
	<p>Research Executive Agency Marie Curie Actions – International Research Staff Exchange Scheme</p>	
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**Project No:** 230855

**Project Acronym:** OAEx

**Project Full Name:** Ocean Acoustic Exploration

## Marie Curie Actions

# Final Report

**Period covered:** from 01/02/2009 to 31/07/2012

**Date of preparation:** 28/09/2012

**Start date of project:** 01/02/2009

**Date of submission (SESAM):** 29/09/2012

**Duration:** 42

**Project coordinator name:**

Prof. Sergio Jesus

**Project coordinator organisation name:**

CINTAL - CENTRO INVESTIGACAO  
TECNOLOGICA DO ALGARVE

**Version:** 1

# Final Report

## PROJECT FINAL REPORT

<b>Grant Agreement number:</b>	230855
<b>Project acronym:</b>	OAEEx
<b>Project title:</b>	Ocean Acoustic Exploration
<b>Funding Scheme:</b>	MC
<b>Project start date:</b>	01/02/2009
<b>Project end date:</b>	31/07/2012
<b>Name, title and organisation of the person in charge of the project for the beneficiary(ies):</b>	Prof. Sergio Jesus CINTAL - CENTRO INVESTIGACAO TECNOLOGICA DO ALGARVE
<b>Tel:</b>	+35128900951
<b>Fax:</b>	+351289800066
<b>E-mail:</b>	sjesus@ualg.pt
<b>Project website address:</b>	

# 1. FINAL PUBLISHABLE SUMMARY REPORT

This section should normally not exceed 2 pages.

This is a comprehensive summary overview of results, conclusions and the socio-economic impacts of the project. The publishable report must be formatted to be printed as a stand alone paper document. This report should address a wide audience, including the general public.

Please ensure that it:

- Is of suitable quality to enable direct publication by the REA or the Commission.
- Is comprehensive, and describes the work carried out to achieve the project's objectives; the main results, conclusions and their potential impact and use and any socio-economic impact of the project. Please mention any target groups such as policy makers or civil society for whom the research could be relevant.
- Includes where appropriate, diagrams or photographs and the project logo, illustrating and promoting the work of the project.
- Provides the address of the project Website (if applicable) as well as relevant contact details.

## **Publishable Summary:**

The OAEx joint research program aims at developing synergies and reinforcing collaboration between the EU, Brazil and Canada in the field of ocean acoustic monitoring and marine technologies. In this context the OAEx program will contribute towards a global ocean through the exchange of experience on the usage of ocean acoustics for geophysical exploration, ocean circulation monitoring and underwater acoustic communications as well as in the framework of global change issues. The OAEx program allows for the transfer of knowledge and information between partners in order to improve and complement their individual expertise to be applied in ongoing and prospective projects. Specifically, European and Canadian groups have developed techniques of ocean environmental monitoring by acoustic remote sensing and underwater acoustic communication that could be integrated and applied to monitor the strategic and challenging site of Cabo Frio in Brazil which has been studied for a long time by the Brazilian partners using conventional oceanographic tools. Moreover, the Canadian partner has privileged access to the NEPTUNE CANADA observatory, at the moment the unique cabled long term multidisciplinary ocean observation laboratory in operation. Since there are plans for creating such complex and expensive infrastructures by other major world players, and in particular EU (ESONET network), the OAEx partners will profit from exchanging experiences to optimize the implementation of current and future laboratories. To achieve the proposed goals, the main events foreseen in OAEx are interdisciplinary workshops where both scientific and technological aspects are discussed also on the basis of simulation and experimental results obtained through researchers' exchange and collaboration during the time frame of OAEx. The exchange will encompass both scientific and technical personnel with experience at sea as well as advanced methodologies for data analysis. The implementation of the project was broken down in two parts. The first part was devoted to the analysis of the experimental area and preparation of the sea experiments, whereas the second part was devoted to perform the sea experiment itself, the analysis of the experimental data and to draw the project conclusions and recommendations.

