

ARCHAEOLOGICAL  
SERVICES  
DURHAM UNIVERSITY

on behalf of  
Dr David Petts  
Durham University

Holy Island (Lindisfarne)  
Northumberland

geophysical survey

report 3029  
December 2012

## Contents

1.	Summary	1
2.	Project background	2
3.	Historical and archaeological background	2
4.	Landuse, topography and geology	7
5.	Geophysical survey	7
6.	Conclusions and recommendations	13
7.	Sources	14

## Figures

Figure 1:	Site location
Figure 2:	Geophysical survey overview
Figure 3:	Geophysical survey
Figure 4:	Geophysical interpretation
Figure 5:	Archaeological interpretation
Figure 6:	Trace plots of geomagnetic data

## **1. Summary**

### **The project**

- 1.1 This report presents the results of geophysical surveys conducted as part of ongoing research on Holy Island, also known as Lindisfarne, Northumberland. The works comprised detailed geomagnetic survey of 13 areas around the village totalling approximately 20ha.
- 1.2 The works were commissioned by Dr David Petts of the Department of Archaeology at Durham University and conducted by Archaeological Services Durham University.

### **Results**

- 1.3 The remains of structures which could be associated with the priory, including a large quadrangle, have been detected in Sanctuary Close (Area 12). Two other possible former structures on a different alignment may be from a different phase of activity at the site. Various probable soil-filled ditches and a probable former track were also detected in this area.
- 1.4 Possible structural remains and anomalies which could relate to industrial practices have been detected in Area 6. Further anomalies which could relate to industrial activities have also been detected in Areas 10 and 11.
- 1.5 Probable former continuations of Marygate and Prior Lane have been detected extending across Area 10 towards the coast.
- 1.6 Further features relating to the former exploitation of Holy Island have been identified, including ridge and furrow cultivation, possible burgage plots, former tracks and field boundaries, some of which are recorded on early OS map editions.
- 1.7 Dykes associated with the Northern England Late Carboniferous Tholeiitic Dyke-Swarm have been identified in Areas 10, 11 and 12.
- 1.8 Services have been detected in Areas 1, 2 and 12.
- 1.9 Probable land drains have been identified in Areas 1-8, 10 and 13.
- 1.10 Made-ground has been identified in Areas 3 and 5.
- 1.11 More recent structures, such as a probable row of pig-sheds or similar, have been detected in Area 8.

### **Recommendations**

- 1.12 Earth resistance survey would almost certainly help to determine the nature and extent of the probable structural remains, and other features, detected in these geomagnetic surveys. Resistance survey would be particularly useful in Sanctuary Close (Area 12), the immediate priory environs and Areas 10 and 11, since, unlike the geomagnetic technique, this technique would not be adversely affected by the igneous dykes there or any concentrations of ferrous/fired debris.

## 2. Project background

### Location (Figure 1)

- 2.1 The survey areas comprised open land in and around the main settlement on Holy Island, Northumberland (NGR centre: NU 1266 4212). Thirteen surveys totalling approximately 20ha were conducted in thirteen land parcels around the village in the south-west of the island.

### Objective

- 2.2 The principal aim of the surveys was to assess the nature and extent of any sub-surface features of potential archaeological significance within the survey areas as part of ongoing research directed by Dr David Petts at Durham University.

### Methods statement

- 2.3 The surveys have been undertaken in accordance with instructions from Dr Petts and with national standards and guidance (see para. 5.1 below).

### Dates

- 2.4 Fieldwork was undertaken in two visits between 10th September and 9th October 2012. This report was prepared for 14th December 2012.

### Personnel

- 2.5 Fieldwork was conducted by Andrew Platell, Nathan Thomas and Richie Villis (Supervisor). The geophysical data were processed by Richie Villis. This report was prepared by Richie Villis and Duncan Hale (the Project Manager) with illustrations by David Graham.

### Archive/OASIS

- 2.6 The site code is **NHI12**, for **Northumberland Holy Island 2012**. The survey archive will be supplied on CD to the client for deposition with the project archive in due course. Archaeological Services Durham University is registered with the **Online AccesS** to the **Index of archaeological investigationS** project (**OASIS**). The OASIS ID number for this project is **archaeol3-137553**.

### Acknowledgements

- 2.7 Archaeological Services Durham University is grateful for the assistance of the landowners and tenants in facilitating this scheme of works.

## 3. Historical and archaeological background

- 3.1 Archaeological Services prepared statements of heritage significance for proposed developments at the Rocket Field and the Lookout Tower in 2010 (Archaeological Services 2010a & 2010b). The following background to the area is taken from this previous research, presented with only minor amendments.

### Previous archaeological works

- 3.2 Archaeological investigations in the 19th and early 20th centuries mainly focused on the medieval priory and the assumed location of the Anglo-Saxon monastery. In the 1890s Crossman (1892) excavated the cloisters to recover a plan of the building and to see if any evidence of the earlier monastery survived. In the early 20th century, the Ministry of Works cleared and restored the cloisters and nave of the priory.

Although no systematic recording was carried out during this work, the quantities of 12th to 16th-century pottery recovered suggests medieval deposits were removed. Evidence of Saxon buildings could easily have been missed, although no Saxon artefacts apart from re-used stonework were found (O'Sullivan & Young 1995, 15). As some of these stones were grave markers it is probable that the early monastic cemetery was within the area of the medieval priory but the precise site of the associated building remains unknown (O'Sullivan & Young 1995, 15).

- 3.3 The historian James Raine noted shallow earthworks on the Heugh south of the priory in 1852. A sketch plan of these was made by SP Blackwell in 1891 although no further action was taken at the time. It is now appreciated that some of these earthworks may represent buildings associated with the Anglo-Saxon monastery (O'Sullivan & Young 1995, 13-14). Resistivity and topographic survey by Leicester University in this area in 1985 confirmed some of these previously-known earthworks and revealed a number of new structures. These include a square foundation east of the coastguard look-out that may be an earlier look-out associated with the early medieval or the Benedictine monastery (Beavitt *et al* 1987, 1-23); other foundations further east may represent other look-out sites or possible chapel foundations (*ibid.*). These structures could have been individual accommodation units for the hermit monks of the Celtic monastery, although without excavation this must remain conjecture. Another earthwork in this area, 'the cockpit', appears to be a post-medieval windmill base (*ibid.*).
- 3.4 In the 1960s Dr Brian Hope-Taylor carried out small-scale excavation and survey work on Holy Island as part of a wider study of early Anglo-Saxon Northumbria. Although this material is unpublished, it is understood that he discovered evidence of structures on the Heugh, and buildings of medieval date in a field to the west of the present vicarage (O'Sullivan & Young 1995, 15).
- 3.5 In 1977 Leicester University carried out an excavation (HER 5352) on the site of the English Heritage Priory Museum. The excavation recorded stratified deposits and features that have been interpreted as resulting from early medieval, medieval and post-medieval settlement on the site.
- 3.6 There have been a number of archaeological investigations carried out in the village in response to development proposals. The archaeological information recovered has largely concerned the medieval and post-medieval periods, although earlier features have been found at the Winery (HER 13176), The Palace (HER 13172) and along Marygate (HER 11134). These earlier features are generally aceramic and undated. Given the lack of finds they are likely to be either prehistoric or early medieval in date. In a few cases dateable artefacts have been found or radiocarbon dates obtained. These include both prehistoric and early medieval dates, suggesting that activity of both periods is present. Medieval deposits have generally been found beneath a considerable depth of post-medieval and modern garden soils, although to the north of the Winery medieval deposits lay only a few centimetres below ground level. There is evidence from several periods that settlement was not restricted to the area which is occupied by the village of Holy Island today.
- 3.7 A number of medieval metal objects including a buckle, a chape and a pilgrim badge were recovered from the Rocket Field by a metal detectorist (HER 5394).

### **The prehistoric period (up to AD 70)**

- 3.8 Prehistoric activity on the island includes a prehistoric flint and stone tool production site at Ness End Quarry (Beavitt *et al* 1987, 2-4), and a possible hearth at The Snook (Cartwright & Cartwright 1976, 46). A sherd of residual prehistoric pottery was discovered amongst later material in Jenny Bell's Well midden (HER 5343) to the west of the village. A burnt occupation deposit containing flint flakes (HER 5361) was identified on the east end of the Heugh and has been interpreted as prehistoric in date.
- 3.9 A number of recent interventions within the town have identified prehistoric features. A posthole from the Castle Hotel Gardens at Marygate (HER 5395) produced a Neolithic radiocarbon date with a calibrated range of 3365- 3685 BC. A ditch excavated at The Palace (HER 13172) contained a prehistoric cup-marked rock, which, if it is not residual, could indicate that the ditch is prehistoric. Further evidence for a prehistoric date for this site is provided by a Neolithic whinstone adze (HER 5344) that was found in the 'Bishop's Palace Garden' in 1926.

### **The Roman period (AD 70 to 5th century)**

- 3.10 Two residual sherds of Roman pottery were found in Jenny Bell's Well midden (HER 5343). The Lindisfarne museum has some Roman pottery in its collection, including the encrusted beak of an amphora (O'Sullivan & Young 1995, 33), thought to have come from a Roman shipwreck somewhere in the vicinity of the harbour. This is the only Roman material known from the island.

