

## CHANGING CULTURES AND CLIMATE IN THE ARCTIC: PREHISTORY TO MODERN TIMES

by William W. Fitzhugh

❖ ❖ ❖

[**Editor's Note:** This article is based on the author's *webinar* presentation for the "Smithsonian Online Education Conference: Climate Change," which took place September 29-October 1, 2009. To view the full presentation, with over 80 illustrations, go to the conference site at <http://www.smithsonianconference.org/climate/>]

Arctic regions have inspired our imagination since the Vikings returned from Greenland with narwhal tusks, and romantic painters drew ships dwarfed by towering icebergs. Martin Frobisher, one of the first Europeans to explore the Arctic, searched for a route to Cathay (China) through Arctic North America in the 1570s and produced the first descriptions of the Inuit (Eskimos). He returned to England with a cargo of fool's gold, while the small cottage he built in Baffin Island quickly turned to rubble. When I explored the site in the 1990s, nothing remained but bits of mortar and worthless ore.

One reason for Frobisher's failure was timing. Five hundred years earlier—like today!—he could have sailed right through the Northwest Passage. But he was sailing during the Little Ice Age's beginnings, one of the coldest periods in the Northern Hemisphere in the last 10,000 years. That same cold climate also led to the Viking colonies' extinction in Greenland and the southward advance of Inuit (Eskimos).

It turns out that the Arctic is one of the most sensitive environments on earth—all because of water's freezing point. Drop the temperature below 32 degrees F. and millions of square miles of the earth's surface turns to snow or ice; warm it a few degrees and much of the world turns to bog or water. No other place on earth has a temperature switch with such massive consequences. Despite this, Arctic plants, animals, and people have adapted as the world changed from glaciers to grass, from pack ice to open ocean.

Today climate change is bringing us an Arctic world we have never seen before. Temperatures are much warmer than just 20 years ago. But it turns out that the Arctic's

temperature switch has been off and on again many times in the past.

In 2007 I helped lead a two-week Smithsonian Journeys trip exploring global warming in the Arctic. We had climate scientists, reporters, paleontologists, economists, and 100 guests on board a Russian ice-breaker that took us north of Bering Strait to Wrangel Island, a near mythical place 100 miles off the Siberian coast. Many early explorers lost their lives and their ships trying to reach Wrangel, even during summer.

Our July 2007 voyage was different—no ice, only a couple of polar bears, and plenty of musk-ox, walrus, and whales. The Arctic sea ice retreated farther north than ever recorded before. En route we heard from native Siberians that Pacific sharks and killer whales had appeared, and that polar bears were wandering around the Siberian mainland stalking reindeer. "We've not seen these things before," one of them reported.

As an archaeologist I am used to looking deeper into the past than people's memories—or even recorded history. Archaeology gives us a way to study history hun-



The walrus' habitat is melting under them as the Arctic ice cover shrinks.

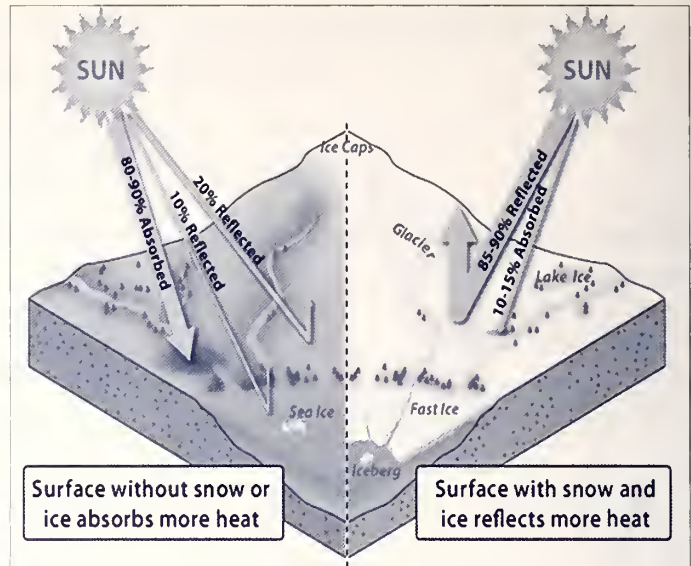
dreds, thousands, and even millions of years ago. Our studies show that climate change has been a constant companion of Arctic life for thousands of years. The questions we ask include:

- How has the Arctic changed over both long and shorter periods of time?
- How has climate change influenced Arctic and world history?
- What can we learn from Arctic history to help us in the future?

