

SOCIB Glider Mission Summary Report

SOCIB_preCALYPSO21.B_20210308_sdeep08_GFMR0111

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Balearic Islands
Coastal Observing
and Forecasting System



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1 Introduction

The aim of this document is to summarize the most significant technical and scientific events during the glider mission. It will explain engineering events that could affect the science data and also some fact from the science point of view.

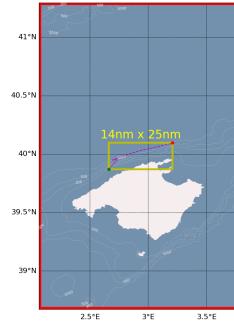


Figure 1.1: Map providing general overview of the Survey Area

1.1 Summary

Mission name	SOCIB_preCALYPSO21.B_20210308_sdeep08_GFMR0111
Platform model	G3 Electric
Platform ID / Name / WMO Code	U829/ sdeep08/ 6801639
Software NAV version	Version 10.02 tags/V10.02-0-gfdea92ab (0, 1)
Software SCI version	Version 10.02 tags/V10.02-0-gfdea92ab (0, 1)
FWD bay sn	0526
SCI bay sn	1350
Mission duration	2.1 days
Mission start	2021-03-08 12:00:00
Mission end	2021-03-10 13:36:43
Total distance	63.6[km] 34.34[nm]
Deployment point [dd°mm.mmmm']	N 39°52.3329' E 02°39.7435'
Recovery point [dd°mm.mmmm']	N 40°05.8468' E 03°12.4612'
Battery Consumption (Ah)	13.5(from 2.2 to 15.7)
Battery specification	20210111 SN045/ TWR 4S lithium (550Ah)
Survey area	North Soller
Objetive	The broad objective is to test the new glider U829 and also to optimize multi-platform observing and analyze high-resolution simulations to quantitatively determine the three-dimensional coherent pathways for the transport of both passive and active water properties between the surface and the deep ocean.
Abstract	Deployment of Slocum G3 deep glider sdeep08 in FUTURE endurance line GIRONA MAR2021 (SOCIB operational program), aiming the coverage of the Girona channel (8 transects) from MAR to APR 2021, sampling physical and biogeochemical parameters (CTD, BSK, fluorescence and turbidity, oxygen, and PAR).
NAV events	<ul style="list-style-type: none"> ▪ Event 1: This is the first mission of this glider. ▪ Event 2: CANCELED due to leak on the digifin ▪ Event 3: STALLED ABORT detected on March 8th
SCI events	<ul style="list-style-type: none"> ▪ Event 1: No relevant SCI data.

1.2 Metadata

*Available netCDF data product:

- L0: https://thredds.socib.es/thredds/fileServer/auv/glider/sdeep08-scb_sldeep008/L0/2021/dep0001_sdeep08_scb-sldeep008_L0_2021-03-08_data_dt.nc
- L1: https://thredds.socib.es/thredds/fileServer/auv/glider/sdeep08-scb_sldeep008/L1/2021/dep0001_sdeep08_scb-sldeep008_L1_2021-03-08_data_dt.nc
- L2: https://thredds.socib.es/thredds/fileServer/auv/glider/sdeep08-scb_sldeep008/L2/2021/dep0001_sdeep08_scb-sldeep008_L2_2021-03-08_data_dt.nc

Principal Investigator	Prof. Joaquim Tintoré jtintore@socib.es (+34 971439821)
Institute	SOCIB
Project Affiliation (web-site)	http://www.socib.eu/
Campaign access type	Colaborative
Partnership / Participation	<ul style="list-style-type: none">▪ SOCIB
Data Retrieval	<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
Data Available From*	http://thredds.socib.es/thredds/catalog/auv/glider/catalog.html
DOI (if available)	https://doi.org/10.25704/jd07-sv9
Further Details	glider@socib.es

2 Engineering Review

2.1 Preparation

- Premission: ok, First mission for U829
- Hardware: ok
- Batteries: ok
- Comms: ok
- Science: ok
- Ballasting: ok
- Sealing: ok
- Fileset: ok
- CEM: na
- Harbor check: ok
- Recovery: ok
- Conclusion: ok

2.2 Mission Survey

- Deployment:
 - Vessel: Valiant
 - Personnel: 2 ETD + 1 GF (field team)+ 1 GF (piloting)
 - Location: Pto. Soller
- Navigation: The glider responded well to the commanded target waypoints.
- Underwater Maneuvering: Performed well
- Engineering sensors:

Sensor	Oddities	Warnings	Errors
science super	2	0	0
digifin	41	6	0
IRIDIUM	20	0	0

- Communication Systems (see appendix for Iridium states):
 - Total number iridium calls [num]: 35
 - Iridium calls to secondary [num]: 2
 - ON overall iridium period [h]: 1.4
 - Iridium calls state from MODE NO CARRIER to MODE UNKNOWN [num]: 11
 - Iridium calls state from MODE OK to MODE UNKNOWN [num]: 1
 - Iridium calls state from MODE CONNECT to MODE UNKNOWN [num]: 24
 - Iridium calls state from MODE ERROR to MODE UNKNOWN [num]: 6
 - Iridium calls state from MODE UNKNOWN to MODE AWAITING OK [num]: 42
 - Drop calls (Iridium state from 2 to 99 with c iridium on = 1) [num]: 5

- Total time at surface [h]: 3.55
- Total time at surface [%]: 7.16
- Hull/Hydrodynamics: No signs of problems
- Recovery:
 - Vessel: SOCIB I
 - Personnel: 2 ETD + 1 GF (field team)+ 1 GF (piloting)
 - Location: Pto. Soller

2.3 NAV plots

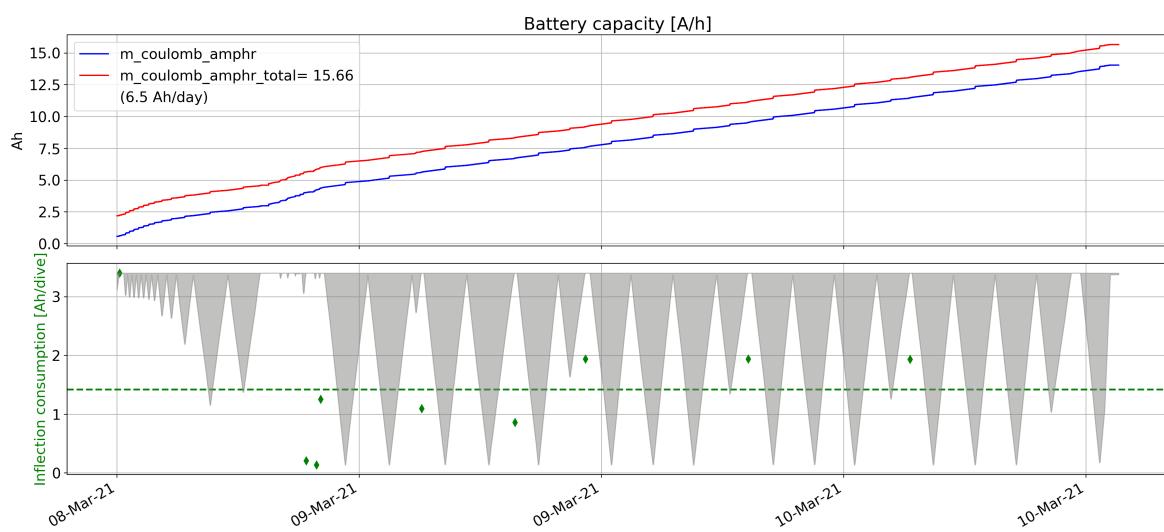
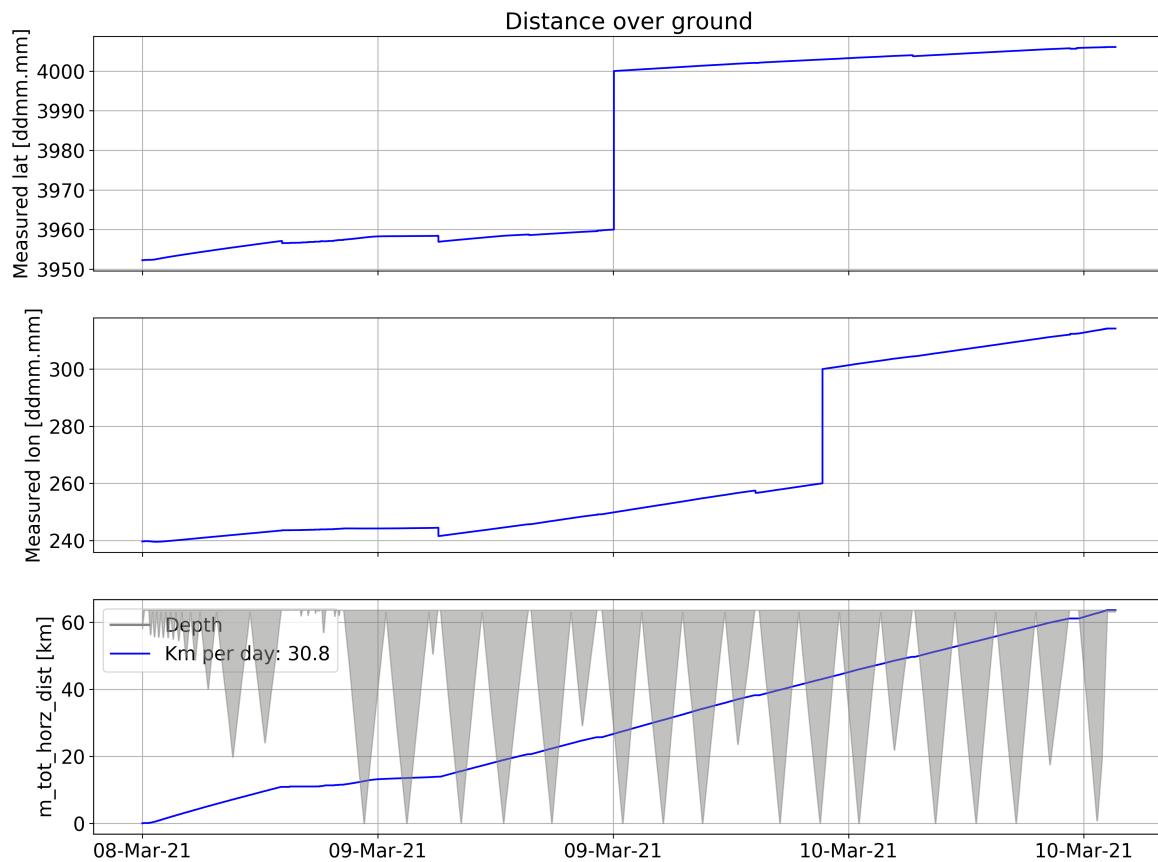


