

# **Clarendon Palace Wiltshire**

## **GROUND PENETRATING RADAR SURVEY REPORT**

for

**Warhorse Project, Department of Archaeology,  
University of Exeter**

David Sabin and Kerry Donaldson

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**Clarendon Palace  
Wiltshire**

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University of Exeter**

Fieldwork and report by David Sabin (BSc Hons) MCIfA and Kerry Donaldson (BSc Hons)

Survey dates - 26<sup>th</sup> & 27<sup>th</sup> April 2021

Ordnance Survey Grid Reference - Area A SU 18137 30122 and Area B SU 18137 30122

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## SUMMARY

Ground penetrating radar (GPR) survey carried out by Archaeological Surveys Ltd targeted two separate areas at Clarendon Palace in Wiltshire. The survey aimed to provide information relating to structural remains possibly associated with medieval stables. Several features of archaeological interest were located around these structures but very few features were identified within the interiors. In the south western part of the site a crossing wall was located in the interior of a building regarded as the 'great stable'. To the west of the building the remains of a substantial wall was located and this has been interpreted as part of the perimeter wall, although it appears to have been largely robbed away. A formal road/track heading east from the western gatehouse was also identified as well as potential structural remains to the north of an adjacent building referred to as the 'old hall'. Possible stables were targeted in the south eastern part of the site, and the survey has clarified the layout of several structures within this area and identified possible structural remains further to the west. Two possible ditch-like features were identified and these may be associated with the most southerly building. Linear anomalies appear below the adjacent inner earthen bank, associated with the bank and ditch boundary feature running through the southern part of the site, but it is unclear whether they relate to part of the construction of the bank or a pre-existing feature.

## 1 INTRODUCTION

### 1.1 *Survey background*

- 1.1.1 Archaeological Surveys Ltd was commissioned by Professor Oliver Creighton (University of Exeter) on behalf of the AHRC-funded research project 'Warhorse: Archaeology of a Medieval Revolution' (based at the University of Exeter and the University of East Anglia) to undertake a ground penetrating radar survey (GPR) at Clarendon Palace in Wiltshire. The survey aims to provide information on the archaeological potential of two areas of structural remains that have been identified as potential stables within the palace complex.
- 1.1.2 The geophysical survey was carried out in accordance with a Written Scheme of Investigation (WSI) produced by Archaeological Surveys (2021) and under licence granted by Historic England under Section 42 of the 1979 Ancient Monuments and Archaeological Areas Act (as amended by the National Heritage Act 1983). Clarendon Palace is a Scheduled Ancient Monument (List Entry No. 1002996, which includes the buildings, gardens and the inner park pale).

### 1.2 *Survey objectives and techniques*

- 1.2.1 The GPR survey intended to map the character of the below-ground remains of two putative stable structures and related archaeological deposits. This

information is intended to feed into a second proposed phase of work, to comprise excavation of a small test pit/test pits for sampling of environmental deposits by the University of Exeter.

- 1.2.2 Geophysical survey can provide useful information on the archaeological potential of a site; however, the outcome of any survey relies on a number of factors and as a consequence results can vary. The success in meeting the aims and objectives of a survey is, therefore, often impossible to predetermine.

### 1.3 *Standards, guidance and recommendations for the use of this report*

- 1.3.1 The survey and report follow the recommendations set out by: European Archaeological Council (2015) *Guidelines for the Use of Geophysics in Archaeology*; Institute for Archaeologists (2002) *The use of Geophysical Techniques in Archaeological Evaluations*. The work has been carried out to the Chartered Institute for Archaeologists (2014) *Standard and Guidance for Archaeological Geophysical Survey*.
- 1.3.2 Archaeological Surveys Ltd carries out ground penetrating radar surveys under a Wireless Telegraphy Act licence from Ofcom (No. 078907/01). It is operated in accordance with Ofcom regulations (OfW 350 Requirements and Guidance Notes for Ground Probing Radar).
- 1.3.3 Archaeological Surveys Ltd provide a detailed geophysical survey report and it is recommended that where possible the contents should be considered in full. The Summary provides a brief overview of the results with more detail available in the Discussion and/or Conclusion. The *List of anomalies* within the Results provides a detailed assessment of the anomalies within separate categories which can be useful in inferring a level of confidence to the interpretation. Quality and factors influencing the interpretation of anomalies is also set out within the results.
- 1.3.4 It is recommended that the full report should always be considered when using data and interpretation plots; where this is not possible, in the field for example, the abstraction and interpretation plots should retain their colour coding and be used with a corresponding legend.
- 1.3.5 Where targeting of anomalies by excavation is to be carried out, care should be taken to place trenches over solid lines or features visible on the abstraction and interpretation plots. Archaeological Surveys abstraction and interpretation avoids the use of dashed or dotted line formats, and broken or fragmented lines used in interpretive plots may well correspond closely with truncation of archaeological features.

#### 1.4 Site location, description and survey conditions

- 1.4.1 The site is located within the remains of Clarendon Palace, in the parish of Clarendon Park, 3.7km east of the centre of Salisbury in Wiltshire, see Fig01. Two areas within the site have been selected for GPR survey based on the putative stables within the south west Area A at SU 18137 30122 and south east Area B at SU 18137 30122.
- 1.4.2 Due to the presence of upstanding masonry, depressions and rough vegetation producing an uneven ground surface, Area A was targeted with three separate survey zones, A1 covered the open ground to the north and north west of the stable block, A2 covered the gravelled interior of the east west aligned 'great stable' and a small area to the west and A3 the gravelled interior of a north south aligned structure to the north east of the stable block, previously identified as the possible old hall and/or the Treasurer's Chamber.

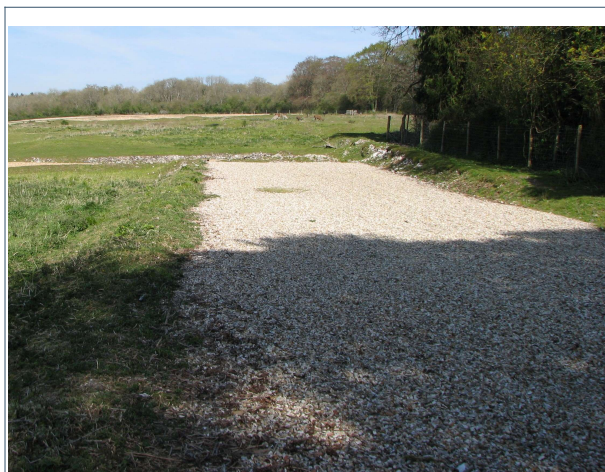


Plate 2: Area A2 'great stable' looking east

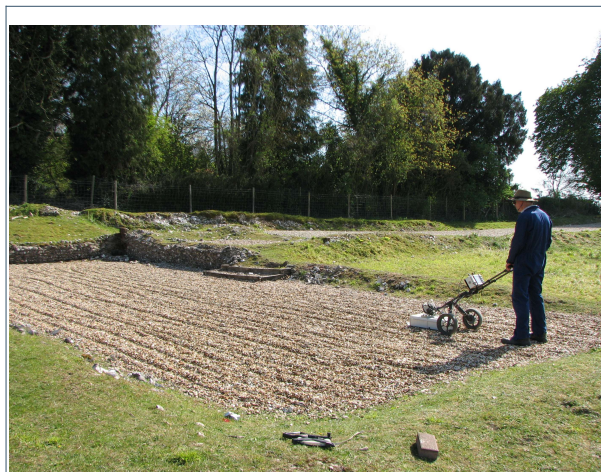


Plate 1: Area A3 'old hall' looking south west

- 1.4.3 Area B is situated 190m east north east of Area A and includes another putative stable block in the south eastern part of the site. Due to the presence of rough vegetation including tree stumps, the western part of the originally outlined 40m block was not suitable for survey. The survey area was, therefore, restricted to only the open, relatively flat, grassed area within this part of the site.





Plate 3: Area B looking south east

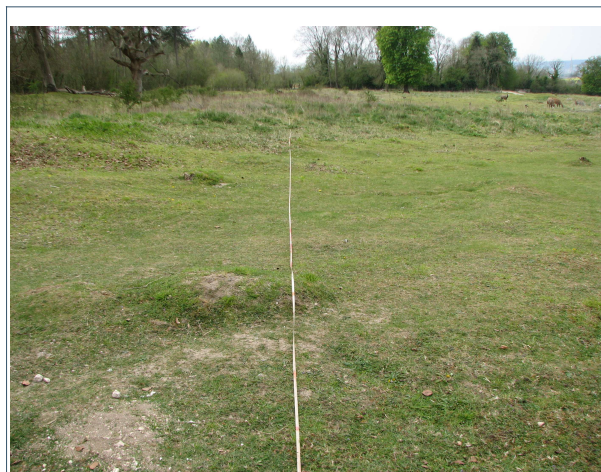


Plate 4: Area B looking south west towards rough vegetation

## 1.5 Site history and archaeological potential

- 1.5.1 Clarendon Palace is a Scheduled Monument (List entry no. 1002996) which includes the buildings, gardens and inner park pale. The site has origins as a hunting lodge at least from the time of William I, and was established as a Royal Palace from the time of Henry II (1154-89), and at its height during the reign of Henry III (1216-1272). It fell into disuse during Tudor times and was abandoned so that it survived within woodland as ruins until the 20<sup>th</sup> century. A programme of tree clearance has been in practice in more recent years.
- 1.5.2 Documentary evidence for the construction of stables was recorded in March 1244 among the works to be carried out by the Sheriff of Wiltshire was the construction of a '*new stable ... extending lengthways from the south wall next to the gate as far as the old hall which is now a stable for the king's horses*'. This would indicate topographically that these stables were constructed along the southern wall to the south east of the western entrance (Area A). Excavations of this building in 1937 suggested that the plastered interior walls were scored vertically which suggested internal divisions, that may have separated stalls. A wide door jamb and windows and an internal oven were interpreted as later features.
- 1.5.3 Early in the reign of Henry IV (1399–1413) repair work is recorded on a '*stable by the deputy's wall*' its walls 63 ft (19 m) long, 6 ft (1.8 m) high and 2 ft (0.6 m) wide. Construction of a 'new' stable, presumably different to the one being repaired, involved 17 carpenters and while its dimensions are not recorded the structure required 46 couple rafters, 12 posts, 6 double beams, 24 other posts and 32 *entrelatez*. This building has usually been equated with a re-build of the structure inside the western entrance (Area A2) although the structure inside the south-east corner of the palace complex (Area B) has been suggested as a plausible alternative (Beaumont James and Gerrard 2007, 75–6). This structure has been interpreted as part of a 14<sup>th</sup> century farm building complex but the excavation revealed five internal bays or stalls, which

may also suggest stables. This building has been tentatively dated to the mid-fourteenth century or later.

- 1.5.4 The site is a Scheduled Monument containing numerous earthworks and masonry ruins. The archaeological potential within the survey areas is clearly extremely high.

## 1.6 *Geology and soils*

- 1.6.1 The underlying solid geology across the site is from the Culver Chalk Formation with overlying clay with flints deposits in the south eastern part of the site (BGS, 2017).
- 1.6.2 The overlying soil across the survey area is from the Andover 1 association and is a brown rendzina. It consists of a shallow, well drained, calcareous, silty soil over chalk (Soil Survey of England and Wales, 1983).

## 2 METHODOLOGY

### 2.1 *Technical synopsis*

- 2.1.1 Ground penetrating radar systems transmit an electromagnetic wave into the ground and record the time delay and amplitude of reflections from buried features. Reflections occur from changes in conductivity or dielectric permittivity.
- 2.1.2 Electromagnetic waves are increasingly attenuated as frequency increases and, therefore, lower frequencies provide greater penetration into the subsurface. However, the longer wavelengths associated with lower frequencies reduce the resolution of buried features. Typical frequencies chosen for archaeological prospection are around 500 and 200 MHz.

### 2.2 *Equipment configuration and data collection*

- 2.2.1 Ground penetrating radar data were acquired using an Utsi Electronics Groundvue 3A system running with a 400MHz shielded antenna. The system utilises a wheeled encoder system on a small cart. A dielectric constant of 10 was used in the field to set up the instrument and view data. The value is for display purposes only and does not affect the recorded data.
- 2.2.2 A value of 80ns (nanoseconds) was chosen for the time sweep (two way GPR signal travel time) in order to balance potential depth of penetration and resolution.
- 2.2.3 Data were collected from scans recorded at 0.0295m along parallel traverses separated by 0.25m. The data captured along each traverse were logged to an internal disk drive to allow further processing and analysis.

### 2.3 *Survey referencing and base mapping*

- 2.3.1 Ground penetrating radar data were collected along traverses originating from common baselines, see Fig 02. The start position for each traverse along the baseline from the start point or origin was measured using a hand tape. A parallel tape was used as a guide to ensure that traverses were surveyed perpendicular to the baseline and parallel to adjacent traverses.
- 2.3.2 The survey baselines and parallel check lines were mainly set out using a Leica GS10 RTK and orientated in order to give best coverage of target areas. Baselines and parallel check lines within the 'great stable' (A2) and 'old hall' (A3) were set out using hand tapes and subsequently recorded with the GNSS.
- 2.3.3 Ordnance survey digital base mapping was acquired for illustration of the data and abstraction and interpretation by Archaeological Surveys.

### 2.4 *Data processing and presentation*

- 2.4.1 Ground penetrating radar data were analysed using REFLEX v8 software. Each traverse was analysed as an individual profile to allow a manual assessment of anomalies. In addition, profiles across each survey area were combined and processed in order to create time slices showing the variation in reflector amplitude at various depths. The following processing has been carried out on GPR data captured during this survey:
- background removal - improves the appearance of the data by removal of strong horizontal bands,
  - gain - increased with time in order to amplify weaker reflections from deeper features,
  - bandpass filtering - lowers noise by the removal of energy below 200MHz and above 800MHz.
- 2.4.2 Time slices were analysed using both absolute and envelope reflectivity strengths. The latter use a square root function of the energy at an instant in time and is generally the preferred option; however, occasionally the absolute values provide more detailed anomalies.
- 2.4.3 An abstraction and interpretation is offered for all geophysical anomalies located by the survey. A brief summary of each anomaly, with an appropriate reference number, is set out in list form within the results (Section 3) to allow a rapid and objective assessment of features within each survey area. Approximate depth to anomalies is stated within the list of anomalies below.
- 2.4.4 The main form of data display prepared for this report are colour time slice plots derived from Reflex as TIF files. Generally blue shades indicate very low amplitude reflections with green and yellow relating to mid range reflections



and red indicative of high amplitude reflections.

- 2.4.5 Anomalies are abstracted using colour coded points, lines and polygons. All plots are scaled to landscape A3 for paper printing.
- 2.4.6 The raster images are combined with base mapping using MapInfo Professional GIS creating TAB file formats. All images are georeferenced to the OSGB36 datum within the GIS. A digital archive, including raster images, is produced with this report, see Appendix A below.

## 3 RESULTS

### 3.1 *General assessment of survey results*

- 3.1.1 The GPR survey located linear, discrete and complex anomalies of archaeological potential within the site. An average GPR wave velocity of 0.09m/ns was used for most survey areas using hyperbola matching. However, the internal areas within the 'great stable' (A2) and 'old hall' (A3) produced a slower velocity of 0.07m/ns, probably due to moisture retentive soil beneath the overlying loose gravel surfaces.

### 3.2 *Statement of data quality and factors influencing the interpretation of anomalies*

- 3.2.1 The GPR data were collected with due consideration given to surface conditions, obstructions and area constraints. GPR signals appear to have achieved deep penetration with the exception of the internal areas within the 'great stable' (A2) and 'old hall' (A3) where antenna coupling was poor due to loose gravel, and a moisture retentive layer beneath the gravel produced high magnitude reflections and comparatively poor transition of wave energy to lower levels. However, it appears that useful reflections were obtained within these buildings down to almost 2m in depth. Grass surfaces are associated with penetration to approximately 4m. was possible within these within all survey areas and maximum depth is likely to be approximately 1.2m.
- 3.2.2 Minimal data processing was carried out, although the loose gravel within the 'great stable' (A2) caused significant slippage to the odometer wheel foreshortening traverses, see 4.1.2. Traverses within this area crossed gravel followed by a short section of grass where very different near surface conditions produced strong reflections that were not fully removed by the processing. Additional filtering was tested but did not appear adequate, and analysis of time slices was carried out by squaring data values to improve contrast in this short section.
- 3.2.3 Strong near surface and deep anomalies are associated with geological layers and have the potential to confuse or obscure anomalies of archaeological potential. The layers appear within time slices as generally broad linear bands

that move from north west to south east as they deepen across the site. The orientation of these bands is similar to some of the walls within the site, and analysis of GPR profiles is required in order to confidently separate them from archaeological features. However, confusion is still possible where these naturally formed anomalies appear at shallow depths.

### 3.3 Data interpretation

3.3.1 The list of sub-headings below attempts to define a number of separate categories that reflect the range and type of features located during the survey. A general explanation of the characteristics of the magnetic anomalies is set out for each category in order to justify interpretation, see Table 1.

Interpretation category	Description and origin of anomalies
<b><i>Anomalies with archaeological potential</i></b>	Anomalies have the characteristics of a range of archaeological features such as walls, structures, etc..
<b><i>Anomalies with an uncertain origin</i></b>	The category applies to a range of anomalies where <u>there is not enough evidence to confidently suggest an origin</u> . Anomalies in this category <u>may well be related to archaeologically significant features, but equally relatively modern features, geological/pedological features and agricultural features should be considered</u> .
<b><i>Anomalies associated with land management</i></b>	GPR reflections that may be related to features that are long and/or form rectilinear elements and they may relate to topographic features or be visible on early mapping. Land drains can appear in a classic herringbone pattern linear anomalies.
<b><i>Anomalies with a modern origin</i></b>	Reflections clearly related to modern features such as services, inspection chambers etc.
<b><i>Anomalies with a natural origin</i></b>	Reflections caused by geological/periglacial/pedological features, tree roots, fluvial features etc.

Table 1: List and description of GPR interpretation categories

### 3.4 List of ground penetrating radar anomalies - Area A

Area A centred on OS NGR 418138 130139, see Figs 3 – 14 & 28.

#### *Anomalies with archaeological potential*

(1) – GPR reflections relating to walls of the ‘old hall’ (A3). The features are visible as exposed walling and earthworks.

(2) – Linear trend possibly indicative of a north wall relating to the ‘old hall’ (A3). The feature does not appear to be associated with any surface expression, although it

appears at a shallow depth.

**(3)** – Possible wall remains approximately 1.5m north west of the north west corner of the 'old hall' (A3) and around 0.4m deep.

**(4)** – A zone of reflections at approximately 0.3m deep that may represent a layer or former surface related to the 'old hall' (A3).

**(5)** – Planar reflections that may indicate a layer associated with a former surface, path or track approximately 0.6m deep that appears to overlie a more formal track or road **(6)**.

**(6)** – A formal road/track approximately 5m in width containing narrow linear elements **(7)**. Its depth is approximately 0.6m to the west deepening to 0.9m to the east.

**(7)** – GPR reflections indicating linear elements associated with a formal road/track **(6)**. The origin of the anomalies cannot be clearly ascertained from GPR profiles. They may be indicative of a formal road construction, drainage features or possibly ruts.

**(8 & 9)** – Parallel linear features to the south of anomaly **(6)** may relate to a former wall **(8)** to the north of a ditch **(9)**. Depth is approximately 0.6m.

**(10)** – Immediately west of the 'old hall' (A3) and north of the 'great stable' (A2) there is a zone of high amplitude planar responses at an approximate depth of 0.37 that probably indicates a buried surface or floor of stone.

**(11)** – A linear feature probably representing a dividing wall within the 'great stable' (A2) at around 0.7m deep.

**(12)** – The western wall of the 'great stable' (A2), which is visible as an extant feature.

**(13)** – A substantial wall, approximately 2m in width, located 4m west of the western wall of the 'great stable' (A2). The feature is unusually deep, starting at approximately 1m below surface, and a clearly defined eastern side to the wall may indicate the use of masonry blocks in its construction. It may well be the remains of the precinct wall but it does not appear to extend through the northern part of survey area A1 suggesting that it may have been completely removed or severely disturbed further to the north. Its depth below surface, and lack of GPR evidence for a shallower trench immediately above, would imply ground make-up after the removal of the wall.

**(14)** – A wall extends to the north from the north western corner of the 'great stable' (A2). The feature is also visible as a linear earthwork and meets the corner of the 'great stable' at a slightly obtuse angle suggesting it is not simply an extension of the western wall of the stable.

### *Anomalies of uncertain origin*

(15) – Very strong planar reflections occur at a shallow depth in the central and southern part of the ‘old hall’ (A3). Although it is possible that they indicate the presence of a former floor within the building, the ground make-up beneath the current gravel surface is uncertain, and the reflections could relate to a strong moisture contrast between modern near surface materials.

(16) – High magnitude reflections within discrete zones may indicate features of archaeological potential within the ‘great stable’ (A2). However, the extant gravel surface has created very strong near surface reflections, probably related to a significant increase in moisture content within layers immediately below the gravel, and the anomalies appear to originate in this near surface zone suggesting they may relate to pockets of moisture or unevenness within near surface layers.

### *Anomalies of modern origin*

(17) – A broad surface/near surface feature caused by ground compression associated with use of the modern access route into the site (A1).

### *Anomalies of natural origin*

Bands of GPR reflections of variable magnitude, and occasionally of high magnitude, appear to cross the time slices from north west to south east indicative of increasing depth to the south east. For clarity no abstraction is shown within the plots. The bands actually represent complete layers within the underlying solid geology with the increasing depth being a function of the natural slope across the site, although the layers may also dip or tilt. The chalk geology may contain layers of flint or bedding planes where there are distinct contrasts in moisture content, and GPR wave velocity, resulting in deep reflections up to 4m below the surface. The linear nature of the reflections within time slices has a similar orientation to some of the buildings within the site, and the reflections occur at similar depths to some anomalies of archaeological potential, and can be located immediately adjacent. It is possible, therefore, that some features of archaeological potential are obscured and some natural features are interpreted as archaeological; however, analysis of GPR profiles as well as time slice sequences allows a more confident separation of archaeological and natural features.

## 3.5 List of ground penetrating radar anomalies - Area B

Area B centred on OS NGR 418138 130139, see Figs Figs 15 – 26 & 28.

### *Anomalies with archaeological potential*

(18) – GPR reflections relating to walls forming the most southerly building in the south eastern part of the site. Some of the walls are visible at the surface.

(19) - GPR reflections relating to walls forming a building to the north west of (18) in the south eastern part of the site. Some of the walls are visible at the surface.

(20) – A wall that appears common to several structures in the south eastern part of the site and continues beyond the survey area to the north west. It was probably part of the perimeter wall.

(21, 22 & 23) – A wall to the north east of the perimeter wall (21) appears to form a building with (22) and (23) that overlies the perimeter wall (20). However, wall (21) appears slightly offset from (22) which could indicate conjoined but separate structures or chambers.

(24) – A weak linear trend near the northern limit of the survey may relate to an internal division.

(25) – A weak linear trend in the southern part of the survey area may indicate extension of a wall from the perimeter wall towards the south east.

(26) – A short linear feature may relate to a former wall.

(27) – Shallow GPR reflections indicate a possible architectural or ornamental feature. The near surface nature of the response may indicate a feature within paving or a floor and could be internal or external. It may be associated with the structure immediately to the north east.

(28) – Linear trends within the north western part of the survey area may be associated with walls. They occur within a zone of variable reflections (29) that could indicate structural remains and/or debris.

(29) – A zone of variable GPR reflections may relate to structural remains or a layer of structural debris. The area has a vaguely circular appearance to the east where there are several high magnitude discrete features (30) that could be associated with structural features. The anomalies appear at approximately 0.3m below the surface.

(30) – Several high magnitude discrete anomalies occur at the eastern limits of (29) could indicate structural remains. However, they do not appear to form a coherent feature.

(31) – Linear features with very weak reflections or null responses may indicate the presence of ditch-like features. The more westerly anomaly appears to cut or disturb reflections caused by geological layers, and LiDAR data indicate that immediately north west of the survey area there is a shallow gully that suggests a continuation of the feature for a further 55m. Within the survey area there is no surface expression of the feature which may relate to infill associated with adjacent excavation work. Although both features appear to extend from the most southerly building there is no clear evidence that they are related to it although an association with drainage is possible.

(32) – Linear elements underlie the inner earthen bank at the southern end of the survey area. The anomalies may relate to the construction of the bank or possibly be associated with a pre-existing feature. They appear to be 0.8m – 1m below the surface.

#### *Anomalies of uncertain origin*

(33) – Several near surface discrete features were located within the southerly building and to the east of it. During the course of the survey, it was noted that the area contained a number of small mounds of earth and very small tree stumps. It is likely, therefore, that the GPR anomalies are associated with these relatively modern features.

(34) – Several weak linear trends were located in the south western part of the survey area. The anomalies are too weak and fragmented to confidently interpret. However, they appear approximately parallel to or orthogonal to possible walls in the north western part of the area.

#### *Anomalies of natural origin*

Bands of GPR reflections of variable magnitude, and occasionally of high magnitude, appear to cross the time slices from north west to south east indicative of increasing depth to the south east. For clarity no abstraction is shown within the plots. The bands actually represent complete layers within the underlying solid geology with the increasing depth being a function of the natural slope across the site, although the layers may also dip or tilt. The chalk geology may contain layers of flint or bedding planes where there are distinct contrasts in moisture content, and GPR wave velocity, resulting in deep reflections up to 4m below the surface. The linear nature of the reflections within time slices has a similar orientation to some of the buildings within the site, and the reflections occur at similar depths to some anomalies of archaeological potential, and can be located immediately adjacent. It is possible, therefore, that some features of archaeological potential are obscured and some natural features are interpreted as archaeological; however, analysis of GPR profiles as well as time slice sequences allows a more confident separation of archaeological and natural features.

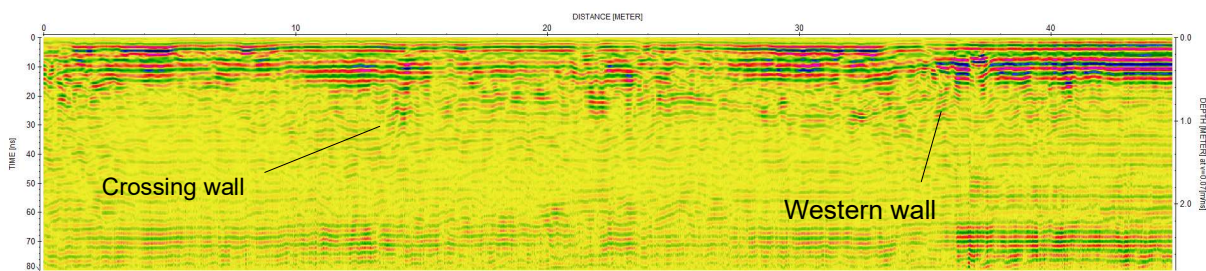
## 4 DISCUSSION

### 4.1 Interior of the 'old hall' and 'great stables' - Area A

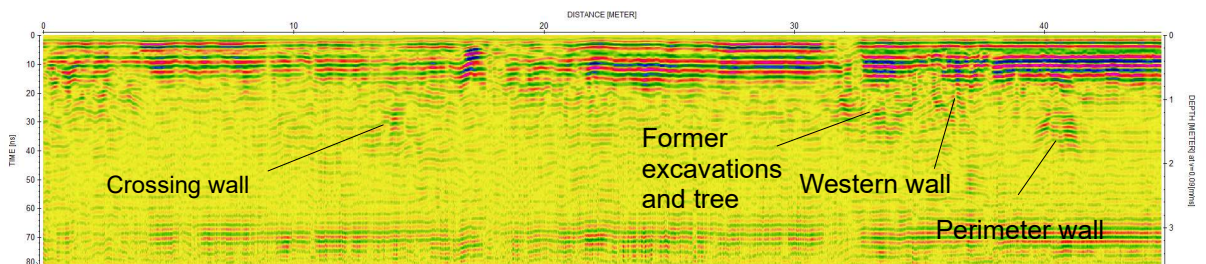
4.1.1 The GPR survey within Area A located a number of anomalies associated with building remains. However, very little evidence was obtained from the interior of both the 'old hall' (A3) and 'great stable' (A2). Survey conditions within these areas were less than optimum due to the loose gravel layer covering the ground within these buildings. The coarse nature of the gravel created numerous air voids and poor ground coupling of the radar antenna compared



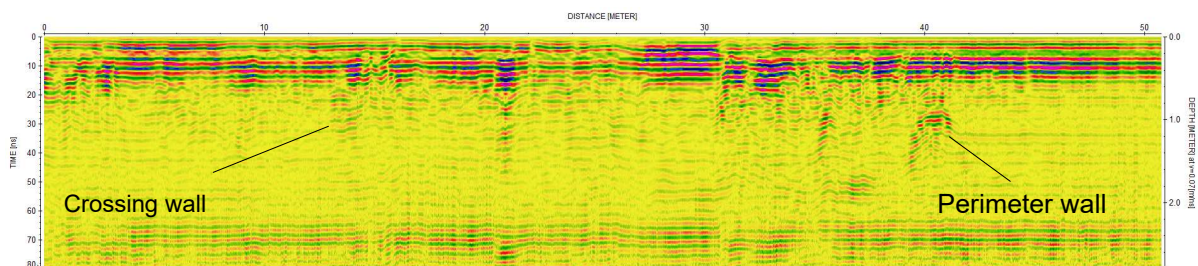
to areas with short grass cover. The transition from a surface layer of very dry gravel to what was considered likely to be a much more moisture retentive, although unknown, material beneath created very high magnitude near surface reflections and poor transfer of wave energy to lower levels, as well as strong multiple reflections, or ringing, from the near surface. Strong planar anomalies (**15**) within the 'old hall' (A3) may, however, relate to a floor, and a linear feature (**11**) crossing the 'great stable' (A2) may relate to an internal division, see GPR Profiles 1 – 4. Several discrete features (**16**) within the 'great stable' could not be confidently interpreted as they are rather amorphous and appear to occur at a similar time or depth to high magnitude reflections related to poor ground coupling. However, an archaeological origin should also be considered due to the more discrete nature of the anomalies.



