VEÐURSTOFA ÍSLANDS

Report
04010

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PREPARED – Management and resource usage summary

Months 7-12: August 1, 2003 - January 31, 2004

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1.1 Objectives of the reporting period and summary

The central objective of the project is to apply large amount of geophysical and geological observations related to the two large year 2000 earthquakes in South Iceland to develop technology for improving earthquake preparedness and mitigating risk. Although the project has a central role in evaluating the observations of these earthquakes, much work had already been carried out before in data retrieval and evaluations for the benefit of the project, and the project is a continuation of such work. It is also a continuation of earlier research projects in the same field.

16 European scientific institutions are partners in this project. 11 of these were partners in earlier earthquake prediction research projects in Iceland supported by EC (PRENLAB, PRENLAB-2, SMSITES and RETINA). The others are new partners in this field, added as they can provide significant contribution to various workpackages of the project. Most of the workpackages of the project are carried out in cooperation of two or more partners.

The project is closely linked to the earlier EC projects, PRENLAB and PRENLAB-2 and SMSITES, as well as to the ongoing RETINA project.

The start date of the project was February 1st, 2003. All the partners attended a Kick-Off Meeting in Reykjavík on February 24-26 to evaluate the state of the research and to organize work within the 25 workpackages.

A website for the project was also set up in February 2003 to tie this multidisciplinary project together and to provide current information of the progress to EC and other users of the results (*http://hraun.vedur.is/ja/prepared*). The two parts of it, the open part and the closed part, have all reports relevant for the progress of the ptoject.

Meeting among attending PREPARED participants was organized during the EGS/AGU/EUG Joint Assembly in Nice, France, April 6-11, 2003.

A two day workshop, i.e. the PREPARED Mid-Term Meeting was organized in Reykjavík on January 30-31, 2004.

During this first part of the project much work was carried out in retrieving and further evaluation of seismic data which are basic for many partners and workpackages in the project. A database of 170.000 earthquakes with high-level and qualified information for the period 1991-2000 has been prepared by the coordinator and was gradually made available for the partners of the project and was finalized in September 2003. It contains information on refined and manually constrained locations, fault plane solutions as well as two types of magnitudes, moment magnitudes and local scale magnitudes. This dataset is of basic significance for the majority of the workpackages, especially those dealing with seismic patterns in time and space as well as for fault and stress mapping at depth. Databases for 2001 and 2002 have partly been released for application within PREPARED.

In other cases data were ready for application from the start of the project like much of the geological data used for mapping of surface faults and other surface effects as well as for analyzing paleo-stress fields. However, the first half term of the project,especially the first 8 months, was used for collecting complementary geological data in many cases.

Significant modelling work has already been carried out during this first part based on constraining the models of the abovementioned projects in light of the year 2000 earthquakes.

Much work had already been carried out before the start of the project in studying deformation related to the earthquakes by InSAR and GPS as well as hydrological changes. Such work is a significant basis for the PREPARED project and a list of reports of such related work is attached in the annexes to this report.

1.2 Scientific/Technical progress made in different workpackages according to the planned time schedule

The progress of the project has generally been as planned, i.e. on schedule. In a few cases the order of tasks has been changed within workpackages for practical reasons. Table 1 is planned/executed efforts by workpackages. Table 2 and Table 3 show comparison between planned and used manpower. In the following subsections the progress of various WPs is summarized. They are all on schedule unless explained in the text.

1.2.1 WP1 - Coordination. Scientific coordination and management of the project is in the hands of IMOR and has been performed as planned in the Description of Work.

1.2.2 WP2 - Analysis of multiparameter geophysical data approaching the June 2000 earthquakes, assessing state of stress. Lead contractor IMOR. Work has been ongoing during all the period. More work has been carried out than planned. The main work during the period was to refine, evaluate further and organize a database of 170.000 microearthquakes of basic significance for several partners of the project. The work on this enormous amount of data showed to be more than expected, but has now come to a final stage, and provision of this well revised and qualified database has started. As soon as the seismic data were made available in September 2003 analysis work started on these data, especially on recognizing precursory signs in the data. (See the report Stefánsson and Guðmundsson 2004 and Annex Ib in the 6 month management report).

