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# 20. EUROMET I - New Meteorite Finds Near Frontier Mountain, North Victoria Land, Antarctica

By Georg Delisle*

## INTRODUCTION

Meteorites in North Victoria Land were found for the first time during the GANOVEX IV expedition in 1984 (DELISLE et al. 1986, 1989) in an ice cored moraine field in a small valley at the SE end of Frontier Mountain. This find in a locality considered hitherto as an unlikely place for a meteorite concentration renewed interest in the investigation of the ice dynamic processes which build up meteorite concentrations on ice surfaces. In this context, the glaciology at the Allan Hills Icefield - one of the most productive Antarctic meteorite fields - was studied in 1988/89 (DELISLE et al. 1990, 1991). The result of this investigation did imply that actually only a small portion of the meteorite field at Frontier Mountain had been detected during GANOVEX IV.

At the end of 1989, a European-wide initiative of scientists active in meteoritics formed EUROMET which is an interest group whose purpose is threefold: (i) to intensify the European effort to search for meteorites in Antarctica (and other desert regions); (ii) to analyze subsequently the extraterrestrial material in laboratories and (iii) to curate the material in European research institutions and museums.

During the season 1990/91 EUROMET was able to send its first team to Antarctica to collect meteorites (A. Rossi, Univ. Modena, Italy; Ian A. Franchi, The Open Univ., U.K.; R. Wieler, ETH-Zürich, Switzerland and G. Delisle, BGR Hannover, Germany). Italy, which had expressed early on a keen interest in supporting EUROMET, both scientifically and logistically, provided the required support through its „Programma Nationale di Richerche in Antartide" (PNRA).

## METEORITE CONCENTRATION MECHANISM AT FRONTIER MOUNTAIN

The meteorite concentration discovered in 1984 at Frontier Mountain is located in a glaciated valley (inofficially called „Meteorite Valley"). Its ice field is exposed to almost constant fall winds which cause a high degree of ice sublimation. The mass loss is by and large balanced by ice flow across the valley entrance. With time a large amount of ice had entered the valley and had been sublimated leaving entrapped meteorites behind. This way, a high meteorite concentration was gradually produced (DELISLE et al. 1989). Meteorites found in the moraine of the „Meteorite Valley" have clearly been transported within the ice to the point of emergence, since they are always found at the moraine - ice interface.

The largest meteorite ever found near Frontier Mountain was, however, located on the blue ice field to the NE. This led to the speculation that a large amount of meteorites is being uncovered on this field and either, if sufficiently heavy, be left at the site of emergence or, if less heavy than a certain threshold weight (about 100 grams; SCHUTT et al. 1986, HARVEY & CASSIDY 1989) be blown away by the prevailing wind. Latter meteorites would then come to rest in snow fields adjacent to the blue ice. This would be equivalent to one of the concentration mechanisms operative at the Allan Hills Icefield. This speculation was the reason to put the camp about 5 km to the N of Frontier Mountain near the boundary of the blue ice field and the adjacent snow field (Fig. 1), which also happens to delineate a mild depression in the blue ice.

* Georg Delisle, Bundesanstalt für Geowissenschaften und Rohstoffe, Stilleweg 2, D-3000 Hannover 51, FRG.

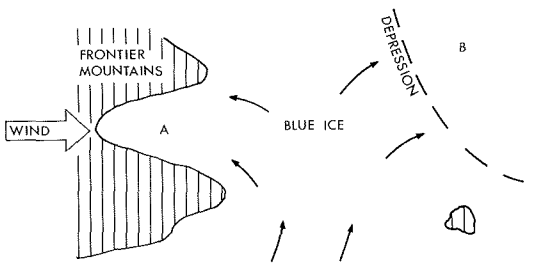


**Fig. 1:** Schematic sketch of meteorite concentration site at Frontier Mountain. High sublimation of ice caused by fall winds in the „Meteorite Valley" (A) causes constant mass flow of ice with entrapped meteorites toward the site. Meteorites are left on the ice surface as the ice evaporates. Meteorites uncovered by ablation on the blue ice field either remain - if heavy enough - at the point of emergence or are blown by the wind past the depression (B) being stopped by the ice - snow interface.

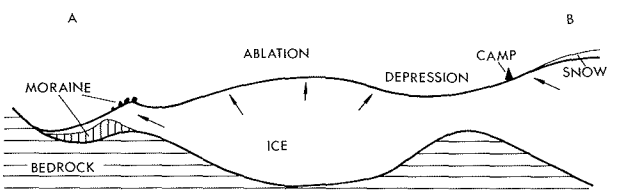


Abb. 1: Schematische Lageskizze und Profil. Durch Fallwinde verursachte hohe Sublimation des Eises im „Meteorite Valley" (A) hat einen permanenten Nachstrom von Eis (mit eingeschlossenen Meteoriten) dorthin zur Folge. Die Meteoriten werden bei der Evaporation des Eises an der Oberfläche angereichert. Die auf diese Weise durch Ablation auf dem Blaueisfeld freigelegten Meteoriten bleiben liegen, wenn sie schwer genug sind. Leichtere Fragmente werden vom Wind durch die gesamte Depression (B) geblasen, bis sie am Rande der Eisfläche von Schnee gestoppt werden.

The first meteorite was found within 1 hour after initiation of the search campaign about 550 m from the camp site. During the meteorite search, which lasted three weeks, the depression near the camp yielded about 80 % of the 256 meteorite fragments that have been found. Most meteorites were concentrated in two elongated zones (each 200 m x 1000 m) parallel to the northern flank of the depression. Very few but the largest meteorites in size (up to 5 cm in diameter) were found on the blue ice between the camp and the NE foot of Frontier Mountain. The old site in the „Meteorite Valley" was not investigated again in great detail but yielded nevertheless about 15 % of all finds.

## CONCLUSIONS

The blue ice field to the NE of Frontier Mountain is currently subject to a high degree of ablation. Meteorites entrapped in the ice, are (i) eventually exposed on the surface and remain there if heavy enough to resist transport by wind, (ii) are blown northwards to the ice depression for deposition at the snow field - blue ice boundary, if lighter than the threshold weight of about 100 grams, (iii) are transported in the ice toward the „Meteorite Valley", where they are brought to the surface by ice sublimation and ice melting and added to the underside of the moraine field.

Based on our current understanding of the site it is believed that only a minor portion of the meteorites deposited there has been recovered so far, since only a part of the total blue ice area has been extensively searched. It is believed that future searches by EUROMET at this site will substantially increase the total number of finds.

## ACKNOWLEDGMENTS

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## References


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