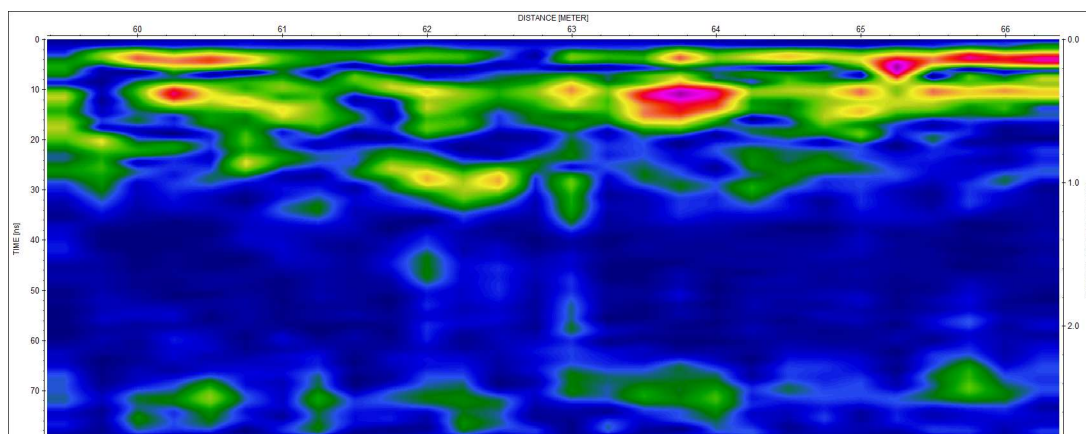
*GPR Profile 1: File CL244 crossing the 'great stable' from north east to south west*



*GPR Profile 2: File CL250 crossing the 'great stable' from north east to south west*



*GPR Profile 3: File CL256 crossing the 'great stable' from north east to south west*



*GPR Profile 4: North west to south east cut along wall feature and crossing all traverses in the 'great stable' (14m from baseline)*

- 4.1.2 The loose gravel surface within the 'great stable' was also associated with a degree of slippage of the odometer wheel which resulted in shortening of traverses. Check markers set at a known distance were used to correct for this slippage; however, some degree of distortion to anomalies was considered inevitable. The relocation of features within this building from the GPR results should, therefore, consider a potential displacement of 0.5m – 1m. The distortion to individual features by variations in the length of adjacent traverses is likely to be considerably less than this. The positional accuracy of traverses to the west of the western wall of the 'great stable' is likely to be very good due to the grass cover in this area and the close proximity of check markers. Although coarse gravel was also present on the surface of the 'old hall' (A3), the material was slightly more compact and, combined with the shorter traverses set out in this area, no significant positional errors occurred.

## 4.2 Western perimeter wall - Area A

- 4.2.1 To the west of the 'great stable' part of a substantial wall was located (**13**) at a depth of approximately 1m, see GPR Profile 2 & 3. It is separated from the western wall of the 'great stable' (**12**) by approximately 4m, but it disappears within the north western part of the surveyed zone. There is no evidence for a robber trench from the near surface down to 1m where the response to the wall begins which would imply that there has been ground make-up above the wall some time after it had been demolished. The GPR response indicates that it may be around 2m thick, and the crisp western side combined with evidence for partial hyperbolas in GPR profiles may indicate construction with ashlar facing.
- 4.2.2 Off the north western corner of the 'great stable' comparatively weak GPR reflections (**14**) are likely to indicate a wall extending towards the north north west. The feature correlates with a low earthen bank which when projected further to the north, beyond the survey area, appears to be aligned closely to the western perimeter wall to the north of the western gatehouse, see Fig27

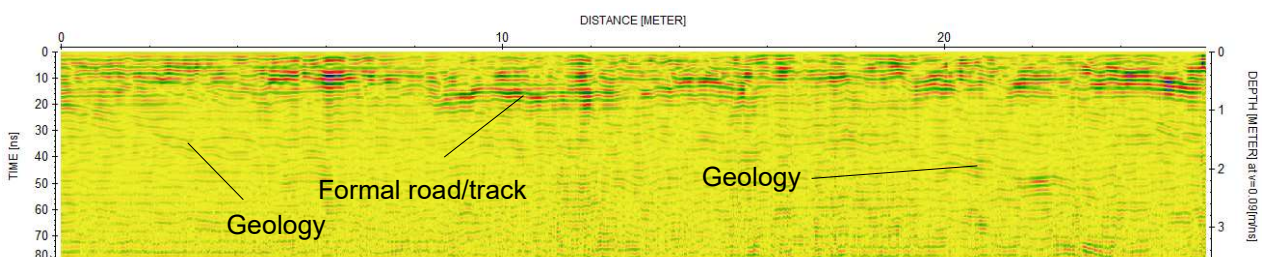


LiDAR DTM. The wall meets the north western corner of the 'great stable' at a slightly obtuse angle which may indicate that it is a separate construction to the western wall of the stable (12), but clearly they are conjoined. However, almost all of the available plans of the site do not map the linear earthwork associated with this wall and, confusingly, the perimeter wall to the north of the western gatehouse is shown too far west by several metres in most plans although the OS Mastermap appears to have rectified this discrepancy as shown in the base mapping. It is considered possible, therefore, that the much more substantial wall remains located by the GPR survey approximately 4m west of the western wall of the 'great stable', are part of the perimeter wall, but it is unclear what happens further to the north as it may have been completely removed.

- 4.2.3 Excavations from 1937 indicate the presence of an extension or associated structure to the west of the west wall of the 'great stable' and the perimeter wall. Although the GPR survey has provided no supporting evidence for this structure, it does imply that the substantial wall located in this area is that referred to as the perimeter or precinct wall, which also supports evidence for significant past mapping errors for the western side of the site.

#### 4.3 Formal road/track east of the western gatehouse - Area A

- 4.3.1 The survey located a broad linear feature (6) likely to relate to a formal road/track crossing to the north of the 'great stable' (A2) and 'old hall' (A3) from the western gatehouse. The GPR reflections indicate an approximate depth of 0.6m and the road is approximately 5m in width, see GPR Profile 2. Weak reflections forming a second broad linear feature (17) were also identified slightly further to the north, and these undoubtedly relate to the current grassed path into the site from the west as the response is very shallow.



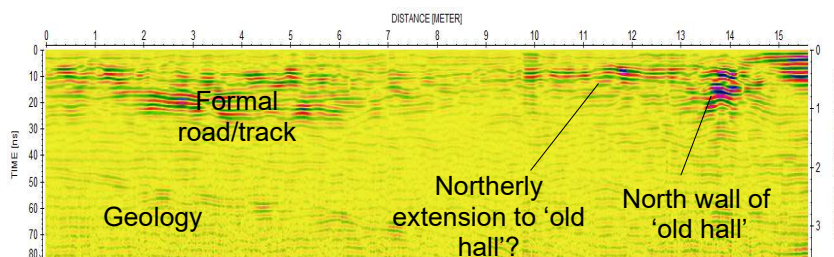
*GPR Profile 5: File CL133 crossing the central northern part of Area A from north west to south east*

- 4.3.2 The formal road/track appears to contain several narrow linear elements that appear as parallel lines running along the length of the feature and separated by approximately 1.2m. Their origin is uncertain as they are not clearly defined in GPR profiles. It is possible that they relate to the method of construction, perhaps narrow cobbled zones contained within linear sets, or shallow gullies to assist drainage etc. Surface rutting through use is possible although the lines appear too evenly spaced and consistent along the length of the feature.

4.3.3 Close to the western limit of the road, within the surveyed area, there appears to be disturbance and possible truncation and the presence of slightly shallower more variable reflections perhaps relating to the disturbed remains of the road, or a later rough surface overlying it. This overlying more irregular layer then appears to extend along much of the road, becoming somewhat shallower towards the south and possibly curving slightly towards the 'old hall' (A3). The shallower more irregular layer may imply, therefore, a more degraded road/ track surface constructed at a later date.

#### 4.4 Features to the north of the 'great stable' and 'old hall' - Area A

4.4.1 Approximately 2m south of the road a narrow linear trend (8) relating to a possible wall was located, and a linear null zone (9) immediately to the south of this may indicate a former ditch fill. These features may indicate an enclosed area of land approximately 10m wide immediately north of the 'great stable' and west of the northern part of the 'old hall' (A3). Within the eastern part of this area, immediately to the west of the northern part of the 'old hall', planar reflections were located (10) and these may indicate a former surface layer at a depth of approximately 0.3m. The area containing these reflections is approximately 10m by 6m, and it may indicate the remains of a hard surface external to the adjacent buildings.



*GPR Profile 6: File CL024 to the north of the 'old hall' from north west to south east*

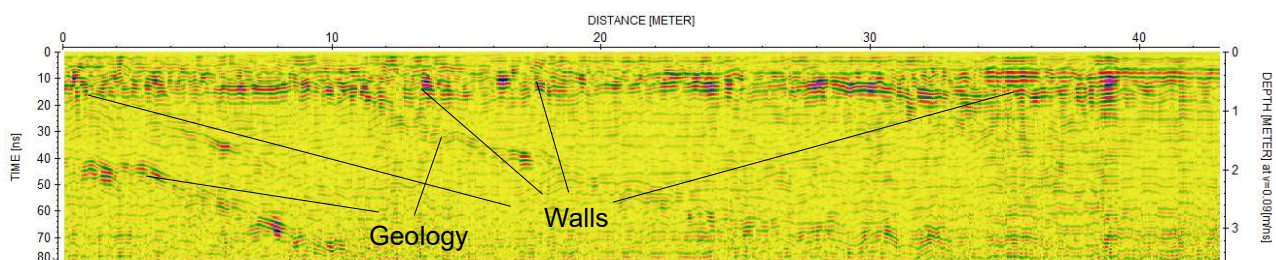
4.4.2 To the north of the northern wall of the 'old hall' (A3), and separated from it by approximately 3.2m, a parallel linear feature (2) may indicate wall remains further to the north, possibly indicating that the building extended further in this direction, see GPR Profile 3. A zone of variable reflections (4) between the two walls may indicate structural remains or debris at an approximate depth of 0.4m.

#### 4.5 Structures within the south eastern part of the site - Area B

4.5.1 The survey located wall remains relating to several structures within the south eastern part of the site, see GPR Profile 4. Although their general layout appears similar to the available plans, there are notable differences. These include the GPR evidence of a building continuing to the north of the north east to south west building that overlies the perimeter wall and had been

excavated in 1933. Very close to the north western edge of the survey area a linear trend (24) may represent an internal division, or possibly an end wall, but it is unclear whether the building extends further to the north west due to the constraints of the surveyed area. The perimeter wall (20) was also clearly located and can be seen crossing through the central part of the building that overlies it. However, the south eastern walls that define this building appear slightly offset; the section built on the western side of the wall (22) is slightly further north west than that built on the eastern side (21). This would imply the perimeter wall was extant at the time of construction and may have acted as an internal division. No internal divisions could be confidently abstracted from the survey data collected across the more southerly building purported to be the stables.

- 4.5.2 Within the north western part of the survey area a zone of variable reflections (29), possibly indicative of structural remains/debris, appears to be associated with parallel linear trends (28) that may indicate walls. It is possible, therefore, that further buildings are located within this part of the site. Several linear anomalies of uncertain origin (34) have a similar orientation or are orthogonal to those possibly indicative of structural remains (28), and this orientation is different to the structures built adjacent to the perimeter wall. However, it is not possible to confidently interpret these anomalies as they are generally weak trends and some may relate to the shallow geology in this part of the site. It is of note though, that the different orientation may be reflected by an earthwork presumed to relate to a former track that crosses through the southern inner earthworks and is visible in LiDAR data from approximately 15m further west than the western limit of the Area B survey, see Fig 27 LiDAR DTM. This track appears to cross the south eastern part of the site heading into the core area and has a north west to south east orientation. It is possible, therefore, that there has been a change to the layout of the south eastern part of the site.



*GPR Profile 7: File CL316 crossing buildings in Area B from north west to south east*

## 4.6 Inner earthworks - Area B

- 4.6.1 The south eastern limit of the survey was on the inner bank of the inner earthworks, traverses were limited by vegetation and a steep sided hollow. The GPR data demonstrate the presence of linear elements (32) within or under the bank, and nearby excavations in 1961 revealed the presence of a layer of cobbles at the base overlain by a chalk rubble filled feature; it is possible, therefore, that the linear elements relate to similar material. However, they appear somewhat deeper than the base layer shown in the

excavation section drawing, perhaps indicating shallow marking out trenches, or features created by removal of the natural topsoil prior to its construction. The interpretations suggested are caveated by the fact that small variations in the height of the survival of the bank, and factors relating to GPR velocity, could make any comparison of reflection depth with the section drawing misleading. An additional interpretation of the linear elements is suggested; the cobbled layer located in 1961 would seem consistent with a path or track, as would the GPR response in that the linear anomalies may be produced by a well defined path edge. The path may have been located close to the inner bank and then subsequently buried by its truncation or partial destruction. LiDAR data hint at lowering and spreading of the bank within this part of the site compared to the same earthwork as it extends north east outside the site, and possibly widening of the ditch immediately south of the survey area, see Fig 27.

- 4.6.2 The relationship between the southern corner of the most southerly building within the survey area and the bank is unclear as this area was unsurveyable due to the presence of a hollow with a steep side. The hollow may indicate removal of part of the inner bank earthwork to allow construction of the building or it may have been removed during excavation of the building or a possible tree hollow.

#### 4.7 Possible cut features - Area B

- 4.7.1 Very weak reflections or a null linear zone appears to extend towards the north west from the most southerly building (**31** western anomaly). The feature only appears relatively clear at approximately 1m depth where it can be seen to cut through higher amplitude reflections associated with the underlying geology. To the north west of the survey area it appears to align with a surface gully visible in LiDAR data and clearly visible as a shallow linear depression extending for at least 55m further to the north west, see Fig 27. However, this surface feature disappears within the survey area, possibly being infilled by spoil from adjacent excavations. The null GPR response suggests wave absorption within the fill of a cut feature, but it is unclear whether it relates directly with the surface gully as there is no evidence for a surface or near surface feature in the data; this could, however, be due to an upper fill with little or no contrast to surrounding soil. The feature may, therefore, indicate the course of a former ditch-like feature possibly associated with drainage.
- 4.7.2 A second possible ditch-like feature (**31** eastern anomaly) appears to extend to the north from the southern building and is clearly resolved at approximately 0.4m, disappearing by about 1m in depth.

## 5 CONCLUSION

- 5.1.1 The GPR survey produced numerous anomalies within both survey areas and many are likely to be associated with features of archaeological potential. Linear anomalies indicative of walls and possible ditch fills were located, along with zones of planar and variable reflections indicative of buried surface and layers.
- 5.1.2 Survey from the interior of the 'great stable' located a single crossing wall and several shallow discrete features of uncertain origin. Ground coupling by the GPR antenna was poor within the building due to loose dry gravel that probably overlies much more moisture retentive layers. Within the 'old hall' similar conditions were also encountered and near surface planar reflections may indicate a floor.
- 5.1.3 Antenna coupling and wave penetration on grass areas was generally good a number of anomalies of archaeological interest were located around the 'great stable' and 'old hall' buildings. A formal road/track crossing to the north of the buildings was located as well as possible structural remains possibly extending the 'old hall' further to the north. To the west of the 'great stable' substantial wall remains were located at depth and these probably indicate the remains of a perimeter wall that appears to have been largely robbed away.
- 5.1.4 In the south eastern part of the site a series of buildings set against the perimeter wall were located; however, no clear evidence of internal features was obtained. To the west of these buildings an area of complex and variable reflections may relate to structural debris, and linear trends, possibly indicative of walling, hint at a somewhat different orientation to the layout of features in this part of the site. To the south, the inner bank of the inner earthworks was partly crossed, revealing several narrow linear anomalies that probably relate to features beneath the bank. Two linear null zones may indicate GPR wave absorption within ditch fills suggesting the presence of former ditch-like features that may be associated with the most southerly building.



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## Appendix A – Archive

Archaeological Surveys Ltd hold the primary digital archive at offices in Wiltshire (see inside cover for address). Data are backed-up onto an on-site data storage drive and at the earliest opportunity data are copied to CD ROM for storage on-site and off-site.

Surveys are reported on in hardcopy using A4 for text and A3 for plots (all plots are scaled for A3). The distribution of both hardcopy report and digital data is considered the responsibility of the Client unless explicitly stated in the survey Brief, Written Scheme of Investigation or other contractual agreement.

This report has been prepared using the following software on a Windows 10 platform:

- Reflex v8 (GPR data analysis)
- ProgeCAD Professional 2021 (report plots),
- LibreOffice.org 7.0.2.2 Writer (document text),
- PDF Creator version 0.9 (PDF archive).

The client will also receive the GPR data as SEG-Y files to be included within the overall project archive, to be deposited with the Archaeology Data Service. The report will also be uploaded to OASIS. Copies of the report will also be issued to Historic England and the Wiltshire Historic Environment Record.

## Appendix B – Historic England Geophysical Survey Summary Questionnaire

### Survey Details

**Name of Site:** Clarendon Palace

**County:** Wiltshire

**NGR Grid Reference** (Centre of survey to nearest 100m): Area A SU 18137 30122 and Area B SU 18137 30122

**Start Date:** 26/4/21

**End Date:** 27/04/21

**Geology at site** (Drift and Solid): Culver Chalk Formation with overlying clay with flints deposits in the south eastern part of the site

### **Known archaeological Sites/Monuments covered by the survey**

(Scheduled Monument No. or National Archaeological Record No. if known)

Clarendon Palace List Entry No. 1002996

### **Archaeological Sites/Monument types detected by survey**

(Type and Period if known. "?" where any doubt).

Medieval walls/buildings

Medieval surfaces

Medieval track/road

Ditch/gully medieval?

**Surveyor** (Organisation, if applicable, otherwise individual responsible for the survey):

David Sabin, Archaeological Surveys Ltd

**Name of Client, if any:**

Oliver Creighton, Warhorse Project, Department of Archaeology, University of Exeter



**Purpose of Survey:**

GPR survey aimed to map character of below-ground remains of two putative stable structures at Clarendon Palace.

**Location of:****a) Primary archive, i.e. raw data, electronic archive etc:**

Archaeological Surveys Ltd, 1 West Nolands, Nolands Road, Yatesbury, Calne, SN11 8YD

**b) Full Report:**

Archaeological Surveys Ltd, 1 West Nolands, Nolands Road, Yatesbury, Calne, SN11 8YD

**Technical Details**

**Type of Survey** (Use term from attached list or specify other):

Ground Penetrating Radar

**Area Surveyed, if applicable** (In hectares to one decimal place): 0.3ha

**Traverse Separation, if regular:** 0.25m    **Reading/Sample Interval:** 0.0295m

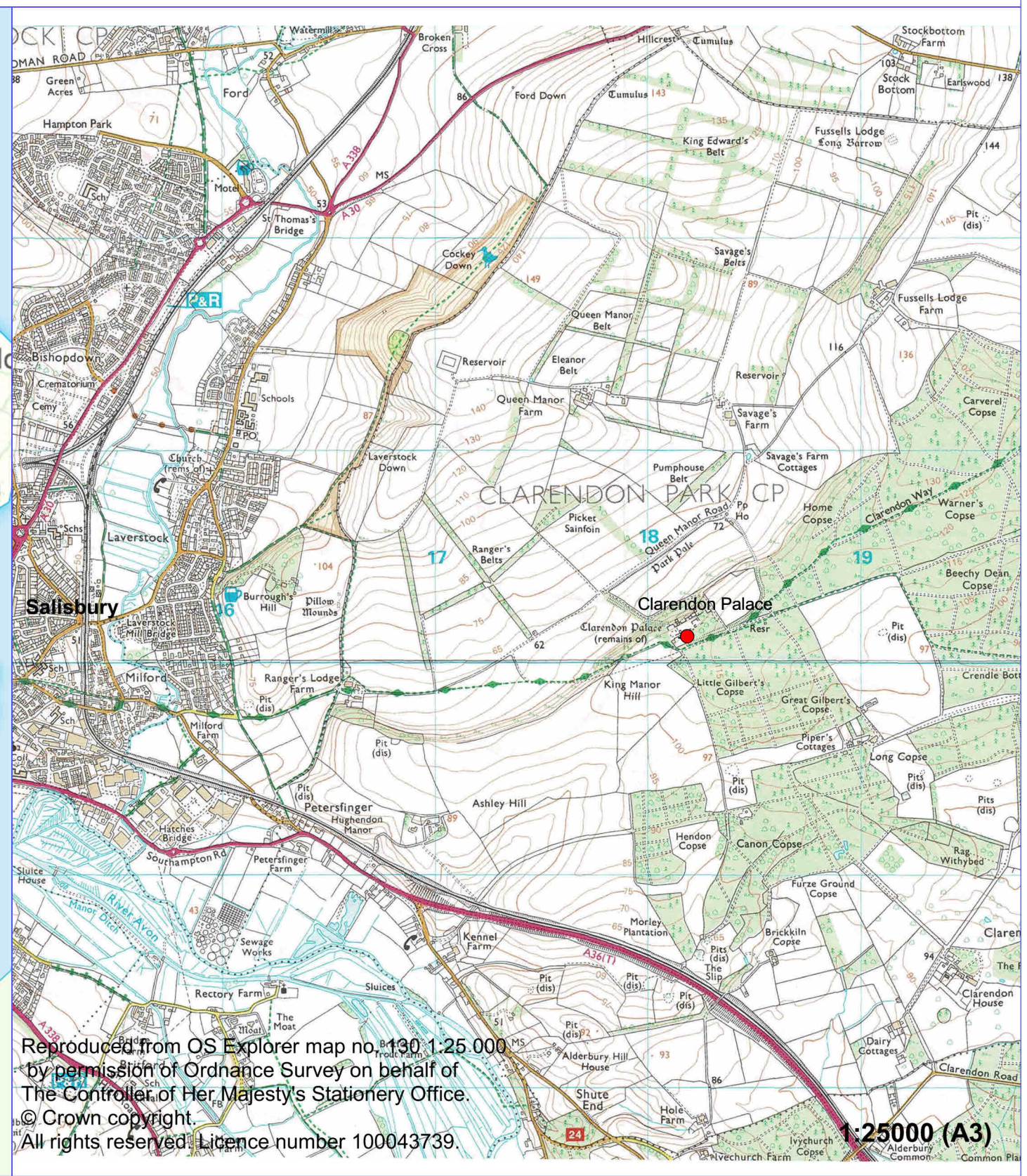
**Type, Make and model of Instrumentation:**

Utsi Groundvue 3 400MHz shielded antenna

**Land use at the time of the survey** (Use term/terms from the attached list or specify other): Grassland pasture



# Clarendon Palace GPR Survey Location Map

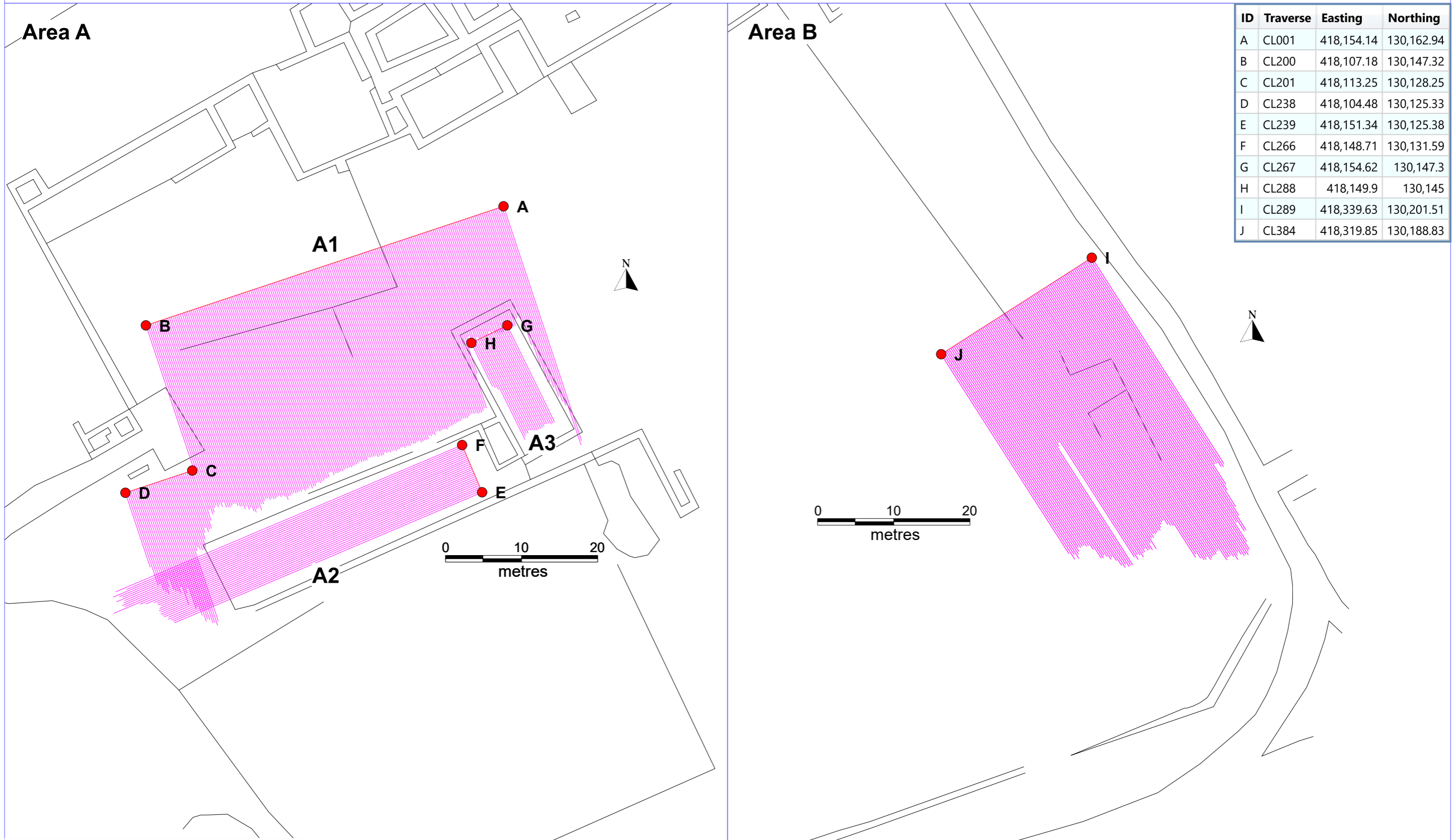


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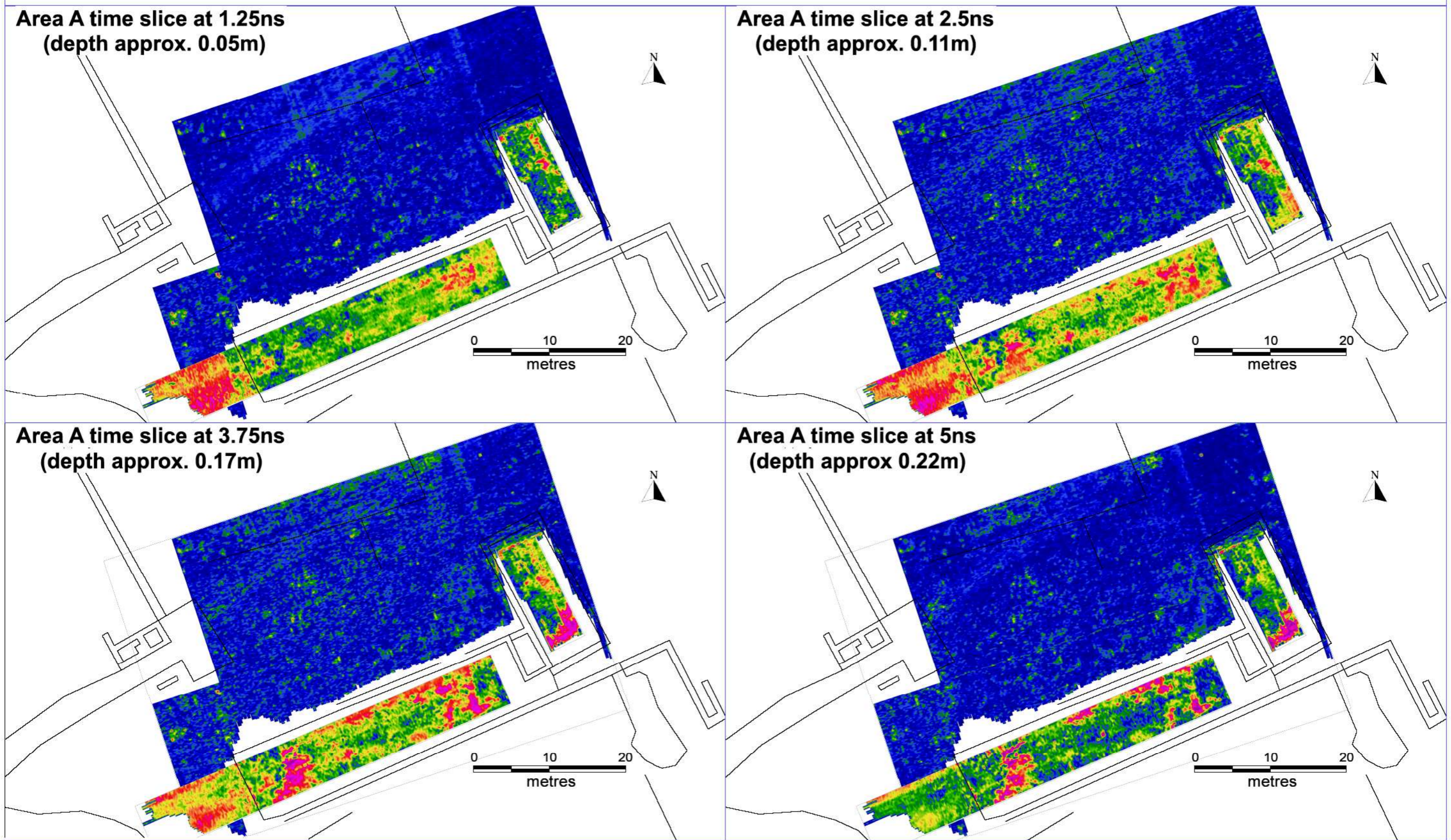


