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HARMONIZATION OF SEISMIC HAZARD MAPS FOR THE WESTERN BALKAN COUNTRIES (BSHAP)

Sinan Akkar, PhD in Civil Engineering, NPD
Earthquake Engineering Research Center, Dept. of Civil Engineering,
Middle East Technical University, Ankara, Turkey

Branislav Glavatović, PhD in Geophysics, PPD
Director of the Montenegro Seismological Observatory, Podgorica



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Project is coordinated by:

Sinan Akkar, Ankara, Turkey, NPD

Branislav Glavatovic, Podgorica, Montenegro, PPD

PROJECT CO-DIRECTORS:

Ismail Hoxha, Tirana, Albania,

Vlado Kuk, Zagreb, Croatia,

Amer Zoranic, Sarajevo, Bosnia and Herzegovina,

Mihail Garevski, Skopje, Macedonia,

Svetlana Kovacevic, Belgrade, Serbia.

Project is carried out by:

12 institutions from **6** countries,

7 Directors / Co-Directors and 48 key members and by other institutional staff

12 CONTRIBUTING INSTITUTIONS:

Montenegro:

Montenegro Seismological Observatory

Geological Institute of Montenegro

Albania:

Geoscience Institute, Albania

Geographic Studies Center, Academy of Sciences of Albania

Bosnia and Herzegovina:

Center for Seismology, Sarajevo

Hydrometeorological Institute of Republic of Srpska / Sector for Seismology

Croatia:

Faculty of Science, Geophysical Department

Macedonia:

Institute of Earthquake Engineering and Engineering Seismology (IZIIS), University "Ss. Cyril and Methodius" Skopje

Seismological Observatory, Faculty of Natural Sciences, University "Ss. Cyril and Methodius" Skopje

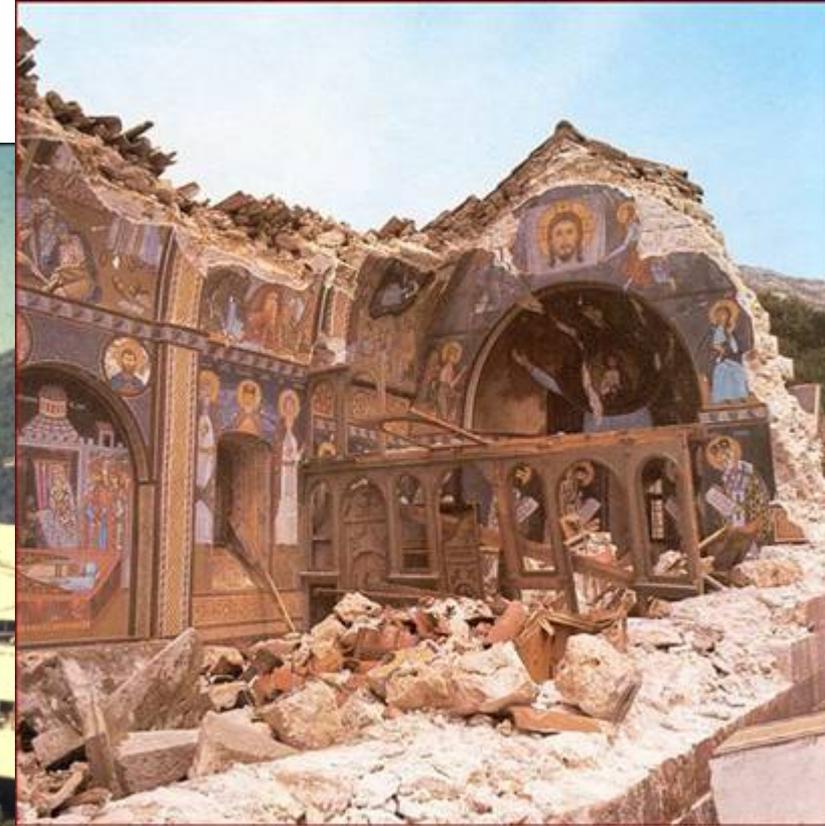
Serbia:

