New climate history adds to understanding of recent Antarctic Peninsula warming

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Results published this week by a team of polar scientists from Britain, Australia and France adds a new dimension to our understanding of Antarctic Peninsula climate change and the likely causes of the break-up of its ice shelves.

The first comprehensive reconstruction of a 15,000 year climate history from an ice core collected from James Ross Island in the Antarctic Peninsula region is reported this week in the journal *Nature*. The scientists reveal that the rapid warming of this region over the last 100 -years has been unprecedented and came on top of a slower natural climate warming that began around 600 years ago. These centuries of continual warming meant that by the time the unusual recent warming began, the Antarctic Peninsula ice shelves were already poised for the dramatic break-ups observed from the 1990's onwards.

The Antarctic Peninsula is one of the fastest warming places on Earth – average temperatures from meteorological stations near James Ross Island have risen by nearly 2°C in the past 50 years.

Lead author Dr Robert Mulvaney OBE, from British Antarctic Survey (BAS) says, "This is a really interesting result. One of the key questions that scientists are attempting to answer is how much of the Earth's recently observed warming is due to natural climate variation and how much can be attributed to human activity since the industrial revolution. The only way we can do this is by looking back through time when the Earth experienced ice ages and warm periods, and ice cores are a very

good method for doing this."

Dr Mulvaney continues, "We know that something unusual is happening in the Antarctic Peninsula. To find out more we mounted a scientific expedition to collect an ice core from James Ross Island – on the northernmost tip of the Peninsula. Within the 364m long core are layers of snow that fell every year for the last 50,000 years. Sophisticated chemical analysis – at BAS and the NERC Isotope Geosciences Laboratory (part of British Geological Survey) – was used to re-create a temperature record over this period.

"For this study we looked in detail at the last 15,000 years – from the time when the Earth emerged from the last ice age and entered into the current warm period. What we see in the ice core temperature record is that the Antarctic Peninsula warmed by about 6°C as it emerged from the last ice age. By 11,000 years ago the temperature had risen to about 1.3°C warmer than today's average and other research indicates that the Antarctic Peninsula ice sheet was shrinking at this time and some of the surrounding ice shelves retreated. The local climate then cooled in two stages, reaching a minimum about 600 years ago. The ice shelves on the northern Antarctic Peninsula expanded during this cooling. Approximately 600 years ago the local temperature started to warm again, followed by a more rapid warming in the last 50-100 years that coincides with present-day disintegration of ice shelves and glacier retreat."

Co-Author Dr Nerilie Abram formerly from British Antarctic Survey and now with the Research School of Earth Sciences, at The Australian National University says, "The centuries of ongoing warming have meant that marginal ice shelves on the northern Peninsula were poised for the succession of collapses that we have witnessed over the last two decades. And if this rapid warming that we are now seeing continues, we can expect that ice shelves further south along the Peninsula that have been

stable for thousands of years will also become vulnerable."

Olivier Alemany, from the French Laboratoire de Glaciologie et Géophysique de l'Environnement was part of the expedition. He says, "The international polar science community has collected and analysed ice cores from Antarctica and Greenland as part of an effort to reconstruct the Earth's past climate and atmosphere. Our team wanted to understand how the recent warming and the loss of ice shelves compared to the longer term climate trends in the region."

This research makes a significant contribution to the understanding of the role that Antarctica's ice sheets play in influencing future climate and sea-level rise. It was funded by NERC (Natural Environment Research Council).

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