Case study 22: Soil and Sediment Analysis from Viking to Medieval deposits in Orkney

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Introduction

Geoarchaeological investigations, in the North Atlantic, have made significant contributions to defining the onset of intensive semi-specialised fishing activity, the position of farming in the transition economy and the land-management characteristics of intensive arable production. However, the investigations have yet to assess the extent to which fishing, farming and their intensification were interdependent particularly at site level. Therefore, the aims of this case study were to

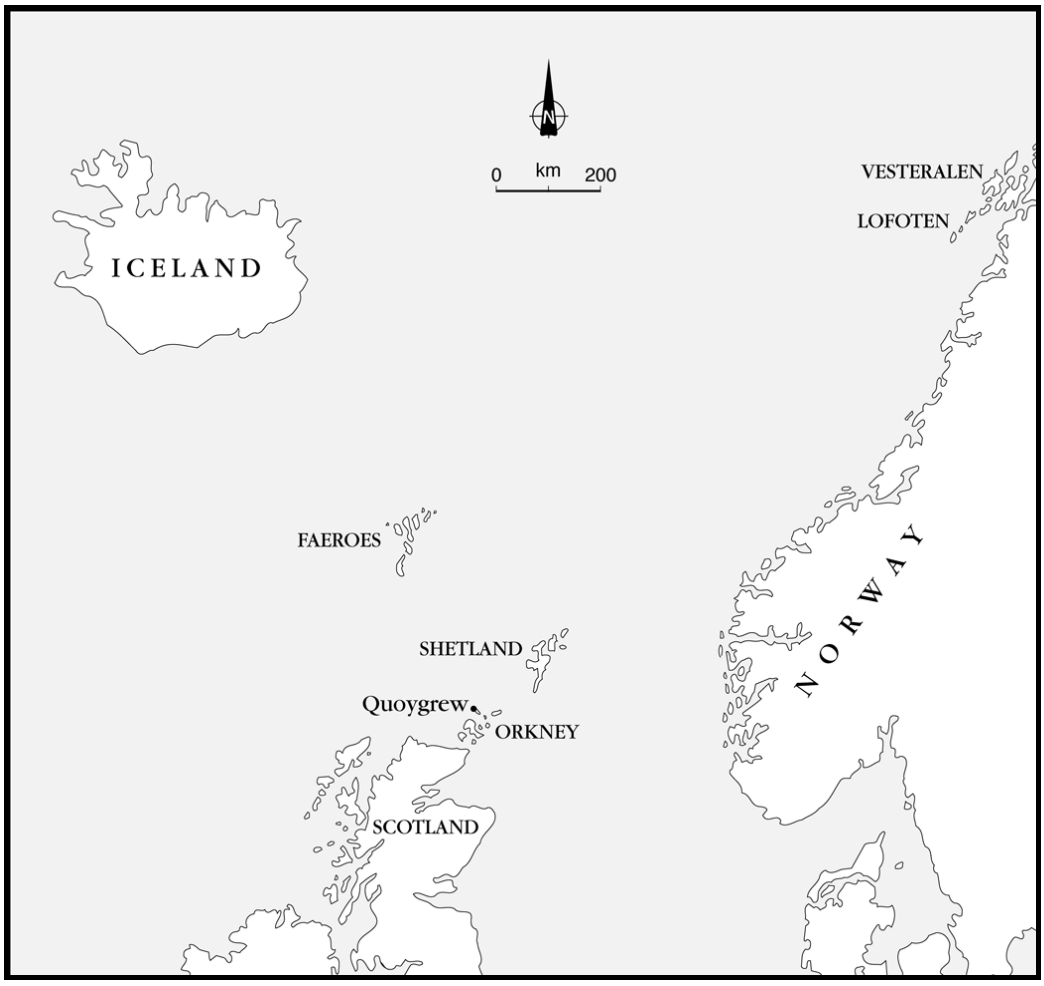

Figure 1: Orkney and Quoygrew in a North Atlantic setting.

establish a geoarchaeological framework for the cultural soils and sediments, to characterise the attributes of the cultural soils and sediments, and to interpret these data in terms of economic activities and organisation. The site of Quoygrew on the island of Westray in the Orkneys was chosen due to having extensive fish midden deposits, a small farm mound, and raised anthropogenic soils dating to the Viking to Medieval Period (800 to 1500AD) (Figures 1 and 2).

