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**INTEGRATION AND STRENGTHENING THE EUROPEAN RESEARCH AREA**

SPECIFIC SUPPORT ACTION

## **EERWEM**

**Earthquake monitoring and Earthquake Risk  
in Western Mediterranean**

# **PUBLISHABLE FINAL ACTIVITY REPORT**

Reference : EERWEM-FINAL-PUBLISHABLE-ACTIVITY-REPORT

Period covered: from 01/01/2006 to 31 /12/2007

Start date of the project: January, 1st 2006 Duration: 24 months

Organisation: European-Mediterranean Seismological Centre (EMSC)

Coordinator: Rémy Bossu

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Dissemination Level		
PU	Public	PU
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	



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REAL INSTITUTO Y OBSERVATORIO DE LA ARMADA  
SAN FERNANDO

Earthquake monitoring and Earthquake risk  
in Western Mediterranean

**EERWEM**  
Workshop

BAHÍA SUR HOTEL. 13 - 16 JUNE, 2006

REAL INSTITUTO Y OBSERVATORIO DE LA ARMADA  
SAN FERNANDO / SPAIN

Orfeus

csem  
emsc



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**D I S T R I B U T I O N   L I S T****PARTNERS:**

<b>EMSC (Int.)</b> Coordinator	ROA (Spain) Core partner	ORFEUS (Int.) Core partner	CNRST (Morocco) Associated partner & Management Committee Member	CRAAG (Algeria) Associated partner & Management Committee member
INMT (Tunisia) Associated partner	SPGM (Morocco) Associated partner	CGS (Algeria) Associated partner	Uni. Malta (Malta) Associated partner	IGN (Spain) Associated partner
UCM (Spain) Associated partner	IMP (Portugal) Associated partner	CGE (Portugal) Associated partner	GA-CNRS (France) Associated partner	INGV (Italy) Associated partner
GFZ (Germany) Associated partner	ETH (Switzerland) Associated partner	CU (Spain) Associated partner	LGIT (France) Associated partner	

**OTHERS:**

EC	DEUC (Monaco) Meeting participant	LCRSS (Libya) Meeting participant	ICC (Spain) Meeting participant	
IOC/UNESCO Meeting participant	EMSC members (77 institutes in 50 countries)	ORFEUS participants		

**C H A N G E   L O G**

Issue / revision	Date	Description of change	New release
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## 1. PROJECT EXECUTION

### 1.1 EERWEM PROJECT SUMMARY

The objectives of this 24-months project are to improve coordination of existing and developing monitoring infrastructures and associate the Northern African seismological research community to the current and future European integrating initiatives led by the two European organizations in seismology, EMSC and ORFEUS.

- **Motivation**

Poor and slow regional data exchange after the recent devastating earthquakes in Northern African, the Boumerdes (Algeria, M6.8, 21/05/2003) and the Al Hoceima (Morocco, M6.5, 24/02/2004) earthquakes resulted, for example, in underestimated initial magnitude and poor rapid location estimates. The poor availability of across-border data not only restrict efficient crisis management aspects, it also severely impairs appropriate monitoring of the seismic movements off-coast (Alboran Sea, strait of Gibraltar) and consequently the understanding of current regional tectonics and reliable assessment of the seismic hazard.

Recent, and planned large technological investments in the Western Mediterranean area, notably Spain, Morocco, and Algeria provide a timely opportunity to reflect on the earthquake and earthquake risk research possibilities that close collaboration can bring in creating an effective research infrastructure and innovative monitoring facilities in the Western Mediterranean area. We aim at elevating the national capabilities to a regional facility. So far related discussions have only taken place based on a person-to-person contact. We intend to bring together the European experience in current integration of research facilities with the local experience in the Western Mediterranean. Moreover, we want to integrate further the Western Mediterranean within the European initiatives such as the European-Mediterranean Real Time Seismicity (initiated by the EC-project RWS ENV4-CT96-0282) and seismological bulletin (initiated by the EC project EPSI; EVR1-CT-2000-40006) and the European real-time waveform data exchange initiatives (MEREDIAN project EVR1-CT2000-40007).

