



Glider Mission Summary Report

PARTHENOPE ABACUS4
SOCIB GLIDING NOV2017 (GF-MR-0066)



Balearic Islands
Coastal Observing
and Forecasting
System



Mission Name		20171107_GF-MR-0066_SOCIB-EXT-ABACUS4-NOV2017_sdeep04	
Platform Model		Slocum 1000m G2	
Platform ID / Name / WMO Code		U567 / sdeep04 / 68997	
Related Platforms / Missions		None	
Start Date		2017-nov-15	
End Date		2017-dic-12	
Total Days	27.8	Total distance (Km / Nm)	589 / 318
Survey Area (NODC or SDN region)		Algerian-Basin (AB) region in between South-Mallorca-Coast and North-Algerian-Coast [Western Mediterranean Sea]	
Objective(s)	<ul style="list-style-type: none">• To continue the time series of oceanographic data collected in the Algerian Basin along the endurance line between Mallorca and Algeria;• 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.		
Number of Profiles	CTD: 843 casts of 850 half-Yos. Overall sampled vertical distance [m]: 306123.0 FLU: 843 casts of 850 half-Yos. Overall sampled vertical distance [m]: 139124.0 OXY: 843 casts of 850 half-Yos. Overall sampled vertical distance [m]: 306009.0		
(name & model / serial_number / calibration date)	<ul style="list-style-type: none">• CTD -SBE- / sn 9289 / 23-Feb-2015• FLNTU -WetLabs- / sn 3934 / 25-Mar-2015• OPTODE -Aandera- / sn 0411 / 21-Jul-2014 (calibration sheets available upon request to glidertech@socib.es)		
Significant Events	<ul style="list-style-type: none">• Abort due to overtime• Deep flying mode: altimeter off		
Mission Summary	<p><u>Pre-mission Report</u> Created prior to the beginning of preparations. It compiles key preliminary aspects of GF-MR-0066 derived from pre-mission planning sessions.</p> <p><u>Preparation</u> Phases were executed between 07/Nov/2017 to 12/Nov/2017. All checks and configurations were undertaken according to the pre-mission-report and applicable protocols. There were neither relevant issues nor problems worth to be mentioned here. The glider was stored at Calanova's hangar waiting for weather good conditions.</p>		

Launching

This field operation (15/Nov/2017) were performed by 1 G-F and 1 ETD using SOCIB I at the south of Cabrera island.

Additionally, glider pilot was remotely acting from IMEDEA. These three teams were in permanent contact by GSM-phones and messaging applications (when possible).

The deployment was an operative and tactical success. Glider executed successful test dives prior to the initial survey dive (regardless the extraordinary elements, the launching protocol was strictly fulfilled).

Survey

In general terms, it was very successful.

- **Navigation:** it was very satisfactory. The glider responded well to the commanded target waypoints.
- **Underwater Maneuvering:** two main configuration was applied during the deployment: deep flying mode during the operative part of the mission in order to reduce consumption; and adaptive flying mode in the rest of the mission in order to avoid collisions with seabed.
- **Engineering**
 - Power Source: (Lithium Eltec battery pack). Dummy Pitch battery. It performed very well.
 - Electro-Mechanical: actuators and sensors exhibited an acceptable performance. Besides normal Oddities raised by Digifin, numerous. This 'out of deadband' are due to the imprecision of the micro-positioning of the pump which is probably a cause of fatigue and age of the device. Device Error-Statistics:
 - 3 Errors (attitude_rev) ;
 - 68 Warnings (4 GPS, 1 attitude_rev 2 science_super, 60 digifin, 1 Iridium)
 - 798 Oddities (66 science_super, digifin 568, 162 iridium).
 - Communication Systems: were reliable and fluent.
 - Electronic Modules: (processors, memory cards, control boards,...) revealed no evidences of problems but the mentioned "Ring Buffer Overflow" problem occurred in Science-Super.
 - Contextual/Awareness Sensors: pressure transducer, internal vacuum and internal temperature seemed to have worked correctly. Compass also reported coherent values. Altimeter detected the bottom correctly.
 - Hull/Hydrodynamics: no signs of problems.
 - Mission Runs: 2 missions runs due to 1 overtime_abort. No significant event

Recovery

In this case, a new behaviour was loaded in order to simplify recovery operation.

