



**Network of European Research Infrastructures for
Earthquake Risk Assessment and Mitigation**

Report

**ORFEUS Observatory Coordination Workshop: Seismic
Networks and Acceleration Networks
12-14 November 2012, Istanbul Turkey, 2012**

Activity:	<i>Networking accelerometric networks and SM data users</i>
Activity number:	<i>NA3, Task3.1</i>
Deliverable:	<i>Dedicated acceleration network and integration</i>
Deliverable number:	<i>D3.3</i>
Responsible activity leader:	<i>Sinan Akkar</i>
Responsible participant:	<i>METU</i>
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**Seventh Framework Programme
EC project number: 262330**



Summary

One of the major tasks in NERA-NA3 is to improve the networking among strong-motion data providers in the broader European region. This task also includes the efforts for increasing the interaction between the broadband and strong-motion community in the same region. To this end two international workshops are scheduled among the deliverables of NERA-NA3 work package. The first one of these workshops was held in November 2012 as part of the Annual ORFEUS Observatory Coordination Workshop. The emphasis of the annual ORFEUS workshop is tailored according to the objectives as summarized above. The workshop also provided a good opportunity to introduce the ongoing efforts of the NERA-NA3 group members for establishing a long-term and sustainable infrastructure for the integration of European accelerometric networks for future research and professional activities. This report summarizes the aforementioned Workshop activities as well as its major outcomes.

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I. Introduction

Efforts for establishing an integral policy for accessing the accelerometric data in the broader European region has started with the NERIES (Network of Research Infrastructures for European Seismology) project; granted by the European Council under the Sixth Framework Program. The NERIES project initiated the European Integrated Data Archives (EIDA) system that conveys an efficient way of near real-time accelerometric data transfer and storage. The key group involved in EIDA consists of ETH (Switzerland), INGV (Italy), KNMI and ORFEUS (Netherlands), as well as ISTERre (France) that operate and maintain the system through the SeisComp3 software developed by GFZ (Germany). The overall operational scheme of SeisComp3 is given in Figure 1.

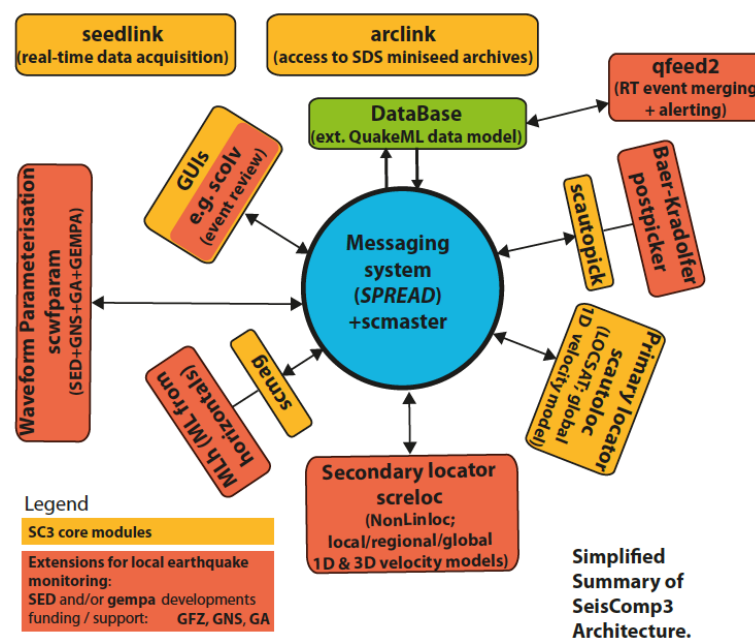


Figure 1. SeisComp3 architecture

The third work package (NA3) of the NERA project (Networking Accelerometric Networks and Strong-Motion Data Users) aims at carrying the NERIES endeavor one step ahead by structuring the inherent relation between the accelerometric data providers and the end-users of accelerometric data. This objective is trying to be achieved by performing activities described in the following items:

