The Research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 262584, JERICO

TNA PROJECT REPORT

3rd Call of Proposals

19 September – 25 November, 2013

A) General Information

Proposal reference number(1)	CALL_3_1
Project Acronym (ID) (2)	FRIPP
Title of the project(3)	FRontal dynamics Influencing Phytoplankton Production and distribution during DCM period
Host Research Infrastructure(4)	CSIC glider
Starting date - End date(5)	2014/05/01 – 2014/09/01 (access to the infrastructure 2014/05/25 – 2014/05/30)
Name of Principal Investigator(6) **Home Laboratory** **E-mail address** **Telephone**	Dr. Antonio Olita Institute for Coastal Marine Environment of CNR, Unit in Oristano, Operational Oceanography Group (GOO) Località Sa Mardini, Torregrande, 09170 Oristano **antonio.olita@cnr.it** +39.0783.229015
Additional users (7)	Alberto Ribotti, CNR-IAMC, Oristano

B) Project objectives (max. 250 words) (8)

The proposed research is drawn in the eastern Alboran Sea, in coincidence with the strong density front at eastern margin of the Eastern Alboran anticyclonic Gyre (Almería-Orán Front). Through a multisensor sea-glider mission supported by modeled and remotely-sensed data, the project aims to study the impact of frontal dynamics on the Phytoplankton production and distribution as inferred from fluorometric measurements. Further, the mission will be accomplished in concomitance to another multi-platform (Ship-based CTD, model, bottles analysis) experiment (already planned by IMEDEA) that will contribute to have a wider and more complete data-base to study the processes of interest.

C) Main achievements and difficulties encountered (max. 250 words) (9)

The proposed samplings were successfully performed. Adverse circumstances (not concerning the project itself) obliged PI to access the facility and the data only remotely. This did not compromise in any way the success of the sampling and the achievement of the results. Main objective (study the frontal role on distribution of phytoplankton during DCM period) was successfully achieved. The data have been processed together with other data sources.

D) Dissemination of the results (10)

A short communication is in preparation to be presented in the next international conferences (e.g. ASLO 2015 in Granada; EGU 2015 in Wien). At least one full paper, to be submitted in a peer reviewed journal, will be prepared and discussed together with owner facilities and other participants to the multidisciplinary and multiplatform oceanographic cruise.

E) Use of the Infrastructure/Installation (11)

	In situ	By remote
Nr. of Users involved		2
Access units (days/months/etc)		6 days
In situ stay day / Remote Access duration		6 days

F) User project scientific field

Main field (12)	Earth Sciences & Environment
Scientific description (13)	Marine Science/Oceanography

H) Technical and Scientific preliminary Outcomes (max. 2 pages) (14)

The sampling was conducted, between May 25-30, in concomitance with the ALBOREX cruise (performed in the framework of Perseus EU project). Alborex was a really successful multiplatform and multidisciplinary experiment. It encompassed the use of CTD casts, the sampling of water bottles, the use of surface gliders and ARGO floats as well as the use of two SLOCUM gliders sampling the eastern Alboran sea (Western Mediterranean, near Gibraltar strait).

One of the glider (a_deep) was programmed to perform deep dives, up to 1000 meters depth, while the FRIPP (present experiment for the Jerico proposal) glider (a_coast) was planned to dive only up to 200 m depth. This because for the current proposal we were interested particularly in surface and subsurface dynamics, not exceeding such a depth. This sampling plan, limiting the depth of the dive to surface layers, allowed to cover a longer linear distance and also to have a finer resolution in the horizontal plane.

The glider used is known as ICOAST00 (a.k.a unit-050). ICOAST00 is an electric glider model SLOCUM which was manufactured by Teledyne Webb Research and delivered to IMEDEA in 2007. It is a 1st Generation shallow glider with a maximum operative depth of 200m (G1-200m). In spite of the fact that it was the second ever delivered Slocum unit in Europe, it has undergone through various upgrades and refurbishments to assure its operability and compatibility with newer versions. The most remarkable characteristics of ICOAST00 are:

- Mechanical buoyancy pump (higher manoeuvrability than hydraulic pumps)
- Powered by an Alkaline battery kit (2 packs: Pitch and Roll. Total of 140Ah of capacity)
- Communication Arsenal: GPS, RF-modem, ARGOS PTT and IRIDIUM modem
- Payload Sensors:
    - FLNTU (manuf. By Wetlabs, s/n: 696). Last calibration: Februay, 2011[1]
    - CTD (manuf. By SeaBird, s/n: 2637). Last calibration: Februay, 2011[1]
    - OXY (manuf. By AADI, s/n: 429). Last calibration: Februay, 2011[1]