This was the motivation for the EERWEM project as written during the summer 2004 and as expressed by the seismological community. Its pertinence has been since confirmed at the political level through 3 international initiatives, the Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North Eastern Atlantic, the Mediterranean and Connected Seas (ICG/NEAMTWS), the Global Earth Observation System of Systems (GEOSS) and its European counterpart Global Monitoring of Environment and Security (GMES). In these 3 cases, the countries agree that the most appropriate and cost-efficient approach to monitor the environment and improve response to natural disasters is to use the existing infrastructure and ensure real data sharing.

On June 1<sup>st</sup> 2006, the EC-funded project NERIES (NEtwork of Research Infrastructures for European Seismology), an ambitious project jointly initiated by EMSC and ORFEUS, started. It deals with aspects such as interoperability, common protocols and databases, distributed facilities and developing new tools for improved seismological services. The earthquake research infrastructure as aimed at by NERIES will be a key land-based segment of the GMES and the GEO 10-years implementation plan. NERIES participation is restricted to partners from EU countries and associated states while the scale of interest while from a seismological point of view (as well as for the tsunami monitoring) the appropriate scale of the driving phenomena is the one of the Eurasia-Africa collision. EERWEM offers a quite unique meeting point between the European and Northern African seismological community to help in disseminating the results, to avoid widening the existing gap between Europe and surrounding countries and ensure in the long-term a more homogeneous monitoring of the tectonic system of the Eurasia-Africa collision.



- **Strategy**

To realize our objectives a workshop was organised in Spain in which the research organizations and observatories involved in the monitoring of the Western Mediterranean participate together with the EMSC, ORFEUS and researchers from some of the major European earthquake research and observatory facilities (outside Spain and Portugal among others INGV-Rome, ETHZ-Zurich, GFZ-Potsdam). It combines the European experience on rapid data exchange and data management with the newly created infrastructure at the Western Mediterranean seismological institutes.

Considering the new context created by GEOSS, GMES, NERIES and, NEAMTWS, it was decided to invite, alongside the seismologists, the directors of the Northern African Institutes to discuss and define an overall framework for a long term cooperation and strategy, and create the conditions for the full participation of Mediterranean partners in more complex EU-funded projects in the future.

## 1.2 CONTRACTORS AND PARTICIPANTS

The EERWEM project involves 2 types of participants, the 3 core partners which are the actual EERWEM contractors and 14 associated partners who were identified during the proposal preparation and 4 additional partners who joined the project at a later stage; They all share interest in the project objectives (Table 1). Participation costs were covered for the majority of them, however due to budget restriction and EC eligibility (e.g. Libya), some partners covered their costs or were funded directly by ORFEUS and ROA (e.g. LCRSSS)

Partner name	Type of partner	Country	Role- Key Expertise
European-Mediterranean Seismological Centre (EMSC)	Core partner	Euro-Med organisation	Management & Information dissemination. Parametric data exchange - Seismic hazard related topics – Networking
Observatories and Research Facilities for European Seismology (ORFEUS)	Core partner	Euro-Med organisation	Technological transfer Waveform data exchange – Research oriented topics in seismology - Networking
Real Instituto y Observatorio de la Armada en San Fernando (ROA)	Core partner	Spain	Workshop organiser Seismic monitoring of Western-Mediterranean
Centre National pour la Recherche Scientifique et Technique (CNR)	Associated partner	Morocco	National network operator
Centre de Recherche en Astronomie, Astrophysique et Géophysique (CRAAG)	Associated partner	Algeria	National network operator
Institut National de la Météorologie (INM)	Associated partner	Tunisia	National network operator
Université Mohammed V (SPGM)	Associated partner	Morocco	Network operator
Centre National de Recherche Appliquée en Génie Parasismique (CGS)	Associated partner	Algeria	Seismic engineering and network operator
University of Malta	Associated	Malta	Network operator