- Improving the waveform parameterization procedures for the near-real time accelerometric data using EIDA and SeisComp3 as the major infrastructural utilities. The near-real time accelerometric data is designated as Rapid-Raw Strong Motion (RRSM) database within the NERA-NA3 group as it is the collection of accelerometric data obtained immediately after an earthquake of any size. The group developed guidelines for rapid processing of near-real time accelerometric data under the leadership of ETH and these are built in a software called "scwfpparam" that runs under SeisComp3.
- Assembling a prototype strong-motion database (defined as Engineering Strong Motion, ESM, database) from the accelerograms recorded by the

major Italian and Turkish strong-motion data providers. The earthquake and strong-motion metadata of ESM contains more detailed information than the corresponding metadata in RRSM as almost all of the accelerograms in ESM are archived collections of relatively large magnitude events that are of engineering significance. The waveform parameterization and metadata information of such accelerometric data are processed in a different way for their use in engineering applications. The INGV and METU members in NERA-NA3 group assembled ESM from the strong-motion databases of the aforementioned countries by following the state-of-art procedures in metadata compilation and strong-motion data processing (i.e., waveform parameterization).

- c) Bridging RRSM and ESM to establish a strong infrastructure for a continuously growing and integrated European accelerometric data bank. This infrastructure is developed by INGV and ETH that retrieves accelerometric data from RRSM for its integration with the already developed ESM. The major restriction in retrieving the accelerometric data from RRSM is the earthquake size that is selected as $M \geq 4.5$ as ground motions from $M \geq 4.5$ events are of main interest for most of the engineering related seismological research.
- d) Improving the broadband station inventory in the broader Europe region and extending it by including strong-motion stations across and around Europe. This activity is inaugurated in NERIES under the responsibility of EMSC that is also carried out by the same institution in NERA-NA3 for the continuity of the task.
- e) Promulgating the efforts summarized in items (a) through (d) to the broadband and strong-motion community in the broader Europe region and helping to develop sustainable policies to ensure the permanency of the infrastructure built as part of NERA-NA3 activities.

Figure 2 presents the overall architecture of RRSM and ESM databases developed under the NERA-NA3 perspective. Figure 3 shows the established accelerometric data transfer scheme for a permanently growing pan-European accelerometric data archive.

