

# **COGEAR**

## **MODULE 3:**

### **Archive review of landslide data in Western Swiss Alps Del. No.: 3b.3.5**

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Competence Center Environment and Sustainability

COGEAR: COUpled seismogenic GEohazards in Alpine Regions

MODULE 3 – Deliverable 3b.3.5

# Archive review of landslide data in Western Swiss Alps

Authors: L. Chao, Dr F. Dupray, Prof. L. Laloui

### Deliverable 3b.3.5

Four possible slopes are identified from achievements in the laboratory of soil mechanics at EPFL. Two of them are soil-type landslides and the rests are rock-type landslides.

General description of the site is firstly addressed in which name, location, type of landslide and maximum elevation are mentioned. Available drilling boreholes' details are followed for each landslide. Valuable information such as hydrology situation, geology description, geophysics test results and borehole coordinates is listed in the tables. It should be noticed that for some sites, the coordinates of drilling are not exact values but approximate ones by re-location of these drillings in the Swiss reference grid, referring to the map with indication of borehole location. It then shows the measurement date of each borehole if available in order to check displacement variation before and after a known earthquake, or to be linked with weather data.

After that, some interesting information for landslide analysis is mentioned such as geodesic measurement, photogrammetry measurement and displacement maps, geology atlas, geology profile of slope.

All these information has been made available in the COGEAR database with the help of Cristina Iosifescu and Ionut Iosifescu from IKG (ETHZ).

Archive review of landslide data in Western Swiss Alps

Landslide No.1	Region	Type	Location	Elevation
Hérémente	Thyon-Hérémente-Mayens	Soil landslide (moraine)	Above the city of Sion in Valais	2000m a.s.l in maximum

No.Inclinometer (measurement on 1983 and 1984)	Depth of measurement (m)	Water table indication	Geology description	Geophysical test results (mass, water content ,saturation, cohesion, friction angle)	Coordinate. (re-localization in SwissTopo)	
HE1	37	Yes	Yes	No	E596962	N113408
HE2	74	Yes	Yes	Yes	E597207	N113961
HE4	28	Yes	Yes	No	E597285	N114495
HE5	60	Yes	Yes	Yes	E596641	N115003
HE6	37	Yes	Yes	Yes	E597285	N115355
HE6 bis	25	Yes	Yes	No	E597229	N115302
HE11	111	Yes	Yes	Yes	E596289	N114721

Date of inclinometer measurement										
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
HE1	02.12.83	22.12.83	10.01.84	08.02.84	07.03.84	13.04.84	11.05.84	20.06.84	23.07.84	24.08.84
HE2	02.02.84	07.03.84	13.04.84	11.05.84	20.06.84	23.07.84	24.08.84			
HE4	21.12.83	10.01.84	08.02.84	07.03.84	13.04.84	11.05.84	20.06.84	23.07.84		
HE5	21.12.83	10.01.84	07.03.84	13.04.84	17.05.84	20.06.84	23.07.84	24.08.84		
HE6	07.03.84	13.04.84	11.05.84	20.06.84	23.07.84	24.08.84				
HE6bis	22.02.84	07.03.84	13.04.84	11.05.84	20.06.84	23.07.84	24.08.84			
HE11	22.12.83	10.01.84	11.05.84	17.05.84	20.06.84					

Geodesic measurement	Duration	Displacement	Velocity	Orientation
	1922,33,80,81,82	Yes	Yes	Yes
	Measurement Point	Coordinate		Elevation
	159	E599093	N115883	1249
	191	E598339	N113491	998
	192	E598556	N113748	928
	175	E596329	N114243	1676
	180	E597278	N113969	1248
	183	E597058	N113417	1244
	1	E596963	N114161	1420

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	154	E596234	N114890	1704
	155	E596558	N115054	1546
	156	E597277	N115498	1169

Photogrammetry measurement	Duration	Surface (km <sup>2</sup> )	Displacement	Velocity	Orientation
		1980,1974,1969,1958	7	Yes	Yes
	Measurement Point	Coordinate		Comment	
	1	E597080	N113180	In total, there are more than 300 points in the region. Here are listed the reference points (or the important points selected by the geology engineers) during the study.	
	2	E597150	N113300		
	3	E596760	N113210		
	4	E597000	N113190		
	5	E597090	N113190		
	14	E597060	N113110		
	15	E597200	N113180		
	16	E597095	N113240		
	17	E597050	N113240		
	18	E597040	N113180		
	19	E596850	N113220		
	20	E596695	N113260		
	21	E596730	N113240		
	22	E596580	N113285		
	24	E597100	N113200		
	25	E597105	N113205		
	183	E597050	N113420		
	X	E596960	N113420		

