

Lindisfarne Landscapes: Geoarchaeological Approaches to Human-Environment Relations (Ref IAP2-18-160)

Durham University, Department of Archaeology

In partnership with Newcastle University and DigVentures (CASE Partner)

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Key Words

Geoarchaeology, pedology, earth surface processes, environmental change

Overview

This project will use a novel suite of geoarchaeological methods to investigate the evolution of the landscape of the Holy Island of Lindisfarne from the start of the Holocene to the present, focussing especially on the reconstruction of the environment and land-use during the Anglo-Saxon and medieval periods.

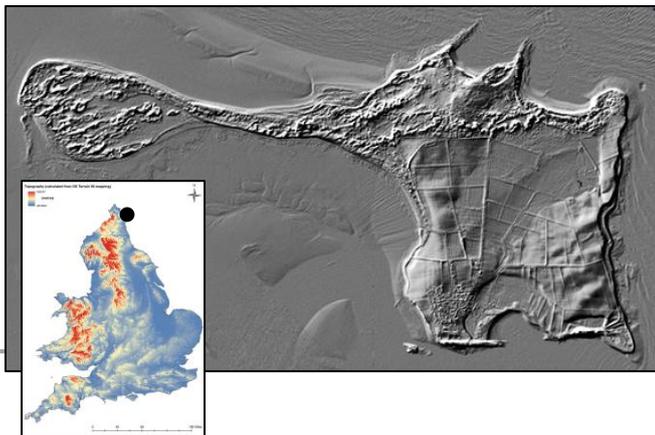


Figure 1. Location map and LIDAR digital surface model of Holy Island (© Environment Agency).

Holy Island (Lindisfarne) is a small tidal island on the Northumberland coast, in the north-east of England (Fig. 1). It is best known as the site of a major Anglo-

Saxon monastery founded in AD 635 by Oswald, King of Northumbria, and Aidan, a monk from Iona, which became a focus for the cult of St. Cuthbert until his relics were removed in AD 875. The island's undefended monastery and sandy beaches also attracted Viking raiders, and the island is famous as the site of one of the earliest Viking attacks on Britain, in AD 793. However, the archaeology of the island also includes a number of prehistoric features and finds from the Mesolithic onwards, a pond known as The Lough, which may have origins in the 7th century AD, a 9th-10th century settlement in the north part of the island known as Green Shiel, an important medieval priory and village, a post-medieval castle and military fort, early modern limestone quarries, kilns and waggonways, and a fishing harbour (Walsh 1993; Walsh et al. 1995; Northumberland County Council and English Heritage 2009; Petts 2015) (Fig. 2).

Since 2016, a new archaeological excavation project on the island, a partnership between DigVentures and Durham University, has focussed primarily on the presumed location of the Anglo-Saxon monastery to the east and southeast of the medieval priory church. These have revealed an early medieval cemetery and the footings of Anglo-Saxon timber buildings, while a narrow trench targeting geophysical anomalies west of the village revealed extensive evidence for medieval occupation from the 13th century and later (Petts 2017; Wilkins et al. 2017; Casswell 2018).

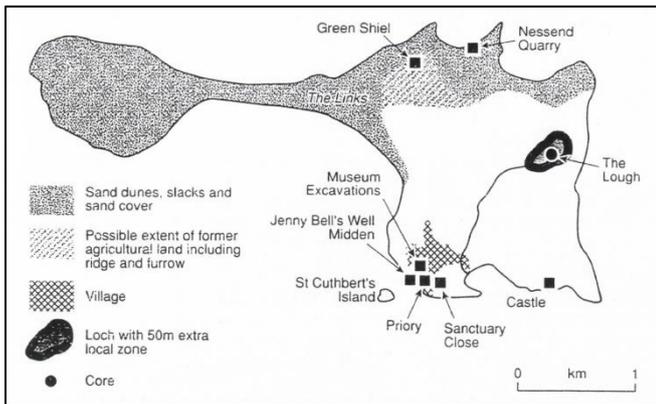


Figure 2. Map of Lindisfarne showing the locations of landforms and landmarks discussed in the text (Walsh 1993, Fig. 2.1).

The wider landscape beyond the Anglo-Saxon monastery and the medieval priory and village remain poorly understood. The topography, character and dates of the soils buried by the sand dunes in the north and northwest parts of the island, the locations of settlements and field systems (other than Green Shiel), patterns of land use and soil improvement, and when and how The Lough was established and whether it was used by the monastic community for aquaculture, remain unknown. What is clear is that the landscape and open vegetation seen today is substantially different from those of the prehistoric and medieval periods, and has been significantly altered by post-medieval sand dune encroachment, the enclosure of fields in the early 1790s, and the expansion of the village in the 18th-19th century (Walsh et al. 1995; Petts 2017).

