JERICO-S3

Proposal for Transnational Access to Coastal Observatories

1st Call
2nd June 2020 - October 2020

Description of the project to be sent in pdf format to jerico.ta@marine.ie

Please consult access rules at http://www.jerico-ri.eu and contact the manager of the infrastructure/installation you wish to use before writing the proposal

The JERICO-S3 project is funded by the European Commission's
H2020 Framework Programme under grant agreement No. 871153
Project coordinator: Ifremer, France.

PART 1

1. GENERAL INFORMATION

Title of the project (255 characters max.)	**Frontal dynamics influencing Primary Production: investigating the onset of the spring bloom mechanism through gliders**
Acronym (20 characters max.)	**FRIPP-spring**
Applying Institution	**ISAC - Institute of Atmospheric sciences and Climate**
Host Institution	**SOCIB**
Host facility(ies)	**Glider**

Have you or other members of your user group previously used the requested facility(ies)?	X	Yes		No

If yes, please indicate the EU Program(s), the name of the project(s) and year(s) you or other members of your user group have used such facility(ies)	In past Jerico programs I have already accessed the facilities. In the last attempt the sampling was not done due to serious issues with the instrument, so I'm substantially proposing the same experiment, positively evaluated, to be performed.
If you have received transnational access support from a previous JERICO project, please list resulting publications, conference contributions, patents. List only the ones that acknowledge the support of the European Commission and JERICO	Frontal dynamics boost primary production in the summer stratified Mediterranean Sea A Olita, A Capet, M Claret, A Mahadevan, PM Poulain, A Ribotti, S Ruiz, ... Ocean Dynamics 67 (6), 767-782 A multiplatform experiment to unravel meso-and submesoscale processes in an intense front (AlborEx) A Pascual, S Ruiz, A Olita, C Troupin, M Claret, B Casas, B Mourre, ... Frontiers in Marine Science 4, 39 Effects of Oceanic Mesoscale and Submesoscale Frontal Processes on the Vertical Transport of Phytoplankton S Ruiz, M Claret, A Pascual, A Olita, C Troupin, A Capet, ... Journal of Geophysical Research: Oceans Observations of a phytoplankton spring bloom onset triggered by a density front in NW Mediterranean A Olita, S Sparnocchia, S Cusí, L Fazioli, R Sorgente, J Tintoré, A Ribotti Ocean Science

2. USER GROUP DETAILS

Indicate if the proposal is submitted by

X	an individual
	a user group

Principal Investigator (user group leader)

First and last name	Antonio Olita					
Gender	**X**	Male		Female	**Nationality**	Italiana
Institution	ISAC-CNR					
Address	% Dipartimento di FIsica - Università degli studi di Cagliari, CIttadella Universitaria di Monserrato					
Country	Italy					
Email address	antonio.olita@cnr.it					
Telephone	+39 3285321116					
Fax						
Previous user	**X**	Yes		No		

(duplicate below for each member of the user group)

3. HOST INFRASTRUCTURE

Indicate the JERICO-S3 host facility(ies) offered in Chapter 1 (Observing systems) you are interested in

(Tick more than one boxes if it is useful for your project)

		Short name	***Requested access time (UA*)***
	Cabled observatory		
	Ferrybox		
	Fixed platform		
	Fishing vessel		
	Glider	SLOCUM GLIDER	15 days
	Supporting facility		
	Special equipment		

**UA: please refer to the Infrastructure description in the JERICO-S3 website*

Modality of access

X	remote	*the measuring system is implemented by the operator of the installation and the presence of the user group is not required*
	partially remote	*the presence of the user group is required at some stage e.g. installing and un-installing*
	in person/hands on	*the presence of the user group is required/recommended during the whole access period*

If you wish to avail also of a support facility from Chapter 2, please fill in the table below

		Short name	***Requested access time (UA*)***
	Supporting facilities and specialized equipment		