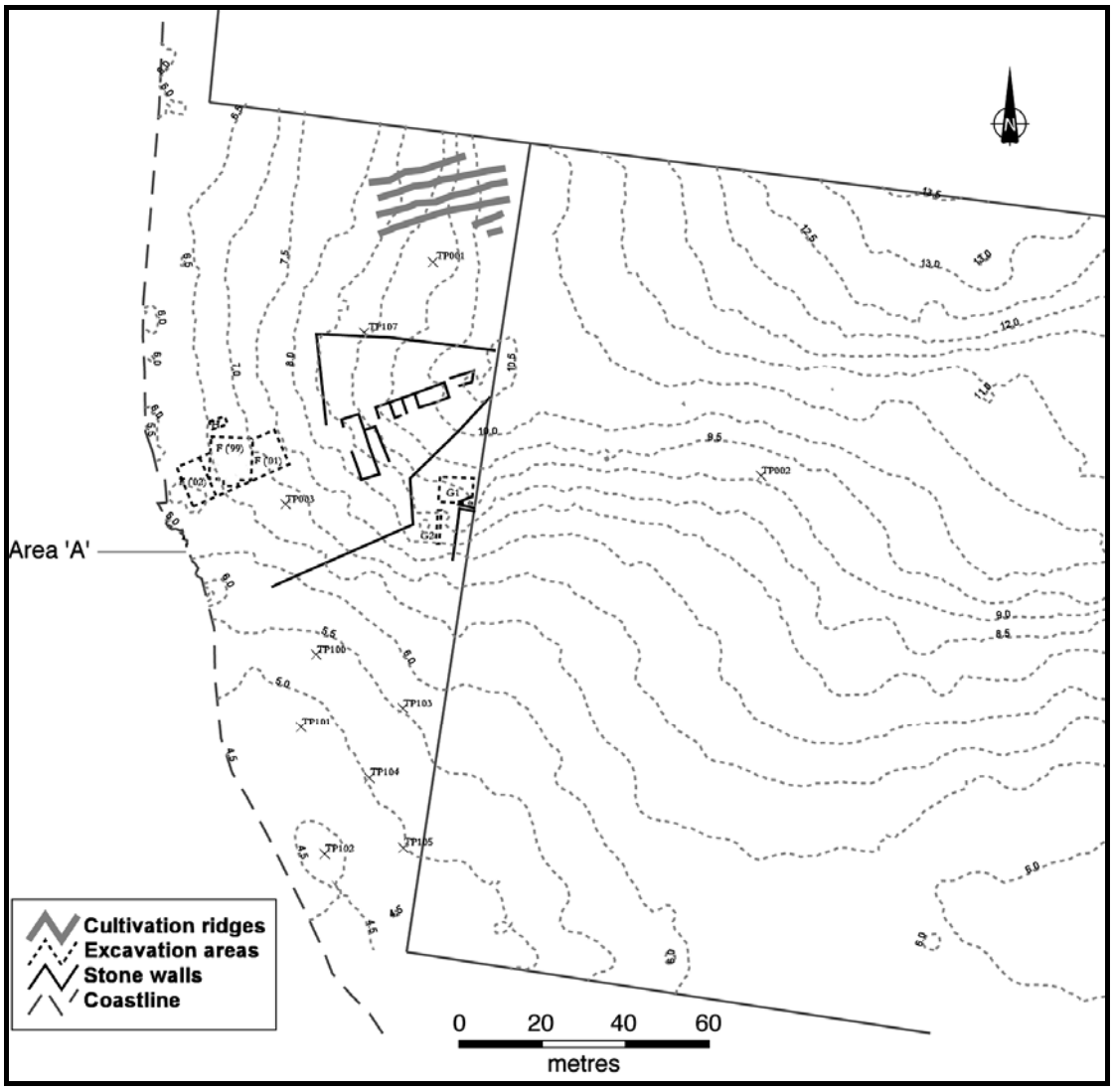

Figure 2: Plan of the Quoygrew site, showing the excavation areas and test pits. The fish midden is evident as a slight mound on the coast. The farm mound occupies the western terminus of an east-west orientated ridge.

