

Project n° EVG1-CT-2000-00026 SESAME

European Commission – Research General Directorate

SESAME

Site EffectS assessment using AMbient Excitations

Fifth progress report

32 months Management report

1 May 2003 – 31 December 2003

SESAME Partnership

1	UJF	University Joseph Fourier	Grenoble
2	Resonance	Résonance Ingénieurs-Conseils SA	Geneva
3	UP	University of Potsdam -	Potsdam
4	ULg	University of Liège	Liège
5	UiB	University of Bergen	Bergen
6	ETHZ	Polytechnic School of Zürich	Zürich
7	ITSAK	Institute of Engineering Seismology and Earthquake Engineering	Thessaloniki
8	ICTE/UL	Institute of Earth and Space Sciences	Lisbon
9	INGV	National Institute of Geophysics and Volcanology	Roma
10	CNR.GSAQ	National Research Council	Milano
11	GPISAS	Geophysical Institute – Slovak Academy of Sciences	Bratislava
12	CETE.Nice	Center of Technical Studies	Nice
13	CNRS	National Center for Scientific Research	Grenoble
14	LCPC	Central Laboratory for Bridges and Roads	Paris

Co-ordinator: Pierre-Yves BARD - LGIT, Observatoire de Grenoble, BP 53 - 38041 Grenoble Cedex – France

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Co-ordinator: Pierre-Yves BARD

LGIT, Observatoire de Grenoble
BP 53
F-38041 Grenoble Cedex

tel: +33 (0)4 76 82 80 61
fax: +33 (0)4 76 82 81 01
e-mail: bard@obs.ujf-grenoble.fr

SESAME project rules

- 1. All the data lent by one of the SESAME project partners can only be used within the framework of the SESAME project. If one partner wants to use the data for another purpose, it is essential that he ask for an utilization agreement to the data owner.***
- 2. Each time the SESAME project partners make a presentation concerning the project SESAME, they must inform the co-ordinator of the project and as much as possible send a copy of the presentation. Moreover, each presentation on the SESAME project has the mandatory obligation to acknowledge the EC funding and mention the grant identification.***

Introduction

April 2001		signature of the contract between the partners and the European Commission			
1 May 2001	Beginning of the contract	}	Work on the field and in the laboratories on the different Tasks		
May 2001					
June 2001	First payment of the EC (40%)				
26-27 June 2001	Kick-off meeting in Grenoble, France				
July 2001					
August 2001					
29-30 August 2001	Workshop for Task C in Zurich, Switzerland				
September 2001					
October 2001					
22-26 October 2001	Instrument workshop (TaskA-WP02) in Bergen, Norway				
November 2001					
A first progress report sent to the EC					
December 2001		}	Work on the field and in the laboratories on the different Tasks		
January 2002					
7-8 January 2002	Instrument workshop (TaskA-WP02) in Potsdam, Germany				
9-11 January 2002	Workshop (TaskA-WP03 & TaskB-WP06) in Potsdam, Germany				
February 2002					
March 2002					
April 2002					
21-27 April 2002	Task A meeting during the EGS in Nice, France				
May 2002					
29-30 May 2002	Task C meeting in Zurich, Switzerland				
A second progress report including Cost statements (= D03.01) and 2 deliverables (D01.02, D02.09) sent to the EC.					
June 2002		}	Work on the field and in the laboratories on the different Tasks		
July 2002					
10 July 2002	Review meeting on seismic risk research in the EU				
August 2002					
September 2002					
October 2002	Second payment of the EC (37,99%)				
22-24 October 2002	Work-package meetings in Roma, Italy				
25-26 October 2002	General SESAME meeting in Roma, Italy				
November 2002					
December 2002					
A third progress report including 4 deliverables D04.04 (draft), D05.06, D05.05, D07.05 sent to the EC.					
January 2003		}	Work on the field and in the laboratories on the different Tasks		
February 2003					
3-14 February 2003	Task B meeting in Potsdam, Germany				
20-21 February 2003	Task C meeting in Bratislava, Slovakia				
March 2003					
April 2003					
7-11 April 2003	WP02 meeting during the EGS-AGU-EUG in Nice, France				
May 2003					
A fourth progress report including Cost statements (= D10.01) and 5 deliverables D08.02, D09.03, D13.08 (first part), D14.07, D15.06 and the final version of D04.04 sent to the EC.					
June 2003				}	Work in the laboratories on the different Tasks
12-15 June 2003	WP04 meeting in Thesssaloniki, Greece				
July 2003					
16-17 July 2003	Task C meeting in Grenoble, France				
August 2003					
September 2003					
22-24 September 2003	SESAME Smolenice Workshop (Slovakia)				
October 2003					
November 2003	Third payment of the EC (7,01%)				
December 2003					
A fifth progress report is sent to the EC.					

Progress of the Work

The following table shows the timetable of the SESAME project. We have highlighted in yellow the work planned to be in progress – and effectively is - at the date of December 31, 2003. This report presents a summary of the work done during the last eight months.

TABLE : Project planning and time table

Phases	WP	Tasks	Year 1	Year 2	Year 3	Deliverables
P01			XXXXXXXXXXXXXX	XXXXXXXXXXXXXX	XXXXXXXXXXXXXX	
	WP01		XXXXXXXXXXXXXX	XXXXXXXXXXXXXX	XXXXXXXXXXXXXX	
		T01.01	XXXXXXXXXXXXXX			<i>D03.01*</i>
		T02.01		XXXXXXXXXXXXXX		<i>D10.01*</i>
		T03.01			XXXXXXXXXXXXXX	
P02 – Task A			XXXXXXXXXXXXXX	XXXXXXXXXXXXXX	XXXXXXXXXX	
Finished ←	WP02		XXXXXXXXXXXXXX	XXXXXXX		
		T01.02	XXXXXXXXXXXXXX			<i>D01.02*</i>
		T02.02		XXXXXXXXXXXXXX		<i>D08.02*</i>
Finished ←	WP03		XXXXXXXXXXXXXX	XXXXXXXXXXXXXX		
		T01.03	XXXXXXXXXXXXXX			
		T02.03		XXXXXXXXXXXXXX		<i>D09.03*</i>
	WP04		XXXXXXX	XXXXXXXXXXXXXX	XXXXXXX	
		T01.04	XXXXXXX			
		T02.04		XXXXXXXXXXXXXX		<i>D04.04*</i>
		T03.04			XXXXXXX →	D16.04 delayed
P03 – Task B			XXXXXXXXXXXXXX	XXXXXXXXXXXXXX	XXXXXXXXXXXXXX	
Finished ←	WP05		XXXXXXXXXXXXXX	XXXXXXX		
		T01.05	XXXXXXXXXXXXXX			
		T02.05		XXXXXXX		<i>D06.05 & D07.05*</i>
	WP06		XXXXXXXXXXXXXX	XXXXXXXXXXXXXX	XXX	
		T01.06	XXXXXXXXXXXXXX			
		T02.06		XXXXXXXXXXXXXX		<i>D05.06*; D15.06*</i>
		T03.06			XXX →	D18.06 & D19.06 delayed
	WP07		XXXXXXXXXXXXXX	XXXXXXXXXXXXXX	XXXXXXXXXXXXXX	
		T01.07	XXXXXXXXXXXXXX			
		T02.07		XXXXXXXXXXXXXX		<i>D14.07*</i>
		T03.07			XXXXXXXXXXXXXX	
P04 – Task C			XXXXXXXXXXXXXX	XXXXXXXXXXXXXX	XXXX	
	WP08		XXXXXXXXXXXXXX	XXXXXXXXXXXXXX		
		T01.08	XXXXXXXXXXXXXX			
		T02.08		XXXXXXXXXXXXXX	→	D13.08* –first part
	WP09		XXXXXXXXXXXXXX	XXXXXXXXXXXXXX		
		T01.09	XXXXXXXXXXXXXX			<i>D02.09*</i>
		T02.09		XXXXXXXXXXXXXX	→	D12.09 delayed
	WP10			XXXXXXXXXXXXXX	XXX	
		T01.10		XXXXXXXXXXXXXX	→	D11.10 delayed
		T02.10			XXX	D17.10 delayed
P05 – Task D					XXXXXXXXXXXXXX	
	WP11				XXXXXXXXXXXXXX	
		T01.11			XXXXXXXXXXXXXX	
	WP12				XXXXXXXXXXXXXX	
		T01.12			XXXXXXXXXXXXXX	
	WP13				XXXXXXXXXXXXXX	
		T01.13			XXXXXXXXXXXXXX	

*, the Deliverables in italic have already been sent to the EC with the previous reports;
the Deliverables in brackets are sent to the EC with this report.

I WP01 – T02.01: co-ordination – year 3

The co-ordination is followed by two persons:

Pierre-Yves Bard for the scientific part and Laurence Bourjot for the administrative and financial part.

