

Permafrostmonitoring in den Hohen und Niederen Tauern

Andreas KELLERER-PIRKLBAUER

Institut für Geographie und Raumforschung, Universität Graz
(Arbeitsgruppe *Cascade – The mountain process and mountain hazard group*)



Permafrostmonitoring Grazer Gruppe – Wer?

- **Grazer Permafrost Monitoring**

- **Universität Graz:** Institut für Geographie und Raumforschung
 - Andreas Kellerer-Pirklbauer
 - Gerhard Karl Lieb



- **TU Graz:** Institut für Geodäsie, Arbeitsgruppe für Fernerkundung und Photogrammetrie
 - Viktor Kaufmann
 - Tobias Bolch

WISSEN
TECHNIK
LEIDENSCHAFT

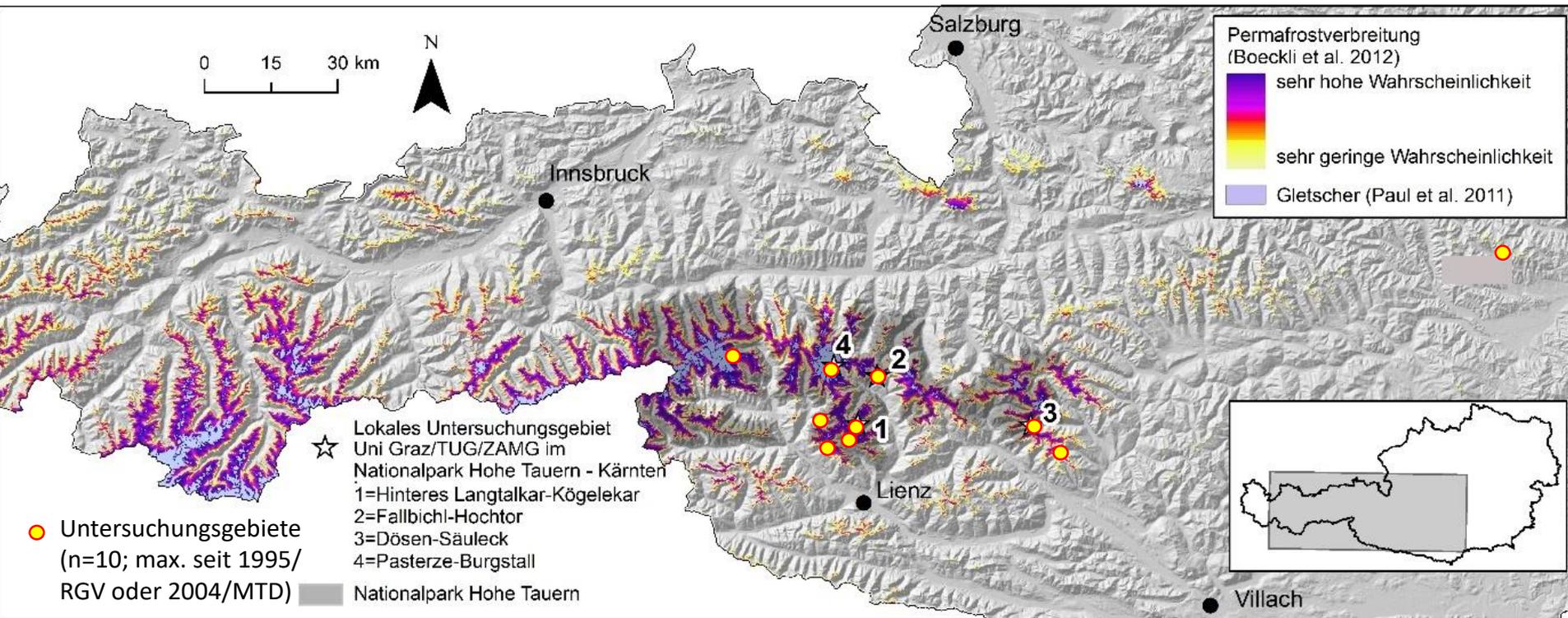


- **ZAMG Graz/Wien (bis 2023) - GeoSphere Austria)**
 - Michael Avian



Permafrostmonitoring Grazer Gruppe – Wo?