### **The early medieval period (5th century to 1066)**

- 3.11 St Aidan founded a monastery on Lindisfarne in AD 635 on land granted by Oswald, King of Northumbria, who had a residence at nearby Bamburgh. The original monastery would have been a small community living and worshipping in humble buildings. The leadership of this small community later passed to Cuthbert, who was to become one of England's most famous saints, although Cuthbert himself sought further retreat by living as a hermit for some time on St Cuthbert's Island, and later on the island of Farne, where he died in AD 687. The monastery became increasingly wealthy during the latter part of the 7th century in what became known as the Golden Age of Northumbria.
- 3.12 The exact location, extent and arrangement of the pre-Conquest monastery remains unknown. However, contemporary historical sources do give an indication of some of the buildings present: two churches, a watch tower (HER 5364), guest house and dormitory (O'Sullivan & Young 1995, 42). These original buildings may lie beneath the later buildings on the site, although no archaeological evidence has been found to date to confirm this. In fact the lack of Anglo-Saxon finds from excavations in the later priory precinct may indicate that the earlier buildings were sited outside this area, the undated remains on the Heugh (see above) being an obvious candidate.
- 3.13 As a daughter house of the monastery on Iona the monastery on Holy Island might be expected to have modelled itself on that one (O'Sullivan 1989, 42). Excavations there have confirmed the presence of timber buildings and the practice of various crafts, including woodturning, leather, metal and glass working and possibly lime burning (O'Sullivan 1989, 128). Similar remains may well exist at Lindisfarne. The two documented churches included one built by Aidan in about AD 634, and a second, by Finan in the AD 650s and dedicated to St Peter. Both were timber

buildings but Bede records that at St Peter's Bishop Eadberht (688-98) "removed the thatch and covered both roofs and walls with lead" (O'Sullivan & Young 1995, 42).

- 3.14 The Northumbrian Golden Age came to a violent end with the first recorded Viking raid of 793. Continuing raids forced the monks to flee the island in 875, taking the remains of St Cuthbert with them. The St Cuthbert community eventually settled in Durham. However, archaeological evidence suggests that for many people life continued on the island. The settlement at Green Shiel in the north of the island was occupied during the ninth century. Remains of processed rye cereal have been found beneath the fort on the Heugh. Rye was particularly abundant in southern Scandinavia and tends to be associated with Viking occupation. Some of the architectural features of St Mary's Church are Anglo-Saxon in date which suggests that either the church survived the Viking raids, or that it was rebuilt. Assorted cross fragments all date from after the Viking invasions, suggesting a continuing Christian presence after the monastic community fled.
- 3.15 A ditch at the Winery site (HER 14259), which was stratigraphically below identifiable medieval deposits, produced a composite bone comb of 9th- to 11th-century date, and is therefore likely to be of this date. A number of undated features in a similar stratigraphic position were also present.

#### **The later medieval period (1066 to 1540)**

- 3.16 The monastery was re-founded by the Bishop of Durham in about 1082. It is an important example of a small Benedictine house re-founded as a cell of Durham Cathedral. It is the remains of this re-foundation that are visible today. The priory was partially fortified during the Scottish Wars and survived them undamaged. It was dissolved in 1537 and in 1543 was let to the king's surveyor of victuals at Berwick. The connection between the priory and Durham was cut in 1613 and the island passed to the Crown.
- 3.17 In 1821 the foundations of the Norman apse were laid bare and a pavement of glazed bricks resting on lime revealed (Tomlinson 1888, 459-60). More was revealed when the site of the medieval priory was cleared in the 1880s by Sir William Crossman. A detailed description of the monastic plan based on both documentary evidence and archaeological investigation was published, however, this report pays little attention to the non-structural archaeological deposits (O'Sullivan 1985). The 1880s excavation uncovered the foundations of the various monastic buildings: the cloister-garth, dormitory, chapter-house, cemetery, calefactory, parlour, lavatory, kitchen, buttery, bakehouse and the prior's hall (Tomlinson 1888, 459-60). Further clearance of the site by the Ministry of Works before and after World War I resulted in the discovery of many medieval finds and fragments of Anglo-Saxon sculpture (O'Sullivan 1985, 27-8). A geophysical resistivity survey by Leicester University in 1984/5 in the Sanctuary Close revealed the south line of the south cloister walk, the north wall of the south range, and indications of a range of buildings parallel with the west wall of the outer court (Beavitt *et al* 1987, 1-23).
- 3.18 The remains of a medieval boundary cross (SAM 24609; HER 5345) are situated on an artificially scarped platform on Heugh Hill, to the east of the coastguard look-out. It has been suggested that it marks the southern boundary of the monastic precinct of Lindisfarne Priory. The rectangular socket stone is all that now survives. On land between the priory and the harbour, two other possible boundary stones have been

found although, unless more are found, it is not possible to say with certainty whether these stones do form a boundary to the Benedictine priory.

### **The post-medieval period (1541 to 1899)**

- 3.19 The island had strategic importance during the unrest that existed between Scotland and England from the 13th century until the 17th century. A sheltered harbour and close proximity to the Scottish border made it an obvious choice to station a garrison and a military supply base. Bulwarks were built to defend the island in 1542 and later, in 1549, an artillery fort was constructed on Beblowe Crag, on the site now known as Lindisfarne Castle. Following the Act of Union in 1603, the risk of attack from Scotland was removed, but in its place there was a perceived threat from Dutch Privateers on the east coast. To help combat this, a fort was constructed in 1671 on the eastern end of the Heugh, overlooking the harbour (HER 5339).
- 3.20 A military supply base, 'The Palace' (HER 5363), lies on the eastern edge of the village. It is known from documentary evidence to have been a medieval house latter used as a Tudor supply base with brewhouse and bakehouse. Its name is probably a corruption of its earlier name of Harbottle Place. At the beginning of the 15th century it belonged to John Jenkyn who later sold it to a John Harbottle of Berwick. In 1514 part of it was sold to the Prior of Durham and when the monastery was dissolved it was passed, along with the monastery, to the Crown. The remains of some of the buildings suggest that the medieval fabric still survives. The layout of the site suggests that it was a courtyard house. The surviving remains were excavated in 2000 (Event 13172) and confirmed the survival of the brewhouse and the brewing vats depicted on a plan of 1548. It also confirmed that this supply base was constructed out of an earlier, medieval complex.
- 3.21 One of the main industries on Holy Island during the 18th and 19th centuries was lime production for agricultural improvements. These limeworks however lie outside the study area and towards the north and east of the island. Another important industry was fishing. The remains of upturned herring boats dating to the 19th century can still be seen at the harbour (HER 5270).
- 3.22 The fields of the island were enclosed in 1792. Enclosure maps of the whole island (NRO 683/9/2) and a detailed map of the town (NRO 683/9/1) survive, however, this latter map could not be traced by Berwick Records Office during our research in 2010.

### **Scheduled Ancient Monuments**

- 3.23 There are five Scheduled Ancient Monuments within the study area: Lindisfarne Priory pre-conquest monastery and post-conquest Benedictine cell (SAM 23235); the medieval chapel and associated building on St Cuthbert's Isle (SAM 24610); 'The Palace' medieval house and Tudor supply base (SAM 24601); the fort on the Heugh and underlying midden (SAM 24600); and the boundary cross 170m south-west of Herring House (SAM 24609). In addition, the disused lime kilns east of Lindisfarne Castle (SAM ND555) and the early medieval farmstead at Green Shiel in the north of the island (SAM 24655) are also scheduled. The whole of the island is a Conservation Area, and the island and its environs fall within the Northumberland Coast Area of Outstanding Natural Beauty and Heritage Coast.



## 4. Landuse, topography and geology

4.1 The surveys covered 13 fields of varied use (see table below).

Area	Size (ha)	Landuse	Topography	NGR
1	7.4	pasture; ungrazed	sloping from E down to W	NU 12386 42183
2	0.9	pasture; ungrazed	flat	NU 12558 42209
3	1.6	pasture; ungrazed	flat with steep bank at W	NU 12769 42410
4	0.3	pasture; ungrazed	flat	NU 12830 42376
5	0.3	grass; overflow car park	flat	NU 12740 42123
6	2.4	pasture; sheep	gently sloping from NW down to SE; ridge E/W	NU 12852 42081
7	0.7	pasture; sheep	gently sloping from NW down to SE	NU 12902 42197
8	1.6	overgrown; chicken sheds	flat	NU 12927 42296
9	1.0	meadow; half mown	flat	NU 12949 42392
10	1.4	meadow; cut	sloping from E down to W	NU 12403 41933
11	0.4	overgrown; scrub	sloping from E down to W; very steep at SW	NU 12499 41763
12	1.5	pasture; ungrazed	flat with ridge to SW	NU 12694 41744
13	0.3	meadow; uncut	flat	NU 12786 42199

4.2 The survey areas varied in height with elevations of between 5m and 15m OD.

4.3 The underlying solid geology of the area predominantly comprises Visean and Namurian limestone, sandstone, siltstone and mudstone strata of the Alston Formation, with Visean limestone of the Four Fathom Limestone Member in the east (Areas 7, 8 & 9). The Northern England Late Carboniferous Tholeiitic Dyke-Swarm runs along the southern edge of the island (detected in Areas 11 & 12). The bedrock is generally overlain by till in the west and raised gravel beach in the east, with smaller areas of blown sand and alluvium to the north-east of the village.

## 5. Geophysical survey Standards

5.1 The surveys and reporting were conducted in accordance with English Heritage guidelines, *Geophysical survey in archaeological field evaluation* (David, Linford & Linford 2008); the Institute for Archaeologists (IfA) *Standard and Guidance for archaeological geophysical survey* (2011); the IfA Technical Paper No.6, *The use of geophysical techniques in archaeological evaluations* (Gaffney, Gater & Ovenden 2002); and the Archaeology Data Service *Guide to Good Practice: Geophysical Data in Archaeology* (Schmidt & Ernenwein 2011).

### Technique selection

5.2 Geophysical survey enables the relatively rapid and non-invasive identification of sub-surface features of potential archaeological significance and can involve a suite of complementary techniques such as magnetometry, earth electrical resistance, ground-penetrating radar, electromagnetic survey and topsoil magnetic susceptibility survey. Some techniques are more suitable than others in particular situations, depending on site-specific factors including the nature of likely targets; depth of likely targets; ground conditions; proximity of buildings, fences or services and the local geology and drift.

