JERICO-S3

Proposal for Transnational Access

to Coastal Observatories

4th Call

20 October to 21 November 2022

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.)	GLider Observations of the Black sea Environment
Acronym (20 characters max.)	GLOBE
Applying Institution	INSTITUTE OF OCEANOLOGY-BULGARIAN ACADEMY OF SCIENCES
Host Institution	SOCIB - Balearic Islands Coastal Ocean Observing and Forecasting System
Host facility(ies)	SOCIB glider facility

Have you or other members of your user group previously used the requested facility(ies)?		Yes	X	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)				
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				

2. USER GROUP DETAILS

Indicate if the proposal is submitted by

☐ an individual

☒ a user group

Principal Investigator # *1* (user group leader)

First and last name	Nikolay Valchev					
Gender	X	Male		Female	**Nationality**	Bulgarian
Institution	INSTITUTE OF OCEANOLOGY-BULGARIAN ACADEMY OF SCIENCES					
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Previous user		Yes	X	No		

Principal Investigator # *2* (user group co-leader)

First and last name	Emil Stanev					
Gender	X	Male		Female	**Nationality**	Bulgarian
Institution	Helmholtz-Zentrum hereon GmbH					
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Previous user		Yes	X	No		

User group members

Member # 1

First and last name	Veselka Marinova						
Gender		Male	X	Female	**Nationality**	Bulgarian	
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Previous user		Yes	X	No			

Member # 2

First and last name	Violeta Slabakova						
Gender		Male	X	Female	**Nationality**	Bulgarian	
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Previous user		Yes	X	No			

Member # 3

First and last name	Atanas Palazov						
Gender	X	Male		Female	**Nationality**	Bulgarian	
Institution	Institute of Oceanology-Bulgarian Academy of Sciences						
Address	40 Parvi May Str., Varna						
Country	Bulgaria						
Email address	palazov@io-bas.bg						
Telephone	+359 897868538						
Fax	+359 52 370483						
Previous user		Yes	X	No			

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	SOCIB GLIDER	40 days
	Supporting facility		
	Special 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*
X	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)	The SOCIB glider facility has already proved its efficiency during previous missions of the ABACUS project. In particular its worth mentioning: • The existence of the pressure test site for gliders at SOCIB. • The existence of a dedicated staff working 24/24h and an engineering lab. • The ability of planning and realizing, in agreement with the user group, the deployment and retrieval of the glider at given time, allowing the glider to be overflown by the altimeter satellite. • The interaction with the SOCIB data centre in order to associate glider in situ data to satellite and model data in near real time.
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)

X	Travel grant (*)
X	***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 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.

ON-SITE VISIT – MISSION BRIEFING

The presence of PI from HEREON in Varna for deploymend and recovery of the glider. Travel grant is requested to cover the expenses connected to the deployment and recivery of the glider and deployment of one Argo float.

• Travel: 2 RT flights for 1 pax from Germany to Bulgaria	1000 €
• Hotel : 8 nights for 1 pax (about 50 € for single room)	400 €
• Meals : 24 meals for 1 pax (about 15 € for single meal)	360 €
Shipment of one Argo float to the deployment point	2640 €
TOTAL GRANT REQUESTED	4400€

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)***

Ass. Prof. Nikolay Valchev is the Director of the Institute of Oceanology and former head of Coastal Dynamics Department. He has a PhD in Oceanography, MSc in Ecology and environmental protection and 25 years of professional experience at the Institute of Oceanology – Bulgarian Academy of Sciences in the field of wind wave modelling, study and monitoring of coastal processes, coastal flood and erosion hazard assessment, coastal vulnerability and risk assessment, disaster risk reduction planning, early warning systems, developing the scientific bases for implementation of the Marine Strategy Framework Directive 2008/56/EC and renewable energy resources (wave energy potential). Currently, he is Leader of CMEMS Black Sea – Monitoring Forecasting Centre. He has experience in stakeholder mapping and communication and was a team leader and participant in a large number of national and international research projects. He has record of more than 75 scientific publications.

Prof. Dr. Emil Stanev is part of the Research department of the University of Sofia. He is also professor for Coastal Oceanography at the University of Oldenburg and at Department Hydrodynamics and Data Assimilation at the Institute of Coastal Systems - Analysis and Modelling, Helmholtz Center Hereon. He got his PhD degree from the University of Sofia, as well as his first professorship in physical oceanography there. His fields of expertise include physical oceanography, numerical modelling, hydrodynamics and sediment dynamics of coastal seas and estuaries, biogeochemical modelling, data assimilation. Stanev is associated editor of Ocean Modelling, Ocean Dynamics and Continental Shelf Research and member of many international science panels. Among his honours are the fellowships from the Alexander von Humboldt Foundation, ONRIFO, University of Washington etc. He was coordinator and WP leader of several EU and other international projects. He acted as member of EuroArgo management Board and is currently member of the CMEMS STAC. He has more than 160 peer reviewed papers and H-index-32.