Seismological Survey of Serbia

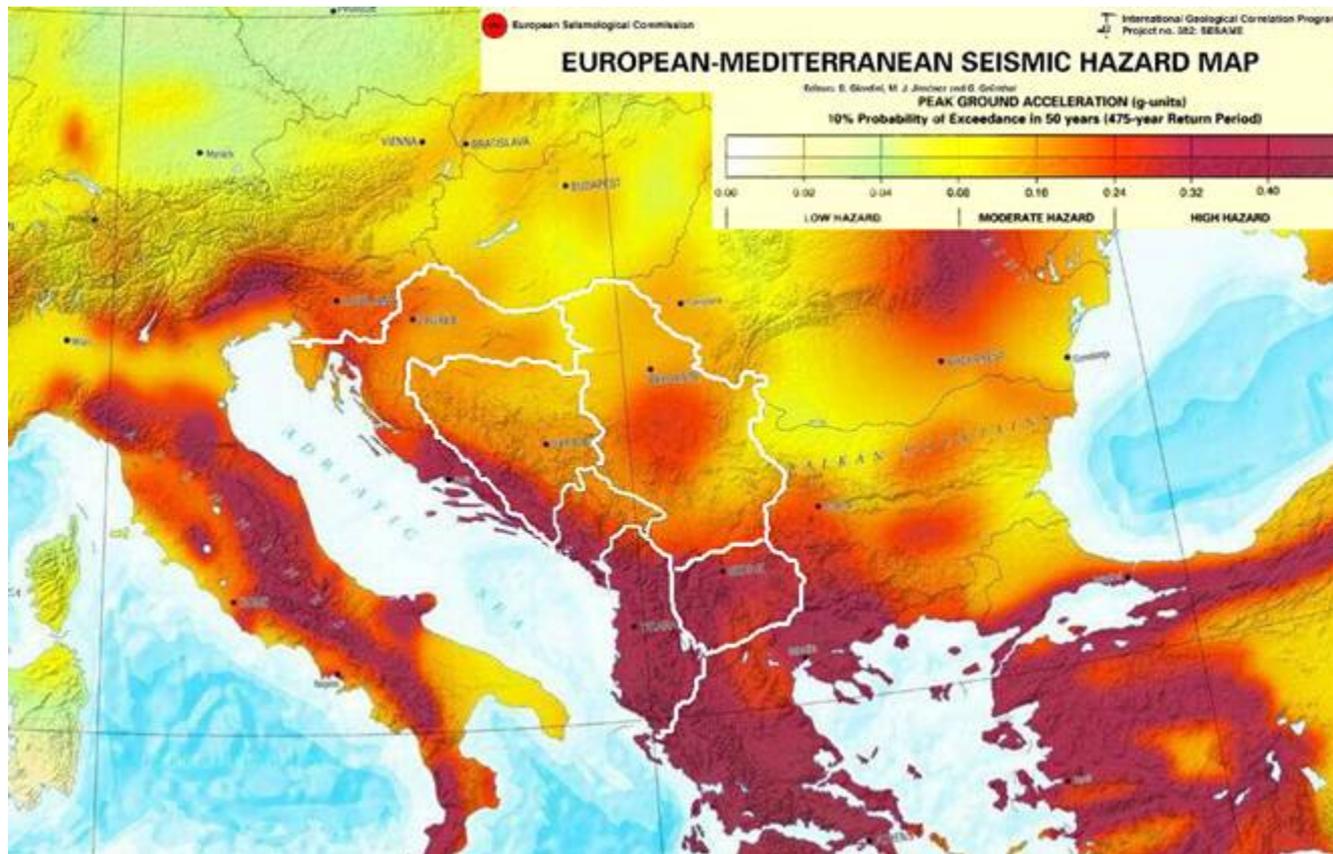
Faculty of Mining and Geology, Department for Geology, University of Belgrade

