



**North Atlantic Biocultural Organization**

***International Polar Year Workshop***

***Human Ecodynamics in the Norse North Atlantic***

*University of Edinburgh  
Institute of Geography, School of GeoSciences  
December 3-5, 2007*



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## Summary

In early December 2007 a group of fifteen scholars from UK, Canada, Scandinavia, and the US were hosted by Prof. Andrew Dugmore and the University of Edinburgh's *Institute of Geography of the School of GeoSciences* for a three day meeting to launch and coordinate a three year collaborative effort to bring directly comparable interdisciplinary investigations to complex human ecodynamics in the Shetlands, Faroes, Iceland and Greenland funded in part by a recent US National Science Foundation IPY grant (US \$ 750,000; 2007-10) through the Arctic Social Sciences Program of the Office of Polar Programs. This meeting report provides a short summary of the workshop and an overview of the NABO IPY collaboration.

## The IPY Effort

The 5<sup>th</sup> International Polar Year (2007-9, first IPY 1888) represents an opportunity for a surge in international, interdisciplinary collaborative research in the Polar Regions. The present IPY has special importance given the rapid environmental and social changes now taking place in the circumpolar north, and the increasing perception of the north as a global "mine canary" for a world arguably on the threshold of multiple cascading changes affecting the entire planet. The IPY effort seeks to promote scientific investigations that cross social science/natural science divides and to better pool different national areas of expertise to create both a high-visibility event for a wide public and a set of lasting products promoting ongoing collaborations in science, education, and outreach.

## The NABO Research Cooperative

The North Atlantic Biocultural Organization (NABO) was formed in 1992 to aid international, interdisciplinary collaboration across the region. Major meetings have taken place every two or three years (New York 1992, Glasgow 1994, Tromsø 1996, St.John's 1997, Glasgow 2000, Copenhagen 2003, Quebec 2006, Bradford 2008, Torshavn 2010). The coordination center is the CUNY Northern Science & Education Center (NORSEC), a collaboration among Hunter College, Brooklyn College and the CUNY Doctoral Program in Anthropology. An initial focus upon the social and environmental impacts of the Viking Age Norse migration from Scandinavia to Vinland has broadened to include the full spectrum of human ecodynamics from prehistory to the recent past, and to include a wide range of participating scholars and institutions. Major collaborative efforts include common standards for field work and laboratory analysis, data management, integrative modeling, and a strong emphasis on education at all levels. The NABO cooperative has run a highly successful multidisciplinary field school in Iceland since 1997, now funded by the Icelandic government as an international academic collaboration managed by Archaeological Institute Iceland, U. Iceland, U. Oslo, and City University of New York. Website (now being upgraded and re-designed for the IPY effort) via U Edinburgh [www:geo@ed.ac.uk/nabo](http://www:geo@ed.ac.uk/nabo)



## The NSF NABO IPY Project Mission Statement

(Project Summary from NSF Grant # 0732327)

Project title; *IPY: Long Term Human Ecodynamics in the Norse North Atlantic: cases of sustainability, survival, and collapse.*

**1) Relevance to IPY:** This proposal to the NSF IPY emphasis area *Human and Biotic Systems; Humans in the Polar Regions* represents the US component of an international, interdisciplinary research program recognized by the ICSU IPY committee under the European MARENA and NORCLIM initiatives. It brings together scholars, students, and local community members from Greenland, Iceland, Shetlands, and the Faroe Islands in a unique cooperative effort to:

1) better understand the complex dynamics of human-environment interaction on the millennial scale, including human impact on island flora, fauna, and soils, sustainable and unsustainable resource use, the impacts of climate change, interactions between subsistence and exchange economies.

2) collect and analyze directly comparable data sets (artifacts, zooarchaeology, archaeobotany, geoarchaeology) from coordinated regional-scale excavations taking place on all three islands as an IPY surge activity, sharing gear, specialists, and excavation staff for the highest possible degree of inter-comparability,

3) involve local communities in the research effort and aid them in making inter-island connections which will aid their own outreach efforts and more effectively manage ecotourism,

4) involve US and international students at high school, undergraduate, and graduate level in fieldwork (including a special outreach program and two formal field schools) and in the development of K-12 classroom materials,

5) collaborate closely with climatologists and oceanographers in the tracking of sea ice expansion in the later Middle Ages and its impacts on ecosystems and human economies,

6) expand the North Atlantic Biocultural Organization (NABO) data management program to leave a lasting IPY legacy.