The main objectives for the first part were to assess the initial conditions of the area, design an experiment for implementing a monitoring station off the Cabo Frio Island, perform modelling and preliminary simulation, plan the at sea experiments and set up the necessary equipment. To assess the initial conditions, perform modelling and simulations, geological and hydrological data for the experimental area were compiled. The geological characterization was complemented with newly acquired cores, analysed in the framework of the project. The in-situ measurements were used to support the oceanographic and acoustic modelling of the area. Work was done in order to attain an integrated environmental model of the area, joining outputs from geophysical and acoustic models. Seminars and presentations were used to share expertise among individual partners. Also, a preliminary engineering test at sea was conducted in a very shallow water area off the Cabo Frio Island to test equipment and procedures related to acoustic data acquisition. The main results achieved in this a priori characterization of the experimental area were presented in the 1st OAEx Workshop held in March 2010 in Arraial do Cabo, Brazil. During the workshop an initial sea trial plan was set up. After the workshop major efforts were directed towards setting up a sea trial taking in account the constraints imposed by the available resources at IEAPM. Collaboration within OAEx allowed to set up an alternative acquisition system based on locally available equipment to gather

experimental data with sufficient quality to attain the scientific objectives for the rest of the exchange program.

The sea trial, took place in November 2010. The OAEx sea experiment was one of the main achievements in transfer of knowledge of the OAEx project, since it was the first time that Brazilian partners participated in the planning, preparation and conduction of a sea trial devoted to acoustic environmental monitoring and underwater communications. Although the resources used in the sea trial were limited due to budgetary constraints to transport equipment from EU partners to Brazil, it was possible to observe the effects of the local particular upwelling feature on acoustic data. Simultaneously with acoustic data acquisition an hydrographic survey of the area was performed to support the analysis of the acoustic data set. The pre-processing of the experimental data and the preliminary inversion results obtained during the subsequent secondments were presented at the “OAEx’10 Experiment and Data processing workshop” in University of Algarve, Faro, Portugal . Another objective of this workshop was to present methods for acoustic data inversion and to devise a strategy for further data processing. The attendance of the Canadian partner in this workshop allowed to a broader discussion on acoustic inversion methods. Also the Brazilian partners were informed about the EU-Canada collaboration in the framework of the OAEx project. Thus, non EU OAEx partners were collaborating directly between them and were effectively involved and participated in all relevant tasks of the project, i.e. the Brazilian partners participated in underwater communication tasks initially programmed only with the Canadian partner and the Canadian partner participated in the environmental inversion initially programmed only with the Brazilian partners. The last project workshop was in Brazil, organized by COPPE and ULB, where the latest data processing results showing the potential of underwater acoustic for monitoring oceanographic features were presented, but also the achievements and lessons learned from the project were discussed. It was also discussed perspectives for future collaborations in the area of research and advanced academic training.

The project fully achieved the initial objectives, in particular contributed for the development of the underwater acoustics in Brazil, helping Brazilian participants COPPE and IEPAM to be reference institutions in the country in the area. Underwater acoustic in Brazil is in early stage of development; however it attracts much attention because of its relevant role in exploitation and monitoring of ocean resources that is a flagship of actual Brazil growing. The project also allowed initiating collaborations with other Brazilian academic and research institutions and enterprises as well. Thus the collaboration between EU, Brazilian and Canada partners initiated in the framework of OAEx project contributed to develop lasting relations that can contribute to increase the exchange of services and goods between the participant regions.

Taking into account the transfer of knowledge activities, the record of publications, the milestone and the deliverable produced, the overall objectives of the project were achieved.

#### **List of Keywords:**

underwater acoustics, acoustic tomography, underwater communications, ocean observatory,

#### **Websites where additional information may be found:**

[www.siplab.fct.ualg.pt](http://www.siplab.fct.ualg.pt)

## REPORT ON THE WORK PERFORMED AND RESULTS

Please report on the work performed and on the results of the research, addressing the following points clearly and concisely:

- a) Accomplishment of the research objectives as presented in the original proposal
- b) New objectives established during the course of work and new lines of research

The following structure should be used in the description of points a) and b) for each objective separately

- Objective of the research;
- Work performed (mentioning also unsuccessful approaches and unforeseen developments);
- Results and degree to which the objectives were met;
- List specific training received on scientific and technical aspects;
- Relevance for basic and applied science and for applications including industrial links.

