APPLICATION FOR CONSENT TO CONDUCT MARINE SCIENTIFIC RESEARCH
IN AREAS UNDER NATIONAL JURISDICTION OF

DENMARK

Date : 20 November 2003

1 - GENERAL INFORMATION

1.1. Cruise name and/or number : OVIDE 2

1.2. Sponsoring institution :

Name : Laboratoire de Physique des Océans
Address : Ifremer - centre de Brest, BP 70, 28280 Plouzané, France
Phone : 33 2 98 22 42 76 Fax : 33 2 98 22 44 96
Director : Xavier Carton

1.3. Scientist in charge of the project :

Name : Herlé Mercier
Address : Laboratoire de Physique des Océans
Ifremer - centre de Brest, BP 70, 29280, Plouzané, France
Phone : 33 2 98 22 42 86 Fax : 33 2 98 22 44 96
Email : herle.mercier@ifremer.fr

1.4. Scientist from Denmark involved in the planning of the project :

None

1.5. Submitting officer:

Name : Thierry Huck
Address : Laboratoire de Physique des Océans
Université de Bretagne Occidentale
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2 - DESCRIPTION OF THE PROJECT

2.1. Nature and objectives of the project :

The goal of the project is to carry out an hydrographic line, corresponding to about 100 hydrographic stations, between the southern tip of Greenland (Denmark) and Portugal in Spring 2004 (see Figure 1). This hydrographic section has already benn carried out in June 2002 and is expected to be repeated every two years for 10 years, with the goal of characterizing the low-frequency fluctuations of both the water masses and the circulation intersected by the line. We aim at monitoring the amplitude of the meridional overturning cell, the associated heat flux towards Europe, and the tracer transports. We will also focus on describing the variability of the characteristics of the water masses formed in the mixed layer (the mode waters) and that of the deep waters generated in the Greenland and Norwegian Seas. The CTDO2 measurements will be carried by the Laboratoire de Physique des Océans (Plouzané, France), the nutrient and CFC content of water samples will be measured by the Laboratoire de Chimie Marine (Institut Universitaire Européen de la Mer, Plouzané, France and Observatoire Océanologique, Roscoff, France), and the pH and Alkalinity of water samples by a team from the Instituto de Investigaciones Marinas (CSIC Vigo, Spain). Current measurements will also be carried out using Acoustic Doppler Current Profilers mounted on the ship and the rosette.

In addition to these synoptic hydrography measurements, preliminary data analysis have shown the wide variability of currents along the Greenland coast: these needs to be fully monitored on time-scales much finer than the bi-annual section in order to obtain reliable estimates of the overturning circulation. In collaboration with the UK RAPID program "Eirik Ridge" project (PI: S. Bacon, Southampton Oceanographic Center, UK), we plan to moor an Acoustic Doppler Current Profiler (300 kHz) and 4 currentmeter lines fully equiped with currentmeters and temperature sensors, respectively 23, 48, 51, 58, 69 nm off the coast around 60°N, that is at nominal depth of 170, 500, 1000, 1700, and 1900 m. The moored instrument within its protection metal-frame is about 1m high above the bottom, while the mooring heads are below 160 m (see Figure 3 for details).

This projet is a contribution to the international CLIVAR program and complements work planned by other European groups in the subpolar gyre of the North Atlantic. One of the main goal is to determine the links between the North Atlantic Ocean variability and that of the atmosphere, which is characterize by the North Atlantic Oscillation (NAO). The North Atlantic Oscillation, defined as the difference in surface atmospheric pressure between Azores and Island, exhibits a rich spectrum with peaks around 10 years, 7-8 years, and inter-annual periods. This low-frequency forcing of ocean by the atmosphere led us to propose a 10-year observation program.

It is mandatory for the success of the project to be able to carry out the hydrographic line from the Greenland coast to the Portugal coast. It is a necessary condition to compute the indices of most interest for the international community, that is the amplitude of the meridional overturning cell, heat and anthropogenic tracer transports.

2.2. Relevant previous or future research cruises :

The science team has recently been involved, within the framework of the World Ocean Circulation Experiment, in cruises in the Equatorial and South Atlantic Oceans that aimed at characterizing water masses from physical and geo-chemical measurements and at quantifying the circulation.
The hydrographic section from Greenland to Portugal has been carried out first in June 2002 (OVIDE 1), and should be repeated every 2 years during 10 years in 2004, 2006, 2008 and 2010.

