

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

Date: 01/03/2018

1 - GENERAL INFORMATION

1.1. Cruise name and/or number:

FRAME-MCS

1.2. Sponsoring institution:

Funding agency: Spanish Ministry of Economy, Industry and Competitiveness (MICINN)

Funding programme: Programa Estatal de Investigación, Desarrollo e Innovación Orientada a los Retos de la Sociedad, Convocatoria 2015, Modalidad 1: "Proyectos De I+D+I"

Name and reference of the project: FRAME (CTM2015-71766-R)

1.3. Scientist in charge of the project:

César Rodríguez Ranero
Institut of Marine Sciences-CSIC
P. Maritim Barceloneta, 37-49, 08003-Barcelona (Spain)
Tel. +34-932 309 619
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1.4. Scientist from Portugal involved in the planning of the project:

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Instituto Dom Luiz, Universidade de Lisboa
Campo Grande, Ed. C8, piso 3, 1749-016 Lisboa (Portugal)
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Departamento de Geociências, Universidade de Aveiro
Campus Universitário de Santiago, 3810-052 Aveiro (Portugal)
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Pedro Terrinha
Instituto Português do Mar e Atmosfera , Divisão de Geologia e Georrecursos Marinhos
Rua C do aeroporto de Lisboa , 1749-077 Lisboa
E-mail. Pedro.terrinha@ipma.pt

1.5. Submitting officer:

César Rodríguez Ranero
Institut of Marine Sciences-CSIC
P. Maritim Barceloneta, 37-49, 08003-Barcelona (Spain)
Tel. +34-932 309 619
Fax. +34-932 309 555
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2 - DESCRIPTION OF THE PROJECT

2.1. Nature and objectives of the project:

FRAME is a geophysical project aiming at providing information on the nature and structure of the geological domains that form the southwest Iberian margin, as well as on the location, geometry and seismo-tectonic significance of their boundaries. Two cruises are planned to acquire the required data: FRAME-MCS (6-29 July 2018) and FRAME-OBS (27 August-21 September 2018). This permit request refers to FRAME-MCS.

The main goal of the FRAME-MCS cruise is collecting Multichannel Seismic Reflection (MCS) data with the Spanish R/V Sarmiento de Gamboa. For this we will use a streamer with hydrophones that will be towed behind the R/V Sarmiento de Gamboa and a group of airguns for the acoustic source.

For the deployment of the 6 km-long streamer and operations during the entire cruise, **the R/V Sarmiento de Gamboa will have the help of the auxiliary R/V Garcia del Cid**. The tasks of the auxiliary boat are thus only to help on the different maneuvers and safety of instrumentation. The auxiliary boat will not collect any scientific data.

The instrumentation will collect data to map geological domains and tectonic structures identified in previous works by our research team and colleagues from other groups. The chief scientific objective is defining the crustal structure in the different geological domains of the rifted margin, and revising it in light of the existing conceptual models concerning their formation and evolution. Second, identifying lithospheric-scale structures defined by the contacts among geological domains in the current kinematic framework of the region, where Africa and Iberian (Eurasian) plates are starting to collide.

The study of tectonic structures is particularly relevant because one or several of these structures are responsible of the greatest earthquakes that have occurred in the area, such as the 1755 Lisbon earthquake and associated tsunami. Thus, the project aims at mapping of

geological structures and studying the region's geologic evolution, but its ultimate goal is natural hazards.

2.2. Relevant previous or future research cruises:

Previous:

NEAREST-SEIS (CGL2006-27098-E/BTE)

Vessel: BiO Hesperides (Spain)

Chief Scientist: Valentí Sallarès

Dates: 1-19 November 2008

TOPOMED (ESF-Eurocore Programme)

Vessel: R/V Sarmiento de Gamboa (Spain)

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Dates: 3-29 October 2011

GEOMARGEN-1

Vessel: R/V Sarmiento de Gamboa (Spain)

Chief Scientist: César R. Ranero

Dates: 1-26 November 2011

Future:

FRAME-OBS (CTM2015-71766-R)

Vessel: R/V Sarmiento de Gamboa (Spain)

Chief Scientist: Valentí Sallarès

Dates: 27 August - 21 September 2018

2.3. Previously published research data relating to the project:

Bartolome, R., E. Gràcia, D. Stich, S. Martinez-Loriente, D. Klaeschen, F. L. Mancilla, C. Lo Iacono, J. J. Dañobeitia, and N. Zitellini (2012). Evidence for active strike-slip faulting along the Eurasia-Africa convergence zone: Implications for seismic hazard in the SW Iberian Margin, *Geology*, 40 (6), 495-498, doi:10.1130/G33107.1.

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- Patch Ridge area and neighboring abyssal plains (SW Iberian Margin), *Geochem. Geophys. Geosyst.*, 14, 2206-2231, doi:10.1002/ggge.20173.
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- Sallares, V., A. Gailler, M. A. Gutscher, D. Graindorge, R. Bartolome, E. Gràcia, J. Díaz, J. J. Dañobeitia, and N. Zitellini (2011), Seismic evidence for the presence of Jurassic oceanic crust in the central Gulf of Cadiz (SW Iberia margin), *Earth Planet. Sci. Lett.*, 311, 112-123, doi:10.1016/j.epsl.2011.09.003.
- Sallares, V., S. Martínez-Loriente, M. Prada, E. Gràcia, C. R. Ranero, M. A. Gutscher, R. Bartolome, A. Gailler, J. J. Dañobeitia, and N. Zitellini (2013). Seismic evidence of exhumed mantle rock basement at the Goringe Bank and the adjacent Horseshoe and Tagus abyssal plains (SW Iberia), *Earth Planet. Sci. Lett.*, 365, 120-131, doi:10.1016/j.epsl.2013.01.021.
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3 - METHODS AND MEANS TO BE USED

