

**APPENDIX 3**  
**TA PROJECT REPORT (TEMPLATE)**

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(see following pages)

**TA PROJECT REPORT PACKAGE**

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- The completed and signed forms included in this package should be sent by email to [jerico.ta@marine.ie](mailto:jerico.ta@marine.ie) and [jerico-s3@ifremer.fr](mailto:jerico-s3@ifremer.fr) within **one month after the completion of the TA project** by the User Group Leader.
  - **Refunding of the TA reimbursement to the user group will be processed as soon as these forms will be submitted.**
  - The TA project report will be published in the JERICO-S3 website. The report, as well as other information collected with the attached forms, will be used to report to the European Commission.
  - **Please note that any publication resulting from work carried out under the JERICO-S3 TA activity must acknowledge the support of the European Commission – H2020 Framework Programme, JERICO-S3 under grant agreement No.871153.**

1. Project Information

<b>Proposal reference number<sup>1</sup></b>	JS3_CALL_3_4049_ABACUS2023
<b>Project Acronym (ID)<sup>2</sup></b>	ABACUS 2023
<b>Title of the project<sup>3</sup></b>	Algerian Basin Circulation Unmanned Survey 2023
<b>Host Research Infrastructure<sup>4</sup></b>	SOCIB - <i>Balearic Islands Coastal Ocean Observing and Forecasting System</i> GLIDER SOCIB Glider Facility
<b>Starting date - End date<sup>5</sup></b>	<b>Total project duration:</b> 18 November 2022 – 30 July 2023  <b>Glider Mission:</b> ABACUS 2023 LEG 1 18/11/2022 – 12/12/2022 WINTER ABACUS 2023 LEG 2 01/06/2023 – 20/06/2023 SPRING ABACUS 2023 LEG 3 19/07/2023 – 10/08/2023 SUMMER
<b>Name of Principal Investigator<sup>6</sup></b> <b>Home Laboratory</b> <b>Address</b> <b>E-mail address</b> <b>Telephone</b>	Yuri Cotroneo Università degli Studi di Napoli "Parthenope" Centro Direzionale Isola C4 – Napoli, Italy <a href="mailto:yuri.cotroneo@uniparthenope.it">yuri.cotroneo@uniparthenope.it</a>

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<sup>1</sup> Reference number assigned to the proposal by the TA-Office.

<sup>2</sup> User-project identifier used in the proposal.

<sup>3</sup> Title of the approved proposal. The length cannot exceed 255 characters

<sup>4</sup> Name of the installation/infrastructure accessed with this project. If more than one installations/infrastructures are used by the same project, please list them in the box.

<sup>5</sup> Specify starting and end date of the project (including eventual preparatory phase before the access).

<sup>6</sup> Fill in with the full contact of the Principal Investigator (user group leader).

2. Project objectives<sup>7</sup> (250 words max.)

ABACUS focuses on the physical and biochemical characteristics of the Algerian Basin (AB) circulation. The AB is dominated by the presence of energetic mesoscale structures that usually develop from meanders of the Algerian Current to isolated cyclonic and anti-cyclonic eddies. The project aims at confirming the importance of the ABACUS monitoring line across the AB between Palma de Mallorca and the southern part of the Algerian basin.

Main objectives are:

- To continue the time series of oceanographic data collected in the AB along the endurance line between Mallorca and Algeria;
- To identify the physical and biochemical variability of the different water masses that are present between Balearic Islands and Algerian coasts at surface and intermediate depth;
- To collect in-situ observations in the late spring where mesoscale high mesoscale activity take place.
- To collect high resolution data able to describe the sub-basins 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 overflying the western Mediterranean Sea;
- To contribute at the creation of a composite dataset to be used for the SWOT satellite mission preparation and calibration;
- To acquire ground truth for satellite retrievals of particulate backscattering (bbp) which are widely used in studies of ocean ecology and biogeochemistry, but have been historically difficult to validate due to the paucity of available comparative field measurements;
- To explore the potential of glider measurements for ecosystem monitoring (fish stocks to cetaceans).

3. Main achievements and difficulties encountered (250 words max.)<sup>8</sup>

Sea activities during ABACUS 2023 were scheduled over three glider missions of the approximate duration of 20 days each to navigate the monitoring line during different seasons namely summer and fall, as follows:

ABACUS 2023 LEG 1 Nov/Dec 2022

ABACUS 2023 LEG 2 June 2023

ABACUS 2023 LEG 3 Jul/Aug 2023

Data collected during the ABACUS 2023 allowed:

- The monitoring of the main physical and biochemical properties of the water column;

<sup>7</sup> Write the short-term, medium and long-term objectives of the project. Use no more than 250 words.