[1] Sensors had not been put into the water since that last calibration. The reason is that a vital part of the glider, the compass, which had been discontinued already, broke down so the vehicle needed an important upgrade. After that repair (Glider returned in August 2013), U050 remained stored until entered ALBOREX Sea-Trials

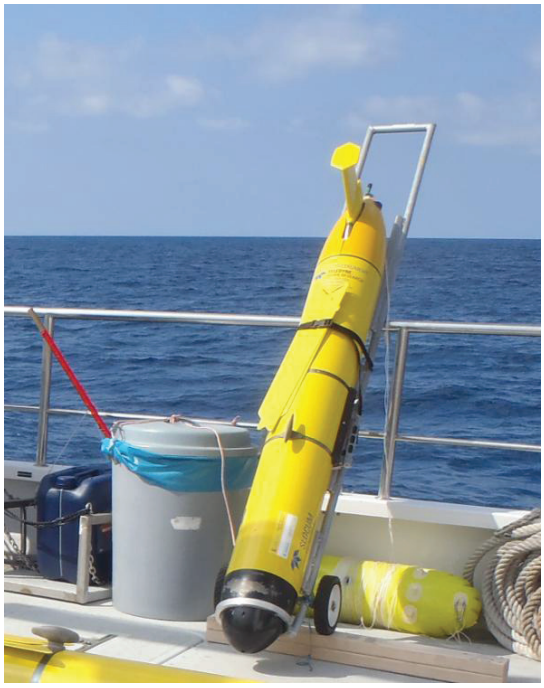

Fig. 1 – ICOAST00, on board SOCIB-R/V, in position of Communications test and preliminary remote configuration (from on-shore Glider Control Centre at IMEDEA)

In this preliminary phase, glider data from the FRIPP experiment (a_coast) were elaborated with the support of high resolution satellite image collected by MODIS (on board of TERRA and AQUA satellites) sensor. MODIS level-2 single swaths provide both infrared derived products (like SST) and ocean colour products (Chlorophyll-a concentration for example). The glider travelled (considering the distance over ground) for more than 125 km in about 6 days (May 25 to May 30, 2014).

Raw data are post-processed for automatic quality check and for the correction of systematic errors due to sensors and to the sampling platform. This was done through a software specifically designed for this purpose named Glider Toolbox (Garau et al., 2011). The software is able to apply many corrections to the raw data, as for example the one due to the thermal lag which is normally present when un-pumped CTD are mounted.

In figure 2 the path of the glider is superimposed on a Chlorophyll-a map from MODIS-AQUA relative to May 29, 2014. The map, as well as other maps relative to the cruise period, shows the presence of a big coastal anticyclonic meander along the African coast. This could be considered as an Eddy at the early stages of its life that was recently formed, probably by baroclinic instabilities, from the main eastward current flow of Atlanti waters. This was also evidenced by analysing a series of satellite images preceding the cruise. The weeks before the cruise the newly born eddy moved toward the Spanish coast and, just some days before the cruise it started to “come back” towards the African coast. This eddy shows its signature in terms of Chl-a above all along its margins, as usually happens for anticyclones. It also seem to capture a coastal filament of relatively CHl-a rich waters from the Spanish coast.

