



SOLICITUD DE BUQUE OCEANOGRÁFICO PLAN DE CAMPAÑA

DATOS DEL/DE LA INVESTIGADOR/A PRINCIPAL:

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DATOS DEL PROYECTO:

1. Título del Proyecto: **DisEntangling Seasonality of Active Flux In the Ocean**
Acrónimo: **DESAFÍO**

Indicar el área temática del Plan Estatal a la que se solicita: CTM/MAR

Relación con grandes proyectos o programas internacionales: SUMMER (BG03)

2. Jefe de Campaña: Santiago Hernández León

3. Indicar cuántas campañas se solicitan para el proyecto:

1ª Campaña: DESAFÍO Invierno de 2023

2ª Campaña: DESAFÍO Otoño de 2023

Se solicitan dos campañas pues se quiere estudiar la estacionalidad del flujo activo durante la época productiva debido a la mezcla vertical (invierno) y la época oligotrófica de máxima estratificación en la columna de agua (otoño).

4. Indicar, en orden de preferencia, los buques en los que se podría desarrollar esta actividad. En el caso de necesitar un buque en concreto, justificarlo detalladamente.

Se solicita el buque oceanográfico “Sarmiento de Gamboa” pues contiene la infraestructura en acústica (ecosondadores de distintas frecuencias) que será fundamental para evaluar las distintas capas de reflexión, las migraciones del zooplancton y micronecton, así como comparar con el perfilador acústico que vamos a utilizar adosado a la roseta (AZFP). La utilización del buque “Hespérides” en otras campañas con su limitación en acústica (así como los ruidos que produce el buque) no han permitido obtener datos satisfactorios. También se podrá utilizar la EK80 pues este buque tiene transductores nuevos que pueden utilizarse en broadband. Además, el Sarmiento de Gamboa dispone de los hidrófonos, sensores y electrónica Marport que pueden utilizarse hasta 2500 m de profundidad.

PLAN DE CAMPAÑA

RESUMEN DEL PLAN DE CAMPAÑA

Se realizarán dos campañas estacionales de 30 días de duración con objeto de estudiar el flujo de carbono particulado y activo (el realizado por los organismos migradores del zooplancton y micronekton), así como la variabilidad de los organismos meso- y batipelágicos migradores en el área comprendida entre el afloramiento de la costa africana, las aguas oligotróficas del giro subtropical, y la Corriente de Azores, para terminar en las aguas productivas al norte de las Azores. Este diseño de campaña permitirá estudiar una importante variedad de escenarios productivos en el océano en dos épocas del ciclo anual caracterizadas por la mayor productividad en invierno y la oligotrofia en otoño (ver proyecto).

Cruise planning.

The main objective of the Project is to estimate the active flux towards bathypelagic waters (carbon sequestration) with a large scale perspective. We propose two cruises during winter (vertical mixing) and autumn (stratification) covering mainly the subtropical zone of the Atlantic Ocean (Figure 1). Eleven 48 h oceanographic stations will be performed along a transect from the African coast, the Canary and Azores Islands. Oceanographic features will be studied through CTD-rosette casts performed in all the stations, and plankton and micronekton abundances and distribution patterns will be analyzed through samples taken from the epipelagic to the bathypelagic zones.

Acoustic data will be recorded along the transect and in all the oceanographic stations, which combined with the information obtained from the Acoustic Zooplankton Fish Profiler (AZFP) attached to the rosette sampler will allow a complete acoustic and visual picture of plankton and micronekton layers. The use of different nets (Mocnes and Mesopelagos or MOHT) to obtain the ground truth will give an insight into the overall biomass of these communities. Calibration of echosounders will be performed leeward of Lanzarote Island. Our experience and knowledge in this area makes it a suitable place (calm, weak currents, and deep) for this work.

Two considerations are given to the managers of the oceanographic fleet (Cocsabo). Firstly, the cruises should begin in the Canaries in order to avoid sending the equipment and material to a foreign country (bureaucratic and customs problems) or to a mainland port (e.g., Vigo) because it is also a problem to send the lab equipment a month (or two) before, causing problems to the normal functioning of our laboratory (shared with other research groups). Finishing in Azores Islands, the equipment will be sent to Las Palmas without leaving the harbor, avoiding customs problems with the Canaries. Secondly, the days at sea should not be altered due to the short and minimum number of stations because of the complexity of sampling (48 h at station and long and tedious deployment of nets during day and night).

