

The historical legacy of Anthrosols at Sandhavn, south Greenland

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Abstract

The impact of European settlement and farming on the landscape of southwest Greenland has been considered in many landscape and archaeological studies, however the nature and extent of soil modification associated with European land management has yet to be determined. This paper explores the historical legacy of Anthrosols at a large Norse farm site in south Greenland. Changes in land management, resource exploitation and site formation are examined, and the notion of soils based evidence for cultural interaction is explored.

Key Words

Anthrosols, Norse, Homefield, manuring, irrigation, Inuit, Greenland.

Introduction

Modification of the landscape through implementation of historic European farming practises is observable at a regional scale and at the individual farm level in southwest Greenland. The landscape across both the Norse Eastern and Western Settlement areas is characterised by a scattered settlement distribution reflecting the importation of a pastoral farming economy by European settlers in the 11th century AD (Arneborg 2005). In particular there is a distinct correlation between farm location and areas of high quality pasture in inner-fjord areas (McGovern 1980a, 1980b). Although all farms were engaged in pastoral agriculture, farms in more peripheral and/or marginal locations specialised in additional modes of subsistence. Interior farms were positioned to exploit migratory caribou, similarly coastal farms specialised in marine resource extraction (Berglund 1986). The settlement pattern of Norse farms was dictated by a European model of subsistence which extended to the spatial organisation of land at the individual farm level. Farmland was divided and utilised according to the infield-outfield system. The infield, also referred to as the homefield, was located near to the farmstead and was used to grow fodder for overwintering cattle. The outfield was used to graze cattle during the summer, and sheep and goats all year.

Farming in Greenland differed from mainland Europe in that it was based exclusively on livestock, however comparable management strategies to ensure maximum growth yields are apparent. The use of irrigation networks to supply the homefield with a regulated water supply has been identified at several Norse sites including Igaliku and Quassiarsuk (Arneborg 2005). This strategy enabled maximisation of fodder crop yields and led to increased growth security in more marginal years through offsetting growing season soil moisture deficits (Adderley and Simpson 2006). In contrast irrigation in mainland Europe was used as a mechanism to increase grain production. The establishment of shielings (small seasonal farms) is an additional example of European resource management in southwest Greenland. Within the Eastern Settlement hay making shielings are restricted to marginal resource areas. In addition, there is a close association between milking shielings and areas of medium quality pasture with limited opportunities for grazing (Albrethsen 1991). The impact of European settlement and farming on the landscape of southwest Greenland has been considered in many landscape and archaeological studies, however the nature and extent of soil modification associated with European land management has yet to be determined. This paper explores the historical legacy of Anthrosols at a large Norse farm site in south Greenland. Changes in land management, resource exploitation and site formation are examined, and the notion of soils based evidence for cultural interaction is explored.

Field Investigations

The site of Sandhavn (59°59'N, 44°46'W) is located on the south coast of Greenland 3.5km WNW of Herjolfsnæs. Sandhavn functioned as a large Norse farm and is thought to have been an important international trading post for Norwegian merchants. Inuit ruins have also been identified at Sandhavn including a dwelling, 'Inuit Structure 6', which is located within the Norse homefield. Charcoal from Inuit Structure 6 has been ¹⁴C dated to the 13-14th centuries AD (Raahauge *et al.* 2003) raising the possibility that Norse and Inuit groups were co-existent at this site.