5.3 In this instance it was considered likely that cut features such as ditches and pits would be present on the site, and that other types of feature such as trackways, wall

foundations and fired structures (for example kilns and hearths) might also be present.

- 5.4 Given the anticipated shallowness of targets and the predominantly non-igneous geological environment of the study area a geomagnetic technique, fluxgate gradiometry, was considered appropriate for detecting the types of feature mentioned above. This technique involves the use of hand-held magnetometers to detect and record anomalies in the vertical component of the Earth's magnetic field caused by variations in soil magnetic susceptibility or permanent magnetisation; such anomalies can reflect archaeological features.

### Field methods

- 5.5 A 30m grid was established across each survey area and related to known, mapped Ordnance Survey (OS) points and the National Grid using a Leica GS15 global navigation satellite system (GNSS) with real-time kinematic (RTK) corrections typically providing 10mm accuracy.
- 5.6 Measurements of vertical geomagnetic field gradient were determined using Bartington Grad601-2 dual fluxgate gradiometers. A zig-zag traverse scheme was employed and data were logged in 30m grid units. The instrument sensitivity was nominally 0.03nT, the sample interval was 0.25m and the traverse interval was 1m, thus providing 3,600 sample measurements per 30m grid unit.
- 5.7 Data were downloaded on site into a laptop computer for initial processing and storage and subsequently transferred to a desktop computer for processing, interpretation and archiving.

### Data processing

- 5.8 Geoplot v.3 software was used to process the geophysical data and to produce both continuous tone greyscale images and trace plots of the raw (minimally processed) data. The greyscale images and interpretations are presented in Figures 2-5; the trace plots are provided in Figure 6. In the greyscale images, positive magnetic anomalies are displayed as dark grey and negative magnetic anomalies as light grey. Palette bars relate the greyscale intensities to anomaly values in nanoTesla.
- 5.9 The following basic processing functions have been applied to each dataset:

<i>clip</i>	clips data to specified maximum or minimum values; to eliminate large noise spikes; also generally makes statistical calculations more realistic
<i>zero mean traverse</i>	sets the background mean of each traverse within a grid to zero; for removing striping effects in the traverse direction and removing grid edge discontinuities
<i>destagger</i>	corrects for displacement of geomagnetic anomalies caused by alternate zig-zag traverses
<i>interpolate</i>	increases the number of data points in a survey to match sample and traverse intervals; in this instance the data have been interpolated to 0.25m x 0.25m intervals

### **Interpretation: anomaly types**

- 5.10 Colour-coded geophysical interpretation plans are provided. Three types of geomagnetic anomaly have been distinguished in the data:

<i>positive magnetic</i>	regions of anomalously high or positive magnetic field gradient, which may be associated with high magnetic susceptibility soil-filled structures such as pits and ditches
<i>negative magnetic</i>	regions of anomalously low or negative magnetic field gradient, which may correspond to features of low magnetic susceptibility such as wall footings and other concentrations of sedimentary rock or voids
<i>dipolar magnetic</i>	paired positive-negative magnetic anomalies, which typically reflect ferrous or fired materials (including fences and service pipes) and/or fired structures such as kilns or hearths

### **Interpretation: features**

#### **General comments**

- 5.11 Colour-coded archaeological interpretation plans are provided.
- 5.12 Except where stated otherwise in the text below, positive magnetic anomalies are taken to reflect relatively high magnetic susceptibility materials, typically sediments in cut archaeological features (such as ditches or pits) whose magnetic susceptibility has been enhanced by decomposed organic matter or by burning.
- 5.13 Series of parallel, weak, positive magnetic anomalies which almost certainly reflect former ridge and furrow cultivation have been detected across Areas 1, 6, 7, 12 and probably 10.
- 5.14 Small, discrete dipolar magnetic anomalies have been detected in all of the survey areas. These almost certainly reflect items of near-surface ferrous and/or fired debris, such as horseshoes and brick fragments, and in most cases have little or no archaeological significance. A sample of these is shown on the geophysical interpretation plan, however, they have been omitted from the archaeological interpretation plan and the following discussion. Dipolar magnetic anomalies have been detected along the edges of many of the survey areas; except where stated otherwise in the text below these anomalies reflect adjacent metal fences.
- 5.15 Some larger dipolar magnetic anomalies reflect igneous dykes and possibly debris from industrial activities; these are discussed below.

#### **Area 1**

- 5.16 The former ridge and furrow cultivation in this area is aligned broadly east/west with a clear positive magnetic anomaly aligned perpendicularly at the east end. This is likely to reflect a feature associated with the former agricultural practices, such as a field boundary or headland. No cartographic evidence has been found for this feature, though it is evident on Google Earth imagery from 2006.
- 5.17 Linear positive magnetic anomalies have been detected in this area, which almost certainly reflect soil-filled ditch features. Early OS editions show former field

boundaries in this area, and some of these anomalies are likely to relate to these. A strong positive magnetic curvilinear anomaly has been detected aligned broadly north-south in the centre of the area. This does not correspond to any historic OS feature, though its shape is identical to that of a former field boundary shown some 40m further east on historic mapping. This anomaly almost certainly reflects a former land boundary.

- 5.18 Several straight linear positive and negative magnetic anomalies have been detected in the east of the survey area, some aligned north/south, others aligned east/west. The magnetic response and regular nature of these anomalies probably reflects a system of land drainage.
- 5.19 A concentration of small dipolar magnetic anomalies has been detected at the north edge of the area. This reflects hardcore forming a track along the edge of the field. A very strong discrete dipolar magnetic anomaly near here corresponds to a metal sheep feeder.
- 5.20 A water tower stands at the south-east corner of the survey area, and a large and strong dipolar magnetic anomaly has been detected around it. A chain of dipolar magnetic anomalies detected to the north-east of this almost certainly reflects a ferrous pipe.

#### **Area 2**

- 5.21 A number of north-east/south-west aligned parallel magnetic anomalies have been detected in this area. These are likely to reflect a system of land drainage.
- 5.22 A strong positive magnetic anomaly has been detected along the west edge of the survey area, this reflects a banked field boundary.
- 5.23 North/south aligned striations evident within the data here almost certainly reflect a former ploughing regime.
- 5.24 A chain of dipolar magnetic anomalies crossing the southern part of this area reflects a continuation of the service pipe detected in Area 1 to the west.

#### **Areas 3 and 4**

- 5.25 A series of narrow, linear, positive magnetic anomalies has been detected across these areas, to both sides of a large open drainage ditch. These anomalies almost certainly reflect a system of land drainage.
- 5.26 A concentration of dipolar magnetic anomalies detected in the north-west of Area 3 corresponds to an area of scrub and probable made-ground, probably associated with the construction of either the sewage works to the north or the car park to the west.

#### **Area 5**

- 5.27 Concentrations of strong dipolar magnetic anomalies have been detected in this overspill car park area. These almost certainly reflect made-ground, hardcore tracks and other landscaping works for the construction of the car park.
- 5.28 Two linear positive magnetic anomalies probably reflect land drains.

### **Areas 6 and 7**

- 5.29 Strong rectilinear positive magnetic anomalies have been detected in the south-west of Area 6. These almost certainly reflect soil-filled features, and could reflect former ditches or the in-filled remains of foundation trenches. Large and strong dipolar magnetic anomalies near these features could indicate some small-scale industrial activity.
- 5.30 A broadly north-east/south-west aligned negative magnetic anomaly, flanked by two positive magnetic anomalies, has been detected bisecting these fields. This corresponds to an earthwork ridge. These anomalies may reflect a former track, although there is no early OS depiction of this.
- 5.31 Broad and diffuse positive magnetic anomalies, aligned north-east/south-west, north of the former track, could reflect former ridge and furrow cultivation of these areas. These features appear to respect the line of the track and may be contemporary with it.
- 5.32 A strong rectilinear dipolar magnetic anomaly has been detected in the south of Area 6. This corresponds to a stone and earth bank on the ground and a former field boundary as shown on early editions of the OS.
- 5.33 Linear negative magnetic anomalies are likely to reflect a system of land drains.
- 5.34 Very strong dipolar magnetic anomalies detected along the western edge of Area 6 reflect buildings and parked cars.
- 5.35 Several large, intense dipolar magnetic anomalies were detected in the south of Area 6 and elsewhere. These almost certainly reflect buried ferrous objects.
- 5.36 Strong dipolar magnetic anomalies detected in the north-east corner of Area 7 reflect an adjacent metal shed.

### **Area 8**

- 5.37 A concentration of strong, rectilinear dipolar magnetic anomalies has been detected across the southern part of this area. These anomalies correspond to parch marks visible on Google Earth images from 2003 and almost certainly reflect the foundations for a row of cells or pens, such as pig-houses. Similar structural foundations can be seen in the south-east corner of the area.
- 5.38 A line of small dipolar magnetic anomalies has been detected across the northern part of the area, aligned north-west/south-east. These correspond to former field boundary shown by the OS. A second former field boundary is shown to the south and follows the line of an anomaly likely to reflect a field drain.
- 5.39 A series of strong positive magnetic anomalies arranged in a 'herring-bone' formation has been detected. These anomalies almost certainly reflect fired clay land drains.
- 5.40 Large discrete dipolar magnetic anomalies and small unsurveyed areas here correspond to metal chicken huts and telegraph poles.

### **Area 9**

- 5.41 Weak, parallel, positive and negative magnetic anomalies have been detected in this area. These are likely to reflect a former ploughing regime.