# Clarendon Palace GPR Survey Referencing



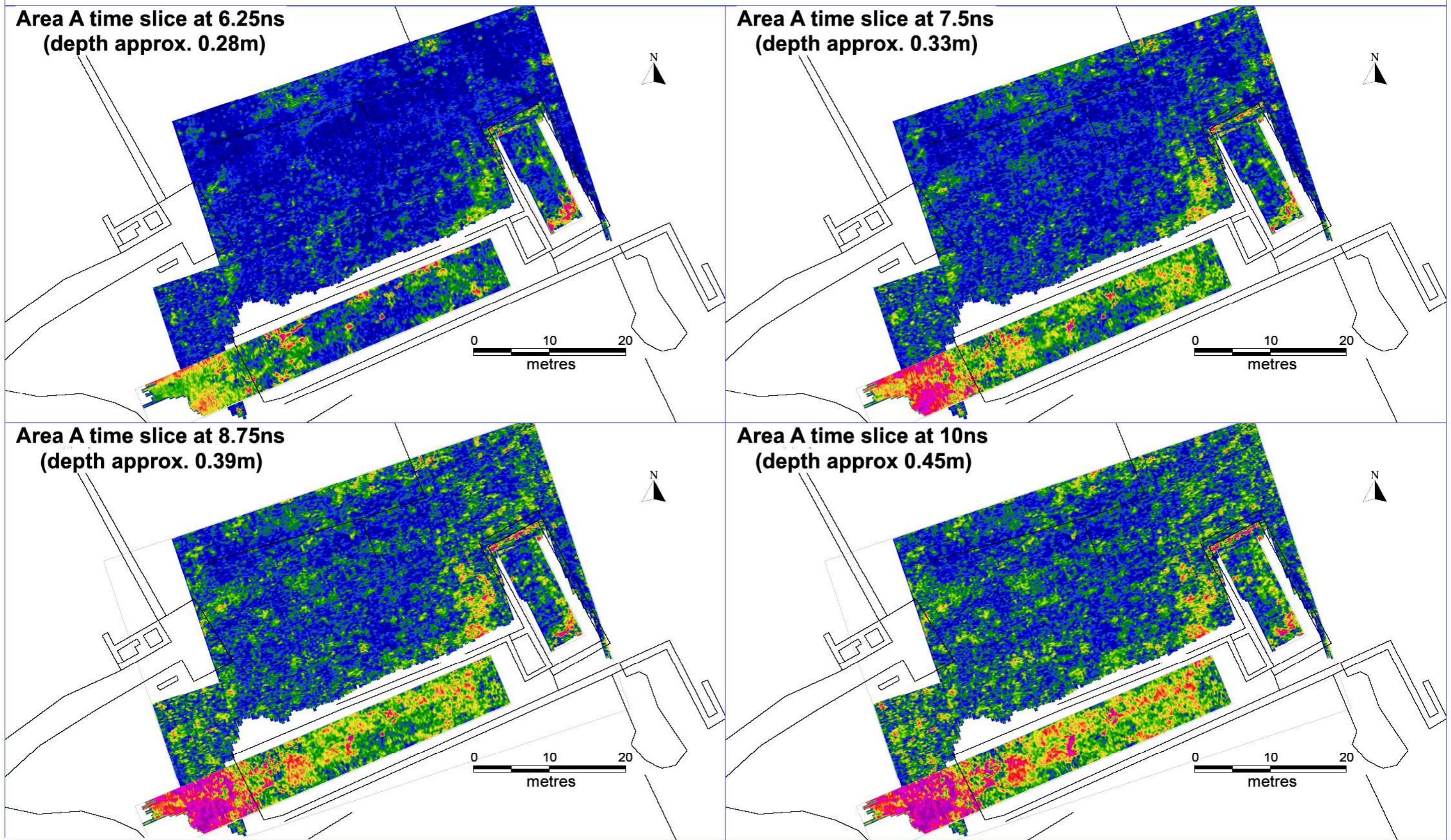


# Clarendon Palace GPR Survey Area A Time Slices



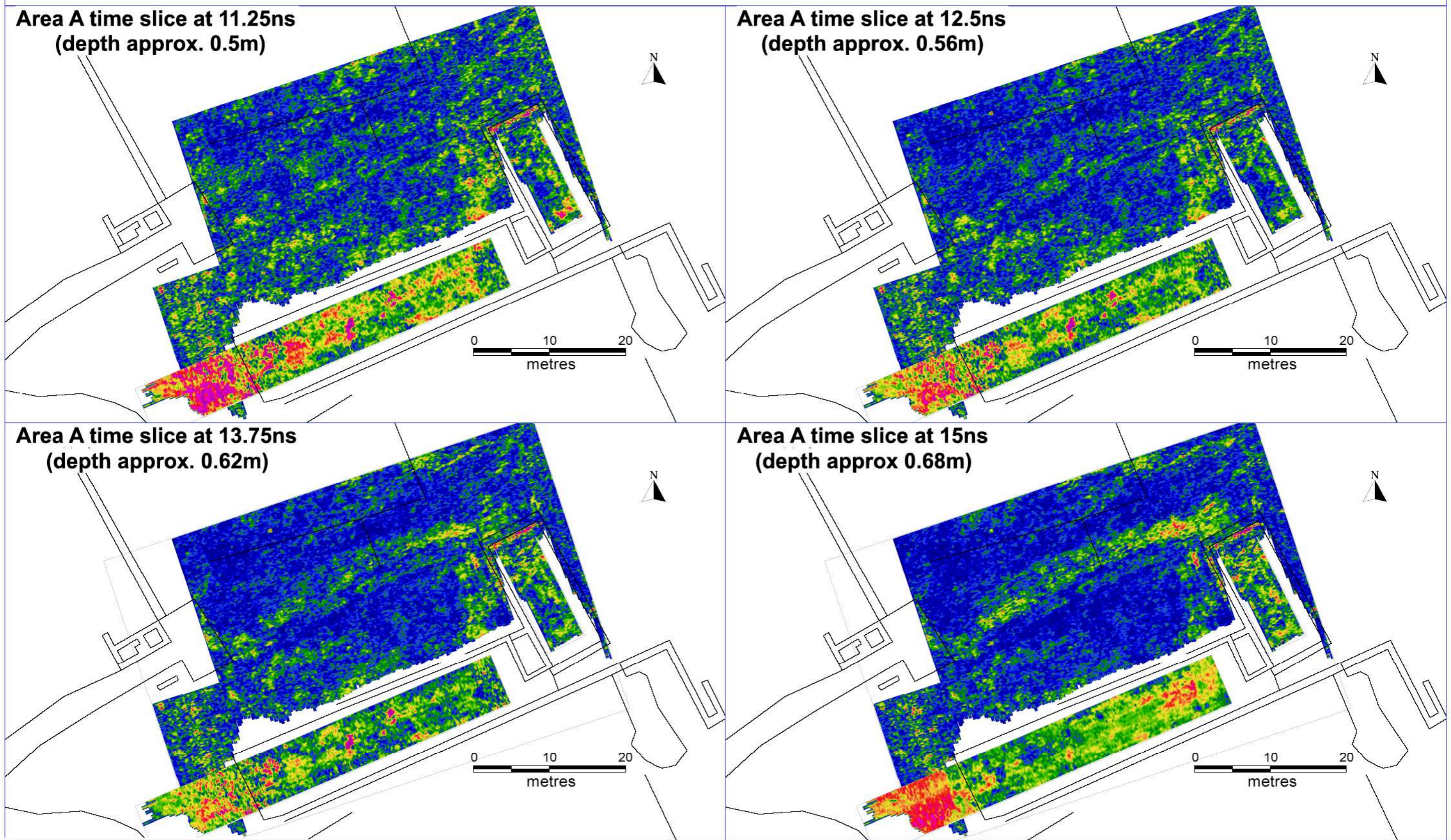


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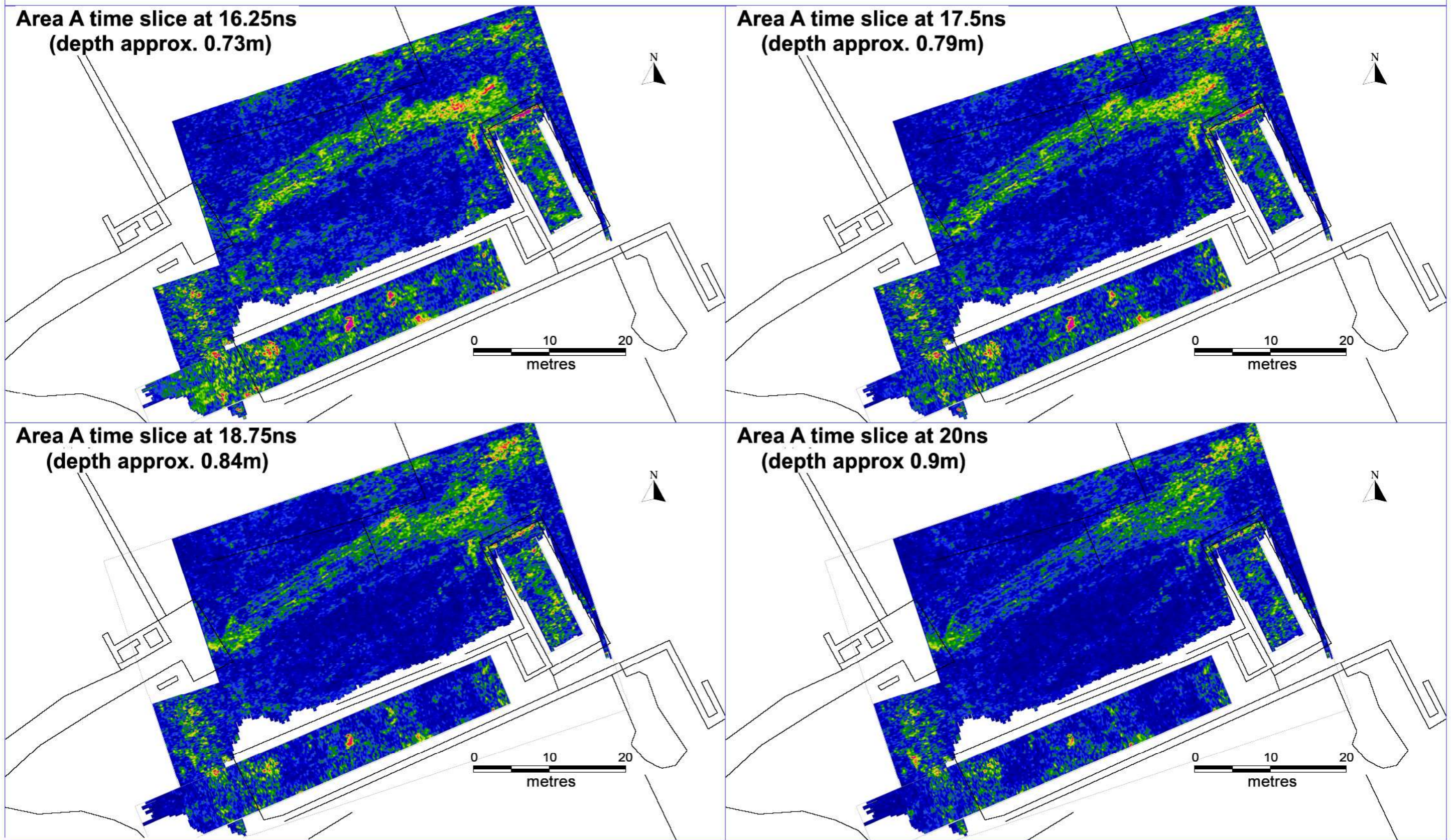


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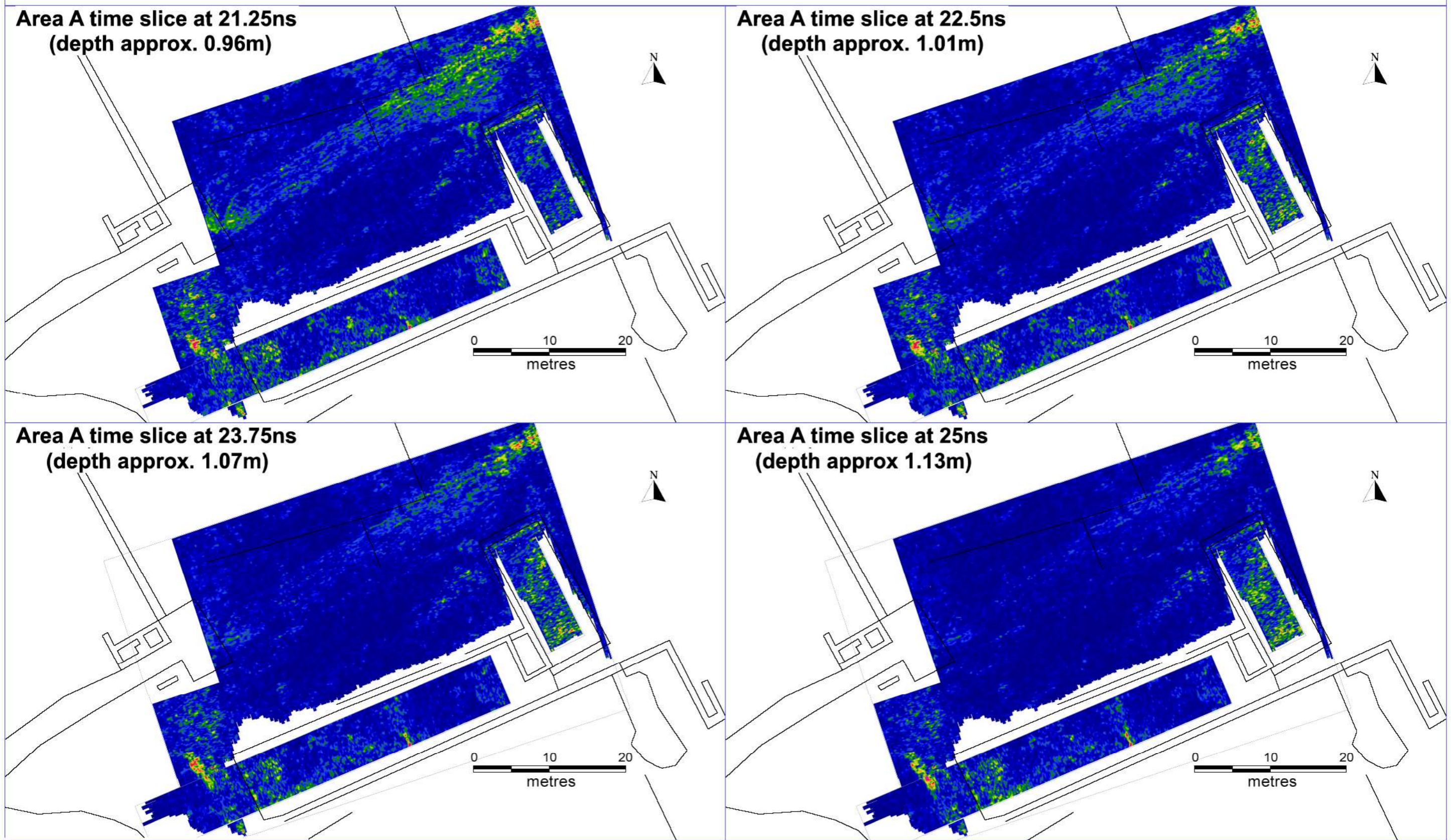


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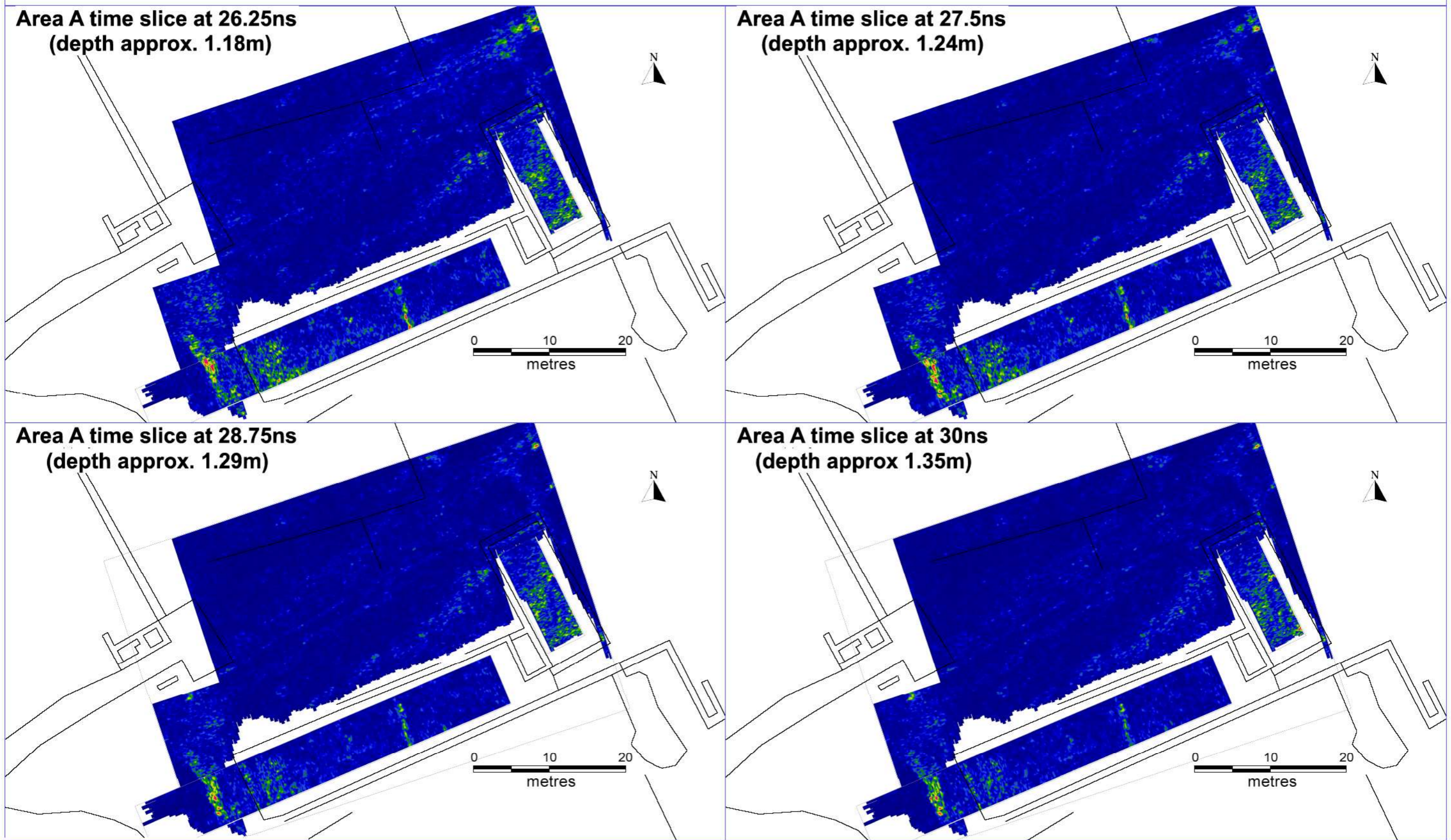


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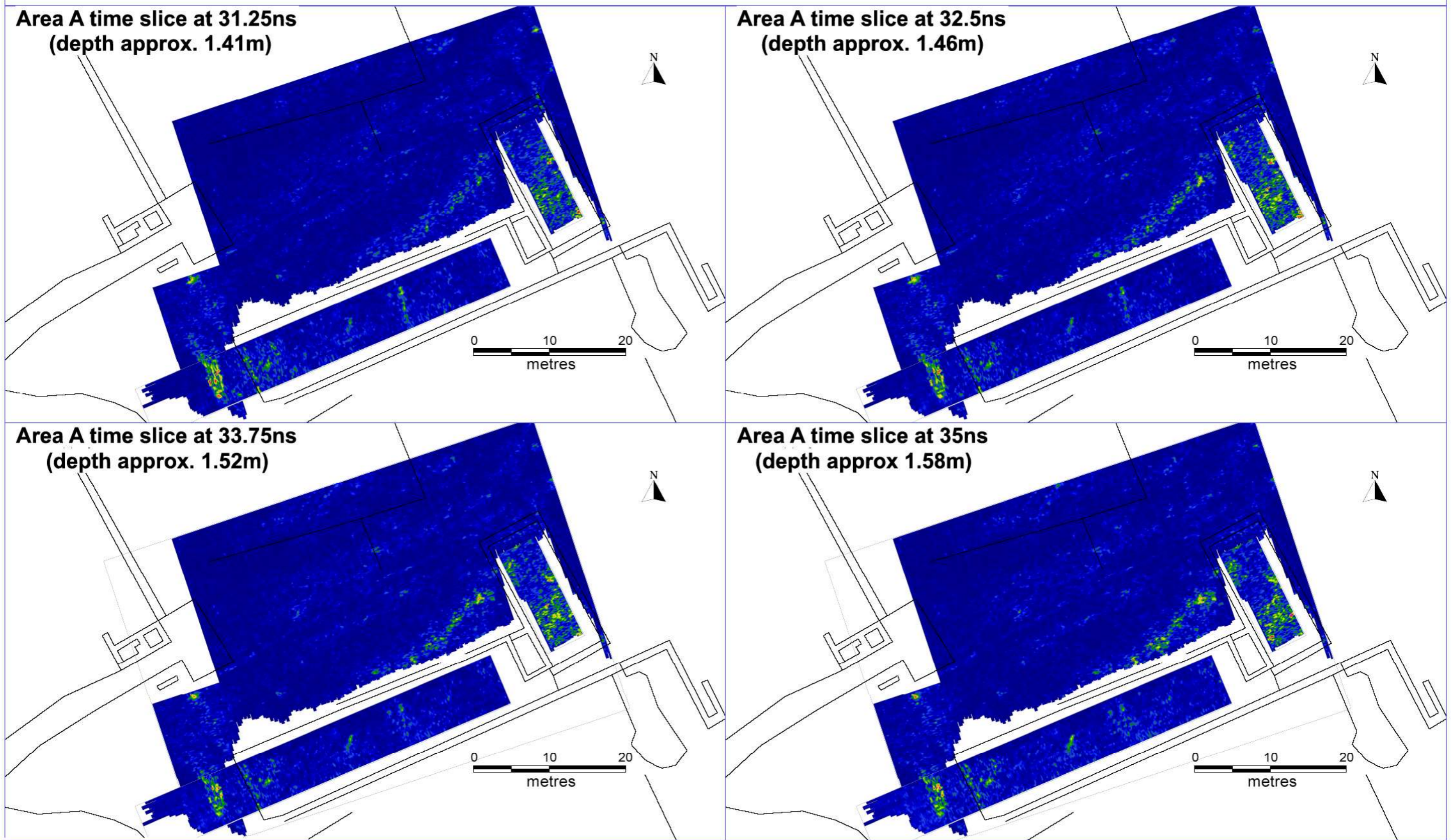


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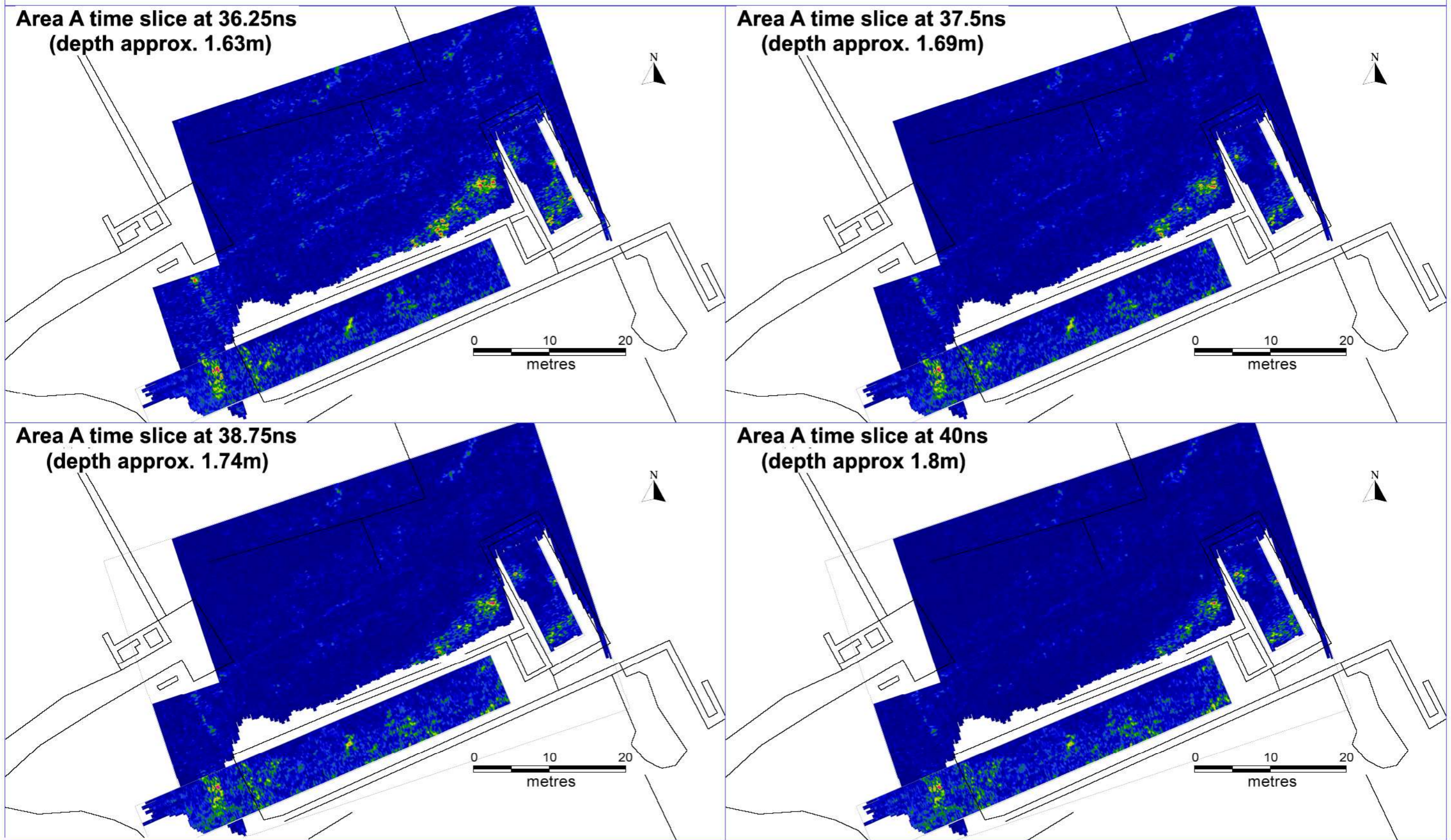


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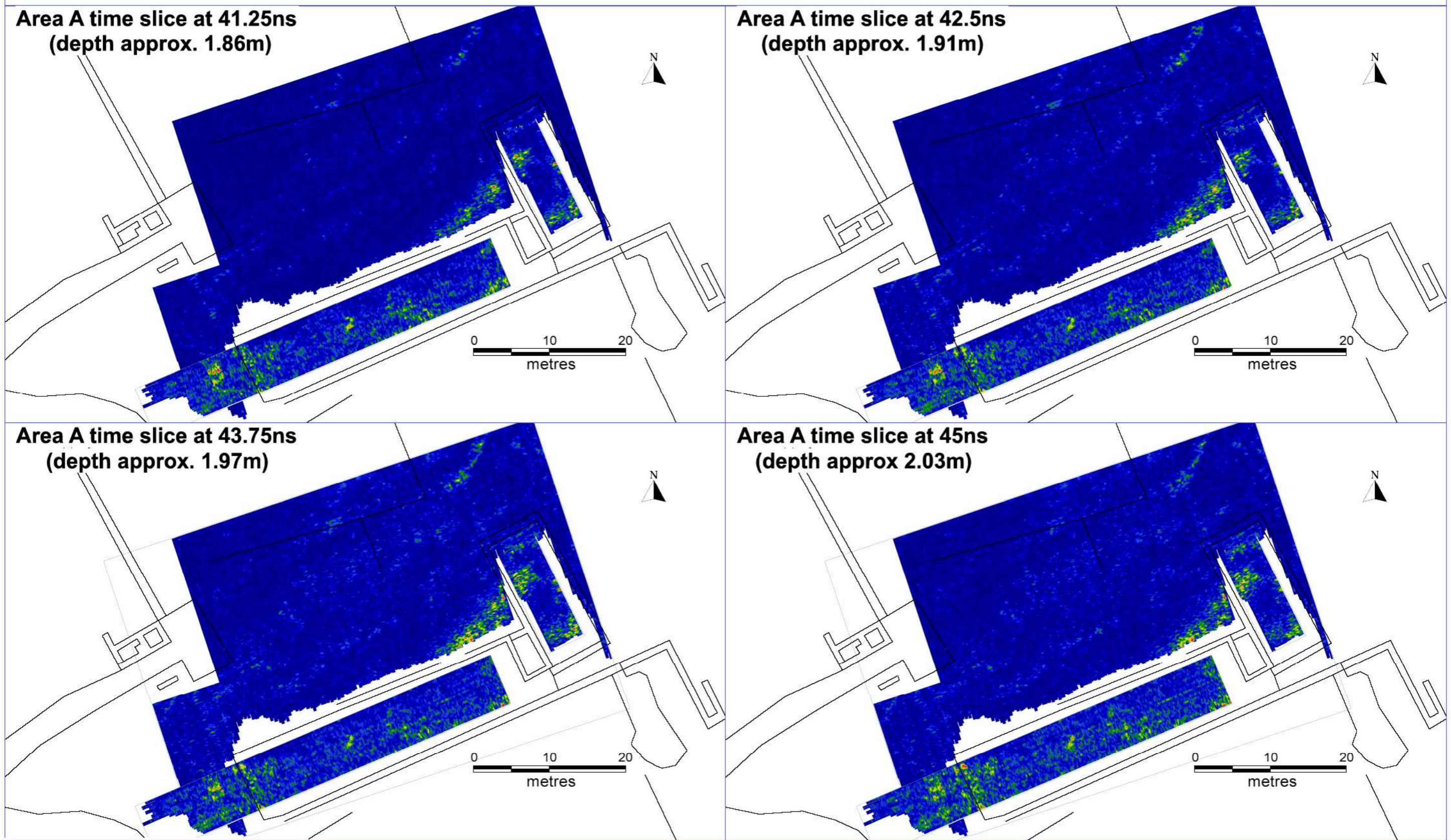