TABLE 1 : Persons working in the project from May 2003 to December 2003

Partners	Name of the person		Task or WP	Time spent
	<i>Bruno Bettig</i>	<i>S</i>	-	-
	<i>Fabien Blarel</i>	<i>T</i>	-	-
1	Sylvette Bonnefoy	<i>S</i>	WP08	8 M
1	Laurence Bourjot	<i>ACo</i>	WP01	1 M
1	Fabrice Cotton	<i>R</i>	WP08	0,8 M
1 (13)	Jean-Luc Chatelain	<i>R</i>	WP02	6 M
	<i>François Dunand</i>	<i>S</i>	-	-
1 (13)	Bertrand Guillier	<i>R</i>	WP02	3,6 M
	<i>Jérôme Noir</i>	<i>S</i>	-	-
1 (14)	Pierre-Yves Bard	<i>R</i>	WP01, Task A,B,C	1,25 M
1 (14)	Philippe Guéguen	<i>R</i>	WP02	0,75 M
2	Martin Koller	<i>R</i>	WP01, WP03	M
2	Corinne Lacave	<i>R</i>	WP03, WP12	M
	<i>Julien Rey</i>	<i>R</i>	-	-
3	Matthias Ohrnberger	<i>R</i>	TaskB	
	<i>Andreas Koehler</i>	<i>S</i>		
3	Gudrun Richter	<i>R</i>	Task B	
3	Frank Scherbaum	<i>R</i>	Task B	
3	Estelle Schissele	<i>R</i>	Task B	
	<i>Daniel Vollmer</i>	<i>T</i>	-	-
	<i>Hans Havenith</i>		-	-
4	Denis Jongmans	<i>R</i>	TaskB	-
4	Marc Wathelet	<i>S</i>	WP07	8 M
5	Kuvvet Atakan	<i>R</i>	Task A	-
	<i>Mathilde Böttger</i>	<i>S</i>		-
5	Margaret Grandison	<i>S</i>	WP03	0,5 M
	<i>Jens Havskov</i>	<i>R</i>	-	-
	<i>Jose Asheim Ojeda</i>	<i>S</i>	-	-
5	Bladimir Moreno	<i>S</i>	-	-
	<i>Eirik Tvedt</i>	<i>S</i>	-	-
	<i>Terje Utheim</i>	<i>T</i>	-	-
	<i>Jose Asheim Ojeda</i>	<i>S</i>	-	-
	<i>Katharina Wolff</i>	<i>S</i>	-	-
	<i>Gerardo Aguacil</i>	<i>R</i>	-	-
6	Cécile Cornou	<i>R</i>	Task A, C	8 M
6	Donat Faeh	<i>R</i>	Task A, B, C	
	<i>Fortunat Kind</i>	<i>R</i>	-	-
	<i>Ivo Oprsal</i>	<i>R</i>	-	-
6	Eva Spühler-Lanz	<i>R</i>	Task C	
	<i>Johannes Rippberger</i>	<i>R</i>	-	-
6	Daniel Roten	<i>R</i>	Task C	
	<i>Jochen Woessner</i>	<i>R</i>	-	-
	<i>Jörg Kirsch</i>	<i>R</i>	-	-
	<i>Anastasios Anastasiadis</i>	<i>T</i>	-	-
7	Petros Dimitriou	<i>R</i>	WP04	2 M
	<i>Bassilios Margaris</i>		-	-
7	Areti Panou	<i>R</i>	WP04	2 M
7	Alekos Savvaidis	<i>S</i>	WP04	1 M
7	Nikos Theodulidis	<i>R</i>	WP04	2 M
	<i>Stratos Zacharopoulos</i>	<i>T</i>	-	-
	Antonio Borges	<i>S</i>	-	-
	<i>Catarina Paz</i>		-	-
8	Pedro Roquette	<i>R</i>	WP03	
8	Gisela Viegas	<i>S</i>	Task A	6 M
8	Paula Teves-Costa	<i>R</i>	Task A	
9	Catello Acerra	<i>T</i>	WP02	-
9	Riccardo Azzara	<i>R</i>	WP02	-
	<i>Roberto Basili</i>	<i>R</i>	-	-
	<i>Paola Bordini</i>	<i>R</i>	-	-
9	Fabrizio Cara	<i>R</i>	WP04	8 M
9	Giovanna Cultrera	<i>R</i>	WP02, WP04	-

9	Giuseppe di Giulio	<i>R</i>	WP02, WP04	-
	<i>Fabrizio Marra</i>	<i>R</i>	-	
	<i>Sandro Rao</i>	<i>T</i>	-	
9	Antonio Rovelli	<i>R</i>	WP02, WP04	
	<i>Mario La Rocca</i>		-	-
	<i>Rosalba Maresca</i>		-	-
	<i>Gilberto Saccoroti</i>		-	-
10	Rosastella Daminelli	<i>T</i>	WP03, WP04	
10	Roberto de Franco	<i>R</i>	WP03, WP04	
10	Alberto Marcellini	<i>R</i>	WP03, WP04	
10	Antonio Morrone	<i>T</i>	WP04	
10	Marco Pagani	<i>R</i>	WP04	
10	Alberto Tento	<i>T</i>	WP03, WP04	
11	Lucia Fojtikova	<i>S</i>	Task C	0,94 M
11	Josef Kristek	<i>R</i>	WP09, WP10	2,90 M
11	Miriam Kristekova	<i>R</i>	WP09, WP10	1,46 M
11	Peter Moczó	<i>R</i>	Task C	2,97 M
12	Anne-Marie Duval	<i>R</i>	WP02, WP03	1 M
	<i>Etor Querendez</i>	<i>R</i>		
12	Jean-François Vassiliades	<i>T</i>	WP02	2 M
	<i>Sylvain Vidal</i>	<i>T</i>		

• *R* = Researcher, *S* = Student, *T* = Technician, *ACo* = Assistant Coordinator

The name in italic are involved in the project, but have not been working in the project during this period.

During the second half of the second year of the project (May 2003 to December 2003), about 40 persons (researchers or engineers, students, technicians and 1 assistant-coordinator) have been involved in the project SESAME for a minimum of 64 man-months (**Table 1**)

① All these persons have met several times to exchange their work and also to do experiments together.

- **12-15 June 2003** – WP04 meeting in Thessaloniki (Greece)
 - to discuss the SESAME database and the two deliverables D16.04 and D20.04,
- **16-17 July 2003** – Task C meeting in Grenoble (France)
 - to present the results and the progress of the workpackages WP08, WP09 and WP10,
 - to define the near future tasks in noise computation for canonical models and real sites.
- **22-24 September 2003** – SESAME Smolenice Workshop (Slovakia)
 - to discuss scientific results
 - to program last year finalisation work (Task D)
 - to discuss the follow-up



The minutes of the meetings or workshops are presented at the end of this report and are available on the web site:

<http://SESAME-FP5.obs.ujf-grenoble.fr>



② Since May 2003, the partners, in parallel to their work on the project, have participated to different national or international meetings where they have presented a part of the scientific work done in the SESAME project.

- **EAGE (Surface Wave Methods for near surface characterization)** in Stavanger (Norway), 1 June 2003
Wathelet M. and D. Jongmans. Surface wave inversion using a direct search algorithm and its application to ambient vibrations measurements, EAGE, Stavanger (Norway), June 2003.

- **AFP** in Cachan (France), 1-4 July 2003

Bonnefoy-Claudet S., C. Cornou, J. Kristek, P.-Y. Bard, F. Cotton, D. Fäh, P. Moczo. Modélisation numérique du bruit de fond sismique: implication pour déterminer la nature du bruit. 6th seminar of the AFP (Association Française de Génie Parasismique), Cachan (France), July 2003.

Chatelain J.-L., A.-M. Duval, E. Querendez, B. Guillier, F. Dunand, S. Bonnefoy-Claudet, F. Cara, P. Teves-Costa, D. Faeh, C. Cornou, K. Attakan et les autres membres de l'équipe du projet européen SESAME⁸Influence des conditions expérimentales de mesure du bruit de fond sismique dans l'application de la méthode « H/V ». 6th seminar of the AFP (Association Française de Génie Parasismique), Cachan (France), July 2003.
- **IUGG (23rd International Union of Geophysics and Geodesy General Assembly)** in Sapporo (Japon), 30 June-11 July 2003

Moczo, P., J. Kristek, C. Cornou, S. Bonnefoy-Claudet and P.-Y. Bard. Finite-difference simulation of seismic noise in surface geologic structures, 23rd IUGG General Assembly, Sapporo (Japan), 30 June-11 July, SS04/07A/A03-11 1215.

Teves-Costa P. and L. Senos. Looking for Site Effects in the Damage Distribution – Application to Angra do Heroismo (Azores) Using Microtremors Measurements, 23rd IUGG General Assembly, Sapporo (Japan), 30 June-11 July, SS04a/09P/D-049, B.504.
- **ESG (Workshop on Effects of Surface Geology on Seismic Motion)** in Sapporo (Japon), 11 July 2003

Bard P.-Y. and the SESAME team. The EU SESAME project : presentation, latest results and perspectives, Workshop on Effects of Surface Geology on Seismic Motion, Sapporo (Japan), 11 July 2003.
- **EEGS (Surface Wave Methods for near surface characterization)** in Prague (Czechoslovakia), September 2003

Wathelet M., M. Ohrnberger, D. Jongmans, T. Cameelbeeck and F. Scherbaum. Non linear inversion of noise array measurements for determining S-wave velocity vertical profile, EEGS, Prague (Czechoslovakia), September 2003.
- **GNGTS (XXII National Conference of Gruppo Nazionale di Geofisica della Terra Solida - C.N.R.)** in Italy, 2003

Cultrera G., A. Tento, R.M. Azzara, F. Cara, G. Di Giulio, A. Marcellini, M. Pagani, A. Rovelli. Rumore sismico ed effetti di sito: il contributo italiano al progetto SESAME (Site EffectS assessment using Ambient Excitations) - *Seismic noise and site effects: the Italian contribution to the SESAME (Site EffectS assessment using Ambient Excitations) project*



The minutes of the meetings or workshops are available on the web site:
<http://SESAME-FP5.obs.ujf-grenoble.fr>



- ③ Since the beginning of the project, eight papers have already been accepted or submitted and several are in preparation
- Bard P.Y., 2002. Extracting information from ambient seismic noise: The SESAME project (Site EffectS assessment using AMbient Excitations) – *Synopsis of the first year project* (14 p.) submitted and accepted for the review to the EC.
 - Bettig, B., Bard, P.-Y., Scherbaum, F., Riepl, J., and Cotton, F., 2003. Analysis of dense array noise measurements using the modified spatial auto-correlation method (SPAC). Application to the Grenoble area, *Bolletino di Geofisica Teorica ed Applicata*, **42-3/4**, p. 281-304.
 - Fäh D., Kind F. and Giardini D., 2003. Inversion of local S-wave velocity structures from average H/V ratios, and their use for the estimation of site effects. *Journal of Seismology*, **7**, 449-467.
 - Kristek K., Moczo P. and Archuleta R., 2002. Efficient methods to simulate planar free surface in the 3D 4th –order staggered-grid finite-difference schemes. *Studia Geophys. Geod.*, **46**, 2002, 355-381.

