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Approvals				
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Coordinator	Patrick Farcy	IFREMER	30:08/2019	PF
WP Leaders	Simon Keble	Blue Lobster	30/08/2019	SK

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1. Executive Summary

This report relates to WP8 - Outreach, communication and engagement. It is an update of D8.10 and describes the activities of the JERICO-NEXT TNA programme carried out under Task 8.8: Implementing Transnational Access to coastal observatories.

Information on the Calls' programme, the rules governing the eligibility of user groups and the procedures for the selection and approval of proposals are described in D8.9, and the facilities participating to the TNA programme in D7.1.

Three Calls were launched by JERICO-NEXT, and 28 access projects were supported with EU funds. The launch of each Call was preceded by a long period of preparatory work: the drafting of the required publicity and TNA documentation, the update of the TNA Web pages on the JERICO-NEXT website, and the promotion of the access opportunities offered.

This document describes the various steps involved in the implementation of the Calls, giving an overview of the proposals that were accepted and their scientific and technical results.

2. Introduction

The JERICO-NEXT Consortium offers Transnational Access (TNA) to a number of unique European Coastal Observatories and Calibration Facilities for international research and technology development. The facilities open to users are ferryboxes, fixed platforms, including cabled observatories, gliders, fishing vessels, calibration laboratories and marine research stations, special equipment.

Free-of-charge access to the facilities specified in the TNA context was granted following the evaluation and selection of proposals submitted by user groups for their utilization in response to three dedicated Calls during the lifetime of the JERICO-NEXT project. The assessment and selection of submitted proposals was conducted by an independent panel of experts (Selection Panel, SP), and was based on scientific excellence, innovation and eventual impacts on the state-of- the-art.

Access to a specific infrastructure (or a specific installation that is part of an infrastructure) by a user group is intended as a concession granted to use the infrastructure to collect specific data following the implementation of a specific automated measuring system. Unless otherwise stated (e.g. for the use of gliders), the measuring system was provided by the user group. The access conceded included logistical, technical and scientific support by the access provider, and any special training required by a user group to use the assigned infrastructure.

Three Calls were launched by JERICO-NEXT (Table 2.1), and 30 user projects were positively evaluated by the Selection Panel and selected for execution. Two of these were canceled by the access provider (SOCIB) for technical reasons, and therefore were not carried out.

Table 2.1: *Dates and results of JERICO-NEXT TNA Calls.*

TNA Call:	1st Call	2nd Call	3rd Call	Total Proposals (Submitted and supported)
Opening of the call	May 2, 2016	February 20, 2017	January 15, 2018	
Deadline	July 5, 2016	April 10, 2017	March 12, 2018	
No. Proposals (submitted)	12	16	12	**40**
No. Proposals (selected)	6	15	9	**30**

In the following we describe experience for selecting and implementing these projects, and also give some outcomes being achieved.

3. First Call

The first Call was published on the JERICO-NEXT website on May 2, 2016, the deadline for proposals submission, originally planned on June 20, 2016 was extended up to July 5, 2016 (ref. Annex 1 - Call announcement). The Call was widely advertised via the JERICO-NEXT newsletter and the mailing lists of the JERICO RI. The proposals were edited according to the Application template distributed with the Call announcement (ref. Annex 1 - Application Form).

Twelve submitted proposals passed through a three-step selection process (ref. Annex 1 - Guidance Note). From the pre-screening made by the TNA Office, three of them resulted not eligible under the present consortium's rules. Consequently, only nine of them were sent to the Selection Panel for evaluation and selection of the research groups to be financially supported in this Call.

The Selection Panel has been established at the JERICO-NEXT Kick-off meeting (Mallorca, Spain, October 1, 2016) involving the members of the Scientific and Technological Advisory Committee (STAC). The TNA procedure allows to name additional experts for the evaluation, if necessity rise, but the final assessment and selection of TNA projects to fund is done by the Selection Panel only. No additional expert was involved in the evaluation of the proposals submitted to the 1st Call, and the STAC members having participated to their review are listed in Table 3.1.

Table 3.1: *Review panel for the first call for access in 2016.*

Review panel member	Affiliation	Role
Laura Beranzoli	INGV, Italy	Representative of EMSO
Eric Delory	PLOCAN, Spain	Representative of NEXOS
Peter Herman	DELTARES, The Netherland	Chair of the STAC
Alicia Lavin Montero	IEO, Spain	Past member of FP7 JERICO SP
Janet Newton	University of Washington, United States of America	Past member of FP7 JERICO SP
Isabel Sousa Pinto	University of Porto, Portugal	Vice chair of EMBOS
Roger Proctor	IMOS and University of Tasmania, Australia	Past member of FP7 JERICO SP

A Selection Panel meeting was organized in Bordeaux, France, on September 7, 2016, during which six out of nine evaluated proposals were finally selected for funding (Table 3.2).

Results of evaluation were communicated to the proponents in September/October 2016, and selected user projects were published in the JERICO-NEXT website (http://www.jerico-ri.eu/tna/selected-projects/first-call/).

TNA END User agreements have been signed between the institution leading the user group (end user), the coordinator IFREMER and the beneficiary giving access to owned infrastructure (facility operator).

Table 3.2: Results of proposal evaluation following the first call for access in 2016.

Reference number	User project Acronym	Title	User group P.I.	User group members nationality(ies)	Host Infrastructure	Score
JN_CALL_1_1	MAICA	Mediterranean Aerosol In Coastal Areas	Jacques Piazzola University of Toulon, Mediterranean Institute of Oceanography, France	France, Greece	Acqua Alta Oceanographic Tower, CNR-ISMAR, Italy	16.3
JN_CALL_1_2	ABACUS-3	Third Algerian BAsin Circulation Unmanned Survey	Giorgio Budillon Università degli Studi di Napoli "Parthenope", Italy	Italy	Glider facility, SOCIB, Spain	20.0
JN_CALL_1_9	CarbonAS	Seasonal variability in carbonate chemistry in the southern Aegean Sea	Andrew King Norwegian Institute for Water Research, Norway	Norway	Poseidon Ferrybox, HCMR, Greece	21.5
JN_CALL_1_10	ANTEIA	Directional wave measuring sensor validation	Ibone Rodriguez de Pablo ZUNIBAL, SL, Spain	Spain	Galway Bay Data Buoy, SBI, Ireland	19.5
JN_CALL_1_11	FinisGlider	Pilot experience to incorporate Glider technology to the Finisterre repeated hydrographic section.	César M. González Pola Muñiz Spanish Institute of Oceanography, Spain	Spain	Glider National Facility, CNRS, France	17.0
JN_CALL_1_12	GLIDER-SOUTH	GLIDER missions in the SOUTHern Sicilian Channel	Aldo Drago University of Malta, Malta	Malta, Italy	Glider National Facility, CNRS, France	18.3

4. Second Call

The second Call was open from 20 February to 10 April 2017 and widely advertised via the JERICO-NEXT newsletter and the mailing lists of the JERICO RI.

Sixteen proposals were submitted and one of them did not receive the feasibility assessment from one of the facility operators involved, so, following the TNA procedure it was not included in the evaluation. The remaining were eligible and passed through a three-step selection process (ref. Annex 2 - Guidance Note).

Following the TNA protocol additional experts were named for the evaluation in support of the Selection Panel. The evaluation team is listed in Table 4.1. It was composed by four members of the Selection Panel agreeing to do the evaluation, six members of the User Panel (a group of experts established in WP8 Task 8.1 representing end-user communities linked to JERICO-RI), and a member of the JERICO-NEXT consortium, whose Institute is not involved in the TNA activity.

Table 4.1: *Evaluation panel for the Second TNA Call of JERICO-NEXT.*

Name	Affiliation	Group
Laura Beranzoli (5)	INGV, Italy	Selection Panel
Alicia Lavin Montero (6)	IEO, Spain	Selection Panel
Janet Newton (6)	University of Washington, United States of America	Selection Panel
Roger Proctor (5)	IMOS and University of Tasmania, Australia	Selection Panel
Laurent Coppola (3)	CNRS, UPMC, Villefranche, France	User Panel
Jo Foden (2)	OSPAR, United Kingdom	User Panel
Peter McKenzie-Midlane (1)	Scitus Management Limited, United Kingdom	User Panel
David Mills (3)	Bangor University, United Kingdom	User Panel
Olaf Sveggen (1)	Fugro Norway A.S, Norway	User Panel
Johan Vercruysse (3)	Flemish government - MDK –aKust, Belgium	User Panel
Rajesh Nair (2)	OGS, Italy	JERICO-NEXT Consortium
The number of proposals evaluated by each member is reported inside brackets		

The final assessment and selection of TNA projects to fund was done by the four members of the Selection Panel only, during a videoconference meeting held on July 6, 2017 during which all the evaluated proposals were approved for funding (Table 4.2).

Results of evaluation were communicated to the proponents in July 2017, and selected user projects were published in the JERICO-NEXT website (http://www.jerico-ri.eu/tna/selected-projects/second-call/).

TNA END User agreements have been signed between the institution leading the user group (end user), the coordinator IFREMER and the beneficiary giving access to owned infrastructure (facility operator).

***Table 4.2:** Results of proposal evaluation following the second call for access in 2017.*

Reference number	User project Acronym	Title	User group P.I.	User group members nationality(ies)	Host Infrastructure(s)	Score
JN_CALL_2_1	EvoLUL	Long term underwater evaluation localization in extreme conditions	Konstantin Kebkal EvoLogics GmbH, Germany	Germany, France , Spain	Expandable Seafloor Observatory, UPC, Spain	17.7
JN_CALL_2_2	MicroPlastox	Microplastics in the marine environment: estimation and ecotoxicological logical assessment	João Pinto da Costa University of Aveiro, Portugal	Portugal	• Galway Bay Cabled Observatory, SBI, Ireland • MS Color Fantasy, NIVA, Norway • Heraklion Coastal Buoy, HCMR, Greece	19.0
JN_CALL_2_3	ReMoBiB	Real time monitoring of bivalve behavior	Rob Witbaard Netherlands Institute for Sea Research, the Netherlands	the Netherlands	Underwater Node Helgoland, HZG/AWI, Germany	19.3
JN_CALL_2_4	ABACUS-4	Fourth Algerian Basin circulation unmanned survey	Yuri Cotroneo Università degli Studi di Napoli “Parthenope”, Italy	Italy, Spain, Algeria	Glider facility, SOCIB, Spain	21.0
JN_CALL_2_5	ANB Sensors pHIMS	Testing an autonomous self-calibrating pH sensor (pHIMS) with on-board QA/QC, for ocean and water quality monitoring	Nathan Lawrence ANB Sensors, United Kingdom	United Kingdom	• Ferrybox at m/s Silja Serenade, SYKE, Finland • Atmospheric and Marine Research Station, FMI, Finland • Marine Research Centre Laboratory, SYKE, Finland	18.5

Table 4.2: Results of proposal evaluation following the second call for access in 2017 (continued).

Reference number	User project Acronym	Title	User group P.I.	User group members nationality(ies)	Host Infrastructure(s)	Score
JN_CALL_2_6	ADVANCE	Automatic Data and Video Acquisition for uNderwater monitoring across Coastal Environments	Simone Marini CNR-ISMAR, Italy	Italy, Spain	• Expandable Seafloor Observatory, UPC, Spain • Galway Bay Cabled Observatory, SBI, Ireland	23.0
JN_CALL_2_8	BB-TRANS	Three-dimensional circulation and transport within the south-eastern Bay of Biscay from a multi-platform approximation	Ainhoa B. Caballero Reyes Azti Foundation, Spain	Spain, Italy	COSYNA Glider, HZG, Germany	19.0
JN_CALL_2_9	LETS-SAT	Leverage tracking efficiency on oceanographic buoys using an energy autonomous solution transmitting satellite messages	Georgios Koutras OpenIchnos Ltd, Malta	Malta	• Heraklion Coastal Buoy, HCMR, Greece • Saronikos buoy, HCMR, Greece • Athos buoy, HCMR, Greece	18.8
JN_CALL_2_10	MOCo Sea Pass	Monitoring of Organic Contaminants in the water of the Southern Europe with Passive Sampling	Ioanna Kalantzi Institute of Oceanography, HCMR, Greece	Greece	• Port Operational Marine Observing System - st. Balchik, IO-BAS, Bulgaria • Meteoceanographic site S1-GB, CNR-ISMAR, Italy	17.0
JN_CALL_2_11	FluorMed-1	Phytoplankton fluorescence studies in Mediterranean. Part 1. Feasibility and comparability of different methods in oligotrophic seas	Jukka Seppälä Finnish Environment Institute SYKE, Finland	Finland, France	• Heraklion Coastal Buoy, HCMR, Greece • Poseidon Calibration Lab, HCMR, Greece	20.2

Table 4.2: Results of proposal evaluation following the second call for access in 2017 (continued).

Reference number	User project Acronym	Title	User group P.I.	User group members nationality(ies)	Host Infrastructure(s)	Score
JN_CALL_2_12	FOULSTOP	Fouling Protection for marine optical systems	Laurent Delauney Ifremer - Detection, Sensors and Measurements Laboratory, France	France	Expandable Seafloor Observatory, UPC, Spain	23.0
JN_CALL_2_13	DYNAS	Dynamics and turbulence in the Sicily channel	Pascale Bouruet-Aubertot Université Pierre et Marie Curie, Laboratoire d'Océanographie et du Climat, France	France	Sicily Channel Observatory, CNR-ISMAR, Italy	20.8
JN_CALL_2_14	GETSCh	Glider Experiments in the Tunisia-Sardinia Channel	Sana Ben Ismail Institut National des Sciences et Technologies de la Mer, Tunisia	Tunisia, Algeria, France, Italy	Glider National Facility, CNRS, France	20.3
JN_CALL_2_15	MONICOAST	Monitoring of organic contaminants by passive samplers in the Southern Europe coastal areas	Natalia Montero Ruiz AZTI-TECNALIA, Spain	Spain, Italy	• Heraklion Coastal Buoy, HCMR, Greece • Saronikos buoy, HCMR, Greece	20.5
JN_CALL_2_16	ECSyrinx	Environmental Characterisation of Syrinx ADCP	Geraint West Sonardyne International Ltd., United Kingdom	United Kingdom	Galway Bay Cabled Observatory, SBI, Ireland	19.7

5. Third Call

The third Call was open from 15 January to 12 March 2018 and widely advertised via the JERICO-NEXT newsletter and the mailing lists of the JERICO RI.

Twelve proposals were submitted. One of these was not eligible because the required infrastructure was not included in the consortium and none of the consortium's infrastructure could host it. The remaining were eligible and passed through a three-step selection process (ref. Annex 3 - Guidance Note). Two of these (FRIPP-2 and ABACUS-5) were canceled by the access provider for technical reasons, and therefore were not carried out.

No additional expert was involved in the evaluation of the proposals submitted to the 3rd Call, and the STAC members having participated to their review are listed in Table 5.1.

***Table 5.1:** Review panel for the Second TNA Call of JERICO-NEXT.*

Review panel member	Affiliation	Role
Laura Beranzoli	INGV, Italy	Representative of EMSO
Eric Delory	PLOCAN, Spain	Representative of NEXOS
Alicia Lavin Montero	IEO, Spain	Past member of FP7 JERICO SP
Janet Newton	University of Washington, United States of America	Past member of FP7 JERICO SP
Roger Proctor	IMOS and University of Tasmania, Australia	Past member of FP7 JERICO SP

A Selection Panel meeting was organized in Rome, Italy, on June 28, 2018, during which seven out of eleven proposals were selected for funding and for the remaining four the judgment was suspended pending clarification from the proposers. Following the clarifications received, two other proposals were approved, for a total of nine proposals, indicated in Table 5.2.

Results of evaluation were communicated to the proponents in July/August 2018, and selected user projects were published in the JERICO-NEXT website (http://www.jerico-ri.eu/tna/selected-projects/third-call/).

TNA END User agreements have been signed between the institution leading the user group (end user), the coordinator IFREMER and the beneficiary giving access to owned infrastructure (facility operator).

Table 5.2: Results of proposal evaluation following the third call for access in 2018.

Reference number	User project Acronym	Title	User group P.I.	User group members nationality(ies)	Host Infrastructure(s)	Score
JN_CALL_3_1	DEFPAM-G	DEep-sea Fish Passive Acoustic Monitoring by using Glider technology	Eric Parmentier University of Liège, Belgium	Belgium	Glider facility, SOCIB, Spain	23.0
JN_CALL_3_2	INTERCARBO	Intercomparison of instruments for carbonate system measurements	Lauri Laakso, FMI, Finland	Finland, Germany, France, Italy	Research Station, NIVA, Norway	19.8
JN_CALL_3_3	FRIPP-2	Frontal dynamics influencing Primary Production: investigating the onset of the spring bloom mechanism through gliders	Antonio Olita CNR, Italy	Italy	Glider facility, SOCIB, Spain	16.0
JN_CALL_3_4	ABACUS-5	Fifth Algerian BAsin Circulation Unmanned Survey	Yuri Cotroneo Università degli Studi di Napoli "Parthenope", Italy	Italy, Spain, Algeria	Glider facility, SOCIB, Spain	18.3
JN_CALL_3_6	MultiFluoro	Testing new multi-parameter fluorometer in optically complex environments	James Kirkbride Chelsea Technologies Group Ltd, United Kingdom	United Kingdom	• Ferrybox at m/s Finnmaid, SYKE, Finland • Marine Research Centre Laboratory, SYKE, Finland	20.5

Table 5.2: *Results of proposal evaluation following the third call for access in 2018 (continued).*

Reference number	User project Acronym	Title	User group P.I.	User group members nationality(ies)	Host Infrastructure(s)	Score
JN_CALL_3_7	WGMP-SPI	Assessment of the Ecological Quality status of the West Gironde Mud Patch, taken as an example of offshore marine system, using Sediment Profile Imagery	Adriana Dalto Federal University of Rio de Janeiro, Brazil	Brazil	Sediment Profile Imager, CNRS, France	17.5
JN_CALL_3_8	NitrateComp	In-situ inter-comparison of nitrate sensors	Eric Achterberg GEOMAR, Germany	Germany, Italy	Research Station, NIVA, Norway	21.5
JN_CALL_3_10	MEPHY	Novel sensing tools to study synergic interaction between trace metals and phytoplankton	Mary-Lou Tercier-Waeber University of Geneva, Switzerland	Switzerland, Italy, France	COSYNA Stationary FerryBox system, HZG, Germany	23.5
JN_CALL_3_12	Easy On-Line microLFA	Field test of a reliable and Easy to use microLFA based nutrient sensor package for Ferrybox On-line monitoring applications	Luca Sanfilippo SYSTEA S.p.A., Italy	Italy	Ferrybox system on MS Color Fantasy, NIVA, Norway	19.7

6. User project reports

This section contains the reports produced by user groups that have benefited from access in JERICO-NEXT.

6.1 First TNA Call

6.1.1 MAICA (JN-CALL 1_1)

Submitted: 22 August 2018.

Project Information

Proposal reference number	JN-CALL 1_1
Project Acronym (ID)	MAICA
Title of the project	Mediterranean Aerosol In Coastal Areas
Host Research Infrastructure	Acqua Alta Oceanographic Tower (AAOT)
In person access **Remote access**	22/03/2017 01/03/2018 05/06/2018 22/03/2017-15/06/2017 01/03/2018 - 05/06/2018
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Jacques Piazzola University of Toulon - Mediterranean Institute of Oceanography (MIO) CS 60584 - 83041 TOULON CEDEX 9, France piazzola@univ-tln.fr
User group members	Jacques Piazzola, Tathy Missamou, Gilles Tedeschi - *University of Toulon, France*

Project objectives

This study focused on the sea-spray contribution and the anthropogenic influence in the coastal aerosol using measurements of aerosol size distributions acquired in the Northern Adriatic on board the Acqua Alta platform. Former results in the study area allowed comparison with data recorded in the Northwestern Mediterranean and showed a similar sea surface production of sea-spray aerosols issued from bubble bursting processes. In addition, the Adriatic experiments confirmed the occurrence of interaction processes between sea-spray and anthropogenic components (Piazzola et al., 2016). The objectives of the project was first to confirm the earlier results about the sea-spray source function and the sea-spray content of organic matter. In addition, this should allow implementation and validation of a nested model chain dedicated to the aerosol transport in coastal areas in the Northern Adriatic. To this end, we have addressed a more comprehensive understanding of the sea-spray production processes (jet, films and spume drops), with focus on their relationships with environmental conditions and the contribution of anthropogenic pollutants using a chemical analysis. This latter is particularly relevant to validate one emission inventory of the region used in the CTM models.

Main achievements and difficulties encountered

The first goal of the MAICA project was improve our knowledge on the sea-spray production mechanisms with emphasis on the generated particles issued from the surface tearing process. To this end, we used two Particle Measuring Systems: the active scattering spectrometer probe (ASASP) and the classical scattering spectrometer probe (CSASP), which were mounted on board the Acqua Alta platform. The objective was to record aerosol size distributions in the 0.1-40 µm size range during preferentially high wind conditions. Unfortunately, the weather was calm most of the time and we get a quite limited dataset. In addition the CSASP probe fails down in May 2018 and in spite of our effort, we did not succeed to repair it before the end of the experiments. In spite of these limitations, the experiments allowed acquisition of about 1000 aerosol size distributions.

The second objective was to provide a chemical analysis of the marine aerosols on the whole size spectrum to study the contribution of the organic matter in the sea-spray function of different sizes. This was achieved using a chemical characterization of aerosols sampled through a low pressure cascade impactor Dekati.

Dissemination of the results

Analysis of the data is still in progress, but it is clear that they will be published soon. In particular, the carbon analysis in the aerosol samplings and the results on sea-spray dynamics are promising.

DATA are available on this link: http://mapom.univ-tln.fr/jerico/maica/

Technical and Scientific preliminary Outcomes

The MAICA experiments, which took place on the ACQUA ALTA platform, allowed acquisition of a large number of aerosol size distributions in the size interval covering 0.1 to 40 µm. In addition, chemical analysis has been made to better understand the anthropogenic impact on the Adriatic. The analysis is still in progress, but the first results seem to show that the numbers of the sea-spray concentrations (acquired during long fetch conditions) are temperature dependant. The WRF-Chem model calculations using the sea-spray source function by Gong et al. (2003) suggest substantially different PM10 concentrations compared to the ones measured using the probes on 01/03/2018 on board the Acqua Alta platform, as shown in Figure 6.1.1.1.

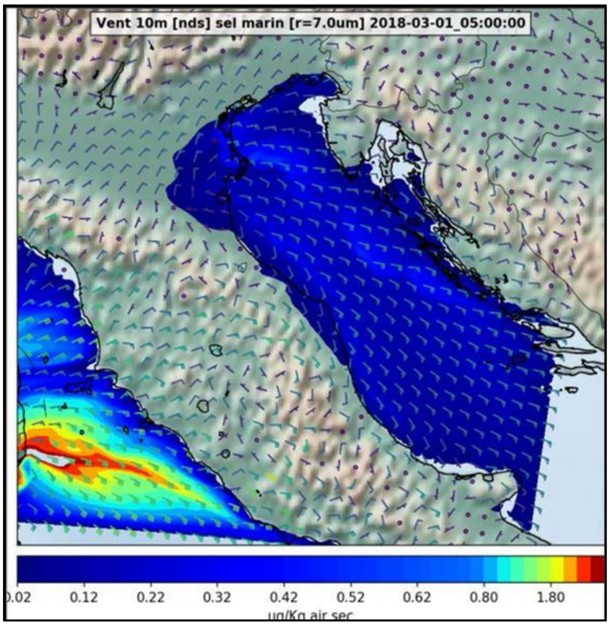

***Figure 6.1.1.1**: Atmospheric Sea-spray concentrations calculated using the WRF-Chem model in the Northern Adriatic during the MAICA experiments.*

As a comparison, we can see in Figure 6.1.1.2 an example of aerosol size distributions measured on board the Aqua Alta at the same date as the results reported in Figure 6.1.1.1, which correspond to a very cold episode in the Northern Adriatic resulting in low sea surface temperature and negative air temperatures.

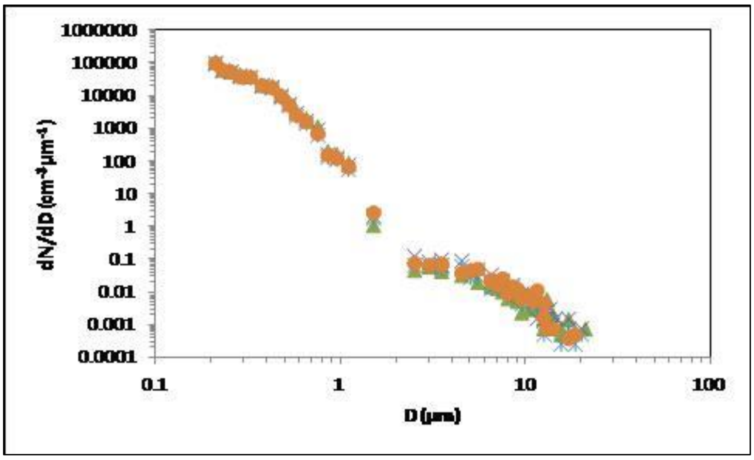

***Figure 6.1.1.2**: Aerosol size distributions measured the 01/03/2017 for a cold temperature conditions.*

Work is still on progress for a relevant data analysis.

6.1.2 ABACUS-3 (JN-CALL 1_2)

Submitted: 18 May 2017; Final revision: 27 July 2017.

Project Information

Proposal reference number	JN-CALL 1_2
Project Acronym (ID)	ABACUS-3
Title of the project	Third Algerian BAsin Circulation Unmanned Survey
Host Research Infrastructure	SOCIB glider facility (SOCIB-GF)
In person access **Remote access**	19/03/2017 - 23/03/2017 11/06/2017 - 16/06/2017 04/11/2016 – 23/12/2016
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Giorgio Budillon Università degli Studi di Napoli "Parthenope" Centro Direzionale Isola C4 – Napoli, Italy giorgio.budillon@uniparthenope.it
User group members	Giorgio Budillon, Yuri Cotroneo, Giuseppe Aulicino, Giannetta Fusco - *Università degli Studi di Napoli "Parthenope", Italy*

Project objectives

The project aims at assessing the importance of a new monitoring line across the Algerian Basin (AB) between Palma de Mallorca and the Algerian Coast. Through its activities, ABACUS-3 project will contribute to data collection in the Southern European Seas, one of the main EU maritime policy objectives, as outlined in the Marine Strategy Framework Directive (MSFD).

The realization of a new glider mission will allow to extend the dataset previously collected in the area (Autumn 2014 and 2015) in order to enrich the data useful for an inter-annual comparison.

The main objectives of the ABACUS-3 project are:

- To continue the time series of oceanographic data collected in the AB along the endurance line between Mallorca and Algeri, enriching the dataset obtained during both the JERICO-NEXT TNA-ABACUS project in 2014 and the external-access SOCIB call in 2015;
- To identify the physical and biological properties of the surface and intermediate water masses between Balearic Islands and Algerian Coast;
- To intercept any mesoscale eddy identified during the mission;
- To understand the sub-basins dynamics and the complex interactions due to eddies;
- To assess the ocean description capabilities of several satellite products when approaching coastal areas, also comparing them to glider high resolution in situ data;
- To validate the new along-track (L3) and gridded interpolated maps (L4) altimetry products provided by the Sentinel-3 altimetry mission and the other satellites for the western Mediterranean Sea.

Main achievements and difficulties encountered

Data collected during the ABACUS 3 mission allowed:

- A real time monitoring of the main physical and biochemical properties of the water column;
- The comparison with new generation satellite data;
- The extension of the glider high resolution dataset;
- The extension of the research activities connected to mesoscale eddy.

From a technical perspective, the glider:

- spent 49 days in water;
- navigated 1127.90 Km (609 Nm);
- collected about 1800 profiles;
- was overflown twice by SENTINEL-3 satellite;
- navigated four times 2 SENTINEL-3 target groundtracks.

The ABACUS team faced the following difficulties:

- Scheduling work to guarantee satellite overflights;
- Severe sea weather conditions during deployment;
- Need to reduce time at surface to avoid collisions;
- Need to break to surface every second cast, in order to sample the very surface layer.

Additionally, an estimated number of 34 to 38 profiles were not recorded due to a problem in the data-logging system on-board the glider. Precisely, it was due to an overflow in some data buffers. This issue is normally logged by the glider under the name "*DRIVER_ODDITY:science_super:906:Input ringbuf overflow*" and started appearing on 15/Nov/2016 at 03:10am, UTC. Consequently, the glider stopped logging scientific data until this situation was solved on 17/Nov/2016 at15:12pm, UTC. This overflow anomaly is very difficult to predict when all the sensors are sampling at their maximum rate.

In order to avoid this issue during next missions, data transmission will not be paused unless strictly necessary and all efforts will be put in not missing any warning message from the glider during the daily report calls.

Dissemination of the results

The results achieved during this and previous ABACUS glider missions have been presented at several national and international conferences as the EGU General Assembly 2017 (Aulicino et al., 2017) and IUGG/IAPSO-IAMAS-IAGA Joint Assembly 2017 (Cotroneo et al., 2017a).

Results have been submitted to appropriate, internationally recognized and peer reviewed journals (Cotroneo et al., 2016).

We realized seminars for graduate and post-graduate students, at Università degli studi di Napoli "Parthenope" and Università Politecnica delle Marche.

A video has been realized to disseminate the project and published in the You Tube channel (https://www.youtube.com/watch?v=GZ43huftfGI&feature=youtu.be).

DATA are available on this link: http://thredds.socib.es/thredds/catalog/auv/glider/sdeep01-scb_sldeep001/L2/2016/catalog.html?dataset=auv/glider/sdeep01-scb_sldeep001/L2/2016/dep0021_sdeep01_scb-sldeep001_L2_2016-11-04_data_dt.nc

Technical and Scientific preliminary Outcomes

Through its activities, ABACUS-3 project contributed to data collection in the Southern European Seas, one of the main EU maritime policy objectives, as outlined in the Marine Strategy Framework Directive (MSFD).

The new glider mission realized in November-December 2016 through JERICO-NEXT allowed to extend the dataset previously collected in the area (Autumn 2014 and 2015) in order to enrich the data useful for an interannual comparison (Fig. 6.1.2.1). The ABACUS glider mission was first realized in 2014 through application to the 3rd JERICO-NEXT TNA call. Since then two more mission have been realized.

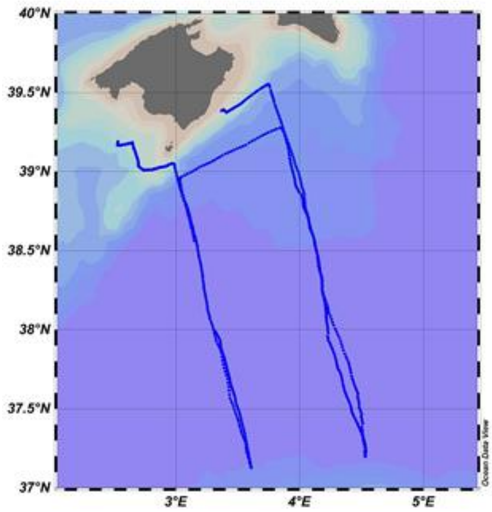

***Figure 6.1.2.1**: Glider track of the ABACUS 3 project.*

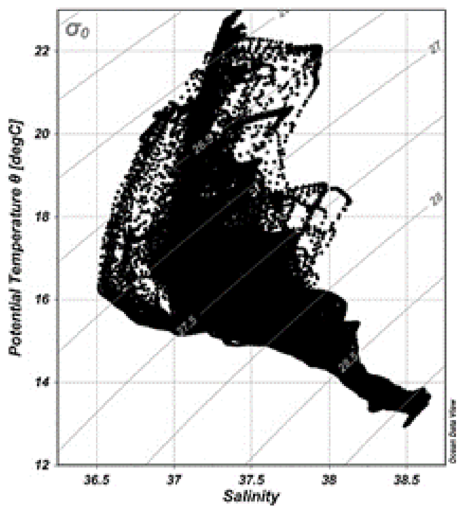

***Figure 6.1.2.2**: θ/S diagram of the data collected during the entire ABACUS 3 glider mission.*

Glider data acquired during ABACUS 3 have been quality controlled and analysed through three different steps:

1) After the mission, data were transferred from the internal glider memory to the SOCIB Data Center where pre-processing, quality control and validation were carried out and production of level 1 and level 2 data occurred;

2) A second quality control process was applied in order to identify any persistent spike in the data and to smooth all the profile along depth in order to reduce the noise of the signal;

3) A final visual check was performed on the single profiles also through the realization of a θ/S diagram (Fig. 6.1.2.2)

The quality controlled dataset was then used to realize a preliminary analysis focused on the identification of water masses and on their location along depth and latitude.

As an example, figures 6.1.2.3 and 6.1.2.4 shows the vertical sections on Potential Temperature, Salinity and Potential density anomaly (Fig. 6.1.2.3), as well as turbidity, chlorophyll-a and oxygen concentration (Fig. 6.1.2.4) between Mallorca and the Algerian coasts from 6 to 12 November, one of the four transects realized during the mission.

Moreover, data have also been analysed in order to correlate the variability of the biochemical parameters to the physical properties of the water column and to the presence of mesoscale structures as filaments or eddies.

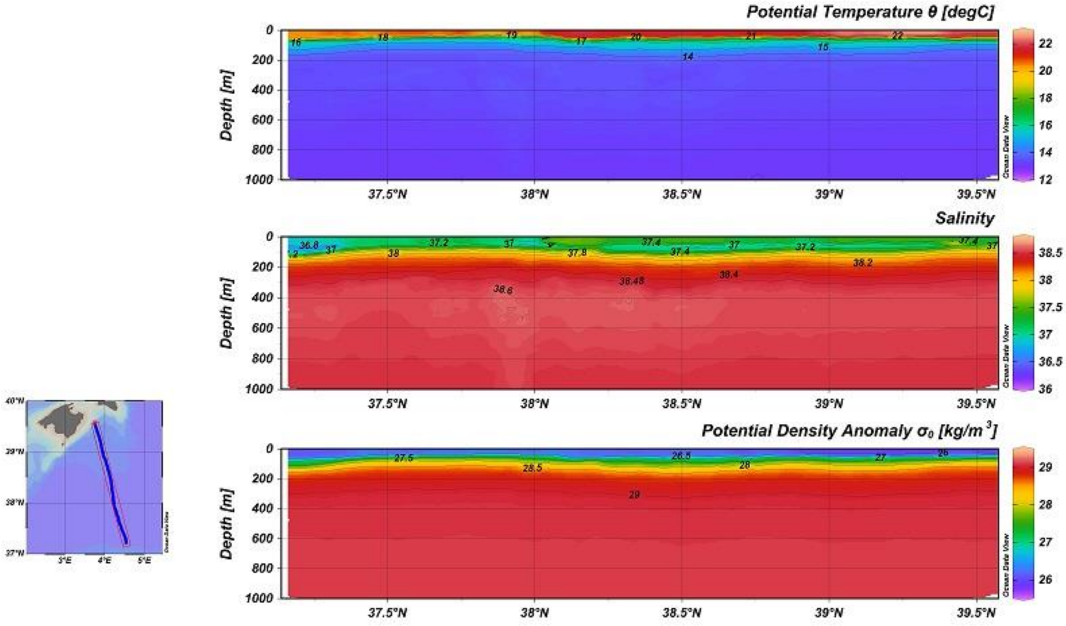

Figure 6.1.2.3*: Vertical sections of Potential Temperature, Salinity and Potential density anomaly between Mallorca and the Algerian coasts from 6 to 12 November.*

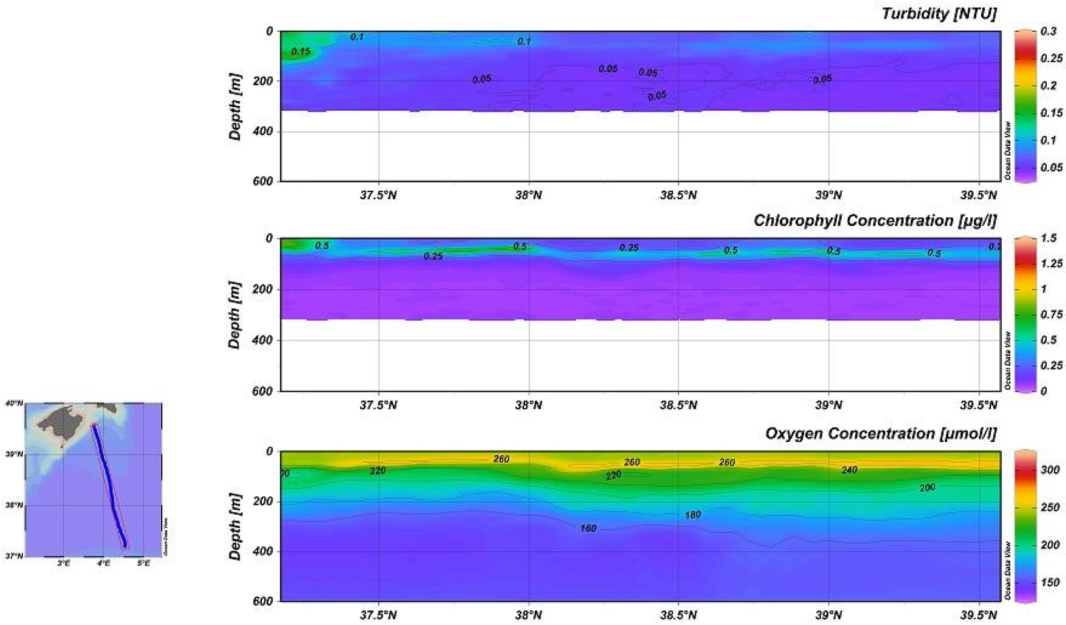

Figure 6.1.2.4*: Vertical sections of turbidity, Chlorophyll-a concentration and oxygen concentration between Mallorca and the Algerian coasts from 6 to 12 November.*

6.1.3 CarbonAS (JN_CALL_1_9)

Submitted: 21 May 2019; Final revision: 4 June 2019.

Project Information

Proposal reference number	JN-CALL 1_9
Project Acronym (ID)	CarbonAS
Title of the project	Seasonal variability in carbonate chemistry in the southern Aegean Sea
Host Research Infrastructure	Poseidon Ferrybox (PFB)
In person access **Remote access**	26/03/2018 - 27/03/2018 28/03/2018 - 05/04/2019
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Andrew King Norwegian Institute for water research (NIVA) Gaustadalléen 21, NO-0349 Oslo, Norway andrew.king@niva.no
User group members	Andrew King, Sabine Marty, Caroline Mengeot - *Norwegian Institute for water research, Norway*

Project objectives

The anthropogenically-driven rise in atmospheric CO2 has potentially significant consequences on marine ecosystems. We planned to deploy a state-of-the-art spectrophotometric pH sensor (AFtES – Automated Flow through Embedded Spectrophotometry) on the host institution's FerryBox sensor system to measure pH and to better elucidate seasonal variability in carbonate chemistry of the southern Aegean Sea – a region of large variability especially with regards to dust deposition and salinity gradients. Through this project, we added high precision pH observations to the suite of measurements that are already part of the Poseidon FerryBox infrastructure, therefore better characterizing the carbonate system. The project was a valuable opportunity to contribute significantly to both instrumental development for surface monitoring and determination of CO2 fluxes in an important region of Mediterranean Sea with unique biogeochemical and water mass characteristics.

Main achievements and difficulties encountered

A spectrophotometric pH sensor was deployed on the H/S/F Festos Palace FerryBox that transits between Heraklion, Crete and Piraeus, Greece (Fig. 6.1.3.1). The sensor successfully collected pH data on ~100 trips between March and June 2018. The data preliminarily shows that while pH is relatively spatially homogenous between Crete and Greece, the nearshore regions on both the northern and southern end of the transect were slightly lower in pH (~0.02). From March to June, pH exhibited seasonal variability of ~0.2 pH units in the study region from ~8.05-8.15 in March to ~7.95-8.00 in June. pH observations during the remainder of the access period were limited due to a sensor malfunction (leaking due to a cracked faceplate) and FerryBox system electrical/PC issues. The shipment of the sensor from Norway to Greece encountered some unexpected delays due to customs and temporary export.

***Figure 6.1.3.1**: Installation of the pH sensor on H/S/F Festos Palace FerryBox on 27 March 2018.*

Dissemination of the results

The pH observations supported by the TNA activity will be published in a peer-reviewed journal together with quality controlled FerryBox data from HCMR.
DATA have not yet been delivered on the date of D8.11.

Technical and Scientific preliminary Outcomes

Despite the shorter than expected observation period, several interesting preliminary findings have emerged through the CarbonAS TNA activity. Surface water pH observations from March to June 2018 in the middle of the transect (~ 36-37 deg N; Figs. 6.1.3.2 and 6.1.3.3) were relatively homogenous. In the coastal regions closer to shore near Heraklion and Piraeus, pH tended to be a ~0.02-0.04 of a pH unit lower. This could be due to ventilation of deeper waters where remineralization has reduced pH – but this needs to examined more carefully and confirmed. From March into June, pH was observed to decline from maximum values of ~8.15 in March and minimum values of ~7.95 in June. This represented a decrease of ~0.2 pH over three months – this magnitude of decline was also observed by buoy-based pH measurements in the Saronikos region of the Aegean Sea which spatially corresponds to the northern section of the H/S/F Festos Palace FerryBox transect (buoy location ~37.6 deg N and 23.6 deg E; observed seasonal variability in pH (total) in 2014 was 8.18 to 7.98; Gonzalez-Davila et al., 2016). Surface temperature during the observation period increased from ~16.5-18.5 deg C to 24-26 deg C (Fig. 6.1.3.4), and the decline in pH was coupled with this warming (Fig. 6.1.3.5). Based on calculations using CO2SYS (Pierrot et al., 2006) and an average AT of 2630 µmol kg-1 (Gonzalez-Davila et al., 2016), the ~6.5 deg C thermodynamic warming effect on pH between March and June was not able to account for the observed ~0.2 pH decline. This therefore suggests that this region is a sink for CO2 during this time of year.

Further analysis will be performed based on a reference samples for total dissolved inorganic carbon and total alkalinity analysis collected in June 2018 (pending at HCMR Athens lab), as well as delayed mode quality controlled data from the Poseidon fixed station (buoy) sensors.

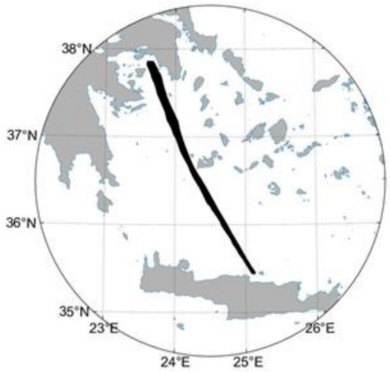

Figure 6.1.3.2: *Ship track of H/S/F Festos Palace between March and June 2018. There were ~100 trips between Heraklion and Piraeus during this time.*

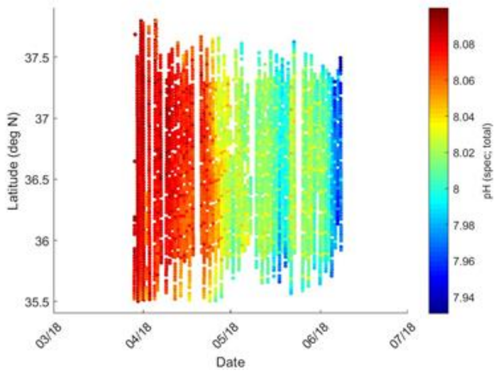

Figure 6.1.3.3*: Spectrophotometric pH measurements (total scale) between March and June 2018 plotted against latitude (deg N) of the transects shown in Fig. 6.1.3.2.*

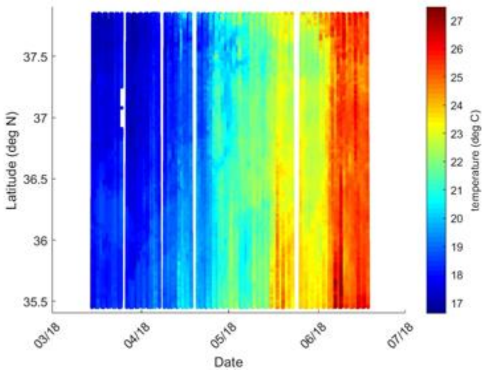

Figure 6.1.3.4*: Sea surface temperature measured by the FerryBox system between March and June 2018 plotted against latitude (deg N) of the transects shown in Fig. 6.1.3.2.*

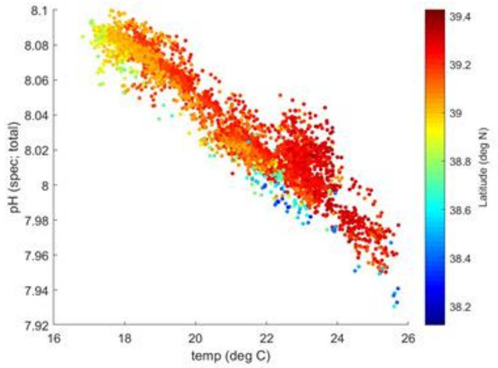

Figure 6.1.3.5*: pH (total scale) plotted against sea surface temperature. Color of symbols indicate salinity at that datapoint. A strong dependence on temperature is observed.*

6.1.4 ANTEIA (JN_CALL_1_10)

Submitted: 27 February 2019; Revision pending (review comments sent on 21 March 2019).

Project Information

Proposal reference number	JN-CALL 1_10
Project Acronym (ID)	ANTEIA
Title of the project	ANTEIA directional wave measuring sensor validation
Host Research Infrastructure	Galway Bay Data Buoy (SMARTBUOY)
Remote access	27/07/2018 – 23/01/2019
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Ibone Rodriguez de Pablo ZUNIBAL, SL Idorsolo, 1 Derio, Bilbao, Vizcaya, Spain ibone.rodriguez@zunibal.com
User group members	Ibone Rodriguez de Pablo, Adolfo Garcia, Carlos Carrasco - *ZUNIBAL, SL, Spain*

Project objectives

The main objectives of the project is the validation of the technology developed by ZUNIBAL through a deployment and data comparison between ANTEIA Wave Buoy and WAVERIDER from Datawell.

As the ANTEIA Wave Buoy System is based on novel GPS technology for measure motions, it has to be validated with the existing wave measurement buoys that use inertial systems to monitor the wave measurements. It is also relevant to have this comparison because of the materials and size of ANTEIA Wave Buoy, which is smaller and made of lighter plastic materials that give the advantage of an easy deployment and maintenance without losing accuracy in the measurements.

Main achievements and difficulties encountered

The main achievements during the period of the project are the mooring design for Galway Bay in the location given by Smartbay, the adaptation of the software configuration for making measurements, deployment, monitoring and retrieval of the system and data analysis and comparison.