2.3. Previously published research date relating to the project :

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3 - METHODS AND MEANS TO BE USED

3.1. Particular of vessel

Name : Thalassa
Nationality : French
Owner : Ifremer
Operator : Genavir
Overall length : 73,65 m
Maximum draught : 3022 t
Net tonnage : Gross tonnage : 2803 UMS
Propulsion : electric engine powered by 4 diesel-alternator groups
Cruising speed : 11 Kn Maximum speed : 14,7 Kn
Call sign :
Method and capability of communication (including telex, frequencies) :
phone Inmarsat B1 : 00 870 3 227 297 20
fax Inmarsat B1 : 00 870 3 227 297 30
phone Inmarsat B2 : 00 870 3 227 297 50 et 51
fax Inmarsat B2 : 00 870 3 227 297 60
telex Inmarsat C1 : 058x 4 227 297 10
telex Inmarsat C2 : 058x 4 227 297 11
Name of master :
Number of crew :
Number of scientists on board : 24

3.2. Aircraft or other craft to be used in the project :

NONE

3.3. Particulars of methods and scientific instruments :

Types of samples and data	Methods to be used	Instruments to be used
Hydrographic stations : measurements of temperature, salinity, dissolved oxygen, and current velocity between the ocean surface and the ocean floor. Water sampling.	The ship being in station, a cast is carried out using a rosette attached to the ship by a wire cable.	The rosette is equipped with 32 sampling bottles, a Neil Brown CTDO2 (Conductivity Depth Temperature Oxygen), an Acoustic Doppler Current Profiler.
Salinity data from water samples.	Measurement of water sample conductivity.	Salinometer.
Dissolved oxygen data from water samples.	Titration of water samples using the Wenkler method.	Metrohm.
Alkalinity data from water samples	Titration of water samples.	Metrohm
pH data from water samples	Analysis of water samples.	Spectrophotometer
Nitrite, nitrate, phosphate, silicate data from water samples	Analysis of water samples.	Technicon AAII Bran and Luebbe

CFC-11, CFC-12, CFC-113, CCL4 data from water samples	Analysis of water samples	Chromatography
Continuous measurement of surface temperature and surface salinity.		Seabird SBE21 Thermosalinographe
Continuous measurement of current velocity and direction in the surface layer.		Vessel-Mounted Acoustic Doppler Current Profiler RDI at 75 KHz and 150 KHz.

3.4. Indicates whether harmful substances will be used : NO

3.5. Indicate whether drilling will be carried out : NO

3.6. Indicate whether explosives will be used : NO

4 - INSTALLATIONS AND EQUIPMENTS

Details of installations and equipments (dates of laying, servicing, recovery, exact locations and depth)

Details of the moorings

Mooring E consists of a 300 kHz Acoustic Doppler Current Profiler within a protective metal frame moored on the bottom with an acoustic release and weight. All other moorings extend from the bottom to around 160m below the surface and are equipped with RCM8 or ADCP currentmeters and SEACAT temperature and conductivity recorders (Figure 3).

These will be moored in June 2004 depending on the ice conditions (especially for coastal mooring E) or the following year on a UK ship (S. Bacon, Southampton Oceanographic Center). They will be recovered in 2006 during the next Ovide hydrographic section, depending on ice conditions, or on a UK cruise (S. Bacon, Southampton Oceanographic Center).

Mooring	***Latitude***	***Longitude***	***Nominal Depth***	***Current meters (RCM8)***	***Temperature conductivity recorders***	***ADCP***
A	N59° 47.27'	W41° 39.60'	1900 m	5	1	
B	N59° 48.31'	W42° 01.80'	1700 m	5	1	
C	N59° 48.98'	W42° 15.90'	1000 m	3		1
D	N59° 49.26'	W42° 21.90'	500 m	2	1	
E	N59° 51.53'	W43° 09.90'	170 m			1

The positions given here are approximative, using Sandwell and Smith bathymetry, and will be adjusted according to the actual bathymetry found during the cruise.

5 - GEOGRAPHICAL AERAS

5.1. Indicate geographical areas in which the project is to be conducted (with reference in latitude and longitude) :

The hydrographic line is presented in figure 1. The nominal locations of the hydrographic stations that will be occupied is indicated. Note that the locations of the stations and their number may change depending on the characteristics of the ocean circulation at the time of the cruise.

The hydrographic stations realized within 200 Nautical Miles of Greenland (Denmark) will be carried out between 59°N and 61°N of latitude (see Figure 2).

