8
12.0	-	-	-	-155.8	-14.2	436.0
14.0	-169.5	17.9	1026.9	-157.5	-14.3	387.7
16.0	-	-	-	-157.6	-14.2	340.0
18.0	-	-	-	-158.7	-14.3	284.2
20.0	-169.2	17.0	755.7	-159.3	-14.9	221.2
22.0	-	-	-	-159.0	-15.5	181.6
24.0	-	-	-	-158.6	-16.0	143.6
26.0	-	-	-	-159.6	-16.8	115.2
28.0	-	-	-	-157.4	-17.0	98.9
30.0	-168.1	16.2	527.1	-157.9	-17.6	82.4

Table 29: Incremental partial demagnetisation measurements for samples 14DAP05 and14DAP07.

	NRM	Measui	rement	ts	After	Partia	l Dema	gnetisat	lon
Sample	Material	\texttt{Dec}°	\texttt{Inc}°	J(mAm ⁻¹)	AF(mT)	$ t Dec^\circ$	\texttt{Inc}°	J (mAm⁻¹)	R
15DAP01	Clay	14.5	60.3	642.7	6.0	11.2	58.2	528.9	
15DAP02	Clay	-88.4	33.5	7.9	6.0	-81.2	-1.5	2.2	R
15DAP03	Clay	26.4	51.5	156.6	6.0	27.6	54.4	112.8	
15DAP04	Clay	8.0	64.3	104.6	6.0	12.0	63.3	73.2	
15DAP05	Clay	-36.1	-9.2	57.7	6.0	-40.1	-21.8	54.8	R
15DAP06	Clay	15.0	51.1	513.4	6.0	19.2	50.4	424.2	
15DAP07	Clay	20.5	65.5	2800.5	6.0	23.5	66.6	2384.6	
15DAP08	Clay	5.5	67.1	2851.2	6.0	11.0	67.3	2446.7	
15DAP09	Clay	7.0	62.2	80.7	6.0	10.6	62.3	73.2	
15DAP10	Clay	0.5	61.6	370.7	6.0	5.5	61.3	302.1	
15DAP11	Clay	-20.0	66.5	76.2	6.0	-18.9	67.7	71.2	

Table 30: Sample NRM measurements and measurements after partial AF demagnetisation for feature 15DAP. J = magnitude of magnetisation vector; AF = peak alternating field strength of demagnetising field; R = sample rejected from mean calculation.

		15DAP07	
AF(mT)	\texttt{Dec}°	\texttt{Inc}°	J (mAm ⁻¹)
0.0	24.7	66.8	2787.2
2.0	23.4	66.8	2731.8
4.0	23.7	66.7	2603.7
6.0	23.5	66.6	2384.6
8.0	23.6	66.7	2090.1
10.0	23.9	66.5	1754.5
12.0	23.9	66.4	1417.0
14.0	23.5	66.2	1063.4
16.0	24.2	66.1	777.2
18.0	23.3	65.8	566.7
20.0	22.8	65.8	441.9
22.0	22.9	66.8	312.4
24.0	24.3	66.2	243.9
26.0	23.6	66.3	194.6
28.0	24.9	66.2	161.5
30.0	24.1	65.7	138.8

Table 31: Incremental partial demagnetisation measurements for sample 15DAP07.

	NRM Measurements					Partia	al Dem	agnetisa	tion
Sample	Material	\texttt{Dec}°	\texttt{Inc}°	J (mAm ⁻¹).	AF(mT)	\texttt{Dec}°	\texttt{Inc}°	J(mAm ⁻¹)	R
16DAP01	Clay	-17.2	74.3	2018.8	8.0	5.4	75.7	776.5	
16DAP02	Clay	-12.6	73.1	998.4	8.0	1.7	70.2	275.4	
16DAP03	Clay	13.5	41.5	3.5	8.0	74.3	-14.7	4.1	R
16DAP04	Clay	4.6	73.6	2039.1	8.0	9.0	68.5	680.4	
16DAP05	Clay	1.3	73.7	1041.9	8.0	8.1	73.5	351.3	
16DAP06	Clay	9.3	68.8	7046.1	8.0	9.1	73.1	2637.6	
16DAP07	Clay	-8.6	74.8	16.5	8.0	61.9	48.7	5.5	R
16DAP08	Clay	17.9	73.4	5365.0	8.0	19.4	71.1	2236.8	
16DAP09	Clay	19.5	74.0	4539.0	8.0	33.8	67.4	1666.4	
16DAP10	Clay	21.2	78.3	4154.8	8.0	26.8	75.7	1799.5	
16DAP11	Clay	32.5	69.6	1357.5	8.0	8.4	70.1	497.5	
16DAP12	Clay	1.4	75.5	367.4	8.0	1.2	77.8	102.2	
16DAP13	Clay	147.8	89.2	2601.4	8.0	15.9	77.2	1229.8	
16DAP14	Clay	100.1	67.7	44.6	8.0	112.3	33.5	20.6	R

