CIP INTERREG III B
Alpine Space Programme
2000-2006

FINAL ACTIVITY REPORT

Project Title (Acronym)	**SISMOVALP**
Project Ref. Number	**F/I-2/3.3/25**
Name of the LP	**Université Joseph Fourier (UJF-LGIT)**

Section 1: Summary on project implementation
A. Technical and management

1. Project management structure and its performance. What were your experiences with regard to structure and resources?

The administrative management has been coordinated by L. Bourjot who has been in close contact (about one meeting every month) with the scientific coordinator F. Cotton.

The scientific coordination has been organised trough different types of meeting:

- general meetings,
- workpackages meetings,
- common participation and/or organisation of international scientific meetings.

General meetings: three general meetings specific to the project (one kick-off meeting in Grenoble, one meeting in Milano, one final meeting in Martigny) have been organized. All the participants did attend to these meetings which did help to describes the goals of each workpackage and the deadlines of each deliverable.

Workpackage meetings: they have been organized by workpackages leaders in order to organize the work dedicated to each workpackage

Common participation and/or organisation of international meetings. SISMOVALP senior researchers have organized specific scientific sessions dedicated to the Sismovalp research topic (site effects, seismic hazard) in the most important international European meeting (European Geophysical Union, Nice, 2004, Vienna, 2005, 2006 and 2007; European Conference on Earthquake Engineering Geneva, 2006, Symposium on the effects of surface geology on seismic motion, Grenoble 2006). These meetings have been useful to compare the results obtained by the SISMOVALP partners and to share the results with the international community.

The scientific board did include the leader of the project (F. Cotton) and the work package leaders. We did not face important scientific disagreement between the various partners. Our experience shows however that most of the problems did occur due to administrative or financial delays and collaboration with some local authorities. These problems have been solved after an important work and amount of emails between the leader, the partners and the local authorities.

2. Please describe the most relevant problems encountered in managing the project and the solutions adopted.

Problems encountered during the project are mainly due to administrative points. As lead partner we asked the partner to list their problems and we decided to present them as they told us. It doesn't mean that we agree with all points but we just want to let him have his say:

- major problems in obtaining certification of the financial report from the Italian Ministry: poor indications, change of the reporting rules on the way, too many papers needed, late responses.
- preparation of cost statements cumbersome and subject to rules that were subject to frequent revisions by the managing authorities

- enormous delays of payments which caused delays in the scientific activities
- no specific solutions could be adopted to face these problems that were not under our control
- very long times to get paid, due to cumbersome certification system, worked efficiently only at the end (in Italy)
- too much administrative overhead for the small budget
- administrative procedures for certification of expenses are very complicated and time consuming

For few partners problems were more internal:

- REP: problems of collaboration with local authorities. Solutions adopted: continuous exchange of information
- BRGM: we encountered the reorganisation of the institution during the period of this project. However through keeping a close relationship with the coordinator (LGIT), we could continue working and contributing to the project product.

3. Did the project establish, strengthen or enlarge trans-national co-operation and/or strategic networks?

For all the partners, there is a consensus to say that the project SISMOVALP was an excellent opportunity to create and strengthen a transnational cooperation. One of the most positive aspects of the project is the establishment of close links with most partners, including representatives of local administrations.

In general, partners exchanged data (e.g. geological, geotechnical, geophysical, seismological data) and experiences. A comparison among some features of the different seismic regulations has been performed. A joint work has been done for the numerical simulation benchmarks as well as for identifying the main features of the valley response and suggesting possible upgrade of the national seismic regulations. The project has allowed to know the "savoir to faire" of the transnational partners in seismic experiences.

In the following lines, we list some examples showing the increase of the cooperation with other alpine institutions:

- very quick response from 3 Italian and 1 Slovenian institutions, following the 12 July, 2004 earthquake in Slovenia, allow to collect very important data on aftershock activity;
- common Swiss and French reaction to the Vallorcine earthquake (8^{th} Sept.2005, M=4,7). This earthquake, occurring during the monitoring period of the project, has demonstrated the importance of real time trans-national transfer of information and the necessity to create trans-national shake maps;
- Joint proposal between LGIT and ETHZ was submit under the FP6 Neries project;
- Joint proposals between LGIT and LMU were submit under the FP7 programme (Initial Training Network) in the field of computational seismology;
- Joint proposals between LGIT, BRGM and INPG were submit under the French ANR (Agence Nationale de la Recherche);
- Italian students did joint the Master Program in Earthquake Engineering and Engineering Seismology of the University Joseph Fourier;
- and we plan to answer together to future Interreg IIIB call.

4. How did you encourage the relevant stakeholders, observers and target groups to participate?

Each country had his own way to encourage target groups to participate, especially for the communication towards the stakeholders but we must note that this project allowed a common reaction towards stakeholders or publics, between French and Swiss or Slovenian and Italian for earthquakes occurring at the borders of the country.

Switzerland: Results and experience gained during the project were shared with engineers, end-users and public during conferences and in particular during the 1st ECEES symposium (3-8 September 2006) , the "Foire du Valais" in Martigny (2-8 October 2006) and the SIA meeting (4 October 2006).

Slovenia: The results of the work done in the Bovec basin were presented to the local authorities and to the office of the Ministry for environment and spatial planning responsible for retrofitting activities in the Bovec region following both (1998 in 2004) damaging earthquakes in the area.

Italy: During the activities involving the instrumentation of different sites, interactions have been established with local authorities and technical staff. The participation to work meeting and the final meeting in Tolmezzo (Friuli, Italy) helped transferring the main results of the project to public and private counterparts. We had also personal contacts with local authorities.

Germany: Information were mainly dedicated to Scientifics through two established information centres in the regions of their seismic network. Information is given through poster boards and online access to current seismic information.

France: Results and experience gained during the project were shared with end-users during two conferences held in Grenoble (France). The first one (30/08/06-1/09/06) has been organised at an international level (250 participants). The second one (21 June 2007, 80 participants) has been organised at a local level. During both meetings, the results of the work done in the Grenoble basin were presented to the local authorities and to the office of the Ministry for environment. The links with other local projects dedicated to seismic risk have been explained. We also did participate to several public meetings, TV and radio interviews to present the seismic risk in Alpine valleys.

5. Did you involve all the sectors/actors as foreseen when setting up the project? Were there more (or fewer) sectors/actors involved than originally anticipated?

More actors than originally anticipated: researchers of Institut de Radioprotection et Sureté Nucleaire (IRSN, Paris, France) did participate to the project with their own budget.

6. Did the lead partner / each partner develop a particular field of expertise or did he/they acquire new knowledge as a result of project activity? If yes, explain what these were.

Not only the lead partner, but each partner develop a particular field of expertise during the project:

LGIT improved our field of expertise in 3D wave simulations and use of noise measurements to determine S velocity profiles. We have validated the numerical tools used to evaluate the seismic hazard in alpine valleys.

INPG improved our field of expertise in: (i) recovering undisturbed samples of soils, (ii) performing in-situ geotechnical tests such as piezocone and seismocone. On another hand, we acquired a good expertise in performing sophisticated small-strain triaxial tests in laboratory in order to evaluate the non linear behaviour of the alpine valley sediments.

BRGM enhanced our know-how on the construction of the database. We learned particularly the geological models and the encountered risk problem in the Alpine valleys for which we will be able to study the seismic hazard with our numerical tools.

INOGS applied the gravimetry method, with a dense acquisition, and integrate it with some more classical geophysical/seismological methods in order to enhance the "image" of the sediment structure of the Tagliamento Valley. As a result, a cheap and very powerful set of methods that can be exported to other cases and a first representation of the inner structure of the Tagliamento Valley have been obtained.

