Glider Mission Summary Report

CAMPAIGN**2015**
SOCIB_glider_facility

SOCIB_ABACUS-II_OCT2015 (GR-MR-0040)

SOCIB

Balearic Islands
Coastal Observing
and Forecasting
System

Mission Name	SOCIB_ABACUS-II_OCT2015(GF-MR-0040)
Platform Model	*Slocum 1000 G2*
Platform ID / Name / WMO Code	*U243 / SDEEP00 / 68457*
Related Platforms / Missions	• *SOCIB-R/V (Canales-Autumn & ALMO missions)* • *IMEDEA glider IDEEP00 (SOCIB GF-MR-0041 mission)* • *Profiler drifter IME-APEX002 (wmo 6900662)* • *Profiler drifter SCB-APEX005 (wmo 6901243)*
Start Date	*2015-10-19*
End Date	*2015-12-11*

Total Days	54	Total distance (Km / Nm)	*1091 / 590*

Survey Area (NODC or SDN region)	*Mallorca-Algeria Channel (Algerian Basin[A.B.], Mediterranean Sea)*
Objective(s)	• *To continue the time series of oceanographic data collected in the A.B. along the track between Mallorca and Algeria during the ABACUS project in 2014* • *To identify the physical and biological properties of the surface and intermediate water masses between Balearic islands and Algerian coasts* • *To understand 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 in situ data* • *To measure water properties within any mesoscale eddy*

Scientific Sensors (name & model / serial_number / calibration date)	• *GPCTD -SBE- / sn 0064 / 24-Nov-2014* • *FLNTUSLC -WetLabs- / sn3711 / 22-Oct-2014* • *OPTODE -Aandera- / sn 1409 / 18-Jun-2014* *(calibration sheets available upon request to glidertech@socib.es)*
Number of Profiles	*1155 (CTD), 1158 (FLNTU), 1155 (OXY)*
Significant Events	• *3rd mission in 2015 by SDEEP00 (Unit 243)* • *1st Open-Access mission in 2015* • *EDDY sampling and SARAL overflown, 2 cross-channel sections* • *30 hrs 'black-out' (no Iridium calls due to secondary dockserver problem)* • *G2 glider powered by TWR Lithium battery pack* • *Very good overall performance (neither critical aborts nor errors)* • *Demo Mission concatenated within the same deployment (Cabrera-SWOT2015 designed by ananda.pascual@imedea.uib-csic.es)*
Mission Summary	*This mission stands for the 2nd iteration of the Abacus Mission (1st one was in 2014) although, in this case, carried out in the framework of SOCIB's Open-Access program.* *There is a <u>Pre-mission Report</u>, created prior to the start of the preparations, compiling the key preliminary aspects of this GF-MR-0040 derived from planning sessions (including multiple meetings).* *<u>Preparation</u> phases were executed between 22/Sept to 16/Oct. All the checks and configurations were undertaken according to the pre-mission-report and applying protocols. There were no relevant issues nor problems worth to be mentioned here. Compass error was measured in a EMI-free forest location and harbor test executed on-board SOCIB-R/V (wet test to check buoyancy).* *<u>Launching</u> operation (19/Oct) was executed by 1 ETD-member field-team and 1GF-member on board 7-m RIB; departing from Portocolom harbor. Glider was released in N39.2781° E3.2788° at 10:05am,utc. The deployment was a operative and tactical success (environmental conditions were very good). Pilot was remote (IMEDEA). Glider executed successful test dives.* *The <u>survey period</u> was, in general terms, very successful. Main <u>preliminary aspects</u> were accomplished although there were running-changes influenced by the presence of mesoscale structures (Eddies) and other contour factors. Null critical situations provoked the absence of emergency actions. <u>Navigation</u> was satisfactory and adjusted to programmed route. Main achievements were: (1) Two legs crossing the Mallorca-Algeria channel, (2) Two attempts of Eddy sampling and (3) synoptic sampling with SARAL satellite [1]. Multiple waypoint lists were configured and waypoints accomplished satisfactorily. <u>Important</u>: Algerian national waters were strictly respected during the whole duration of the survey. <u>Underwater maneuvers</u> were executed accordingly to a configuration that changed multiple times for (1) engineering reasons (initial dives to 250m, 500m and 750m to test pressure resistance; and some false sea-floor detections by the altimeter during the last 3 days of mission); and (2) to adapt to the scientific interests (see Chart 1 for details). Data logging during <u>sampling</u> seems to have been successful and according to details shown in Chart 2 (normal and non-critical oddities raised by Science-Payload and FLNTU sensor).Surface maneuvers occurred every 6 hours (average), lasted 5 to 20 minutes and allowed the vehicle to send telemetry and sampled-data as well as receive commands.*