**UA: please refer to the Infrastructure description in the JERICO-S3 website*

Modality of access

	remote	*the measuring system is implemented by the operator of the installation and the presence of the user group is not required*
	partially remote	*the presence of the user group is required at some stage e.g. installing and un-installing*
	in person/hands on	*the presence of the user group is required/recommended during the whole access period*

Explain briefly why you think your project will be best carried out at the specified host facility(ies)	We intend to sample oceanic meso and submesoscale in an area close to the host facility. Such a site is well known by the host and also by the proponent as testified by track records of publications.
If possible, list other JERICO-S3 facility(ies) where you think your experiment could alternatively be carried out	

Is there a facility similar to one/all those you wish to utilize in your country?		Yes	X	No
If yes, please indicate your reasons for requesting access to the JERICO-S3 facility(ies) you have chosen and also exist in your country				

4. REQUEST FOR A JERICO-S3 GRANT

(tick the box)

	Travel grant (*)
	Shipment of your equipment, if applicable

(*) travel, hotel and meals

Please provide a detailed and realistic budget for the expenses you expect to incur, including the number of people and days required. Explain clearly the role of each person for which a travel grant is requested.

Please note that a base amount of 3000-6000 € has been set for each facility involved in a TA project. The effective grant assigned to a project will be considered case- by-case depending on the type of access, the types and number of facilities requested, the length of stay, and the costs in the visited country.

We do not require any grant as the access will be fully remote.

PART 2

Note: This part contains material for the evaluation

1. SCIENTIFIC EXCELLENCE OF USER GROUP
(maximum score: 5)

Short biography of the PI ***(half a page)***

Antonio Olita, Bs in Marine Biology, Ms (II level) in Remote Sensing and GIS, Doctorate in marine Ecology and management of Biological Resources, is researcher in physical and biological oceanography, expert on data assimilation and ocean data analysis @ CNR. He works on projects mainly focused on operational oceanography and regional ocean forecasting. His scientific production is particularly dedicated to the physical/biological relationships at sea, with focus on mesoscale and sub-mesoscale dynamics.
Since 2013 has also been working with sea Gliders mainly through several JERICO-TNA project partecipations. He was engaged as co-convener and chair of a session on gliders and AUVs at the next EGU2018 general Assembly in Wien.
He also accessed glider facilities in 2020 through the EUMR program.

Expertise of the user group in the domain of the application ***(half a page)***

Expertise of the group in the domain of the application
The Proponent, under a different PI, successfully applied to a previous JERICO-TNA call (1st call) for the project named GABS, during which two glider launches were successfully accomplished. A peer reviewed paper was written and is currently under review for Ocean Science. Antonio Olita was also PI of a successive and successful proposal named FRIPP, that used gliders in an Area similar to the present proposal. During the first FRIPP project the gliders investigated the frontal dynamics influencing PP during stratification period while in the present project we propose to investigate the same dynamics but this time during bloom initiation. He also participated in other projects within JERICO-TNA, and JERICO-NEXT TNA. In particular during GABS, he investigated through a glider the onset of the bloom along the front, subject of the current proposal.
In 2018 A. Olita applied successfully for a FRIPP-2 project that was NOT performed only due to technical issues of the host due to glider navigation problems. So substantially the same project, we think still scientifically valid, with some minor modification, was proposed for this call.
He also applied successfully in 2019 for a Grant under the EUMR program for a sampling with gliders in Canary islands, successfully performed in 2020.

A list of 5 recent, relevant publications of the user group in the field of the project

1- Olita, A., Capet, A., Claret, M. et al. Frontal dynamics boost primary production in the summer stratified Mediterranean sea Ocean Dynamics (2017) 67: 767. https://doi.org/10.1007/s10236-017-1058-z

2 - Pascual A, Ruiz S, Olita A, Troupin C, Claret M, Casas B, Mourre B, Poulain PM, Tovar-Sanchez A, Capet A, Mason E, Allen J, Mahadevan AJT (2017) A multiplatform experiment to unravel meso- and submesoscale processes in an intense front

3 - Olita, A., Sparnocchia, S., Cusí, S., Fazioli, L., Sorgente, R., Tintoré, J., and Ribotti, A.: Observations of a phytoplankton spring bloom onset triggered by a density front in NW Mediterranean, Ocean Sci., 10, 657-666, https://doi.org/10.5194/os-10-657-2014, 2014.