Map	Geology atlas	Displacement
	No	Yes

Landslide No.2	Region	Type	Location	Elevation	Already slid ?
La Ridda-Iserable	Left bank of the Rhone Valley	Rock-slide	15km upstream from the town of Martiny	Between 490m and 670m a.s.l in maximum	Yes. On 04-05.1985

Map	Geology atlas	Geology profile
	Yes	Yes

Measurement of velocity of the upper mass	Measurement of displacement of the upper rock mass	Coordinate of the center of rock falling mass		Material test of falling rock
Yes, the results are available discontinuously in 1985	Yes, displacement-time curve is available from 1985-1989	E584989.30	N113946.03	Yes, results on c and phi.
28-31.08.85 01-15.09.85 16-30.09.85 01-10.10.85	Continuously from 19.11.85 to 03.06.1989			

Landslide No.3	Region	Type	Location	Elevation	Precipitation Monthly data
La Halde	Saas Fee	Rock-Land-slide	Very close to the city of Saas Fee	2053m a.s.l in maximum	Available 1950-1979

No.Inclinometer (measurement on 1985-1987)	Depth of mesurement (m)	Water table indication	Geology description	Geophysical test results	Coordinate. (re-localization in SwissTopo)	
S4(SF 3)	28.65	Yes	Yes	No	E637422	N106509
S5(SF12)	57.30	Yes	Yes	No	E637524	N106633
S6(SF14)	45.11	Yes	Yes	No	E637149	N106689

DATE OF MEASUREMENT						
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
S4	22.11.84	12.06.85	01.07.86	24.06.87	23.08.88	13.07.89
S5		12.06.85	01.07.86	24.06.87	23.08.88	13.07.89
S6	22.11.84	12.06.85	01.07.86	24.06.87	23.08.88	13.07.89

Photogrammetry measurement	Duration	Surface (km <sup>2</sup> )	Displacement	Velocity	Orientation
	1962, 1977	-	Yes	Yes	Yes
Measurement points	There are more than 400 points selected in the area from [E637000, N10600] to [E638000, N107000]				

Map	Geology atlas	Geology Profile	Displacement
	Yes (too dark, in german)	Yes	Yes

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Landslide No.4	Region	Type	Location	Elevation
Arveyes	Arveyes (Alpes, Vaud)	Soil landslides	Center of Arveyes	1252m a.s.l in maximum

No.Inclinometer (measurement on 1982-1991)	Depth of mesurement (m)	Water table indication	Geology description	Geophysical test results	Coordinate.	
AR1	64.80	Yes	Yes	Yes	E571220	N126377
AR2	45.00	Yes	Yes	Yes	E571040	N126645
AR3	57.70	Yes	Yes	Yes	E571085	N126412
AR4	51.60	Yes	Yes	Yes	E571000	N126259
AR5	69.10	Yes	Yes	Yes	E571329	N126364
AR6	83.50	NO	NO	NO	E570900	N126430
AR7	88.40	NO	NO	NO	E571321	N126573

DATE OF MEASUREMENT										
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
	Day 11	Day 12	Day 13	Day 14						
AR1	29.11.82	12.01.83	02.03.83	04.05.83	09.06.83	14.09.83	09.11.83	18.04.84	17.07.84	21.11.84
	14.11.86	09.07.87	21.10.87	25.05.88						
AR2	15.07.82	11.08.82	29.11.82	06.05.83	09.06.83	12.01.83	09.11.83	18.04.84	06.08.84	21.11.84
	02.05.85	14.05.86	09.07.87							
AR3	29.11.82	02.03.83	12.01.83	02.03.83	06.05.83	09.06.83	14.09.83	09.11.83	18.04.84	17.07.84
	21.11.84	02.05.85	29.10.85	14.05.86	14.11.86	09.07.87	21.10.87	25.05.88	20.06.89	
AR4	29.11.82	12.01.83								
AR5	29.11.82	02.03.83	12.01.83	02.03.83	04.05.83	09.06.83	15.09.83	09.11.83	18.04.84	17.07.84
	21.11.84	02.05.85	29.10.85	14.05.86	14.11.86	09.07.87	21.10.87	25.05.88	20.06.89	03.07.91
AR6	15.07.83	14.09.83	09.11.83	18.04.84	17.07.84	21.11.84	02.05.85	29.10.85	14.05.86	14.11.86
	09.07.87	21.10.87	25.05.88	20.06.89	03.07.91					
AR7	15.09.83	09.11.83	15.12.83	17.07.84	21.11.84	02.05.85	29.10.85	14.05.86	14.11.86	09.07.87
	21.10.87	25.05.88								

Map	Geology atlas	Geology Profile	Displacement
	Yes	Yes (3 sites)	Yes