New digital tools for using palaeoenvironmental records to understand long-term human ecodynamics in Iceland

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Project Description

The colonisation of the north Atlantic islands by the Norse in the 9th and 10th centuries is one of the best case studies we have for examining and understanding the impact of human settlement on fragile ecosystems. In Iceland we can also examine the ecological and geomorphological impacts of volcanic activity: the frequent occurrence of volcanic ash (tephra) layers gives excellent chronological control for palaeoenvironmental records. Thanks to many years of palaeoenvironmental and archaeological research we have a good overall understanding of the impact of settlers on vegetation and soil stability in Iceland (e.g. Streeter et al., 2015 for a recent synthesis). However there is still much uncertainty about how spatially homogenous the impact was and there are areas in Iceland where we have very little information.

Online databases are increasingly used to store and access an even larger number of palaeoenvironmental and archaeological datasets. These databases are an excellent tool for conducting meta-analysis of change over larger spatial regions, but there can be issues with successfully integrating the wide range and variety of data contained within these (e.g. the level of chronological control can vary greatly between records). There is also a great deal of so-called 'long-tail' palaeoenvironmental data stored in 'grey literature' (e.g. reports, or unpublished data in notebooks), which may be insignificant on its own (hence why it may not have been published), but collectively this data may be important for improving our wider understanding.

The project will draw on both the exciting developments in palaeoenvironmental databases for meta-analysis and classical palaeoenvironmental approaches to better characterise the environmental impact of the arrival of humans on pristine natural systems, specifically in Iceland. The overall aims of the project are to (1) develop new approaches to synthesising and utilising palaeoenvironmental data stored in existing data archives (2) use this to identify gaps in our understanding of palaeoenvironmental change in Iceland (3) target the collection of selective new datasets to address these gaps (4) attempt to utilise 'long tail' data which is frequently not incorporated in meta-analysis (e.g. by digitising soil erosion records in field notebooks).

The project is part of a wider, interdisciplinary initiative called dataARC, which aims to integrate data across the natural, social and humanities with the goal of improving our understanding of human-environment interactions in the North Atlantic through the development of new digital tools (https://www.data-arc.org), and the project would also benefit from collaboration archaeologists and other specialists within NABO (http://www.nabohome.org). There is the opportunity to develop skills needed to test hypotheses about human-environmental interactions beyond site level, which is essential for making rigorous contributions to global debates on sustainability and adaptive capacity.
The picture on the left shows a soil section in southern Iceland with multiple volcanic ash (tephra) layers visible (the dark and light bands). These provide chronological control and allow the dating of soil accumulation which allows us to infer rates of soil degradation over time. The second image shows areas of extensive erosion in north eastern Iceland and a landscape which is likely very different to that encountered by the first Norse settlers.

Training

Research skills and training in data-synthesis, spatial analysis, GIS and tephrochronology will be provided, with opportunity for specialisation in other approaches (e.g. palynology). The project will involve fieldwork in Iceland and travel to dataARC meetings.

Eligibility

Studentships will be awarded on the basis of academic quality and research promise. Some experience and familiarity with palaeoenvironmental data desirable, and a familiarity and willingness to use digital tools, databases and basic modelling desirable. A willingness to conduct fieldwork in Iceland essential.

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