

# **COGEAR**

## **MODULE 3:**

### **Overview of existing data in the Matter valley (soil slopes)**

**Del. No.: 3b.3.1.1**

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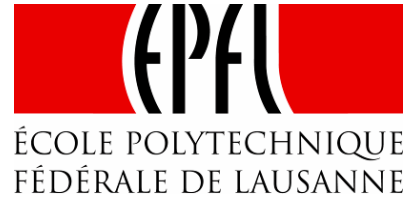
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## **COGEAR: Coupled seismogenic GEohazards in Alpine Regions**

### **Deliverable 3b.3.1**

#### **Overview of existing data in the Matter valley (soil slopes)**

J. Eichenberger, A. Ferrari, C. Schurmann, L. Laloui

**March 2010**

## 1. Introduction

The document summarizes the existing data available on soil slopes for the Matter Valley with reference to the activities of the Task 3b.3 of the COGEAR project. A complementary document (deliverable 3b.2.1) describing the available data with particular reference to the rock slopes was prepared by the Engineering Geology group of the ETHZ. Detailed information on the topographic and geological maps has been already described in that document and will only be briefly revisited here.

A few sites have been investigated in details. The data, maps and cross sections belonging to these investigations were included in the present document and are cited in footnotes.

All data described in this document are available on the project database ([swissgear.ethz.ch/cogear](http://swissgear.ethz.ch/cogear)). Information can either be visualised on maps or as metadata. All maps are used under the agreement between COGEAR and Swisstopo (nr. 5704000000).

Investigations on soil and surface deposits are unfortunately not numerous in the area of interest (Figure 1). This is mainly due to the characteristics of the area: it is situated at an altitude where slopes are often bare or only covered by thin soils. However, slopes close to the valley's bottoms are often covered with extensive quaternary deposits (moraines, talus screens, lake sediments, alluvial fans ...), which are subjected to mass movement. This is typically the case in the Matter Valley.



Figure 1: Map showing the area of interest within the Matter Valley

## 2. Topographic and Geological data

The topography and geological data (maps, DEMs, aerial photographs, geological data) come from the public domain and have been described in Deliverable 3b.2.1. The available maps in the COGEAR database are:

- Geological atlas (geological maps 1:25000);
- DHM 25 gray (Digital Height Model, resolution 25m in gray shades);
- DHM coloured (Digital Height Model, resolution 25m coloured);
- PK maps (Topographic map);
- Swissimage and Spot (two different kinds of aerial photograph);
- Landsat images;
- Shaded relief.

## 3. Data from previous studies

The available information about soils mainly comes from the private domain. A few sites have been investigated for water or heat resources, decontamination or for geotechnical expertises. These investigations comprise both surface and in-depth surveys. They are briefly presented here.

### ***Boreholes***

Information about the type of soil and existing structures mostly comes from boreholes. In the area of interest, there are two sites where boreholes were drilled: around the village of Grächen (altitude of approx. 1600m) and in the Rhône Valley (altitude of about 650m).

In Grächen, four boreholes between 50 and 76m were drilled in order to assess the water resources of a large terrace of sediments about 100-150m thick. These boreholes were performed by *Ospag AG* in Brig. The emplacement of these boreholes is presented in Figure 2. Two reports were produced by the company about the geology and hydrogeology of the area<sup>1</sup>.

Several boreholes exist in the Rhône Valley. They come from different projects and were realised by different companies. Data on them were collected by the IGT at ETHZ and have been inserted in the COGEAR database.

