

Two-layered permafrost formation as a result of climate change in a mountainous environment. Example from Storglaciären, Tarfala, Northern Sweden.

Wojciech Dobinski

University of Silesia, Faculty of Earth Sciences, KATOWICE, Poland (wojciech.dobinski@us.edu.pl)

The most common study of the occurrence of permafrost in the world concerns one layer in the lithosphere inside which the temperature is equal to or lower than 0 ° C. Like other components of the cryosphere, Permafrost reacts to climatic changes that register in its thermal characteristics. This causes that the temperature course in the permafrost profile is nonlinear, and in specific locations two layers of permafrost can be separated by talik. Such a situation is known for its occurrence in West Siberia. However, climate changes are similar in both the Arctic and Alpine permafrost. ERT research conducted in the Tarfala area, in the forefield of the Storglaciären, show two high-resistance anomalies separated by a layer of lower resistance. The results of electro resistivity surveys together with previous published results indicate that two layers of permafrost can be distinguished also in the Storglaciären forefield and probably in Tarfala valley as well. The shallower, discontinuous layer, with thickness ca. 2–6 meters is connected to the current climate, Deeper located second layer, separated with talik, must be significantly older. Its thickness can reach dozens of metres and its existence is probably the result of permafrost formation during early Holocene or even Pleistocene epoch. The occurrence of two-layered permafrost in the Tarfala valley shows that the evolution of mountain permafrost may be seen as analogous to that in Western Siberia. This means that the effect of climate changes gives a similar results in permafrost formation and evolution in both altitudinal and latitudinal extent. The occurrence of two-layered permafrost in Scandes and Western Siberia plain indicates possible analogy in climatic evolution, and gives opportunity to understand them in uniform way. The existence of a two-layer permafrost in the mountain environment of the Scandinavian Mountains should be included in the models that are developed by other authors.

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