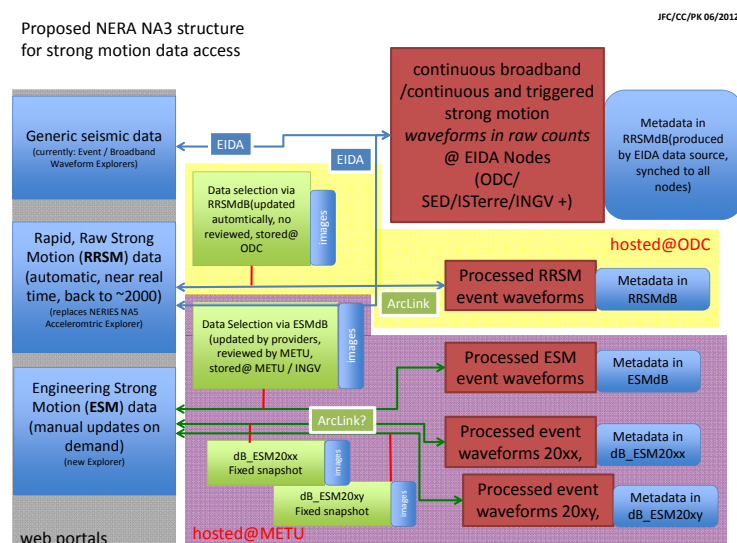


Figure 2. Architecture proposed by NERA-NA3 to integrate RRSM and ESM

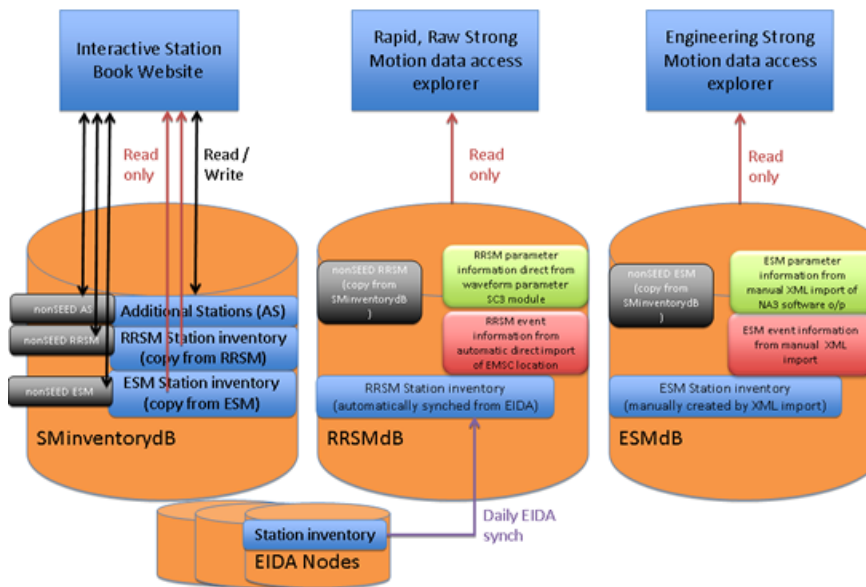


Figure 3. Data exchange scheme developed by NERA-NA3

Item (e) constitutes the focus point of this report. The first 2-year activities of the NERA-NA3 work package are shared with the strong-motion community of Europe and surrounding countries in the 2012 ORFEUS Observatory Coordination Workshop that was held in Istanbul, Turkey. The major theme of the Workshop is to bring forward the NERA-NA3 activities to develop policies for the integrated pan-European accelerometric databank. The relevant feedbacks of the invited strong-motion data providers from and around Europe were evaluated through panel discussions as well as network presentations. The workshop also hosted lecturers on (i) use of accelerometric data for engineering research, (ii) recent developments in the SeismComp3 environment, (iii) strong-motion network practice in the U.S, and (iv) the progress of a large-scale European project (SIGMA; mainly funded by EDF) that also establishes a pan-European strong-motion databank for developing ground-motion predictive models to be used in and around Europe. The content of the Workshop and its major achievement are detailed in the subsequent sections.

II. Workshop organization

The Workshop is hosted by the Kandilli Observatory and Earthquake Research Institute (KOERI) of the Bogazici University. The official web page of the workshop is at <http://www.koeri.boun.edu.tr/orfeus2012>. The local organizers of the Workshop are as follows:

- Dogan Kalafat (KOERI)
- Can Zulfikar (KOERI)
- Sinan Akkar (METU)
- Tuba Kadiroglu (Republic of Turkey Disaster and Emergency Management Presidency, DEMP)
- Eren Tepeugur (Republic of Turkey Disaster and Emergency Management Presidency, DEMP)

The local organizing committee consists of members from the two important strong-motion data providers of Turkey (KOERI and DEMP) and the NERA-NA3 coordinator. The members of international committee who actively participated in the organization of the Workshop are:

- Torild van Eck (ORFEUS and KNMI, the Netherlands)
- John Clinton (ETH, Switzerland)
- Lucia Luzi (INGV, Italy)