Administration/Notification

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 (special and more intense actions taken in that aspect. Contact gliderteh@socib.es and outreach@socib.es for specific information); and also for accounting.

HHRR

Once more, the novelties and exigencies of this mission required of an extraordinary team coordination (with more people involved and number of intra-communications). Nevertheless, coordination amongst multiple participants (glider-techs, field-techs, scientists & outreachers) 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 -which was more intense than usual-). Interaction with external partners was also very fruitful.

Detailed Charts:

Date (utc)	15/nov	13/nov
Underwater Top Inflection Depth (m)	15	
Underwater Bottom Inflection Depth (m)	950	
Average Period of Underwater Navigation (secs)	27000	3600
Minimum Distance to Sea-floor to be kept (m)	40	
Surface upon completion of this # of dives	∞	
Surface if this amount of hours without stable communications (hrs)	12	
Surface at this particular UTC times	5,11,17,21	
Surface if a waypoint is hit within that distance (m)	1000	

Chart 1 Summary of Underwater Strategies (Navigation)

Date (utc)	SEN	fSMP	DRNG	MDIV	MCLI
(from Mission Start to Mission End)	CTD	0,5000	[-5, 2000]	yes	yes
	OXY	0,5000	[-5, 2000]	yes	yes
	FLNTU	0,5000	[-5, 250]	yes	yes

SEN: Sensor type
 fSMP: Frequency of sampling (Hz)
 DRNG: Depth range this configuration applies (m)
 MDIV: Sampling during Diving maneuver
 MCLI: Sampling during Climbing maneuver

Chart 2 Summary of Commanded Sampling Strategies

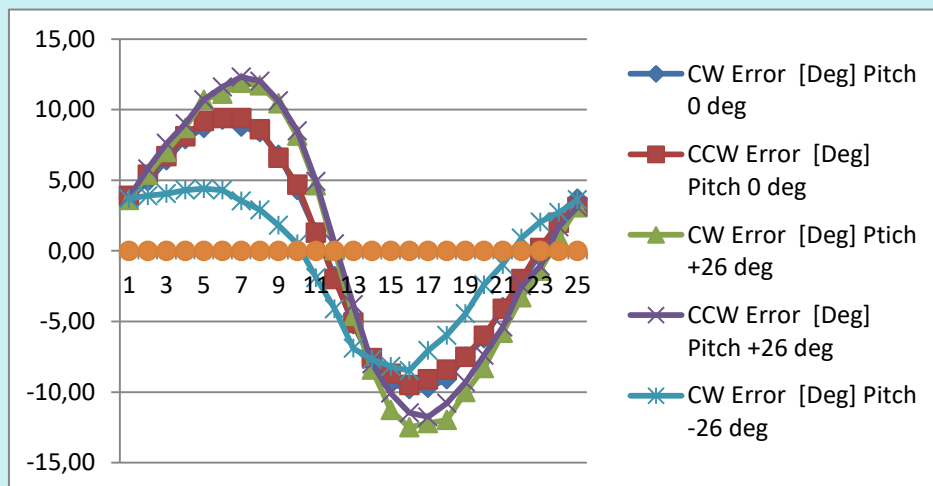


Figure 1-Error measured during Compass Error Check procedure in an electromagnetic-field-free environment located in a forest close to IMEDEA (in Esporles)