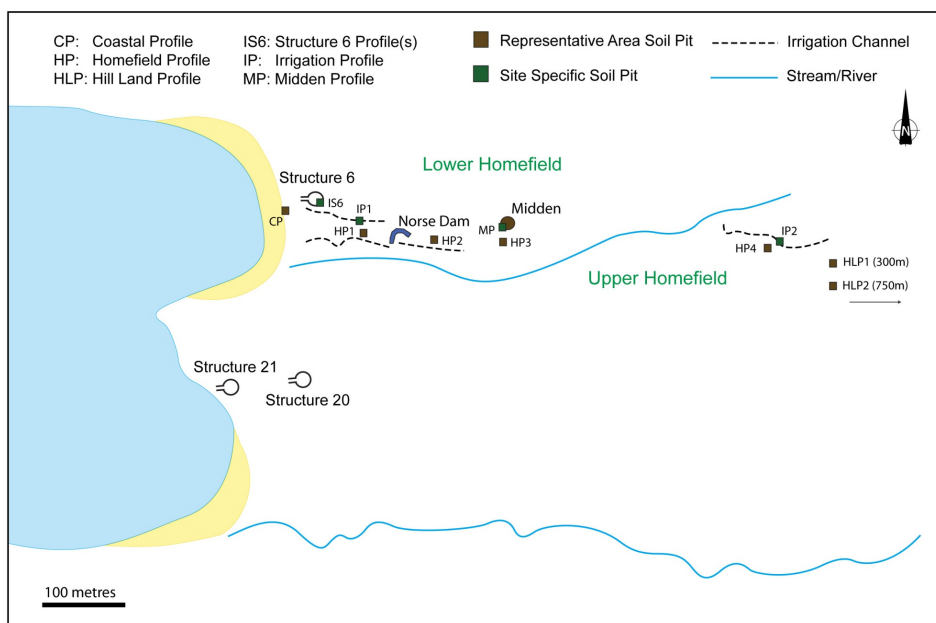


Figure 1. Location of site features and soil pits investigated at Sandhavn (Image geo-corrected in ArcGIS © ESRI 2006).

The first stage of fieldwork at Sandhavn involved locating and recording important landscape features such as Norse structures, Inuit dwelling remains, irrigation channels, and Norse ‘upper’ and ‘lower’ homefield areas. Subsequently seven representative area soil pits were dug along an east-west transect traversing the lower and upper Norse homefield to determine changes in landscape utilisation across space and in time. Site specific soil pits were located according to additional features of interest including Inuit winter dwelling ‘Structure 6’, a Norse midden, an irrigation channel in the lower homefield and an irrigation channel in the upper homefield (Figure 1). Exposed profile faces were recorded according to standard procedures (Hodgson 1976) and the presence of exotic inclusions such as charcoal and bone were noted. In total 38 charcoal samples were extracted for radiocarbon dating and 27 Kubiena tin samples were taken for thin section manufacture and micromorphological analysis.

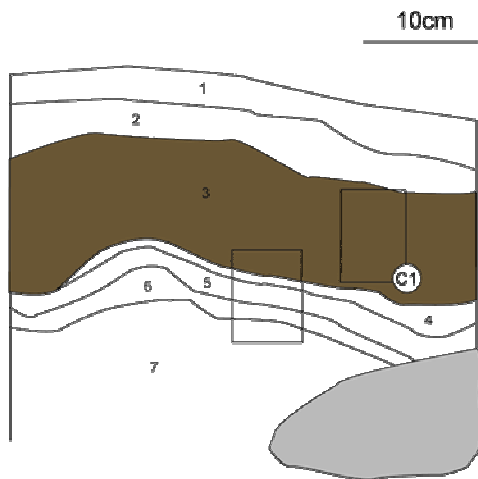
Results

The existence of a fossil soil buried beneath anthropogenic deposits is noted within all soil profiles in the homefield. The fossil soil comprises dark brown/dark yellowish brown freely draining sand, which is overlain by a black/dark brown organic sandy loam horizon typically no deeper than 5cm. In some cases dark greyish brown sand is present above the latter horizon ranging in depth from 2cm (HP4) to 11cm (HP2). The distinctive black/dark brown organic sandy loam horizon is representative of the original land surface prior to Norse occupation. Charcoal (willow) obtained from this horizon has been ¹⁴C dated to cal AD 1040-1230 (2σ) indicating Norse settlement in the 11th century AD.