- Moczo P., Kristek J., Vavrycuk V., Archuleta R. and Halada L., 2002. 3D heterogeneous staggered-grid finite-difference modeling of seismic motion with volume harmonic and arithmetic averaging of elastic moduli and densities. *Bull. Seism. Soc. Am.*, **92**, 3042-3066.
- Scherbaum F., Hinzen K.-G. and Ohrnberger M., 2002. Determination of shallow shear wave velocity profiles in the Cologne/Germany area using ambient vibrations. *Geophys. Journ. Int.*, **152**, 597-612.
- Cara F. , G. Di Giulio and A. Rovelli (2003). A Study on Seismic Noise Variations at Colfiorito, Central Italy: Implications for the Use of H/V Spectral Ratios. *Geoph. Res. Lett.*, vol. 30 (in press).
- Kristek J., Moczo P., 2003. Seismic wave propagation in viscoelastic media with material discontinuities – a 3D 4th-order staggered-grid finite-difference modelling. *Bull. Seism. Soc. Am.* (in press).
- Atakan K., A-M. Duval, N. Theodulidis, P-Y. Bard and the SESAME-Team, On the reliability of the H/V Spectral Ratio Technique → submitted to *ICSDEE & ICEGE 2004*.
- Bonnefoy-Claudet S., Cornou C., Fäh D., Bard P.-Y., Wathelet M. & Ohrnberger M., Modélisation numérique du bruit de fond sismique: implication pour déterminer la nature du bruit → submitted to 6th seminar of the AFP (*Association Française de Génie Parasismique*), Cachan (France), July 2003.
- Duval A.-M., J.-L. Chatelain, B. Guillier and the SESAME WP02 team. Influence of experimental conditions on H/V determination using ambient vibrations (noise) → submitted to *ICSDEE & ICEGE 2004*.
- Ohrnberger M., Scherbaum F., Krüger F., Pelzing R. and Reamer S.K., 2003. How good are shear wave velocity models in the Lower Rhine Embayment (NW-Germany) obtained from inversion of ambient vibrations, *Bolletino di Geofisica Teorica ed Applicata* (submitted).
- Wathelet M., Jongmans D. and Ohrnberger M. Surface wave inversion using a direct search algorithm and its application to ambient vibrations measurements. *Near Surface Geophysics* (submitted).
- Kristek J., Moczo P. and Kristeková M. Finite-difference Simulation of Ambient Noise in 3D Surface Sedimentary Structures: Part 1 – Method (in preparation).

In addition,

→ SESAME related papers with contributions by the UP team funded by the German Research Council:

- Hinzen, K.G., Scherbaum, F. and Weber, B. (2003). On the resolution of H/V measurements to determine sediment thickness, a case study across a normal fault in the Lower Rhine Embayment, Germany, *JEEE*, (submitted), 2003.
- Diallo, M.S., Holschneider, M., Kulesh, M., Scherbaum, F. and Adler, F. (2003). Characterization of seismic waves polarization attributes using continuous wavelet transforms, *Geophysics* (submitted), 2003.

→ SESAME related papers with contributions by the LGIT team:

- Dunand, F., P.-Y. Bard, Ph. Guéguen, J.-L. Chatelain, B. Guillier, T. Vassail, 2003. Caractérisation du comportement dynamique des sols et structures par mesures de vibrations ambiantes : Développements récents et questions en suspens, *Journée d'étude F²AS "Recalage calcul / Mesures"* (25/03/2003, Paris), *IPSI, Vol. XXVII, n°1, 15 pages (in French)*



A copy of the papers can be asked to Pierre-Yves Bard



4

At the end of December 2003, thirteen deliverables are available.

⇒ D01.02 “**Controlled instrumental specifications**”: a report of 34 pages + 5 appendices.

⇒ D02.09 “**FD code to generate noise synthetics**”: in the form of a CD ROM with a report describing the flow chart of the software and canonical structural models.

- ⇒ D03.01 “*First year progress report*”: a report of 41 pages + annexes on the financial aspect of the project.
- ⇒ D04.04 “*Homogeneous data set of noise and earthquake recording at many sites*”: a report of 55 pages + 1 appendix
- ⇒ D05.06 “*Quality control software for in-situ checks*”: a report of 16 pages + 1 appendix.
- ⇒ D06.05 “*Array data set for different sites*”: a report of 33 pages + 1 appendix + 12 CD ROMs containing the data sets.
- ⇒ D07.05 “*Optimum development strategy and quality measure for array layout in view of obtaining surface wave*”: a report of 41 pages + 3 appendices. The complete report will be available on a CD Rom.
- ⇒ D08.02 “*Measurement guidelines*”: a report of 96 pages including 59 figures, accompanied by a DVD archiving all the test data and the corresponding results
- ⇒ D09.03 “*Multi-platform H/V processing software J-SESAME*”: a report of 37 pages describing the software + 1 CD ROM containing the software
- ⇒ D10.01 “*Second year progress report*”: a report of 31 pages + annexes on the financial aspect of the project.
- ⇒ D13.08 “*Report on the nature of noise*”: a report of 45 pages (first part of the deliverable)
- ⇒ D14.07 “*Report on the inversion of velocity profile and Version 0 on the inversion software*”: a report of 40 pages + 2 appendixes including 45 figures
- ⇒ D15.06 “*Interface software*”: a report of 8 pages describing the software tool



The above deliverables have been sent to the EC with the previous progress reports in June 2002, January 2003 and July 2003.

All these deliverables are available on the web site (except the CD ROMs with the data): <http://SESAME-FP5.obs.ujf-grenoble.fr>



II WP02 – H/V technique – experimental conditions

Leader : Anne-Marie Duval (Partner 12 : CETEMED.LRE – Nice – France)

😊😊 The work package is finished. Two deliverable D01.02 “*Controlled instrumental specifications*” and D08.02 “*Measurement guidelines*” has been produced in June 2002 and July 2003. The deliverable D08.02, presents the evaluation of the influence of experimental parameters in stability and reproducibility of H/V estimation from ambient vibrations, together with a DVD ROM archiving all the experimental data and the corresponding results (more than 500 tests).

Remind of the discussion held in Smolenice during the SESAME workshop:

The extensive work done on the experimental conditions are now finalized and the report is now delivered. The entire analyses results are compiled by the Grenoble team on a DVD and delivered to the participants during the workshop. A summary of the results are also presented by J.L. Chatelain during the first day of the workshop. In this extensive data collected on many tested parameters (ca. 58) by several groups are now analysed systematically using a statistical approach. Student t-test is applied to all test results and the deviation from the reference records are presented on individual “Technical Cards” for each tested parameter. Following this systematic evaluation, there is a need to make a thorough interpretation.

Clear set of conclusions should be drawn and disseminated. This is planned in two parallel lines of further work:

1. active participation in the guidelines that will be prepared within WP12. J.L. Chatelain and C. Lacave are given the responsibility (see the minutes of the WP12) to lead the work and each group which has performed tests are encouraged strongly to participate in this work;
2. preparation of a dedicated paper on experimental conditions - J.L. Chatelain is given the responsibility to lead the work;
3. preparation of a paper on the instrumental conditions - This paper will be lead by B. Guillier

III WP03 – H/V technique – data processing

Leader : Kuvvet Atakan (Partner 5: UIB.ISI – Bergen – Norway)

☺☺ This work package is finished. The deliverable D09.03 “*Multi-platform H/V processing software J-SESAME*” has been produced in July 2003. It describes the new software solution to be used in H/V spectral ratio technique. This software is going to be tested by external people and if necessary, further improvements and modifications will be done after the Smolenice castle workshop next fall. A final version of the software with user guidelines will be available during year 3 in the work package 12.

Remind of the discussion held in Smolenice during the SESAME workshop:

The software J-SESAME was presented by K. Atakan during the workshop. The tests that were performed by different groups have revealed a number of bugs, which need to be corrected. There were also some suggestions with regard to additional functionalities. A general decision was made to do all the changes on the software through a concentrated effort on a location where all developers get together to finalize the work. This work-session will be done in 8-13 February 2004 in Lisbon, Portugal. P. Teves-Costa will host the meeting. The purpose of this work-session is to prepare the final version of the J-SESAME software and is NOT meant as another discussion forum for further suggestions.

A parallel line of work is planned in connection with the user manual of the software, which will be done within the WP12. This will be lead by K. Atakan and B. Guillier. The deadline will be 15 April 2004.

IV WP04 – T03.04: H/V technique – empirical evaluation – year 3

Leader: Nikos Theodulidis (Partner 7 – IESEE – Thessaloniki – Greece)

Compilation of the database for experimental validation is completed: about two hundred sites, information on noise and earthquake recordings is presented in the Standard Information Sheets (SIS), a number double of the one initially foreseen. The complete set of SIS files was included in the “Homogeneous data set of noise and earthquake recordings at many sites” [Deliverable D04.04]. In order to facilitate data selection with certain criteria, a specific SESAME Database management system was constructed and a specific software is developed for easy access to the data (using MS-Access). This system provides easy access to the users in choosing a relevant sub-set of data.