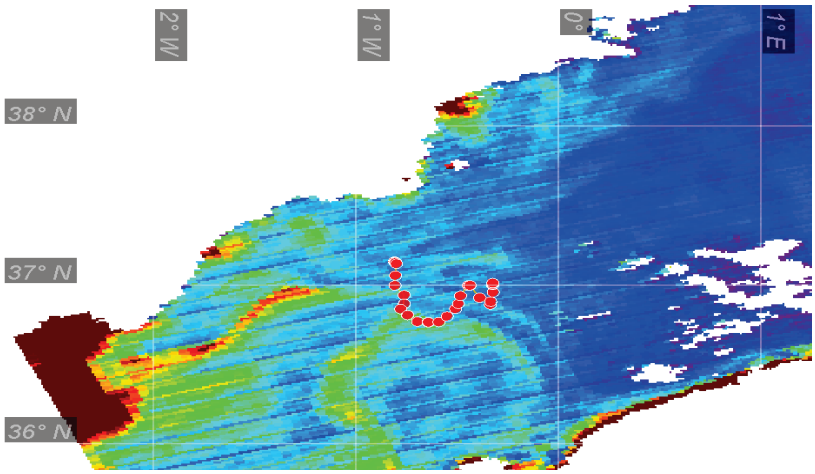

Fig.2 – Red dots represent the path of the glider (west to east). Chl-a image is relative to May 29, 2014. The presence of a large coastal meander is evicenced near the African coast, while a second filament seems to detach from the Spanish coast.

In Figure 3, Chl-a, density, temperature and salinity (a, b, c, d respectively) sections for the upper 100 meters are shown. A strong modulation of the Chl-a is evidenced, as expected, to be in relation to the sub-mesoscale structures activity. The DCM is placed on average at about 50 m depth, but subsidence can be observed at the margins of the eddy, both at the western and eastern part of the transect. The density front is mostly due to the salinity gradient generated by the encounter of local waters with waters of Atlantic origin present in the eddy interior. This sharp gradient is responsible for the occurrence of subsidence events at eddy margins. Such subsidence areas are especially evident in terms of Chl-a signature. A deeper insight on such processes will be given by calculating vertical velocities, which will provide useful suggestions on vertical processes influencing the distribution of biological tracers. Further, the concomitant use of data coming from other platforms (CTD and the second glider) will provide a better view of the dynamics occurring in the area.

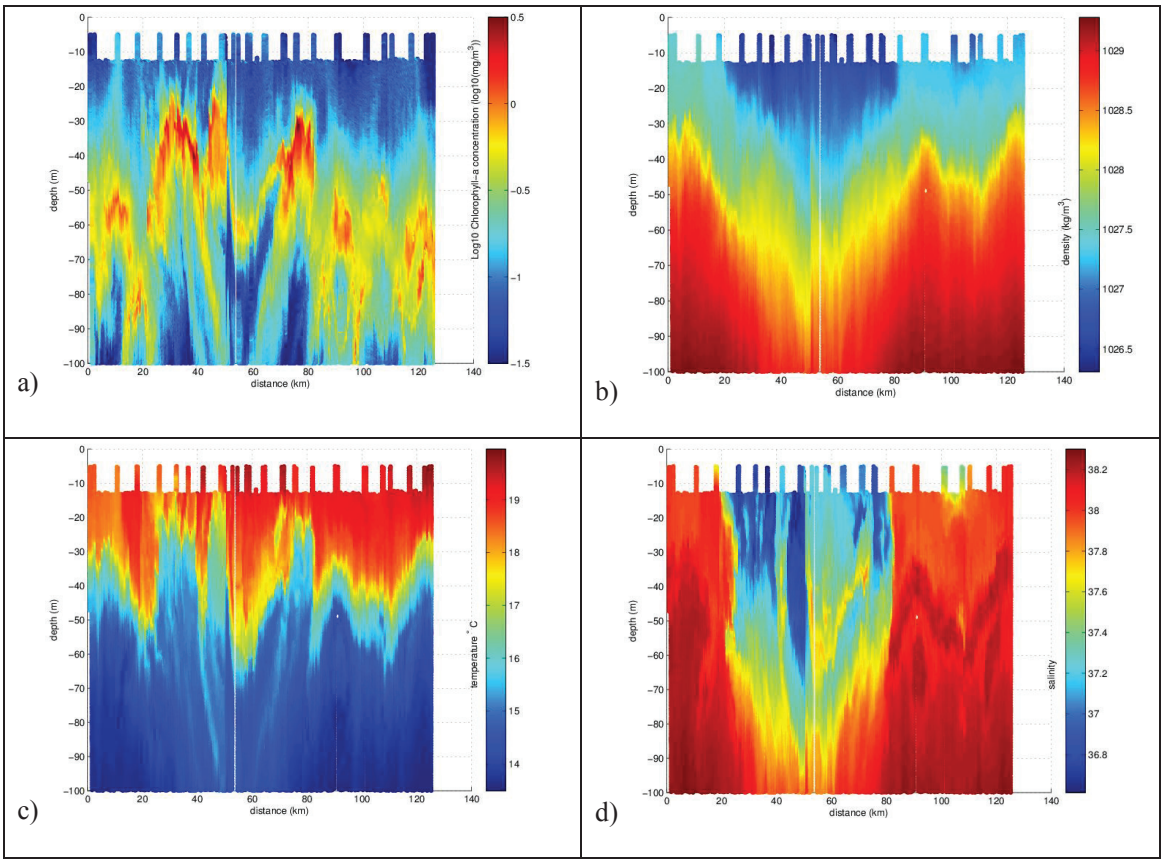

Fig.3 – Vertical sections for log10(Chl-a), Density, Temperature, Salinity (respectively a, b, c, and d panels).