Figure 2.1: Battery capacity



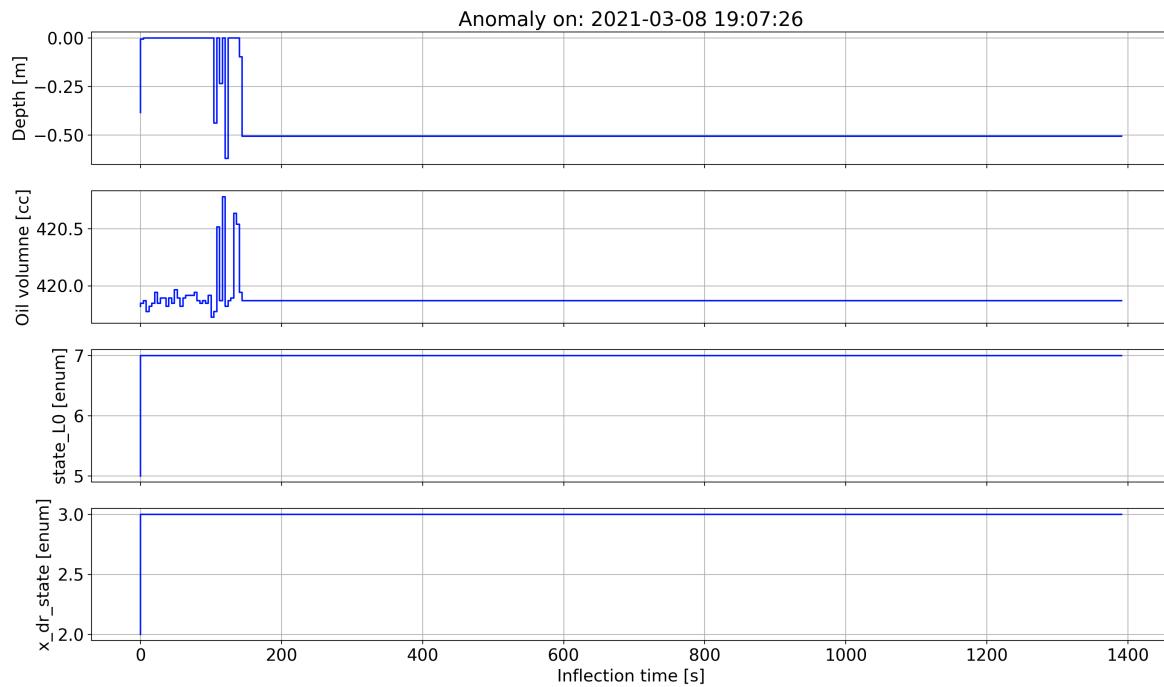


Figure 2.4: 20210308T190726 Anomaly 1

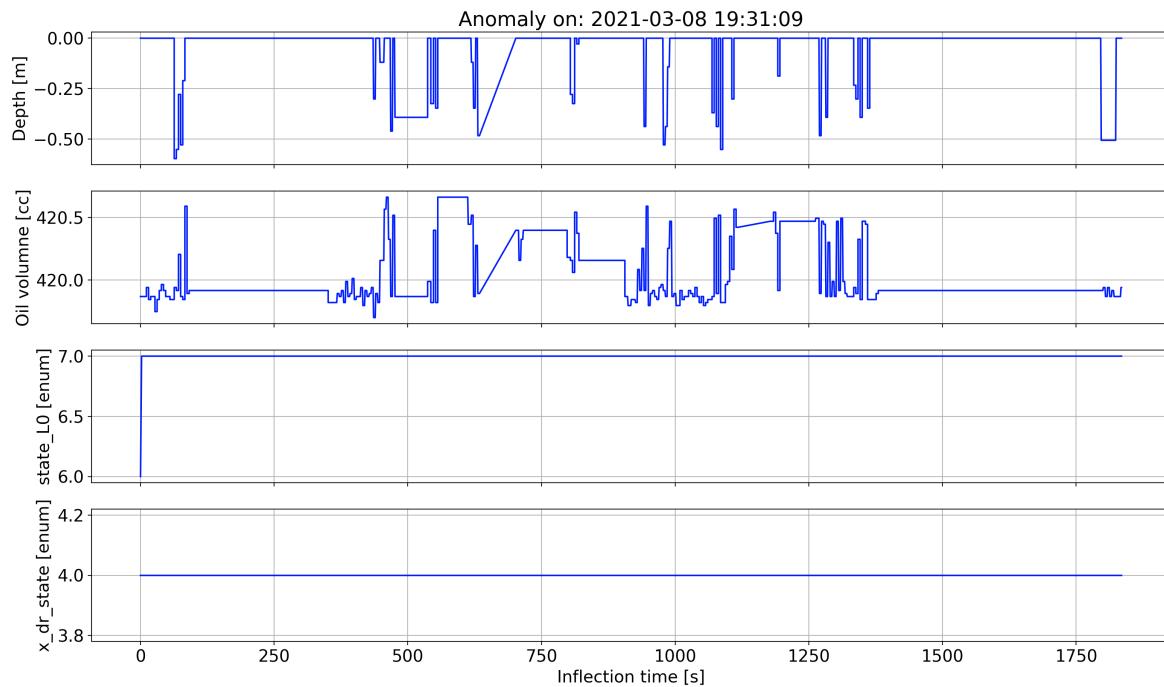


Figure 2.5: 20210308T193109 Anomaly 2

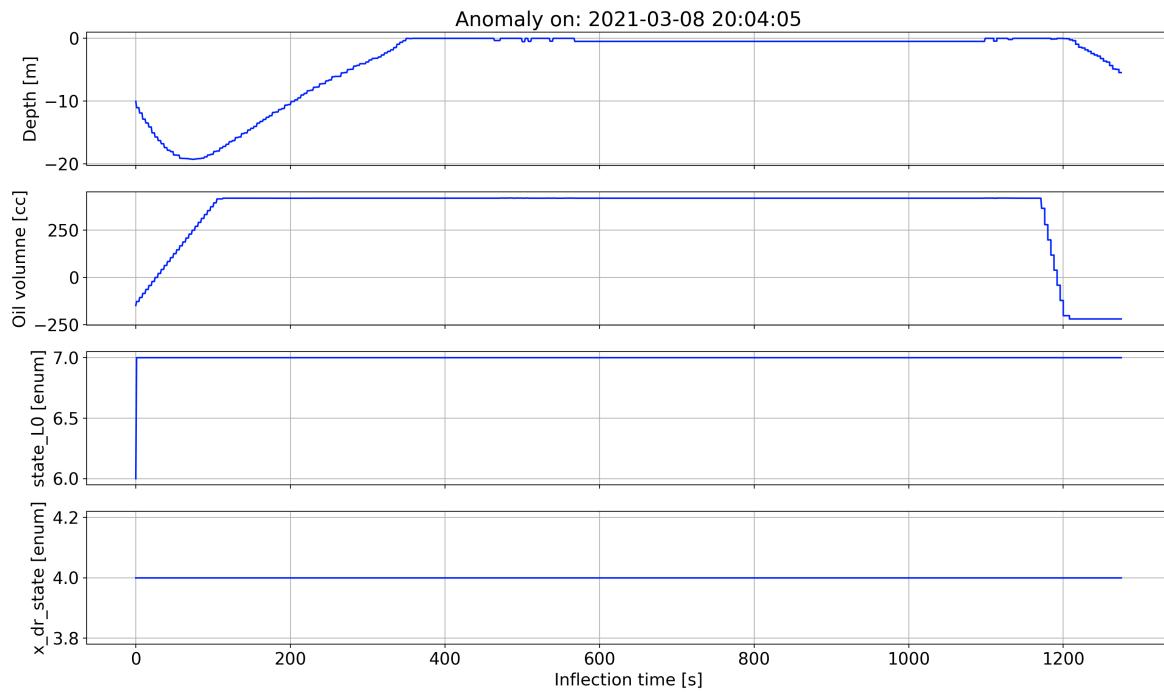


Figure 2.6: 20210308T200405 Anomaly 3

