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A high resolution stable isotope record from central West Antarctica covering the last 62,000 years

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Drilling of the West Antarctic Ice Sheet (WAIS) Divide ice core has been completed to a depth of 3400 m. WAIS Divide (79°28'S, 112°05' W) is located about 160 km from the location of the well-known Byrd ice core record (80°S, 120°W). We present the stable isotope (δD, δ^{18}O, deuterium excess) record from the core, measured using both discrete samples and continuous flow, using the annually-layer-counted timescale reported by Fudge et al. (this meeting). WAIS Divide is the only ice core record from Antarctica that has annual resolution through at least the last 30,000 years. Although the low frequency variations in WAIS Divide δ^{18}O are similar to those from Byrd, there are important differences, owing in part to the non-continuous nature of the Byrd record, which results in aliasing of high frequencies. Furthermore, the significantly higher resolution and more precise dating of the WAIS Divide record reveal a number of interesting and previously unrecognized climatic features. For example, while the Antarctic Cold Reversal (ACR) is similar to that seen in other cores, there is an abrupt isotope increase in the middle of the ACR that begins at 12.88 ka (BP 1950) apparently coincident with the Younger Dryas cooling. The beginning of Antarctic Isotope Maximum 2 (AIM2) is much more abrupt (>2 ‰ δ^{18}O over 100 years, beginning about 24.5 ka) than previously recognized. There is also an isotope decline and then rapid increase at 8 ka, which appears to be the West Antarctic expression of the 8.2 ka abrupt climate change event in Greenland. In the last 2000 years, WAIS Divide shows a long term decline in δ^{18}O similar to that in most East Antarctic records, consistent with long term cooling due to Milankovitch forcing. Superimposed on the long term trend are isotope maxima that are probably associated with tropical Pacific ENSO activity. The most significant of these maxima in the last 1000 years occurred in the decade of the 1990s, coincident with significant increases in local ice sheet temperature and declining sea ice in the Amundsen Sea. The unusual conditions in West Antarctica in the 1990s can be attributed to comparably unusual conditions in the central tropical Pacific.