

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

Date: 13/02/2024

1 - GENERAL INFORMATION

1.1. Cruise name and/or number: BIOCAL

1.2. Sponsoring institution:

Name: Institute of Environmental Science and Technology (ICTA-UAB)
Universitat Autònoma de Barcelona
Address: Campus UAB, ICTA-UAB, Edifici Z, Carrer de les columnas, E- 08193
Bellaterra (Cerdanyola del Vallès - Barcelona), SPAIN
Phone: (+34) 935 86 83 85
Director: Isabel Pont

1.3. Scientist in charge of the project:

Name: Patrizia Ziveri
Address: Institute of Environmental Science and Technology (ICTA-UAB)
Universitat Autònoma de Barcelona, Campus UAB, ICTA-UAB, Edifici Z,
Carrer de les columnas, E- 08193 Bellaterra (Cerdanyola del Vallès -
Barcelona), SPAIN
Phone: (+34) 935 868 974
Email: patrizia.ziveri@uab.cat

1.4. Scientist from ICTA-UAB involved in the planning of the project:

Patrizia Ziveri, Michaël Grelaud

1.5. Submitting officer:

Name: Patrizia Ziveri
Address: Institute of Environmental Science and Technology (ICTA-UAB)
Universitat Autònoma de Barcelona, Campus UAB, ICTA-UAB, Edifici Z,
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Phone: +34 93 586 6154
Email: patrizia.ziveri@uab.cat

2 - DESCRIPTION OF THE PROJECT

2.1. Nature and objectives of the project:

The overall objective of this campaign is to improve our understanding and quantification of the biodiversity of abundant groups of calcifying marine phyto- and zoo- planktonic organisms (coccolithophores, foraminifers and pteropods) during periods of rapidly changing environmental conditions (last glacial/interglacial transition and last 2000 years) along a latitudinal transect in the North Atlantic. The campaign will start from Vigo (north-western Spain) before heading south-west to reach the Azores archipelago, then heading north along the eastern side of the mid Atlantic ridge. Around 50°N, the cruise will head North-east between Iceland and Faroes islands to reach 75°N, south of Svalbard. The campaign will stop in Iceland. The transect which will cross strong physico-chemical gradients, will permit to study the natural diversity of the targeted organisms in different environmental conditions and to characterize the factors controlling their distribution at a large spatial scale.%

It is foreseen to collect water samples with a CTD/Rosette to assess the abundance and the diversity of living coccolithophores in the photic zone as well as in the underneath layers of the ocean (marine snow). The diversity and abundance of pteropods and foraminifers will be measured by collecting living organisms from the upper 1000m with a multinet. The device will be deployed to integrate different layers from the surface with a thickness ranging from 250m to 50m. This approach will be useful as these organisms can migrate through the water column following diurnal cycles. We plan to equally distribute the number of samples collected during the day or the night along the latitudinal transects. These organisms will be sampled as well in the surface waters with a neuston net. Environmental parameters such as the temperature, salinity or PAR will be recorded from the CTD and water samples will be used to characterize the carbonate system and nutrients contents.%

We plan to retrieve marine sediment (gravity core, multicore, box core) to study variation in abundances and diversity of the selected organisms through periods of rapid changing environmental conditions. We will retrieve material from the last two millennia (multicore/box core) and from the last glacial/interglacial period (gravity core). As different sampling sites are foreseen from the subtropics to polar region, we anticipate getting knowledge on the spatial distribution and diversity of these organisms through time. All the stations where we plan to collect sediment are well above the carbonate compensation depth, suggesting good preservation of selected organisms.

2.2. Relevant previous or future research cruises:

- MedSeA cruise on R/V Ángeles Alvariño , longitudinal transect across the Mediterranean Sea (May 2013)
- CDisK-IV (KM1712) cruise on R/V Kilo Moana from Hawaii to Alaska (August 2017)
- MERS-BLUEISLANDS cruise on R/V Sarmiento de Gamboa in Northwestern Mediterranean Sea (December 2019)

2.3. Previously published research data relating to the project:

Ziveri, P., Gray, W.R., Anglada-Ortiz, G. et al. Pelagic calcium carbonate production and shallow dissolution in the North Pacific Ocean. *Nat Commun* 14, 805 (2023). <https://doi.org/10.1038/s41467-023-36177-w>

Pallacks, S., Ziveri, P., Schiebel, R. et al. Anthropogenic acidification of surface waters drives decreased biogenic calcification in the Mediterranean Sea. *Commun Earth Environ* 4, 301 (2023). <https://doi.org/10.1038/s43247-023-00947-7>

Johnson, R., Manno, C., Ziveri, P. Shelled pteropod abundance and distribution across the Mediterranean Sea during spring. *Progress in Oceanography*, 210, 102930 (2023). <https://doi.org/10.1016/j.pocean.2022.102930>

Johnson R, Langer G, Rossi S, Probert I, Mammone M, Ziveri P (2022) Nutritional response of a coccolithophore to changing pH and temperature, *Limnology and Oceanography*, 67, 10, 2309-2324. <https://doi.org/10.1002/lno.12204>