Kerngebiet National Park Hohe Tauern Kärnten und Tirol



RGV=rock glacier velocity

MTD=miniature temperature datenlogger (Permafrost Temperature/im Bereich der Active Layer)

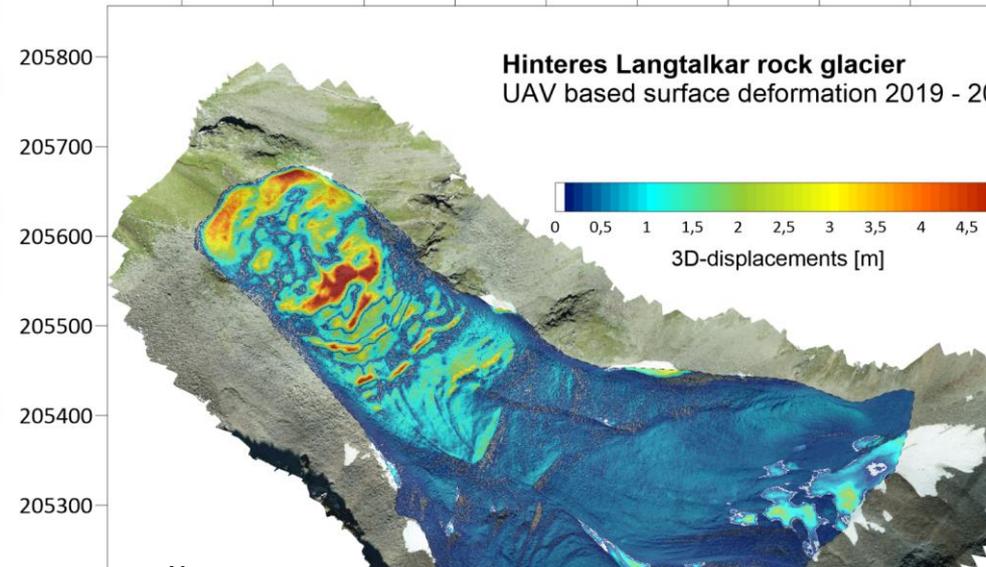
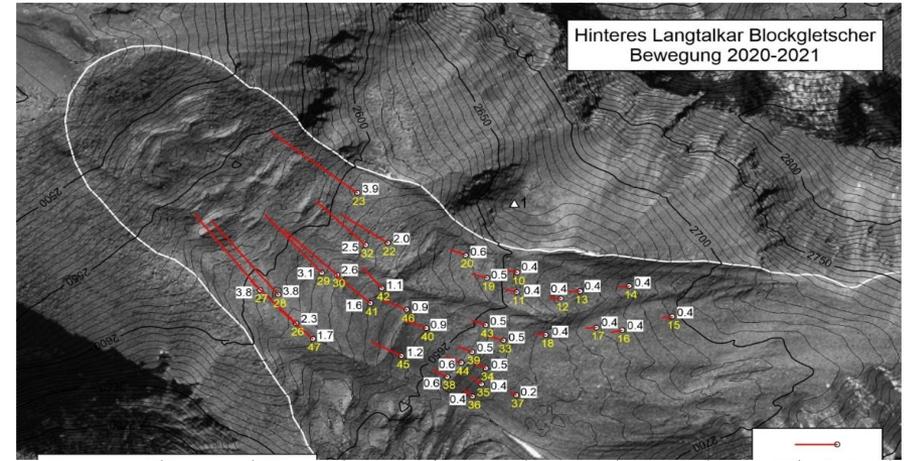
Permafrostmonitoring Grazer Gruppe – Was?



Permafrostmonitoring Grazer Gruppe – Was?

Kerngebiet National Park Hohe Tauern Kärnten und Tirol

Hinteres Längtalkar-Kögelekar



Messnetze im Untersuchungsgebiet
 Hinteren Längtalkar

Permafrostmonitoring Grazer Gruppe – Wohin?



