Antarctic sea temperatures cooled in Holocene but now rising: study

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(PhysOrg.com) -- A new study of an ocean sediment core taken from deep water off the coast of the western Antarctic Peninsula is beginning to fill in some of the gaps in our knowledge of climate variability in the region.

The 43-meter-long marine sediment core was analyzed by Dr Amelia Shevenell, lecturer in Geography and Earth Sciences at University College London, and her colleagues. Dr Shevenell said good records of sea surface temperatures near the Antarctic ice sheet have not been available up to now, but the present research is starting to fill in the gaps.

The biological material in the sediments within the core gives a continuous profile of sea surface temperatures during the Holocene

period, which extends back some 12,000 years from the present. This period has been characterized by a warm and relatively stable climate.

The core indicates that surface ocean temperatures at the margins of the peninsula cooled by 3-4 °C over the past 12,000 years, which follows the decline of spring incoming solar radiation (insolation) in the area during that period due to shifts in the Earth's orbit.

The study also found the cooling is now being offset by the current climate change, and sea temperatures have been rising at around the same rate as land temperatures in the Antarctic, estimated at around 3-4 °C per century.

Similarities between sea surface temperatures derived from the sediment core, data on the Southern Hemisphere westerly wind reconstructions, and the El Niño southern oscillation, suggest the connections between the tropical Pacific Ocean and the western Antarctic Peninsula have strengthened within the last 2,000 years of the Holocene.

The authors of the paper, published in the journal *Nature*, say that during the Holocene period temperatures in the Southern Ocean at the margins of the western Antarctic Peninsula have been tied to changes in the position of the westerly winds.

Current climate models predict more frequent and stronger El Niño - La Niña cycles, which could weaken the ice shelves along the peninsula and make them more likely to disintegrate. A melting of the ice shelves could raise sea levels, but Dr Shevenell said it is not possible to predict how high temperatures would have to be to trigger widespread collapses of the ice shelves.

More information: Holocene Southern Ocean surface temperature variability west of the Antarctic Peninsula, by A. E. Shevenell et al.,

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