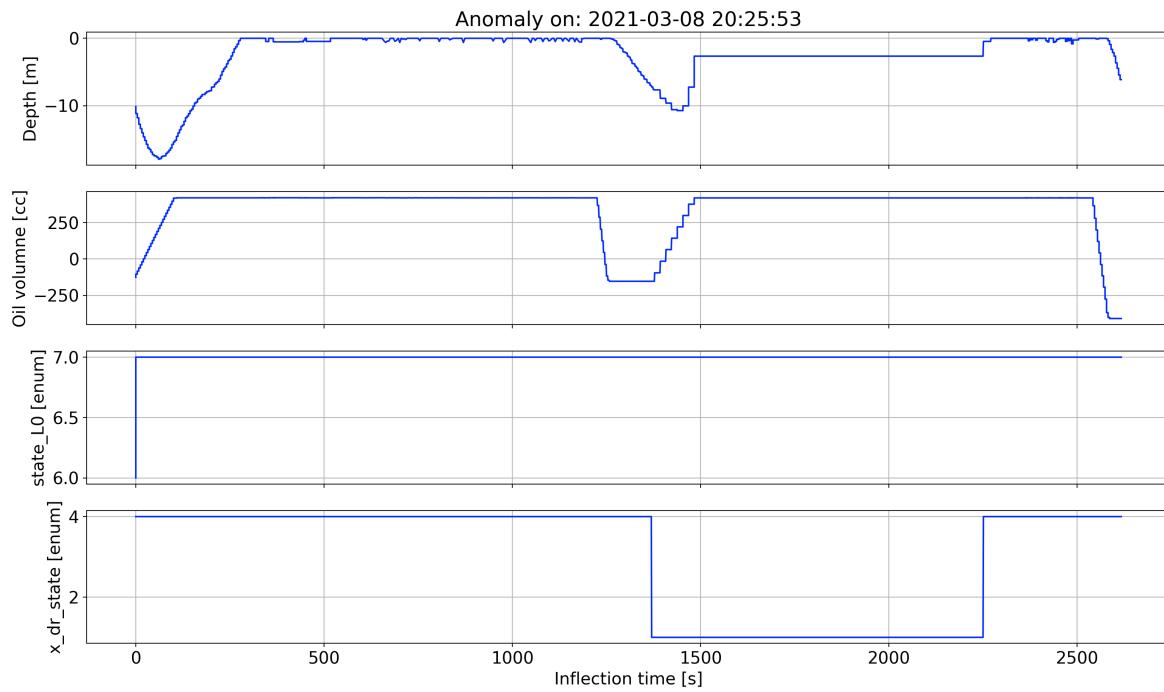


Figure 2.7: 20210308T202553 Anomaly 4

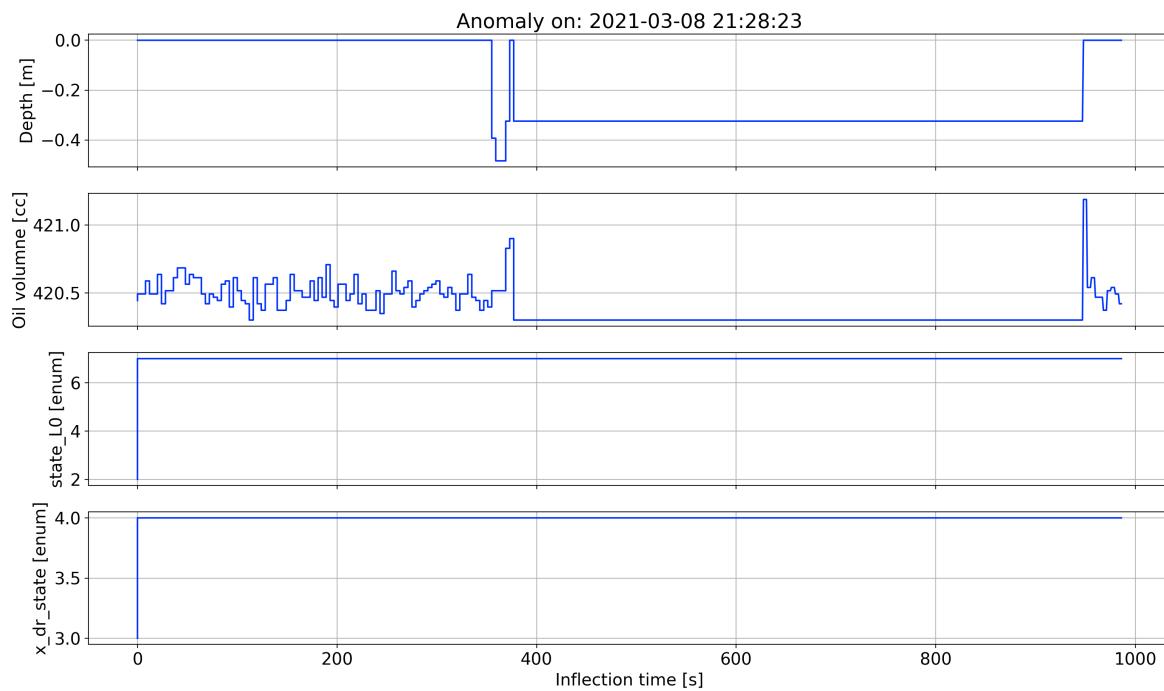


Figure 2.8: 20210308T212823 Anomaly 5

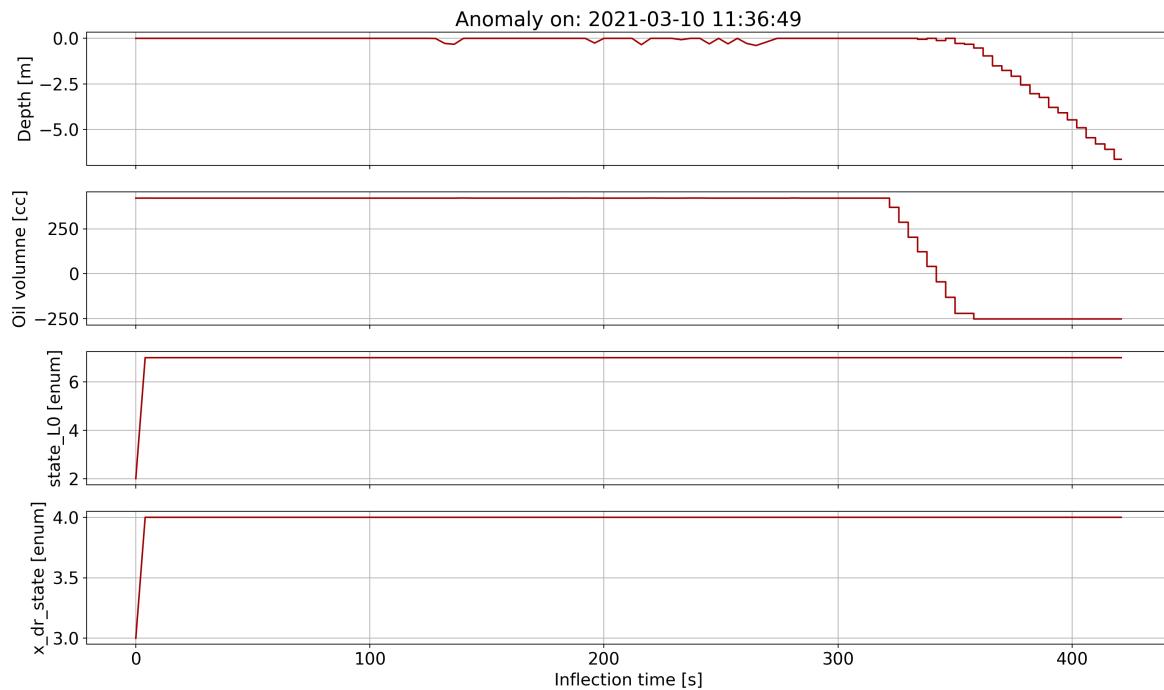


Figure 2.9: 20210310T113649 Anomaly 6

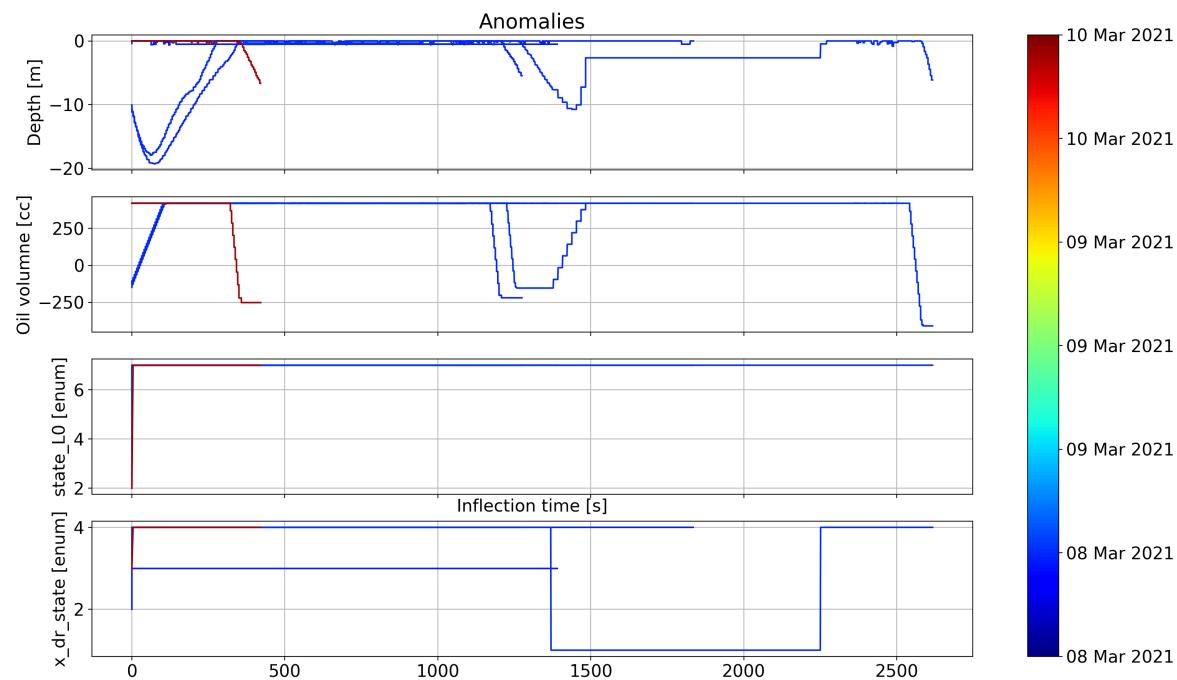


Figure 2.10: Anomalies (time)

