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ICE-CORE-BASED ANTARCTIC TEMPERATURE RECONSTRUCTION

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Most of what has been said about modern Antarctic climate change is based on studies of meteorological observations that extend back the 1950s. Most attention to Antarctic ice core records is focused on the timescale of glacial-interglacial cycles. Relatively little attention has been paid to using ice core records to directly extend the instrumental record. New, high-resolution ice core records obtained by the International Trans Antarctic Scientific Expedition (ITASE) and by Australian projects (mainly at Law Dome) are available for reconstruction of Antarctic climate. Here, we focus on the del 18-O and del D records from ITASE, Law Dome, and other cores to reconstruct Antarctic temperature back to 1800 AD. It is shown that the particular records do not relate to temperature variability on the Antarctic Peninsula, but they do correlate quite well with temperatures over the Antarctic continent, as depicted in new meteorological datasets spanning the last 20-40 years. Therefore, the ice core records can be calibrated with conventional paleoclimate/statistical methods, and used in a reconstruction. The reconstruction shows the recent continental cooling (namely, several cold years in the 1990s) that is almost entirely attributable to the Southern Hemisphere Annular Mode (SAM), and it also shows a modest longer-term warming, consistent with instrumental records from other regions of the Southern Hemisphere. However the Antarctic warming indicated by our reconstruction is somewhat less than that depicted by current generation climate models. The interannual to decadal scale variability of reconstructed continental temperature exhibits a SAM-like relationship with the instrumental Orcadas temperature and pressure records back to 1904.