All the stages of the project have been successfully committed with a global result of complete validation of ANTEIA Wave Buoy and obtaining a document that describes the techniques used for the measurements, the comparison with WAVERIDER and the results of the experiment regarding accuracy, conformance to the goals of the product and repeatability of measurements.

We have not encountered any difficulty despite finally the deployment and retrieval had been remotely.

Dissemination of the results

The results of the project have been included internally in a dossier that we are going to use in different exhibitions to show the accuracy of ANTEIA Wave Buoy vs. WAVERIDER.

It has been published a communication on the Ocean Energy Ireland website where it has been shown a data comparison figure of both buoys. (http://news.oceanenergyireland.com/smartbay-marine-and-renewable-energy-test-site-activities).
DATA have not yet been delivered on the date of D8.11.

Technical and Scientific preliminary Outcomes

The main objective of this project, was to test ANTEIA Wave Buoy, in Galway Bay. This area, has different sea states that makes a good scenario to test in.

Galway Bay, has a depth about 20 meters, and calm sea states during most of the time. Some storms has appeared during the testing period, and has make a complete type of sea states. Apart from that Galway Bay owns a WAVERIDER buoy, which is a reference in wave measurement, and allow us to have the reference in data obtained.

ANTEIA Wave Buoy was deployed in Galway Bay, at August, until January. The installation was managed by Marine Institute. ANTEIA's installation, was made by a vessel with a crane. The mooring line was connected to the buoy and to the clamp weight. The procedure consist on download the clamp weight up to the sea bed (around 20m), and automatically the buoy goes to the working position.

At this moment ANTEIA started to get sea measurements, and were transmitted to the servers by GSM. Apart from oceanographic data, the buoy transmits GPS position, to check if it is in the correct position.

Wave information were divided into time domain data, and frequency domain data. The data from ANTEIA is shown in contrast with WAVERIDER data in Figure 6.1.4.1. In this plot Hm0 is shown. ANTEIA buoy has been working in different sea states between 0.5m and 4.5m of Hm0. With this different sea states, it has been possible to test the system in most relevant sea states. The correlation between both buoys, has reached 97,63%.

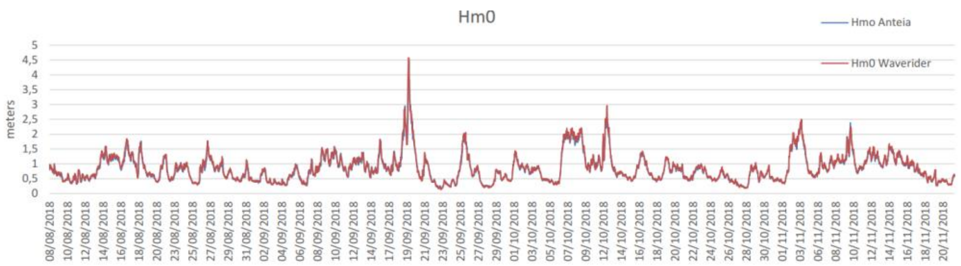

***Figure 6.1.4.1**: HM0 from ANTEIA and WAVERIDER.*

Figure 6.1.4.2 shows a Hmax of 8m that was recorded during "Ali storm". The correlation between both buoys reaches 92.84%.

Figure 6.1.4.3 shows Hs (time domain). There are some "0" values because ANTEIA buoy has a cut off filter tuned at 15 cm, what means, that a wave below 15 cm is not considered as a wave. The correlation between both buys reaches 99.32%

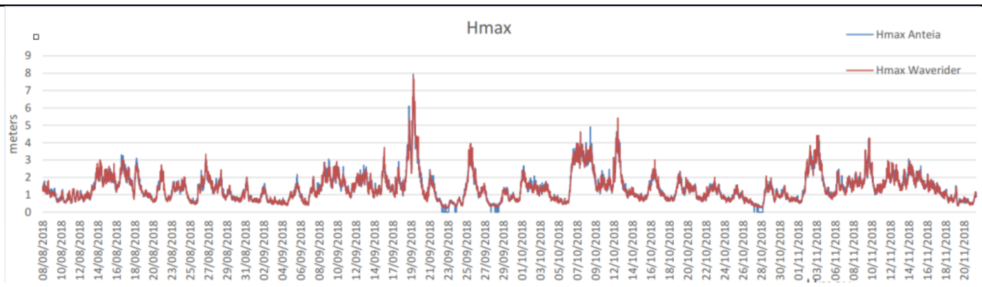

Figure 6.1.4.2*: Hmax from ANTEIA and WAVERIDER.*

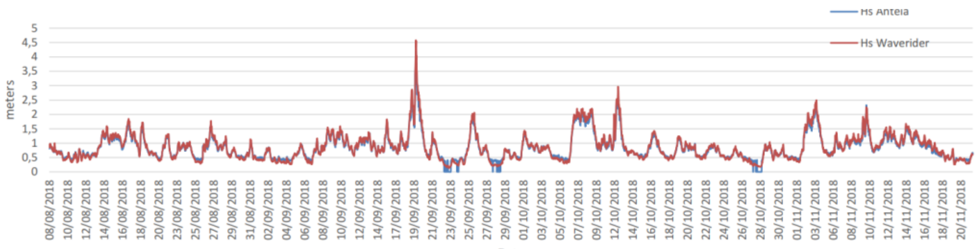

Figure 6.1.4.3*: Hs from ANTEIA and WAVERIDER.*

Finally a non-directional spectrum (PSD) is shown in Figure 6.1.4.4. These plot has been obtained directly from the buoy without any computation.

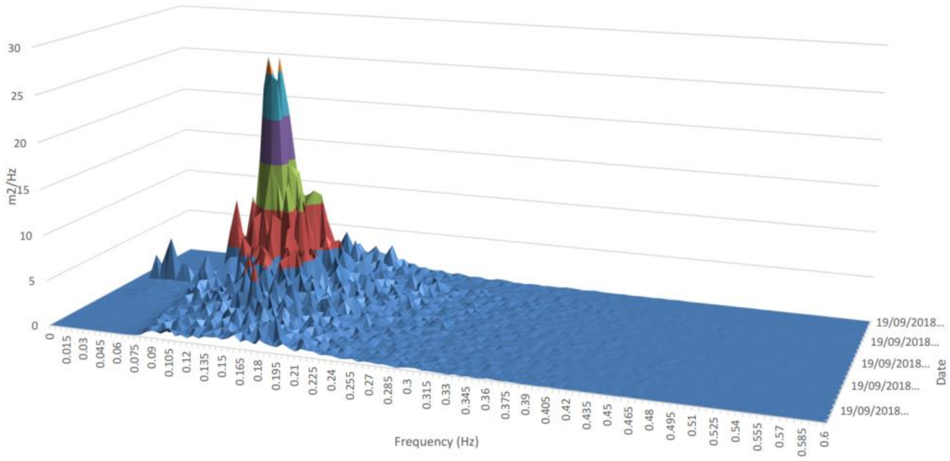

Figure 6.1.4.4*: Non-directional spectrum (PSD) obtained directly from the buoy without any computation.*

Preliminary outcomes:

With this experiment, it has been possible to obtain a comparison between ANTEIA wave Buoy, and a traditional system hosted by SmartBay.

The measurements obtained, reaches a correlation higher than 95%, and with this first results it can be said that the experiment has been successful.

6.1.5 FinisGlider (JN_CALL_1_11)

Submitted: 27 November 2017; Final revision: 7 December 2017.

Project Information

Proposal reference number	JN-CALL 1_11
Project Acronym (ID)	FinisGlider
Title of the project	FinisGlider. Pilot experience to incorporate Glider technology to the Finisterre repeated hydrographic section.
Host Research Infrastructure	CNRS-INSU Glider National Facility (GNF)
In person access **Remote access**	25/04/2017 – 26/04/2017 27/06/2017 – 18/08/2017
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	César M. González-Pola Muñiz Spanish Institute of Oceanography Avda Príncipe de Asturias 70 Bis, 33212, Gijón, Spain cesar.pola@ieo.es
User group members	César González-Pola, Marta Álvarez Rodriguez, Alicia Lavín Montero, Manuel Ruiz Villarreal - *Spanish Institute of Oceanography, Spain*

Project objectives

The objectives of the FinisGlider mission are part of a broad long-term monitoring program of the ocean hydrography in the Western Iberia Margin. The VACLAN-RADPROF program maintains continuous observation of ocean climate variability in this region of the North Atlantic eastern boundary. A full-depth hydrography and biogeochemistry sampling is performed yearly through a ship-based deep section perpendicular to the coast, extending to 250 nm off Cape Finisterre into the Iberian Abyssal Plain basin (north-western Iberia, 43ºN, 9-15ºW, > 5000 m). From 2003 to 2010 the section was sampled twice per year around winter and summer, from 2012 only the Finisterre summertime section is conducted on regular basis.

FinisGlider is the first glider occupation of the section. We expect that glider missions should help to (i) study the influence of mesoscale variability on the water mass properties determination by ship cruises and (ii) understand the variability in circulation patterns at the Galician slope and the passage from the shelf to the Galician Bank. The mission also must assess the viability of addressing the repeated hydrographical section west of Finisterre through glider missions.

Main achievements and difficulties encountered

The glider mission was scheduled in summer 2017 to overlap with the annual ship cruise in order to provide an independent dataset of the hydrographical/biogeochemical conditions. Both glider mission and cruise were successfully accomplished. Logistic and planning of the mission started by a Skype meeting between the CNRS-INSU Glider National Facility and the Spanish Institute of Oceanography (IEO) on January 13, 2017. Tentative dates for the mission were discussed and it was agreed to organize a visit to the GNF in Toulon in late April (finally set to 25-26), where the mission details and glider functioning were further discussed. Soon it was noticed that, based on web documents, we had assumed an unreliable high speed for the glider and the whole section was going to take about 40 days instead of slightly over 20 as we had assumed in the initial proposal. Fortunately, it was possible to increase the extent of the time mission under the JERICO-NEXT agreement.

The Glider Facility team was in charge of deployment and piloting the glider. Due to unexpected very bad weather forecast in the area we had to speed up the deployment and go out at sea the same day that the glider technician arrived from France (June 29). The first days of the mission the glider experienced functioning issues that were solved remotely by the facility team. The recovery was made by the IEO using a zodiac on August 18, in permanent phone contact with the facility team.

Dissemination of the results

FinisGlider is a first step in order to incorporate glider-based oceanography sampling at the Finisterre section on a regular basis, while the mission is expected to provide some scientific insights regarding the inter-comparability of both independent sampling systems in the area. The dissemination paths of scientific outcomes should be the standard for science, as conference presentation and/or scientific documents. At the time of writing we have just received the glider dataset (about a month ago), thus it is soon to draw a specific dissemination plan of the results. As agreed within the TNA call, main findings will be presented in the final JERICO-NEXT meeting in 2019.

Currently, the Finisterre section contributes to the ICES yearly status report on ocean climate (http://ocean.ices.dk/iroc/). Within this framework, gliders are starting to be implemented in different regular sections across Europe. A close example is the so called "Extended Ellet Line" from Scotland to Iceland (http://prj.noc.ac.uk/ExtendedEllettLine/). The next Working Group on Ocean Hydrography meeting will take place in Norwich, March 20th, 2018. The results from the FinisGlider mission will be firstly presented there. Also an internal report for IEO on the potential of a fleet of gliders for regular monitoring will be issued.

DATA: The data set gathered by the glider were processed by CORIOLIS under SEANOE (Gonzalez-Pola and Ruiz, 2017), and made public through the link: http://www.seanoe.org/data/00409/52032/

Technical and Scientific preliminary Outcomes

After the glider mission ended in late August, it took some weeks before the glider was sent back to the CNRS-INSU GNF for data downloading and processing. The whole record, processed by the GNF team, was sent to the IEO on October 20. The whole record processed by SEOANE was released on November 11. Therefore, at the time of writing the scientific analysis, the dataset is in a preliminary stage.

BondPland glider took slightly over 20 days each way, from June 29 to July 19 the forward journey and July 19 to August 12 the backwards leg (Fig. 6.1.5.1). The glider was recovered on August 18 due to logistics. Its sensor payload provided pressure, temperature, salinity, dissolved oxygen, chlorophyll-fluorescence, coloured dissolved organic matter (CDOM) and turbidity backscattering. CNRS-INSU processed record split the glider track into 320 downcast and another 320 upcast profiles, covering the whole section down to about 1000 m depth.

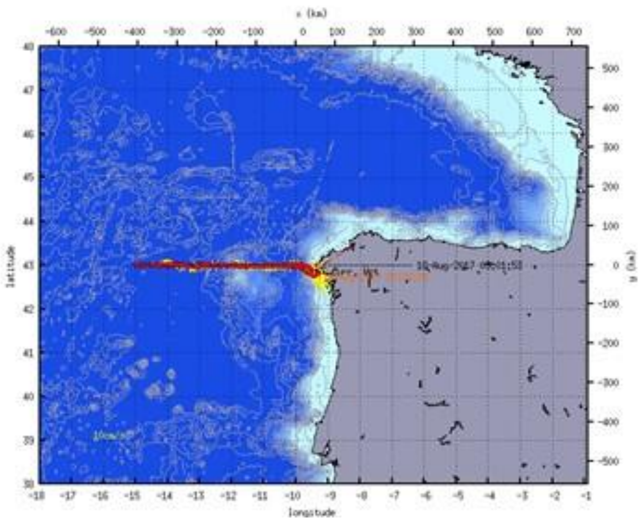

***Figure 6.1.5.1**: Mission track.*

Cruise occupation of the section lasted 5 full working days from July 4 to July 8, covering the 24 planned stations from the continental shelf to the inner Iberian Abyssal Plain (Fig. 6.1.5.2). The CTD had the standard hydrographical payload plus external sensors for chlorophyll-fluorescence and dissolved oxygen. The rosette sampler had 24 10-litter bottles from where several biogeochemistry variables were determined, among them chlorophyll, dissolved oxygen, nutrients and organic matter. A dual 300-kHz LADCP was included and the ship had a 150 kHz VMADCP running continuously.

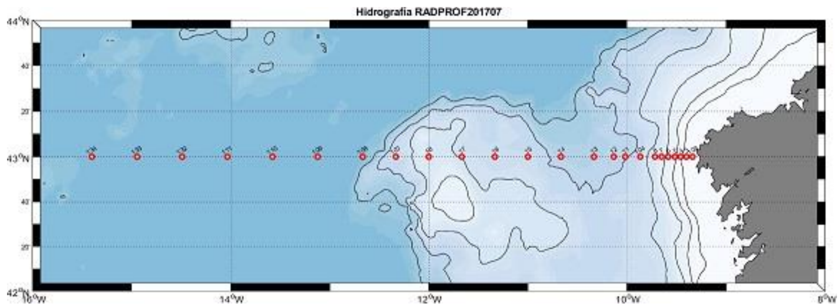

***Figure 6.1.5.2**: Cruise stations from the continental shelf to the inner Iberian Abyssal Plain.*

A primary scientific target of this first mission is thus the quantification of short-term variability influence on the representativeness of one-per-year hydrographical cruise series. Thus, it was considered convenient to perform inter-calibration dives for a direct comparison of CTD Sbe911. On cruise start, July 3, we sailed directly to the last known position of the glider to make a first inter-calibration profile. A first CTD was performed on July 3 at 20:57 UTC at 42º 59.95'N, 010º 19.80'W matching with glider dive #52 (43º 00.05'N, 010º 21.16'W, 22:50 UTC), i.e. separated by 2.5 km and less than 2 hours. 3 days later the cruise overtook the glider close to 011º W providing a second inter-calibration dive (2.5 km and 4 hours of difference). After finishing the sampling, the ship returned along the same line recording an additional track of velocity field.

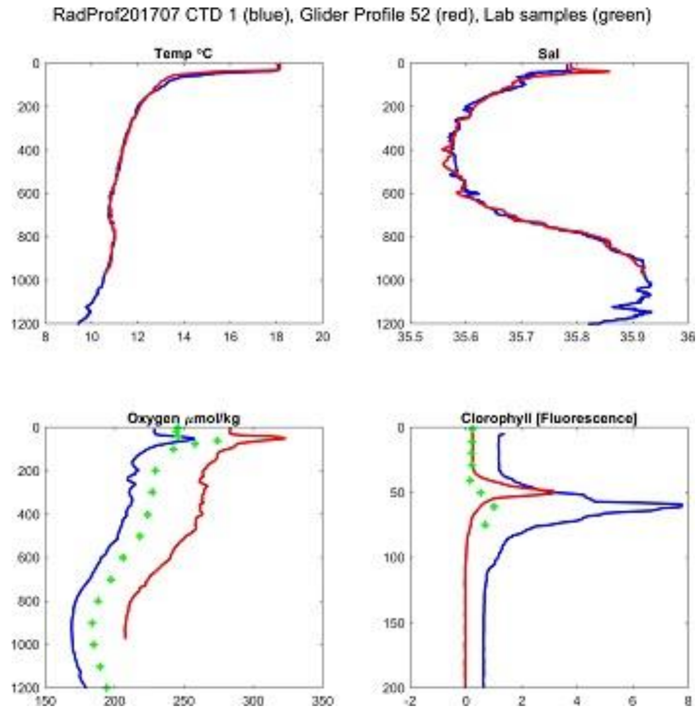

***Figure 6.1.5.3**: Intercalibration profiles.*

The inter-calibration dive shows clear matching among samplers but highlights the need to calibrate carefully the oxygen and chlorophyll sensors both in CTD and glider payload. Vertical displacement seen in chlorophyll-fluorescence is consistent with vertical shift of overall hydrographical structure due to the local internal wave field.

So far we are assuming that we can estimate the hydrographical state of regional water masses through classical one-per-year CTD sections. This assumption seems weaker as we deal with Mediterranean Water levels, where there is strong mesoscale and submesoscale activity. The next step to be carried out from the FinisGlider record is analyzing the differences among the cruise and the glider sections (forward and back tracks), that will allow quantifying the influence of intrinsic short-term variability of hydrographical properties and mesoscale structures on the determination of the background state.

The overlapping of a cruise and a glider mission provides a rare opportunity to make these same estimates for biogeochemical variables, as dissolved oxygen and chlorophyll, whose spatial structure depends strongly on hydrography but also on biological factors. Finally, it is well-known that shelf-slope dynamics as well as mesoscale structures evolve in timeframes of weeks, so it is anticipated that, in terms of recirculation structures, outcomes will vary among different records. The differences with regard to geostrophic circulation will be explored, taking into account regional meteorological forcing and altimetry.

6.1.6 GLIDER-SOUTH (JN_CALL_1_12)

Submitted: 28 September 2017; Final revision: 7 November 2017.

Project Information

Proposal reference number	JN-CALL 1_12
Project Acronym (ID)	GLIDER-SOUTH
Title of the project	GLIDER missions in the SOUTHern Sicilian Channel
Host Research Infrastructure	CNRS-INSU Glider National Facility France
In person access **Remote access**	10/04/2017 – 13/04/2017 23/04/2017 – 28/06/2017
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Aldo Drago Physical Oceanography Research Group, Dept. of Geosciences, University of Malta MSD 2080, Malta Aldo.drago@um.edu.mt
User group members	Aldo Drago, Adam Gauci, Anthony Galea, Carl Cassar - *University of Malta, Malta* Antonio Olita, Roberto Sorgente - *IAMC-CNR, Italy*

Project objectives

The stretch of sea southward of the Maltese Islands beyond 35°N is practically an unexplored area of the Mediterranean Sea. Except for a very limited number of oceanographic surveys, the most recent one conducted within the MEDSUDMED initiative on the shelf area close to Tripoli in summer 2006, data are very scarce and provide only a coarse description of the hydrographical conditions of the region. Knowledge about the thermohaline characteristics and the water mass circulation in the southern Sicilian Channel is mainly derived from regional scale numerical simulations and satellite observations. The surface circulation appears to be complex with the presence of gyres, eddies and current bifurcations, and characterized by a significant seasonal modulation.

The significant extent of the African (Tunisian and Libyan) continental shelf, with a large portion of very shallow bathymetry, renders sampling efforts and the characterisation and location of water masses somewhat demanding; furthermore national structures for data acquisition, even in the coastal sea areas, are greatly lacking.

The GLIDER SOUTH project was principally aimed to sample intensively this historically under surveyed area of the Sicily Channel, by using dedicated glider missions in the area shown in Figure 6.1.6.1, supported by joint Lagrangian drifter experiments, and assessments through the use of numerical model

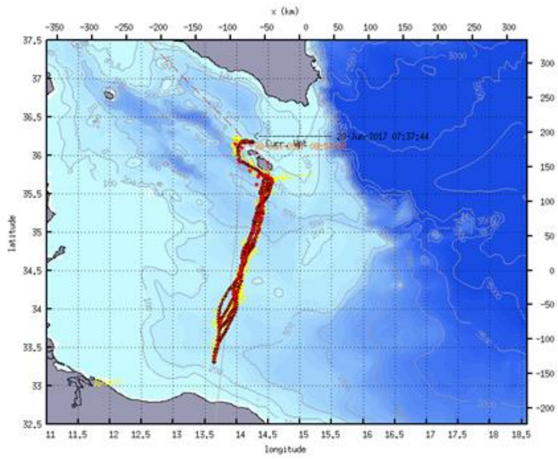

Figure 6.1.6.1*: Glider track, complete mission (23 April – 28 June 2017).*

simulations to better interpret the pertinent processes in this marine domain.

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The GLIDER SOUTH project was principally aimed to sample intensively this historically under surveyed area of the Sicily Channel, by using dedicated glider missions in the area shown in Figure 6.1.6.1, supported by joint Lagrangian drifter experiments, and assessments through the use of numerical model simulations to better interpret the pertinent processes in this marine domain.

Main achievements and difficulties encountered

The glider Campe has been deployed on the 23th of April, 2017 by staff of the Glider National Facility with the help of the Maltese team and support of the Armed Forces of Malta. It has since then performed transects between the Maltese Islands and the southern Mediterranean shelf, and after a successful mission of 66 days, the glider was recovered in the north-western approaches to the Maltese Islands, collecting over 2000 profiles.

Hydrographic data in this region is very scarce and the project provides pristine data which will help to understand the dynamic phenomena observed in the stretch of sea between Malta and Libya.

The sea glider was further employed along a track close to the Maltese Islands to demonstrate how adaptive monitoring strategies using remotely controlled unmanned devices provide cost effective methods to routinely collect basic marine data and measure the health of coastal waters.

The track of this mission and the plots of the measures taken along it, are viewable at the following link: https://gfcpdsi.ego-network.org/plot/plot_deployment.php?glider=Campe&deployment=GliderSouth.

Dissemination of the results

A half-day seminar was organized on 7 July 2017, at the Dolmen Resort Hotel, Qawra, to present the sea glider experience in Malta to key stakeholders and interested parties, and showcase how the new generation of sea gliders offers an innovative aid to observe and monitor the sea areas under local jurisdiction. With the participation of local scientists and two foreign experts, the seminar provided an avenue to brainstorm the way to the shaping of the operational marine observing system for the Maltese Islands ("Introducing sea gliders for monitoring the marine environment in Malta", http://ioi.research.um.edu.mt/GliderSouth/index.php/welcome/events).

GLIDER South has been presented to the public through media features on radio and TV as well as through a dedicated article on THINK magazine issued quarterly by the University for public outreach.

GLIDER South is also being presented at international fora such as the EMSO-ERIC link workshop in Rome in October and the XXIII Congress AIOL in Cagliari in September.

The project has served to showcase how gliders can provide an optimal monitoring solution in the case of an island state like Malta. With a fleet of three gliders, two units in the sea at any time and moving with a phase difference of half a turn along a common trajectory around the Maltese Islands, it is possible to monitor the whole coastal sea area at least every five days. This would provide a system that can resolve high spatial and temporal variability. Such a system has been proposed to the local Environment Resources Authority who are currently planning a large IP proposal that permits acquisition of marine infrastructure.

DATA: Access to the data is available through a brand new service called SEANOE, which is offered by SISMER, an IFREMER department. GLIDER South data is referenced by SEANOE with a dedicated webpage: https://www.seanoe.org/data/00400/51145/. The full raw data set has been processed by CORIOLIS, with all intermediate processing steps available, and it is freely downloadable (Drago et al., 2017).

Technical and Scientific preliminary Outcomes

GLIDER SOUTH has provided pristine water column observations in this area of the Mediterranean Sea where hydrographic data is very scarce. This data, still in the process of being fully analysed, will help to understand the dynamic phenomena in the stretch of sea between Malta and Libya.

Important targets concern the vertical water column structure associated to mesoscale and sub-mesoscale circulation features appearing and monitored by satellite during the glider mission; the study of the extension and seasonality of the Bifurcation Atlantic Tunisian Current through its subsurface signatures; assessing for any particular water column structure and water masses in association to bathymetric differences especially in the deeper areas such as the Malta Graben southwest of the Maltese Islands; tracing evidence of deep water formation from the Libyan continental shelf, and obtaining direct observations on the westward LIW flow south of the Maltese Islands.

Furthermore, data collected is being used to validate numerical forecasting models of the area, and work with IAMC-CNR, (Oristano section) will specifically target the Tyrrhenian Sicily Channel Regional Model TSCRM. Figure 6.1.6.2 shows the root mean square error between TSCRM-derived and glider profiles for temperature and salinity respectively.

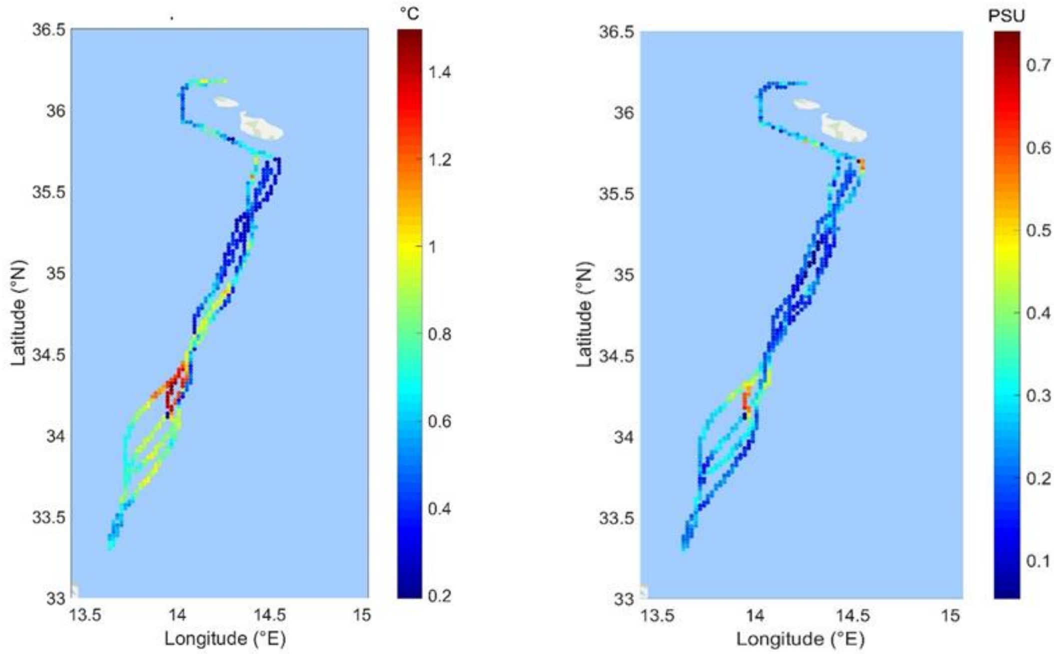


***Figure 6.1.6.2**: Temperature RMSE between glider and TSCRM model profiles (Left), and Salinity RMSE between glider and TSCRM model profiles (Right).*

The sea glider was further employed along a track close to the Maltese Islands to demonstrate how adaptive monitoring strategies using remotely controlled unmanned devices provide cost effective methods to routinely collect basic marine data and measure the health of coastal waters.

The project has served to train local staff in the use of sea gliders on the field. The experience on GLIDER South has been essential to understand how glider data is managed, quality controlled and analysed.

A substantial effort is ongoing to translate this effort into a comprehensive sea glider data management platform which will serve to (a) process and visualise glider data; (b) integrate glider data with other in situ data, satellite observations, and numerical model data, linking and superposing data types acquired by different platforms and different temporal and spatial data representations; (c) deploy useful tools developed in this project and in previous work, in a web application that can generate visualisation plots of processed data, for online viewing of both delayed and real time glider data.

The GLIDER South webpage has been set up to show the project activity and will be maintained to show scientific results as they mature, http://ioi.research.um.edu.mt/GliderSouth/index.php/welcome/index .

6.2 Second TNA Call

6.2.1 EvoLUL (JN_CALL_2_1)

Submitted: 20 December 2018; Final revision: 25 January 2019.

Project Information

Proposal reference number	JN_CALL_2_1
Project Acronym (ID)	EvoLUL
Title of the project	Long term Underwater localization in extreme conditions
Host Research Infrastructure	Expandable Seafloor Observatory (OBSEA)
Remote access	17/10/2017 – 14/09/2018
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Konstantin Kebkal EvoLogics GmbH Ackerstraße 76 D-13355 Berlin, Germany kebkal@evologics.de
User group members	Konstantin Kebkal - *EvoLogics GmbH, Germany* Pierre-Jean Bouvet - *ISEN, France* Ivan Masmitja - *UPC, Spain*

Project objectives

The main idea of this project is to study the performance of range-only single-beacon localization algorithms, with which both static and moving target can be localized and tracked using autonomous underwater vehicles. These kind of methods can be used, for example, to follow a tagged animal. Moreover, it can be implemented in a fleet of autonomous vehicles to know the position between them, as a future work, if the results in terms of accuracy and feasibility are acceptable.

A long term deployment experiment will offer the possibility to ensure robustness of the range estimation at different meteorological and sea conditions, and quality of the data along time. Variability of the measurements will be studied and correlated with sea conditions since OBSEA platform is measuring waves, currents and water properties.

Main achievements and difficulties encountered

This project had two main goals:

a) Study the range error obtained using acoustic modems at different sea states

b) Evaluate these kinds of errors for different types of target localization algorithms

We studied the range variability due to sea conditions comparing the range obtained between two seafloor modems, and the range obtained between a seafloor and a modem in a buoy. Because tests were conducted during more than 271 days, their variability could be correlated among different sea parameters such as wave's height, buoy movement, pressure variations, etc. The results will be used to understand/estimate the target tracking accuracy expected vs the sea conditions presented. Moreover, different tracking tests have been conducted showing differences in algorithm's performances due to range noise and tracking paths.

Finally, some electromagnetic interferences were encountered which were propagated through the cabled observatory and the modems. This electromagnetic noise can sporadically cause acoustic communication problems between modems. These kinds of issues were observed previously in other similar scenarios, and need to be addressed using either uncoupled DC/DC power supply, EMI filters, etc. However, despite these interferences, the test has been conducted properly thanks to the robustness of the modems.

Dissemination of the results

Two congress publications has been carried out (Masmitja et al., 2018a and 2018b) and a third publication in a peer review paper is in progress (Masmitja et al., 2019).

DATA are available on this link: https://obsea.es/jericonext/evolul.php

Technical and Scientific preliminary Outcomes

Two acoustic modems and one USBL (all from Evologics; www.evologics.de) were installed in December 2017. A representation of this deployment can be observed in Figure 6.2.1.1. The USBL (M1) and one modem (M2) were deployed on the seafloor. These devices were connected to a secondary cylinder, which provides both Ethernet and power supply through the OBSEA observatory. Moreover, an ODROID embedded computer was used as a main controller to perform the tests, which was also allocated inside the cylinder. A second modem (M3) was installed on a buoy, in order to obtain a more challenging operative scenario for the acquisition of the range measurements. Finally, a third modem (M4) was designed to be installed on an Autonomous Underwater Vehicle (AUV) to perform the target tracking tests.

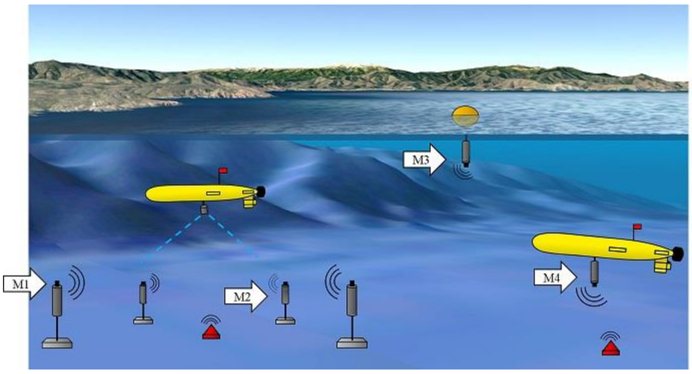


***Figure 6.2.1.1**: Acoustic modem deployment scenario.*

The ranges among all the modems (M1 … M3) are presented in Figure 6.2.1.2 (middle), which were measured from December 6, 2017, to September 19, 2018, with a sampling frequency of 5 min. The Received Signal Strength Indicator (RSSI) and Integrity Level of the communication between modems are also presented. These measurements are important for the evaluation of the goodness of the communication, and therefore the range measured. To correlate the measured range variations with the sea state a parameter called total buoy inclination was used. This parameter indicates the absolute buoy inclination respect to the normal vector of the plane X-Y, it has been calculated from the combination of the pitch and roll from the buoy and offers an estimation of the sea flatness. Then, the Standard Deviation (STD) of both range measurements and buoy inclination have been computed in groups of 1 hour to observe the influence of the sea state with the range variations, Figure 6.2.1.2 (bottom). The STD between M1 and M2 is much lower than the STD between M1 (or M2) and M3, as expected, because both M1 and M2 were moored on the seafloor, and M3 was in a buoy. Finally, the range variations can also be compared with the Wave Height and other parameters such as CTD measurements presented in Figure 6.2.1.2 (Top).

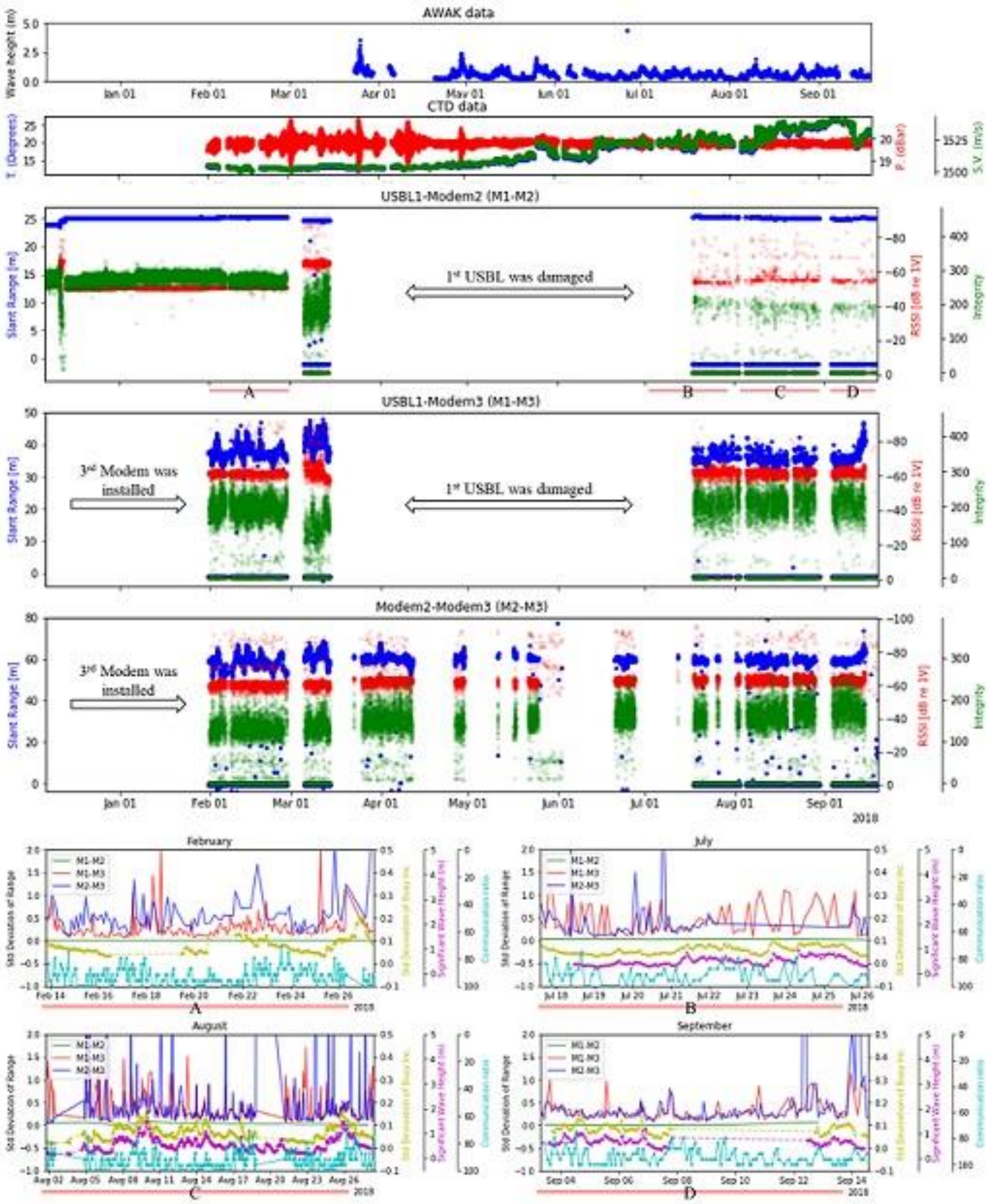


Figure 6.2.1.2: *Long term deployment: Slant Range vs RSSI and Integrity among the modems deployed at OBSEA (top); Range measurement's STD vs Total Buoy Inclination's STD, Wave Height, and Communication ratio, for 4th different time periods (bottom).*

The localization experiments using range-only methods were conducted in two scenarios. Firstly, the three modems (M1 … M3) deployed in the OBSEA were localized using a forth modem (M4) installed on a boat (used as an AUV). Two methods were used to estimate the modems' position, a Least Square (LS) and a Particle Filter (PF). The main difference between the LS and PF is observed in M1's position, where the error introduced by LS is significantly greater (Fig. 6.2.1.3). The second scenario was tracking a moving target, in this case a drifting buoy with one modem was tracked for approximately 1 hour. During this time, the ranges between both target and observer were measured and used with a PF algorithm to track the target's position (Fig. 6.2.1.4).

Finally, a last experiment using an AUV to track two targets were conducted, the preliminary results are shown in Figure 6.2.1.5. Despite of some issues with AUV's compass, both targets could initially be tracked. These results will be published in a peer review journal.

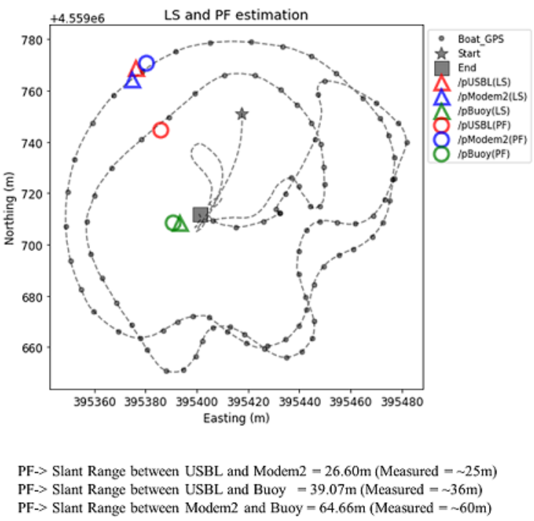


Figure 6.2.1.3: Static target localization: Test conducted to localize the modems deployed in the OBSEA, using LS (triangles) and PF (circles) algorithms, and their ranges from an observer (grey dots). The slant range obtained using PF and the ones measured with the modems are also represented (bottom).

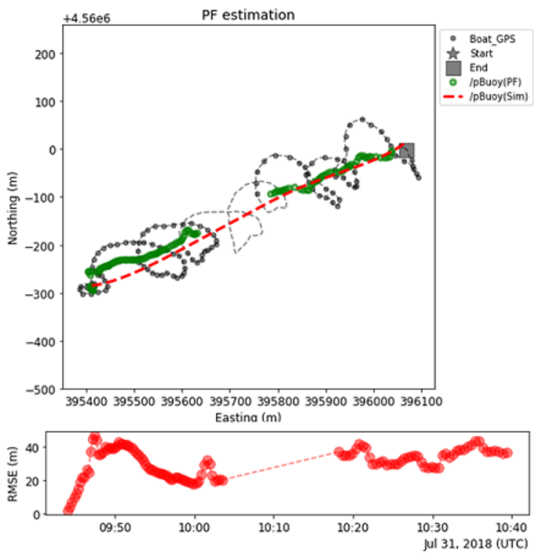


Figure 6.2.1.4: Moving target tracking: Test carried out to track a drifting buoy equipped with a modem. The x-y position of the observer (grey), the target (red), and the target's estimation (green) are represented on the top figure. The Root Mean Square Error (RMSE) is represented in the bottom figure.

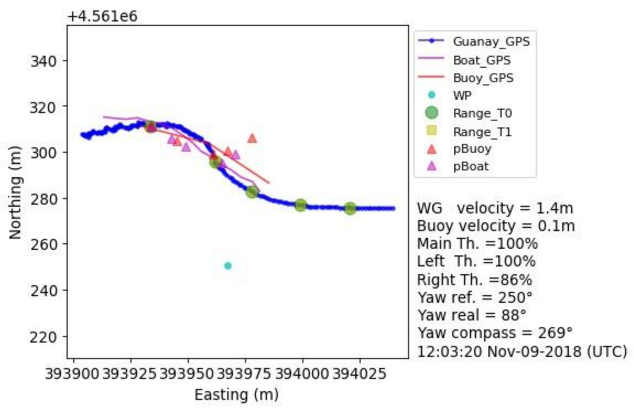


Figure 6.2.1.5: Moving multi target tracking: Test conducted to track a drifting buoy (red-triangles) and a boat (purple-triangles). Using an AUV (blue line).

Figure 6.2.1.2 shows some of the results obtained during the long-term deployment. The different plots indicate (top to bottom): the wave height in meters obtained with an Acoustic Doppler Current Profiler (ADCP); the Conductivity, Temperature, and Depth (CTD) measured; the slant range between two modems, as well as their signal Integrity and Received Signal Strength Indicator (RSSI), which is can be used to know the communication's quality; finally, a comparative result between range variability and sea state condition from 4 different periods of time are presented in the bottom.

On the other hand, Figure 6.2.1.3 shows an x-y plot of the tests conducted to localize three modems deployed in the OBSEA. One attached in a buoy at 5 m depth (green color), and two deployed in the seafloor at 20 m depth (red and blue color). Triangle dots represent their positions estimated using the LS algorithm, whereas circle dots are their positions estimated using PF.

Figure 6.2.1.4 shows the dynamic test conducted, where the path conducted (grey dots) to track a drifting buoy (red line) can be observed. The error between the target's prediction and its "true" position is shown in the bottom. However, the drifter's GPS position was not available during this test, and its "true" position was derived using its deployment and recovery positions. Therefore, the constant error value shown (around 40 m) can be a circumstance of real target instead of PF performance.

To conclude, a long-term test with slant range measurements (more than 90.000) among different acoustic modems has been carried out under extreme conditions. These measurements could be compared to weather and sea state to find correlations between them. This study helps on the characterization of the range error, and therefore, the knowledge in target position's estimation.

For example, Figure 6.2.1.2 (bottom) shows the result obtained in four different periods of time (February, July, August, and September), where the variation in range measurement is compared with the sea state. In the August plot, the range measurement's STD (blue and red lines) follows the same behavior of the total buoy inclination's STD (yellow line) and the wave height (purple line), which are the main indicators of the sea state. In other words, more variability in range measurements is obtained when the weather is worst. This performance is important in range-only tracking/localization algorithms, which helps to know the accuracy achievable. On the other hand, the communication ratio which is the number of successful communications divided by the total number of attempts (green-blue line) shows also that when the sea state is worst, less successful communications are obtained between modems. However, due to the communication protocol used by Evologics modems, this problem have a minor impact.

Finally, three tests have been conducted using range-only methods to localize and track different targets under different scenarios. These methods were the LS and PF, where they good capabilities have studied.

For example, the slant range measured acoustically by modems can be compared with the slant range computed using their estimated position obtained through PF algorithm as follows:

PF-> Slant Range between USBL and Modem2 = 26.60m (Measured acoustically = ~25m)

PF-> Slant Range between USBL and Buoy = 39.07m (Measured acoustically = ~36m)

PF-> Slant Range between Modem2 and Buoy = 64.66m (Measured acoustically = ~60m)

In this case, the greatest error is obtained between Modem2 and Buoy which is 4.7 m, where the lowest error is 1.6 m. In both cases the error is < 5 m which indicates the PF's performance for target localization.

6.2.2 MicroPlastox (JN_CALL_2_2)

Submitted: 11 June 2019; Final revision: 13 August 2019.

Project Information

Proposal reference number	JN_CALL_2_2
Project Acronym (ID)	MicroPlastox
Title of the project	Microplastics in the marine environment: estimation and ecotoxicological assessment
Host Research Infrastructures	Galway Bay Cabled Observatory (CPO) MS Color Fantasy (FA) Heraklion Coastal Buoy (HCB)
CPO : In person access **Remote access** **FA : In person access** **HCB : In person access** **Remote access**	28/02/2019 28/09/2018 - 24/11/2018 21/01/2019 - 25/01/2019 26/03/2019 - 29/03/2019 01/06/2018 - 31/05/2019
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	João Pinto da Costa University of Aveiro, CESAM & Department of Chemistry 3810-193 Aveiro, Portugal joao.pinto.da.costa@gmail.com jpintocosta@ua.pt
User group members	João Pinto da Costa - *University of Aveiro, Portugal*

Project objectives

The main goal of the submitted research project is the assessment of the presence and prevalence of microplastic particles (MP) in European waters. From the collected particles, the creation of an online repository, detailing the findings, is expected (see the Dissemination section). The collected samples will be used in future studies assessing the potential ecotoxicological effects of these particles.

The collected samples are presently being thoroughly analysed (optical microscopy, FTIR spectroscopy) and their effects currently under study, using bioluminescence inhibition test with *Vibrio fischeri*, algae growth inhibition test with marine microalgae *Phaeodactylum tricornutum* and *Isochrysis galbana* and 24-48h acute toxicity test with the crustacean *Artemia franciscana*, although additional tests may be carried out, depending on the availability of MP samples.

This project will provide the basis for the development of monitoring approaches for plastics and subsequent recommendations to be included in water policies and management strategies. Hence, the collection and cataloguing of the existing MPs sampled in aquatic systems will concomitantly allow for the assessment of ecotoxicological risks and effects of microplastics using adapted standardized methodologies, and the dissemination of the gathered data will effectively contribute to the development and establishment of water policies and will, hopefully, constituted significant contributions to the development of potential MP-related pollution ecotoxicology evaluation and subsequent development of specific regulations.