	partner		
Instituto Geografico Nacional (IGN)	Associated partner	Spain	National network operator
Universidad Complutense de Madrid (UCM)	Associated partner	Spain	Seismic monitoring of Western-Mediterranean and research
Instituto de Meteorologia, Portugal (IMP)	Associated partner	Portugal	National network operator
Centro de Geofísica de Évora (CGE)	Associated partner	Portugal	Seismic hazard of the Ibero-Magrehbian zone
Laboratoire de Géophysique Interne et Tectonophysique (LGIT)	Associated partner	France	Accelerometric networks and databases
Geosciences Azur (GA)	Associated partner	France	Seismic monitoring and research; Existing collaboration with CRAAG
MedNet/INGV	Associated partner	Italy	Seismic monitoring of the Mediterranean
GEOOrschungsNetz (GEOFON)	Associated partner	Germany	Seismic monitoring and data exchange
Eidgenössische Technische Hochschule (ETH)	Associated partner	Switzerland	Databases & earthquake quantification
Consejo Superior de Investigaciones Científicas	Additional partner	Spain	Seismic monitoring of the Mediterranean
Direction Environnement Urbanisme et Construction (DEUC)	Additional Partner	Monaco	Development of a cooperation with INMT
Libyan Centre for Remote Sensing and Space Science (LCRSSS)	Additional Partner	Libya	National network operator
International Oceanographic Commission (IOC)	Additional partner	UNESCO	International tsunami warning system

### 1.3 DESCRIPTION OF THE WORK AND RESULTS

The workshop “Earthquake monitoring and Earthquake Risk in Western Mediterranean” summarized the current knowledge, on-going projects and research plans with regard to seismic activity and risk in the region. The participants acknowledged the excellent local organisation despite it took place only 3 weeks after the reception of the pre-financing. The workshop further discussed the required research and monitoring infrastructure necessary in the region taking into account the new context created by the three essential initiatives for our community namely GMES (Global Monitoring of Environment and Security), GEO/GEOSS (Global Earth Observation/Global Earth Observation System of Systems) and NEAMTWS (North-East Atlantic and Mediterranean Tsunami Warning System). An indication of the timeliness and the importance of these discussions is the fact that 4 additional partners joined the project since its acceptance, the LCRSS which just started to operate the national Libyan network, the DEUC (Monaco) which signed an agreement with Tunisia to upgrade their network and which want to ensure coherent development at regional scale, the IOC to present the issues associated to the set-up of a tsunami warning system in the region and the CSIC which plan large scale tomographic studies in the region. The precise type of the



implementations, chosen from among a range of available tools, have been discussed and proposed at the workshop.

In order to formalise the decisions, the text of a Memorandum of Understanding “for the establishment of a Cooperation framework on earthquake surveillance in the Western Mediterranean Region” was drafted and discussed during the workshop. Its agreed overall objectives are:

- To improve the cooperation in earthquake monitoring
- To provide input for improved assessment of seismic hazards
- To build a regional network for earthquake surveillance
- To reinforce and ally the local institutions and personnel
- To facilitate access to advanced technologies
- To increase the regional participation in international activities

It includes a first-year of demonstration activities which is the first step towards “the establishment of a Regional Seismic Network in the Western Mediterranean (RSN-WM), building largely on the existing infrastructures already installed or planned by the national and local agencies [...]”. The RSN-WM will build the backbone for the participation of the Western Mediterranean countries in the IOC ‘North-Eastern Atlantic and Mediterranean Tsunami Warning System’ (NEAMTWS)”. During this demonstration period, the signatories agree to make available in real-time the waveform of at least one station to all the other parties. The final version of the MoU comprises the text in French, Spanish and English and is available on the EERWEM web site ([www.roa.es/eerwem](http://www.roa.es/eerwem)). So far, the MoU has been signed by 18 institutes from 10 different countries. It constitutes the earthquake (risk) research infrastructure integration plan for the Western Mediterranean region and as such is a significant step towards a better integration of our community at the Euro-Med scale. These will also be the basis for a joint future EC-proposals.

A formal call for “exchange initiative proposal” aiming at the implementation of the MoU was issued in October 2006 and seven of them have been accepted by the EERWEM Governing Council and will be finalised in the coming months. This grant system has proved efficient to ease some actions although it should be noted that the main part of the budget required to create a regional network (notably hardware) originates from national funding and/or bilateral agreements. A second call will be launched in February.

