Iron Age Palaeoenvironments of NW Scotland (Ref IAP-17-91)

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In partnership with NERC Isotope Geosciences Laboratory, British Geological Survey and
CASE partner: AOC Archaeology

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Overview

The Northwest coast of Scotland has a remarkably dense concentration of Iron Age archaeological sites, many of them contain structures such as brochs and crannogs (Harding, 2004). These were most likely used as part of strengthened farmsteads, but little is known about the daily life in the Iron Age and the way in which people interacted with their environment. In this project, we will reconstruct the palaeoenvironments using remains from lake sediment cores collected near three key sites in NW Scotland.

Many biological and chemical indicators are well-preserved in lake sediment archives, including pollen, plant macrofossils, and chemical markers of plants and animals. By taking lake sediment cores adjacent to archaeological sites, a wealth of palaeoenvironmental information can be found that provides evidence for the local environment at the time of occupation, and in particular for the way in which humans cultivated their landscape to produce crops, raise livestock, and build

settlements.

Fig 1. Spectacular location of remains of Clachtoll Broch

The project will focus on understanding changes in vegetation and agricultural practices from pollen, plant macrofossils, stable carbon and nitrogen isotopes, and specific biomarkers for vegetation. The elemental composition of sediments will be analysed via X-ray Fluorescence (XRF) to understand changes in erosion and local hydrology. Other biomarkers, specific for human and animal

waste, will provide direct evidence of the intensity of human occupation of the sites. This multi-proxy approach will provide an integrated view on human impact on past environments, and a step-change in understanding NW Scotland's landscape in the Iron Age.

The project will be closely aligned with ongoing excavations at three Iron Age sites at the Assynt coast, Sutherland, NW Scotland by CASE partner AOC Archaeology. The sites include Clachtoll Broch, Loch na Claise Crannog, and Achlochan Broch, all of which are located in or close to the shore of a lake that can be used to obtain sediment cores.

This studentship will address the following key research questions:
1. Which changes in local landscape and vegetation resulted from Iron Age settlements?
2. What is the evidence for animal husbandry?
3. Were the three sites in use during the same period. and how did they differ in the intensity and longevity of use?

Methodology

The project will use a combination of fieldwork, analysis of plant macrofossils, pollen, biogeochemistry, and statistical methods to address the research questions.

Wide-diameter sediment cores will be obtained during fieldwork in fall 2018. Cores will be analysed by XRF core scanning at BOSCORF NERC facility and AMS ^{14}C-dated. From each core ca 30 samples will be analysed, depending on the exact chronologies. 90 Subsamples will be analysed for charcoal and plant macrofossils at AOC Archaeology. Subsamples for stable carbon and nitrogen isotopes will be analysed at BGS. Subsmaples for biomarkers will be analysed at Newcastle University. The ratio of n-alkane chain length will be used to infer switches between forest and grassland. In addition, concentrations of specific faecal sterols (coprostanol, 5β-campestanol and 5β-stigmastanol) will provide evidence for human and animal waste.

Multivariate statistics will be used to indicate the main changes that occur through time. Because the same methodology is used at all three sites, they can be compared in detail with respect to timing

Timeline

Year1: Literature review, fieldwork, sample processing, XRF core scanning, ^{210}Pb/^{137}Cs dating

Year2: Training for charcoal and plant macrofossil identification at AOC Archaeology. Training for biomarker analysis at Newcastle University. Analysis of material from site 1.

Year3: Analysis of material from sites 2 and 3.

Year 4 (six months only): Integration of results and thesis writing.

Training & Skills

The student will receive training in sediment coring, logging, XRF scanning, and sample processing for plant macrofossils, stable isotopes, and biomarkers. He/she will be trained to identify charcoal and plant macrofossils by CASE partner AOC Archaeology. Training to extract and measure n-alkanes and faecal sterols will take place at Newcastle University. The student will also receive training in statistical methods to interpret multi-proxy environmental data.

References & Further Reading

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