Table 32: Sample NRM measurements and measurements after partial AF demagnetisation for feature 16DAP. J = magnitude of magnetisation vector; AF = peak alternating field strength of demagnetising field; R = sample rejected from mean calculation.

		16DAP)2		16DAP()4	16DAP11			
AF(mT)	\texttt{Dec}°	\texttt{Inc}°	J (mAm ⁻¹)	\texttt{Dec}°	\texttt{Inc}°	J (mAm ⁻¹)	Dec°	\texttt{Inc}°	J (mAm ⁻¹)	
0.0	-17.7	78.0	915.1	1.9	74.5	2150.4	-13.4	77.4	1372.8	
2.0	-9.0	71.2	767.6	4.8	71.6	1845.6	2.4	73.9	1167.0	
4.0	-6.6	70.1	559.0	3.4	70.1	1357.9	7.1	71.7	909.4	
6.0	-4.7	68.7	390.5	5.0	69.8	987.8	8.3	70.0	669.9	
8.0	1.7	70.2	275.4	9.0	68.5	680.4	8.4	70.1	497.5	
10.0	1.4	70.3	215.0	9.5	68.8	455.4	9.9	71.5	342.1	
12.0	5.5	73.4	157.7	22.7	69.7	286.1	10.9	72.7	238.7	
14.0	23.6	75.3	121.1	28.0	69.7	194.6	7.1	76.7	181.7	
16.0	38.5	73.3	88.8	44.1	84.1	152.8	17.1	78.9	134.2	
18.0	37.7	76.6	77.7	83.8	73.8	84.2	24.8	79.4	110.9	
20.0	46.6	76.2	70.6	40.2	74.9	65.4	19.4	85.4	99.5	
22.0	29.5	80.7	60.7	50.6	63.9	52.7	25.5	81.1	84.4	
24.0	55.2	75.4	56.6	92.4	62.8	52.7	55.5	84.1	82.7	
26.0	49.6	79.5	49.2	117.6	63.2	44.8	70.9	81.0	77.6	
28.0	58.7	80.6	44.3	87.7	65.5	42.3	-9.4	89.3	67.6	
30.0	65.1	78.6	45.1	63.3	61.2	36.7	79.7	84.7	65.9	

Table 33: Incremental partial demagnetisation measurements for samples 16DAP02,16DAP04 and 16DAP11.

	NRM	Measu	remen	ts	After	Partial	Demagnet	isation
Sample	Material	\texttt{Dec}°	\texttt{Inc}°	J (mAm ⁻¹)	AF (mT) Dec	° Inc°	J (mAm ⁻¹)
17DAP01	Clay	17.3	76.7	252.1	8.	0 4.4	80.2	170.3
17DAP02	Clay	-73.6	29.2	1.8	8.	0 -59.2	2 77.5	2.5
17DAP03	Clay	2.4	65.2	407.7	8.	0 -3.2	L 67.8	236.5
17DAP04	Clay	21.6	65.7	394.1	8.	0 31.0	70.0	213.2
17DAP05	Clay	-73.6	71.3	9.0	8.	0 -27.8	3 76.3	5.4
17DAP06	Clay	-117.4	8.2	3.5	8.	0 -144.9	9 -14.7	1.6
17DAP07	Clay	3.0	42.5	13.4	8.	0 14.3	L 43.3	11.8
17DAP08	Clay	10.3	69.5	125.7	8.	0 28.4	£ 65.0	65.7
17DAP09	Clay	-24.1	61.4	14.2	8.	0 -8.2	L 65.9	9.6
17DAP10	Clay	-171.4	76.3	1934.2	8.	0 -178.9	9 78.2	1310.7

Table 34: Sample NRM measurements and measurements after partial AF demagnetisation for feature 17DAP. J = magnitude of magnetisation vector; AF = peak alternating field strength of demagnetising field.