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<sup>1</sup> Wasserbeschaffung für die Gemeinde Grächen, Trinkwasserfassung FB /Meisen : Hydrogeologischer Bericht. 28 Februar 1997

Wasserbeschaffung für die Gemeinde Grächen, Trinkwasserbohrungen in den regionen "Meisen" und "Taa": Hydrogeologischer Bericht. 17 September 1997

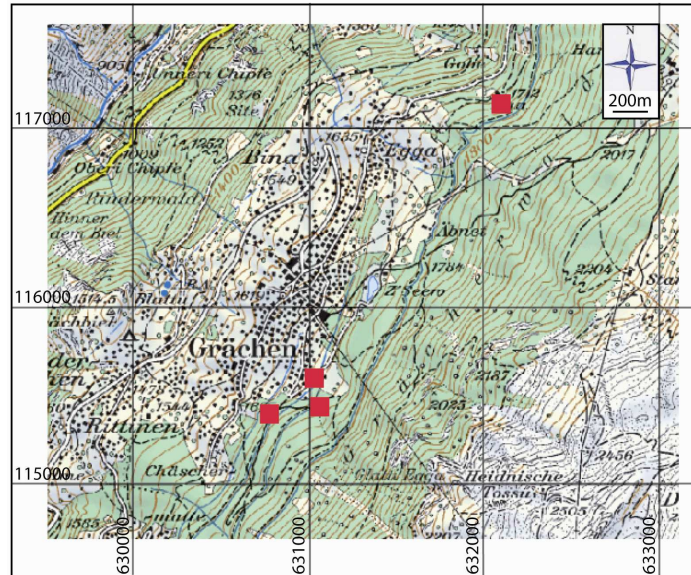


Figure 2: Location of the boreholes in Grächen (Image from the GOGEAR database)

Every borehole comes with a complete set of metadata summarizing:

- the location of the borehole (in exact coordinates and by reference to the commune);
- the date when it was drilled;
- the type of borehole (destructive or drilled);
- the purpose of the borehole (geotechnical, hydrogeological...);
- the project it is associated with (construction, research...);
- the kind of device (if any) is installed in the borehole;
- the associated analyses (water, pollutants);
- the associated offices, laboratories, authorities and references...

An example of borehole with its description as it appears in the database is presented in Figure 3.

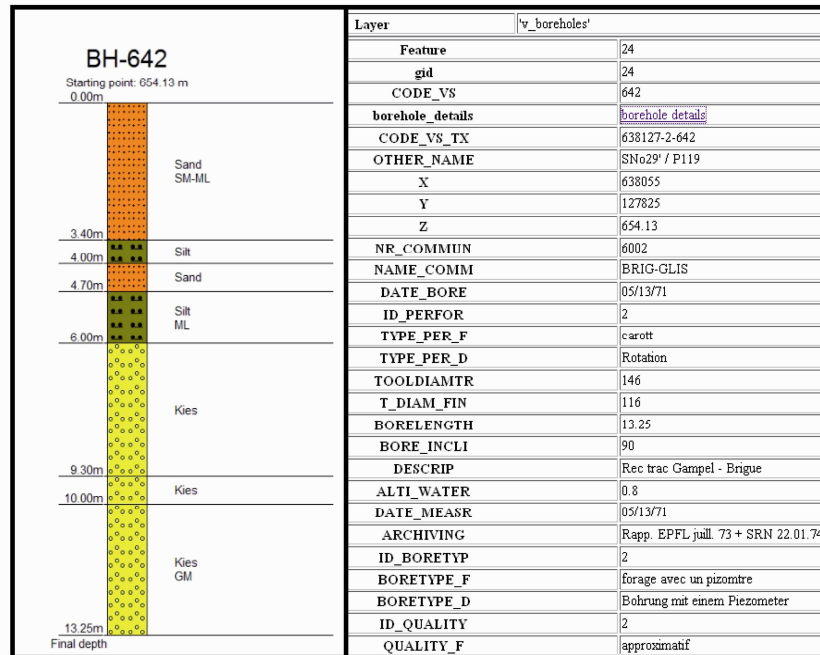


Figure 3: Example of borehole in the Rhône Valley and the descriptive document (from the COGEAR database)

### Displacement data

The whole slope around Grächen is a large landslide which was further investigated. The area is known for a long time for being in movement. A detailed map with two cross sections was provided within the VERSINCLIM project<sup>2</sup> (Figures 4 and 5). During the same project, data on displacements were collected by the *Institut de Géodésie et Mensurations* of the EPFL<sup>3</sup>. Data were obtained comparing the positions of trig points in 1930 with their positions in 1992 assessed by GPS measurements. No information is available on the positions of those points between the two measurement campaigns. 12 points were considered of whom 3 were assumed as fixed. Positions of trig points and displacement vectors are reported in Figure 6.

