

ANSELMO CAGNATI (\*)

## SOME OBSERVATIONS ON SNOWPACK FEATURES IN NORTHERN VICTORIA LAND, ANTARCTICA

**ABSTRACT:** A. CAGNATI, *Some observations on snowpack features in Northern Victoria Land, Antarctica.* (IT ISSN 0391-9838, 1997).

The first results of snowpack observations carried out in Antarctica during the Italian scientific expedition in 1994/95 winter are presented here. In a mountainous area of about 50,000 km<sup>2</sup> in the Northern Victoria Land, where the Terra Nova Station is located, several conventional snow profiles were performed at variable depths, from some centimetres to a maximum of one metre according to situation. Observations have been carried out utilizing the traditional field instruments. In particular, for every snow profile the following characteristics were analysed: grain shape and grain size, hardness index, density, liquid water content and snow temperature. During the helicopter flights, observations on avalanche activity were also made. Analysis of snow profiles has highlighted some characteristics that distinguish antarctic from alpine snowpack. In general, a low structural diversification was found with an alternance of layers of small rounded particles and layers of faceted crystals. Hardness index profiles present on average patterns of «quasi-hydrostatic» type that confer a relative stability on the snowpacks. Snow characteristics integrated with climatological analysis of the period made possible to formulate some hypotheses on the low avalanche activity observed in the region.

**KEY WORDS:** Snowpack, Snow profiles, Avalanche activity, Antarctica.

**RIASSUNTO:** A. CAGNATI, *Alcune osservazioni sulle caratteristiche del manto nevoso nella Terra Vittoria Settentrionale, Antartide.* (IT ISSN 0391-9838, 1997).

Sono qui presentati i primi risultati delle osservazioni effettuate sul manto nevoso in Antartide durante la spedizione scientifica italiana dell'inverno 1994/95. In una regione montagnosa di circa 50.000 km<sup>2</sup> nella Terra Vittoria settentrionale, dove è ubicata la stazione di Terra Nova, sono stati eseguiti diversi profili del manto nevoso di tipo convenzionale fino a profondità diverse, da un minimo di qualche centimetro a un massimo di un metro a seconda delle situazioni. Le osservazioni sono state effettuate utilizzando la classica strumentazione da campagna. In particolare, per ciascun profilo, sono state analizzate le seguenti caratteristiche: forma e dimensione dei grani, indice di durezza, densità, contenuto in ac-

qua liquida e temperatura della neve. Inoltre, durante gli spostamenti effettuati con l'elicottero, sono state eseguite osservazioni sull'attività valanghiva. Le analisi dei profili hanno evidenziato alcune caratteristiche che differenziano il manto nevoso antartico dalle tipologie alpine. In generale, è stata riscontrata una bassa diversificazione strutturale con una alternanza di strati di grani arrotondati di piccole dimensioni e strati di cristalli sfaccettati. I profili degli indici di durezza presentano mediamente degli andamenti di tipo «quasi-idrostatico» che conferiscono una relativa stabilità al manto nevoso. Le caratteristiche del manto nevoso integrate con l'analisi climatologica del periodo, hanno consentito infine di formulare delle ipotesi sulla scarsa attività valanghiva osservata nella regione.

**TERMINI CHIAVE:** Manto nevoso, Profili del manto nevoso, Attività valanghiva, Antartide.

### INTRODUCTION

Among one of the research activity of the Italian Antarctic Research Programme (Pnra), the 1994-95, field season was the carrying out of a radiometric measurements of the different kinds of snow and ice covers. The radiometric response of the surfaces, in terms of reflectance, facilitates identification of their nature on satellite pictures. During the tenth expedition, which took place during the winter 1994-95, beside the radiometric measurements, a series of observations on the snowpack were carried out in order to define the physical and structural features of the surface layers. The decreasing in radiation through the snowpack is in fact very rapid with the increase of depth, and it can be calculated that, in the case of new snow, from a depth of 30 to 50 cm, most of the radiation is discharged. However, also for the glaciological interest that the data gathered may have, in several cases observations were made to a maximum depth of 100 cm. Studies on the Antarctic snowpack, and in particular concerning the space-time variability of snow accumulation, have been carried out by several researchers (Palais & alii, 1982; Young & alii, 1982; Reinwarth & alii, 1982). During the same research programme, Italian researchers (Meneghel & alii, 1990) have recently carried out snowpack analyses for the purpose of

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