Faculty for Civil Engineering, University of Belgrade

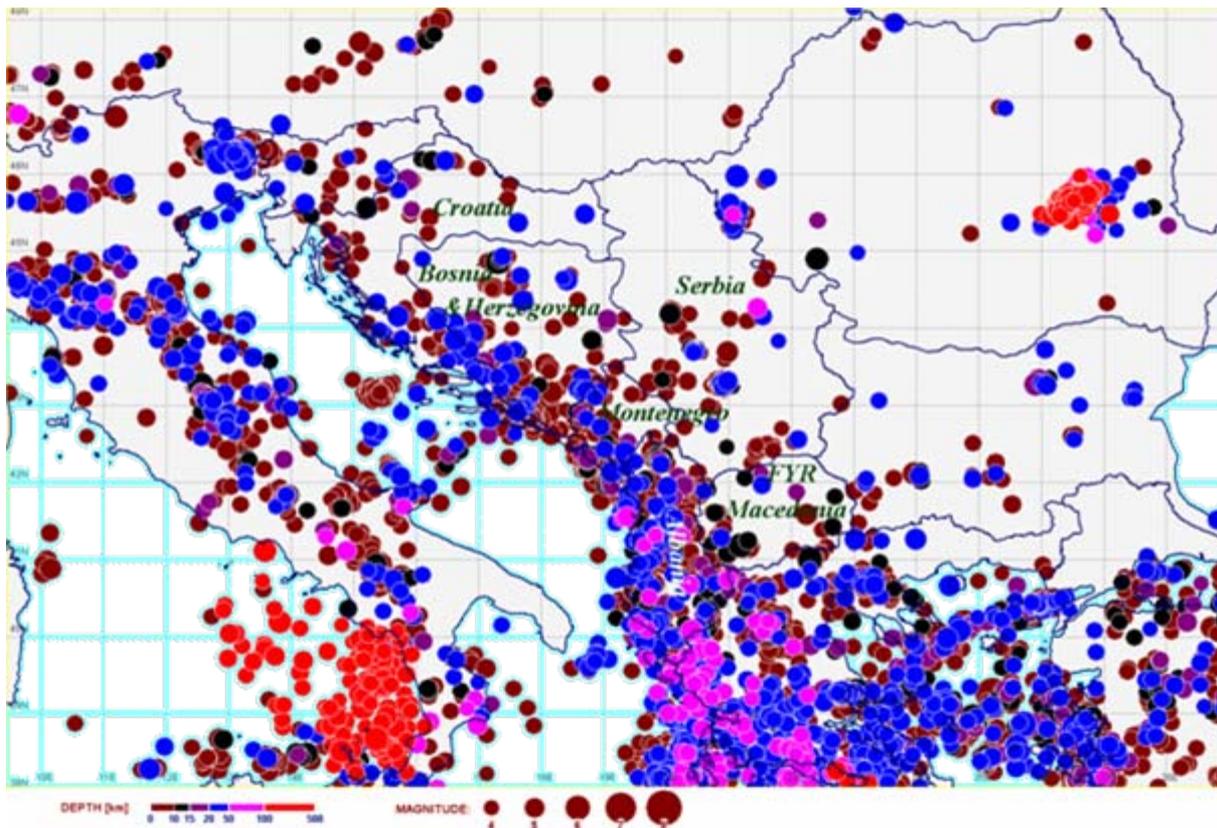
**Seismic hazard in the region resulted in devastating losses.
The well-known examples to this fact are the 1963 Skopje, 1969 Banja Luca
and the 1979 Montenegro earthquakes**



**136 victims in Montenegro and Albania
\$4 Bil. loss in Montenegro (4 x GDP at the time)**



The participating countries in the BSHAP project have been active in many similar projects. However, the regional instability during the past years prevented these countries to follow the recent developments in earthquake engineering and engineering seismology.



Significant earthquakes in the region during last 33 years

This project re-motivates the countries in the region to start conducting collaborative studies on seismic hazard.

This accomplishment is compatible with the security mission of the NATO Science for Peace and Security Program.

Ultimate Objectives of the Project:

- Integration of recent seismic, seismotectonic and geophysical information (removing artificial differences due to national boundaries),
- Derivation of new empirical ground-motion models for the region,
- Updating the seismic hazard maps in the region
Harmonization of these hazard maps with the rest of Europe and surrounding countries,
- Implementation of these maps to the seismic codes in the region (compatible with the Eurocode standards)

Additional Objectives:

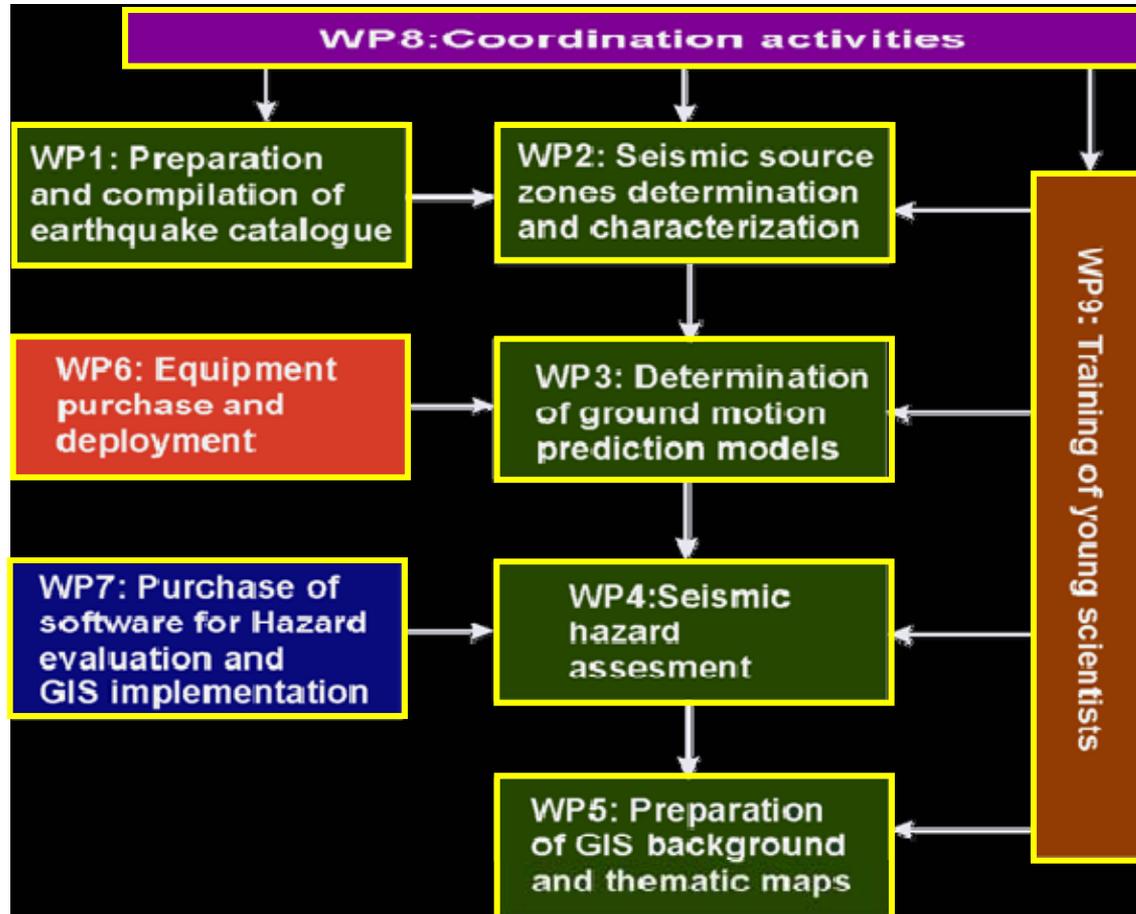
- Improvement of scientific collaboration in seismic hazard analysis and seismic data exchange in the region,**
- Training of young scientists in the region.**
- Improvement of international cooperation with similar EU institutions,**
- Dissemination (publication) and capacity building.**

End Users:

- Civil protection agencies,
- Urban planning agencies,
- Ministries responsible for seismic safety improvement and seismic risk management,
- Authorities for seismic design code legislation,
- National seismic networks,
- Seismological, geological and geophysical institutions in the region,
- Insurance companies.

