

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

Date: 31.03.2017

1 - GENERAL INFORMATION

1.1. Cruise name and/or number: Cruise PES-1

1.2. Sponsoring institution:

Instituto Português do Mar e da Atmosfera (IPMA, IP)
Divisão de Geologia e Georecursos Marinhos
Rua C do Aeroporto
1749-077 Lisboa
Portugal

1.3. Scientist in charge of the project:

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

Vitor Hugo Magalhães (IPMA)
Pedro Madureira (EMEPC)
Luís Sebastião (IST)

1.5. Submitting officer:

Instituto Português do Mar e da Atmosfera (IPMA, IP)
Divisão de Geologia e Georecursos Marinhos
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Unidade de Subvoo Navios Europeus
Ministério dos Negócios Estrangeiros

2 - DESCRIPTION OF THE PROJECT

2.1. Nature and objectives of the project:

The PES project is a process-oriented multidisciplinary project focused on the pockmarks, fluid migration and seepage recently discovered in the Estremadura Spur continental shelf (Portugal), and on their implications to the regional geology, to the evolution of this section of the margin and to their petroleum system, and their significance to the ecosystems.

A field with more than 40 individual pockmarks, covering an area of at least 27 km², was recently discovered and partially surveyed (Kim and shipboard scientific party, 2011; PACEMAKER project funded by the European Research Council). This data set was made available for this project. This field of pockmarks is located at the outer shelf of the Estremadura Spur, between 200 and 350 m water depth, with individual pockmarks up to 120 m in diameter and 10 m depth. A preliminary processing of the backscatter data indicate that some pockmarks have a high acoustic seafloor reflectivity in their central part, most probably indicating the presence of methane-derived authigenic carbonate hard-grounds. While fluid flow is a widespread process in continental margins and sedimentary basins, this is the first record of fluid escape processes were not previously identified on the W Iberian margin. Gas seepage evidence in the Iberia margin has only been reported in estuarine environments such as the Ria de Vigo (Iglesias and Garcia-Gil, 2007), the Aveiro Estuary/lagoon (Duarte et al., 2007), and in the Gulf of Cadiz (Magalhães, 2007; Magalhães et al., 2012; Pinheiro et al., 2003). This pockmark field and underlying fluid generation and escape processes, which are the focus of this project, are thus the first fluid seepage system identified and reported from the W Portuguese margin, not yet investigated.

Fluid seeps are highly dynamic systems characterized by strong coupling processes between the geosphere, biosphere, hydrosphere and atmosphere. As such, PES is a comprehensive and transdisciplinary investigation of the Estremadura Spur fluid seepage manifestations.

This cruise is the main cruise of this research project and the main objective of the cruise is to recollect geophysical and samples to fulfill the objectives of the project. We will investigate this pockmarks field and characterize these structures to understand their structural and stratigraphic control based on: 1) sampling with Gravity corer and Smith McIntyre grab; 2) Sarmiento swath bathymetry; 3) Parasound and 2D multichannel sparker seismics; 4) ROV Luso direct observation of the seafloor.

This campaign will extend and complement the datasets that were previously acquired during the PECAMAKER cruise (2001) onboard the RV Pelagia and during the EMEPC/Luso 2015 cruise on-board the RV Gago Coutinho.

2.2. Relevant previous or future research cruises:

Relevant previous research cruises: PACEMAKER (2011) and EMEPC/ROV/2015

2.3. Previously published research date relating to the project:

Duarte, D., 2015. Identification and characterization of fluid escape structures (pockmarks) in the Estremadura Spur, based on single-channel seismic reflection record, *Geology*. University of Lisbon, University of Lisbon, p. 158.

Duarte, D., Magalhães, V.H., Terrinha, P., Ribeiro, C., Madureira, P., Pinheiro, L.M., Benazzouz, O., Kim, J.H., Duarte, H., 2017. Identification and characterization of fluid escape structures (pockmarks) in the Estremadura Spur, West Iberian Margin. *Marine and Petroleum Geology* 82, 414-423.

