Geogr. Fis. Dinam. Quat.
20 (1997), 269-270, 2 figg., 1 tab.

ROBERTO GRAGNANI (*) & SANDRO TORCINI (**)

ION CHROMATOGRAPHIC METHOD FOR MONITORING SULPHATE IN ICE-CORES

ABSTRACT: GRAGNANI R. & TORCINI S., *Ion chromatographic method for monitoring sulphate in ice-cores.* (IT ISSN 0391-9838, 1997).

Using ion chromatography a method was developed for monitoring sulphate in firn and ice cores. With the present method, the sample was loaded automatically in the column without a loop. The results obtained with the monitoring procedure were compared with those obtained with conventional method.

A practical detection limit of 0,4 μEq/L of $SO_4^=$ was reached when 2 ml of samples were loaded in the column.

KEY WORDS: Ion Chromatography, Monitoring, Sulphate, Ice cores

RIASSUNTO: GRAGNANI R. & TORCINI S., *Metodo di analisi di cromatografia ionica per il monitoraggio dei solfati nelle carote di ghiaccio.* (IT ISSN 0391-9838, 1997).

Mediante cromatografia ionica è stato messo a punto un metodo per la determinazione in continuo della concentrazione dello ione solfato in carote di ghiaccio. Il caricamento del campione avviene direttamente nella colonna cromatografica senza l'utilizzazione di un loop.

Il metodo permette di raggiungere un «practical detection limit» di 0,4 μEq/L $SO_4^=$. I risultati ottenuti con il metodo cromatografico convenzionale sono confrontati con quelli ottenuti mediante il metodo qui proposto.

TERMINI CHIAVE: Cromatografia ionica, Monitoraggio, Solfati, Carote di ghiaccio

INTRODUCTION

Sulphate presence in the Antarctic region is mainly due to marine biogenic activity and sea salt. Crustal and antropic sources are generally negligible. Volcanic events can produce a significant input of SOx in the atmosphere that can increase the $SO_4^=$ deposition and give a very well marked signal in the snow in sites both close to and far from eruptions (Hammer, 1977 and 1985, Delmas & *alii*, 1985, Moor & *alii*, 1991).

The monitoring of sulphate concentration in ice-core makes it possible to identify volcanic events, which can serve as a chronological marker, and to investigate environmental conditions in the past. With these aims, monitoring of $SO_4^=$ and other chemical parameters of ice-core will be carried out during coring in Antarctica (Epica Project).

Turbidimetric and Thorin methods were considered before choosing the ion chromatographic method for sulphate monitoring. The detection limit of 25 μEq/L as $SO_4^=$, obtained with the first method, is too high compared to the concentration of 0,5-5 μEq/L of sulphate generally found in antarctic ice.

With the second method the detection limit corresponds to for the concentration of sulphate found in ice cores (Gjessing, 1984), but the procedure is rather complex for continuous analyses because metal ions have to be removed by a catio-exchange resin.

ANALYTICAL METHOD

Ion chromatography is a suitable method for trace element and compound determination. With the new generation instrument (Dionex DX 500) it is possible to reach an $SO_4^=$ detection limit 4-5 times lower than that obtained by instrumentation available at the moment in our laboratories (Dionex 2020 i). Analysis is generally carried out injecting the sample into the chromatographic system by means of a loop. By this procedure a discontinuous analysis is obtained. The method proposed consists in an automatic loading of the sample directly in the column with the aim of producing a continuos monitoring of $SO_4^=$ along an ice core.

When a single channel system is used, the sample frequency is one every two minutes and loading time is one minute. In the present work, 2 ml of sample were directly loaded with a gradient pump in the chromatographic column in a minute.

(*) *Enea, Amb-Cat, Cre Casaccia - 00100 Roma.*
(**) *Enea, Amb-Tein-Chim, Cre Casaccia - 00100 Roma.*
This work was carried out with the financial support of the Italian Programme for Antarctic Research (Pnra).