4 - Olita A., Sorgente R., Ribotti A., Fazioli L, Perilli A., Pelagic primary production in the Algero-Provençal Basin by means of multisensory satellite data: focus on interannual variability and its drivers, (2011), Ocean Dynamics, 61, 7: 1005-1016

5 - Olita, A., Ribotti, A., Sorgente, R., Fazioli, L., & Perilli, A. (2011). SLA-chlorophyll-a variability and covariability in the algero- provençal basin (1997-2007) through combined use of EOF and wavelet analysis of satellite data. Ocean Dynamics, 61(1), 89-102

2. SCIENTIFIC AND TECHNICAL VALUE OF THE PROJECT
(maximum score: 5)

Description of the project

Main objectives *(half a page)*

The project aims to study, through a multisensor sea-glider mission supported by modeled and remotely-sensed data, the impact of frontal dynamics on the Phytoplankton production and distribution as inferred from fluorometric measurements.

The specific objectives are the following:

1) Observe the dynamics of the front in terms of: horizontal and vertical velocities; instabilities; mixing and enhanced dynamical stratification

2) Study the impact of such frontal dynamics on new production and on displacement of phytoplanktonic biomass in a well mixed regime, during the first onset of the early spring bloom, *and characterize phytoplankton community composition through an Optical Community Index*

Scientific background and rationale *(one page)*

The proposed research is to be carried out in the Algero provencal Basin, and specifically along and across the Front separating Provencal and Algerian sub Basin named North Balearic Front. Thisfront was sampled during the GABS project, a JERICO-TNA proposal funded during the first JERICO-FP7call whose main objective was to investigate the intermediate water masses variability.

During GABS the glider was programmed to sample down to 1000 meters but during the operations by chance, the front was intercepted. Nevertheless, we were able to capture the bloom initiation in coincidence of the inversion of heat fluxes, and consequent shutdown of turbulent convection (Olita et al. 2014).

Subsequently, I was PI of the FRIPP project during which a glider sampled another strong front (in the Alboran sea) during the stratification period, in order to understand the impact of frontal structures on Primary Production (assessed with a method described in Olita et al. 2017) and on phytoplanktonic biomass distribution.

The present project will benefit of experiences done in both past projects.It will be performed in the same area where we found frontal processes acting on biology during GABS (as in Olita et al. 2014) and the investigation will be conducted with a methodology similar to that of FRIPP.

More specifically, the project aims to study, through a multisensor sea-glider mission supported by modeled and remotely-sensed data, the impact of frontal dynamics on the Phytoplankton productionand distribution as inferred from fluorometric, PAR (desirable) and CTD measurements during theonset of the bloom across frontal areas were the onset of the stratification is enhanced by dynamicsand where we already observed that the spring bloom shows its first and early footprint within theMediterranean Basin.

The primary production (that we defined in the previous version of the document as “new” as we will study the early bloom stage so no relevant percent of recycled production should set during this stage.) will be assessed by using the methodology glider-based described in Hemsley et al. 2015 and, with some modification, in Olita et al. 2017.

The methodology consists in the application of the spectral model of Morel et al. 1991 (and successive modifications), that diagnostically estimates the production given the concentration of Chlorophyll-a (hereafter simply Chlorophyll) and PAR, weighted by parameters of production efficiency.