Polimi acquired expertise in dealing with seismic instrumentation of a site, together with in-field investigations of soil properties.

Unige: The Environmental Protection Agency of Piedmont and Valle d'Aosta planned and managed the acquisition of new geotechnical and geophysical data in the study areas with collaboration and suggestions of Dip.Te.Ris. and the Dept. Structural Engineering (Politecnico di Milano) ; The Dip.Te.Ris, University of Genoa and the Dept. Structural Engineering, Politecnico di Milano, planned and supervised the installation of the seismic and accelerometric temporary networks and performed the analysis on the collected data in order to study the seismic response of the two sites of Pellice valley and La Salle fan. Moreover the available geological-geotechnical-geophysical information was carefully analysed in order to produce 2D models of the valley and of the fan performing numerical simulation of the earthquake-induced ground motion. The collaboration among the project partners has leaded to improve investigation methods concerning characterization of the soils in seismic conditions and interpretation of the results in reference to recent seismic laws

LMU: Through the detailed analysis of seismicity and meteorological data in our study area (Bad Reichenhall Valley, SE Germany) we established a previously unknown direct causal link between rain and earthquakes that may well exist in several areas in the Alps.

Each partner developed its own expertise, but shared the knowledge with others and everybody checked all results achieved against those of others. In this way new knowledge was generated by interaction and discussion at meetings and within Task groups. Comparison of different expertises proved essential for improving them.

7. Please explain your experience with trans-national cooperation. What was the value added to the project by trans-national cooperation?

The value added by transnational cooperation are numerous and, in particular, deals with the following points:

- data and experience sharing (partners are willing to share their data and knowledge within a Project, rather than with people you are not collaborating with),
- validation of numerical methods at an international level,
- young researcher and students mobility,
- and friendship created during the project will also be very useful to help the alpine cooperation after a damaging earthquake.

This trans-national project allowed comparison among the various countries experiences concerning policies of protection and prevention of seismic hazard in urban planning. Moreover, the scientific meeting planned during the project, allowed us to compare, discuss and validate updated methodologies applied to Alpine valleys for site effect and seismic response analyses.

Other points are:

- trans-national cooperation was very useful to establish the similarity of the configuration of the different alpine valleys and allowed to establish a complementary approach in predicting the seismic response of the different sites. In particular the collaboration between seismologists and geotechnical researchers was very fruitful;
- database could not be established without such trans-national cooperation;
- value added in being confronted with Countries that have already acquired remarkable experiences in the seismic characterization of the territory;

8. What contacts have been made with other programmes and projects? Have synergies been exploited? Will they continue in the future? Please explain how this work developed in practice.

The SISMOVALP project benefited from the 5 PCRD project SESAME and from the international Marie-Curie Training Network SPICE. Contacts have been made during scientific meeting with other projects to exchange and present the results.
Some of the partners (LMU and UJF) have used the links developed during the project to write a common proposal under the FP7 project.
Some of the partners (ETHZ and UJF) are participating to the same FP6 Neries project (http://neries.knmi.nl/)
Some of the partners now participate to the same European Master courses (Polimi and UJF: Master of Earthquake Engineering and Engineering Seismology) which help to increase the students mobility within Europe.

9. Had the project any influence on the regional economy of the participating regions? If yes, explain how (e.g. new guidelines, activities, creation of a significant number of jobs...).

This project help to limit impacts of earthquakes on alpine economic activities by providing to civil engineer local spectra validated by the latest data and several research groups' simulations.

The methodologies developed during the project have been disseminated locally toward companies (GEOLITHE, LEAS, IMSRN Grenoble, BRGM) in charge of seismic hazard evaluation in the Alps. These methodologies will helps these companies to answer to international call dedicated to seismic risk evaluation.

These transnational Alpine spectra and methodology guarantee local authorities and civil engineers that these spectra are adapted to Alpine geologic specificities and will avoid the development of inhomogeneous seismic prevention actions.

Height pilot initiatives (Grenoble Isère river valley-Fr, Lower Valais-Ch, Bovec basin-Sl, Tagliamento river high valley-It, Gemona del Friuli-It, Val Resia-It, Val Pellice-It, La Salle-It) aimed at transferring experiences and good practices in the field of natural risk prevention have been implemented during the project.

Height joint actions (in the 8 pilot sites) among institutions took place in a transnational frame during the project.

Six institutions (UJF-LGIT, BRGM, INPGS, MIP-Polimi, UDST, EARS, CREALP) have used alpine accelerometric seismological networks for early detection of the ground motions (and associated potential damages) of an earthquake

International meetings held in Geneva and Grenoble (September 2006) had a significant economic impact (several thousands researchers have spend a week in the Alps).

The project has contributed to create or maintain about 10 jobs (mainly young researchers) partly or entirely founded by the project.

10. Please, detail any planned follow-up activities and further steps for utilisation and dissemination of the achieved results.

The common trans-national databases constructed in this project give the basis for future more complete Alpine databases. The goal of the project was also:

- to motivate other Alpine research institutes to join this trans-national goal and to disseminate their own data,
- to keep this monitoring working,
- to use the projects results to develop future microzoning studies in other alpine valleys.

LGIT : We develop

- new methods for 3D simulations to include topographic effects (PhD Celine Hallier),
- new research axes to understand the links between earthquakes and rock falls,
- new research program to take into account realistic earthquakes kinematics (PhD Mathieu Causse).

INPG: A numerical model taking into account the non linearities of the soil is actually in development at INPG and IRSN and will be tested with the data obtained during the project (PhD Jane Jerram 2007).

BRGM: We aim to continue studying the seismic hazard problem in this region with national or international partners. We are willing to participate to other projects in this future.

INOGS: Possible collaboration with local administrator to improve the data-set acquired within the project with new acquisitions and start up a microzonation study in the Tolmezzo area.

Polimi: Use of project results for the activities foreseen within the European Technical Committees in charge for proposals of revision of the technical norms for seismic design and prescription of seismic actions.

UDST: The research started within the project on the seismic response of valleys will continue. We will improve and make even more investigations to obtain a full 3-D input data related to our alpine valleys in order to continue the interaction with a few partners and obtain 3-D site effects for these valleys. Hopefully we can do this within another project.

Unige: A complete report about the obtained results in Pellice valley and La Salle fan will be as soon as possible available for local authorities in order to propose possible guidelines for microzoning purposes.

LMU: The results in the field of rain-induced seismicity will lead to follow-up projects that are currently being coordinated. As there is a strong likelihood that these phenomena exist in other parts of the world it is planned to understand it in more detail through multi-disciplinary studies (geodesy, hydrology, geochemistry, seismology) in the study region in SE Germany. This will be done in close collaboration with leading international scientists in the field.

EARS: The results of the investigations in the Bovec basin, which was damaged during 1998 and 2004 earthquakes will be used in retrofitting activities of damaged houses and in further spatial planning in the area.

11. What will happen to the partnership after closure of your project?

The partnership is continuing or will continue trough other programs at a national or European scale (FP6, FP7, Alcotra). We plan to strengthen the partnership within a new Interreg project.

12. Does your project have a website?

The project had a website for the duration of the project only and this site was more an intranet to exchange data between the partners.
This website is no more running after the project closure.
The project publications will not be posted on this website, as it is closed. They will be available directly on the website of the lead partner UJF – LGIT.