1.2.2.1 WP2.1 - Pattern search in multi-parameter seismic data. The WP is led by CAU. The work has had a good start by adaption and enhancement of necessary software, and first test runs for search of patterns in the data. This was a preparation for running the total microearthquake database from 1991 to 2000, which finally was made available in September 2003. There are no fundamental deviations from the workplan in WP2.1, except for the delay in analysis of the actual data due to delays in their availability. This had, however, no impact on fulfilling the goals and all future deliverables will be on time.

1.2.2.2 WP2.2 - Possible precursory seismic quiescence and b-value changes. The WP which is led by WAPMERR is on schedule, the used man-months so far are equal to the planned ones and there is no deviation from the work plan.

1.2.2.3 WP2.3 - Long-term deformation in the South Iceland seismic zone inferred by joint interpretation of GPS, InSAR and borehole strain data. Lead contractor is NVI. Reanalysis of 1992-1999 GPS data, i.e. prior to the earthquakes has been done in cooperation with

CNRS-UMR 5562 (P10). Repeated GPS measurements have been carried out. There are no major deviations from the workplan.

1.2.2.4 WP2.4 - Space and time variations in crustal stress using microearthquake source information. Lead contractor UU. Algorithms and technique for stress tensor calculations have been prepared. Also it has been studied how precise relative location of earthquakes can be applied when evaluating the stress tensor. The same is true for the pattern analysis by the SAG method. Necessary methodological development has taken place. Application of data to be treated by this technology is ongoing and already showing significant results. Less time has been used than planned partly due to delay of data at the beginning. The work is in progress as planned.

1.2.2.5 WP2.5 - Using shear-wave splitting above small earthquakes to monitor stress in SISZ. Lead contractor UEDIN. Monitoring of shear-wave splitting in Iceland started under earlier EC projects has continued during the period. Current analysis demonstrates reason for scatter in Δt above earthquakes, and recognizes stress-relaxation before earthquakes, where log of the delay is proportional to earthquake magnitude. In studying SWS before the 2000 earthquakes, the data from 1991 to 1996 are too sparse to be valuable for shear-wave splitting results, but evaluations of post- 1996 data are essentially complete. The progress in the WP is as planned.

1.2.3 WP3 – Short-term changes before large earthquakes, short-term warning algorithms. Lead contractor IMOR. The main work here is multidisciplinary analysis and focussing of results of other WPs, especially the WP2.1-2.5 and WP3.1-3.2. This part naturally waits for such results. The main work done so far is the writing of a report by the contractor on earlier observations, on historical and instrumental short-term premonitory changes as well as writing of a report: About the state-of-the-art in providing earthquake warnings in Iceland by Stefánsson and Guðmundsson 2004.

1.2.3.1 WP3.1 - Foreshocks and development of new warning algorithms. Lead contractor UU. Work is ongoing to recalculate, in light of the new data, the parameters involved in the earthquake warning algorithms EQWA which was designed during PRENLAB-2. The absolute stress level monitoring is a new and a significant parameter for EQ warning and is independent of the previous parameters used in EQWA. This can possibly lead to a significant improvement of the EQWA. Also methods are being developed in light of the new data for unique determination of fault planes. Such an elimination of the auxiliary plane will possibly help to distinguish foreshocks from other seismic activity. All this new development will be in the new version of EQWA which will be developed into an operational warning algorithm during the second half of the work. The work is proceeding according to the plan and time schedule.

1.2.3.2 WP3.2 - Radon anomalies/Development of warning algorithms. Lead contractor SIUI. Time series of radon measurements, related to earthquake occurrence, of various sources in Iceland have been evaluated and ready to be delivered to other participants, and ready to be applied to prepare for warning algorithms which will be delivered. Paper on the premonitory anomalies to the 2000 earthquakes has been submitted for publication in Geophysical Research Letters (Einarsson et al. 2004). There are no major deviations from the workplan and the WP is well on schedule.

1.2.4. WP4 - A model of the release of the two June 2000 earthquakes based on all available observations. IMOR is lead contractor. Much of the work has been related to evaluation of the multidisciplinary data from various sources applied in this WP. The focussing of modelling results, which is the basic work in this package, naturally waits for the results of other modelling packages. The pattern analysis work of IMOR on the microseismic data, since these were delivered, is significant input to the modelling work. The progress of WP4 is on schedule.