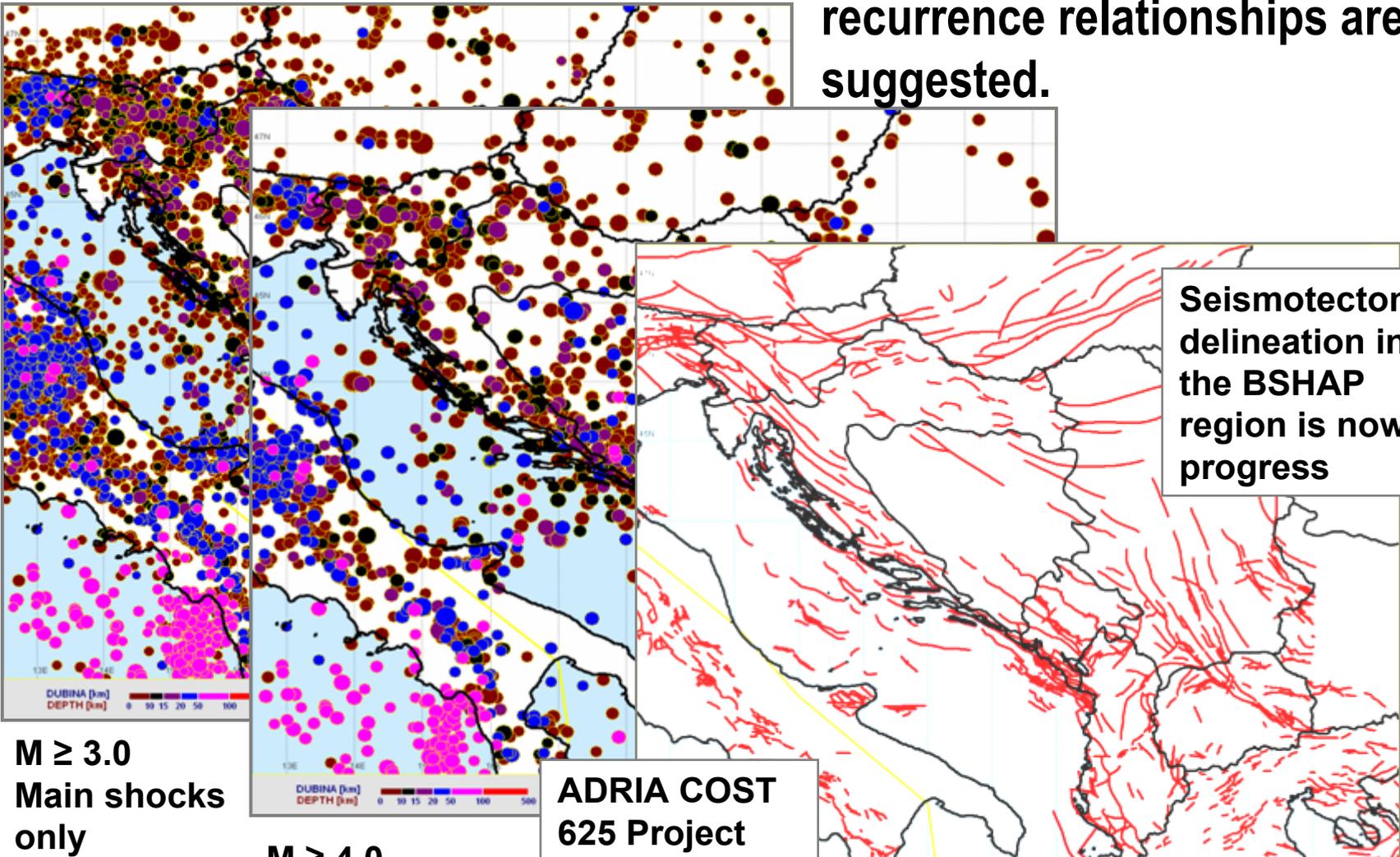
Work packages (WP) in the project

Flow chart of Project activities



Overview of achievements in the BSHAP project

Earthquake catalogue data for the BSHAP region has been completed (under the guidance of Prof. Herak), integrated and declustered, with the lower magnitude threshold 3.0. Parameters for calculating the magnitude recurrence relationships are suggested.