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Institute	<p>SOCIB in collaboration with IMEDEA</p> <p>Università di Napoli Parthenope Dipartimento di Scienze per l'Ambiente Tel.: +39-081-5476584 FAX: +39-081-5476515 Centro Direzionale, Isola C4 80143 Napoli (Italy)</p>
Project Affiliation (web-site)	<p>http://www.socib.eu http://www.jerico-ri.eu/infrastructure/socib-glider-facility/</p>
Partnership / Participation	<ul style="list-style-type: none"> • PARTHENOPE (Jerico-Next-TNA granted team) • SOCIB (Accessed Infrastructure) • IMEDEA (in-kind contribution)
Glider Software Version	Nav : v7.13 Acomms, Payload: 3.17
Data Retrieval (real-time [RT] / delayed-mode [DM])	<ul style="list-style-type: none"> • RT: sub-set via satellite link at each surface maneuver • DM: full/direct memory card backup after glider disassembly during Conclusion mission-phase
Compass Calibration (specify procedure)	<p>Compass error was measured. Observed error followed a well-known sinusoid-shape although the glider followed traced-route very well(See Figure 1). Re-calibration is needed.</p>
Battery Type	Eltec lithium Battery Pack (300Ah-nominal capacity) (Brand new)
Battery Consumption (Ah)	114.7Ah (reading from 0Ah)
Data Available From	http://thredds.socib.es/thredds/catalog/auv/glider/sdeep04-scb_sldeep004/L0/2017/catalog.htm
Further Details	glidertech@socib.es

General Map

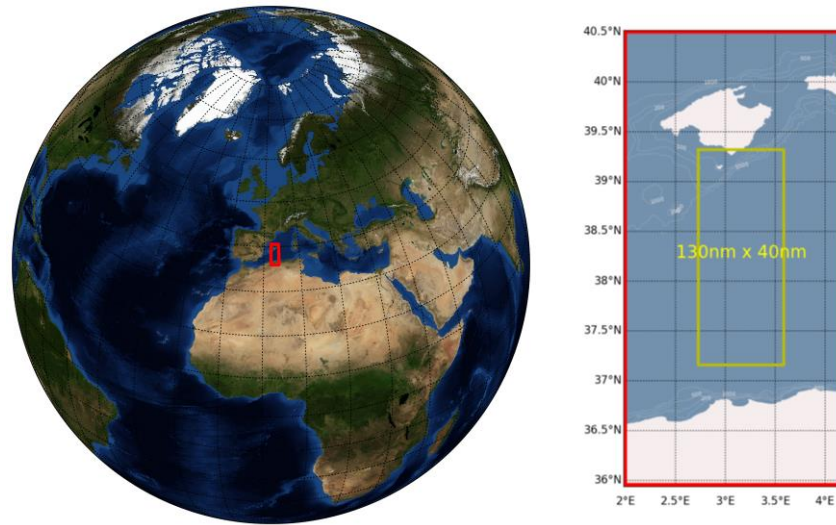
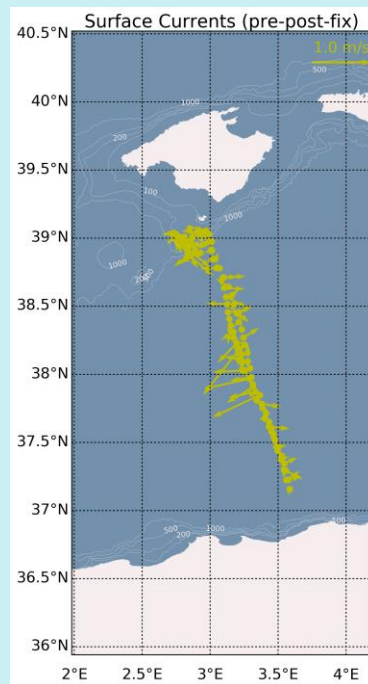


Figure 2 - Map providing general overview of the Survey Area

On-line
Track

<http://apps.socib.es/dapp/?deployments=774-29-0-CCCC99&layers=none&units=scientific>