The individual studies performed in the cities of Thessaloniki-Greece & Kalamata-Greece, the city of Palermo-Italy and the city of Fabriano-Italy for comparing the H/V ratios with damage have been discussed during the Smolenice Workshop. In general, the results gave room for a variety of interpretations. Although in some cases there seems to be a positive correlation, in general it is agreed that the comparison to damage is a complex procedure. The comparisons to the near-surface geology, on the other hand seems to be more consistent. All aforementioned issues are under study.

☺☺ A first deliverable D04.04 “*Homogeneous data set of noise and earthquake recordings at many sites*” presenting the Standard Information Sheets (SIS) with information on noise and earthquake recordings has been sent with the previous report. The next deliverable D16.04 “*Comparisons of experimentally and theoretically estimated transfer functions*” will be presented in May 2004 (see the reason of this delay below).

The main reasons for the delay of the D16.04 are the following:

1. Large amount of ambient noise data compiled: (i) from strong motion stations, (ii) from seismograph stations (iii) from sites within modern cities hit by damaging events.
2. Enrichment of the SESAME database with about double number of sites compared to those initially foreseen.
3. Delay of the JSESAME software tool shifted calculations of the (H/V) ratios for the D16.04.

V WP05 – Instrument layout for array measurements

Leader: Frank Scherbaum (Partner 3 – UPOTS.GEO – Postdam – Germany)

☺☺ This work package is finished. Two deliverables, one on a tentative strategy for array deployment and performance evaluation D06.05 “*Array data set for different sites*”, and a second on field survey D07.05 “*Optimum deployment strategy and quality measure for array layout in view of obtaining surface wave*” have been sent with the third report.

VI WP06 – T03.06: array measurements – derivation of dispersion curves – year 3

Leader: Frank Scherbaum (Partner 3 – UPOTS.GEO – Postdam – Germany)

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) have been assessed. The inputs needed for this task were 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) and computer codes for the calculation of the array transfer functions. Based on the conclusions drawn from WP05, the objective of WP06 is the development of a semiautomatic processing system for the array analysis of ambient vibrations. The array processing system is especially designed for the determination of dispersion curve characteristics in order to allow the inversion of shallow shear velocity profiles (WP07) for site effects assessment.

Since May 2003, the following work has been done:

- work on the interface software tool "retrieve" and preparation of deliverable D15.06;
- re-coding of MUSIC algorithm and strategies to pre-select time windows for further processing based on time-frequency analysis of energy contribution within the signal windows;
- preparation and analysis of synthetic waveform datasets based on different 1D velocity models;
- determination of influence on array analysis results from source effects (relative source receiver positioning, source depth and source type);
- testing of implemented MUSIC algorithm and pre-selection strategy on the datasets;
- visualization of 2D-spatial aliasing effects and determination of region of confidence in display of array analysis results;
- preliminary inversion of dispersion curves for sites in Greece;
- preliminary inversion of spatial autocorrelation curves for sites in Greece;
- participation in SESAME workshop in Smolenice, Slovakia;
- re-coding of array analysis software "cap" and subsequent testing on synthetic and real datasets. Work on final deliverables for March 2004

☺ Two deliverable, D05.06 “*Quality control software for in-situ checks*” and D15.06 “**Interface software**” have already been sent with the previous reports. The two deliverables D18.06 “*FK/SPC Continuous array processing software*” and D19.06 “*FK/SPAC capabilities and limitations*” will be presented in May 2004 (see the reason of this delay below).

The main reasons for the delay of the D16.04 are the following:

During the 2nd year SESAME workshop held in Smolenice, Slovenia, several presentations have been given regarding Task B by M. Ohrmberger, M. Wathelet and A. Savvaïdis. The presentations focussed on the array analysis of 1D synthetic and real datasets and subsequent inversion of the dispersion information extracted. During the presentation of A. Savvaïdis reporting about the dispersion curve inversion for sites in Greece, a discussion started about the way to quantify the "goodness of fit" between inverted velocity models and geotechnical information. Within a following internal discussion of the group members of Task B an agreement was achieved on how to present the results of array analysis, how to determine the dispersion curve information from the array analysis and how to use this information in the inversion process. As most important point, it has been agreed to perform the complete processing scheme (including inversion) always in the slowness domain. Further, the extraction of the dispersion information should be based on robust statistics. Both, for the presentation of dispersion analysis and the inversion results, the total distribution of analysis results should be used. In order to remove outliers in the array analysis results or unlikely velocity models from the inversion procedure, the distribution shall be truncated to reasonable quantiles (e.g. 15% and 85%).

These modifications together with additional suggestions made by the test users of the software packages made it necessary to re-code major parts of the array analysis software. Most of this re-coding has been done until now. However, during the new testing phase, some inconsistencies have been recognized, which could not be solved so far. Therefore, we requested the delay of the two deliverables until the next report (May 2004), as the final processing of real and synthetic datasets and thorough testing will take place during the anticipated SESAME workshop in Potsdam between 16th and 20th of February.

VII WP07 – T03.07: array measurements – inversion of velocity profile – year 3

Leader: Denis Jongmans (Partner 4 – ULGG.DGO – Liège – Belgium)

During the period running from May 2003 to January 2004, the software was improved by implementing the SPAC (autocorrelation) method and the direct inversion of the autocorrelation curve for obtaining the shear wave velocity profile. A paper (Wathelet *et al.*) about the results obtained before September 2003 was written and submitted to a special issue of the journal “Near Surface Geophysics” dedicated to surface waves.

Subcontractor: Royal Observatory of Belgium (ROB).

Array Noise measurements were performed in Mons (Belgium) by the ROB team in December 2003.

The Mons town, located in a basin, has been shown to be at risk by the seismic hazard study of Belgium and this experiment aims at testing the array methods for deriving shear wave velocity profile. These measurements will be interpreted in the following months.

Wathelet M., Jongmans D. and Ohrnberger M. Surface wave inversion using a direct search algorithm and its application to ambient vibrations measurements. Near Surface Geophysics (submitted).

☺ ☺ A first deliverable D14.07 “**Report on the inversion of velocity profile and Version 0 on the inversion software**” describing the inversion procedure developed in the framework of the SESAME project has been sent with the previous report. Different presentations in international meetings have been done on the subject and a paper has been submitted to the journal “Near Surface Geophysics”. A second deliverable D21.07 “**PC version of the inversion software**” will be presented in May 2004 (see the reason of this delay below).

The main reasons for the delay are the following:

1. If the current version of the software is now able to inverse dispersion curves with their uncertainties as well as autocorrelation curves computed by the SPAC array method, the final result of the inversion is not sufficient for a correct and quantitative estimation of the final uncertainties on the ground velocity model. A refined approach, still under development, needs a resampling of the misfit function at the end of the inversion. The computation of the covariance and the resolution of the inversion method will be calculated.
2. The term "PC version" is somehow useless as all the developed programs are running on all platforms: Linux, Mac and Windows (already tested). Other extensions to Unix is not planned (but possible at a low cost)...

VIII WP08 – T02.08: nature of noise wavefield – year 2

Leader: Pierre-Yves Bard (Partner 1 – UJF.LGIT – Grenoble – France)

As mentioned in the 2nd-year fourth progress report, we now focus our work on noise modelling. We have decided to share the noise computations between the Grenoble and Zurich groups: 1D canonical models are computed using the Grenoble computer platform (Hisada DWN method), 2D and 3D canonical models are computed in Zurich (FD code). At this time, noise synthetics from 1D and 2D canonical model specified during the Roma general meeting (M1, M2, M3, M4, M6, M7, M8, M10 and M11) have been computed. The next step is now to apply the H/V ratio and array analysis technique on these noise synthetics. During the Potsdam meeting (16th to 20th February) we will discuss the H/V and array analysis results obtained from these canonical models, and we will compare these results with real sites data analysis.

In the same time we carry on the sources-receivers configuration tests (source time function sources, near/far sources, surface/deeper sources) in order to define the noise wavefield nature. H/V and array analysis on these noise synthetics have allowed linking the occurrence of H/V ratio peaks with the noise wavefield composition:

1. when sources are near and superficial, H/V curves exhibit one single peak, while the array analysis shows that the wavefield is dominated by Rayleigh waves;

2. when sources are distant and located inside the sedimentary layer, two peaks show up on the H/V curve, while the array analysis indicates that both Rayleigh waves and strong S head waves are present. The first peak is due to both fundamental Rayleigh waves and resonance of head S waves, the second peak is only due to resonance of head S waves;

3. when sources are deep (located inside the bedrock), whatever their distance, H/V ratio exhibit peaks at the fundamental and harmonic resonance frequencies, while array analyses indicate only non-dispersive body waves: the H/V is thus simply due to multiple reflections of S waves within the layer.

Therefore, considering that experimental H/V ratio (i.e., derived from actual noise measured in the field) exhibit in most cases only one peak, we conclude that H/V ratio is mainly controlled by local surface sources and mainly due to the ellipticity of the fundamental Rayleigh waves. These results have already been shown during the Smolenice general meeting, and a paper on this topic is under preparation at this time and should be submitted before the end of May.

☺ ☺ The first part of the deliverable presenting the results of the survey of the scientific literature dealing with seismic noise presented in the deliverable D13.08 “*Report on the nature of noise*” has been sent with the previous report and should be published in *Earth-Science Reviews*; the paper will be submitted at the end of March. The second part of the deliverable, on the results already obtained with the parametric study of noise sources, will be presented in May 2004 (see the reason of this delay below).