**2) Intellectual merit criteria:** Radically different long term outcomes in sustainable resource use, climate impact, and culture contact followed the initial colonization of the four island groups by a common Scandinavian culture during the Viking Age (AD 800-1050). Current research indicates that the Faroese may have established economic patterns permitting long term sustainable use of both terrestrial and marine resources by the early medieval period, allowing remarkable settlement stability down to the present. The Icelandic interaction



reflects both successes and failures in long term terrestrial resource conservation in a context of dramatic environmental change following first introductions of European domestic animals and farming systems. In the Icelandic case, intensive fishing and coastal-inland exchange of dried fish extends back to first settlement, and island-wide economic integration as well as local level social buffering may have become critical to survival following late medieval landscape destabilization and climate change. In Greenland, the collapse of the Norse settlement ca AD 1450 is still incompletely understood, but available evidence indicates different patterns of marine resource use from either Iceland or Faroes may have played a role in the ultimate failure to maintain long term community viability in the face of culture contact and climate change. Connecting field studies and specialist analyses will allow better understanding of regional-scale questions of differential climate impact, origins and spread of commercial fisheries, and the role of inter-regional trade and exchange.

**3) Broader impacts:** The unintended consequences of long term human impact on animals, vegetation, soils, and fresh water are widespread threats to community sustainability in many parts of the world today, and the long term consequences (for good or ill) of past cultural landscape formation are part of the environmental heritage of modern humanity. These four North Atlantic cases have direct and clear relevance to modern northern peoples now also faced with rapid climate change, resource fluctuation, and challenges in sustainably integrating maritime hunting and fishing economies, terrestrial farming and hunting strategies, and a cash economy. The project has a major **educational component**, and intends to make use of new and existing field schools and field programs to connect different generations of researchers from different national traditions to combine research continuity with innovation, student to student peer mentoring with intergenerational apprenticeships, and youthful energy with multi-decadal field experience. In addition to providing solidly based natural and social science data and analysis to global attempts to better understand long term human ecodynamics, the project will directly aid modern northern institutions and communities in the study areas to better manage the rapid spread of ecological and cultural tourism. The project will **aid community efforts** to share best-practice experience in responsibly and effectively managing tourism and heritage development by pooling resources and ideas to also achieve results beyond the reach of any single community or local organization. The proposed three year surge in international cooperative activity will produce a lasting IPY legacy in cooperative infrastructure, community inter-connection, directly comparable & widely disseminated scientific data sets, and will raise the archaeology of the region to a new level of accomplishment, connecting scientists, disciplines, and islands across the North Atlantic quarter of the circumpolar north.



### **Participating Scholars & Institutions**

Jette Arneborg (National Museum of Denmark)  
Simun Arge (Faroese Museum)  
Philippa Ascough (St. Andrews)  
Julie Bond (Bradford)  
Andy Casely (Edinburgh)  
Mike Church (Durham)  
Steve Dockrill (Bradford)  
Andy Dugmore (Edinburgh)  
Ragnar Edvardsson (West Fjords Museum, CUNY)  
Ian Lawson (U Leeds)  
Tom McGovern (CUNY)  
Anthony Newton (Edinburgh)  
Ian Simpson (U Stirling)  
Richard Streeter (Edinburgh)  
Jim Woollett (U. Laval)  
Orri Vésteinsson (U Iceland, FSI)

### **Major Themes**

Major overarching research themes identified by workshop participants included:

- *Seafaring and the reconstruction of maritime capabilities.* While the islands of the North Atlantic are clearly connected as much as divided by the sea, and much data exists on historical and ethnographic seafaring, boats, and navigation, there is a need for coordinated assessment of the nature and capabilities of the ships and boats of Iron Age and Viking times. Assessment of hazard of different voyages, capabilities for large scale transfer of population and resources, and differences in degree and character of maritime resource use all require better understanding of the nature of past sea conditions and normal capabilities of past seafarers. A coordinated approach making use of current and wind modeling, paleoclimatic proxy evidence, performance of reconstructions and the ethnographic record may represent a way forward (cf. Dugmore, Casely et al 2007).
- *Landnám and initial settlement conditions.* Current evidence suggests the Nordic colonization of Iceland (and perhaps Faroes and Greenland) may have been on a far larger scale and much more rapid than previously believed. Reassessment needs to incorporate cognitive & political as well as economic and environmental variables. How were initial settlement/subsistence decisions made, how was an initial store of “traditional environmental knowledge” (TEK) accumulated, how was changing status negotiated/contested, what evidence flags significant differences / continuities between first settlement economy and ecology and later periods?



- *Adaptation vs. resilience*; in developing island economies is there a rising curve in connection, intensification, investment in fixed resource spaces social and material infrastructure which increases the effectiveness of adaptation at the cost of overall resilience in the face of variation? Do concepts borrowed from island biogeography and the popular *resilience framework* have direct relevance for complex human-landscape and human-human interactions? What structures can be identified as conserving resilience or promoting specialization? What role do “reserve resources” (fish, sea birds, sea mammals?) play in providing flexibility to adaptive systems, and how do these roles change with time and in different island contexts? How does changing distribution of woodlands interact with fuel consumption, winter stock sheltering, construction use, movement routes, and charcoal production? How does the shifting balance between marine and terrestrial resource use (green foot/blue foot) affect resilience on the local, regional, and inter-regional level?
- *Continuity and discontinuity*; assessing “collapse”, “success”, “sustainability” from a long term, wide scale perspective. Why are settlement and abandonment decisions made on the scale of farmstead, grazing area, valley system, or island? What factors characterize long-occupied locations in different islands? Do “over-optimistic” pioneer fringe settlements recur in different periods and locations? What factors distinguish cycles of temporary abandonment/reoccupation from both continuous settlements and permanent abandonment?
- *Climate impacts*; effects of strings of good and bad years, extreme events, threshold crossings (such as advent of summer sea ice in SW Greenland ca 1250-1300), making use of high resolution proxy climate indicators and direct climate records to make effective use of the new “human scaled” historical climatology, integrating with high resolution indicators of geomorphology, livestock management, human dietary changes.
- *Inter-Scale interactions*: All participating field research programs are explicitly aimed at expanding from single-site focus to a broader multi-site landscape perspective, driven in part by the realization that major economic and environmental forces above the scale of the individual site have greatly affected the nature and viability of single farms and regional settlement systems. Trading contacts within islands, between islands, and between islands and larger continental economies prior to 1100 may have been undervalued and remain poorly understood.
- *Time depth*: Some N Atlantic islands have seen human occupation and successive phases of landscape creation since the Mesolithic. Others represented an effectively clean slate for large scale agricultural settlement. Understanding the effects of accumulated landscape heritage (place names, constructed landscape features, soil creation/augmentation and depletion, species extinction/conservation, and overall adaptive resilience) over different time scales.



- *Types of Time*: conjuncture, cascades, gradual transitions, fast and slow variables, specific historical sequence and broad evolutionary process. All times are not alike, periods of gradual development / decline are punctuated with sudden revolutionary change (epiphanal as well as catastrophic).
- Perception, Cognition, Memory, Cultural Schemata (Whitehouse et al 2000) all mediate human environmental interaction and act to store memory of potential responses to extreme (or simply low-frequency) events and provide the basis for social legitimacy and community labor mobilization. The rich documentary and literary record of the North Atlantic provides sources of detailed insights and an interior ethnographic perspective denied to completely prehistoric cases.