Norse Homefield

Differences in soil characteristics between the lower and upper homefield areas are identified (Figure 2). Soils within the lower homefield contain dark brown sandy loam/sandy silt loam topsoil varying in depth from 8 to 18cm. In comparison soils within the upper homefield contain three phases of dark brown organic loam, interspersed with thin bands of dark brown sand. The organic loam horizons are wavy and range in depth from 5cm to 10cm, whereas the brown sand layers are typically smooth and no deeper than 3cm. Differing manuring regimes may account for variation in soil characteristics between the lower and upper homefield areas. Charcoal obtained from topsoils within the lower homefield has been dated to 1030-1220 cal AD (HP3) and 1280-1400 cal AD (HP1) (2σ). These dates suggest sustained manuring of the lower homefield throughout the duration of Norse occupation, although the possibility of discontinuity in the onset of manuring across the lower homefield cannot be disregarded. In comparison results of ¹⁴C dating on birch charcoal obtained from successive deposits within the upper homefield indicate three discrete phases of manuring activity: 1) 11th to late 13th century AD; 2) 13th century AD; 3) 13th to 14th century AD.

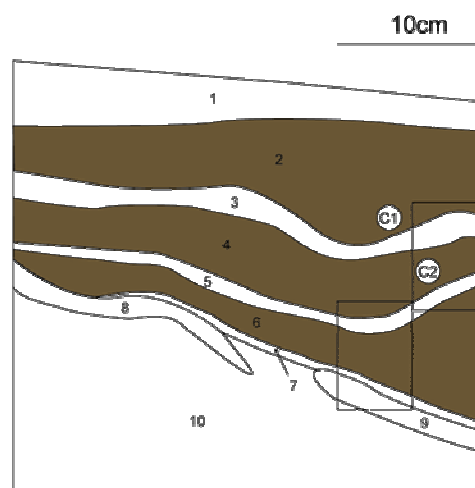
Homefield Profile 3: HP3
59°59'57.5"(N) 044°46'36.1"(W)



Ⓒ1 SUERC-21998 900±30BP, 1030-1220 cal AD (95%)

- 1: Brown (7.5YR 4/2), Sand
- 2: Dark Brown (7.5YR 3/3), Sandy Silt Loam
- 3: Dark Brown (7.5YR 3/2), Sandy Silt Loam
- 4: Very Dark Greyish Brown (10YR 3/2), Sandy Silt Loam
- 5: Black (7.5YR 2.5/1), Organic Loam
- 6: Dark Greyish Brown (10YR 4/2), Sand
- 7: Dark Yellowish Brown (10YR 3/6), Sand

Homefield Profile 4: HP4
59°59'57.5"(N) 044°46'25.5"(W)



Ⓒ1 SUERC-21999 670±30BP, 1270-1400AD (95%)

Ⓒ2 SUERC-212000 790±30BP, 1185-1280AD (95%)

- 1: Brown (7.5YR 4/2), Sand
- 2: Very Dark Brown (7.5YR 2.5/2), Organic Loam
- 3: Dark Brown (7.5YR 3/2), Sand
- 4: Very Dark Brown (7.5YR 2.5/2), Organic Loam
- 5: Dark Brown (7.5YR 3/2), Sand
- 6: Very Dark Brown (7.5YR 2.5/2), Organic Loam
- 7: Light Brownish Grey (10YR 6/2), Sand
- 8: Black (7.5YR 2.5/1), Organic Loam
- 9: Black (7.5YR 2.5/1), Organic Loam
- 10: Dark Yellowish Brown (10YR 3/4), Sand

Figure 2: Profile description of Homefield Profile 3: HP3 (Lower homefield) and Homefield Profile 4: HP4 (Upper homefield).

Irrigation channels

A contrast in soil characteristics and channel morphology is noted between irrigation channel soil profiles in the lower (IP1) and upper homefield (IP2). It is proposed that manure/midden material was used to line and consolidate irrigation channels in the lower homefield. This would account for the markedly different colour and texture of the channel lining compared to surrounding soil horizons (Figure 3). Charcoal obtained from the channel lining has been ¹⁴C dated to cal AD 1260-1390 (2σ), although it is possible that construction and use of irrigation channels at Sandhavn dates to an earlier period, especially if more recent charcoal became incorporated into the channel lining through replacement/repair. Surface irrigation within the lower homefield would have promoted higher crop yields in addition to growth security in more marginal years by offsetting growing season soil moisture deficits (Adderley and Simpson 2006). The irrigation channel investigated within the upper homefield appears to have been lined with small stones rather than manure/midden type material. Variation in channel morphology between the lower and upper homefield may reflect differences in when these irrigation channels were constructed and/or utilised.