The equation is as follow:

$$PP = 12 \int_0^L \int_0^D \int_{\lambda_2}^{\lambda_1} \mathrm{Chl}(Z)\mathrm{PAR}(\lambda, Z, t)a^*(\lambda)\phi_\mu(\lambda, Z, t)\,d\lambda\,dZ\,dt$$

Where Chl is Chlorophill concentration, PAR is photosynthetically active radiation (measured in FRIPP-2 and derived in FRIPP-1) while phi is growth rate and a* is the absorption per unity of Chl that can be derived by literature.

For the present proposal, it would be optimal to collect directly theunderwater light field through a PAR sensor opportunely carried out by the glider, instead ofindirectly retrieving PAR values by empirical algorithms as successfully done during the first FRIPP (Olita et al. 2017).

About community composition, we will adopt the OCI, Optical Community Index, proposed by Cetinic et al. 2014, that we already used in Olita et al. 2017.The OCI is the ratio between Backscatter and fluorescence (both retrieved by the glider): large OCI means community driven by diatoms, i.e. the initial phases of a bloom, while lower values are characteristics of presence of larger cells, usually present during low production and/or during late bloom stages. The combination of such information (production and community composition) can provide very relevant information to understand the role of dynamical features during such an important stage of the seasonal cycle.

3. QUALITY OF THE WORK PLAN
(maximum score: 5)

Experimental method and work plan

Describe below the proposed method and work plan for the project

(one page)

In order to study the physical characteristics and dynamics of surface water masses across and along the North Balearic Front area (Fig.1) a SLOCUM glider, equipped with CTD , ECO-LAB FLNTU, oxygen sensor and PAR, fluorometer, will be deployed in February/March 2019 from Mallorca Island.

The glider will sample the area during a favourable period to observe phytoplankton distribution and assess primary production in relation to frontal dynamics (first 15 days of March 2019),just during the shutdown of turbulent convection and trying to match the bloom triggered by dynamical features (dynamical restratification).

For this reason we plan a “butterfly” sampling that will cross the front many times and increase the ability to resolve both spatially and temporally the process under investigation.

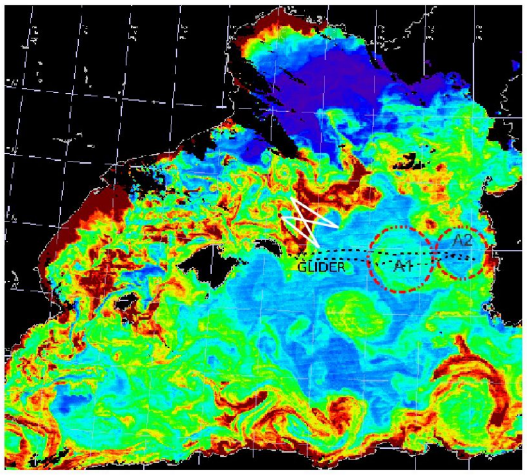


Fig.1 (modified from Olita et al. 2014) shows the Chl Image (MODIS-AQUA) for March, 8, 2013. In dashed black is represented the Glider path during GABS project, while in continous white is presented the proposed sampling plan for the present proposal. A1 and A2 are two eddies individuated during GABS, observed and described in Olita et al. 2014.

The sampling plan can be subject to last-minute modifications due to the displacement of the frontal area or to other contingencies like sea conditions, location of CHl and SST signature just before the mission start. Glider will sample the proposed area down to 200 m depth as the focus of the experiment is on surface and sub-surface dynamics.
Glider CTD and fluorometric measurements will be analysed and interpreted with the help of modelling and remotely-sensed synoptic data.

Proposed time schedule

Provide below a clear schedule for your project including interruption, restarts and expected duration of access time

(half a page)

-4 days in February/March 2021, 1 researcher
Accordingly with sea conditions, glider will be deployed and retrieved during the second visit of the personnel of CNR in February-March 2021
-The experiment should last about 12-15 days, planned accordingly with sea conditions on February-March 2021.

Please specify your requests regarding the use of your chosen facility's equipment/instruments/sensors, including any additional services, data or other requirements

We request the use of a SLOCUM glider equipped with CTD, ECO-FLNTU, Oxygen and, possibly, PAR and CDOM sensors. The processing chain for the PAR sensor will be developed by SOCIB personnel together with CNR-ISAC researchers before the launch of the glider experiment in march 2021.