		17DAP03	
AF(mT)	$ t Dec^\circ$	\tt{Inc}°	J(mAm⁻¹)
0.0	0.4	65.2	384.6
2.0	0.4	66.4	338.5
4.0	-0.4	67.0	303.3
6.0	-2.0	67.5	267.5
8.0	-3.1	67.8	236.5
10.0	-4.8	68.1	207.5
12.0	-8.0	68.9	183.2
14.0	-10.2	69.4	157.4
16.0	-13.6	69.2	136.3
18.0	-14.5	69.2	121.1
20.0	-18.8	69.7	105.5
22.0	-23.3	70.2	94.2
24.0	-22.3	69.1	85.9
26.0	-20.3	69.7	78.1
28.0	-21.3	69.8	66.1
30.0	-24.0	71.5	63.9

Table 35: Incremental partial demagnetisation measurements for sample 17DAP03.

	NRM	Measu	rement	ts	After	Partial	Demagnet	isation
Sample	Material	\texttt{Dec}°	\texttt{Inc}°	J (mAm ⁻¹)	AF (mT) Dec	° Inc°	$J(mAm^{-1})$
18DAP01	Clay	28.7	42.2	954.6	14.	0 28.2	40.7	562.7
18DAP02	Clay	119.1	-13.1	14023.8	14.	0 120.6	-14.4	8458.4
18DAP03	Clay	-4.3	53.8	469.9	14.	0 -5.1	50.8	214.2
18DAP04	Clay	58.0	48.8	678.1	14.	0 56.4	35.8	299.3
18DAP05	Clay	19.1	59.3	1428.9	14.	0 25.6	45.8	267.8
18DAP06	Clay	11.2	73.0	841.7	14.	0 15.7	63.7	114.8
18DAP07	Clay	-5.3	60.4	506.6	14.	0 -18.7	55.4	92.6
18DAP08	Clay	-2.0	73.2	316.7	14.	0 1.2	66.5	189.8
18DAP09	Clay	101.6	87.5	929.1	14.	0 125.1	55.5	164.1
18DAP10	Clay	35.9	-21.3	427.3	14.	0 40.4	-29.6	272.6
18DAP11	Clay -	115.4	81.9	45.3	14.	0 -137.1	. 83.7	21.9
18DAP12	Clay	-47.4	79.8	20.7	14.	0 -86.0	78.2	9.7
18DAP13	Clay	-8.3	68.0	3165.2	14.	0 -13.1	. 70.2	1559.7
18DAP14	Clay	61.5	75.9	908.9	14.	0 20.7	66.5	1185.4
18DAP15	Clay	-21.6	66.3	401.1	14.	0 -23.0	65.3	224.2

Table 36: Sample NRM measurements and measurements after partial AF demagnetisation for feature 18DAP. J = magnitude of magnetisation vector; AF = peak alternating field strength of demagnetising field.

	18DAP07				18DAP08		
AF(mT)	Dec°	\tt{Inc}°	J (mAm⁻¹)	Dec°	\texttt{Inc}°	J (mAm⁻¹)	
0.0	-11.8	65.2	492.2	-11.4	63.5	1105.0	
2.0	-9.6	63.8	438.1	-5.9	62.4	974.2	
4.0	-10.1	62.6	364.0	-4.5	61.8	829.2	
6.0	-11.1	61.9	286.6	-3.7	61.8	617.7	
8.0	-12.6	61.0	217.4	-1.9	62.0	456.8	
10.0	-7.4	57.6	171.8	0.6	63.8	330.0	
12.0	-12.4	62.7	135.4	1.1	64.5	241.4	
14.0	-18.7	55.4	92.6	1.2	66.5	189.8	
16.0	-18.4	54.8	75.4	3.8	67.2	148.7	
18.0	-16.5	53.7	61.6	-3.4	66.3	126.5	
20.0	-20.3	54.6	51.6	-1.4	67.7	106.4	
22.0	-21.0	53.9	44.7	-2.3	67.0	91.2	
24.0	-19.3	54.0	37.9	-6.7	69.2	81.0	
26.0	-18.0	57.1	35.4	-4.8	66.9	75.4	
28.0	-15.2	56.4	32.7	-7.0	66.0	71.1	
30.0	-13.7	58.5	30.3	-5.8	66.4	63.1	

Table 37: Incremental partial demagnetisation measurements for samples 18DAP07 and18DAP08.