### **Area 10**

- 5.42 A number of strong, linear positive magnetic anomalies have been detected in the north of this area, which are likely to reflect soil-filled ditch features. Weaker linear anomalies, which probably reflect traces of ridge and furrow cultivation parallel to those detected to the north in Area 1, have compounded the many anomalies recorded in this area. Some of the stronger anomalies are aligned with existing thoroughfares and appear to define former continuations of both Marygate and Prior Lane across this field towards the coast; these anomalies would therefore reflect ditches flanking those lanes.
- 5.43 The concentration of ditches in this area, coupled with the field's proximity to the village, may reflect a change from ridge and furrow cultivation in the hinterland to smaller scale burgage plots around the settlement.
- 5.44 Several linear negative magnetic anomalies have also been detected in this area, which may reflect stone land drains or possibly even wall-footings.
- 5.45 The concentration and strength of magnetic anomalies increases towards the south of the area. This could be a reflection of intrusive igneous geological debris related to the nearby dyke to the south, or possibly a concentration of industrial activity. There are a number of large, strong, discrete magnetic anomalies on the south side of the possible continuation to Prior Lane; these could possibly be associated with kilns or ovens or other industrial activities.
- 5.46 One intense anomaly in the south-western corner of this survey is probably associated with an igneous dyke detected more clearly in Area 11, below.

### **Area 11**

- 5.47 Large and strong dipolar magnetic anomalies have been detected in this area. The strong linear anomaly detected near the western edge of the area almost certainly reflects a geological feature. It is almost certainly a dyke of the Northern England Late Carboniferous Tholeiitic Dyke-Swarm, which is known along the southern edge of the island. Some of the other strong anomalies here are likely to reflect igneous material which has weathered out of the dyke, however, some structure is also evident amongst the anomalies, which will almost certainly reflect features of possible interest.
- 5.48 For example, a strong sinuous positive magnetic anomaly in the north probably reflects the course of a former track or path to Jenny Bell's Well on the coast, and strong linear anomalies in the east of the area could reflect former plot boundaries there.

### **Area 12**

- 5.49 Strong linear magnetic anomalies have been detected in the west of this area, close to the known remains of the priory. The anomalies appear to reflect two sets of rectilinear wall-footings forming a quadrangle or cloister-type structure measuring approximately 35m north/south; the east/west dimension is not so clear, as the

anomalies are obscured by others in the west, but appears to be similar or shorter in length.

- 5.50 A number of other strong positive magnetic anomalies have also been detected in this area, which could reflect former ditches or foundation trenches. There are two sets of such anomalies forming rectilinear features to the north and north-east of the quadrangle; one shares an east/west alignment with the known priory buildings and the quadrangle, while the other is aligned north-east/south-west. Another similar anomaly, with three sides detected, has been detected parallel to and north of this latter feature. Both the larger rectilinear features measure approximately 20m in length and up to 15m in width, and all three features could be associated with former buildings, though not necessarily contemporary.
- 5.51 A broad band of small dipolar magnetic anomalies has been detected near the south-eastern corner of the quadrangle, heading south-east towards the coast. These anomalies probably reflect a former track.
- 5.52 A wide and strong dipolar magnetic anomaly has been detected across the southern part of the area as the land rises towards the Heugh. This reflects a dyke of the Northern England Late Carboniferous Tholeiitic Dyke-Swarm, also evident in Areas 10 and 11.
- 5.53 A north/south aligned chain of dipolar magnetic anomalies has been detected in this area. This almost certainly reflects a service which runs parallel to the east side of the building detected above. The asphalt public footpath that runs north-west/south-east across Sanctuary Close has been detected as a strong dipolar magnetic anomaly, almost certainly due to the underlying hardcore.

### **Area 13**

- 5.54 Very strong dipolar magnetic anomalies detected at the north of this area reflect the buildings of St Coomb's Farm and possibly buried services also.
- 5.55 Parallel negative magnetic anomalies in this area probably reflect land drains.

## **6. Conclusions and recommendations**

- 6.1 Approximately 20ha of geomagnetic survey was undertaken at Holy Island as part of a research project directed by Dr David Petts.
- 6.2 The remains of structures which could be associated with the priory, including a large quadrangle, have been detected in Sanctuary Close (Area 12). Two other possible former structures on a different alignment may be from a different phase of activity at the site. Various probable soil-filled ditches and a probable former track were also detected in this area.
- 6.3 Possible structural remains and anomalies which could relate to industrial practices have been detected in Area 6. Further anomalies which could relate to industrial activities have also been detected in Areas 10 and 11.
- 6.4 Probable former continuations of Marygate and Prior Lane have been detected extending across Area 10 to the coast.

- 6.5 Further features relating to the former exploitation of Holy Island have been identified, including ridge and furrow cultivation, possible burgage plots, former tracks and field boundaries, some of which are recorded on early OS map editions.
- 6.6 Dykes associated with the Northern England Late Carboniferous Tholeiitic Dyke-Swarm have been identified in Areas 10, 11 and 12.
- 6.7 Services have been detected in Areas 1, 2 and 12.
- 6.8 Probable land drains have been identified in Areas 1-8, 10 and 13.
- 6.9 Made-ground has been identified in Areas 3 and 5.
- 6.10 More recent structures, such as a probable row of pig-sheds or similar, have been detected in Area 8.

### Recommendations

- 6.11 Earth resistance survey would almost certainly help to determine the nature and extent of the probable structural remains, and other features, detected in these geomagnetic surveys. Resistance survey would be particularly useful in Sanctuary Close (Area 12), the immediate priory environs and Areas 10 and 11, since unlike geomagnetic survey the technique would not be adversely affected by the igneous dykes there or any concentrations of ferrous/fired debris.

## 7. Sources

- Archaeological Services 2010a *The Rocket Field, Holy Island, Northumberland: heritage statement*. Unpublished report **2456**, Archaeological Services Durham University
- Archaeological Services 2010b *The Lookout Tower, Holy Island, Northumberland: heritage statement*. Unpublished report **2457**, Archaeological Services Durham University
- Beavitt, P, O'Sullivan, D, & Young, R, 1987 Fieldwork on Lindisfarne, Northumberland, 1980-1988. *Northern Archaeology* **8**, 1-27
- Cartwright, RA, & Cartwright, DB, 1976 *The Holy Island of Lindisfarne and the Farne Islands*. London
- Crossman, W, 1892 The Recent Excavations at Holy Island Priory, *History of the Berwickshire Naturalists Club* **13**, 225-240
- David, A, Linford, N, & Linford, P, 2008 *Geophysical Survey in Archaeological Field Evaluation*. English Heritage
- Gaffney, C, Gater, J, & Ovenden, S, 2002 *The use of geophysical techniques in archaeological evaluations*. Technical Paper **6**, Institute of Field Archaeologists
- IfA 2011 *Standard and Guidance for archaeological geophysical survey*. Institute for Archaeologists
- O'Sullivan, D, 1989 The plan of the early Christian monastery on Lindisfarne: a fresh look at the evidence in G Bonner, DW Rollarson and C Stancliffe (eds) *St Cuthbert, his cult and his Community to AD 1200*. Woodbridge
- O'Sullivan, D, & Young, R, 1995 *Book of Lindisfarne Holy Island*. London
- Schmidt, A, & Ernenwein, E, 2011 *Guide to Good Practice: Geophysical Data in Archaeology*. Archaeology Data Service



Tomlinson, WW, 1888 *Comprehensive Gide to the County of Northumberland*.  
London



426

© Crown Copyright/database right 2011. An Ordnance Survey/EDINA supplied service

# ARCHAEOLOGICAL SERVICES DURHAM UNIVERSITY

424

on behalf of  
Dr David Petts  
Durham University

422

Holy Island (Lindisfarne)  
Northumberland

420

geophysical survey  
report 3029

Figure 2: Geophysical survey overview

418

0 200m  
scale 1:4000 for A3 plot

416

 magnetic survey

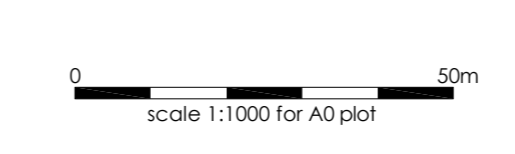
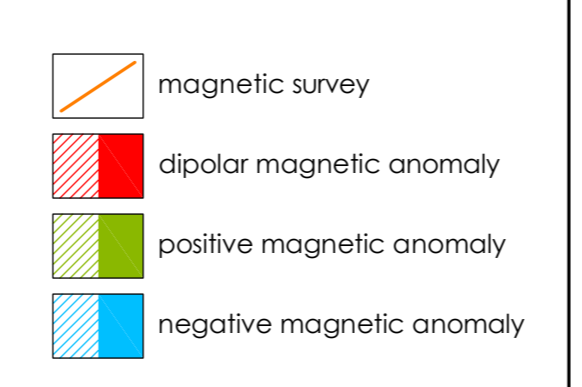