Detailed Maps



Scientific Preliminary Review

CTD

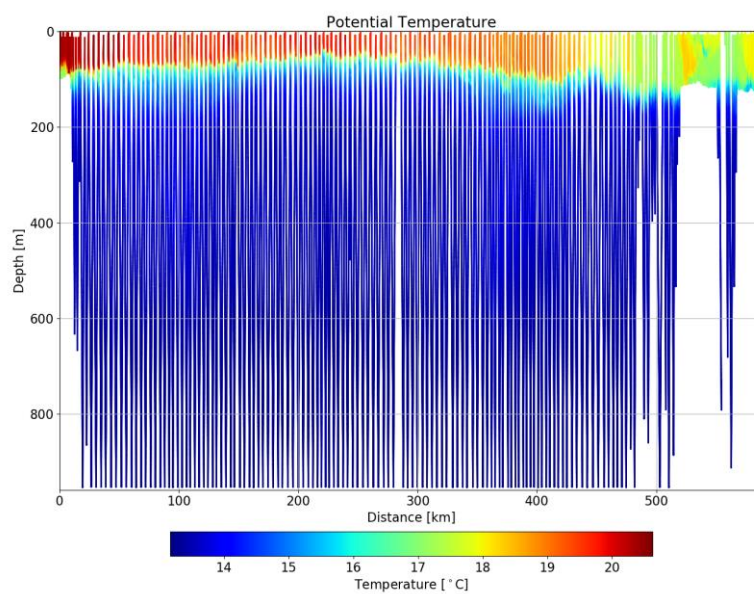


Figure 3 - Potential temperature (full depth range)

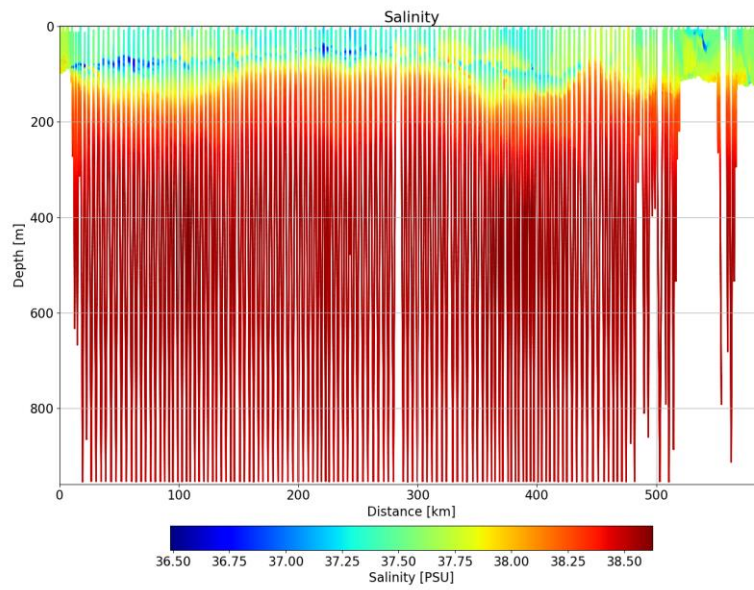


Figure 4 - Corrected salinity (full depth range)