<sup>8</sup> Describe briefly the main achievements obtained and possible impacts, as well as possible difficulties encountered during the execution of the project. Use no more than 250 words.

- To extent the glider datasets in the AB;
- The collection of acoustic data across the AB to identify wind and rain patterns, as well as the presence of marine mammals.

From a more technical point of view, the glider mission has covered the following for each leg:

- spent 25 days in water for ABACUS 2023 LEG 1 – collecting 284 profiles along the transect
- spent 20 days in water for ABACUS 2023 LEG 2 – collecting 128 profiles along the transect
- spent 22 days in water for ABACUS 2023 LEG 3 – collecting 157 profiles along the transect

During each leg the glider realized 2 complete transects across the AB and was overflown by the Sentinel 3 satellite.

A total of about 569 complete profiles were collected along the 6 planned transects;

#### 4. Dissemination of the results<sup>9</sup>

- 1) Data collected during ABACUS 2023 can be downloaded through the SOCIB DAPP.
- 2) Data collected during all the ABACUS missions since 2014, can be downloaded from the webpage <http://apps.socib.es/data-catalog/#/data-products/abacus> that is regularly updated

A DOI was assigned to this dataset that can be cited as Miralles, A., Rubio, M., Rivera, P., Zarokanellos, N., Charcos, M., Fernández, J. G., Budillon, G., Cotroneo, Y., Aulicino, G., Balager, P., Wirth, N., Casas, B., Baeza, J., Calafat, N., Juza, M., Notario, X., Heslop, E., Ruiz, S., Muñoz, C., ... Tintoré, J. (2018). SOCIB TNA Abacus (Version 1.0) [Data set]. Balearic Islands Coastal Observing and Forecasting System, SOCIB. <https://doi.org/10.25704/B200-3VF5>

- 3) The results achieved during the previous ABACUS glider missions have been presented at international conferences, e.g., the EGU general assembly 2023 (Vienna, April 2023): Cotroneo, Y., Aulicino, G., Fusco, G., Ruiz, S., Pascual, A., Testor, P., Cauchy, P., Zarokanellos, N., Miralles, A., Zerrouki, M., Tintoré, J., and Budillon, G.: "ABACUS – a repeated glider monitoring line across the western Mediterranean Sea", EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023, EGU23-6024, <https://doi.org/10.5194/egusphere-egu23-6024>, 2023". We expect to present the ABACUS 2023 results at international conferences planned in 2024.

- 4) ABACUS results are usually presented in seminars for graduate and post-graduate students, at Università degli studi di Napoli "Parthenope"
- 5) Three master degree students did their intership using and analysing the ABACUS 2023 data in the framework of their course.

<sup>9</sup> Describe any plan you have to disseminate and publish the results resulting from work carried out under the Transnational Access activity in JERICO -S3: scientific articles, books - or part of them -, patents, as well as reports and communication to scientific conferences, meetings and workshops. Highlight peer-reviewed publications. **Note that any publications resulting from work carried out under the JERICO -S3 TA activity must acknowledge the support of the European Commission – H2020 Framework Programme, JERICO -S3 under grant agreement No. 871153.**

5. Technical and Scientific preliminary Outcomes (2 pages max.)<sup>10</sup>

ABACUS 2023 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.

Additionally, the use of a passive acoustic recorder allowed us to analyse the sounds associated to wind, rain, and marine mammals in the study area.

ABACUS 2023 allowed us to realize a glider mission in the Algerian Basin organized into 3 legs during winter 2022, spring 2023 and summer 2023 sampling the water column up to 1000 m depth with the spatial resolution of about 2 Km.

The ABACUS 2023 quality-controlled datasets are then used to realize a preliminary analysis focused on the identification of the different water masses characteristics and on their location along depth and latitude.