5.2. Attach chart(s) at an appropriate scale showing the geographical areas of the intented work and, as far as practicable, the positions of intented stations, the tracks of survey lines, and the locations od installations and equipment :

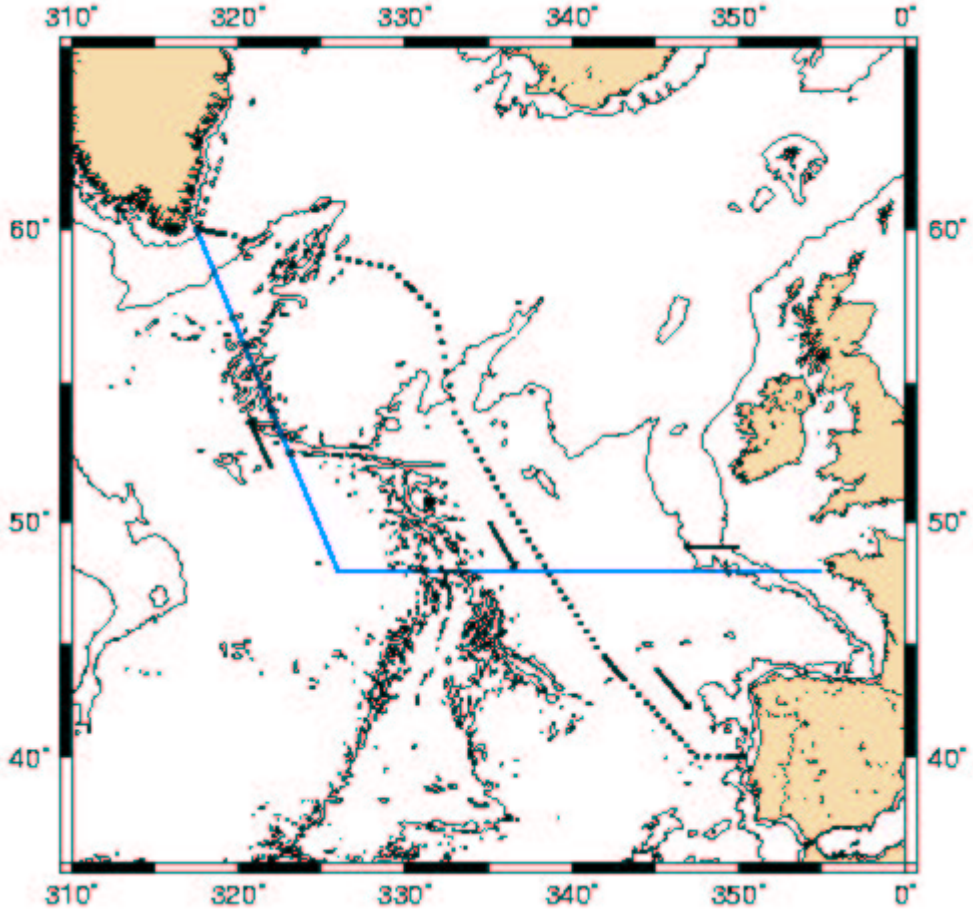

Figure 1 : The OVIDE 1 cruise (7 June 2002, Brest – 9 July 2002, Lisbon). OVIDE 2 cruise will starts from Brest, France, on 4 June 2004 and will end at Lisbon, Portugal, on 5 July 2004. The continuous line indicates the ship track between France and Greenland (Denmark). The ship track between Brest and Greenland does not follow a direct route but will be chosen according to specifications given by the international ARGO Program for the deployments of freely drifting profilers in international waters. The hydrographic station locations between the southern tip of Greenland and Portugal are nominal and might change given the ocean circulation at the time of the cruise. The locations of the hydrographic stations scheduled within 200 Nautical Miles of the Greenland coasts can be better visualized from Figure 2.