The main reasons for the delay are the following:

1. problems encountered with noise simulation in the WP09 and WP10, that brought us to shift our focus on the noise modelling issue.
2. as a consequence, the detailed analysis that were anticipated on the array data gathered by the Potsdam team over the first 18 months, and on the noise synthetics from canonical models and real sites could not be performed: it is scheduled to be performed in Fall 2003 and Winter 2003/2004.

IX WP09 – T02.09: numerical simulation of noise – year 3

Leader: Peter Moczo (Partner 11 – IGSAS.SD – Bratislava – Slovakia)

The first series of the numerical test to find out a reason for the undesired artificial high-frequency oscillations led to an assumption that the oscillations are caused by the type of the body point forces applied as point sources to generate the field of seismic noise. Particularly, the use of a single point force acting at just one grid point was a prime suspect. The further investigations showed that the type of the body point force probably is not the main reason of the undesired oscillations. Theoretical considerations on how the finite-difference grid propagates seismic motion led to a hypothesis that it is a large frequency span which might be a primary reason for the oscillations. The hypothesis means that due to large frequency span the simulation of the largest wavelength (corresponding to the minimum propagated frequency in the grid) is too much oversampled both in space and time. This oversampling may imply some kind of a numerical noise which, during long-time-window calculations eventually turns into instable high-frequency oscillations. In order to verify this working hypothesis, particularly the role of the span, calculated time window and number of acting sources, a set of calculations has been designed. Calculations are under way.

As previously reported, the high-frequency oscillations pose a serious complication in the numerical modelling of seismic noise, and a special filtration technique has to be applied to reduce them.

As previously reported, the algorithm of the two-step calculations using the so-called excitation box was developed. The implementation of the excitation box into the program FDSIM of the program package NOISE was completed. Numerical tests were performed to check the implementation. Program FDSIM now can be used also for simulation of the seismic noise wavefield generated by distant sources.

The new approach to determine the spectral H/V ratio based on the time-frequency analysis was tested also on observed data from a few real sites. Because the results were not as clear as in the case of synthetic noise signals generated by the modal summation technique, it was decided to perform further tests. The first set of tests will be performed on synthetic noise data generated by Hisada's code and the second one for the observed data from real sites with simpler geological structure.

☺ ☹ A first deliverable D02.09 “**FD code to generate noise synthetics**” in the form of a CD ROM with a report describing the flow chart of the software and canonical structural models has been sent to the EC in June 2002. The next step will be the deliverable D12.09 “**Report on parameter studies**” presenting the numerical simulations for a selected set of canonical models which undergo some delay, and is now scheduled for May 2004 (see the reason of this delay below).

The main reason for the delay is the following:

1. large number of numerical simulations of seismic noise in relatively complex canonical models of local structures which require large computer time and memory.

X WP10 – T02.10: simulation of real sites – year 3

Leader: Donat Fäh (Partner 6 – ETHZ – Zürich – Switzerland)

The very first intensive use of the FD code in February 2003 showed that, for anelastic models, some numerical instabilities appeared after a few seconds of noise synthetics: it could not allow us thus computation of long noise time series [i.e. from 3 to 10 minutes for canonical and real sites models, respectively] that are mandatory for getting some statistically meaningful data analysis. The FD code has been 80% rewritten in order to delay these numerical instabilities appearance. During that period however, a wave-number method has been modified in order to simulate noise for 1D canonical models. Results were presented in conferences (Cornou et al, 2003; Bonnefoy-Claudet et al., 2003) and allowed us to assess the appropriate noise sources characteristics in order to get a good representation of the actual noise.

Since July 2003, the new FD code was used to simulate noise wave fields for some 3D canonical models (sedimentary deep and shallow valleys) and some real sites (Grenoble and Colfiorito basins; 3 minutes of noise). A first analysis of these synthetics was presented during the third year general SESAME workshop last September. Other computations for 3D canonical models are now running and the detailed analysis of noise synthetics for canonical models is under progress.

The end of the year 2003 has been dedicated in ending computations and data analysis for 3D canonical models.

The research plan for the next year is to simulate ambient noise time series of long duration for the real sites:

- computation of the noise synthetics for Basel model and computation of additive noise time series for the Grenoble and Colfiorito basins in order to reach around 10 minutes of noise synthetics;
- computation of the 3D transfer function for real sites and two bounded 3D canonical models (sediment fill valleys);
- computation of the effects of the coastal waves on the noise properties.

☺ ☹ This work package has started at the beginning of year 2. Due to the heavy computational requirements, some delay is anticipated in the first deliverable D11.10 "Set of noise synthetics for H/V and array studies from simulation of real sites".

The main reason for the delay is the time needed for computation.

1. First analysis of 3 minutes of noise computed for the Grenoble and Colfiorito real sites have indeed outlined that time series of at least 9 minutes are mandatory for allowing statistically meaningful comparisons between simulated and actual noise. It is why, the WP team will also focus on simulating 9-10 minutes of noise for the Basel area and 6 additive minutes for the Grenoble and Colfiorito sites (**and typically computation of 3 minutes of noise require 1 month of computation on IBM SP4 machines**).
2. The WP will also continue with the computation of 3D transfer function for real sites and two 3D canonical models (deep and shallow valley) in order to precise whether the frequency of the H/V peak provides the frequency of the 3D transfer function or an approximation of the 1D local resonance frequency. Besides some insights about the nature of the noise wave field, the results will have very practical outcomes on the use or misuse of H/V curves in 3D structures for estimating the local 1D resonance frequency as it is commonly interpreted.
3. Finally, the effects of impinging coastal surface waves that propagate at low frequency (around 0.2 Hz) on the noise characteristics will be investigated for two canonical models: a deep valley having a resonance frequency (0.3 Hz) close to the frequency content of the incident wave field and a shallow valley having a much higher resonance frequency (2 Hz). These simulations will help in understanding the differences usually observed on the accuracy of surface waves dispersion curves derived from noise array measurements between sites close or not to the sea.

XI Task D: short description

Task D is devoted to the dissemination and implementation of the scientific results. It will officially start only during the 3rd year, after the Smolenice workshop.

During the Smolenice workshop, the content of each WP has been discussed and deadlines have been defined (see the minutes of the Smolenice for details).

→ **WP11 - Scientific outcomes:** different papers defines in the different WP.

→ **WP12 - H/V user guidelines**

General content of the guidelines

1. Technical requirements for measurements (ca. 5 pgs.)
 2. Data processing standard (ca. 5 pgs.)
 3. Interpretation guidelines (ca. 5 pgs.)
- Appendices:
- a. "Good" and "bad" examples illustrating the merits and limitations (ca. 10 pgs.)
 - b. Physical explanations (ca. 5 pgs.)
 - c. "Field summary" (2 pgs.) + "Field-sheet" (1 pg.)
 - d. Technical card (ca. 2-3 pgs.)

Total Review of the guidelines: Hanan Nimry (pilot application?), Benoit Lebrun and Martin Koller

→ **WP13 – recommendations for quality array measurements and processing**

XII To conclude this fifth report

As outlined in the sections describing each active work package, the project is progressing normally, and there does not exist any major problem that jeopardize the chance of success of this project. Even, if some deliverables undergo some delays, these delays are always well explained, and remain under control. For this reason, we decided, with all the partners, to ask for a six months prolongation to the EC. We have already send a letter to the EC to Maria Yeroyanni the 22 July 2003 (see appended letter). Having no answer to this letter we consider that our prolongation is accepted. The project would thus be finished in October 2004 (against April 2004) with:

- progress reports foreseen for: - June 2004 (report 6),
 - October (report 7: minutes of "Les Houches" meeting + a copy of the abstracts presented during the special theme session in Vancouver);
- and **the final report** foreseen for December 2004-January 2005 with the TIP.

We remind that the final results of the project SESAME will be presented during a Special Theme Session at 13WCEE (World Conference on Earthquake Engineering), Vancouver, in August 2004: "Site characterization for site effects studies using ambient vibration" (see the previous report for details).

The last meeting for the project SESAME will be in Les Houches, near Chamonix (France), from

