

THE 3-REGIONS WORKING GROUP SLOPE INSTABILITIES (SlopeIn); COMMON LANGUAGE, COMPARABLE HAZARD MAPPING AND SHARED EXPERIENCES ACROSS EUROPE.

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INTRODUCTION

In the year 1992 the Geological Surveys of Emilia-Romagna, Catalonia and Bavaria started an informal and innovative collaboration in the fields of the Earths Science and Information Systems that led to the organisation of conferences in Bologna (1994), Barcelona (1997), Munich (2000) and Bologna (2003). Based on this collaboration programme an Agreement Protocol between the Freistaat Bayern, the Regione Emilia-Romagna and the Generalitat de Catalunya was signed in November the 19th, 2004. Amongst others one of the main targets of the protocol was to “assess hazards, minimising risks and maximising awareness to enhance sustainable development and quality of life”. The protocol was signed by the responsible politicians of the three regions and following conferences in Barcelona (2006) and Munich (2009) were organised. At the last conference in Munich the Organising Committee decided to implement different working groups in order to strengthen the collaboration in particular areas of interest of the three regions. One working group was called “Land Instabilities”. The authors of this paper, who were responsible for the working group, started to plan activities and projects in the beginning of 2010 always taking the focus on the main agreements mentioned in the Agreement Protocol of 2004:

- continuing with the organisation of congresses and international meetings to stimulate the exchange of knowledge and methodologies between technicians and scientists of Europe and the Circum-Mediterranean area
- promoting technical and scientific projects focused on the definition of standards in hazard assessment and mapping
- organising joint advanced technical and professional training activities to implement the available

technologies and adopted methodologies by each survey, particularly in the sector of information systems and applied earth science mapping

- promoting common initiatives to make general geological information available and understandable to a wider public, working in particular to enhance the geological heritage of Emilia-Romagna, Catalonia and Bavaria
- submitting to the European Community and to other institutions common projects in the field of geosciences
- involving in their activities and in the international projects other partners coming from East-European and Circum-Mediterranean countries.

Following the common activities are described:

ACTIVITIES

In the context with the Interreg-Project AdaptAlp, co-financed by the European Union, in the Work Package 5 different common activities of the three regions have been realised between 2010 and 2012. Beside **harmonization of terminology** concerning landslides an important issue tackled by this Work Package was to create **minimum requirements for hazard mapping** for geological risks. Due to the long lasting collaboration of the three regions it was self-evident to profit from this relationship and to invite the geological surveys of Emilia-Romagna and Catalonia as official observers, to take part in the project. Bavaria had the role of Project Partner (LfU) and Lead Partner (StMUG) of the Alpine Space Project. In order to cover also the standards and requirements for hazard mapping of Catalonia and Emilia Romagna, it was a great benefit for the whole AdaptAlp Project, due to the experience in the range of landslides in Apennine and Pyrenean areas.

To harmonise the terminology an obvious possibility was to create a web-based multilingual glossary, taking the most important languages of Europe into account. For Italian and Spanish (Catalan and Castellan) language the geological

Surveys of Emilia Romagna and Catalonia took the responsibility. For German language (Germany) the Bavarian Environment Agency was responsible.

MULTILINGUAL GLOSSARY

Purpose and motivation for the glossary were the difficulties when using or defining mass wasting related terms in scientific papers. This results in different methods and concepts being used by geological surveys and leads to misunderstanding and problems when cooperating on international projects. In order to tackle that complexity and ambiguity, found not only in the German-speaking geology, but generally throughout Europe, a multilingual glossary was created. This glossary aims at an international harmonization by providing the user with a selection of official terms used by the geological surveys in the specific country and by setting relations to similar terms employed in other countries.

To fill the complex database-structure of the glossary the approach in getting the topics had central importance. Unlike many other glossaries, which are rather dictionaries working with direct translation, this glossary is consisting of terms definitions and explanations, which are not necessarily have to be part of a scientific nomenclature or literature, but really be used by the official surveys within the involved countries.

In order to facilitate this filling process all the terms were structured in different topics. To simplify the comparability between the languages this classification was very useful. For example it is much easier to get the Italian or Catalan term for "Stauchwulst" if the responsible of the respective region knows that one is searching for an accumulation term. This topical limitation helps the translator to get the different experts on the right track.