1.2.4.1 WP4.1 - Source mechanisms and fault dimensions of the June 17 and June 21 earthquakes determined from the inversion of teleseismic body waves and from mapping of aftershocks. Lead contractor IMOR. The main part of the work is reevaluation of a large amount of the seismic data and finishing refinement of the methodology to accurately relocate microearthquakes and calculate fault plane solutions from these. This development is now successively finished and the basic work with the data for fast application timely finishing the deliverables. The work with the inversion of teleseismic data has been delayed, as it is considered significant to finish "precise" mapping of the aftershocks before the teleseismic inversion is finished. Much more work has been involved in this than anticipated. Minor delays in some aspects of the workpackage will be evened out during the later part because of the thorough methodological work that has been finalized.

1.2.4.2 WP4.2 - Analysis, inversion and estimation of strong ground motion data from extended earthquake fault models of the two June 2000 Icelandic events. Lead contractor UNIVTS.DST. The work during the first part of the project involved assembling the accelerometer waveform database and to obtain the best model of seismic structure of the South Iceland seismic zone, necessary for the inversion. Deliverables D58, D61 and D62 are done. D59 and D60 are delayed to the second year due to lack of absolute timing on most of the strong motion records. This can be solved and the work in this package can be expected to fully comply with the objectives at the end of the project period.

1.2.4.3 WP4.3 - Surface fractures in the source region of the June 2000 events. Lead contractor SIUI. All major known surface fault segments of the South Iceland seismic zone have been field-checked and mapped by differential GPS instruments. Surface faulting of the 2000 earthquakes was more extensive than previously thought. Additional faults have been mapped and a paper submitted to Tectonophysics (Clifton and Einarsson 2004). The general map base of the Icelandic Geodetic Survey has been incorporated into the mapping software. Detailed maps of faults can now be produced on that base for any sub-area. All expected deliveries of this WP have been fulfilled, i.e. D65-D69.

1.2.4.4 WP4.4 - Deformation model for the June 2000 earthquakes from joint intepretation of GPS, InSAR and borehole strain data. Lead contractor NVI. The work is partly a direct continuation of a work begun before the start of the project, and is well on schedule. Work has been ongoing in refining the evaluations and modelling procedures, and comparing the results with emerging results from the seismic evaluations and other modelling work. The deliverables due in the first year are completed, i.e. D71 (See Figure 1 in a detailed WP4.4 report in Section 3). There are no major deviations from the workplan and work is well on schedule.

1.2.5 WP5 - New hazard assessment/New methods for improving assessment of probable earthquake effects. The WP is led by IMOR. The work in this WP involves mainly assembling and merging together the results of WP5.1-5.6 and WP 4.2 as well as the

modelling packages. The main work of the contractor so far within this WP is in evaluating, analyzing and supplying seismic data, and gradually during the second year to focus multidiscipliary results for special application for a real-time hazard assessment, for nowcasting and short-term warnings. All deliveries are met and the work on schedule.

1.2.5.1 WP5.1 - Mapping subsurface faults in southwestern Iceland with the micro-earthquakes induced by the June 17 and June 21 earthquakes. Led by IMOR. The work so far involves refinements of methods, group selection and testing, preparing for the mapping work on a large scale. It has been shown that by applying the relocation algorithm to the microearthquakes induced by J17 and J21 events, locations can be significantly improved such that fault patterns become resolvable. There were no deliverables expected for the first half year, but reports have anyhow been presented at scientific meetings. Work is well on scedule.

1.2.5.2 WP5.2 - Mapping and interpretation of earthquake rupture in the Reykjanes peninsula and other surface effects there and in the SISZ. Field work is completed and a complete map of primary rupture and secondary effects has been completed. A GIS database has been established for the entire Reykjanes peninsula. A new fault and fracture map has been generated from a combination of field mapping and mapping from georeferenced digital air photos. Work is well on schedule and has already been partially reported at scientific meetings. No formal deliverables were expected until month 18. Work is well on schedule.

1.2.5.3 WP 5.3 - *Study of the strong ground motion, acceleration and intensities of the two large earthquakes.* A theoretical model has been fit to the strong ground motion recordings from South Iceland earthquakes in June 2000. These models are also used for simulating realistic input records for computational structural models (contributions to deliverables D83 and D84). A paper has been written to appear in an international earth science journal (contribution to deliverable D85). Work is well on schedule and there are no significant deviations from workplan.