on behalf of  
Dr David Petts  
Durham University

**ARCHAEOLOGICAL SERVICES**  
DURHAM UNIVERSITY

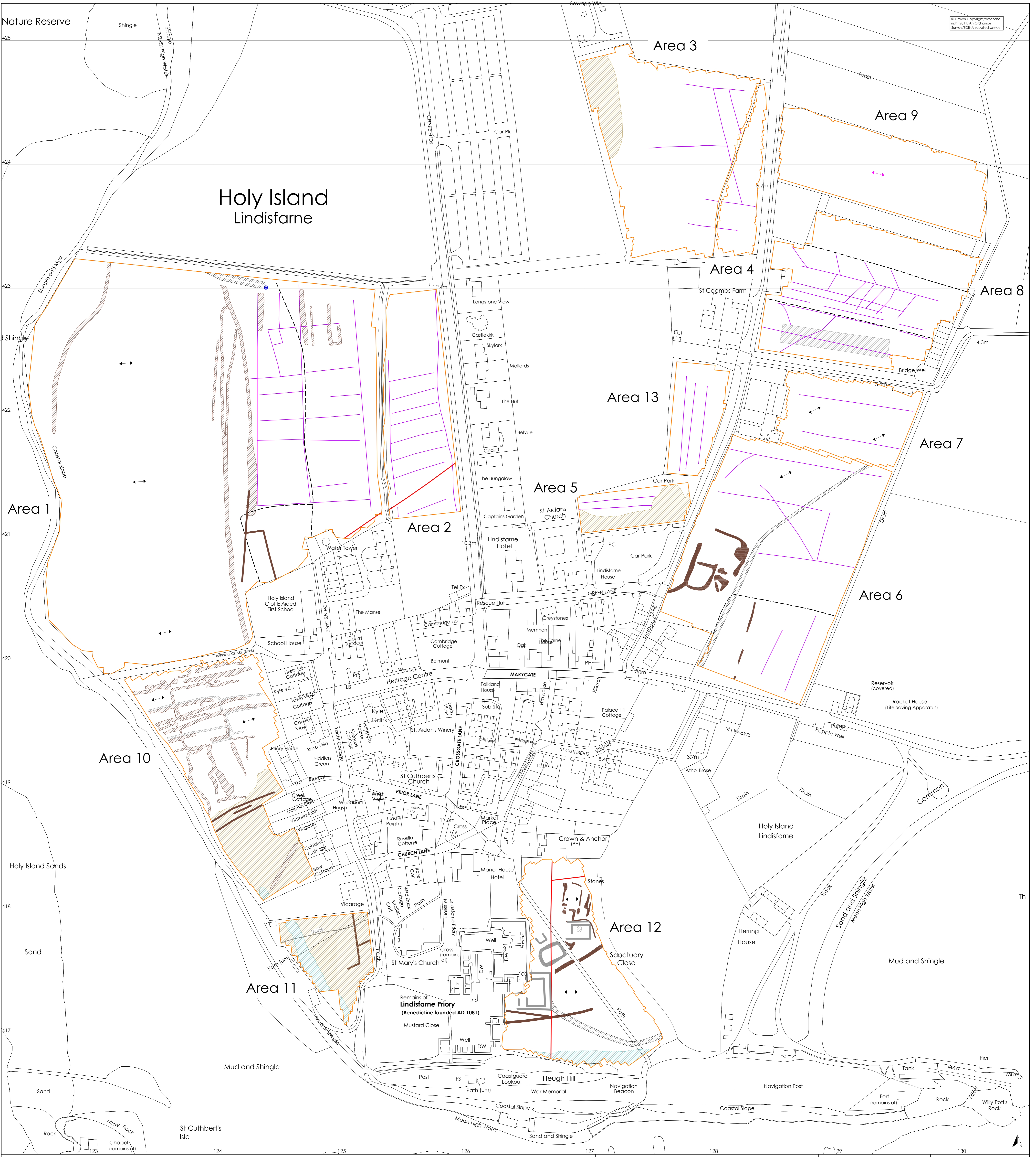
Holy Island (Lindisfarne)  
Northumberland  
geophysical survey  
report 3029  
Figure 3: Geophysical survey



on behalf of  
Dr David Petts  
Durham University

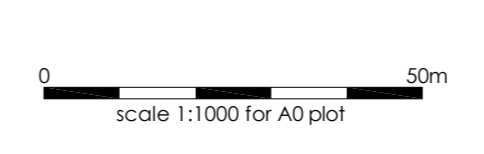
**ARCHAEOLOGICAL SERVICES**  
DURHAM UNIVERSITY

Holy Island (Lindisfarne)  
Northumberland  
geophysical survey  
report 3029  
Figure 4: Geophysical  
interpretation