Methodology

Thin-section micromorphology supported by conventional bulk-soil analyses and associated radiocarbon dates were integrated to characterise the cultural deposits. An

extensive cliff side survey revealed that the wave-cut cultural deposits, with substantial volumes of fishbone extended for 40m along the shore. One sample column (column A) was chosen for geoarchaeological investigation because it preserved the cliff-edge midden to a greater depth (1.5m) and was less disturbed by cliff-edge slumping. The column measured 50x50x50cm and seven undisturbed samples for micromorphological analysis were collected in Kubiena tins, together with small bulk samples (Figure 3).

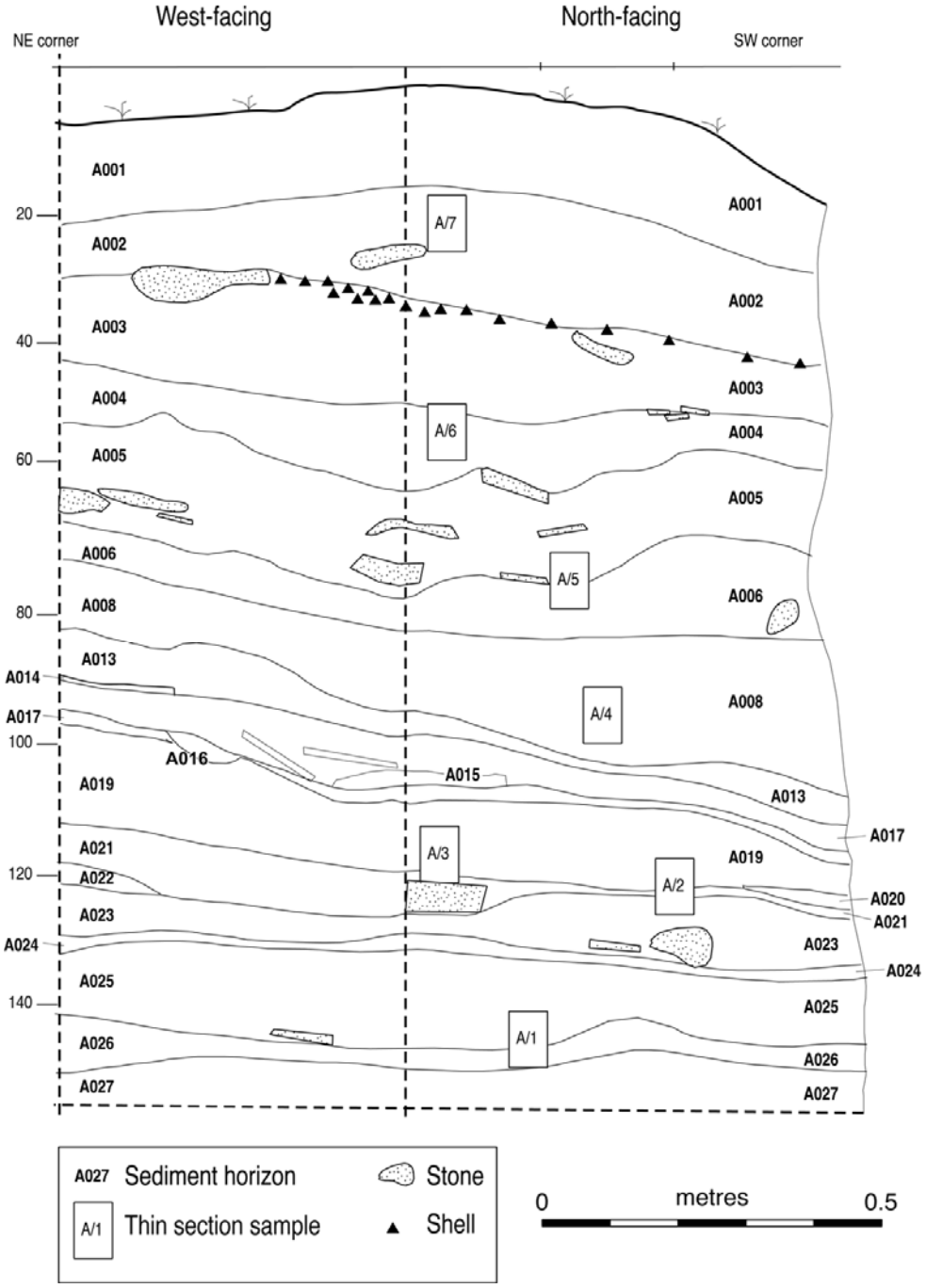

Figure 3: Stratigraphy of the Area A sediments, Quoygrew, Orkney.