### The Arctic Climate Cycle

The Arctic climate cycle can be broadly explained by a relatively simple “albedo model.” Cooling climate produces more sea ice and snow, expanding the ice-covered portion of the earth. Since snow and ice are white, they reflect more solar energy back into space, multiplying the original cooling in a process called climate ‘feed-back.’ As the North cools, polar currents export more cold water and ice into southern waters, cooling the Subarctic and Temperate coastal zones. In places like Labrador on North America’s East Coast, the extension of the Labrador Current brings Arctic pack ice farther south, and with it comes seals, walruses, polar bears, and other northern animals. Growing seasons become shorter; the northern forest limit moves south and temperate species like deer and moose are replaced by caribou and seals. In an Ice Age, continental ice sheets and Arctic conditions advance deep into the temperate zones of Canada and the northern United States.

Warming climates have the opposite result. As land ice, snow, and ocean pack ice melt, the darker surfaces of land and water that are uncovered absorb solar energy, multiplying the warming effect. Glaciers, winter snow cover, and forest and animal boundaries move north and the Arctic realm gets smaller. Of course people and cultures adapted to the tundra and northern seas or to the warmer forest zones react in similar fashion. We would expect Arctic peoples to expand south during cooling phases and retreat north again during warm phases. Forest people would react in the opposite manner, moving north as the forest boundary moves north, and retreating when ice retreats southward in cool peri-



Albedo processes for Arctic summer and winter.

ods. In reality, this northern climate-culture interaction model is not quite so simple because warming and cooling phases vary in intensity, duration, and even by region.

### The Siberian Paleolithic and Mesolithic

During the first 2.3 million years of human history, cycles of cold glacial periods alternated with warmer interglacials like the warm period we have been in for the past 10,000 years. Geologically the icy period is known as the Pleistocene. Ice covered Europe and North America, pushing animals—and people—thousands of miles south of the northern limits they had reached during the warm periods. In spite of these cold periods, culture and art flourished along the glaciers’ southern margins. Cold is not necessarily ‘bad’—only if you do not know how to deal with it.

When the present Holocene interglacial started, Eurasia warmed quickly, especially in Siberia where there were no ice sheets. Melting glaciers caused oceans to rise to near their present levels between 12,000-8,000 years ago. At the end of this period—a time that was warmer than it has ever been since—people settled on tiny Zhokhov Island, 300 miles north of the Siberian coast. For many years they lived in driftwood houses eating caribou and polar bears. However, as sea levels continued to rise, people eventually had to retreat far to the south.

When the sea level was lower, 500 miles east, Wrangel Island, like Zhokhov Island, was also part of the Siberian

mainland. Recently Russian scientists found mammoth remains on Wrangel Island. These tundra-dwelling Ice Age elephants were nearly the size of modern elephants. In addition to large mammoths, scientists found bones of much smaller mammoths. Most of the large animals dated 10-20,000 years old, but the small mammoths—barely taller than a large dog—were only 5000 years old. Soon after that, they became extinct, outlasting all other mammoths on earth by 5000 years. Paleontologists believe that the Wrangel Island mammoths grew progressively smaller after the sea level rose and isolated Wrangel from the mainland. Humans arrived on Wrangel about the same time, raising an interesting question: What finally killed off the Wrangel mammoths—climate, or humans? We still don't know!

### Paleoindians Arrive in America

At the end of the Pleistocene, 12,000 years ago, the northern hemisphere warmed rapidly. Ice sheets melted, vegetation zones moved north, and sea levels rose. These climate-related changes coincided with the first people arriving in America. Migrating across the land bridge between Siberia and Alaska, or—equally possible—traveling over the ice, or voyaging by boat, these early Siberians spread south along the Pacific coast or through an inland ice-free corridor in western Canada. The earliest identifiable culture in North America is called Clovis, after the archaeological site that produced the first distinctive fluted spear point that defines these people's culture. Within 1000 years Clovis people had spread throughout North and South America, creating the foundation for all later cultures of the New World, except in the Arctic.



Excavations at 8,000 year old Zhokhov Island site in the Siberian Arctic. Photo courtesy William Fitzhugh.

### Paleoeskimos Arrive and Spread

About 5000 years ago a different Siberian group looking more Mongoloid than their Paleoindian predecessors reached Bering Strait. Their culture included use of tiny blades and delicately chipped arrow points. They also used a simple type of clay pottery and burned seal oil in their lamps. By 5000 years ago this Siberian 'Neolithic' culture had become established in western Alaska. These early Paleoeskimos had learned how to inhabit the tree-less Arctic tundra along the coast of Arctic Alaska north of the forest boundary.