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

The user group is composed of scientists with a proven expertise in the field of operational oceanography, using data from different instruments in semi enclosed basins and their interpretation, as well as in the field of Black Sea oceanograpgy. Scientists of the group have been coordinators and participants in several projects as well: CMEMS BS-MFC, CMEMS IN-SITU TAC, DOORS, Euro-Argo, BlackSeaColour, MyOcean, ASCABOS, ARENA, ets.
The complementary experience can be seen from the below (very short) list of publications.

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

1) Stanev, E. V., Y. He, S. Grayek, and A. Boetius (2013), Oxygen dynamics in the Black Sea as seen by Argo profiling floats, Geophys. Res. Lett., 40, 3085-3090 doi:10.1002/grl.50606.
2) Stanev, EV, Y He, J Staneva and E Yakushev (2014) Mixing in the Black Sea detected from the temporal and spatial variability of oxygen and sulfide – Argo float observations and numerical modelling. Biogeosciences, 11, 5707–5732, 2014, doi:10.5194/bg-11-5707-2014.
3) Palazov A, Ciliberti S, Peneva E, Gregoire M, Staneva J, Lemieux-Dudon B, Masina S, Pinardi N, Vandenbulcke L, Behrens A, Lima L, Coppini G, Marinova V, Slabakova V, Lecci R, Creti S, Palermo F, Stefanizzi L, Valcheva N and Agostini P (2019) Black Sea Observing System. Front. Mar. Sci. 6:315. doi: 10.3389/fmars.2019.00315
4) Atanas Palazov, Stefania A. Ciliberti, Rita Lecci, Marilaure Grégoire, Joanna Staneva, Elisaveta Peneva, Marius Matreata, Eric Jansen, Leonardo Lima, Diana Azevedo, Ali Aydogdu, Simona Masina, Giovanni Coppini, Luc Vandenbulcke, Arthur Capet, Arno Behrens, Marcel Ricker, Gerhard Gayer, Sergio Creti', Laura Stefanizzi, Francesco Palermo, Salvatore Causio, Mehmet Ilicak, Murat Gunduz, Nadia Pinardi, Veselka Marinova, Nadezcha Valcheva, Paola Agostini. CMEMS Black Sea Monitoring and Forecasting Centre: an overview on service and scientific developments in 2016-2021 and future perspectives, Proceedings of the 9th EuroGOOS International Conference 'Advances in Operational Oceanography: Expanding Europe's Observing and Forecasting Capacity'. 3 – 5 May 2021 V. Fernández, A. Lara-López, D. Eparkhina, L. Cocquempot, C. Lochet, I. Lips (Eds), EuroGOOS. Brussels, Belgium. 2021. pp. 302-312, DOI: 10.13155/83160
5) Ciliberti, S.A.; Jansen, E.; Coppini, G.; Peneva, E.; Azevedo, D.; Causio, S.; Stefanizzi, L.; Creti', S.; Lecci, R.; Lima, L.; Ilicak, M.; Pinardi, N.; Palazov, A. The Black Sea Physics Analysis and Forecasting System within the Framework of the Copernicus Marine Service. J. Mar. Sci. Eng. 2022, 10, 48. https://doi.org/10.3390/jmse10010048

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

Description of the project

Main objectives ***(half a page)***

The proposed research focuses on the dynamics of Rim current in the Western Black Sea and on the interaction between shelf and open-ocean. This current (front) separates low salinity shelf and coastal waters from the ones in the open-ocean and is subject to pronounced temporal and spatial variability. The presence of energetic mesoscale structures and meanders is known from satellite and in-situ observations. Isolated cyclonic and anti-cyclonic eddies are observed on both sides of this jet current propagating coastal waters into the basin interior.

The project aims at assessing the importance of gliders for advancing the Black sea oceanography. This observational platform is considered as a new for the Black Sea, but could have potentially strong impact as science driver and contribution to operational oceanography. The project will contribute to data collection in the western part of Black Sea, a region which is important for the overall Black Sea dynamics. At the same time this region is affected by the discharge from the Danube, the biggest Black Sea river contributing substantially to the eutrophication of Black Sea. This gives to the present research the relevance to the EU maritime policy objectives, as outlined in the Marine Strategy Framework Directive (MSFD).

The realization of a new glider mission will allow for the first time to collect data with unknown in the past sampling in three dimensions and time along transects of big dynamic importance. This will add to the presently used data from remote sensing, Argo and other in situ observing platforms. With the unprecedented resolution data collected by glider will allow us to investigate important mesoscale and sub mesoscale processes. The complementarity of glider measurements, Argo data and Sentinel data opens new horizons for science development.