Main achievements and difficulties encountered

The main contribution of this work will be not only the geographical coverage of sampling, but also the use of different sample collection methodologies. In fact, the inclusion of the neuston net in the Heraklion Coastal Buoy (images available at https://themprepository.wixsite.com/themprepository/blog/net_away) involved conceiving a protection mechanism that allowed for prolonged sampling campaigns; the net was, unfortunately, lost, probably removed by fishermen and an alternative was devised, based on the surface collection of samples, according to outings performed by HCMR at Heraklion. On board the MS Color Fantasy, the innovative process used, firstly tested within the framework of this TNA project, will quite probably become a reference in the future. It allows for the filtrations of thousands of liters of (sea)water, and, considering its use in well-defined routes, it will certainly contribute towards the elimination of one of the major gaps in MP research: replication, as multiple samplings can take place, repeatedly and throughout the year, also permitting a window into potential seasonal variation on the presence of these materials. However, as a brand new system, modifications and optimizations were required, and, therefore, sampling was delayed until late January 2019. Lastly, the use of a neuston net at the Galway cabled observatory was a yet unreported sampling method, as the net was placed on the seabed for a couple of weeks, thus allowing confirmation on the presence of these materials throughout the water column. The main constraints were the weather and availability of a highly trained diver to this location.

Dissemination of the results

Although analyses of the collected samples are still underway, as well as ecotoxicological tests, this Project was disseminated online, by creating a temporary website, as well as a social media page: https://themprepository.wixsite.com/themprepository), https://www.facebook.com/mprepository/. There has been a peer-reviewed work published in which acknowledgement to JERICO-NEXT was made (Paço et al., 2019), although the grant agreement number was not included for an oversight that the Project Leader apologizes for. In the near future, another publication reporting the prevalence of these materials and another focusing on their (potential) effects are also planned, which will include the appropriate acknowledgment.
DATA have not yet been delivered on the date of D8.11.

Technical and Scientific preliminary Outcomes

As noted before, analyses are still underway. However, visual inspection has resulted in the confirmation of the presence of plastic particles, as detailed in Table 6.2.2.1 and exemplified in Figure 6.2.2.1, in samples collected in Norway.

Table 6.2.2.1: *Summary of the main findings pertaining to data collected on board MS Color Fantasy.*

Path	Start/endpoints	Approx. water volume (L)	Number particles	Number fibers	Total MP	Estimated MP.m^{-3}
Oslo - Kiel	Oslo - Drobak	900	1	2	3	3.33
	Drobak - Torbjornskaer	1000	1	1	2	2.00
	Torbjornskaer - Skagen/Goteborg	2400	2	1	3	1.25
	Skagen/Goteborg - Kiel	7800	4	4	8	1.03
Kiel - Oslo	Kiel - Skagen/Goteborg	7800	4	3	7	0.90
	Skagen/Goteborg - Torbjornskaer	2100	2	0	2	0.95
	Torbjornskaer -Drobak	1200	0	4	4	3.33
	Drobak - Oslo	900	1	3	4	4.44

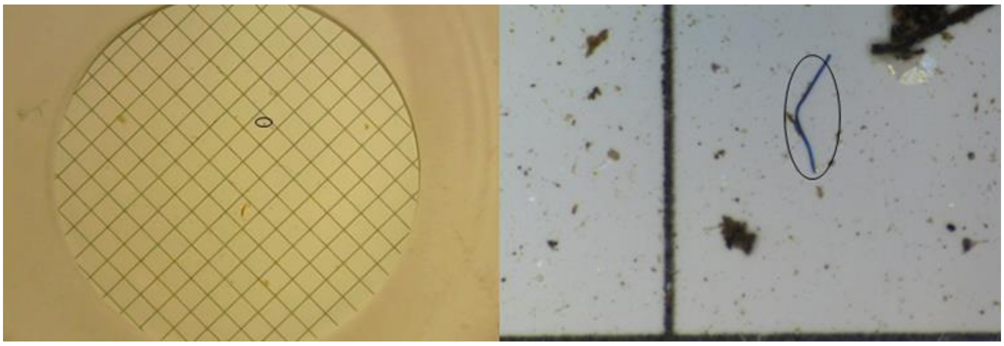


Figure 6.2.2.1*: Some of the particles isolated from a sample collected on board the MS Color Fantasy filtration system (Norway). The highlighted particles are fibers.*

These are examples of the currently gathered data, although some of the collected samples are still under analysis; other particles, already characterized, are presently being used for initial ecotoxicological tests using the aforementioned species, although some issues regarding the growth of the control individuals have been noted (thus affecting any inferences on the potential effects of these materials). These issues are presently being addressed, namely, by optimizing the growth conditions of these organisms.

In Greece, microplastics were also present in the collected samples, although their prevalence varied with dates of sampling, as exemplified in Table 6.2.2.2. However, it should be noted that additional samples than those listed in Table 6.2.2.2 were collected in Greece and these are still under analysis and that preliminary results suggest a considerably higher number of microplastics present in other samples, a variation that may stem not only from the sampling dates, but also locations.

Table 6.2.2.2: *Preliminary findings pertaining to data collected from Heraklion Coastal Buoy.*

Date	Distance covered (km)	Approx. water volume (m^3)	Number particles	Number fibers	Total MP	Estimated MP.m^{-3}
22.10.2018	2.35	600.48	12	0	12	0.02
16.12.2018	3.58	913.73	11	1	12	0.01

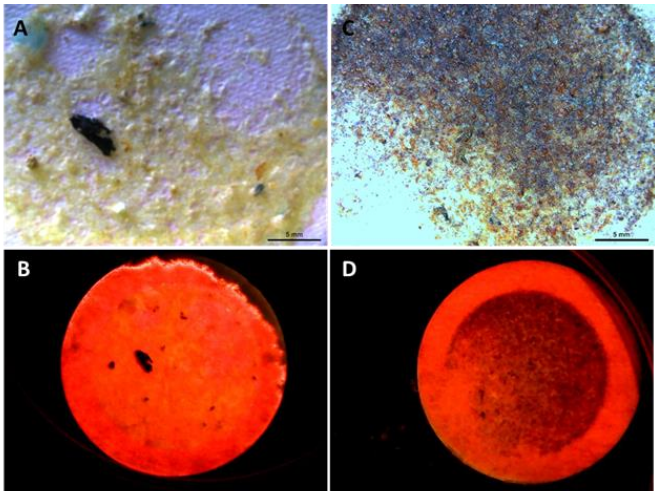


Figure 6.2.2.2 *– In A), detail of a 47 mm filter, detailing the presence of microplastics in samples collected on 16.12.2018. In B), an overview of the filter showed in A), following digestion (with H_2O_2) and Nile Red staining and under a 470 nm wavelength light. In C), detail of filtered samples collected on 22.10.2018, showing the high prevalence of organic matter. In D), overview of the filter described in C), following digestion (with H_2O_2) and Nile Red staining and under a 470 nm wavelength light.*

Meanwhile, samples from Galway and Heraklion are presently being processed, and, hopefully, a more detailed description of the identified particles will soon follow the present report. Briefly, however, it should be noted that almost all samples contained some MPs, whose chemical signature (assessed by FTIR) will expectantly contribute to the elucidation of the prevalence of these materials in European waters.

Partial ecotoxicological assays were carried out exposing *Danio rerio* embryos to different concentrations of microplastics. A fertilized egg was transferred into individual wells of a 24-well microtiter plate. Mortality was recorded at 96 h of exposure. Embryos were incubated at a temperature of 26.0 ± 1.0°C with a light/darkness cycle of 16:8h. Mortality, hatching, larvae length and abnormalities were evaluated using an inverted microscope coupled with camera, SMZ2800 with a Nikon Model LH-M100C-1 camera. Some of these results are summarized in Figures 6.2.2.3 and 6.2.2.4. In the tested periods, no significant effects over the rate of hatching and percentage of survival were noted (Fig. 6.2.2.3), as well as on larvae length (Fig. 6.2.2.4A). Nonetheless, some abnormalities were noted, following a period of 48h exposure to different concentrations of microplastics. Presently, additional studies are underway to assess the extent of these effects and their significance, as well as supplementary assays focusing on the use of lower, more environmentally relevant concentrations.

Hopefully, in the near future, the body of collected and obtained data will result in two publications stemming from the collaboration of the different partners in MicroPlastox: one, regarding the prevalence of these materials and a second one, detailing the effects (if any) of these collected particles and fragments in commonly used ecotoxicity monitoring species.

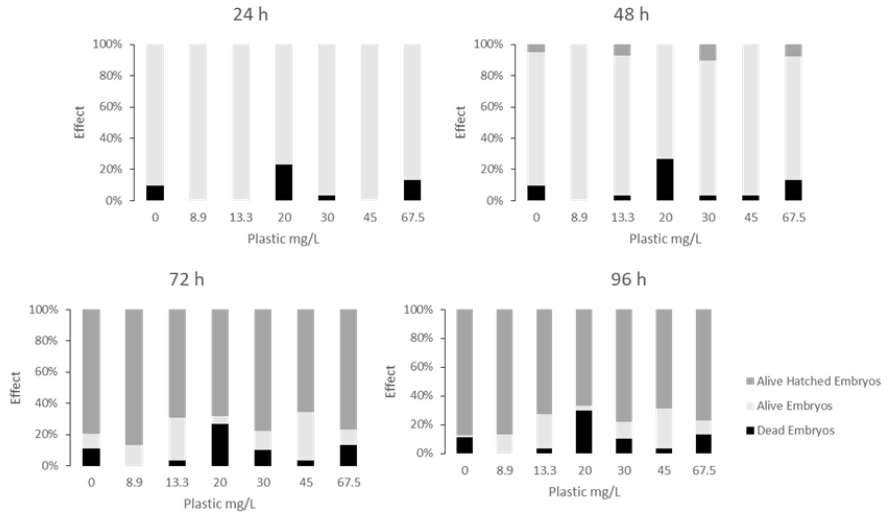


***Figure 6.2.2.3**: Effects of microplastics, in the described concentrations, on the proportion of dead, alive and alive hatched embryos, which are represented by the different colours of the bars, at 24, 48, 72 and 96h.*

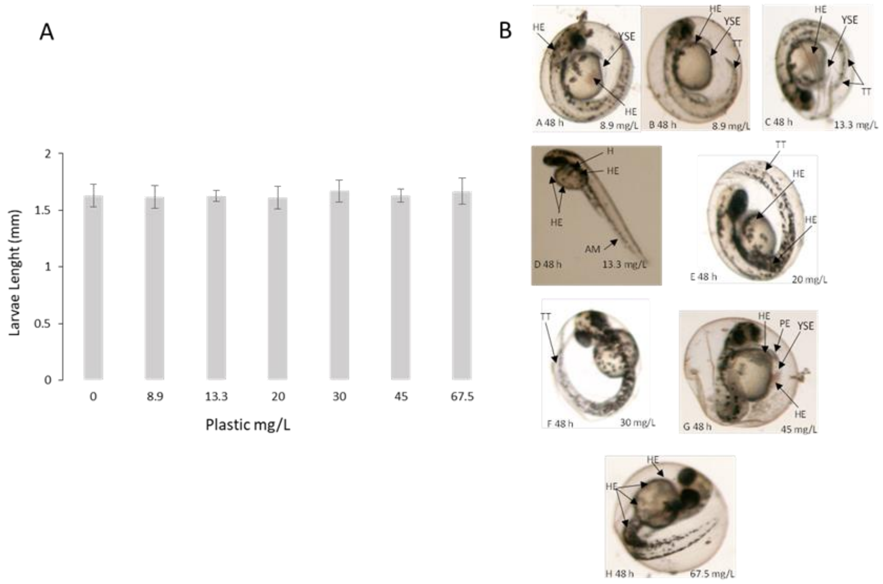


***Figure 6.2.2.4** - In A), the larvae length measured after 48h; In B), at the same period, Detected malformations in Danio rerio larvae. A) Embryo with yolk sac oedema (YSE), tail twisting (TT) and pericardial oedema (PE); B) Embryo with hemagglutination (HE) and TT; C) Embryo with TT, YSE, HE and PE; D) Embryo with axial HE, YSE and double tail; E) Embryo with TT, HE, PE and YSE; F) Larvae with HE and axial malformation (AM). Microplastic concentration is noted in each inset.*

6.2.3 ReMoBiB (JN_CALL_2_3)

Submitted: 11 March 2019.

Project Information

Proposal reference number	JN_CALL_2_3
Project Acronym (ID)	ReMoBiB
Title of the project	Real time Monitoring of Bivalve Behavior
Host Research Infrastructure	Underwater Node Helgoland (COSYNA_UNH)
In person access **Remote access**	04/02/2018 – 09/02/2018 16/07/2018 – 20/07/2018 08/02/2018 – 23/02/2019
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Rob Witbaard Netherlands Institute for Sea Research Landsdiep 4, 1797 SZ, den Hoorn, Texel, the Netherlands witbaard@nioz.nl
User group members	Rob Witbaard - *NIOZ, the Netherlands*

Project objectives

Over the very short term, the aim of the project was to demonstrate the possibility to use shell valve gape as a bio-monitor in addition to more traditional environmental monitoring techniques. At the same time we wanted to test the possibility to connect this equipment to the COSYNA underwater node at Helgoland. For this, the existing stand-alone equipment developed by NIOZ had to be adapted to enable connection and data transfer.

On the medium term, the scientific aim of the project is to establish, from these tests, the relationship between shell gape (filtration activity) of *Arctica islandica* and environmental factors (Salinity, Temperature, Chlorophyll, light) at the southern limit of its distribution. This by collecting a continuous observational time series on shell gaping behaviour covering at least an entire year, while at the same time high resolution environmental data are being collected from the underwater node to which the gape recorder is connected. Within the project it is aimed to develop an online visualisation of real time valve gape activity on the NIOZ and AWI website as means to raise awareness about sea life among the broader public and show that the shells are living creatures reacting to their environment.

On the longer term, the aim is to show that the online monitoring of the gaping behaviour of bivalves adds an extra dimension to environmental monitoring especially for ecological studies. Results are likely to illustrate the role of (extreme) environmental conditions on the feeding behaviour of individuals and the variation therein. It is anticipated that this project will lead to intensified cooperation and joint benthic ecological studies between NIOZ and AWI.

Main achievements and difficulties encountered

Since its deployment on February 20th 2018 the equipment technically worked fine up to the beginning of July 2018, although we observed that over that period valve gape signals from individual shells were lost one by one. In July we did a major maintenance action, i.e. we recovered the entire setup from the sea floor and replaced shells and electronic hardware. It appeared that predation by crabs and lobsters have a destructive effect on the setup.

Shells were lost from the cups, other shells had died. To protect the shells from predation we mounted a plastic 1 × 1 cm mesh over the setup. On July 23rd the setup was redeployed. Since then the set up was running fine until October 25th when all signal and connection with the underwater node was lost. This had to do with loss of power to the underwater station. It took until mid December that the connection could be re-established. So far we have collected data series of valve gape with a minute resolution up to the end of May, from end of July until October 25th and in a third period from December 13th up to February 23rd. Although the technical part of the equipment is working fine, the gradual loss of signals, i.e. as time passed by is partly unexplained. This signal loss of certain channels can partly be attributed to crabs and lobsters, which is confirmed by a diving inspection showing the damaged and torn apart mesh over the setup.The data collected in spring show a gradual increase in gape activity in early spring. The limited dataset collected in autumn supports the observations made in northern Norway that the shells become dormant in winter and autumn and are only intermittently active for short periods of time.

Dissemination of the results

Early attempts to get the NIOZ ICT department making an application to visualise the data, a shortage of manpower made it necessary to organise this differently. Therefore a R script has been written which automatically downloads the data from the AWI server. This first application which has been build can be incorporated into any website to visualise the most recent gaping activity of the clams (http://www.rforscience.com/vg/1/ and http://www.rforscience.com/vg/2/). Further dissemination of results will take place in the form of scientific articles and presentation at the international conference on sclerochronology 2019 (http://jadran.izor.hr/isc2019/index.html). Other possible submission deals with day-night changes in species composition at Smartbay.
DATA have not yet been delivered on the date of D8.11.

Technical and Scientific preliminary Outcomes

Introduction *Arctica islandica* as a bivalve has to open its valves a bit, to feed and respire. By measuring valve gape one thus can get an impression of the activity of a bivalve over time, i.e. a behavioural response. Insight in the response to variations in the environment can thus give insight in the factors which regulate the functioning and growth of bivalves. Ultimately such behavioral responses can be used for environmental monitoring of for instance water quality. The experiment conducted here had a two fold intention: first test whether the newly designed equipment is working properly and could be connected to the Helgoland underwater node and secondly to collect time series of valve gape to be compared to similar series collected in northern Norway. **Method** Valve gape has been determined by measuring the electromagnetical field between two electronic coils glued on to the shell at the siphon side of the shell. The strength of the electromagnetic field between the coils is a measure for the distance that the coils are separated and thus how far the both valves are apart from each other. Valve gape is expressed as fraction open, i.e. for comparison of different animals the signals are rescaled to vary between 0 and 1.

Valve gape opening has been measured with a ~1 second frequency. These ultra high resolution data have been saved and collected in data files representing 1 hour periods. For data analyses the "seconds" data have been aggregated to minute data by calculating the average valve gape in that minute. For further analyses the minute data have been aggregated to daily data. A brief comparison has been made between the averaged daily valve gape signal and the environmental variables.

Results

Figure 6.2.3.1 depicts the valve gape data (by minute) which has been collected in the period between February 2018 and February 2019. There are two main gaps in the data. The first gap falls between end of May 2018 and end of July 2018. The second gap falls between October 25th 2018 and December 13th 2018. The first gap in 2018 is related to damage to the set up caused by predating crabs or lobsters. The second gap is related to the loss of power because the supply cable to the underwater node was abraded.

Apart from these gaps is also visible that some of the individual measurement channels had problems as well. Channel 3 for instance never functioned properly. Channels 4 and 6 only yielded data between February and end of May. Channel 2, 7 and 8 did yield reliable signals since the power cut in October. In the spring period most channels show a tendency of increasing valve gape over time. Especially the data gap in spring is a pity as this is the most interesting period in terms of changing hydrographical conditions.

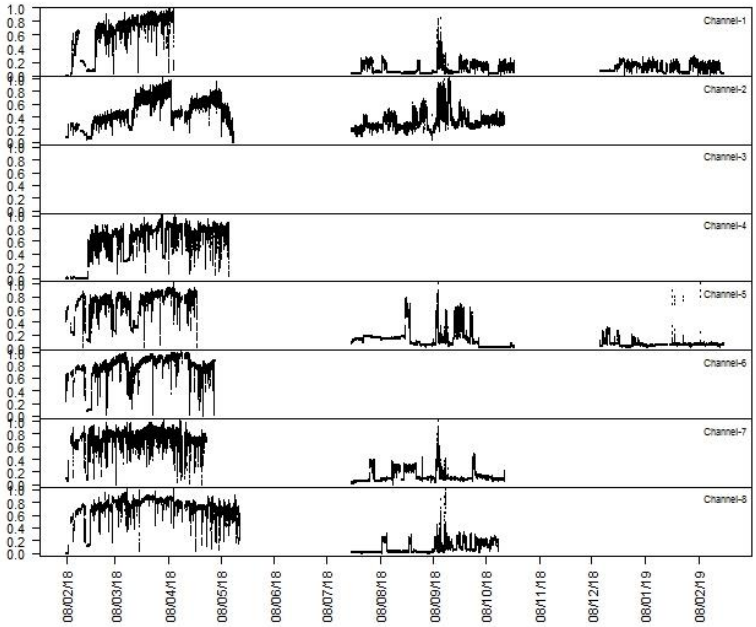


Figure 6.2.3.1*: Raw Gape data.*

Figure 6.2.3.2 gives the daily averaged valve gape for all specimens together. The pattern up to the end of May shows first a gradual increase in average valve gape values followed by a gradual closing. The average gape in the spring period was 65%. Between July 2018 and February 2019 the average valve gape fraction was only 0.13. This pattern supports what has been found in northern Norway.

Numerical analyses (Fig. 6.2.3.3) of these average gape values against the main environmental parameters (Temperature, Salinity, Chlorophyll and Turbidity) shows an inverse relationship between Gape and Temperature and a linear relationship between Gape and Salinity. Salinity and Temperature are strongly correlated with each other so it is impossible to separate between the effects of these two.

Arctica islandica is a boreal species, with an upper temperature limit of approximately 16°C. The strong decrease in average valve gape in the summer when compared to the early spring is therefore not unexpected and could well fit with the biology of this species. The low correlation between Gape and Chlorophyll was however unexpected and might suggest that either food supply is not limiting, or other factors play in this setting a more important role.

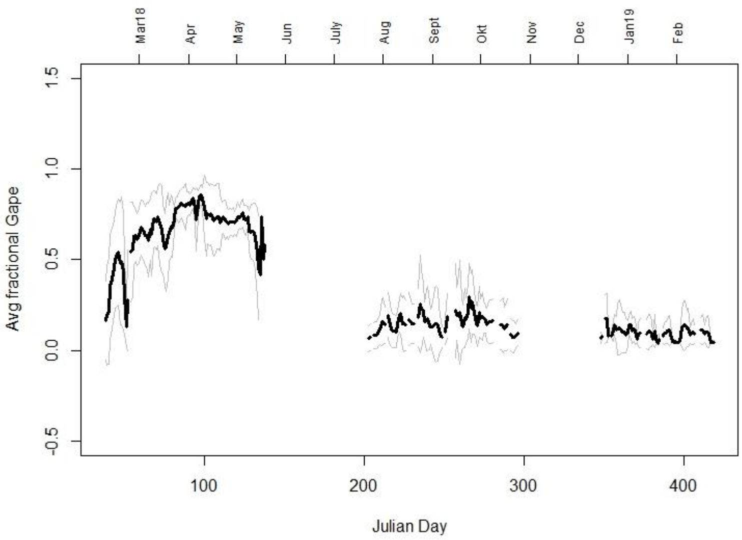


Figure 6.2.3.2: *Aggregated Gape data. Black line average Valve gape values. Grey lines indicate standard deviation.*

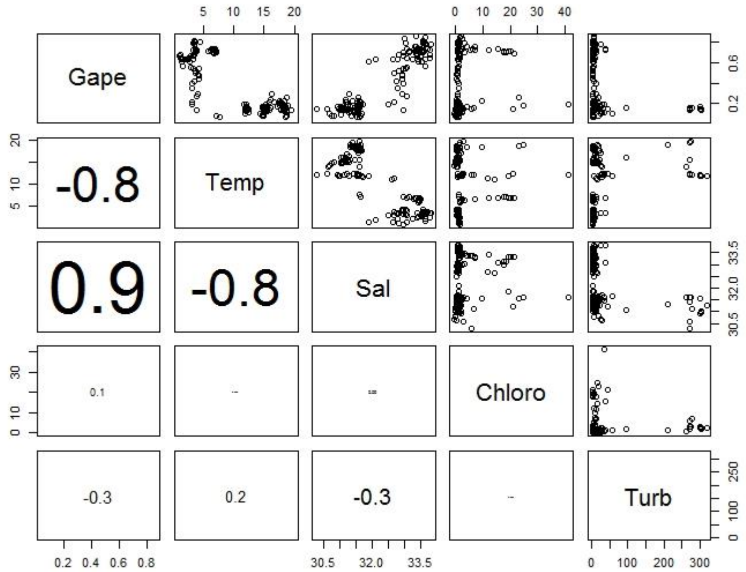


Figure 6.2.3.3: *Pairs plot showing the correlation between the average valve gape (as depicted in figure 2) against the main environmental variables measured at the Helgoland underwater node.*

6.2.4 ABACUS-4 (JN_CALL_2_4)

Submitted: 18 July 2018; Final revision: 26 July 2018.

Project Information

Proposal reference number	JN-CALL 2_4
Project Acronym (ID)	ABACUS-4
Title of the project	Fourth Algerian BAsin Circulation Unmanned Survey
Host Research Infrastructure	SOCIB Glider Facility (SOCIB-GF)
In person access **Remote access**	07/07/2018 – 15/07/2018 15/11/2017 - 13/12/2017 15/05/2018 - 07/06/2018
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Yuri Cotroneo Università degli Studi di Napoli "Parthenope" Centro Direzionale Isola C4 – Napoli, Italy yuri.cotroneo@uniparthenope.it
User group members	Yuri Cotroneo, Giorgio Budillon, Giuseppe Aulicino, Giannetta Fusco - *Università degli Studi di Napoli "Parthenope", Italy* Ananda Pascual, Simon Ruiz - *Instituto Mediterráneo de Estudios Avanzados IMEDEA (CSIC-UIB), Spain* Ferial Louanchi, Katia Malil - *Ecole Nationale Spérieure des Sciences de la Mer et de l'Aménagement du Littoral (ENSSMAL), Algeria* Yannice Faugere - *Collecte Localisation Satellites – CLS, France*

Project objectives

ABACUS 4 focuses on the characteristics of the Algerian Basin (AB) circulation. The AB is dominated by the presence of energetic mesoscale structures that usually cannot be monitored by standard resolution surveys. Through its activities, ABACUS 4 project contributes to the collection of high resolution data in this area.

The main objectives ABACUS 4 are:

- To continue the time series of oceanographic data collected in the AB along the endurance line between Mallorca and Algeri during the previous ABACUS missions.
- To identify the physical and biological properties of the surface and intermediate water masses between Balearic Islands and Algerian coasts;
- To collect data across mesoscale structure eventually crossed;
- To understand sub-basin dynamics;
- To assess the ocean description capabilities of several satellite products when approaching coastal areas, also comparing them to glider in situ data;
- To validate the new along-track (L3) and gridded interpolated maps (L4) altimetry products provided by the Sentinel-3 altimetry mission and other satellites in the western Mediterranean Sea.

ABACUS 4 has realized two glider missions in the study area during autumn 2017 and spring 2018.

The autumn leg (ABACUS 4.1) realized in November/December 2017 allowed us to extend the dataset previously collected in the area in 2014, 2015 and 2016.

The spring leg (ABACUS 4.2) realized in May/June 2018 is the first dataset collected during a different season in the framework of ABACUS and was associated to the PRE–SWOT survey of the northern part of the Algerian Basin through high-resolution multi-platform multidisciplinary synoptic experiment.

Main achievements and difficulties encountered

Data collected during the ABACUS 4 mission allowed:

- A real time monitoring of the main physical and biochemical properties of the water column during two different seasons;
- The extension of the glider high resolution dataset in the Algerian Basin;
- New ideas and data for the research activities connected to mesoscale eddy and sub-mesoscale processes.

From a technical perspective, the glider:

- spent 29 days in water for ABACUS 4.1 realizing 2 Mallorca – Algeri complete transect
- spent 24 days in water for ABACUS 4.2 leg 1 realizing 2 Mallorca – Algeri complete transect
- collected about 500 complete profiles along the 4 planned transect;
- was overflown twice by SENTINEL-3 satellite;
- navigated four times the SENTINEL-3 target groundtrack.

Problems encountered during the ABACUS 3 mission due to glider over-buffering were solved and no gap is present in the acquired data.

The ABACUS team faced the following difficulties:

- Scheduling work to guarantee satellite overflights;
- Need to reduce time at surface to avoid collisions;
- Need to break to surface every second cast, in order to sample the very surface layer was not possible due to safety reason. Then a turning depth in the first ten meters was adopted;
- Anomalous negative chlorophyll concentration values collected during the ABACUS 4.2 leg were discarded during the QC procedures so limiting chlorophyll observations at about 150 meters depth.

Dissemination of the results

- The results achieved during this and the previous ABACUS glider missions have been presented at international conferences as the METROLOGY FOR THE SEA Conference, Naples, October 2017 (Cotroneo et al., 2017b) and the EGU General Assembly 2018 (Aulicino et al., 2018a; Cotroneo et al., 2018). More recently a contribution has been submitted to ESA Ocean Salinity Science Conference to be held in Paris, November 2018.
- Last results have been submitted to appropriate, internationally recognized and peer reviewed journals (Aulicino et al., 2018b).
- We realized seminars for graduate and post-graduate students, at Università degli studi di Napoli “Parthenope” and Università Politecnica delle Marche.
- A Master degree thesis project was realized and discussed in “Advanced Physics and Applied Mathematics at the UNIVERSITAT DE LES ILLES BALEARS on the “Mesoscale oceanic

convergence and divergence: Quasi-geostrophic theory, analytical modelling and observations" by Daniel Rodríguez Tarry on the basis of ABACUS data and analysis
DATA are available on the following links: • Data collected during ABACUS 4 can be downloaded through the SOCIB DAPP. **ABACUS 4.1**: http://thredds.socib.es/thredds/catalog/auv/glider/sdeep04-scb_sldeep004/L2/2017/catalog.html?dataset=auv/glider/sdeep04-scb_sldeep004/L2/2017/dep0010_sdeep04_scb-sldeep004_L2_2017-11-15_data_dt.nc **ABACUS 4.2**: http://thredds.socib.es/thredds/catalog/auv/glider/sdeep00-scb_sldeep000/L2/2018/catalog.html?dataset=auv/glider/sdeep00-scb_sldeep000/L2/2018/dep0024_sdeep00_scb-sldeep000_L2_2018-05-15_data_dt.nc • Data collected during ABACUS, ABACUS 2 and ABACUS 3 can be downloaded from the webpage http://apps.socib.es/data-catalog/#/data-products/abacus. A DOI was assigned to this dataset to cite as "Budillon, Giorgio; Cotroneo, Yuri; Aulicino, Giuseppe; Fusco, Giannetta; Heslop, Emma; Torner Tomas, Marc; Tintoré, Joaquin (2016). SOCIB TNA Algerian BAsinCirculation Unmanned Survey - ABACUS (2014-2016) - DATASET. https://doi.org/10.25704/b200-3vf5".

Technical and Scientific preliminary Outcomes

Through its activities, ABACUS-4 project contributed to data collection in the Southern European Seas, one of the main EU maritime policy objectives, as outlined in the Marine Strategy Framework Directive (MSFD). In particular, the high resolution of glider data and the efforts to get simultaneous satellite altimetry data along the same groundtrack, allowed us to observe and describe the oceanographic characteristics of the area at several time and spatial scales. ABACUS 4 has realized a glider mission in the Algerian Basin splitted into 2 legs during autumn 2017 and spring 2018 sampling the water column up to 1000 m depth with the spatial resolution of about 2 Km. The autumn leg (ABACUS 4.1) realized in November/December 2017 and extend the dataset previously collected in the area in autumns 2014, 2015 and 2016. The spring leg (ABACUS 4.2) realized in May/June 2018 is the first dataset collected during spring in the framework of ABACUS and constitutes the starting point for the observation of the seasonal variability in the area. Additionally, this leg is part of the PRE SWOT activities including a multiplatform survey of the area and calibration of glider CTD with the onboard rosette of the SOCIB research vessel. Figure 6.2.4.1 shows the map and the Theta/S diagram of the entire ABACUS 4 mission.

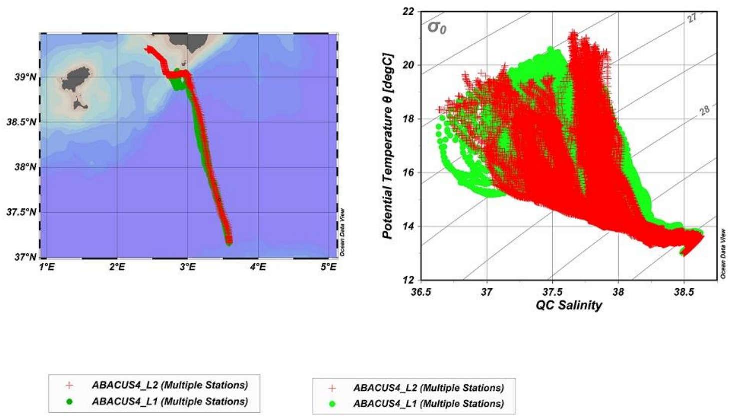


Figure 6.2.4.1*: Map and Theta/S diagram of the entire ABACUS 4 mission. Green dots indicate data and position of the first leg (Nov/Dec), whilst red dots indicate the position and Theta/S couples of the spring (May/Jun) leg.*

ABACUS 4 observations have been quality controlled and analysed following the procedures developed during the previous ABACUS projects. Main steps follow:

1. After the mission, data were transferred from the internal glider memory to the SOCIB Data Center where pre-processing, quality control and validation were carried out and production of level 1 and level 2 data occurred;
2. A second quality control process was applied in order to identify any persistent spike in the data and reduce the possible noise of the signal;
3. A final visual check was performed on the single profiles and on the θ/S diagram.

The quality controlled dataset was then used to realize a preliminary analysis focused on the identification of water masses and on their location along depth and latitude. Along the ABACUS 4 transects, the main Mediterranean water masses were identified and several mesoscale and sub-mesoscale processes like eddies and filaments were observed.

As an example, figures 6.2.4.2 and 6.2.4.3 show the vertical sections for the first 350 m depth of potential temperature, salinity, chlorophyll-a and oxygen concentration between Mallorca and the Algerian coasts from 25th May to 3rd June 2018, one of the four transects realized during the mission.

From a first analysis of the data the following preliminary observations can be done:

- Levantine Intermediate Water – LIW is observed at expected depth along the transects;
- The glider only reached the northern edge of the Algerian current – AC
- A mesoscale anticyclonic eddy is evident in ABACUS 4.2 at about 38.2°N
- The subdUction of Oxygen is evident in the northern part of the observed eddy

A submesoscale structures, possibly an AC filament, is evident in the southern part of the ABACUS 4.2 transect.

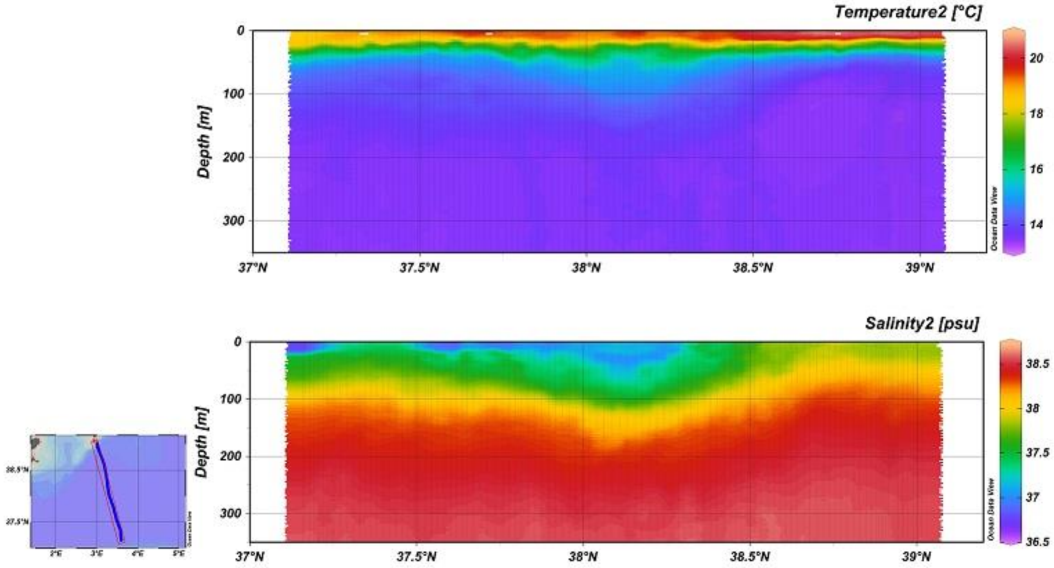


Figure 6.2.4.2*: Vertical sections of Potential Temperature and Salinity between Mallorca and the Algerian coasts during ABACUS 4.2 second transect.*

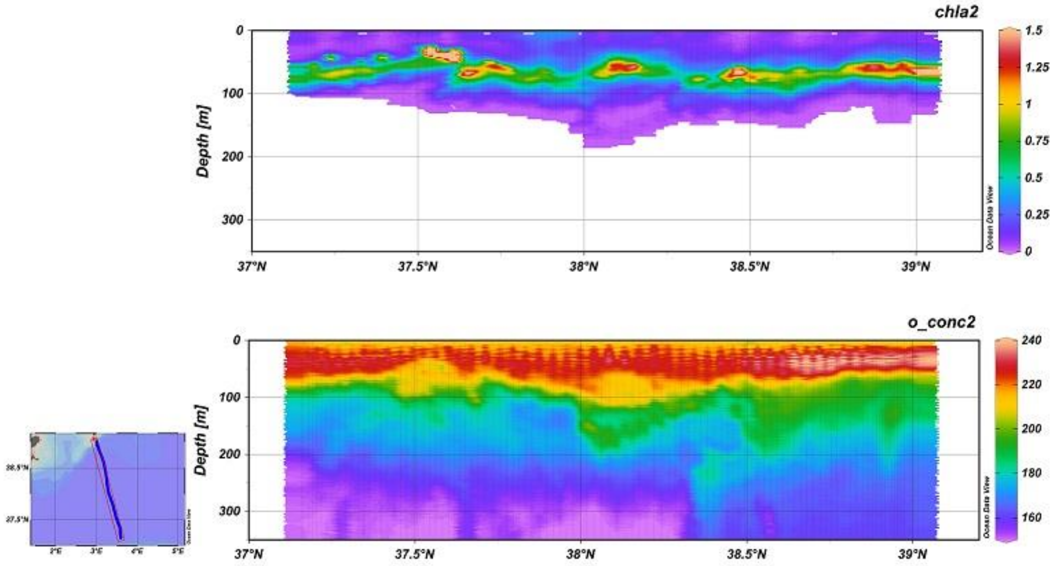


Figure 6.2.4.3*: Vertical sections of Chlorophyll and Oxygen concentration between Mallorca and the Algerian coasts during ABACUS 4.2 second transect.*

6.2.5 ANB Sensors pHIMS (JN_CALL_2_5)

Submitted: 10 June 2019; Final revision: 6 August 2019.

Project Information

Proposal reference number	JN_CALL_2_5
Project Acronym (ID)	ANB Sensors pHIMS
Title of the project	Testing an Autonomous Self-Calibrating pH Sensor (pHIMS) with On-Board QA/QC, For Ocean and Water Quality Monitoring
Host Research Infrastructures	Ferrybox at m/s Silja Serenade (SILJA SERENADE) Atmospheric and Marine Research Station (Utö) Marine Research Centre Laboratory (SYKE MRC-lab)
MRC-lab : **In person access** **Remote access** **S. SERENADE**: **In person access** **Remote access** **Utö** : **Remote access**	21/01/2019 - 25/01/2019 28/01/2019 - 05/04/2019 (30 days of lab testing in this period) 07/04/2019 - 10/04/2019 10/04/2019 – 24/05/2019 03/04/2019 – 26/05/2019
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Nathan Lawrence ANB Sensors 28 Willow Lane, Great Cambourne, Cambs,CB23 6AA, United Kingdom nlawrence@anbsensors.com
User group members	Nathan Lawrence, Luke Shirley, Brandon McHale - *ANB Sensors, United Kingdom*

Project objectives

ANB Sensors are developing the next-generation pH sensor suitable for oceanographic profiling and buoy deployment. The main objective of JERICO-NEXT TNA project was to test their current sensor version (as of January 2019) at the Finnish Environmental Institute SYKE and at Finnish Meteorological Institute FMI. The lessons learnt in these tests would be put in place for their next generation sensor which has been developed alongside the current TNA project. This version would allow the TRL be raised further ready for commercialisation in late 2019. The key objectives for the JERICO-NEXT TNA project in collaboration with SYKE and FMI were to:

- Provide feedback on the sensors ease of use, ease of deployment and data retrieval features.
- Debug the sensors highlighting any key issues associated with the sensor performance and use.
- Validate the sensors response against independent measurements in real time deployment.
- Deploy the sensor in a variety of conditions.
- Raise the TRL to 8/9 through Beta testing.
- Allow ANB Sensors to understand the issues associated with oceanography and sensor deployment for other analytes – providing scope for future collaborations.

Main achievements and difficulties encountered

The projects main achievement was the successful testing and de-bugging of the sensor in a live system. From both the evaluation of the data retrieved from our sensor, along with a better understanding of today's current sensor offerings, this work has been invaluable in allowing ANB Sensors to further raise its TRL enroute to producing a commercial product in late 2019.

These were the first tests of the system in live media with varying salinity (5ppt to 17.3ppt). By interrogating samples from stations along the ferry Finnmaid voyages it was shown the sensor response suffered no detrimental effects.

The sensor was deployed under a variety conditions, laboratory, on-board a ferry and remotely at an island station. Each location demonstrated the sensors ease of use, with its plug and play technology and ability to retrieve data through removal of the on-board memory card, with a wireless communication capability planned for future versions.

External validation of the sensors response was sought through connecting the system in a flowline with two commercial sensors, a AFT Sunburst pH sensor and a Contros pCO2. However, on doing this a noise caused by the pumps in the Contros system was seen, so the pCO2 was removed and the tests continued. Despite this, the system still suffered higher than expected signal-to-noise issues, so new electrodes were produced to maximize the signal. In addition a new electronic design has since been manufactured to enhance the signal, and these electronics are already being deployed in the next generation sensor.

Dissemination of the results

Utilizing the data and results gathered throughout this JERICO-NEXT TNA project, in conjunction with our *in-situ* lab-based research, an academic peer-reviewed article detailing the current electrode composition and measurement technique will be published. In addition, the data will be communicated through conference/meeting presentations in order to demonstrate the validity of our system, and for public, through social media like Twitter. Finally, the results and data will be gathered to procure intellectual property on resulting technologies directly resulting from this research project.

DATA are available on this link: http://www.jerico-ri.eu/tna/selected-projects/second-call/anb-sensors-phims/

Technical and Scientific preliminary Outcomes

The experimentation for this project was conducted over three platforms, Syke MRC-lab, Silja Serenade ferry and the fixed platform at FMI Utö Atmospheric and Marine Research Station.

During the initial phase of testing at the MRC lab in Syke, we first obtained a baseline set of results using a commercial potentiostat. This gave us an indication of the expected results for the complete sensing system when placed in stagnant brackish Baltic Sea water. By utilizing the varying stations from the Finnmaid voyages, we were able to see the effects of a large gradient of salinity (5-17.3). These cover the ranges observed on the Island and ferry test locations. Prior tests at ANB Sensors facilities had shown the sensor operates effectively in ocean salinities (35 ppt). The apprehension going into the testing was that the lower end salinity may affect the conductivity of the system creating problems for the measurement in these areas. However, the conclusion of this demonstrated that our system was able to handle the lower values of salinity.

Following these open water tests we integrated our sensor into a flow loop system, shown in the figure 6.2.5.1. Overnight testing demonstrated the systems ability to handle the relevant pressure (1 bar) and flow rate (5 liters per minute). The integration of the sensor into the flow set-up was tested for approximately 25 days in the lab with both teams present to pass on knowledge of the operation of the instrument.

***Figure 6.2.5.1**: Integration of the ANB Sensors pH sensor into the flow loop system.*

With confidence in the sensor performance in the flow loop, the next step was to simulate the acidification of the ocean waters in the lab. To this end, two processes were trialed; the first was the addition of CO_2 gas to the water samples collected. However, this route posed difficulty in achieving constant and appropriate steps in pH for a calibration to be achieved. Considering this, the pH change was achieved by addition of carbonated water. This technique was much more controlled and gave the potential/current plots shown in the figure 6.2.5.2 for different pH waters, validated by the AFT-pH system.

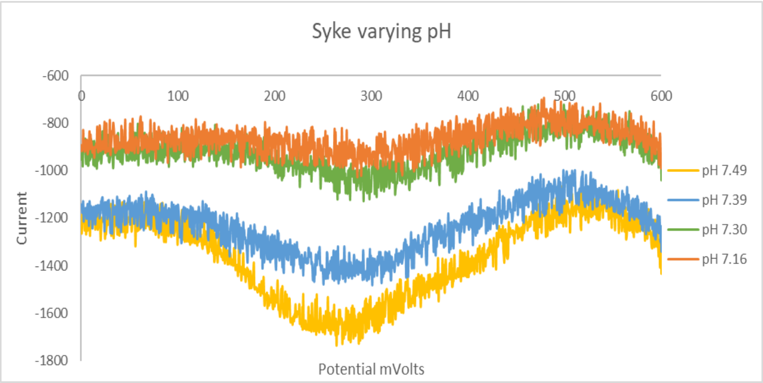


***Figure 6.2.5.2**: Current vs Potential plots for different pH waters, validated by the AFT-pH system.*

During these trials both the pH and reference signals began to drift over time, and since the drift was consistent for both electrodes, it was suspected that the Ag reference electrode had been damaged or worn away. After analyzing the photos sent by the Syke team, it was apparent that the coating had been worn away and a leak path had been found on the original design. A redesign was rapidly produced and shipped to the lab where it was exchanged for the old design to solve this issue.

Following the redesign, a more robust test of the lab flow system was trialed with a flow loop containing the ANB Sensors pH sensor, the AFT Sunburst pH sensor and the Contros pCO_2, shown in the figure ***6.2.5.3***. However, on doing this a repeating noise within the data was seen which, on further investigation, was seen to be caused by the membrane in the Contros system, so for the remaining tests the Contros pCO_2 was removed from the flow loop. The data was found to respond to changes in the pH of the solution and although not all the experimental plan was completed (temperature studies), the data retrieved from these tests has been invaluable in understanding how the sensor performs under these conditions.

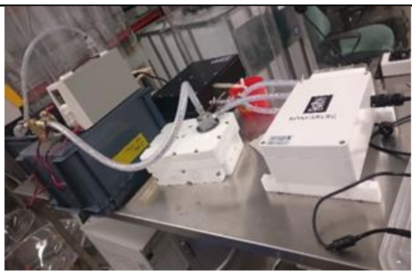


Figure 6.2.5.3*: Integration of the ANB Sensors pH sensor, the AFT Sunburst pH sensor and the Contros pCO2 into the flow loop system.*

Figure 6.2.5.4*: Set-up on the Silja Serenade.*

For the remainder of the project, one system was loaded on to the Silja Serenade, the set-up of which is shown in the figure 6.2.5.4. The second system was placed on the Utö platform. In each case the sensor was placed in a flowline where sea water was drawn in directly from the environment and passed over the sensor interface. The data obtained from the Silja Serenade was found to suffer from noise issues (Fig. 6.2.5.5), through the external equipment within the flowline. Despite this, the electrodes were tested on their return to the ANB Sensors laboratory and showed a response in a commercial seawater system.

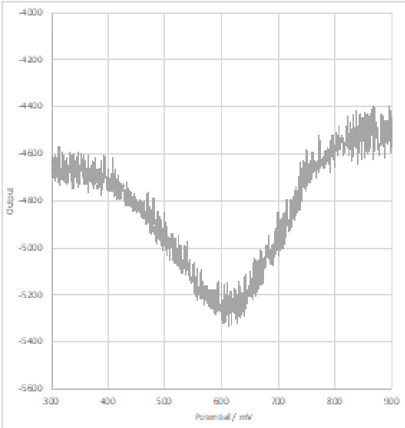


Figure 6.2.5.5*: Data from the Silja Serenade.*

The lesson learnt from this is to increase the shielding and grounding on the electronics board of the sensor. This recommendation has already been incorporated into the next version of the sensor which is due to go to further trials in June 2019. The results from the Utö station were more encouraging, with the system showing discernable peaks particularly for the system deployed to monitor the drift in the reference system – the common cause of drift in electrochemical based pH sensors.

