Geophysical Research Abstracts, Vol. 8, 07279, 2006
SRef-ID: 1607-7962/gra/EGU06-A-07279

FIC (Fast Ion Chromatography) measurements of chloride, nitrate and sulphate in the EDML ice core.

E. Castellano (1,2), S. Becagli (1), A. Morganti (1), M. Severi (1,2), R. Traversi (1), R. Udisti (1), U. Ruth (3), H. Fischer (3), P. Kaufmann (4), F. Lambert (4) and H. Oerter (3).

(1) Dept. of Chemistry, University of Florence, Italy, (2) MNA, University of Siena, Italy, (3) AWI, Bremerhaven , Germany, (4) Physics Institute, University of Bern, Switzerland. (emiliano.castellano@unifi.it)

In the framework of the EPICA project a deep drilling was performed at Kohnen Station (EDML - 75˚00'S, 00˚04'E, 2892 m a.s.l., Atlantic sector), in order to achieve information on the relationships between Northern and Southern hemispheres, via atmospheric and deep oceanic circulation, due to its geographical location facing the Southern Atlantic Ocean. In order to obtain high-resolution chemical profiles, ice core sections were on site continuously analysed for chloride, nitrate and sulphate by using a Fast Ion Chromatographic (FIC) method similar to the one carried out on the whole EPICA Dome C (EDC) ice core (3190 m), spanning the last 9 glacial cycles (about 900 kyr). While FIC method applied to the EDC ice core gave a constant depth resolution (2 to 4 cm ice) along all the ice core, at Konhen station we used two different resolutions. In the upper 619 m, covering almost the whole Holocene, the method was speed up, reaching a depth resolution of 1.0 cm, in order to reconstruct the expected seasonal signal of sulphate, such as a marker of biogenic oceanic emissions. The negative consequence of this approach was the lost of chloride and nitrate measurements for the Holocene. For depth higher than 619 m, the original FIC method was applied, obtaining 2 cm resolution along the remaining ice core. In this way, chloride and nitrate were measured together with sulphate. Here, we show their profiles in the last glacial-interglacial cycle, including the Eemian interglacial. Concentrations and fluxes of chloride, nitrate and sulphate were plotted as a function of isotopes and dust record, in order to understand their relationships with climate changes and lower or higher free acidity of snow. Particular attention was spent in pointing out the preservation of

the chloride and nitrate records in cold periods, when the increased atmospheric load of dust and sea spray particles acted as neutralising factor in fixing HCl and HNO_3 as stable salts. By contrast, post-depositional re-emission into the atmosphere of chloride and nitrate in acidic form was shown in layers recording acidic volcanic depositions (revealed by sulphate spikes).

A comparison between background values of sulphate, chloride and nitrate in different climatic periods and in the two EPICA ice cores (EDC and EDML) was also carried out.