

Scientists discover why is the North Pole frozen

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Ice has been building up in the Arctic for 2.7 million years. Until now, no-one has been able to prove what mechanism brought about this accumulation of ice. However, a team of international scientists led by Antoni Rosell, a researcher for the Universitat Autònoma de Barcelona, and Gerald H. Haug of the Potsdam Institute for Climate Impact Research (Germany) has discovered the mechanism that set off the accumulation of ice.

A sudden fall in average world temperatures 2.7 million years ago caused the Arctic Ocean to freeze and Europe and North America to become covered in ice. The reason seems obvious: the cold temperatures caused ice to build up. But the drop in average temperatures is not enough to explain why so much ice built up and has remained to this day. For many years, scientists have been speculating on what caused this accumulation of ice and have proposed many theories.

A team of international scientists led by Antoni Rosell, a researcher for the Catalan Institute for Research and Advanced Studies and the Institute of Environmental Science and Technology at the Universitat Autònoma de Barcelona, and Gerald H. Haug of the Potsdam Institute for Climate Impact Research (Germany) has discovered the mechanism that set off the accumulation of ice. The researchers have worked mainly with existing data from the remains of marine organisms that have built up over the years, as well as with climate models.

According to the research, the most important change during the period

was a 7°C (13°F) increase in the difference between summer and winter temperatures within just a few centuries. The summers became warmer and the winters cooler, causing more water to evaporate from the sea into the atmosphere during the summer. The air became more humid and snowfall increased. When Winter set in, the sharp decrease in temperatures enabled ice to build up.

But what brought about this difference in temperatures? The researchers are the first to find evidence showing that this was caused by the stratification of ocean water, due to an increase in freshwater. This means that water mixed less than previously, forming layers of different densities in different strata and at different depths. When spring came, the layers closest to the surface began to heat up. Since the water did not mix, the temperature of those layers continued to rise, and increasing amounts of water evaporated. During the summer months, this effect intensified, as higher temperatures increase stratification; in winter, however, the water began mixing again, and temperatures dropped more than in previous years.

The authors of the research have reconstructed the seasonal changes in temperature in the North Pacific by reinterpreting the data obtained from analysing the remains of marine organisms and by checking these temperatures using a climate model. This reconstruction shows how the ocean, in terms of its surface temperature and its size during different seasons, and water evaporation from the sea can generate significant general changes to the climate, as well as more intense glacial cycles and a general cooling of the planet's temperatures.

According to Antoni Rosell, "through this research we can understand in greater detail why climate change occurs, and more specifically, the role of the ocean in producing climate change. This information will improve climate models used to predict how today's climate will change in the future".

Source: Universitat Autònoma de Barcelona

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