Section 1: Summary on project implementation
B. Content

1. What was the main aim of the project? To what extent has it been achieved?

The objective of the project SISMOVALP was to improve seismic hazard management in the Alps. Alpine urban areas are located on deep-filled young postglacial valleys close to faults where moderate to large earthquakes did occur in the past and recent studies have shown that seismic motion is strongly amplified by local soil conditions, increasing seismic hazard.

The aim was to improve the knowledge on seismic hazard and:

- to improve the instrumentation to record earthquakes,
- to share the available information and to build a common database which could be used in the whole Alpine area,
- to evaluate and validate EC8 or compatible local spectra that could be applied for microzonation in the whole alpine area.

The aim was also to reduce vulnerability through better information on seismic risk, discussions about the use of the new specific alpine spectra by local authorities and civil engineers, and the elaboration of common methods to evaluate alpine vulnerability to earthquakes.

→ The objectives of the project SISMOVALP have been achieved.

2. Did the activities carried out enable the project to achieve its aims and objectives?

The work has consisted of 5 main, complementary tasks.

1. State of the art of seismic risk in alpine valleys: in France, local devolution and growing capacity of microzoning challenge state expertise and uniform rules. In Italy, regional autonomy allowed to experiment locally very different rules according to local seismic risk culture. Switzerland benefits of a strong culture of participative policy making, but try to converge to EC8 European criteria about seismic prevention. Comparing these different political strategies in selected alpine valleys allowed to identify "key issues" for seismic risk reduction and the way local and/or national authorities react to the specific problem of ground motion amplification and fast building industrial expansion in alpine valleys.

→ The result is the identification of "key issues" for seismic risk reduction in selected alpine valleys and the comparison of the different state policies.

2. New data acquisition and dissemination of common trans-national databases: seven valleys located in the whole alpine space and having benefit from local scientific and co-financial support have been chosen for such data acquisition. The data acquisition have included the upgrade of existing regional earthquake monitoring system, temporary experiments and laboratory measurements of soil non-linear properties, and was joined with the synthesis of geotechnical and available ground motions recorded in alpine valleys.

→ The result is geotechnical soil profiles and superficial S velocity profiles representative of alpines valleys. A CDROM with the transnational alpine records (both new and previous one) database has been compiled during the project.

3. Identification of potential earthquakes scenarios and generic alpine valleys shape: state of the art of earthquake scenarios (magnitude, distance…) selected in previous urban alpine seismic risk studies and omparison of geological or geotechnical alpine valleys information collected by the partners.

→ The result is the selection of generic alpine earthquakes scenarios used for ground motions simulations and the definition of "generic" alpine valleys types (geological and geotechnical characteristics) and their associated geotechnical databases (CDROM 2, Lacave and Lemeille, 2006).

4. Ground motion evaluation in alpine valleys: analysis of recorded seismic response, development of new empirical ground motions models, definition of the input signal used for baserock motion for simulations in microzonation and strong motion simulations in Alpine Valleys by each partner.

→ The result is - the definition of alpine response spectra on both rock and alpine valley deposits for the earthquakes scenarios defined, - the Comparison with national, European (EC8) and local spectra deduced from microzonation in the whole alpine area, and the identification of weaknesses or conservatism of actual regulations.

5. From seismic hazard to seismic risk and public authorities actions: presentation of the project results to local civil engineers and local authorities, and stimulation of discussion between the scientific community and public authorities.

→ The result is the information of decision makers and civil engineers on the Alpine seismic risk specificity and the identification of issues.

3. Please highlight the contribution of your project to gender mainstreaming. → Neutral in terms of equality

4. Please highlight the contribution of your project to environmental policies. → Environmentally neutral

5. Please indicate how and by whom the results achieved will be used.

The final task of the project is the dissemination of the results to civil engineers and local authorities in order to reduce seismic vulnerability in the alpine space.

- Local and national authorities will be able to refer their particular case to one of the SISMOVALP "generic" alpine valleys cases in order (without costly studies) to have a first evaluation of actual national regulation in their own alpine valley. The project results can be used by local authorities to decide (or not) the need of specific microzoning studies.
- Local engineering companies will use the software and databases developed disseminated within the project for microzonation studies in France but also in other countries.
- Civil protection authorities of Italy can use the result of the project to obtain site effect estimation in valleys in order to get – in case of a strong earthquake in our area – rapid estimates of strong ground motion at all important localities, many in alpine valleys.
- The data acquired for the Grenoble area can be used to design the future microzonation study (Plan de Prevention des Risques Sismiques, French PPRS).

- The data acquired for the Tolmezzo area can be used to design new studies (e.g. microzonation) and perform new research activities (e.g. a 3D model of the valley and complete numerical simulations of the ground motion).
- The analysis of geological-geotechnical-geophysical characteristics of the Pellice valley and of La Salle fluvial fan by means multidisciplinary subsoil exploration surveys and the accurate and reliable definition of the seismic response of the two sites by means experimental and numerical analyses may be very helpful for microzonation studies. In detail, the use of complete databases of seismic signals recorded in different local condition allowed us to define with reliability and accuracy the seismic reponse (in terms of resonance frequencies and amplification level) of the two sites by applying updated methods based on spectral ratio technique.
- The results of the investigations in the Bovec basin, which was damaged during 1998 and 2004 earthquakes will be used by local authorities and office responsible for retrofitting activities in the area. A new microzonation map will be used in spatial planning.
- The data obtained during the project concerning the mineralogy of the sediments and their non linear properties will be used in the numerical predictions using non linear models performed by seismologists. Part of the database was already used in the international Workshop (Third International Symposium on the Effects of Surface Geology on Seismic Motion, Grenoble, France, August 2006).
- The results on atmospherically forced seismicity and algorithms for wave propagation will be used particularly by scientists in charge of seismic networks to understand seismicity patterns and observed seismograms
- It will be also ourselves, partners of the project, to use the results and the knowledge, which have been all reported in the international meetings or in scientific publications. Furthermore several different seismological communities are interested in what have been done in this project.

6. Will the results achieved by your project influence any legislation or future policy in spatial planning? Is there any political agreement for using and implementing your project results?

France: The French ministry for environment has launched a new program to increase the number of seismic microzonation (PPRS : Plan Prévention des Risques Sismiques). These PPRS will replace locally the national building codes. A scientific comity has been created in order to validate the activities which will organised within each future PPRS. The coordination of this scientific comity will be lead by PY Bard who has been part of the SISMOVALP project. Several other French participants of the SISMOVALP project will be part of this comity. This will ensure continuity between SISMOVALP activities and future policies.

Italy: For the time being there is not any political agreement for using our project results in future policy in spatial planning or in microzoning and seismic risk mitigation analysis of the investigated areas. Nevertheless, as soon as possible, the results will became available for the local authorities in order to give them help for microzoning and seismic risk mitigation purposes

7. Will project results be transferred to other regions within the Alpine Space area? Are there any results transferable to other European regions other than the Alpine area?

The results of the project are not specific to particular alpine valleys, it will be useful for seismic risk studies in the ALL alpine space (e.g. identification of weaknesses or conservatism of actual regulations).

8. Did the project produce any potential activity that could be continued through funding opportunities in the future?

LGIT: The results achieved within this project represent a good base for proposing new studies/projects :Our cooperation has shown that our group has the opportunity to validate simulations of seismic motion on slopes and complex geological geometries. We also have discussed the need to understand the triggering of rock falls by earthquakes. Our work shows that there is a need to harmonize the seismic network in the Alpine space and to organize the reaction to future damaging earthquake (common information toward the media and authorities, fast data exchange, common postseismic field work).