_								
		18DAP13				18DAP14		
	AF(mT)	\texttt{Dec}°	\texttt{Inc}°	J(mAm⁻¹)	\texttt{Dec}°	\texttt{Inc}°	J (mAm ⁻¹)	
	0.0	-3.6	68.4	3117.4	16.9	71.6	3827.8	
	2.0	-5.5	68.5	3064.7	15.7	70.0	3602.4	
	4.0	-6.0	68.9	2920.5	16.0	69.3	3304.1	
	6.0	-6.3	69.1	2716.1	15.7	68.7	2992.5	
	8.0	-7.9	69.3	2400.5	17.0	68.8	2363.0	
	10.0	-9.3	69.5	2121.6	18.2	68.0	2001.1	
	12.0	-10.1	69.8	1884.0	17.5	67.9	1594.5	
	14.0	-13.1	70.2	1559.7	20.7	66.5	1185.4	
	16.0	-14.5	70.4	1308.2	22.1	65.8	916.2	
	18.0	-17.2	70.6	1140.7	22.4	66.2	719.1	
	20.0	-19.7	70.6	1022.7	25.8	66.7	572.5	
	22.0	-21.7	70.6	842.1	26.6	65.7	443.0	
	24.0	-24.4	70.4	766.7	29.8	64.0	362.2	
	26.0	-24.9	70.9	684.3	30.5	61.9	316.9	
	28.0	-25.9	71.1	621.6	29.4	62.2	274.1	
_	30.0	-26.2	71.7	557.9	36.2	62.2	237.4	

Table 38: Incremental partial demagnetisation measurements for samples 18DAP13 and 18DAP14.

Appendix: Standard Procedures for Sampling and Measurement

1) Sampling

One of three sampling techniques is employed depending on the consistency of the material (Clark, Tarling and Noel 1988):

- a) Consolidated materials: Rock and fired clay samples are collected by the disc method. Several small levelled plastic discs are glued to the feature, marked with an orientation line related to True North, then removed with a small piece of the material attached.
- **b)** Unconsolidated materials: Sediments are collected by the tube method. Small pillars of the material are carved out from a prepared platform, then encapsulated in levelled plastic tubes using plaster of Paris. The orientation line is then marked on top of the plaster.
- c) Plastic materials: Waterlogged clays and muds are sampled in a similar manner to method 1b) above; however, the levelled plastic tubes are pressed directly into the material to be sampled.

2) Physical Analysis

- a) Magnetic remanences are measured using a slow speed spinner fluxgate magnetometer (Molyneux et al. 1972; see also Tarling 1983, p84; Thompson and Oldfield 1986, p52).
- b) Partial demagnetisation is achieved using the alternating magnetic field method (As 1967; Creer 1959; see also Tarling 1983, p91; Thompson and Oldfield 1986, p59), to remove viscous magnetic components if necessary. Demagnetising fields are measured in milli-Tesla (mT), figures quoted being for the peak value of the field.

3) Remanent Field Direction

- a) The remanent field direction of a sample is expressed as two angles, declination (Dec) and inclination (Inc), both quoted in degrees. Declination represents the bearing of the field relative to true north, angles to the east being positive; inclination represents the angle of dip of this field.
- **b)** Aitken and Hawley (1971) have shown that the angle of inclination in measured samples is likely to be distorted owing to magnetic refraction. The phenomenon is not well understood but is known to depend on the position the samples occupied within the structure. The corrections recommended by Aitken and Hawley are applied, where appropriate, to measured inclinations, in keeping with the practise of Clark, Tarling and Noel (1988).

- c) Individual remanent field directions are combined to produce the mean remanent field direction using the statistical method developed by R. A. Fisher (1953). The quantity a_{95} , "alpha-95", is quoted with mean field directions and is a measure of the precision of the determination (see Aitken 1990, p247). It is analogous to the standard error statistic for scalar quantities; hence the smaller its value, the better the precision of the date.
- d) For the purposes of comparison with standardised UK calibration data, remanent field directions are adjusted to the values they would have had if the feature had been located at Meriden, a standard reference point. The adjustment is done using the method suggested by Noel (Tarling 1983, p116).

4) Calibration

- a) Material less than 3000 years old is dated using the archaeomagnetic calibration curve compiled by Clark, Tarling and Noel (1988).
- **b)** Older material is dated using the lake sediment data compiled by Turner and Thompson (1982).
- c) Dates are normally given at the 63% and 95% confidence levels. However, the quality of the measurement and the estimated reliability of the calibration curve for the period in question are not taken into account, so this figure is only approximate. Owing to crossovers and contiguities in the curve, alternative dates are sometimes given. It may be possible to select the correct alternative using independent dating evidence.
- **d)** As the thermoremanent effect is reset at each heating, all dates for fired material refer to the final heating.
- e) Dates are prefixed by "cal", for consistency with the new convention for calibrated radiocarbon dates (Mook 1986).

