

# General SESAME mid-project meeting

Rome (Italy), 25-26 October 2002

In addition to “get-together” of all partners at mid-project, the objectives were:

- to review the work done since the beginning of the project,
- to have a global view of the project for every partner,
- to have interactions between different tasks and WP,
- to exchange viewpoints about several issues and partial decisions,
- to recall the main objectives of each task and work packages,
- to prepare the future of the project.

The present minutes can not keep track of the richness of all the discussions that occurred during the meeting; their aim is basically to indicate all the decisions that were taken and are to be implemented by the corresponding task leaders, work package leaders and partners.

## I Partners attending the meeting

All partners were present to the meeting (Table 1).

TABLE 1 : List of the persons attending the mid-plenary meeting in Rome

Partners	Name of the person	Partners	Name of the person
1	Pierre-Yves Bard	8	Pedro Roquette
1	Sylvette Bonnefoy	8	Paula Teves-Costa
1	Laurence Bourjot	9	Riccardo Azzara
1	Fabrice Cotton	9	Fabrizio Cara
1	Jean-Luc Chatelain	9	Giovanna Cultrera
1	Bertrand Guillier	9	Giuseppe di Giulio
2	Martin Koller	9	Antonio Rovelli
3	Matthias Ohrnberger		Rosalba Maresca *
3	Frank Scherbaum	10	Alberto Marcellini
4	Denis Jongmans	10	Marco Pagani
4	Marc Wathelet	10	Alberto Tento
5	Kuvvet Atakan	11	Josef Kristek
5	Bladimir Moreno	11	Miriam Kristekova
6	Cécile Cornou	11	Peter Moczo
6	Donat Faeh	12	Anne-Marie Duval
7	Nikos Theodulidis		

\* from the Università del Sannio-Benevento - Italy

## II Schedule of the meeting

See appended file "Rome schedule"

## III Scientific matters

### III.1 Task A – H/V Technique

The whole morning was dedicated to Task A - H/V technique. It started with an overview presentation by K. Atakan, which was followed by more detailed presentations of each work package by A.-M. Duval (WP02:

Experimental aspects, measurements and stability), K. Atakan (WP03: Data processing) and N. Theodulidis (WP04: Experimental evaluation).

### III.1.1 WP02 (Experimental conditions : A-M Duval)

This workpackage is dedicated to investigations on the required experimental conditions for warranting the stability and reproduction of measurements. The work is divided in two parts.

1. **Instrumental specification:** instrument calibration and, testing and comparisons of the instruments that are used in the project were completed following the workshop in Bergen in October 2001. A report on "Controlled instrumental specifications" corresponding to Deliverable D01.02 has been written. These results are useful for the calibration of instruments and they have to be published but we first have to answer the following question: "Can the instruments tested be named or not in the paper?".
2. **Experimental conditions:** assessment of the effects on the experimental conditions is ongoing and a large number of tests are already performed. For different reasons explained in the minutes of the "WP04 Rome meeting", the work has taken more time than foreseen and there is some delay in the progress of WP02. The deliverable D08.02 "Measurement guidelines" will not be finished for month 18 as foreseen and Anne-Marie asked for an extension of six months to finish this work package.

The following decisions were taken, and several issues were identified to be thought about:

- **Instrumental specification:**

*A first draft of a paper will be written without naming the instruments but detailing their specifications. Pierre-Yves will ask for advices to the EC, and with Kuvvet, they will prepare a letter to be sent to the manufacturers giving the results of the tests for their instruments.*

- **Experimental conditions:**

*In the third progress report sent to the EC at the beginning of December, we will inform Brussels about a 6 months delay for the deliverable D08.02. (for month 24 – April 2003).*

*The next work meeting is scheduled in Nice (April 7-11<sup>th</sup>,2003), during the EGS meeting.*

**Reminder** → *think about the end user of H/V (f0, amplitude, ellipticity...) whenever possible, while writing the conclusions of this work.*

➡ ➡ ➡ **WP02 with D08.02 will be finished for April 2003**

### III.1.2 WP03 (Data processing, K. Atakan)

This WP is devoted to investigations on the various data processing alternatives and is intended to produce a standard processing software based on the most robust alternative.