1.2.5.4 WP5.4 - Reevaluation of the historical earthquakes in the light of the new observations. An attenuation formula has been developed based on measurements of the year 2000 activity. Other parts of the WP are in progress. First deliverables are expected in M24. Work well on schedule.

1.2.5.4 *WP5.5 - Hydrological changes associated with the June 2000 earthquakes.* Lead contractor UIB until 31.1.2004. The scientific leader of this WP, Prof. Agust Gudmundsson, did move to the University of Göttingen early 2003. UIB has not done any work on the WP during this first year nor claimed any costs from EC. However, the work is well on way in Göttingen including hydrological observations during the 2000 earthquakes, theoretical work on new models of faulting, fluid transport and deformation in the SISZ, as well as planned field work during this summer. Field work and theoretical work is ongoing with significant outcome. Televiewer measurements in boreholes are delayed for reasons explained in Chapter 1.6. The analysis in general of the hydrological data is somewhat delayed, but for the summer 2004 the plan is that all the participants in this package will be in Iceland to work on and analyze these data. The most important milestones reached so far in this project are the numerical model results D87 (on schedule). Work is in general on schedule and deviation from planned work will even out during the second year.

1.2.5.5 *WP5.6 - Paleo-stress fields and mechanics of faulting.* Lead contractor UPMC. The work during the period is in accordance with the plan. Geometry and mechanics of faulting after selected fault traces measurements. Collection of fault slip datasets in the field, analysis in terms of stress tensors by inversion method. Inversion of focal mechanisms of earthquakes, comparison with faulting results. First attemps at stress modelling of fault slip measurements in the field, stress distribution around the June 21 earthquake based on earthquake data and surface deformation of the year 1630 historical earthquake in Iceland. Work well on schedule. No deviations from workplan.

1.2.6 *WP6 - Modelling and parameterizing the SW-Iceland earthquake release and deformation processes.* Lead contractor IMOR. This WP is mainly based on progress of WP6.1 and WP6.2 and of other WPs parameterizing on basis of various observations of crustal processes. The main work up to now is providing of data and basic information and participation in discussion on modelling efforts. Work has started by CNRS-UMR 5562 to apply 3D finite-element modelling to model the deformation associated with the year 2000 earthquakes. Conclusions so far are that for a general modelling and parameterizing the SW Iceland earthquake release and deformation processes, results from most other WPs are needed, and new knowledge is emerging in the various workpackages that can be expected to lead to new understanding of the South Iceland seismic zone earthquake processes. Work is well on schedule and no deviations from workplan.

1.2.6.1 WP6.1 - Earthquake probability changes due to stress transfer. Lead contractor GFZ Potsdam. During this first period the contractor has extended his software based on elastic crustal properties, applied in the PRENLAB projects mainly on historical earthquakes to include also Coulomb stress changes in the modelling. The model was set up considering various information about the crustal structure at the SISZ and information about the viscosity of the lower crust and tested. A report about the model results were given during the Mid-Term Meeting by end of January 2004 and are contained in the Mid-Term project report. This is a part of the D96 delivery M12. Finalizing that delivery has to wait for some results of WP5.4. Which thus is a deviation from the plan. On the other hand work with delivery D97 has been accelerated, ahead of plans. So in general the work is in good progress and on schedule.

1.2.6.2 WP6.2 - Model stress in the solid matrix and pressures in fluids permeating the crust. Lead contractor DF.UNIBO. All tasks scheduled to start within the first half year are in good progress. The first task "Original mathematical solutions for crack models in trans-tensional environment" has been finished and a paper has been prepared. In general the progress and deliverables are on schedule, however, with minor deviations in both directions. Thus D95 is ahead of schedule**,** D98 on schedule, D99 behind schedule due to late appointment of Post-Doctor Researcher, D100 on schedule. Progress is good and in general in agreement with workplan.

