Point 4c – Waldemar River *78° 40' 23" N 11° 58' 10" E*

Thickness of mineral covers on the ice-cored moraine and an active layer of permafrost on the western coast of the Oscar II Land (Svalbard)

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Ice-cored moraines belong to the dominating forms in the landscape of the glaciers marginal zones. The relict glacial ice existence in in the ice-covered moraines depends on climatic conditions, the thickness of mineral covers and their seasonal thawing. In the case of the active layers contacting the top of the relict ice, its disappearing is quicker. Mass movements uncovering ice play the greatest role then. That phenomenon is much more important at the initial phase of ice-cored moraines degradation. When the thickness of the mineral cover increases, the rate in which ie thaws decreases. As a result, slope processes slow down distinctly. At that moment ice-cored moraines reach the mature stage, which is indicated by numerous thermokarst hollows with no drainage.

The top parts of the ice-cored moraine lack snow covers throughout the whole year. The process of thawing last about 1.5 months longer as compare to the surrounding area. Its begins as early as in the second part April and gets to he depth of 0.3–0.4 m in first ten of May. Besides climatic conditions slope layers character play a significant role in relict ice degradation. Four characteristic phases distinguished in evolution of ice-cored moraine.

The questions arise: How long can the ice-core moraine exist? What geomorphological effects occur after the ice-core melting? Known that the outer series of ice-cored moraine were formed at the turn of the 19th century. These are "mature" forms which, however, contain ice inside.

The depth of summer thaw in various kind of ground has been presented as a scheme on the fig. 2. From the analysis of a set of estimates available, it follows that at least seven different environments which differ in the course and of thaw, i.e. the thickness of the active layer, my be recognized:

Ia, Ib) ground varying in particle, size distribution, with a blanketing continuous organic layer, more than 20 cm thick,
II) tills with high moisture contents which are colonized by luxuriant tundra vegetation,
III) gravels, sands and silts within depressions at marine terraces, which are occupied by luxuriant tundra vegetation,
IV) modeled (patterned) ground, the interior of which is build up of predominant earth particles and which is colonized by extremely luxuriant tundra vegetation,
V) sands, gravels of which marine terraces covered with sparse tundra vegetation are built up,
VI) gravels and sands forming present-day outwash fans,
VII) mineral mantle (boulders, silts, ...) over ice-core moraine.

The established pattern of seasonal thaw in various kind of ground at an 60 m a.s.l. provides the basis of plotting of eight (Ia, Ib, ... VII) empirical curves, the approximations of which are given by the formula:

$$h = a \lg (T \pm c) - b$$

where h is the depth of a thawed layer, a and b are constants coefficients defining a thawing layer, T is the duration of thaw in days, c is allowance for earlier (+) or a later (-) disappearance of snow at given locality. Index c is calculated in the following way: the actual number of the 24-hour of delay divided by 4.