Changes to original proposal: Note that the REA has to be informed in advance of any changes to the original proposal. For point a) it is important that any deviations from the original proposal are clearly indicated.

In order to help illustrate the work carried out during the fellowship, please enclose copies of the most relevant publications and reports as well as abstracts of the other publications and manuscripts.

Note that this is in addition to the free-text report requested above.

Additional information such as Word documents, graphs, tables, etc. can be uploaded as attachments using the upload functionality (attachments button)

### Work Progress:

The aim of the OAEx project was to develop synergies and reinforce collaboration between institutions from EU (Portugal, Belgium), Brazil and Canada in the field of marine technologies, in particular those supported by ocean acoustic science. The development of underwater acoustics in EU, Brazil and Canada are at different stages, whereas in EU and Canada the research in the field is solid and of worldwide level, the field in Brazil is just emerging. The collaboration between the EU and Canadian institutions was focused on exchange of advanced technologies and methods, such those applied on long term ocean observation laboratories, which Canada and particular laboratories closely linked with the University of Victoria (the mother institution of C-MARS the Canadian partner) are worldwide leading research centres. Brazil has developed a renowned know-how on off-shore technology based on the exploitation of its oil and gas natural resources; however the underwater acoustics area is just emerging. Underwater acoustics contributes definitively to remotely monitor the ocean, thus can be applied with advantage in ocean resources exploitation at different stages: resources survey, equipment and installation monitoring and control, hazards monitoring. Brazil is an emerging economic world player and this project contributed to transfer knowledge in underwater acoustic to Brazilian institutions, reinforcing the partnership of EU institutions in particular in academic and research, but also in Brazilian related industry. The planned and carried out activities reflects this twofold objectives of the project which were accomplished in an integrated form supported by the workshops. The activities of the project were focused on:

- 1) Investigation of the performance characteristics required for acoustic environmental monitoring and data transmission over underwater acoustic channel,
- 2) Definition of the requirements and suggestion of methodologies for the implementation of a generic monitoring network in Cabo Frio (Brazil),
- 3) Experience exchange regarding the NEPTUNE network requirements, methodologies and specific algorithm integration, data transmission and overall network infrastructure,
- 4) Experiments on Cabo Frio site.

One can say that the main objectives of the project were achieved, with minor adjustments from the initial proposal: the underwater acoustic experiment was held at Cabo Frio site and the project was extended 6 month. Of course the initial secondments timetable was few times adjusted during the project lifetime, reflecting the progress of the work and the availability constraints of researchers. Next the work performed in the different Work Packages is briefly described.

WP1 –Initial assessment of conditions on sites.

The scientific objectives of the project according to the DoW were detailed and refined taking account the background of each institution. A plan was outlined for the transfer of knowledge between participants regarding the areas within the interest of each institution that should be strengthen in the framework of the project. Also, the technical conditions and resources available and foreseen related to the implementation of the project were discussed and a plan was agreed among partners. Practical issues were considered and decided regarding compilation of archival data, site logistics (acquisition of equipment and equipment deployment), installation of modelling and simulation tools and human resources training. The initial plan was decided during the first secondments and was executed during the following secondments. The work produced was presented in the Workshop #1, held in March 2010, Arraial do Cabo. Task 1.1 work preparation in Brazil was completed according the planned project timetable. Task 2.1 plans for development of an underwater acoustic network, which leader was C-MARS was concluded later due to difficulties to perform secondments to/from C-MARS during the initial period of the project.

#### WP2- Interdisciplinary simulation study and processing of experimental data:

This is the Work Package with more resources allocated in the OAEx project, since it is devoted to develop an environmental model, perform ocean-acoustic simulations and prepare eventual joint at sea experiments. The Simulation Study, Task 2.1, is directly related to Task 1.1 the simulation and acoustic inversion tools to be used in the framework of OAEx were selected. The support for installing those tools and basic training was also provided. The archival data from the Arraial do Cabo test site was compiled, and the usage of feature oriented oceanographic models to simulate and regularize the oceanographic processes in the considered area was discussed. Also, some core samples of sediments were processed to complement and validate archival geological surveys of the area. Those were the major inputs used to perform the simulation study. The simulations were performed during secondments in Brazil and EU, some of them more related to water column characterization, with CINTAL, and other more focused on geoacoustic characterization, with ULB. Significant advances in this subject were attained during the first year, giving rise to conference papers (see list of publications). The outputs produced for this Task were also presented in the Workshop #1.