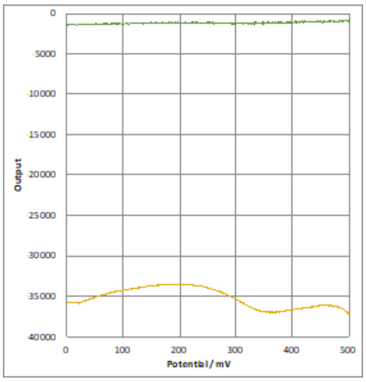


Figure 6.2.5.6*: Comparison of data taken from the SYKE sensor (green) and the pre-commercial sensor (yellow).*

This is shown in the figure 6.2.5.6, where the potential of the reference system is given by the peak minimum value in the data. Through the information gathered within this project, a new revision of the ANB Sensors pH sensor has been developed. The feedback on the ease of use, deployment, and ease of data retrieval has all been positive. All debugging issues have been resolved. Figure 6.2.5.6 highlights the improvements made in the new system, which compares data taken from the SYKE sensor (green) and our pre-commercial sensor (yellow).

Through understanding the responses obtained in the real world media, we have enhanced signal, improved the stability of the electrodes and longevity of the sensors, whilst lowering the noise on the system. With the deployment of the sensor in the Utö station and Silja Serenade we have been able to collect real-world data that has allowed for the next revision to increase the TRL and allow for commercialization in late 2019.

6.2.6 ADVANCE (JN_CALL_2_6)

Submitted: 18 April 2019; Final revision: 27 September 2018.

Project Information

Proposal reference number	JN-CALL 2_6
Project Acronym (ID)	ADVANCE
Title of the project	Automatic Data and Video Acquisition for uNderwater monitoring across Coastal Environments
Host Research Infrastructures	Cabled Observatory OBSEA (UPC) Cabled Observatory CPO (SBI)
<u>CPO</u>: In person access **Remote access** **<u>OBSEA</u>: In person access** **Remote access**	11/04/2018 – 12/04/2018 27/07/2018 – 29/09/2018 02/10/2018 28/03/2019 22/10/2018 – 5/12/2018 17/12/2018 – 29/01/2019
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Simone Marini CNR-ISMAR Arsenale-Tesa 104, Castello 2737/f, 30122 Venezia, Italy simone.marini@sp.ismar.cnr.it
User group members	Simone Marini - *CNR-ISMAR, Italy* Emanuela Fanelli - *Università Politecnica delle Marche, Italy* Jacopo Aguzzi - *Consejo Superior de Investigacio Científicas, Spain* Ernesto Azzurro - *Istituto superiore per la ricerca ambientale, Italy*

Project objectives

The short-term objective of the ADVANCE project is the test of the imaging device GUARD1, described in the European Patent EP2863257A1, as a stand-alone and autonomous sensor capable of quantifying biological activities at individual, population, and community levels. The GUARD1 consists of a low-power system conceived for installation on both fixed and mobile platforms for acquiring images of objects or organisms from 1 mm to 100 cm in size. On-board the device, the image content can be autonomously analyzed, recognized and classified. Even if the GUARD1 is capable to transmit the information extracted from the acquired images outside the device, in this project, such data will be stored in order to be accessed for further analysis after the recovery.

The medium-term objective of the ADVANCE project is the assessment of the GUARD1 imaging device by comparing the information automatically produced by the system with the visual inspection of the images acquired by the cameras that the two observatories provide. In particular, the images will be acquired continuously during the day and night (by using the GUARD1 lighting system) for a period of at least two months, in order to estimate the image quality with a different diffusion of light and with different conditions of water turbidity.

Main achievements and difficulties encountered

SmartBay deployment: During the deployment, about 100 ml of water entered the housing and definitively damaged the battery pack. As a consequence, the battery pack got completely discharged in only 10 days of acquisition. Due to the housing damage, an unplanned shipment of the device was performed from

Galway to CNR-ISMAR on 9 October 2018. After further analysis a small scratch was found in the housing near the caseback, and the rechargeable battery pack needed to be replaced. During this deployment 635 images were acquired by the GUARD1 and contextually images and short video clip were also acquired, in the same field of view, with CPO videocamera. **OBSEA deployment**: due to the GUARD1 damage, the new imaging device called DeepEye was sent to Vilanova i la Geltru' for performing the planned experiment. Since the DeepEye was released on July 2018, the experiment at the OBSEA was considered as a test for assessing its hardware reliability and its capability of acquiring images useful for ecological applications. During the OBSEA experiment, two deployment were performed for testing different image acquisition and elaboration parameter settings. The two deployments allowed to detect an error in the device firmware and for this reason an unplanned shipment from the UPC laboratory to the CNR-ISMAR was needed. Nevertheless, the two deployments resulted into 2445 acquired images by the DeepEye device and contextually images was also acquired, in the same field of view, with the OBSEA camera.

Dissemination of the results

During the TNA period the two imaging devices GUARD1 and DeepEye was tested into a relevant environment. Images were acquired by the two devices and by the video cameras that are normally part of the CPO and the OBSEA infrastructures. Ground truth image datasets will be defined using the acquired images and new computer vision and pattern recognition algorithms will be defined and experimented on the acquired data. Moreover, the video clips acquired by the CPO Smartbay camera, are already in the process to be visually inspected by the biologists of the ADVANCE user group, and in the next months also the images acquired by the OBSEA will be analysed. In this context, a manuscript regarding the assessment of the new imaging device DeepEye as innovative ecological device for the estimation and monitoring of both the biodiversity and the assemblage structure will be submitted to the special issue "Imaging Sensor Systems for Analyzing Subsea Environment and Life" of SENSORS: https://www.mdpi.com/journal/sensors/special_issues/image_subsea. In that paper, the architecture of new DeepEye imaging device will be described and the recognition results will be presented. Another scientific article will be written based on the analysis of the CPO image data, especially regarding the fish species assemblage surrounding the observatory in a time period that include the ADVANCE deployment. Other possible submission deals with day-night changes in species composition at Smartbay.
DATA have not yet been delivered on the date of D8.11.

Technical and Scientific preliminary Outcomes

The project was articulated into three main phases: 1) deployment at the SmartBay facility; 2) deployment at the OBSEA facility; 3) Data analysis.

Deployment at the SmartBay facility: The GUARD1 imaging device was shipped to Galway on 3 April 2108 and the preparatory meeting of the phase (1) took place at the Marine Institute in Galway on 11 and 12 April 2018.

The preparatory meeting was attended - for the ADVANCE user group - by Simone Marini (PI) from CNR-ISMAR, Emanuela Fanelli (PI) from Università Politecnica delle Marche - Iatly, Jacopo Aguzzi (member of the ADVANCE research team) from ICM-CSIC (Spain) and by the TNA provider team of the CPO. During the meeting, the functioning of the imaging device was explained, we decided which bracket was needed for installing the device on the CPO infrastructure, which would be the best field of view of both the GUARD1 imaging device and the CPO camera and which was the best acquisition frequency for the experiment. In particular, both the GUARD1 and the CPO camera was positioned in order to acquire images containing part of the water column and part of the seabed. The image acquisition frequency was set to one image every 25 minutes.

Due to a delay into the maintenance of the CPO infrastructure, the imaging device deployment was delayed to 27 July 2018. As a consequence the device recovery was planned on 26 September 2018 (60 days). The device was actually recovered on 29 September 2018. During the deployment, about 100 ml of water entered the GUARD1 housing and compromised the battery pack, which was consequently completely discharged in only 10 days of acquisition, corresponding to 635 images. In spite of this, the acquired images resulted of good quality and contain relevant information about the fish species present in the surrounding of the observatory. The acquired images contain also relevant information about Norway lobster's burrows and organisms in the part of the seabed framed by both the GUARD1 imaging device and the CPO camera.

Due to the battery pack and housing damage, an unplanned shipment of the device was performed from Galway to CNR-ISMAR on 9 October 2018. After further analysis a small scratch was found in the housing, near the case-back and the rechargeable battery pack needed to be replaced.

Deployment at the OBSEA facility: due to the GUARD1 damage, the new imaging device called DeepEye, released on July 2018, was sent to Vilanova i la Geltru' for performing the experiment planned in phase 2). The new DeepEye imaging device has a completely different technology from the old GUARD1 imaging device and the experiment at the OBSEA was considered as a test for assessing the hardware reliability of the the DeepEye device and for assessing its capability to acquire images useful for ecological applications.

The DeepEye imaging device was sent to the UPC laboratory in Vilanova i la Geltrù on 21 September 2018 and the preparatory meeting for the OBSEA experiment took place on the 2nd October 2018 in Vilanova i la Geltrù. The preparatory meeting was attended - for the ADVANCE user group - by Simone Marini (PI) from CNR-ISMAR (Italy), Emanuela Fanelli (PI) from Università Politecnica delle Marche (Italy), and by the TNA provider team of the OBSEA. Similarly to the Galway meeting, the functioning of the imaging device was explained, we decided which bracket was needed to install the device on the OBSEA infrastructure, which would be the best field of view of DeepEye and which was the best acquisition frequency for the experiment. In particular, the DeepEye was positioned in order to take images in the same field of view of the OBSEA camera, both facing the artificial reef made of concrete positioned in front of the observatory. The image acquisition frequency was set to one image every 10 minutes.

During the OBSEA experiment, two deployments were performed. The first deployment started on 22 October 2019 and finished on 5 December 2018. During this deployment 2445 images was acquired. The images resulted slightly overexposed and moreover the planned image acquisition frequency was not respected by the device. The image acquisition parameters of the device was changed in order to improve the image quality and the acquisition frequency was re-programmed. The second deployment started on 17

December 2018 and finished on 29 January 2019. The new settings of the image acquisition parameters produced well-exposed images. The DeepEye imaging device incorporates a general-purpose firmware-level image filter capable to identify which regions of the acquired image have relevant content. During the two deployments two different settings of the image filter was experimented providing good results in both the cases. On the contrary, also during the second deployment, the planned image acquisition frequency was not respected by the device. Thus, the device was shipped back to ISMAR-CNR (Italy) for an in-depth check and an error was found in the firmware device. The error was corrected and the imaging device was shipped again to Vilanova i la Geltrù on 5 March 2019. Then a third meeting took place at the UPC laboratory in Vilanova i la Geltrù and in Barcelona, at the ICM-CSIC, on 27-29 March 2019 . The meeting was attended by Simone Marini (ADVANCE PI), Emanuela Fanelli (ADVANCE PI), Ernesto Azzurro (ADVANCE research team), Jacopo Aguzzi (ADVANCE research team) and by the TNA provider team of the OBSEA. During this meeting the device was tested and prepared for a new deployment (outside of the ADVANCE project). Furthermore, the data acquired during the CPO deployment and during the first two OBSEA deployments were discussed. The activities of data analysis were outlined as well as the dissemination activities.

Data Analysis: using the image dataset acquired by the two imaging devices, GUARD1 and DeepEye, and by the cameras installed on the CPO and the OBSEA observatories, ground truth image datasets will be defined. These datasets will be used for the definition and the validation of new computer vision and pattern recognition algorithms for fish recognition and the classification tasks. In particular, the video clips acquired by the CPO Smartbay camera, are already in the process to be visually inspected by the biologists of the ADVANCE user group, and in the next months also the images acquired by the OBSEA will be analysed.

6.2.7 BB-TRANS (JN_CALL_2_8)

Submitted: 25 July 2018; Final revision: 27 September 2018.

Project Information

Proposal reference number	JN_CALL_2_8
Project Acronym (ID)	BB-TRANS
Title of the project	Three-dimensional circulation and transport within the south-eastern Bay of Biscay from a multi-platform approximation
Host Research Infrastructure	COSYNA Glider (COSYNA_GL)
Remote access	17/05/2018 – 14/06/2018
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Ainhoa B. Caballero Reyes Azti Foundation Herrera Kaia Portualdea, z/g, 20110 Pasaia (Gipuzkoa) Spain acaballero@azti.es
User group members	Ainhoa B. Caballero Reyes, Anna Rubio, Julien Mader - *Azti Foundation, Spain*

Project objectives

Recent studies focused on the evaluation of the capabilities of altimetry using HF radar (HFR) data, and with the combined use of HFR and glider measurements, conclude that both approximations offer useful data that can help to improve the processing of altimetry data for coastal studies. Providing information of the circulation and transport of the water column, from the expansion of the surface information of HFR to deeper levels can extend the applications of these data for biological and environmental purposes. Several approaches, based on the combination of HFR data with information on the water column (from in-situ moored instruments, remote sensing or numerical models), have proven promising for understanding the three-dimensional coastal circulation. The combination of glider and HF radar data will offer a unique opportunity to describe local ocean processes at high spatial and temporal resolution and to investigate their role in the coastal transport.

Summarizing, the purpose of this project is to recover measurements of the water column, within the area covered by the coastal HFR system of the SE-BoB, in order to evaluate on the one hand, the accuracy of coastal altimetry along-track data within the HFR footprint area, and on the other hand, the performance of different methodologies for deriving transport in the water column, by means of HFR and glider data blending.

Main achievements and difficulties encountered

Several achievements have been reached during this project, but we highlight here three of them:

HZG team has provided to the project a second glider. This shallow-shallow-glider (surface-100 m depth) was equipped with the same sensors as the deep-glider (CTD, fluorescence-turbidity and MicroRider sensors) with the exception of the ADCP. The data obtained by this glider (from 16 to 29 May 2018) will afford a larger spatial coverage and sampling frequency of the sea surface.

The deep-glider carried out an almost one-month mission (17 May-14 June), the period planned for this mission. It collected water-column data in the area covered by the HFR and some tracks were concomitant with 2 altimeter tracks. More concretely it followed one track of the S3A and another from Jason-3.

During the mission, besides glider tracking that allowed monitoring of the position and data measured by the glider, surface current fields and derived Lagrangian Residual Currents and satellite images, were used to change, when necessary, the next positions and settings of the glider, in near real time. According to this set of data (glider-HFR-satellite) both gliders crossed at least one mesoscale eddy.

The main difficulties encountered during this mission were, on the one hand, the leak of the deep-glider during the deployment. The glider was recovered and brought back to the port, where the HZG team replaced a piece of the glider. The day after the glider was successfully deployed. On the other hand, the shallow-glider required early recovery for a leak.

Dissemination of the results

The results of the project will be shown in the final JERICO-NEXT scientific results workshop (2019). The team plans to send at least one peer-reviewed publication and one contribution to a congress, e.g. the EGU General Assembly. So far, the team has participated in the following dissemination actions:

- Oral presentation in the "11th Coastal Altimetry Workshop", 12-15 June, Frascati, Italy (Caballero et al., 2018).
- Poster presentation in the "25 Years of Progress in Radar Altimetry Symposium", 24-29 September 2018, Azores Archipelago, Portugal (Manso-Narvarte et al., 2018).

DATA are available on these links:

ftp://ftp.ifremer.fr/ifremer/glider/v2/comet; ftp://ftp.ifremer.fr/ifremer/glider/v2/sebastian.

Technical and Scientific preliminary Outcomes

First of all, the deep-glider followed 2 tracks of two different altimeters (Table 6.2.7.1 and Fig. 6.2.7.1). More specifically Jason 3's 248 track (two cycles) and Sentinel 3A's 257 track (1 cycle). These data will be compared with coastal altimetry along-track data.

Altimeter	Track	Date	Time
Jason 3	248	2018-05-20	04:04
Jason 3	248	2018-05-30	20:37

Table 6.2.7.1: *Number of the tracks of the two altimeters that crossed the area covered by the coastal HFR system of the SE-BoB, during the mission and the estimated passing date/time.*

On the other hand, both gliders crossed mesoscale-like eddies. For example, the shallow-glider appears to have crossed an anticyclonic structure around 26 May. For monitoring the presence of structures, we have computed the Lagrangian Residual Currents (LRC). To obtain the LRCs, the Lagrangian trajectories for particles evenly located in the HF radar grid are computed over 3 days; then, the initial and final positions of each particle are used to compute a Lagrangian residual vector (we call this "residual", because the contribution of the tidal component is filtered out by the time integration used). The LRC maps provide an estimation of the surface transport during the integration period. According to the LRC map (Fig. 6.2.7.2 Left), the glider flew near the core of an eddy, while the deep-glider passed close to the periphery during the same days.

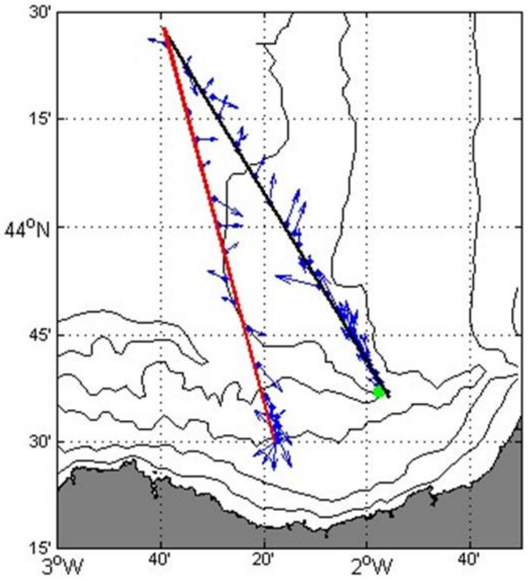


Figure 6.2.7.1*: Tracks of the two altimeters crossing the area during the mission (the black/red line represents the track of Jason 3/Sentinel 3A) and vertically integrated currents corresponding to the deep glider (blue arrows). Isobaths (m): 50, 100, 200, 1000, 2000, 3000 and 4000.*

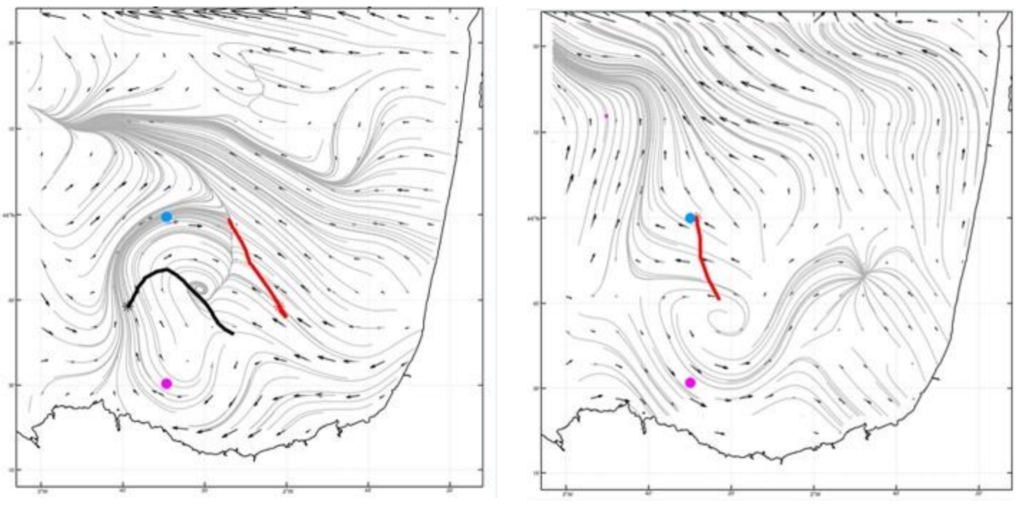


Figure 6.2.7.2*: LRC maps estimated from the HFR data and corresponding to 26 to 28 May (Left) and from 2 to 4 June (Right). The trajectories followed by the deep-glider (red line) and shallow-glider (black line) during this period are also shown. Note: the asterisks indicate the beginning of the trajectory. The blue and pink points indicate the positions for which the wind evolution has been analyzed.*

Around this date, a down-lifting of the seasonal thermocline is observed in the vertical profiles of the shallow-glider (Fig. 6.2.7.3a, black square). The down-lifting is more evident in the salinity and density profiles (Figs. 6.2.7.3bc) and has a clear impact in the fluorescence, whose Deep Chlorophyll Maximum reaches deeper waters. Some days after, around 2-3 June, the deep-glider arrived at the periphery of a cyclone (Fig. 6.2.7.2 Right). In this occasion, an up-lifting of the shallower isotherms (from surface to around 100 m depth) and a down-lifting of the intermediate isotherms (from around 100 to 400 m depth) is observed (Fig. 6.2.7.4, black square). The core of this cyclone was close to the position of the anticyclone mentioned before. Therefore, two hypotheses could be obtained from this inverse polarity of these mesoscale structures. First, both signals (in different dates) correspond to the same eddy but due to the interaction of the surface waters with the wind, it is not observed the same polarity of the eddy in the sea surface, not the same behaviour in deeper waters (0-100 m). And second, these signals correspond to two different eddies that occupied the same place, in a time-difference of a week.

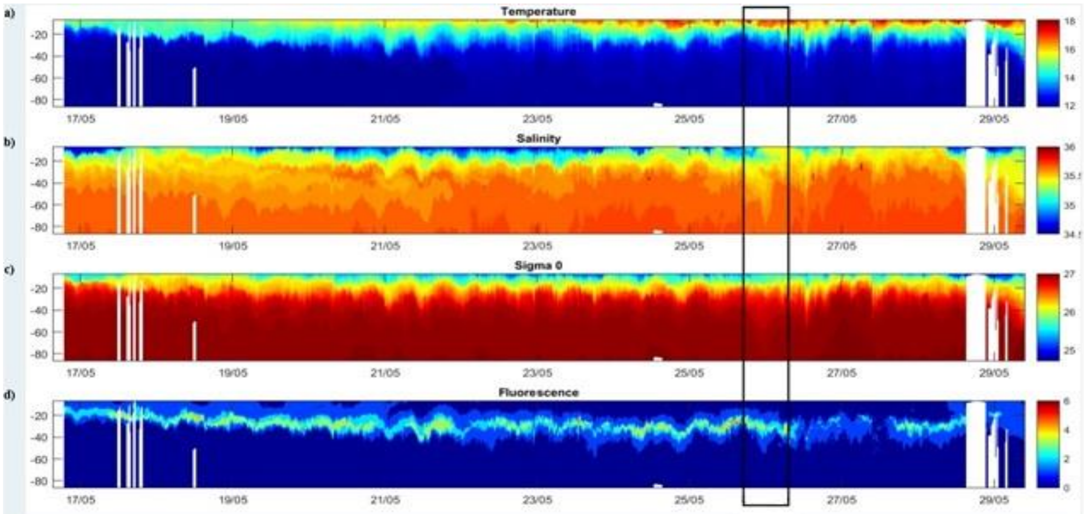


***Figure 6.2.7.3**: Vertical potential temperature (a), salinity (b), density (c) and fluorescence (d) distribution along the shallow-glider tracks from the surface to 100 m depth. The black square delimits the signal of the eddy.*

As an initial approximation to the first hypothesis, the wind regime estimated from the WRF regional meteorological model (source: MeteoGalicia) in the location indicated with a blue (pink) point in Figure 6.2.7.2 and covering the period of both LRC maps (26 May-4 June) is showed in Figure 6.2.7.5 up (bottom). Over the northern point, from 26 to 28 May the wind flowed mainly to the NE, this forcing agrees with the eastward flow of the currents in the area. While during 2-4 June the wind flowed mainly to the SW; this forcing could produce the westward currents. The wind regime in the southern point was similar to the previous one, but the currents seem to be less correlated with it. This could be due to the rectification of the wind driven circulation by the local topography.

In order to test these last hypotheses, more analyses must be done for obtaining more conclusive results. These analyses will be also complemented with high resolution model data from the Atlantic-Iberian Biscay Irish - Ocean Physics Reanalysis, available in the Copernicus Marine environment monitoring service (http://marine.copernicus.eu).

6.2.8 LETS-SAT (JN_CALL_2_9)

Submitted: 28 June 2019; Final revision: 27 August 2019.

Project Information

Proposal reference number	JN_CALL_2_9
Project Acronym (ID)	LETS-SAT
Title of the project	Leverage tracking efficiency on oceanographic buoys using an energy autonomous solution transmitting satellite messages
Host Research Infrastructures	Heraklion Coastal Buoy (HCB) Saronikos buoy (SB) Athos buoy (AB)
HCB, SB : Remote access **AB : In person access** **Remote access**	01/06/2018 - 31/05/2019 12/10/2018 - 13/10/2018 01/06/2018 - 01/10/2018
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Georgios Koutras OpenIchnos Ltd OpenIchnos HQ 18, South Street Valletta VLT 1102, Malta koutras@openichnos.com
User group members	Georgios Koutras, Themis Koutsouras - *OpenIchnos Ltd, Malta*

Project objectives

The LETS_SAT TNA project aimed to install and test the OpenIchnos tracking technology in fixed point oceanographic platforms under the influence of a wide range of environmental conditions (winds, waves, temperature, sea sprays etc), through the simultaneous access on three platforms for extended periods of time (1 full year) in order to fully exploit and test the operational capabilities of the product.

Although OpenIchnos tracking technology was initially developed for moving vessels, given the size and characteristics of the marine observing community (low energy, harsh environmental conditions etc), the technical and practical suitability of the system integration was an obvious challenge.

The specific objectives of the LETS-SAT project were:

1) To allow the installation of more efficient and sophisticated tracking device on moored oceanographic buoys. The geofencing module will be developed and embed to allow intelligent monitoring, thus utilizing efficient tracking and alerting for the buoys. This will provide both a primary and a backup geolocation system for fixed platforms.

2) Applicability of OpenIchnos solution in maritime environment in long term field exposure under harsh sea conditions.

Main achievements and difficulties encountered

The preparatory actions of the project started on the 1st June of 2018 and included the installation and the testing of the OpenIchnos modules in two types of buoys of the Poseidon network. The equipment was secured on the buoy masts and the whole set up was tested on land, attached in the same type of buoys as the ones in the sea, in order to secure that the OpenIchnos modules transmission and power charging through a dedicated solar panel were not affected by the buoy equipment and apparatus. The OpenIchnos trackers were deployed at the sites during the Poseidon network maintenance cruise that took place between 18th and 26th of June 2018.

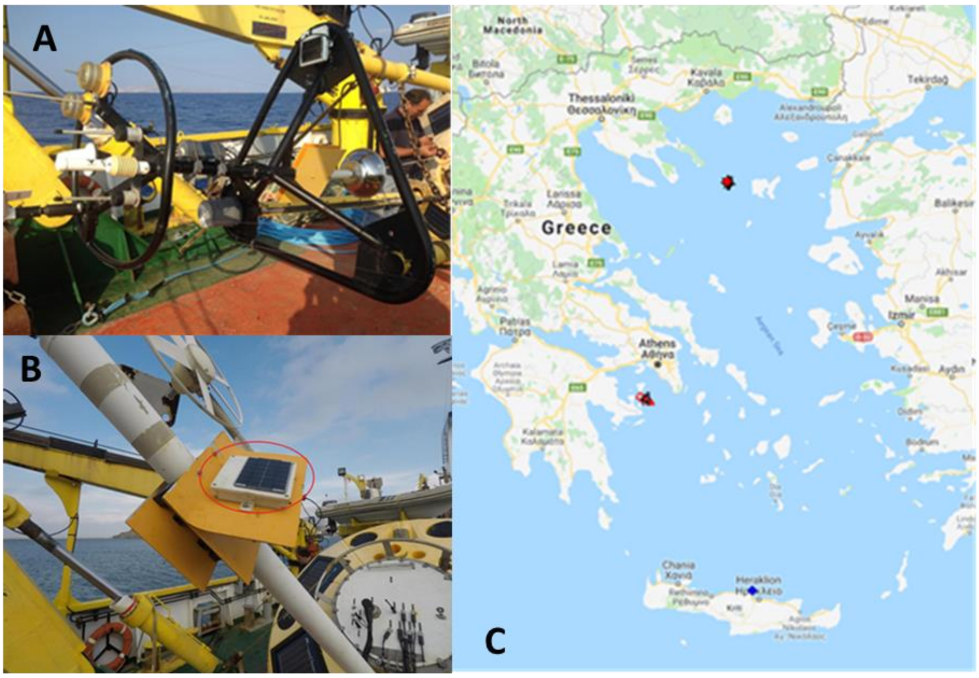


Figure 6.2.8.1*: The OpenIchnos tracking modules installed in Seawatch (A) and Wavescan (B) buoys and the location of the TNA stations as provided by the OpenIchnos on-line application (C).*

The final deployments sites were:

- Herakleion Coastal Buoy (HCB): Lat 35.4339, Lon 25.0775
- Saronikos Buoy (SB): Lat 37.6099, Lon 23.5669
- Athos Buoy (AB): Lat 39.9635, Lon 24.7226

Dissemination of the results

The outcomes of this TNA activity will be presented by OpenIchnos and HCMR in industry and operational oceanography meetings and workshops. When the TNA experiment started, OpenIchnos announced this activity in the Greek Press.

DATA are available on this link: http://www.jerico-ri.eu/tna/selected-projects/second-call/lets-sat/

Technical and Scientific preliminary Outcomes

The devices installed in the JERICO TNA infrastructures operated continuously for a full year exposed to the marine environment without any maintenance or servicing procedures. The long deployment period and the harsh environmental conditions of the deployment sites (Table 6.2.8.1) proved the seaworthiness of the OpenIchnos tracking device. The geofencing software was tested too in a realistic environment during the deployment period (Figs. 6.2.8.2 and 6.2.8.3) providing useful information about the station's status and security.

Table 6.2.8.1: *Minimum and maximum values for the air temperature, wind speed and maximum wave height in the three deployments sites.*

	Air temperature (min-max)	Wind speed (min-max)	Maximum wave height Hmax (min-max)
Heraklion Coastal Buoy	9.72 – 37.425 C	0 – 18. 228 m/sec	0 – 6.97 m
Saronikos buoy	12.206 – 35.91 C	0 -15.117 m/sec	0 -1.69 m
Athos Buoy	8.25 – 28.075 C	0 – 19.72 m/sec	0 -7.39 m

During the access period on the Poseidon network JERICO stations two incidents that triggered the HF location data transmission of the OpenIchnos equipment, took place:

Mooring line failure: On September 27, 2018, an extratropical storm developed in the eastern Mediterranean Sea. Water temperatures of around 27° C supported the storm's transition into a hybrid cyclone, with a warm thermal core in the center. The storm moved north eastward toward Greece, gradually intensifying and developing characteristics of a tropical cyclone. During this incident the mooring line of the Athos station broke and the buoy started drifting in the North Aegean Sea. Despite the severe weather conditions, the OpenIchnos module continue to transmit HF location data allowing the HCMR stuff to monitor the station location and proceed with the recovery procedures. The same module was installed next in the E1m3A station in the Cretan sea.

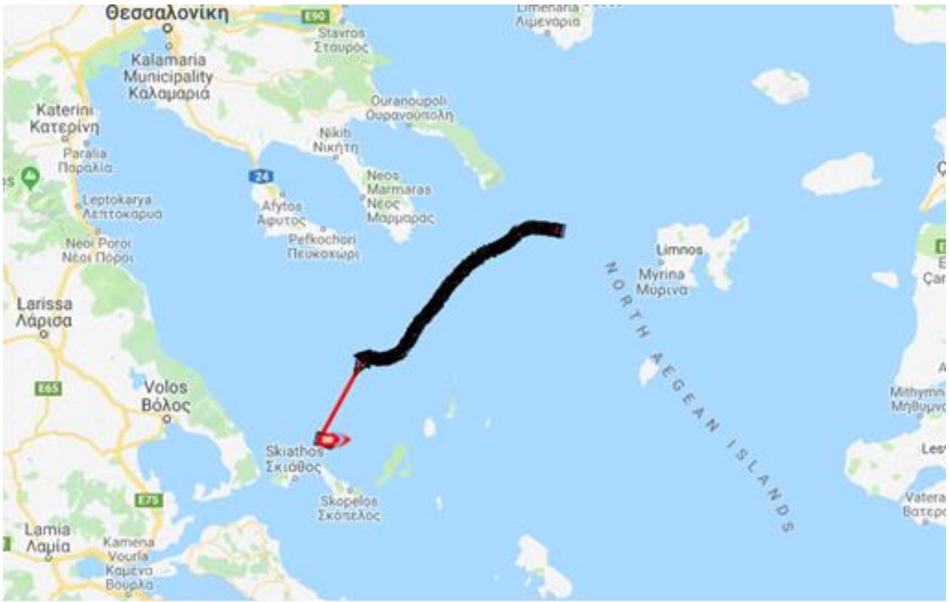


Figure 6.2.8.2*: The Athos station drifting course in the North Aegean sea after a mooring line failure (27/09/2018-01/10/2018) before the recovery by the R/V AEGEO.*

Station vandalised: On May 7, 2019 a sailing boat approached the E1m3A station and the passengers removed equipment from the buoy including the OpenIchnos tracking module. The device was transmitting data continuously so the boat course was detailed tracked and the equipment was recovered by the coast guard when the boat docked at the Rethimno marina.

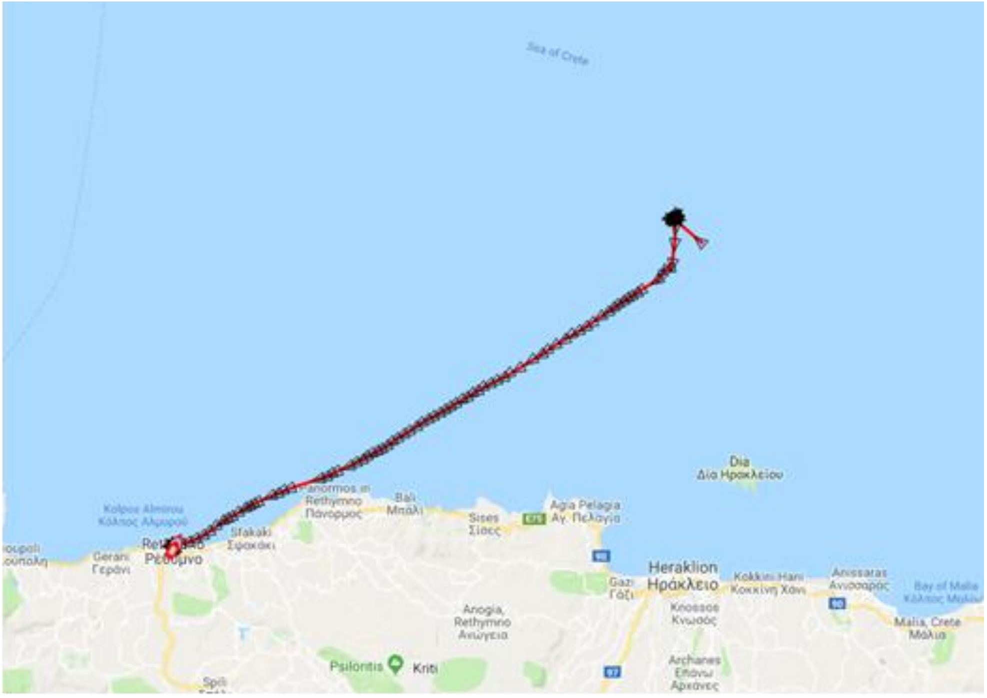


__Figure 6.2.8.3__: The course of the sailing boat that vandalize the E1m3A station, removed the OpenIchnos module and approached the Rethimno harbour. (05/05/2019).

The majority of traditional tracking systems need a power source and are limited to GSM coverage areas. Thus, neither have continuous transmission of their trace due to lack of power supply nor cover any possible area their assets may be. Moreover, solutions based on GSM network covers 50% of the terrestrial globe, leaving deep sea and coastal waters out of its range.

Openichnos tracking solution addressed these challenges, as its tracking device is designed and manufactured with very low power consumption, and equipped with a solar panel. This makes OpenIchnos a really autonomous service, able to work for 60 days without sunlight and reach full charge in just 3 days of sunshine. Furthermore, Openichnos uses the Iridium satellite constellation for transmitting data, achieving true global coverage while the asset's owners are able to monitor the whole tracking history through their PCs and mobile phones.

The installation of Openichnos in oceanographic observing platforms provides significant added value as

a) it increases the efficient tracking in 100% global range,

b) provides a reliable and autonomous primary and back-up solution for the high frequency tracking of the observing platform,

c) it increases the efficiency in case of emergency or used as a failover communication device and

d) it leads to future research in developing cost efficient observing platforms with low energy requirements and state of the art communication capability.

The proposed POSEIDON platforms offered a unique opportunity for the testing of Openichnos in a whole new market, that of the marine observing platforms. The installation and test of the device in a wide range of environmental conditions (wave, temperature, salinity, etc), through the simultaneous access on three platforms for extended periods of time (1 full year) gave us the possibility to fully exploit and test the operational capabilities of the product, transmission and their consistency especially under rough sea conditions.

A more detailed study of the results for the comparison of geolocation information, the efficiency of transmission and their consistency especially under rough sea conditions will be carried out when the devices will be recovered during the maintenance cruise of the Poseidon network.

References:

https://en.wikipedia.org/wiki/Mediterranean_tropicallike_cyclone#Zorbas_(27_Sep_%E2%80%93_1_Oct_2018).

6.2.9 MOCo Sea Pass (JN_CALL_2_10)

Submitted: 29 November 2018; Final revision: 17 December 2018.

Project Information

Proposal reference number	JN_CALL_2_10
Project Acronym (ID)	MOCo SEa Pass
Title of the project	Monitoring of Organic Contaminant in the water of the Southern Europe with Passive Sampling
Host Research Infrastructures	Port Operational Marine Observing System - st. Balchik (POMOS) Meteoceanographic site S1-GB (S1-GB)
POMOS : In person access	27/02/2018 - 01/03/2018 13/05/2018 - 15/05/2018
Remote access	09/03/2018 - 14/05/2018
S1-GB : In person access	16/05/2018 - 18/05/2018 17/07/2018 - 20/07/2018 23/10/2018 - 26/10/2018
Remote access	17/05/2018 - 25/10/2018
Name of Principal Investigator	Ioanna Kalantzi
Home Laboratory	Institute of Oceanography, Hellenic Centre for Marine Research
Address	Gournes – Pediados, Heraklion, Crete, Greece
E-mail address	kalantzi@hcmr.gr
User group members	Ioanna Kalantzi, Manolis Tsapakis, Kyriaki Mylona - *Hellenic Centre for Marine Research, Greece*

Project objectives

Organic contaminants, in particular persistent organic pollutants (POPs), adversely affect water quality and aquatic food webs across the globe. To date, there is no globally consistent information available on concentrations of dissolved POPs in water bodies. The advance of passive sampling techniques has made it possible to establish a global monitoring program for these compounds in the waters of the world, which we call the Aquatic Global Passive Sampling (AQUA-GAPS) network.

The main objective of this project was the use of state of the art passive sampling devices for monitoring and study the process (air sea exchange) governing the fate of POPs in marine boundary layer.

This technique will contribute to reach the aims of AQUA-GAPS including the investigation of the global distribution of POPs without discrepancies caused by individual or local approaches. Through the current project, this objective was implemented in the water of Southern Europe including the following:

- Evaluation of the present state of POPs pollution in the water of the Southern European coastal areas
- Investigation of different sites with different sources of anthropogenic inputs and different environmental characteristics (e.g. depth, salinity, currents etc).
- Study of the air-sea exchange of organic contaminants.

Main achievements and difficulties encountered

Through the current project, selected urban/industrially impacted sites were monitored in an attempt to examine the impacts of anthropogenic activities on aquatic environments and to combine these results with

AQUA-GAPS for a global scale estimation. The present project was aimed at developing new monitoring technologies to detect POPs in marine water and to evaluate the air-sea exchange of organic contaminants. Thus, it was achieved, for the first time, the simultaneous deployment of two passive samplers (air- and sea-samplers) resulting in (1) the evaluation of the present state of POPs pollution in the water and in the air of the Southern European coast and (2) the simultaneous monitoring of air-sea exchange of organic contaminants.

The selected sites for deployment were in the Western part of Black Sea (43.4042°N, 28.1653°E) and in the Northern Adriatic Sea (44.7384°N, 12.4526°E). Deployment sites included the Port Operational Marine Observing System (POMOS) (st.Balchik) in Black Sea and the Meteoceanographic site (S1-GB) in Mediterranean Sea. No technical difficulties were encountered. Both infrastructures' personnel was very helpful and cooperative.

Dissemination of the results

As soon as samples will be analysed and data will be interpreted, the results from the work, which was carried out under the TNA in JERICO-NEXT, will be disseminated through scientific conferences and scientific articles in peer-reviewed journals.

Meta-data of ratios/ comparisons of the organic contaminants will be given immediately after analysis to JERICO-NEXT. Most of the original data will be closed for one year for usage by our team. Then the original data will be available through publications in peer-reviewed journals. If there will be no publications after the first year, then the original data will be provided to JERICO-NEXT for on-line publication.

DATA have not yet been delivered on the date of D8.11.

Technical and Scientific preliminary Outcomes

Sites Description and Selection

Considering the advantages of passive sampling techniques, two observing systems have been selected for the monitoring of organic contaminants in the Southern European coastal area (Fig. 6.2.9.1). The Mediterranean Sea and Black Sea are unique marine environments subject to important anthropogenic pressures due to atmospheric and riverine inputs of organic contaminants. It is therefore of paramount importance to understand better the geographical distributions and temporal trends of organic contaminants, such as persistent organic pollutants (POPs), polycyclic aromatic hydrocarbons (PAHs), novel flame retardants and other contaminants of emerging concern.

Within the framework of AQUAGAPs and JERICO-NEXT TNA programs, passive samplers were deployed at 1.5m below the sea surface at the Port Operational Marine Observing System (POMOS) (st.Balchik) in the Black Sea and at the Meteoceanographic site (S1-GB) in the Mediterranean Sea (Figs. 6.2.9.1b,c).

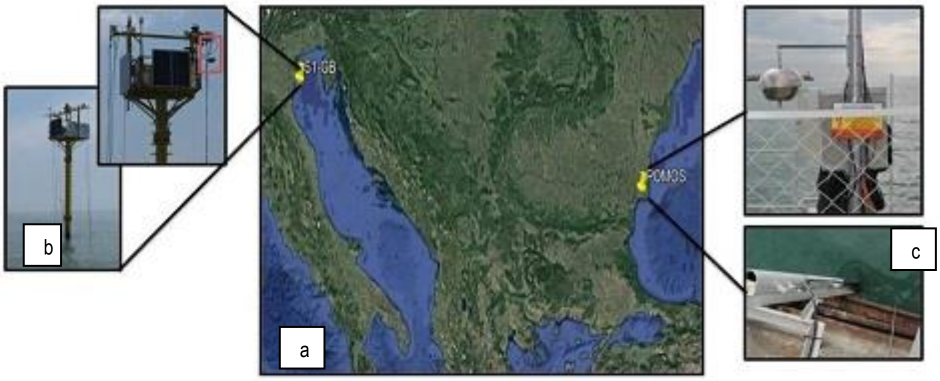


***Figure 6.2.9.1:** **(a)** The different observing systems selected for the monitoring of POPs in the Southern European coastal area; **(b)** Meteoceanographic site (S1-GB) in the Mediterranean Sea; and **(c)** Deployment aquatic and air passive samplers in the Western part of the Black Sea.*

Those two observing systems are of great interest for the detection of organic pollutants as they receive chemical contaminants from a variety of sources. The S1-GB is located offshore the Po river delta, in a key monitoring point for studying the interactions between the Northern Adriatic and the Po River. The POMOS is near the major Bulgarian ports, channels and bays, thus, the combination of the industrialised nature of the area surrounding the ports, the extent of marine traffic and population density.

<u>Sampler Deployment and Retrieval</u>

The passive sampler (PS) holders were attached to the sampler frame (Fig.e 6.2.9.2a). Twelve silicone rubber (SR) and twelve low density polyethylene (LDPE) sheets were secured to each holder. SR and LDPE were deployed in parallel (Fig. 6.2.9.2b). At the same time, passive air sampler (PAS) were deployed to the observing systems using polyurethane foam (PUF) disks (Fig. 6.2.9.2c). The preparation of the sheets and PUF was carried out at the Research Centre for Toxic Compounds in the Environment (RECETOX, Masaryk University, Czech Republic).

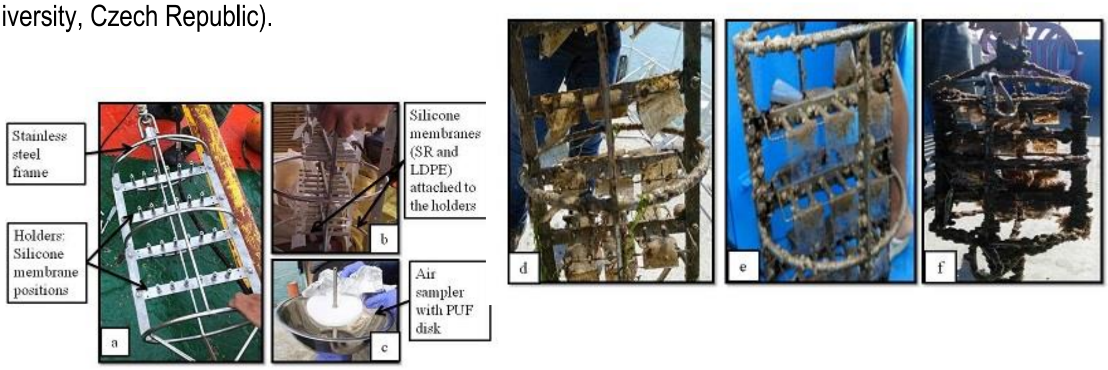


***Figure 6.2.9.2:** Passive sampling device assembly showing **(a)** the skeletal structure consisting of the stainless steel frame and holders; **(b)** the attached silicone rubber (SR) and LDPE membranes; **(c)** the air sampler with the PUF disk; **(d)** The mesh covered passive sampling devices recovered from POMOS; and **(e-f)** S1-GB experienced different degrees of biofouling.*

The steel devices together with SR and LDPE sheets were deployed once at POMOS (9th March, 2018) and twice at S1-GB (17th March, 2018 and 19th July 2018). At the same deployment period, PAS were deployed at each site for the simultaneous monitoring of air-sea exchange of organic contaminants. At the end of the exposure period (Table 6.2.9.1), both samplers, PAS and aquatic PS, were retrieved and the sheets and PUF disks were kept in the freezer until shipment to the central laboratory, RECETOX, for analysis.