Energetically, the power source (Primary Lithium Batteries) behaved perfectly being stable and fully capable of fulfilling the requirements of all the on-board systems. Electro-Mechanical actuators and sensors exhibited a more than acceptable performance (but Oddities raised by buoyancy-pump and digifin).Communication systems were reliable and fluent although (1)there was a 30-hour 'blackout' on Iridium connections due to a failure in the secondary Dockserver; and (2) the occurrence of some false sea-floor detections forced pilots to investigate the performance of the Altimeter although the glider was navigating in >1000m water (see report of concatenated demo-mission). Electronic modules (processors, memory cards, control boards,...) revealed no evidences of problems at all. Moreover, there were no signs of problems derived from the Hull sections nor the hydrodynamic elements attached to those (related aspect noticed during conclusive bench work). Finally, the statistics of device performance concluded that occurred 0 Errors; 24 Warnings (23:GPS, 1:Iridium) and 1526 Oddities (1099:Digifin, 221:De-pump, 83:science-super and 123:Iridium).

No recovery operation is associated to this mission as there was a concatenation with a demo-mission (Cabrera-Swot-2015) conceived by Dra. Ananda Pascual (IMEDEA). The mission reported here conceptually ended at 09:47am-utc, of 11/Dec, in N38.8624° E2.9848°.

The conclusion phase associated to this mission was delayed due to this concatenation and executed once SDEEP00 was recovered and transported (21/Dec) to SOCIB's Glider-Lab (IMEDEA building). During the following 3 days the glider underwent the conclusion procedure mainly focused on (1) general checkout of all devices, assemblies and components (complete disassembly); (2) external-surfaces and sensor cleaning/refurbishment (which was intensive due to the presence of abnormally grown-up 1cm-3cm barnacles. Corrosion was not particularly evident) ; (3) gathered-data backup (direct duplication of memory flash-cards in this case) and uploading to SOCIB's data-center for post-processing; and, finally, (4) preparation for storage and battery removal (this pack will be reused in 2016). After that, the storage status of the vehicle is 'under-repair' due to a problem detected with the Altimeter device (see report of Cabrera-Swot-2015, the demo-mission, for further details on the evidences and origin of this problem). This failure must be reviewed and solved before assigning a new mission to this Unit 243 (SDEEP00).

(Note that although multiple administrative and notification procedures took place during the different stages described above, these have not been reported due to being considered out of the scope of this report. Same applies for multimedia and public-diffusion; and also for accounting).

With respect to the human resources: coordination amongst multiple participants (glider-techs, field-techs, scientists & open-access-users) was fluent and efficient. There were no personal damages and the availability of each member, for all the tasks assigned at each moment, was correct (including on-alert shifts for field intervention and 24/7 glider monitoring during survey).

Detail Charts:

Date (utc)	D_{UTI}	D_{UBI}	T_{UND}	d_{BOT}	N_{DIV}	N_{COM}	t_{UTC}	H_{WPT}
19/Oct @11:07 (M.S.)	*20*	*250*	*21600*	*40*	*∞*	*12*	*4,10,14,20*	*1000*
19/Oct @ 20:00	*20*	*500*	*21600*	*40*	*1*	*12*	*4,10,14,20*	*1000*
20/Oct @ 04:00	*20*	*750*	*21600*	*40*	*1*	*12*	*4,10,14,20*	*1000*
20/Oct @ 10:00	*20*	*950*	*21600*	*off*	*2*	*12*	*off*	*1000*
04/Nov @ 01:19	*15*	*500*	*21600*	*off*	*4*	*12*	*off*	*1000*
16/Nov @ 09:25	*20*	*50*	*1200*	*off*	*2*	*12*	*off*	*1000*
16/Nov @ 10:16	*15*	*500*	*21600*	*off*	*∞*	*6*	*off*	*1000*
02/Dec @ 10:33	*20*	*950*	*21600*	*off*	*2*	*6*	*off*	*1000*
06/Dec @ 07:00	*20*	*950*	*21600*	*off*	*2*	*12*	*off*	*1000*
08/Dec @ 18:27	*20*	*950*	*21600*	*40*	*2*	*12*	*off*	*1000*
11/Dec @ 04:55	*20*	*950*	*10800*	*40*	*1*	*12*	*off*	*1000*

