EUR-OPA MAJOR HAZARDS AGREEMENT ACCORD EUR-OPA RISQUES MAJEURS	ecils	NATO OTAN
European Center on Vulnerability of Industrial and Lifeline Systems, *Institute of Earthquake Engineering and Engineering Seismology, University "Ss. Cyril and Methodius", Skopje, Republic of Macedonia*		**NATO** North Atlantic Treaty Organization **SCIENCE FOR PEACE AND SECURITY PROGRAMME** **Public Diplomacy Division**
KICK-OFF MEETING ON EUR-OPA MHA CA **"Harmonization of Seismic Hazard Maps in Balkans"** SECOND WORKSHOP OF NATO SfP983054 Project **"Harmonization of Seismic Hazard Maps for the Western Balkan Countries"** **ECILS / IZIIS-Skopje** **17 – 18 December 2007**		

MINUTES OF THE JOINT MEETING

The Second Workshop of the Project "Harmonization of Seismic Hazard Maps for the Western Balkan Countries" was organized and partially European Center on Vulnerability of Industrial and Lifeline Systems, Institute of Earthquake Engineering and Engineering Seismology, University "Ss. Cyril and Methodius", Skopje, Republic of Macedonia.
The second Project dedicated Workshop was held on December 17-18 in Skopje, Macedonia with participation of representatives of partner institutions from countries involved in the Project: Albania, Bosnia and Herzegovina, Croatia, Macedonia, Montenegro and Serbia, as well as the NPD from Turkey.

On behalf of the host, Prof. Mihail Garevski, Project Co-Director and Director of Institute of Earthquake Engineering and Engineering Seismology, gave welcome speech.

Workshop successfully resolved the issues of the cooperation between Project participating institutions and present representatives of seismological institutions from Bulgaria and Romania. Also, Prof. Anastasia Kiratzi from Greece, who was enabled to participate although invited, sent information on availability of necessary Greek earthquake.

- **First day sessions:**

First session of the Workshop was dedicated to introduction of EUR-OPA MHA agreement, background, Structure and scope and objectives of CA "Harmonization of Seismic Maps in Balkans" Overview of these topics was presented by Prof. Milutinovic, while Prof. Jordanovski elaborated synergy between EUR-OPA MHA CA and SfP No. 983054.

Project Co-Director, Prof. Glavatovic reported about current progress related to the planned activities of the Project.

Second session was dedicated to County reports of Bulgaria and Romania. On behalf of Bulgaria Prof. Dimo Solakov and Prof. Stela Simeonova presented the seismological network of Bulgaria, and reported on current status, type and the format of available seismological data. State of the art of investigation related to earthquake phenomena in Romania was presented by Dr. Constantin Ionescu and Dr. Mihaela Popa. Also, participants were informed about the relevant contact to Prof Anastasia Kiratzi from Greece.

Prof. Sinan Akkar (NPD) presented *Catalogue information* on strong motion records of Turkish National Strong Motion Project, governed by Earthquake engineering Research center of Middle East Technical University from Ankara. The presentation reviewed recent investigation on the topic of prediction formulas their dependence of SM station distribution, chosen type of distance parameter, faulting style etc.

- **Second day sessions:**

Morning sessions were dedicated to Project related questions: reports of partners activities. All partners reported about the state of the progress related to catalogue preparation. Montenegro reported on OHAZ program application and presented comparison of the obtained seismic hazard results depending on declustering of events in eq. catalogue. Related to OHAZ program Barbara Sket Motnikar gave further explanation of background theory and software.

Prof. Sinan Akkar (NPD) summarized conclusions from the Ig Workshop regarding the specification for instrument bid. Discussion followed.

Serbian and Bosnian PPD informed about the recent contact of Czech partner and seismological institutions in Bosnia and Herzegovina and possible cooperation and donation.