Table 6.2.9.1: *Samplings of air and aquatic passive samplers at the POMOS and S1-GB.*

Country		Installation	Start time - End time	Sampling time
Italy	Remote access 1	S1-GB	17/5/2018-19/7/2018	2 months and 2 days
	Remote access 2	S1-GB	19/7/2018-25/10/2018	3 months and 6 days
Bulgaria	Remote access 1	POMOS	09/3/2018-14/5/2018	2 months and 6 days

All analyses will be performed in the same lab at the RECETOX using identical methods. PUFs and SRs will be extracted with DCM and methanol, respectively, in an automatic extractorF2d. Prior to extraction, SRs will be brushed to remove biofouling from the surface and surrogate recovery standards will be added on SRs and on PAS PUFs. Volume will be reduced and extracts will be split into two portions, for PAH analysis (10 %) and analysis of PCBs, OCPs and PBDEs (90 %) (Lammel et al., 2015). Samples will be analysed using a GC-MS (Gas Chromatograph coupled with a Mass Spectrometer) Agilent 7890 coupled to Agilent 7000B. Air–sea exchange will be studied by determining the vertical concentration gradients (Tsapakis et al., 2006; Lammel et al. 2016). Surface seawater temperature (SST) will be retrieved from satellite data using AVHRR (Advanced Very High Resolution Radiometer).

6.2.10 FluorMed-1 (JN_CALL_2_11)

Submitted: 14 June 2019.

Project Information

Proposal reference number	JN_CALL_2_11
Project Acronym (ID)	FluorMed-1
Title of the project	Phytoplankton fluorescence studies in Mediterranean. Part 1. Feasibility and comparability of different methods in oligotrophic seas
Host Research Infrastructures	Heraklion Coastal Buoy (HCB) Poseidon Calibration Lab (PCL)
PCL : In person access **HCB : Remote access**	09/04/2018 - 21/4/2018 01/06/2018 - 20/05/2019
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Jukka Seppälä Finnish Environment Institute SYKE, Marine Research Centre Erik Palménin aukio 1, FI-00560 Helsinki, Finland jukka.seppala@ymparisto.fi
User group members	Jukka Seppälä, Pasi Ylöstalo - *Finnish Environment Institute SYKE, Finland* Melilotus Thyssen, Olivier Grosso - *Mediterranean Institute of Oceanology CNRS, France*

Project objectives

The FluorMed-1 project aims in providing information on the applicability and comparability of various fluorescence detection methods for phytoplankton community structure at a high frequency in the oligotrophic conditions of the Mediterranean waters. Those methods are used in contemporary online phytoplankton diversity and physiology research on various platforms (buoys, bench with pumped water, ships of opportunity, scientific vessels) and are mostly tested in eutrophied sea areas, where diversity and biomass are important. Since bulk or specific fluorescence sensors are not well defined in terms of detection limits but that they are depicted as required when selecting technology for monitoring the biological state of marine areas, it is important to define the possible applications in the oligotrophic conditions, and when developing the methodology further.

The validation and combination between bulk and physiology analysis in oligotrophic areas will be coupled with single cell analysis using high frequency pulse shape recording flow cytometry. This project will enable to get insight on the picoplankton community functioning, dominating oligotrophic areas.

Main achievements and difficulties encountered

Project started with a laboratory experiment. Water was collected from the oligotrophic coastal site (10.4. & 16.4. 2018). 200 L of water was incubated in a tank for 6 and 3 days respectively. Water was fertilized with nutrients and development of phytoplankton community was followed using a suite of sensors (3 different LED fluorometers, 1 spectral fluorometer, 1 integrating cavity spectrophotometer, 2 FRRF fluorometers, flow cytometer, membrane inlet mass spectrometer, spectroradiometer, probes for oxygen, salinity and temperature). Some instruments were placed directly in the tank while some were used in flow-through mode. All sensors were functional throughout the experiments and their dynamic responses in varying oligotrophic conditions were obtained. Discrete sampling for analytical laboratory measurements was carried out to validate sensor data.

The field deployment of fluorometers required more interfacing work than anticipated. New model of Trios NanoFlu Chlorophyll fluorometer was deployed at HCB at 25.6. 2018 and data was received in real time. After approx. 2 months of deployment, the sensor readings became unstable due to biofouling. Sensor was cleaned manually couple of times during the deployment until finally delivered back to user mid-May and finally re-inspected 21 May by user. The initial two month period with HQ data will be studied along with light data to analyse effect of non-photosynthetic quenching on fluorescence. Trios Unilux-PE sensor deployment was planned along with NanoFlu. The analysis of fluorescence profiles along the water sampling (for experiment) indicated that phycoerythrin at the surface waters is not measurable and other sampling strategy was decided. PE sensor was attached to CTD and several casts were performed during spring 2019, to assess phycoerythrin in deeper layers.

Dissemination of the results

Results have been presented (poster) at JERICO-NEXT general assembly (Galway, IR, 24.-27.9 2018). Results will be presented (poster) at JERICO-NEXT general assembly (Brest, FR, 2.-5.7. 2019). Results will be published in scientific peer-reviewed journal. Results will be communicated towards sensor manufacturers.
DATA have not yet been delivered on the date of D8.11.

Technical and Scientific preliminary Outcomes

Experiment: POSEIDON PCL

Water was collected from the oligotrophic coastal site (10.4. & 16.4. 2018, Fig. 6.2.10.1) and incubated in a 200L-tank for 6 (EXP1) and 3 (EXP2) days respectively. Water was fertilized with nutrients and development of phytoplankton community was followed using a suite of sensors (Fig. 6.2.10.2) and standard laboratory sampling. Some instruments were placed directly in the tank while some were used in flow-through mode (Fig. 6.2.10.1).

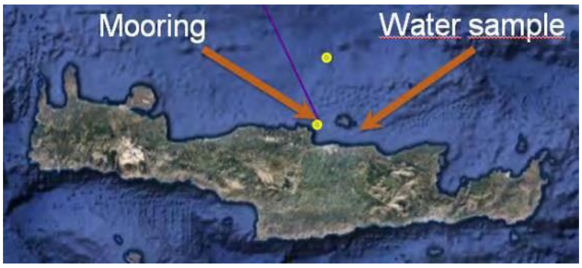


***Figure 6.2.10.1**: Location of water sampling and mooring (up) and experimental setup at calibration lab (right).*

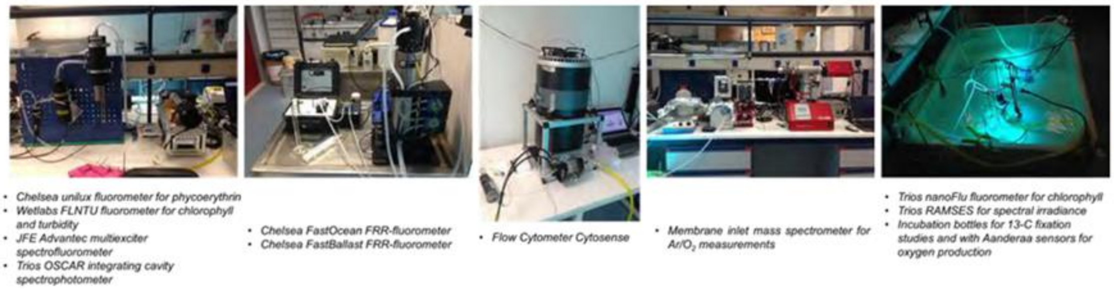


***Figure 6.2.10.2**: Sensors used in the experimental period.*

The key findings of the experimental results are highlighted for EXP2, as follows:

- Phytoplankton subpopulations were identified by cytometer, and *Synechococcus* sp. picocyanobacteria being important component of community (Fig. 6.2.10.3A).
- Cell numbers of pico- and nanoeucaryotes decreased during experiment (Fig. 6.2.10.3C), which was also reflected in Chlorophyll a fluorescence (Fig. 6.2.10.3B). Chlorophyll a concentration from discrete samples decreased similarly from the start value 0.35 down to 0.08 µg Chla L^{-1}.
- Higher decrease of chlorophyll a fluorescence during light periods was observed, due to nonphotochemical quenching (Figure 6.2.10.3B), but similar response is not seen for phycoerythrin fluorescence (Fig. 6.2.10.3F).
- *Synechococcus* sp., with two subpopulations (high FLO and high FLR), maintained it's abundance, with a switch between subpopulations during the experiment (Fig. 6.2.10.3E).
- Phycoerythrin fluorescence increased during the first night (Fig. 6.2.10.3F), as well as the number of *Synechococcus* sp. cells.
- Photosynthetic efficiency, measured with Chelsea Fast Ocean FRRF, declined during the experiment. During the latter part of the experiment, the signal-to-noise ratio increased, indicating that for this instrument the range of phytoplankton concentration was too low.

Results will be studied more in detail and instrument intercomparison will be carried out, especially evaluating their capacity to provide reliable measurements in low phytoplankton concentrations.

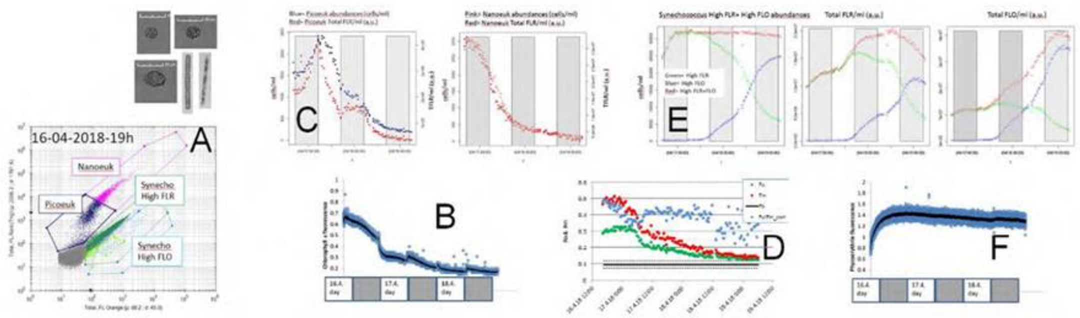


***Figure 6.2.10.3**: Highlights of the results in EXP2.*

Deployment: POSEIDON HCB

During the collection of water samples for the experiments, the vertical profiles of spectral irradiance and fluorescence were measured (Fig. 6.2.10.4). These measurements highlight the light climate of the study area, with blue light penetrating the deepest and vertical profile of phytoplankton with deep layer chlorophyll maxima. Spectral adaptation/acclimation of prevailing deep layer phytoplankton populations to harvest blue light is seen by both spectra peaking around 470 nm. Based on this information and the experimental results, Chlorophyll a fluorometer (Trios Chlorophyll NanoFlu) was selected as the best option (connections, size, power consumption, reliability) to be deployed in the Poseidon HCB mooring, to follow phytoplankton dynamics. The phycoerythrin fluorometer (Chelsea Unilux PE) was considered as a second option, but as the mooring provides measurements at the surface only, it was considered that the phycoerythrin signal will be very low. Instead it was decided to install the phycoerythrin fluorometer on a profiling CTD.

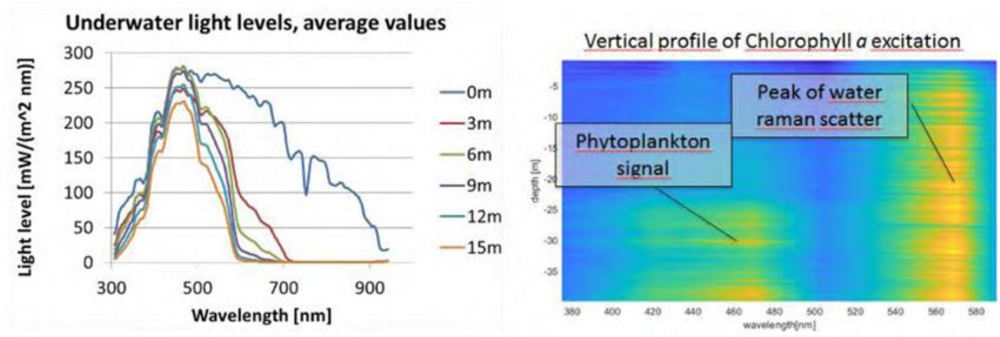


Figure 6.2.10.4: *Spectral irradiance profile (left) and spectral fluorescence.*

Fluorometer data was with good quality for approximately 3 months, thereafter affected strongly by biofouling (Fig. 6.2.10.5). Removal of biofouling material was tested couple of times, but it was likely that the signal was no more reliable. The initial records however provide insight of the inherent problem in fluorescence detection at high irradiance and oligotrophic conditions. The diel rhythm of fluorescence follows the irradiance levels, with low fluorescence at time of high irradiance, due to non-photochemical quenching. The observed differences in day-night values were 1.5-10 fold. Most obviously the night time values reflect better the real concentrations. With the available light data we aim to estimate the rate constants for non-photochemical quenching and its relaxation.

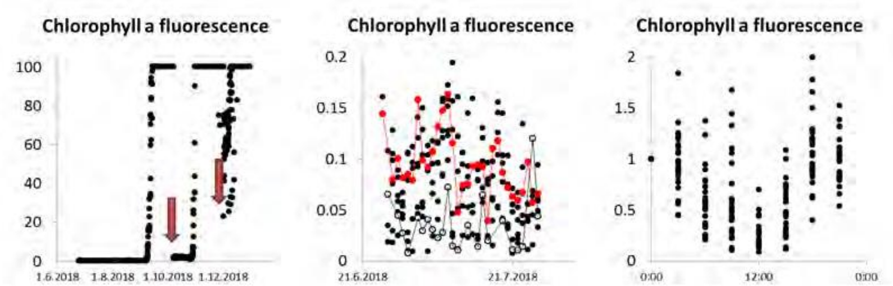


Figure 6.2.10.5: *(Left) Fluorescence readings at the mooring for period from 25.6.-31.12.2018 (moments of cleaning noted by red arrows) especially showing the biofouling events. (Middle) Fluorescence readings (black circles) for the first month of deployment, showing the high night-time values (red circles) and low daytime values (white circles). (Right) Fluorescence values for the first month normalised to values observed at midnight, showing the consistent diel pattern with minima during midday.*

6.2.11 FOULSTOP (JN_CALL_2_12)

Submitted: 23 June 2019; Final revision: 9 August 2019.

Project Information

Proposal reference number	JN_CALL_2_12
Project Acronym (ID)	FOULSTOP
Title of the project	Fouling Protection for Marine Optical Systems
Host Research Infrastructure	Expandable Seafloor Observatory (OBSEA)
In person access **Remote access**	13/11/2018 - 15/11/2018 09/11/2018 - 21/05/2019
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Laurent Delauney Ifremer – Detection, Sensors and Measurements Laboratory Centre de Bretagne, ZI pointe du Diable CS10070- 29280 Plouzané, France Laurent.delauney@ifremer.fr
User group members	Laurent Delauney, Mathieu Debeaumont, Jean Pierre Lafontaine, Mertz Nicolas - *Ifremer, France*

Project objectives

This project consist to test in the Mediterranean sea environment an innovative technique to protect optical windows that are part of optical oceanographic sensors or more generally part of optical devices like underwater cameras and lights. The biofouling protection is achieved by a conductive layer that coats the optical window and is used to generate very low quantity of hypochlorous acid by controlled *in situ* chlorination of seawater.

Main achievements and difficulties encountered

The FOULSTOP antifouling station equipped with 2 protected fluorometers, 1 unprotected fluorometer and a protected camera was deployed on the OBSEA seabed observatory from 5th of December 2018 to 21st of May 2019. During this deployment the station was recovered on the 15th of February and deployed back to sea on the 12th of April. During this recovery the real time data transfer system and the fluorometers were checked.

The biofouling protection of the optics of the 2 fluorometers and of the camera is achieved by a conductive layer that coats the optical window and is used to generate very low quantity of hypochlorous acid by controlled in situ chlorination of seawater.

This innovative low power demand and very efficient biofouling protection technique was controlled by a loop system based on a biofilm sensor that can trigger the active biofouling protection device only when biofilm formation is detected.

Before shipping the station to OBSEA we were not sure that the biofilm sensor was working properly. We could not postpone anymore the shipping and consequently it was decided to cancel the antifouling loop system in order to ensure that the antifouling protection was applied at its maximum rate. The maximum rate for fluorescence sensors was a periodic cycle made with 10mn with protection ON and then 10mn with protection OFF. For the camera, since there is no possible adverse effect on the images due to the protection, the maximum rate was a continuous protection ON. The loop system based on the biofilm sensor was first demonstrated during the NeXOS project (*NeXOS Project, D3.4 – Biofouling protection control system, Test and Sites Dependence*

Report) during a one month deployment, and showed that a sensor protection controlled by the biofilm sensor is perfectly protected with SnO_2 conductive layer technology with a ratio of 1/6 compared to a protected sensor that is blindly actively protected by the same technology and on half time period (e.g. 10mn ON, 10mn OFF).

After nearly 5 months of deployment in the Mediterranean Sea the biofouling protection shows a good protection efficiency that was clearly showed for example by the images (camera) that remained perfectly unblurred during the whole period. And, the fluorescence measurements produced by the two protected fluorometers didn't show drift that could be caused by biofilm development and the unprotected one showed a suspicious drift.

Dissemination of the results

Social media, and photos of the deployments:

JERICO-NEXT Web site: http://www.jerico-ri.eu/2019/01/29/fouling-protection-for-marine-optical-systems/

The live video was displayed during the whole deployment on the OBSEA web site:

https://obsea.es/data/live_video.php#loaded

https://twitter.com/Jerico_NEXT/status/1090929807041486848

https://photos.app.goo.gl/vUuV77BxA9gTkpb19

https://photos.app.goo.gl/VK4dwUKAqJ55EeSi8

https://photos.app.goo.gl/8k97H6UEXRRZWNm47
https://photos.app.goo.gl/mXUYVPDTHqVFPtXs7.

The FOULSTOP TNA results will be presented during the final JERICO-NEXT general assembly in Brest from the 2nd of July to the 5th of July.

The Ifremer is presently studying how to collaborate with private companies specialized in oceanographic instrumentation and underwater cameras.

DATA: The data set is available to the public via the link https://www.seanoe.org/data/00509/62105/ (Delauney et. al, 2018).

Technical and Scientific preliminary Outcomes

The FOULSTOP antifouling station equipped with 2 protected fluorometers, 1 unprotected fluorometer and a protected camera was deployed on the OBSEA seabed observatory from 5th of December 2018 to 21st of May 2019. The FOULSTOP station was immersed at 20m depth in the Mediterranean Sea and during a period where fouling pressure is from medium to high.

The biofouling protection technology has been fully integrated to two TriOS commercial optical sensors and an HD camera. The deployment at sea is performed on an underwater-cabled structure equipped with an EMSO COSTOF II junction box. As show on the photo below (Fig. 6.2.11.1), the camera is placed faced to the three fluorometers and connected to the OBSEA observatory by a specific junction box that allowed for example to view the camera online in real time on the OBSEA website.

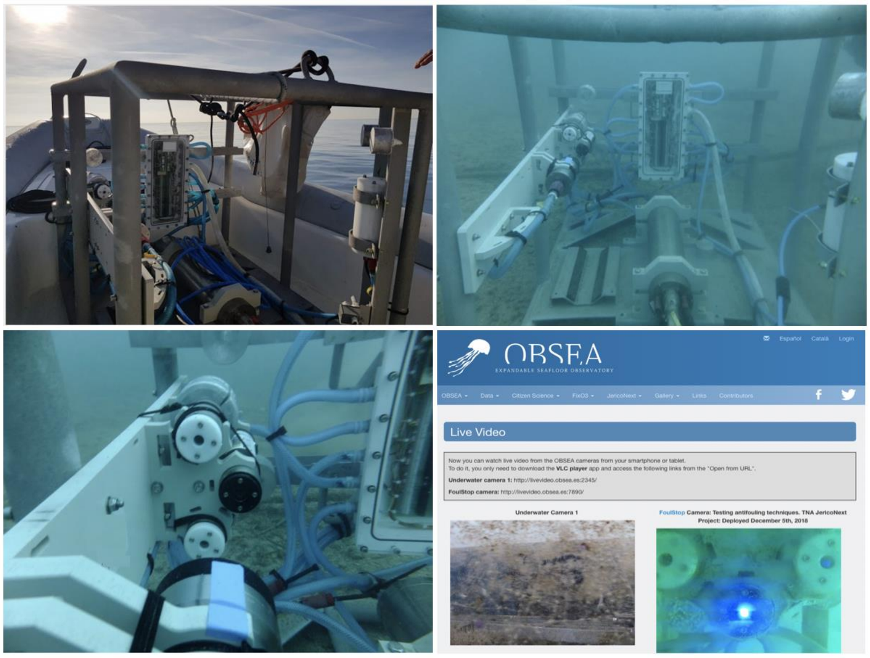


Figure 6.2.11.1: *The FOULSTOP station deployment and online camera stream on the OBSEA website.*

To evaluate the efficiency of the biofouling protection, 2 indicators was used. The first one consists to compare the fluorescence measurement produced by the protected fluorometer in comparison to the one that is unprotected. If a fluorometer is affected by a biofilm, the fluorescence measurement should rise little by little as the biofilm is developing. The second indicator is to examine the images produced by the camera as the experimentation runs and monitor whether the images become fuzzy or not.

The figure below (Fig. 6.2.11.2) shows the fluorescence signal produced by the unprotected fluorometer (top) and the protected fluorometer (below).

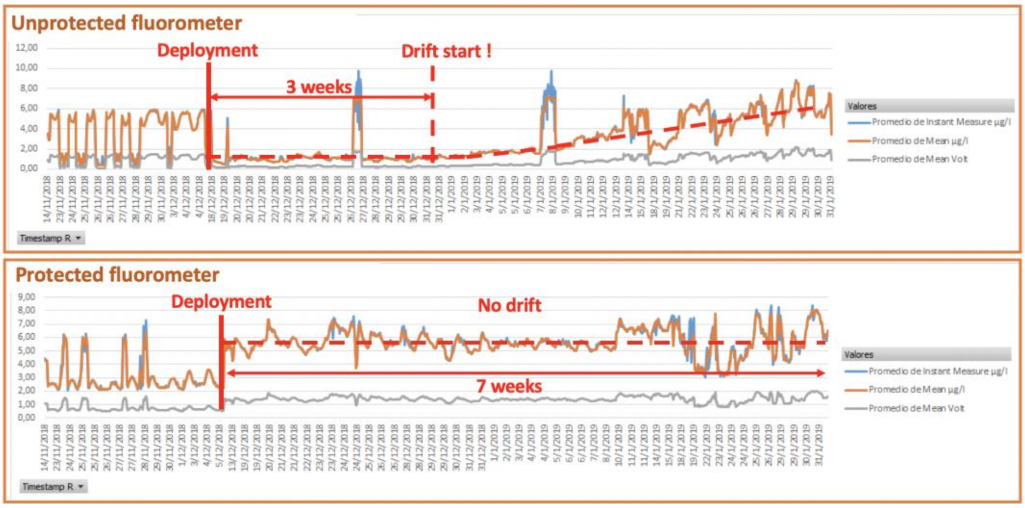


Figure 6.2.11.2: *Fluorometers, 2 first months of deployment. Top: Unprotected fluorometer – Below: Protected fluorometer.*

The important information shown by these data (Fig. 6.2.11.2) is the regular increase of the value produced by the unprotected fluorometer after 3 weeks of deployment and during the remaining 4 weeks of data recording.

And at the same time the protected fluorometer shows fluorescence variations but not a continuous increase during the 7 weeks of continuous recording. This indicates that a biofilm has developed on the optics of the unprotected fluorometer while on the protected instrument no biofilm happened.

Indicator #2 is shown below (Fig. 6.2.11.3).

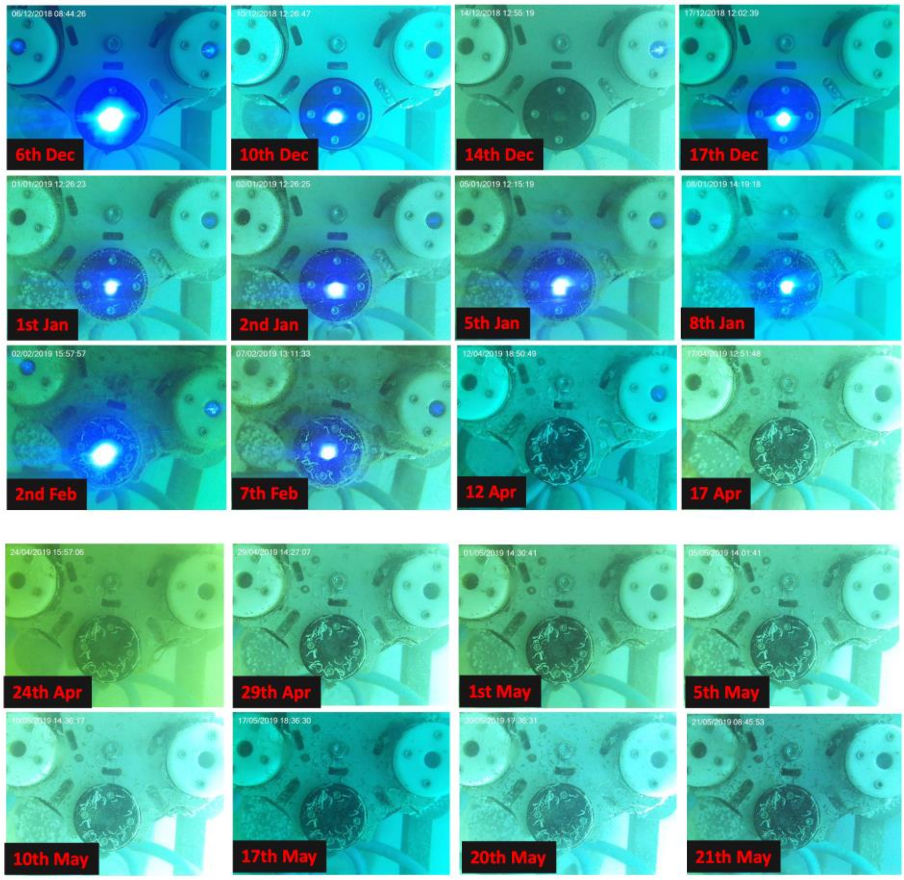


Figure 6.2.11.3: *Protected camera snapshots over the full deployment duration (from December 2018 to May 2019).*

Figure 6.2.11.3 is showing snapshots produced by the protected camera over the full deployment duration, from December 2018 up to May 2019. The snapshots show clearly the very neat images obtained days after days regardless of deployment duration thanks to the biofouling protection used on the optics of the camera. We can see on the pictures the unprotected fluorometer in the center with a black optic holder getting little by little colonized by biofouling.

As a general conclusion, we can consider that this experiment clearly demonstrated that the biofouling protection for optical instruments based on a polarized conductive layer is efficient enough to protect camera or fluorometer in Mediterranean Sea conditions. This experiment has been a very useful complement to the previous test performed in Atlantic condition during the NeXOS project.

To complete the Atlantic and Mediterranean tests, it would be desirable to be able to deploy this technology in North Sea conditions, for example on the LoVE observatory in Norway or the Utö observatory in Finland.

6.2.12 DYNAS (JN_CALL_2_13)

Submitted: 19 June 2019; Revision pending (review comments sent on 6 August 2019).

Project Information

Proposal reference number	JN_CALL_2_13
Project Acronym (ID)	DYNAS
Title of the project	Dynamics and turbulence in the Sicily channel
Host Research Infrastructure	Sicily Channel Observatory (SiCO)
In person access **Remote access**	20/05/2018 - 28/05/2018 19/09/2018 - 28/09/2018 23/05/2018 - 04/04/2019
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Pascale Bouruet-Aubertot Université Pierre et Marie Curie (UPMC)- Laboratoire d'Océanographie et du Climat (LOCEAN) BP100- 4 Place Jussieu 75252 Paris Cedex 05, France pascale.bouruet-aubertot@sorbonne-universite.fr
User group members	Pascale Bouruet-Aubertot, Anda Vladoiu, Yannis Cuypers *Sorbonne Université, France* Bruno Ferron, Olivier Peden *LOPS UMR 6527, France*

Project objectives

The Sicily Strait is a key region crossed by different water masses exchanged between the Eastern and Western Mediterranean basins. It is also a very dynamical area characterized by meso and submesoscale processes with a strong variability and internal wave activity. Nevertheless the turbulence induced has been only characterized recently with the first in-situ microstructure measurements performed by our group during five cruises over two years (2013-2014) revealing that the Sicily channel is a hotspot for turbulence. Implementing additional measurements of temperature and conductivity along the mooring lines as well as high frequency velocity measurements close to the bottom will allow us to get insights on the impact of turbulence in local water mass transformation with indirect estimates from the mooring measurements provided that the inertial subrange is resolved (Lorke and Wüest, 2005). The ultimate ambitious goal is to get a vision on scale interactions with the quantification of energy transfers (bi-spectral analysis) and how they modulate the transport in the Sicily channel. Another related objective is to take benefit of the cruises to perform additional turbulence measurements along the main branches of the deep flow.

We plan also to use these observations for numerical model comparison and validation with improved parameterization in realistic numerical models and focus on the impact on internal tide mixing and nonlinear processes of higher frequencies. Also we may perform idealized numerical simulations with Daniel Bourgault's high resolution numerical model (Bourgault and Kelley, 2004) along C01 section to help the interpretation of in-situ measurements.

Main achievements and difficulties encountered

The aim of our participation to the two cruises cruises was to perform additional microstructure measurements with the VMP in the Sicily channel and to deploy additional sensors (Fast temperature sensors, additional CTD sensor, high resolution 1200 kHZ ADCP) along the two mooring lines part of the Observatory. The two legs took place onboard Dalla Porta research vessel.

Leg1 (20-28/05/2018): the additional instruments were clamped on the mooring as scheduled under good weather conditions and 17 microstructure profiles were performed, half less than scheduled initially (see Leg1 cruise report)

Leg 2 (19-28/09/2018): because of bad weather conditions the ship had to remain most of the time in harbour and the work at sea was conducted during one day Sept.23rd, C01 mooring, which has surfaced a couple of weeks before the cruise and already recovered, was deployed without a few sensors whose connectors were broken and the maintenance of C02 mooring was performed. In the meantime, two VMP profiles were performed (see Leg2 cruise report).

All additional sensors deployed on the two moorings were recovered by the Italian team in April 2019. Part of the data were downloaded while the others will be downloaded as soon as possible when the instruments will be sent back to LOCEAN and LOPS (the transportation is scheduled these coming days).

Most of the sensors worked well except a few ones because of battery deficiency. The data collected are under process to get further insight high frequency dynamical processes in the Sicily strait.

Dissemination of the results

A poster presentation is scheduled this July at the JERICO-NEXT meeting to be held in Brest.

The additional turbulence measurements collected during the two cruises will be integrated to the dataset of turbulence measurements presently under-process in a manuscript on the variability of mixing efficiency in the Western Mediterranean Sea, to be submitted within a month approximately ("Contrasted mixing efficiency in turbulent versus quiescent regions: insights from microstructure measurements in the Western Mediterranean Sea" Vladoiu et al).

We plan to investigate the variability of the high frequency dynamics based on the mooring data and to publish these results as soon as possible.

In the meantime we plan to start to analyze hourly outputs from the NEMO numerical simulations at 1/60° from the NEMO eNATL60 experiment, with two configurations, with/without tidal forcing in collaboration with colleagues from IGE in Grenoble. The purpose of the manuscript will focus on the ability of the model to reproduce the high frequency dynamics and also estimate its relevance regarding the parameterization of turbulent mixing and to get some insights on the dynamics of the trapped diurnal internal tides.

The diurnal tide, which is sub-inertial at the Sicily channel, is evidenced from the mooring observations. This suggest a possible local resonance that we plan to further investigate and address the question of the parameterization of bottom trapped internal tides. This work is under present investigation.

Eventually, as scheduled, we plan to conduct non hydrostatic numerical simulations focused on the most turbulent constricted northern passage (C01 location) to help the interpretation of the measurements and the development of a parameterization, ideally this work should lead to a publication.

DATA have not yet been delivered on the date of D8.11.

Technical and Scientific preliminary Outcomes

This report is a preliminary version of the technical and scientific report that will be sent once all the instruments will have been downloaded and the data overviewed. Two points are mentioned in the following : the turbulence measurements collected along the two deep flow branches and some spectral analysis performed focusing on high frequencies.

Turbulence measurements :

The only turbulence profiles collected prior to the project were obtained at C01 and C02. Turbulence profiles collected during DYNAS-Leg 1 provide for the first time an overview of the turbulence in the channel while the two profiles collected during DYNAS-Leg 2 support the findings from 4 previous cruises, namely an intense dissipation in the lower layer at C01 (Vladoiu et al, 2018). Figure 6.2.12.1 shows the depth averaged dissipation rate in the 20-150 dbar surface layer (left) and in the 150dbar-bottom layer (right). While subsurface dissipation rates are relatively homogeneous and moderately intense (~10^{-8} W.kg^{-1}), dissipation rates are contrasted at depth with enhanced turbulence at C01 and upstream. These measurements confirm that the deep flow branch passing through C01 is the most active one.

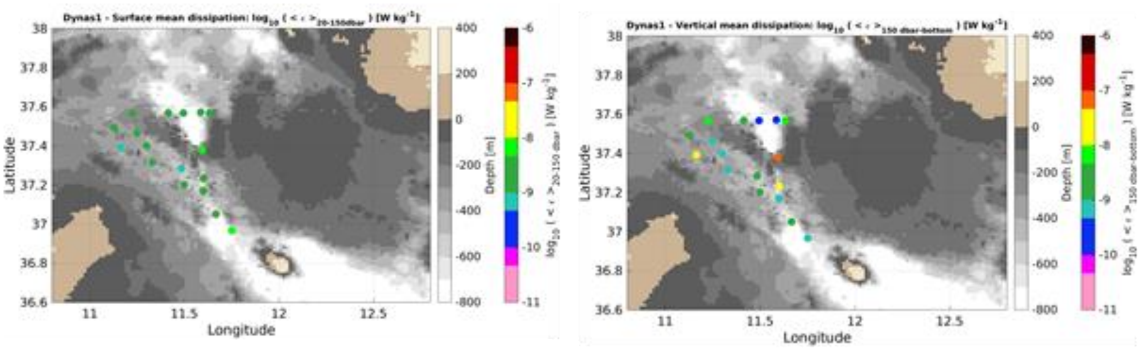


***Figure 6.2.12.1**: Depth-averaged dissipation rate (log scale, W.kg-1) during Dynas Leg1 between 20 and 150 dbar (left panel) and below 150 dbar (right panel).*

Dynamics at high frequencies : focus on tidal frequencies

The ADCP, long range and short range, deployed at C01 were chosen to illustrate here the variability during late spring and summer 2018. The general features of the dynamics are well-known, with a meridional velocity larger in absolute value than the zonal velocity, a significant variability at temporal scales of a few weeks/days associated with the mesoscale dynamics and tidal fequency peaks. The inertial peak is remarkably non-existent while both semi-diurnal and diurnal tidal frequencies are observed (Fig. 6.2.12.2). The absence of energy at near-inertial frequency in spite of the fairly strong atmospheric forcing suggests a dissipation mechanism coming into play, in the surface layer, non resolved by the ADCP measurements. The semi-diurnal tidal constituent is on the other hand a main component of the dynamics (Fig. 6.2.12.3) and may contribute to the enhancement of shear instability as it represents as well a signifcant fraction of the shear (Fig. 6.2.12.3c). This question will be adressed as well as the question of its parameterization in numerical models. The relative contributions of these different constituents to dissipation may be estimated from the shear components taking benefit of the 0.5 m fine vertical resolution of the 1200 kHz, short range, ADCP. The time series of velocity and shear reveals a strong variability of these different components with events of strong shear (Fig. 6.2.12.3) characterizing turbulent events. The question of the modulation of dissipation will be further addressed based on the fine vertical resolution velocity measurements and estimates of the stratification. The diurnal K1 tidal component is also evidenced. We plan to investigate further its propagation and resonance along the Talbot bank as suggested by Artale et al (1989) and base our analysis also on numerical simulations. The structure of the sub-inertial diurnal internal tide from the mooring data may also provide insights on the bottom trapped generation process which may help to improve the parameterization of bottom trapped internal tides.

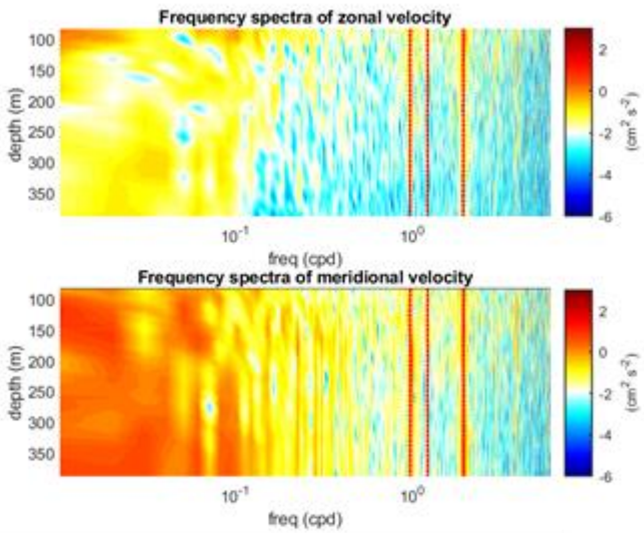


***Figure 6.2.12.2** : Frequency spectra of meridional and zonal velocities as a function of frequency and depth.*

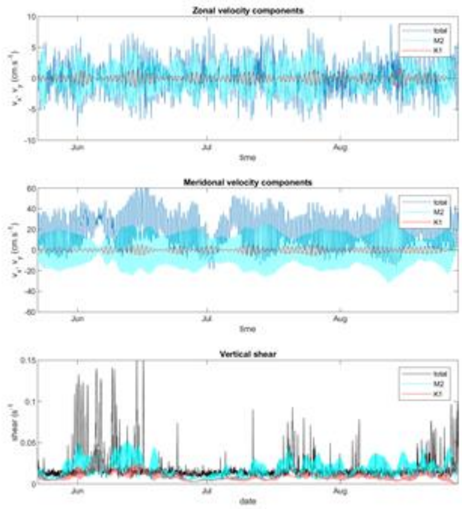


***Figure 6.2.12.3**: Time series of depth-averaged zonal and meridional velocities (total and tidal, top and middle panels) and times series of the vertical shear of the components (bottom panel) from the short range 1200kHz ADCP.*

6.2.13 GETSCh (JN_CALL_2_14)

Submitted: 31 July 2018; Final revision: 21 September 2018.

Project Information

Proposal reference number	JN_CALL_2_14
Project Acronym (ID)	GETSCh
Title of the project	Glider Experiments in the Tunisia-Sardinia Channel
Host Research Infrastructure	CNRS-INSU Glider National Facility (GNF)
In person access **Remote access**	06/03/2018 - 10/03/2018 16/03/2018 - 04/05/2018
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Sana Ben Ismail Institut National des Sciences et Technologies de la Mer 28 rue 2 mars 1934 Salambôo,Tunis, Tunisia Sana.benismail@instm.rnrt.tn
User group members	Sana Ben Ismail, Cherif Sammari, Mohamed Anis Ben Ismail - *INSTM, Tunisia* Katia Mallil - *ISSMAL, Algeria* Laurent Mortier, Pierre Testor - *LOCEAN, France*

Project objectives

The proposed research is focusing on the Channel of Sardinia. The Sardinia Channel which is an important passage connecting the Algerian and the Tyrrhenian basins, with a sill depth of about 1900 m. In spite of the considerable amount of work achieved and accurate results obtained about the circulation in the Western Mediterranean Sea, during the last 20 years, the Sardinia Channel is still one of the less explored regions where the dynamical processes and water exchanges are not yet clearly identified.

In order to clarify some of these processes, in particular those related to the mesoscale variability, which might be related to the instable behaviour of the Algerian current and associated eddies, as well as interaction with the topography and the widening of the shelf in the channel, our methodology will be based on a combined approach using glider observations in the channel, sea surface height observation by satellite altimetry and available ship borne CTD, ferrybox, profiling floats and mooring data in the adjacent basins. The combination of all those data sets coming from multiple measuring platforms has demonstrated the benefits for improving the knowledge on water masses properties and mesoscale dynamics, as well as more quantitative analysis.

The GETSCH project main objectives are to :

- identify the physical properties of the surface and intermediate water masses between Northern Tunisian Coast and Sardinia,
- study the variability of the physical properties of surface and intermediate water masses;
- understand exchanges through sub-basins and the complex interactions through eddies;
- evaluate the transport of water, salt and heat through the area and verify if the interannual variability of the surface and intermediate water masses is due to climatic changes (here use of the LOCEAN CTD historical database);
- assess the capabilities of coastal altimetry when validated by in-situ data.

Main achievements and difficulties encountered

The Glider BONPLAND has been deployed in Cagliari on the 15th of March by the Glider National Facility's staff helped by CNR Italy. It has performed transects between Sardinia and Tunisia during a 45 days mission. The glider was recovered near Cagliari (south of Sardinia) after collecting about 500 profiles.

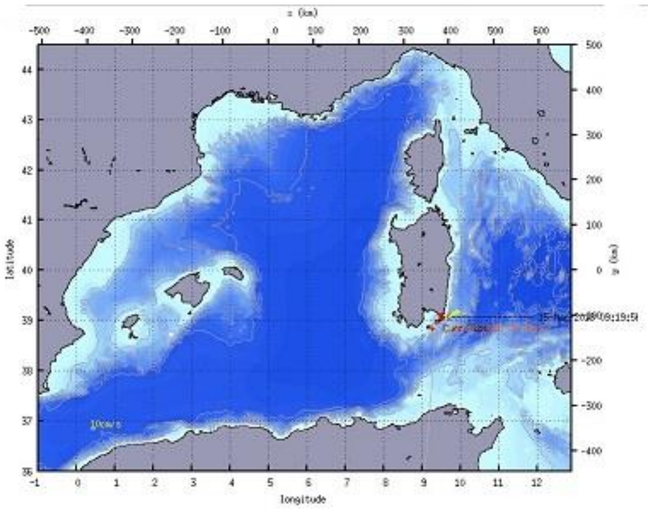


Figure 6.2.13.1*: Glider track, complete mission (16 March to 04 May 2018).*

The Glider Facility team was in charge of deploying and piloting the glider. Due to unexpected very bad weather in the area we had to change the position of the final waypoint in the section to avoid bathymetry issues. On the first days of the mission the glider experienced functioning issues that were solved remotely by the facility team.

The recovery was made also during very bad weather conditions, hopefully the BonPland Glider was safely recovered on May 4th by the GNF with the precious help of Dr. Antonio Olita (Cagliari) using a zodiac, being constantly in phone contact with the facility team.

Unfortunately the FerryBox did not sample on the deployments period because of technical maintenance of the opportunity ship C/f Carthage.

Dissemination of the results

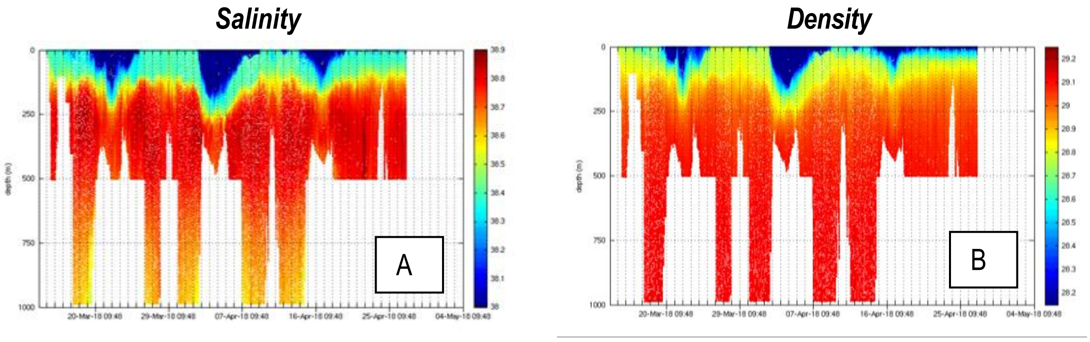
GETSCh is a second step in order to incorporate glider-based oceanography sampling at the Tunisia Sardinia section on a regular basis, while the mission is expected to provide some scientific insights regarding the inter-comparability of both independent sampling systems (Glider and deep mooring data) in the area. The dissemination paths of scientific outcomes should be the standard for science, as conference presentation and/or scientific documents. We have received the glider dataset about a month ago, thus it is soon to draw a specific dissemination plan of the results. As agreed within the TNA call, main findings will be presented in the final JERICO-NEXT meeting in 2019. The project user group and the project leader will meet soon to discuss the possibility of GETSCh workshop in Tunisia planned at the end of 2018 or early 2019. The results from the GETSCh mission will be firstly presented there. Also an internal report for INSTM on the potential of a fleet of gliders for regular monitoring will be issued. The scientific team plans to submit a paper within JERICO-NEXT special issue in Ocean Science (https://www.ocean-science.net/special_issues/schedule.html#19).

DATA: The data set gathered by the glider was processed by CORIOLIS under SEANOE Service (Sea scientific open data publication), and made public through the link http://doi.org/10.17882/56794 (Ben Ismail, 2018).

Technical and Scientific preliminary Outcomes

After the glider mission ended in May, it took some weeks before the glider was sent back to the CNRS INSU GNF for data downloading and processing. The whole record, as processed by the GNF team, was sent to the INSTM on June 20. The whole record as processed by SEOANE was released on September 2018. Therefore, at the time of writing, the scientific analysis of the dataset is in a preliminary stage (Figure 6.2.13.2).

Bonpland glider took slightly over 9 days each way, from March 16 to May 04. The glider was recovered on May 04 due to logistics. Its sensor payload provided pressure, temperature, salinity, dissolved oxygen, chlorophyll-fluorescence, colored dissolved organic matter (CDOM) and turbidity backscattering. CNRS-INSU processed record split the glider track into 320 downcast and another 320 upcast profiles, covering the whole section down to about 1000 m depth.



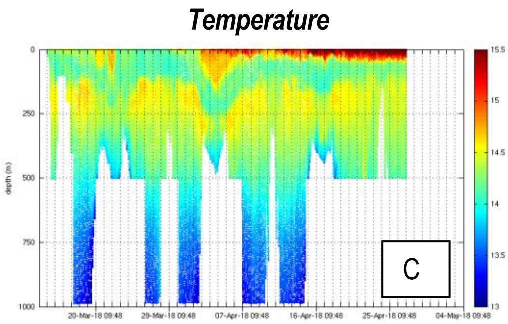


***Figure 6.2.13.2**: Vertical distribution of salinity (A), density (B) and Temperature (C) along the transect for all the mission period.*

6.2.14 MONICOAST (JN_CALL_2_15)

Submitted: 28 June 2019; Final revision: 14 August 2019.