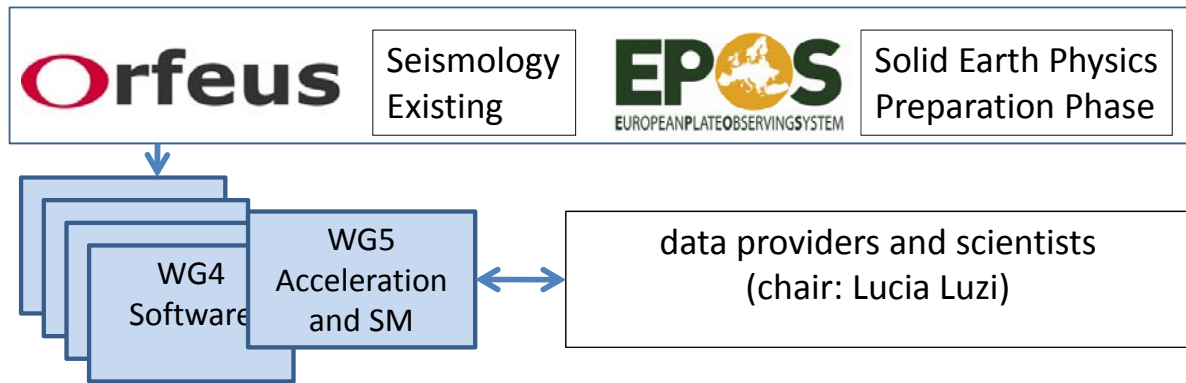
The international committee members are also the members of the NERA-NA3 work package. Torild van Eck and John Clinton are on the executive board of ORFEUS that is one of the data centers of near-real time accelerometric data in Europe. ORFEUS, as institution, is the contact point for the seismological research component of the EPOS (European Plate Observing System) project that guides the infrastructure-based research and implementation on earth sciences in Europe. Appendices A and B present the Workshop program and the list of participants.

III. Main Conclusions of the Workshop

The major outcome of the Workshop is the common agreement on a strong-motion consortium in Europe that will operate under ORFEUS. The consortium will be the basis of the sustainable integrated pan-European accelerometric databank, which is one of the targets of the NEAR-NA3 group. This conclusive remark is supported by all the representatives of the strong-motion data providers participated in the Workshop. The consortium will be structured as a work group (Work Group 5) under ORFEUS. The participants of the Workshop selected Lucia Luzi as the chair of the work group who will contact all the strong-motion data providers in the broader Europe region to be the members of the consortium. The schematic representation of this new initiative is presented in Figure 4. Structuring the consortium under ORFEUS will also benefit the future project opportunities supported by EPOS as ORFEUS is the contact institution of the seismological research component in EPOS as emphasized in the previous section. The responsibilities and duties of the Work Group 5 are envisaged as follows:

- Setting rules for data dissemination
- MoU's between data providers (extending the Consortium)
- Collaborating with EPOS for the preparation of projects
- Contacting similar establishments in the other parts of the world
- Ensure quality of metadata and waveforms:
 - Checking the quality of processed data of the partner institutions
 - Suggestion/development of the state-of-the-art techniques for metadata compilation and data processing
- Ensure IT development improvements:
 - Data transfer, optimum data dissemination techniques etc
 - Coordinate with related activities of ORFEUS/EPOS

European coordination of acceleration and strong motion data



Proposed at the ORFEUS coordination workshop November 12 – 14, 2012

Current WG participants:

Turkey (KOERI/AFAD), Italy (INGV/OGS), Greece (ITSAK/NOA), Portugal, Jordan, France (RAP), Switzerland (ETHZ), ...

Figure 4. Strong-motion consortium that will be structured under the umbrella of ORFEUS

Appendix A: Workshop Program

DAY 1 : Monday, November 12

8:00 – 9:00 Registration

9:00 – 10:00 Presentations outlining the meeting context and scope (**Chair: Doğan Kalafat**)

- Introduction (Mustafa Erdik)
- Seismic Monitoring in Turkey: Weak and Strong Motion [DEMP] (Murat Nurlu)
- Seismic Monitoring in Turkey: Weak and Strong Motion [KOERI] (Ali Pinar)
- On Going Relevant Projects for Strong Motion in Europe (Sinan Akkar)
- Infrastructure: ORFEUS, EIDA, EPOS developments (Torild van Eck)

10:00 – 10:40 **Keynote Lecture:** The importance of strong-motion data in engineering seismology and earthquake engineering (Roberto Paolucci)

10:40 – 11:00 Coffee Break

11:00 – 12:30 Improving strong motion data access in Europe (**Chair: John Clinton**)

- The Rapid Raw Strong Motion Database (Carlo Cauzzi)
- The Engineering Strong Motion Database (Lucia Luzi)
- The Accelerometric Station Book (Reinould Sleeman)

12:30 – 14:00 Lunch

14:00 – 15:00 Current Practices in Strong Motion Seismic Monitoring (**Chair: Torild van Eck**)