3.1. Particular of vessel:

MAIN RESEARCH VESSEL

Name: SARMIENTO DE GAMBOA

Nationality: Spanish

Owner: CSIC

Operator: CSIC, UTM

Type of vessel: **Oceanographic Research Vessel**

Year built and country: **2007 by CNP Freire, Spain**

Length / width **70,5 m**

Length p.p.: **62,0 m**

Design Draught: **4,60 m**

Scantling Draught: **4,90 m**

Depth to main deck: **5,00 m**

Tonnage: Gross = **2630 GT**

Dead weight: **850 tpm**

Maximum Speed: **14,5 knots**

Prop. Power: **2400 kW**

Fuel: **528 m3**

Endurance: **40 days**

Accommodation (crew + research) **16+26**

Classification society: **Bureau Veritas, +HULL Special Service Oceanographic and Fishing Research/Unrestricted Navigation/+MACH+AUT-UMS, AUT-CCS, ALM SDS COMF-1, SYS-NEQ 1 DYNAPOS AM/AT**

Register port: **Vigo**

Call code: **E A K F**

Phone:

INMARSAT: +870.761.143.975 / INMARSAT: +870.761.143.979

VSAT: +34.931.845.898

Cellular: +34.679.510.317

Email: capitan@sdgamboa.cmima.csic.es

Name of master :

María Ángeles Campos

Pablo Fernández Pérez

Number of crew: 16

Number of scientists on board: 26

AUXILIARY RESEARCH VESSEL

Name: BO Garcia del Cid

Nationality: Spanish

Operator: CSIC, Spain

Owner: CSIC, Spain

Flag: **Spain**

Type of vessel: **Oceanographic Research Vessel**

Year built and country: **1977 by Astilleros de Tarragona, Spain**

Length / width **37.2 m**

Design Draught: **4,70 m**

Tonnage: Gross = **285.5 GT**

Maximum Speed: **10.0 knots**

Engine. Power: **1160 kW**

Endurance: **12 days**

Classification society: **Bureau Veritas, + HULL, + MACH, Fishing vessel, Unrestricted Navigation**

Register port: **Barcelona**

Call code: **EHUU**

Phone:

- INMARSAT: + **870764057558**

- Cellular: + **630473172**

Email: capitan.Garciadelcid@SkyFile.com

Name of master:

Alejandro Muro Ortega

Number of crew: 12

3.2. Aircraft or other craft to be used in the project: None

3.3. Particulars of methods and scientific instruments:

Provide a list of the main scientific equipment that is going to be used, saying the waters where it will be used / installed	Fisheries research within the established	Research related to the continental shelf beyond	Distance to shore		
			Within 12 nautical miles	Within 12 and 50 nautical miles	Within 50 and 200 nautical miles

	<i>fishing limits</i>	<i>the limits of the coastal state</i>			
Six-km-long streamer cable with hydrophones will be deployed and towed behind the ship..	No	Yes	Yes	Yes	Yes
An airgun seismic source array constituted by two sub-arrays with a capacity o between 3,500-4,500 c.i. will be towed behind the vessel. It will generate the acoustic signal to be recorded in the hydrophones.	No	Yes	Yes	Yes	Yes
Multibeam echosounder ATLAS Hydrosweep DS mounted on the hull of RV “ <i>Sarmiento de Gamboa</i> ”. The system emits a frequency range between 14.5 to 16 kHz. It operates at depths between 200 to 11000 m. Swath-bathymetric and backscatter data are simultaneously acquired.	No	Yes	Yes	Yes	Yes
Parametric sub-bottom profiler ATLAS Parasound P35 mounted on the hull of the RV “ <i>Sarmiento de Gamboa</i> ”. It uses a primary frequency of 18-20 kHz and a secondary frequency of 1.5 to 4 kHz. It is simultaneously acquired with multibeam bathymetry.	No	Yes	Yes	Yes	Yes