### Research Questions

Research questions with broad relevance to multiple projects were identified:

- Processes of colonization- means, motivation, scale, and relation to resource distribution.
- Processes of intensification – wild/domestic, marine/terrestrial, exchange (local, regional, trans-Atlantic), labor coordination and deployment, technological change or stability.
- Processes of interaction- changing mixes of staple goods/prestige goods in trans-Atlantic trade, cross cultural exchange (Norse-Celtic-Saxon, Norse-Saami, Norse-Dorset, Norse-Thule).
- Processes of abandonment and re-organization- chronology, motivation, scale, connection, buffering.
- Connections- route ways on land and sea, pathways and boundaries, effects of topography, wind, ice conditions on movement costs.
- Scheduling – seasonal round, availability of migratory species, critical seasonal “crunch points” of potential shortfall or surplus.
- Production for export- local and regional scale, walrus, wool, fish, pre- and post- Fish Event Horizon, local impacts of early world systems.
- Synergistic interactions of human politics and environmental change (including prior human impacts), heritage and legacy effects, ideology, perception, legitimation.

### Research Methods and Tools

Drawing on the pool of professional and institutional resources available to the NABO IPY, participants identified great potential for the expanded integration of a combination of well-established and innovative techniques and analytical approaches, all aided by common data collection and management protocols.

- *Multi-indicator chronologies*
  - Multiple AMS Radiocarbon w/ N and C isotopic assay
  - Tephra (esp. Iceland)



- OSL (esp. Shetland and Greenland)
- Artifacts
- *Integrative Models*
  - BuModel- grazing impact (Thomsen & Simpson)
  - PLACE- localizing climate impacts (Casely)
  - CENTURY- climate + soil fertility (Adderley & Simpson)
  - Animal settlement models as a framework for human colonization (Arni Einarsson).
  - Agent based modeling incorporating social rule sets (Grágás etc.- under development)
- *Human Bioarchaeology*
  - Strontium isotope evidence for colonization and contact (Price & Gestdottir)
  - N and C isotopic evidence for food web and dietary reconstruction (Arneborg et al)
  - Human osteological evidence for biomechanics, trauma, development, pathology fully coordinated with isotopic and archaeological evidence (Gestdottir, Lynnerup).
- *Zooarchaeology*
  - Vertebrate osteological analysis of species abundance, age profile, butchery strategies, taphonomy, size and shape.
  - Dental analyses of wear, hypoplasias, incremental structure.
  - N and C isotopic evidence for food web, grazing pattern (land mammals), catch provenience (fish), and provisioning catchment radius.
  - Invertebrate zooarchaeology (mainly insects) activity areas, introductions, climate change, environmental reconstruction.
- *Archaeobotany*
  - Palynology (Lawson)
  - Macrofloral (Church)
    - Charcoal production & consumption
    - Woodland management, driftwood consumption
    - Fuel use
- *Material Culture*
  - Provenience analyses (organics, lithics, pottery)
  - Residues
  - Stylistic change and continuity
  - Trade and inter-regional contacts
  - “Viking Settler Kit” hypothesis
  - Boats and wood use
  - Functionality analysis (consumption/ cooking / storage/ display).
  - Fabrication/acquisition costing (time, opportunity, money)



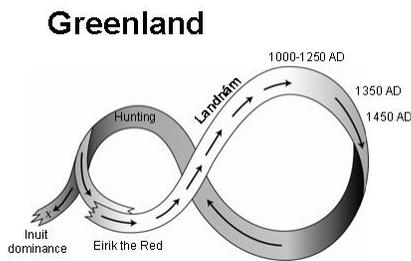
- Housing, hearths, pens, pasture areas, functional and symbolic use of created cultural landscape features at different scales (within room to district-wide)
- Geoarchaeology
  - Landscape scale geomorphology
  - Site / intra site micromorphology
  - Erosion impact analysis
  - Locational geography

**Collaborating Field Programs**

- Viking Unst Project (Shetland)
- Heart of the Atlantic Project (Faroes)
- Landscapes of Settlement in N Iceland (Mývatnssveit)
- Gásir Hinterlands Project (Eyjafjord Iceland)
- Flatey Project (Breiðafjord Iceland)
- Vatnsfjord Field School and Research Center (NW Iceland)
- Vatnahverfi Project (Greenland)

