

Rapid Sea Level Rise in the Arctic Ocean May Alter Views of Human Migration

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Scientists have found new evidence that the Bering Strait near Alaska flooded into the Arctic Ocean about 11,000 years ago, about 1,000 years earlier than widely believed, closing off the land bridge thought to be the major route for human migration from Asia to the Americas.

Knowledge of climate change and sea level rise in the Arctic Ocean has been limited because sediment cores collected from the floor of the Arctic Ocean have been taken from locations where sediment has accumulated only about one centimeter (less than one-half inch) every 1,000 years. Such slow rates make it impossible for scientists to distinguish between one millennium and the next.

In a paper in the October issue of *Geology* magazine, lead author Lloyd Keigwin of the Woods Hole Oceanographic Institution (WHOI) and colleagues from WHOI, Neal Driscoll from Scripps Institution of Oceanography at UC San Diego and Julie Brigham-Grette of the University of Massachusetts, Amherst report results from three new core sites north and west of Alaska in the Chukchi Sea. At these locations, accumulation of sediment is more than 100 times greater than at previous sites, allowing identification of climate changes that were previously unseen. During the expeditions, the researchers extracted the longest piston core ever obtained from the Arctic region.

The Chukchi Sea in the Arctic Ocean covers part of the continental shelf exposed when sea level fell during the last glacial maximum, about 20,000 years ago. When sea level was low the climate in the area was

more continental across a large area of the Arctic, and when sea level was high the flow of water from the North Pacific Ocean through the Bering Strait between Russia and Alaska, where the sill depth is 50 meters (165 feet), affected the freshwater and nutrient balance of the Arctic and the North Atlantic. The traditional view that humans and fauna migrated across the exposed shelf before flooding has been challenged by recent studies suggesting a maritime route for migration.

“Although we have only a few cores, this is the first evidence of flooding of the Chukchi Sea by 11,000 years ago, at least 1,000 years before previously thought,” Keigwin said. “The new data are also consistent with data from other recent studies, and show potential for developing ocean and climate histories of this region.”

Keigwin, a senior scientist in the WHOI Geology and Geophysics Department, and colleagues surveyed and collected cores from many locations in the Bering and Chukchi Seas in 2002 to study climate and sea level. Cores from these sites reveal that rising sea level flooded the Bering Strait about 12,000 years before present. Since 7,000 years ago, very little sediment has eroded from Alaska compared to before that time, and beginning about 4,000 years ago there has been a decline in biological productivity that may have resulted from increased sea ice or decreased nutrient supply from the Bering Strait.

“Our research suggests there was more ice present in the region during the last glacial period than previously thought,” said co-author Neal Driscoll, a professor in the Geosciences Research Division at Scripps Oceanography. “Evidence of an increased sedimentation rate, along with deep valleys cut into the continental shelf when sea level was rising rapidly during the deglaciation, helped guide us to that result. Additional ice in this region of the Arctic is an important discovery, and is significant in helping our understanding of climate models, circulation and precipitation during glacial periods.”

Cores from Hope Valley on the Chukchi shelf and Barrow Canyon off Point Barrow, Alaska contain high resolution records of climate, sea-level change and the history of the sediment source. The researchers sampled the cores to identify skeletons of animals, known as foraminifera, that can be traced to specific water and atmospheric temperatures. The samples were also radiocarbon dated at the National Ocean Sciences Accelerator Mass Spectrometry facility at WHOI.

The cores were collected during a cruise in 2002 on the U.S. Coast Guard cutter Healy.

Source: Woods Hole Oceanographic Institution

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