<sup>2</sup> Noverraz F, Bonnard C, Dupraz H, Huguenin L (1998) Grands glissements de versants et climat—VERSINCLIM—Comportement passé, présent et futur des grands versants instables subactifs en fonction de l'évolution climatique, et évolution en continu des mouvements en profondeur. In: Rapport final PNR 31, pp 314.

<sup>3</sup> Institut de Géodésie et Mensurations/EPFL, 1993, Etude de la stabilité du Plateau de Grächen, PNR 31: VERSINCLIM.

These data concerning displacement integrated in the COGEAR database are the following:

- The position of the trig points;
- The displacement in mm;
- The orientation of the displacement vector (in clockwise rotation from North);
- The author of the data and his contact;
- Comments on the measurements.

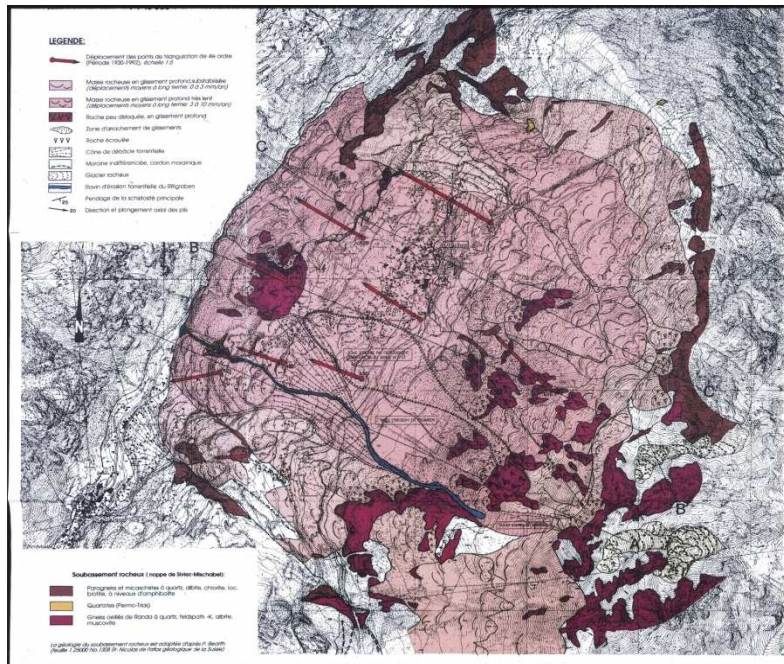


Figure 4: Map of the Grächen landslide.

Deliverable 3b.3.1 - Overview of existing data in the Matter valley (soil slopes)