# Holy Island Lindisfarne

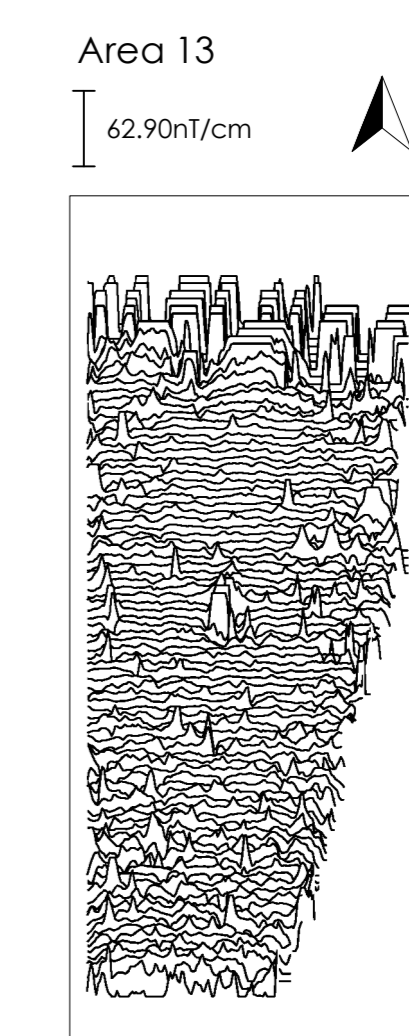
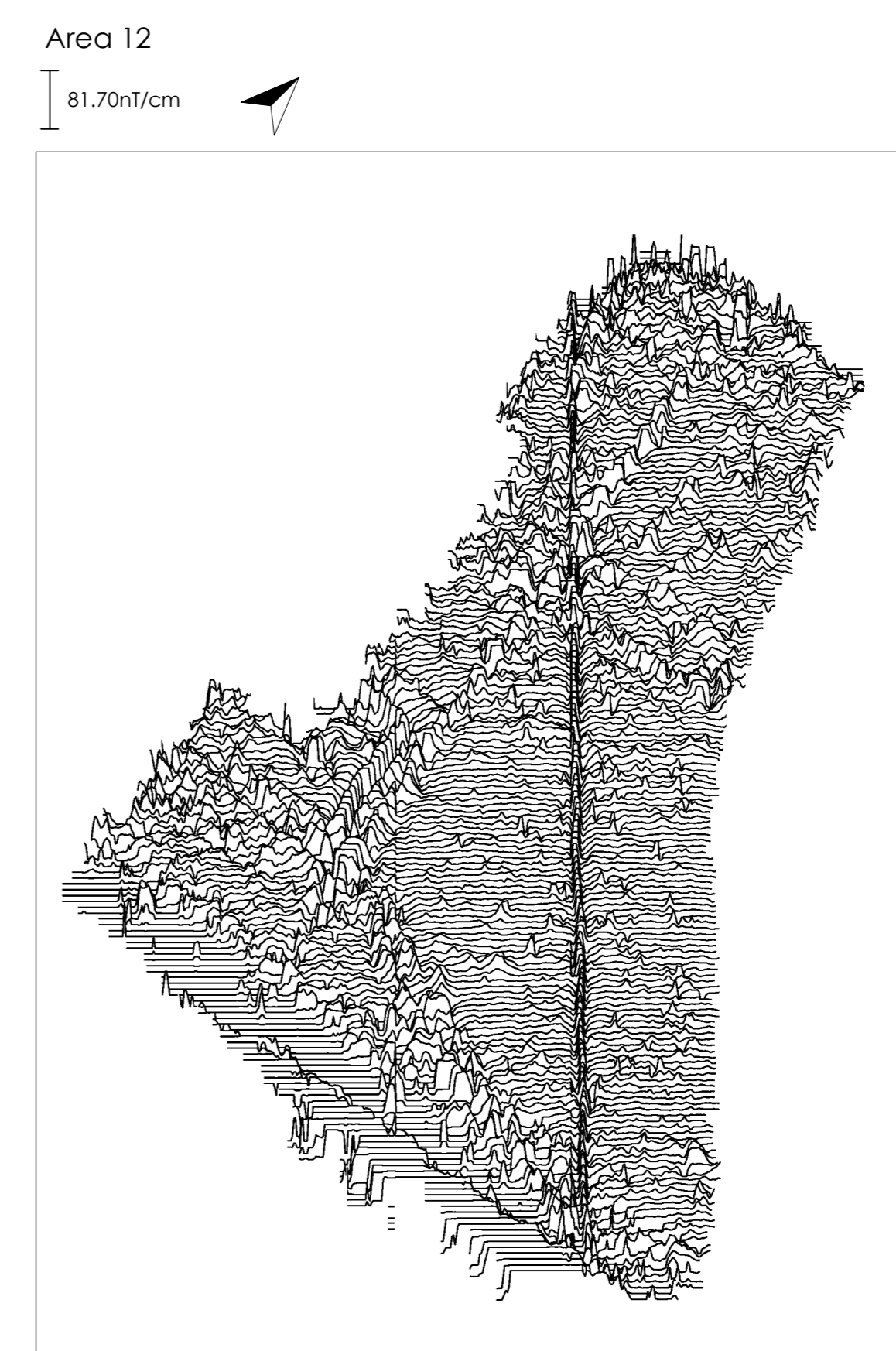
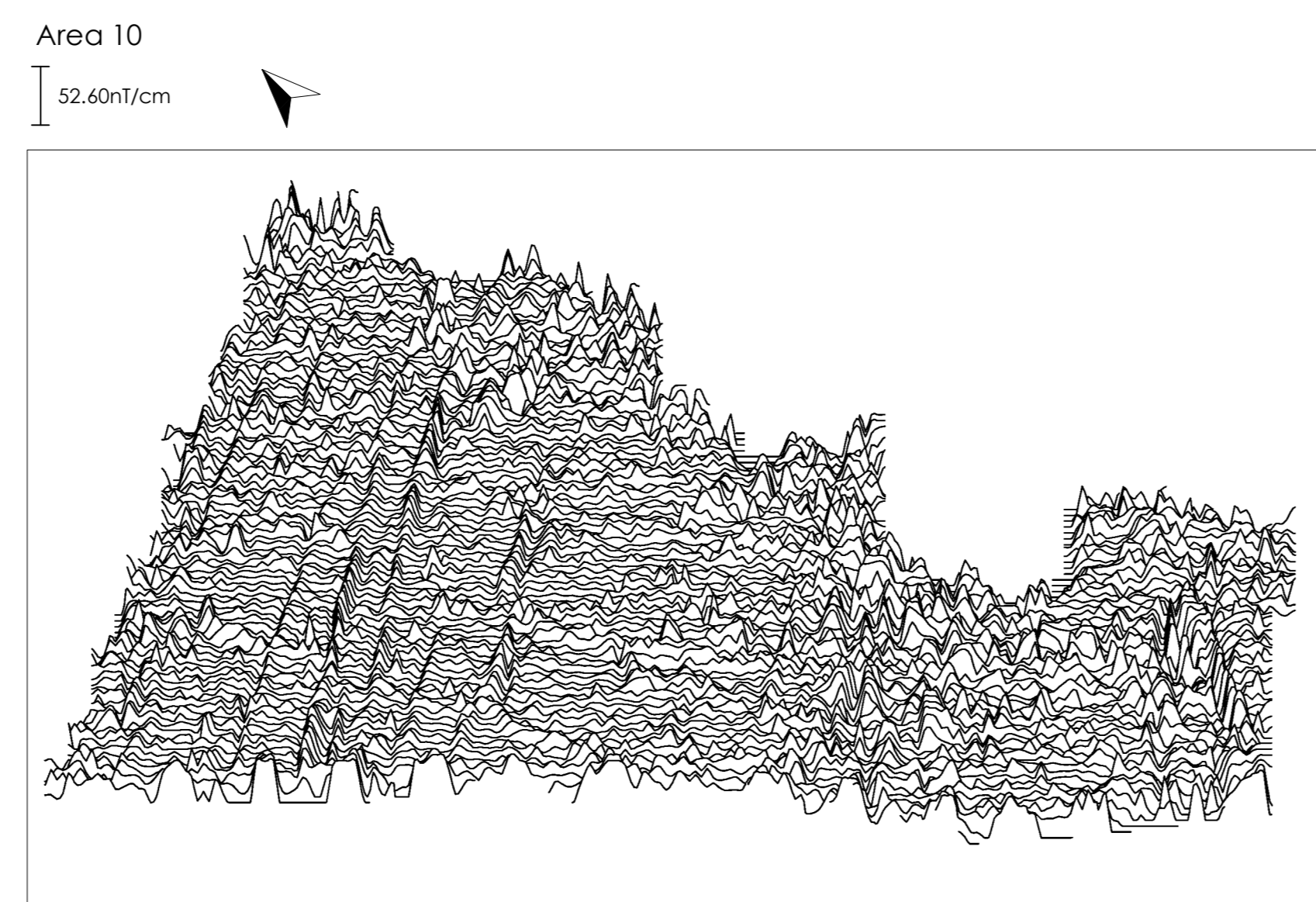
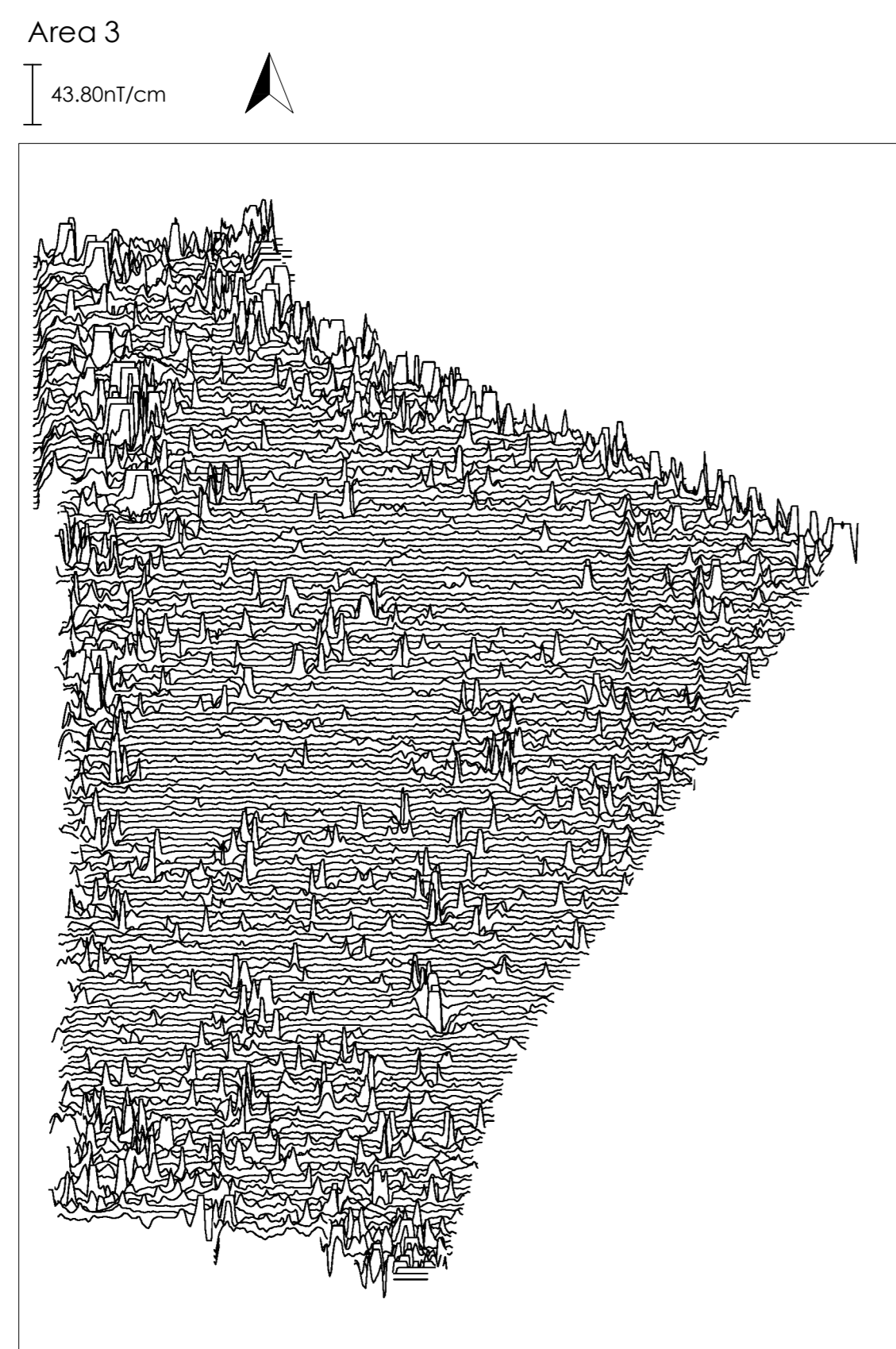
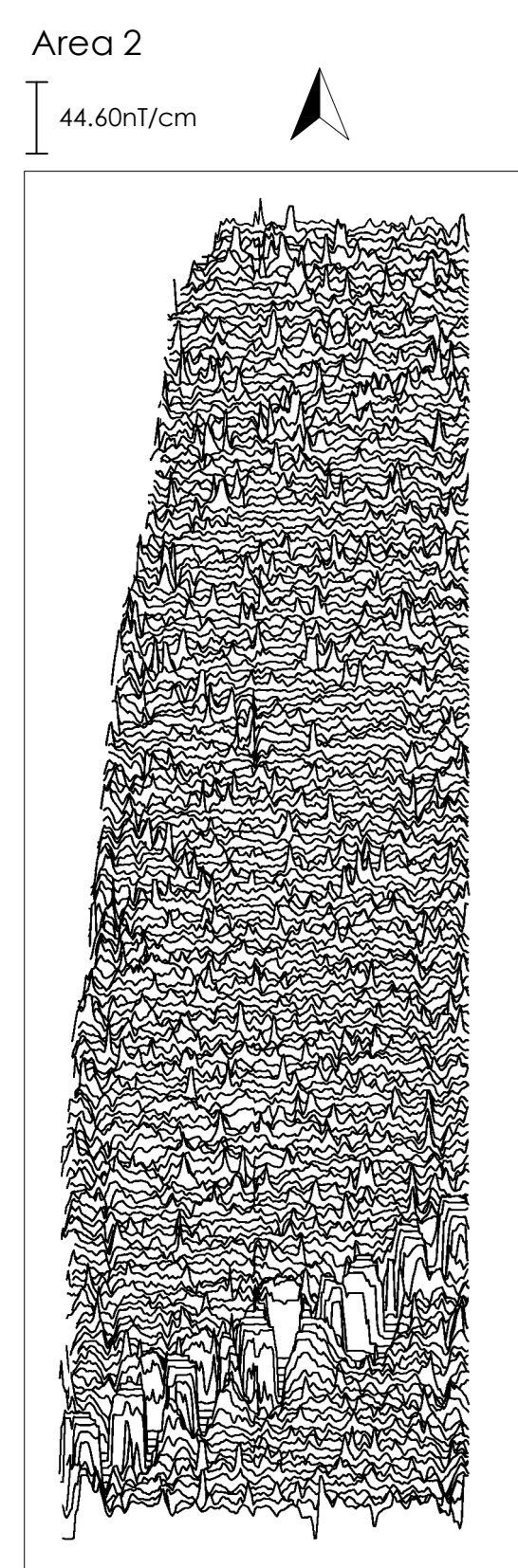
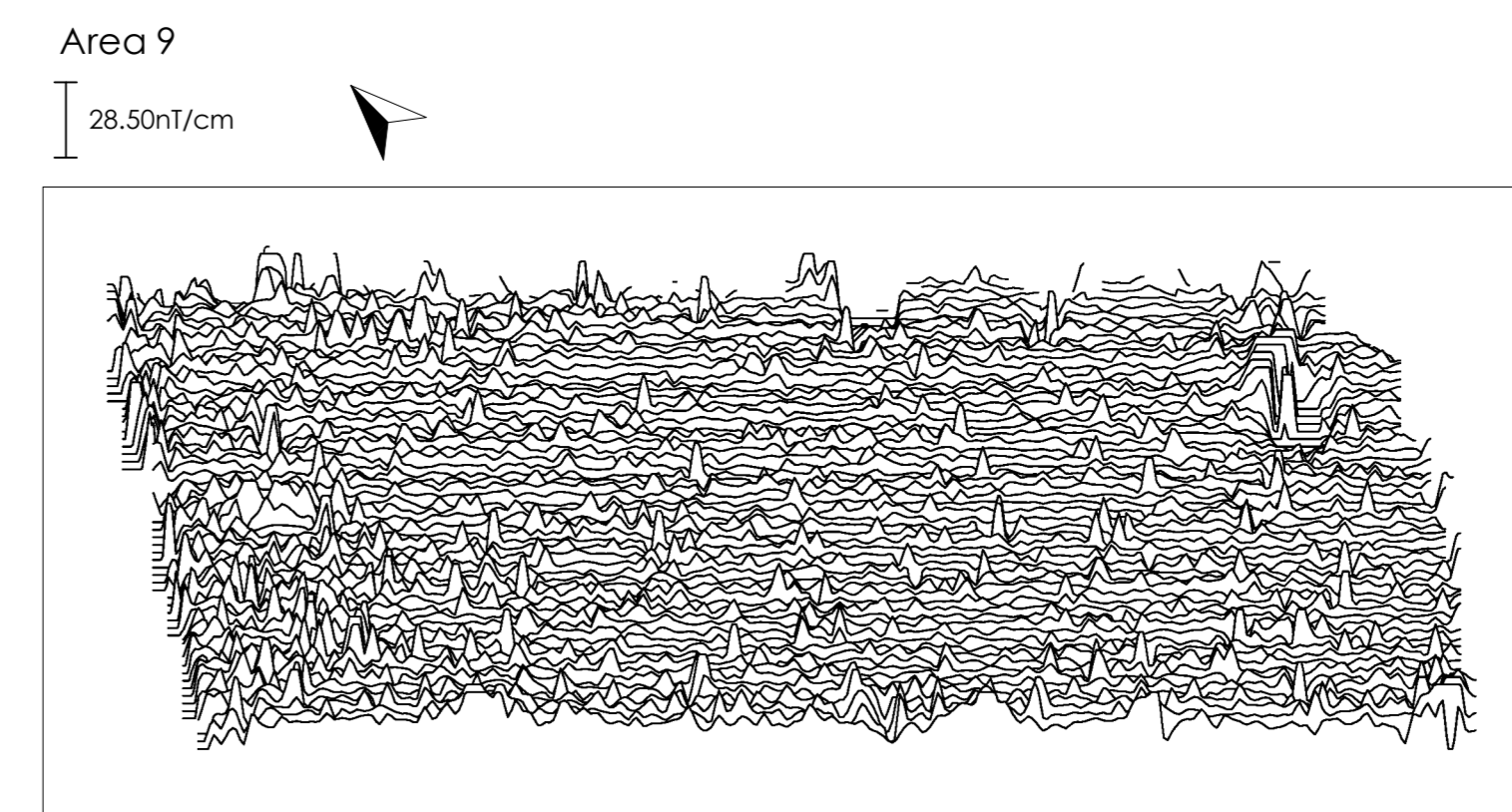
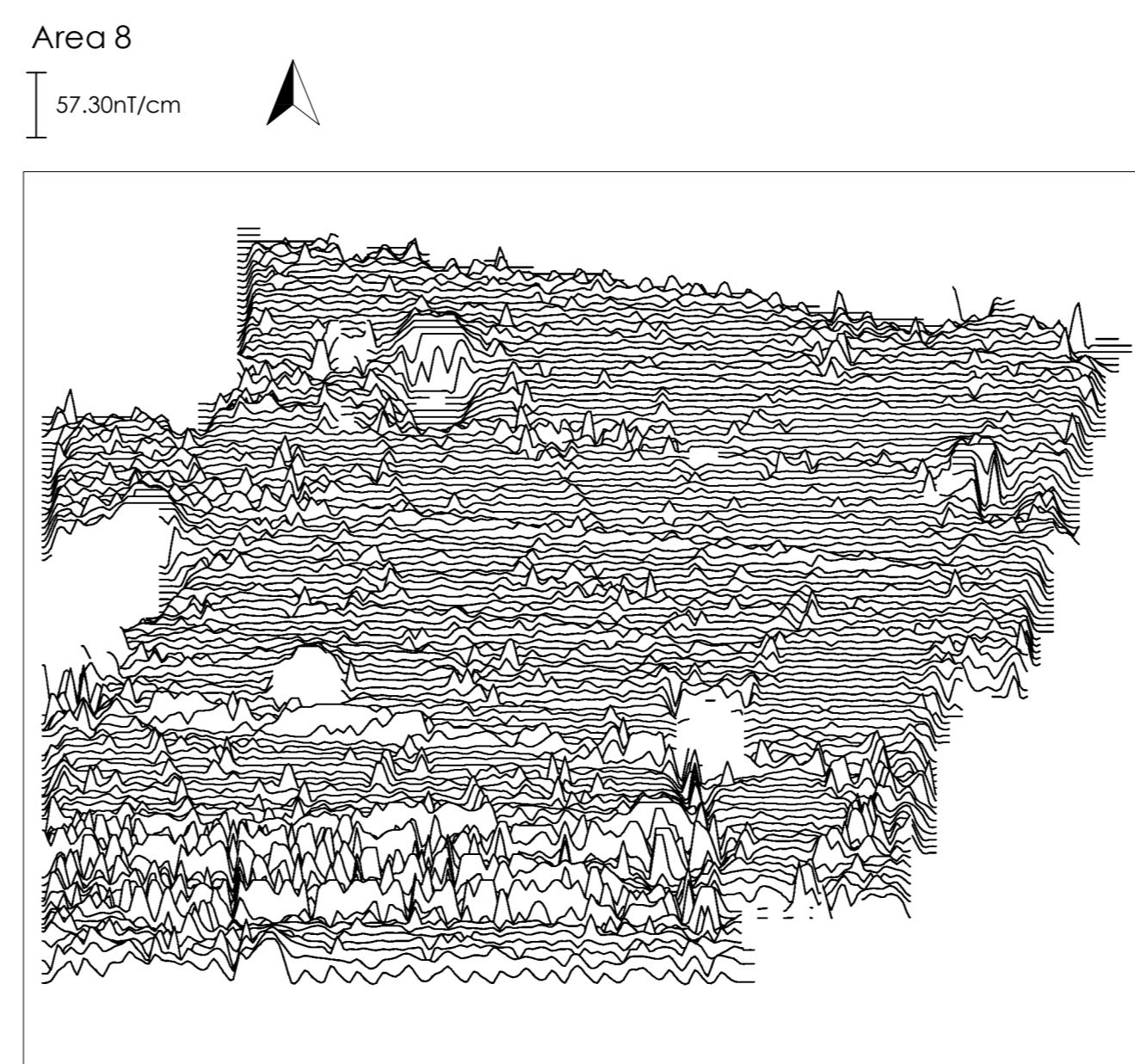
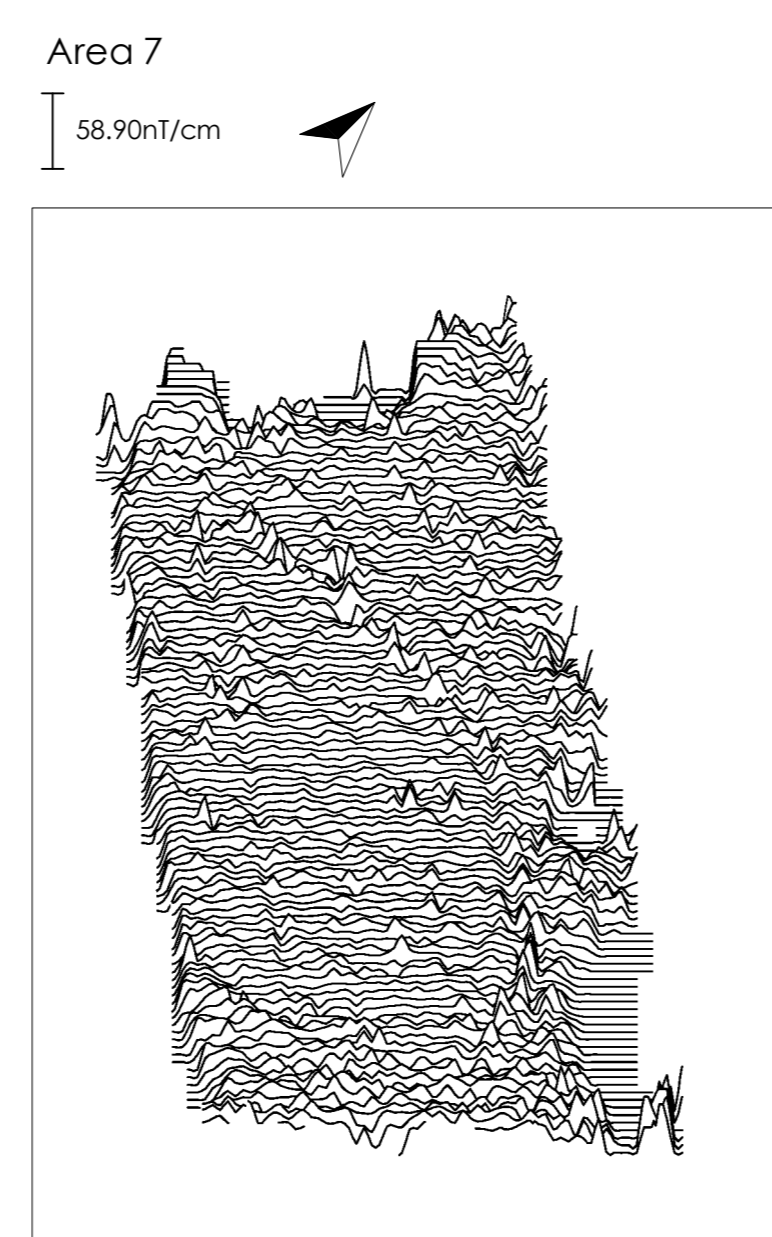
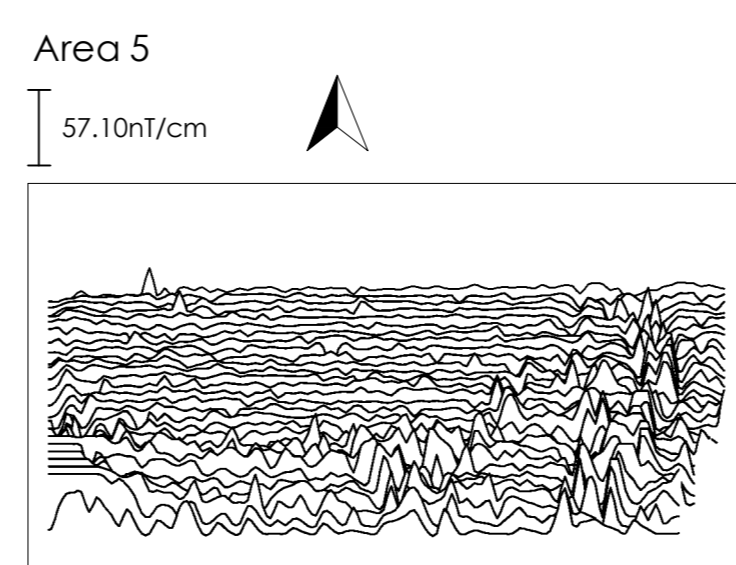