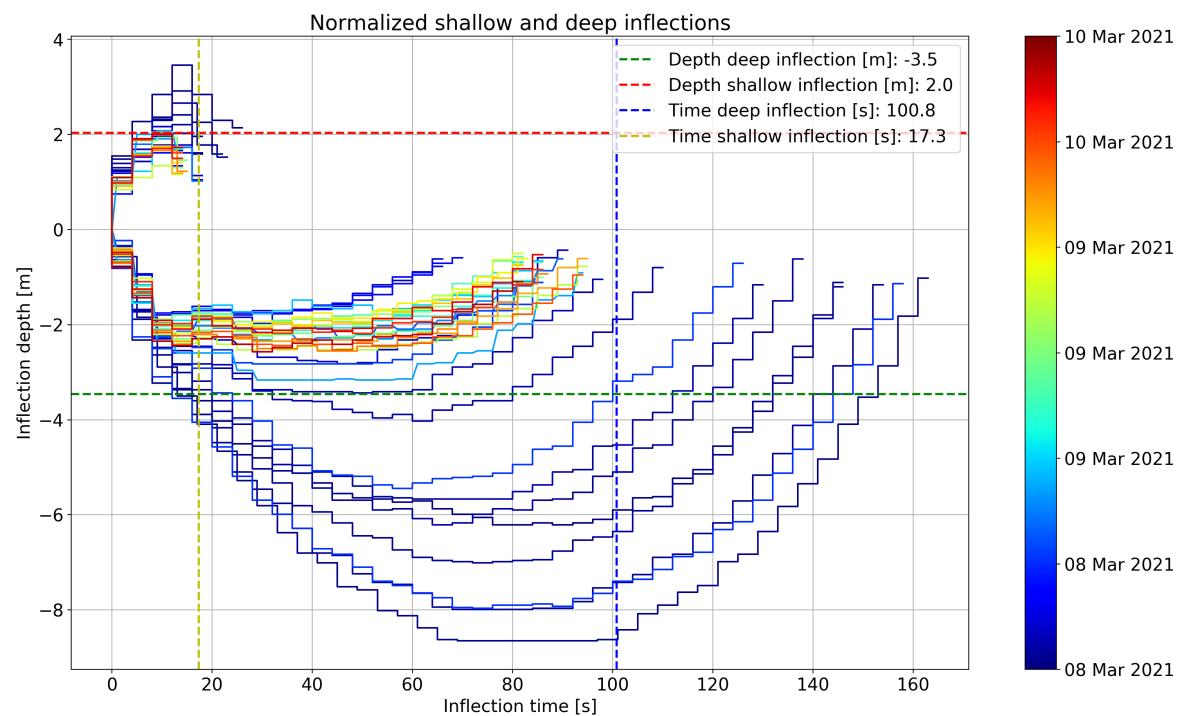


Figure 2.11: Depth inflections

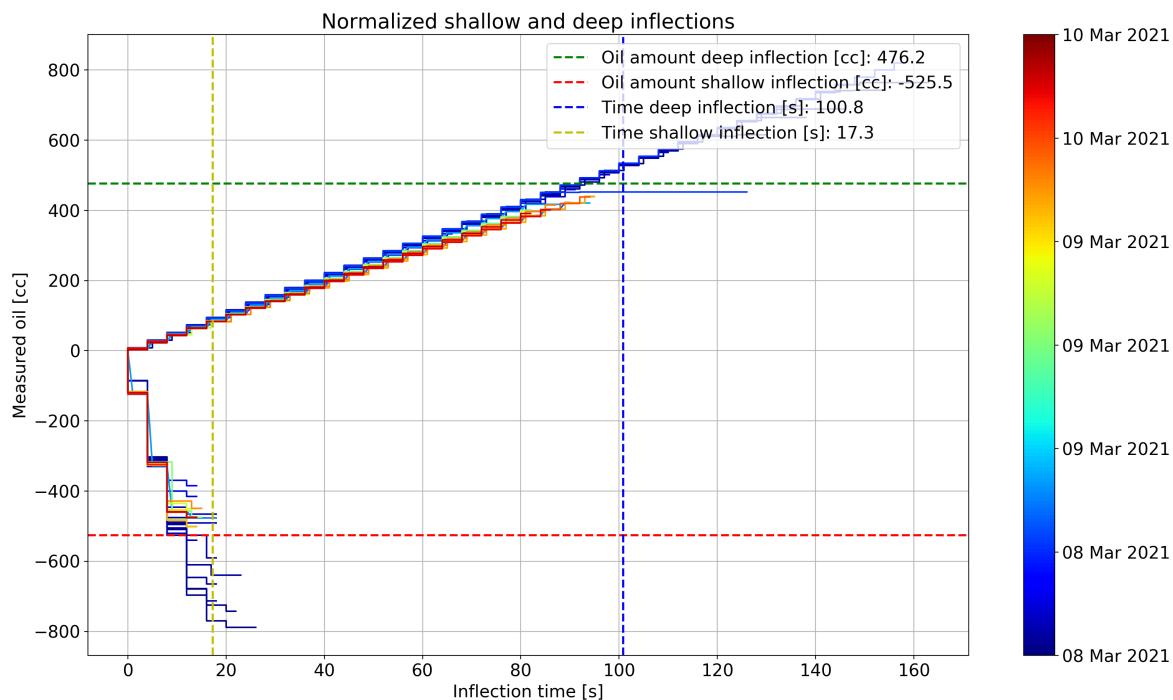


Figure 2.12: Oil inflections

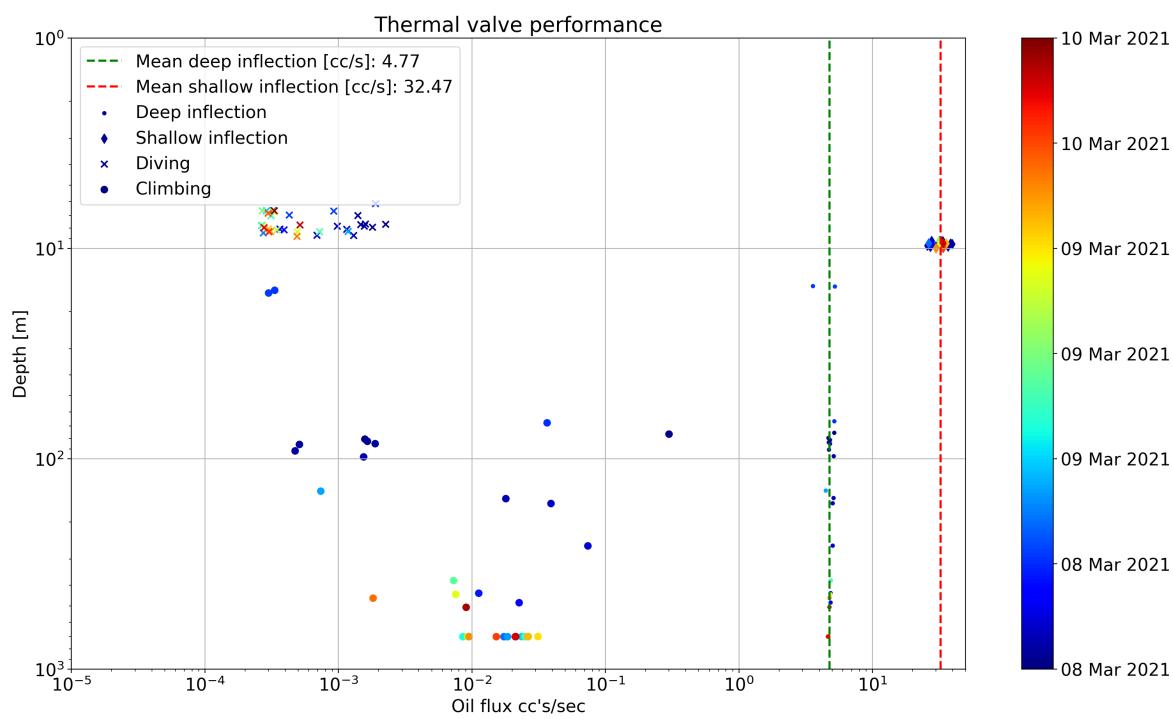


Figure 2.13: Oil flux

Normalized shallow and deep inflections

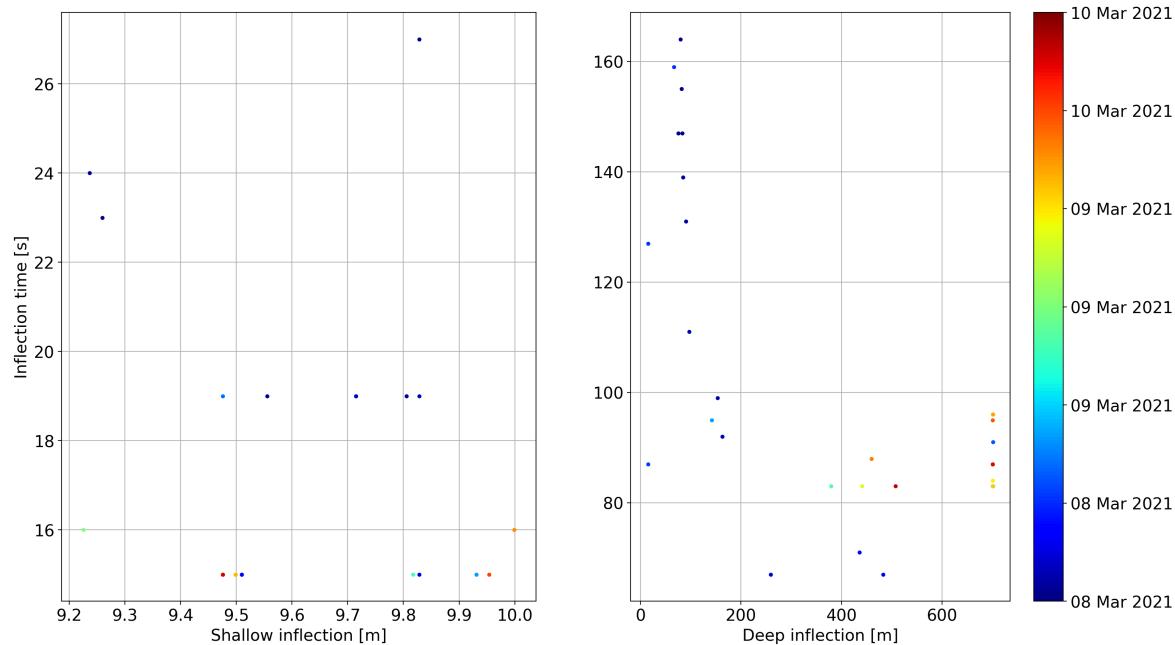


Figure 2.14: Duration inflections

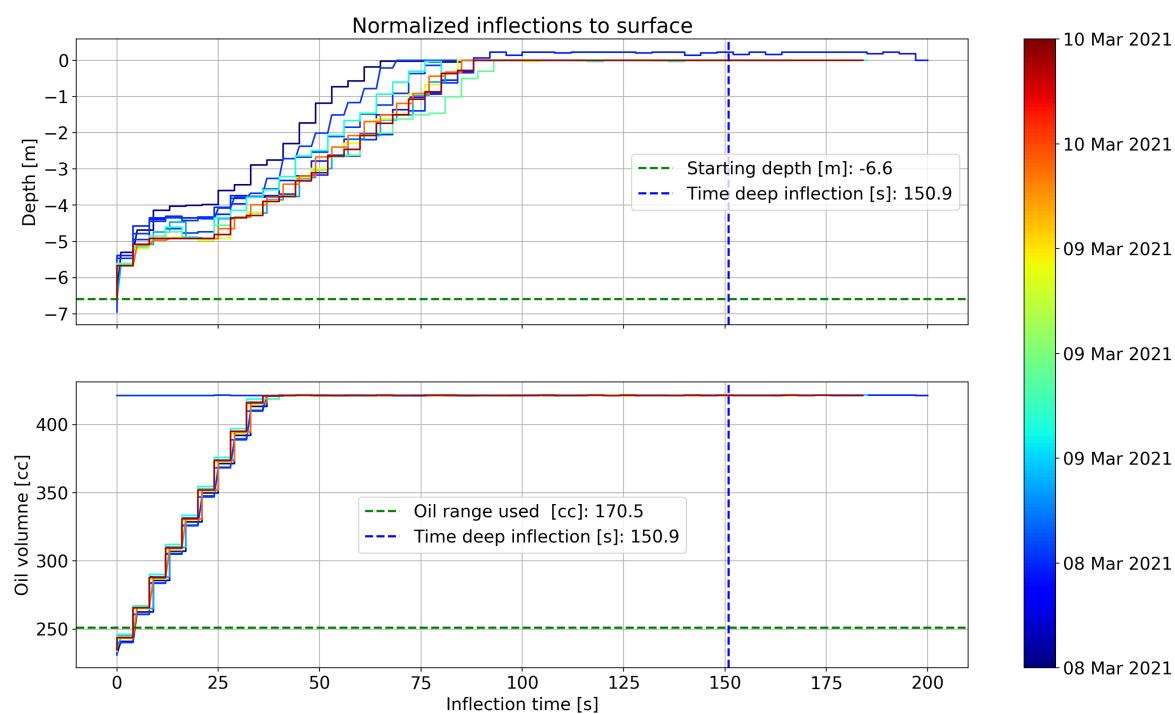


Figure 2.15: Surface Oil inflections

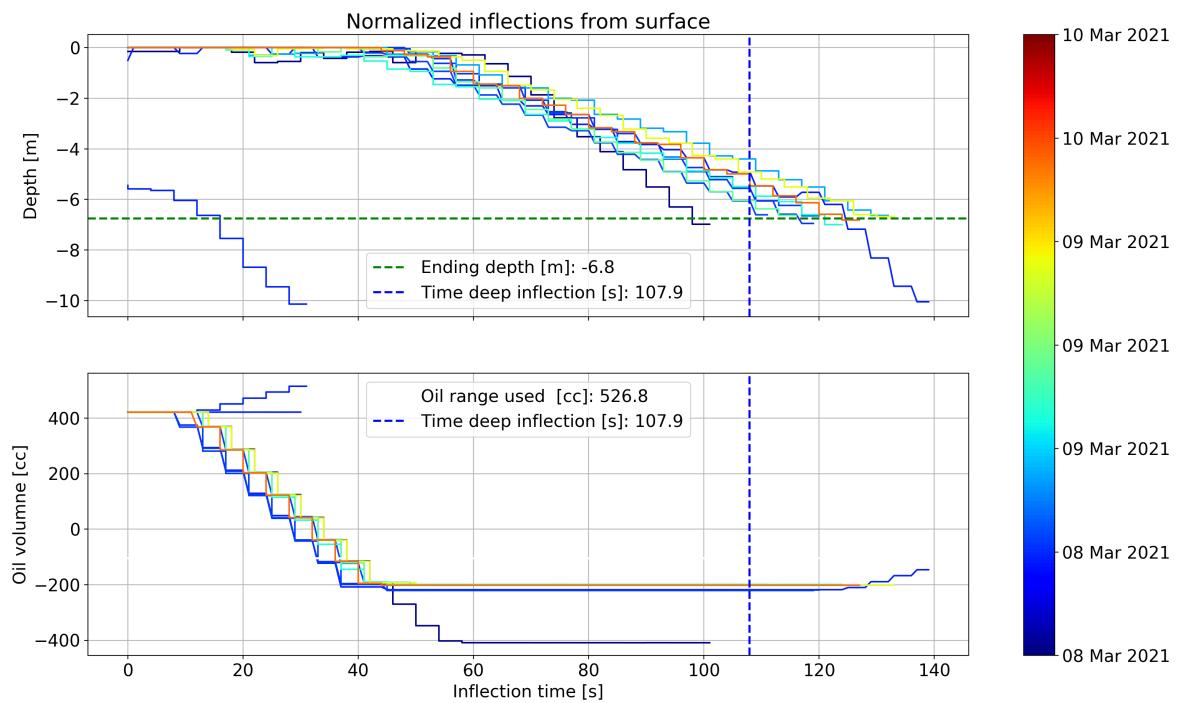