Project Information

Proposal reference number	JN_CALL_2_15
Project Acronym (ID)	MONICOAST
Title of the project	Monitoring of organic contaminants by passive samplers in the Southern Europe coastal areas
Host Research Infrastructures	Heraklion Coastal Buoy (HCB) Saronikos buoy (SB)
In person access **HCB : Remote access** **SB : Remote access**	12/02/2019 - 14/02/2019 01/06/2018 - 31/05/2019 01/06/2018 - 10/07/2019
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Natalia Montero Ruiz University of Cagliari Via Porcell 4, 09127 Cagliari, Italy natalia.montero.ruiz@gmail.com
User group members	Natalia Montero Ruiz, Marco Schintu, Alessandro Marrucci - *University of Cagliari, Italy* María Jesús Belzunce Segarra - *AZTI-TECNALIA, Spain*

Project objectives

The overall aim of MONICOAST is to evaluate the presence and distribution of organic pollutants in the Southern European coastal areas.

Additionally, the following operational objectives have been set:

1. To investigate the presence of organic contaminants by means of specific water and air passive samplers placed at two buoys (Heraklion Coastal Buoy (HCB) and Saronikos Buoy (SB)) in Greece, affected by various sources of contamination and characterized by different physico-chemical characteristics.
2. To study the air-sea exchange of organic pollutants, which will determine the potential long-range transport of contaminants.
3. To establish relationships between the information obtained by passive samplers, in terms of concentrations of organic contaminants, with the environmental data (e.g. salinity, currents).

Main achievements and difficulties encountered

MONICOAST, developed in the framework of the JERICO-NEXT Transnational Access (TNA) Call, is a collaborative project between the University of Cagliari (UNICA, Italy) and AZTI (Spain), hosted by the Hellenic Centre for Marine Research (HCMR, Greece).

The main achievements of the project are listed as follows:

1) Successful deployment of water and air passive samplers for two consecutive periods (June-October 2018 and October 2018 -June 2019), at two buoys (Heraklion Coastal Buoy (HCB) and Saronikos Buoy (SB)) located in the Mediterranean Sea (Greece) and affected by various sources of contamination.

2) Retrieval of the passive samplers and sending of the samples to the reference laboratories in Czech Republic (Research Centre for Toxic Compounds in the Environment; RECETOX) and Italy (University of Cagliari) for analysis.
3) Meeting with the HCMR group in Heraklion to visit the HCMR infrastructures, discuss the scientific outcomes of the TNA Project and to strengthen the relationships between groups.

The main difficulties encountered:

1) Adaptation of the sampling strategy for the deployment of the passive samplers in the buoys. This problem was overcome thanks to the expertise of HCMR technicians.
2) Delay in the retrieval of the passive samplers deployed at the second sampling period, due to weather conditions and technical issues. This is a common risk when working offshore and HCMR has proactively searched for a solution.

Dissemination of the results

Passive samplers have been sent to the reference laboratories and the analysis of the samples are ongoing. However, the MONICOAST project was presented, via poster, at the 2nd General Assembly Meeting and at the Final General Assembly of JERICO-NEXT, carried out in Galway (September 2018) and Brest (July 2019), respectively.

We are in direct contact with another TNA Group from the HCMR, who has deployed the same type of passive samplers at two buoys in Italy. Last February we met in Heraklion, to discuss the scientific outcomes of both TNA Projects and the potential collaboration for common publications in order to increase the impact of the results.

The results produced within the framework of MONICOAST will be published as scientific articles. Additionally, the dissemination of the results will be further ensured by the attendance to pertinent conferences and participation in specific working groups dealing with coastal water contamination.

DATA have not yet been delivered on the date of D8.11.

Technical and Scientific preliminary Outcomes

In order to achieve the objectives of MONICOAST, specific air (Polyurethane foam (PUF)) and water (Silicon Rubber (SSP) and Low Density Polyethylene (LDPE)) passive samplers were deployed at two buoys (Heraklion Coastal Buoy (HCB) and Saronikos Buoy (SB)) in Greece. In this sense, HCMR technicians were able to adapt the sampling strategy to guarantee the correct installation of the samplers in the buoys and to reduce the damage/loss of the samplers due to strong meteorological conditions (See Fig. 6.2.14.1).

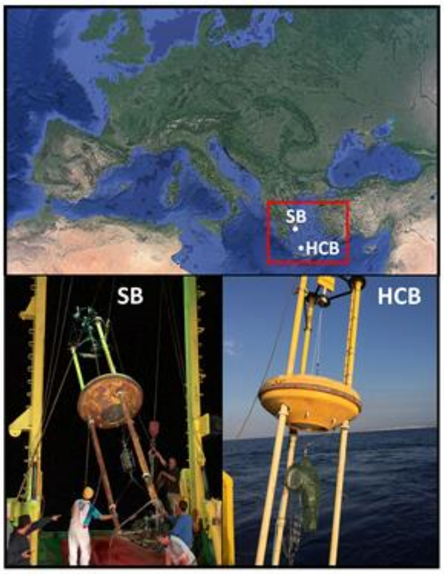


***Figure 6.2.14.1**: Deployment of water and air passive samplers at two buoys (Saronikos Buoy (SB) and Heraklion Coastal Buoy (HCB)) in Greece.*

As explained when applied for the TNA Call, the activities listed in MONICOAST were aligned with the objectives of the AQUA-GAPS (Aquatic Global Passive Sampling) network, which aims to understand better the geographic distribution of organic contaminants, especially persistent organic pollutants (POPs), in the world oceans. Therefore, the passive samplers that are used in MONICOAST are those selected within the framework of AQUA-GAPS and the samplers have been sent for analysis to RECETOX, the reference laboratory of the AQUA-GAPS network. At this point, the analysis of the samplers are ongoing, and as agreed with the JERICO-NEXT TNA Office, the final TNA report will be updated once the data are available. The data obtained will be used to fulfil the objectives of the MONICOAST project and those of the AQUA-GAPS passive sampling global network, enriching the current knowledge of organic compound distribution in the Southern Europe coastal areas.

At this point, the only results available are those of the organic compound concentrations measured at the buoys by means of the PUF air passive samplers. The air concentrations of several PCBs, OCPs and PAHs measured by PUFs are represented in Figure 6.2.14.2. Briefly, air concentrations of the target compounds were derived dividing the mass accumulated in the PUFs (ng sampler-1) by the effective air volume (Vair, m3) (Shoeib and Harner 2002; Harner 2016). The linear phase uptake sampling rate used for PCBs and OCPs was 3.9 m3d-1 and 5.0 m3d-1 for PAHs, following Estellano et al. (2012) and Harner et al. (2013), respectively.

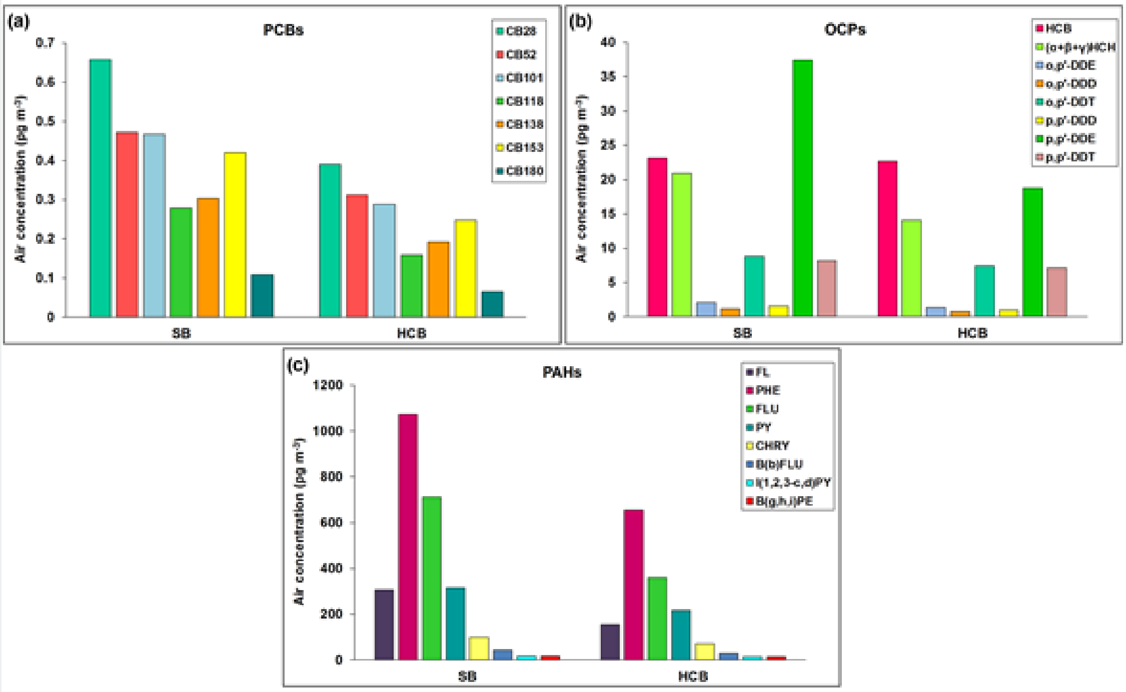


Figure 6.2.14.2: *Air concentrations (pg m-3) of (a) polychlorinated biphenyls (PCBs), (b) organochlorine pesticides (OCPs) and (c) polycyclic aromatic hydrocarbons (PAHs) measured by PUFs in two buoys (Saronikos Buoy, SB; Heraklion Coastal Buoy, HCB) in Greece. FL: fluorene; PHE: phenanthrene; FLU: fluoranthene; PY: pyrene; CHRY: chrysene; B(b)FLU: benzo(b)fluoranthene; I(1,2,3-c,d)PY: indeno(1,2,3-c,d)pyrene; B(g,h,i)PE: benzo(g,h,i)perylene.*

In general, the levels of contaminants were higher in SB than in HCB, probably explained by the position of the former at a site affected by anthropogenic activities. Besides, PCBs, OCPs and PAHs concentrations found in the current study are in the range of those found in the literature. These are preliminary results which have to be treated cautiously and interpreted as a whole once that the water passive sampler results are available.

We would like to acknowledge the HCMR for their involvement and professionality all along the development of the project and to the JERICO-NEXT TNA office for their willingness to help us all along the process. Finally, we would like to show our gratefulness to the JERICO-NEXT TNA Call for granting us the opportunity to carry out this project. The analytical part was performed by the RECETOX Research Infrastructure (LM2015051 and CZ.02.1.01/0.0/0.0/16_013/0001761).

6.2.15 ECSyrinx (JN_CALL_2_16)

Submitted: 24 August 2018.

Project Information

Proposal reference number	JN_CALL_2_16
Project Acronym (ID)	ECSyrinx
Title of the project	Environmental Characterisation of Syrinx ADCP
Host Research Infrastructure	Galway Bay Cabled Observatory (CPO)
In person access **Remote access**	03/10/2017 - 05/10/2017 30/11/2017 - 25/03/2018
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Geraint West Sonardyne International Ltd. Ocean House, Blackbushe Business Park Yateley, GU46 6GD, United Kingdom Geraint.west@sonardyne.com
User group members	Geraint West, Tom Bennetts, Matthew Thorne - *Sonardyne International Ltd., United Kingdom*

Project objectives

The objective of this project is to undertake a long term deployment of Sonardyne's Syrinx Acoustic Doppler Current Profiler (ADCP) in order to evaluate its performance in a variety of environmental conditions. Syrinx is a relatively new product and has until now only been used as a Doppler Velocity Log (DVL) to aid underwater vehicle navigation, usually for reasonably short deployments of a few hours. This trial will involve bottom-mounting the ADCP in an upward looking orientation for at least two months for use as an in-situ current measuring instrument.

Main achievements and difficulties encountered

The deployment of the Syrinx ADCP prototype was well supported by the SmartBay team, who established a good working relationship with the Sonardyne technical team. Overall the trial was highly successful, achieving most of the targets set, with a comprehensive data set which will be used to guide further development of the instrument.

The only difficulties encountered were:

- Access to the SmartBay RDP server gave rise to an expected security risk raised by Sonardyne's IT department. This was resolved internally to the company.
- It had been hoped to compare data from the SmartBay waverider buoy with Syrinx, but this was unavailable for a variety of reasons; however, SmartBay did provide data from the Teledyne ADCP installed, which was useful.

Sonardyne are very grateful to Rogerio and the SmartBay team for their excellent support.

Dissemination of the results

Syrinx is a commercially sensitive development and therefore only limited distribution of technical results is possible at this time. Notwithstanding this, a copy of the data in PD0 format has been deposited with SmartBay (contact rogerio.chumbinho@smartbay.ie), while several contributions to trade press have been published:

- Wave and Tidal Energy Magazine Issue 13 (https://content.yudu.com/libraryHtml/A433ga/2WTEN13/reader.html?refUrl=https%253A%252F%252Fexpress.yudu.com%252Fitem%252Fdetails%252F3930739%252F2WTEN13)
- SmartBay Newsletter Issue 14 (http://www.smartbay.ie/News/tabid/96/FID/0/NewsID/162/Default.aspx)

DATA are available on this link:: http://spiddal.marine.ie/data/jerico_next/ecsyrinx/

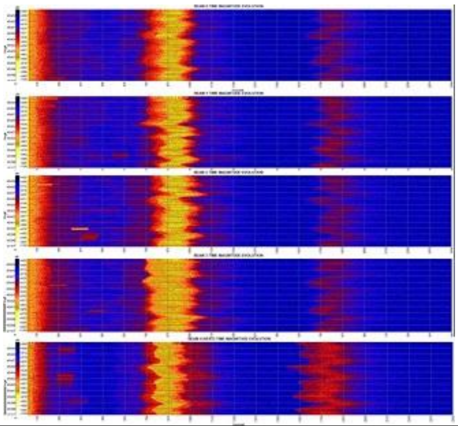
Technical and Scientific preliminary Outcomes

Syrinx is a prototype 5-beam ADCP derived from Sonarydyne's Syrinx Doppler Velocity Log (DVL). The objective of the deployment was to evaluate the instrument capabilities for current and wave measurement, specifically:

- Measurement of 5 x beam surface and volume raw backscatter
- Per-beam Measurement and tracking of surface wave raw backscatter
- Per-beam measurement of subsurface backscatter
- Time synchronised non-acoustic sensors
- Pressure sensor
- MEM's tilt & heading
- Temperature (defective during this deployment)
- GPS/other

The key attributes of the instrument are:

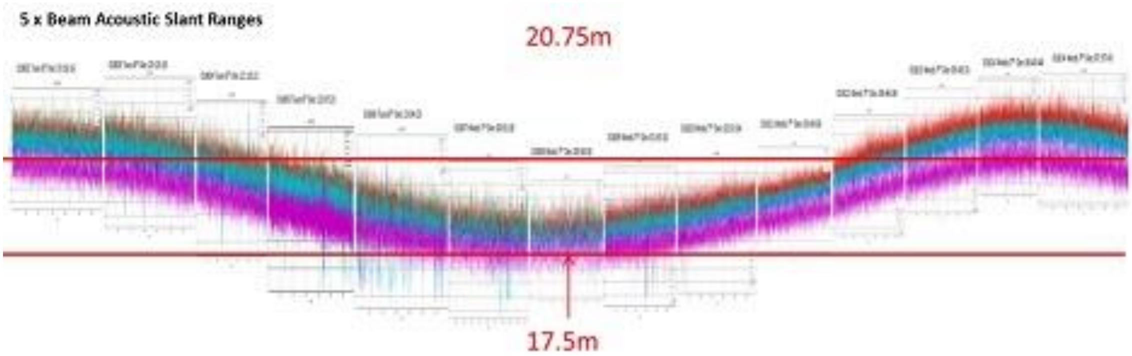
- Linear processing chain
- Configurable Temporal and Spatial resolutions
- Temporal Sampling up to 20Hz
- Spatial sampling configurable from 10s cm to 100s cm
- Oversampling velocity noise reduction
- Independent surface range tracking on vertical and Janus tilted (5 x wave elevation & slope observation)
- High resolution subsurface Doppler calculation (5 x beam)

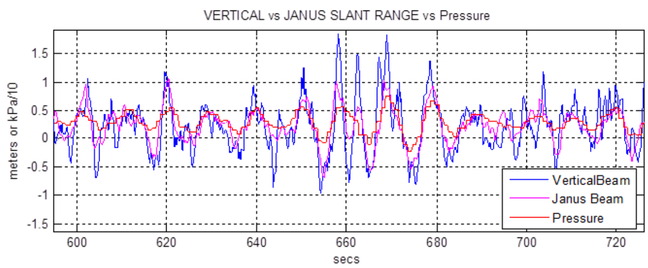


Implicit in the trial was both real time and off-line data analysis: the former comprised use of a real time-Ethernet interface to a laptop hosting GUI and processing algorithms & data storage; while the latter included replay and re-processing of stored raw acoustic/non-acoustic data through the GUI.

Within the trials period, the sensor real time displays were continuously evaluated. These are too numerous and complex to illustrate here, but included time series of a range of parameters such as raw acoustic data, ping return spectrum, beam slant range, surface elevation, non-acoustics (pressure and roll/pitch), backscatter, real-time ADCP processing and averaged subsurface layer magnitude and direction. The graphic to the right shows raw backscatter from the five beams, clearly showing the surface return as well as fish in the water column.

A typical example of the data collected (see below) shows passage of a weather system between 6th - 7th December 2017, and comprises 14 x 1hr data sets, which were recorded at 4Hz and covered a full tidal cycle (19:16pm – 07:40am.) The plot shows summarised surface tracking data from vertical (purple) and Janus (20°) tilted (red/cyan/green/blue) beams. The tidal range was ~3m and wave height ~+/-1.5m. The graphic shows surface tracking range data provided by both vertical and tilted beams, with outliers being more prevalent during low water and more evident on one beam. It is suspected that this is related to a wind direction change.





Taking a subset of this (1804), detailed comparison with the pressure sensor shows highest noise on the vertical beam, which is possibly attributable to signal saturation of acoustic return, while the titled Janus beams, which are averaged and resolved to vertical shows the highest coherence with the pressure sensor. Note though that the pressure data is biased low at peak wave height due to spatial LPF action.

The examples above give some insight into the results from this deployment, but are only a fraction of an extremely large and valuable data set. Consequently, analysis is continuing and it will be some time before final conclusions are drawn. Sonardyne are continuing to deploy the ADCP with a number of specific end-users in order to carry out further evaluation before making the instrument commercially available.

6.3 Third TNA Call

6.3.1 DEFPAM-G (JN_CALL_3_1)

Submitted: 11 May 2019; Final revision: 20 June 2019.

Project Information

Proposal reference number	JN_CALL_3_1
Project Acronym (ID)	DEFPAM-G
Title of the project	DEep-sea Fish Passive Acoustic Monitoring by using Glider technology
Host Research Infrastructure	SOCIB glider facility (SOCIB-GF)
Remote access	04/02/2019 - 24/02/2019
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Eric Parmentier Université de Liège Laboratoire de Morphologie Fonctionnelle B6C,Sart Tilman 4000 Liège, Belgium e.parmentier@uliege.be
User group members	Eric Parmentier, Marta Bolgan - *Université de Liège, Belgium*

Project objectives

The specific objectives of DEFPAM-G are:

1) Testing the performance of the acoustic datalogger of property of the PI (i.e. BCB, Loggerhead) to pressure typical of depths of max. 970 m (Work-package 1)

2) Coupling PAM to the glider technology for mapping spatial and depth patterns of deep-sea fish vocal populations in the Balearic Sea (Work-package 2)

3) Sound description, characterisation of spatial and temporal occurrence of sounds, correlation of acoustic features with environmental factors (such as temperature) and inferring of the potential vocal fish species. Final sound library creation (Work-package 3).

Main achievements and difficulties encountered

1. WP1:

The acoustic datalogger (BCB) provided by the TNA-user-team (Prof. Parmentier and Dr. Bolgan) was pressure tested twice.

The user-team shipped the BCB to SOCIB during January 2019. SOCIB glider facility team (Marc Torner, Albert Miralles, Manu Rubio) tested the BCB, which was turned off, in the SOCIB pressure chamber (max pressure 100 bar). The BCB did not report any sign of mechanical damage.

From 29/01/2019 to 02/02/2019, the TNA-user-team travelled to Mallorca to i) further test the BCB; 2) take part to the launching and iii) provide a seminar at IMEDEA.

The BCB was turned on and tested again in the pressure chamber. The BCB reported no sign of mechanical damage and recorded important baseline information about the glider self-noise (Fig. 6.3.1.1).

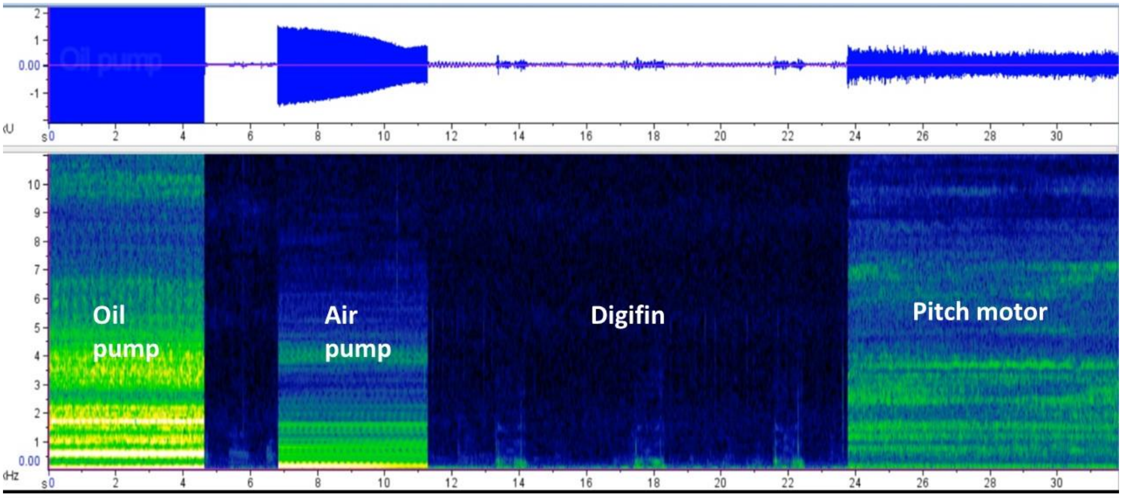


Figure 6.3.1.1: *Glider self-noise successfully recorded during the tests conducted as part of WP1. The time scale of x-axis is seconds. The original files were cut to show the different kinds of sounds. The testing experiment lasted longer.*

The TNA-users and SOCIB glider facility team worked to find the most suitable solution for attaching the BCB to SOCIB's glider Unit-567 (aka SDEEP04) (Fig. 6.3.1.2). Due to adverse weather conditions, the TNA-user team could not take part to the glider launching (postponed to 04/02/2019).

Figure 6.3.1.2: *The acoustic datalogger (BCB, Loggerhead Instrument) was turned on following the selected schedule and attached to the SOCIB glider SDEEP04.*

2. WP2:

SDEEP04 was launched on 04/02/2019 in front of Palma's Bay (N39.3534° E2.4532°). SDEEP04 covered the Eivissa channel (6 transects) and Mallorca channel (1 transect) (Fig. 6.3.1.3). Mission ended on 15-03-2019, when SDEEP04 was retrieved.

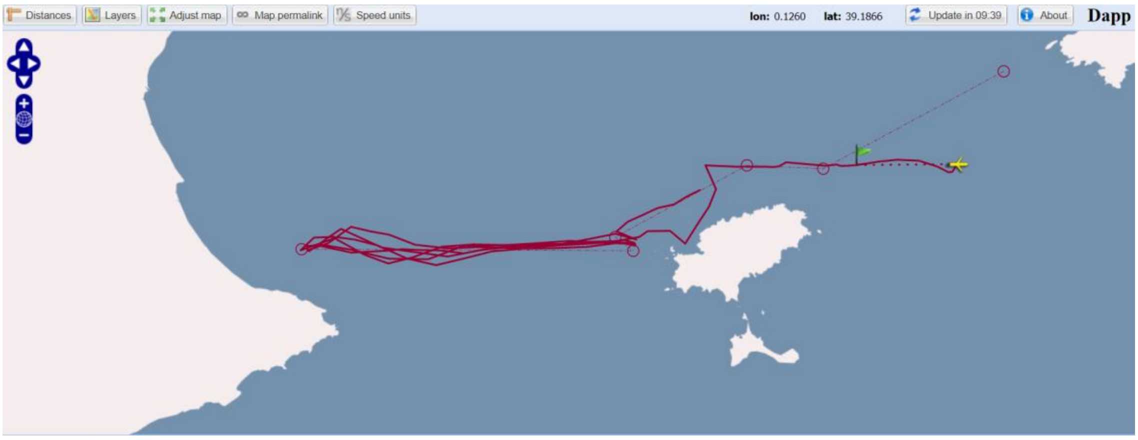


***Figure 6.3.1.3**: DEFPAM-G mission (WP2).*

3. WP3:

Probably because the vibrations due to the water displacement and glider movements, the BCB lid unscrewed and salt water entered in the device (Fig. 6.3.1.4). We retrieved the SD card but it is not possible to read it; no acoustic data have therefore been retrieved.

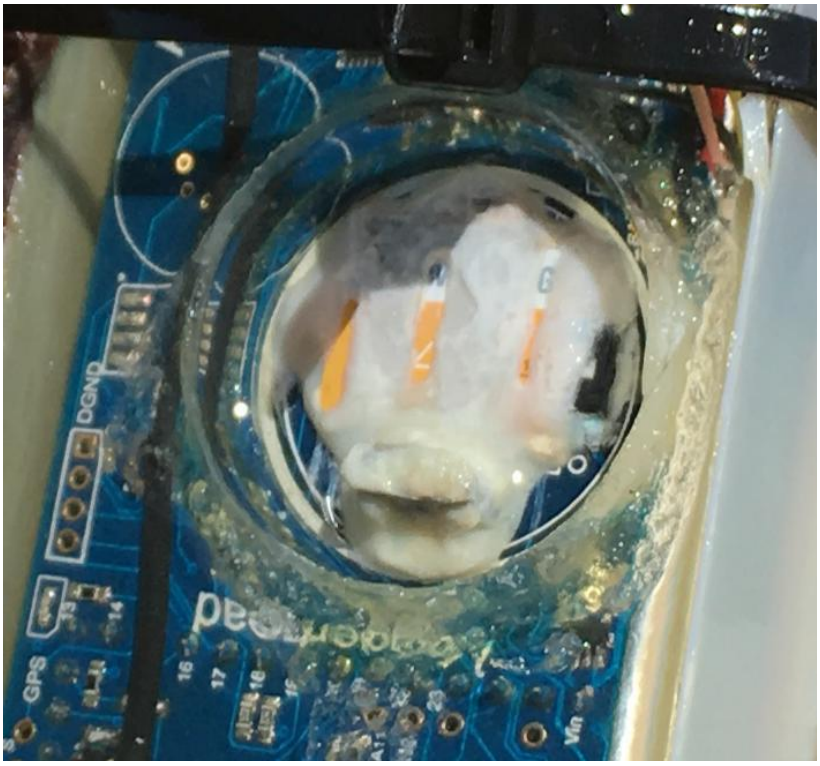


***Figure 6.3.1.4**: The damage reported by the BCB at the end of WP2.*

Dissemination of the results

A seminar, organised by Marc Torner, was provided by the TNA-user-team to scientists of IMEDEA and SOCIB on February 1st, 2019 (Fig. 6.3.1.5).

Figure 6.3.1.5*: The seminar organised by Marc Torner (SOCIB) and provided by the user-team to IMEDEA and SOCIB scientists.*

Veronica Ortiz (SOCIB) has prepared the following list of divulgative media posted in the SOCIB account

1. 30/01/2019: Starting of the DEFPAM project: https://twitter.com/socib_icts/status/1090643264905117696
2. 31/01/2019: Seminario at SOCIB: https://twitter.com/socib_icts/status/1091006436157591552
3. 01/02/2018: Seminario feedback: https://twitter.com/socib_icts/status/1091375984140578817
4. 05/02/2019: Glider launching:

https://twitter.com/socib_icts/status/1092721841469378561

Unfortunately, due to the problems encountered during WP3, we do not envisage any scientific publication arising from DEFPAM, as no valuable data were collected.

DATA: No valuable data were collected.

Technical and Scientific preliminary Outcomes

Unfortunately, no results have been collected due to an unexpected mechanical failure of the acoustic datalogger. This resulted in a) impossibility of publishing and divulgating pioneer results on the possibility of mapping deep-sea fish populations thanks to Passive Acoustic technology; b) a serious financial lost encountered by the TNA-user group and c) the necessity to secure new funding for purchasing a new acoustic datalogger with mechanical improvements specifically designed by the manufacturer (Loggerhead Instruments) after analysing the technical problems encountered during DEFPAM. As TNA-user group we would like to stress that we are confident that this experiment can work, as we are in contact with other research teams which are using Passive Acoustic Monitoring coupled with glider technology for similar purposes.

Finally, we would like to acknowledge and thank the JERICO-NEXT TNA initiative for granting us the opportunity to perform this survey.

6.3.2 INTERCARBO (JN_CALL_3_2)

Submitted: 7 March 2019.

Project Information

Proposal reference number	JN_CALL_3_2
Project Acronym (ID)	INTERCARBO
Title of the project	Intercomparison of instruments for carbonate system measurements
Host Research Infrastructure	NIVA Research Station (NRS)
In person access	21/11/2018 – 28/11/2018
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Lauri Laakso Finnish Meteorological Institute Erik Palmenin aukio 1, FI-00560 Helsinki, Finland Lauri.laakso@fmi.fi
User group members	Lauri Laakso, Martti Honkanen - *FMI, Finland* Sami Kielosto - *SYKE, Finland* Martina Gehrung - *HZG, Germany* Jens Müller, Gregor Rehder - *IOW, Germany* Carolina Cantoni - *CNR-ISMAR, Italy* Christian Le Gall - *Ifremer, France*

Project objectives

The main objectives of the project were the following:

1) To compare the sensors provided by the user group against reference seawater carbonate system states, aiming to obtain information on their metrology performance (accuracy, precision, etc.).
2) To obtain information on functioning of the instruments in different salinities and temperatures.
3) To obtain information on time responses of the instruments in changing conditions.

Main achievements and difficulties encountered

The experiments took place at NIVA research station close to Oslo 21 – 28 November 2018. We had approximately 15 different marine carbonate system measurement instruments from participating institutes. After setting up the systems, we managed to complete 15 different experiments in different temperatures, salinities and pCO2-concentrations. The observations went in general well. The main challenges came from the high alkalinity tap water used to produce low-salinity water (20 psu, 5 psu), which led to very long stabilization time (more than 12 hours) of the test tank water and increased the use of calibration gases by a factor of two. Fortunately, we found another source for low-alkalinity water, which reduced time required for the last experiments. From administrative perspective, there were some challenges related to the funding of the project as the experimental costs exceeded the planned and also due to delays in pre-payment.

Dissemination of the results

The participants will write a joint refereed paper on the results during the spring 2019 which is planned to be published in Ocean Sciences / JERICO-NEXT special issue. In addition, Lauri Laakso / FMI who initiated the

experiment, will visit ICOS OTC meeting in 18-19 March 2019 in Southampton, UK and present the preliminary results to the ICOS-OTC community.
DATA have not yet been delivered on the date of D8.11.

Technical and Scientific preliminary Outcomes

The INTERCARBO measurements were carried out in three 1 m^3 tanks that were filled with seawater at salinity 5, 20, and 35 and carbon dioxide target values of approximately 200, 400, and 800 parts per million (ppm). The measurements were made on seawater temperatures of 10 °C and 20 °C.

The instruments used in the INTERCARBO experiment were:

pCO2:
- 1 xSuper-CO2 (Sunburst Sensors LLC)
- 2 x Sami2 (Sunburst Sensors LLC)
- 3 x Contros HydroC FT (Kongsberg Maritime)
- 1 x Franatech pCO2 (Franatech GMBH)
- 1 x silicon-tube based membrane system

pH:
- 1 x AFT-pH (Sunburst Sensors LLC)
- 1 x Ifremer pHT spectrophotometric reference
- 4 x Contros HydroFIA pH (Kongsberg Maritime)
- 1 x NIVA spectrophotometric pH sensor
- 1 SeaFET V2 pH sensor (Seabird)

Total alkalinity
- 1 x Contros HydroFIA TA (Kongsberg Maritime)
- 1 x Vindta (Marianda ltd)

The preliminary results show that:

1) Despite the use of best practices for lab-based calibration and operation, there were clear differences between the instruments during the intercomparison under a more “real-life” measurement situation (e.g., calibration gas and CO2CRMs as compared to measuring seawater from 1 m3 tanks).
2) There are specific aspects which make the installation of the carbonate system instruments on different platforms challenging, e.g. related to water inlet and outlet pressures;
3) Instrument intercomparison experiments for carbonate system sensors, as well as sensors for other EOVs, are mandatory for creating a harmonized and reliable coastal observing network.
4) Creating suitable experiments and setups for instrument comparison are challenging and require iterative process to be reliable.

Figures 6.3.2.1 and 6.3.2.2 show preliminary results from the experiments (for illustrative purposes only; data not fully corrected & some instruments not visualized). The data-analysis is partly on-going and should be completed during the spring and summer 2019.

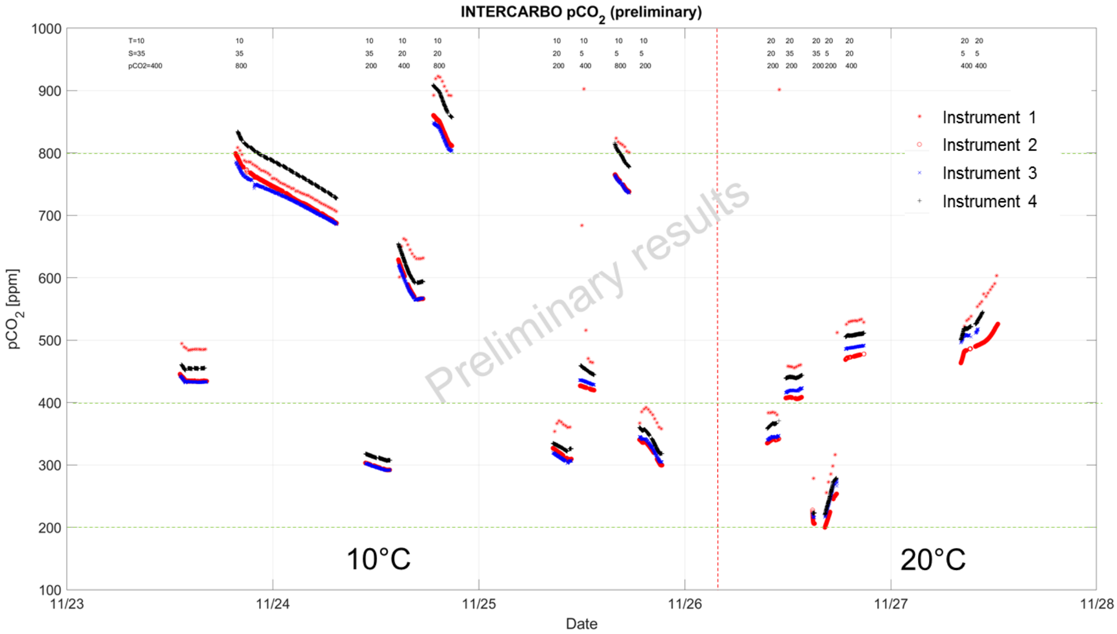


***Figure 6.3.2.6**: Comparison of four different pCO_2 instruments during the INTERCARBO experiments (preliminary result).*

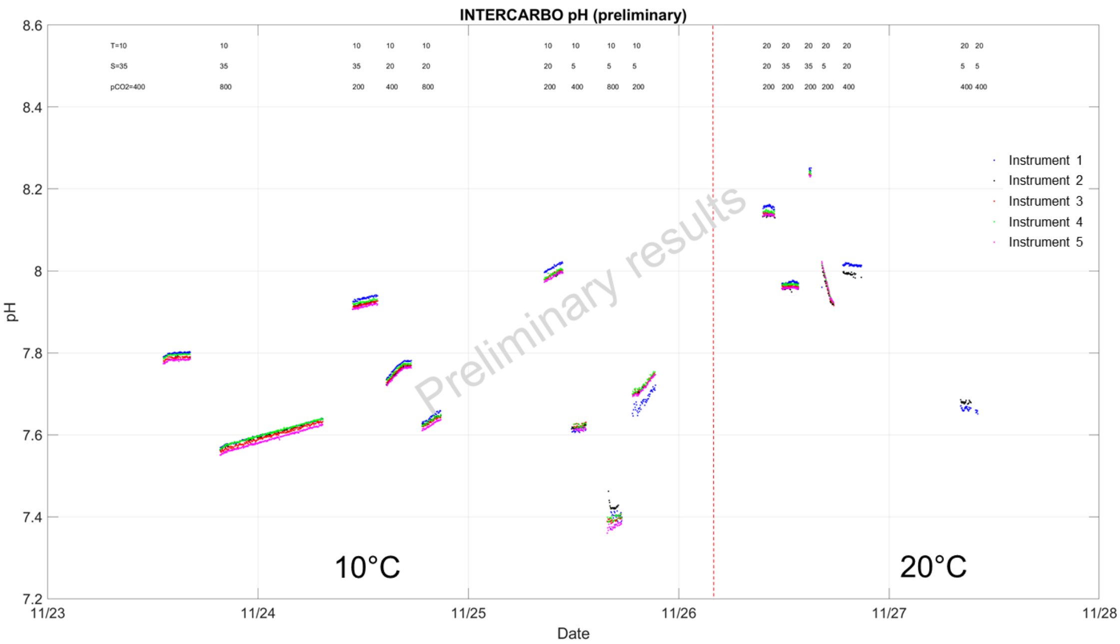


***Figure 6.3.2.7**: Comparison of five different pH instruments / observing methods during the INTERCARBO experiments (preliminary result).*

6.3.3 MultiFluoro (JN_CALL_3_6)

Submitted: 27 June 2019; Revision pending (review comments sent on 6 August 2019).

Project Information

Proposal reference number	JN_CALL_3_6
Project Acronym (ID)	MultiFluoro
Title of the project	Testing new multi-parameter fluorometer in optically complex environments
Host Research Infrastructures	SYKE MRC-lab SYKE-ALG@LINE FINNMAID
MRC-lab : **In person access** **Remote access** **FINNMAID:** **In person access** **Remote access**	15/05/2019 - 16/05/2019 16/05/2019 - 31/05/2019 01/04/2019 - 02/04/2019 03/04/2019 – 31/05/2019
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	James Kirkbride Chelsea Technologies Group 55 Central Avenue, West Molesey, KT8 2QZ, United Kingdom jkirkbride@chelsea.co.uk
User group members	James Kirkbride, Sam Kirby, John Attridge - *Chelsea Technologies Group, United Kingdom*

Project objectives

The main objectives of the project were to test the following characteristics of Chelsea Technologies' new VLux multiparameter fluorometer:

- Test the effect of background humic signal on detected algal fluorescence.
- Test the sensitivity and selectivity of different fluorescence bands to different algal classes.
- To compare the selectivity of fluorescence bands targeting phycobilin pigments against other field fluorometers and a bench-top spectrofluorometer.
- Obtain first evidence of operationality of the VLux instrument in a flow-through system.
- Follow the development of the Baltic Sea spring bloom by combining VLux with an operational FerryBox system and demonstrate the added value of having several measurement wavebands.
- Demonstrate the added value of having optical absorbance and turbidity characterisation in correcting the measured fluorescence.

Main achievements and difficulties encountered

Difficulties in the development of the multi-parameter fluorometer (VLux) necessitated a change to the initial schedule. Issues were found in the sensor which result in disappointing sensitivity. A redesign has been carried out to improve on these but was not completed before this work was begun. As such we will not be commenting on the sensitivity of the instrument.

Two representatives from Chelsea took a VLux sensor to the SYKE laboratory on 1st April 2019 and demonstrated the method of mounting the sensor in its flow-through assembly. The VLux was demonstrated to work correctly in a flow-through system and was successfully integrated into the FerryBox system aboard the ferry Finnmaid on 2nd April by SYKE, hoping to catch the end of the spring algal bloom. It was not possible to integrate the sensor with the logging system on the ship, so a separate system was provided, logging to a Raspberry Pi computer. Water samples were collected with ferrybox system, to provide validation data for sensor. A memory issue in the logging program meant that some transects were not logged, these unfortunately corresponding with some transects during which water samples were taken. A second sensor was prepared by Chelsea and taken to SYKE on 16th May 2019 to be used for laboratory testing. A visit was made to the ship, and the logging program updated to fix the memory issue.

Dissemination of the results

The results will be utilised as a case study demonstrating the efficacy of the VLux instrument. The data will be used in promotional material for the new instrument, currently scheduled to be launched in September 2019. The data may also be presented at meetings and/or workshops (to be decided upon) to demonstrate and promote the capabilities of the new instrument.

DATA have not yet been delivered on the date of D8.11.

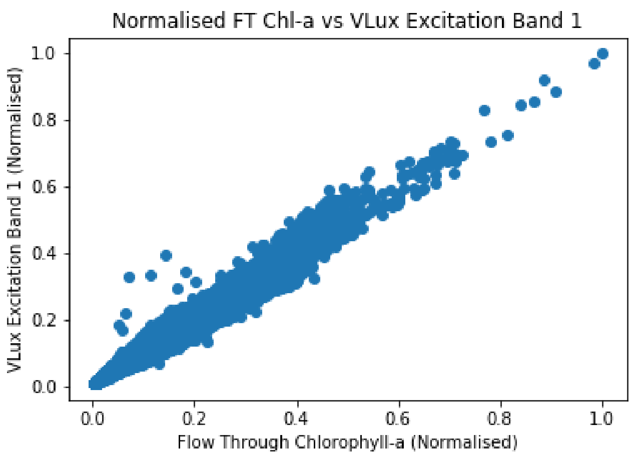
Technical and Scientific preliminary Outcomes

The first VLux was installed in the FerryBox system aboard Finnlines' Finnmaid Ro-Ro passenger ferry. The ship travels between Helsinki, Finland and Travemünde, Germany twice per week. The FerryBox system contained the following sensors:

- Chlorophyll & Turbidity (WET Labs, FLNTU)
- Phycocyanin (TriOS, MicroFlu Blue)
- CDOM (TriOS, MicroFlu)
- Phycoerythrin (Chelsea Technologies, UniLux)

A JFA Advantec Multi-Exciter was also installed for comparison.

Preliminary results from the FerryBox system are encouraging, showing good correlation between the VLux and the WET Labs FLNTU chlorophyll sensor installed on the FerryBox system (Fig. 6.3.3.1):



VLux Installation

***Figure 6.3.3.1**: Comparison between the VLux and the WET Labs FLNTU chlorophyll sensor installed on the FerryBox system.*

The correlation coefficients between the flow-through chlorophyll measurement and the four VLux excitation bands are presented in the following table:

Excitation Band	Excitation Wavelength	Correlation coefficient
1	450 nm	0.99
2	470 nm	0.99
3	530 nm	0.99
4	625 nm	0.97

While absolute reported concentrations did not match well, which is due to differing calibration methods, the excellent correlation seen between the sensors demonstrates that the VLux is functioning well in measuring chlorophyll. The correlations for phycocyanin and phycoerythrin sensors was poor, however, there was little or no signal present for these sensors in the flow-through system. Essentially, it was just baseline noise being compared on these sensors, which will be uncorrelated. There was also little turbidity or CDOM measured. Consequently, the corrections for absorbance and turbidity made little difference to the reported values over the trial period.

VLux fluorescence also correlates well with the JFA Multi-Exciter data. The table below shows correlation coefficients between the four excitation bands of the VLux and the nearest equivalent bands of the Multi-exciter.

		Multi-Exciter Bands			
		435nm	470nm	525nm	590nm
VLux Excitation Bands	2	0.88	0.94	0.97	0.95
	1	0.95	0.92	0.94	0.96
	3	0.89	0.94	0.97	0.96
	4	0.94	0.87	0.90	0.93

This data shows that the responses from the two sensors are very similar and that both respond in the same way to the conditions in the Baltic Sea.

In the laboratory the following sensors were used:

- TriOS, MicroFlu Blue (Phycocyanin)
- Chelsea Technologies, UniLux (Phycoerythrin)
- Chelsea Technologies, Trilux
- JFE Advantec, Multiexciter

These sensors, along with the VLux, were exposed to a variety of samples containing different pigment groups (green algae, cyanobacteria, diatoms, dinoflagellates, cryptophytes) as well as CDOM gradient from the Baltic.

The laboratory data is still being analysed so we are only able to show preliminary data from testing during an initial demonstration of VLux operation. We tested three different organisms; a green alga, a cyanobacterium, and a red synechococcus to show how the use of multiple excitation bands can provide information on the types of organisms present. Figure 6.3.3.2 shows the relative signals from each excitation band for the three types of cells.

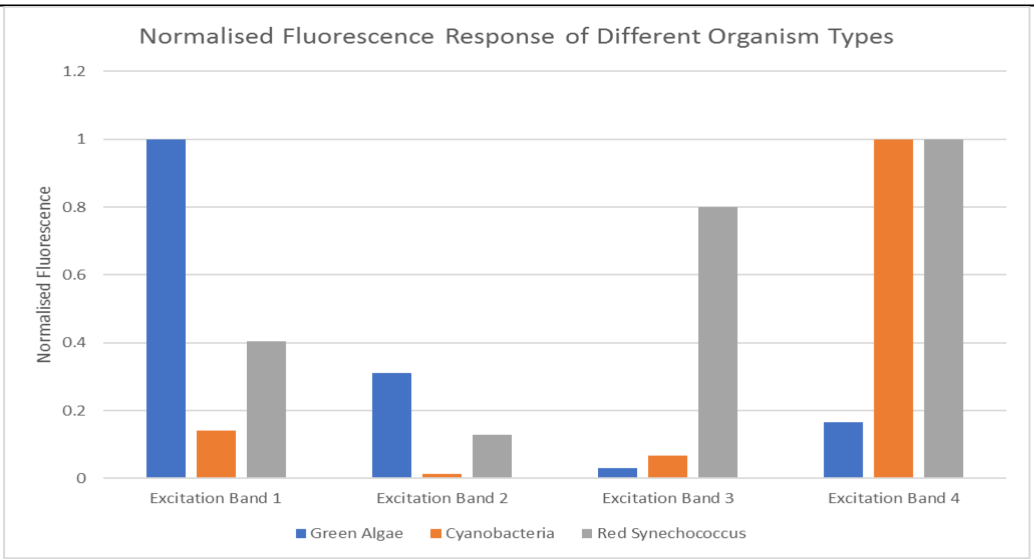


***Figure 6.3.3.2**: Relative signals from each excitation band for the three types of cells: green algae, cyanobacteria and red synechococcus.*

The green alga gives its strongest signal under excitation Band 1 with the signals decreasing through Bands 2 and 3 before increasing slightly in Band 4. The cyanobacteria shows by far the strongest emission with Band 4 excitation, whereas the red synechococcus shows strong emission with both Bands 3 and 4. These VLux responses correlated well with the respective fluorescence induction spectrum for each species.

