An International Surface Collection and Remote Sensing Field School on the Hill of Slane, County Meath, Ireland

8th -13th April 2012

Kevin Barton and Conor Brady with
Asia Balcerzak, Kieran Campbell, Anthony Corns,
Gary Devlin, Michal Pisz, Robert Shaw and Piotr Wroniecki

The Field School was composed of eighteen students from eleven countries including Ireland;
Bolivia (1), Denmark(1), Estonia (2),
Finland (1), Germany (1), Greece (1),
Ireland (4), Latvia (1), Poland (3),
Slovakia (2) and USA (1).

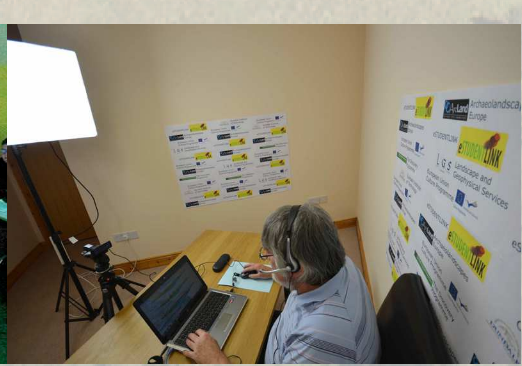
Field School practical work was based on the Hill of Slane where there is an ongoing archaeological research project –

http://hillofslane.wordpress.com/

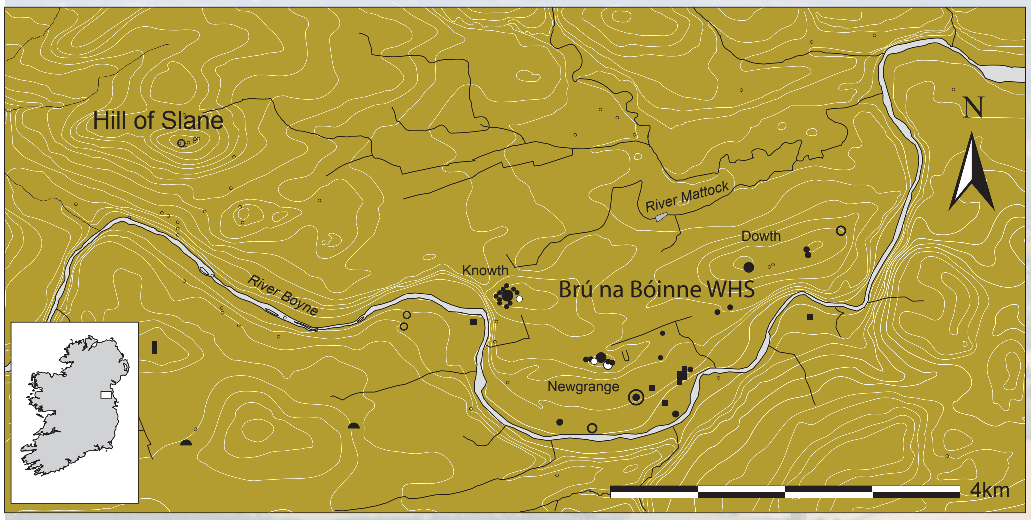
Over the duration of the Field School a partnership of six tutors and three students (who contributed as specialized part-time tutors) delivered field demonstrations with hands-on instruction and evening sessions on survey techniques, software and data processing.

Tutors were drawn from Landscape & Geophysical Services, Dundalk Institute of Technology, The Discovery Programme and the University of Warsaw.
Kieran Campbell, Field Archaeologist, and the Irish Archaeology Field School provided field supervision and logistical support respectively.

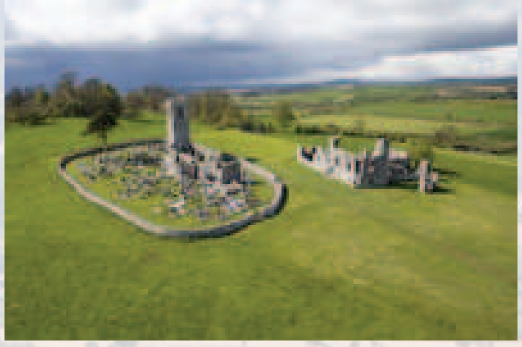





Introduction



Above: map showing the location of the Hill of Slane relative to the Brú na Bóinne WHS (Conor Brady).



