Geophysical Research Abstracts, Vol. 8, 07101, 2006
SRef-ID: 1607-7962/gra/EGU06-A-07101

Sulphate as an accumulation-rate proxy in the EPICA Dome C ice core. Features and differences with respect to accumulation rate from isotopic stratigraphy.

R. Udisti (1), S. Becagli (1), E. Castellano (1), O. Cattani (2), M. Hansson (3), J. Jouzel (2), F. Parrenin (2), U. Ruth (4), J. Schwander (5), M. Severi (1), B. Stenni (6), R. Traversi (1), E. Wolff (7).

(1) Dept. of Chemistry, University of Florence, Italy, (2) LSCE, UMR CEA-CNRS, Gif-sur-Yvette, France, (3) Dept. of Phys. Geogr. and Quatern. Geol., University of Stockolm, Sweden, (4) AWI, Bremerhaven, Germany, (5) Physics Institute, University of bern, Switzerland, (6) Dept. of Geol. Environ. and Marine Sci., University of Trieste, Italy, (7) BAS, NERC, Cambridge, United Kingdom. (udisti@unifi.it)

The EPICA ice core (EDC96) drilled at Dome C (75˚06' S; 123˚23' E; 3233 m a.s.l.) is able to give a huge quantity of paleo-data for the last 900 kyr. One of the main challenge is the evaluation of the accumulation rate changes at different ages, as a results of variation in hydrological cycles induced by climatic changes. Indeed, changes in accumulation rate in different climatic periods reveal the environmental response to temperature forcing and represent the effects of the complex feedback processes involving, among others, changes in sea level, atmospheric circulation, cloud coverage, Earth surface albedo, load of atmospheric aerosols (via changes in precipitation frequency and intensity) and continental surface conditions (wet area extension, desertification). Past accumulation rate in ice core is satisfactory evaluated by using stable isotopic ratios (δD or δ^{18}O) as proxies of site temperature at the inversion layer and assuming that the accumulation rate changes in proportion to the derivative of the water vapour saturation pressure at this layer. This approach is the best method today used, but recent evidences revealed that in particular climatic conditions, e.g. during periods immediately foregoing or following glaciations or deglaciations, non-linear processes could change the temperature-accumulation rate relationships. Therefore, the availability of an independent proxy for accumulation rate is desirable. At Dome C, where accumulation rate is very low and dry deposition is the dominant scaveng-

ing process, concentration of conservative chemical species could be affected only by changes in accumulation rate, if source intensity and transport processes feeding such components to the Antarctic ice sheet can be considered sufficiently constant. High-resolution sulphate measurements along the EDC ice core revealed that its depositional fluxes were relatively constant along the last 900 kyr, making the sulphate concentration a marker of accumulation rate. Here we report a complete record of sulphate concentration stratigraphy compared to the δD profile. Features of the sulphate profile are discussed, especially in periods where differences with dD trends were found (e.g. at the end of MIS 15).