Due to funding limitations the plan to implement Task 2.2, Sea Trial planning and execution, was based on adapting/recycling locally existing equipment at IEAPM. Some equipment was tested in an engineering test that took place in July 2009, where several drawbacks and limitations of the acquisition system were identified. During the Workshop #1 it was agreed that the sea trial will occur in November 2010 when it is likely to obtain a developed upwelling feature in the Cabo Frio area. A first draft of the test plan was produced during the Workshop. The test plan was updated with the contributions of the different partners and equipment was assembled and pool tested (July 2010). As planned, the experiment took place in November 2010, and is one of the main achievements in transfer of knowledge of the OAEx project. Although Brazilian partners have long time experience gathering hydrographic data, they have little experience in planning and conducting at sea acoustic experiment devoted to monitoring of the oceanic environment.

Task 2.3 Communication equipment testing, was revised regarding the initial plan. Due to initial difficulties with secondments to C-MARS and logistics at Canadian laboratories, it was not possible to communication equipment testing during secondments to Canada. It was agreed that this task will be performed in IEAPM facilities. Underwater communications is an area that was revealed important for the Brazilian partner during the execution of the project. The experimental part of this task was performed during the sea trial and the data processing was performed during the secondments of CINTAL researchers to Brazilian institutions, when deliverable D2.2 acoustic equipment report was concluded.

The experimental data were pre-processed and included in a data report that describes the details of the acquired data to support further processing. This activity of Task 2.4 real data analysis gave rise to deliverable D2.1 Cabo Frio experimental data report. The data report was concluded during the secondments occurred in June, July and August linked with the “OAEx’10 Experiment and Data processing” workshop that took place at CINTAL/University of Algarve, Faro in June 2011. The main objectives of this workshop, as planned during the project execution, were to present and discuss the data acquired and the preliminary results. In this workshop were also presented the collaboration with the Canadian partner carried out during the secondments from/to C-MARS, were

it was possible to interact with researchers at NEPTUNE control centre and at Venus Observatory/Ocean Technology test bed and discuss lines followed by European and Canadian group in inversion methods research for acoustical ocean monitoring. The “OAEx’10 Experiment and Data processing” workshop allowed involving the Brazilian partners in this discussion. Since the Brazilian partners have limited experience with processing of real acoustic data and the transfer of knowledge is a key point of the project, it was decided that the data analysis will be focused on the training of the Brazilian researchers. The data analysis was performed during the next secondments until the end of the project. Actual results of data analysis were presented during the “Workshop #2” showing the upwelling feature observed during the sea trial, its influence on acoustic propagation, the potential of acoustic inversion to track the upwelling feature, the influence of upwelling in source localization and underwater communications. It was also presented the ability of acoustic methods to assess the geoacoustic features of the region.

WP3 –Achievements, lessons learned and perspectives, is devoted to critically review the technological and scientific progress being made during the exchange and discuss plans of future collaboration with Brazil and Canada. This WP encompasses 3 tasks related to the different scientific aspects of the project: Task 3.1 acoustic inversion aspects, Task 3.2 communications aspects and Task 3.3 underwater acoustic networking. Central to this WP was the realization of “Workshop #2” was organized by COPPE and ULB, took place in IEAPM facilities in Arraial do Cabo during April 2012. All partners attended the workshop, including the Canadian partner C-MARS. During the workshop it was also discussed perspectives for further collaborations in areas of research and advanced academic training in underwater acoustics. The workshop was open for external participants allowing initiating new contacts with academic and industrial partners.