Above: Aerial view of the Graveyard and College on the Hill of Slane taken with a kite-mounted camera. (Michal Pisz)

Standing remains on the hill include a medieval church with a number of building phases evident. The other structure, the College, is also multi-period. Initialy built as the parish Rectory, it was expanded in the fifteenth century into a chantry college.

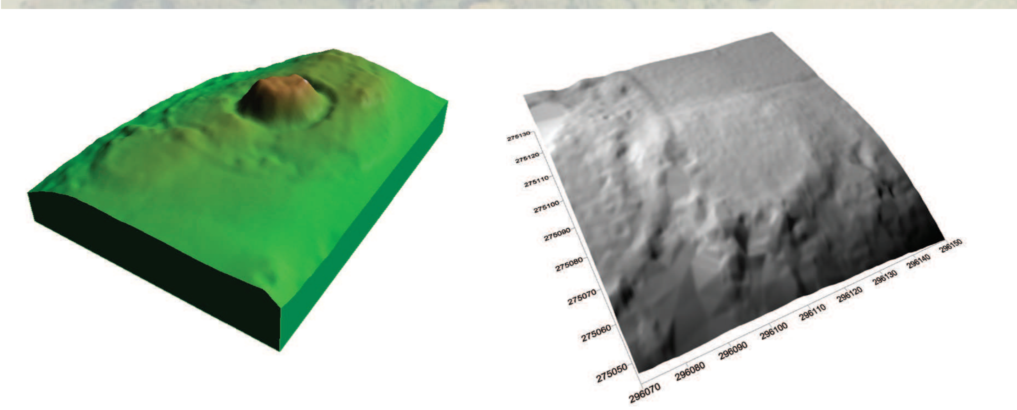
Above: Tomb of St. Erc, first abbot of the monastery at Slane. (Conor Brady)

The Site

The Hill of Slane is an important complex of prehistoric, early medieval and medieval monuments. It has extensive views over the surrounding landscape and is 3km from the edge of the Brú na Bóinne WHS.

Activity on the Hill of Slane almost certainly began during prehistory although most of the surviving monuments are from historic times. A large enclosed mound is classified as an Anglo-Norman motte (late12th century AD). A surrounding circular enclosure and a possible ring-barrow nearby suggests it originated as a prehistoric monument.

Above: The south side of the medieval church (left) and the south side of the College (right). (Conor Brady)



Above: 3D lidar model of the mound (motte, enclosure and small enclosure from NE (left). Detail of the relationship of the larger enclosure to the smaller one from SW (right). (Data courtesy of OSi)

Above: Statue of St. Patrick on the Hill of Slane (Conor Brady)

The site is traditionally regarded as the location where St Patrick, Ireland's patron saint, lit the first Pascal Fire in the 5th century AD signalling the beginning of his missionary activity. An important monastery was founded at the site (6th century AD), few traces of which now remain.

The Field School

Organised with the support of the ArchaeoLandscapes Europe Project, the intensive six day School provided an introduction to a range of archaeological site survey and remote sensing techniques.

The main objective was to provide an understanding of the principles of and hands-on experience of the field operation of the techniques. There was also basic instruction in data processing (using open source software where possible) and interpretation. The Field School was organised into four modules:

1. Surface collection & reconnaissance geophysics
2. Kite aerial photography (KAP)
3. Terrestrial laser scanning (TLS)
4. Multi-method geophysical survey

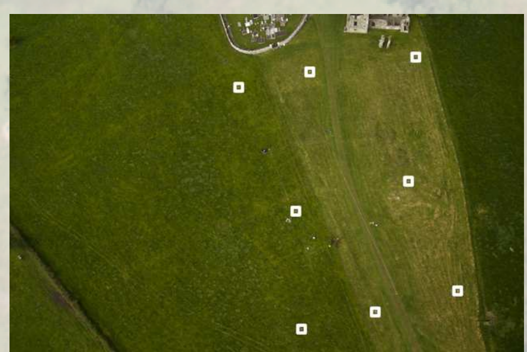
Kite Aerial Photography (KAP)

Top: Kite winch and cable
Middle: Camera platform and controller
Bottom: Kite airborne with platform
(Asia Balcerzac/Michal Pisz)

The KAP module was contributed by students from the University of Warsaw. Wind conditions on the Hill were very variable and the wind direction and speed were tested in advance of deploying the kite alone and the kite with the camera platform Students had the opportunity to experiment with flying the kite in various wind conditions before a freak gust caused the platform to crash.