INPG: It has been shown that non linearities in the sediments behaviour can have a significant influence on the site seismic response. Further studies are necessary to improve the knowledge of these aspects, and to determine if they can be taken into account in the zonation of the seismic risk of the alpine valleys

BRGM: At the national level, we could succeed to have a project with the partner (LGIT) on the related topics. We are having some discussions with the international partners for the future funding.

INOGS: Not completely. The results achieved within this project represent a good base for proposing new studies/projects (see point A.10 and B.5).

Polimi: Seismic microzonation of the sites involved in the project, and the extension to other sites as well, is one of the most interesting and potentially useful activities, which may be a natural continuation of the Sismovalp project.

UDST: Yes, we would like to extend this experience and work with other alpine valleys as well.

Unige: Studies could be improved in order to better define the geological-geotechnical-geophysical characteristics of both sites in order to better constrain and validate the seismic response and to better define microzonation maps. The improved methodologies on both sites could be exported and applied in other geological and geomorfological situations. So the increased number of collected data may represent an important database of geothecnical and geophysical parameters to be used to produce and improve more simplified procedures in microzonation.

LMU: Several of the activities shall be continued within FP7 projects.

9. Do you have any project ideas for the next programme period of INTERREG?

In general, the ideas for the next programme period are:

- improvement and homogeneity of seismic alpine network,
- scientific work to develop community codes for wave propagation in complex media,
- scientific work to understand the triggering of landslides by earthquakes,
- improvement of the cooperation between researchers, engineering companies and end-users of local seismic microzonations,
- discussion with local authorities and media to prepare an efficient reaction after a damaging earthquake.

or

- detailed study of the seismic response in the presence of specific valleys with a strict collaboration with local administrators. Two/three study areas in Italy, Slovenia, Austria where most of the data acquisition and interpretation can be performed by the involved research institutes, sharing the whole available experience, while each single local administration can get benefit and use the results for managing the territory;
- seismic instrumentation, monitoring and numerical simulations for the seismic response analysis of spatially extended structures, such as long tunnels at the border between different Alpine regions;
- seismic monitoring and assessment of natural and artificial slopes in the Alpine environment, even under moderate-to-low seismic hazard conditions, including the effect of local topographical irregularities;
- networking among the partners running strong motion and broadband instruments in the Alpine area;
- recognition of active faults in the alpine area;
- installation of permanent stations inside Alpine valley in North-western Italy to improve the seismic monitoring capability of the pre-existing network (i.e. Regional Seismic network of Northwestern Italy managed by Dip.Te.Ris.) mainly in the borderline region (i.e. Valle d'Aosta). This creates the possibility to an online transfer of recording data between Italy, French and Swiss seismic network in order to locate more precisely the border seismic activity and in case of strong earthquake to built in quasi real time shake maps of the area to distribute to civil protection.
- - …

Section 2: Overview on activities, outputs and results
2.1 Output and result indicators

Planned outputs	Achieved outputs
1. A better and more homogenous seismic monitoring of alpine valleys	- Wallis: Upgrading of the actual instrumentation and installation of 2 couples of accelerometric stations (rock / soft soil) - Grenoble: Borehole accelerometric measurements - Tagliamento valley: deployment of 10 temporary (6-8 months) seismometric stations (rock / soft soil) . - Pellice valley: partial upgrading of the actual instrumentation - Greysonney: partial upggrading of the actual instrumentation - Resia valley: partial upgrading of the existing instrumentation; next installation site identified, new instrumentation - Gemona fan: partial upgrading of the existing installation and new instrumentation
2. Trans-national databases for seismic hazard evaluation	2 transnational databases: - data and references. The CDROM 1"Alpine Accelerometric Database has been disseminated during the EGS and Geneva meeting. This CD contains corrected acceleration, velocity and displacement time histories of 432 triaxial strong motion records from Alpine Valleys in Europe. It also contains linear elastic and inelastic response spectra and parameters that are usually used by seismologists and engineers. In addition an appropriate browser-software (Strog Motion datascape Navigator) is provided allowing the user to search, view and analyze the date. SMDN allows to export the time histories, spectra and parameters to ASCII files in a standard format. - valleys configurations and earthquake scenarios available on CDROM 2 "Generic Alpine Valley characterization". Noise analysis software (http://www.geopsy.org/) and wave2D (paolucci@stru.polimi.it) simulation code available.
3. Network of scientists and experts for seismic risk reduction in alpine valleys	Several meetings and discussions with professionals and end-users have been organized in each country (Grenoble 2006, 2007, Martigny, 2006, Tolmezzo, 2007). Formations of the technical professionals have also been organized on more specific topics (site characterisation) Several examples shows that the network initiated during the Sismovalp project is working: - Alpine seismologists have been reacting together to the Vallorcine earthquake,

	- Several Sismovalp partners (ETHZ, LGIT) have been working together (as main coordinator and WP coordinator) to write a proposal in order to harmonize seismic hazard maps in Europe (project "Sgare submitted to FP7), - Several Sismovalp partners have submitted a new Interreg B proposal (SERAC) . The project has not been accepted and the partners and now revisiting the project in order to submit it to their national research agencies, - Several partners are working together within the Alcotra framework in order to improve seismological alpine networks.

Planned results	**Achieved results**
1. A better and more homogenous seismic monitoring of alpine valleys	- Wallis: Upgrading of the actual instrumentation and installation of 2 couples of accelerometric stations (rock / soft soil) - Grenoble: Borehole accelerometric measurements - Tagliamento valley: deployment of 10 temporary (6-8 months) seismometric stations (rock / soft soil) . - Pellice valley: partial upgrading of the actual instrumentation - Greysonney: partial upggrading of the actual instrumentation - Resia valley: partial upgrading of the existing instrumentation; next installation site identified, new instrumentation - Gemona fan: partial upgrading of the existing installation and new instrumentation
2. Improving acceptance of alpine specific spectra by civil engineers	Some benchmark models for computing the seismic response is now available for the whole scientific and engineering community. A quite clear procedure has been defined that allows one to compare the valley response with respect the existing national regulations (i.e. the existing project design spectra).
3. Toward a seismic risk reduction at a trans-national alpine scale	The main results which contributes to seismic risk reduction are: (1) The calibration of site amplification factors on response spectral ordinates for complex alluvial valleys, including basin-edge effects (2) The preparation of a set of real accelerograms compatible with the design spectrum for moderate-to-low seismicity areas such in the Alpine regions

	(3) The feedback (from several meetings) from administration representatives, engineers and geologists which show the common understanding of the need to replace EC8 codes by local alpine codes.

Additional outputs and results achieved through the project

- Education of several master and PhD on the subject.
- Organization of an international symposium ESG 2006 with 250 participants (which was not planed initially).
- Field work after the Vallorcine earthquake.
- Availability of some benchmark models for computing the seismic response, for the whole scientific community.
- Definition of a quite clear procedure allowing the comparison of the valley response with respect to the existing national regulations (i.e. the existing project design spectra).
- Better understanding of complex seismic site effects, including valley resonance and basin edge effects, and their consequences on seismic actions for design.