- Seismic monitoring in Switzerland: an overview of SED Network (John Clinton)
- Seismic monitoring in France, an overview of RAP Network (Matheuss Crousse)
- Seismic monitoring in Italy, INGV Network (Lucia Luzi)

15:00 – 15:40 **Keynote Lecture:** Developing a strong motion database – the experience from SIGMA Project –(Fabrice Cotton)

15:40 – 16:00 Coffee Break

16:10 – 17:30 Panel discussion: Future directions and policies for the integrated European dynamic strong-motion databank (**Chair: Sinan Akkar**)

19:30 Social Dinner (hosted by Workshop Organization)

DAY 2 : Tuesday, November 13

9:00 – 10:40 Current Practices in Strong Motion Seismic Monitoring (Morning Session, **Chair: Sinan Akkar**)

- Seismic monitoring in Italy, an overview of RAN Network (Lucia Luzi)
- Seismic monitoring in Greece, an overview of ITSAK Network (Nikos Theodoulidis)
- Seismic monitoring in Greece, an overview of NOA Network (Ioannis Kalogeras)
- Seismic monitoring in Romania, an overview of Romanian Network (Cristian Neagoe)
- Seismic monitoring in Serbia an overview of Serbian Network (Slavica Radovanovic and Vladan Kovacevic)

10:40 – 11:00 Coffee/tee

11:00 - 11:40 **Keynote Lecture:** Statistics of Strong Motions (Thomas Heaton)

11:40 - 12:30 **Keynote Lecture:** Strong Motion data processing in SeisComP3 (Jan Becker)

12:30 – 14:00 Lunch

14:00 – 15:40 Current Practices in Strong Motion Seismic Monitoring (Afternoon Session, **Chair: Lucia Luzi**)

- Current status of Croatian network, with focus on the catalog and its upgrade, completeness analyses and magnitude revision (Marijan Herak)
- The Strong-Motion data in the Western Balkans (Zoran Militunovic)
- Seismic monitoring in Turkey, an overview of National Strong-Motion Network and Seismological Observation Network (Eren Tepeuğur and F. Tuba Kadiroğlu)
- Seismic monitoring in Turkey, an overview of Kandilli Strong-Motion Network (Doğan Kalafat)
- Seismic monitoring in Northern Cyprus, an overview of METU Strong-Motion Network (M. Tolga Yilmaz)

15:40 – 16:00 Coffee Break

16:00 – 17:00 Current Practices in Strong Motion Seismic Monitoring (Afternoon Session, **Chair: C. Cauzzi**)

- The OGS Northeast Italy (NI) Seismic Network (Damiano Pesaresi)
- The EUROSEISTEST (Zafeiria Roumelioti)
- Seismic monitoring in USA, an overview of the US Strong-Motion Networks (Thomas Heaton)

17:10 – 18:30 Panel discussion: EPOS and strong motion; Open data access, data quality, US-Europe cooperation (**Chair: Torild van Eck**)

DAY 3 : Wednesday, November 14 (will be held at KOERI)

9:30 – 10:30 Ongoing Earthquake Preparedness Activities in Istanbul (**Chair: Can Zülfikar**)

- Risk Mitigation and Activities in Istanbul (Mustafa Erdik)
- Integrated monitoring - Supersite MARsite Turkey (Ali Pınar)
- EMME (Earthquake Model of the Middle East Region) Project (Karin Şeşetyan)

10:30 – 11:00 Coffee Break

11:00 – 12:20 Ongoing Earthquake Preparedness Activities in Istanbul (**Chair: Ali Pınar**)

- Early Warning and Rapid Response System in Istanbul (Mustafa Erdik)
- Earthquake Protection of Museum Collections (Bilgen Sungay)
- Establishing a Tsunami Warning Center in Turkey (Cemil Gürbüz)
- Tsunami Hydrodynamics and Preparations of Inundation Maps at NEAMTWS Forecast Points in KOERI (Ceren Özer)

