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THE CALDERONE GLACIER (GRAN SASSO D'ITALIA). DETERMINATION OF ICE THICKNESS AND BEDROCK MORPHOLOGY BY MEANS OF RADIO-ECHO SOUNDING

ABSTRACT: FIUCCI A., GIGANTE B., ROSSI C., SMIRAGLIA C. & VEGGETTI O., *The Calderone Glacier (Gran Sasso d'Italia). Determination of ice thickness and bedrock morphology by means of radio-echo sounding.* (IT ISSN 0391-9838, 1997).

The Calderone Glacier is situated on Corno Grande, Gran Sasso d'Italia. It is the only glacier in the Apennine mountain chain and is now rapidly reducing and thinning. Geophysical surveys were conducted there in 1992 for the purposes of measuring the ice thickness and determining the bedrock morphology. Six cross and one longitudinal radio-echo sounding (R.E.S.) profiles were carried out on the lower sector of the glacier. G.S.S. radar equipment, including an 80-Mhz antenna, was used. The glacier showed ice thickness of 26 m at most, with evident over-deepening. The debris cover showed a maximum thickness of 2 m.

KEY WORDS: Glacier, Radioglaciology, Calderone, Gran Sasso, Apennines.

RIASSUNTO: FIUCCI A., GIGANTE B., ROSSI C., SMIRAGLIA C. & VEGGETTI O., *Ghiacciaio del Calderone (Gran Sasso d'Italia). Determinazione dello spessore del ghiacciaio e della morfologia del substrato mediante radio-echo sounding.* (IT ISSN 0391-9838, 1997).

Il Ghiacciaio del Calderone, situato sul Corno Grande del Gran Sasso d'Italia, è l'unico apparato glaciale appenninico, attualmente in accentuata riduzione. Nel 1992 vi sono stati compiuti dei rilievi geofisici per determinare lo spessore del ghiaccio e la morfologia del substrato roccioso. Nel settore inferiore del ghiacciaio, mediante radio-echo sounding, sono stati effettuati sei profili trasvesali e uno longitudinale che hanno mostrato uno spessore massimo di ghiaccio di 26 m con una evidente sovraescavazione. Lo spessore massimo del detrito epiglaciale è risultato di 2 m. Si è utilizzata una strumentazione G.S.S., con un'antenna di 80 Mhz.

TERMINI CHIAVE: Ghiacciaio, Radioglaciologia, Calderone, Gran Sasso, Appennino.

INTRODUCTION

The Calderone Glacier, the only glacier in the Apennines, is situated inside a cirque on the NNE slope of Corno Grande (2 912 m), the highest peak on the Gran Sasso and in the Apennines.

Studied since the start of this century by Marinelli & Ricci (1916), its evolution was evaluated by Tonini (1961) up to the early nineteen sixties. In recent years, survey work has been resumed, with the aim of revealing recent areal variations (Gellatly & *alii*, 1994) and accumulation-ablation ratios (D'Orefice & *alii*, 1995).

Ice thickness is most definitely one of the most important factors in the determination of the geometry of a glacier and its «survival time». Therefore, besides direct measurements in crevasses and moulins, geoelectric surveys have also been conducted, revealing an ice thickness of at least ten m in the lower sector (Smiraglia & Veggetti, 1992). To confirm the results of the preliminary surveys and to extend the survey network, measurements of the thicknesses were made in July of 1992 using radio-echo sounding. The objective of this report is to illustrate the results of these surveys.

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