## MANAGEMENT REPORT

Please describe the management activities relative to the initial financial planning of the project

### Management Report:

Although the project have accomplished the planned objectives, we have faced problems with secondments to C-MARS. As explained in the first mid-term report, soon after OAEx project has started, the C-MARS group leader Prof. Ross Chapman was faced with unforeseen personal problems. Since C-MARS is a small group, composed by 2 teachers and few post-doc and PhD students, the group leader personal problems had impact on secondments during the first reporting period. However, during the second reporting period it was possible to perform secondments to C-MARS. From the original plan only 2 secondments from CINTAL to C-MARS were not realized. It had not major impact on project objective since part of the work (underwater communications) was performed with Brazilian partners. Prof. Champan collaborated in the project tasks by electronic means and he has performed a secondment to CINTAL during the Workshop devoted to initial experimental data analysis. Although not reported on the secondment list, Prof. Chapman also attended the final workshop in Brazil, which denoted its interest for OAEx and the work performed.



## 2. USE AND DISSEMINATION OF FOREGROUND

### Section A (public) – DISSEMINATION MEASURES

This section should describe the dissemination measures, including any scientific publications relating to foreground and specify any applications for patents etc. Its content will be made available in the public domain thus demonstrating the added-value and positive impact of the project on the European Union.

#### Dissemination activities

This section must include a list of planned dissemination activities (publications, conferences, workshops, web, press releases, flyers, etc) in free text format. Where Articles have been published in the popular press, please provide a list as well.

Barreira, L. M., Chaves, A. H. S., Jesus S. - Projeto de Cooperação Internacional em Acústica Submarina (OAEx). A Ressurgência, (3) 17-19. Arraial do Cabo, 2009;

L. P. Maia, Lucia Artusi , "OAEx project presentation to the European Commission in Brazil", USP (Universidade de São Paulo), June-2009;

O. Carrière, J.-P. Hermand, L. Calado, A. C. Paula, and I. C. A. da Silveira, "Feature-oriented acoustic tomography: Upwelling at Cabo Frio (Brazil)," in Proceedings of OCEANS'09 MTS/IEEE,Biloxi, Oct. 2009;

Lussac Preste Maia, Jean-Pierre Hermand , "OAEx presentation to FAUBAI (Brazilian Universities Consortium) delegation at ULB, Oct. 2009;

J.-P. Hermand, "Geoacoustic characterization and tomographic observation of the shallow water environment: approaches, results and perspectives", Invited presentation at the VIII Underwater Technology Meeting, Instituto de Pesquisas da Marinha - IpqM, Nov. 2009;

L.P. Maia, J-P. Hermand and C. E. P. Ribeiro, "Inversão geoacústica e localização passiva com array curto e fonte de banda larga", Proceedings of the VIII ETAS - Eighth Underwater Technology Meeting, Instituto de Pesquisas da Marinha -IpqM, Nov. 2009;

H. C. Macedo, J.-P. Hermand, R. C. Abuchacra, I. C. V. Peres Simões, L. Artusi, and A. G. de Figueiredo, "Medições acústicas em sedimentos marinhos coletados por testemunhos de sondagem," in Proceedings of the VIII ETAS - Eighth Underwater Technology Meeting, Instituto de Pesquisas da Marinha -IpqM, Nov. 2009;

O.C. Rodríguez, P. Santos, S.M. Jesus, "Modelização acústica submarina de alta frequência baseada em traçamento de raios: revisão teórica e aplicações actuais", in Proceedings of the VIII ETAS - Eighth Underwater Technology Meeting, Instituto de Pesquisas da Marinha -IpqM, Nov. 2009;

Luiz Gallisa Guimarães, Carlos Eduardo Parente, Sergio Machado Jesus, Orlando Camargo Rodríguez, "Propagação acústica em águas profundas na presença de massas d'água de mesoescala na costa sudoeste de Portugal", 11th Congresso da Sociedade Brasileira de Geofísica, Salvador, Ago. 2009;

L.G.Guimarães; C.E.Parente; S.M. Jesus; O.C.Rodriguez , "Double Munk channel model to underwater acoustic fluctuations in presence of Mediterranean eddies in the southwest coast of Portugal", 72nd EAGE Conference, Barcelona, June 2010;

N. Martins, L. Calado, A.C. de Paula and S.M. Jesus, "Classification of three-dimensional ocean features using three-dimensional empirical orthogonal functions", in Proc. 10th European Conference on Underwater Acoustics, Istanbul (Turkey), July 2010;

