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## ISOTOPIC COMPOSITION OF SNOW SAMPLES FROM NORTHERN VICTORIA LAND (ANTARCTICA) AND CORRELATIONS WITH GEOGRAPHICAL FACTORS

**ABSTRACT:** DINI M., LONGINELLI A., OROMBELLI G. & SMIRAGLIA C., *Isotopic composition of snow samples from Northern Victoria Land (Antarctica) and correlations with the geographical factors.* (IT ISSN 0391-9838, 1997).

During the 1989-90 and 1994-95 Italian expeditions to Antarctica, two sets of fresh surface snow samples were collected in order to analyse their isotope composition and correlation with geographical factors, such as elevation and distance from the coast.

A linear relationship between  $\delta^{18}\text{O}$  and  $\delta\text{D}$  was found yielding a high correlation coefficient. Mean vertical isotopic gradients of  $-0.6\text{‰}/100\text{m}$  and  $-0.5\text{‰}/100\text{m}$  were obtained for  $\delta^{18}\text{O}$  from the two different sets, whereas the  $\delta\text{D}/\text{elevation}$  gradients were  $-4.7\text{‰}/100\text{m}$  and  $-3.5\text{‰}/100\text{m}$ , respectively. The correlation coefficients between isotopic composition of snowfall and elevation were higher ( $R^2$  from 0.42 to 0.81) than those between isotopic composition and distance from the coast.

The correlation between deuterium excess and distance from the coast was very weak with higher values moving inland, probably owing to the rather complicated morphology of the area.

**KEY WORDS:** Snow isotopic composition, Altitude effect, Victoria Land, Antarctica.

**RIASSUNTO:** DINI M., LONGINELLI A., OROMBELLI G. & SMIRAGLIA C., *Composizione isotopica di campioni di neve nella Terra Vittoria Setten-trionale (Antartide) e relazioni con i fattori geografici.* (IT ISSN 0391-9838, 1997).

Durante le spedizioni italiane in Antartide negli anni 1989-90 e 1994-95, sono state raccolte due serie di campioni di neve fresca superficiale per analizzare la loro composizione isotopica ed evidenziare le correlazioni con alcuni parametri geografici, quali altitudine e distanza dalla costa.

È stata trovata una relazione tra  $\delta^{18}\text{O}$  e  $\delta\text{D}$  con un elevato coefficiente di correlazione. Inoltre, nei due differenti periodi di campionamento

sono stati ottenuti dei gradienti isotopici verticali medi di  $-0.6\text{‰}/100\text{m}$  e  $-0.5\text{‰}/100\text{m}$  per l'ossigeno e di  $-4.7\text{‰}/100\text{m}$  e  $-3.5\text{‰}/100\text{m}$  per l'idrogeno.

I coefficienti di correlazione fra la composizione isotopica della neve e l'altezza sono risultati più alti ( $R^2$  varia da 0,42 a 0,81) rispetto a quelli con la distanza dalla costa. La correlazione tra l'eccesso di deuterio e la distanza dalla costa è risultata piuttosto debole, forse a causa della complicata morfologia dell'area esaminata, con una progressione verso valori più elevati allontanandosi dalla linea di costa.

**PAROLE CHIAVE:** Composizione isotopica della neve, Effetto altitudine, Terra Vittoria, Antartide.

### INTRODUCTION

The samples were collected in two periods: from January 15 to February 20, 1990 and from November 6 to November 26, 1994.

All the sampling sites are located in Northern Victoria Land (figs. 1 and 2). The first set consists of 16 samples from 12 sites roughly distributed along a South-North transect 140 km in length, extending from Tarn Flat ( $75^{\circ}00'\text{S}$ , situated a few kilometers north of Larsen Glacier) to Mt. Pollock ( $74^{\circ}15'\text{S}$ , close to the higher Campbell Glacier). The longitudinal extension was about 60 km, from Hogden Heights to Mt. Emison (excluding the Ricker Hills site, situated about 50 km west of Mount Joyce, as shown in fig. 2). Sampling site elevations ranged from 10 m at Tarn Flat (a flat, deglaciated area between Larsen Glacier and Reeves Glacier) to 3490 m on Shafer Peak (on the ice-divide between Reeves Glacier and Campbell Glacier). The distribution of sampling frequency according to altitude was: 3 samples in the 0-100 m altitude range, 6 samples in the 1000-2000 m altitude range, 6 samples in the 2000-3000 m range and 1 sample at an elevation of over 3000 m. The distance from the coast ranged from 5 km at Tarn Flat to about 100 km at Mt. Pollock.

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