were measured down to a depth of 1278 m; below this depth transformation of air bubbles to transparent air hydrate inclusions occurs (Shoji and Langway, 1987) and the megascopic melt features become obscure. The melt-feature data extends back to 1883 B.C. or approximately 3900 years B.P., based on the accurate time scale of continuous $\delta^{18}O$ measurements (Dansgaard and others, 1985) For the entire core profile investigated the annual melt percentage is 5.7. Individual melt features range in thickness from 1 mm to 100 mm. A mean value for melt-feature thickness was calculated for continuous 30-year time intervals to consider the general long-term summer temperature trends with corrections made for progressive annual accumulation layer thinning due to ice flow.

Since the AMP parameter includes noise from radiation and wind crusts it appears that the simple average of melt-feature thickness per longer time-units is a better indication of air temperature paleodata. The average melt-feature thickness is 1.2 cm. The complete curve obtained shows a higher thickness value of about 1.5 cm for the period 1800 B.C. to 1300 B.C. A lower, almost constant thickness value of about 1 cm is shown for the period 1000 B.C. to 1800 A.D., with a slight reduction in thickness recorded around 200 B.C., 400 A.D. and 1600 A.D. These long-term trends are coherent with those recorded in the $\delta^{18}O$ profile for the same ice core.

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ATMOSPHERIC CHEMISTRY CHANGES OVER THE LAST CLIMATIC CYCLE (180 000 YEARS) INFERRED FROM THE VOSTOK (ANTARCTICA) ICE-CORE STUDY

(Abstract)

by

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A 2 200 m-deep ice core from Vostok Station (East Antarctica) has been used for a comprehensive study of a series of ions (Na^+, NH_4^+, K^+, H^+, Ca^{2+}, Mg^{2+}, Cl^-, F^-, NO_3^- and SO_4^{2-}) originating from impurities deposited over the whole last climatic cycle (180 000 years) as depicted from the isotopic composition of the ice.

Concentration profiles confirm that both marine and terrestrial aerosol inputs were higher (up to five and 30 times the Holocene values respectively) during cold climatic conditions. Such large variations of marine and terrestrial aerosol concentrations measured in ice mainly reflect global (source strength and atmospheric transport efficiency) changes, and to a lesser extent local (deposition) changes.

As opposed to these primary aerosols, secondary aerosols or gases (HNO_3, HCl) exhibit more moderate variations. Finally, variations of other minor ions such as NH_4^+ provide information on the capacity of ammonia to neutralize the natural acidity of the past background atmosphere.

Spectral analyses performed on our chemical profiles (200 samples) exhibit several specific periodicities (around 20 and 40 k year) close to the Earth's orbit tilt and precession frequencies which are discussed in terms of atmospheric response to climatic fluctuations.

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