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Figure 1: a) Distribution of NRM directions of samples from feature 1DAP represented as an equal area stereogram. In this projection declination increases clockwise with zero being at 12 o'clock while inclination increases from zero at the equator to 90 degrees in the centre of the projection. Open circles represent negative inclinations. b) Distribution of thermoremanent directions of magnetisation of the same samples after partial AF demagnetisation to either 8 or 20mT.



Figure 2: Stepwise AF demagnetisation of sample 1DAP07. Diagram a) depicts the variation of the remanent direction as an equal area stereogram (declination increases clockwise, while inclination increases from zero at the equator to 90 degrees at the centre of the projection); b) shows the normalised change in remanence intensity as a function of the demagnetising field; c) shows the changes in both direction and intensity as a vector endpoint projection.



Figure 3: Stepwise AF demagnetisation of sample 1DAP12. Diagram a) depicts the variation of the remanent direction as an equal area stereogram (declination increases clockwise, while inclination increases from zero at the equator to 90 degrees at the centre of the projection); b) shows the normalised change in remanence intensity as a function of the demagnetising field; c) shows the changes in both direction and intensity as a vector endpoint projection.



Figure 4: Comparison with the UK master curve of the mean thermoremanent vector calculated for feature 1DAP from samples partially demagnetised to 8 or 20mT. Thick error bar lines represent 63% confidence limits and narrow lines 95% confidence limits.

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Figure 5: a) Distribution of NRM directions of samples from feature 2DAP represented as an equal area stereogram. In this projection declination increases clockwise with zero being at 12 o'clock while inclination increases from zero at the equator to 90 degrees in the centre of the projection. Open circles represent negative inclinations. b) Distribution of thermoremanent directions of magnetisation of the same samples after partial AF demagnetisation to 8mT.

b)



Figure 6: Stepwise AF demagnetisation of sample 2DAP02. Diagram a) depicts the variation of the remanent direction as an equal area stereogram (declination increases clockwise, while inclination increases from zero at the equalor to 90 degrees at the centre of the projection); b) shows the normalised change in remanence intensity as a function of the demagnetising field; c) shows the changes in both direction and intensity as a vector endpoint projection.



Figure 7: Comparison with the UK master curve of the mean thermoremanent vector calculated for feature 2DAP from samples partially demagnetised to 8mT. Thick error bar lines represent 63% confidence limits and narrow lines 95% confidence limits.



Figure 8: a) Distribution of NRM directions of samples from feature 3DAP represented as an equal area stereogram. In this projection declination increases clockwise with zero being at 12 o'clock while inclination increases from zero at the equator to 90 degrees in the centre of the projection. Open circles represent negative inclinations. b) Distribution of thermoremanent directions of magnetisation of the same samples after partial AF demagnetisation to 10mT.



Figure 9: Stepwise AF demagnetisation of sample 3DAP09. Diagram a) depicts the variation of the remanent direction as an equal area stereogram (declination increases clockwise, while inclination increases from zero at the equator to 90 degrees at the centre of the projection); b) shows the normalised change in remanence intensity as a function of the demagnetising field; c) shows the changes in both direction and intensity as a vector endpoint projection.



Figure 10: Comparison with the UK master curve of the mean thermoremanent vector calculated for feature 3DAP from sample NRM vectors. Thick error bar lines represent 63% confidence limits and narrow lines 95% confidence limits.

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Figure 11: a) Distribution of NRM directions of samples from feature 4DAP represented as an equal area stereogram. In this projection declination increases clockwise with zero being at 12 o'clock while inclination increases from zero at the equator to 90 degrees in the centre of the projection. Open circles represent negative inclinations. b) Distribution of thermoremanent directions of magnetisation of the same samples after partial AF demagnetisation to 8mT.



Figure 12: Stepwise AF demagnetisation of sample 4DAP12. Diagram a) depicts the variation of the remanent direction as an equal area stereogram (declination increases clockwise, while inclination increases from zero at the equator to 90 degrees at the centre of the projection); b) shows the normalised change in remanence intensity as a function of the demagnetising field; c) shows the changes in both direction and intensity as a vector endpoint projection.



Figure 13: Comparison with the UK master curve of the mean thermoremanent vector calculated for feature 4DAP from samples partially demagnetised to 8mT. Thick error bar lines represent 63% confidence limits and narrow lines 95% confidence limits.