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Guidelines for the TNA Project Report

This report is due within one month after the completion of the JERICO TNA project by the User Group Leader (P.I.) and should be submitted to the **JERICO TNA Office** (**jerico.tna@ismar.cnr.it**) and the **Scientific Site Coordinator** at the hosting facility with a copy to the **JERICO Coordinator** (**jerico@ifremer.fr**).

An online "user group questionnaire" has also to be completed by each **Group Leader** of a user-project supported under JERICO as soon as an experiment has come to an end - you will find it here: **http://cordis.europa.eu/fp7/capacities/questionnaire_en.html#fnote**.

NOTES:

Refunding of the TA reimbursement will be processed as soon as the JERICO TNA Office, the Scientific Site Coordinator and the JERICO Coordinator will received this report.

Part of the information collected with this report will be used to fill in the European Commission MS Access database. Following article 4.4.2, the User Group PI will be asked by the JERICO Coordinator to update it at the reporting deadlines.

Notes for the compilation

(1) It is the reference number assigned to the proposal by the TNA-Office.

(2) It is the user-project identifier and must be unique under the grant agreement and for its lifetime. The length cannot exceed 20 characters.
(3) Title for the approved proposal. The length cannot exceed 255 characters.
(4) 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.
(5) Specify starting and end date of the project (including eventual preparatory phase before the access).
(6) Fill with the full contact of the Principal Investigator (user group leader).
(7) List the full users team (name and affiliation) that made direct use (physically or remotely - please specify) of the installation/infrastructure under the direction of the group leader.
(8) Write the short-term, medium and long-term objectives of project. Use no more than 250 words.
(9) 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.
(10) Describe any plan you have to disseminate and publish the results resulting from work carried out under the Transnational Access activity in JERICO: scientific articles, books - or part of them -, patents, as well as reports and communication to scientific conferences, meetings and workshops. Highlight peer-reviewed publications. Users supported under the transnational access activity are encouraged, as far as possible, to make available on open repositories their publications. Acknowledgement to EC and JERICO is requested following article 4.5 of the “End-User“ Agreement.
(11) Indicate the number of users involved in the activity (the P.I. plus the users described at point 6), the amount of access to the installation/infrastructure and the length of in-person stay at the installation or the operator laboratory (e.g. for preparing the experiment).
(12) See Annex, First column.
(13) See Annex, Second column.
(14) Describe in detail results and main findings of your experiment at the present stage.

Annex of the TNA Project Preliminary Report - User-Project Scientific fields

Main field	Scientific description
Physics	Astronomy/Astrophysics/Astroparticles Atomic & molecular physics Condensed matter physics High energy and particle physics Nuclear physics Plasma physics Quantum electronics & optics Other - Physics
Chemistry	Chemistry
Life Sciences & Biotech	Food quality & safety Agriculture & Fisheries Medicine Veterinary sciences Molecular & cellular biology Other - Life Sciences & Biotech
Earth Sciences & Environment	Global Change & Climate Observation Ecosystems & Biodiversity Natural Disaster & Desertification Marine Science/Oceanography Water Science Hydrology Other – Earth Science Other – Environment
Engineering & Technology	Aeronautics Space New production processes Nanotechnology & Nanosciences Transport Other - Engineering & Technology
Mathematics	Mathematics
Information & Communication Technologies	IST for citizens, businesses & organizations Trust & Security Communication & Networks Computing & software technologies Components & Micro-systems Knowledge & interface technologies Other - ICT
Material Sciences	Knowledge based multifunctional materials Other - Material Sciences
Energy	Sustainable energy systems Fusion Other - Energy
Social Sciences	Economics Political Sciences Educational sciences Law Demography Other - Social Sciences
Humanities	Arts Hystory Languages Other - Humanities