During a warming trend between 4500-4000 years ago, Paleoeskimos spread into the previously unoccupied North American Arctic. Within a few hundred years they had settled all of northern Canada, the entire Greenland coast, and northern Labrador, living in small tents, hunting caribou, musk-ox, and seals with spears and simple harpoons. These early Paleoeskimos were more accustomed to hunting on land than at sea and heated their tents and food with driftwood or animal bones.

When Paleoeskimos reached Labrador they found they were no longer the only people there. The early Holocene's warm climate had brought forests to Labrador, along with Maritime Archaic Indians, the descendants of northeastern Paleoindians. After the disappearance of mammoths and other Ice Age game, Paleoindians had become adept hunters of seals, swordfish, walruses, and small whales along the northeastern coasts from Maine to Labrador. For 5000 years their culture thrived and in some respects resembled the maritime Indians of Alaska and British Columbia. Large longhouse sites, burial mounds and cemeteries filled with exotic grave goods reveal a rich and complex maritime culture with trade connections from Maine to Labrador.

But the Maritime Archaic culture was forest-based and even its maritime hunting depended on wooden or birch bark boats, not the skin-covered kayaks used by Arctic peoples. Instead of sea-mammal oil lamps they used open wood fires. By 3500 years ago, when climates turned cold and the treeline began to recede south, Maritime Archaic people faced stormier seas, longer winters, more Arctic pack ice, and shorter and cooler summers—as well as something else they had never encountered before—Eskimos, or Inuit as they are called today.

The same conditions that made life more difficult for Maritime Archaic Indians were advantageous for Paleoeskimos. As climate cooled during the next 2000 years, Maritime Archaic Indians withdrew to the south, closely followed by Paleoeskimos who advanced into the former Indian territories in Labrador, Newfoundland, and even the Gulf of St. Lawrence. This early Eskimo advance reached its southernmost limit in the Gulf during the cold period between 500 BC to 1 A.D.

### Humanity Goes Global

Our final examples of Arctic climate impacts come from the last 1000 years and the meeting of two cultures—Europeans and Inuit—in northeastern North America. It turns out that their arrivals had everything to do with climate change—in this case, a warming climate. The first Europeans to reach North America—the Vikings—and their encounter there with the Inuit can also be viewed as the last chapter in humanity's great migration out of Africa, in opposite directions, around the earth, creating the global cultural world we know today.

### The World Warms: Vikings and Inuit

The Danish and Norwegian Vikings who began moving west across the North Atlantic about A.D. 800 were spurred by warming climate and superb ships. Within 200 years Vikings had colonized Shetland Islands, the Faeros, Iceland, and eventually Greenland, which Erik the Red settled in 985. By 1000 Leif Eriksson and other Greenland and Icelandic Norse had reached Newfoundland and the Gulf of St. Lawrence, where they established a colony in "Vinland." In the 1960s "Vinland" was discovered in northern Newfoundland at a site called L'Anse aux Meadows. Its three sod houses and shops conform to the Viking saga accounts and date exactly to A.D. 1000. But the Norse soon abandoned this site and the Vinland region probably due to Indian and Eskimo attacks and the high cost of maintaining a colony so far from Greenland and Iceland. Nevertheless a Norwegian penny dating to 1085 found in an Indian site on the Maine coast shows that Greenland or Iceland Norse continued to voyage to the American mainland, obtaining timber for building boats.



*Thule (Eskimo) carving of a Norseman seen in Hudson Strait ca. A.D. 1300. Courtesy Canadian Museum of Civilization.*

Norse expansion to North America was facilitated by the Medieval Warm Period of A.D. 800-1300 indicated by advancing northern forests, melting Alpine glaciers, sea ice reduction, and increased grain and grape harvests in Europe. Warming made Viking voyages safer and Viking farms more productive, and commerce with Europe flourished. Greenland's products included wool, textiles, walrus ivory, as well as elite items like falcons and narwhal (i.e. "unicorn") tusks. At its peak in the 1200s, Norse Greenland was a thriving European colony of 5000 people with many Christian churches and its own Catholic bishop.

