Glider Mission Summary Report

CAMPAIGN**2015**
SOCIB_glider_facility

SOCIB_CANALES_NOV2015 (GF-MR-0041)

SOCIB Balearic Islands Coastal Observing and Forecasting System

CSIC

IMEDEA

UIB Universitat de les Illes Balears

GOBIERNO DE ESPAÑA MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

Govern de les Illes Balears

Mission Name		*SOCIB_CANALES_NOV2015 (GF-MR-0041)*		
Platform Model		*Slocum 1000 G1*		
Platform ID / Name / WMO Code		*U184 / IDEEP00 / 68452*		
Related Platforms / Missions		• *SOCIB-R/V (Canales-Autumn & ALMO missions)* • *IMEDEA glider IDEEP00 (SOCIB GF-MR-0041 mission)*		
Start Date		*2015-11-03*		
End Date		*2015-12-21*		
Total Days	*49*	**Total distance (Km / Nm)**		*1099 / 594*
Survey Area (NODC or SDN region)		*Mallorca and Eïvissa Channels (Western Mediterranean Sea)*		
Objective(s)		• *Establishing the variability of the N/S exchange of water masses that occur through the Ibiza Channel(IC). Sampling standard transects across the Ibiza Channel several times using physical and biogeochemical sensors. No greater than 1 month gap in between consecutive iterations. The Mallorca Channel is also sampled when operationally practical.* • *Synoptic contribution to ALMO cruise by SOCIB-R/V and its main objective:Transects across the Northern Current (NC) and sampling across the Almeria-Oran front, in order to look at the role of the IC and the impact of the seasonality/high frequency changes seen in circulation in IC on the Almeria-Oran front/eastern Alboran Sea*		

Scientific Sensors (name & model / serial_number / calibration date)		• *CTD -SBE- / sn 0129 / 25-Jul-2014* • *FLNTU -WetLabs- / sn2128 / 01-Feb-2011* • *OPTODE -Aandera- / sn 0993 / 23-10-2009* *(calibration sheets available upon request to glidertech@socib.es)*
Number of Profiles		*2929 (CTD), 1165 (FLNTU), 1167 (OXY)*
Significant Events		• *1st mission in 2015 by IDEEP00 (last Canales-mission of 2015)* • *Deployed during Canales-Autumn-SOCIB-R/V and synoptic with ALMO-cruise* • *Significant Drifts due to Northern currents in front of Valencia's coast* • *G1 glider powered by SAFT lithium custom packs* • *Very good overall performance (no critical aborts nor errors): few missed calls and missed gps pre-fixes* • *8 Eïvissa-Valencia transects + 1 Eïvissa-Mallorca transect* • *Recovery in Palma's Bay. Dual recovery (IDEEP00+SDEEP00)*
Mission Summary		*This mission stands for the 7th iteration of the Canales Mission within 2015 and the 1st deployment of Unit 184 (IDEEP00).* *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-0041 derived from planning sessions (including several meetings).* *<u>Preparation</u> phases were executed between 20/Oct to 29/Oct. All the checks and configurations were undertaken according to the pre-mission-report and applying protocols. There were neither 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 (03/Nov) was executed by multiple ETD and GF facilities members on board SOCIB-R/V (during Canales-Autumn-2015). Glider was released in N39° 17.828' E02°30.291' at 16:25-utc. The deployment was an operative and tactical success (environmental conditions were very good). Pilot was both local and remote (redundancy). Glider executed successful test dives.* *The <u>survey period</u> was, in general terms, very successful. Main <u>preliminary aspects</u> were accomplished without major setbacks. Null critical situations provoked the absence of emergency actions. <u>Navigation</u> was satisfactory but the presence of N-to-S currents stopped the approach to the Valencian coast and forced the implementation of evasive maneuvers. Main achievements were: (1) Synopticity and multi-platforming (with GF-MR-0040 and ALMO-cruise), (2) eight Eïvissa↔Valencia transects and (3) one Eïvissa↔Mallorca transect. Only the initial waypoint list was followed and waypoints accomplished satisfactorily. <u>Underwater maneuvers</u> were executed accordingly to a configuration that changed multiple times for (1) engineering reasons; 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).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 were some missing calls; and (2) various GPS pre-fixes were also not completed correctly. 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. Finally, the statistics of device performance concluded that occurred 0 Errors; 0 Warnings and 1592 Oddities (988:digifin, 59:de-pump, 133:science-super, 100:coulomb, 75:pitch_motor, 8:ocean_pressure and 229:Iridium). None of these oddity-messages are considered an evidence of an abnormal/critical situation.

The recovery operation associated to this mission was dual (SDEEP00 also recovered) and happened in Palma's bay. It all occurred on 21/Dec, in N39.1564° E2.6411°, at 11:42-utc. The last 2 days of mission were dedicated to navigate from Eïv-Mall end-wpt to recovery location.

