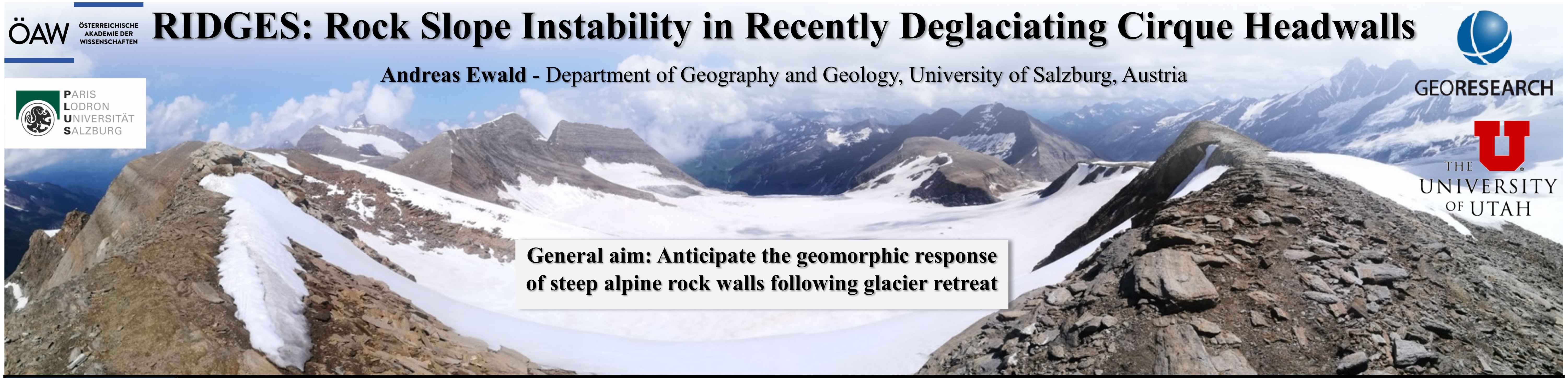


RIDGES: Rock Slope Instability in Recently Deglaciating Cirque Headwalls

Andreas Ewald - Department of Geography and Geology, University of Salzburg, Austria

General aim: Anticipate the geomorphic response of steep alpine rock walls following glacier retreat

Background

The focus of the proposed research is on recently deglaciating and rapidly reacting, unstable rock slope systems that may endanger people and infrastructure in the near future. These rock slope systems share a distinct **topography** but differ in **material properties**, experience fundamental cryospheric change and thus **destabilise** by a multitude of **processes**, ultimately leading to **failure**. Following a multi scale approach, each of these different aspects of rock slope instability is addressed by a specified work package presented below.

Work Packages

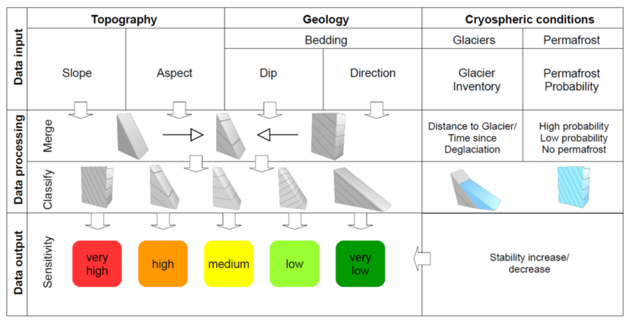
(i) Preconditioning

Specific Aims

Where rock slopes respond rapidly to glacier retreat may depend largely on their inherent conditions such as topography, rock structure and lithology. The aim is to **identify** and **characterise** cirque glacier **headwalls** on a broad spatial scale by their topography, geology, permafrost occurrence and glacial occupation.

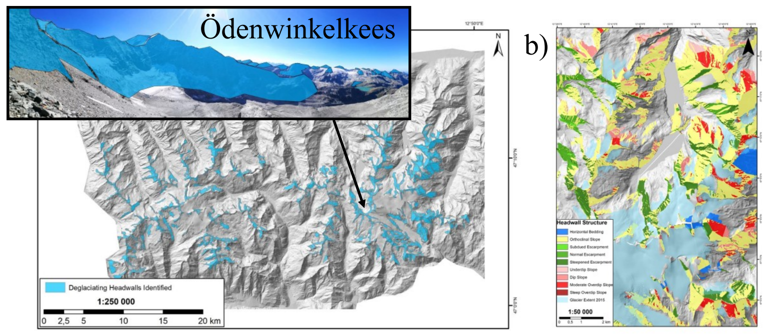
Methods

Object-based image analysis (**OBIA**) for headwall detection and **GIS**-based approach for further headwall characterisation