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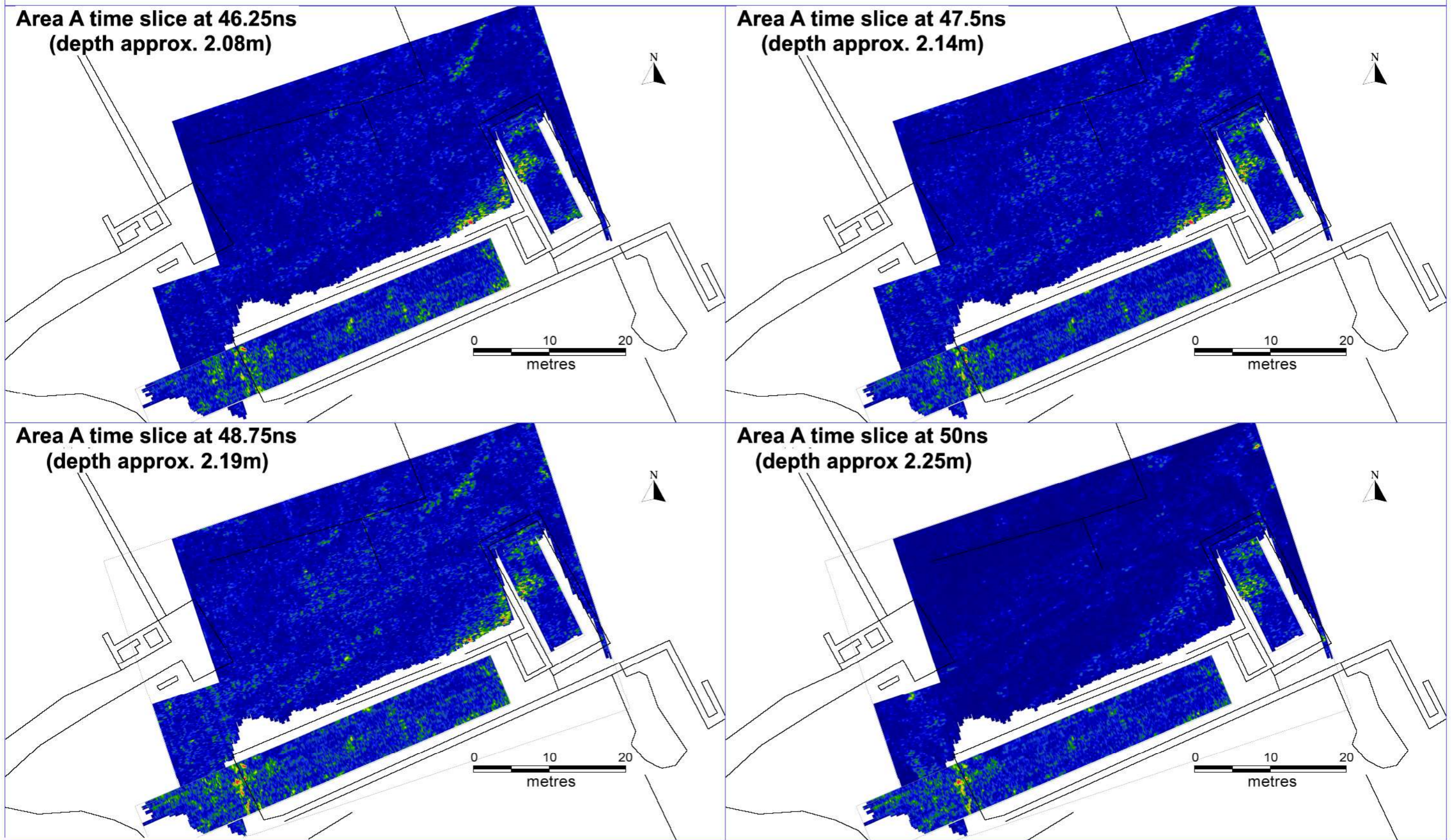


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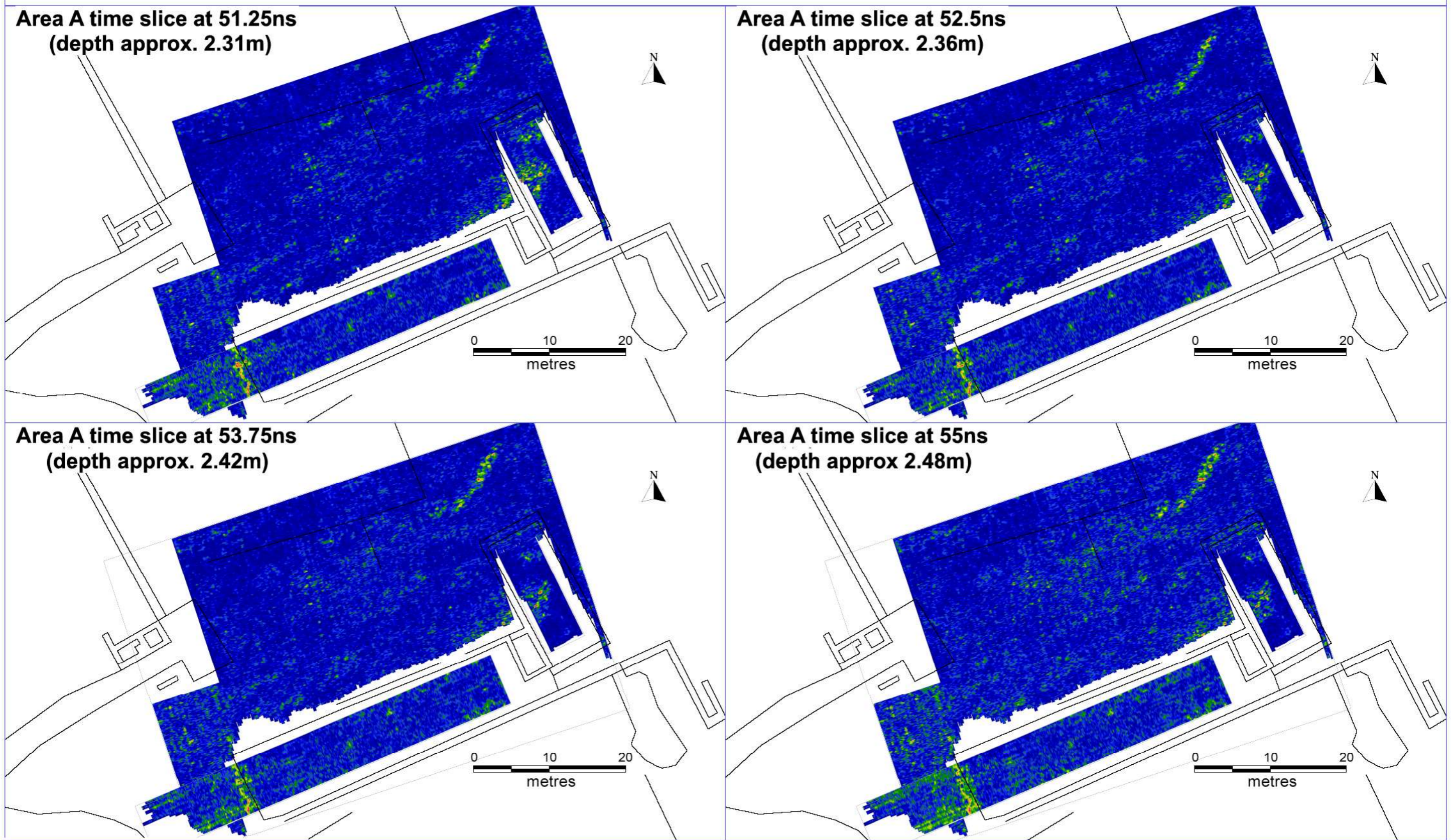


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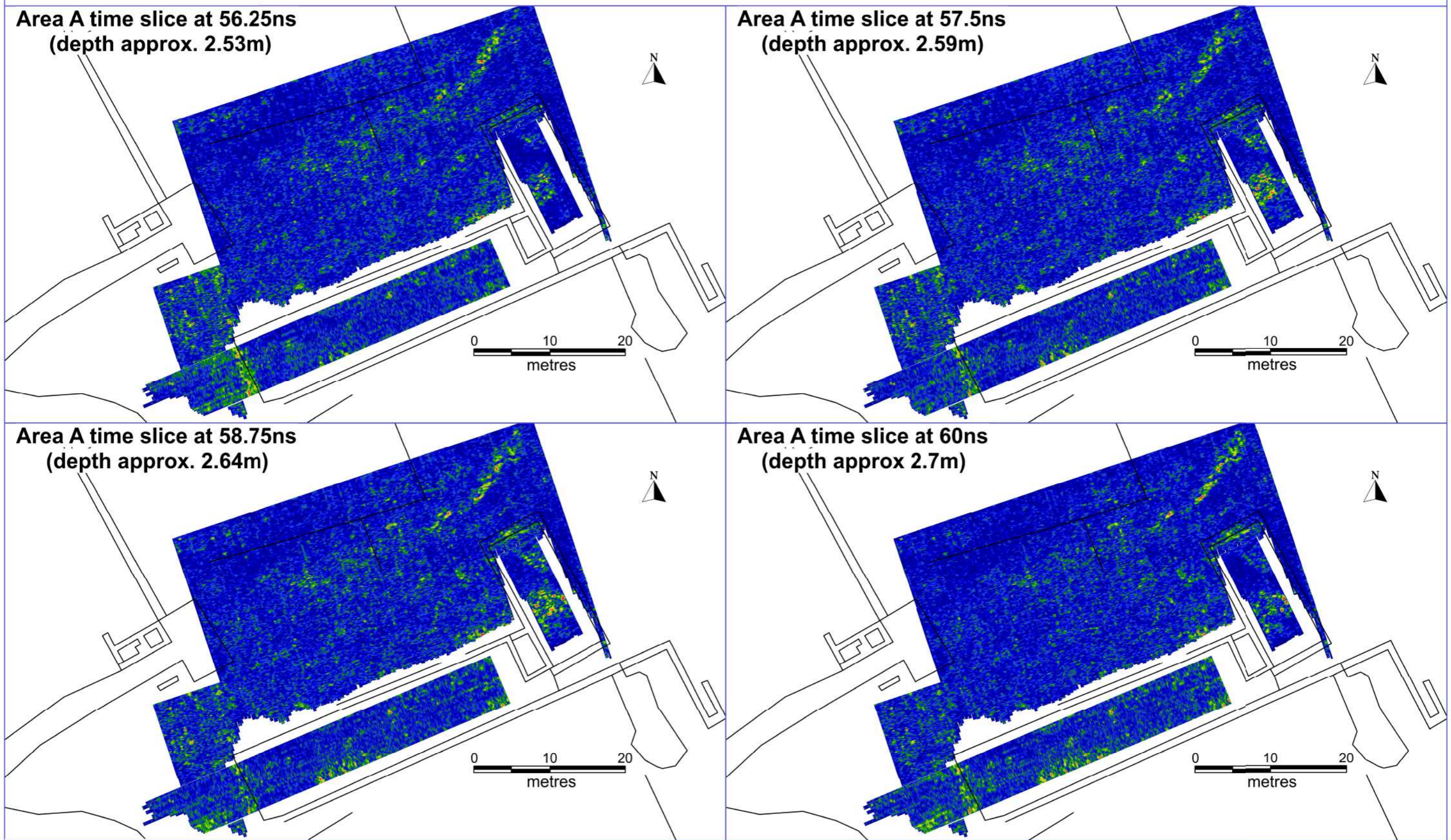


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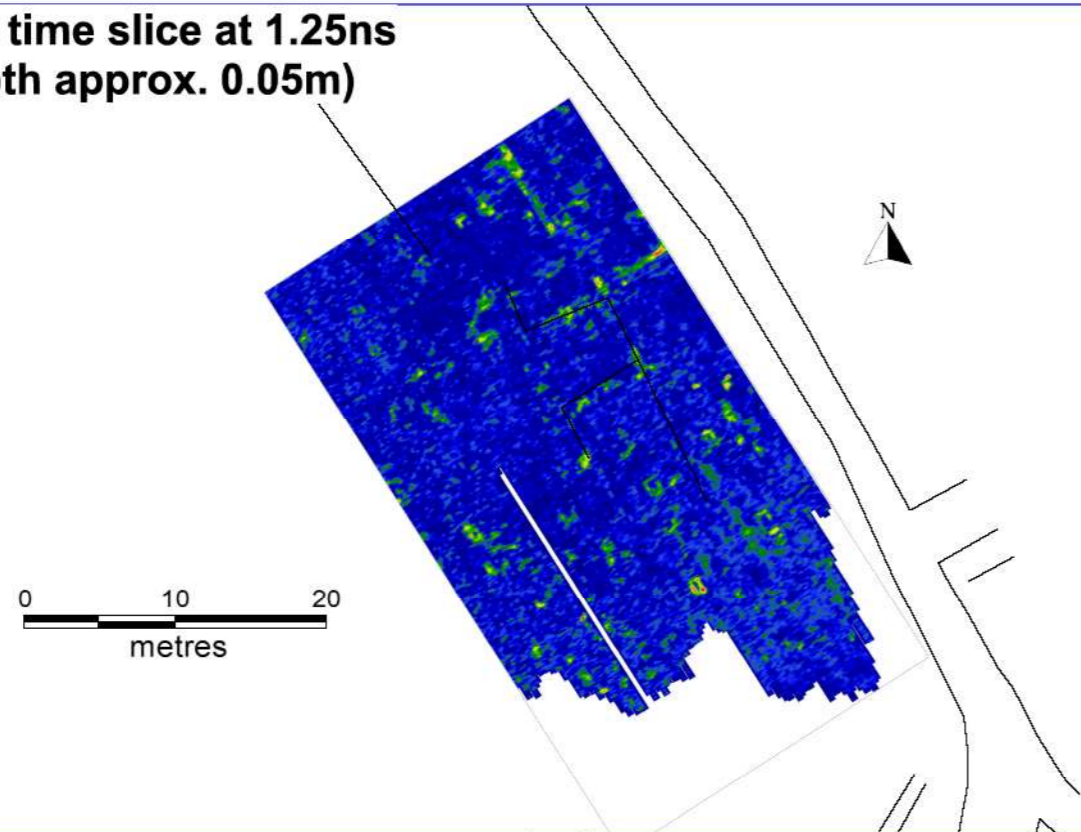
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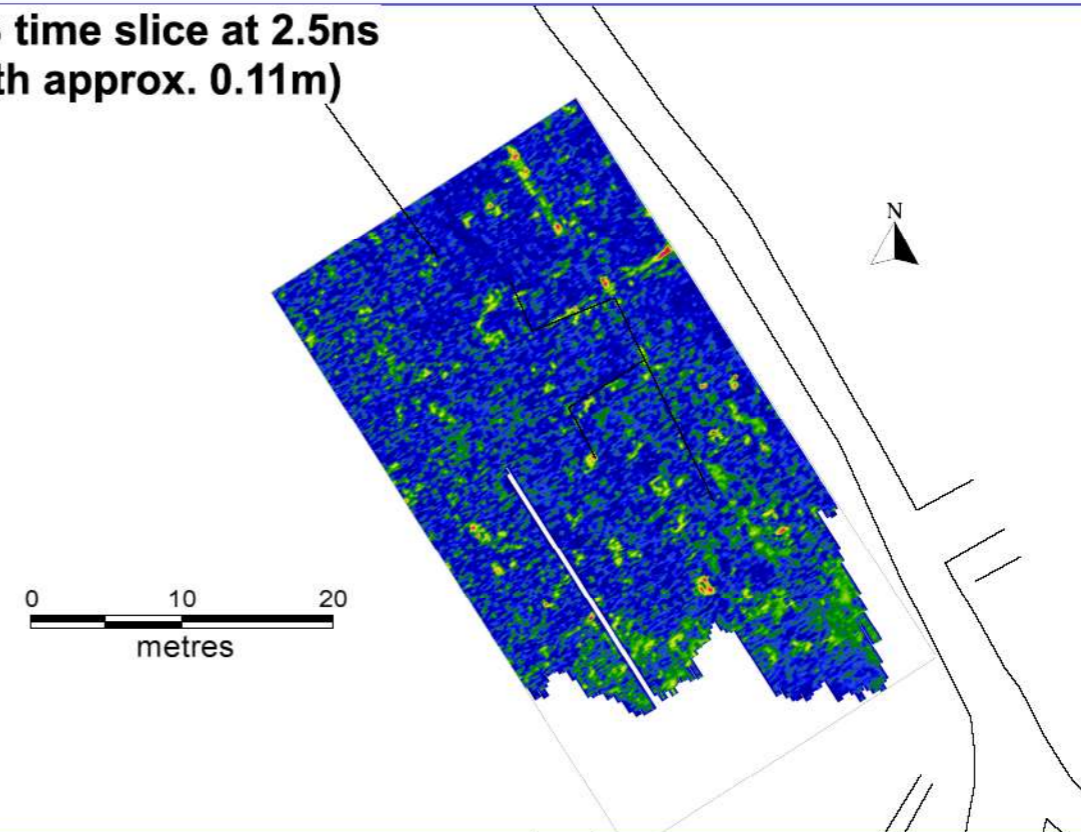


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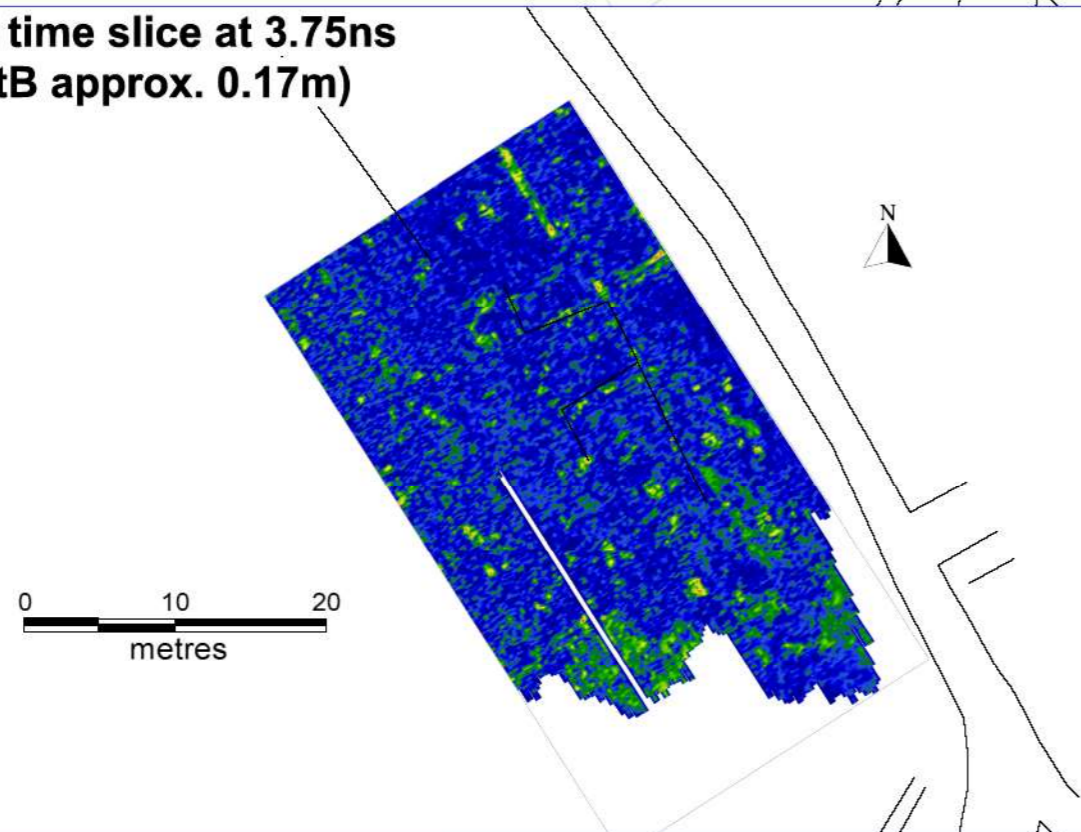
Area B time slice at 1.25ns  
(depth approx. 0.05m)



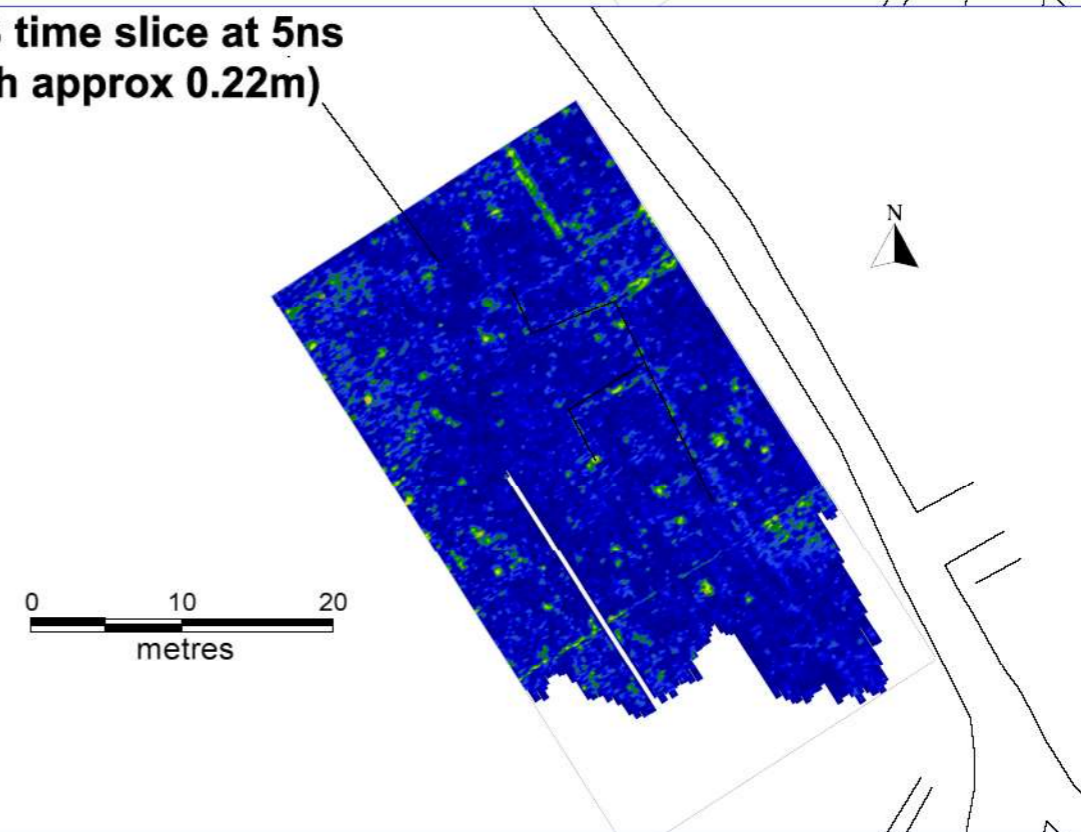
Area B time slice at 2.5ns  
(depth approx. 0.11m)



Area B time slice at 3.75ns  
(depth approx. 0.17m)



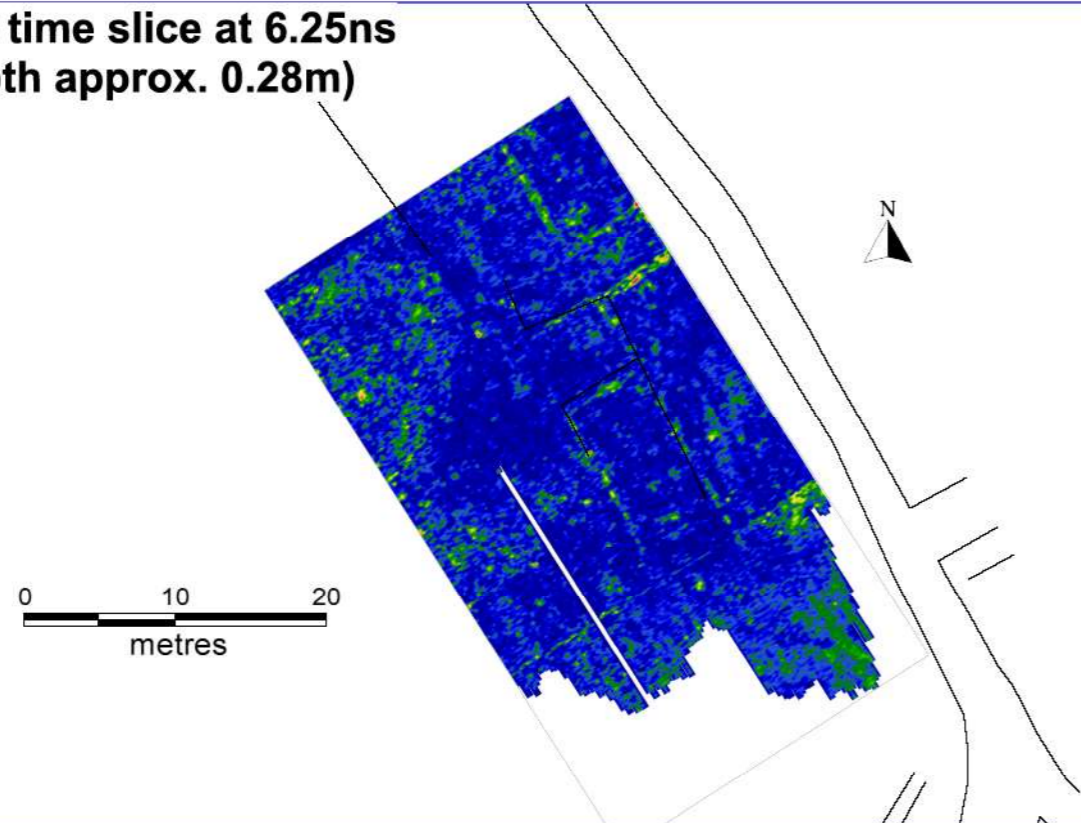
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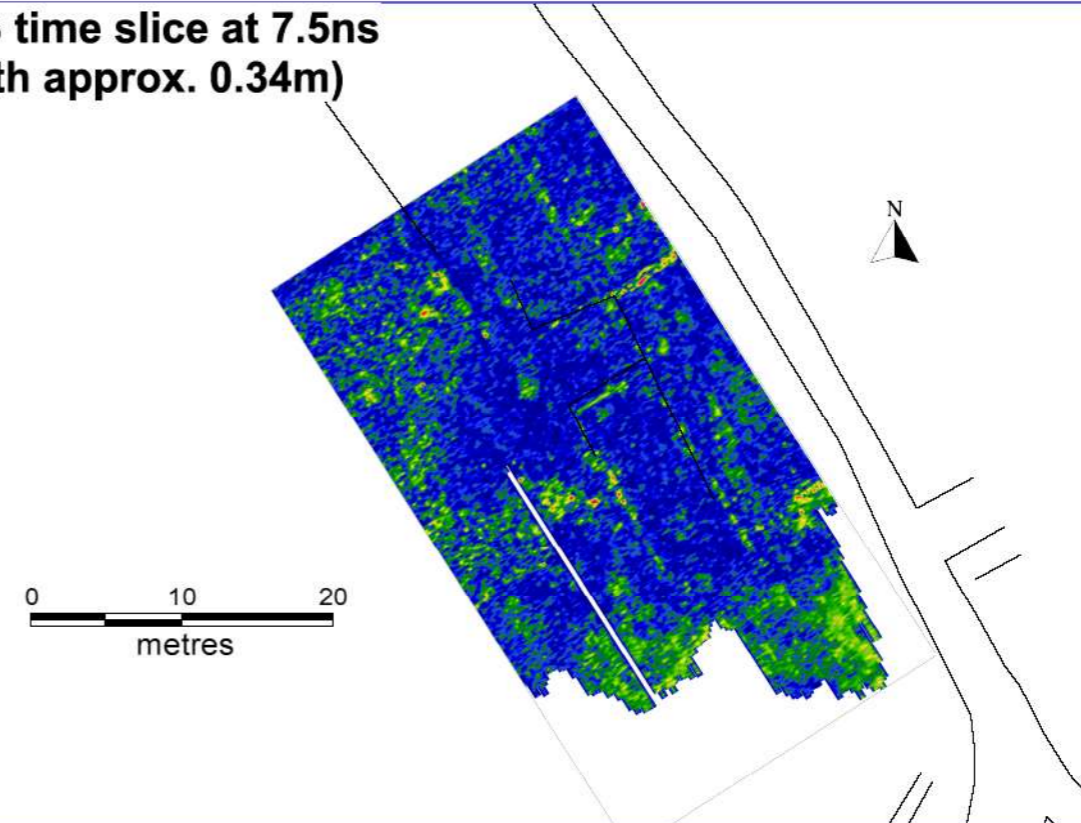