1.3 Milestones and deliverables obtained

List of deliverables expected during the first half year and how they have been fulfilled:

D 1	Kick-off meeting for the project, minutes	M01 Re RE	**Finalized M01 Re RE**
D 2	Project website, internal, external	M03 Re PU	**Finalized M01 Re PU**
D 3	Brief progress report	M06 Re RE	**Finalized M06 Re RE**
D 4	First annual scientific report, including edited report and cost	M12 Re PU	**Finalized by current**

	statements		**report M12 Re PU**
D 7	Sessions at regular project meetings	M01 Re RE	**Finalized M01 Re PU**
D 8	Sessions at regular project meetings	M10 Re RE	**Finalized M12 Re PU**
D13	Application of PCA to SIL-data, emphasizing computational statistics	M10 Re PU	**Finalized M12 Re RE**
D14	Application of PCA to SIL-data, emphasizing computational statistics	M12 Re PU	**Finalized M12 Re RE**
D18	Changes of seismicity rate	M12 Re PU	**Finalized by manuscript to submit M12 Re RE. Takes also partly to D19**
D20	Three-dimensional displacement field in a time-period prior to the June 2000 earthquakes	M12 Re PU	**Finalized M12 Re RE**
D21	Strain-field in the pre-seismic period	M12 Re PU	**Finalized M12 Re RE**
D23	Estimates of the stress tensor in the SISZ during 1991 through 2001	M12 Re PU	**Finalized M12 Re RE**
D24	SAG analysis in the SISZ during 1991 through 2001	M12 Re PU	**Finalized M12 Re RE**
D25	Estimates of the stress regimes in the SISZ during the last 2-3 million years	M12 Re PU	**Finalized M12 Re RE**
D26	Results from statistical analysis of source parameters of the earthquakes in the SISZ during 1991 through 2001	M12 Re PU	**Finalized M12 Re RE**
D28	Plots of stress variations before earthquakes and volcanic eruptions	M12/24 Re PU	**Delivered to end user M08, M10, M11 Re PU**
D29	Stress-forecasts of impending large earthquakes issued to IMOR	Re CO	**Delivered to IMOR, Re CO**
D30	Report on stress changes estimates by SWS since 1996	M12 Re PU	**Finalized M12 Re RE**
D31	Reports in collaboration with other partners of imaging stress variations	M12/24 Re PU	**Finalized M12 Re RE**
D32	Reports on progress of ANN measurements of shear-wave splitting	M12 Re PU	**Finalized M12 Re RE**
D33	Reports on experience of selecting training sets for ANN	M12 Re PU	**Finalized M12 Re RE**
D36	Sessions at project meetings	M01 Re RE	**Finalized M01 Re PU**
D37	Sessions at project meetings	M10 Re RE	**Finalized M12 Re PU**
D47	Time series of radon at all radon stations in South Iceland since 1977	M12 Re PU	**Finalized M11 Re PU**
D48	Presentation of the radon results at international meetings	M12 Re PU	**Finalized M12 Re PU**
D51	Sessions at regular project meetings	M01 Re RE	**Finalized M01 Re PU**
D52	Sessions at regular project meetings	M10 Re RE	**Finalized M12 Re PU**
D56	A point-source moment tensor solution and source-time function for the earthquakes of June 17 and June 21, 2000	M03 Re PU	**Expected delay to M16**
D58	Preliminary slip model of rupture on the fault of the first earthquake	M08 Re PU	**Finalized M08 Re RE**
D59	Best slip model of rupture on the fault of the first earthquake.	M12 Re PU	**Delayed to M18.**
D61	Estimated acceleration field in selected localities for first event	M14 Re PU	**Finalized M12 Re RE**
D62	Preliminary slip model of rupture on the fault of the second event	M18 Re PU	**Finalized M12 Re RE**
D65	Map of surface fractures in the eastern source area.	M06 Re PU	**Finalized M06 Re RE Finalized M12 PU**
D66	Map of faulting during the June 2000 events	M06 Re PU	**Finalized M06 Re PU Finalized M10 Re PU (paper submitted to Tectonopysics)**
D67	Input into the gereral modelling of the June 2000 events	M06 Re PU	**Finalized M06 Re PU. Input into published articles**
D68	Map of fractures in the western source area	M12 Re PU	**Finalized M12 Re PU (for risk information)**
D69	Presentations of results at international meetings	M12 Re PU	**Finalized M10 Re PU**
D71	Three-dimensional co-seismic displacement field for June 17 and	M06 Re PU	**Finalized M06 Re PU**