Inuit Structure 6

Profile descriptions of two cross sections through Inuit structure 6 are summarised in Golding *et al.* (2009). It is suggested that manure/midden material may have been used as a construction material accounting for the differing colour and texture of organic loam layers compared to adjacent sand horizons. The use of manure/midden material in dwelling construction is logical given its physical and thermal properties. Charcoal from the wall packing (context 9) and occupation surface of structure 6 date to cal AD 1220-1295 (2σ). It is possible that the Inuit were using Norse midden material in dwelling construction implying some element of mutual cooperation between the two groups. Alternatively it can be argued that Inuit Structure 6 predates Norse occupation at Sandhavn, and that the brown organic layers are formed through subsequent application of manure/midden to the lower homefield in which this structure is located. It is expected that subsequent micromorphological analyses will resolve this issue.

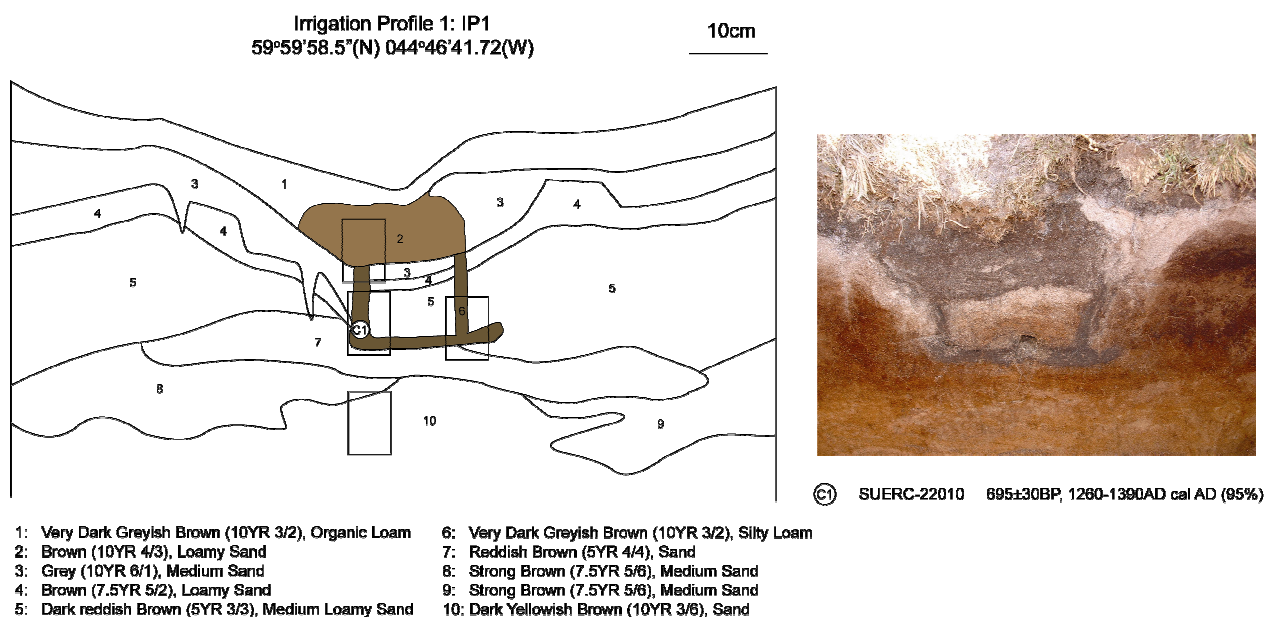


Figure 3: Profile description of Irrigation Profile 1 (IP1) (Lower homefield)

Conclusions and Future Work

Results of field investigations of Anthrosols at Sandhavn reveal complex landscape management practises associated with the Norse farm. It is apparent that soil improvement within the homefield and utilisation of irrigation channels were important strategies in maximising resource yield. The possibility of contact between Norse and Inuit groups at Sandhavn remains unresolved. It is expected that micromorphological analysis in association with quantitative chemical investigation of key anthropogenic features (SEM EDX) will prove vital in resolving whether the Inuit were utilising Norse midden/manure resources.

Acknowledgements

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