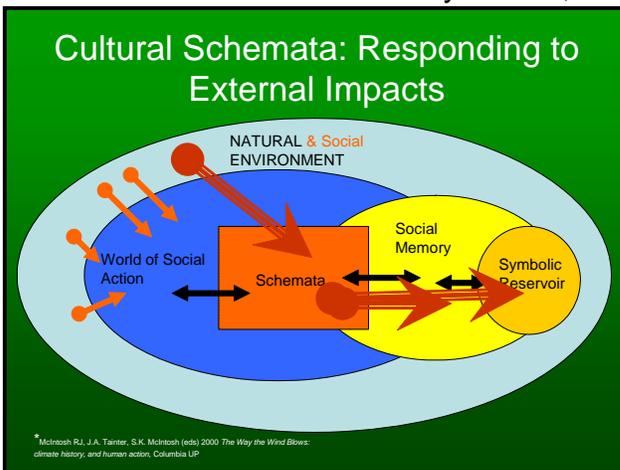
**Theoretical Framework**

A very spirited and productive discussion followed a presentation on the potentials for inter-scalar integration provided by the now popular resilience framework/Panarchy approach to complex human ecodynamics (Gunderson and Holling 2002, Gotts 2007). As the participants noted, some aspects of the emerging N Atlantic story do seem to correspond to the looping heuristic framework of the panarchic formulation, but other aspects clearly do not. Concepts of



threshold, resilience vs. adaptation, *longue durée*, conjuncture, and alternate stable states seem universally useful, but concerns about replicating 1970's processual attempts to force complex cases into a simplistic general systems model appear well founded (Crumley 2001). The consensus emerged that better ties to the emergent resilience network seem appropriate but that a cookie-cutter approach that imposes a "one size fits all" perspective remains highly problematic. Human perception, memory, TEK, and capacity for coordinated social action

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culture contact. Plans for an integrative workshop combining the experiences of N Pacific, Oceanic, and Caribbean workers dealing with island ecodynamics and resilience theory were advanced as a productive way forward in the integration of theory, models, and emerging data trends.

### **Dissemination & Publication**

While all participants expressed a continued interest in regular publication in established journals (*Arctic Anthropology*, *Journal of Archaeological Science*, *Environmental Archaeology*, *Antiquity*, *Norwegian Archaeological Review*, *Archaeologica Islandica*) there was widespread interest in making full use of the new online ***Journal of the North Atlantic (JONA)***. Project members make up a substantial portion of the governing board, and Arneborg and Dugmore are senior editors, so the group involvement in the JONA initiative is already intense. It is already clear that JONA will rapidly become a major outlet for individual reviewed papers, special topical issues, field research notes, conference proceedings, as well as providing rapid searchable access to full text, databases, color photos and other linked files. Several participants noted that students now tend to ignore any publication not available on line as a download, and this trend is only likely to accelerate in the future. The NABO IPY will certainly work closely with JONA to make full use of these potentials.

Additionally, plans were discussed for IPY sessions at both regular academic meetings (particularly the upcoming NABO 2008 meeting at Bradford) and for the planned 2009 IPY Stakeholder's outreach meeting. This stakeholder's meeting is now being planned for Iceland, recognizing both the growing role of local Icelandic archaeological associations and the exceptional concentration of expertise in digitally assisted outreach now accumulated in Reykjavik (as witness the current *Reykjavik AD871+/-2* exhibit). Creating material suitable for small-museum or heritage center kiosk display (maximizing often limited floor space) was discussed, and participants agreed to work together to provide attractive and up to date content.

Upcoming meetings with NABO IPY participation already scheduled include a special session at the spring 2008 *Society for American Archaeology* meetings (Vancouver, organized by George Hambrecht), the *NABO 2008 Bradford* meeting (August), and the *Hvalsey Conference* (Greenland, September).

### **Education and Student Support**

The NABO IPY is committed to education and will continue strong support for the long running FSI/NABO field school in Vatnsfjord, NW Iceland (1996-present) now generously funded by the Government of Iceland and directed by Karen Milek (U Aberdeen) and Gardar Gudmundsson (FSI), with academic credit managed through U Iceland (Icelanders), U Oslo (Europe/EU), and CUNY (N Americans). We also anticipate renewed active participation in the *NSF North Atlantic Research Experience for Undergraduates* program directed by Dr. Sophia Perdikaris of Brooklyn College CUNY in 2008-11. Besides providing



direct salary support to two CUNY doctoral students (Ramona Harrison and Konrad Smiarowski), the NABO IPY will provide travel funds and fieldwork support for grad students. A set of named NABO IPY student prizes will be instituted to provide both resume enhancement and a lasting sense of accomplishment for student participants. The active participation of new investigators as principle investigators and senior scientific collaborators in the NABO IPY is a welcome source of vitality and ensures inter-generational continuity of the collective effort as well as an important expansion of institutional connections and expertise.