Sunday 3 October 2004 to Tuesday 5 October 2004

SESAME important dates

Months	Week 1	Week 2	Week 3	Week 4
1	May 2001			
2	June 2001			Kick-off Meeting-Grenoble
3	July 2001			
4	Aug. 2001			Zürich – Aug 29-30 Task C meeting
5	Sept. 2001			
6	Oct. 2001			Bergen – Oct 22-26 TaskA - WP02
7	Nov. 2001	First progress report: 6 th months report		
8	Dec. 2001	(AGU)		
9	Jan. 2002	Potsdam – Jan 7-8 TaskA-WP02	Potsdam – Jan 9-11 TaskA-WP03 & TaskB-WP06	
10	Feb. 2002			
11	March 2002			
12	April 2002			During the EGS – Nice – April 21-27 Task A- WP02- WP 03- WP 04 D1, D2 → sent with D3 in June 03
13	May 2002		Zürich Task C meeting	D3: Progress report 1 (due on 30/06/02)
14	June 2002	Second report: first year progress report + Deliverables D1, D2 & D3		
15	July 2002			
16	Aug. 2002			
17	Sept 2002	(ECEE London) (ESC Genoa)		
18	Oct. 2002		Roma – Oct 22-26 Oct 22-24: WP02, WP03, WP04, WP09-10 meetings Oct. 25-26: General SESAME meeting	D5, D6, D7 → sent with the third report
19	Nov. 2002			
20	Dec. 2002			D4 draft sent with the third report
	Dec. 2002	Third report: 18 th months report + Deliverables D5, D6, D7 & a draft of D4		
21	Jan. 2003			
22	Feb. 2003	Potsdam – Feb. 3-14 Task B meeting	Bratislava – Feb. 20-21 Task C meeting	
23	March 2003			
24	April 2003		During the EGS-AGU-EUG Nice – April 7-11 WP02 meeting	D8, D9, D13 (first part), D14, D15 → sent with the fourth report
25	May 2003			D10: Progress report 2 (due on 30/06/03)
26	June 2003		Thessaloniki – June 12-13 WP03-WP04 meeting	
	July 2003	Fourth report: 2 nd year report + Deliverables D8, D9, D10, D13, D14 & D15		
27	July 2003		Grenoble – July 16-17 Task C meeting	
28	Aug. 2003			
29	Sept. 2003		Smolenice – Sept 22-24 Scientific Workshop	
30	Oct. 2003			
31	Nov. 2003			
32	Dec. 2003			(AGU)
	Jan 2004	Fifth report: 32 th months report		
33	Jan. 2004			
34	Feb. 2004	Lisbon – Feb. 8-13 WP03 meeting	Potsdam – Feb. 16-20 Task C meeting	
35	March 2004			
36	April 2004			EGU – Nice (25-30 apr.)
37	May 2004			D11, D12, D13 (second part), D16, D17, D18, D19, D20, D21, D22, D23, D24
38	June 2004			D25: Progress report 3
39	July 2004			
40	August 2004		Vancouver – August 1-6 13 th world conference in Earthquake Engineering,	
41	September 2004			
42	October 2004	Les Houches – Oct. 3-5 Final Meeting		
43	November 2004			
44	December 2004			D25: Final report

Minutes of the meetings or workshops

1. WPO4 meeting – Thessaloniki (Greece), 12-14 June 2003

The objectives were to discuss:

- the presentation and adoption of the SESAME database,
- the progress of D16.04 and D20.04

I Partners attending the meeting

Last Name	First Name	e-mail	Phone
Lacave	Corinne	corinne.lacave@resonance.ch	(+41)223010253
Fäh	Donat	faeh@seismo.ifg.ethz.ch	(+41)16332658
Atakan	Kuvvet	atakan@geo.uib.no	(+47)55583413
Savvaïdis	Alexandros	alekos@itsak.gr	(+30)2310476081
Dimitriu	Petros	pedim@itsak.gr	(+30)2310476081
Cultrera	Giovanna	cultrera@ingv.it	(+39)0651860536
Marcellini	Alberto	alberto.marcellini@idpa.cnr.it	(+39)0228311427
Pagani	Marco	marco.pagani@idpa.cnr.it	(+39)0228311423
Tento	Alberto	Alberto.tento@idpa.cnr.it	(+39)0228311425
Bard	Pierre-Yves	bard@obs.ujf-grenoble.fr	(+33)476828061
Moreno	Bladimir	bladimir@sssn.ciges.inf.cu	(+53)22641623
Costa	Paula Teves	ptcosta@fc.ul.pt	(+351)217500814
Zacharopoulos	Stratos	stratos@itsak.gr	(+30)2310476081
Theodulidis	Nikos	ntheo@itsak.gr	(+30)2310476081
Guillier	Bertrand	guillier@bondy.ird.fr	(+33)476828026
Chatelain	Gaillot, J-L.	jean-luc.chatelain@obs.ujf-grenoble.fr	(+33)476828026
Panou	Areti	apanou@lemnos.geo.auth.gr	(+30)2310991420
Klimis	Nikos	klimis@itsak.gr	(+30)2310476081
Papaioannou	Christos	chpapai@itsak.gr	(+30)2310476081

II Scientific matters

II.1 Discussion-Resolution on SIS and SESAME database

- For unknown magnitude in the Site Selection Criteria to put $M = -1$.
- For unknown earthquake epicenter in the Site Selection Criteria to put $R = -1$.
- For unknown earthquake origin time to consider recording start time
- For any additional SIS information [especially in cases where in SIS the logical variable is set Y] to add a field in the SIS file.
- For SESAME db:
 - To publish its final version
 - To be open within the SESAME consortium
 - To be “locked” by the end of the project
 - ITSAK to continue its maintenance
- Deliverable D04.04 to be submitted by the end of June 2003.

→ Partners to Contribute: ITSAK by the assistance of all Participants

II.2 Discussion-Resolution on Report D16.04 Contents

- Prolongation of D16.04 submission by October 2003
- SESAME Database noise processed with JSESAME → [h/v]
- SESAME Database earthquake records processed with JSESAME similar standardized procedure → [SSR, h/v]
 - Comparison & Statistics in terms of:
 - Resonant Frequency, F_0
 - Amplification Bandwidth
 - Amplitude Level, A_0

→ Partners to Contribute: LGIT, ITSAK

Comparisons to be made by each WP04 Partner [processed also by JSESAME or/and their own code]

- Gen. Inv. Transfer Function S. M. & Weak Data → ITSAK
- 1D / 2D Linear Modeling → ITSAK and ETHZ
- Non Linear effects (few sites) → ITSAK

II.3 Discussion-Resolution on Report D20.04 Contents

1. (h/v) noise ratio & damage for the cities:
 - Palermo (Italy), $I_{max} \sim VI+$
 - Rome (Italy), $I_{max} \sim V$
 - Fabriano (Italy), $I_{max} \sim VIII$
 - Angra do Heroismo (Portugal), $I_{max} \sim VIII$
 - Thessaloniki (Greece), $I_{max} \sim IX$
 - Kalamata (Greece), $I_{max} \sim IX$ [experiment summer 2003]
2. Work to be done by Smolenice meeting by each Partner using the JSESAME s/w with default parameters
 - Fo & Ao – Local Geology: Buildings Number of Stories (if available Eigenfrequency)
 - Maps & Correlation Curves
 - Fo - Macroseismic Intensity [MI] (Thessaloniki, Kalamata, Palermo, Rome)
 - Ao - Macroseismic Intensity [MI] (Thessaloniki, Kalamata, Palermo, Rome)
 - Fo – Structural Damage [SD] (Thessaloniki, Angra do Heroismo, Fabriano)
 - Ao – Structural Damage [SD] (Thessaloniki, Angra do Heroismo, Fabriano)
 - [SD] → Consensus on Definition (EMS 98 Damage Grade / Vulnerability Classes)
3. During/After Smolenice Meeting Sept. 2003: Comparisons based on Cumulative Results at least for the cities:
 - Thessaloniki
 - Kalamata
 - Angra do Heroismo
 - Fabriano
4. Prolongation of D16.04 submission by December 2003

II.4 General SESAME issues/resolution

Dissemination Policy of SESAME Database

- To be open within the SESAME Consortium by end of project.
- To publish the SESAME database
- To close the final tool to be submitted to EC.
- SESAME database to be maintained after the end of project by ITSAK

Publications of WP02 - WP03 – WP04

- Vancouver 13WCEE (papers by January 31st 2004)
- Berkeley SDEE (papers by 31st August 2003)
- Japan IUGG (P-Y. Bard)
- Special Issue on the Bulletin Earth. Eng. by the end of 2004 (editor A. Ansal)

2nd YEAR SESAME Report by the end of June 2003

- To send short Reports to Coordinator and L. Bourjot.
- To submit Reports of all Deliverables due.

Project's Prolongation

- Agreed by all Participants a 6 months prolongation (end of October 2004).
- Final Project Report is due by December 2004.

Final General Meeting

- From April to be shifted October 2004 (Place: Nice or elsewhere?)

External Invitations to Smolenice Sept. 2003 Meeting/Workshop

- Agreed by all Participants to invite 4 persons paid by all Partners.
- Coordinator will arrange further details of this issue.

2. Smolenice Workshop - Smolenice (Slovakia), 21-24 September 2003

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

- to have a global view of the project for every partner and invited persons in presenting the various results already obtained after 2 years concerning the H/V technique, the array studies, the nature of noise wavefield, and noise simulation results;
- to discuss the scientific results
- to discuss the way to transfer the results in the scientific community and also in routine practice, with special emphasis on developing countries who make an extended use of the H/V technique;
- to have some feedbacks about the past results and the directions for the future of the project from extern person;
- 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 Smolenice Workshop in Slovakia

Partners	Name of the person	Partners	Name of the person
1	Pierre-Yves Bard	6	Daniel Roten
1	Sylvette Bonnefoy	7	Petros Dimitriu
1	Laurence Bourjot	7	Alexandros Savaidis
1	Fabrice Cotton	7	Nikos Theodulidis
1	Jean-Luc Chatelain	8	Paula Teves-Costa
1	Philippe Guéguen	9	Fabrizio Para
1	Bertrand Guillier	9	Giovanna Cultrera
2	Corinne Lacave	10	Marco Pagani
2	Martin Koller	10	Alberto Tento
3	Matthias Ohrnberger	11	Lucia Fojtikova
3	Frank Scherbaum	11	Josef Kristek
	Estelle Schisselé	11	Miriam Kristekova
4	Denis Jongmans	11	Peter Moczo
4	Marc Wathelet	11	Peter Labak
5	Kuvvet Atakan	11	Martin Galis, Peter Frank
6	Cécile Cornou	12	Anne-Marie Duval
6	Donat Faeh	12	Jean-François Vassiliades

- And - Attila Ansal, Kandili Observatory and Earthquake research Institute, Bogazici University, Turkey
- Michael Schmitz & Victor Rocabado, FUNVISIS, Venezuela
 - Bill Stephenson, Seismology section, Institute of Geological and Nuclear Sciences, New Zealand
 - Benoît Lebrun, BRGM Marseille, France
 - Hanan Nimry, Royal Scientific Society, Jordania

II Scientific matters

II.1 Task A – H/V Technique

Discussion on the entire Task A was done with the participation of the contributors of the task. Each work package has been discussed separately.

