

Bering Land Bridge formed surprisingly late during last ice age, study finds

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Frozen Bering Strait near Nome/Alaska. Credit: [Crissi](#)/Wikimedia Commons, [CC BY-SA](#)

A new study that reconstructs the history of sea level at the Bering Strait shows that the Bering Land Bridge connecting Asia to North America

did not emerge until around 35,700 years ago, less than 10,000 years before the height of the last ice age (known as the Last Glacial Maximum).

The new findings, published the week of December 26 in *Proceedings of the National Academy of Sciences*, indicate that the growth of the ice sheets—and the resulting drop in [sea level](#)—occurred surprisingly quickly and much later in the glacial cycle than previous studies had suggested.

"It means that more than 50% of the global ice volume at the Last Glacial Maximum grew after 46,000 years ago," said Tamara Pico, assistant professor of Earth and planetary sciences at UC Santa Cruz and a corresponding author of the paper. "This is important for understanding the feedbacks between climate and ice sheets, because it implies that there was a substantial delay in the development of ice sheets after [global temperatures](#) dropped."

Global sea levels drop during ice ages as more and more of Earth's water gets locked up in massive ice sheets, but the timing of these processes has been hard to pin down. During the Last Glacial Maximum, which lasted from about 26,500 to 19,000 years ago, ice sheets covered large areas of North America. Dramatically lower sea levels uncovered a vast land area known as Beringia that extended from Siberia to Alaska and supported herds of horses, mammoths, and other Pleistocene fauna. As the ice sheets melted, the Bering Strait became flooded again around 13,000 to 11,000 years ago.

The new findings are interesting in relation to [human migration](#) because they shorten the time between the opening of the land bridge and the arrival of humans in the Americas. The timing of human migration into North America remains unresolved, but some studies suggest people may have lived in Beringia throughout the height of the ice age.

"People may have started going across as soon as the land bridge formed," Pico said.

The new study used an analysis of nitrogen isotopes in seafloor sediments to determine when the Bering Strait was flooded during the past 46,000 years, allowing Pacific Ocean water to flow into the Arctic Ocean. First author Jesse Farmer at Princeton University led the isotope analysis, measuring nitrogen isotope ratios in the remains of marine plankton preserved in sediment cores collected from the seafloor at three locations in the western Arctic Ocean. Because of differences in the nitrogen composition of Pacific and Arctic waters, Farmer was able to identify a nitrogen isotope signature indicating when Pacific water flowed into the Arctic.

Pico, whose expertise is in sea level modeling, then compared Farmer's results with sea level models based on different scenarios for the growth of the ice sheets.

"The exciting thing to me is that this provides a completely independent constraint on global sea level during this time period," Pico said. "Some of the ice sheet histories that have been proposed differ by quite a lot, and we were able to look at what the predicted sea level would be at the Bering Strait and see which ones are consistent with the nitrogen data."

The results support recent studies indicating that [global sea levels](#) were much higher prior to the Last Glacial Maximum than previous estimates had suggested, she said. Average global sea level during the Last Glacial Maximum was about 130 meters (425 feet) lower than today. The actual sea level at a particular site such as the Bering Strait, however, depends on factors such as the deformation of the Earth's crust by the weight of the ice sheets.

"It's like punching down on bread dough—the crust sinks under the ice

and rises up around the edges," Pico said. "Also, the ice sheets are so massive they have gravitational effects on the water. I model those processes to see how sea level would vary around the world and, in this case, to look at the Bering Strait."

The findings imply a complicated relationship between climate and global ice volume and suggest new avenues for investigating the mechanisms underlying glacial cycles.

More information: Farmer, Jesse R. et al, The Bering Strait was flooded 10,000 years before the Last Glacial Maximum, *Proceedings of the National Academy of Sciences* (2022). [DOI: 10.1073/pnas.2206742119](https://doi.org/10.1073/pnas.2206742119).

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