Figure 2.16: Surface Duration inflections

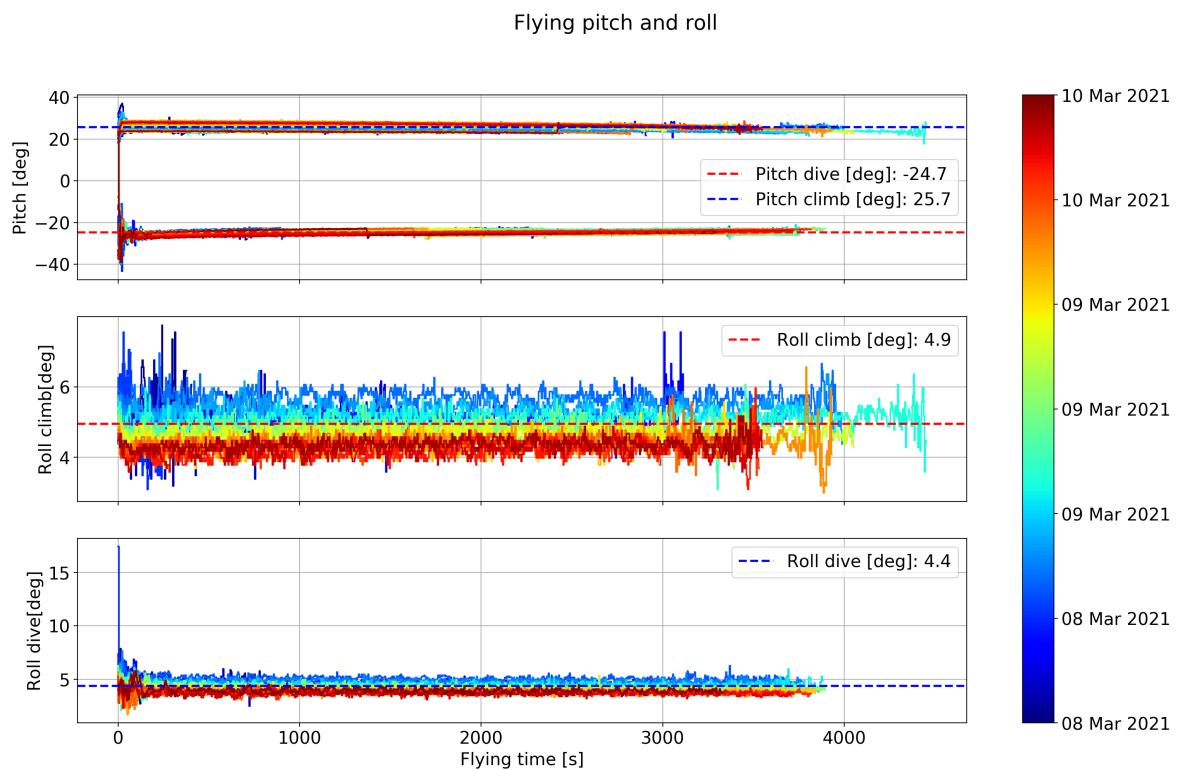


Figure 2.17: Pitch and roll, when climbing and diving

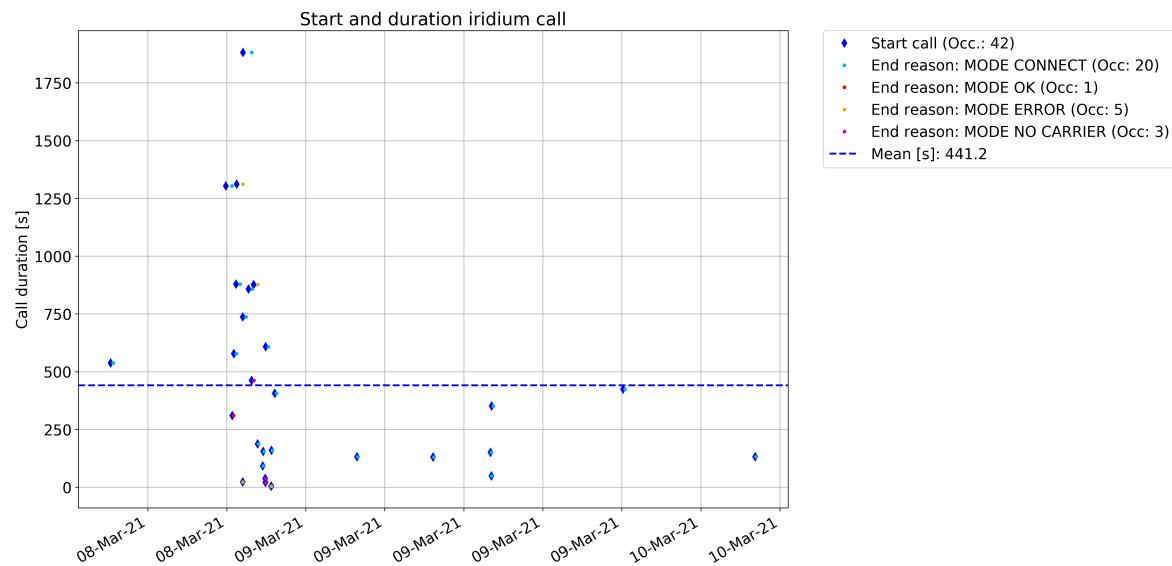


Figure 2.18: Iridium Status

3 Scientific Preliminary Review

3.1 SCI Profiles

Calibration sheets available upon request to glider@socib.es

Sensor	Serial number	Calibration date	Casts	Half YOs	Samples	Intersample time [s]*	Sampled distance [km]
CTD	9580	20190205	69	77	25979	5.999	28.4
FLNTU- FLBBCDSLC	5988	20191121	34	77	na	na	14.4
OXY 3-4	0845	20190923	69	77	25974	5.999	28.4
PAR	50315	20200203	34	77	2446	16.578	7.5
Hydrophone	na	na	na	na	na	na	na
Microrider	na	na	na	na	na	na	na

* See appendix for sampling strategy details and changes during the mission

Sensor parameters set:

CTD	CC's per second	na
FLx	Chlorophyll dark count	50
FLx	Turbidity dark count	na
FLx	CDOM dark count	50
FLx	BB700 dark count	50