- Existing algorithms for each processing step were collected.
- The best (robustness-simplicity-resolution) solution for processing has been found based on comparisons with representative data sets
- The design and implementation of the software has been done by a dedicated sub-group (UiB, Bergen).
- Now, the software is distributed for evaluation (WP04) and review within the consortium.
- A final version of the software with user guidelines will be available at the end of the project (WP12).

The following decisions were taken, and several issues were identified to be thought about:

- *The deliverable D09.03 "multi-platform H/V processing software" will be finished on time (month 21-January 2003). A first working version will be available within 3 weeks. **No further change will be done/accepted in the software after the Rome meeting for the January version.***

- *On a later version of the software, it will be possible to consider improvements, and in particular on the aspect of filtering on raw time histories.*

- *The next work meeting (with WP04) is scheduled in Thessaloniki (June 12-13<sup>th</sup>,2003).*

- *Within Task D, a detailed user manual will be written for this software. Also, within report D09.03, there will be only a short description of the various modules.*

➡ ➡ ➡ **WP03 with D09.03 will be finished for April 2003**

### III.1.3 WP04 (Empirical evaluation, N. Theodulidis)

This WP is intended to evaluate and compare (using the software developed in WP03) the H/V ratios with other more reliable estimates (reference site). It will also compare H/V results with observed damage on recent earthquakes. The work is carried out in different stages:

- **Data set:** - existing data sets (earthquake and noise) have already been collected, but additional data (outside of Europe) are going to enrich the database, and experimental measurements and processing of ambient vibrations at a few selected sites have been performed, but possible seasonal variation of noise level forced some partners to repeat noise measurements in certain sites. For these reasons, the work took more time than foreseen and there is some delay for the deliverable D04.04 "Homogeneous data set of noise and earthquake recordings at many site". Nikos asked for an extension of four months to finish the deliverable.
- Systematic comparisons of standardized H/V noise ratio with weak- and strong-motion data as well as damage distribution in urban areas is in progress. The comparison with macroseismic data will be performed for the cities of Kalamata, Thessaloniki, Roma, Palermo, Fabriano, and possibly the Azores (Horta-Angra).
- Comparing experimentally and theoretically estimated transfer functions with H/V ratios on very well constrained sites has still to be done.

The following decisions were taken, and several issues were identified to be thought about::

- **Data set**

*In the third progress report sent to the EC, we will inform Brussels about a 4 months delay for the deliverable D04.04. (for month 20 – December 2002).*

*ITSAK has proposed to organize the whole data base (this was not included in the contract, which was only considering a data set). In that objective, all teams are asked to send, in addition to the actual data, a summary table of events with their localization and an indication on which stations have recorded those events.*

*The whole data base will be delivered as several CD-ROM's, which will be fully available for all project partners, but not yet delivered outside the consortium.*

- **Data Processing and Overall comparison**

*- H/V on noise vs Site/reference spectral ratios on Earthquake recording : each team is asked to process his own noise data set with the SESAME H/V software, and with the standard parameters; the homogenized processing of earthquake recordings and derivation of site to reference spectral ratios will be performed at LGIT by a PhD student, E. Haghshenas.*

*- Noise H/V vs Damage observations: each team is asked to process his own noise data set with the SESAME H/V software, and with the standard parameters; each team will also perform a preliminary comparison with damage data as he feels it: there is not yet any standardized procedure for such a comparison; which will have to be discussed in the next WP04 meeting.*

- *The next work meeting (with WP03) is scheduled in Thessaloniki (June 12-13<sup>th</sup>, 2003).*

➡ ➡ ➡ **The deliverable D04.04 will be finished in January 2003**

## III.2 Task B – Array measurement techniques

F. Scherbaum presented first an overview of Task B (Array measurement techniques). It was followed by more detailed presentations of each work package by M. Ohrnberger (WP05: Instrumental layout for array measurements; and WP06; Derivation of dispersion curves) and M. Wathelet (WP07: Inversion of velocity profile).

### III.2.1 WP05 (Instrumental layout) and WP06 (Derivation of dispersion curves) – M Ohrnberger

Within the context of WP05 the dependence of the array performance (for phase velocity determination) on the experimental conditions (array geometry, aperture, number of sensors, sensor types, timing accuracy) shall be assessed. The input needed for this task are:

- existing array measurement data sets from within the consortium,
- array measurements performed at well known test sites within the consortium,

- the relative calibration of instruments with respect to a broadband sensor (phase response)
- computer codes for the calculation of the array transfer functions.

