SIXTH FRAMEWORK PROGRAMME

Project no. 018412

IRASMOS

Integral Risk Management of Extremely Rapid Mass Movements

Specific Targeted Research Project

Priority VI: Sustainable Development, Global Change and Ecosystems

D5.5 – Final Project Report

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WSL Swiss Federal Institute for Snow and Avalanche Research

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Dissemination Level		
PU	Public	
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

SIXTH FRAMEWORK PROGRAMME
PRIORITY VI
Sustainable Development, Global Change and Ecosystems

SPECIFIC TARGETED RESEARCH PROJECT

INTEGRAL RISK MANAGEMENT OF EXTREMELY RAPID MASS MOVEMENTS

WORK PACKAGE 5:
INTEGRAL RISK MANAGEMENT

DELIVERABLE D5.5

Final Project Report

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1. Achievement of Scientific Objectives

Most of the scientific objectives of the IRASMOS project have been addressed within the project duration. All deliverables, which were proposed in Annex I could be finished. Some of the deliverables were slightly modified. The three deliverables originally proposed for work package 4 were summarized into one deliverable. The IRASMOS Summer School (D5.6) could not be conducted because of too few applications. Instead, an international conference was conducted in May 2008.

The submitted deliverables generally reflect the original goals of IRASMOS. There is a considerable amount of scientific papers, which has been elaborated, submitted or accepted by scientific journals. The contributions of WP1 to 3 can be considered as comprehensive overviews of the state-of-the-art, especially with regard to standard methods that have enjoyed long-standing applications in the IRASMOS partner countries.

However, some of the goals could not be fully achieved. The most important points are listed in the following.

In work package 2 the efficiency of the different countermeasures could not be well described. It turned out that the efficiency is very specific to a certain situation and a generally valid definition is therefore hardly possible. The same holds for the shortcomings or uncertainty of the design criteria, which must be individually assessed. Further development and investigations in this field are necessary.

In work package 4 the original aim to provide a universal vulnerability function (or a least a small set of functions) applicable to all rapid mass movement processes was not achieved. The analysis of the literature showed that the existing vulnerability functions base on rough assumptions and the scarceness of data did not allow deriving such a function. Although for rock avalanches the assumption could be made that vulnerability is “1” (total damage), considerable improvements would have been possible if data would have been available with respect to torrent processes and avalanches. Instead, we followed two directions.

First, an analysis of empirical data for torrent processes was conducted. Based on the results, a new empirical vulnerability function could be developed for a limited range of intensity values. The established empirical vulnerability function for torrent processes is a clear step forward – even if the amount of data available is still scarce, and the results might therefore only provide a first hint on the intensity-susceptibility relationship. The results of this study were published in scientific journals.

Second, an alternative, numerical, approach was developed. The reason for this development is the overall scarceness of data, as well as the fact that individual process characteristics are responsible for a major part of structural damage and economic losses. The scarceness of data is due to missing direct observations of process intensities for all studied mass movements, i.e., avalanches, debris flows, and rock avalanches. The developed numerical finite element based method for the simulation of the destruction process should allow the derivation of vulnerability functions even on the basis of a scarce data basis. The development could not be completed, and more research into the method is needed, along with empirical investigations, i.e. analysis of past damages and correlation of the observed damages with intensity. In the long term, the numerical and the empirical approach should be merged.

2. Achievement of Practical Objectives

There are a number of practical objectives, which have been achieved within IRASMOS. First of all, the establishment and/or improvement of the scientific network are among the important outcomes of IRASMOS. All of the deliverables are the results of collaborative work of several partners. The experience showed that the most effective way of collaborating is, when partners meet each other at one of the institutes for a concentrated work on a specific subject. Discussions are more fruitful, if the group works together for several days. The practical issue of actually bringing key partners together may be a point to be explicitly addressed in future proposals and projects.

During these discussions it became clear that there exists a significant divergence in technical jargon and terminology concerning especially the technical countermeasures against extremely rapid mass movements. This strikingly different reference to tools to mitigate risk from events strongly calls for efforts to harmonize not only the scientific terminology, but also the jargon that practitioners use when working on risk mitigation.

The key objective of many IRASMOS deliverables was to give an overview of the state-of-the-art in risk mitigation concerning extremely rapid mass movements. Hence, there are several deliverables that have for the first time collated such methods and approaches in a systematic manner. These deliverables can be deemed representative in that they have condensated the minimum information necessary to conduct risk mitigation.

There were some deliverables, which directly addressed the need of practitioners and which should be emphasized here. First, the expert workshop in Chamonix (D3.2) helped to identify the actual problems in risk management. The results of these workshops were an important basis for the SWOT-Analysis in D5.4 (work package 5).

Second, the decalogue (D3.3) summarises the most important ten points for hazard assessment of each of the IRASMOS processes. It represents an innovative and valuable tool for practice in terms of harmonisation of hazard mapping. Some additional work (content and harmonisation) could be put in here to further improve the benefits of this deliverable for the practitioners.

Third, the comprehensive presentation of vulnerability and the development of new vulnerability functions are an important outcome for practitioners, who are involved in risk assessment. With respect to practical application, the proposed empirical vulnerability function for debris flow will enable practitioners to use a quantitative relationship between process intensity (obtained from modelling) and damage susceptibility for the quantification of risk. In combination with the developed model we believe that the basis for the development of instruments (e.g., vulnerability functions) suitable for practitioners could be developed in the next years.