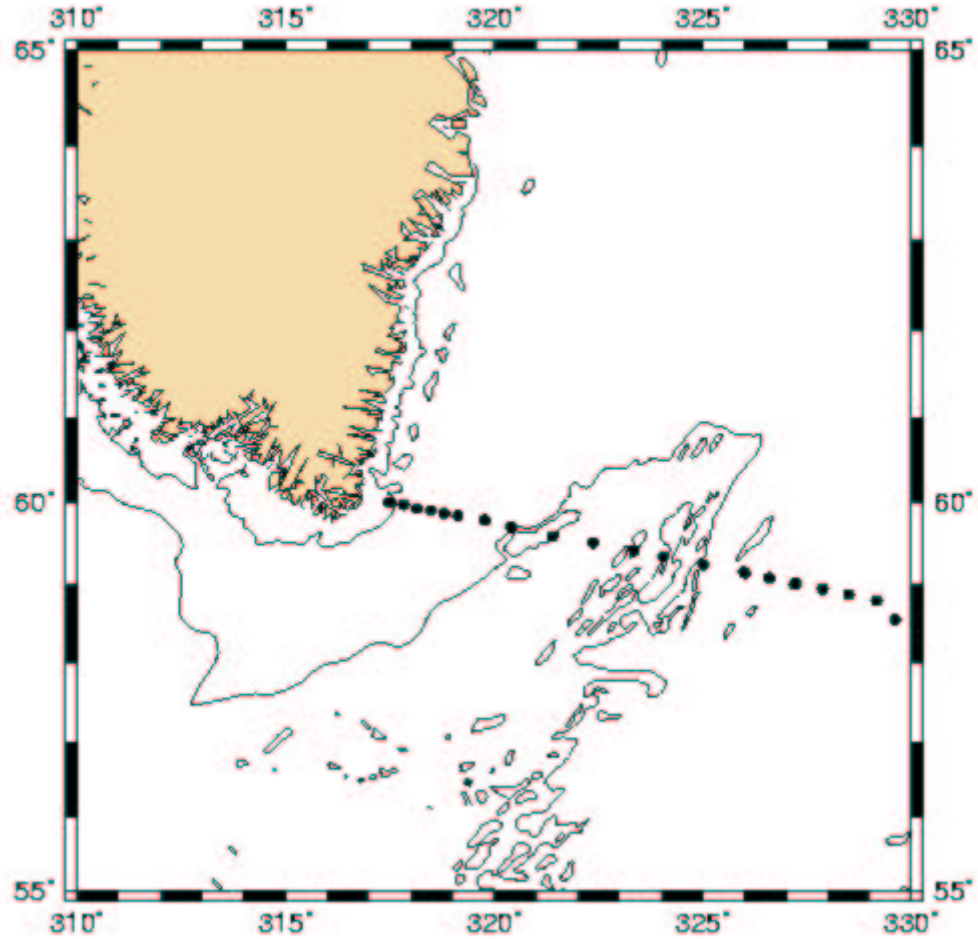

Figure 2 : Nominal locations of the hydrographic stations scheduled off Greenland during the OVIDE 2 Cruise, based on actual stations carried out during OVIDE 1 cruise in 2002. The exact locations of the stations may vary depending on the characteristics of the ocean circulation at the time of the cruise. The work within 200 Nautical Miles from Greenland will be limited to the 59°N to 61°N latitude range.