GLOBE aims at filling this missing observational gap in the studied environment, and advance the Black Sea science in both its physical, as well as biogeochemical branches.

The main objectives of the proposed research are:

- *To collect oceanographic data in the western Black Sea along and across the Rim current;*
- *To quantify small scale dynamics and biological state of surface and intermediate water masses in the western Black Sea;*
- *To understand sub-basins dynamics and the complex interactions between eddies and mean flow;*
- *To assess the synergy between satellite products, Argo data and glider observations;*
- *To advance understanding of biogeochemistry processes in the studied area (intercomparison between BioArgo and glider observations).*
- *To build a capacity which can be further extended to other Black sea regions.*

Scientific background and rationale ***(one page)***

The Black Sea is a nearly enclosed deep basin (maximum depth of ~2200 m) with a large shelf in its north-western part. It is connected to the Sea of Marmara and the Sea of Azov by the narrow Bosporus and Kerch Straits, respectively. The Black Sea is large estuarine basin because the positive part of its fresh water balance (river runoff, plus precipitation) exceeds evaporation. The narrow opening in the strait of Bosporus restricts the two-layer exchange between the Black and Mediterranean; the outflowing surface current is two times larger than the inflowing deep counter-current, thus the Black Sea's surface salinity is about half that of the Mediterranean's. The large salinity contrasts explain the stable stratification and distinct vertical layering, the latter supports active mesoscale dynamics. The cold intermediate water (CIW) mass, with temperatures lower than the mean annual temperature of the surface and deep layers, is one of the most representative consequence of the extremely stable stratification. This cold intermediate layer (CIL) is formed by winter cooling followed by spreading of CIW along the western coast throughout the sea in a layer approximately 50 to 100 m below the surface. The CIL acts as a boundary between surface and deep waters.

The small vertical exchange supports also a unique chemical and biological environment (Konovalov et al., 2005, Stanev et al., 2013). The circulation is structured usually in two connected gyre systems encompassing the basin (the Rim Current). Its mean position follows approximately the continental slope in the northwestern and western parts of the Black Sea. Rossby radius is ~20 to 30 km, in many places comparable to the width of the continental slope area. As shown by Stanev and Staneva (2000) eddy processes control the transition between summer (weak) and winter (intense) circulation. The large seasonal variability of stratification shapes the balance between vorticity in the open ocean and coastal sea (Staneva et al., 2001). As demonstrated by Stanev et al. (2014), there are two different regimes of ventilation of pycnocline: a gyre-dominated (cyclonic) regime in winter and eddy-dominated regime in summer. These contrasting states are characterized by very different pathways of oxygen intrusions along the isopycnals and vertical oxygen conveyor belt organized in multiple-layered cells formed in each gyre. These findings challenge deeper understanding of mesoscale and sub-mesoscale control using dedicated observational actions. Furthermore, this relatively small sea provides optimal possibilities, using easily manageable observational platforms to address a wide spectrum of processes observed in the ocean.

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. Please note, **all proposed projects must be scheduled to complete the experiment by September 2023 with the final report submitted no later than October 2023.**

(one page)

Deepwater glider (to 1000m depth) equipped with biogeochemical sensors is requested for a total period of about 40 days. The glider will be deployed in the western Black Sea (East of Varna city). The area to investigate is chosen to be away from fishing regions and with the minimum intensity of ship traffic to avoid collision of the glider with vessels (Fig.1). The glider will perform several gradients of physical and biogeochemical properties. Additionally, an Argo float will O2 sensor will be deployed in the same area in parallel with the glider deployment to collect vertical profiles for intercalibration. During the survey the entire area will be monitored daily through the analyses of near real-time altimetry, ocean colour SST and Chlorophyll-a MODIS-Aqua information in order to optimize glider ability to eventually change the cruise plan. These data will be used in optimizing the track and re-direct the glider into eventually observed eddy active areas. Data from the Black Sea MFS will also be used for this purpose.

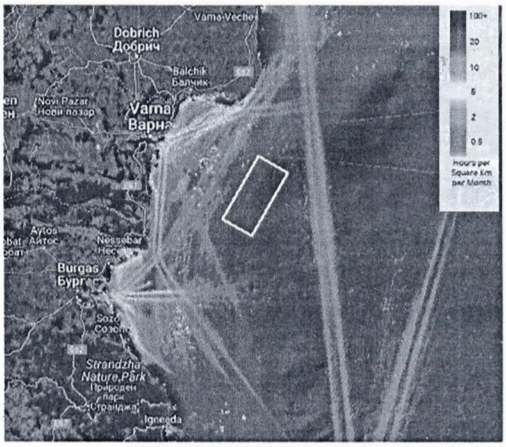

Fig. 1. Selected area and vessel density (EMODNET 2021)

\Similar missions proved to be efficient in previous Mediterranean and Baltic Sea activities. Experience from the latter in particular in optimizing the vertical extent of profiling in zones of extremely strong vertical density gradients will be used.