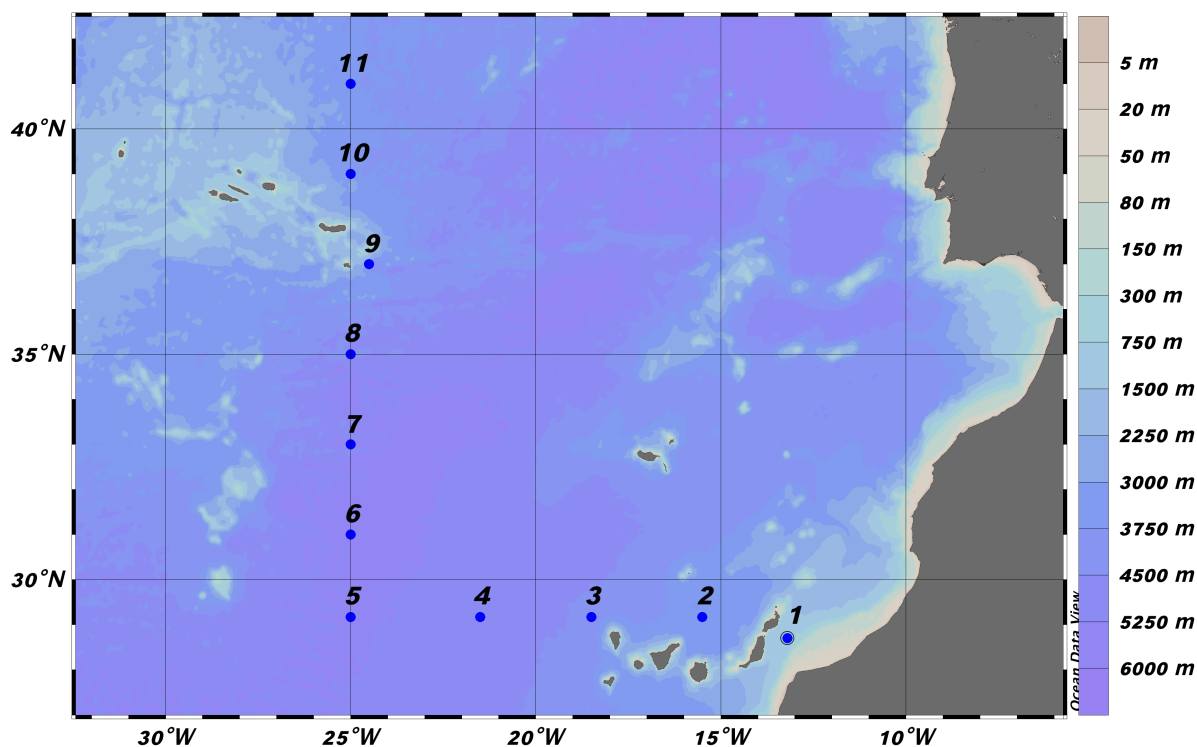


Figure 1. Location of sampling stations. Dots indicate 48 h stations to deploy the sediment trap, rosette sampler equipped with CTD, fluorometer, the Acoustic Zooplankton Fish Profiler, and video system, Moccus and Micronekton nets.

Station	Latitude	Longitude	Distancia	Distancia total
St	degrees	degrees	nm	nm
Las Palmas	28.08	-15.33	0	
1	28.70	-13.20	136	136
2	29.17	-15.50	136	272
3	29.17	-18.50	158	430
4	29.17	-21.50	158	588
5	29.17	-25.00	182	770
6	31.00	-25.00	110	880
7	33.00	-25.00	120	1000
8	35.00	-25.00	120	1120
9	37.00	-25.00	120	1240
10	39.00	-25.00	120	1360
11	41.00	-25.00	120	1480
Azores	37.50	-25.00	220	1700

Table 1. Position of oceanographic stations along the Atlantic transect.

We will carry out the next sampling:

Sampling will require two days at the oceanographic station (Figure 1).

First day at station. Zooplankton sampling.

Deployment of a drifting sediment trap: This instrument will be deployed at the start of the oceanographic station to measure the particle flux (POC, PON, and stable isotopes) at the base of the mixed layer (0.5 h for deployment).

Rosette-CTD cast by day: Temperature, salinity, oxygen, and fluorescence will be recorded using a CTD sensor mounted in a rosette sampler equipped with 24 Niskin Bottles (provided by the UTM) from the sea surface to 4000 m depth (~4 h). The rosette will be equipped with the AZFP (38, 125, 200 and 455 KHz) allowing a complete full depth acoustic profile of organisms.

Zooplankton net deployment by day: A 1 m² MOCNESS net with 9 nets of 200 µm (provided by the UTM) in the 0-2000 m depth layer (7 h during the day). Hauls will be oblique at a ship speed of ca. 2 knots.

Zooplankton net deployment by night: A 1 m² MOCNESS net with 9 nets of 200 µm (provided by the UTM) in the 0-2000 m depth layer (7 h at night). Hauls will be oblique at a ship speed of ca. 2 knots.

Rosette-CTD cast by night: Temperature, salinity, oxygen, and fluorescence will be recorded using a CTD sensor mounted in a rosette sampler equipped with 24 Niskin Bottles (provided by the UTM) from the sea surface to 4000 m depth (~4 h). The rosette will be equipped with the AZFP (38, 125, 200 and 455 KHz) allowing a complete full depth acoustic profile of organisms.

Acoustic sampling: In order to evaluate the vertical distribution and migration patterns we will use the standard hull mounted echosounders (EK80, provided by the UTM) during all the cruise.

Second day in station. Micronekton sampling.

Micronekton net deployment by day: A Mesopelagos 15x5 m net or alternatively a 5 m² Matsuda-Oozeki-Hu trawl (MOHT), both provided by the project, equipped with 4 and 2 mm mesh size will be deployed in the 0-2000 layer (8 h during the day). Depth strata of each haul will be decided according to the acoustic sound layers.

Recovery of the drifting sediment trap (1 h).

Short rosette-CTD cast: Deployment of the rosette in the 0-200 m layer in order to obtain samples for primary production, microzooplankton grazing experiments and detailed sampling of the epipelagic community (1 h) requiring large volumes of water.



Micronekton net deployment by night: A Mesopelagos 15x5 m net or alternatively a 5 m² Matsuda-Oozeki-Hu trawl (MOHT), both provided by the project, equipped with 4 mm mesh size will be deployed in the 0-2000 m layer (8 h at night). Depth strata of each haul will be decided according to the acoustic sound layers.

Special support of ship crew:

All the handling at stations (CTD, nets, sediment traps,...) will require the assistance of the ship crew, especially the nets deployment. These maneuvers are relatively dangerous and should require special assistance. It is also compulsory the implication of the UTM team in these activities. Although the researchers in charge of all this equipment (senior scientists) have an important experience at sea, supervision by the ship crew is required for safe and security. Electronic, informatics, and acoustic experts from the UTM are also required.