Figure 14: a) Distribution of NRM directions of samples from feature 5DAP represented as an equal area stereogram. In this projection declination increases clockwise with zero being at 12 o'clock while inclination increases from zero at the equator to 90 degrees in the centre of the projection. Open circles represent negative inclinations. b) Distribution of thermoremanent directions of magnetisation of the same samples after partial AF demagnetisation to 10mT.



Figure 15: Stepwise AF demagnetisation of sample 5DAP02. Diagram a) depicts the variation of the remanent direction as an equal area stereogram (declination increases clockwise, while inclination increases from zero at the equator to 90 degrees at the centre of the projection); b) shows the normalised change in remanence intensity as a function of the demagnetising field; c) shows the changes in both direction and intensity as a vector endpoint projection.



Figure 16: Comparison with the UK master curve of the mean thermoremanent vector calculated for feature 5DAP from samples partially demagnetised to 10mT. Thick error bar lines represent 63% confidence limits and narrow lines 95% confidence limits.



Figure 17: a) Distribution of NRM directions of samples from feature 6DAP represented as an equal area stereogram. In this projection declination increases clockwise with zero being at 12 o'clock while inclination increases from zero at the equator to 90 degrees in the centre of the projection. Open circles represent negative inclinations. b) Distribution of thermoremanent directions of magnetisation of the same samples after partial AF demagnetisation to 16mT.

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Figure 18: Stepwise AF demagnetisation of sample 6DAP02. Diagram a) depicts the variation of the remanent direction as an equal area stereogram (declination increases clockwise, while inclination increases from zero at the equator to 90 degrees at the centre of the projection); b) shows the normalised change in remanence intensity as a function of the demagnetising field; c) shows the changes in both direction and intensity as a vector endpoint projection.



Figure 19: Comparison with the UK master curve of the mean thermoremanent vector calculated for feature 6DAP from samples partially demagnetised to 16mT. Thick error bar lines represent 63% confidence limits and narrow lines 95% confidence limits.



Figure 20: a) Distribution of NRM directions of samples from feature 7DAP represented as an equal area stereogram. In this projection declination increases clockwise with zero being at 12 o'clock while inclination increases from zero at the equator to 90 degrees in the centre of the projection. Open circles represent negative inclinations. b) Distribution of thermoremanent directions of magnetisation of the same samples after partial AF demagnetisation to 8mT.



Figure 21: Stepwise AF demagnetisation of sample 7DAP06. Diagram a) depicts the variation of the remanent direction as an equal area stereogram (declination increases clockwise, while inclination increases from zero at the equator to 90 degrees at the centre of the projection); b) shows the normalised change in remanence intensity as a function of the demagnetising field; c) shows the changes in both direction and intensity as a vector endpoint projection.



Figure 22: Comparison with the UK master curve of the mean thermoremanent vector calculated for feature 7DAP from samples partially demagnetised to 8mT. Thick error bar lines represent 63% confidence limits and narrow lines 95% confidence limits.



Figure 23: a) Distribution of NRM directions of samples from feature 8DAP represented as an equal area stereogram. In this projection declination increases clockwise with zero being at 12 o'clock while inclination increases from zero at the equator to 90 degrees in the centre of the projection. Open circles represent negative inclinations. b) Distribution of thermoremanent directions of magnetisation of the same samples after partial AF demagnetisation to 6mT.



Figure 24: Stepwise AF demagnetisation of sample 8DAP04. Diagram a) depicts the variation of the remanent direction as an equal area stereogram (declination increases clockwise, while inclination increases from zero at the equator to 90 degrees at the centre of the projection); b) shows the normalised change in remanence intensity as a function of the demagnetising field; c) shows the changes in both direction and intensity as a vector endpoint projection.



Figure 25: Comparison with the UK master curve of the mean thermoremanent vector calculated for feature 8DAP from samples partially demagnetised to 6mT. Thick error bar lines represent 63% confidence limits and narrow lines 95% confidence limits.



Figure 26: a) Distribution of NRM directions of samples from feature 9DAP represented as an equal area stereogram. In this projection declination increases clockwise with zero being at 12 o'clock while inclination increases from zero at the equator to 90 degrees in the centre of the projection. Open circles represent negative inclinations. b) Distribution of thermoremanent directions of magnetisation of the same samples after partial AF demagnetisation to 10mT.