3.2 SCI plots

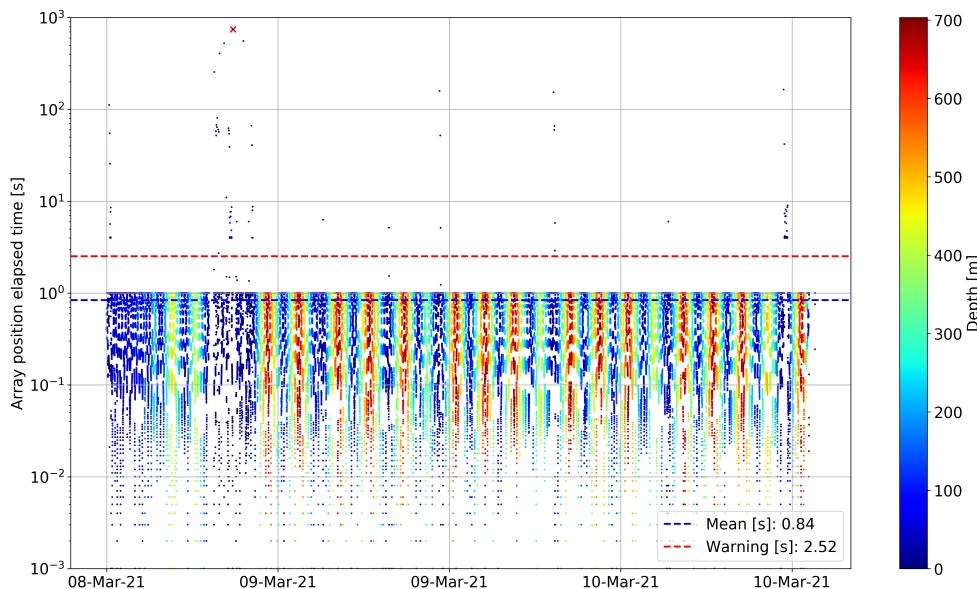


Figure 3.1: Array time

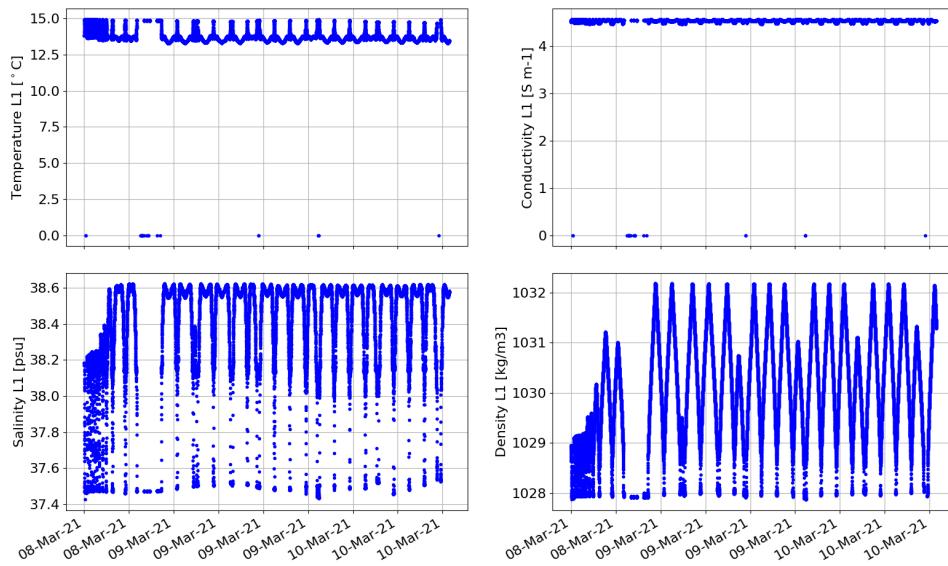


Figure 3.2: Raw CTD L1

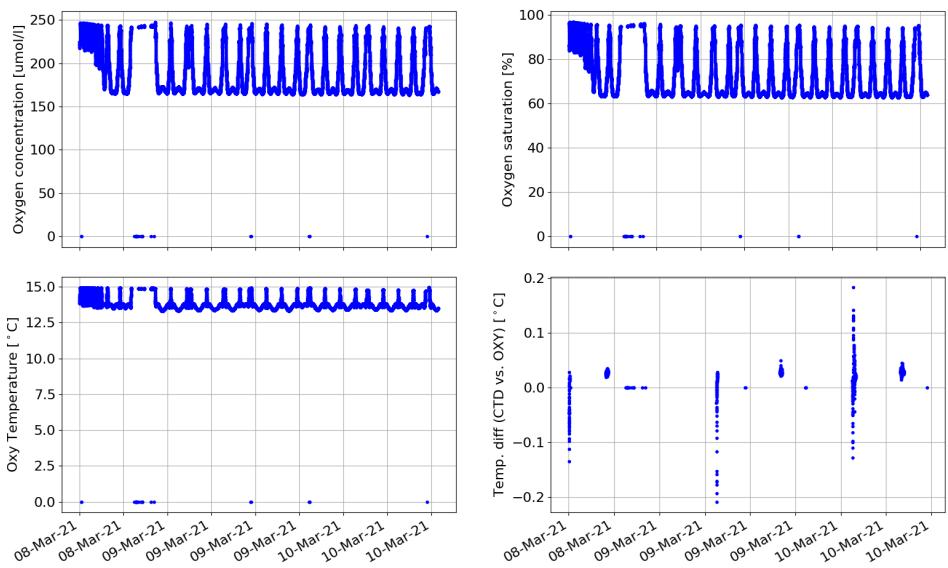


Figure 3.3: Raw OXY L1

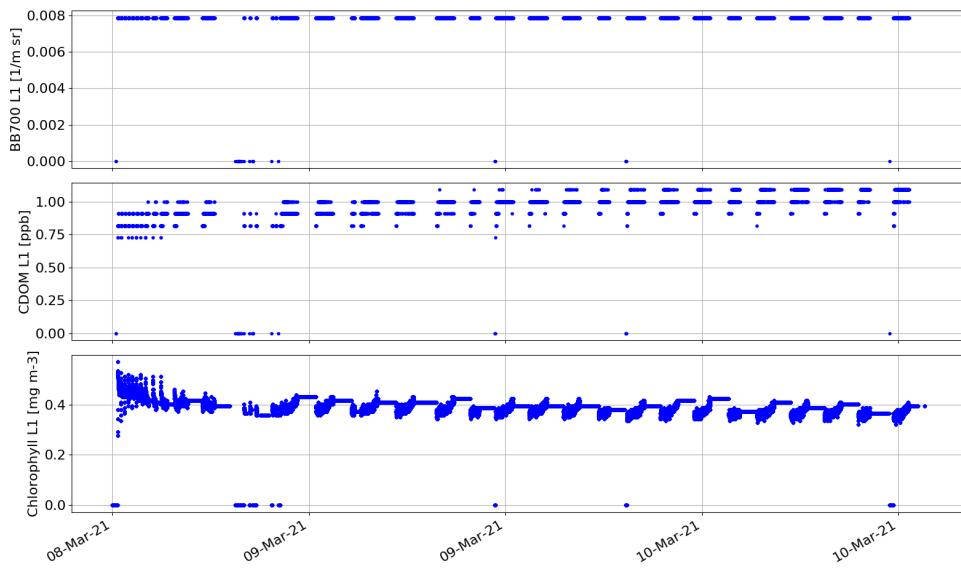


Figure 3.4: Raw FLBBCDSLC L1

