The Polar Archaeology Network

Global Climate Change and the Polar Archaeological Record: Report on a Recent Workshop

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Archaeological Sites
An Irreplaceable Record of the Past

Figure 1. Ariel view of the Saqqaq Culture settlement area at the island of Qeqertasussuk., Disko Bay, Greenland The intact traces of dwellings and culture layers with organic preservation are dated to 2.400 - 1.400 BC (cal.), among the earliest human settlements in Greenland. The site was investigated by an interdisciplinary team of researchers from Greenland and Denmark during the years 1983 - 1990. (Photo: Bjarne Grønnow).

Archaeological sites contain the irreplaceable record of the complex histories of the many societies that have lived in the circumpolar North over the past millennia. Along with associated paleoecological deposits they provide powerful proxy evidence for paleoclimate and ecosystem structure and function, and direct evidence of species diversity, distributions and genetic variability (Deitl and Flessa 2011, Murray 2008). Both provide a wide range of data which allow the understanding of human ecodynamics in a broad spatial and temporal perspective (Amorosi et al. 1996, Buckland et al. 2011, Redman 1999). Such an understanding is vital as modern societies seek to support sustainability and increase resilience in northern socio-ecological systems in the face of inevitable environmental changes.

However, archaeological sources of environmental, social and cultural data are frequently overlooked in broad arctic science initiatives, including those that have an applied component, despite the fact that many recent national and international science plans and initiatives have identified the long term human dimension as critical for developing accurate projections of future changes and for managing and adapting to change (cf. SEARCH 2005).

Figure 2. The heavily wind-eroded Early Metal Age site Kolvika on Vestvågøy, Lofoten, Norway. Photo by H.P.Blankholm.

Figure 3. Rescue excavation of the Odden 2 site at the regulated Altevatnet in Troms county, Norway. Note the wear and tear of both the lateral erosion from the reservoir and the path across the site. Photo: H.P.Blankholm

Arctic Change and Data Loss

Recently, archaeologists working at sites across the North have been seeing increasing damage to sites from environmental factors that are related to global change (Blankholm 2009). Currently accepted climate models indicate that the threats that this situation poses to the archaeological heritage of Alaska and the rest of the circumpolar north is immense and growing.

Figure 3. Erosion of Mound A, Nunagiak, Point Belcher, AK. Ford (1959) shows a much lower water level and several additional meters of deposits extending to the right (Photo: A. Jensen).

Figure 4. Pauline Cove on Herschel Island, northern Yukon, which was placed on the World Monuments Fund Watch List in 2008 due to climate change-related erosion. On this spit of land stand the earliest frame structures in Yukon Territory, along with numerous early Inuvialuit dwellings. All are within 2 meters of current sea level, and will likely be gone within 50 years. (Photo: M. Friesen.)

Ground radar plot kindly provided by Jan Burvall at Skellefteå Kraft AB.

Figure 5. In Norheden, Sortsele, Swedish Lapland, permafrost thawing is facilitating peat mining and leading to loss of the extensive paleoecological record. Photos courtesy Paul C. Buckland, Philip I. Buckland and Eva Panagiotakopulu.

The PAN Workshop on Global Climate Change and the Polar Archaeological Record

In response, a workshop on "*Global Climate Change and the Polar Archaeological Record*" was held February 15-16, 2011 at the Institute of Archaeology and Social Anthropology, University of Tromsø, Norway. The workshop focused on identification of global change-related threats to archaeological sites across the Arctic and way to mitigate these, either proposed or currently in use.