Figure 27: Stepwise AF demagnetisation of sample 9DAP09. Diagram a) depicts the variation of the remanent direction as an equal area stereogram (declination increases clockwise, while inclination increases from zero at the equator to 90 degrees at the centre of the projection); b) shows the normalised change in remanence intensity as a function of the demagnetising field; c) shows the changes in both direction and intensity as a vector endpoint projection.



Figure 28: Comparison with the UK master curve of the mean thermoremanent vector calculated for feature 9DAP from samples partially demagnetised to 10mT. Thick error bar lines represent 63% confidence limits and narrow lines 95% confidence limits.



Figure 29: a) Distribution of NRM directions of samples from feature 10DAP represented as an equal area stereogram. In this projection declination increases clockwise with zero being at 12 o'clock while inclination increases from zero at the equator to 90 degrees in the centre of the projection. Open circles represent negative inclinations. b) Distribution of thermoremanent directions of magnetisation of samples 06-09 after partial AF demagnetisation to 20mT.



Figure 30; Stepwise AF demagnetisation of sample 10DAP09. Diagram a) depicts the variation of the remanent direction as an equal area stereogram (declination increases clockwise, while inclination increases from zero at the equator to 90 degrees at the centre of the projection); b) shows the normalised change in remanence intensity as a function of the demagnetising field; c) shows the changes in both direction and intensity as a vector endpoint projection.

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Figure 31: Comparison with the UK master curve of the mean thermoremanent vector calculated for feature 10DAP using only the tile samples, 06-09. The grey cross represents the mean TRM direction calculated from these samples after partial demagnetisation to 20mT. The black cross represents the mean recalculated after removal of the primary magnetisation component from each sample. Thick error bar lines represent 63% confidence limits and narrow lines 95% confidence limits.



Figure 32: a) Distribution of NRM directions of samples from feature 11DAP represented as an equal area stereogram. In this projection declination increases clockwise with zero being at 12 o'clock while inclination increases from zero at the equator to 90 degrees in the centre of the projection. Open circles represent negative inclinations. b) Distribution of thermoremanent directions of magnetisation of the same samples after partial AF demagnetisation to 10mT.



Figure 33: Stepwise AF demagnetisation of sample 11DAP08. Diagram a) depicts the variation of the remanent direction as an equal area stereogram (declination increases clockwise, while inclination increases from zero at the equator to 90 degrees at the centre of the projection); b) shows the normalised change in remanence intensity as a function of the demagnetising field; c) shows the changes in both direction and intensity as a vector endpoint projection.



Figure 34: Comparison with the UK master curve of the mean thermoremanent vector calculated for feature 11DAP from samples partially demagnetised to 10mT. Thick error bar lines represent 63% confidence limits and narrow lines 95% confidence limits.



Figure 35: a) Distribution of NRM directions of samples from feature 12DAP represented as an equal area stereogram. In this projection declination increases clockwise with zero being at 12 o'clock while inclination increases from zero at the equator to 90 degrees in the centre of the projection. Open circles represent negative inclinations. b) Distribution of thermoremanent directions of magnetisation of the same samples after partial AF demagnetisation to 10mT.



Figure 36: Stepwise AF demagnetisation of sample 12DAP04. Diagram a) depicts the variation of the remanent direction as an equal area stereogram (declination increases clockwise, while inclination increases from zero at the equator to 90 degrees at the centre of the projection); b) shows the normalised change in remanence intensity as a function of the demagnetising field; c) shows the changes in both direction and intensity as a vector endpoint projection.



Figure 37: a) Distribution of NRM directions of samples from feature 13DAP represented as an equal area stereogram. In this projection declination increases clockwise with zero being at 12 o'clock while inclination increases from zero at the equator to 90 degrees in the centre of the projection. Open circles represent negative inclinations. b) Distribution of thermoremanent directions of magnetisation of the same samples after partial AF demagnetisation to 10mT.



Figure 38; Stepwise AF demagnetisation of sample 13DAP03. Diagram a) depicts the variation of the remanent direction as an equal area stereogram (declination increases clockwise, while inclination increases from zero at the equator to 90 degrees at the centre of the projection); b) shows the normalised change in remanence intensity as a function of the demagnetising field; c) shows the changes in both direction and intensity as a vector endpoint projection.



Figure 39: Comparison with the UK master curve of the mean thermoremanent vector calculated for feature 13DAP from samples partially demagnetised to 10mT. Thick error bar lines represent 63% confidence limits and narrow lines 95% confidence limits.