Sampling included 18 out of the 27 layers and lenses that had been identified in the field, and was designed to ensure the maximum range of deposit types. Thirteen samples of cereal grain, derived from wet sieving of sediments, and two samples of mammal bone material were used for radiocarbon measurement.

Results

Using field observations, bulk soil analysis, and systematic thin-section observations the stratigraphy can be partitioned into three broad units based on sediment colour, texture, structure, composition and total phosphorous values. Microstructure, coarse mineral and excremental pedofeature attributes allow the uppermost stratigraphic unit (A001-003 in Figure 3) to be interpreted as a thickened and bioturbated midden and A-horizon soil material, to which wind-blown shell sand was continuously added. Organic carbon and phosphorus values, and the frequency of phytoliths, organic matter and the presence of dusty clay coatings in thin section, suggest that the lower, basal deposits (A026-027 in Figure 3) belong to weakly developed soil formed on boulder clay.

The major stratigraphic unit (A004-A025 in Figure 3) has a total thickness of 1m, with a sequence of cultural deposits that are variable in their microstratigraphy and with frequent occurrence of fishbone fragments. Features observed in thin section include fine calcareous ash crystals, rubified fine mineral material (Figure 4), phytoliths and diatoms, and black charred peaty flecks. The peaty features are identified as fragments of herbaceous and woody tissues in varying states of decomposition and included monocot and dicot stems, roots, petioles, leaves/bracts and inflorescences. These observations allow the basic matrix of the deposits to be interpreted as peat ash. The sediments contain a higher percentage of sand and silt grains than other areas of Orcadian peat ash either due to differences in the source of peat or to a steady input of wind blown quartz sand throughout the deposits accumulation. Inclusions in the peat ash residues include fishbone fragments that are randomly orientated and distributed.

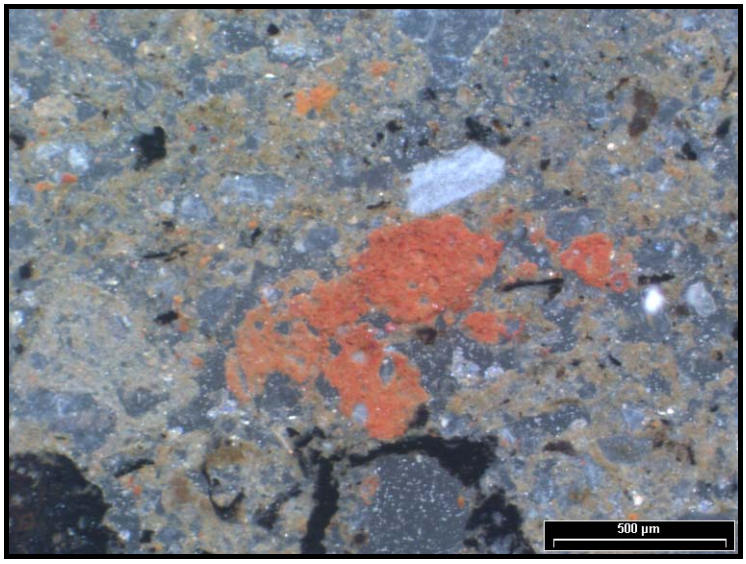

Figure 4: Thin section of a rubified mineral material (oblique incident light).

Conclusion

A discrete area of the site developed as a fish midden (a depositional zone for waste products from specialised marine-resource processing) commencing c. AD966-1162 and continuing until AD1223-1296. Marine exploitation developed as part of long-term trend towards increasing rural productivity, but arable land improvement, probably associated with the intensification of arable agriculture is considered to be a later innovation at the site, commencing c. AD1256-1400 (around 250 years later than the intensification of marine-resource exploitation).