The laboratory measurements are currently being analysed, but are expected to further demonstrate the value of the different wavebands in discriminating between different algae groups. This data should also show the effects of background humic signal, which has been low throughout the time that the sensor has been installed in the FerryBox system. This will demonstrate the efficacy of integrated optical correction algorithms in extending the linear range of the instrument.

6.3.4 WGMP-SPI (JN_CALL_3_7)

Submitted: 28 March 2019; Final revision: 16 June 2019.

Project Information

Proposal reference number	JN_CALL_3_7
Project Acronym (ID)	WGMP-SPI
Title of the project	Assessment of the ECOcological Quality status of the West Gironde Mud Patch, taken as an example of offshore marine system, using Sediment Profile Imagery
Host Research Infrastructure	Sediment Profile Imager (SPI-H)
In person access **Remote access**	24/01/2019 – 28/02/2019 19/04/2018 – 02/05/2018 07/06/2018 – 13/06/2018
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Dr. Adriana Galindo Dalto Federal University of Rio de Janeiro -UFRJ CCS/Instituto de Biologia/Laboratorio de Benthos Avenida Carlos Chagas Filho, 373 Bloco A, sala A1-089 Postal Code: 21.941-902, Brazil agdalto@gmail.com
User group members	Adriana Galindo Dalto, Márcio Murilo Barboza Tenório - *Federal University of Rio de Janeiro, Brazil*

Project objectives

The aim of the WGMP-SPI project was to assess the potential of Sediment Profile Images (SPIs) for characterizing the Ecological Quality Status (ECOQ) of marine offshore systems, which is required by the EU Marine Strategy framework Directive. In order to do so, the project is using the West Gironde Mud Patch as a model of marine offshore systems. JERICO-NEXT supported our participation to the project. This included assistance in the collection, processing of the sediment profile images (SPIs) collected with SPI-H during two cruises achieved in April-May and June 2018. SPIs were analysed using the SPIArcBase software (Romero et al. 2013), which is made available through SPI-S within JERICO-NEXT. It was also initially planned to take part to a third cruise in February 2019.

Main achievements and difficulties encountered

Main achievements:

1) Processing of the Sediment Profile Images collected during the Jericobent-4 (19/04/2018 to 02/05/2018) and Jericobent-5 (07/06/2018 to 13/06/2018) cruises
2) Setting up of a spectrofluorometric method for chlorophyll and phaeopigment analyses and training of the scientific staff from the hosting group;
3) Assessments of micrgranulometry, organic carbon, chlorophyll and phaeopigment concentrations in the surface sediments collected during the Jericobent 4 and 5 cruises.
4) Data analysis procedures

Difficulties encountered:

Cancellation of the JERICObent-6 (January-February 2019) cruise due to exceptionally severe meteorological conditions. This cruise has been rescheduled in April 2019 (i.e., outside our period of stay in France and with no much success since only 1 station was finally sampled). The processing and interpretation of SPIs have therefore only been carried out on the images collected during two cruises (i.e., Jericobent 4 and 5) instead of three as initially planned.

Dissemination of the results

The results produced within the framework of the WGMP-SPI project have been the subject of a Master 2 report by Pierre Thouzerie. They will be part of Bastien Lamarque's PhD thesis and will be published as scientific articles and/or presented as communications/posters in scientific journals and meetings (including the final JERICO-NEXT General Assembly).

DATA have not yet been delivered on the date of D8.11.

Technical and Scientific preliminary Outcomes

Overall, 5 stations (39m<z<70m) were sampled during Jericobent 4 and 32 (32.5<z<79m) during Jericobent 5 (Fig. 6.3.4.1).

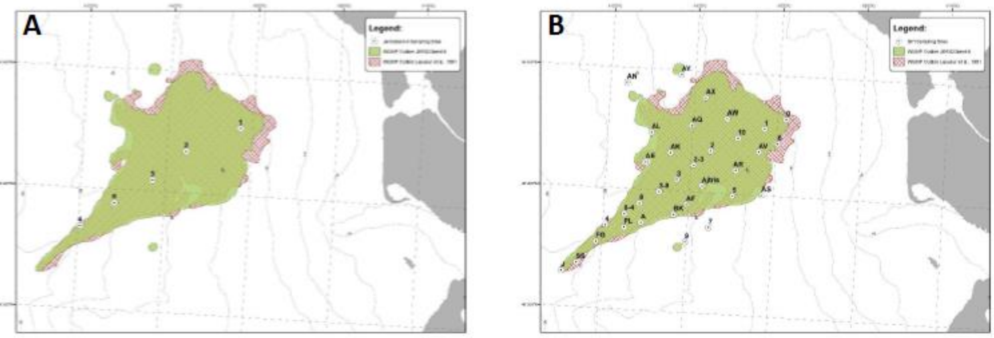


***Figure 6.3.4.1**: Maps showing the West Gironde Mud Patch and the stations sampled during the Jericobent 4 (A) and the Jericobent 5 (B) cruises.*

Sediment granulometry: During Jericobent 5 the median diameter of surface sediment was between 13.4 and 64.6µm. It was highest at some of the shallowest stations in relation with transitory sand deposition. This pattern was much less clear during Jericobent 4 (16.0<median diameter<20.1µm), which may reflect spatial microheterogeneity as suggested by the evidence of sand deposition on some of the SPIs collected at station 1.

Sedimentary organics: During Jericobent 5, surface sediment organic carbon concentrations were between 0.35 and 1.56%DW and clearly tended to increase with depth (N=32n r^2=0.66). This was also the case of chl *a* and phaeo *a* concentrations, which were between 0.74 and 6.09, and 2.96 and 26.38 µg.gDW^{-1}, respectively. The (chl *a* / chl *a* + phaeo *a*) ratios were between 0.132 and 0.302 and tended to slightly decline with depth. All these patterns are fully coherent with what was observed during Jericobent 4 (1.15<OC<1.59%DW, 0.58<chl *a*<5.48 µg.gDW^{-1}, 3.63<phaeo *a*<27.91, 0.140< chl *a* / chl *a* + phaeo<0.200).

Sediment Profile Images: The 186 SPIs collected during Jericobent 5 and the 71 collected during Jericobent 4 have been analysed. This corresponds to 3-6 and 12-13 images per station, respectively. Assessed characteristics were the numbers of: burrows, feeding pits, tubes, epifauna, oxic voids, associated oxic voids, infauna and the total number of biogenic structures; the apparent Redox Potential Discontinuity (aRPD, see Figure 6.3.4.2 for examples of these types of structures) and the Benthic Habitat Quality index (BHQ, Nilson & Rosenberg 1997). Results from Jericobent 5 show a clear trend toward higher number and total surface of biogenic structures as well as deeper ARPD with depth (Fig. 6.3.4.3). This trend was however not observed for all specific biogenic structures (e.g. feeding pit, epifauna and infauna). Results also showed a clear trend toward the increase of the depth of oxic void with sediment column with depth. Overall changes resulted in much lower BHQ values at stations 6 and AV with values around 4 and then a tendency toward slightly increasing (i.e., from around 8 to around 11) BHQ values with depth (Fig. 6.3.4.3). This pattern is likely related with the strong hydrodynamics in the inner part of the WGMP, which results in frequent transitory hydrosedimentary (i.e., sedimentation/resuspension) events (Jouanneau et al 1989), which preclude the development of a mature benthic macrofauna community penetrating deep in the sediment and indicative of a good ECOQ (Nilsson & Rosenberg 2000).

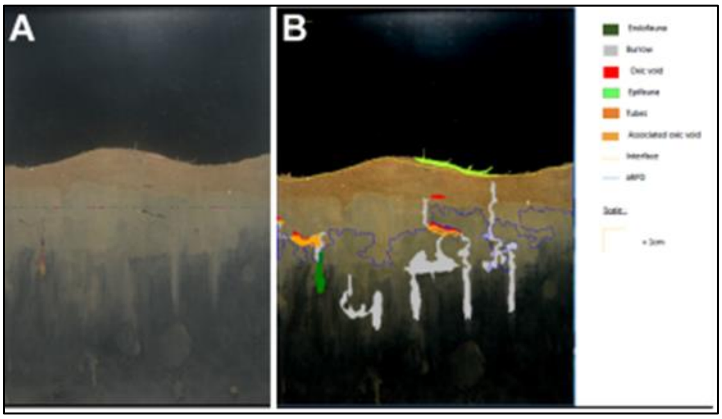


Figure 6.3.4.2: *Example of a SPI image before (A) and after processing by the SPIArcbase software (B). The later shows the different kinds of biogenic structures that can be identified and quantifed.*

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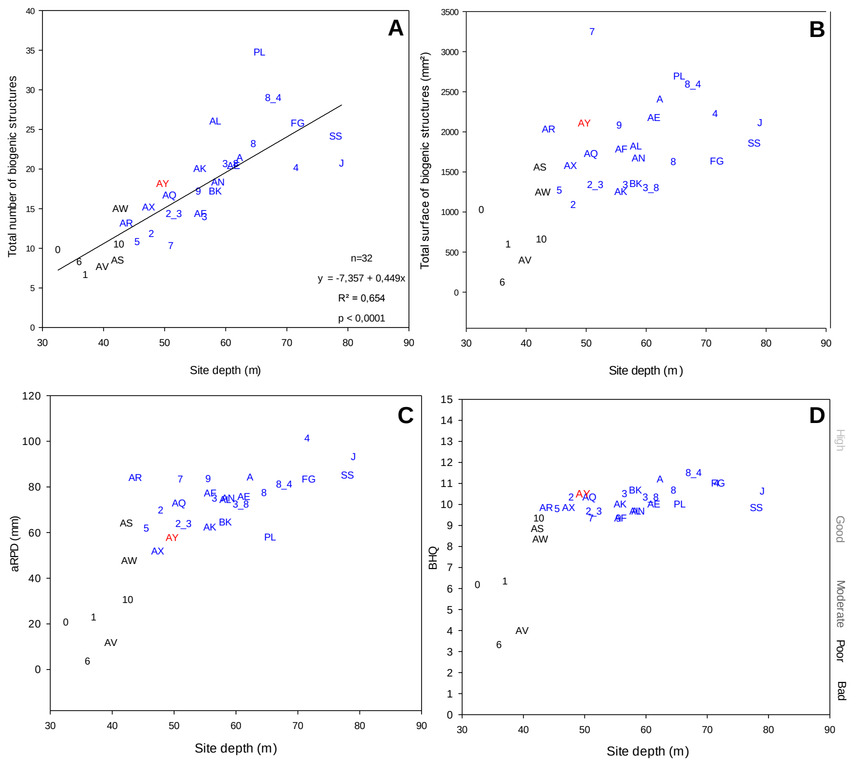

Figure 6.3.4.3*: Relationships linking depth with the total number and surface of biogenic structures (A -B), the mean ARPD thickness (C) a,d BHQ values (D). See Figure 6.3.4.1B for station codes.*

Here again, these observations are in full agreement with the results of the Jericobent 4 cruise during which the burrows at the shallowest station were smaller and located closer to the sediment surface than at the deepest ones.

Remaining ongoing work. One main objective now consists in: (1) relating spatiotemporal changes in SPI characteristics with those in benthic macrofauna composition, and (2) compare the ECOQ assessment derived from SPI and benthic macrofauna composition. This will be achieved based on the results of all Jericobent seasonal cruises (i.e., Jericobent 1-4) and therefore overpass the objectives of the WGMP-SPI project.

6.3.5 NitrateComp (JN_CALL_3_8)

Submitted: 24 June 2019.

Project Information

Proposal reference number	JN_CALL_3_8
Project Acronym (ID)	NitrateComp
Title of the project	In-situ inter-comparison of nitrate sensors
Host Research Infrastructure	NIVA Research Station (NRS)
In person access **Remote access**	21/11/2018 14/03/2019 – 15/03/2019 21/11/2018 – 07/04/2019
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Eric Achterberg GEOMAR Wischhofstr 1-3, 24248 Kiel, Germany eachterberg@geomar.de
User group members	Eric Achterberg, Mario Esposito, Maria Martinez Cabanas - *GEOMAR, Germany*

Project objectives

The main objective of NitrateComp project was to deploy a commercial Opus UV (TriOS GmbH) nitrate sensor and a recently developed Lab on Chip (National Oceanography Centre Southampton) technology on a FerryBox-like stationary system located at the NIVA Solbergstrand Research Facility in order to evaluate their performances. The two systems use different analytical principles for the determination of nitrate so that simultaneous measurements on a common platform are ideal for providing an in-depth comparison and a solid evaluation of their operational capabilities.

In costal environments, physical and biological processes together with anthropogenic inputs, contribute to generate large temporal and spatial variability in the concentration of nitrate. The objective was to test the sensors suitablility for long-term monitoring of nitrate concentrations in such highly variable environments. As a final objective, this project aimed to develop an improved computational strategy to calculate nitrate concentrations for the in-situ Opus UV sensor and to determine optimal settings for the LOC technology in terms of reagent consumption, precision and long-term stability in order to implement their technological development.

Main achievements and difficulties encountered

Within the NitrateComp project the performances of the Opus UV and the LOC nitrate sensors were compared during a field test deployment. Over a period of five months the two sensors were installed at the NIVA Solbergstrand Research Facility and continuously recorded nitrate concentrations of the surface and deep water of the Oslofjord. Both sensors showed great stability over time and only minimal maintenance operations were required. The formation of copper deposits on the Opus UV optical window prevented nitrate measurements to be undertaken for the period between December 16th, 2018 and January 16th, 2019 so that no data during this period could be retrieved. The Opus UV sensor optical lens were therefore cleaned, and new reagents and sampling filter were installed on the LOC sensor. Sensor operations were monitored remotely (in Kiel) over the whole period. On several occasions, communication with the sensors was not possible due to failure of the remote connection. Faulty communication did not affect sensor operations or measurements as data were logged internally. Instability and minor gaps in CTD data retrieval during the initial period prevented adequate processing of Opus UV nitrate measurements for these days. In general, for the remaining part of the deployment, following appropriate data processing procedures, results from both sensors were highly comparable, which was very encouraging.

Dissemination of the results

During the recent years the scientific community has increased its interest in nutrient sensors and the stationary Ferrybox deployment at the NIVA Research Station provided a unique opportunity to showcase the potential of the sensors for high quality oceanographic monitoring activities. The NitrateComp project allowed for the first simultaneous oceanographic deployment of UV nitrate and LOC nitrate sensors. The GEOMAR marine biogeochemistry department has excellent links and work collaboration with TriOS GmbH as well as with the National Oceanography Centre in Southampton. Results from this project will contribute to optimize sensor metrologies and to improve technical features of the current sensors.

The OPUS nitrate sensor lacks a solid post data processing method that takes into account in-situ temperature and salinity to calculate the nitrate concentrations. The GEOMAR group has developed algorithms over the last year to treat the data. The UV nitrate and LOC nitrate sensor deployment allowed the testing of the new UV nitrate sensor algorithm. Results from this work will be included in the manuscript as a validation of the new algorithm (Nehir et al., in preparation) computed specifically for the Opus.

DATA are available on this link: http://www.jerico-ri.eu/tna/selected-projects/third-call/nitratecomp/ .

Technical and Scientific preliminary Outcomes

The NitrateComp project describes the deployment of two nitrate sensors in the Oslofjord. The field deployment can be divided into two parts. During the first part of the work, the sensors were fully immersed into a small sensor test tank (60 L) connected to a water switching system that allowed for a fast replacement of the water inside the container. The sensors were deployed from the 22nd of November 2018 up to the 20th of February 2019. A Seabird SBE45 CTD was set to record water temperature and conductivity at one-minute interval while the measurement frequency of the Opus UV was set to ten minutes and the LOC to one hour.

The second deployment was on a stationary FerryBox system from the 16th of March to the 6th of April 2019. The FerryBox was equipped with a de-bubbling unit to remove air bubbles from the water flow and a Seabird SBE45 CTD for water temperature and salinity measurements. The water from the Oslofjord was pumped at a constant rate (1.2 $L \cdot min^{-1}$) into the measuring circuit, where the two sensors (Opus UV and Lab on Chip) were connected in series. The water from the fjord was pumped through a flow cell cuvette installed on the Opus UV sensor allowing for UV nitrate measurements. The same water was also pumped into the LOC sensor. A 0.45 µm PES filter (Fisherbrand® Syringe filter, Fisher Scientific) was installed at the end of the inlet tubing of the LOC sensor in order to avoid particles entering the LOC microfluidic channels. An additional tubing with a clamp was installed at the end of the circuit to allow for manual water sampling. The measurement frequency of the Opus UV was set to two minutes, while LOC measurements were taken every 30 minutes.

A new algorithm (Nehir et al., in preparation) specific for the Opus that takes into account in-situ temperature and salinity to calculate the nitrate concentrations was computed and applied herein. A sensor specific calibration file consisting of waterbase spectra and extinction coefficients of sea salt (bromide) and nitrate at a range of temperatures was derived experimentally and used for data processing. The raw absorbance at each wavelength from 200 to 260 nm was calculated using the Beer Lambert Law. A new absorption spectrum at each wavelength was then calculated by subtracting the theoretical seawater spectrum (Sakamoto et al., 2009) from the in-situ seawater spectrum both based on external calibration and sample salinity and temperature values. The absorption spectrum of cDOM was estimated from a linear function between absorbance and wavelength from 240 to 260 nm. The final concentrations of nitrate were than calculated in the wavelength range between 217 and 240 nm.

To calculate the nitrate concentration of the water sample, the LOC sensor uses the relative absorption of the sample to the standard solutions of known concentrations. For each sample analysed the sensor performed a measurement of the blank, sample and standard ([NO3] = 12 µM). The photodiodes placed at the end of each measuring channel measured the transmitted light emitted by the LEDs and propagated through the medium. The average photodiode voltages recorded during the last 5 seconds of the stopped flow period were used to compute nitrate concentrations. Monitoring of the photodiodes intensities of the blank and standard/sample were used as scaling factor to correct for thermal drifts while measurements of the photodiode voltages taken prior to the mixing of the blank or sample with the reagents were used to compensate for potential optical refraction effects.

During the first days of the experiment, temperature and salinity data showed high variability as several activities at NIVA station which required water from the water supply system were being undertaken and changes in the normal water flow occurred. From December onwards, the water flowing through the tank was mostly coming from 60 m depth with switching to surface water only on two occasions. Nitrate measurements from both the LOC and Opus sensors for the first deployment period are shown below.

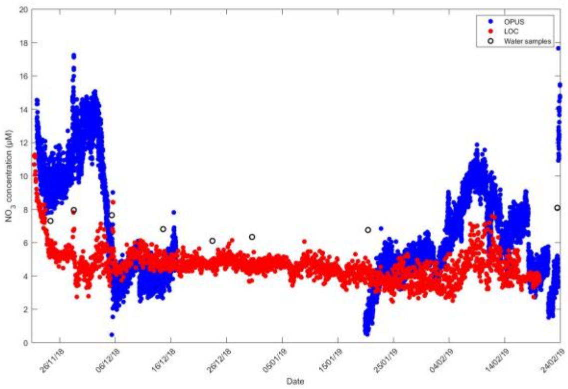

***Figure 6.3.5.1**: Nitrate measurements from the LOC (red) and Opus (blue) sensors for the first deployment period compared with water samples (black).*

Nitrate values determined by the two sensors exhibit a similar trend, however a large difference in concentrations is observed at the beginning until December 6th. Inhomogeneous mixing of the water inside the container and/or instability of the CTD data used for UV nitrate data processing might have contributed to the large discrepancy found in nitrate measurements during this period. After the initial period, temperature and salinity values were more stable and both sensors gave comparable nitrate concentrations, with values ranging between 5 and 8 µM.

During the deployment on the stationary FerryBox system, the Opus UV and the LOC sensors were connected in series and surface water from the Oslofjord was pumped through. Nitrate concentrations measured by the Opus and LOC sensors during the FerryBox system deployment are shown below.

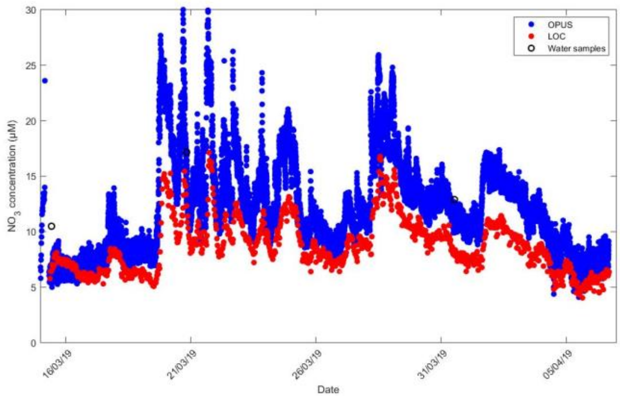

***Figure 6.3.5.2**: Nitrate measurements from the LOC (red) and Opus (blue) sensors during the FerryBox system deployment compared with water samples (black).*

Concentrations were variable showing several peaks of different height reflecting the natural variability of Oslofjord surface waters. Identical patterns for nitrate concentrations were given by both the sensors. The fast water flow through the system allowed for simultaneous detection of changes in nitrate concentration. The LOC nitrate values varied between 5 and 15 µM, while the Opus measured values up to 30 µM. Comparison with values from discrete water samples agrees with the LOC measurements so that it is possible that further corrections in the Opus data processing calculation is required. However, it not to be excluded the possibility that the faster sampling frequency of the Opus allowed for a better temporal resolution of nitrate concentrations in the Oslofjord waters compared to the LOC.

The simultaneous deployment of the Opus UV and LOC nitrate sensors provided a first positive field based assessment of the potential of the sensors for high quality oceanographic monitoring. Both the Opus UV and LOC sensors demonstrated to be suitable for long-term monitoring of nitrate concentrations in highly variable environments opening the door to potential future use and deployments on FerryBox systems and ships of opportunities.

6.3.6 MEPHY (JN_CALL_3_10)

Submitted: 27 June 2019.

Project Information

Proposal reference number	JN_CALL_3_10
Project Acronym (ID)	MEPHY
Title of the project	Novel sensing tools to study synergic interaction between trace metals and phytoplankton
Host Research Infrastructure	COSYNA Stationary FerryBox system (COSYNA_SFB)
In person access	06/05/2019 - 17/05/2019
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Mary-Lou Tercier-Waeber University of Geneva (UNIGE) Dept. of Inorganic and Analytical Chemistry, Sciences II, 30 Quai E.-Ansermet, 1211 Geneva 4, Switzerland Marie-Louise.Tercier@unige.ch
User group members	Mary-Lou Tercier-Waeber, Melina Abdou, Pierre Groc - *University of Geneva, Switzerland* Luca Bonofiglio - *ETT, Italy* Maëva Labassa, Thibault Devanne - *University of Bordeaux, France*

Project objectives

The MEPHY field campaign aims at, for the first time, synergising state of the art analytical sensing tools to monitor at high resolution a range of trace metals, algal-bacterial species, and macronutrients in impacted and highly dynamic marine coastal areas; and examine if and how they are related. Toward this goal, the specific objectives are:

1: real-time high-resolution quantification of the bioavailable fraction of a range of trace metals and classification of a range of phytoplankton groups using pigment-based taxonomic classification applying two innovative sensing systems recently developed (www.schema-ocean.eu). Namely: the TMSM, a compact submersible multichannel Trace Metal Sensing probe incorporating various antifouling gel integrated microelectrode arrays (GIMEs) enabling simultaneous direct detection of the bioavailable fraction of cadmium, lead, copper, zinc, and inorganic arsenic and mercury; the ALPACA, a miniature height-channel Algae Sensing Module enabling discrimination of phytoplankton phyla based on pigment-based taxonomic classification;

2: biosensor assay evaluation of algae toxicity;

3: field and laboratory ancillary measurements of master bio-physicochemical parameters; macronutrients; particulate, total and total dissolved concentrations of the target trace metals as well as Pt (tracer of anthropogenic activity);

4: study of the dynamic behaviour of the bioavailable fraction of a range of trace metals, algal-bacterial species, and macronutrients; and investigation of their main sources and potential interaction by coupling all the collected data.

The two-week MEPHY field campaign has been performed at the COSYNA Stationary FerryBox platform (COSYNA_SFB) from May 6th to 16th, 2019. This facility is ideally located for the proposed field activities, namely: in the German Southern North Sea coastal area characterized by frequent Spring and Summer phytoplankton blooms and impacted by anthropogenic sources of trace metals.

Main achievements and difficulties encountered

Field activities were successfully achieved according to the work plan. Day 1 was dedicated to inform users on the use of the facilities and FerryBox sensing activities and data file access. Maintenance and calibration of the FerryBox was performed. A sampling pipe, based on Teflon tubes and a Plexiglas sampling chamber built by UNIGE, was installed in parallel to the FerryBox sampling line to avoid contamination problem on on-site sensing of the bioavailable fraction of trace metals and sample collection for ancillary measurements of trace metal analysis as well as metal in phytoplankton. Installation of the user partners sensing and sampling devices; TMSM sensor preparation and calibration; and preliminary tests of the TMSM, ALPAGA and sampling process flow were successfully achieved days 2 to 3. Autonomous operational measurements of the bioavailable fraction of Cu, Pb, Cd, Zn and inorganic As and Hg species (TMSM; time interval 1h); macro-nutrients (COSYMA-SFB sensors; time-interval 1h10); and master bio-physicochemical parameters (COSYNA-SFB instruments 7 sensors; time-interval 10 min) were successfully achieved from days 4 to 11. During the same period, sampling for ancillary measurements of: Pt and speciation of the TMSM target trace metals; (phyto-)plankton community and species (on-site ALPACA and laboratory microscopy analysis); macro-nutrients and organic compounds were performed 3 to 6 times per day prior and after a measurement cycle of 34h (May 13th to 14th) during which sampling was performed every 2h. Laboratory analysis of As(III) and Astot; macronutrients, chlorophyll a and pheopigments; dissolved organic compounds (DOC, FA/HA) for TMSM and FerryBox sensors evaluation/validation and complementary data have been achieved. Phytoplankton morphological investigation by microscopy has been started. Ancillary measurements of the other target trace metals (particulate, total dissolved) and POC are pending.

Within the exception of the absence of the Spring bloom expected due to the April and May months weather conditions (especially lower temperatures that usually observed), no difficulties were encountered. Biosensor assay evaluation of algae toxicity could not be performed due to the very low algae cell density (see last section).

Dissemination of the results

Plan for dissemination of the results are:

- Publication in peer-reviewed papers (1 to 2 reporting exclusively the outcome of the MEPHY field campaign; 1 coupling SCHeMA and MEPHY field campaign data monitored in various dynamic coastal area).
- Oral and Poster presentation in conferences/meetings. Dissemination as part of two meetings are already scheduled: 1) MEPHY Poster at the Final General Assembly of JERICO-NEXT, Brest-France, 3 July 2019. 2) as part of an invited Keynote, for the Experimentation and Instrumentation Workshop: session "From laboratory measurement to routine field measurement" of the Experimentation and Instrumentation Workshop, Lille-France, 9-11 July 2019.
- First raw data file, and later on validate data file, submitted for open access via the SeaDataNet network and the EMODnet Data Ingestion portal.

DATA: metadata available at http://www.jerico-ri.eu/tna/selected-projects/third-call/mephy/

Technical and Scientific preliminary Outcomes

Main outcomes at the present stage of the MEPHY field monitoring in the Elbe Estuary during the period 7 to 16 May 2019 are summarized below:

TMSM autonomous measurements of the bioavailable fraction of trace metals.

The Elbe Estuary is a major European estuary impacted by anthropogenic sources of trace metals. The TMSM records allowed producing the first data for the Elbe Estuary on the concentrations of a range of trace metals under their forms potentially available for bio-uptake. Bioavailability is of primary concern when considering if a metal behaves as nutrient or toxicant. While the global regulatory environmental quality standards (EQS) for metals in water bodies are still mainly based on total (dissolved) concentrations, the revised WFD Priority Substances Directive (2013/39/EU) highlights the need of measurement of the bioavailability of hazardous trace metals either indirectly by modelling of their speciation or directly by applying specific measurement methodology. Significant temporal variations in the bioavailable fraction of all the trace metals targeted were observed. The temporal variation of the As(III), Hg(II), and Pb(II) available for bio-uptake were found to be mainly anti-cyclic to the temporal variation of the salinity, suggesting a conservative behavior (i.e. dilution of the metal bioavailable species carried out by the Elbe River by mixing with marine water). This is supported by the concentration vs salinity distributions of these metals. The temporal variations observed for the bioavailable fraction of Cu(II), Cd(II), Zn(II), and possibly As(V), are more complex suggesting that other processes, in addition to dilution, control the fate of the potentially more toxic fraction of these metals. It is expected that coupling the TMSM data with those of particulate, total and total dissolved metal concentrations, measured by ICP-MS in the collected samples, will deepen information on these processes.

ALPACA direct detection of algae.

During MEPHY field campaign, we evaluated the presence of relevant phytoplankton groups combined with an approximation of the microalgae cell density directly after the sample collection. The samples were pumped through the detection unit using a peristaltic pump at flow rate of 1.5 mL/min. Pump velocity and data-acquisition rate ensure that each cell event is recognized at each measurement channel with at least three measurement points. This strategy is crucial to enabling and improving the individual signal analyses of mixed algal samples. As blank and baseline correction, we processed sterile seawater (by filtration 0.22µm). At the end of each measurement 70% ethanol was processed to wash the entire fluidic system and avoid biofouling. During the entire monitoring activity, first we evaluated sterile seawater (for at least 5 min) and immediately after, without stopping the measurement, the properly mixed marine sample (for at least 10 min). In general, the sample fluorescence pattern changed very slightly compared to the blank (sterile seawater) indicating the low amount of algal cells present in the collected samples. For identification of algae groups, a multivariate pattern recognition algorithm combined with internal calibration and standardization strategies were applied. In same sample, the system has indicated that Miozoa constituted the major phylum of the sample, followed by Rhodophyta and Haptophyta. In order to validate the results, each sample was taken in duplicate and preserved with Lugol's (2 to 10 %) for morphological investigations by microscopy. This analysis showed evidence of 0-10 cells in 50 ml in the marine samples, in which dinoflagellates (belonging to Miozoa phylum) and diatoms constituted the major groups.

COSYNA FerryBox autonomous measurements of macronutrients.

The temporal variation of the macronutrients (nitrate, nitrite, phosphate, silicate) monitored at high-resolution by the FerryBox were anti-cyclic to the variation of salinity with a strong correlation ($R2 \geq 0.7$) for the concentration vs salinity distributions indicating the conservative behavior of the four macronutrients (nitrate, nitrite, phosphate, silicate) monitored at high-resolution by the FerryBox. This can be expected during a period characterized by low biological activities as revealed by the ALPACA results.

Synergic interaction between trace metal speciation and phytoplankton.

The results suggest that the biological activity may influence dissolved arsenic speciation. Indeed, As(III) bioavailable concentrations as well as the As(III)/Astot ratio peak up with increasing effective light penetration and increase of pheopigments. This would support the hypothesis that the reason behind the relatively high concentrations of As(III) in oxygen saturated water can be found in reduction of As(V) to As(III) by microorganism (e.g., phytoplankton and cyanobacteria) activity. Phytoplankton and bacteria uptake arsenate because of its chemical similarity to phosphate, after which it can be reduced to As(III), methylated, and excreted, mostly as As(III) and/or DMAs(V). Influence or not of the biological activities on the dissolved speciation of the other metals must be still evaluated.

TMSM and FerryBox evaluation/validation.

As(III) quantification. As(III) concentrations and temporal trends measured on-field by the TMSM and in laboratory by FIAAS were similar. As the TMSM measure specifically the bioavailable species while FIASS measurements reflect the total dissolved concentrations, this result revealed that As(III) is mainly under the bioavailable (more toxic) form. Moreover, it validates the AuNP-GIME performance for direct autonomous field detection and quantification of As(III).

Nutrients. Results obtained in laboratory for nutrient concentrations monitored in collected samples during the 34h measurement cycle were compared with field autonomous measurements from the FerryBox. For the nitrates, data are well inter-compared and give similar results. For the phosphates, qualitative variations seem similar but values measured in the collected samples are much lower than those reported by the FerryBox. For nitrite, variations are very different both qualitatively and quantitatively and concentration values obtained from laboratory based technique are much lower.

Chlorophyll-a. No link in the temporal variations were observed between the in situ and lab chlorophyll a data, and laboratory values are much higher than those from the Ferrybox.

6.3.7 Easy On-Line microLFA (JN_CALL_3_12)

Submitted: 5 July 2019; Final revision: 29 August 2019.

Project Information

Proposal reference number	JN_CALL_3_12
Project Acronym (ID)	Easy On-line microLFA
Title of the project	Field test of a reliable and Easy to use microLFA based nutrient sensor package for Ferrybox On-line monitoring applications
Host Research Infrastructure	NIVA NorFerry/Color Fantasy (FA)
In person access **Remote access**	29/01/2019 - 01/02/2019 28/05/2019 - 30/05/2019 11/12/2018 – 30/06/2019
Name of Principal Investigator **Home Laboratory** **Address** **E-mail address**	Luca Sanfilippo SYSTEA S.p.A. Via Fratta Rotonda Vado Largo 2A, 03012 Anagni (FR), Italy luca.sanfilippo@systea.it
User group members	Luca Sanfilippo, Enrico Savino, Pompeo Moscetta - *SYSTEA S.p.A., Italy*

Project objectives

The proposed TNA project aimed to test in operative conditions an updated version of the SYSTEA Micromac-1000 on-line analyzers in a FerryBox system for unattended nutrients monitoring in sea water, with the scientific, technical and logistic support of the Norwegian Institute for Water Research (NIVA).

The biparametric Micromac-1000 analytical modules to measure:

1. NH3 and PO4 by fluorimetric methods
2. NO3+NO2 and NO2 by spectrophotometric methods
3. PO4 and SiO2 by spectrophotometric methods

were manufactured, tested in factory and then installed in Color Fantasy Ferrybox system, running periodically go/back along the commercial route Oslo-Kiel and Kiel-Oslo.

The measurement data were acquired from the analyzers by the FerryBox PC, properly programmed at the time of the installation by NIVA's SW specialist, then correlated with GPS data + temperature and salinity and transferred via satellite Internet to FTP server in NIVA HQ.

The on-line analyzers run unattended for 2.5 months, then they had a maintenance by NIVA technicians; a second visit of SYSTEA specialist was done in the 4th week of May to solve some technical problems.

27 discrete nutrient samples were collected by NIVA on 26-27 February and 8-10 April 2019 for laboratory analysis comparison, using a CFA routine analyzer.

Main achievements and difficulties encountered

The main new features of the updated version of the Micromac on-line analyzers follow:

- Teflon sealed hydraulics
- Lower reagents consumption enables longer unattended operation

- Smaller reagents volume -> internal reagents cooling for longer unattended operation

The following table summarize the reagents and DI water consumption for each measurement method:

Parameter	Reagent 1/3 (µL)	Reagent 2/4 (µL)	DI water (mL)
NH_3	70	70	25
PO_4 fluo	140 70	140 70	25
NO_2	70	70	10
NO_X	140 280	140	10
PO_4	70	70	25
SiO_2	140 70	140 70	25

The following table summarizes the difficulties encountered and the actions done or suggested to solve each problem:

Issue	Action done
Data storage every minutes didn't allow an easy and direct data interpretation and evaluation	Data filtration by Excel macro was provided by NIVA. NIVA's data-logger was updated in May to store only real measured data
SiO2 missing data after 15 days of operation, due to the use of an alternative reagent generated crystals blocking reagent and sampling line	Use of the right reagent as requested by the standard method. Problem solved in the 4th week of May
PO4 fluorimetric method collected too high concentrations, due to missing DI water generated false ODS values	DI water consumption was minimized by measurement cycle update and internal control check to be improved
Missing correlation between PO4 fluorimetric and PO4 colorimetric data	On board activity in the 4th week of May was done to cross check the issue
NOx too high values over some periods	On board activity in the 4th week of May was done to cross check the issue
Missing automatic positive controls even if on board standards were available	Requested SW improvement in NIVA data-logger, to perform automatic positive controls along the trip
Missing periodic recalibration of the analyzers	Suggested to be done manually in harbour based on results of positive control checks
Missing written procedure to perform on board maintenance	Written procedure was defined and started to be tested on board in June
Difficulty to correlate GPS position of collected water samples with on-line nutrients data, due to continuous sample flow in the Ferrybox	Suggested installation of a storage tank to be updated periodically, where the same sample from Micromac and lab water sample have to be collected
Difficulty of cross comparison between lab and on-line measurements	Suggested to measure again the collected and stored lab samples on the Micromac analyzers, when the Ferrybox is stopped in Oslo using the grab sample function.

Dissemination of the results

Two oral presentations of the activity done and results obtained were performed in: • 9th FerryBox Workshop, 24-26 April 2019 in Genova (Italy) • JERICO-NEXT final meeting on 4 July 2019 in Brest (France).
DATA have not yet been delivered on the date of D8.11.

Technical and Scientific preliminary Outcomes

Scientific preliminary outcomes:

Based on reliable nutrient data that was collected (approximately n=800 during a ~1 month period between 1-28 February 2019), a preliminary assessment includes the observed spring phytoplankton bloom in in mid Feb at ~56-57 deg N and expanded to 55-59 deg N by late February. The reported chl a fluorescence in Fig. 6.3.7.1 are uncorrected values on a ln scale. The phytoplankton bloom was also indicated by increased oxygen saturation in the same time/region (Fig. 6.3.7.1; >100% = photosynthesis). The spatial and temporal pattern of the phytoplankton bloom correspond very well to the time/regions of observed PO4 and NO3 drawdown (Fig. 6.3.7.1). By late February, the winter nutrient reserves appear to be fully utilized by the phytoplankton bloom, and chlorophyll a fluorescence declines in region of ~56-57 deg N chl where PO4 and NO3 availability are low (<5 µg P/L and <1 µN/L).

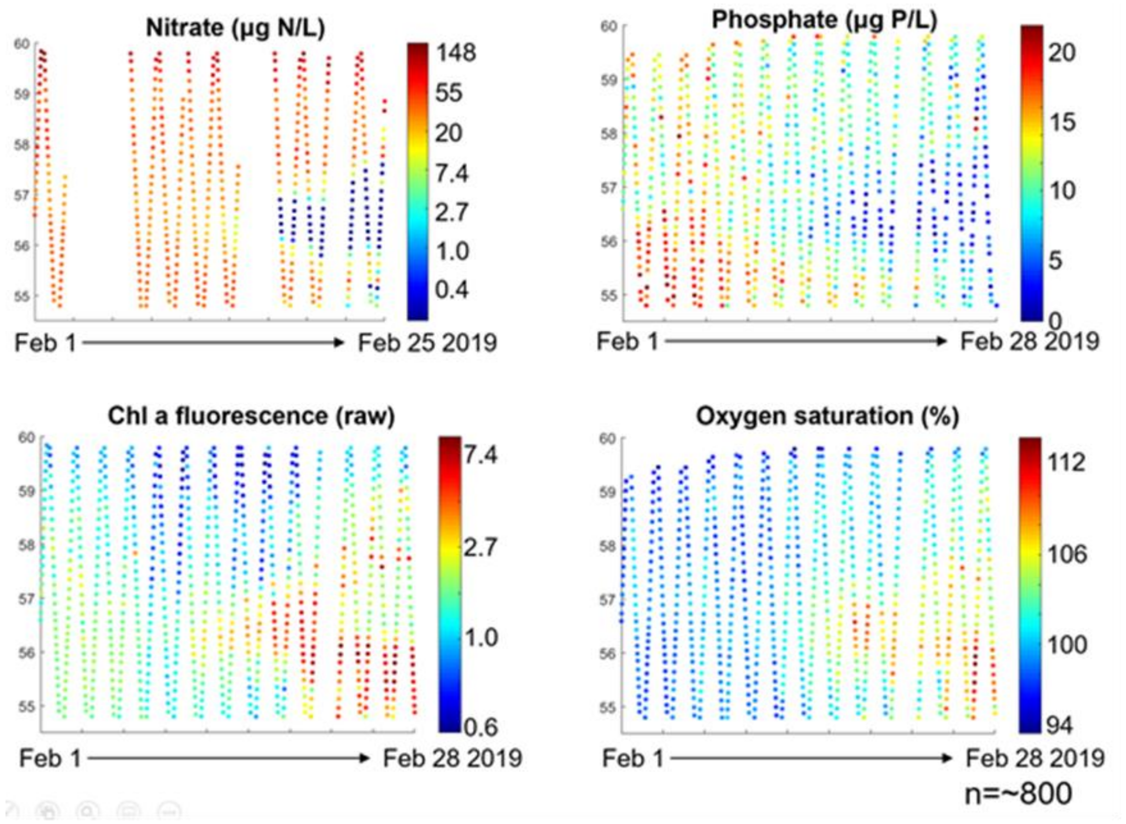

Figure 6.3.7.1*: Nitrate, phosphate, chl a fluorescence, and oxygen saturation along the Oslo (~60 deg N) to Kiel (~55 deg N) transect. Nitrate, phosphate, and chl a fluorescence are on a natural log scale.*

One reagent for silicate analysis was not available at NIVA at the time of the startup and it could not be shipped from SYSTEA due to shipment regulations; the decision to substitute it with another substance brought after two weeks a severe hydraulic clogging that disabled its operativity for months. Ammonia fluorescence measurements showed high signal to noise in a relatively low NH4 environment. This resulted in unreliable data. It should be noted that NH4 measurements at low concentrations is generally difficult to measure.

The analytical systems became fouled and clogged since a pre-filter was not installed by the User. This corresponded to the time of the spring bloom. Unclogging and restoring flow took several trips and was not initially successful. Later, the main 220 Vac power supply of the installation room inside the ship had an electrical fault that took some time to repair by the User, not allowing any data collection. These delays combined with no systematic calibration of the system resulted in the collection of unreliable data between March and June.

Despite this, the data collected in February caught the spring bloom and it was quite successful and unique.

The experience teaches both User and Provider would have to dedicate more time on the technical training to more than one operator, to ensure a proper backup along the time.

After February the User had some personnel availability weakness due to overlapping field activities, that affected the quick evaluation of the collected data and our related reaction for the required field maintenance operations.

Technical preliminary outcomes:

Easy installation and start-up of the three on-line analyzers was performed on site in two days, including the SW programming of the NIVA data-logger to acquire the measurement data by RS-232 serial communication.

2,5 months of acquired unattended data with very good reagents stability, even if some issues were reported on collected measurement data

Joint on board activity to cross check the analyzers was done in the 4th week of May

Automatic positive controls have to be activated by NIVA data-logger yet, to support on board validation of the collected data

Collected water samples will have to be measured on Micromac analyzers when the Ferrybox will be stopped in Oslo yet

Field measurement test will go on further until end of August 2019

User manual and technical training to be improved, to allow a reliable independent use from the very beginning of the test.

Strict management procedure is required to manage properly long term unattended analysis of this type of equipment.

7. Conclusions

Composed of different types of automatic or semi-automatic observing systems distributed in the coastal and shelf seas around Europe, JERICO-RI's strength lies in its ability to deliver timely, continuous high-quality infrastructure services to facilitate user access to environmental data, information products and instrumentation in a sustainable manner for research, industry, ecosystem health and resource management purposes (Sparnocchia et al., 2016).

To encourage cross-border and cross-sector collaboration and more efficient use of its research services, the JERICO infrastructure has opened up a number of unique European Coastal Observatories and associated Laboratories and Calibration Facilities for international research and technology development, involving the research community both in industry and in academia.

Access opportunity was offered by the JERICO-NEXT project through three calls and allocated to individual researchers or groups after evaluations of proposals by an independent panel of international experts following transparent rules. Twenty-eigth access proposals have been supported under the TNA program.

As a general rule, access to a specific infrastructure (or a specific installation that is part of an infrastructure) by a user group was intended as a concession granted to use the infrastructure to collect specific data following the implementation of a specific automated measuring system. Except for the use of gliders, the measuring system was provided by the user group.

The operators of the involved JERICO-RI facilities contributed actively to the implementation of user projects by providing the necessary in loco logistical, technological and scientific assistance, including specific training, required for their realization.

Most of the user groups were from the research community (universities or research institutions), except eight of them representing or involving private companies active in manufacturing marine sensors and devices. This number is decidedly higher than in JERICO-FP7, which has attracted only a user group from the private sector (Sparnocchia et al., 2015). Three user groups (ABACUS-4, GETSCh, and WGMP-SPI) involve scientists from non-EU countries (Algeria and Brazil), one of them also with a leading role. More detailed statistics on users are presented in D7.3.

The user projects are oriented towards both scientific research and technological applications, and some of them specifically addressed the issue of testing/validating new sensors/sampling methods using the available JERICO-RI platforms (Fig. 7.1).

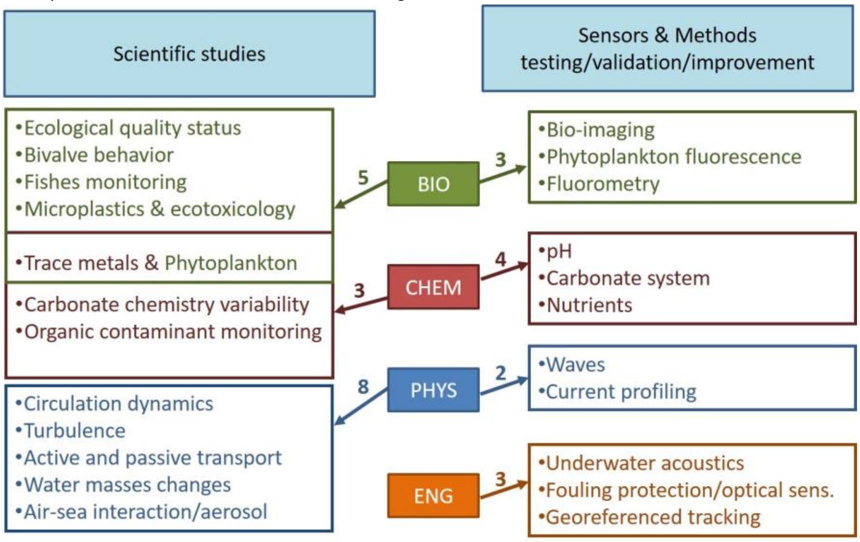

Figure 7.1: *Application domains of TNA projects.*

Coastal observatories are quite complex as they can include different types of observing systems (and supporting facilities. Naturally, this diversity poses a challenge when streamlined access to such infrastructures is being contemplated. The JERICO consortium worked hard to define a coordinated general scheme for managing the sharing of its resources with a wide user community and to support their research projects, and the results obtained both in JERICO (Sparnocchia et al, 2015) and JERICO-NEXT are excellent.

The activities developed in the framework of the JERICO TNA program are helping to build long-term collaborations between users and access providers, and are serving to promote innovation and the transfer of know-how in the marine sector. Moreover, besides extending the influence of the networked coastal infrastructures beyond national borders, the outcomes of the TNA calls evidence the major existing client communities and their scientific and technological needs, and also highlight the services amongst those offered that are the most in demand at the present time. This information is useful for setting priorities for the future development of the joint research infrastructure and also for paving the way for marketing services and strategies to attract new user communities.