Pallacks S, Ziveri P, Martrat B, Mortyn PG, Grelaud M, Schiebel R, Incarbona A, Garcia-Orellana J, Anglada-Ortiz G (2021) Planktic Foraminifera changes in the western Mediterranean Anthropocene, *Global and Planetary Change*, 204, 103549 <https://www.sciencedirect.com/science/article/abs/pii/S092181812100134X?via%3Dihub>

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:

Phone:
INMARSAT: +870773931000 (Bridge)
VSAT: +34911930359 (Bridge)
Cellular: +34679510317
Email: capitan.sdg@utm.csic.es

Name of master :
Pedro A. Herrera Brito
Miguel A. Menéndez Pardiñas
Number of crew: 16
Number of scientists on board: 26

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

NOT APPLICABLE

3.3. Particulars of methods and scientific instruments:

Types of samples and data	Methods to be used	Instruments to be used
Coccolithophore abundances in the water column	Bulk water (3-5L per sample) at different water depth	Niskin Bottle
Pteropod and foraminifer abundances	Water towing at different water depth	Multinet (Hydrobios Mammoth), BONGO net (Hydrobios) and Neuston net (Sea Gear)
Environmental parameters (temperature, salinity, fluorescence,...)	Continuous measurement across the water column from the surface to the seafloor	CTD SBE 19plus Sea-Bird Scientific
Carbonate system parameters	Bulk water (0.5L per sample) at different water depth	Niskin Bottle
Nutrient content	Bulk water (0.25L per sample) at different water depth	Niskin Bottle
Fluxes of particulate inorganic carbon at 100m and 200m of water depth	Continuous flow of falling particles from the surface down to 100-200m for 24-36 hours	Short term drifting sediment trap
Abundances of coccolithophores, pteropods and foraminifers preserved in marine sediments	Bulk sediment	Gravity core Multi core Box core

3.4. Indicates whether harmful substances will be used:

NOT APPLICABLE

3.5. Indicate whether drilling will be carried out:

Marine sediment cores will be collected with a gravity core (up to 5m of sediment), a multi core (up to 0.6m of sediment) and a box core (up to 0.5m of sediment).

3.6. Indicate whether explosives will be used:

NOT APPLICABLE

4 - INSTALLATIONS AND EQUIPMENTS

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

NOT APPLICABLE

5 - GEOGRAPHICAL AREAS.

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

2 stations are foreseen in the waters of Iceland:

- St9: 61.482°N; 19.536°W
- St18: 66.763°N; 18.750°W

6 - DATES

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

entry date : 30/08/2024

departure date : 15/09/2024

6.2 Indicate if multiple entry is expected:

Yes, 30/08/2024 (1st entry) – 31/08/2024 (1st departure); 14/09/2024 (2nd entry) – 15/09/2024 (final destination).

7 - PORTS CALLS

7.1. Dates and names of intended ports of call in Iceland: 15/09/2024, Reykjavik.

7.2. Any special logistical requirements at ports of call: NOT APPLICABLE

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

8 - PARTICIPATION

8.1. Participants on the BIOCAL cruise are members of the Research and Working Team of the BIOCAL Project (see Annex).

8.2. Proposed dates and ports for embarkation/disembarkation:

Start: Vigo date: 16/08/24

End: Reikiavik date: 15/09/24

9 - ACCESS TO DATA, SAMPLES AND RESEARCH RESULTS

9.1. A preliminary report will be submitted to Portugal authorities within 3 months after the end of the cruise. The final report with the data analysis and interpretation will be issued at the end of the BIOCAL project.

9.2. Proposed means for access by Iceland to data and samples: all the data collected during the BIOCAL campaign will be made publicly available through open access data repository such as PANGAEA (<https://www.pangaea.de/>).

9.3. Proposed means of making research internationally available:



All the data collected during the BIOCAL campaign will be made publicly available through open access data repository such as PANGAEA (<https://www.pangaea.de/>).

ANNEX

List of the scientific team

1	Patrizia Ziveri (ICTA-UAB)
2	Michaël Grelaud (ICTA-UAB)
3	Graham Mortyn (ICTA-UAB)
4	Gerald Langer (ICTA-UAB)
5	Stéphanie Birnstiel (ICTA-UAB)
6	Arturo Lucas (ICTA-UAB)
7	Mouna Chambon (ICTA-UAB)
8	Thais Pexodo Maceto (ICTA-UAB)
9	Athina Kekelou (ICTA-UAB)
10	Griselda Anglada Ortiz (Centre for Artic Gas Hydrate, Environment and Climate, Norway)
11	Clara Manno (British Antarctic Survey, UK)
12	Ian Probert (Station Biologique de Roscoff, France)
13	Richard Norris (Scripps Institution of Oceanography, University of California San Diego, USA)
14	Alessandro Incarbona (Dipartimenti de Scienze della Terra e del Mare, Università degli Studi di Palermo, Italy)
15	Jeremy Young (University College of London, Earth Science, UK)
16	Joost C. de Vries (School of Geographical Sciences, University of Bristol, UK)
17	Sonia Chaabane (FRB-Cesab Institut Bouisson Bertrand, France)
18	Nina Keul (Christian-Albrechts-Universität, Kiel, Germany)
19	Stergios Zarkogiannis (Department of Earth Science, University of Oxford, UK)
20	Thibault de Garidel-Thoron, (Centre Européen de Reserche et d'Enseignement des Géosciences de l'Environnement, France)
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The list will be updated 2 months prior the cruise.