WP06 aims at developing a semi-automatic processing system for array analysis of ambient vibrations, based on frequency-wave number and spatial auto-correlation methods. Besides providing all the necessary facilities to obtain dispersion curves, the system should allow for rapid in-situ quality control of the array performance.

The discussions emphasized several issues:

- o there is an essential need for both pre processing and post processing of the data. Wavelet extraction techniques, as well as MUSIC like techniques coupled with polarization analysis, should be tried in order to help the selection of the windows to be analysed.
- o It is also essential to look for any way to extend the upper period limit on estimated dispersion curves. This limit is not only controlled by the array aperture and/or instrumental limitations, but may also be partially controlled by the generation mechanism of surface waves (which implies some tight connections with Task C / Noise simulation). This also emphasizes the need for including as soon as possible the processing of Horizontal components.

The following decisions were taken:

- *The next work meeting is scheduled in Postdam (February 3-14<sup>th</sup>, 2003).*
- *There is no problem with the deadlines and the deliverables will be finished on time.*

▶▶▶ **WP 05** with D06.05 and D07.05 **will be finished for April 2003**

▶▶▶ **The deliverable D05.06 and D15.06 will be finished for April 2003**

### III.2.2 WP07 (Inversion of velocity profile – M. Wathelet)

The objective of this WP is the development of a flexible software allowing to retrieve the Vp and Vs velocity profiles from the dispersion curves in an easy and reliable way. A particular attention will be paid to the introduction of a priori information which can greatly help to constrain the model during the inversion process.

Up to now, the work mainly focused on the two following topics: improvements of the forward calculations and test on synthetic dispersion curves. During the next months, they will work on the introduction of the various a priori Vp profile. Before application to real cases they have to develop a flexible way of defining the parameters of the layered model. As the inversion is performed by several runs of the same algorithm with different random seeds, the automatic estimation the global convergence is still under study.

The discussions emphasized the following points:

- o It is recommended to investigate the sensitivity of the inversion process and of the results reliability on the upper period limit of the dispersion curve
- o Amongst the "a priori information" to help constraining the inversion, the fundamental frequency, the ellipticity (i.e., H/V ratio) should be paid special attention.
- o the variability of the inverted velocity profiles should be considered together with the resulting variability on the corresponding transfer functions.

The following decisions were taken:

- *There is no problem with the deadlines and the deliverables will be finished on time.*

▶▶▶ **The deliverable D14.07 will be finished for April 2003**

The perspective regarding the interrelationship between the different WPs in Task B has considerably changed over the course of the project. Within the proposal, the links between the individual Wps were rather weak. One important lesson which we have already learned and which deserves to be mentioned is that there is not a single best deployment strategy which only depends on one single aspect, e. g. the array geometry or parture. As a consequence, the issues in the individual Wps become much more dependent on each other. For this reason, the work done in work packages 5 and 6 are so closely connected, that it is nearly impossible to allow separate work. It is the same with WP07 and also between Task B and Task C.

▶▶▶ **There must be more interactions between Task B and Task C**

### III.3 Task C – Physical background and noise simulation

At first, P.Y Bard gave a rapid overview of Task C. It was followed by more detailed presentation by S. Bonnefoy (WP08: Nature of noise wavefield), P. Moczo (WP09: Numerical simulation of seismic noise) and D. Faëh (WP10: Simulation for real sites)

#### III.3.1 WP08 [Nature of noise wavefield, P.-Y. Bard]

Its basic objective is to clarify – and as much as possible to improve - our knowledge about the physical nature of a noise wavefield, with special emphasis on urban areas.

Up to now, the work focused on the literature survey and the next step will be to analyse array data from test sites in the light of numerical modelling and tests in Task B.