Basically the data acquisition was made within short visits in the involved countries. Building on the German "Basic-list" within these talks "term after term" was discussed with the respective persons responsible. Especially in this work the relation between the three regions based on our collaboration was very helpful. The elaborated terms were related in the following three forms:

- Same meaning (The term has the same meaning in both languages)
- Similar meaning (The term has a similar meaning in both languages)
- Not existing (No term with the same or similar meaning does exist)

Altogether the major findings of this glossary can give an important contribution to one of the main goals of our collaboration, namely the improvement of the cooperation by the three

regions in dealing with geological hazards by finding a common language.

The screenshot shows a web interface for a multilingual glossary. It is divided into three main sections:

- 1. scegli la lingua**: A section for selecting the source and target languages. It shows 'lingua di partenza' (source language) and 'lingua finale' (target language) with dropdown menus containing flags for DEU, SUI, AUT, FRA, ITA, SVN, ESP, GBR, and CAT.
- 2. scegli il termine**: A section for selecting a term. It features a horizontal menu of letters (A, B, C, D, E, F, G, I, K, M, P, R, S, T, U, V, Z) and a list of terms, with 'Coronamento' highlighted in orange.
- 3. definizione**: A table comparing terms across languages. The table has columns for 'termine', 'traduzione', and 'lingua finale'. The 'lingua finale' dropdown is set to 'CAT'. The table shows the German term 'Coronamento' and its Catalan translation 'Cicatriu'.

At the bottom, there is a legend with icons for 'legenda', 'sinonimo', 'termine simile', and 'traduzione letterale'.

Figure 1 – Screen shot of the Multilingual Glossary <http://www.lfu.bayern.de/geologie/massenbewegunge/n/glossar/index.htm>

MINIMUM REQUIREMENTS OF GEOLOGICAL HAZARD MAPPING

In dealing with geological hazard today geotechnical (active) and spatial (passive) measures are applied to minimize risk. Because of time limitation of active measures (e.g. protective walls and catch fences) and the decrease of space for permanent settlements, spatial planning gets more and more important. Countless types of susceptibility and hazard maps are produced to all kinds of risks. With regard to natural hazards especially for geological processes a large variety of maps and methods are used in our countries to prevent from natural disasters. Exactly this variety, which reaches from simple susceptibility mappings to legally binding "Hazard Zone Plans", requires a development of a "least common denominator" which includes the minimum requirements for the creation of susceptibility and hazard maps.

Within an expert hearing in Bolzano the Land Instability Working Group "SlopeIn" met with other representatives from the AdaptAlp Project, presenting their "status quo" in dealing with

geological hazards. The main outputs of this hearing were published in a joined publication within the Journal of "Torrent and avalanche control" in Austria. The "state of the art" contributions from each involved region are shown in this publication.

To come to minimum requirements for susceptibility and hazard maps in a **first step** the definition of these maps had to be given:

Landslide Susceptibility Map Level 1

A Landslide Susceptibility Map (Level 1) is used for the first identification of areas showing conflicts of interests or areas under suspicion to be hazardous. It is a map created on objective, scientific criteria with information on hazard susceptibility, which are not analysed, identified and localised in detail. With empirical, statistical or deterministic methods these maps show the basic disposition for the development of landslides. In general only the potential detachment zone of the landslides is shown and no classification of different hazard levels (probability and intensity) is done.

Landslide Susceptibility Map Level 2

A Landslide Susceptibility Map (Level 2) is used for the first identification of areas showing conflicts of interests or areas under suspicion to be hazardous. It is a map created on objective, scientific criteria with information on hazard susceptibility, which are analysed, identified and localised. With empirical, statistical or deterministic methods these maps show the basic disposition for the development of landslides. In general the whole process areas of the landslides and the propagation areas are shown (potential detachment and runout zone) and no classification of different hazard levels (probability and intensity) is done.

Hazard Map

A Landslide Hazard Map builds the base for urban land use planning and the development and the costing of protective measures. It is a map created on objective, scientific criteria with information to hazard, which are analysed, identified and localised in detail. With empirical, statistical or deterministic methods in general the whole process areas of the different types of landslides, including the propagation areas are considered (potential detachment and run out zone) and a classification of different hazard levels based on probability and intensity is done.

