

Graz University of Technology  
Institute of Rock Mechanics and Tunnelling

# Master thesis (MT, 30 ECTS)

**Working title** Engineering geological and geomechanical analysis of a rock slope in the Ödenwinkelkees – Focus on the determination of the discontinuity network and its characteristics

## Description

It's all about the rock slope shown in the following photograph:



The slope is situated in the Ödenwinkelkees, a glacier in the Glockner group in Salzburg. A very long time ago this rock slope has been covered by ice. Ever since the glacier melts continuously (neglecting seasonal variations and ice periods) and on some day revealed this rock slope exposing it to weathering. The rock mass illustrated in the photograph has not failed yet but features a network of discontinuities of different kinds which makes various blocks prone to failure along shear planes, to block toppling or to a combination of both. The probability that one, two or more blocks fail anytime soon, depends on several conditions. Some of these are: persistence of discontinuities; linkage of discontinuities and related possibilities for water to pile up and to impose pressure on the system; shear resistance along discontinuities; tensile strength of the intact rock block and of rock bridges.

The student(s) should complete following tasks:

- Literature study: "How can the discontinuity persistence be obtained in situ?" (state of the art)
- Identification of methods to measure/obtain the persistence of discontinuities; if required incorporate additional project partners and/or invite offers for geophysical measurements
- Mapping of the rock slope: discontinuity orientation, characteristics of the discontinuity surface, flow of water, discontinuity thickness and length, discontinuity filling, etc.
- Data acquisition and analysis: temperature, rainfall, snowfall, height of the snow cover, data from laboratory tests on rock and discontinuities (from pumped-storage power plant project Weißsee/Tauernmoossee by the Austrian Federal Railways), earthquake magnitude and occurrence
- Evaluation of images (satellite images, photographs from UAV flights)
- Construction of a 2D- (several cross-sections) or 3D model of the rock slope (focus on the discontinuity network and especially on the discontinuity persistence)
- Preliminary- and final presentation and written report (master thesis)

Depending on the working load the thesis will be split into several theses. The thesis can be combined with a master project (preliminary study).

At a later stage, the rock slope shall be analysed numerically and probabilities of failures shall be determined.

**Requirements** Passion for field work and data analysis; Interest for "giving unusual methods a try" (determination of discontinuity persistence)

**Supervision** Thomas Geisler & Alexander Kluckner | *Graz University of Technology*  
Gerald Valentin | *Geological Survey of Salzburg*

**Start** Immediately / by agreement

**Duration** approx. 6 months

**Contact** Thomas Geisler (+43 (0) 316 / 873 8615, geisler[at]tugraz.at)