	June 21, 2000 earthquakes		
D74	Sessions during project meetings	M01 Re RE	**Finalized M01 Re PU**
D75	Sessions during project meetings	M10 Re RE	**Finalized M12 Re PU**
D83	Attenuation of strong ground motion of the large earthquakes	M12 Re PU	**Finalized M12 Re PU**
D87	Results from ongoing analytical and numerical modelling	M12 Re PU	**Finalized M12 Re RE**
D91	Sessions at project meetings	M01 Re RE	**Finalized M01 Re PU**
D92	Sessions at project meetings	M10 Re RE	**Finalized M12 Re PU**
D96	Inelastic model for the earthquake series (M>=6) in the SISZ since 1706	M12 Re PU	**Finalized M12 Re PU (Oral meeting report M11, Mid-term report M12)**
D98	Original mathematical solutions for crack models in trans-tensional environment	M06 Re PU	**Finalized M06 Re PU**
D99	Crack models in viscoelastic	M09 Re PU	**Delayed to M18**
D100	Crack model in poroelastic (12m) media	M12 Re PU	**Finalized M12 Re RE**

1.4 Deviations from the work plan or/and time schedule and their impact to the project

There are no deviations from the workplan as a whole. Some tasks have advanced slightly slower than expected while other have advanced faster due to practical order in carrying out the tasks. However, the WPs as a whole are on schedule as takes to planned deliverables. Many studies are based on the huge and high-level seismic dataset of microearthquakes of IMOR from 1991-2000, which was released as a whole to the PREPARED consortium in September 2003. This dataset of 170.000 earthquakes includes besides usual information in seismic catalogues, fault plane solutions to all observed earthquakes down to magnitude zero as well as moment magnitudes. It was necessary to reevaluate all this dataset from the routinely evaluated catalogue to a level that can be useful for all workpackages, which are based on seismic data. Waiting for this database to be ready the users started their work by preparing software and by test runnings on parts of the data, in preparing the application of the dataset as a whole which started in full September/October 2003. The deliverables table above shows few deviations, i.e. a few deliverables are delayed, like D56. In this case the delay is due to that it is considered necessary to have accurate relative locations of all aftershocks ready before finalizing it. There is a delay in the televiewer measurements in WP5.5. In several cases the reports released so far are not marked as PU (public) as was estimated, but the resulting report marked RE which mean internal, within the consortium. Anyhow the work has been carried out and the data and results are available for the others in the group, and thus are a part of the progress of the project as a whole. In spite of the delays in the televiewer measurements and in the final high-level evaluations of the seismic data, deliverables are generally on schedule. However, it is possible that these delays may cause other delays at a later stage of the project. The project as a whole is linked together in end products, the most significant warning tools, which are based on well established results of all the individual taks in the project. Minor delays in individual tasks can thus cause some delays in the project as a whole at a final stage. This will be looked better into in the next months.

1.5 Communication between partners

The project started with a 3 days Kick-Off Meeting in Reykjavík, with the attendance of all partners, where the state of the research was discussed as well as cooperation, both in the group as a whole as well as cooperation in smaller groups. The center for communication is the PREPARED website which was opened in February 2003. An inofficial meeting of the consortium was held among many of the partners during the EGS/AGU/EUG Joint Assembly in Nice, April 6-11, 2003. A two day workshop, i.e. the PREPARED Mid-Term Meeting was organized in Reykjavik on January 30-31, 2004, and several of the participants used the days before for smaller discussion meetings. During the later year of PREPARED there are plans for much multidisciplinary cooperative work in merging together results into useful tool and new understanding.

1.6 Difficulties encountered at management and coordination level and proposed/applied solutions

There have been some problems linked to the transfer of Professor Agust Gudmundsson from professorship at the University of Bergen, Norway to the University of Göttingen, Germany. The University of Bergen (with scientific leader Gudmundsson) was partner 5 in the PREPARED proposal and in the following project contract. Gudmundsson leads WP5.5. However, just before the start of PREPARED project, Gudmundsson was accepted as a professor at the University of Göttingen. For some reasons which are not detailed here the official start date of participation of the University of Göttingen in the project was decided to be February 1, 2004. Because of uncertainty if work in this WP would be funded, all the most costly parts were delayed, among these the televiewer measurements, planned to be carried out by a subcontractor. The University of Bergen has not done any work on the project, no payments have been made transferred to it and no costs have been claimed on its behalf. The University of Göttingen is a formal contractor in the project from February 1, 2004, with the scientific leader as originally planned, Agust Gudmundsson.