Delivery/ Output

Regional scale maps of a) identified and b) characterised headwalls



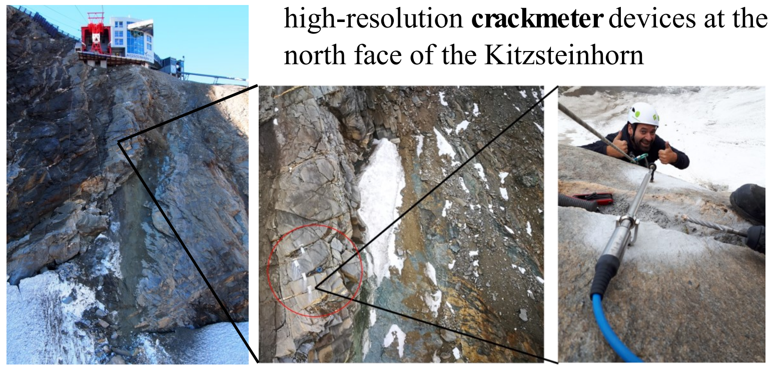
(ii) Destabilising Processes

Specific Aims

As soon as formerly glaciated rock slopes are exposed, destabilising processes such as frost cracking and thermomechanical deformation initiate or intensify. A novel monitoring setup enables to **decipher** and **quantify destabilising processes** in a recently deglaciated and highly unstable headwall section at the Open Air Lab Kitzsteinhorn.

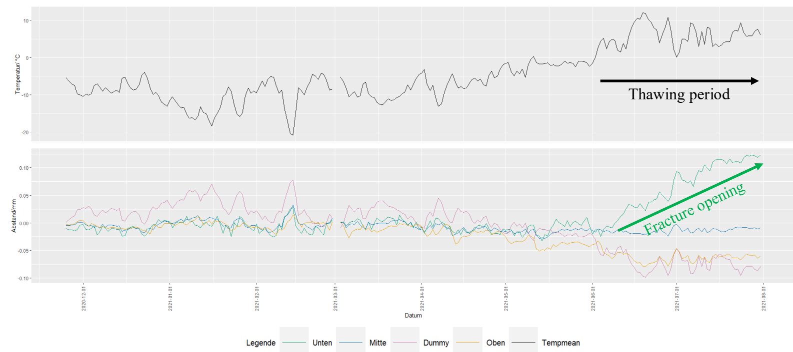
Methods

Monitoring of fracture kinematics with high-resolution **crackmeter** devices at the north face of the Kitzsteinhorn



Delivery/ Output

Continuous monitoring network in a recently deglaciating headwall



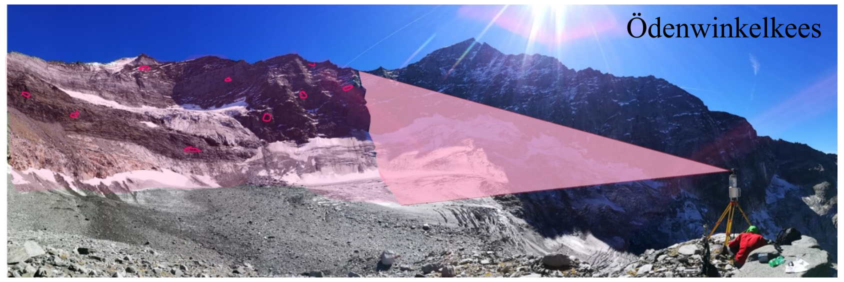
(iii) Rock Slope Failure

Specific Aims

To date, datasets of rockfall from recently deglaciating headwalls barely exist, but pioneering studies point towards an immediate response of freshly exposed rock surfaces. Extensive laserscanning campaigns at four different cirque settings aim to **detect** and **quantify rockfall** and reveal which headwall characteristics most significantly affect instability.

Methods

Annually repeated **laserscanning** campaigns at four study sites within the Hohe Tauern Range, Austria, enable detection of rockfall scars and associated rockfall volumina from deglaciating cirque headwalls



Delivery/ Output

Extensive data base of rockfall events in deglaciating cirques