At the end of the session, guests visited Seismological Observatory at Vodno near Skopje and also the facilities of Institute of Earthquake Engineering and Engineering Seismology, University ñSs. Cyril and Methodiusò

Discussions and Conclusions

A. SUMMARY OF ACTIVITIES TO PROVIDE EARTHQUAKE CATALOGUE(s)

Country	Last update	Lover Magnitude Threshold	Comment
Albania	Unknown	No	Good Catalog
BiH	Unknown		Incomplete, no date/time
Bulgaria			Not delivered
Croatia	2007	No	
Greece	September 2007		Homogenized to **Mw** Mw=6.0 from 550 BC Mw=4.9 from 1911 Mw=4.5 from 1950 Area covered: 34.0°N - 42.5°N / 19.0°E - 30.0°E
Macedonia	Unknown		Balkan catalogue, Part for Macedonia
Montenegro	August 2007	Ó3.5	National catalogue, ML
Romania		No	ROMPLUS (984-2006) Homogenized to **Mw** Period: 984-1979 - data compiled from Constantinescu and Marza (1980) cat. 1980-2006 - all events relocated or newly located 984-1400 - not complete before

			1411-1800 complete for Mw Ó7.0 1801-1900 complete for Mw Ó6.5 1901-1935 complete for Mw Ó5.5 1936-1977 complete for Mw Ó4.5 1978-2006 complete for Mw Ó3.0 Magnitude estimates before ~ 1800 affected by large errors
Serbia			Not delivered

A.1 Technical Suggestions:

To include catalogue data from NATO SfP 983054 neighboring countries for min 50 km from the borders.

To include catalogue data from Bulgaria, Greece, Italy, Slovenia and Hungary.

Lower magnitude threshold to be decreased to M = 3.00 (2.95) because the threshold agreed in Ig, Slovenia, is too high to assure reliable statistical estimates and delineation of seismic zones.

A.2 Policy Suggestions:

A.2.1 Use of the final catalogue:

To define the use of the resulting catalogue after Project closure - Who and under which conditions

Decision
Free usage for scientific and research purposes.
Prohibition for commercial uses without written consent of all parties involved.

A.2.2 Modalities of publishing:

Internal report to NATO, only.
Internal report to NATO, and paper(s) in recognized journals.

Decision
Internal report to NATO, and paper(s) in recognized journals.

A.2.3 Requests:

Romania (NIEP) agreed and provided the Earthquake Catalogue to NATO SfP 983054.

Greece, AUTh, Department of Geophysics, agreed and provided the Earthquake Catalogue to NATO SfP 983054.

NATO SfP 983054 (NPD, PPD) should provide the letter of recognition acknowledging their kind contribution.

Bulgaria, Italy, Slovenia, Hungary:
NATO SfP 983054 (NPD, PPD) should, in a written form, request for providing their earthquake catalogue.

B. IMPLEMENTATION AND USE OF OHAZ 6.0 (version by November 05, 2007)

Comments/Suggestions:

1. Prof. S. Akkar (NPD):
   Additional attenuation models be included in the OHAZ database:
   - Boore, Atkinson, 2007
   - Bragato, Slejko, BSSA, 2005
   - Akkar, Bomer, 2007 (geometrical mean)
   - A PGM for low seismicity

   To include attenuation models that depend on fault type and that the fault typology be taken/included in the seismotectonic file.

   To consider the possibility for cut-off at the attenuation function (e.g. at 3 sigma).

2. Other participants:
   To increase the max. number of regions in the seismotectonic file (presently it is limited to 10).

   Weights in each seismotectonic region should be normalized so that their sum is 1.
   Further improvement and debugging of the OHAZ program is indispensable.

C. WEAK (WM)/STRONG (SM) MOTION INSTRUMENTATION; BID DETAILS

It was agreed:

- To define Minimum Requirements of Planned Strong/Weak Motion Seismic Instrumentation.
- Bid be organized by inviting reliable manufacturers of corresponding instrumentation.
- Bid documentation for procurement of weak/strong motion seismic instrumentation to be prepared and send to invited manufacturers by January 1, 2008.
- Dead line for manufacturers' response is set.
- The deadline for receiving the offers (technical and economic documentation) is set to March 1, 2008.
- Each NATO SfP Project director shall separately receive offers (Ø single copy) in a sealed envelope no latter than the deadline agreed.