WPO2 discussions

The extensive work done on the experimental conditions are now finalized and the report is now delivered. The entire analysis results are compiled by the Grenoble team on a DVD and delivered to the participants during the workshop. A summary of the results are also presented by Jean-Luc Chatelain during the first day of the workshop. This extensive data set collected on many tested parameters (ca. 58) by several groups have been now analysed systematically using a statistical approach. Student t-test is applied to all test results and the deviation from the reference records are presented on individual "Technical Cards" for each tested parameter. Following this systematic evaluation, there is a need to make a thorough interpretation.

Clear set of conclusions should be drawn and disseminated. This is planned in two parallel lines of further work:

4. active participation in the guidelines that will be prepared within WP12. **Jean Luc Chatelain** and **Corinne Lacave** are given the responsibility (see the minutes of the WP12) to lead the work and each group which has performed tests are encouraged strongly to participate in this work;
- 2a. preparation of a dedicated paper on experimental conditions - **Jean Luc Chatelain** is given the responsibility to lead the work;
- 2b. preparation of a paper on the instrumental conditions - This paper will be lead by **Bertrand Guillier**



- For points 2a and 2b, the lead authors will prepare the first draft and send it for suggestions to other participants at the beginning of February 2004. The deadline for the preparation of these two papers is set to the beginning the year (**January 2004**).
- Preparation of the guidelines in connection with WP12.

WPO3 Discussions

The software J-SESAME was presented by Kuvvet Atakan during the workshop. The tests that were performed by different groups have revealed a number of bugs, which need to be corrected. There were also some suggestions with regard to additional functionalities. A general decision was made to do all the changes on the software through a concentrated effort on a location where all developers get together to finalize the work. This work-session will be done in **8-13 February 2004** in Lisbon, Portugal. Paula Teves-Costa will host the meeting. The purpose of this work-session is to prepare the final version of the J-SESAME software (and SAF format) and is NOT meant as another discussion forum for further suggestions.

Following are invited to the planned meeting:

- Pierre-Yves Bard (window selection module),
- Alberto Tento (processing module),
- Bladimir Moreno (browsing module),
- Pedro Roquette (display module).

In addition, - Bertrand Guillier (Macintosh implementation),
 - Kuvvet Atakan (general co-ordination and testing),
 - Paula Teves-Costa (work-session host and testing) will also participate.

A parallel line of work is planned in connection with the user manual of the software, which will be done within the WP12 (see the minutes). This will be lead by **Kuvvet Atakan** and **Bertrand Guillier**. The deadline will be 15 April 2004.



- next meeting : 8-13 February 2004 in Lisbon, Portugal.
- preparation of a user manual of the software in connection with WP12.

WPO4 Discussions

Status of the work was presented by Nikos Theodulidis during the first day of the workshop. Compilation of the database for experimental validation is completed. Specific software is developed for easy access to the data. All information regarding the individual records are archived in Standard Information Sheets (SIS), which are organized in a relational data base management system (using MS-Access). This system provides easy access to the users in choosing a relevant sub-set of data. It is wished that this data base can survive the project, and a proposal was made to use the same data base structure for the "SISMOVALP" data base to be built under the coordination of Fabrice Cotton.

Various comparisons were the presented based on this data set: the ITSAK group presented comparisons between noise H/V ratios and theoretical transfer functions for a number of sites with reliable geotechnical information, or with H/V ratios from earthquake recordings (Petros Dimitriou); Pierre-Yves Bard presented the preliminary results obtained by E. Haghshenas about the comparison between noise H/V ratios and experimental site transfer functions (ESTF).

It is agreed upon that the comparison between H/V ratio and other quantities (numerical transfer functions, H/V ratios from earthquake recordings) should be performed with the JSESAME software, or at least a procedure similar to the one used within JSESAME (windowing, smoothing, etc.). For some sites with reliable shear velocity profile information (Edessa, ...), it is recommended to compare also H/V ratio with theoretical H/V ellipticity ratios. It is also recommended to add in the global comparison H/V / ESTF the few Swiss sites for which there exist a pair of site / reference sites, and to check the results for the Predappio sites. It would also be nice to perform a generalized inversion on the strong motion data to obtain estimates of the site transfer functions.

The individual studies performed for comparing the H/V ratios with damage, are discussed. In general, the results gave room for a variety of interpretations. Although in some cases there seems to be a positive correlation (generally in case of distant earthquakes: Thessaloniki, Palermo, Roma), in general it is agreed that the comparison to damage is a complex procedure. It is recommended to focus first on the comparisons with the near-surface geology. Bill Stephenson also suggested principal component analysis to look for possible correlations between H/V and damage. In order to have a "homogeneous" description of damage, it is also recommended, as much as possible, to express to use the EMS98 intensity scale for building and damage characterization.

Planned papers in Task A

In total 19 papers (long: journal or short: conferences) are planned covering the various results of Task A, out of which 2 are already submitted. It is agreed that person responsible for each paper sends the detailed information to the Task leader who will forward these to the project co-ordination. Following is a short summary of these.

11th SDEE-EGE (Berkeley, CA, USA, Jan.2004) papers:

- On the reliability of the H/V technique (abstract accepted + paper by Atakan et al., submitted)
- Experimental conditions (abstract accepted + paper by Duval et al., submitted)

13th WCEE (Vancouver, Canada, Aug.2004) papers:

- Task A results (abstract submitted + paper by Atakan et al., in prep.)
- WP02 results (abstract submitted + paper by Duval et al., in prep.)
- WP03 results (abstract submitted + paper by Atakan et al., in prep.)
- WP04 results (abstract submitted + paper by Theodulidis et al., in prep.)
- Individual WP04 paper on Italian case 1 (abstract submitted + paper in prep.)
- Individual WP04 paper on Italian case 2 (abstract submitted + paper in prep.)

To be sent together to the same journal (or to the special issue):

- Instrumentation paper (Guillier et al., in prep.)
- Experimental conditions (Chatelain et al., in prep.)
- JSESAME paper (in prep.)(to be submitted to SRL (electronic seismologist) or Computer Geosciences and/or Special Issue of the BEE (?)). This paper can be sent together with another paper about the WP04 database (an article in SRL)
- Empirical evaluation of the H/V (Bard et al., in prep.)

Individual papers:

- Thessaloniki seasonal variation of noise (empirical comparison paper) : Pageoph
- Thessaloniki : an other paper on comparison of H/V ratios with observed damage
- Paper on strong motion network data comparison of weak, strong and noise data (Greek case)
- Palermo: comparison of H/V ratios with observed damage
- Paper on the Colfiorito on the stability
- Azores case study
- A common paper for all the six case studies for WP04

II.2 Task B – Array measurement techniques

Frank Scherbaum presented first an overview of Task B (Array measurement techniques). It was followed by more detailed presentations of each work package by Matthias Ohrnberger (WP05: Instrumental layout for array measurements; and WP06: Derivation of dispersion curves) and Marc Wathelet (WP07: Inversion of velocity profile). After all the presentations and the feedback from the audience, it became clear that several issues remain to be addressed within the coming year. The most relevant ones relate to the overall consistency of the WP in terms of improving consistency between data acquisition - processing - inversion but also in terms of display and interpretation of the results.

After discussing the pros and cons an agreement was reached upon the following points:

- all the processing (determination of dispersion curve, misfit function, etc.) should be consistently done in slowness instead of velocity;
- the selection of the acceptable range of slowness to be considered for the inversion should be based on chosen fractiles of the distribution of slowness values;
- the inclusion of constraints into the inversion remains a topic of primary importance. In particular, the relevance of depth to bedrock information and vs30 needs to be investigated;
- information about model resolution needs to be included into the display of the models as well as for the SH transfer functions;
- the comparison of inverted slowness-depth models needs to be done in a quantitative way;
- the importance of pre/post processing needs to be investigated further.

Planned papers in Task B

Furthermore, the discussion focussed on the different papers to be written. Below is the list of responsible authors/coordinators with the working titles of the papers which were discussed:

- Marc Wathelet: Direct inversion of SPAC
- Matthias Ohrnberger: Comparison of different methods for the determination of dispersion curves
- Alexandros Savaidis: Determination of dispersion curves and comparison with those obtained from geotechnical models for the Greek data sets
- Estelle Schisselé: The influence of Pre/post selection
- Frank Scherbaum: Comparison between Rayleigh H/V ellipticity peak frequency, and fundamental S-wave resonance frequency



- next meeting : 16-20 February 2004 in Potsdam, Germany

II.3 Task C – Physical background and noise simulation

At first, Pierre-Yves Bard gave a rapid overview of Task C. It was followed by more detailed presentation by Sylvette Bonnefoy (WP08: Nature of noise wavefield), Peter Moczo (WP09: Numerical simulation of seismic noise) and Cécile Cornou (WP10: Simulation for real sites). Joseph Kristek also gave some indications on the latest developments of the "NOISE" program package (already implemented: HF filtering + new viscoelastic formulation, + under work: excitation box), while Miriam Kristekova presented the results obtained with time-frequency analysis techniques for the derivation of H/V curves.