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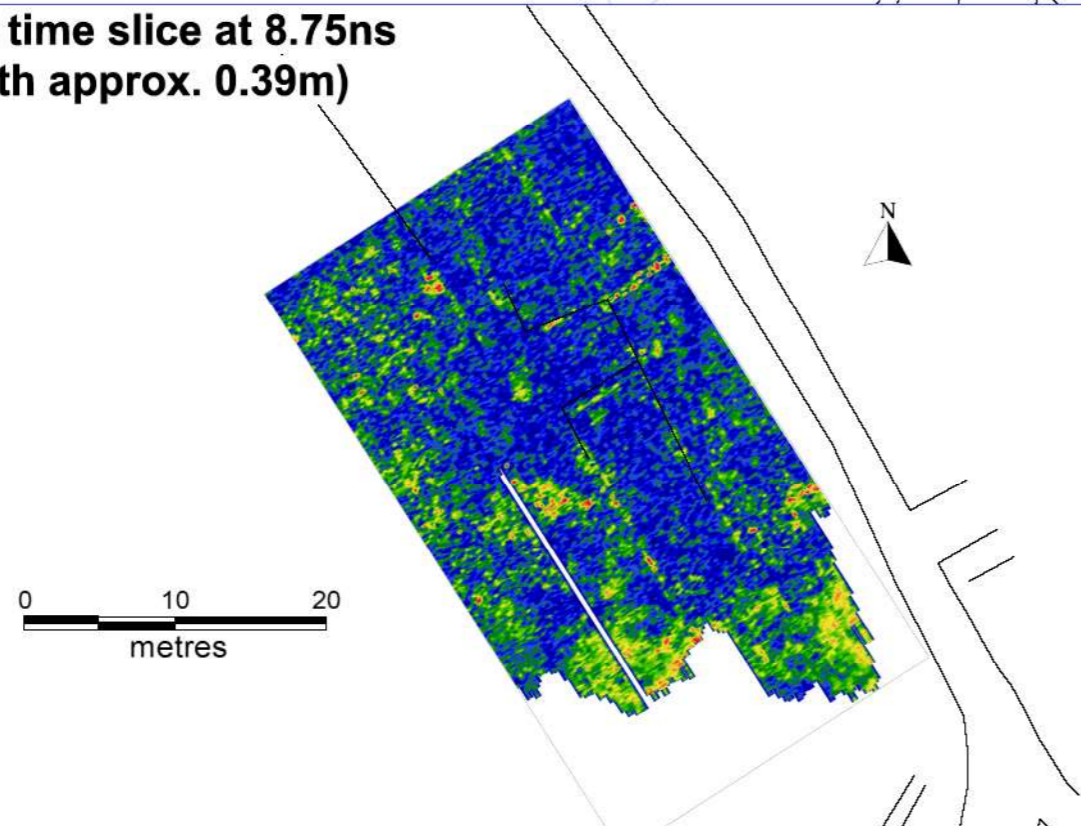
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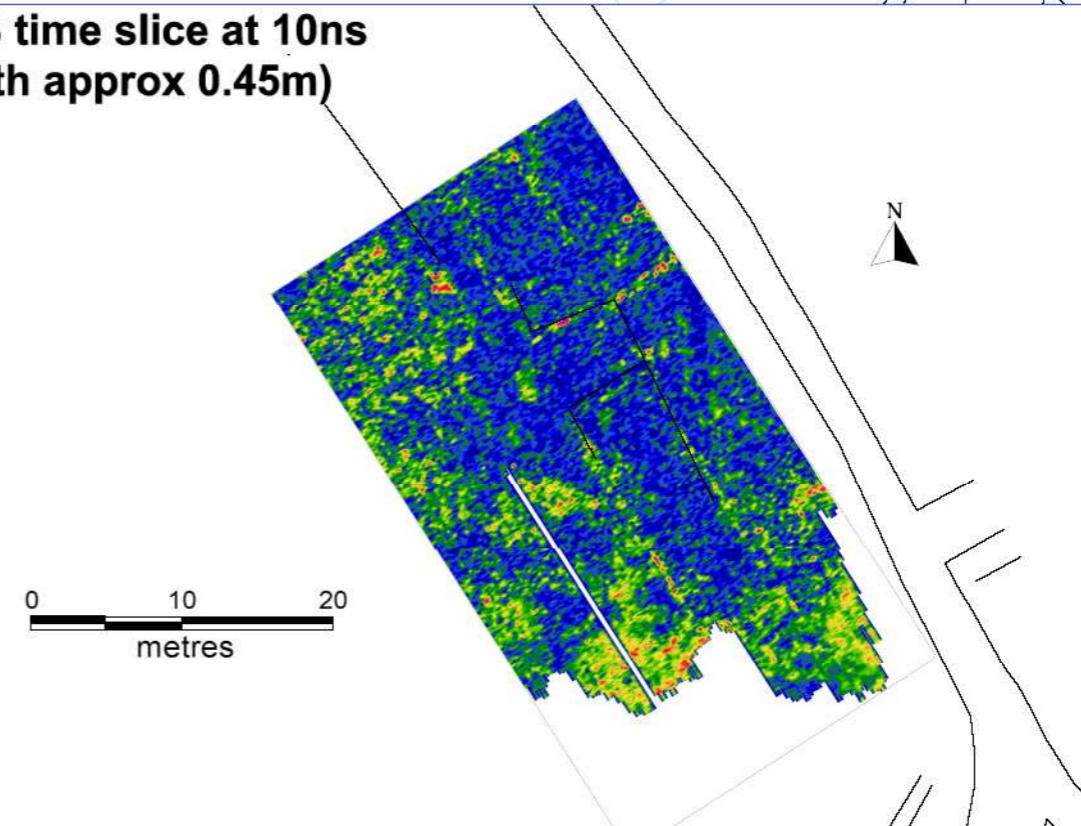
Area B time slice at 7.5ns  
(depth approx. 0.34m)



Area B time slice at 8.75ns  
(depth approx. 0.39m)



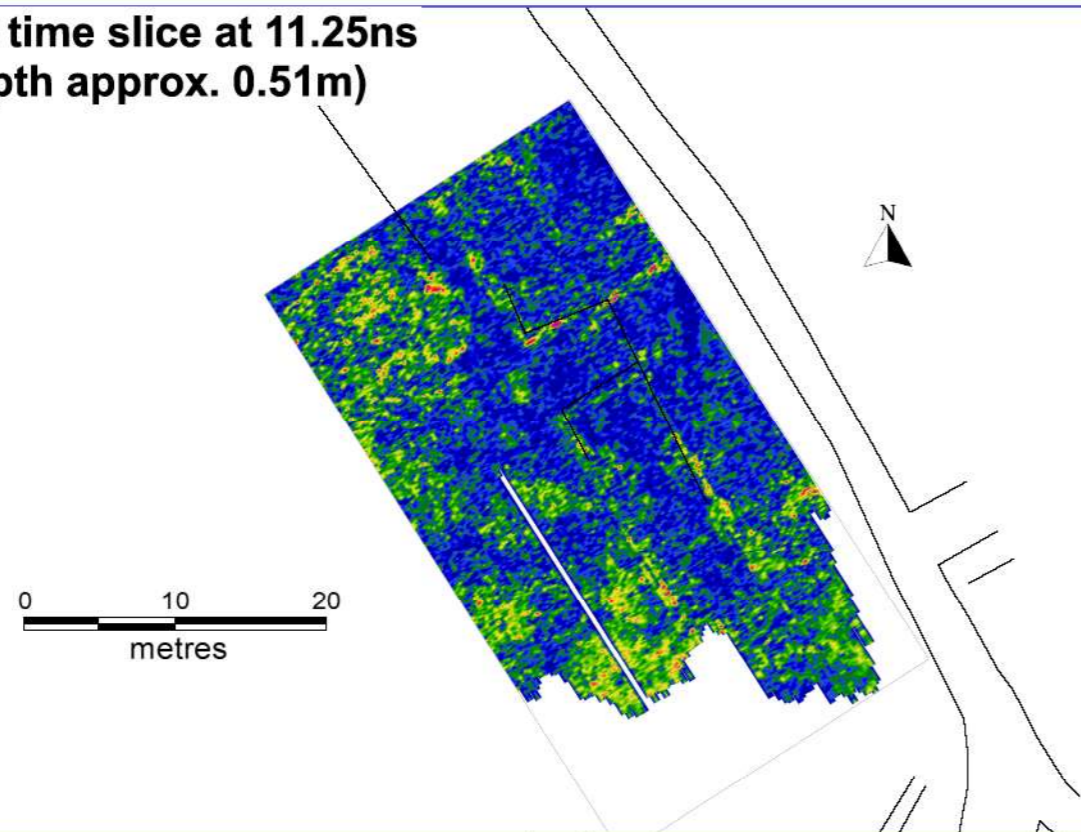
Area B time slice at 10ns  
(depth approx. 0.45m)



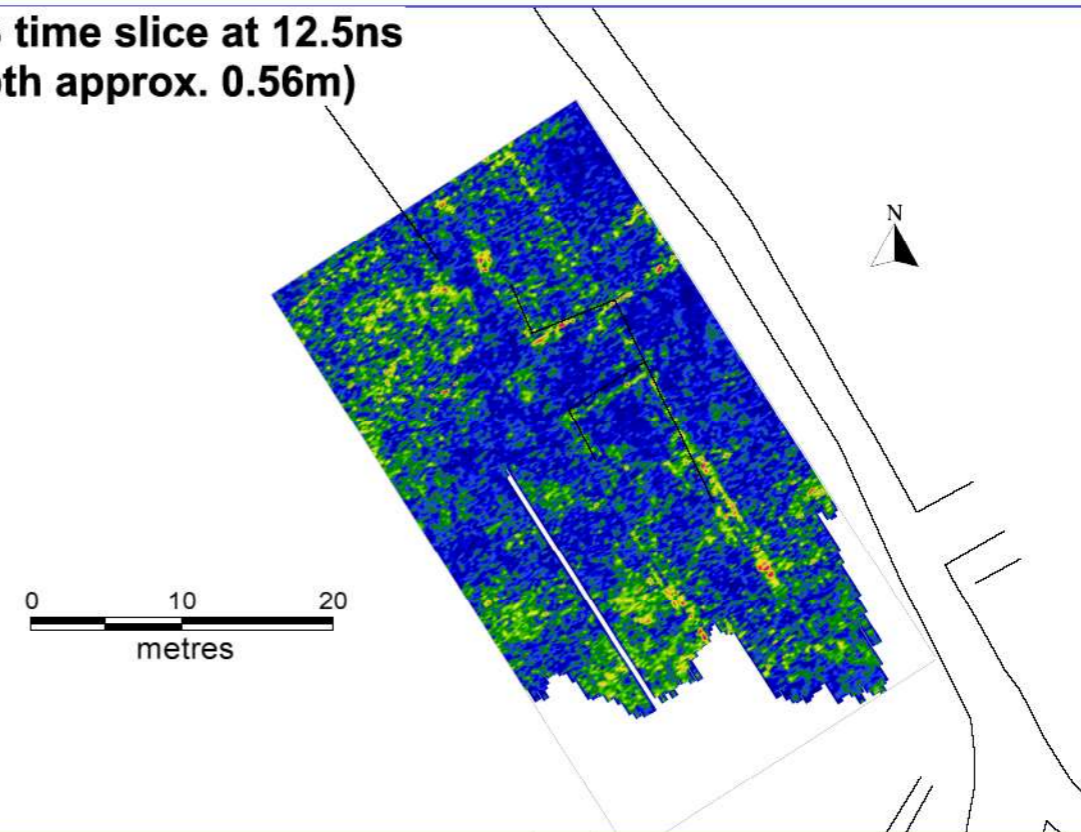


# Clarendon Palace GPR Survey Area B Time Slices

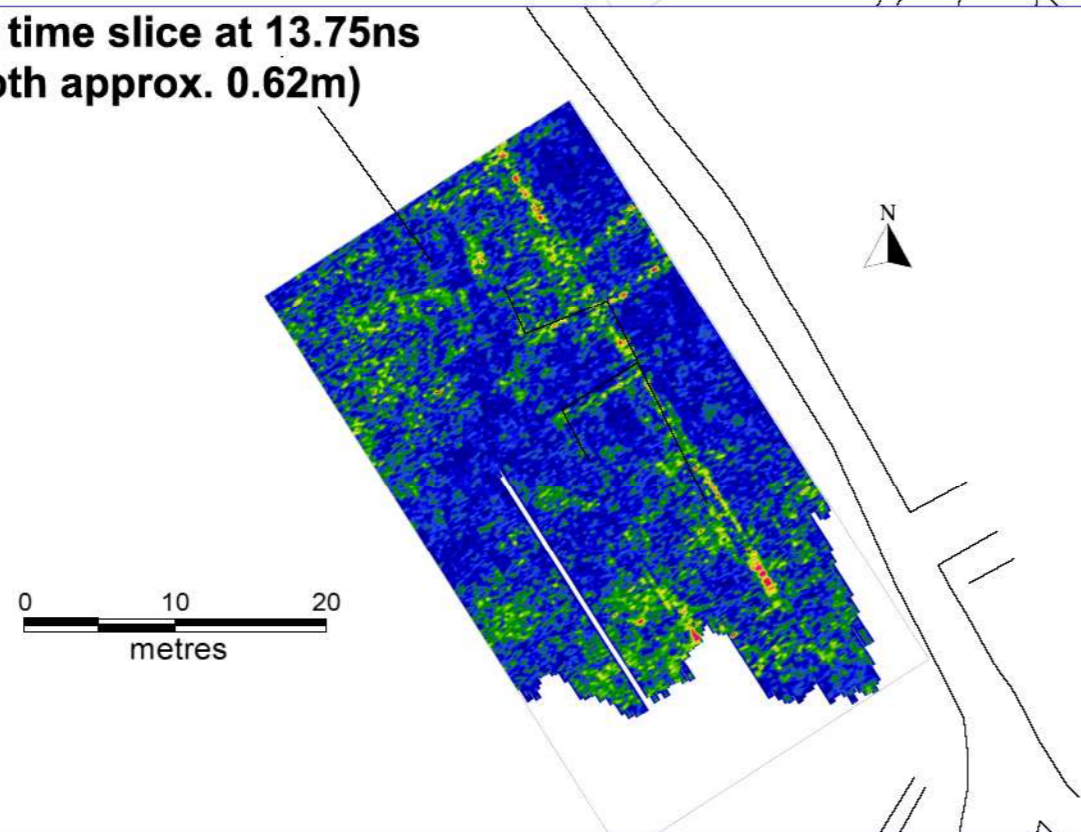
Area B time slice at 11.25ns  
(depth approx. 0.51m)



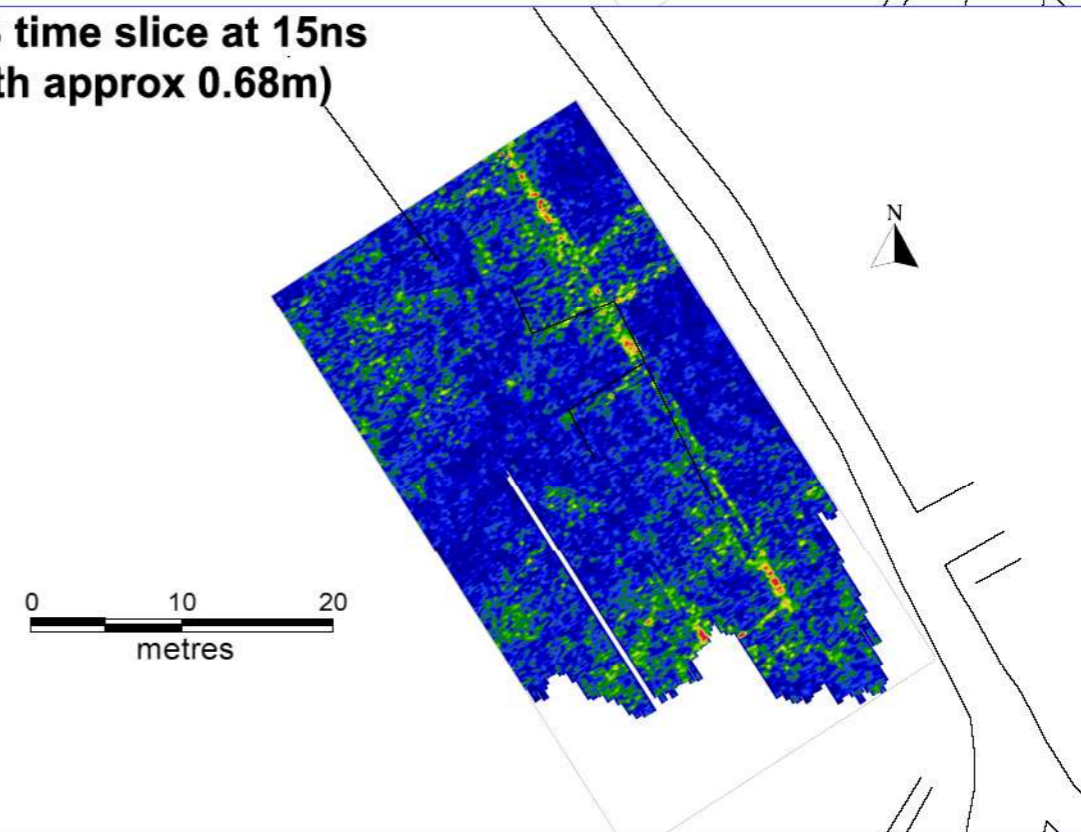
Area B time slice at 12.5ns  
(depth approx. 0.56m)



Area B time slice at 13.75ns  
(depth approx. 0.62m)



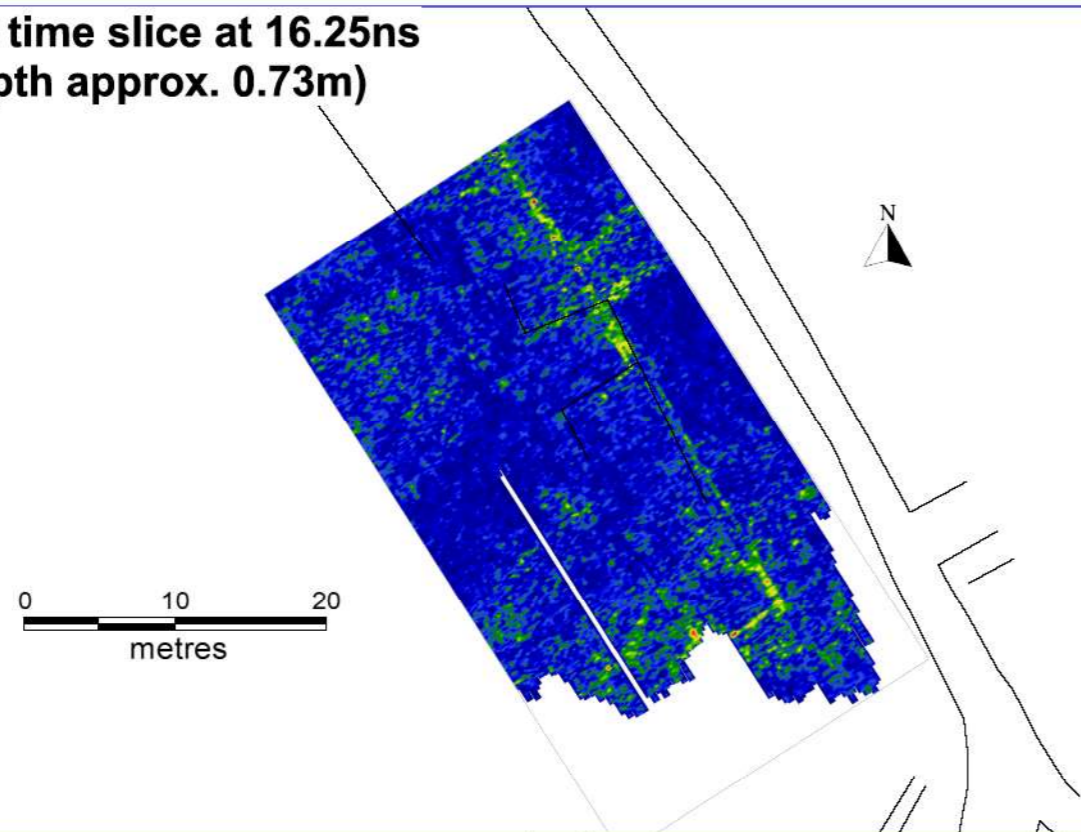
Area B time slice at 15ns  
(depth approx. 0.68m)



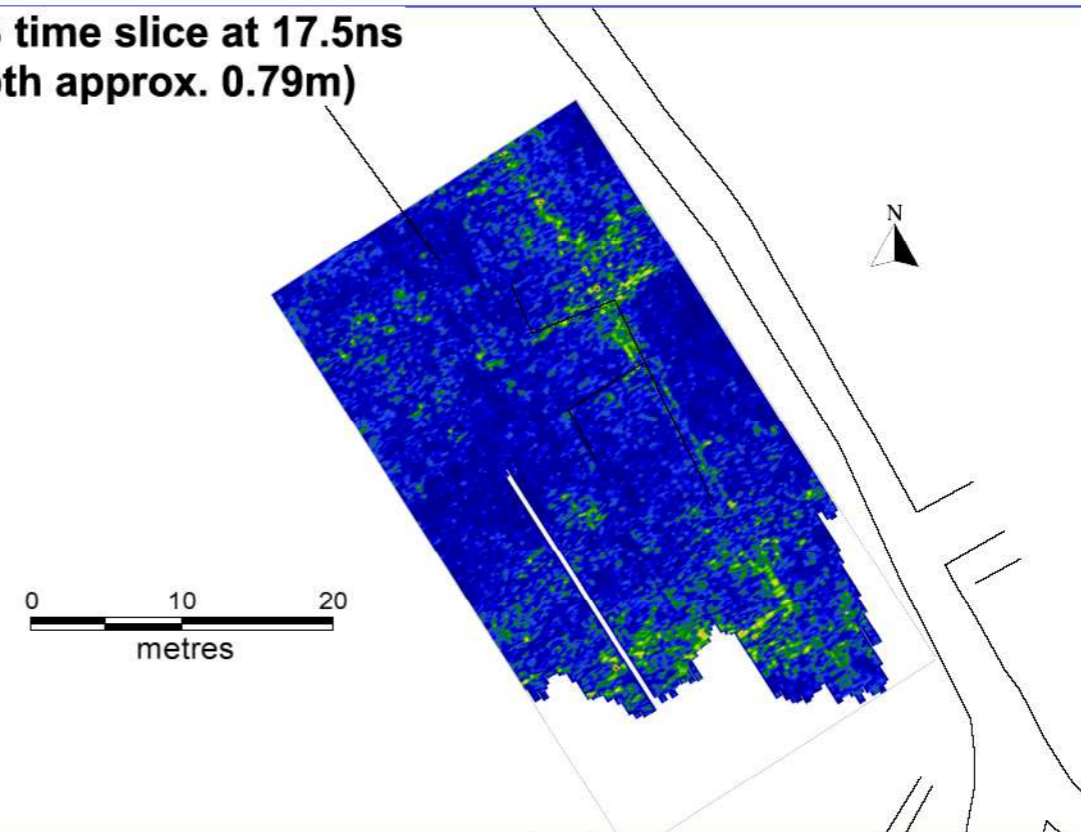


# Clarendon Palace GPR Survey Area B Time Slices

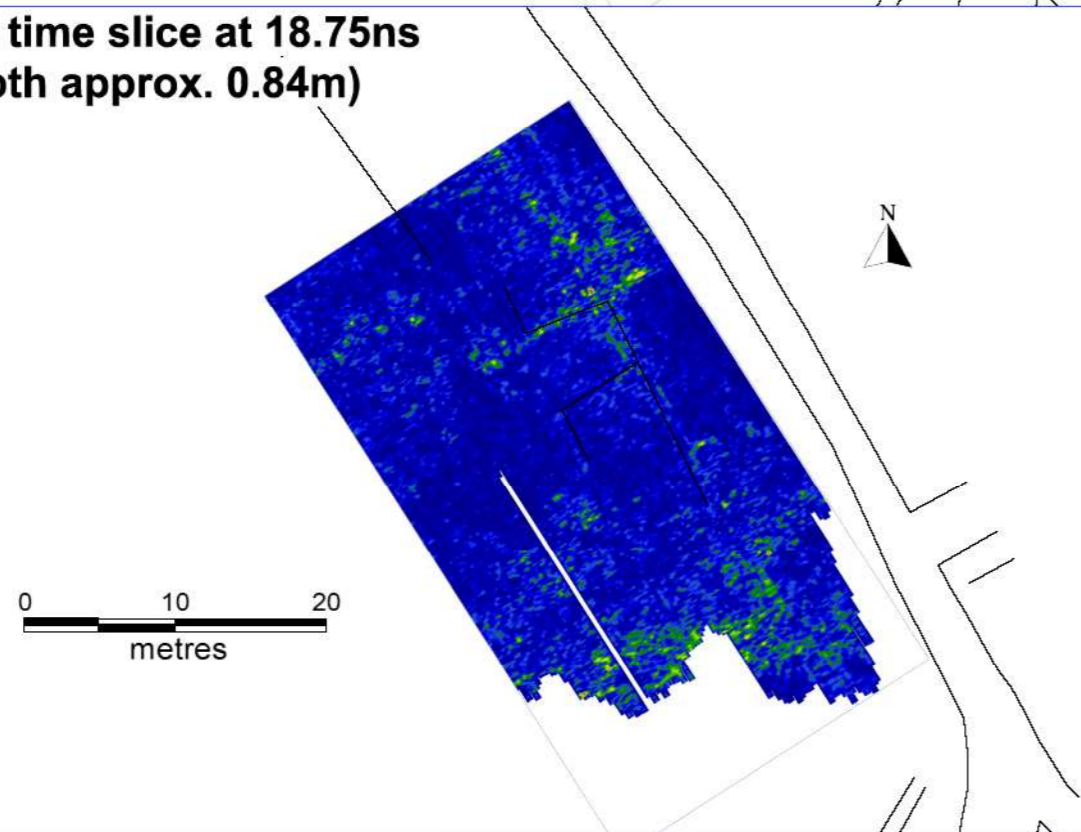
Area B time slice at 16.25ns  
(depth approx. 0.73m)



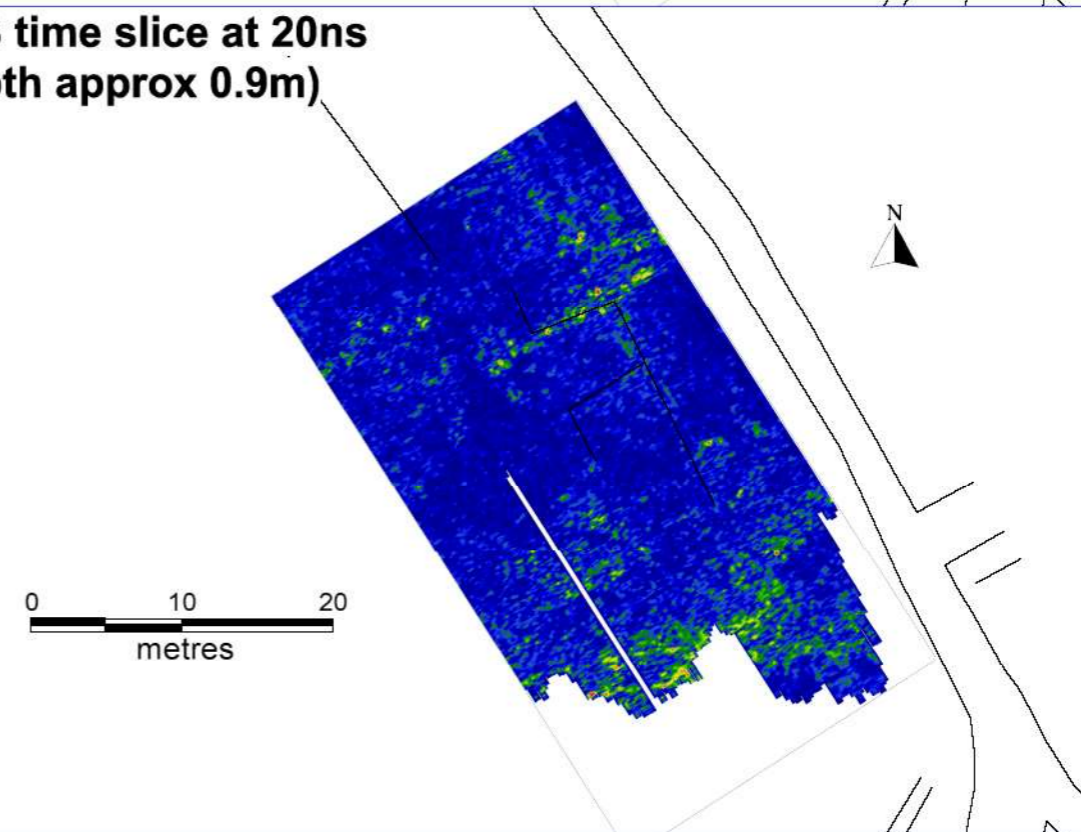
Area B time slice at 17.5ns  
(depth approx. 0.79m)



Area B time slice at 18.75ns  
(depth approx. 0.84m)



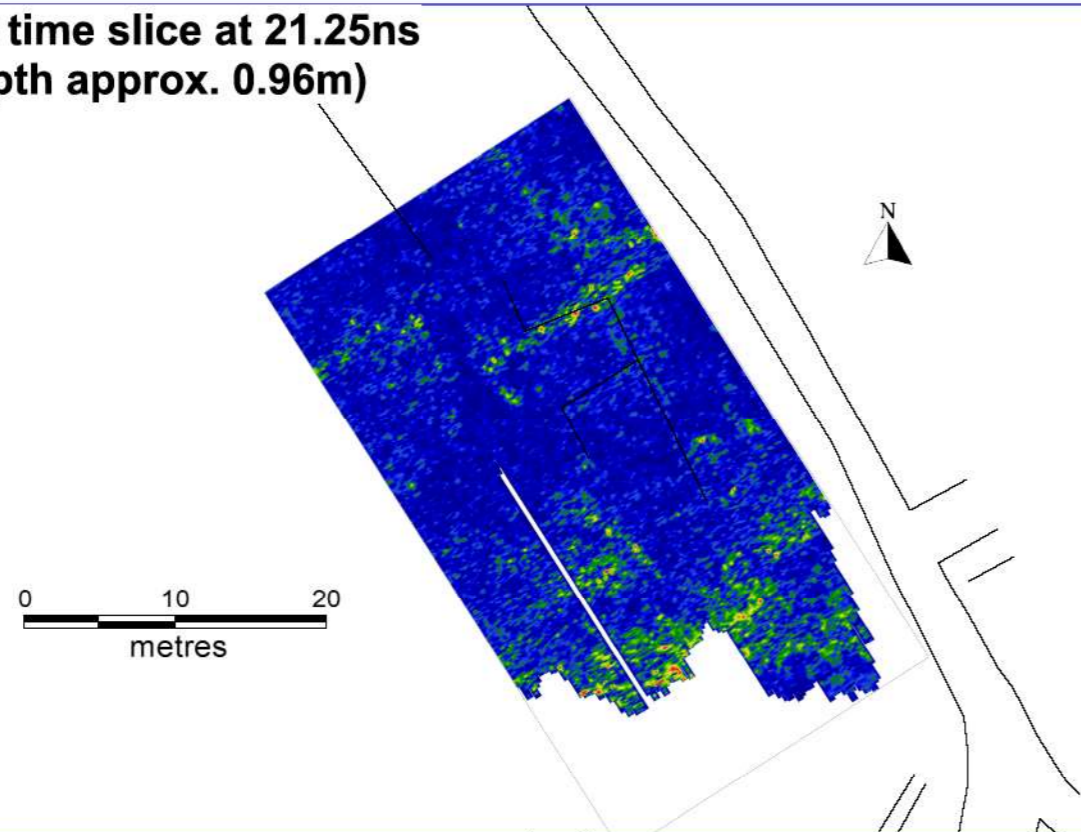
Area B time slice at 20ns  
(depth approx. 0.9m)