The following decisions were taken, and several issues were identified to be thought about::

- *The literature survey has to be completed by Russian papers as already outlined during the kick-off meeting. Sylvette has to see this point with Pierre-Yves and Peter.*
- *A compilation of the whole list of references uses in the literature survey, followed by a synthesis has to be done for the beginning of year 2003.*
- *there is a need to look for borehole data (INGV + Ferrara, if possible; Netherlands; Lennartz; see also the ICC data from Barcelona boreholes)*
- *There is no problem with the deadlines and the deliverable will be finished on time (D13.08 – "Report on the nature of noise" for April 2003)*
- *The next work meeting (general Task C meeting) is scheduled in Bratislava (January 7-8 or 9-11<sup>h</sup>, 2003- postponed for February 20-21).*

➡ ➡ ➡ **WP08 with D13.08 will be finished for April 2003**

#### III.3.2 WP09 [Numerical simulation of seismic noise, P. Moczo]

This WP focuses on the development and validation of numerical models producing realistic noise synthetics. It will mainly use Finite-Difference techniques (FD) with spatially and temporally random surface sources, and include parameter studies to investigate the ability of H/V and array techniques, applied on synthetics, to recover the information on the structure.

Decisions/issues took for this work package are presented together with WP10.

#### III.3.3 WP10 [Simulation for real sites, D. Faëh]

This WP is an extension of the previous one to real sites, where, in addition to the good knowledge of the structure, field measurements are already or will be available. It will thus allow a final cross-checking between actual noise observations, noise synthetics from numerical simulations, and the known geological structure and local site effects.

The discussion focused on several issues:

- ? May the velocity profile smoothing included in the FD modelling induce some bias in the H/V curve ? In order to check that issue, Donat will compute ellipticity curves for "equivalent FD" velocity profiles.
- What is the origin of the numerical instabilities in FD code ? It might be due to the large number of close sources, but it is not sure. In order to check that issue, it was agreed to perform simulations with 3 different computer codes (Finite Difference, Modal Summation, and Discrete WaveNumber / Hisada version, for an M2 like model to be chosen by Peter and Donat, and 2 source configurations (1 single source, and many simultaneous sources).
- What is the recommended choice of source characteristics?
  - The depth appears as a very important parameter. Surface sources (located between surface and h/4 depth) provide better simulation results as unrealistic High Frequency components appear

on the simulated H/V curves for deeper sources). This issue will be once more checked by Cécile with additional computations on M2 model, with sources from the surface down to large depth.

- Density and location of sources (inside / outside the receiver arrays): although preliminary computations seem to show it is not so important and that one choice might be a constant number of acting sources, Donat prefers to allocate some time for further checks, considering in particular the shape of H/V for very close acting sources: Cécile will perform 4 additional tests with sources at varying positions with respect to the receiver array.
- The time function does not seem very important; the recommended proportion between pulse-like and monochromatic-like sources is 50% - 50%.
- How to decide whether a simulated noise is acceptable or not? The best criteria seem to be a) the shape of the H/V curve (single peak, low frequency only...), and b) the correlation map as a function of distance and frequency: it is therefore recommended to look at these maps for the 5 sites instrumented with arrays by Frank and Matthias.

See the Minutes of the specialized Task C meeting for more details.

The following decisions were taken:

- *There is some concern about the deadlines for deliverables (D12.09 and D11.10) to be finished, in principle, for April 2003: the origin of that concern is the very heavy computational time required.*
- *The next work meeting (general Task C meeting) is scheduled in Bratislava (the date January 7-8 or 9-11<sup>h</sup>, 2003 has been later postponed to **February 20-21, 2003**).*

➤ ➤ ➤ **WP09 with D12.09 might have to be extended beyond April 2003**

➤ ➤ ➤ **The deliverable D11.10 will probably not be finished for April 2003**

#### III.4 Task D – Practical implementation and guidelines (M. Koller and D. Jongmans)

Task D is devoted to the dissemination and implementation of the scientific results. It is composed of the following three work-packages:

- WP11: Scientific outcomes,
- WP12: H/V user guidelines,
- WP 13: Recommendations for quality array measurements and processing.

The scientific outcomes will be disseminated in three steps.

- First, seven months before the end of the project, a three day workshop will be held in Smolenice, near Bratislava in September 2003 to exchange the results within the project team; a few observers not being involved in the project will be invited and asked to add constructive critics.
- Second, a special issue of an international journal or a monograph will be prepared that presents the project achievements.
- Finally, a special theme session on the project outcomes will be organised at the 13<sup>th</sup> World Conference on Earthquake Engineering in Vancouver in August 2004, three months after the so far scheduled end of the project.