The work in this second reporting period has focused on the dissemination of the results of the workshop “Earthquake monitoring and Earthquake Risk in Western Mediterranean” organised during the previous period, on the organisation of technical visits to better identify the needs for implementing real time data exchange and, probably the most important result, to define a permanent framework for cooperation on earthquake surveillance in the Western Mediterranean region.

In practice, 8 technical visits have been organised at XXX and XX. A special issue of the EMSC Newsletter was printed in April 2007 in 1 500 paper copies and downloaded approximately 10 000 times until the end of 2007. It presents an overview of the existing of the earthquake monitoring infrastructures in Western Mediterranean as well as special papers on the M6.1 earthquake which shook Portugal, Spain and Morocco on Feb. 12 2007. This event was a good illustration of an earthquake having an international impact in the region and a further demonstration of the necessity to coordinate surveillance.

In November 2007, the review of the first year of implementation of the MoU established during the previous period was performed during a joint meeting in Rabat with the *Institut Scientifique* (Morocco). It was the occasion to share the network developments in the region and to agree on a permanent framework for improved earthquake surveillance in the region. The latter was expressed through a revised text of a MoU which has now a 5-year renewable duration.

#### 1.4 RESULTS AND IMPACT

The EERWEM project has been extremely successful, especially in regards to its limited budget. It proved to be an essential and timely meeting point between the Northern African and European seismological



communities at a time when the context is evolving fast (GMES, NEAMTWS, GEO/GEOSS), the integration of the European seismological community accelerates thanks to large EC projects such as NERIES and the surveillance infrastructure is being upgraded in many countries.

The most emblematic result has been the establishment of a permanent framework for improved earthquake surveillance in Western Mediterranean region through the definition of a 5-years renewable MoU. It benefits from the review of the first-year implementation of the initial MoU which was signed by all the actors of the region during the first reporting period. A pragmatic result is the agreement of the main network operators in Morocco, Algeria and Tunisia for improved real time waveform availability, which is a prerequisite for setting-up a tsunami warning system for Western Mediterranean. Capacity building was also identified as the key issue to be addressed within a long-term cooperation; the preferred solution would be to establish long technical visits (3 to 6 months) of Northern African seismologists in recognised European seismological observatories.

The willingness to cooperate and the regional ownership of the initiative are best illustrated by the strong involvement of the Northern African partners. The DPG-IS (*Institut Scientifique, Rabat*) kindly offered to organise and host the review of the first year of application of the MoU at the occasion of the 50th anniversary of the Université Mohammed V Agdal-Rabat and the 70th anniversary of the Geophysical Observatory of Averroès in Novembre 2007. The *Institut National de Météorologie* (Tunis) offered to organise and host a similar meeting at the autumn 2008 at a time when its three new broad-band stations which are being installed should be in a position to be made available in real time to the global seismological community.

In conclusion, EERWEM has been successful to define a long-term strategy for cooperation in Western Med and coordination of earthquake surveillance. The EMSC and ORFEUS will be looking for future funding opportunities to implement this strategy in the future.



## 1.5 EERWEM FIGURES

- **BUDGET**

The EERWEM grant is 110k€.

- **SCHEDULE**

- Starting date of activities: January 1<sup>st</sup>, 2006
- Ending date: December 31<sup>th</sup>, 2007
- Main phases:
  - PHASE 1 (T0, T0+12 months),
  - PHASE 2 (T0+13 months, T0+24 months)

- **COORDINATOR**



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## 2. DISSEMINATION AND USE

The EERWEM project focus on coordination of monitoring infrastructures and none of the results have a potential for industrial, commercial or marketing application.

The EERWEM results are fully open and both EMSC and ORFEUS have used their network to inform the whole Euro-Med and worldwide seismological communities on the developments. For example, the inventory of existing monitoring infrastructures has already been used within the GEOSS and NEAMTWS initiatives. The MoU has been widely publicised and the special issue of the EMSC Newsletter both in electronic and paper forms has been extensively distributed. The process has been open to partners not eligible to EC funding such as the operators of the Libyan national seismic network.