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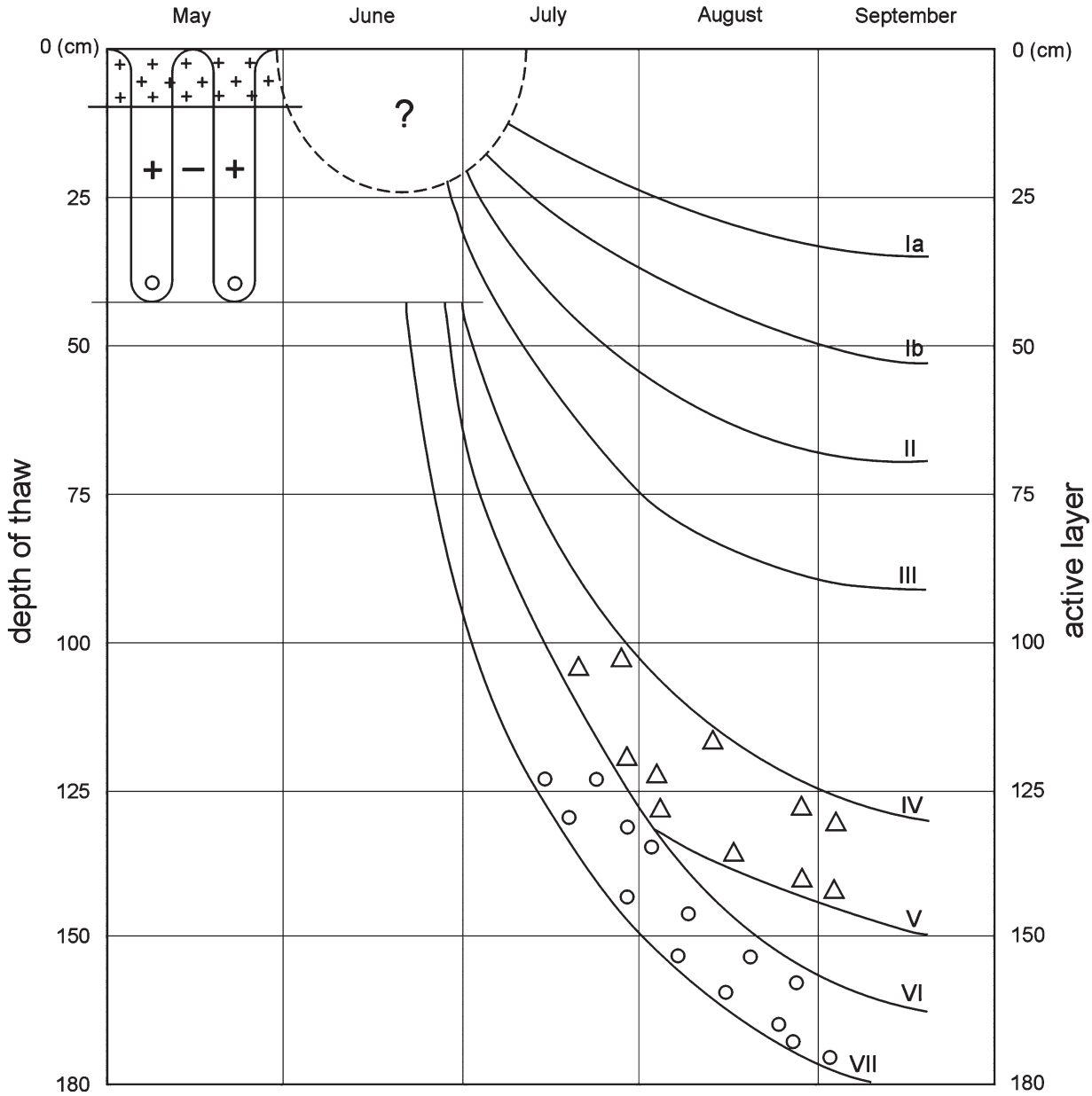

Fig. 1. Degradation scheme of ice-core moraine
1 – initial heiht (H1), 2 – formation of the initial thermokarst hollow with a small lake, 3 – formation of the complex of thermokarst hollows, 4 – formation of the therokarst hollows parallel to the ridge lines of the ice-core moraine, 4a – the final stage of the ice-core moraines degradation, the divisision of the ice core into two parts and their height H2, W1 and W2 – initial and final wi width of the form base

If the duration of thawing in a selected kind of environments is known, the above formula permit determination of the thickness of the active layer with high precision.

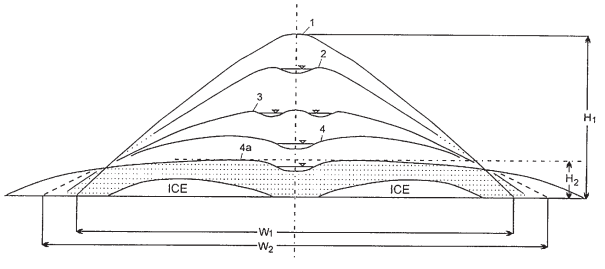

Fig. 2. Scheme of summer thaw (explanation in the text)