3.4. Indicate 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

NO EQUIPMENT OR MOORING WILL BE INSTALLED ON THE OCEAN FLOOR

Streamer with Hydrophones

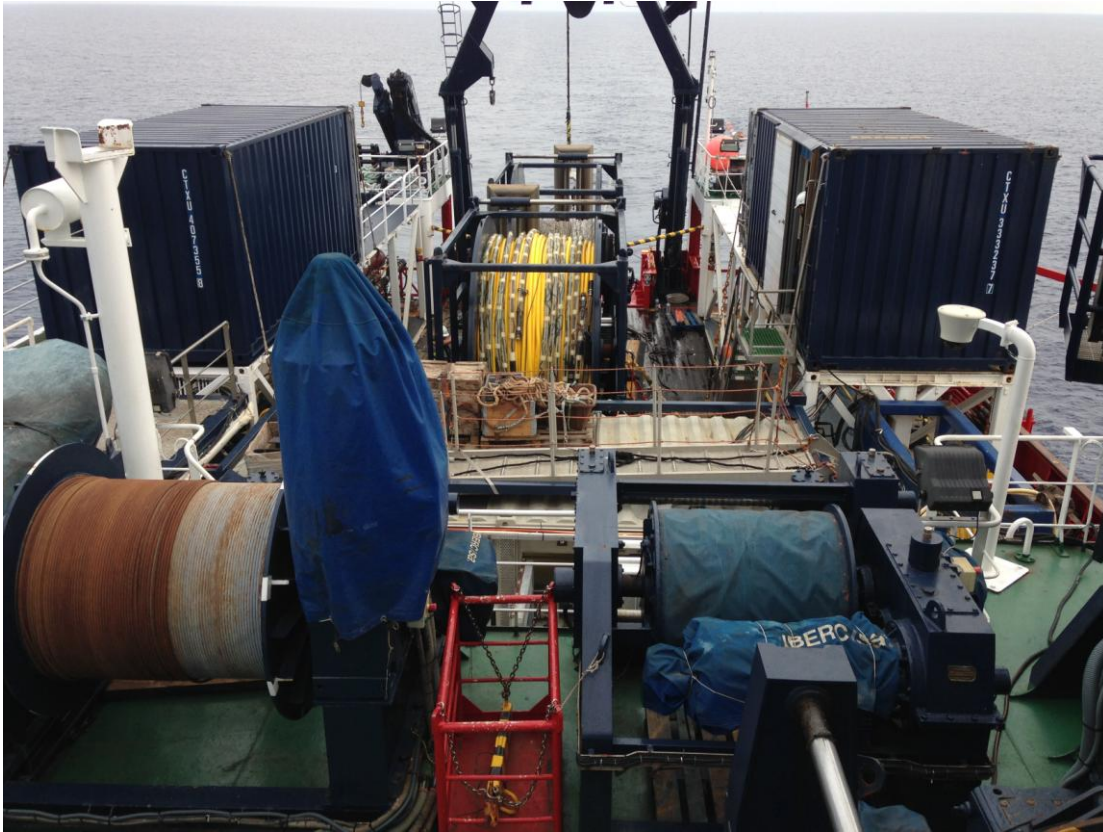


Fig. 1 Streamer onboard Research Vessel (R/V) Sarmiento de Gamboa during its deployment in the Ionian Sea in 2016. The 6-km-long streamer is contained in two winches on the working deck of the vessel.

The Research Vessel (R/V) Sarmiento de Gamboa will sail from Vigo (Spain) to the research area offshore Portugal, where the deployment of geophysical instrumentation will take place. The streamer (**Figure 1**) will be deployed from the ship from two winches, and in the operation of the Sarmiento de Gamboa the auxiliary boat R/V Garcia del CSIC will provide support and will also be alert in case passing boats need to be warned of the operation. The ship will collect several transects roughly perpendicular to the coast (**Figure 3**), approaching and sailing away from the shelf, as it gradually navigates towards the south. It will also collect data across the Goringe bank a several-km-tall ridge offshore Cape of San Vicente. The ridge was possibly formed by one of the largest faults in the regions, and its activity is not well understood. The R/V Sarmiento de Gamboa will sail further into Moroccan waters and later will finish the cruise in the port of Cádiz.

Airgun Seismic Source

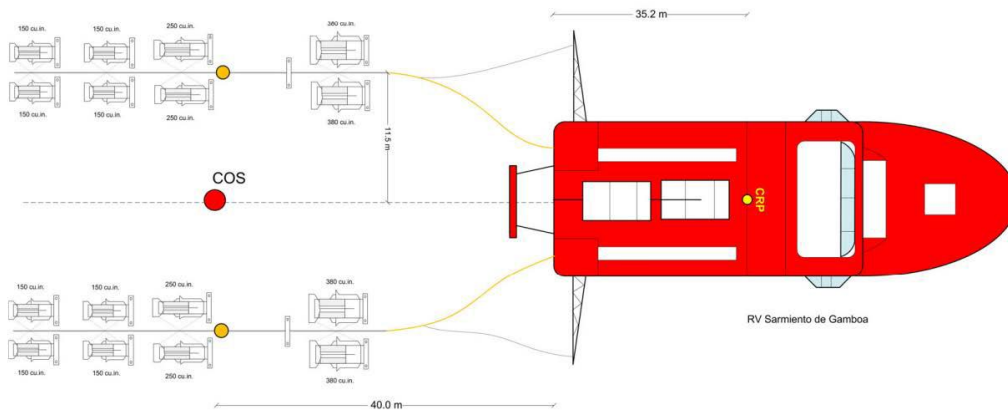


Figure 2.- Example of airgun array like the one to be used in the FRAME-OBS survey. It is constituted by two sub-arrays of 8 airguns each that will hang ~10-15 m below sea surface.

An airgun seismic source composed of two sub-arrays with 8-10 units each and a total capacity of ~3,500-4,500 c.i. (**fig. 2**), will be used to generate the acoustic signal to be recorded by the OBS/H along the three profiles. The acquisition speed will be of ~4.5 knots, meaning an average acquisition time of ~36 hours for a 300 km-long profile. During data acquisition, we will follow a protocol of best practice based on the Joint Nature Conservation Committee (JNCC) guidelines to minimize impact on marine wildlife. A team of dedicated Marine Mammal Observers (MMOs) will embark to supervise all airgun shooting operations using both visual and Passive Acoustic Monitoring (PAM) systems. As it is recommended by the JNCC, data acquisition will consist of three phases. First, a pre-shooting phase to search for marine mammals inside the mitigation area (MA) previously defined by the MMOs, will begin 1h before start shooting. This phase will be reinitiated if a mammal is observed inside the MA. The soft-start and ramp up phase will initiate once the pre-shooting phase is successfully completed. During this second phase, shooting will start with a single unit at minimum pressure, and the rest of units will be progressively incorporated during the following 20 minutes, until the source operates at full power. Shooting shall immediately stop if a mammal is observed inside the MA, and the pre-shooting phase will start again only once MMOs confirm that the mammal left the MA. A report including all MMO and PAM operations and incidences during the survey will be included in the final survey report to be delivered to Portuguese authorities.