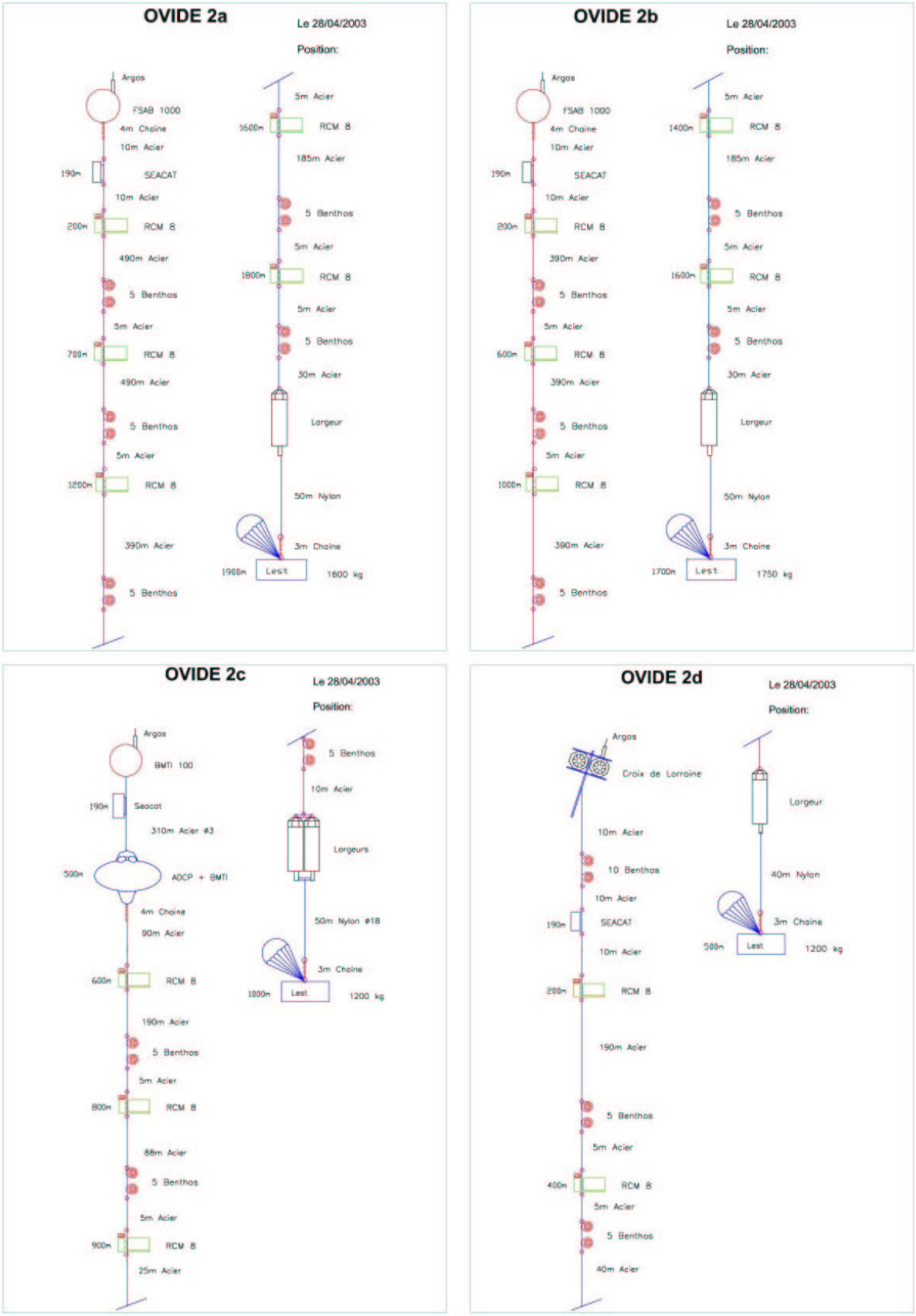

Figure 3 : Details of the 4 moorings that will be deployed off the Greenland coast.

6 - DATES

6.1 Expected dates of first entry into and final departure from the research area of the research vessel :

entry date : 9 June 2004

departure date : 17 June 2004

6.2 Indicate if multiple entry is expected : No

7 - PORTS CALLS

7.1. Dates and names of intented ports of call in Denmark . NONE

7.2. Any special logistical requirements at ports of call :

7.3. Name/Address/Telephone of shipping agent (if available)

8 - PARTICIPATION

8.1. Extent of which Denmark will be enabled to participate or to be represented in the research project :

At the moment, there is no plan for a danish participation to the cruise, but interested scientists could contact us.

8.2. Proposed dates and ports for embarkation/disembarkation :

start date : 4 June 2004 in Brest, France

end date : 5 July 2004 in Lisbon, Portugal

9 - ACCESS TO DATA, SAMPLES AND RESEARCH RESULTS

9.1. Expected dates of submission to Denmark of preliminary reports which should include the expected dates of submission of the final results :

A preliminary cruise report will be send to Denmark authorities within three months of the end of the cruise.

9.2. Proposed means for access by Denmark to data and samples :

- Preliminary data (ASCII files) will be distributed to Denmark scientists and authorities on request using either FTP or Compact Disk (CD).
- Final data will be publicly available from the SISMER data center (www.ifremer.fr/sismer/).

9.3. Proposed means of making research internationally available :

- Oral or Poster presentations in international conferences (European Geophysical Society conferences, international Program CLIVAR conferences).
- Articles in international journals in oceanography.

ANNEX

List of the scientific team

Laboratoire de Physique des Océans, Brest, France
(Ifremer - centre de Brest, BP 70 29280 Plouzané, France)

- André Billant, engineer, Ifremer
- Pierre Branellec, technician, Ifremer
- Julie Deshayes, student, UPMC Paris
- Bruno Ferron, research scientist, CNRS
- Jean-Pierre Gouillou, engineer, Ifremer
- Thierry Huck, research scientist, CNRS
- Catherine Kermabon, technician, Ifremer
- Catherine Lagadec, technician, Ifremer
- Pascal Le Grand, research scientist, Ifremer
- Caroline LeBihan, technician, Ifremer
- Olivier Ménage, technician, Ifremer
- Herlé Mercier, research scientist, CNRS
- Olivier Peden, technician, Ifremer
- Lucie Roa, student, UBO Brest
- Virginie Thierry, research scientist, Ifremer

Laboratoire de Chimie Marine, Brest, France
(IUEM, technopôle Brest-Iroise, Place Nicolas Copernic, 29280 Plouzané, France)

- Thierry Cariou, engineer, CNRS
- Boris Cocquempot, post-doc, UBO Brest
- Sandra Forner, PhD student, UBO Brest
- Essyllt Louarn, PhD student, UBO
- Eric Macé, engineer, CNRS
- Pascal Morin, research scientist, CNRS

Instituto de Investigaciones Marinas de Vigo, Spain

- Fiz Fernández Pérez, research scientist
- Marta Alvarez Rodriguez, research scientist
- Monica Castaño Carrera, research scientist