Figure 40: a) Distribution of NRM directions of samples from feature 14DAP represented as an equal area stereogram. In this projection declination increases clockwise with zero being at 12 o'clock while inclination increases from zero at the equator to 90 degrees in the centre of the projection. Open circles represent negative inclinations. b) Distribution of thermoremanent directions of magnetisation of the same samples after partial AF demagnetisation to 4mT.


Figure 41: Stepwise AF demagnetisation of sample 14DAP07. Diagram a) depicts the variation of the remanent direction as an equal area stereogram (declination increases clockwise, while inclination increases from zero at the equator to 90 degrees at the centre of the projection); b) shows the normalised change in remanence intensity as a function of the demagnetising field; c) shows the changes in both direction and intensity as a vector endpoint projection.



Figure 42: a) Distribution of NRM directions of samples from feature 15DAP represented as an equal area stereogram. In this projection declination increases clockwise with zero being at 12 o'clock while inclination increases from zero at the equator to 90 degrees in the centre of the projection. Open circles represent negative inclinations. b) Distribution of thermoremanent directions of magnetisation of the same samples after partial AF demagnetisation to 6mT.



Figure 43: Stepwise AF demagnetisation of sample 15DAP07. Diagram a) depicts the variation of the remanent direction as an equal area stereogram (declination increases clockwise, while inclination increases from zero at the equator to 90 degrees at the centre of the projection); b) shows the normalised change in remanence intensity as a function of the demagnetising field; c) shows the changes in both direction and intensity as a vector endpoint projection.



Figure 44: Comparison with the UK master curve of the mean thermoremanent vector calculated for feature 15DAP from samples partially demagnetised to 6mT. Thick error bar lines represent 63% confidence limits and narrow lines 95% confidence limits.



Figure 45: a) Distribution of NRM directions of samples from feature 16DAP represented as an equal area stereogram. In this projection declination increases clockwise with zero being at 12 o'clock while inclination increases from zero at the equator to 90 degrees in the centre of the projection. Open circles represent negative inclinations. b) Distribution of thermoremanent directions of magnetisation of the same samples after partial AF demagnetisation to 8mT.



Figure 46: Stepwise AF demagnetisation of sample 16DAP11. Diagram a) depicts the variation of the remanent direction as an equal area stereogram (declination increases clockwise, while inclination increases from zero at the equator to 90 degrees at the centre of the projection); b) shows the normalised change in remanence intensity as a function of the demagnetising field; c) shows the changes in both direction and intensity as a vector endpoint projection.



Figure 47: Comparison with the UK master curve of the mean thermoremanent vector calculated for feature 16DAP from samples partially demagnetised to 8mT. Thick error bar lines represent 63% confidence limits and narrow lines 95% confidence limits.



Figure 48: a) Distribution of NRM directions of samples from feature 17DAP represented as an equal area stereogram. In this projection declination increases clockwise with zero being at 12 o'clock while inclination increases from zero at the equator to 90 degrees in the centre of the projection. Open circles represent negative inclinations. b) Distribution of thermoremanent directions of magnetisation of the same samples after partial AF demagnetisation to 8mT.



Figure 49: Stepwise AF demagnetisation of sample 17DAP03. Diagram a) depicts the variation of the remanent direction as an equal area stereogram (declination increases clockwise, while inclination increases from zero at the equator to 90 degrees at the centre of the projection); b) shows the normalised change in remanence intensity as a function of the demagnetising field; c) shows the changes in both direction and intensity as a vector endpoint projection.



Figure 50: a) Distribution of NRM directions of samples from feature 18DAP represented as an equal area stereogram. In this projection declination increases clockwise with zero being at 12 o'clock while inclination increases from zero at the equator to 90 degrees in the centre of the projection. Open circles represent negative inclinations. b) Distribution of thermoremanent directions of magnetisation of the same samples after partial AF demagnetisation to 14mT.



Figure 51: Stepwise AF demagnetisation of sample 18DAP08. Diagram a) depicts the variation of the remanent direction as an equal area stereogram (declination increases clockwise, while inclination increases from zero at the equator to 90 degrees at the centre of the projection); b) shows the normalised change in remanence intensity as a function of the demagnetising field; c) shows the changes in both direction and intensity as a vector endpoint projection.



Figure 52: 63% confidence limits for the mean thermoremanent vectors of all datable features from Deansway compared with the relevant portion of the UK archaeomagnetic master curve. Dates range from the 7th to the 14th centuries AD with the majority clustering between 1050 and 1250 AD.

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