(M.S.): Mission Start
D_{UTI}: Underwater Top Inflection Depth (m)
D_{UBI}: Underwater Bottom Inflection Depth (m)
T_{UND}: Average Period of Underwater Navigation (secs)
d_{BOT}: Minimum Distance to Sea-floor to be kept (m)

N_{DIV}: Surface upon completion of this # of dives
N_{COM}: Surface if this amount of hours without stable communications (hrs)
t_{UTC}: Surface at this particular UTC times
H_{WPT}: Surface if a waypoint is hit within that distance (m)

Chart 1 Summary of Underwater Strategies (Navigation)

Date (utc)	S_{EN}	f_{SMP}	D_{RNG}	M_{DIV}	M_{CLI}
19/Oct @11:07 (M.S.)	*GP-CTD*	*0,5000*	*[-5, 2000]*	*yes*	*yes*
19/Oct @11:07 (M.S.)	*OXY*	*0,2500*	*[-5, 2000]*	*yes*	*yes*
19/Oct @11:07 (M.S.)	*FLNTU*	*0,1250*	*[-5, 150]*	*yes*	*yes*
19/Oct @11:07 (M.S.)	*FLNTU*	*0,0625*	*[150, 300]*	*yes*	*yes*

S_{EN}: Sensor type
f_{SMP}: Frequency of sampling (Hz)
D_{RNG}: Depth range this configuration applies (m)
M_{DIV}: Sampling during Diving maneuver
M_{CLI}: Sampling during Climbing maneuver

Chart 2 Summary of Underwater Strategies (Sampling)

Notes:

(1)SARAL satellite over-flight date: 23/Oct/2015. SDEEP00 was, at the moment of the satellite passing, diving somewhere in between surface-locations [N38° 33.435', E03° 30.622'] and [N38°30.445', E03°31.767']

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Institute	*PARTHENOPE (granted with Glider access)*
Project Affiliation (web-site)	*http://www.socib.eu*
Partnership / Participation	• *SOCIB* • *PARTHENOPE (Naples, Italy)* • *IMEDEA (in-kind contribution of infrastructures)*
Glider Software Version	*v7.13 Acomms*
Data Retrieval (real-time [RT] / delayed-mode [DM])	• *RT: via satellite link every 6 hours, every day* • *DM: direct download of full gathered data sets (flash-cards backup)*
Compass Calibration (specify procedure)	*Error measurement during mission preparation revealed no necessity to perform a compass calibration*
Battery Type	*ELECTROCHEM factory Lithium Pack (700Ah-nominal cap.)*
Battery Consumption (Ah)	*334.2Ah (reading from 0 to 334.2Ah)*
Data Available From	*http://thredds.socib.es/thredds/dodsC/auv/glider/sdeep00-scb_sldeep000/L1/2015/dep0016_sdeep00_scb-sldeep000_L1_2015-10-19_data_dt.nc*
Full Mission Report From	*glidertech@socib.es*
Technical Contact	*glidertech@socib.es*

| **Figure 1** (Map providing general overview of Survey Area)	
On-line Track	http://apps.socib.es/dapp/?deployments=531-30-0-CCFFFF&layers=none&units=scientific

Figure 2 (Map providing detailed overview of Survey Area and traced Flight Path with surface points if possible)	Mission Concatenation: ABACUS-2 ended. Demo-mission (Cabrera-Swot) started. 2nd EDDY sampling attempt (Eastern edge zig-zag and diagonal crossing)	
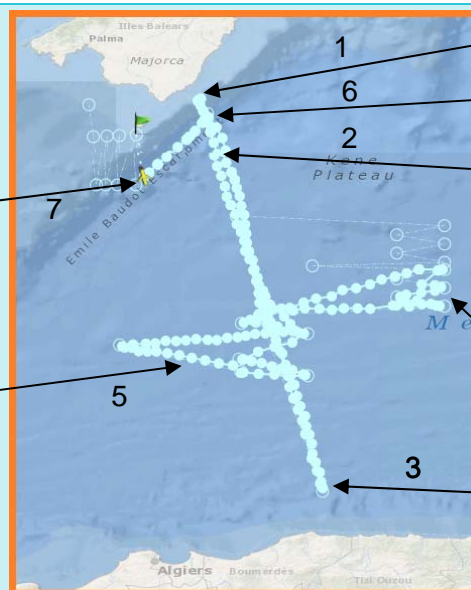
Figure 3

(Compilation of preliminary post-processing plots provided by SOCIB's data-center glider-toolbox and processing services. Contact data.center@socib.es for further info. Plots available through DAPP - See Figure 1 -)

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