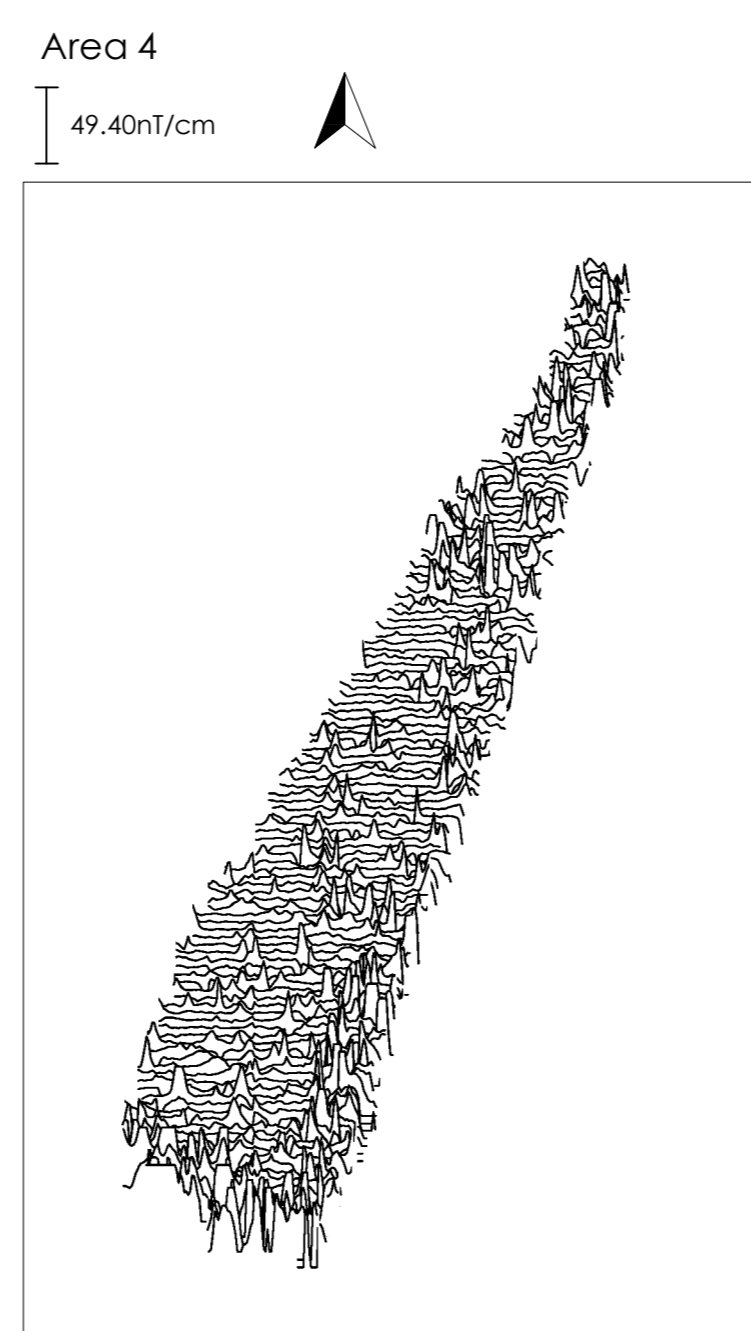
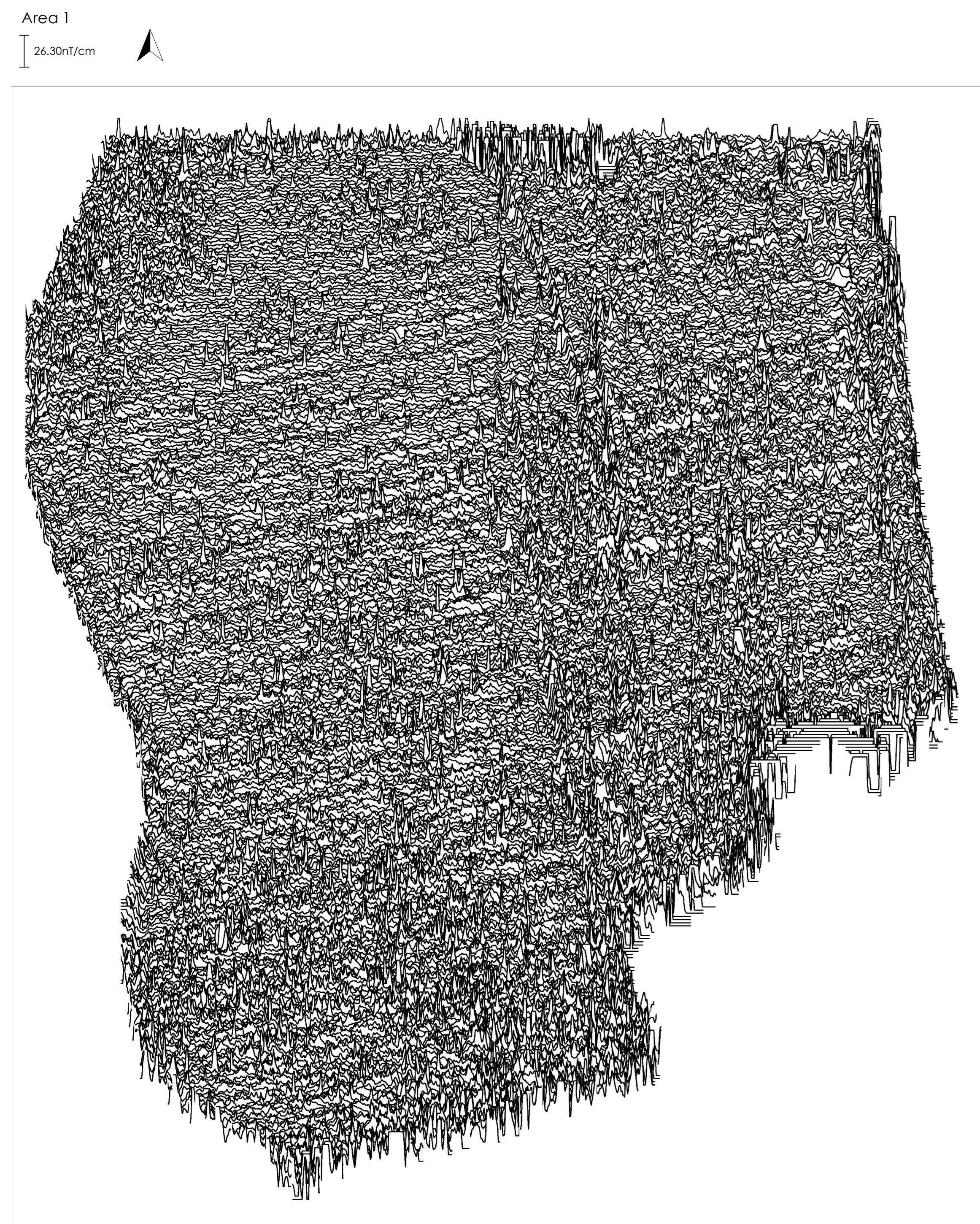
- magnetic survey
- soil-filled feature
- stone / rubble / structural remains
- disturbed area / made ground / industrial debris
- geological features
- service pipe
- ridge and furrow
- former ploughing
- former field boundary
- land drain
- sheep feeder
- track



on behalf of Dr David Petts Durham University

**ARCHAEOLOGICAL SERVICES**  
DURHAM UNIVERSITY

Holy Island (Lindisfarne) Northumberland  
geophysical survey report 3029  
Figure 5: Archaeological interpretation



0 50m  
scale 1:1000 for A0 plot

ARCHAEOLOGICAL SERVICES  
DURHAM UNIVERSITY

on behalf of  
Dr David Petts  
Durham University

Holy Island (Lindisfame)  
Northumberland  
geophysical survey  
report 3029

Figure 6: Trace plots of geomagnetic data