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Plio-Pleistocene evolution of the southern Victoria Land climate system as seen in New Harbor drill cores

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The Taylor Valley (DVDP-10, -11) and Ferrar Fiord (CIROS-2) drill cores offer a window into the history of Southern Victoria Land glaciers and the Antarctic climate system during the late- Neogene. Here we present new paleomagnetic studies from these drill cores which date five phases of sedimentation in the Taylor/Ferrar fiords and reveal a climate modulation of magnetic mineralogy in southern Victoria Land during the late Neogene.

Magnetostratigraphies were constructed from stepwise AF and/or thermal demagnetisation of discrete specimens from drill cores. Correlation of magnetostratigraphies with the magnetic polarity timescale was guided by biostratigraphic and radiometric constraints. Environmental magnetic studies were conducted to determine changes in concentration, gainsize and magnetic mineralogy through time. A parallel rock magnetic study was also conducted of regional basement rocks to quantify the source of magnetic minerals.

The new ages models and environmental magnetic records indicate that during the latest Miocene - early Pliocene, wet based glaciers filled the Taylor and Ferrar fiords and that glaciers retreated during the Pliocene warm period leaving open marine conditions and deep fiords (>300 m). Magnetic minerals in these sediments are variably oxidised indicating terrestrial soil formation and probably warmer and wetter conditions at a time when the Ross Sea was free of ice and sea surface temperatures were 5°C warmer than today.

We recognise the first significant cooling in DVDP-11 after 2.6 Ma by a shift to current winnowed sediments sourced from the Ross Sea. After 1.7 Ma sediments are almost exclusively lacustrine and were deposited in ice dammed lakes which formed when West Antarctic ice expanded across the Ross Embayment and abutted the Transantarctic Mountains. Magnetic mineralogy after $\sim$2.6 Ma is dominated by a ubiquitous, paramagnetic component which coincides with the shift from warmer/wetter, sub-polar conditions to dry, polar dominated conditions.