

	 REPUBLIC OF SLOVENIA		 NATO OTAN
STABILITY PACT FOR SE EUROPE Disaster Preparedness and Prevention Initiative - DPPI	MINISTRY OF DEFENCE Administration for Civil Protection and Disaster Relief	MINISTRY FOR ENVIRONMENT AND SPATIAL PLANNING Environmental Agency of the Republic of Slovenia Seismology and Geology Office	NATO North Atlantic Treaty Organization SCIENCE FOR PEACE AND SECURITY PROGRAMME Public Diplomacy Division

MINUTES OF THE FIRST WORKSHOP

Discussion and Conclusions

NATO SCIENCE FOR PEACE PROJECT NO. 983054

“Harmonization of Seismic Hazard Maps for the Western Balkan Countries”

Ig near Ljubljana, Slovenia

7 – 9 November 2007

The First Workshop of the Project *Harmonization of Seismic Hazard Maps for the Western Balkan Countries* was organized and sponsored by the Ministry of defense Administration for Civil Protection and Disaster Relief and Ministry for environment and spatial planning - Environmental Agency of the Republic of Slovenia (Seismology and Geology Office). Meeting was also sponsored by the Stability Pact for SE Europe - Disaster Preparedness and Prevention Initiative (DPPI).

The first Project dedicated Workshop was held on November 7 - 9 in Ig - Ljubljana, Slovenia with participation of representatives of the partner institutions from all countries involved in the Project: Albania, Bosnia and Herzegovina, Croatia, Macedonia, Montenegro and Serbia, as well as the host country Slovenia and NPD from Turkey.

On behalf of the workshop host, Mr. Branko Dervodel Deputy Director of the Administration of the RS for Civil Protection and Disaster Relief and DPPI SEE Chair in Office for 2007, gave the welcome speech and dinner on 6th November. At this occasion, Project Co-Director Prof. Branislav Glavatovi, on behalf of the Workshop participants expressed gratitude to the NATO Science for Peace and Security Program, as well as to the DPPI and Slovenia Government for the financial support to the Project. He also gave a short overview of the current status of the activities related to the starting activities of the Project Proposal Document *Harmonization of Seismic Hazard Maps for the Western Balkan Countries*. He informed the participants about the invitation to cooperate with the Project *Harmonization of Seismic Hazard Assessment for the European Region* that is in its preparatory phase and that should be financed through FP7. The invitation to join the Project came from Prof. Domenico Guidardi, director of the Swiss Seismological Center, Project coordinator.

The Workshop was officially opened on November 7 by the welcome address of Dr Silvo Žlebir, General Director of Environmental Agency of the Republic of Slovenia.

On behalf of Institute of Earthquake Engineering and Engineering Seismology, Skopje (IZIIS) Prof. Zoran Milutinovi invited participants to join complementary Workshop that will be organized by IZIIS in Skopje (December 17-18, 2007) under the auspices of EUR-

OPA MHA, strictly in relation to SfP 983054. The principle topic of this Workshop will be: Integration of Earthquake Catalogues of the Western Balkan Countries, and discussion on delineation of potential seismic zones affecting the region under the study (Albania, Bosnia&Herzegovina, Croatia, Macedonia, Montenegro and Serbia).

The Ig Workshop successfully resolved the issues that were planned for this meeting by host experts and Project Co-directors, as it was stated in the Working Program.

- **FIRST DAY SESSIONS:**

First session of the Workshop was dedicated to theoretical backgrounds of PSHA methodology and was prepared and presented by Prof. Milutinović .

The common problems and usual methodology of preparation of input earthquake catalogue data, such as: completeness, gaps, filtering, declustering, etc. and other related topics: seismic source delineation, source parameters determination and magnitude type unification, was presented by Prof Marijan Herak, as well as case study of Project COST Action 625: *ϕ-D Monitoring of Active Tectonic Structures of the Peri-Adriatic Region*

On behalf of Environmental Agency of the Republic of Slovenia (Seismology and Geology Office) expertise related to own experience in earthquake catalogue preparation was presented by Mr. Mladen Živić as well as the Krzko NPP case study.

Ms. Ina Ceci presented topic on treatment of historical earthquakes and introduction of confidence level of specific events in earthquake catalogues. She also suggested that similar approach should be involved when combining new catalogues.

Second session was dedicated to the participating countries reports: presentations of relevant available data in the countries for the seismogenic model determination (status of existing national earthquake catalogues, geological, morphological, geophysical, reflection seismic data, seismotectonical, geodetical, remote sensing data etc).

Evening session was dedicated to exchange of experience in BB seismic instruments application and recommendations related to Project bid for such a type of the instruments, what was prepared and reported by MS. Slavica Radovanović . Discussion pointed out the importance and necessity of improvement of real-time seismic data exchange in the region for the purpose of increasing the quality of earthquake monitoring. It was suggested that best results should be achieved through bilateral agreements.

