

Abstract

Late Quaternary has seen numerous major permafrost expansions and retreats associated with alternating glacial and interglacial periods as well as stadials and interstadials, the research of which is necessary to understand the past environmental evolution, but also provides useful analogues for its present-day and future behaviour. However, observations of permafrost and active-layer phenomena are still limited, and sometimes misleading, even in many present-day permafrost regions, and naturally less comprehensive evidence is available from areas where permafrost existed in the past.

The thesis provides comprehensive information on the distribution and morphology of mostly relict patterned ground and rock glaciers in the High Sudetes Mts. and in the Western and High Tatra Mts., respectively, which are the most widespread permafrost features that occur in these Central European mountain ranges situated north of the Alps. It shows that the landforms are closely related to increased severity of climates and/or sparser vegetation at higher elevations and as such they attest to the environmental conditions, which prevailed there towards the end of the Last Glacial Period to the early Holocene, but also to their current states. Similar elevation trends in the pattern morphology are also documented for active sorted patterned ground in the Svalbard archipelago. Nonetheless, these patterns may also have been forming throughout the Holocene and as such they are not in equilibrium with present-day climate conditions, also considering the excessively thick active layer caused by recent climate warming, which has occurred in most permafrost regions in the Northern Hemisphere. It thus calls for a broader use of the pattern morphology, established at the time of its initiation, in palaeo-environmental reconstructions. However, not all present-day permafrost regions are currently experiencing its degradation as observations from the Antarctic Peninsula region indicate that active layer has been cooling and thinning there in recent years.

Conclusively, the thesis provides insights into the past and present dynamics of the examined regions, which documents that permafrost and active-layer phenomena are valuable measures of Late Quaternary environmental changes, but it also has notable methodological and genetic implications as well as relevance to concepts of permafrost landscape evolution.

Keywords: permafrost, active layer, patterned ground, rock glacier, High Sudetes Mts., Western and High Tatra Mts., Svalbard archipelago, Antarctic Peninsula region, Late Quaternary