The high resolution in situ data collected by the glider will be also used for validation of Sentinel-3 A/B ocean colour products in the Western Black Sea surface waters.

Of particular importance is the analysis of satellite borne biological data (Chl-a) and glider measurements. As known from the research of Stanev et al. (2017), CHl-a concentration in the estuarine basins shows very different correlation with turbidity from what is known for the ocean areas and this issue will be deeper addressed with the help of new data.

It is planned that during the survey period (40 days) the glider to cover a total distance of about 400 nm. The starting date will depend on the availability of glider; spring to summer period would be preferable.

Work plan:
The management/deployment of the deep glider (Slocum G2/G3) by the SOCIB glider facility staff is mandatory. At least two technicians from the SOCIB should be involved in the operations in the Black Sea.

Phase 1) The deep glider will be prepared and a specialized technician from SOCIB will manage laboratory operations (ballasting, calibration, informatics, data management and other required operations) and deployment of the instrument. During this period, prior the beginning of the mission, one/two scientists from the user group will attend the activities to enrich group experience with deep gliders and optimize its performances according to the expected objectives.

Phase 2) The deep glider will be launched east of Varna (Partner IO-BAS) and perform the mission explained above. The IO-BAS and HEREON partners will acquire data supervised by SOCIB team. Parallelly remote sensing data and data from the Black sea operational service will be analysed and potentially used to optimize the glider mission.

Phase 3) At the end of the mission scientists from user group and SOCIB will be involved in the recovering of the deep glider (Partner IO-BAS) and in the recovery and analysis of data.

Phase 4) After the mission, all partners will conjointly analyse the data and write scientific report and paper.

Proposed time schedule

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

(half a page)

We apply for a 40 days of deep glider activity to be organized in a single mission in the period between May and August 2023.
Some days of glider sea activity could be used to monitor any eventual mesoscale activity identified from satellite data, or to realize additional transects.

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

A deep-water glider (Slocum G2/G3 glider to 1000m depth), equipped with CTD, O2 sensors, Fluorimeter (turbidity, Chl-A) is requested.
An intensive collaboration with technicians and engineers from the glider facility, as well as cooperation with the SOCIB data centre, are expected.

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

N/A

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	Collision with boats and fishing activities	Tools are available at the facility to minimize the risks of collision when crossing the main traffic routes as monitored by historical and real time AIS data. The proposed track will minimize crossings with the main marine traffic routes.
2	Glider functioning anomaly	The ability to activate emergency logistic through the use of the IO-BAS boat, as well as the possible presence of the R/V Akademik in the study area.
3	COVID-19 risks	The glider cruise will be realized even in case of reduced travel possibility. Planning will be tailored to possible restrictions imposed by the pandemic situation.

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)

The realization of glider cruises in the western part of the Black Sea, will contribute to increase knowledge on the circulation and in particular of the mesoscale (spatial and temporal) characteristics of Rim current.

The parallel analysis of glider and other in situ and remote sensing data will allow us to improve the use of observations in operational works.

The collection of high-resolution data will allow us to improve the use of remote sensed data (mainly altimetry data) to monitor the position, extension and strength of the Black Sea Currents throughout the entire year. We will also explore the potential of gliders for ecosystem (fish to cetaceans), particulate and pollutants monitoring in the study area.

Fishery industry as well as the marine shipping companies could be benefited by using more accurate information needed to identify of fishing areas and the select optimal routes for shipping.

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)

GLOBE project will contribute to the advancement of Black Sea oceanography and biogeochemistry. This will be achieved via the collection of high resolution data and their interpretation in parallel with other in situ and remotely sensed data. The basic new research aspects affected by this innovative research are the study of water mass properties and current dynamics from basin scale to sub mesoscale, and the inter-relationship between physical and biogeochemical processes. The Black Sea is one of the most unique ocean basin, as far as dynamics of oxic-anoxic interfaces are concerned and the present project will provide a further support to recent studies based on BioArgo.

To summarize, the project will advance the data collection in the Black Sea, which presents one of the main EU maritime policy objectives, as outlined in the Marine Strategy Framework Directive (MSFD).

The parallel analysis of data from different observing platforms and using different sensors is in line with the evolution of CMEMS. This will enable an efficient mean for calibration and validation of data, which is a step forward ensuring the effective use of these data in operational oceanography.

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 21/11/2022

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 _____