Kite aerial photography; oblique photograph taken from the east showing St Patrick's church and graveyard and the College/rectory which were scanned in the terrestrial laser scanning module. (Asia Balcerzak/Michal Pisz)

Before the KAP equipment was damaged, some excellent oblique aerial photographs were obtained including the surface collection area, St Patrick's church and graveyard and the College.



The location of targets was captured with a dGPS. This allowed the aerial photographs to be georectified

Kite aerial photography; near vertical photograph of the multi-method geophysical survey area to east of the graveyard. The locations of the georeferencing targets are highlighted in white.
(photo: Asia Balcerzak/Michal Pisz)

Terrestrial Laser Scanning (TLS)

Terrestrial laser scanning; a colour compilation of the scan of the College from the east showing the gatehouse, College wall and the nearby St Patrick's church tower. (The Discovery Programme)

This module utilized three types of terrestrial scanner each operating using a different scanning principle or mode. The three scanners were used to demonstrate the principles and practice of laser scanning. Laser scanning was carried out in the following modes: time of flight, triangulation and phase comparison.

Terrestrial laser scanning; setting up a time of flight scanner at St Patrick's medieval church. (Anthony Corns)

Terrestrial laser scanning; scanning the carved stone head in the graveyard wall with a triangulation mode scanner (Conor Brady)

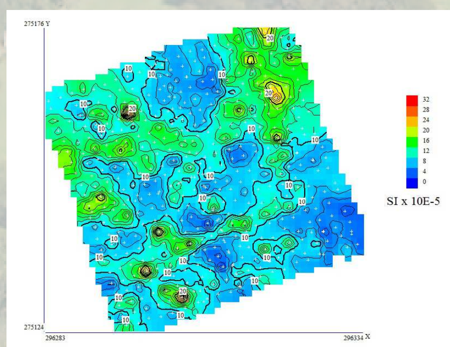
Terrestrial laser scanning; configuring a phase comparison mode scanner to scan the internal walls of the College/rectory. (Asia Balcerzak)

Multi-method Geophysical Survey

This module involved fieldwork immediately to the east of the graveyard. The twin objectives here were to investigate possible archaeological features noted or monitored in a narrow trench and to provide the opportunity for hands-on experience of data collection using a range of geophysical instruments and techniques.
The 30cm wide and up to 60cm deep trench had been dug in 1997 to lay a power cable for floodlighting St Patrick's church and the College.

View looking east from the tower of St Patrick's church showing the line of the back-filled trench. (Kieran Campbell)

The question of whether the responses from magnetic survey methods would be influenced by possibly naturally magnetic geology needed to be investigated as this could influence the archaeological interpretation of the data.