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Annex 1 – First call announcement and Application documents

Call announcement

Please note that the deadline has been extended up to July 5, 2016 at 11:59 HOURS (CET)

[Note also that the Application form and Guidance note below have not be updated with the new date]

JERICO NEXT TNA Application Form 1st Call (178.1 KiB)

JERICO NEXT Guidance Note 1st Call For TNA (314.8 KiB)

The first call for access to the JERICO-NEXT Coastal Observatories and Supporting Facilities is open

from 2 May to 20 June 2016

for activities scheduled in the period **October 2016 – September 2017** subsequent to a formal screening and selection process.

The JERICO-NEXT project is offering access to **ferrybox lines, fixed platforms,** including **cabled observatories, glider fleets**, and **fishing vessels** based in coastal and shelf-sea areas around Europe.

Calibration and **research laboratories** complement the offer, as also certain specific kinds of **special equipment**. These are intended to be used in conjunction with one or more of the observing systems mentioned above.

Go ahead and browse the JERICO-NEXT catalogue of available infrastructures and facilities to find the ones most suitable to your research purposes!!!

The catalogue of facilities is accessible by clicking on through the 'Jerico Facilities in TNA' option in the Menu bar; items are sorted either by country or by facility type (Cabled observatories, Ferryboxes, Fishing Vessels, Fixed Platforms, Gliders, Specialised Equipment, Supporting Facilities).

In addition to this catalogue, an interactive map has been provided to allow you to visualise the locations of all the facilities, to zoom in and out, and to view cursory descriptions of single elements by hovering over them with your cursor. Clicking the 'View Details' button in the popup, will permit you to recover more information and go directly to the relative facility page in the catalogue.

- Browse the interactive map
- Browse the facilities by type
- Browse the facilities by country

This is a unique opportunity for scientists and engineers to avail of high-quality, interlinked instrumented infrastructures operating in coastal and shelf-sea areas for carrying out research and/or testing activities.

Interested users can request access to one or more facilities in the same proposal. JERICO-NEXT will provide them with technical assistance, travel support and complimentary core measurements that may be necessary to their work, if these are available. Projects will be selected on the basis of the quality and novelty of the proposed activities

Check rules and procedures on this website using the following links

- Access rules
- Evaluation and selection procedures

Proposals must be drafted according to the attached template, and should be submitted by email within

20th of JUNE 2016 23:59 HOURS (CET)

to the following email address:

JERICO.TNA (at) ismar.cnr.it

Proposals for the first call will NOT be accepted after this date: **late submission will be rerouted to the Second Call in May 2017**.

Application Form

JERICO-NEXT

Proposal for Transnational Access

to Coastal Observatories

1st Call

2 May 2016 - 20 June 2016

Description of the project to be sent in pdf format to jerico.tna@ismar.cnr.it
on 20 June 2016 23:59 HOURS (CET) the latest
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

PART 1

1. GENERAL INFORMATION

Title of the project (255 characters max.)	
Acronym (20 characters max.)	
Applying Institution	
Host Institution	
Host facility(ies)	

Have you or other members of your user group previously used the requested facility(ies)?		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)				
If you have received transnational access support by the JERICO FP7 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 (user group leader)

First and last name						
Gender		Male		Female	**Nationality**	
Institution						
Address						
Country						
Email address						
Telephone						
Fax						
Previous user		Yes		No		

User group members

Member # 1

First and last name						
Gender		Male		Female	**Nationality**	
Institution						
Address						
Country						
Email address						
Telephone						
Fax						
Previous user		Yes		No		

(duplicate below for each member of the user group)

3. HOST INFRASTRUCTURE

Indicate the JERICO-NEXT 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		

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

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-NEXT 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)	
If possible, list other JERICO-NEXT 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		No
If yes, please indicate your reasons for requesting access to the JERICO-NEXT facility(ies) you have chosen and also exist in your country				

4. REQUEST FOR A JERICO-NEXT 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 € has been set for each facility involved in a TNA 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.

- Travel : < *number, costs, persons' role* >
- Hotel : < *number, costs, persons' role* >
- Meals : < *number, costs, persons' role* >

- Shipment of equipment : <*type of carrier, costs*>

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)***

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

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

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

Description of the project

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

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

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)

Proposed time schedule

Provide below a clear schedule for your project including interruption, restarts and expected duration of access time ***(half a page)***

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

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

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		
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)***

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)***

Date of compilation ____

Signature of the PI ____

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

This section is reserved to the JERICO-NEXT TNA Office
Date of proposal receipt by email ___________________________________
Assigned reference number ___________________________________
Signature of receiving officer ___________________________________

Guidance Note

JERICO-NEXT

Transnational Access to Coastal Observatories

Guidance Notes

1st Call

2 May 2016 - 20 June 2016

Project website: http://www.jerico-ri.eu/
TNA webpages: http://www.jerico-ri.eu/tna/

Version 28.04.2016

1. FIRST CALL

The first Call for access to the JERICO-NEXT Coastal Observatories and Supporting Facilities is open from **2 May** to **20 June 2016** for activities scheduled in the period **October 2016** – **September 2017** subsequent to a formal screening and selection process.

Look for detailed descriptions of facilities available for this Call in the JERICO website (http://www.jerico-ri.eu/tna/jerico-facilities-in-tna/).

The access time available per facilities participating to the first Call is also summarised in Annex 1.

2. REQUEST FOR ACCESS

Free-of-charge access to the facilities specified in the TNA context will be granted following the evaluation of proposals submitted by user groups for their utilization in response to three dedicated Calls during the lifetime of the JERICO-NEXT project.

Interested users can request access to one or more facilities in the same proposal.

Proposals for the first Call have to be drawn up following the template available in the JERICO-NEXT website (http://www.jerico-ri.eu/tna/calls-and-selection/1st-call) and sent by email to **JERICO.TNA@ismar.cnr.it** within **JUNE 20th, 2016, 23:59 HOURS (CET).**

3. ELIGIBILITY OF USER GROUPS

A user group can be a single researcher (user) or a team of two or more researchers (users) satisfying specific eligibility conditions:

a) The access must be transnational, i.e. the user group leader and the majority of the users in the group must work in a country other than the country(ies) where the installation is located.

b) Only user groups that are allowed to disseminate the results they have generated under the action may benefit from the access, unless the users are working for SMEs.

c) Access for user groups with a majority of users not working in an EU or associated country is limited to 20 % of the total amount of units of access provided under the grant.

4. MODALITY OF ACCESS

Unless otherwise specified, access to a specific infrastructure (or a specific installation that is part of an infrastructure) by a user group is to be intended as a concession granted to use the infrastructure to collect specific data following the implementation of a specific automated measuring system. A written contract or agreement between the “Access Provider“ and the “End User” will delineate the actions to be undertaken, the resources that will need to be allocated, the length of planned user stays (if any), and the period of use. It will also define the rights and obligations of all the Parties involved, including eventual provisions for early termination of the conferred access.

Unless otherwise stated (e.g. for the use of gliders), the measuring system shall be provided by the user group.

Whenever possible, the start and end of an access interval will be set by the access provider to coincide with times scheduled for the ordinary maintenance of the installation in the interests of financial economy (e.g. limiting the costs of vessel-time needed to access the infrastructure, etc.).

It is mandatory that user groups interact directly with the managers of the infrastructures/installations they wish to use during the preparation of proposals

- **to verify the particulars of access to the infrastructure/installation they wish to use, and**
- **to verify the feasibilities of the proposed projects and address practical concerns.**

5. EVALUATION AND SELECTION

The user groups will be selected by a Selection Panel, consisting of independent international experts.

Submitted proposals will first be checked by the JERICO-NEXT TNA Office to ensure formal compliance with access rules. **Incomplete proposals, where the template has been filled in only partially, will automatically be rejected.**

Properly compiled proposals will undergo a three-step selection process involving:

1. Validation of each proposal by the interested facility operator (feasibility assessment).
2. Evaluation based on **scientific excellence, innovation and impacts on the state-of-the-art**. This step will be performed by the SP with the aid of additional experts, if necessary.
3. Final assessment and selection by the SP, which will recommend a short-list of proposals eligible for support.

Only proposals successfully validated by the relevant facility operators, will pass on to the evaluation phase. **To avoid misunderstandings and difficulties, users shall interact directly with the facility operators during the preparation of their proposals, to confirm that their targeted facilities are suitable for the planned experiments.**

The submitted projects will be evaluated according to the following criteria:

#	Criterion for Evaluation	Max Score
1	Scientific excellence of user group	5
2	Scientific and technical value of the project	5
3	Quality of the work plan	5
4	Potential for seeding links with industry	5
5	European relevance and interests for the scientific community	5
	Total score	**25**

A proposal will be considered for acceptance if it receives a total score that is ≥15.

Priority will be given to user groups composed of users who:

- have not previously used the installation and
- are working in countries where no equivalent research infrastructure exists.

According to EU requirements, special attention will be paid to female participation in order to promote equal opportunities in the implementation of the TNA activities, to the extent possible.

The results of the selection will be published on the JERICO-NEXT web site, and will be communicated directly to user group leaders and facility providers by email.

If users apply for access to a facility, the access time of which has already been used up, they may be redirected to another facility with unconsumed access time. As far as possible, the alternative facility offered will have similar technical or geographical characteristics.

6. SUPPORT TO USER GROUPS

User groups whose proposals are approved by the Selection Panel will benefit of:

- free-of charge access to the infrastructure(s) they have selected for the purposes of their research,
- logistical, technical and scientific support by the access provider, and any special training they may require to use the assigned infrastructure/facility,
- a financial contribution for travel and subsistence costs for visiting infrastructures, if justified [*A base amount of 3000 € has been set for each facility involved in a 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*],
- a financial contribution shipping their equipment to the infrastructure/facility, if justified [*The amount conceded will be evaluated case-by-case*].

7. POST-ACCESS REQUIREMENTS

i. At the stipulated end of the access project, the user group leader must submit **a report describing the resulting technical and preliminary scientific outputs within 30 days** (a template will be provided by the TNA management team). The report will be published on the JERICO-NEXT web site, and will be made available to the European Commission if requested.

   The receipt and approval of this report **will be required to finalize any and all financial support** received by the user group, as indicated in the relevant TNA End-user Agreement.

ii. Any publications or patents resulting from the JERICO-NEXT TNA project must be reported to the host institute and the JERICO-NEXT TNA office. Furthermore, **all such publications or patents shall acknowledge the support of the European Commission's H2020 Framework Programme under grant agreement No. 654410, JERICO-NEXT Trans National Access program, and the host institute**.

iii. Access beneficiaries undertake to reply promptly to all the requests of the JERICO-NEXT coordinator and the TNA office relating to their access activities.

ANNEX 1 - FACILITIES AVAILABLE FOR THE FIRST CALL (PER TYPE)

Chapter 1 – Observing systems

Organization	Country	Name	Short name	Unit of Access (UA)	Access available (in UA)
CABLED OBSERVATORIES					
FMI	Finland	Atmospheric and Marine Research Station	Utö	day	120
IFREMER	France	Coastal-cabled observatory EMSO-Molène	MOLENE	month	3
HZG & AWI	Germany	Underwater Node Helgoland	COSYNA_UNH	14 days	4
HZG & AWI	Germany	Underwater Node Spitzbergen	AWIPEV_UNS	14 days	2
IMR	Norway	LoVe cable based observatory	CABLE	day	100
SBI	Ireland	Galway Bay Cabled Observatory	CPO	month	2
UPC	Spain	Expandable Seafloor Observatory	OBSEA	day	210
FERRYBOXES					
HCMR	Greece	Poseidon Ferrybox	PFB	month	12
HZG	Germany	COSYNA FerryBox	COSYNA_FB	day	120
IMR	Norway	MV Vesterålen	FERRY	day	100
NIVA	Norway	MS Color Fantasy	FA	day	120
NIVA	Norway	MS Trollfjord	TF	day	120
SYKE	Finland	MS Finnmaid	FINNMAID	day	60
SYKE	Finland	MS Silja Serenade	SILJA	day	60
FISHING VESSELS					
IMR	Norway	FV Vester Junior	FISHING1	day	50
IMR	Norway	FV Brattholm	FISHING2	day	50
FIXED PLATFORMS					
CNR-ISMAR	Italy	Acqua Alta Oceanographic Tower	Acqua Alta	2-months	2
CNR-ISMAR	Italy	Meteoceanographic site S1	S1	4-months	1
HCMR	Greece	Saronikos buoy	SB	month	12
HCMR	Greece	Heraklion Coastal Buoy	HCB	month	12
HCMR	Greece	Athos buoy	AB	month	6
IFREMER	France	MOLIT Buoy	MOLIT	month	3
HZG	Germany	Stationary FerryBox system	COSYNA_SFB	day	120
IO-BAS	Bulgaria	Port Operational Marine Observing System (st. Balchik)	POMOS	month	2
SBI	Ireland	Galway Bay Data Buoy	SMARTBUOY	month	2
GLIDERS					
CNRS	France	CNRS-INSU Glider National	GNF	day	98
HZG	Germany	COSYNA Glider	COSYNA_GL	month	2
SOCIB	Spain	SOCIB glider facility	SOCIB GF	day	110

Chapter 2 – Supporting facilities and specialized equipment

Organization	Country	Name	Short name	Unit of Access (UA)	Access available (in UA)
SUPPORTING FACILITIES					
HCMR	Greece	Poseidon Calibration Lab	PCL	week (*)	4
IFREMER	France	Ifremer Metrology Laboratory	METLAB	week (*)	5
NIVA	Norway	NIVA Research Station	NRS	week (*)	5
SYKE	Finland	SYKE Marine Research Centre	SYKE MRC-	8 hour day	25
SPECIAL EQUIPMENT					
CNRS	France	Sediment Profile Imager	SPI-H	week	5

(*) week=5 days of 8 hours

The detailed catalogue of facilities is accessible in the JERICO-NEXT website by clicking on the 'Jerico Facilities in TNA' option in the Menu bar.

Items are sorted either by country or by facility type (Cabled observatories, Ferryboxes, Fishing Vessels, Fixed Platforms, Gliders, Specialised Equipment, Supporting Facilities).

In addition to this catalogue, an interactive map has been provided to allow you to visualise the locations of all the facilities, to zoom in and out, and to view cursory descriptions of single elements by hovering over them with your cursor. Clicking the 'View Details' button in the popup, will permit you to recover more information and go directly to the relative facility page in the catalogue.

- Browse the interactive map [link to http://www.jerico-ri.eu/tna/]
- Browse the facilities by type [link to http://www.jerico-ri.eu/tna/jerico-facilities-in-tna/by-type/]
- Browse the facilities by country [link to http://www.jerico-ri.eu/tna/jerico-facilities-in-tna/by-country/]

Annex 2 – Second call announcement and Application documents

Call announcement

JERICO NEXT TNA Application Form (180.2 KiB)

JERICO NEXT Guidance Note 2nd Call (189.2 KiB)

NOTE: There are changes from the First Call. Please download the documents pertinent to the present Call.

The second call for access to the JERICO-NEXT Coastal Observatories and Supporting Facilities is open

from 20 February 2017 to 10 April 2017

for activities scheduled in the period **September 2017 – August 2018** subsequent to a formal screening and selection process.

The JERICO-NEXT project is offering access to Observing systems, such as **ferrybox lines,fixed platforms,** including **cabled observatories, glider fleets**, and **fishing vessels** based in coastal and shelf-sea areas around Europe.

Supporting facilities, such as **calibration** and **research laboratories,** complete the offer, as also certain specific kinds of **special equipment**. These may be used alone or in conjunction with one or more of the observing systems, but priority will be given to the projects using the both (Supporting facilities/Special equipment and Observing systems).

Go ahead and browse the JERICO-NEXT catalogue of available infrastructures and facilities to find the ones most suitable to your research purposes!!!

The catalogue of facilities is accessible by clicking on through the 'Jerico Facilities in TNA' option in the Menu bar; items are sorted either by country or by facility type (Cabled observatories, Ferryboxes, Fishing Vessels, Fixed Platforms, Gliders, Special Equipment, Supporting Facilities).

In addition to this catalogue, an interactive map has been provided to allow you to visualise the locations of all the facilities, to zoom in and out, and to view cursory descriptions of single elements by hovering over them with your cursor. Clicking the 'View Details' button in the popup, will permit you to recover more information and go directly to the relative facility page in the catalogue.

- Browse the interactive map
- Browse the facilities by type
- Browse the facilities by country

This is a unique opportunity for scientists and engineers to avail of high-quality, interlinked instrumented infrastructures operating in coastal and shelf-sea areas for carrying out research and/or testing activities.

Interested users can request access to one or more facilities in the same proposal. JERICO-NEXT will provide them with technical assistance, travel support and complimentary core measurements that may be necessary to their work, if these are available. Projects will be selected on the basis of the quality and novelty of the proposed activities.

Check rules and procedures on this website using the following links

- Access rules
- Evaluation and selection procedures

Proposals must be drafted according to the attached template, and should be submitted by email within

10th of APRIL 2017 23:59 HOURS (CET)

to the following email address:

JERICO.TNA (at) ismar.cnr.it

Proposals for the Second Call will **NOT** be accepted after this date: **late submission will be rerouted to the Third Call in January 2018**.

Application Form

JERICO-NEXT

Proposal for Transnational Access

to Coastal Observatories

2nd Call

20 February 2017 - 10 April 2017

Description of the project to be sent in pdf format to jerico.tna@ismar.cnr.it
on 10 APRIL 2017 23:59 HOURS (CET) the latest
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

PART 1

1. GENERAL INFORMATION

Title of the project (255 characters max.)	
Acronym (20 characters max.)	
Applying Institution	
Legal contact Name Address Function e-mail address	
Legal representative Name Address Function e-mail address	
Host Institution	
Legal contact Name Address Function e-mail address	
Legal representative Name Address Function e-mail address	
Host facility(ies)	

Have you or other members of your user group previously used the requested facility(ies)?		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)				
If you have received transnational access support by the JERICO FP7 project, please list below resulting publications, conference contributions, patents. List only the ones that acknowledge the support of the European Commission and JERICO				

Is this a resubmission of a previously rejected proposal?		Yes		No
If yes, please give the exact reference number and submission date. Kindly describe briefly the changes made in comparison to the rejected version.				

Is this a continuation of an earlier project funded under a previous call for Transnational Access in JERICO-NEXT at the same facility?		Yes		No
If yes, please give the exact reference number and submission date. Kindly indicate also what has been achieved in the previous experiment and the reasons why the objectives have not been fully met.				

2. USER GROUP DETAILS

Indicate if the proposal is submitted by

☐ an individual

☐ a user group

Principal Investigator (user group leader)

First and last name						
Gender		Male		Female	**Nationality**	
Institution						
Address						
Country						
Email address						
Telephone						
Fax						
Previous user		Yes		No		

User group members

Member # 1

First and last name						
Gender		Male		Female	**Nationality**	
Institution						

Address				
Country				
Email address				
Telephone				
Fax				
Previous user		Yes		No

(duplicate below for each member of the user group)

3. HOST INFRASTRUCTURE

Indicate the JERICO-NEXT host facility(ies) offered in you are interested in

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

<u>Chapter 1 (Observing systems)</u>

		Short name	***Requested access time (UA*)***
	cabled observatory		
	ferrybox		
	fixed platform		
	fishing vessel		
	glider		

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

<u>Chapter 2 (Supporting facilities and special equipment)</u>

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

**UA: please refer to the Infrastructure description in the JERICO-NEXT 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)	
If possible, list other JERICO-NEXT 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		No
If yes, please indicate your reasons for requesting access to the JERICO-NEXT facility(ies) you have chosen and also exist in your country				

4. REQUEST FOR A JERICO-NEXT GRANT

(tick the box)

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

(*) travel, hotel and meals

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

Please note that a comprehensive nominal reference amount of 3000-6000 € is available to each 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. ***<u>Please be sure to provide detailed justification of your request.</u>***

- Travel : < *number, costs, persons' role* >
- Hotel : < *number, costs, persons' role* >
- Meals : < *number, costs, persons' role* >
- Shipment of equipment : <*what equipment, type of carrier, costs*>

PART 2

Note: This part contains material for the evaluation

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

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

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

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

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

Description of the project

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

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

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

Experimental method and work plan ***(one page)***

<Describe the proposed method and work plan for the project>

Proposed time schedule ***(half a page)***

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

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

List all material/equipment you plan to bring to the facility

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		
2		
3		

4. POTENTIAL FOR SEEDING LINKS WITH INDUSTRY AND/OR POTENTIAL APPLICATION TO STAKEHOLDERS (maximum score: 5)

Highlight below any innovative aspect of your proposal beneficial to industrial application and/or relevant to other stakeholders. ***(half page)***

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)***

Date of compilation ____

Signature of the PI ____

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

This section is reserved to the JERICO-NEXT TNA Office

Date of proposal receipt by email _________________________________

Assigned reference number __________________________________

Signature of receiving officer __________________________________

JERICO-NEXT

Transnational Access to Coastal Observatories

Guidance Notes

2nd Call

20 February 2017 to 10 April 2017

Project website: http://www.jerico-ri.eu/

TNA webpages: http://www.jerico-ri.eu/tna/

Version 13.02.2017

1. SECOND CALL

The second Call for access to the JERICO-NEXT Coastal Observatories, Supporting Facilities and Special Equipment is open from **20 February** to **10 April 2017** for activities scheduled in the period **September 2017 - August 2018** subsequent to a formal screening and selection process.

Look for detailed descriptions of facilities available for this Call in the JERICO-RI website (http://www.jerico-ri.eu/tna/jerico-facilities-in-tna/).

The access time available per facilities participating to the second Call is also summarised in Annex 1.

2. REQUEST FOR ACCESS

Free-of-charge access to the facilities specified in the TNA context will be granted following the evaluation of proposals submitted by user groups for their utilization in response to three dedicated Calls during the lifetime of the JERICO-NEXT project.

Interested users can request access to one or more facilities in the same proposal.

Proposals for the second Call have to be drawn up following the template available in the JERICO-NEXT website (http://www.jerico-ri.eu/tna/calls-and-selection/2nd-call) and sent by email to JERICO.TNA@ismar.cnr.it within **APRIL 10th, 2017, 23:59 HOURS (CET).**

3. ELIGIBILITY OF USER GROUPS

A user group can be a single researcher (user) or a team of two or more researchers (users) satisfying specific eligibility conditions:

a) The access must be transnational, i.e. the user group leader and the majority of the users in the group must work in a country other than the country(ies) where the installation is located.

b) Only user groups that are allowed to disseminate the results they have generated under the action may benefit from the access, unless the users are working for SMEs.

c) Access for user groups with a majority of users not working in an EU or associated country is limited to 20 % of the total amount of units of access provided under the grant.

4. MODALITY OF ACCESS

Unless otherwise specified, access to a specific infrastructure (or a specific installation that is part of an infrastructure) by a user group is to be intended as a concession granted to use the infrastructure to collect specific data following the implementation of a specific automated measuring system. A written contract or agreement between the "Access Provider" and the "End User" will delineate the actions to be undertaken, the resources that will need to be allocated, the length of planned user stays (if any), and the period of use. It will also define the rights and obligations of all the Parties involved, including eventual provisions for early termination of the conferred access.

Unless otherwise stated (e.g. for the use of gliders), the measuring system shall be provided by the user group.

Whenever possible, the start and end of an access interval will be set by the access provider to coincide with times scheduled for the ordinary maintenance of the installation in the interests of financial economy (e.g. limiting the costs of vessel-time needed to access the infrastructure, etc.).

It is mandatory that user groups interact directly with the managers of the infrastructures/installations they wish to use during the preparation of proposals

- **to verify the particulars of access to the infrastructure/installation they wish to use, and**
- **to verify the feasibilities of the proposed projects and address practical concerns.**

5. EVALUATION AND SELECTION

The user groups will be selected by a Selection Panel, consisting of independent international experts.

Submitted proposals will first be checked by the TNA management team to ensure formal compliance with access rules and their technical quality. Requests for amendments of technical issues only can be requested to proponents, whose response is expected as soon as possible, anyway before one week.

Properly compiled proposals will undergo a three-step selection process involving:

1. Validation of each proposal by the interested facility operator (feasibility assessment).
2. Evaluation based on **scientific excellence, innovation and impacts on the state-of-the-art**. This step will be performed by the SP with the aid of additional experts, if necessary.
3. Final assessment and selection by the SP, which will recommend a short-list of proposals eligible for support.

Only proposals successfully validated by the relevant facility operators will pass on to the evaluation phase. **To avoid misunderstandings and difficulties, users shall interact directly with the facility operators during the preparation of their proposals, to confirm that their targeted facilities are suitable for the planned experiments.**

The submitted projects will be evaluated according to the following criteria:

#	Criterion for Evaluation	Max Score
1	Scientific and/or technological excellence of user group	5
2	Scientific and technical value of the project	5
3	Quality of the work plan	5
4	Potential for seeding links with industry and/or potential application to stakeholders	5
5	European relevance and interests for the scientific community	5
	Total score	**25**

A proposal will be considered for acceptance if it receives a total score that is ≥15.

Priority will be given to user groups composed of users who:

- have not previously used the installation and
- are working in countries where no equivalent research infrastructure exists.

According to EU requirements, special attention will be paid to female participation in order to promote equal opportunities in the implementation of the TNA activities, to the extent possible.

The results of the selection will be published on the JERICO-NEXT web site, and will be communicated directly to user group leaders and facility providers by email.

If users apply for access to a facility, the access time of which has already been used up, they may be redirected to another facility with unconsumed access time. As far as possible, the alternative facility offered will have similar technical or geographical characteristics.

4. SUPPORT TO USER GROUPS

User groups whose proposals are approved by the Selection Panel will benefit of:

- free-of charge access to the infrastructure(s) they have selected for the purposes of their research,
- logistical, technical and scientific support by the access provider, and any special training they may require to use the assigned infrastructure/facility,
- a financial contribution for travel and subsistence costs for visiting infrastructures, if justified,
- a financial contribution for shipping their equipment to the infrastructure/facility, if justified,
- a comprehensive nominal reference amount of 3000-6000 € is available to each 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.

5. POST-ACCESS REQUIREMENTS

i. At the stipulated end of the access project, the user group leader must submit **a report describing the resulting technical and preliminary scientific outputs within 30 days** (a template will be provided by the TNA management team). The report will be published on the JERICO-NEXT web site, and will be made available to the European Commission if requested.

   The receipt and approval of this report **will be required to finalize any and all financial support** received by the user group, as indicated in the relevant TNA End-user Agreement. Any video and/or photo will be appreciated.

ii. Any publications or patents resulting from the JERICO-NEXT TNA project must be reported to the host institute and the JERICO-NEXT TNA office. Furthermore, **all such publications or patents shall acknowledge the support of the European Commission's H2020 Framework Programme under grant agreement No. 654410, JERICO-NEXT Trans National Access program, and the host institute**.

iii. Access beneficiaries undertake to reply promptly to all the requests of the JERICO-NEXT coordinator and the TNA office relating to their access activities.

ANNEX 1 - FACILITIES AVAILABLE FOR THE SECOND CALL (PER TYPE)

Chapter 1 – Observing systems

Organization	Country	Name	Short name	Unit of Access (UA)	Access available (in UA)
CABLED OBSERVATORIES					
FMI	Finland	Atmospheric and Marine Research Station	Utö	day	120
IFREMER	France	Coastal-cabled observatory EMSO-Molène	MOLENE	month	3
HZG & AWI	Germany	Underwater Node Helgoland	COSYNA_UNH	14 days	4
HZG & AWI	Germany	Underwater Node Spitzbergen	AWIPEV_UNS	14 days	2
IMR	Norway	LoVe cable based observatory	CABLE	day	100
SBI	Ireland	Galway Bay Cabled Observatory	CPO	month	2
UPC	Spain	Expandable Seafloor Observatory	OBSEA	day	210
FERRYBOXES					
HCMR	Greece	Poseidon Ferrybox	PFB	month	5
HZG	Germany	COSYNA FerryBox	COSYNA_FB	day	120
IMR	Norway	MV Vesterålen	FERRY	day	100
NIVA	Norway	MS Color Fantasy	FA	day	120
NIVA	Norway	MS Trollfjord	TF	day	120
SYKE	Finland	MS Finnmaid	FINNMAID	day	60
SYKE	Finland	MS Silja Serenade	SILJA	day	60
FISHING VESSELS					
IMR	Norway	FV Vester Junior	FISHING1	day	50
IMR	Norway	FV Brattholm	FISHING2	day	50
FIXED PLATFORMS					
CNR-ISMAR	Italy	Sicily Channel Observatory	SiCO	6-months	3
CNR-ISMAR	Italy	Meteoceanographic site S1	S1	4-months	1
HCMR	Greece	Saronikos buoy	SB	month	12
HCMR	Greece	Heraklion Coastal Buoy	HCB	month	12
HCMR	Greece	Athos buoy	AB	month	6
IFREMER	France	MOLIT Buoy	MOLIT	month	3
HZG	Germany	Stationary FerryBox system	COSYNA_SFB	day	120
IO-BAS	Bulgaria	Port Operational Marine Observing System (st. Balchik)	POMOS	month	2
GLIDERS					
CNRS	France	CNRS-INSU Glider National	GNF	day	17
HZG	Germany	COSYNA Glider	COSYNA_GL	month	2
SOCIB	Spain	SOCIB glider facility	SOCIB GF	day	40

Chapter 2 – Supporting facilities and specialized equipment

Organization	Country	Name	Short name	Unit of Access (UA)	Access available (in UA)
SUPPORTING FACILITIES					
HCMR	Greece	Poseidon Calibration Lab	PCL	week (*)	4
IFREMER	France	Ifremer Metrology Laboratory	METLAB	week (*)	5
NIVA	Norway	NIVA Research Station	NRS	week (*)	5
SYKE	Finland	SYKE Marine Research Centre	SYKE MRC-	8 hour day	25
SPECIAL EQUIPMENT					
CNRS	France	Sediment Profile Imager	SPI-H	week	5

(*) week=5 days of 8 hours

The detailed catalogue of facilities is accessible in the JERICO-NEXT website by clicking on the 'Jerico Facilities in TNA' option in the Menu bar.

Items are sorted either by country or by facility type (Cabled observatories, Ferryboxes, Fishing Vessels, Fixed Platforms, Gliders, Specialised Equipment, Supporting Facilities).

In addition to this catalogue, an interactive map has been provided to allow you to visualise the locations of all the facilities, to zoom in and out, and to view cursory descriptions of single elements by hovering over them with your cursor. Clicking the 'View Details' button in the popup, will permit you to recover more information and go directly to the relative facility page in the catalogue.

- Browse the interactive map [link to http://www.jerico-ri.eu/tna/]
- Browse the facilities by type [link to http://www.jerico-ri.eu/tna/jerico-facilities-in-tna/by-type/]
- Browse the facilities by country [link to http://www.jerico-ri.eu/tna/jerico-facilities-in-tna/by-country/]

Annex 3 – Third call announcement and Application documents

Call announcement

JERICO NEXT TNA Application Form 3rd Call (180.4 KiB)

JERICO NEXT Guidance Note 3rd Call For TNA (309.5 KiB)

NOTE: There are changes compared to previous calls. Please download the above documents related to this one.

The third and last call for access to the JERICO-NEXT Coastal Observatories and Supporting Facilities will open

from 15 January 2018 to 12 March 2018

for activities scheduled in the period **October 2018 – May 2019** subsequent to a formal screening and selection process.

- **Please note this is the last opportunity for users to access the infrastructure of JERICO-NEXT before it ends on 31 August 2019**.
- **The experiments of users at selected facilities should been completed by May 2019 and their project reports should be delivered absolutely by June 2019. No delay will be conceded.**

Proposals must be drafted according to the attached template, and should be submitted by email within

12th of MARCH 2018 23:59 HOURS (CET)

to the following email address:

JERICO.TNA (at) ismar.cnr.it

Proposals will **NOT** be accepted after this date.

The JERICO-NEXT project is offering access to Observing systems, such as **ferrybox lines,fixed platforms,** including **cabled observatories, gliders**, and **fishing vessels** based in coastal and shelf-sea areas around Europe.

Supporting facilities, such as **calibration** and **research laboratories,** complete the offer, as also certain specific kinds of **special equipment**. These may be used alone or in conjunction with one or more of the observing systems, but priority will be given to the projects using the both (Supporting facilities/Special equipment and Observing systems).

Go ahead and browse the JERICO-NEXT catalogue of available infrastructures and facilities to find the ones most suitable to your research purposes!!!

The catalogue of facilities is accessible by clicking on through the 'Jerico Facilities in TNA' option in the Menu bar; items are sorted either by country or by facility type (Cabled observatories, Ferryboxes, Fishing Vessels, Fixed Platforms, Gliders, Special Equipment, Supporting Facilities).

In addition to this catalogue, an interactive map has been provided to allow you to visualise the locations of all the facilities, to zoom in and out, and to view cursory descriptions of single elements by hovering over them with your cursor. Clicking the 'View Details' button in the popup, will permit you to recover more information and go directly to the relative facility page in the catalogue.

- Browse the interactive map
- Browse the facilities by type
- Browse the facilities by country

This is a unique opportunity for scientists and engineers to avail of high-quality, interlinked instrumented infrastructures operating in coastal and shelf-sea areas for carrying out research and/or testing activities.

Interested users can request access to one or more facilities in the same proposal. JERICO-NEXT will provide them with technical assistance, travel support and complimentary core measurements that may be necessary to their work, if these are available. Projects will be selected on the basis of the quality and novelty of the proposed activities.

Check rules and procedures on this website using the following links

- Access rules
- Evaluation and selection procedures

View the descriptions and results of TNA user projects from previous calls using the following links

- First call
- Second call

Application Form

JERICO-NEXT

Proposal for Transnational Access

to Coastal Observatories

3rd Call
15 January 2018 - 12 March 2018

Description of the project to be sent in pdf format to jerico.tna@ismar.cnr.it
on 12 MARCH 2018 23:59 HOURS (CET) the latest
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

PART 1

1. GENERAL INFORMATION

Title of the project (255 characters max.)	
Acronym (20 characters max.)	
Applying Institution	
Legal contact Name Address Function e-mail address	
Legal representative Name Address Function e-mail address	
Host Institution	
Legal contact Name Address Function e-mail address	
Legal representative Name Address Function e-mail address	
Host facility(ies)	

Have you or other members of your user group previously used the requested facility(ies)?		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)				
If you have received transnational access support by JERICO FP7 and/or JERICO-NEXT projects, please list resulting publications, conference contributions, patents. List only the ones that acknowledge the support of the European Commission and JERICO/JERICO-NEXT.				

Is this a resubmission of a previously rejected proposal?		Yes		No
If yes, please give the exact reference number and submission date. Kindly describe briefly the changes made in comparison to the rejected version.				

Is this a continuation of an earlier project funded under a previous call for Transnational Access in JERICO-NEXT at the same facility?		Yes		No
If yes, please give the exact reference number and submission date. Kindly indicate also what has been achieved in the previous experiment and the reasons why the objectives have not been fully met.				

2. USER GROUP DETAILS

Indicate if the proposal is submitted by

☐ an individual

☐ a user group

Principal Investigator (user group leader)

First and last name						
Gender		Male		Female	**Nationality**	
Institution						
Address						
Country						
Email address						
Telephone						
Fax						
Previous user		Yes		No		

User group members

Member # 1

First and last name						
Gender		Male		Female	**Nationality**	

Institution				
Address				
Country				
Email address				
Telephone				
Fax				
Previous user		Yes		No

(duplicate below for each member of the user group)

3. HOST INFRASTRUCTURE

Indicate the JERICO-NEXT host facility(ies) you are interested in

- *Refer to Annex 1 of the Guidance Notes - 3rd Call*
- *Tick more than one boxes if it is useful for your project*

Chapter 1 (Observing systems)

		Short name	***Requested access time (UA*)***
	cabled observatory		
	ferrybox		
	fixed platform		
	fishing vessel		
	glider		

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

Chapter 2 (Supporting facilities and special equipment)

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

**UA: please refer to the Infrastructure description in the JERICO-NEXT 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)	
If possible, list other JERICO-NEXT 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		No
If yes, please indicate your reasons for requesting access to the JERICO-NEXT facility(ies) you have chosen and also exist in your country				

4. REQUEST FOR A JERICO-NEXT GRANT

(tick the box)

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

(*) travel, hotel and meals

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

Please note that a comprehensive nominal reference amount of 3000-6000 € is available to each 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. ***<u>Please be sure to provide detailed justification of your request.</u>***

- Travel : < *number, costs, persons' role* >
- Hotel : < *number, costs, persons' role* >
- Meals : < *number, costs, persons' role* >

- Shipment of equipment : <*what equipment, type of carrier, costs*>

PART 2

Note: This part contains material for the evaluation

1. SCIENTIFIC AND/OR TECHNOLOGICAL EXCELLENCE OF USER GROUP (maximum score: 5)

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

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

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

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

Description of the project

Main objectives *(half a page)*

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

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

Experimental method and work plan *(one page)*

<Describe the proposed method and work plan for the project>

Proposed time schedule ***(half a page)***

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

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

List all material/equipment you plan to bring to the facility

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		
2		
3		

4. POTENTIAL FOR SEEDING LINKS WITH INDUSTRY AND/OR POTENTIAL APPLICATION TO STAKEHOLDERS (maximum score: 5)

Highlight below any innovative aspect of your proposal beneficial to industrial application and/or relevant to other stakeholders. ***(half page)***

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)***

Date of compilation ____

Signature of the PI ____

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

This section is reserved to the JERICO-NEXT TNA Office

Date of proposal receipt by email ____________________________________

Assigned reference number ____________________________________

Signature of receiving officer ____________________________________

JERICO-NEXT

Transnational Access to Coastal Observatories

Guidance Notes

3rd Call

15 January 2018 - 12 March 2018

Project website: http://www.jerico-ri.eu/

TNA webpages: http://www.jerico-ri.eu/tna/

Version 10.01.2018

1. THIRD CALL

The third Call for access to the JERICO-NEXT Coastal Observatories, Supporting Facilities and Special Equipment is open from **15 January** to **12 March 2018** for activities scheduled in the period **October 2018 - May 2019** subsequent to a formal screening and selection process. Please note this is the last opportunity for users to access the infrastructure of JERICO-NEXT before it ends on 31 August 2019. The experiment of users at selected facilities should been completed by May 2019 and their project report should be delivered absolutely by June 2019. **No delay will be conceded.**

Look for detailed descriptions of facilities available for this Call in the JERICO-RI (website http://www.jerico-ri.eu/tna/jerico-facilities-in-tna/).
The access time available for the facilities participating in the third Call is summarised in Annex 1 of this document.

2. REQUEST FOR ACCESS

Free-of-charge access to the facilities specified in the TNA context will be granted following the evaluation of proposals submitted by user groups for their utilization in response to three dedicated Calls during the lifetime of the JERICO-NEXT project.

Interested users can request access to one or more facilities in the same proposal.

Proposals for the third Call have to be drawn up following the template available in the JERICO-NEXT website (http://www.jerico-ri.eu/tna/calls-and-selection/3rd-call) and sent by email to JERICO.TNA@ismar.cnr.it within **MARCH 12th, 2018, 23:59 HOURS (CET).**

3. ELIGIBILITY OF USER GROUPS

A user group can be a single researcher (user) or a team of two or more researchers (users) satisfying specific eligibility conditions:

a) The access must be transnational, i.e. the user group leader and the majority of the users in the group must work in a country other than the country(ies) where the installation is located.

b) Only user groups that are allowed to disseminate the results they have generated under the action may benefit from the access, unless the users are working for SMEs.

c) Access for user groups with a majority of users not working in an EU or associated country is limited to 20 % of the total amount of units of access provided under the grant.

4. MODALITY OF ACCESS

Unless otherwise specified, access to a specific infrastructure (or a specific installation that is part of an infrastructure) by a user group is to be intended as a concession granted to use the infrastructure to collect specific data following the implementation of a specific automated measuring system. A written contract or agreement between the “Access Provider“ and the “End User” will delineate the actions to be undertaken, the resources that will need to be allocated, the length of planned user stays (if any), and the period of use. It will also define the rights and obligations of all the Parties involved, including eventual provisions for early termination of the conferred access.

Unless otherwise stated (e.g. for the use of gliders), the measuring system shall be provided by the user group.

Whenever possible, the start and end of an access interval will be set by the access provider to coincide with times scheduled for the ordinary maintenance of the installation in the interests of financial economy (e.g. limiting the costs of vessel-time needed to access the infrastructure, etc.).

It is mandatory that user groups interact directly with the managers of the infrastructures/installations they wish to use during the preparation of proposals

- **to verify the particulars of access to the infrastructure/installation they wish to use, and**
- **to verify the feasibilities of the proposed projects and address practical concerns.**

5. EVALUATION AND SELECTION

The user groups will be selected by a Selection Panel, consisting of independent international experts.

Submitted proposals will first be checked by the TNA management team to ensure formal compliance with access rules and their technical quality. Requests for amendments of technical issues only can be requested to proponents, whose response is expected as soon as possible, anyway before one week.

Properly compiled proposals will undergo a three-step selection process involving:

1. Validation of each proposal by the interested facility operator (feasibility assessment).
2. Evaluation based on **scientific excellence, innovation and impacts on the state-of-the-art**. This step will be performed by the SP with the aid of additional experts, if necessary.
3. Final assessment and selection by the SP, which will recommend a short-list of proposals eligible for support.

Only proposals successfully validated by the relevant facility operators will pass on to the evaluation phase. **To avoid misunderstandings and difficulties, users shall interact directly with the facility operators during the preparation of their proposals, to confirm that their targeted facilities are suitable for the planned experiments.**

The submitted projects will be evaluated according to the following criteria:

#	Criterion for Evaluation	Max Score
1	Scientific and/or technological excellence of user group	5
2	Scientific and technical value of the project	5
3	Quality of the work plan	5
4	Potential for seeding links with industry and/or potential application to stakeholders	5
5	European relevance and interests for the scientific community	5
	Total score	**25**

A proposal will be considered for acceptance if it receives a total score that is ≥15.

Priority will be given to user groups composed of users who:

- have not previously used the installation and
- are working in countries where no equivalent research infrastructure exists.

According to EU requirements, special attention will be paid to female participation in order to promote equal opportunities in the implementation of the TNA activities, to the extent possible.

The results of the selection will be published on the JERICO-NEXT web site, and will be communicated directly to user group leaders and facility providers by email.

If users apply for access to a facility, the access time of which has already been used up, they may be redirected to another facility with unconsumed access time. As far as possible, the alternative facility offered will have similar technical or geographical characteristics.

4. SUPPORT TO USER GROUPS

User groups whose proposals are approved by the Selection Panel will benefit of:

- free-of charge access to the infrastructure(s) they have selected for the purposes of their research,
- logistical, technical and scientific support by the access provider, and any special training they may require to use the assigned infrastructure/facility,
- a financial contribution for travel and subsistence costs for visiting infrastructures, if justified,
- a financial contribution for shipping their equipment to the infrastructure/facility, if justified,

A comprehensive nominal reference amount of 3000-6000 € is available to each 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.

5. POST-ACCESS REQUIREMENTS

i. At the stipulated end of the access project, the user group leader must submit **a report describing the resulting technical and preliminary scientific outputs within 30 days** (a template will be provided by the TNA management team). The report will be published on the JERICO-NEXT web site, and will be made available to the European Commission if requested.

   The receipt and approval of this report **will be required to finalize any and all financial support** received by the user group, as indicated in the relevant TNA End-user Agreement. Any video and/or photo will be appreciated.

ii. Any publications or patents resulting from the JERICO-NEXT TNA project must be reported to the host institute and the JERICO-NEXT TNA office. Furthermore, all such publications or **patents shall acknowledge the support of the European Commission's H2020 Framework Programme under grant agreement No. 654410, JERICO-NEXT Trans National Access program, and the host institute**.

iii. Access beneficiaries undertake to reply promptly to all the requests of the JERICO-NEXT coordinator and the TNA office relating to their access activities.

ANNEX 1 - FACILITIES AVAILABLE FOR THE THIRD CALL (PER TYPE)

Chapter 1 – Observing systems

Organization	Country	Name	Short name	Unit of Access (UA)	Access available (in UA)
CABLED OBSERVATORIES					
FMI	Finland	Atmospheric and Marine Research Station	Utö	day	82
HZG & AWI	Germany	Underwater Node Spitzbergen	AWIPEV_UNS	14 days	2
IMR	Norway	LoVe cable based observatory	CABLE	day	100
FERRYBOXES					
HZG	Germany	COSYNA FerryBox	COSYNA_FB	day	120
IMR	Norway	MV Vesterålen	FERRY	day	100
NIVA	Norway	MS Color Fantasy	FA	day	112
NIVA	Norway	MS Trollfjord	TF	day	120
SYKE	Finland	MS Finnmaid	FINNMAID	day	60
FISHING VESSELS					
IMR	Norway	FV Vester Junior	FISHING1	day	50
IMR	Norway	FV Brattholm	FISHING2	day	50
FIXED PLATFORMS					
IFREMER	France	MOLIT Buoy	MOLIT	day	92
HZG	Germany	Stationary FerryBox system	COSYNA_SFB	day	120
IO-BAS	Bulgaria	Port Operational Marine Observing System (st. Balchik)	POMOS	month	3
GLIDERS					
SOCIB	Spain	SOCIB glider facility	SOCIB GF	day	60

Chapter 2 – Supporting facilities and specialized equipment

Organization	Country	Name	Short name	Unit of Access (UA)	Access available (in UA)
SUPPORTING FACILITIES					
IFREMER	France	Ifremer Metrology Laboratory	METLAB	week (*)	5
NIVA	Norway	NIVA Research Station	NRS	week (*)	5
SYKE	Finland	SYKE Marine Research Centre	SYKE MRC-	8 hour day	10
SPECIAL EQUIPMENT					
CNRS	France	Sediment Profile Imager	SPI-H	week	5

(*) week=5 days of 8 hours

The detailed catalogue of facilities is accessible in the JERICO-NEXT website by clicking on the 'Jerico facilities in TNA – 3rd Call' option in the Menu bar.

Items are sorted either by country or by facility type (Cabled observatories, Ferryboxes, Fishing Vessels, Fixed Platforms, Gliders, Specialised Equipment, Supporting Facilities).

In addition to this catalogue, an interactive map has been provided to allow you to visualise the locations of all the facilities, to zoom in and out, and to view cursory descriptions of single elements by hovering over them with your cursor. Clicking the 'View Details' button in the popup, will permit you to recover more information and go directly to the relative facility page in the catalogue.

- Browse the interactive map [link to http://www.jerico-ri.eu/tna/]
- Browse the facilities by type [link to http://www.jerico-ri.eu/tna/jerico-facilities-in-tna/by-type/]
- Browse the facilities by country [link to http://www.jerico-ri.eu/tna/jerico-facilities-in-tna/by-country/]