Mit Unterstützung von BwL und Extratouristik Steiermark
Bundesministerium für Klimaschutz, Umwelt, Energie, Digitalisierung und Nachhaltigkeit
LE 14-20

Langzeitmonitoring von Ökosystemprozessen
Modul 07 – Kryosphäre: Gletscher, Hydroklima, Permafrost
Endbericht 2019-2022

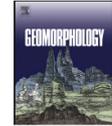
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Potential weathering by freeze-thaw action in alpine rocks in the European Alps during a nine year monitoring period



Andreas Kellerer-Pirklbauer

Department of Geography and Regional Science, Working Group Alpine Landscape Dynamics (ALADYN), University of Graz, Heinrichstrasse 36, 8010 Graz, Austria

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ABSTRACT

A quantification of rock weathering by freeze-thaw processes in alpine rocks requires at least rock temperature data in high temporal resolution, in high quality, and over a sufficient period of time. In this study up to nine years

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Solifluction rates and environmental controls at local and regional scales in central Austria

Andreas Kellerer-Pirklbauer

Andreas Kellerer-Pirklbauer, Working Group Alpine Landscape Dynamics (ALADYN), Department of Geography and Regional Science, University of Graz, Heinrichstrasse 36, AT-8010 Graz, Austria

ABSTRACT

Solifluction is a widespread periglacial phenomenon. Little is known about present solifluction rates in Austria. The author monitored five solifluction lobes during a four-year period. Annual rates of surface velocity, vertical velocity profiles, depths of movement, and volumetric velocities were quantified using near-surface markers and painted lines. Environmental conditions were assessed using air temperature, soil texture, and ground temperature-derived parameters. The latter were used to estimate the relevance of needle-ice creep, diurnal frost creep, annual frost creep, and gelifluction. The mean surface velocity rates were 3.5–6.1 cm yr⁻¹ (near-surface markers) and 6.2–8.9 cm yr⁻¹ (painted lines), respectively, indicating a high relevance of needle-ice creep. The mean depth of movement was 32.5–40 cm. The mean volumetric velocities were 71–102 cm³ cm⁻¹ yr⁻¹. Solifluction rates at the five sites did not correlate with each other due to site-specific controls. No statistically significant correlations were quantified between solifluction rates and different environmental parameters due to data gaps and short time series, thus highlighting the importance of long-term monitoring. Nevertheless, the results suggest that longer zero curtain periods, longer seasonal ground thawing periods, later start of the seasonal snow cover, more freeze-thaw cycles, and cooler early summer temperatures promote solifluction.



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Permafrostmonitoring Grazer Gruppe – Wohin?

STATE OF THE CLIMATE
IN 2020

STATE OF THE CLIMATE
IN 2021

State of the Global Climate
2023

State of the Global Climate 2023

WMO-No. 1347

Permafrost

ESSENTIAL CLIMATE VARIABLE (ECV)

Products: Permafrost Temperature (PT);
Active Layer Thickness (ALT);
Rock Glacier Velocity (RGV)

Glaciers

ESSENTIAL CLIMATE VARIABLE (ECV)

Products: Glacier Area;
Glacier Elevation Change;
Glacier Mass Change

ENVIRONMENTAL RESEARCH
LETTERS

LETTER

Acceleration and interannual variability of creep rates in mountain permafrost landforms (rock glacier velocities) in the European Alps in 1995–2022

Andreas Kellerer-Pirklbauer^{1*}, Xavier Bodin², Reynald Delaloye³, Christophe Lambiel⁴, Isabelle Gärtner-Roer⁵, Mylène Bonnefoy-Demongeot⁶, Luca Carturan^{7,8}, Bodo Damm⁹, Julia Eulenstein¹⁰, Andrea Fischer¹⁰, Lea Hartl¹⁰, Atsushi Ikeda¹¹, Viktor Kaufmann¹², Karl Krainer¹³, Norikazu Matsuoka¹¹, Umberto Morra Di Cella¹⁴, Jeannette Noetzi¹⁵, Roberto Seppi¹⁶, Cristian Scapozza¹⁷, Philippe Schoeneich¹⁸, Martin Stocker-Waldhuber¹⁸, Emmanuel Thibert⁹ and Matteo Zumiani¹⁹