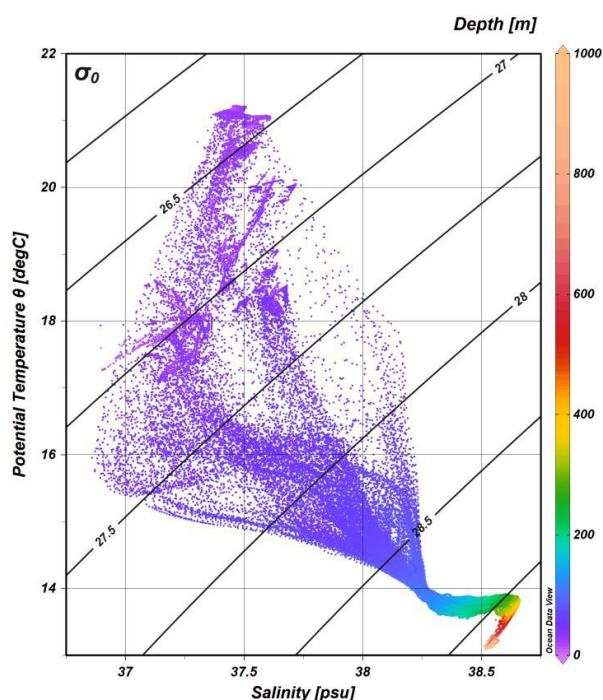
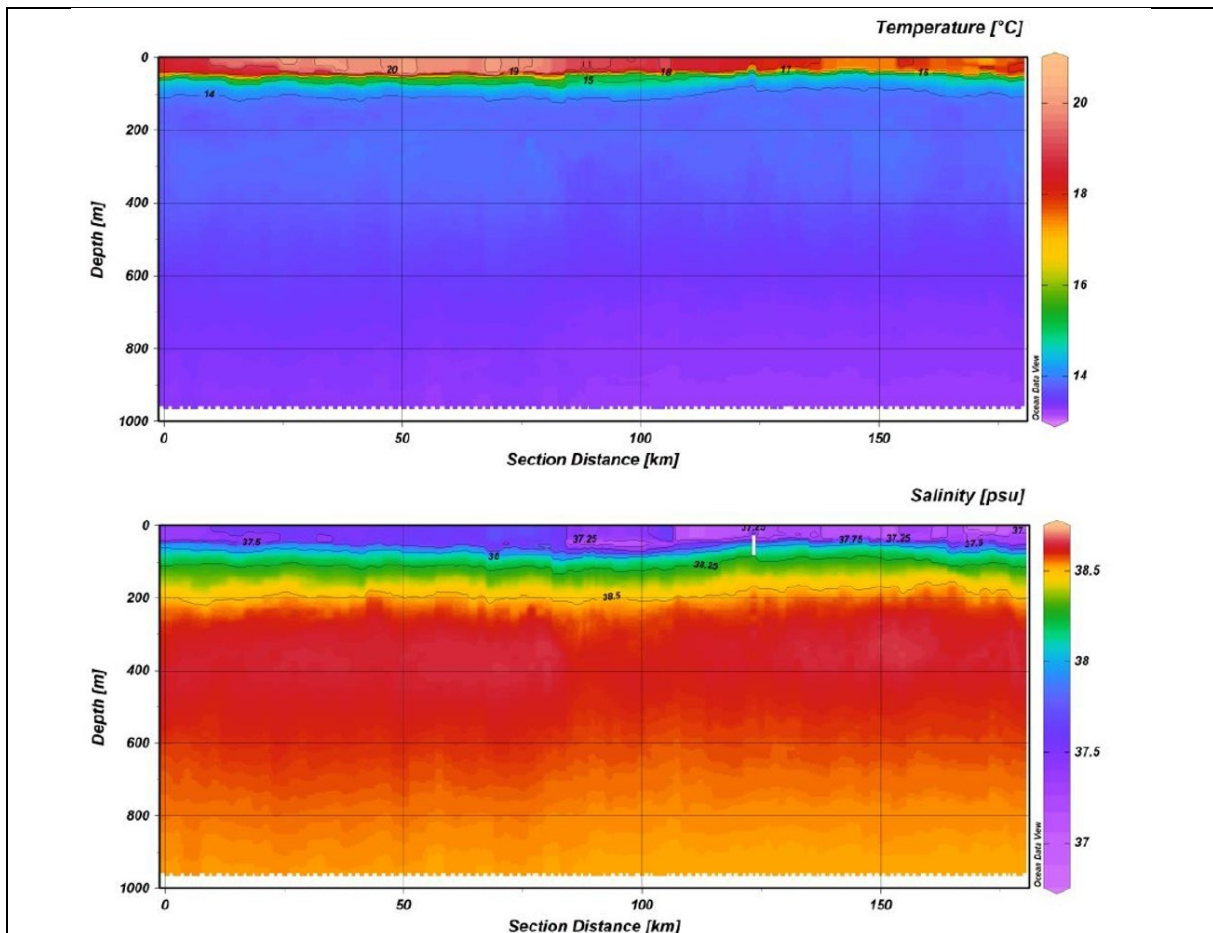