Section 2: Overview on activities, outputs and results
2.2 Activities, output and results on WP level referring to the total project duration

WP 1:

Activities carried out	Accumulated outputs and results	Deviation

WP 2: Transnational project management

Activities carried out **What we have promised**	**Accumulated outputs and results**	**Deviation**
Definition of common "trans-national data format". Data collection from the different Work-packages (WP5-7) Software development for a convenient and fast data use, quality check and validation of the final database and dissemination using CDROM. Dissemination of: - "transnational data format" via the partners web site - benchmark results (WP8) in an international scientific journal - recommendations (WP9) in European Earthquake Engineering Journal - CDROM 1 and associated publication: references on seismic hazard and seismic risk studies published before 2003. - CDROM 2: Alpine geotechnical database and alpine seismic motion database.	A training on "noise measurements processing" has been organized in Grenoble. The programs and documentation can be disseminated. This training has been reconducted in Potsdam, Caracas, Grenoble, Alger, Bangalore in 2006 and 2007 and in Istanbul in 2008 (see the information sheet on this training – n° 50) A matlab user-friendly interface for Wave2D, a computer program that uses the pseudo-spectral Fourier method for SH seismic wave propagation in heterogeneous media, has been disseminated among the partners Publications has been written (see the list at the end of the report) - benchmark results - recommendations - Causse et al, 2006 (n°9) - Cotton et al, 2006 (n°19) - Paolucci et al., 2006 (n°44) 2 CDROM:	CDROM 1 and CDROM 2 has been presented in one CDROM "Alpine Accelerometric Database" A publication with recommendations in European earthquake Engineering Journal was foreseen but up to now these publications has not been written. To obtain good recommendations, requires more scientific work. For this reason a new project SERAC was submitted to the new

- CDROM 3 and associated publication: alpine seismic motion simulations and proposed alpine "spectra". Comparison of seismic risk situation and administration situation in each country.	- data and references. The CDROM 1"Alpine Accelerometric Database has been disseminated during the EGS and Geneva meeting. - valleys configurations and earthquake scenarios available on CDROM 2 "Generic Alpine Valley characterization". Noise analysis software (http://www.geopsy.org/) and wave2D (paolucci@stru.polimi.it) simulation code available.	programme Alpine Space.

WP 3: Project management

Activities carried out **What we have promised**	**Accumulated outputs and results**	**Deviation**
Organisation of a kick-off meeting Taking care of the regular exchange of information and expertise between the participants Animation of seminars/meetings to review the progress of the project Connections with external partners and in particular decision-makers Follow-up and preparation of the administrative and scientific reports and preparation of the restitutions days of the work done in the project for a non scientific public.	UJF-LGIT, as lead Partner, has been the international co-ordination office of the project. He has been responsible - for liaising with all national secretariats, the MA and Joint Technical Secretariat (JTS), and other international organisations; - for the scientific, administrative and financial co-ordination; - for the preparation of the progress reports and final report in due time. INPG-L3S, BRGM-ARN, INOGS, MIP-Polimi, RAVA, REP, UDST-DST, UNIGE-Dipteris, LMU-DGU, CREALP and EARS have participated to all the general meetings, animated by UJF-LGIT and have prepared their participation to the progress reports and the final report. The main milestones are the meetings (scientific meetings and also meetings between scientific and decision makers), scientific and financial progress reports and a final report.	

WP 4: Information and publicity activities

Activities carried out What we have promised	Accumulated outputs and results	Deviation
Physical basis of ground motion amplification in alpine valleys → presentation in international scientific meetings and description in peer review international journals. Trans-national databases, generic alpine spectra and final recommendations → publication in the journal of the national earthquake engineering associations of all the alpine space. The CD-ROM's (trans-national databases) and final recommendations → sent to the experts in charge of seismic risk evaluation in alpine space.	Presentation of the project results in different scientific meeting and in particular: - Third international symposium on the effects of surface geology on seismic motion. 30 August – 1 September 2006, Grenoble - First European conference on earthquake Engineering and Seismology, 3-8 September 2006, Geneva - 47th Valais annual fair, 3 October 2006 - SIA meeting, 4 October 2006 - Tolmezzo restitution day in Italy, 9 March 2007 - Grenoble restitution day in France, 22 May 2007 With distribution of the CD-Rom'S and redaction of publications.	

WP 5: Seismic risk in alpine valleys and potential earthquakes scenarios

Activities carried out What we have promised	Accumulated outputs and results	Deviation
State of the art of seismic risk policies in the alpine space. Identification of "key issues" for seismic risk reduction in five selected alpine valleys. State of the art of earthquake scenarios (magnitude, distance, type of faulting) that have been selected in previous urban alpine seismic risk studies trough the analysis of historical or instrumental seismicity. Updating of these scenarios according to recent neotectonic studies.	Paper Cartier (2007) to compare seismic risk policies within the alpine space. Selection of possible references earthquakes that might be used in ground motions simulations (magnitude, distance to the basin): CDROM 2 and Lacave and Lemeille paper (2006) Martigny 2006" to share our results with local authorities of France and Switzerland have been organized.	

Selection of possible references earthquakes that might be used in ground motions simulations (magnitude, distance to the basin).	ESG 2006. French decision makers have been invited. A lot of information has been disseminated by the local newspapers Synthesis of "alpine" references has been done (CDROM 1) "Tolmezzo 2007" to share our results with local authorities of Italy. "Grenoble 2007" to share our results with local authorities of France..	

WP 6: Generic alpine valleys configurations

Activities carried out **What we have promised**	**Accumulated outputs and results**	**Deviation**
Synthesis, acquisition and comparison of the geological and geotechnical parameters of 5 "pilot" valleys. This information has been used to determine (one or several) "generic" alpine valleys types and an associated trans-national geotechnical database. This WP includes new geotechnical and geophysical studies necessary to characterise the pilot valleys. According to the work performed before, the level of these new studies has been different from one valley to another. - Wallis valley (CH): geophysical measurements - Grenoble valley (F): geophysical measurements and geotechnical borehole - Tagliamento valley (Friuli-Venezia Giulia, It): geophysical measurements. - Chisone valley (Piemonte, It): geotechnical boreholes - Greysonney (Valle d'Aosta, It): geotechnical boreholes	Geophysical and geotechnical studies have been done. A synthesis of these results has been presented in Geneva 2006 (this synthesis is part of the final report). A report about geological properties of Alpine Valleys has been written and presented in Geneva 2006. These results have been used to build 3D models of some of the valleys, for WP06 simulation exercises. Non linear experimental work has been carried out in Grenoble (results have been presented in ESG) A final CD-ROM has been edited with all the valley characterisation.	Change and increase in the number of investigated valleys: ➢ Grenoble Isère river valley ➢ Lower Valais (Massongex - Aigle) ➢ Bovec basin (upper Soca valley) ➢ Tagliamento river high valley ➢ Gemona del Friuli ➢ Val Resia ➢ Val Pellice to replace Chisone ➢ La Salle (Val d'Aosta)

WP 7: Trans-national database of alpine earthquake records

Activities carried out What we have promised	Accumulated outputs and results	Deviation
For all the partners: synthesis and share of all data recorded during and before the project to develop a trans-national database of alpine earthquake records. Due to the lack of seismic records in alpines valleys new (permanent or temporary) instrumentations or upgrading of the old instruments have been realised to improve the records collected in the selected pilot valleys. According to the work performed before the SISMOVALP project the level of this new instrumentation is different from one valley to another. - Wallis: Upgrading of the actual instrumentation and installation of 2 couples of accelerometric stations (rock / soft soil) - Grenoble: Borehole accelerometric measurements - Tagliamento valley: deployment of 10 temporary (6-8 months) seismometric stations (rock / soft soil) . - Chisone valley: partial upgrading of the actual instrumentation - Greysonney: partial upgrading of the actual instrumentation	An alpine database has been built by P. Gueguen and J. Douglas and presented in a CD-ROM: *The CD-ROM contains corrected acceleration, velocity and displacement time histories of 432 triaxial strong motion records from Alpine Valleys in Europe. It also contains linear elastic and inelastic response spectra and parameters that are usually used by seismologist and engineers. The data available on this CD-ROM are from national permanent networks and from temporary networks deployed for the project SISMOVALP.* The promised station instrumentation has been done The CDROM has been disseminated during ESG + Geneva	Change and increase in the number of investigated valleys: ➢ Grenoble Isère river valley ➢ Lower Valais (Massongex - Aigle) ➢ Bovec basin (upper Soca valley) ➢ Tagliamento river high valley ➢ Gemona del Friuli: partial upgrading of the existing installation and new instrumentation ➢ Val Resia: partial u pgrading of the existing instrumentation; next installation site identified, new instrumentation ➢ Val Pellice ➢ La Salle (Val d'Aosta)