### References

Ascough, P. L., Gordon Cook, Mike Church, Andrew Dugmore, Thomas H McGovern, Elaine Dunbar, Arni Einarsson, Adolf Friðriksson, Hildur Gestsdóttir  
2007 Reservoirs and Radiocarbon; 14 C dating problems in Mývatnssveit Northern Iceland *Radiocarbon* 49(2): 1-15.

Casely, Andrew  
2005 *Medieval Climate Change and Settlement in Iceland*, doctoral thesis, Institute of Geography, University of Edinburgh.

Arneborg, J.  
2003 Norse Greenland - reflections on the Discussion of Depopulation. In Barrett H.J. (ed.) *Contact, Continuity and Collapse: The Norse Colonisation of the North Atlantic*. Turnhout: Brepols, York Studies in the Early Middle Ages. Pp. 163 – 181.

Arneborg Jette, Jan Heinemeier, Niels Lynnerup, Henrik L. Nielsen, Niels Rud and Arny E. Sveinbjornsdóttir  
1999 Change of diet of the Greenland vikings determined from stable carbon isotope analysis and C14 dating of their bones. *Radiocarbon*, 41: 157-168

Carole L. Crumley, ed.  
2001 *New Directions in Anthropology and Environment: Intersections*. . Walnut Creek :Altamira Press.

Dugmore, Andy, Christian Keller & Thomas H. McGovern,  
2007 Reflections on climate change, trade, and the contrasting fates of human settlements in the North Atlantic islands, *Arctic Anthropology* 44(1): 12-37

Dugmore, Andy, Mike J. Church, Kerry-Anne Mairs, T.H. McGovern, Sophia Perdikaris, and Orri Vesteinsson,  
2007 Abandoned farms, volcanic impacts, and woodland management: revisiting Thórsárdalur, the "Pompeii of Iceland", *Arctic Anthropology* 44(1): 1-12.

Gotts, N. M.  
2007 Resilience, Panarchy, and world-systems analysis, *Ecology & Society* 12(1)24 (online  
<http://www.ecologyandsociety.org/vol12/iss1/aer24>

Gunderson L.H. & C.S. Holling (eds)  
2002 Panarchy; understanding transformations in human and natural systems, Island Press Washington DC

McIntosh, R.J., Tainter, J.A. and Keech McIntosh, S.  
2000 Climate, history and human action. In: McIntosh, R.J., Tainter, J.A. and Keech McIntosh, S. ed. *The way the wind blows: climate, history and human action*. New York, Columbia University Press, 2000. pp. 1-42

McGovern Thomas H., Orri Vésteinsson , Adolf Fridriksson, Mike Church , Ian Lawson, Ian A. Simpson, Arni Einarsson , Andy Dugmore , Gordon Cook , Sophia Perdikaris , Kevin Edwards , Amanda M. Thomson, W. Paul Adderley ,Anthony Newton , Gavin Lucas , Oscar Aldred  
2007 Landscapes of Settlement in Northern Iceland: Historical Ecology of Human Impact & Climate Fluctuation on the Millennial Scale, *American Anthropologist*,109(1):27-51



Simpson, Ian A., Vésteinsson, Orri, Adderley, W. Paul and Thomas H. McGovern  
2003 Fuel resources in landscapes of settlement. *Journal of Archaeological Science* 30:1401-1420.

Simpson, Ian A., Guðmundsson, Garðar, Thomson, Amanda M., and Jon Cluett  
2004 Assessing the role of winter grazing in historic land degradation, Mývatnssveit, north-east Iceland. *Geoarchaeology* 19:471-503.

Thomson, A. and Simpson, I.A. (2007). Modeling Historic Rangeland Management and Grazing Pressures in Landscapes of Settlement. *Human Ecology* 35: 151-168.