This PhD project forms an essential new component of the current investigations at Lindisfarne. Using a novel suite of geoarchaeological methods, the PhD student will survey and analyse the surviving soil and sediment archive on Holy Island in order to model how the landscape has evolved over time, and how it has been impacted by human settlement and land-use. The environment of the island may be uniquely suited to reconstructing past landscapes – not just the monastic landscape, but the prehistoric and high medieval landscapes as well. A geoarchaeological assessment funded by the Medieval Settlement Research Group, and conducted by Durham University in the southwest part of the island in September 2018, revealed that medieval plough soils containing bones, shells, and medieval ceramics survive in some areas, buried under early modern plough soils. Walsh et al. (1995) also found early medieval land surfaces and agricultural soils associated with the Green Shiel settlement, and there is no doubt that much more lies buried below the vast area of sand dunes (Fig. 2). This project therefore represents a unique opportunity to contribute to the understanding of how a monastic community and a medieval priory, and their tenants, interacted with the

environment: what types of soil resources they inherited, how they perceived these landscape resources, and how they chose to use and alter them.

Methodology

This project will use a range of techniques to survey, map, and evaluate soils, sediments, landforms, and landscape divisions on Holy Island in order to reconstruct the environment and land-use in a number of time periods.

Fieldwork:

- 1) Extensive soil survey across the island using a combination of test pits and coring with hand-held and mechanical augers to map soil profiles in detail, and to identify, describe, and sample buried soils. In the areas of The Lough and the castle, coring and test pitting will also be used to map sediments, and to study the evolution of landforms.
- 2) Excavation of long test trenches running perpendicular to geophysical anomalies (e.g. in the Glebe Field, west of the village) and modern field boundaries in order to map and date pre-modern field systems, and to locate the medieval monastic enclosures.

Laboratory work:

- 1) Soil micromorphology, the analysis of undisturbed soil/sediment in thin section using petrographic microscopes. This is used for the quantification of natural and anthropogenic components of soils and sediments and the interpretation of features formed by pedogenic processes.
- 2) Multi-element analysis by X-ray fluorescence (XRF), which is used to identify anthropogenic inputs in manured/improved soils, and to interpret particular pedogenic processes such as eluviation.
- 3) Magnetic susceptibility of powdered soil/sediment using a Bartington MS2B dual frequency sensor coupled with an MS3 meter, which is used to identify heat-affected soils or sediments.
- 4) Loss-on-ignition at 550°C, a proxy for organic matter content, which is used to identify A horizons associated with elevated organic matter, and to interpret pedogenic processes such as eluviation.
- 5) pH, a measure of the relative acidity of the soil.
- 6) Particle-size analysis using a Coulter laser analyser.
- 7) Flotation and heavy residue analysis, in which artefacts and ecofacts (e.g. seeds, charcoal, bones) are recovered by floating in water and wet sieving archaeological soil and sediment samples. This is crucial for the retrieval of datable materials.
- 8) Phytolith analysis of buried agricultural soils, in which the silica bodies produced by vascular plants are extracted and analysed using high-power transmitted light microscopes.

In addition, techniques such as faecal lipid biomarker analysis and VP-SEM may be applied to soil and sediment samples if the first phase of analyses indicates that these techniques would be beneficial.

Placement with DigVentures:

The project includes a six-month placement with CASE Partner DigVentures, which will provide:

- 1) Essential background information about Holy Island, the medieval and monastic communities who resided there, and their material culture (e.g. an opportunity to study original excavation archives);
- 2) Hands-on training and experience in archaeological field and post-excavation research skills, as well as innovative dissemination skills (detailed below).

Timeline

Year 1

Oct-Dec: Research and writing of literature review.

Jan-Feb: 1st stage of placement with DigVentures.

Mar-May: Training in thin section production, soil micromorphology, and other laboratory methods in Durham and Newcastle using samples already collected from Lindisfarne.

June-July: Fieldwork on Lindisfarne (soil mapping).

Aug-Sept: 2nd stage placement with DigVentures.

Year 2

Oct-July: Laboratory analyses and writing of technical specialist reports.

-Presentation of research results at an archaeological science or geoarchaeology conference.

Aug-Sept: 3rd stage placement with DigVentures.

Years 3 – 3.5 (six months only)

Oct-Feb: Completion of any outstanding laboratory analyses and technical specialist reports.

March-May: Preparation and submission of a paper to an international, peer-reviewed journal.

June-March: Writing of the remainder of the PhD, either in the form of a traditional 80,000-100,000 word dissertation, or in the form of three additional papers written for submission to peer-reviewed journals (depending on the student's choice, as decided early in the PhD).

-Presentation at an international conference.

Training & Skills

Fieldwork:

The PhD student who undertakes this project will receive training and practice in archaeological excavation and recording methods, and soil survey, description, and sampling methods, by working closely with the project supervisors from Durham University

and DigVentures in the field. This will take place on Lindisfarne and possibly at other project sites as well.

Laboratory work:

Training in thin section production and phytolith extraction and analysis will take place at Newcastle University. Training in soil micromorphology will take place at both Durham and Newcastle Universities. Multi-element analysis by XRF, magnetic susceptibility analysis, loss-on-ignition, particle-size analysis and pH will be provided primarily at Durham University. Training in sample 'processing' by flotation and wet sieving will be provided at Durham University and with DigVentures.

Project planning, logistics, and dissemination:

Training and practice in project planning, budgeting, and logistics, technical reporting, training of and reporting to non-specialists, and using social media platforms as communication tools, will be provided by DigVentures.

References & Further Reading

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Further Information

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