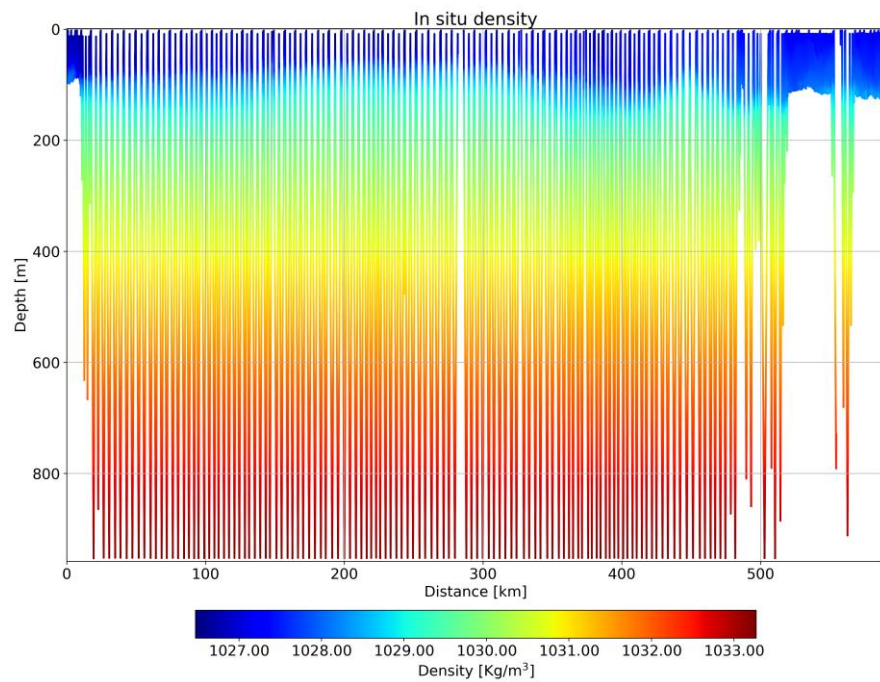
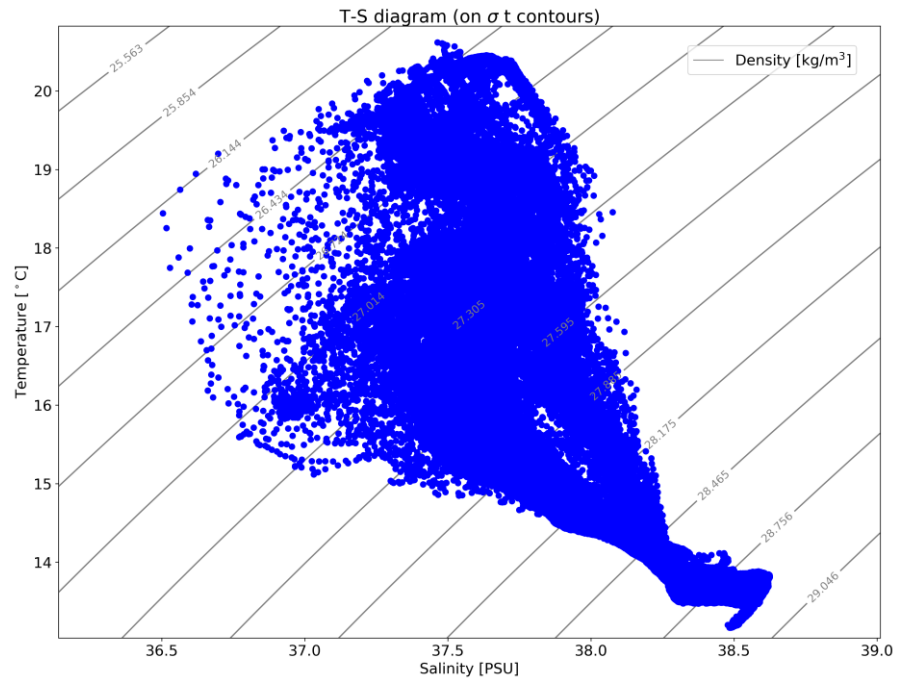


Figure 5 – In-situ Density derived from corrected salinity and temperature (full depth range)



Plot 4 – T-S diagram (thermal-lag corrected)