List all material/equipment you plan to bring to the facility (if any)

NO visit to the facility is planned

Risks, contingencies and mitigation measures

Describe below the potential risks and contingencies that might occur during the project and how do you plan to avoid, mitigate or resolve them

#	Risk / Contingency	Prevention / Mitigation / Corrective action
1	1) Human Risks are those usually linked with the use of AUVs and to sea operations conducted on RVs. 2) RIsks related to the damage/loss of the facility	Formation about instrument use; good practices on board of the RV;
2		
3		

4. POTENTIAL FOR SEEDING LINKS WITH INDUSTRY
(maximum score: 5)

Do you think that this proposal has potential for seeding links with Industry? If so, how?

(half page)

There are no direct links with industry.
However, a deeper understanding of relationships between (sub-)mesoscale dynamics and phytoplankton bloom would help to better foresee potential ecological shifts in a scenario of changing climate. Pelagic PP on its turn is linked with the secondary production (consumers), especially in relation to pelagic species like tunas. The deep understanding of pelagic PP mechanisms is fundamental in order to foresee possible changes in terms of secondary productivity in turn impacting on fisheries.

5. EUROPEAN RELEVANCE AND INTERESTS FOR THE SCIENTIFIC COMMUNITY (maximum score: 5)

Describe the relevance of your proposal at the European level and the potential interests for the research community

(half page)

The scientific oceanographic community is still trying to understand how much mesoscale and submesoscale can influence the budget of Carbon sequestered by Primary production. PP itself is often underestimated by usual estimation methods. Glider-based assessment may represent a big step forward in a comprehensive understanding of PP at sea.

GDPR Consent:

Personal data : I hereby understand that the JERICO-S3 project - through the Marine Institute, acting as the Work Package Leader for TransNational Access has needed to collect some of my personal information and data for the means of processing my application for Funding under the Jerico S3 project TransNational Access funding call.

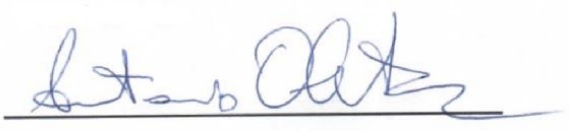
Application processing: The Marine Institute will gather and securely store your data. Access will be restricted to required personnel as well as selected qualified external evaluators who will determine successful applicants. Data will be stored on Marine Institute servers onsite at the Marine Institute, Rinville, Oranmore, Galway, Ireland for the duration of this project which should last 4 years. The data will be deleted thereafter. Your data will not be used for any other purpose without your consent.

1. Privacy Policy: *JERICO-S3* is the data controller pursuant to article 28 of the EU GDPR (EU 2016/679), *– Ifremer Brest Centre, CS 10070 29280 Plouzané France, the Project Coordinator is Laurent DELAUNEY. MAIL Jerico-S3@ifremer.fr JERICO-S3: If you change your mind at any time, you can unsubscribe by contacting us at mailto: Jerico-S3@ifremer.fr. We will treat your information with respect.*

2. *TYPES OF DATA PROCESSED Personal and identification data - Personal data, any information relating to an individual, identified or identifiable, even indirectly, through reference to another piece of information, including a number of personal identification; Identifying data, personal data that includes the direct information of the interested party (such for example name, surname, e-mail address, address, number of telephone, etc ...). Defence in court - The User's Personal Data may be used for defence purposes on the part of the Owner in court or in the preparatory phases to his possible establishment, from abuse in the use of the same or the connected services by the User.*

Date of compilation 22/09/2020

Signature of the PI



Signature of an appropriate authorised person
(e.g. Head of Department, Research Office) _____

This section is reserved to the JERICO-S3 TA Office

Date of proposal receipt by email _____

Assigned reference number _____

Signature of receiving officer _____