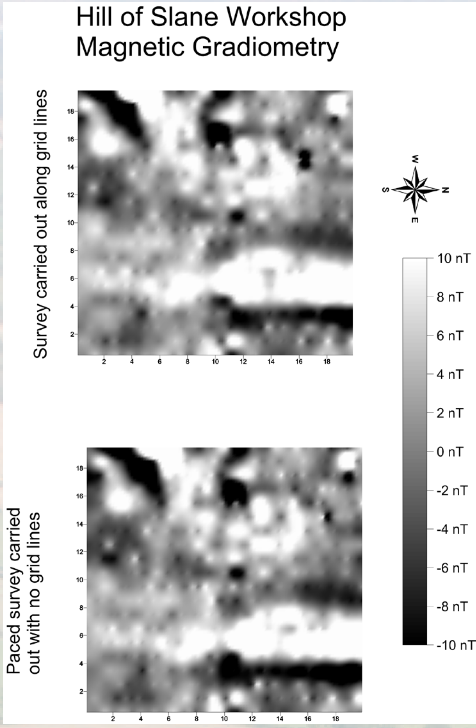


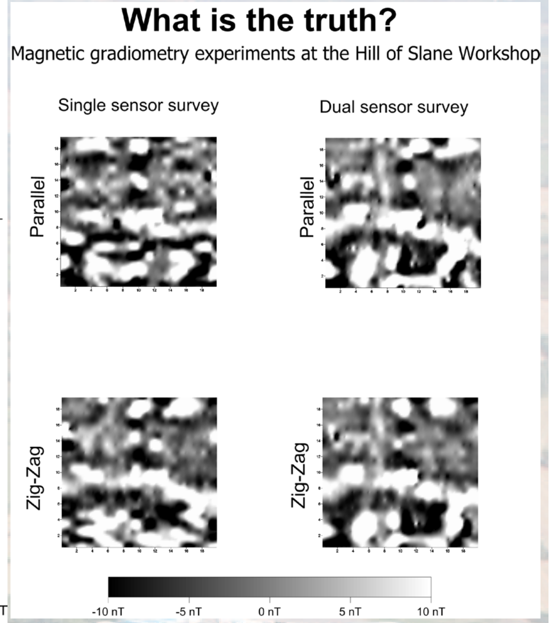
Above: Magnetic susceptibility survey in the vicinity of the trench. (Asia Balcerzak) Right: Magnetic susceptibility; contoured and coloured georeferenced map of part of the area showing zones of enhancement

Magnetic gradiometry surveys were carried out using single and twin fluxgate gradiometer instruments. The objective was to investigate cut features recorded in the trench to see if they extended away from the trench. In addition each student had the opportunity to experiment in using a number of sampling densities and acquisition modes.

Above: Magnetic gradiometry; "am I non-magnetic?" (Asia Balcerzak) Right: Magnetic gradiometry; configuring a single gradiometer with 1m sensor spacing. (Michal Pisz)

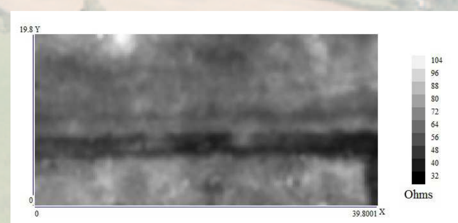
The results of the experiments are shown in the next column.



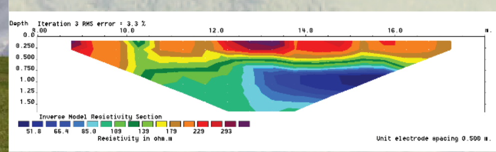


Above: Comparison between using survey lines and a paced grid. Right: comparisons between single and dual sensor instruments surveying in zig-zag and parallel mode (Piotr Wroniecki)

The objective of the earth resistance survey were to see if the trench and large-scale cut features had a resistance response.

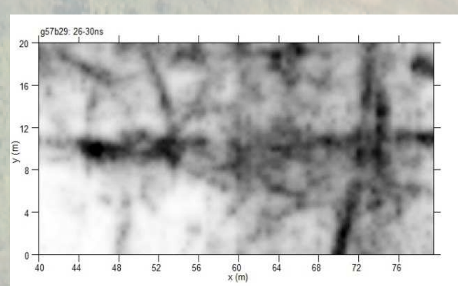


Above: Earth resistance; 0.5m twin-probe array survey over the trench. (Jaroslava Panisova). Right: Earth resistance image of part of the survey area showing a weak response from the trench and a strong response from a previously unknown parallel feature lying to the south



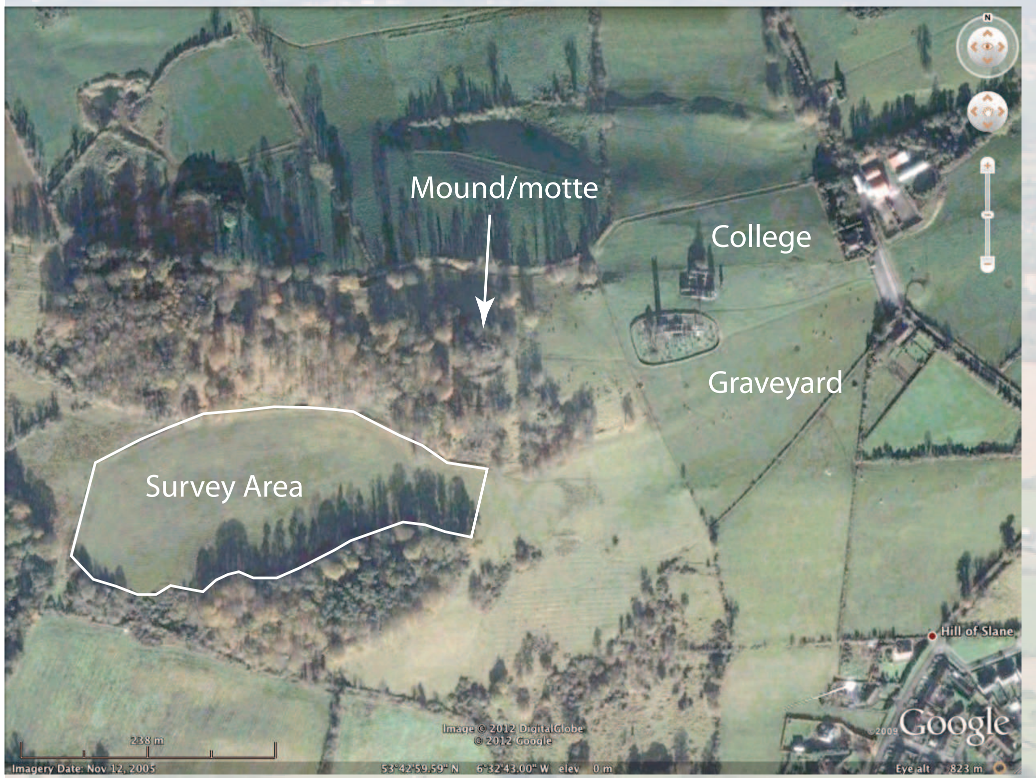
Above: Electrical Resistivity Tomography; "which electrode do we move next?" (Jaroslava Panisova). Right: South to north modelled pseudosection. The response from the trench can be seen just after 10m along the section