The discussion outlined the following points:

- There are strong interactions between Tasks B and C, especially for the real sites; it was therefore decided to create a new sub-group, especially in order to compare the observations and the simulations in a consistent way (similar array processing techniques). This group will meet in Potsdam in February 16-20 to compare the results.
- Another meeting between groups B and C might be needed in Spring 2004, once the computations and processing are over, including the CWT analysis on real data and synthetics. The decision to hold it, its date and location should be discussed in Potsdam in February.
- Concerning the structure of the noise wavefield, the following suggestions were performed
 - The ratio between body and surface waves may be investigated with the help of the energy carried by non-dispersive and dispersive wave trains. CWT should help in quantifying such energy.
 - It looks interesting to investigate the ratio between Rayleigh and Love waves through a polarization analysis, as the noise observed in most real sites exhibit very clear predominant azimuths. Donat Fäh suggests that the proportion of Love waves is increased in deep basins.
 - The mode jump issues should be investigated on some simple models
- Concerning the interpretation of the H/V ratio, the following suggestions were performed
 - The shifts between Rayleigh ellipticity peak frequency and fundamental S-wave frequency, outlined by Frank Scherbaum, should be clarified and quantified, taking also into account the uncertainty in their estimation (what is the tolerance on f_0 estimation?). It is therefore also very important to look at this issue (frequency shifts) in all modelling results (1D, 3D), and to see whether local sources "stabilize" the results and provide better estimates
 - It is also important to understand why there sometimes exist several peaks on the observed H/V ratios. In this perspective, a) having a look at higher mode eigenfunctions in simple models and b) a compilation of all real sites exhibiting several peaks, would be precious.
 - The interest of new computations accounting for a high scattering / low Q in the underlying half-space was indicated. It was also mentioned that none of the test sites includes a very soft soil, and that some models involving such a structure would be welcome.
 - Although we do not understand now the meaning of the amplitude of the H/V ratio, it is thought useful to have a systematic look at its comparison with the SH amplification.

Planned papers in Task C

The discussion also allowed to establish a list of the papers to be written, together with their main content and their main author (scientist in charge !):

- Paper 1: Review paper from the literature survey (Sylvette Bonnefoy)
Earth Science review: Check the audience of the journal
- Paper 2: Noise modelling Part I - Simulation (Joseph Kristek / Peter Moczo)
RANSOURCE: include demonstration of randomness
FD: theory + comparison with Hisada
Excitation box (not 100% sure)
Examples: local sources, far sources (M7b)
first draft before Christmas.
- Paper 3: Noise modelling II: Parameter studies and constraints on source properties (Sylvette Bonnefoy)
Following Sylvette's presentation + AFPS.
M1 + M2.2 + M6b (source distance / depth)
H/V, array + Cross-correlation maps

Source properties
first draft before Christmas.



Paper 4: Canonical models / 3D models (Cécile Cornou)
Goal : ? Relevancy of H/V technique and array processing techniques for 3D structures.
Include some comparison with transfer functions for 3D cases (with excitation box)
1st draft : January / February 2004

Paper 5 to 9: Real sites
5: Grenoble (Cécile Cornou + Sylvette Bonnefoy)
6: Colfiorito (INGV)
7: Basel (Cécile Cornou)
8: Liège (Marc Wathelet)
9: a synthesis paper: overall comparison

The processing of synthetics and observations should be the same (see above), and the structure of the papers similar.
Acknowledge SESAME + Lugano (when there is an author from Zurich)
Tentative schedule : First draft in Spring (May-June).

Paper 10: Time Frequency analysis (Miriam Kristekova + Donat Fäh),
Working meeting in Potsdam to meet mathematicians
Methodology
Apply it to SESAME synthetic data
Apply it to SESAME real data
1st draft in March 2004



-  - paper writing
-  - computations to finish

II.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:

In addition to the different papers defined in the different WP, the following scientific dissemination means were considered and agreed upon.

- Special session on microtremors at XXIX ESC (Potsdam, 12-17 /09/ 2004). Pierre-Yves Bard is supposed to act as a co-convenor of this session.
- The SESAME project has been proposed by Attila Ansal a special issue in the Bulletin of Earthquake Engineering / or a book in a new book series. The special issue has been preferred and, given the number of papers planned in the various tasks, it was agreed upon that this special issue should be "user oriented" and driven by the H/V user guidelines (WP12), and might include a CD with the JSESAME software.
For a publication by the end of 2004, the manuscripts should be ready by the end of July; for a publication in early 2005, the deadline would be postponed to the end of November 2004..
- In order to ease the concertation and exchange on the many papers to be written, it was also agreed upon to implement a limited access zone on the SESAME web site, for partners to upload and download ongoing versions of the various papers

→ WP12 - H/V user guidelines

General content of the guidelines

4. Technical requirements for measurements (ca. 5 pgs.)
 5. Data processing standard (ca. 5 pgs.)
 6. Interpretation guidelines (ca. 5 pgs.)
- Appendices:
- a. "Good" and "bad" examples illustrating the merits and limitations (ca. 10 pgs.)
 - b. Physical explanations (ca. 5 pgs.)
 - c. "Field summary" (2 pgs.) + "Field-sheet" (1 pg.)
 - d. Technical card (ca. 2-3 pgs.)

Total Review of the guidelines: Hanan Nimry (pilot application?), Benoit Lebrun and Martin Koller



- Deadlines : - For the first draft version: **15 April 2004**
- For the reviewers: **15 May 2004**
- Revised version: **30 June 2004**
- WCEE display: **1 August 2004**
- Final version: end of September 2004

It is mandatory to have a display version for WCEE13 in Vancouver !

Detailed content of the guidelines

1. Technical requirements

Who will do the work: Gaillot and Corinne (review: Anne-Marie and Giovanna)

How the work will proceed: close interaction with people involved in the work. No meetings planned unless necessary.

What should be included: instrumentation work and experimental conditions. Detailed references and pointers to SESAME reports should be given.

Field-summary (and Example field-sheet) as a part of technical requirements

Who will do the work: Corinne and Gaillot

How the work will proceed: it will be integrated to the work in point 1.

What should be included

2. Data processing standard

Who will do the work: Kuvvet and Bertrand (review: Gaillot and Alberto Tendo and Paula)

How the work will proceed: close interaction with people involved in the work. No meetings planned unless necessary.

What should be included: description and the guidelines. JSESAME software and user manual on a CD. SAF format description and pointers to web sites or individuals for the available conversion programs.

3. Interpretation guidelines

Who will do the work: Corinne/Martin and Pierre-Yves and Alberto Marcellini (Review: Bertrand and Frank)

How the work will proceed: close interaction with people involved in the work. No meetings planned unless necessary.

What should be included: clear guidelines for the interpretation of results.

Appendixes

a. Data examples ("good" and "bad")

Who will do the work: Nikos and Cecile (Review: Fabrizio and Bill Stephenson)

How the work will proceed: close interaction with people involved in the work. No meetings planned unless necessary.

What should be included: based on examples of case studies.

b. Physical explanations

Who will do the work: Pierre-Yves and Donat (Review: Kuvvet and Frank)

How the work will proceed: close interaction with people involved in the work. No meetings planned unless necessary.

What should be included: physical explanations taking also into account the theoretical considerations.

c. Technical card

Who will do the work: Gaillot and Bertrand (Review: Alberto Marcellini and Matthias, testing the software by Marco)

How the work will proceed: close interaction with people involved in the work. No meetings planned unless necessary.

What should be included: a description on how and why the technical cards are produced and the software to do the Student t-tests and the plots. The software will not be part of the distribution CD, but will be referenced to a web-site for download and the corresponding developers.

The "external" participants from Venezuela, Jordan and Algeria also volunteered to test the preliminary versions of the guidelines (together with the software).

→ WP13 – recommendations for quality array measurements and processing

The main target of these recommendations is for the users of the "Ses_array" software under development. These users are thought to be essentially scientists, as the method looks too sophisticated for general dissemination and explanation.

It is wished to propose new, more appealing names for this software : suggestions welcome !

III Administrative and Financial Matters

III.1 Financial follow-up

A second financial report with all the cost statements was sent to the EC in July 2003.

The EC started the procedure for the second payment, only at the end of October and the University of Joseph Fourier received the money in November. I will send to each partner a financial state of art.

The University have done the payments to each partner in November 2003.

- During February 2004, Laurence will send to you and/or the person following the financial part of the project, a table presenting the financial situation of each partner.
- The next financial report is for May 2004. Laurence will ask each partner to complete their expenses table at the end of December 2003 and then at the end of April 2004. Thank you to be on time

III.2 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), a third one in January 2003 and a fourth one in July 2003 (with the second annual report). A fifth one will be sent in January 2004.

- The next reports are:
 - January 2004: fifth progress report (done);
 - May 2004: sixth progress report or the third annual report with 7 deliverables (D13.08 second part, D11.10, D12.09, D16.04, D17.10, D18.06, D19.06 D20.04 and D21.07) and the cost statements;
 - November 2004: seventh progress report with 4 deliverables (D22.11, D23.12 , D24.13 and D25.01 corresponding to the final report) and the final cost statements.
 - December 2004: TIP (Technological Implementation Plan)

III.3 Website

The website will be updated by Philippe in the next weeks

III.4 Miscellaneous

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

IV Other important points

IV.1 Final meeting



- The final meeting of the project will be in Les Houches (near Chamonix) in France from:
Sunday 3 October 2004 to Tuesday 5 October 2004

All the necessary information will be send in August 2004. If you want to have an idea of the place, you can go on the following website:
www-houches.ujf-grenoble.fr

IV.2 Vancouver

The deadline for the participation to the Vancouver meeting is the 31 January 2004. About 11 people from the project will attend the meeting.
In February-March, Pierre-Yves will do a common letter to ask the European Commission, the authorization for using the SESAME budget to go to the Vancouver meeting.