3 - METHODS AND MEANS TO BE USED

3.1. Particular of 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

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

3.2.2 EMEPC ROV Luso

The ROV Luso is a ARGUS class ROV from the EMEPC and is composed by the following operational units:

Control Container: standard 20" feet container

Workshop Container: standard 10" feet container

Spare Parts Container: standard 10" feet container

Launch and Recovery system: 7.35 x 2.9 x 3.42 m (L x W x H)

Power Generator (not mandatory) 4 x 2.435 x 2.571 m (L x W x H)

3.3. Particulars of methods and scientific instruments:

		Distance to shore			
<i>Provide a list of the main scientific equipment that is going to be used, saying the waters where it will be used / installed</i>	<i>Fisheries research within the established fishing limits</i>	<i>Research related to the continental shelf beyond the limits of the coastal state</i>			
			<i>Within 12 nautical miles</i>	<i>Within 12 and 50 nautical miles</i>	<i>Within 50 and 200 nautical miles</i>
Swath bathymetry and backscatter. Hull-mounted on "BO Sarmiento"	No	Yes	No	Yes	No
Sub-bottom profiler TOPAS Hull-mounted.	No	Yes	No	Yes	No
Gravimeter. Hull-mounted	No	Yes	No	Yes	No
Ocean Bottom Seismometer	No	No	No	No	No

3.4. Indicates whether harmful substances will be used: No harmful substances will be used

3.5. Indicate whether drilling will be carried out: No drilling will be used

3.6. Indicate whether explosives will be used: No explosives will be used

4 - INSTALLATIONS AND EQUIPMENTS

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

ROV dives

Seafloor HD video observation and still photos of selected pockmarks will be carried out with the EMEPC ROV Luso. The dives will be conducted preferably during day light period and limited to a maximum of 12 hours of continuous operation. 4 or 5 dives will be attempted. Sampling of rocks, biology, corers, suction are planned to be recollected during the dives.

Sediment sampling

Sediment samples will be collected with the RV Sarmiento de Gamboa Gravity Corer. Surface sampling with the IPMA Smith McIntyre grab will also be attempted.

Multibeam bathymetry

Multibeam bathymetry will be acquired with the RV Sarmiento de Gamboa ATLAS HYDROSWEEP DS system. This data will be acquired in continuous (except with the ROV dives). A simple post processing of the data will be done on-board in order to plan the sampling stations and the ROV dives.

Parasound

Parametric PARASOUND P35 data will be acquired, recording also the water column in order to evaluate the presence of any gas flare.

Multibeam and Parasound will be acquired simultaneously during the night along parallel N-S lines, as illustrated in Figure 2, in order to complete the (Pacemaker and EMEPC) multibeam coverage already available. The exact positioning of the survey lines will be a function of the multibeam swath coverage that depends on the water depth, but an average spacing of 800 m is considered for planning.

Seismics

High resolution multichannel sparker seismics will be acquired using the UTM-CSIC new system.

Table 2. Location of the ROV dives and sampling stations. Sampling stations (gravity coring and Grab) From this list, only 10-12 stations will be done and will be selected based on the geophysical survey with multibeam and the ROV dives.

<i>point #</i>	<i>Latitude</i>	<i>Longitude</i>	<i>Depth (m)</i>	<i>ROV Dives</i>
pk-20	39.25130	-9.97756	287	Yes
pk-23	39.26791	-9.98310	312	
pk-24	39.26578	-9.97399	398	
pk-25	39.26541	-9.97275	395	
pk-32	39.26605	-9.96736	289	
pk-31	39.26347	-9.95854	276	
pk-26	39.26190	-9.96124	275	
pk-30	39.26256	-9.95270	270	
pk-29	39.25910	-9.95657	272	
pk-27	39.25966	-9.95734	271	
pk-28	39.25946	-9.95692	271	
pk-22	39.25956	-9.97549	294	
pk-21	39.25845	-9.97773	301	

vh-01	39.289394	-10.03830	318	Yes
vh-03	39.289394	-10.03830	325	
vh-04	39.237579	-10.03560	352	
vh-05	39.239433	-10.03270	350	
vh-06	39.242515	-10.03401	387	
auv01	39.286170	-10.21590	970	Yes
auv02	39.183330	-10.26667	970	

5 - GEOGRAPHICAL AREAS

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

The working area corresponds to the Estremadura Spur area, located on the West Iberian margin, between Cabo Carvoeiro and Cabo da Roca (Map in Figure below), in a field with more than 40 pockmarks was recently discovered. The NW region of the Estremadura Spur outer shelf (Lourinhã Monocline) will be the main target of this cruise, located between latitudes 39°07.10' N and 39°22.30'N; and at longitudes between 9°47.70'W and 10°19.00'W.