Workshop attendees identified a number of wide-spread global change-related threats, including:

1. Thawing of permafrost, increased depth of active layer--complete decay of organic materials, more frequent freeze-thaw leading to destruction of stratigraphic integrity of deposits.
2. Coastal sites are under threat from sea ice retreat, increased storminess and rising sea level; rapid and ongoing erosion
3. Expansion, then drainage, of lakes perched on permafrost surface. Drying out of organic sediments –the record simply blows away.
4. Increased fire –higher number and intensity of tundra and taiga fires, increased probability of deep peat fires.
5. More vigorous plant growth leading to site destruction.
6. The increased productivity of a warmer Arctic will lead to additional threats to sites from.
7. Changes in land use due to industrial development, increased tourism, agriculture(both pastoral and cultivation), wild animals

Thawing Permafrost

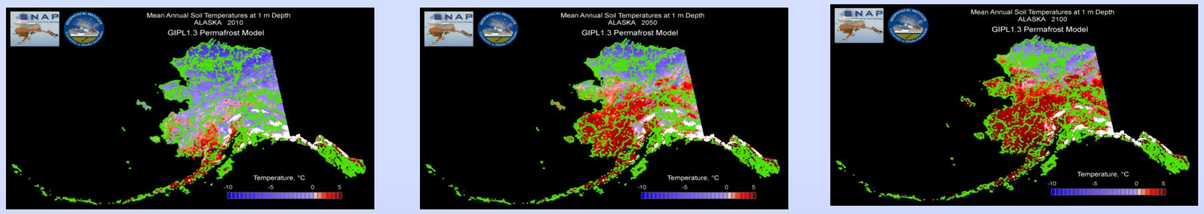

Figure 6. Mean annual soil temperatures across Alaska at depths of 1 m, projected until 2100 using the GIPL3.1 permafrost model. Approximate locations of AHR sites are shown in green. (Image: V. Romanovsky, **). Active layer depths reach nearly 2 m over the entire state by 2100. Increase in active layer depth and loss of permafrost threaten sites with organic preservation all over Alaska, just as many such sites from all time periods are starting to be found and tested.

Several attendees presented information on efforts to develop threat assessment matrices (mostly focused on coastal erosion) through survey and modelling, and on various preliminary attempts at preservation and mitigation. Possible changes to cultural resource management priorities and procedures, needs for sample archiving, prioritization of research locations, and international collaboration within and beyond the archaeological and paleoecological research communities were also discussed.

Attendees are now working on a white paper for public distribution. The objective is to further detail issues relating to global climate change and the Polar archaeological record, and to provide a framework for wide discussion of needs for monitoring, data rescue and data archive of threatened samples.

The Polar Archaeology Network

- Building and maintenance of an international circumpolar archaeological observing network.
- Identification and rescue of threatened data sets, including site deposits.
- Identification and synthesis of existing retrospective datasets.
- Integration of diverse data streams.
- Integration of relevant archaeological data and archaeological approaches into larger Arctic Change research programs.
- Collection of new circumpolar-scale time series on arctic environmental change, especially change among the marine, terrestrial, and human components of the arctic system.
- Collection and development of proxies for past climate and environmental change episodes.

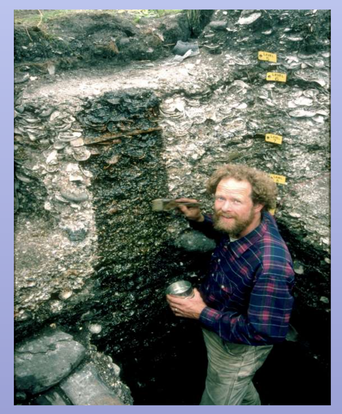

Figure 2. A section through a shell midden at Mink Island, Alaska. The midden is dated 2000-5000 BP. (Photo: J. Schaaf).

The Polar Archaeology Network (PAN) http://polararchaeologynetwork.blogg.no/, formed in the spring of 2007 in response to a need for better engagement with broader initiatives in polar science, a desire for stronger international collaborations in discipline-based and interdisciplinary science initiatives, a desire to grow polar archaeological research capacity through scholarly development and post-graduate educational activities, the wish to develop more advanced field and analytical methods particular to polar archaeology, and to ensure continued access to potential datasets that may be environmentally and/or politically sensitive in the context of a changing arctic. PAN is endorsed by the International Arctic Science Committee (IASC) http://www.arcticportal.org/iasc/ as an IASC Network. IASC provided partial support for this workshop.

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