5 - GEOGRAPHICAL AREAS

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

<u>Zone 1:</u> (Portugal)	<u>Zone 2:</u> (Portugal)	<u>Zone 3:</u> (Marruecos Portugal)
14.5°W, 40.90°N	14.70°W, 38.6°N	07.40°W, 33.90°N
14.5°W, 39.45°N	14.70°W, 37.2°N	09.35°W, 32.85°N
09.0°W, 39.45°N	09.05°W, 37.2°N	12.35°W, 36.75°N



09.0°W, 40.90°N

09.65°W, 38.6°N

10.40°W, 37.80°N

ZONES 1-3 are shown as shaded polygons in the map of figure 3.

5.2. Attach chart(s) at an appropriate scale showing the geographical areas of the intended work and, as far as practicable, the positions of intended stations, the tracks of survey lines, and the locations of specific equipments or facilities:

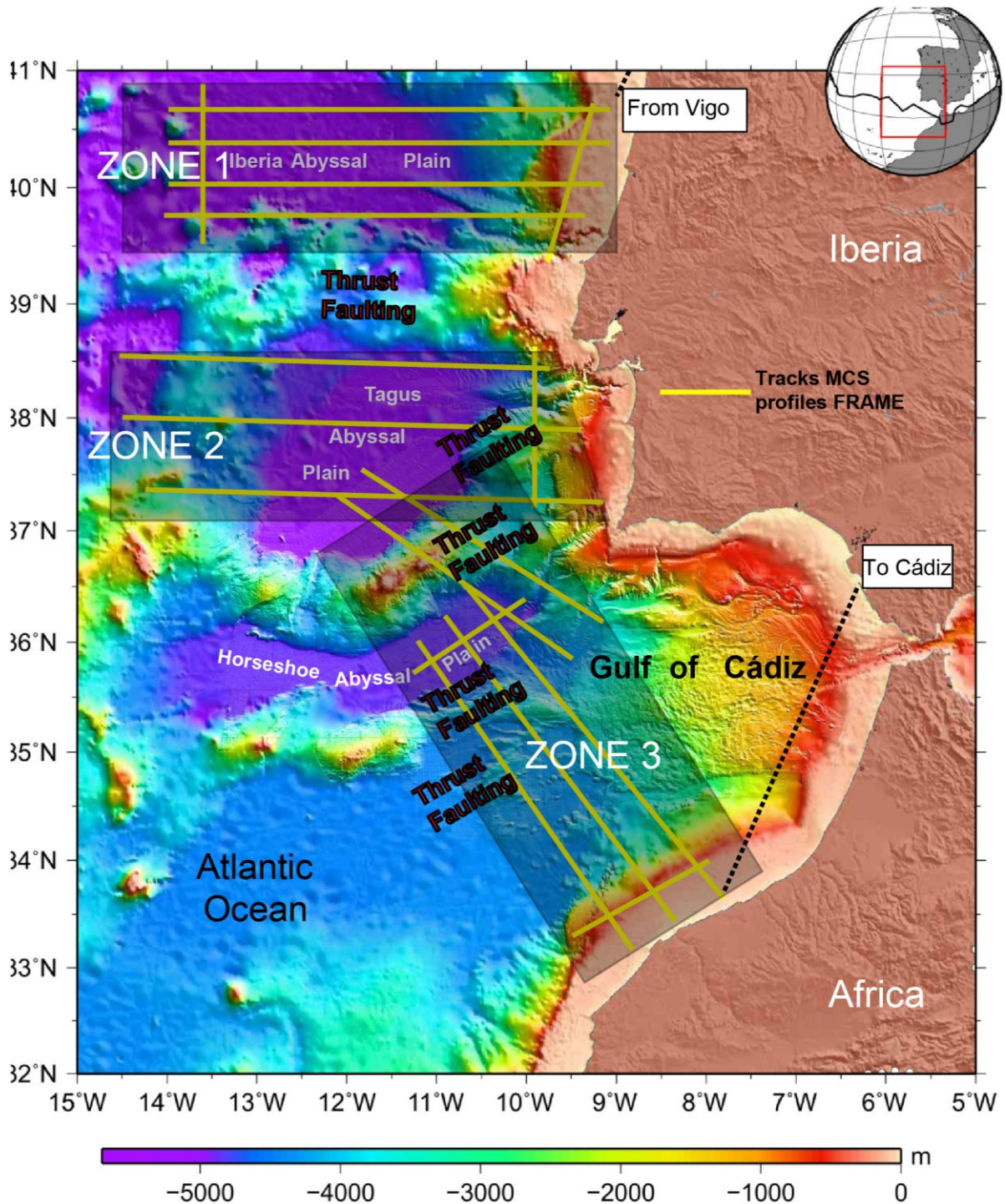


Figure 3.- Track chart of multichannel seismic reflection profiles (in yellow) to be collected during the FRAME cruise displayed over bathymetric map. The semi-transparent boxes indicate areas of operation

of the cruise with corners indicated in tables above.

6 - DATES

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

entry date : 5 July 2018

departure date : 28 July 2018

6.2 Indicate if multiple entry is expected:

No

7 - PORTS CALLS

7.1. Dates and names of intended ports of call in Lisbon:

No port calls in Lisbon or any other Portuguese harbors are planned.

7.2. Any special logistical requirements at ports of call:

N.A.

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

N.A.

8 - PARTICIPATION

8.1. Proposed dates and ports for embarkation/disembarkation:

start date : 4 July 2018 (Vigo, Spain)

end date : 29 July 2018 (Cádiz, Spain)

9 - ACCESS TO DATA, SAMPLES AND RESEARCH RESULTS

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

A preliminary report will be submitted to the institution designed by Portuguese authorities within 2 months after the end of the survey.

