



Europeanization of sub-Arctic environments: soils based evidence from Norse Greenland

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Europeanization of sub-Arctic environments by Norse communities in Greenland from the early 11th to mid 15th centuries AD varied spatially and temporally, with pastoral agriculture and associated homefield management at the heart of this transformation. This process is poorly understood and so from inner, middle and outer fjord areas of the Norse Eastern settlement in Greenland we contribute a chronologically constrained homefield soils and sediments-based historical ecodynamic analysis. Our findings demonstrate a range of homefield management activities in contrasting environmental and social settings including a) 'recipe effects' - the partitioning of turf, domestic animal manure and domestic waste resources used to manage soil fertility and the effects of eroded material deposition in the homefield; b) field irrigation management to overcome seasonal water limitations; and c) 'non-management' where homefield productivities relied on natural soil fertilities. These management practices created an anthrosols soil environment overlying and distinct from the podsol environment at settlement. In doing so Norse settlers increased soil nutrient status relative to pre-settlement levels in some homefields, whilst nutrient levels in other areas of the homefield were allowed to decline, resulting in a situation of 'partial sustainability'. We demonstrate that in historical contexts, local 'partial sustainability' can lead to resilience amongst agricultural communities in the face of climatic deterioration, but that ultimately this may only be as effective as the broader social framework in which it is found.