OXYGEN

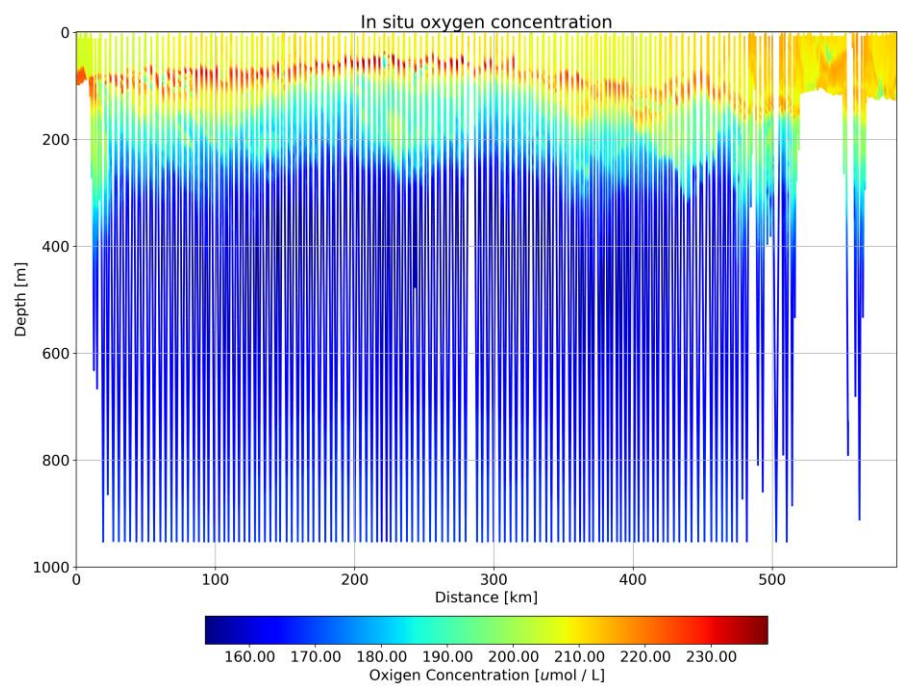


Figure 6 - In-situ oxygen concentration

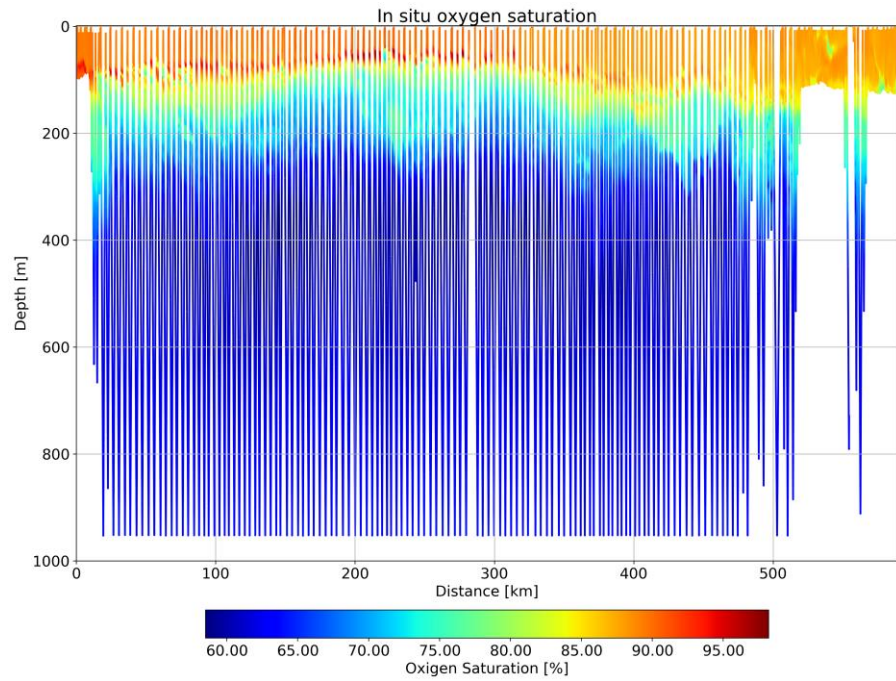


Figure 7 - In-situ oxygen saturation