The conclusion phase associated to this mission staarted once IDEEP00 was recovered and transported (21/Dec) to SOCIB's Glider-Lab (IMEDEA building). During the following two weeks 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 was "Standing-by & Ready for a new preparation".

(Note that although multiple administrative and notification procedures took place during the different stages described above, these have not been reported because are 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}
03/Nov@17:16(M.S.)	20	950	21600	40	∞	12	5,11,17,21	1000
21/Dec@07:30	20	950	21600	40	4	12	5,11,17,21	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}
03/Nov@17:16(M.S.)	CTD	0,5000	[-5, 2000]	yes	yes
"	OXY	0,2500	[-5, 2000]	yes	no
"	FLNTU	0,1250	[-5, 150]	yes	no
"	FLNTU	0,0625	[150, 300]	yes	no
11/Nov@17:25	OXY	off	-	-	-
	FLNTU	off	-	-	-
	FLNTU	off	-	-	-
21/Nov@17:20	OXY	0,2500	[-5, 2000]	yes	no
	FLNTU	0,1250	[-5, 150]	yes	no
	FLNTU	0,0625	[150, 300]	yes	no

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)

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Institute	*SOCIB in collaboration with IMEDEA*
Project Affiliation (web-site)	*http://www.socib.eu*
Partnership / Participation	• *SOCIB* • *IMEDEA (in-kind contribution of infrastructures)*
Glider Software Version	*Nav : v7.13 Acomms, Payload: 3.17*
Data Retrieval (real-time [RT] / delayed-mode [DM])	• *RT: sub-set via satellite link every 24 hours every day during 12am,lt control-call* • *DM: direct download of full gathered data sets (flash-cards backup)*
Compass Calibration (specify procedure)	*Compass error was measured. Although the vehicle navigated well, re-calibration will be done (See Figure 3.1)*
Battery Type	*SAFT Custom Lithium Pack (430Ah-nominal capacity)* *(With in-house-designed ballasting chassis)*
Battery Consumption (Ah)	*216.543Ah (reading from 2.066 to 218.609Ah)*
Data Available From	*http://thredds.socib.es/thredds/dodsC/auv/glider/ideep00-ime_sldeep000/L1/2015/dep0015_ideep00_ime-sldeep000_L1_2015-11-03_data_dt.nc*
Further Details	*glidertech@socib.es*

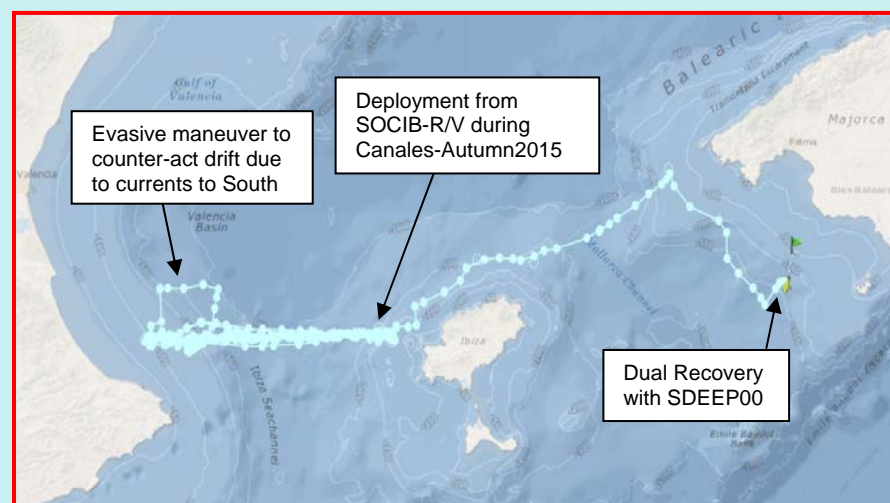| Figure 1 (Map providing general overview of Survey Area)	
On-line Track	http://apps.socib.es/dapp/?deployments=531-30-0-CCFFFF&layers=none&units=scientific

Figure 2 (Map providing detailed overview of Survey Area and traced Flight Path with surface points if possible)	

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 -)
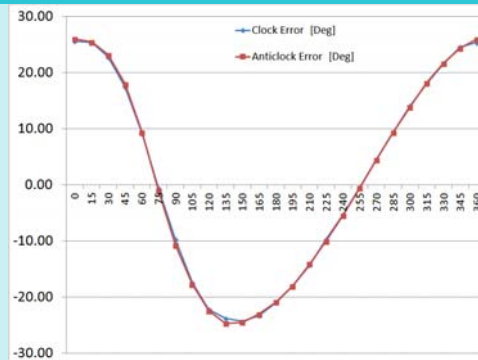
Fig 3.1- Error measured during Compass Error Check procedure in an electromagnetic-field-free environment located in a forest close to IMEDEA (in Esporles)