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:

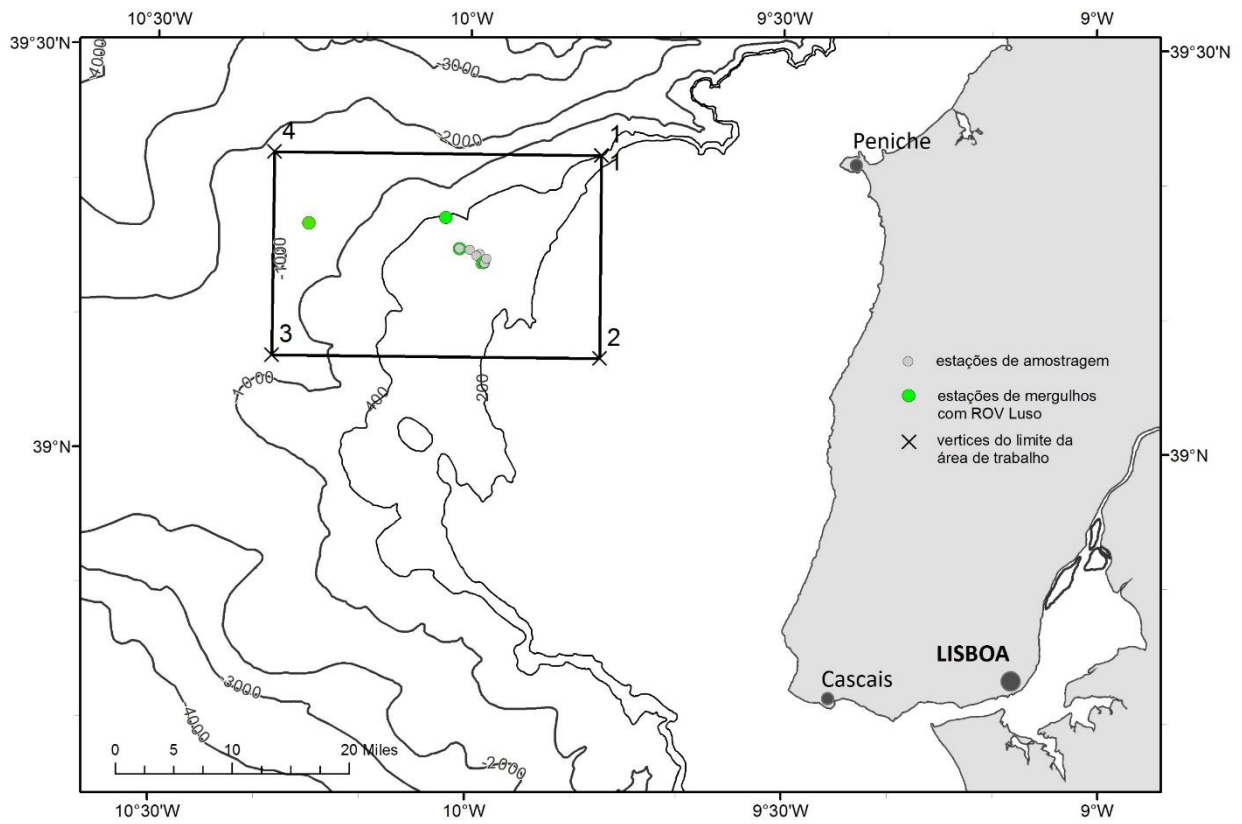


Figure 1. Proposed working area.