As the University of Bergen has not done any work on the project and the University of Göttingen is first a formal partner in the project from February 1, 2004, Table 1 shows no executable efforts in WP5.5 during the first 12 months, Table 2 shows no used manpower for the University of Bergen, and Table 3 shows no used manpower in WP5.5.

Workpackage number and name	Month 1	2	3	4	5	6	7	8	9	10	11	12
WP 1 Coordination.												
WP 2 Analysis of trends in geophysical data approaching June 2000 earthquakes.												
WP 2.1 Pattern search in multiparameter seismic data, PCA.												
WP 2.2 Analysis of seismic catalogue, homogeneity, quiescence, b-values.												
WP 2.3 Long-term deformation based mainly on GPS, InSAR and strain.												
WP 2.4 Stress changes based on microearthquake sources and from geology.												
WP 2.5 Shear-wave splitting above small earthquakes to monitor stress changes.												
WP 3 Short-term changes before large earthquakes, short-term warning algorithms.												
WP 3.1 Foreshocks. Detailed study and development of new warning algorithms.												
WP 3.2 Radon anomalies. Detailed study and development of warning algorithms.												
WP 4 Detailed model of the two large earthquakes. A group work.												
WP 4.1 Focal mechanism, based on teleseismic and microearthquake information.												
WP 4.2 Inversion of near field strong motion data. Slip distribution.												
WP 4.3 Interpretation of surface fractures related to the two large earthquakes.												
WP 4.4 Deformation associated with the two large earthquakes, GPS, InSAR, strain.												
WP 5 New methods for improving assessment earthquake effects. A group work.												
WP 5.1 Detailed mapping of distant faults by microearthquakes.												
WP 5.2 Detailed geological mapping of surface effects in a large area.												
WP 5.3 Study of the strong motion records, intensities, from the large earthquakes.												
WP 5.4 Reevaluations of historical earthquakes in light of the new observations.												
WP 5.5 Hydrological changes in a large area related to the earthquakes.												
WP 5.6 Analysis of paleo-stress fields and mechanism.												
WP 6 Integration of the modelling work. A new general model.												
WP 6.1 Model stress changes in Iceland based on historical activity.												
WP 6.2 Model stress in the solid matrix and pressures in fluids permeating the crust.												

Table 1. *Timetable for the first 12 months of the project. For each WP the red boxes show planned efforts and the yellow ones executed efforts.*

Workpackage number	IMOR		UU		UEDIN		NVI		UIB		SIUI		UPMC		DF.UNIBO		GFZ POTSDAM		CNRS-UMR 5562		UNIVTS-DST		CAU		WAPMERR		UI	
		%		%		%		%		%		%		%		%		%		%		%		%		%		%
WP1	11	50																										
WP2	2,5	190	0,5	5	1	5	1	5															1	20	1	40		
WP2.1																							9,5	35				
WP2.2																									9	50		
WP2.3							21	45											4	65								
WP2.4			21	45									0,5	50														
WP2.5	1,5	0			15	40																						
WP3	2,5	35	0,5	5							1	5																
WP3.1	1	0	12,5	35																								
WP3.2											10	70																
WP4	2,5	20					0,5	20			1	5									0,5	5						
WP4.1	13	65	0,5	0																								
WP4.2	1	0																			15	50					2,5	40
WP4.3							1	0			13	45																
WP4.4	1	5					11	45			0,5	10							1	70								
WP5	2,5	10					0,5	10	1				1	5							0,5	20					0,5	5
WP5.1	11,5	75																										
WP5.2	0,5	10					11	55																				
WP5.3	1	0																									16	55
WP5.4	8,5	50																									1	0
WP5.5									17				0,5	50	2	50												
WP5.6													7,5	60	1	50												
WP6	2	5									1,5	5			4	50	1	150	1	5								
WP6.1															2	50	15,5	40	4	50								
WP6.2															29	46			1	0								
Total	62	55	35	35	16	40	46	45	18	0	27	50	9,5	55	38	47	16,5	50	11	50	16	50	10,5	35	10	50	20	50

