alter the frost-heave regime and lead to new landscape patterns. This project examined experimentally the influence of vegetation on thermal insulation and the effect of different plant functional types on active layer depth and frost heave. We selected 28 similar frost boils at a moist nonacidic tundra site next to the Dalton Highway, northern Alaska. An area of 0.5 $m^2$ in the center of each frost boil received one of four treatments in July 2002: 1. control, no manipulation, 2. removal of the vegetation mat, 3. vegetation removal and transplanting graminoid seedlings, and 4. vegetation removal and transplanting a 0.1 m thick moss carpet. We monitored frost heave, thaw depth, soil-surface stability, near-surface soil temperature and volumetric soil moisture. Average frost heave and thaw depth were greatest in the bare plots (16 cm and 81 cm, respectively) and lowest in the moss plots (8 cm and 69 cm, respectively). Soil-surface stability was greatest in the moss plots and lowest in the bare plots. Moss plots showed significantly reduced soil temperatures in the summer, and freezing and thawing were delayed. Soil moisture was greatest in the moss plots (mean 46%) and lowest in the bare plots (mean 39%). The sedge seedlings in the graminoid plots did not expand their root systems over the course of the experiment, which might have been caused by frost heaving and the formation of needle ice. Moss treatments had decreased frost-heave activity; the shallower active layers presumably had fewer ice lenses and thus less frost heave. In contrast, vegetation removal led to greater heat fluxes at the soil surface and increased frost heave and soil-surface disturbance. This study suggests that a possible shift in plant functional types and increase in biomass due to global warming could suppress the activity of nonsorted circles significantly. The potential loss of these cryogenic features could result in decreased soil temperatures and less landscape heterogeneity.

# Aspects on the formation of solifluction lobes in recently deglaciated cirques - Schober Group, Central Alps, Austria

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**key words**: solifluction lobe, glacier retreat, paraglacial

The retreat of glacier systems commonly exposes a landscape that is susceptible to rapid morphological changes. In such a paraglacial environment destabilized rock walls and debris slopes above a glacier cause potential debris release and thus generally enlarges the input of debris on top of the retreating glacier and on ice-free areas at the foot slope. The present paper discusses the relation between recent retreat of glaciers and formation of solifluction landforms for the innermost part of two neighbouring cirques (Koegele cirque, Hinteres Langtal) of the Schober Group (Central Alps, Austria) with the aid of aerial photo interpretation and field studies. During the LIA-maximum glaciation the Koegele cirque was completely covered by a small cirque glacier (0.21 $km^2$). In the early 1980s glacier ice still covered about 0.08 $km^2$ but mostly disappeared by end of the 1990s. Today, only small patches of glacier ice are found in radiation-sheltered areas. In close vicinity to these patches a number of vegetation-free solifluction lobes have recently formed. The Hinteres Langtal is the neighbouring valley to the north of the Koegele cirque and comprises a well-known complex rock glacier. The two root zones of the rock glacier show two distinct depressions. At least in the northern root zone a small cirque glacier (0.06 $km^2$) existed during the LIA-maximum glaciation, but completely disappeared in the first half of the 20th century. Perennial snow patches, probably 'relict' glacier ice and solifluction lobes are found at both rooting zones. The observed solifluction lobes at both study sites seem to be very active according to their fresh geomorphic appearance. Samples of clasts revealed that these landforms lithologically consist predominantly of platy mica-schist with a long-axis to short-axis ratio of 1:0.23 to 1:0.31. Mean absolute values of long-axis are normally 25 to 45 cm and of short-axis 6 to 14 cm, respectively. In close vicinity to the solifluction lobes some debris slopes show now signs of deformation, which is due to a different lithology in the rock face above and thus clast characteristics. The differences in slope material indicate that finer-grained material favours the formation of solifluction lobes, whereas coarse-grained debris slopes show no sign of solifluction but nourish blocky landforms instead. It can be assumed at both study sites that ice is occurring underneath the solifluction landforms. At least some solifluciton lobes seem to be underlain by remnants of the cirque glacier. Such lobes can be considered as supraglacial solifluction lobes. In contrast, near-surface ice is absent at less radiation-sheltered lobes and therefore the lobes have the appearance of typical periglacial solifluction lobes. Due to their topographical position it is most likely that they are underlain by permafrost. It can be concluded that similar looking solifluction lobes may form on slopes underlain by permafrost as well as on remnants of glacier ice.

## Climate and geomorphology of the periglacial belt in the Central Mountain Range, Taiwan

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**key words**: East Asia, high mountain geomorphology, relict periglacial landforms, Holocene

The Holocene geomorphology of the uppermost regions of the Central Mountain Range of Taiwan has not been studied yet. Investigations based on field work and air photo study in Nanhuta Shan (3742 m) and Yushan (3952 m) and the analysis of climate data indicate the presence of a periglacial belt with a lower limit at 3600 to 3700 m. The upper limit of the periglacial belt in Taiwan is not met. Ground temperature measurements in Nanhuta Shan show that freeze-thaw activity at 3560 m during the winter is reduced to the top few centimetres of the ground and the maximum frost depth is ∼25 cm. The strongest indicator for present periglacial activity are the formation of smooth slopes as a consequence of frost weathering. The high relief energy accounts for the absence of other periglacial landforms. Relict solifluction terraces, debris cones and slope failures found in Nanhuta Shan are strong evidence for a period of increased slope activity during the Holocene. In two cases this period could be dated by OSL to approx. 3 ka. At least one solifluction terrace developed during a cooler phase between 3 ka and today.

## New perspectives for periglacial geomorphology through the application of 2D resistivity imaging

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**key words**: 2D electrical resistivity imaging, periglacial geomorphology, subarctic periglacial environment, alpine periglacial environment, permafrost

The use of 2D resistivity imaging for the investigation of typical periglacial phenomena is shown on different case studies from the mid-latitude high-alpine and high-latitude subarctic periglacial environments. Application of geoelectrical surveys in periglacial environments often implies one major problem which is the coupling between the electrodes to the sometimes heterogeneous and rocky ground surface. From these extremely rugged terrain conditions in periglacial environments the limitations of application of geoelectric methods can arise since good electrical coupling between the electrodes and the ground is a prerequisite for geoelectrical surveys. Insufficient coupling of the electrodes to the ground and great heterogeneity of the surface terrain can lead to bad data quality resulting in noisy model interpretations of the subsurface. Nevertheless, this method is considered as the most multifunctional geophysical method and could be first choice for geomorphologists working in periglacial environments if only one single method can be applied.

This contribution aims to provide an insight into the broad opportunities, perspectives and limitations of 2D resistivity imaging for the investigation of typical periglacial landforms from the mid-latitude high-alpine