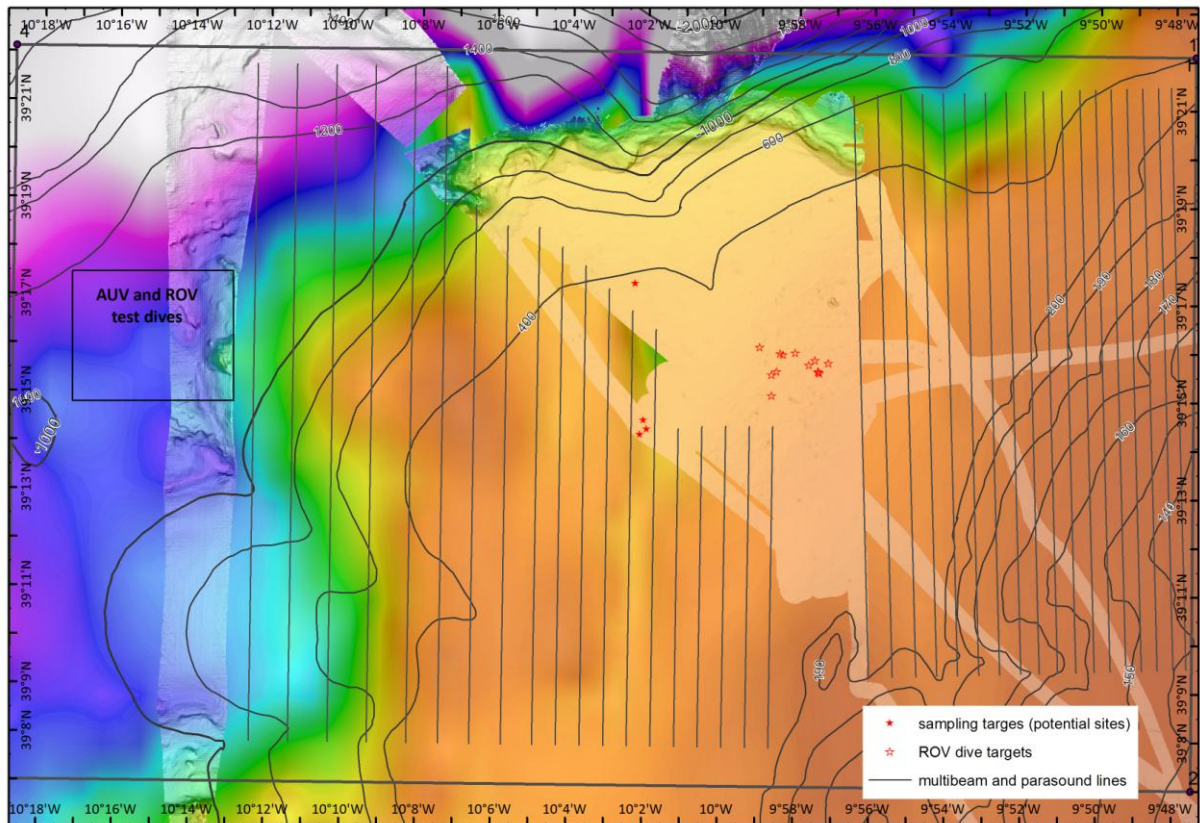


Figure 2. Location of the multibeam, PARASOUND and seismic survey lines.

Table 1. Limits of the working area (decimal degrees).

point #	Latitude	Longitude
1	39.36837350	-9.79136330
2	39.11685346	-9.79141683
3	39.11696443	-10.31285637
4	39.36848447	-10.31280284

6 - DATES

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

entry date : 18.05.2017

departure date : 22.05.2017

6.2 Indicate if multiple entry is expected: No, only one entry is expected.

7 - PORTS CALLS

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

Departure from Lisbon on the 18.04.2017

Arrive at Lisbon port on the 22.05.2017

7.2. Any special logistical requirements at ports of call: Truck and crane dedicated to the installation and recollection of the ROV containers will be contracted and organized by the scientific team.

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

see 3.1.

8 - PARTICIPATION

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

8.2. Proposed dates and ports for embarkation/disembarkation:

start date : 17.05.2017

end date : 23.05.2017

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: One month after the cruise

A final report will be elaborated, and sent to the contractor (Spanish National Research Council-CSIC), and to the designed Portuguese and international authorities.

The final report will contain the following information:

- The reference number of the authorization provided to the project applicant.

- Date and place of the project.
- Operations (date, time, duration, type).
- Number and types of vessels involved in the project.
- Registration of changes in acoustic activity (exchange of energy used, use of echo sounder, operational changes, etc.)
- Any other documentation required by the authorities.

9.2. Proposed means for access by the Portuguese scientific and public entities, to data and samples: Metadata will be open and available through the project and IPMA web pages, Data will be available by direct request to the PI project during the time frame of the project.

9.3. Proposed means of making research internationally available: Cruise report will be available through the IPMA web page, through the project web page and under request to the project PI.

ANNEX

List of the scientific team

(List to be completed soon)

	Name	Institution	E-mail	Nationality	Passport n.	phone +351
1	Vitor Magalhaes	IPMA	vitor.magalhaes@ipma.pt	Portuguese		963363810
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6	Marina Cunha	Univ Aveiro		Portuguese		
7	Clara Rodrigues	Univ Aveiro		Portuguese		
8	Miguel Caetano	IPMA		Portuguese		
9	Mário Mil-Homens	IPMA		Portuguese		
10	Ana Isabel Rodrigues	IPMA		Portuguese		
11	Pedro Madureira	EMEPC		Portuguese		
12	Antonio Calado	EMEPC	antonio.calado@emepec.mm.gov.pt	Portuguese		963282369
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14	Miguel Souto	EMEPC	miguel.souto@emepec.mm.gov.pt	Portuguese		924202232
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16	Renato Bettencourt	IMAR	rpmartins@uac.pt	Portuguese		965708604
17	Cristina Roque	EMEPC	cristina.roque@emepec.mamaot.pt	Portuguese		
18	Luis Sebastião	IST	l.sebastiao@isr.ist.utl.pt	Portuguese		
19	Medusa person	IST		Portuguese		
20	Medusa person	IST		Portuguese		
21	Medusa person	IST		Portuguese		
22	UTM/CSIC technician	UTM/CSIC		Spanish		
23	UTM/CSIC technician	UTM/CSIC		Spanish		
24	UTM/CSIC technician	UTM/CSIC		Spanish		
25	UTM/CSIC technician	UTM/CSIC		Spanish		
26	UTM/CSIC technician	UTM/CSIC		Spanish		