ANNEX 2: PROCUREMENT LETTER

Ankara, 01 January 2008

Subject: Procurement of weak/strong motion seismic instrumentation - **Competitive bid**

Dear Sir,

I am writing to you as Project Director of ⊙ NATO funded SfP research Project, named "Harmonization of Seismic Hazard Maps for the Western Balkan Countries" with administrative number NATO SfP 983054.

Within the framework of this project, participated by 6 countries, by alphabetic order, Albania, Bosnia and Herzegovina, Croatia, Macedonia, Montenegro and Serbia, we are to purchase ⊙ minimum/maximum of strong/weak motion seismic instrumentation as follows:

- Strong motion seismic instrumentation: min 2 max. 27
- Weak motion seismic instrumentation: min 3 max. 8

The minimum requirements are as presented in Annex 1 to this invitation letter, as well as stated in the approved project - The preference will be given to instrumentation that provides the best performance at affordable price.

I am requesting you ⊙technical description of your proposed best solution and ⊙quotation with ⊙60 days validity.

Please consider that NATO has special rules for bid, delivery, payment and tax exemption. In your offer you must state that you have read the Section 4 "Procurement of Equipment and Other Items of ⊙ Relatively High Value" of the "Project Management Handbook: Science for Peace Programme" (pages 10-12) available at the web page http://www.nato.int/science/information_for_grantees/handbook/doc/handbook_full.pdf and that you fully agree to comply with it.

The deadline for receiving the offer is March 1, 2008. All the technical and economic documentation has to be enclosed in ⊙sealed envelope and ⊙single copy has to be mailed to the addresses given in Annex 2. No fax or e-mail offer will be accepted. Please do not hesitate to contact me for any further clarification at my e-mail address: sakkar@metu.edu.tr

I would appreciate ⊙confirmation that you have received this letter, even if you decide not to participate to the bid. The list of the manufacturers invited to participate to this competitive bidding is reported in Annex 3.

Thank you very much for considering this issue and best regards,

Prof. Sinan AKKAR, NPD

ANNEX 2: MINIMUM REQUIREMENTS OF PLANNED STRONG/WEAK MOTION SEISMIC INSTRUMENTATION

A. Strong Motion Seismic Instrumentation - Minimum Performance Requirements

- Number of channels: Three channels
- Sensor Type: Triaxial force balance accelerometer (orthogonally oriented)
- Full scale range: Selectable, min ±1g
- Resolution min of 18 bits with more than 100 dB dynamic range
- Real time digital output
- Multitasking operating system that allows simultaneous data acquisition and interrogation
- Remote alerting capability for system event or auto-diagnostic failure
- TCP/IP compatibility
- Noise < 10 µV RMS
- 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
- Operation on 95-100% humidity
- Calibration Coil Functional and Response Test
- ISO standards
- Malfunction rate to be declared
- Compatibility of format of recorded data
- Optional: Available free software for spectral and waveform analysis
- Optional: Price for commercial software for spectral and waveform analysis
- Optional: integrated solution for strong and weak motion instruments

B. Weak Motion Seismic Instrumentation - Minimum Performance Requirements

- Number of channels: Three channels orthogonal
- Frequency band: 50 Hz to minimum 100 s
- A/D converter 24bit minimum, oversampling, 6 channels minimum
- TCP/IP compatibility
- GPS Timing
- Optional: professional microwave high-speed wireless link for distances up to 50 km (frequency to be determined in agreement with national telecommunication agency);
- Optional: lightening protection
- Optional: integrated solution for strong and weak motion instruments

ANNEX 3: ADDRESSES OF PROJECT CO-DIRECTORS

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ANNEX 4: LIST OF INVITED MANUFACTURES

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