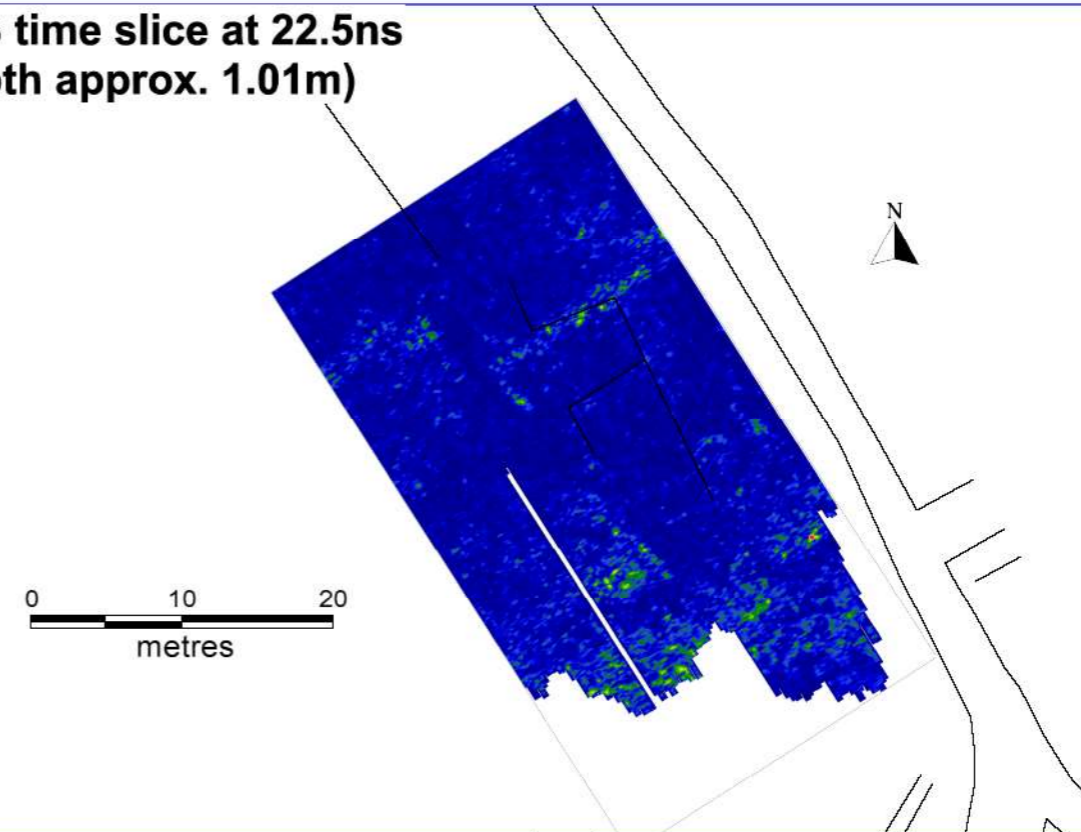


# Clarendon Palace GPR Survey Area B Time Slices

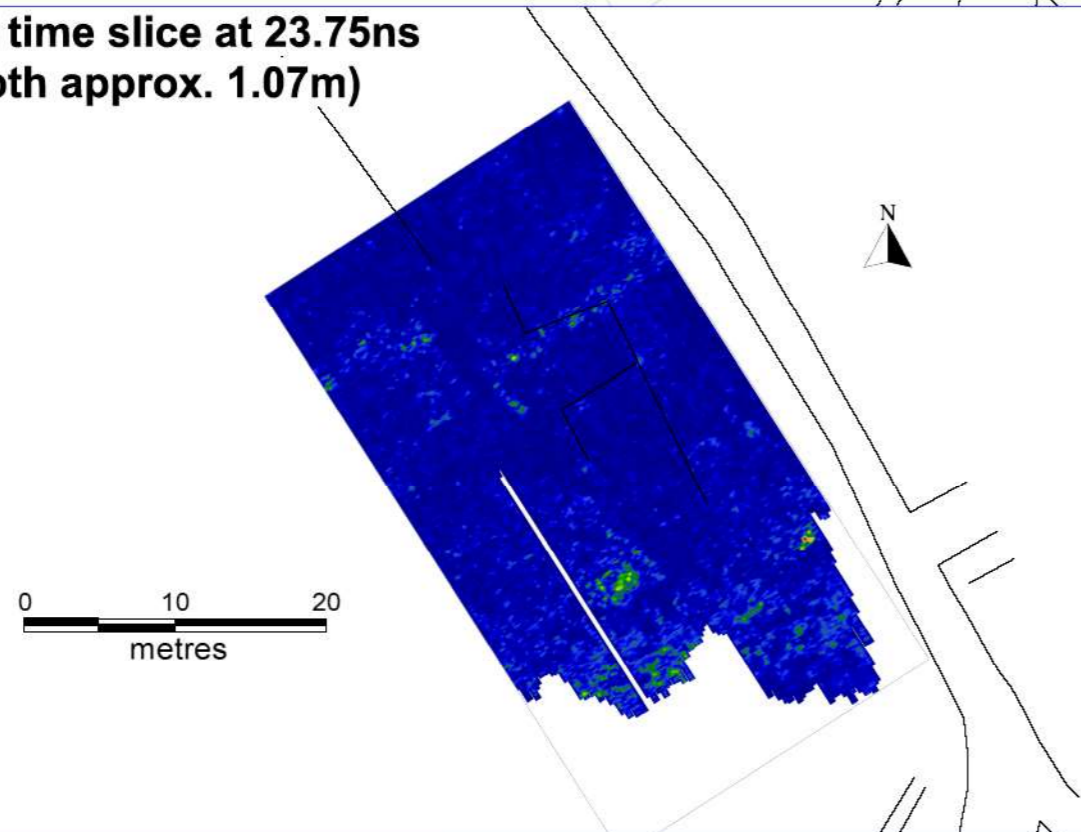
Area B time slice at 21.25ns  
(depth approx. 0.96m)



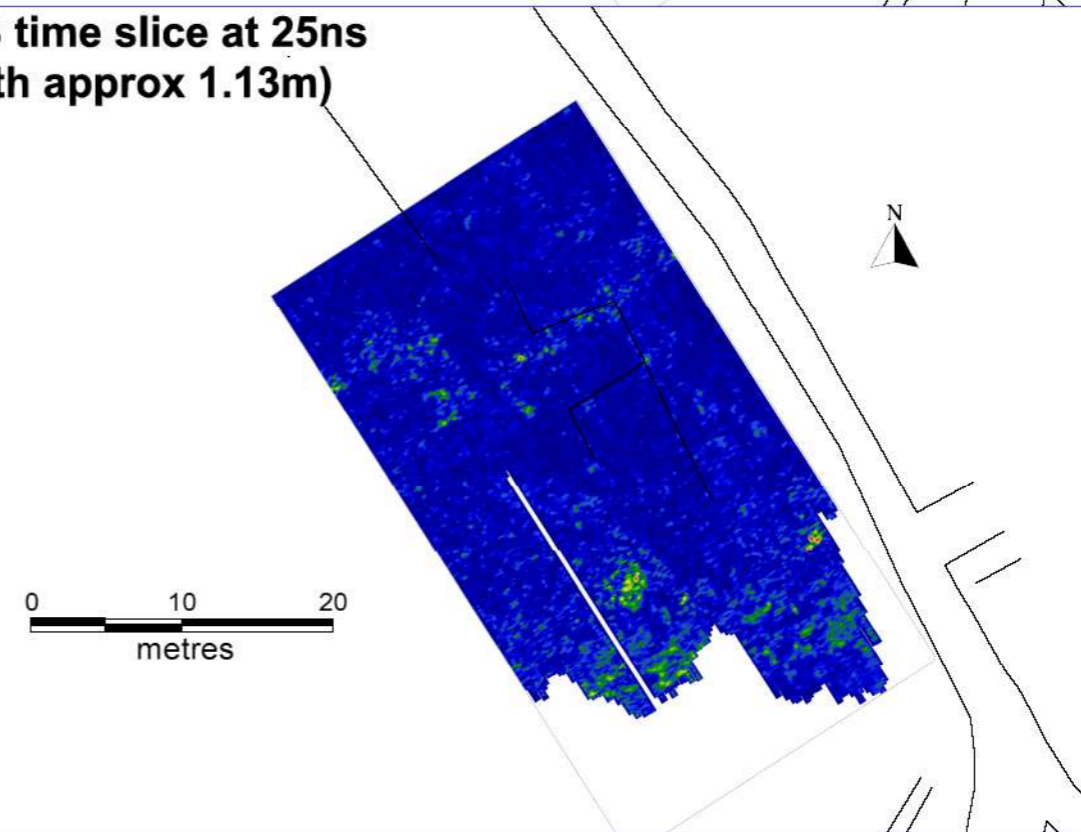
Area B time slice at 22.5ns  
(depth approx. 1.01m)



Area B time slice at 23.75ns  
(depth approx. 1.07m)



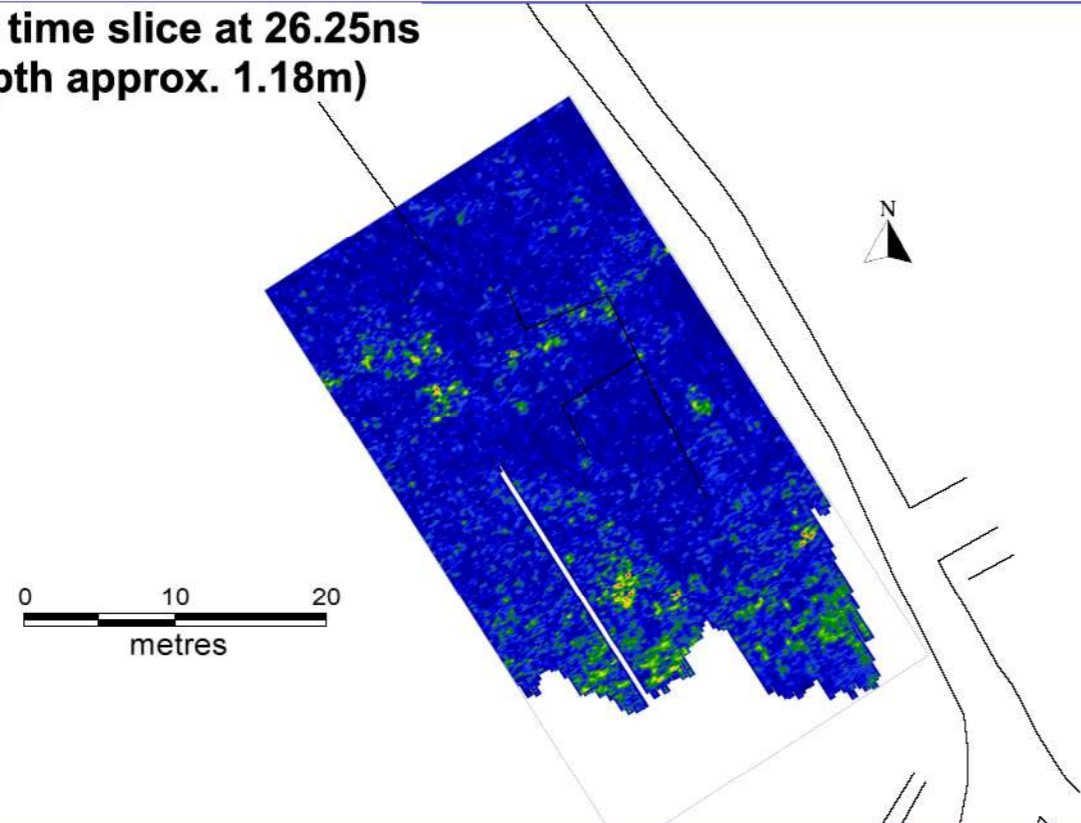
Area B time slice at 25ns  
(depth approx. 1.13m)



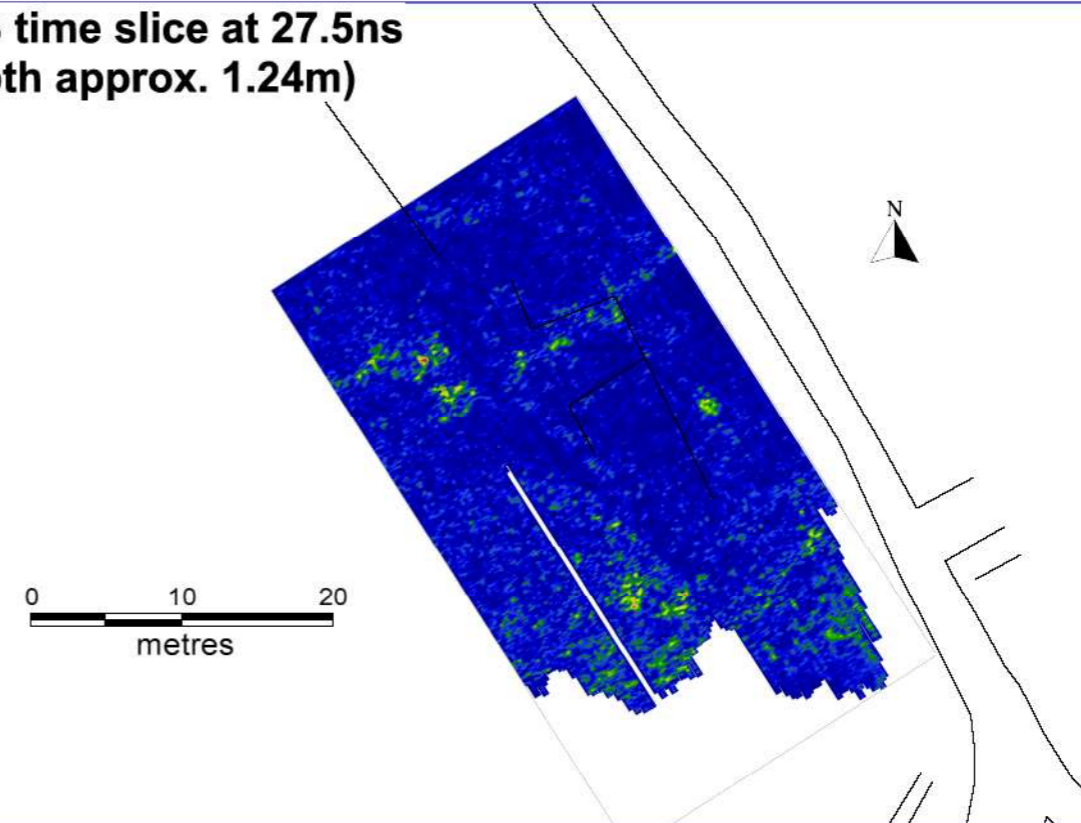


# Clarendon Palace GPR Survey Area B Time Slices

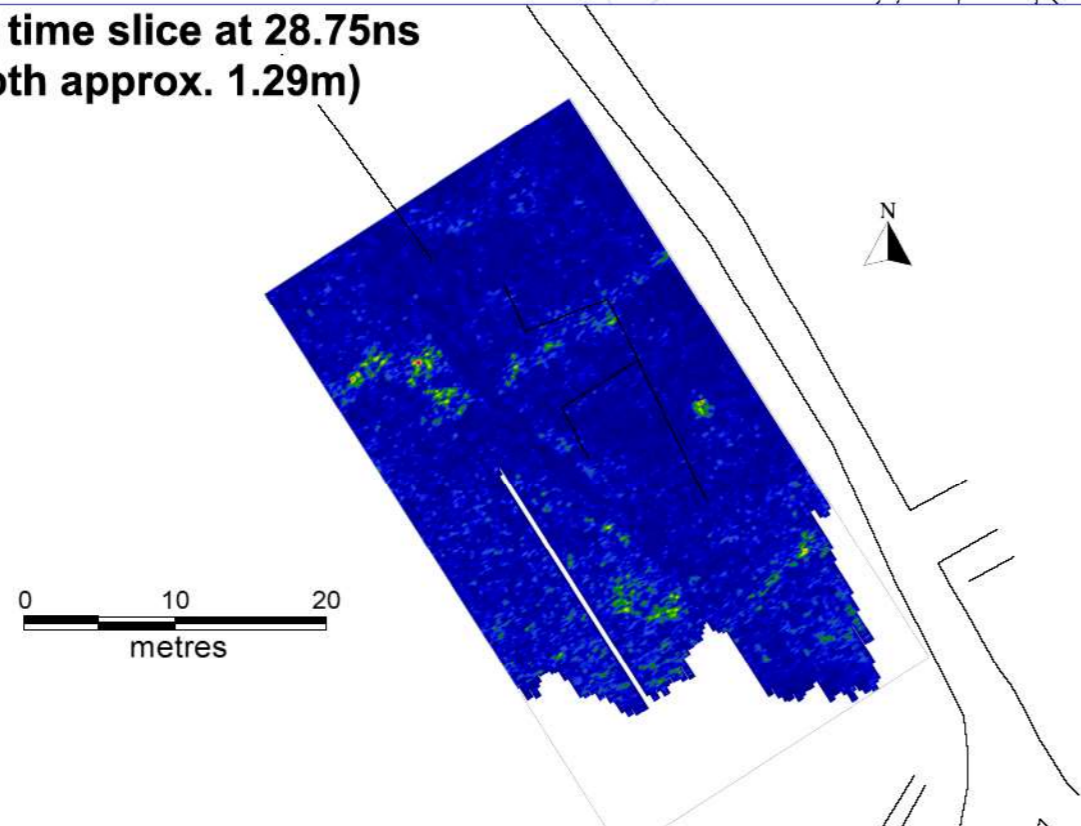
Area B time slice at 26.25ns  
(depth approx. 1.18m)



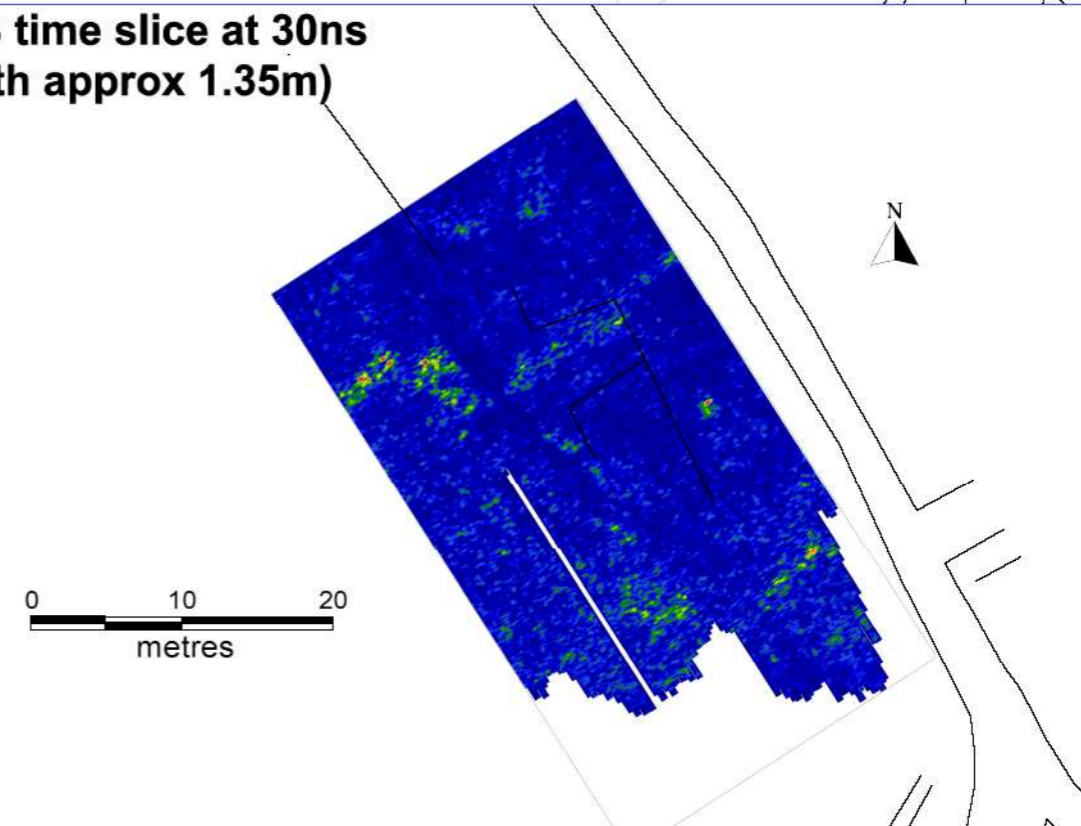
Area B time slice at 27.5ns  
(depth approx. 1.24m)



Area B time slice at 28.75ns  
(depth approx. 1.29m)



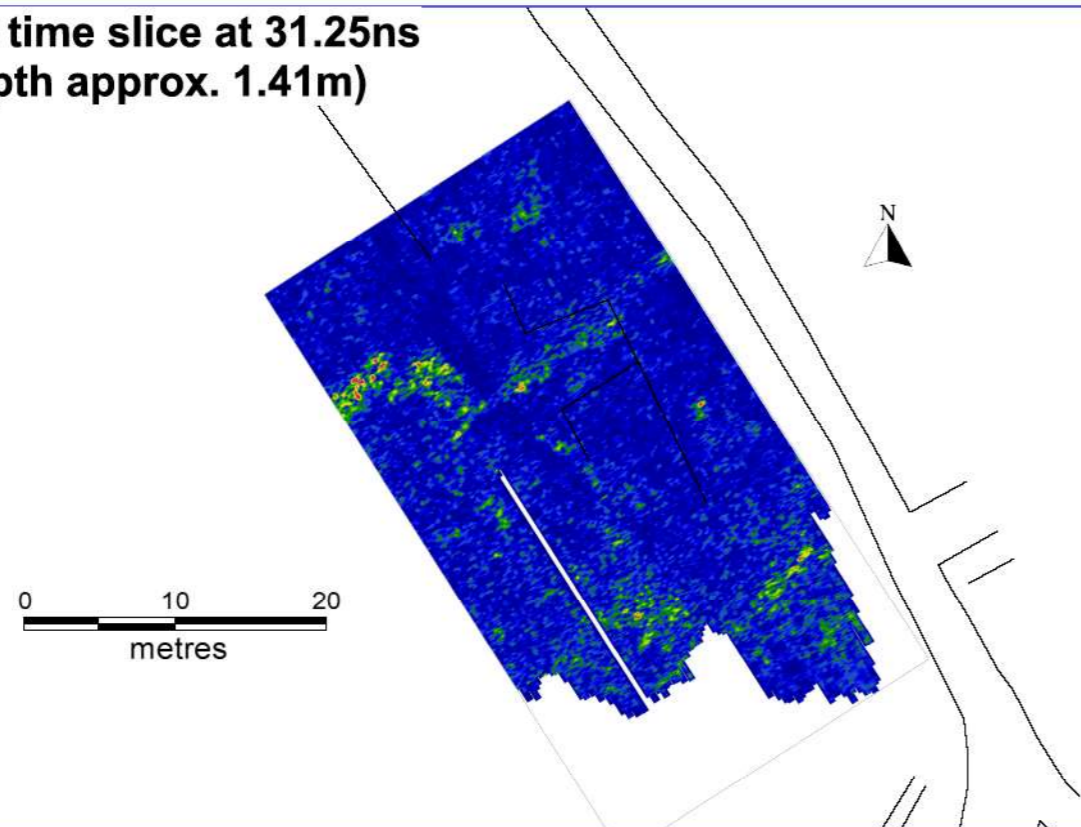
Area B time slice at 30ns  
(depth approx. 1.35m)



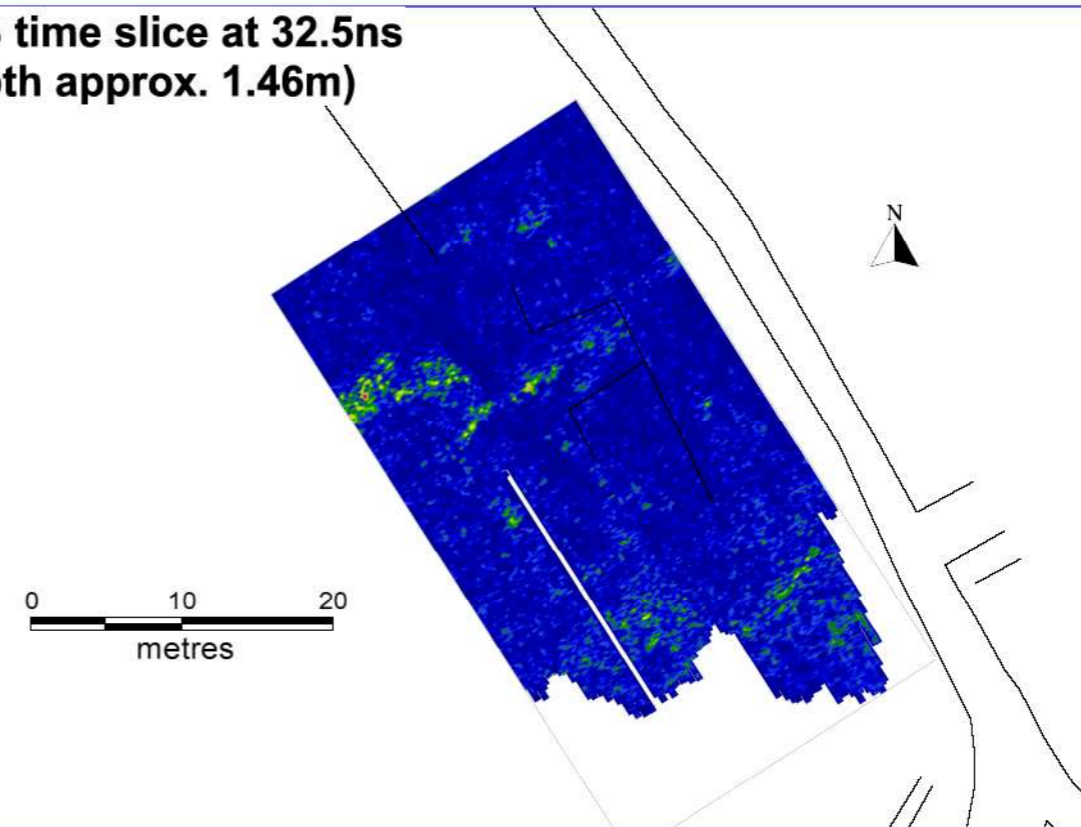


# Clarendon Palace GPR Survey Area B Time Slices

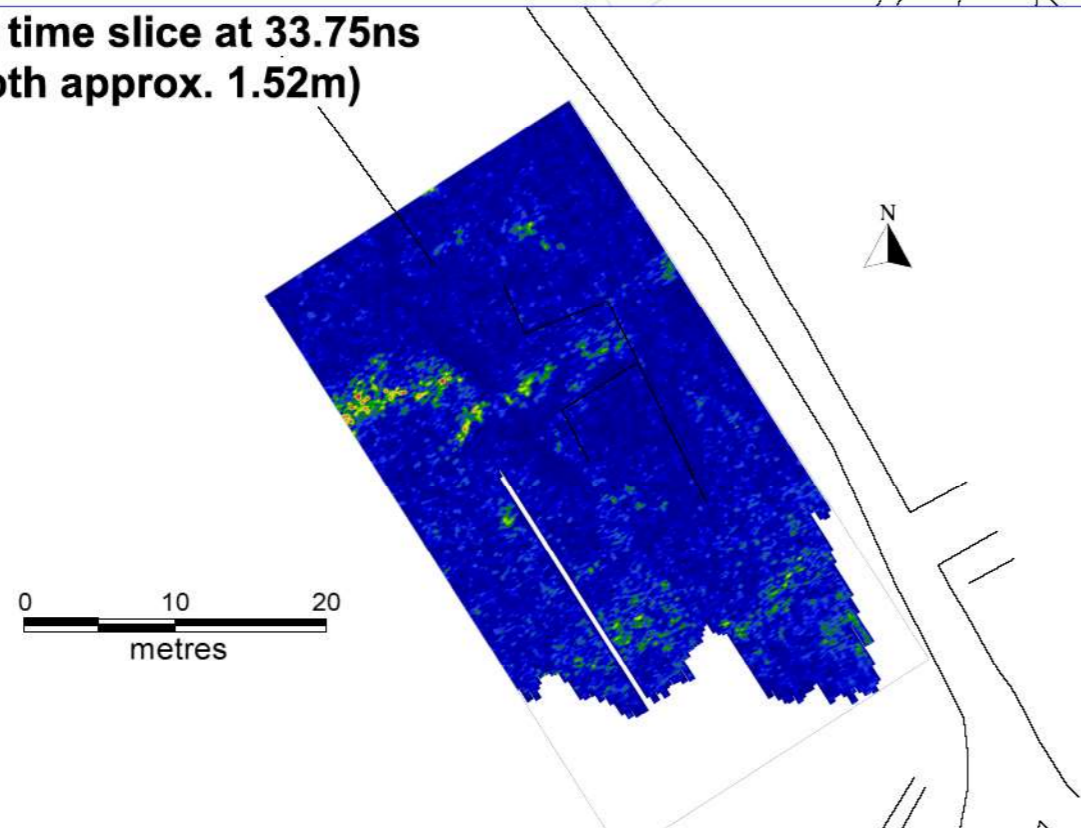
Area B time slice at 31.25ns  
(depth approx. 1.41m)



