

1500 Years of Annual Climate and Environmental Variability as Recorded in Bona-Churchill (Alaska) Ice Cores

Thompson, L. G. ; Mosley-Thompson, E. S. ; Zagorodnov, V. ; Davis, M. E. ; Mashiotta, T. A. ; Lin, P.


In 2003, six ice cores measuring 10.5, 11.5, 11.8, 12.4, 114 and 460 meters were recovered from the col between Mount Bona and Mount Churchill (61° 24'N; 141° 42'W; 4420 m asl). These cores have been analyzed for stable isotopic ratios, insoluble dust content and concentrations of major chemical species. Total Beta radioactivity was measured in the upper sections. The 460-meter core, extending to bedrock, captured the entire depositional record at this site where ice temperatures ranged from -24° C at 10 meters to -19.8° C at the ice/bedrock contact. The shallow cores allow assessment of surface processes under modern meteorological conditions while the deep core offers a ~1500-year climate and environmental perspective. The average annual net balance is ~1000 mm of water equivalent and distinct annual signals in dust and calcium concentrations along with $\delta^{18}\text{O}$ allow annual resolution over most of the core. The excess sulfate record reflects many known large volcanic eruptions such as Katmai, Krakatau, Tambora, and Laki which allow validation of the time scale in the upper part of the core. The lower part of the core yields a history of earlier volcanic events. The 460-m Bona-Churchill ice core provides a detailed history of the 'Little Ice Age' and medieval warm periods for southeastern Alaska. The source of the White River Ash will be discussed in light of the evidence from this core. The 460-m core also provides a long-term history of the dust fall that originates in north-central China. The annual ice core-derived climate records from southeastern Alaska will facilitate an investigation of the likelihood that the high resolution 1500-year record from the tropical Quelccaya Ice Cap (Peru) preserves a history of the variability of both the PDO and the Aleutian Low.

Publication: American Geophysical Union, Fall Meeting 2004, abstract id. PP23C-05

Pub Date: December 2004

Bibcode: 2004AGUFMPP23C..05T

Keywords: 9315 Arctic region; 3344 Paleoclimatology; 1827 Glaciology (1863); 1600 GLOBAL CHANGE (New category); 1620 Climate dynamics (3309)

 Feedback/Corrections?