WP 8: Generic alpine ground motion

Activities carried out What we have promised	Accumulated outputs and results	Deviation
Analysis of the recorded motions and performing of seismic motion simulations in order to define some representative	Several presentations at ESG2006 and Geneva meeting	

generic "alpine" soil spectra and accelerograms. Part of this WP has been dedicated to the definition of rock motion (coherence with regional seismic “rock” hazard studies, definition of the basement input used in microzonation studies). This WP uses the generic alpine scenarios, the generic alpine valleys types and the trans-national databases to define the accelerograms and spectra for each of the selected generic alpine valley types and scenarios. The project partners have developed different simulations codes and methods in the last decade. The project allowed comparing and validating the simulation methods used by each group. These comparisons are particularly important since there are still strong discussions in the earthquake engineering community how to evaluate the vibrations that will occur in the future in case of strong earthquakes using actual records from small earthquakes or how to take into account the non-linear behaviour of soft soil using geotechnical information. The final accelerograms and spectra finally delivered are the results of this common benchmark.	Papers about wave propagation in Alpine Valleys have been written. Publication of benchmark results in a review paper: Chaljub et al., 2006 (n° 13) plus one synopsis in preparation. The 2D and 3D benchmark specifications, the numerical solutions computed within the project, as well as the comparison among the results are freely available upon request and soon on a web site.	

WP 9: Toward an alpine seismic hazard harmonisation

Activities carried out **What we have promised**	**Accumulated outputs and results**	**Deviation**
Synthesis of results of WP5-8 - Feed back information: in each pilot valley, presentation to local civil engineers local authorities of the comparison between alpine specific results of WP8 with the level of protection against earthquakes pursued locally. - Identification in each valley of “key locking issues” and feed-back from local authorities and civil engineers	Synthesis of results in terms of: - calibration of site amplification factors on response spectral ordinates for complex alluvial valleys, including basin-edge effects - comparison of results for different valleys in a common format to highlight similar response features - comparison of the previous Alpine site-specific amplification factors with those prescribed by the Eurocode 8 and by local technical norms	

- Analysing compatibility of SISMOVALP results, local and national rules with EC8 standards. - Final synthesis and suggestion of remedial actions at European alpine scale.	- definition of a representative rock profile for Alpine sites - preparation of a set of real accelerograms compatible with the design spectrum for moderate-to-low seismicity areas such in the Alpine regions - presentation of results to administration representatives, engineers and geologists during the Tolmezzo workshop on March 2007 and the Restitution day in Grenoble in June 07	

Plus presentations of the work done in each valley in separate files

Section 3: Listing of results and products

Listing of all documents, studies and publications elaborated during the project implementation

For publications aimed at dissemination purposes, please do also indicate the target group and the results disseminated.

Responsible PP	Title of the paper	Subject	Publications		Related WP	Related certified costs
			Target group	Results		
LGIT-UJF	See the list below: 16 presentations on the results of SISMOVALP	3rd International Symposium on the Effects of Surface Geology on Seismic Motion. Grenoble, France, 30 August-1 September 2006	Engineers and Scientists about 250 pers.	Proceedings (volumes 1 and 2 + CD),	all	30 889 €
CREALP - RESONANCE	See the list below: 7 presentations on the results of SISMOVALP	First European Conference on Earthquake Engineering and Seismology, 3-8 September 2006, Geneva, Switzerland	Engineers and Scientists about 80 pers.	Publications	all	0
All partners	See the list below: 13 publications "rang A"	Results of the SISMOVALP projects	Scientists and Engineers	Publications	all	Work time + 2 990 €
All partners	See the list below: abstracts or posters in international symposium (ESC, IGC, RAP, EGU…)	Results of the SISMOVALP projects	Scientists and Engineers	Publications	all	27 000 €
INOGS	Booklet	Presentation of the project SISMOVALP in italian	Scientists, Engineers, Stakeholders	Booklet of presentation	all	500 €
LGIT-UJF with all partners	Progress reports on the project	Presentation of the works done during the reporting period	Interreg IIIB authorities	Reports	all	Work time
BRGM with all partners	CD-ROM	Alpine Accelerometric Database	Scientists and Engineers	Diffusion of CD-ROM's	WP5-WP9	Work time
CREALP (Resonance) with all partners	CD-ROM	Generic Alpine Valley characterization	Scientists and Engineers	Diffusion of CD-ROM's	WP6	Work time + 2 070 €
LGIT-UJF with all partners	Final booklet (in progress)	General presentation of the project plus one presentation per valley – finish for Grenoble but not for the other valleys	Scientists, Engineers, Stakeholders	Booklet	all	0

List of publications

All the following publications have the mention that the work was carried out in the project Interreg IIIB SISMOVALP
The appended CD-Rom contains a pdf file of each following publications.

1 Álvarez-Rubio,S., H.B. Havenith and D. Fäh (2007). Seismic ground motion estimation in Alpine valleys (Valais, Switzerland): modelling and response spectra. Proceedings Asociación Española de Ingeniería Sísmica Girona, 8-11 may 2007.

2 Aochi H., J. Rey and J. Douglas (2006). Numerical Simulation of Wave Propagation in the Grenoble Basin. 3rd International Symposium on the Effects of Surface Geology on Seismic Motion. Grenoble, France, 30 August-1 September 2006, LCPC, paper n°32 (Vol 1).

3 ARPA Piemonte, in collaboration with Politecnico di Milano- Dipartimento di Ingegneria Strutturale, Università di Genova- Dip.Te.Ris. (2006). Brochure presented within: "Forum della Pubblica Amministrazione" 8-12 may 2006, Roma.

4 Barnaba C., F. Palmieri, A. Vuan and E. Priolo (2006). Geophysical exploration and seismic response int the Tagliamento alpine valley (NE Italy). 3rd International Symposium on the Effects of Surface Geology on Seismic Motion. Grenoble, France, 30 August-1 September 2006, LCPC, abstractn°102 (Vol 2).

5 Barnaba C., E. Priolo, A. Vuan, and M. Romanelli (2007). Site Effect Of The Strong-Motion Site At Tolmezzo-Ambiesta Dam In Northeastern Italy. Bull. Seis. Soc. Am., Vol97, 339-346, 2007.

6 Bonilla L.F., P.C. Liu and S. Nielsen (2006). 1D and 2D linear and nonlinear site response in the Grenoble area. 3rd International Symposium on the Effects of Surface Geology on Seismic Motion. Grenoble, France, 30 August-1 September 2006, LCPC, paper n°82 (Vol 1).

7 Cartier S. (2007). Microzonages sismiques dans les vallées alpines et déclinaison locale des règles d'urbanisme - Seismic micro-zoning in the alpine valleys and local application in urban planning regulations, RGA, Vol 2 ,51-72, 2007.