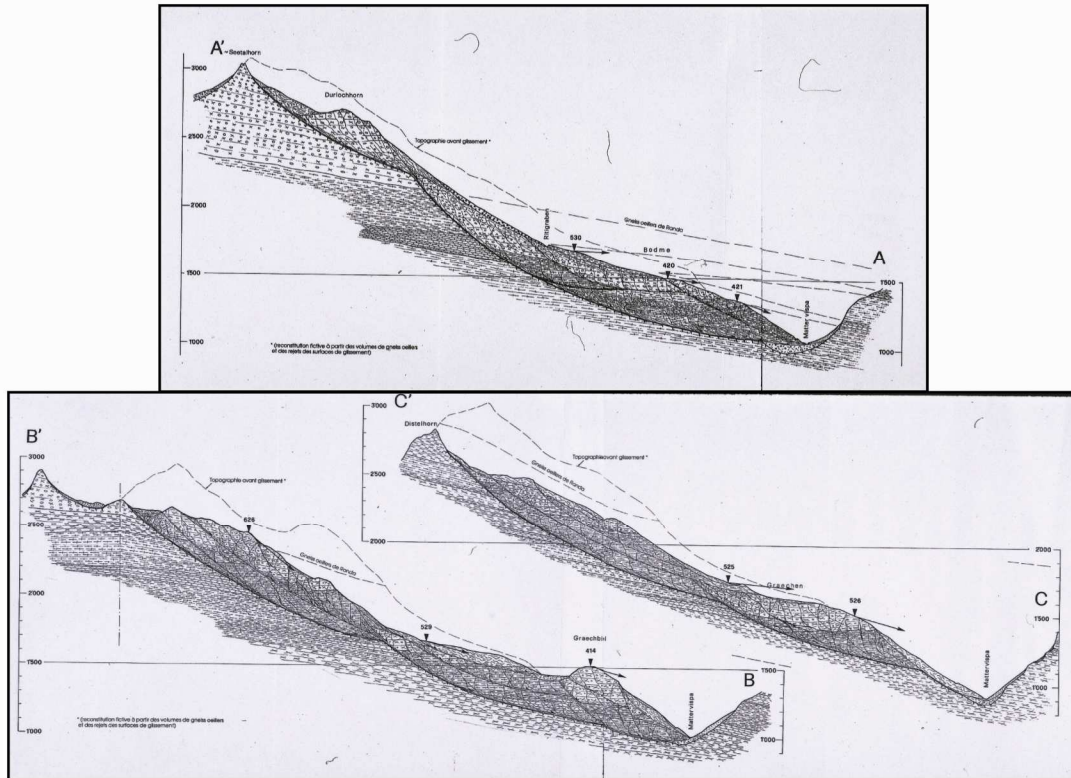


Figure 5: Cross sections of the Grächen landslide. Positions of the cross sections are indicated in Figure 4.

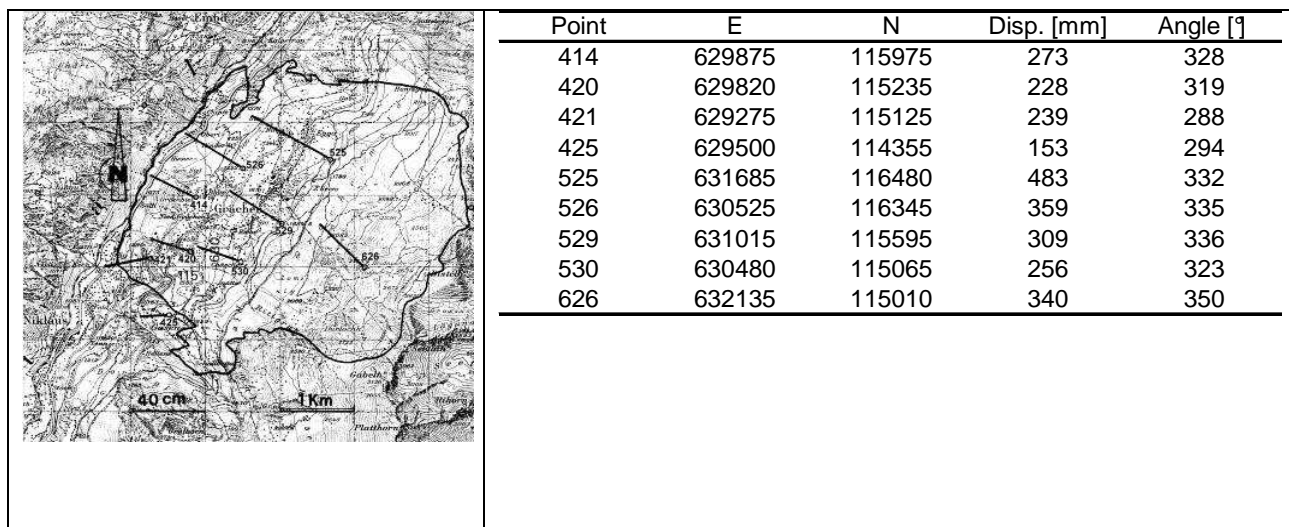


Figure 6: Position of the trig vectors on the Grächen landslide