Activities and Responsibilities – Discussions and Conclusions

The first day of workshop was concluded by compilation of discussions on Project related activities that should immediately start with the implementation. For that purpose the activity groups were appointed to treat and coordinate specific task:

AC1: Common Earthquake Catalogue preparation

National coordinators: Herak, Kovačević , Pekevski, Aliaj, Cvijić , Brlek, Glavatović , Živić

Task: to complete DRAFT compiled catalogue as the unified data base made of existing national earthquake catalogue for the next workshop in Skopje

Short-term task: December - Meeting in Skopje (17-18. Dec. 2007) - to deliver national earthquake catalogs to Prof. Marijan Herak till Nov. 30, 2007.

Approach: to merge national and other available catalogues in the *Homogeneous regional catalogue* as stated:

- Historic period (prior to 1900) / $M_{min}=4.0$ /
- Instrumental period (post 1900) / $M_{min}=3.5$ or lower/

To use the opportunity of presence of representatives of neighboring countries at Skopje meeting (Greece, Bulgaria & Romania) to support this compilation with own data.

Mid-term task: Spring 2008 . to revise national catalogues according to the compiled version and to reanalyze principal parameters of the biggest earthquakes in the past.

Problems recognized:

Reinterpretation of historic earthquakes
Identification of other weakest points in catalogues
Data declustering
Treatment of Maximum magnitude.

Adopted Solutions:

Fast method (Reliability estimates on national level)
Sovereignty principle.

AC2: Strong Motion Data

Coordinator: Prof. Zoran Milutinović

Short-term tasks:

1. Preparation of the list of SM records by Institutions /IZIIS Dominantly/, to check what is already present in the European Strong motion Data Bank . related to records originated from region of interest.
2. To prepare a list of existing strong motion stations, including the type of instrument, station coordinates and soil profile data (info on availability) for the Skopje Meeting. To prepare available strong motion data base, too.
3. To investigate all existing prediction formula and check on what data base are they developed. To test compatibility of existing ones with regional SM data.

Problems to be considered: The possibility to develop a regional prediction formula for the Project.

Adopted solutions: To prepare a data bank in the format of European SM data bank.

Time: Meeting in Skopje (December 17 – 18, 2007)

AC3: Real Time Data Exchange

Coordinator: Slavica Radovanovi

Short-term task: to prepare the list of stations, including the coordinates, instruments, other relevant data and availability for the data exchange.

Time schedule: Meeting in Skopje (December 17 – 18, 2007)

Long-term task: Encouragement of cooperation in real data exchange and building the regional capacity for urgent and reliable earthquake parameters determination and dissemination.

Problems considered:

Seismic data format to be adopted,

Stations of Interest for Location of Regional Earthquakes to be selected,
Procedures for seismic data use,
Procedures for seismic data exchange.

Approach: bilateral agreements to be established.

- **SECOND DAY SESSIONS:**

Morning sessions were dedicated to theoretical background of Spatially smoothed seismicity approach in PSHA and presented by Barbara Žet Motnikar and Polona Zupan i . Also, the participants were introduced by OHAZ software for PSHA, the latest improvement of the software and the foreseen ones.

The training in OHAZ program was accomplished. For that purpose the prepared case-study was overviewed and training performed on prepared national catalogues.

The training was followed by questions in particular solutions of software and possibilities to implement additional modules into software.

In the discussion that followed, OHAZ software was found as the appropriate tool for fast assessment of seismic hazard, especially for treatment of background seismicity, for modeling of not well-defined seismic sources. Participants find it as the useful tool and thanked the host, ISA and Prof. Neki Kuka for the efforts to improve the software and to be freely used in the Project.

The afternoon sessions was dedicated for the specification and exploration of needs in purchasing strong motion instruments for the Project. In that sense, the minimum requirements were defined with the aim to prepare draft of bid technical documentation.

Next, the representative of Kinometrics company (USA) Mr. Mohamed El Idrissi has presented performances of the last generation of strong-motion instruments called ROCK: versions Basalt and Granite.

Some technical details and questions concerning the Project coordination, were discussed between national co-directors and NPD Prof. Sinan Akkar.

Activities and Responsibilities – Discussions and Conclusions

AC4: Seismic Hazard assessment – OHAZ software

Short-term task: National representatives to report the problems in OHAZ software implementation,

Time schedule: Skopje Meeting,

Long-term task: To implement the spatially smoothed seismicity approach for the PSHA.

AC5: Instruments purchase (bid requests preparation)

Short-term task: Bid request preparation Strong motion instruments - IZIISS representative, weak motion instruments - Slavica Radovanovi and Vlado Kuk.

Approach: Define minimum requirements and prepare the bid procurement request document.

Adopted solutions - stated performances:

- Number of channels: Three channels
- Sensor Type: Triaxial force balance accelerometer (orthogonally oriented)
- Full scale range: selectable, min $\pm 1g$,
- Real time digital output,
- TCP/IP compatibility,
- Optional modem,
- Sampling rate: min 200 sps,
- Storage capacity: min 64 MB,
- Timing: GPS,
- Power autonomy: min. 70 hours - (without external battery)
- Operating temperature: -20 C to 70 C.

Time schedule: Skopje Workshop.

- **THIRD DAY SESSION:**

Morning of third day of the Workshop was used to additionally explore OHAZ software capabilities and options. Testing the software and training on national input data was continued.

Conclusions

The coordinators nominated according to the titled activities will take actions to prepare and coordinate foreseen tasks, as it was agreed in terms of milestones and goals of the Project Document.