9.2. Proposed means for access by the Portuguese scientific and public entities, to data and samples:

A copy the raw data acquired during the survey will be given to the Portuguese Institution in charge designed by Portuguese authorities.

9.3. Proposed means of making research internationally available:

All the scientific results obtained with the data acquired during the FRAME-MCS survey will be made publically available through presentation at international scientific meetings, workshops and conferences, as well as with publications in SCI-indexed journals.

The publication work will be largely done in collaboration with Portuguese scientists

ANNEX

List of the scientific team

1. Prof. César R. Ranero, Institute of Marine Sciences-CSIC, Spain
2. Dr. Alcinoe Calahorrano Betancurt, Institute of Marine Sciences-CSIC, Spain
3. Irene Merino Pérez, Institute of Marine Sciences-CSIC, Spain
4. Dr. Adrià Meléndez Catalán, Institute of Marine Sciences-CSIC, Spain
5. Miquel Camaroft Blanco, Institute of Marine Sciences-CSIC, Spain
6. Dr. Estela Jiménez Tejero, Institute of Marine Sciences-CSIC, Spain
7. Dr. Alejandra Lago Cameselle, Universidad de Vigo, Spain
8. Prof. Luis Pinhero, Depart. de Geociências, Universidade de Aveiro, Portugal
9. Dr. Marta Neres, Instituto Português do Mar e Atmosfera, Portugal
10. Prof. Tiago Alves or Chantelle Roelofse, University of Cardiff (UK).
11. Moroccan observer/scientist #1
12. Moroccan observer/scientist #2
13. Marine Technology Unit from CSIC technician
14. Marine Technology Unit from CSIC technician
15. Marine Technology Unit from CSIC technician
16. Marine Technology Unit from CSIC technician
17. Marine Technology Unit from CSIC technician
18. Marine Technology Unit from CSIC technician
19. Marine Technology Unit from CSIC technician
20. Marine Technology Unit from CSIC technician

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Email. cranero@icm.csic.es

1.4. Scientist from Morocco contacted for the project:

Prof. Dr. Azelarab Elmouraouah
Institut National de Géophysique
Centre National pour la Recherche Scientifique et Technique (CNRST)
52, Av. Omar Ibn Al Khattab,
BP. 8027 Agdal - Nations Unies,
10102 Rabat
MAROC
Tél : (212 37) 77.86.74
Fax: (212 37) 77.13.34
E-mail. elmouraouah@cnrst.ma / elmouraouah@hotmail.ma

Prof. Dr. Aomar Iben Brahim
Institut National de Géophysique
Centre National pour la Recherche Scientifique et Technique (CNRST)

52, Av. Omar Ibn AlKhattab,
BP. 8027 Agdal - Nations Unies, 10102 Rabat
MAROC
Tél : (212 37) 77.86.74
Fax: (212 37) 77.13.34
E-mail: ibenbrahim@cnrst.ma

1.5. Submitting officer:

César Rodríguez Ranero
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Geissler, W.H., Matias, L., Stich, D., Carrilho, F., Jokat, W., Monna, S., Ibenbrahim, A., Mancilla, F., Gutscher, M.-A., Sallares, V., Zitellini, N. (2010). Focal mechanisms for sub-crustal earthquakes in the Gulf of Cadiz from a dense OBS deployment. *Geophys. Res. Lett.* 37, 18.

Gutscher, M.A., Dominguez, S., Westbrook, G.K., Le Roy, P., Rosas, F., Duarte, J.C., Terrinha, P., Miranda, J.M., Graindorge, D., Gailler, A., Sallares, V. (2012). The Gibraltar subduction: a decade of new geophysical data. *Tectonophysics* 574-575, 72-91.

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3 - METHODS AND MEANS TO BE USED

3.1. Particular of vessel:

MAIN RESEARCH VESSEL

Name: SARMIENTO DE GAMBOA

Nationality: Spanish

Owner: CSIC

Operator: CSIC, UTM

Type of vessel: **Oceanographic Research Vessel**

Year built and country: **2007 by CNP Freire, Spain**

Length / width **70,5 m**

Length p.p.: **62,0 m**

Design Draught: **4,60 m**

Scantling Draught: **4,90 m**

Depth to main deck: **5,00 m**

Tonnage: Gross = **2630 GT**

Dead weight: **850 tpm**

Maximum Speed: **14,5 knots**

Prop. Power: **2400 kW**

Fuel: **528 m3**

Endurance: **40 days**

Accommodation (crew + research) **16+26**

Classification society: **Bureau Veritas, +HULL Special Service Oceanographic and Fishing Research/Unrestricted Navigation/+MACH+AUT-UMS, AUT-CCS, ALM SDS COMF-1, SYS-NEQ 1 DYNAPOS AM/AT**

Register port: **Vigo**
 Call code: **E A K F**
 Phone:
 INMARSAT: +870.761.143.975 / INMARSAT: +870.761.143.979
 VSAT: +34.931.845.898
 Cellular: +34.679.510.317
 Email: capitan@sdgamboa.cmima.csic.es

Name of master :
 María Ángeles Campos
 Pablo Fernández Pérez
 Number of crew: 16
 Number of scientists on board: 26

AUXILIARY RESEARCH VESSEL

Name: **BO Garcia del Cid**
 Nationality: Spanish
 Operator: CSIC, Spain
 Owner: CSIC, Spain
 Flag: **Spain**
 Type of vessel: **Oceanographic Research Vessel**
 Year built and country: **1977 by Astilleros de Tarragona, Spain**
 Length / width **37.2 m**
 Design Draught: **4,70 m**
 Tonnage: Gross = **285.5 GT**
 Maximum Speed: **10.0 knots**
 Engine. Power: **1160 kW**
 Endurance: **12 days**