Table 2. *Planned and used manpower: The yellow columns show planned manpower for months 1-24 (both permanent and temporary) for each partner in individual WPs in man-months. The green columns show the used manpower in each case for months 1-12 as percentage of the planned one.*

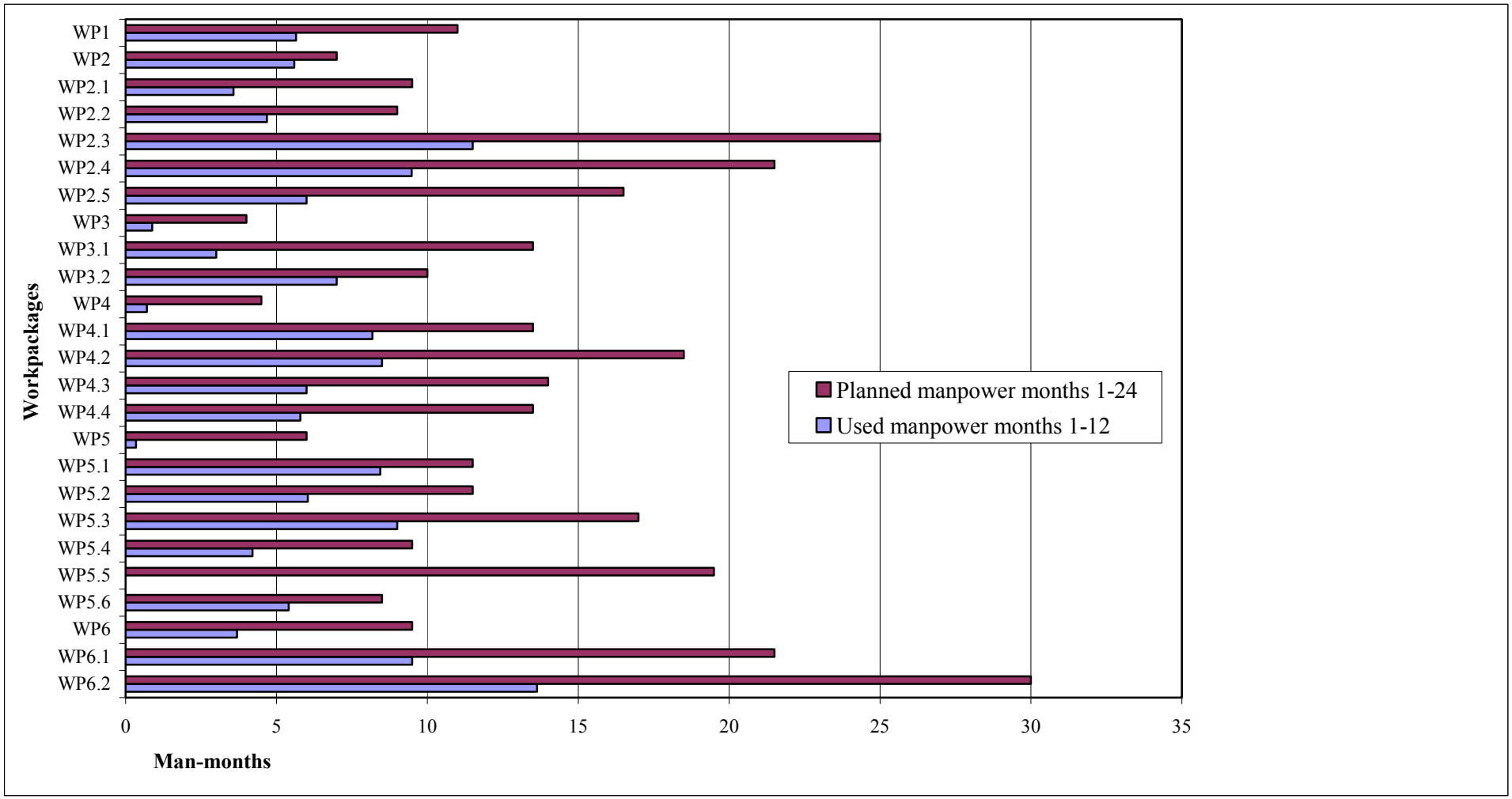

Table 3. *Planned and used manpower (both permanent and temporary) in each WP.*