Integrative modelling of human ecodynamics in the Norse North Atlantic

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We present a new model of human ecodynamics that is illustrated with case studies from the Norse North Atlantic. The aim is to compare and contrast different completed experiments in human ecodynamics, enhancing both analysis and explanation. The focus is on pathways, each attributed to a place that can vary in scale and be a settlement or a region. Change through time is expressed by progression along the pathway. These pathways are defined by different routes across a 2-D surface that defines the changing importance of pairs of co-variant parameters, such as the use of wild or domestic biota, marine or terrestrial resources, or hierarchical versus egalitarian organisation. Each pathway creates a ridge of variable height, width, longitudinal profile and cross-sectional slope. This topography can be used to define at least eight values. Breadth can be related to a range of economic activities (and the surface neighbouring the ridge potential activities); height can be a measure of productivity, the range of productivity creates a cross-sectional profile that can represent resilience and the potential for change. Attributes of the population at a moment in time may be described with a changing density across the cross profile. An overarching ceiling may be defined by both environmental and cultural factors (such as climate, skills and technology). At different times, as defined by the position on the pathway, the ceiling may be higher or lower and either constrains the ridge or creates scope for growth; imposed height constraints may lead to adaptation and see a lateral shift of the pathway. Different zones within the cross profile can be related to local production or imports- with local products affected by the overarching ceiling about the pathway, but imports being related to conditions elsewhere. Trade can be represented by connections between pathways. The long profile of the ridge is a measure of change through time, and this may related to very different scales, such as season to season or decade to decade. Potential strengths of this model are its ability to capture contracting scales and rates of change, and provide a quantified framework for the visualisation and analysis of at least 16 variables.