L. Maia, O. Carrière, C. Parente, J-P. Hermand, "Acoustic inversion with a frequency-domain version of the model-based matched filter processing", in Proc. 10th European Conference on Underwater Acoustics, Istanbul (Turkey), July 2010;

Lussac P.Maia, Carlos E. Parente, Jean-Pierre Hermand, Acoustic inversion with broadband MFP for seabed characterization in OAEx'10 experiment, 4th Underwater acoustic Technologies &results conference, Kos (Greece), June 2011;

N. MARTINS and S. M. JESUS, "From oceanographic to acoustic forecasting: acoustic model calibration using in situ acoustic measures", IX Encontro de Tecnologia Acustica Submarina - IX ETAS, Arraial do Cabo (Brasil), November, 2010;

S. I. SIDDIQUI, A.J. SILVA and S. M. JESUS, "Doppler domain decomposition of the underwater acoustic channel arriving paths for the CALCOM'10 experiment", IX Encontro de Tecnologia

Acustica Submarina - IX ETAS, Arraial do Cabo (Brasil), November, 2010;  
P. SANTOS, P. FELISBERTO, S.M. JESUS, J. JOÃO, "Experimental Results of Geometric and Geoacoustic Parameter Estimation Using a Vector Sensor Array", IX Encontro de Tecnologia Acustica Submarina - IX ETAS, Arraial do Cabo (Brasil), November, 2010;  
P. FELISBERTO, N. MARTINS and S.M. JESUS, "Field Calibration a Tool for Acoustic Noise Prediction: the CALCOM'10 data set", IX Encontro de Tecnologia Acustica Submarina - IX ETAS, Arraial do Cabo (Brasil), November, 2010;  
G.A.S. Codato, W.B. Watanabe, L. Calado, N. Martins, and A.E.A. Ramos, A influência da frente térmica da ressurgência costeira de cabo frio na perda do sinal acústico: um estudo numérico, X Encontro de Tecnologia Acústica Submarina – ETAS, Rio de Janeiro, Brasil, November 2011;  
Salman Ijaz, A. Silva, S. Jesus, Poetncial of vertical line array beamforming in underwater acoustic communications, X Encontro de Tecnologia Acústica Submarina – ETAS, Rio de Janeiro, Brasil, November 2011;  
.SIMÕES; F.XAVIER; L. BARREIRA; L. ARTUSI; H. MACEDO; Y. ALVAREZ; R. ROMANO E J-P. HERMAND - Medições geoacústicas em sedimentos marinhos da plataforma continental próxima à Arraial do Cabo - RJ - Brasil. In; Actas das 2as. Jornadas de Engenharia Hidrográfica, Lisboa, 2012, p: 239 a 242;  
L. M. Barreira, and M. V. S. Simões, Inversão de parâmetros geométricos de canal acústico submarine, in Proc. SOBRAC2012, Belém, Brazil, 2012;

Publications (peer reviewed)

With regard to scientific publications published before or after the final report, such details/references and an abstract of the publication must be provided to the REA or the Commission at the latest two months following publication.

Furthermore, an electronic copy of the published version or the final manuscript accepted for publication must also be provided to the REA or the Commission at the same time for the purpose of publication by the REA or the Commission if this does not infringe any rights of third parties.

LIST OF SCIENTIFIC (PEER REVIEWED) PUBLICATIONS, STARTING WITH THE MOST IMPORTANT ONES											
No.	DOI	Title	Main author	Title of the periodical or the series	Number, date or frequency	Publisher	Place of publication	Date of publication	Relevant pages	Permanent identifiers (if applicable)	Is open access provided to this publication ?

## Section B (confidential) - EXPLOITABLE FOREGROUND AND PLANS FOR EXPLOITATION

This section should specify the exploitable foreground and provide the plans for exploitation. It will be kept confidential and will be treated as such by the REA.

The applications for patents, trademarks, registered designs, etc. must be listed according to the template provided below.

The list should specify at least one unique identifier e.g. European Patent application reference. For patent applications, only if applicable, contributions to standards should be specified.