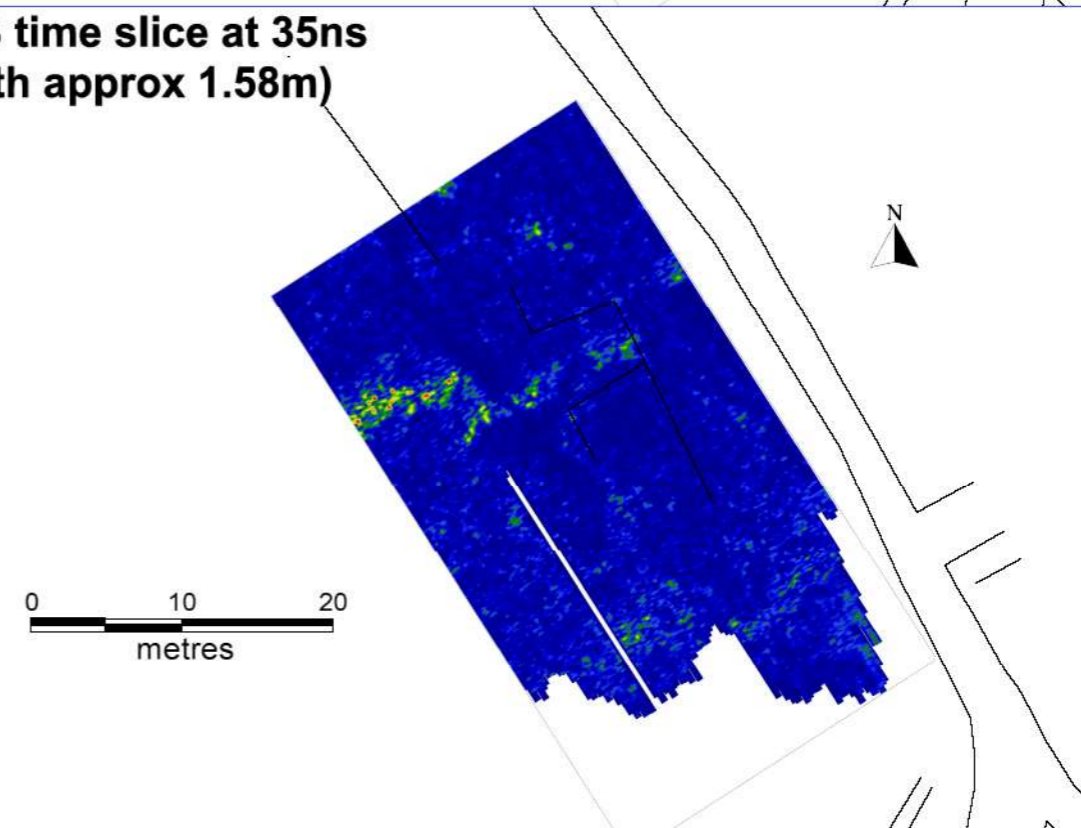
Area B time slice at 32.5ns  
(depth approx. 1.46m)



Area B time slice at 33.75ns  
(depth approx. 1.52m)



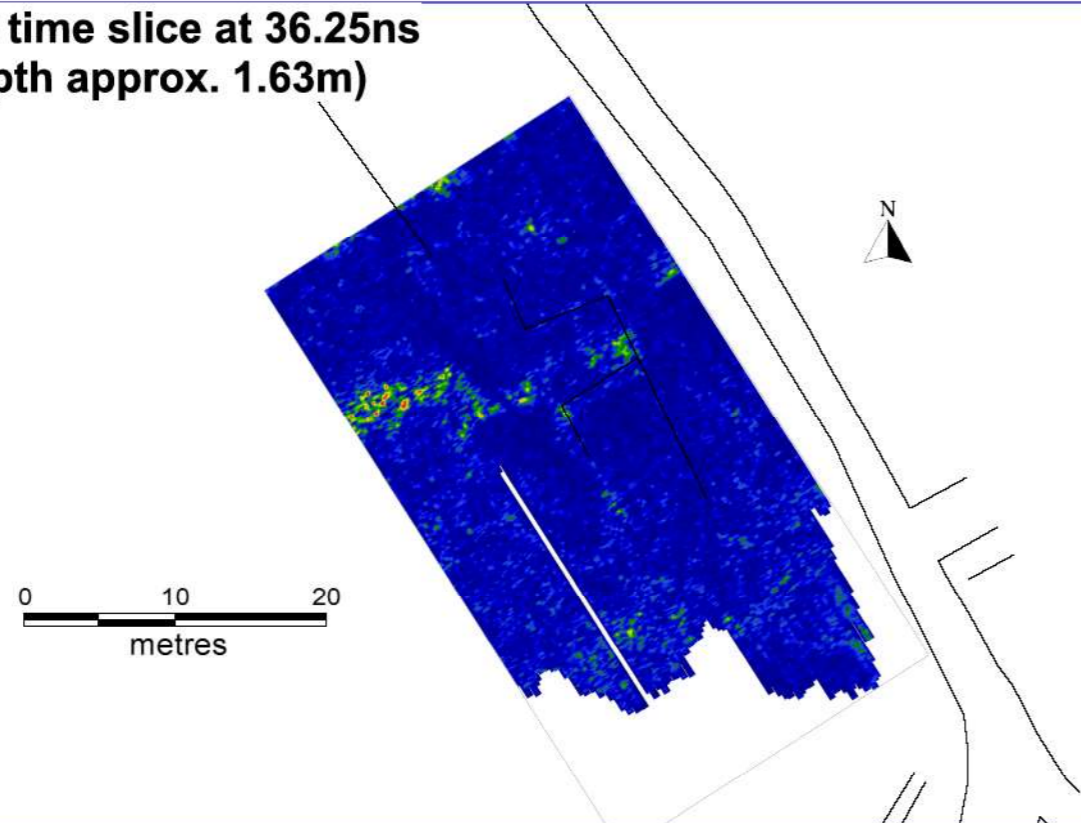
Area B time slice at 35ns  
(depth approx. 1.58m)



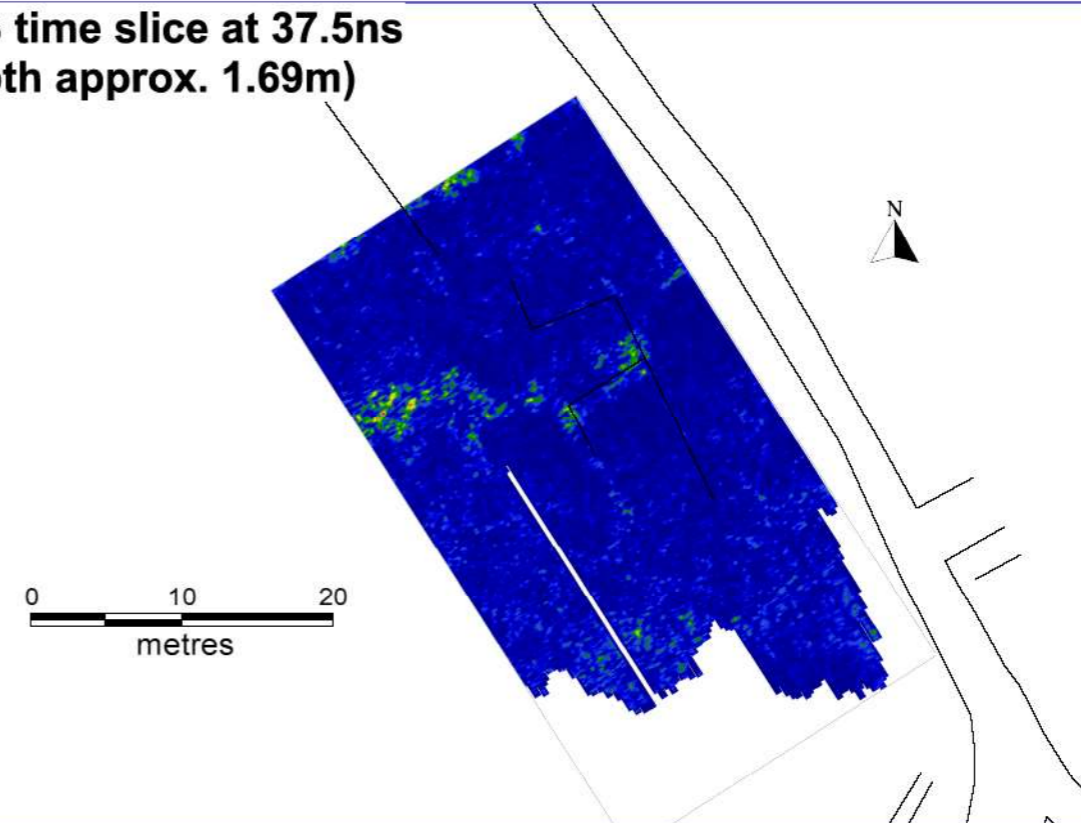


# Clarendon Palace GPR Survey Area B Time Slices

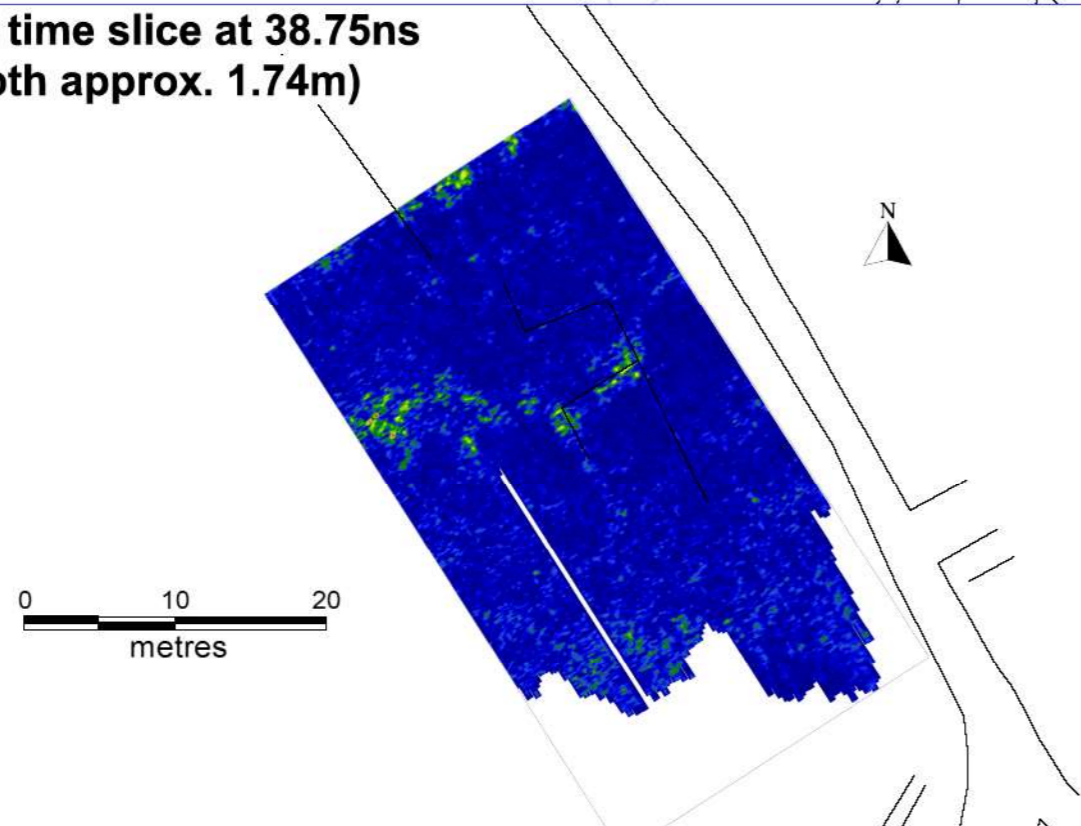
Area B time slice at 36.25ns  
(depth approx. 1.63m)



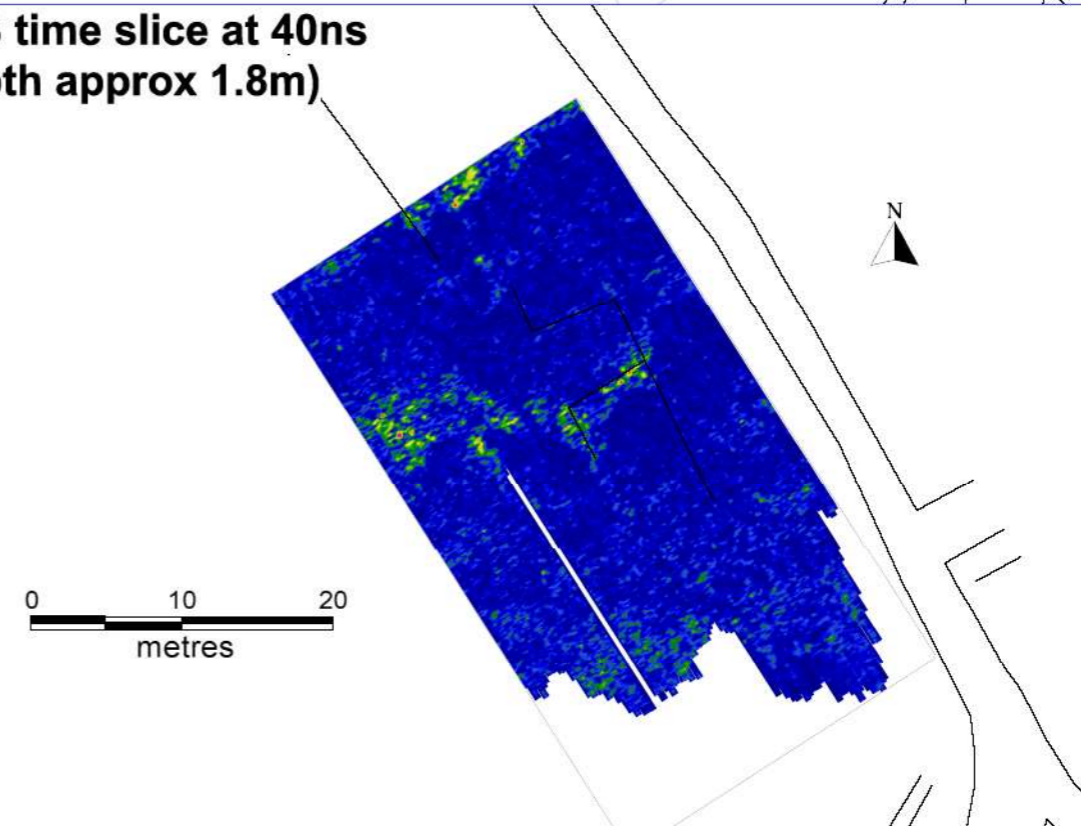
Area B time slice at 37.5ns  
(depth approx. 1.69m)



Area B time slice at 38.75ns  
(depth approx. 1.74m)



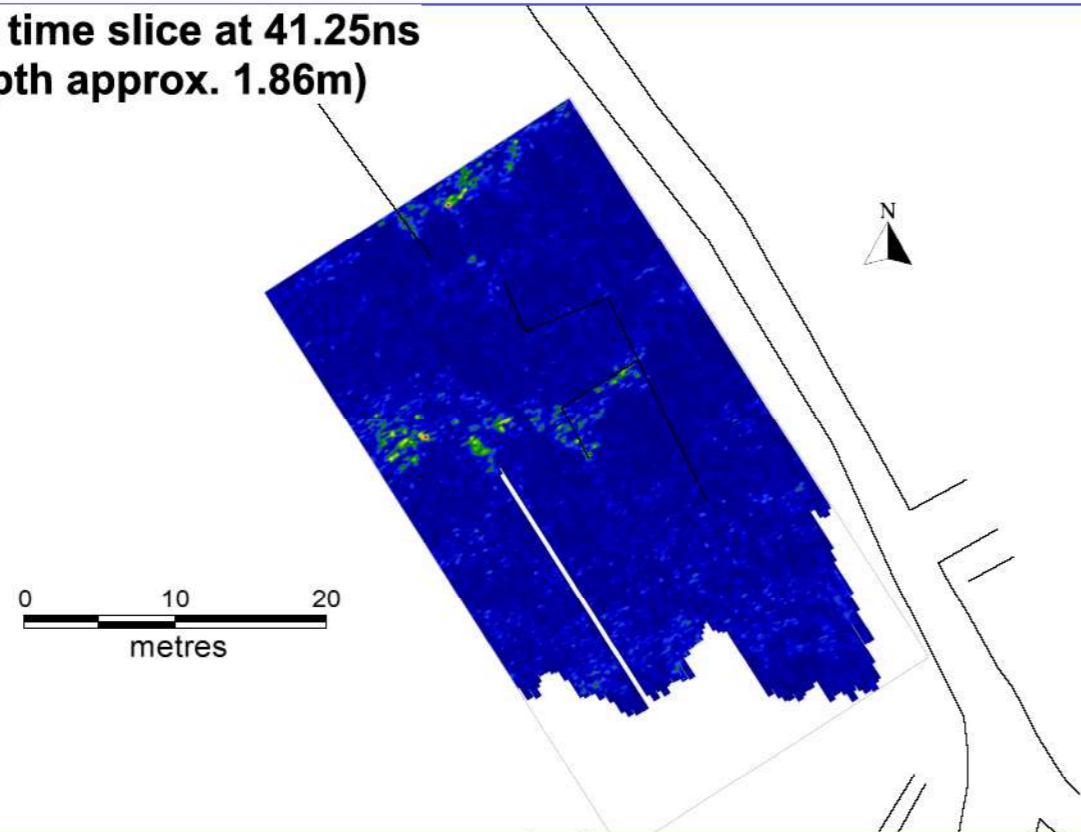
Area B time slice at 40ns  
(depth approx. 1.8m)



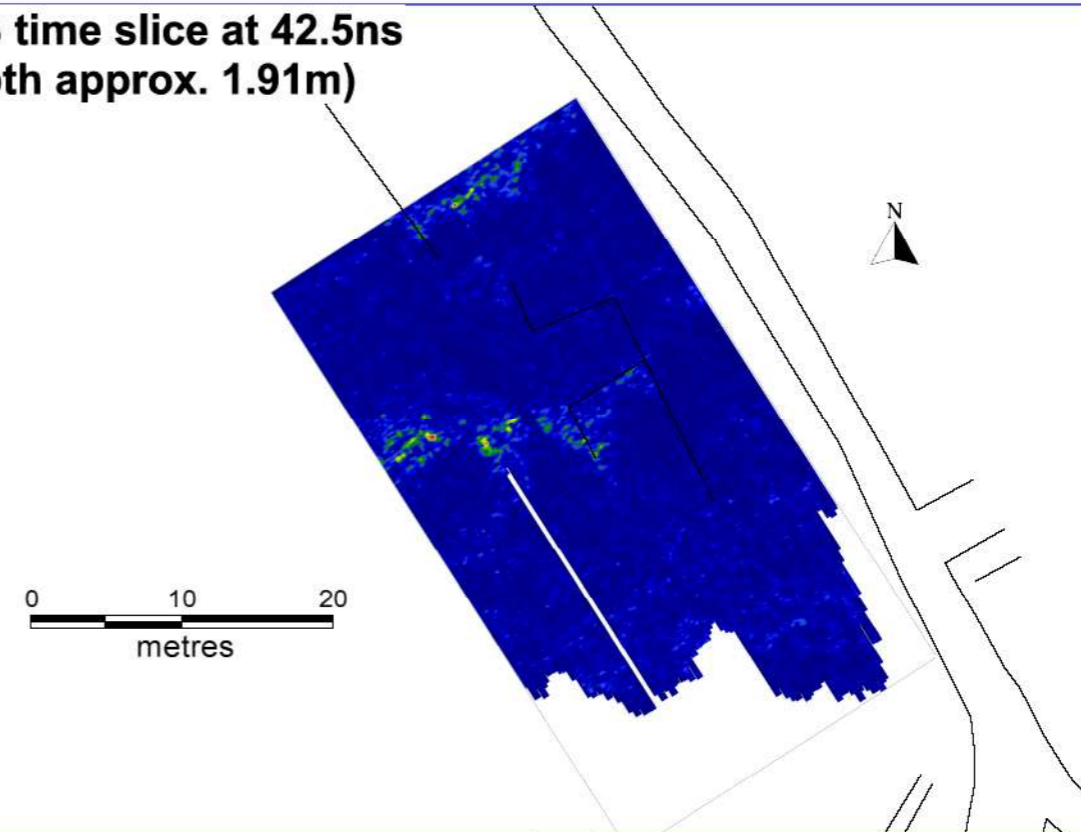


# Clarendon Palace GPR Survey Area B Time Slices

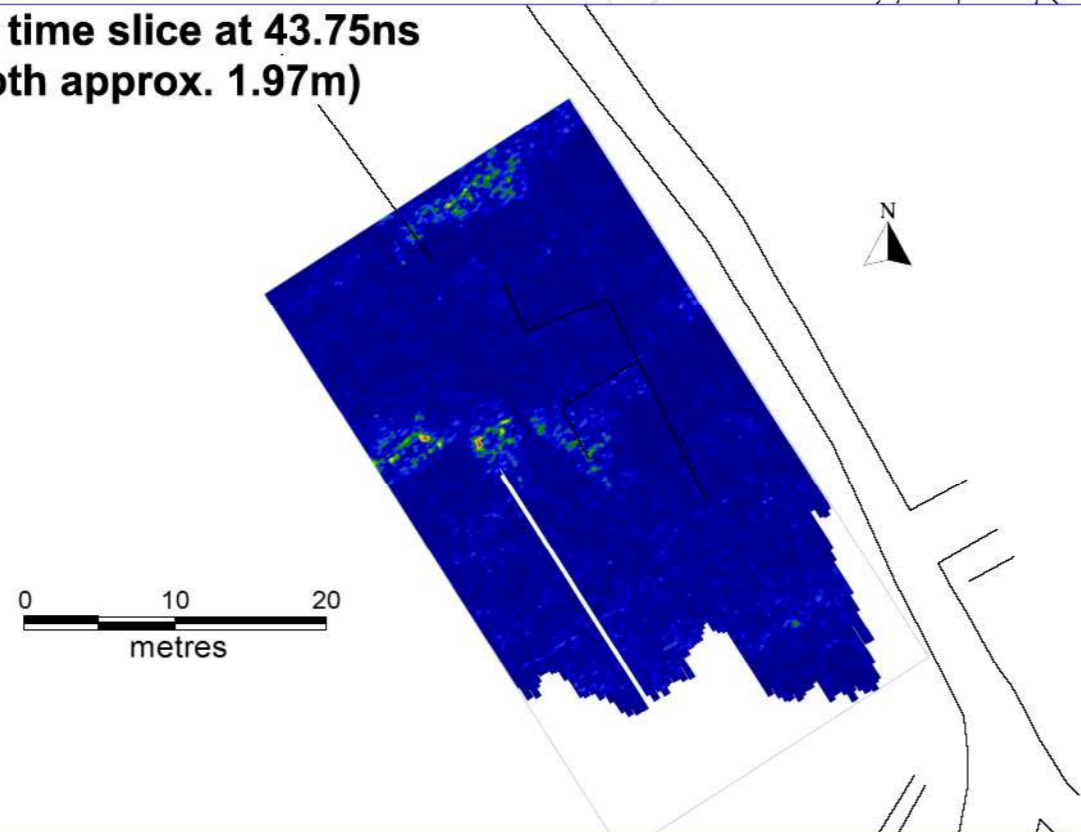
Area B time slice at 41.25ns  
(depth approx. 1.86m)



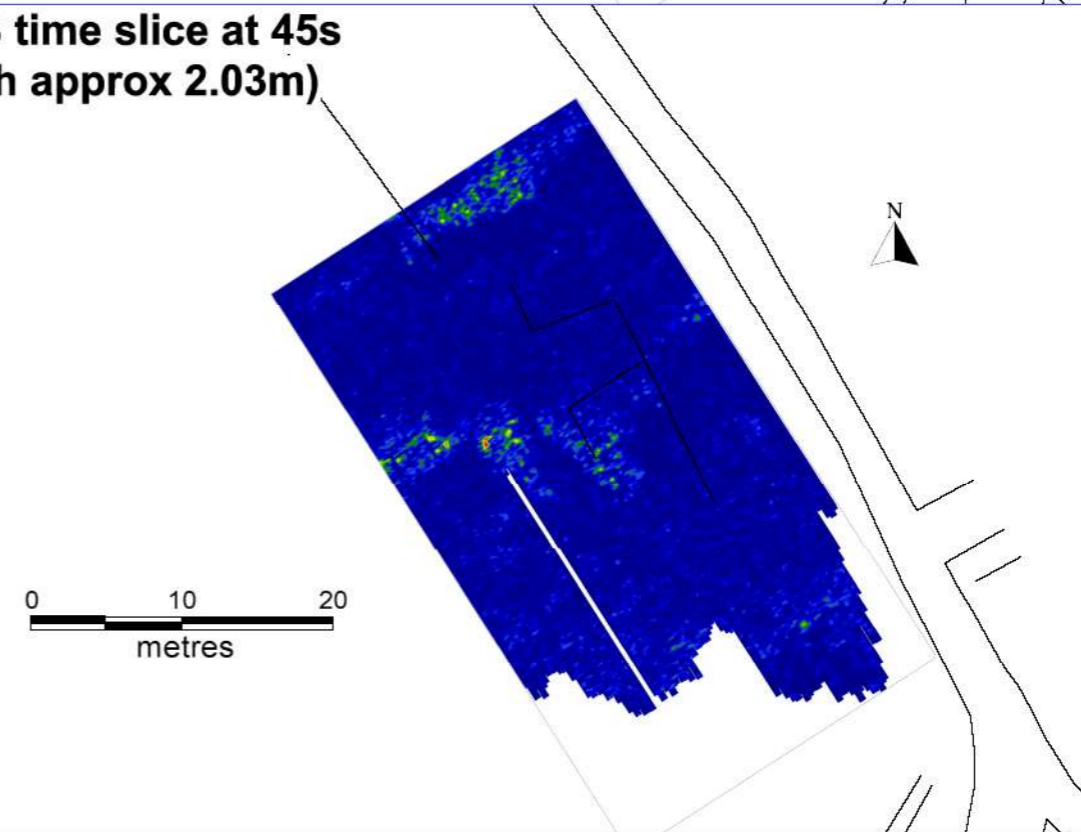
Area B time slice at 42.5ns  
(depth approx. 1.91m)



Area B time slice at 43.75ns  
(depth approx. 1.97m)



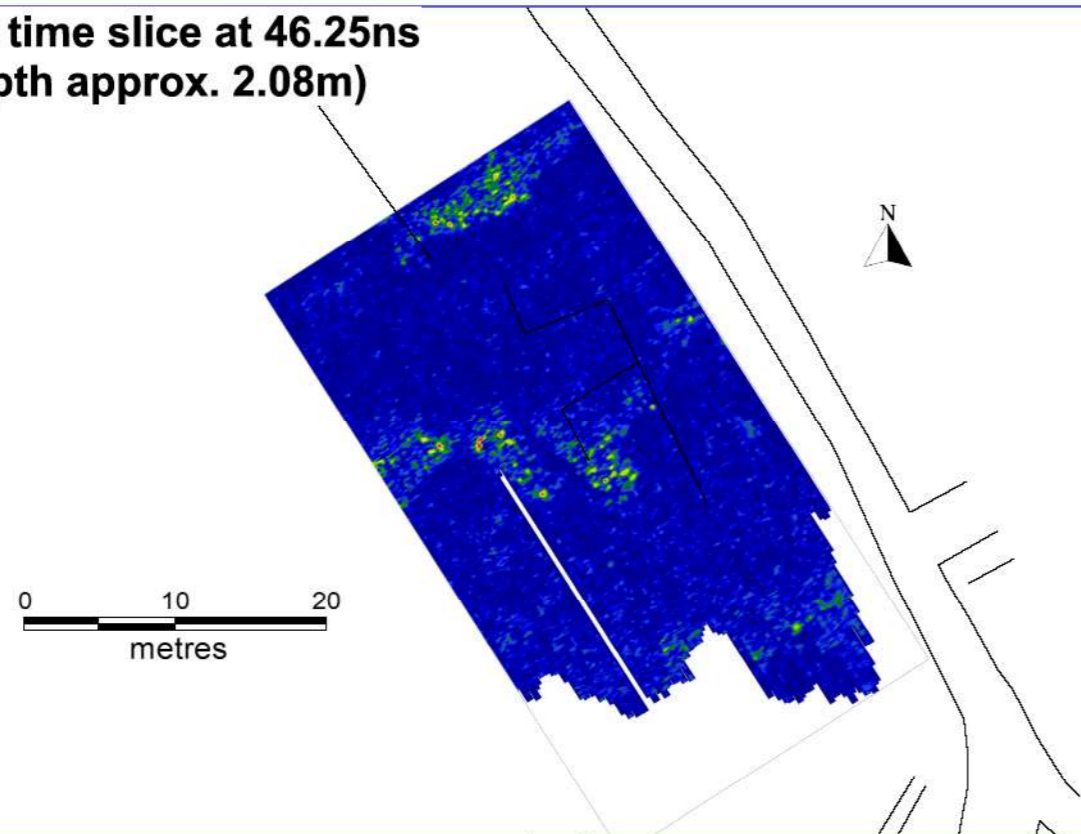
Area B time slice at 45s  
(depth approx 2.03m)



