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### Discovery of thermal springs in the Raudfjellet region, SW Spitsbergen

*Abstract.* - Two thermal springs were discovered in the Raudfjellet region in Spitsbergen. They had a total discharge of about  $0.1 \text{ m}^3/\text{sec}$  and were found in metamorphic carbonate rocks on bare ground under the eastern part of Torellbreen. Water with temperatures between  $12.3$  and  $6.5^\circ\text{C}$  caused thermoerosive phenomena to take place at the end of the eastern Torellbreen snout and formed an ice sheet covering the ground after cooling and freezing.

The expedition of the Polish Academy of Sciences found thermal springs in the Raudfjellet region on Wedel Jarlsberg Land in April 1982.

Raudfjellet is a wide nunatak in the middle of Torellbreen and divides the glacier into one eastern and one western part. It consists of metamorphic rocks and carbonate rocks from the Hecla Hoek formation in which karst phenomena with mineral springs occur (Baranowski 1974). Torellbreen has retreated strongly during the last few decades, increasing the area of Torellmorena which divides the glacier into two parts. Torellmorena is today a strongly degraded, medial moraine area with buried ice, ground moraine and a sandur of pebbles and gravel of a river-bed facies type.



Fig. 1. Outlet under the snow drift with a water temperature of  $6.5^\circ\text{C}$ .

The thermal springs, surrounded by fluvioglacial gravel, are found in an area from which the glacier retreated less than thirty years ago. Discharge was observed at two locations several hundred metres apart. The first covered a 200 m<sup>2</sup> area with several outlets near the snout of the eastern part of Torellbreen where it abuts on the slope of Raudfjellet and on the ground moraine covered by fluvioglacial gravel. The water temperature of this spring was 12.3<sup>o</sup> with an air temperature of -14.5<sup>o</sup>C. The water flows towards the glacier snout, disappearing under the ice. Because of the many outlets from this spring, the discharge could not be measured, but it was estimated to be not less than 10 l/sec. The second spring is located northwest of the first within the river-bed made by nival and fluvioglacial water flowing from the Raudfjellet glacier (Fig. 1). Exact location of this spring was difficult since the water flowed underneath a wide snow drift. Below the spring, the water flowed for 200 m towards Torellbreen as a distinct stream and was then lost under the ice cover of a little lake near the glacier snout. The water temperature at the outlet under the snow was 6.5<sup>o</sup>C with an air temperature of -12<sup>o</sup>C. The discharge was measured to be about 70 l/sec by a simple float method.

Both springs contribute to the high ablation in some parts of the glacier snout where the thermoerosive effects show up as a marked undercut of the glacier snout. This undercut is a several metre high cliff in a few places. The thermal water is lost under the glacier, but reappears three kilometres further southwest down Torellmorena, where it builds up a 'naledi' type ice cover. This covered about one square kilometre and was about one metre thick on 8 April 1982.

The described area is flooded by nival and fluvioglacial water in the summer and can therefore best be investigated in the spring and autumn.

This is a preliminary note. More detailed description will be given after completion of hydrochemical analyses of the water samples.

#### *References*

Baranowski, S., 1974: *Report on the field work of the Polish Scientific Expedition to Spitsbergen in 1973*. University of Wrocław Publishers, Wrocław.

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