The objectives were to investigate if the trench could be imaged and also to assess the geological structure of the area.



Above: Ground penetrating radar; control/data logger console, control/data cable and transmitting/receiving antenna mounted on a sled. (Séamus Ó Murchú). Right: GPR horizontal time slice showing the trench and numerous cross-cutting linear features.

Surface Collection and Reconnaissance Geophysics

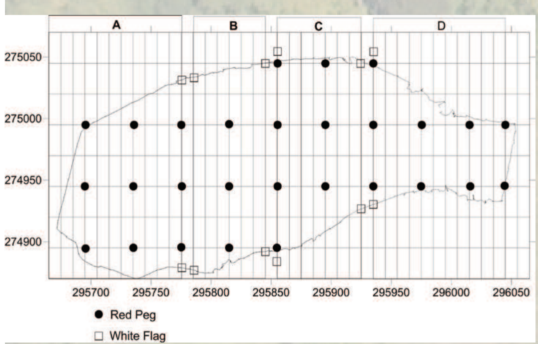


Above: AP showing the location of the survey area relative to the main monuments on the hill. (Google Earth)

This module was carried out in a tillage field on the SW slope of the Hill of Slane. The main aim was to identify evidence of past activity in an area outside the core of the complex.
The techniques were surface collection survey, magnetic susceptibility survey and metal detector survey. All were carried out on a reconaissance sampling basis on a site grid established using dGPS and total station.

Surface Collection Survey

Conditions were ideal with a well-weathered harrowed surface with excellent visibility. A range of material was recovered from prehistoric lithic artefacts, medieval ceramic fragments and modern brick, glass, metal and shotgun cartridges all indicating various types of activity in the past.



Above: The site grid. (Kevin Baton)

The artefacts were not collected - findspots were flagged, coded and recorded using a total station. Plots were produced using QGIS open sourcesoftware.

Above: Plots showing lithic finds (left) and all material (right). (Piotr Wroniecki)

Above: The survey area looking W towards Slane Castle and the Boyne Valley. (Conor Brady)

Above: The surface collection survey in action. (Conor Brady)

Magnetic Susceptibility

This survey was carried out on a 10m x 10m grid, using the same grid as for the other activities. Each point was recorded with a dGPS connected to a laptop and the MS values were inputted directly at each point. An area of intense burning was identified at the W corresponding with an area of blackened soil, possible the site of a prehistoric burnt mound.

Above: The metal detector survey underway (Conor Brady)

Above: Magnetic susceptibility survey (left), recorded using a dGPS and Toughbook laptop (right). (Conor Brady)

Metal Detecting

This was carried out on a sampling basis using the survey grid along lines set 10m apart. 'Hits' were indicated using flags and each findspot was later recorded using a total station. Material was plotted along with the lithic and other artefacts using QGIS.

Conclusion

These surveys were very successful as they confirm that there was prehistoric activity in the vicinity of the hill and also highlighted that this area, outside the 'core' area of the hilltop itself, was used for a range of activities from prehistory to modern times.

Left: Students learn about laying out grids. (Conor Brady)