Fourth, the workshops in the IRASMOS countries for the SWOT-Analysis of the “Best-Practice Handbook” reflected the current state and the strengths and weaknesses in integral risk management of rapid mass movements in the partner countries. In this way, the results documented in the Best Practice Handbook indicate the open questions and the need for further research. In this respect also the technical report, presenting the state-of-the-art of risk-based planning of countermeasures, serves as a reference handbook; it also presents open research questions for the future.

And last but not least, the IRASMOS conference (D5.6) provided the possibility of presenting the project results but gave also the floor for discussions between researchers, practitioners and decision makers.

3. Self-evaluation of the Project

This section contains a self-evaluation of the overall success of the project as seen from the perspective of the coordinator and the work package leaders. Although a self-evaluation has strong subjective components, some of the key issues of collaboration are mentioned here.

All the involved partner institutions are renowned for their process related research in either the fields of snow avalanches, debris flow, and / or rock avalanches. Therefore, the fundamental goal of IRASMOS – not to further develop our process knowledge, but to assess the existing state of knowledge in view of its potential for a sound risk management, and to identify further questions for process related research – was known to be a considerable challenge to all partners from the beginning of the project preparation.

In respect to these preliminaries, the initialisation of the project was considered to be successful. For the achievement of the envisaged goals, the partners regarded the structure of the work packages, the work plan, the available time and the budget to be appropriate. From an organisational point of view, the administrative structure warranted a clear and successful management.

In the run of the first project period administrative delays and communication problems have been detected. These shortcomings have been met by a new organisational structure, which was then implemented by the coordinator, with the major change of integration of a deputy coordinator, which takes mainly care of project management. A scientific coordinator accompanied this position, and all management positions have been clarified in detail and communicated to the consortium. From the second project period onwards the coordinators took emphasis on steering committee and work package meetings to ensure better communication and cooperation.

During the course of the project it turned out that the engagement of the partners for collaboration was different. This led to the critical point that the initial foreseen funding of some partners did not fully agree with their scientific contributions. This means that very active and collaborative partners got the same funding than those partners, which were less collaborative.

A particular problem in this respect was the phase after a draft of a deliverable was sent out to the partners for revision. The willingness to adjust or revise the content/structure of the draft version of a deliverable after instructions from the coordinator and/or the work package leaders considerably varied. This, and the dealing with different opinions on contributions made the revision phase and the editing work very difficult and time consuming. Generally, the revision phase was hard to organise for the work package leaders and turned out to be the most problematic phase of work.

However, finally the partner stated that they would be willing to participate in any similar projects in the future. In a scale of 1-100 (with 100 being the most positive), the partners rank the overall success of this project at 75.

4. Consortium Recommendations for further EC-funded Research Activities in this Field

Based on the experiences of this project, the IRASMOS consortium would like to make the following recommendations with respect to future EC-funded research activities in the field of natural hazards in general, and mass movements, like landslides and avalanches, in particular. These recommendations reflect a balanced synthesis of our self-evaluation in the light of judging the successful achievement of both scientific and practical objectives.

Scientific recommendations:

- Process understanding and forecasting procedures should become more precise spatially and temporally in future in order to improve the potential of organisational measures and to further improve the acceptance of decisions by the public.
- For further development and implementation of risk-based dealing with Natural Hazards, the gaps of knowledge have to be filled. There are several factors in the risk equation, which are uncertain. The definition of scenarios, the vulnerability of objects, and the assessment of the effectiveness of countermeasures are crucial factors for risk-based planning of countermeasures. For all factors empirical and modelling approaches should be taken into consideration.
- To overcome these uncertainties or at least to take them into further account, EC-funded research should focus on comparative studies with equal methods in different countries and with different data sets.
- Future EC-funded initiatives on landslides should focus more on the quantification and quantitative comparison of hazards and risks at European level.
- Future EC-funded initiatives should address the development of risk maps as a further development of hazard maps.
- Future EC-funded research should focus on collecting existing knowledge on specific topics and to make them available for the research community in a simplified manner. The gained knowledge in the different countries is tremendous and the access to this knowledge is limited, especially for practical applications, which are less (or even not) published in scientific journals. Web-based knowledge platforms for practical applications are one possible approach.
- The implementation of the risk into practice is closely related to the communication of risk and the acceptance of the risk concept as management practice. Particular attention should be payed to an intensified dialogue between science, engineering and planning practice.
- EC-funded research activities should further address the effective management of seemingly rare, but highly destructive, natural hazards. The knowledge base on such high-magnitude/low-frequency events and the risk-based methodology for their treatment are still far from being complete.

- Likewise, such initiatives should address in more detail the indirect consequences of large catastrophic landslides.
- Future research projects should also address the possible implication of the changing climate and its consequences for the assessment of risk mitigation measures.

Administrative Recommendations

- The management tools for the coordinators should be improved. A crucial point in this respect is the dissemination of the funding at the beginning and during the project. If most of the funding is distributed among the partners at the beginning of the project, the management capabilities are limited. This may lead to decreasing motivation of partners to provide good quality work especially towards the end of the project. The incentives, the coordinator can give during the project are decreasing and therefore strongly limited.

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