8 Causse M. (2004). Evaluation du mouvement sismique dans la cuvette grenobloise par la méthode des fonctions de Green empiriques. Rapport de Stage, juin 2004, 77p.

9 Causse M., F. Cotton and C. Cornou (2006). A ground-motion simulation approach coupling rock ground motion prediction equations and the empirical Green's functions method. 3rd International Symposium on the Effects of Surface Geology on Seismic Motion. Grenoble, France, 30 August-1 September 2006, LCPC, paper n°27 (Vol 1).

10 Causse, M., Cotton, F., Cornou, C. and Bard P.-Y (2008). Calibrating median and uncertainty estimates for a practical use of Empirical Green's Functions technique. Bull. Seism. Soc. Am., Vol 98, 1, 344-353.

11 Cauzzi C., C. Eva, G. Ferretti, V. Giraud and R. Paolucci, Seismic response of alpine valleys: the case of Val Pellice, Italy. First European Conference on Earthquake Engineering and Seismology, 3-8 September 2006, Geneva, Switzerland, paper n°636.

12 Chaljub E. (2006). Spectral Element modeling of 3D wave propagation in the alpine valley of Grenoble, France. 3rd International Symposium on the Effects of Surface Geology on Seismic Motion. Grenoble, France, 30 August-1 September 2006, LCPC, paper S04 (Vol 2).

13 Chaljub E., C. Cornou and P.-Y. Bard (2006). Numerical benchmark of 3D ground motion simulation in the valley of Grenoble, French Alps. France. 3rd International Symposium on the Effects of Surface Geology on Seismic Motion. Grenoble, France, 30 August-1 September 2006, LCPC, paper SB1 (Vol 2).

14 Chaljub, E., S. Tsuno, P.-Y. Bard, C. Cornou, 2007. Analyse des résultats d'un benchmark numérique de prédiction du mouvement sismique dans la vallée de Grenoble, 7ème colloque de l'Association Francaise de Génie Parasismique, Paris (France), juillet 2007. AFPS 2007.

15 Chaljub E., C. Cornou, P. Guéguen, M. Causse, D. Komatish (2005). Spectral element modelling of 3D wave propagation in the alpine valley of Grenoble, France . EGU 2005, GRA, Vol 7, 05225, 2005

16 Chaljub E., D. Komatitsch, J-P. Vilotte, Y. Capdeville, B. Valette and G. Festa (2006). Spectral-element analysis in seismology. In: Wu R.S. and V. Maupin (Eds), *Advances in Wave Propagation in Heterogeneous Media*. In: *Advances in geophysics*, vol. 48, Elsevier, pp.365-419

17 Costa G., L. Moratto, D. Sandron, A. Delise and P. Suhadolc (2006). Ground motion attenuation and shaking maps generation in the southern Alps area. First European Conference on Earthquake Engineering and Seismology, 3-8 September 2006, Geneva, Switzerland, poster n°1811.

18 Costa G., P. Suhadolc, A. Delise, L. Moratto, E. Furlanetto and F. Fitzko (2006). Estimation of Site Effects at Some Stations of the Friuli (NE Italy) Accelerometric Network (RAF). 3rd International Symposium on the Effects of Surface Geology on Seismic Motion. Grenoble, France, 30 August-1 September 2006, LCPC, paper n°89 (Vol 2).

19 Cotton F., F. Scherbaum, J. Bommer, H. Bungum (2005). Crirteria for selecting and adjusting ground-motion modes for specific target regions: application to central Europe and rock sites. EGU 2005, GRA, Vol 7, 052267, 2005

20 Douglas J., H. Aochi, P. Suhadolc and G. Costa (2006). On the applicability of one dimensional crustal structures for groud motion simulation. First European Conference on Earthquake Engineering and Seismology, 3-8 September 2006, Geneva, Switzerland, Paper n° 18.

21 Douglas, J., H. Aochi, P. Suhadolc and G. Costa (2007). The importance of crustal structure in explaining the observed uncertainties in ground motion estimation. Bulletin of Earthquake Engineering, 5(1), 17-26.

22 Douglas J., P. Gueguen, E. Chaljub, F. Cotton, P. Suhadolc, G. Costa, D. Faeh, E. Spühler, A. Gosar, E. Priolo, C. Barnaba, R. Paolucci, C. Cauzzi and C. Eva (2006). Dissemination of Alpine Accelerometric Data. 3rd International Symposium on the Effects of Surface Geology on Seismic Motion. Grenoble, France, 30 August-1 September 2006, LCPC, paper n°31 (Vol 1).

23 Douglas, J., P. Guéguen, E. Chaljub, F. Cotton, P. Suhadolc, G. Costa, D. Faeh, E. Spühle, A. Gosar, E. Priolo, C. Barnaba, R. Paolucci, C. Cauzzi, C. Eva. (2006). Alpine Accelerometric Database. CD-ROM I, Projet Interreg 3B, Sismovalp.

24 Drouet, S., Chevrot, S., Cotton, F. and Souriau, A (2008). Simultaneous inversion of source spectra, attenuation parameters and site responses. Application to the data of the French Accelerometric Network. Bull. Seism. Soc. Am., Vol 98, 1, 198-219.

25 Drouet S., A. Souriau and F. Cotton (2005). Attenuation, seismic moments and site effects for weak-motion events: application to the Pyrenees. Bull. Seism. Soc. Am., Vol 95, 1731-1748.

26 Ferretti G., M. Massa., L. Isella e C.Eva, (2005). Uso di dati telesismici per la determinazione degli effetti di sito in Val Pellice, 24° Convegno nazionale GNGTS, Roma, C.N.R.

27 Ferretti G., M. Massa, L. Isella, and C. Eva (2007). Site-Amplification Effects Based on Teleseismic Wave Analysis: The Case of the Pellice Valley, Piedmont, Italy. Bull. Seis. Soc. Am., Vol. 97, 2, 605-613.

28 Fitzko F., G. Costa, A. Delise and P. Suhadolc (2007). Site Effects Analyses in the Old City Center of Trieste (NE Italy) Using Accelerometric Data. Journal of Earthquake Engineering, 11:1, 33 - 48

29 Furlanetto E., G. Costa, P. Suhadolc, F. Palmieri (2008) Gravimetric characterization of the Gemona (NE Italy) alluvial fan for site estimation. Near Surface Geophysics, in revision

30 Furlanetto E., G. Costa, F. Palmieri, A. Delise, and P. Suhadolc (2006). Gravimetric and microseismic characterization of the Gemona (NE Italy) alluvial fan for site effects estimation. First European Conference on Earthquake Engineering and Seismology, 3-8 September 2006, Geneva, Switzerland, poster n°1935.

31 Furlanetto E., G. Costa, F. Palmieri, A. Delise, P. Suhadolc (2006). Gravimetric and microseismic characterization of the Gemona (NE Italy) alluvial fan for site effects estimation. EGU 2006, GRA, Vol 8, 05994, 2006.

32 Gosar A. (2007). Microtremor HVSR study for assessing site effects in the Bovec basin (NW Slovenia) related to 1998 Mw5.6 and 2004 Mw5.2 earthquakes. Engineering Geology, 91, 178-193.

33 Gosar A. (2008) Site effects study in shallow glaciofluvial basin using H/V spectral ratios from ambient noise and earthquake data; the case of Bovec basin (NW Slovenia). Journal of Earthquake Engineering, Vol 12, 17-35.