12:30 – 13:30 Lunch

13:30 – 15:10 The Van Earthquake Special Session (**Chair: Cemil Gürbüz**)

- The Van Earthquake: Seismicity and Tectonics (Ali Pınar, Doğan Kalafat and Can Zülfikar)
- Performance of the Infrastructure (Eren Uçkan)
- The Van Earthquake: Damage Distribution (Cem Yenidoğan)
- The Van Earthquake: Statistical Assessment of Van Earthquake Aftershock Activity (F. Tuba Kadiroğlu, Recai F. Kartal, Tuğbay Kılıç, Meltem Türkoğlu, Mehmet Kaplan, Kenan Yanık, Sami Zünbül, Mustafa Demir, Derya Karaağaç, Aygül Özkan)
- Performance of ground-motion prediction equations in the light of the Van Earthquake recordings (Zeynep Gülerce)

15:10 – 15:30 Coffee Break

15:30 – 16:00 Closure

Appendix B: ORFEUS Observatory Coordination Workshop: Seismic Networks and acceleration Networks – List of Participants

No	Name	Institute / Institution
1	Ogie Kuraica	Kinematics Inc.
2	Zoran Milutinovic	IZIIS-Skopje
3	Ioannis Kalogeras	Institute of Geodynamics, National Observatory of Athens
4	Paulo Alves	Instituto Português do Mar e da Atmosfera
5	Fernando Carrilho	Instituto Português do Mar e da Atmosfera
6	Filiz Tuba Kadrioglu	AFAD Earthquake Department
7	Eren Tepeugur	AFAD Earthquake Department
8	Dejan Valcic	Seismological Survey of Serbia
9	Vladan Kovacevic	Seismological Survey of Serbia
10	Rodolfo Puglia	Instituto Nazionale Di Geofisica e Vulcanologia
11	Lucia Luzi	INGV
12	Torild van Eck	KNMI / ORFEUS
13	Fabrice Cotton	ISTerre
14	Nikos Theodoulidis	ITSAK-EPPO
15	John Clinton	ETHZ
16	Sinan Akkar	Middle East Technical University
17	Dogan Kalafat	B.U. Kandilli Observatory and Earthquake Research Institute
18	Causse Mathieu	ISTerre
19	Richard Luckett	British Geological Survey
20	Carlo Cauzzi	SED / ETHZ
21	Rachid Jomaa	CNRS Lebanon
22	Alex Sursock	CNRS Lebanon
23	Reinoud Sleeman	KNMI / ORFEUS
24	Terje Utheim	University of Bergen
25	Dragana Chernih	Seismological Observatory Skopje
25	Mehmet Ergin	TUBITAK MRC. Earth.Sci.Inst.
27	Marijan Herak	Dept.Geoph.Univ. of Zagreb
28	Joachim Saul	GFZ Potsdam
29	Roberto Paolucci	Politecnico di Milano
30	Stephan Herrnkind	gempa GmbH
31	Angelo Strollo	GFZ Potsdam
32	Damiano Pesaresi	OGS
33	Vladimir Plicka	Charles Univ. in Prague Dept.of Geophysics
34	Tom Blake	Dublin Institute for Advanced Studies
35	Zafeiria Roumelioti	Aristotle University of Thessaloniki
36	Ayman Mohsen	An Najah National University
37	Mahmoud Al-Qaryouti	Jordan Seismological Observatory
38	Cristian Neagoe	National Institute for Earth Physics

39	Jan Becker	gempa GmbH
40	Riza Pektas	B.U. Kandilli Observatory and Earthquake Research Institute
41	Mustafa Comoglu	B.U. Kandilli Observatory and Earthquake Research Institute
42	Didem Cambaz	B.U. Kandilli Observatory and Earthquake Research Institute
43	Dogan Aksari	B.U. Kandilli Observatory and Earthquake Research Institute
44	Aysegul Koseoglu	B.U. Kandilli Observatory and Earthquake Research Institute
45	Selda Altuncu Poyraz	B.U. Kandilli Observatory and Earthquake Research Institute
46	M. Tolga Yilmaz	Middle East Technical University