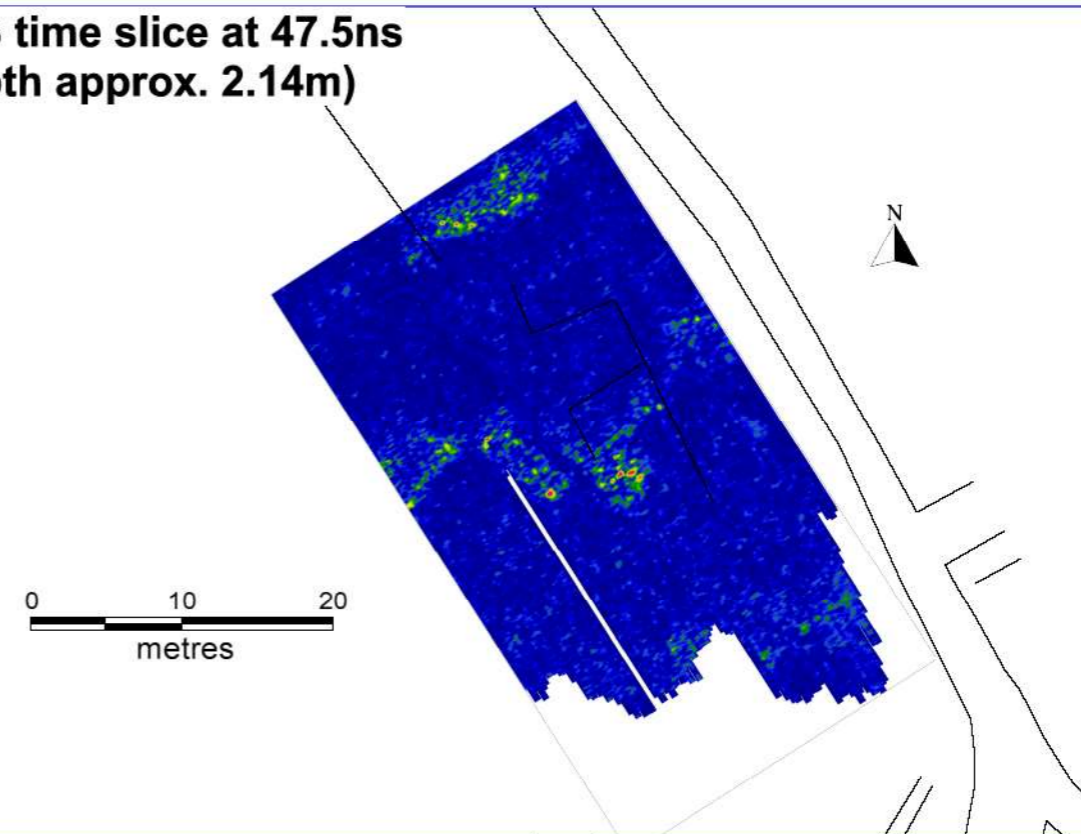


# Clarendon Palace GPR Survey Area B Time Slices

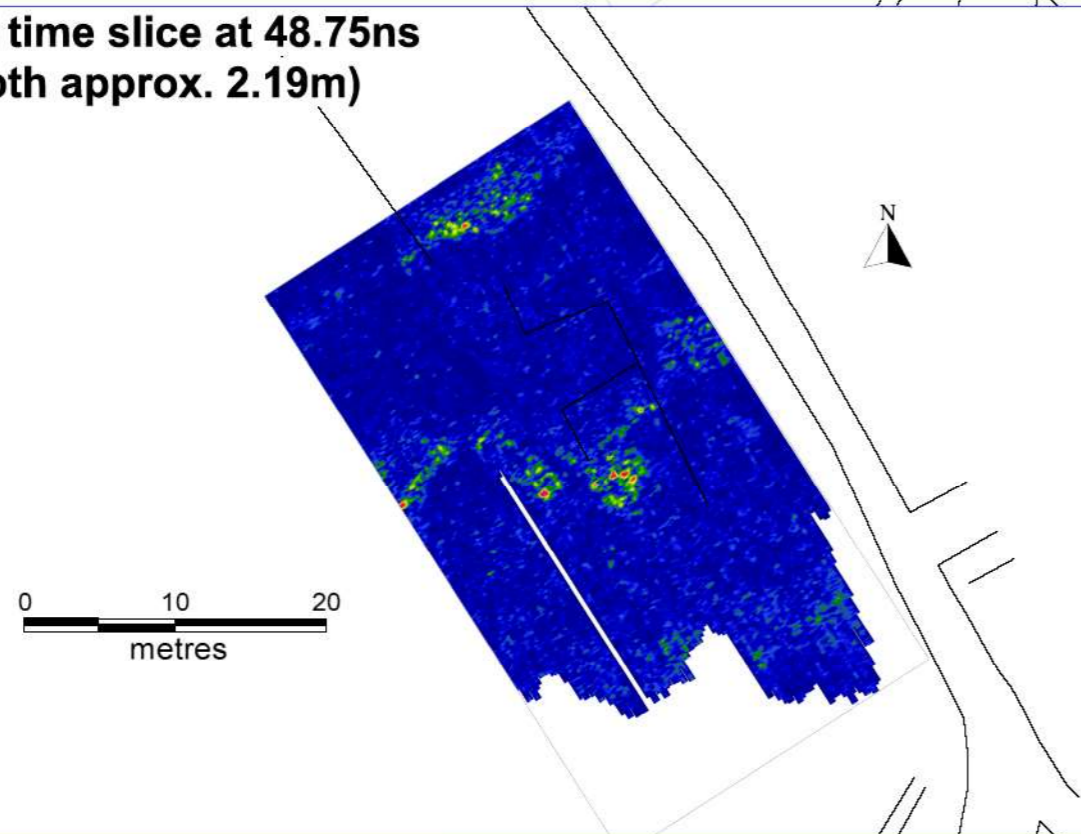
Area B time slice at 46.25ns  
(depth approx. 2.08m)



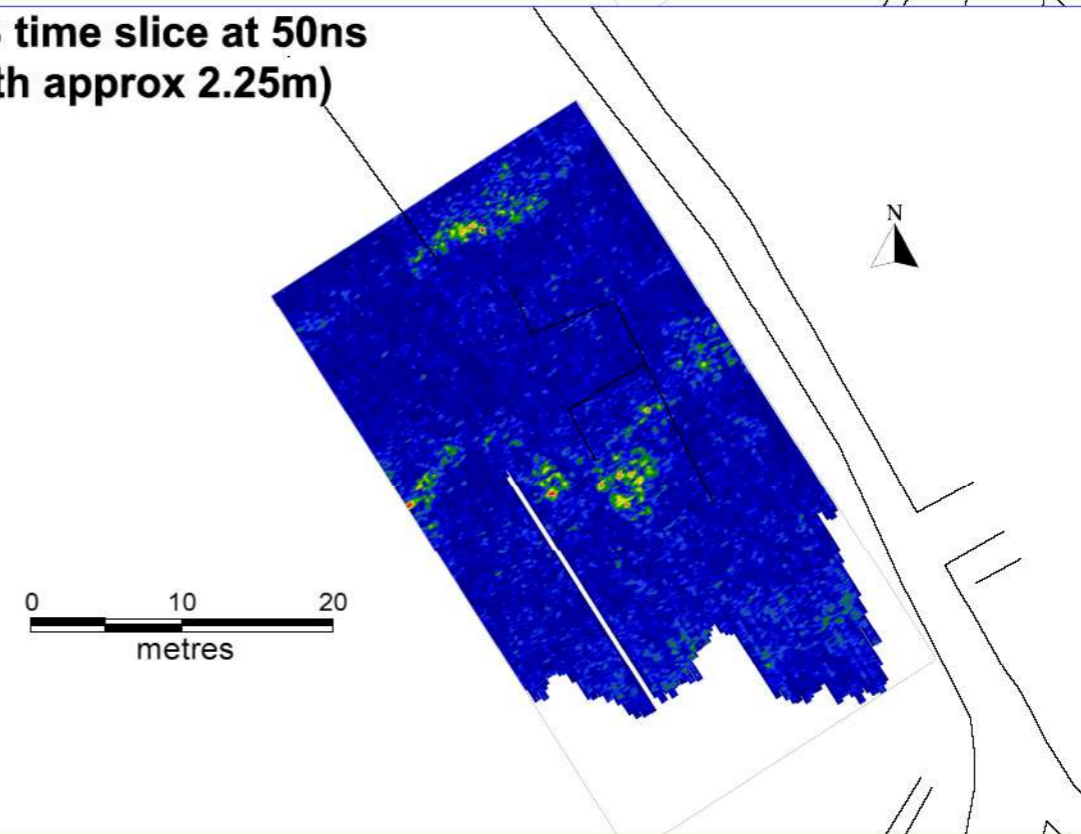
Area B time slice at 47.5ns  
(depth approx. 2.14m)



Area B time slice at 48.75ns  
(depth approx. 2.19m)



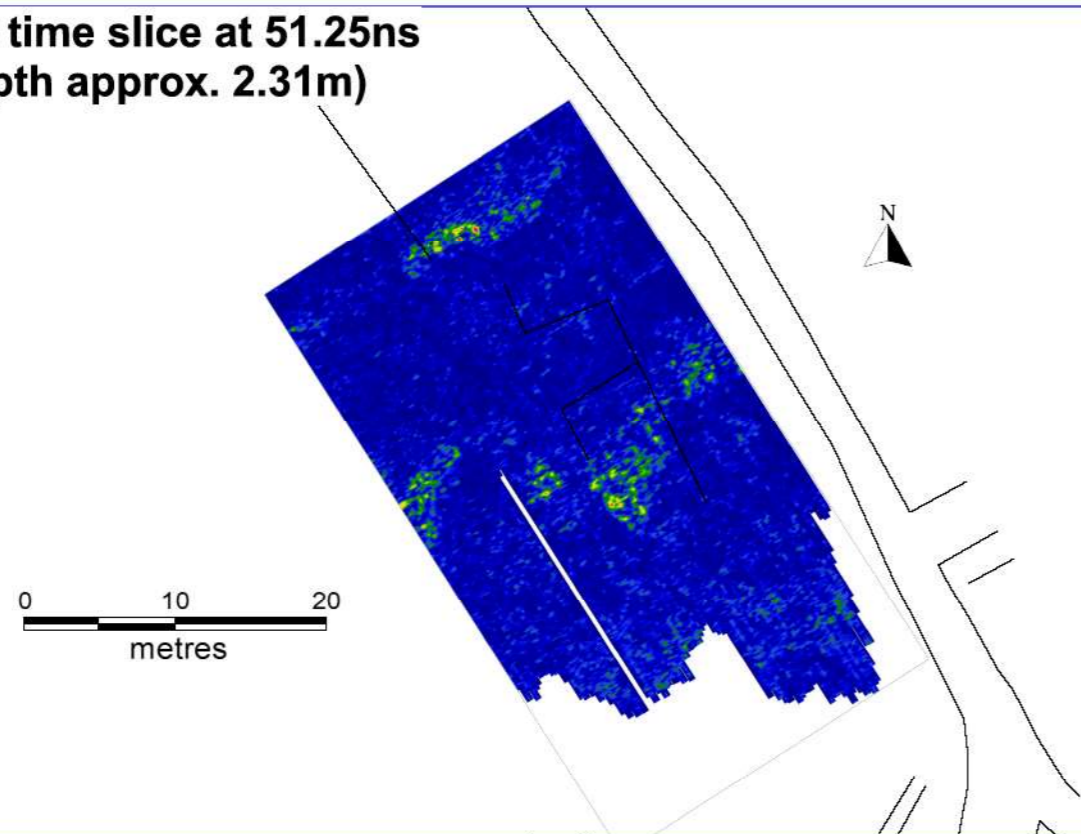
Area B time slice at 50ns  
(depth approx. 2.25m)



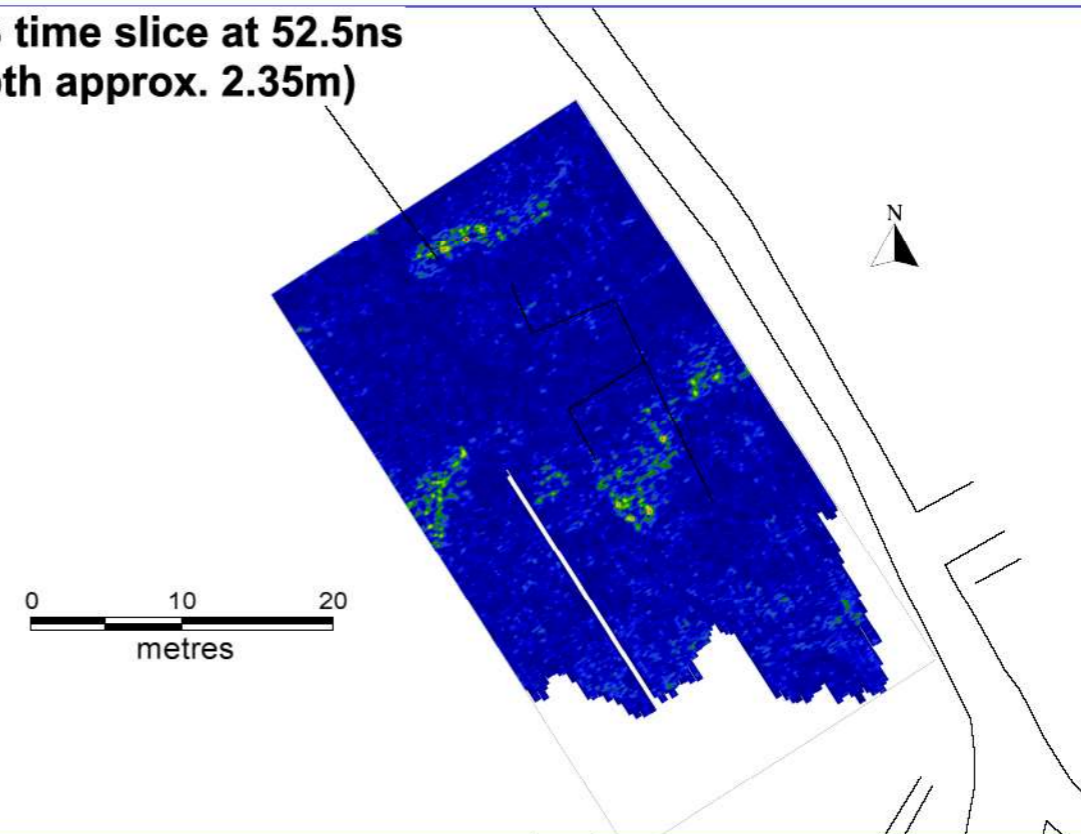


# Clarendon Palace GPR Survey Area B Time Slices

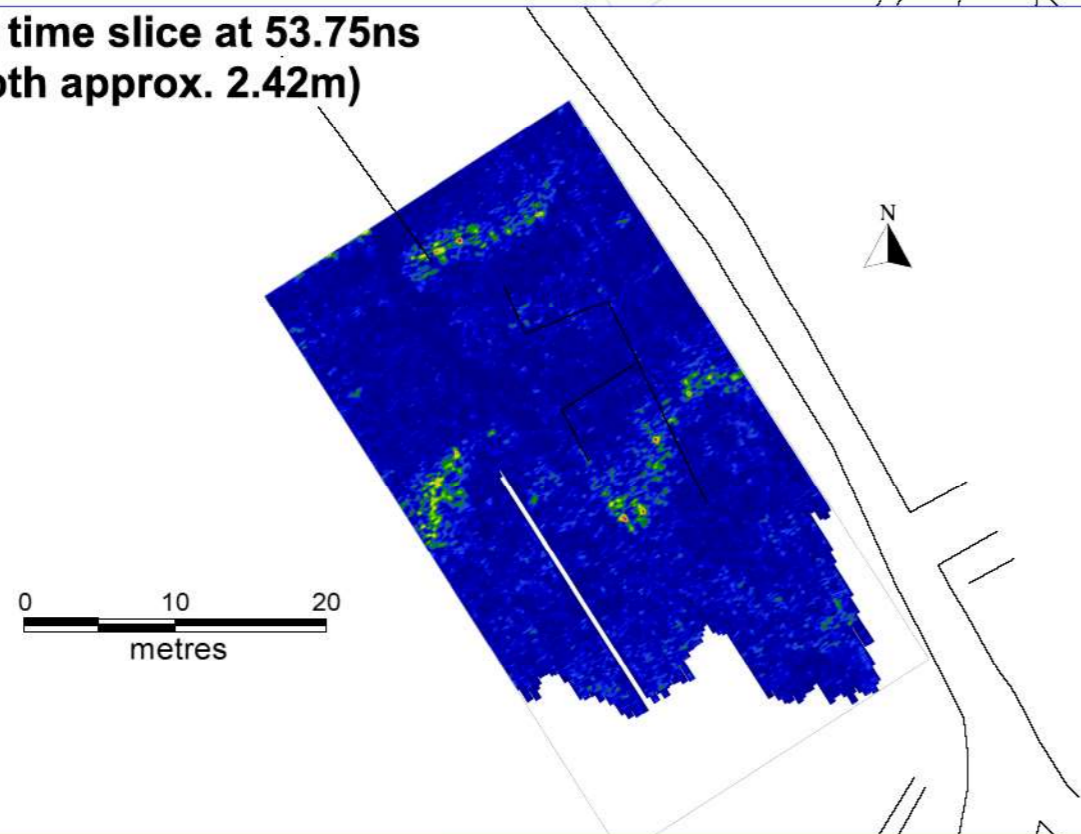
Area B time slice at 51.25ns  
(depth approx. 2.31m)



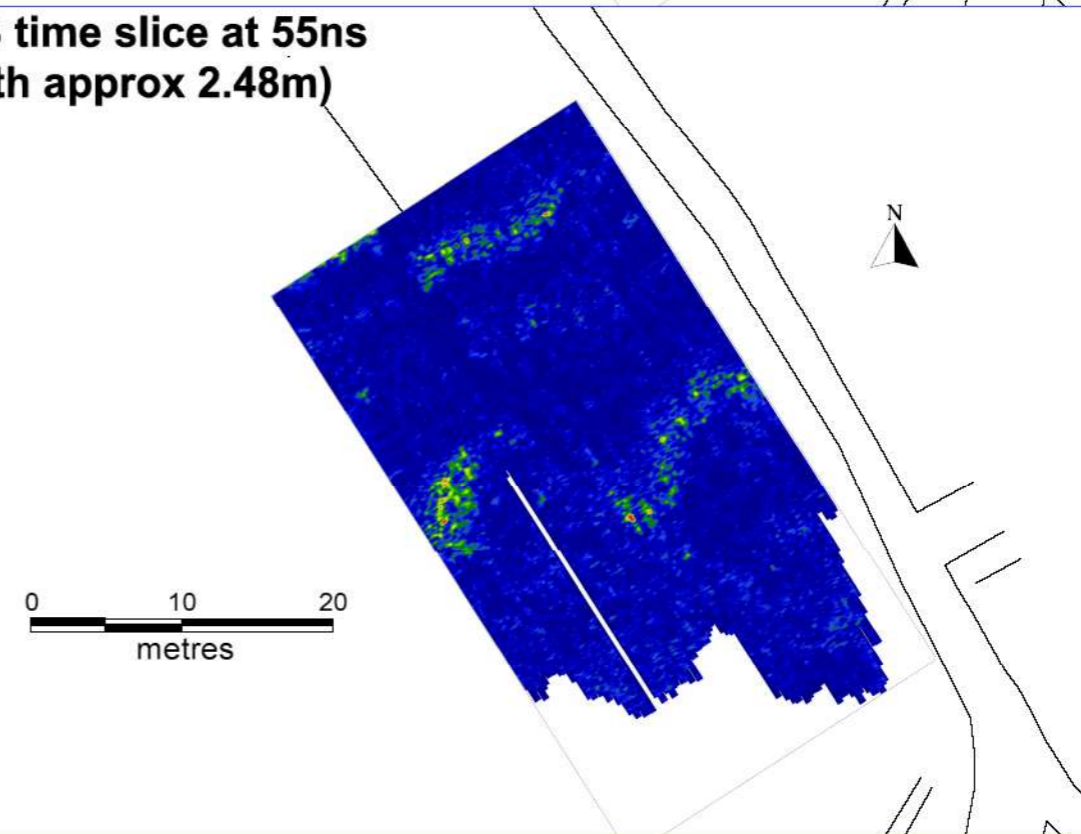
Area B time slice at 52.5ns  
(depth approx. 2.35m)



Area B time slice at 53.75ns  
(depth approx. 2.42m)



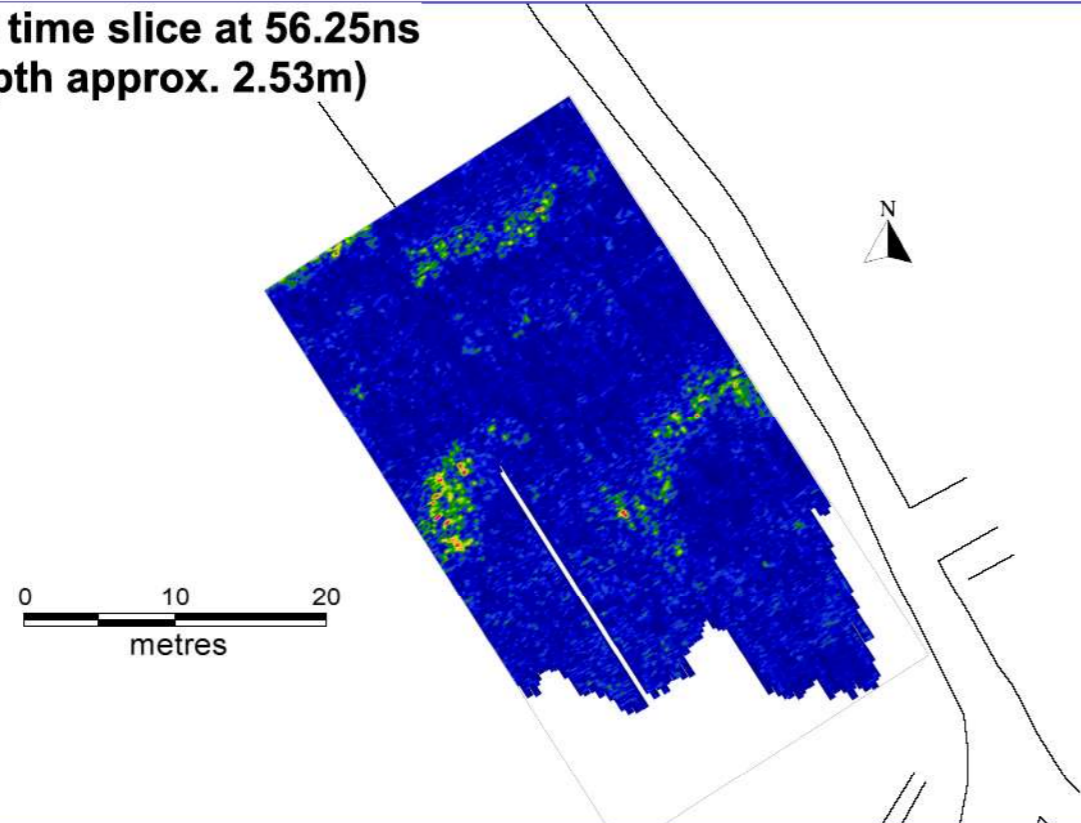
Area B time slice at 55ns  
(depth approx. 2.48m)



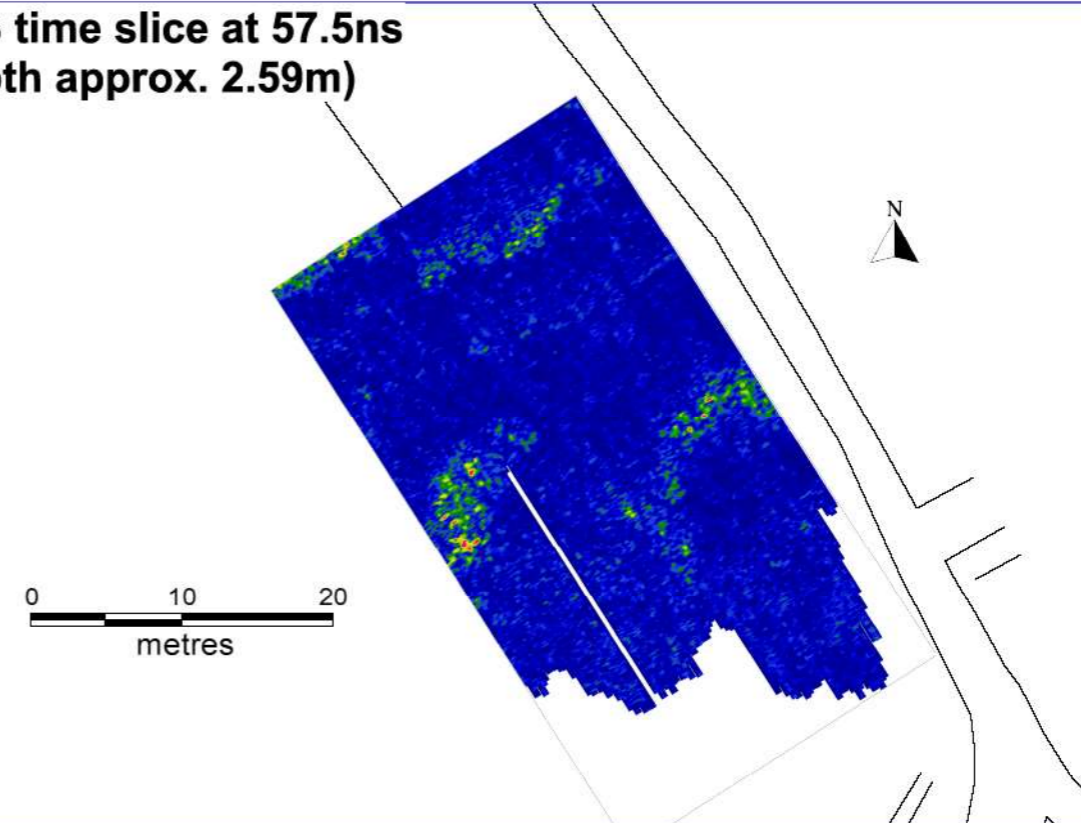


# Clarendon Palace GPR Survey Area B Time Slices

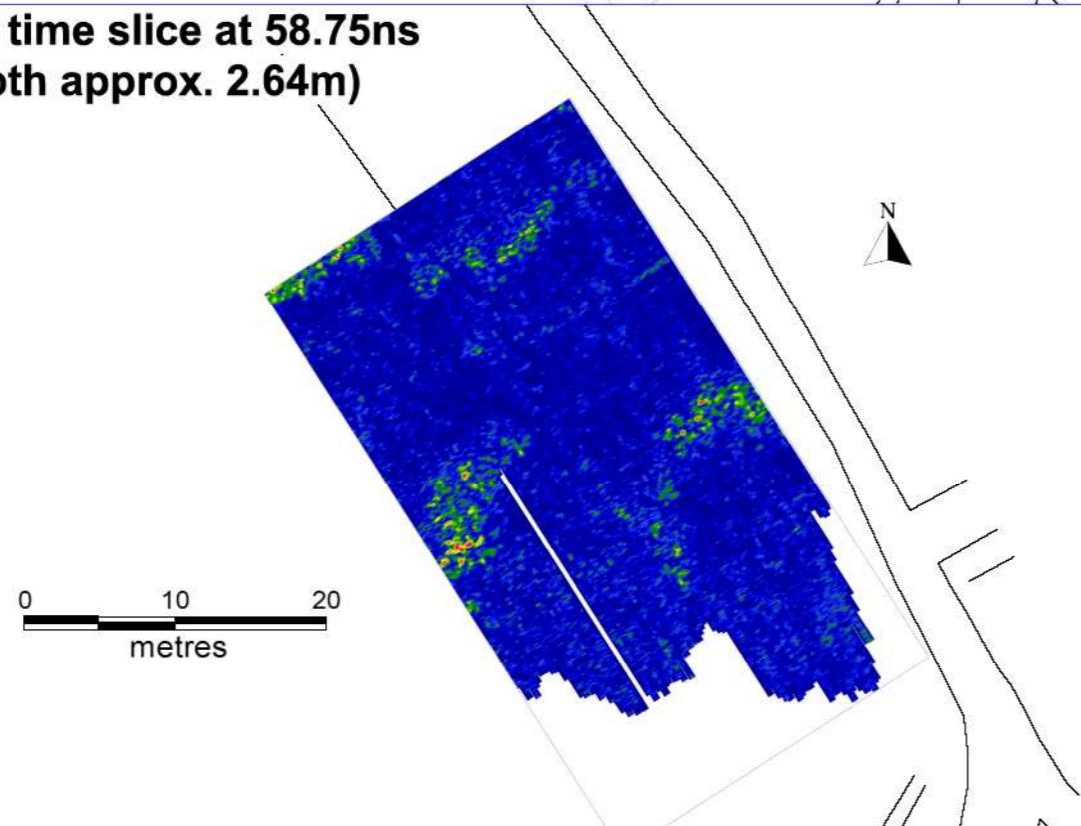
Area B time slice at 56.25ns  
(depth approx. 2.53m)



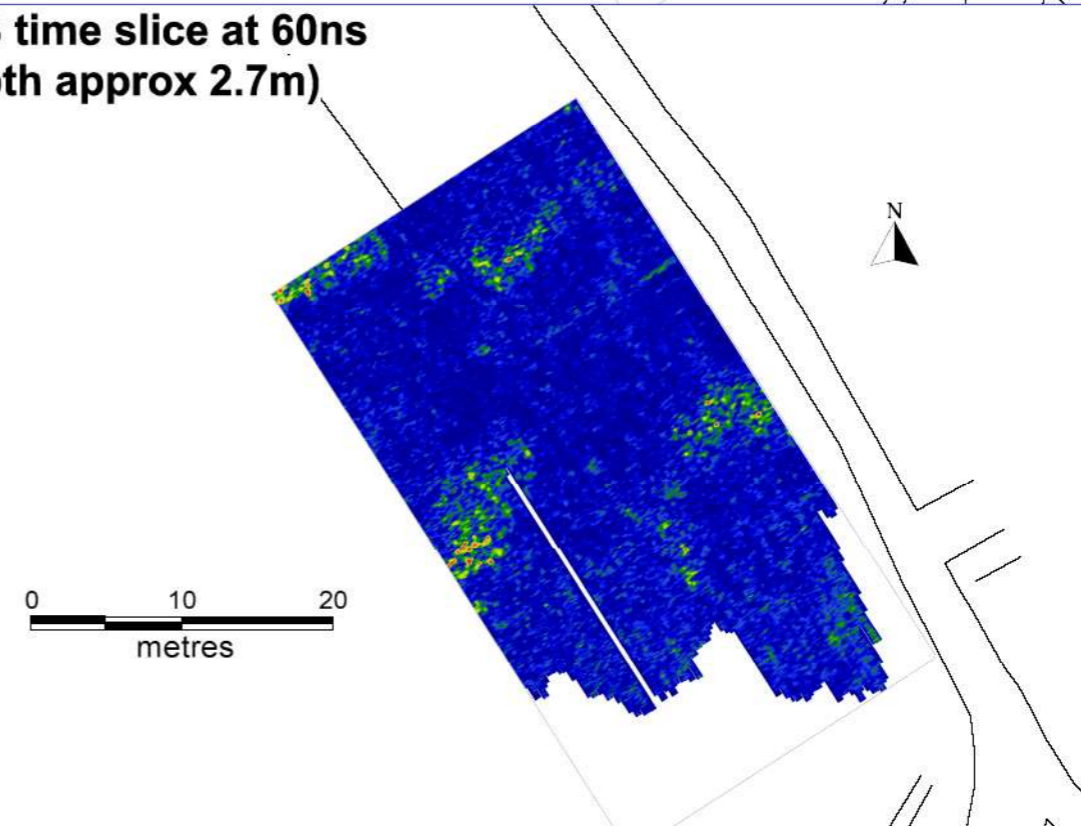
Area B time slice at 57.5ns  
(depth approx. 2.59m)



Area B time slice at 58.75ns  
(depth approx. 2.64m)



Area B time slice at 60ns  
(depth approx. 2.7m)





# Clarendon Palace GPR Survey Abstraction and LiDAR digital terrain model





# Clarendon Palace GPR Survey Abstraction and Interpretation