LIST OF APPLICATIONS FOR PATENTS, TRADEMARKS, REGISTERED DESIGNS, UTILITY MODELS, ETC.					
Type of IP Rights	Confidential	Foreseen embargo date dd/mm/yyyy	Application reference(s) (e.g. EP123456)	Subject or title of application	Applicant(s) (as on the application)

OVERVIEW TABLE OF EXPLOITABLE FOREGROUND								
Type of Exploitable Foreground	Description of Exploitable Foreground	Confidential	Foreseen embargo date dd/mm/yyyy	Exploitable product(s) or measure(s)	Sector(s) of application	Timetable for commercial use or any other use	Patents or other IPR exploitation (licences)	Owner and Other Beneficiary(s) involved

ADDITIONAL TEMPLATE B2: OVERVIEW TABLE OF EXPLOITABLE FOREGROUND	
Description of Exploitable Foreground	Explain of the Exploitable Foreground

### 3. PERSON IN CHARGE QUESTIONNAIRE

#### EXCHANGE MOBILITY ASSESSMENT:

What is the size of the hosting research group?	15
-------------------------------------------------	----

#### How many researchers have you supervised, within the past 10 years? Of which funded by:

EC/Marie Curie actions	0
EC Other Funding	6
University fellowships	0
National public bodies	5
Industry	0
Other	0

Other, please specify:

How many researchers have you supervised within this project?	8
Corresponding to how many person months?	13

#### Number of publications resulting directly from the research project:

Selected researcher(s) and yourself	0
Selected researcher(s) alone	0
Selected researcher(s) with authors other than yourself	0

#### Participation of the selected researcher(s) in conferences (number):

Passive	2
Active	6
How do you rate the overall success of the research training?	Good

#### General assessment:

Differences between countries in terms of level of scientific advancement and funding flow are often difficult to manage and make compatible with the timing of a project such as OAEEx. A more flexible time plan is necessary when dealing with third countries than for normal EU partnership only projects.

#### RESEARCHER ASSESSMENT:

#### Rate the overall level of the recruited researcher(s) integration in the research team and the host organisation with regards to:

participation in meetings/seminars	Fair
discussions of results and project-related topics	Poor

<b>co-operation with other team members</b>	Good
<b>co-operation with other researchers of the host institution</b>	Good
<b>co-operation with other researchers of the partnership</b>	Good

**Rate the overall performance of the selected researcher(s) with regard to:**

<b>originality of researchers' approach towards research (initiative/independent thinking)</b>	Poor
<b>capacity to develop new skills and to benefit from training</b>	Poor
<b>productivity (research results/ publications/ international conference attendance)</b>	Poor
<b>communication skills</b>	Poor
<b>group leader skills (collaboration with other groups/project management)</b>	Poor
<b>training and/or teaching skills</b>	Fair

**Comment:**

As mentioned above, the difference of scientific level is often a barrier for timely carrying out the project tasks.

**RESEARCH NETWORKING OUTCOMES:**

<b>Do you intend to continue the collaboration and networking activities after the end of the project?</b>	Yes
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**If no, please specify:**

<b>Has this project provided additional links with other research groups or institutions?</b>	Yes
<b>If yes, do you plan to submit a joint proposal?</b>	Yes

**If yes, indicate the number of contacts in each case**

<b>Universities</b>	3
<b>Research Centres</b>	0
<b>Industry/private companies</b>	1
<b>Others</b>	0

**If Other, please specify:**

**Rate the importance of the following outcomes of the research training:**

<b>results of the research</b>	Fair
<b>number of publications</b>	Fair
<b>development of research</b>	Poor

<b>establishment of international collaborations</b>	Good
<b>transfer of knowledge/technology</b>	Good
<b>training of students/researchers</b>	Fair
<b>further academic qualifications (PhD, habilitation etc.) for fellows</b>	Fair
<b>Comments:</b>	



**YOUR OPINION ABOUT THE MARIE CURIE ACTIONS:**

**Do you have any other comments or suggestions of how to improve the Marie Curie actions concerned?**

**Did you have previous knowledge of the Marie Curie actions?** No

**If yes, what sort of image do you think that the Marie Curie actions have among the scientific community in your research area?**

**Attachments**

PhotoFaroWorkshop.jpg, Array\_at\_op.jpg,  
AraayDeploy.jpg, Array.jpg,  
Coordinators\_table\_final.xlsx

Date:

Person in charge of the project for the beneficiary(ies):