Classification society: **Bureau Veritas, + HULL, + MACH, Fishing vessel, Unrestricted**

Navigation

Register port: **Barcelona**
 Call code: **EHUU**
 Phone:

- INMARSAT: + **870764057558**
 - Cellular: + **630473172**
- Email: capitan.Garciadelcid@SkyFile.com

Name of master:
 Alejandro Muro Ortega
 Number of crew: 12

3.2. Aircraft or other craft to be used in the project: None

3.3. Particulars of methods and scientific instruments:

Provide a list of the main scientific equipment that is going to be used, saying the waters where it	Fisheries research within the	Research related to the continental	Distance to shore		
			Within 12 nautical	Within 12 and 50 nautical	Within 50 and 200 nautical

<i>will be used / installed</i>	<i>established fishing limits</i>	<i>shelf beyond the limits of the coastal state</i>	<i>miles</i>	<i>miles</i>	<i>miles</i>
Six-km-long streamer cable with hydrophones will be deployed and towed behind the ship..	No	Yes	Yes	Yes	Yes
An airgun seismic source array constituted by two sub-arrays with a capacity o between 3,500-4,500 c.i. will be towed behind the vessel. It will generate the acoustic signal to be recorded in the hydrophones.	No	Yes	Yes	Yes	Yes
Multibeam echosounder ATLAS Hydrosweep DS mounted on the hull of RV “ <i>Sarmiento de Gamboa</i> ”. The system emits a frequency range between 14.5 to 16 kHz. It operates at depths between 200 to 11000 m. Swath-bathymetric and backscatter data are simultaneously acquired.	No	Yes	Yes	Yes	Yes
Parametric sub-bottom profiler ATLAS Parasound P35 mounted on the hull of the RV “ <i>Sarmiento de Gamboa</i> ”. It uses a primary frequency of 18-20 kHz and a secondary frequency of 1.5 to 4 kHz. It is simultaneously acquired with multibeam bathymetry.	No	Yes	Yes	Yes	Yes

3.4. Indicate 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

NO EQUIPMENT OR MOORING WILL BE INSTALLED ON THE OCEAN FLOOR

Streamer with Hydrophones

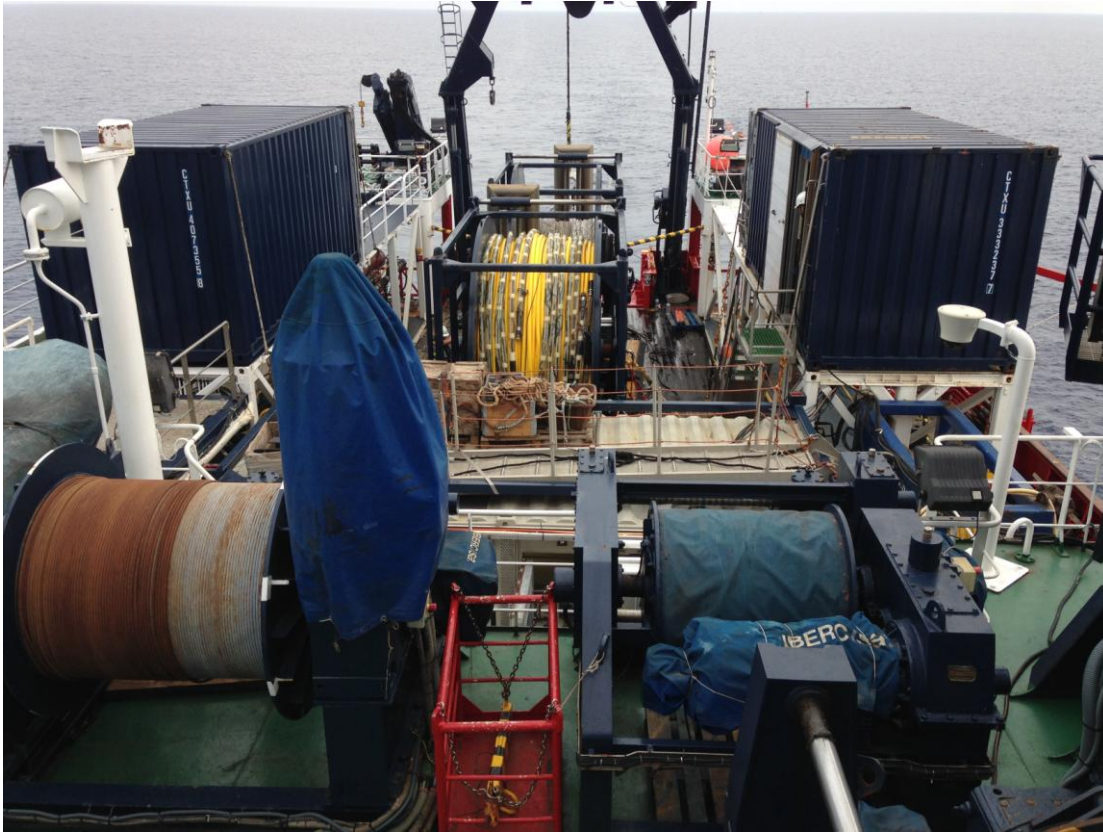


Fig. 1 Streamer onboard Research Vessel (R/V) Sarmiento de Gamboa during its deployment in the Ionian Sea in 2016. The 6-km-long streamer is contained in two winches on the working deck of the vessel.