M ≥ 3.0
Main shocks
only

M ≥ 4.0
Main shocks
only

ADRIA COST
625 Project
results will be
the starting
point

**Seismotectonic
delineation in
the BSHAP
region is now in
progress**



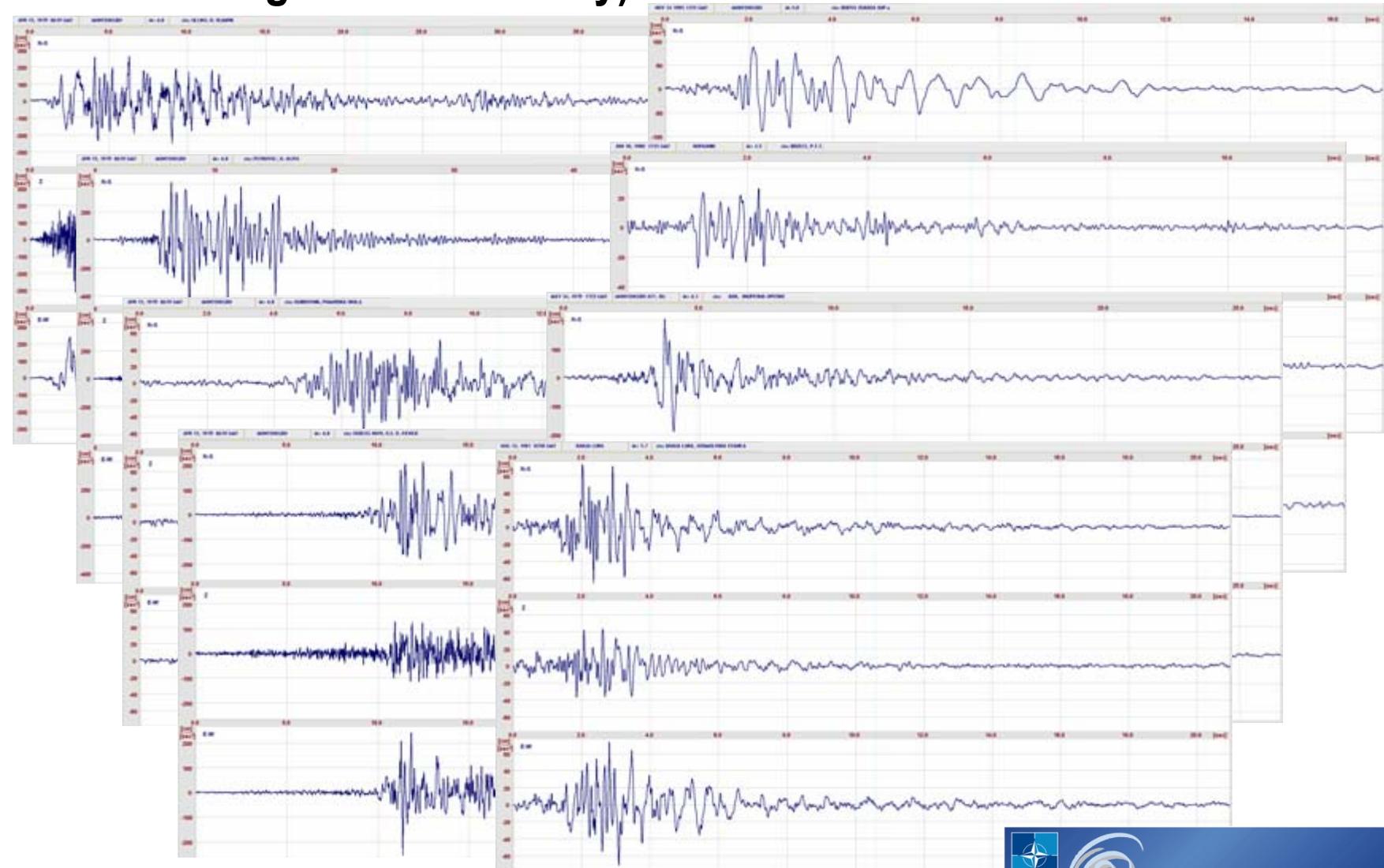
Procurement of seismic instruments (accelerometers and broadbands) is completed. Some of them were deployed at the chosen sites during the summer of 2009.

Development of OHAZ software for PSHA is almost completed to accomplish the project oriented objectives (under the guidance of Dr. Kuka, Albania):

- Adaptation of ground-motion predictive models that might be of use for PSHA is completed and verified,**
- Training activities were realized for the efficient use of OHAZ,**
- First results of OHAZ are obtained for Montenegro and Serbia.**

- Preliminary results about the evaluation of global ground-motion predictive models that will be used in PSHA have been reported by the IZIIS group. IZIIS continues to work on a local predictive model to be implemented in PSHA,
- Many young scientists were supported (and are being supported) to participate in the training programs, workshops, seminars etc,
- Memorandum on real-time data exchange was signed between the partner institutions.

Compilation (and may be reprocessing) of accelerometric data of some participating institutions have been undertaken (Montenegro Seismological Observatory)



Planned achievements for the next period

- **Completing the deployment of seismic instruments,**
- **Finalizing the background studies for PSHA (evaluation of global predictive models, derivation of local model, magnitude unification etc),**
- **Preperation of hazard maps in the GIS environment for the entire region (incorporation of seismotectonic information and zonation),**
- **Comparisons of these findings with the recent engineering related studies on the demand side (Recent trends in the Eurocode hazard definitions),**
- **Establishing strong grounds for new projects.**

THANK YOU