In a **second step** the existing maps of the particular countries were allocated to the definitions, so that it was easy to see, how comparable the maps are and even though they

have different names and contents, how they are corresponding to the elaborated definitions.

Country	Process	Landslide Suscep. Map (L1)	Landslide Suscep. Map (L2)	Hazard Map
Germany (Bavaria)	slide		Susc. Map (1:25.000)	
	fall		Susc. Map (1:25.000)	
	shallow landslides		Susc. Map (1:25.000)	
Italy (Emilia Romagna)	slide		Susc. Map (1:10.000)	
	fall			
	shallow landslides	Susc. Map (1:10.000)		
Spain (Catalonia)	slide		Geological Risk Prevention Map (1:25.000)	
	fall		Geological Risk Prevention Map (1:25.000)	
	shallow landslides		Geological Risk Prevention Map (1:25.000)	

Figure 2 – Existing maps in the three regions corresponding to the given definitions

In a **third step** the minimum requirements for these maps were elaborated. For example a landslide inventory, a digital elevation model and optical areal photos are mandatory for every type of maps and landslide process as well as modelling for fall processes and shallow landslides. A complete overview of the minimum requirements can be seen and downloaded from the AdaptAlp homepage (<http://www.adaptalp.org>) under Final Reports (Final Report WP5 "Hazard Mapping").

TECHNICAL EXCURSION ON LANDSLIDES AND DEBRIS FLOWS IN CATALONIA

A further activity of the SlopeIn working group was the organization of an international excursion to landslide, debris flow and mine subsidence sites in Catalonia in October 2010. This activity was performed together with the "Munich Forum on Mass Movements". With the participation of 28 experts from geological surveys, water and road authorities and niversities of Catalonia, France, Austria and Germany this excursion was an excellent opportunity to complete the theoretical approach of our hazard map and glossary project with concrete situations in the field. The three day excursion was organised and guided by the collaborators of the Institut Geològic de Catalunya. It covered about 9 sites between Montserrat near Barcelona and Port de la Bonaigua in the north of Catalonia.

- Sallent
- Vallcebre
- Pont de Bar
- Guingueta
- Estany de Senyora
- Port de la Bonaigua
- Portainé
- Puigcercós
- Montserrat



Figure 3 – Excursion sites in Catalonia

By giving a profound insight into the country, into the geotechnical problems Catalonia have to deal with and into the work of the geological survey (Institut Geològic de Catalunya) and their collaborators (Universitat Politècnica de Catalunya, Universitat de Catalunya, Conselh Generau d’Aran, GEOCAT, Geobruigg) it was a very fruitful exchange of experiences and a perfect possibility to deepen the scientific and practice exchange of the specialists. The discussions on the different excursion sites between the experts of the different countries were very fruitful to all participants.

The Institut Geològic de Catalunya published the comprehensive excursion guide under the name “Münchener Forum Massenbewegungen. Excursion 2010 in Catalunya” (Codi: AP-060/10).



Figure 4 – Excursion site Portainé torrent with completely filled debris flow protection fences

SLOPE INSTABILITY SESSION IN THE EUREGEO CONGRESS 2012

The most actual activity of the SlopeIn working group is the organisation of the “Slope Instability session (Session 1) in the EUREGEO congress 2012. Taking the chairmanship the working group took the responsibility of this session. The great response of congress participants according to this session indicated the great importance of this topic. More than 35 submitted abstracts, including oral and poster presentations with reference to hazard and susceptibility mapping as well as remote sensing, monitoring and case studies, only for this session brought us to expand the session from a half-day in a full-day session. The long lasting collaboration of the SlopeIn group was very helpful in sharing the incoming works without problems.

SUMMARY

To give a résumé of the 3 years lasting work of the working group “Land Instability (SlopeIn)”, it has to be outlined, that the work of the SlopeIn group on the more detailed and subject-specific level was a big success. On the basis of the Agreement Protocol from 2004 it was possible to institutionalise the relationship between the three regions on a not only administrative level, but also on a topic related expert level. From our (SlopeIn group) point of view it was a very helpful and fruitful collaboration which is absolutely recommendable for other specialist fields. Even though thereby apparently assault more work for the persons in charge, the benefits of such collaborations are far beyond the disadvantages.

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