Figure 1 shows the map of ABACUS2023 glider mission and the associated Theta/S diagram. ABACUS 2023 observations are characterized by high spatial and temporal resolution, which is allows us to identify the different physical and biochemical processes. Figure 2 shows the vertical transect along the monitoring line of late November 2022 for Potential temperature and Salinity. Analogous figures have been realized for the other 5 transects realized and for the Potential Density anomaly, Chlorophyll concentration, turbidity and Oxygen concentration data collected by the glider.

<sup>10</sup> Describe in detail results and main findings of your experiment at the present stage.



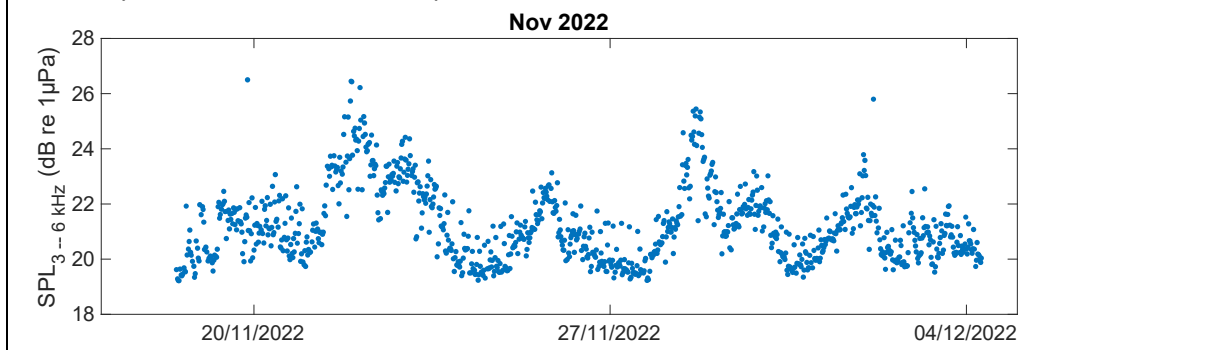
One of the most innovative aspects of the ABACUS 2023 project consists in the use of the passive acoustic recorder installed on the glider (ACOUSONDE). Some of these data already available, were also included in the ABACUS 2021 finale report.

Acoustic data requires long elaboration time and have not been analysed at the moment. This is mainly due to the large amount of data collected and to the different analyses that need to be performed to identify the sound originated by the different sources.

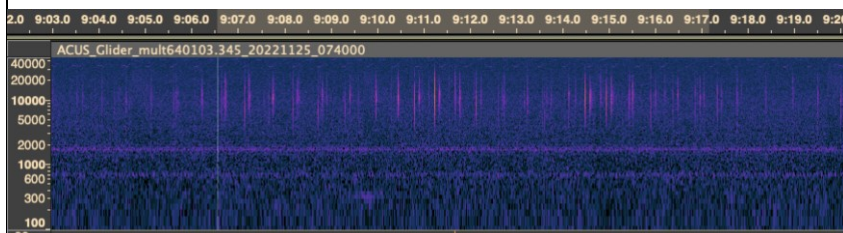
Nevertheless, data acquisition during the 4 transects of AbACUS 2023 (i.e, on November/December 2022 and July/August 2023) is confirmed. Unfortunately, the hydrophone did not record anything on the June 2023 mission.

Figures 3 and 4 show some preliminary results of the acoustic data analysis.

The analysis of the acoustic data requested an additional effort.



The first figure shows the signal associated to wind noise during the November 2022 leg, while figure 4 shows the noise associated to Sperm whale echolocation sounds, characterized by very regular trains of clicks at about ~ 10 kHz, 2 clicks/s. Similar analysis highlighted the presence of Dolphin echolocation clicks as rapid and variable click patterns ~ 30 kHz, 10 – 20 clicks/s.



Napoli, 07/12/2023

Location and date



Signature of principal investigator