➤ ➤ ➤ **This WP has already begun with the different papers and presentations done by all the partners since the beginning of the project, but every partner has to keep in mind that this Task D can only be performed if the others Tasks are finished.**

➤ ➤ ➤ **One has also to think about the idea proposed by Martin in the kick-off meeting, i.e., to agree on a "glossary of words and expressions to be used, so as to also "standardize" the vocabulary and better understand each other. It should be discussed in the Smolenice (near Bratislava) internal workshop.**

## **IV Administrative and Financial Matters**

### **IV.1 Financial follow-up**

A first financial report with all the cost statements was sent to the EC in June 2002, on time.

The EC started the procedure for the second payment, only at the end of September and the University of Joseph Fourier received the money during our meeting in Rome.

The University have done the payments to each partner on Friday 25<sup>th</sup> October.

▶▶▶ The next financial report is for May 2003. Laurence will ask each partner to complete their expenses table at the end of January 2003 and then at the end of April 2003. Thank you to be on time

### **IV.2 Time sheet follow-up**

Just to remind you: each person working on the project SESAME has to be registered.

Please when a new person (student, technician, researcher...) is working on the project SESAME, do not forget to inform Laurence, even if this person is not paid by the project.

### **IV.3 Progress and/or management reports**

On 6-monthly intervals from the project's starting date, the project provide the Commission services with a short management report, outlining the practical information of the project in accordance with the time schedule indicated in the project proposal.

A first management report was sent to the EC in November 2001, a second one in June 2002 (with the first annual report) and a third one will be sent at the end of December 2002.

▶▶▶ The next progress/management report is for May 2003. It will be the second annual report. This report will include: - a financial report (as mentioned in point IV.1),  
- a scientific report describing in details the scientific progress and results of each work package,  
- the following deliverables (D08.02, D09.03, D11.10, D12.09, D13.08, D14.07, D15.03),  
- a management report.

Laurence will inform each partner, at the beginning of April 2003, on what they have to do for this report.

### **IV.4 Logo**

▶▶▶ Attention: some of you don't use the right logo on their presentation. See the first page of the minutes to have a look on the SESAME logo chosen by the partners.

### **IV.5 Website**

Laurence, with Philippe, will put all the last reports, presentations, deliverables on the Website.

### **IV.6 Miscellaneous**

The **table**, page 17 is a summary of all the important Dates (Task meeting, General meeting, Workshop,...)

## **V Other important points**

### **V.1 Smolenice workshop (near Bratislava)**

The workshop in Smolenice is maintained on the first date: **22-24 September 2003**

At the beginning, it was decided that this workshop would be open to persons not working in the project. After a general discussion, all the partners agreed with the fact that in September 2003, the scientific results of the

project will not be enough analysed, discussed, in between the partners of the project, to be presented to exterior people. Furthermore, a workshop open to everyone could be a barrier for a productive discussion.

It was decided that only few observers, not being involved in the project, will be invited and asked to add constructive critics. In particular, persons who will be able to use the H/V techniques process in the project, have to participate to this workshop in order to make some tests.

It is asked to all partners to propose few names of observers and of potential users (from developing countries, if possible) and to sent their proposition to Laurence. Also everyone is strongly invited to look for some additional funding to invite those persons.

## **V.2 FP6 and SESAME continuation**

The presentations made in various conferences and meetings did show the interest for the SESAME project, its preliminary results and its anticipated outcomes, especially in "third world countries". We think a continuation would be very welcome in 2004: the consortium would very much like to have a follow-up project.

Several directions were proposed, amongst which quasi-real time in-situ array analysis, investigations on urban noise and ambient vibrations in any environment (soil / structure), strong motion observations at well investigated sites, practical use for microzonation, NL behavior. Some of them may be included in the proposals presently under building under ongoing FP6 calls, but unfortunately, it is not possible to keep the same consortium given the new FP6 structure, especially for "NoE". These "follow-up" issues will be of major importance in next general meetings, which will be the Smolenice (near Bratislava) scientific workshop, and the Nice end meeting in April 2004 (followed, hopefully, by the Special Session at 13WCEE, Vancouver, in August 2004)