34 Guéguen P., C. Cornou, S. Garambois and J. Banton (2007). On the limitation of the H/V spectral ration using seismic noise as an axploitation tool : application to the Grenoble valley (France), a small apex ration basin. PAGEOPH, 164(1), 115-134.

35 Gueguen P., S. Garambois, S. Tadenuma, B. Lebrun, and F. Cotton (2006). Geotechnical, geophysical and seismological data used for the estimate of the highest amplified frequency in the basin of Grenoble. 3rd International Symposium on the Effects of Surface Geology on Seismic Motion. Grenoble, France, 30 August-1 September 2006, LCPC, paper n°100 (Vol 2).

36 Jerram J., P. Foray, S. Labanieh and E. Flavigny (2006). Characterising the nonlinearities of lacustrine clays in the Grenoble basin. 3rd International Symposium on the Effects of Surface Geology on Seismic Motion. Grenoble, France, 30 August-1 September 2006, LCPC, paper n°81 (Vol 1).

37 Jerram J., P. Foray and E. Flavigny (2006). Caractérisation des sols de la cuvette grenobloise: application à l'étude du risque de liquéfaction. Journées nationales de Géotechnique et de Géologie de l'ingénieur, Lyon.

38 Lacave C. and F. Hollender (2006). Ground motion simulation on a 2D profile across the Grenoble basin using the Aki-Larner discrete wave-number method. 3rd International Symposium on the Effects of Surface Geology on Seismic Motion. Grenoble, France, 30 August-1 September 2006, LCPC, paper n°14 (Vol 1).

39 Lacave C. and F. Lemeille (2006). Seismic hazard and alpine valley response analysis: generic valley configuration.. First European Conference on Earthquake Engineering and Seismology, 3-8 September 2006, Geneva, Switzerland, paper n°1.

40 Lacave, C., F. Lemeille, P. Guéguen, E. Priolo, C. Barnaba, A. Vuan, G. Costa, A. Gosar, P. Suhadolc, D. Fäh, D. Roten, P. Tissières, S. Tadenuma, P.-Y. Bard, F. Cotton, C. Eva, V. Giraud, R. Paolucci, F. Bonilla, P. Foray, J. Jerram. (2006). Generic Alpine Valley characterization. CD-ROM II, Projet Interreg 3B, Sismovalp.

41 Lemeille F. (2005). Contribution de l'IRSN à la synthèse des éléments généraux sur la géométrie et sur la nature du remplissage des vallées alpines (prg européen SISMOVALP), note technique DEI/SARG n° 04-50.

42 Lemeille F. (2005). Distribution des formations géologiques superficielles du remplissage post-glaciaire de la vallée de Grenoble (prg européen SISMOVALP), note technique DEI/SARG n°02-55.

43 Paolucci R. and D. Spinelli (2006). WAVE2D: a computer program for SH seismic wave propagation in heterogeneous media by the Fourier pseudo-spectral method. 3rd International Symposium on the Effects of Surface Geology on Seismic Motion. Grenoble, France, 30 August-1 September 2006, LCPC, paper n°43 (Vol 1).

44 Paolucci R. and L. Morstabilini (2006). Non-dimensional site amplification functions for basin edge effects on seismic ground motion. 3rd International Symposium on the Effects of Surface Geology on Seismic Motion. Grenoble, France, 30 August-1 September 2006, LCPC, paper n°41 (Vol 1).

45 Roten, D. and D. Fäh (2006). A combined inversion of Rayleigh wave dispersion and 2D resonance frequencies. Geophysical J. Int.. 168, 1261-1275.

46 Roten D., D. Faeh, Oprsal I., Olsen K. and D. Giardini (2006). Site effects in the Rhône valley analysed from ambient noise, local earthquakes and numerical simulations. 3rd International Symposium on the Effects of Surface Geology on Seismic Motion. Grenoble, France, 30 August-1 September 2006, LCPC, paper n°92 (Vol 1).

47 Roten D., D. Fäh, I. Oprsal, K. Olsen and D. Giardini (2006). Analysis of deep valley response by ambient noise, earthquake records and numerical simulations, First European Conference on Earthquake Engineering and Seismology. Geneva, Switzerland, 3-8 September 2006, paper number 1108

48 Turino C., G. Ferretti, C. Eva, C. Cauzzi, R. Paolucci (2006) Seismic Response analysis of La Salle fluvial fan, Valle D'Aosta, Italy. 3rd International Symposium on the Effects of Surface Geology on Seismic Motion. Grenoble, France, 30 August-1 September 2006, LCPC, paper n°79 (Vol 2).

49 Vanini M., M. Villani, E. Faccioli and A. Gosar (2006). Modelling of strong ground motion of the July 2004 , Mw 5.2 earthquake in Krn mountains. 3rd International Symposium on the Effects of Surface Geology on Seismic Motion. Grenoble, France, 30 August-1 September 2006, LCPC, paper n°33 (Vol 2).

50 Sesarray training – information sheet

Conference organised in Tolmezzo (Italy), the 9 March 2007, to present the results of the project SISMOVALP in Italy.

The following presentations are available on web at: http://www2.inogs.it/sismovalp and on the appended CD-Rom

Pericolosità e amplificazione sismica locale nelle valli alpine, Convegno di presentazione dei risultati del progetto SISMOVALP, Tolmezzo (UD) 9 Marzo 2007.

L. Palazzo, The Italian Participation in the EU Community Initiative Alpine Space: Results and perspectives
E. Priolo, Il Progetto SISMOVALP: Sommario generale, descrizione e risultati ottenuti
C. Barnaba, Le vallate alpine: caratteri generali ed elementi in comune
G. Costa, Il conoide di Gemona e la Val Resia
C. Eva, Analisi della risposta sismica del Comune di Torre Pellice (Val Pellice) e del Comune di La Salle (AO): osservazioni sperimentali e simulazioni numeriche
A. Vuan, L'Alta Val Tagliamento e l'area di Tolmezzo e Cavazzo Carnico
R. Paolucci, Sintesi dei risultati ottenuti sulle diverse valli e possibili implicazioni normative
C.G. Lai, Indagini geognostiche per la caratterizzazione geotecnico-sismica dei siti
A. Rovelli, Metodi di indagine per la stima della risposta di sito
M. Dolce, Stato attuale ed evoluzione della normativa sismica italiana

Conference organised in Grenoble (France), the 21 June 2007, to present the results of the project SISMOVALP in France

Projet SISMOVALP : Risque Sismique dans les vallées alpines

The following presentations are available on web at: http://www.obs.ujf-grenoble.fr/risknat/ and on the appended CD-Rom

F. Cotton (LGIT, UJF), Projet Sismovalp : Aléa sismique à Grenoble et dans les vallées alpines,
P. Guéguen (LGIT, LCPC), Vulnérabilité du bâti collectif : restitution des projets Vulneralp et Sismo-DT,
E. Francou et S.Baranger (Direction des bâtiments, Ville de Grenoble), Démarche de la Ville de Grenoble en lien avec le projet Sismo-DT,
C. Lutoff (PACTE, UJF) et P.A. Davoine (LSR, INPG) Conscience et perception du risque sismique à Grenoble,
J.D. Rouiller (Canton du Valais) et R. Perruzi (expert agréé), Autorisation de construire : procédure valaisanne et formulaires d'expertise
P.Y. Bard (LGIT, LCPC), Contexte et perspectives réglementaires
P. Sabourault (MEDAD), Plan séisme National
A. Palmier (DIREN) et J.M. Vengeon (PGRN), Actions programmées en Rhône-Alpes dans le cadre du Plan Séisme : information, formation des professionnels…

Presentation of the two CD-ROM's