However, soon after the Inuit became established in the Eastern Arctic, around A.D. 1200, the weather turned colder; by 1500 the region had entered a phase known as the Little Ice Age. European historical records note crop failures, poor harvests, and increasing North Atlantic ice that endangered shipping. In Greenland, the Norse colonies began to suffer as their animals declined and sea ice and storms restricted European contact. By 1350 the Norse Western Settlement was abandoned; in the early 1400s the larger Eastern Settlement disappeared. By 1450 Inuit groups were advancing south, occupying former Norse lands, thriving there as sea mammal hunters and fishermen where the agricultural Norse had starved. Climates that once favored the Norse now required an entirely different way of life, one of fishing and hunting, which the now Christian Norse considered a barbarian way of life.

By 1600 the Inuit were raiding the European whaling and fishing stations in Newfoundland and the Gulf of St. Lawrence. But the story of these Arctic people, the southernmost Inuit in the world, did not end happily. Historical reports indicate that the Inuit who moved here during the cool 17<sup>th</sup> and early 18<sup>th</sup> centuries were killed or driven back north by Indians allied with French and English settlers. By the mid-1700s all Inuit had disappeared from southern Labrador and Quebec and were located where they

live today, hundreds of miles to the north in central and northern Labrador.

This last chapter in our story illustrates the complexity of interpreting culture history from any single point of view. Yes, Inuit movements into southern Greenland, Labrador, and the Gulf of St. Lawrence were facilitated by the expansion of Arctic pack ice and marine mammals during the Little Ice Age. The expansion of the Arctic marine niche provided migration incentive for a people already adapted to these conditions.

Yet other factors must have been involved—initially a desire to obtain practical European objects like sturdy wood boats and iron, but later, items of social value like glass beads, textiles, and ceramics, things Inuit could live without, but nevertheless desperately wanted. Untangling the various factors in addition to environment and subsistence requires consideration of such influences as technology transfer, religious conversion, culture contact, prestige, and inter-group marrying. THIS is what makes archaeology so fascinating and complex, but ultimately the only way to understand the prehistoric past.

### Archaeology for the Future?

Arctic archaeology demonstrates that today's changes are partly a result of natural climatic cycles that the earth has undergone for eons, often having great impact on human cultures. Some peoples have prospered while others have disappeared. For the northern archaeologist today, one of the most severe problems is the loss of sites to coastal erosion as a result of rising sea levels. However, this is nothing compared to the far more serious societal problem of whole villages being eroded by the rising sea. Today, technology provides some tools to combat these threats, but the first order of business is to reduce the human component in global warming.

The human and environmental impacts of the changing Arctic were explored in a 2007 exhibition at the Smithsonian's National Museum of Natural History called *Arctic: A Friend Acting Strangely*. This exhibit can be viewed on the web at ([www.forces.si.edu/arctic](http://www.forces.si.edu/arctic))

Lessons from these northern studies show that: (1) Change is inevitable—but we can influence its outcome; (2) Listen to elders; (3) Adapt, because we probably can't force the system; (4) Understand the science, because it's

more important than ever before; (5) Learn lessons from the past. One lesson from Norse Greenland is the danger of over-exploiting resources. What may work in 'good times' may fail catastrophically when the climate turns the other way, and finally, (6) Don't make things worse—nature provides challenge enough.

### References

- Diamond, Jared. 2005. *Collapse: How Societies Choose to Fail or Succeed*. Viking Press.
- Fitzhugh, Willam W. 2008. Arctic and Circumpolar Regions. In Deborah M. Pearsall, ed., *Encyclopedia of Archaeology*, pp. 247-271. Academic Press/Elsevier.
- Fitzhugh, Willam W. 2002. Yamal to Greenland: Global Connections in Circumpolar Archaeology. In Barry Cunliffe, Wendy Davies, and Colin Renfrew, eds., *Archaeology: the Widening Debate*, pp. 91-144. Oxford University Press.
- Fitzhugh, Willam W., and Elizabeth Ward, eds. 2000. *Vikings: the North Atlantic Saga*. Smithsonian Institution Press.
- Hoffecker, John F. 2005. *A Prehistory of the North: Human Settlement of the Higher Latitudes*. Rutgers University Press.
- McGhee, Robert. 2007. *The Last Imaginary Place: A Human History of the Arctic World*. University of Chicago Press.
- William W. Fitzhugh is the Director of the Arctic Studies Center, Department of Anthropology, National Museum of Natural History.*



Saami (Lapp) reindeer-herder relaxes with new transport vehicle. Photo courtesy Bryan and Cherry Alexander.