The Research Vessel (R/V) Sarmiento de Gamboa will sail from Vigo (Spain) to the research area offshore Portugal, where the deployment of geophysical instrumentation will take place. The streamer (**Figure 1**) will be deployed from the ship from two winches, and in the operation of the Sarmiento de Gamboa the auxiliary boat R/V Garcia del CSIC will provide support and will also be alert in case passing boats need to be warned of the operation. The ship will collect several transects roughly perpendicular to the coast (**Figure 3**), approaching and sailing away from the shelf, as it gradually navigates towards the south. It will also collect data across the Goringe bank a several-km-tall ridge offshore Cape of San Vicente. The ridge was possibly formed by one of the largest faults in the regions, and its activity is not well understood. The R/V Sarmiento de Gamboa will sail further into Moroccan waters and later will finish the cruise in the port of Cádiz.

Airgun Seismic Source

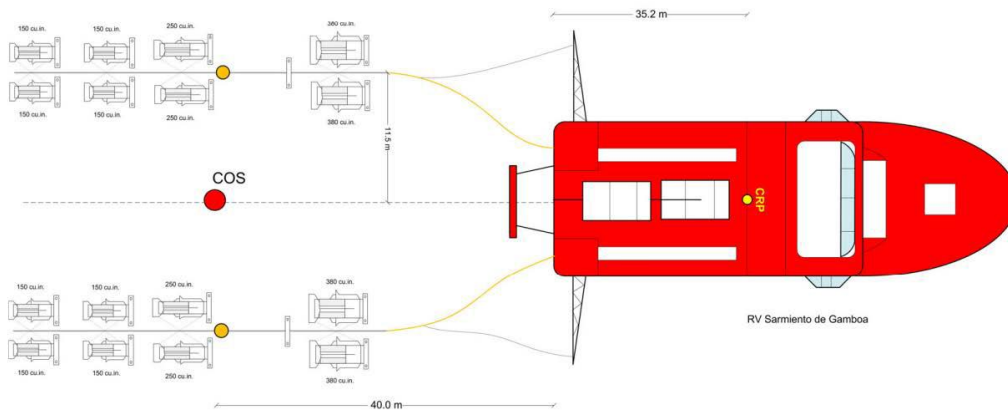


Figure 2.- Example of airgun array like the one to be used in the FRAME-OBS survey. It is constituted by two sub-arrays of 8 airguns each that will hang ~10-15 m below sea surface.

An airgun seismic source composed of two sub-arrays with 8-10 units each and a total capacity of ~3,500-4,500 c.i. (**fig. 2**), will be used to generate the acoustic signal to be recorded by the OBS/H along the three profiles. The acquisition speed will be of ~4.5 knots, meaning an average acquisition time of ~36 hours for a 300 km-long profile. During data acquisition, we will follow a protocol of best practice based on the Joint Nature Conservation Committee (JNCC) guidelines to minimize impact on marine wildlife. A team of dedicated Marine Mammal Observers (MMOs) will embark to supervise all airgun shooting operations using both visual and Passive Acoustic Monitoring (PAM) systems. As it is recommended by the JNCC, data acquisition will consist of three phases. First, a pre-shooting phase to search for marine mammals inside the mitigation area (MA) previously defined by the MMOs, will begin 1h before start shooting. This phase will be reinitiated if a mammal is observed inside the MA. The soft-start and ramp up phase will initiate once the pre-shooting phase is successfully completed. During this second phase, shooting will start with a single unit at minimum pressure, and the rest of units will be progressively incorporated during the following 20 minutes, until the source operates at full power. Shooting shall immediately stop if a mammal is observed inside the MA, and the pre-shooting phase will start again only once MMOs confirm that the mammal left the MA. A report including all MMO and PAM operations and incidences during the survey will be included in the final survey report to be delivered to Portuguese authorities.

5 - GEOGRAPHICAL AREAS

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

<u>Zone 1:</u> (Portugal)	<u>Zone 2:</u> (Portugal)	<u>Zone 3:</u> (Marruecos Portugal)
14.5°W, 40.90°N	14.70°W, 38.6°N	07.40°W, 33.90°N
14.5°W, 39.45°N	14.70°W, 37.2°N	09.35°W, 32.85°N
09.0°W, 39.45°N	09.05°W, 37.2°N	12.35°W, 36.75°N



09.0°W, 40.90°N

09.65°W, 38.6°N

10.40°W, 37.80°N

ZONES 1-3 are shown as shaded polygons in the map of figure 3.

5.2. Attach chart(s) at an appropriate scale showing the geographical areas of the intended work and, as far as practicable, the positions of intended stations, the tracks of survey lines, and the locations of specific equipments or facilities:

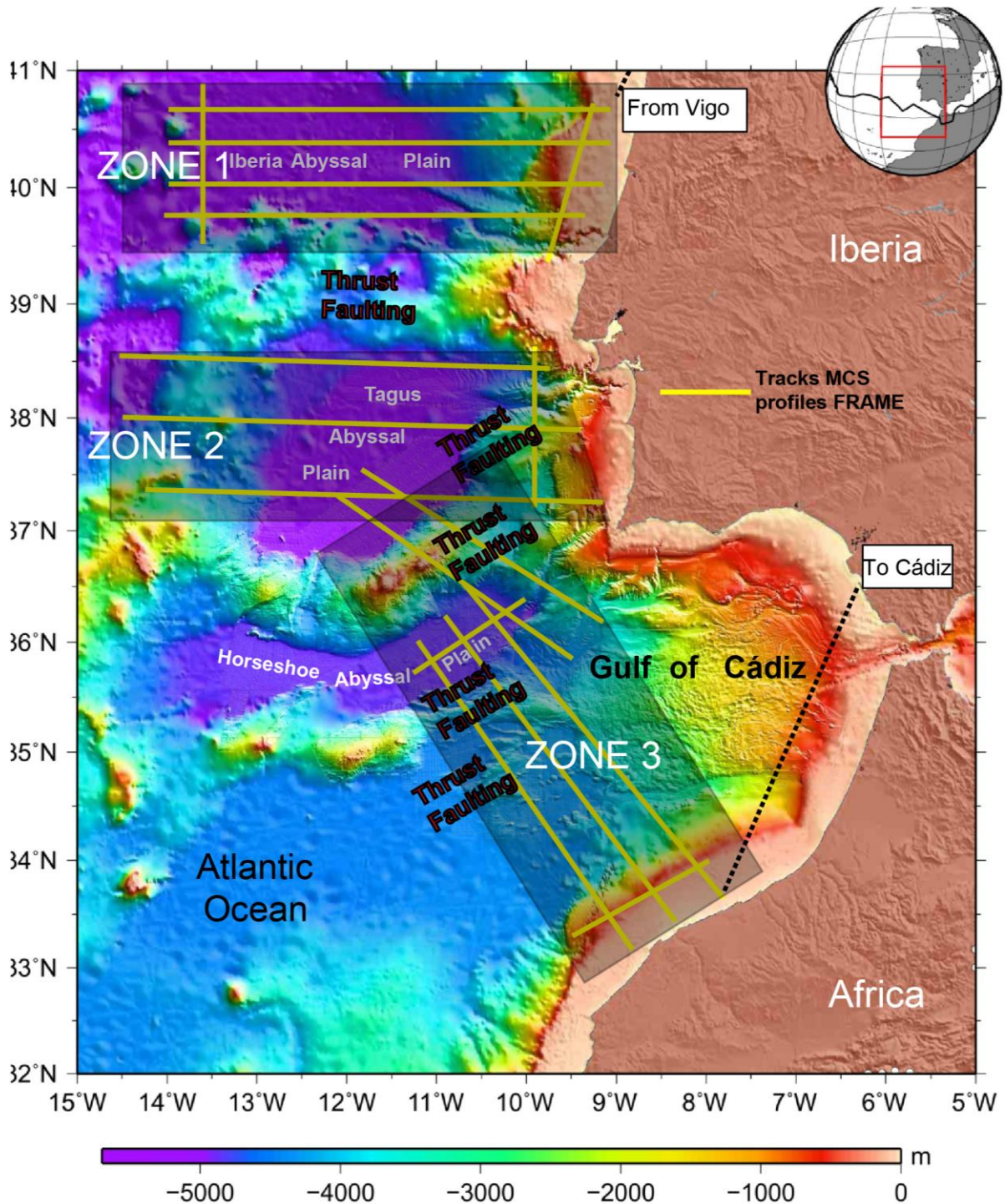


Figure 3.- Track chart of multichannel seismic reflection profiles (in yellow) to be collected during the FRAME cruise displayed over bathymetric map. The semi-transparent boxes indicate areas of operation

of the cruise with corners indicated in tables above.

6 - DATES

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

entry date : 5 July 2018

departure date : 28 July 2018

6.2 Indicate if multiple entry is expected:

No

7 - PORTS CALLS

7.1. Dates and names of intended ports of call in Lisbon:

No port calls in Morocco harbors are planned.

7.2. Any special logistical requirements at ports of call:

N.A.

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

N.A.

8 - PARTICIPATION

8.1. Proposed dates and ports for embarkation/disembarkation:

start date : 4 July 2018 (Vigo, Spain)

end date : 29 July 2018 (Cádiz, Spain)

9 - ACCESS TO DATA, SAMPLES AND RESEARCH RESULTS

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

A preliminary report will be submitted to the institution designed by Moroccan authorities within 2 months after the end of the survey.

9.2. Proposed means for access by the Moroccan scientific and public entities, to data and samples:

A copy the raw data acquired during the survey will be given to the Moroccan Institution in charge designed by Moroccan authorities.

9.3. Proposed means of making research internationally available:

All the scientific results obtained with the data acquired during the FRAME-MCS survey will be made publically available through presentation at international scientific meetings, workshops and conferences, as well as with publications in SCI-indexed journals.

The publication work will be largely done in collaboration with Portuguese scientists

ANNEX

List of the scientific team

1. Prof. César R. Ranero, Institute of Marine Sciences-CSIC, Spain
2. Dr. Alcinoe Calahorrano Betancurt, Institute of Marine Sciences-CSIC, Spain
3. Irene Merino Pérez, Institute of Marine Sciences-CSIC, Spain
4. Dr. Adrià Meléndez Catalán, Institute of Marine Sciences-CSIC, Spain
5. Miquel Camaroft Blanco, Institute of Marine Sciences-CSIC, Spain
6. Dr. Estela Jiménez Tejero, Institute of Marine Sciences-CSIC, Spain
7. Dr. Alejandra Lago Cameselle, Universidad de Vigo, Spain
8. Prof. Luis Pinhero, Depart. de Geociências, Universidade de Aveiro, Portugal
9. Dr. Marta Neres, Instituto Português do Mar e Atmosfera, Portugal
10. Chantelle Roelofse, University of Cardiff, UK.
11. Moroccan observer/scientist #1
12. Moroccan observer/scientist #2
13. Marine Technology Unit from CSIC technician
14. Marine Technology Unit from CSIC technician
15. Marine Technology Unit from CSIC technician
16. Marine Technology Unit from CSIC technician
17. Marine Technology Unit from CSIC technician
18. Marine Technology Unit from CSIC technician
19. Marine Technology Unit from CSIC technician
20. Marine Technology Unit from CSIC technician