TURBIDITY & CHLOROPHYLL

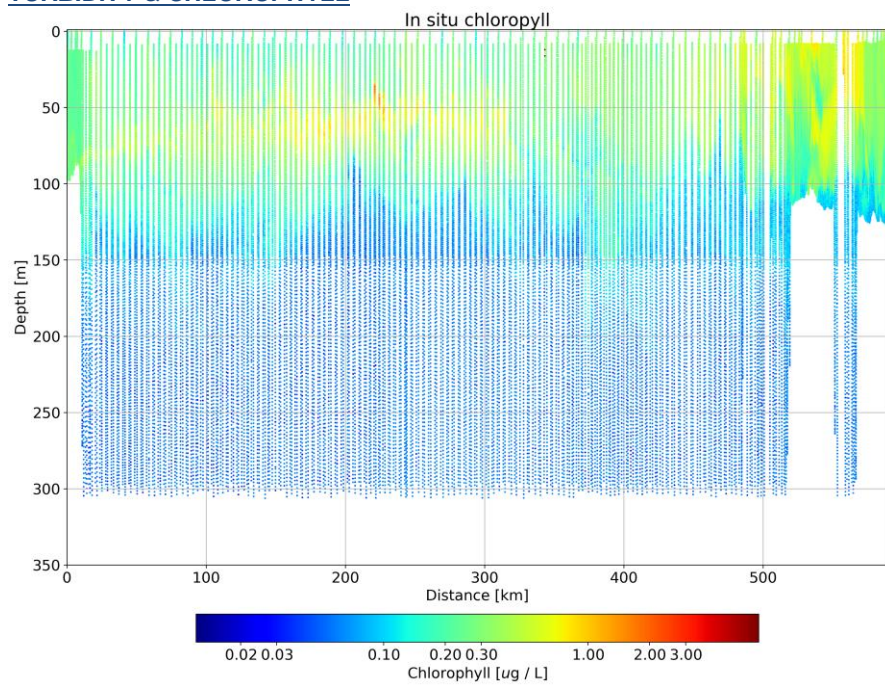


Figure 8 - In situ chlorophyll

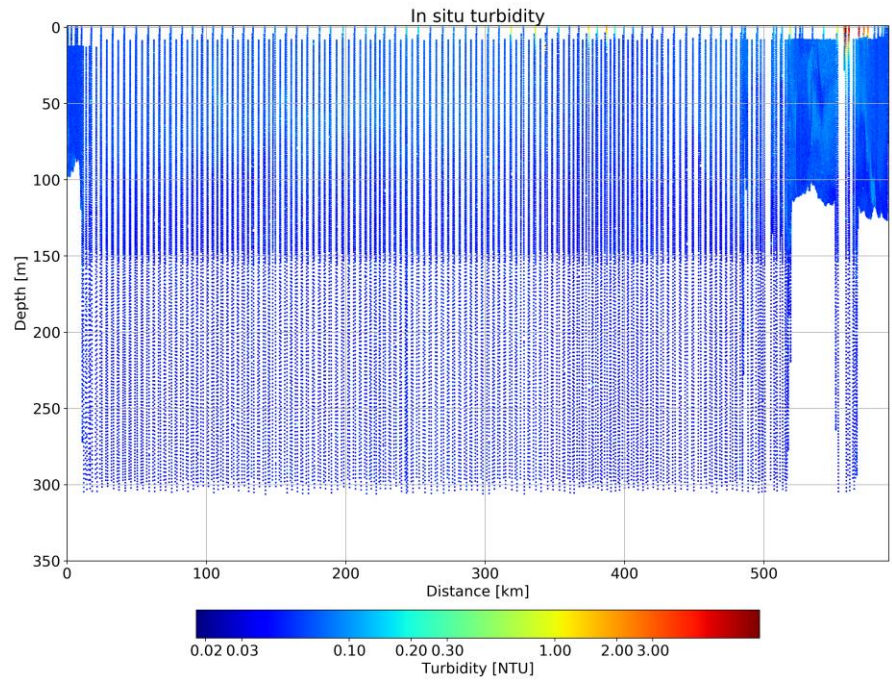


Figure 9 – In situ turbidity