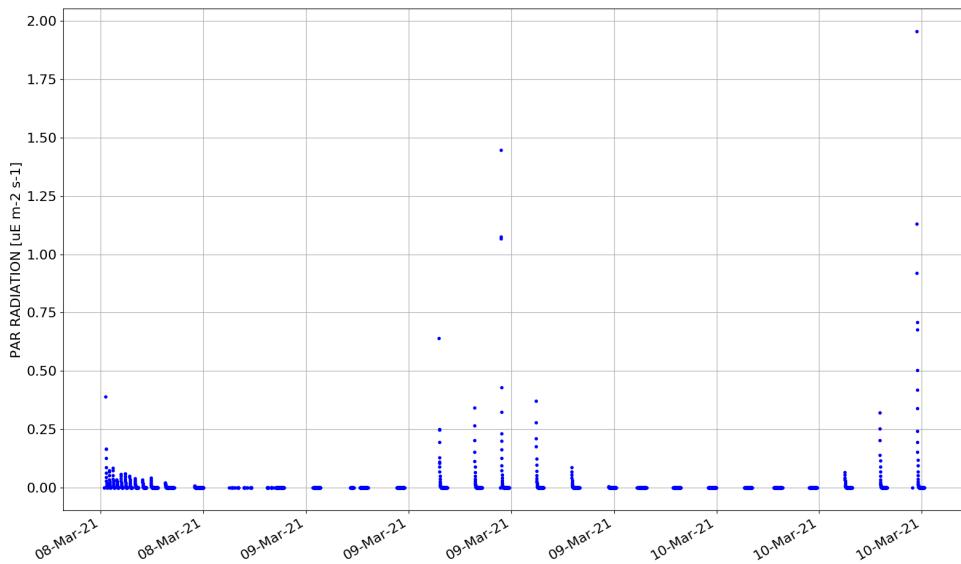


Figure 3.5: Raw PAR L1

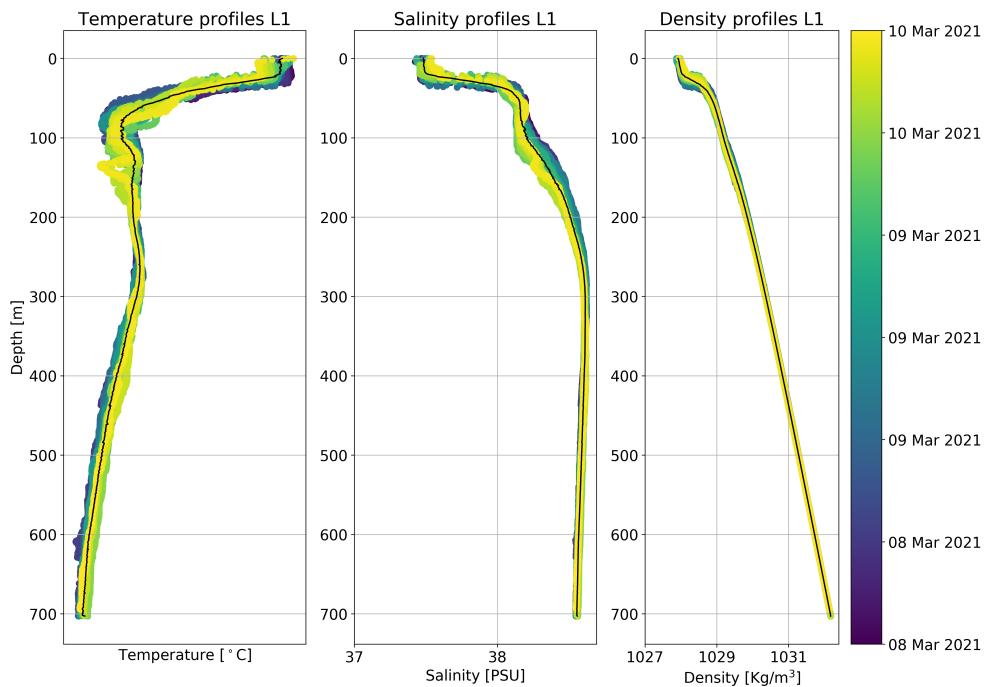


Figure 3.6: CTD profiles

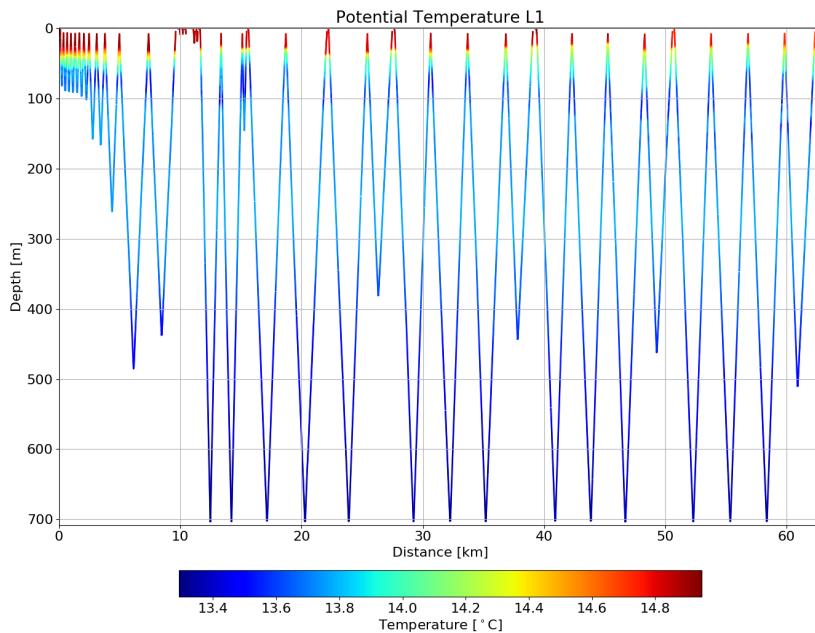


Figure 3.7: CTD temperature

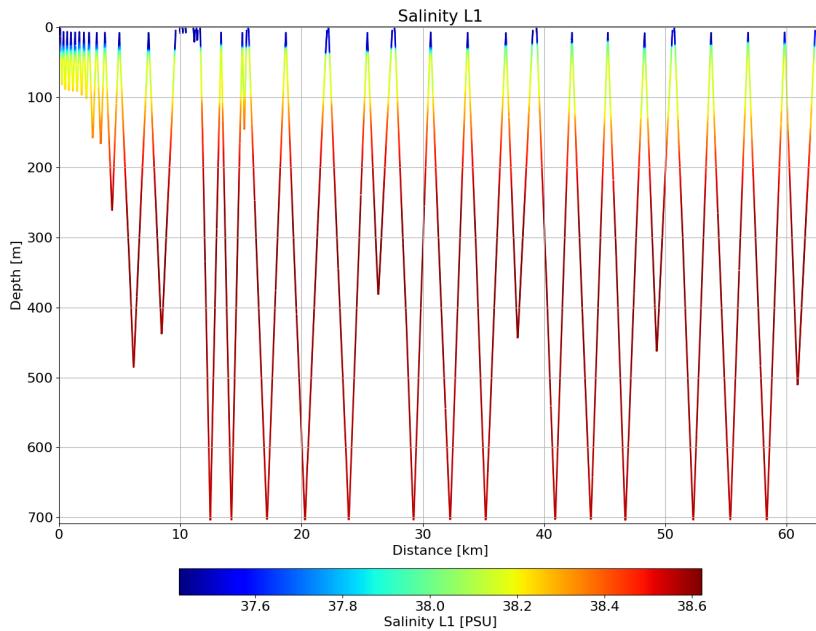


Figure 3.8: CTD Salinity

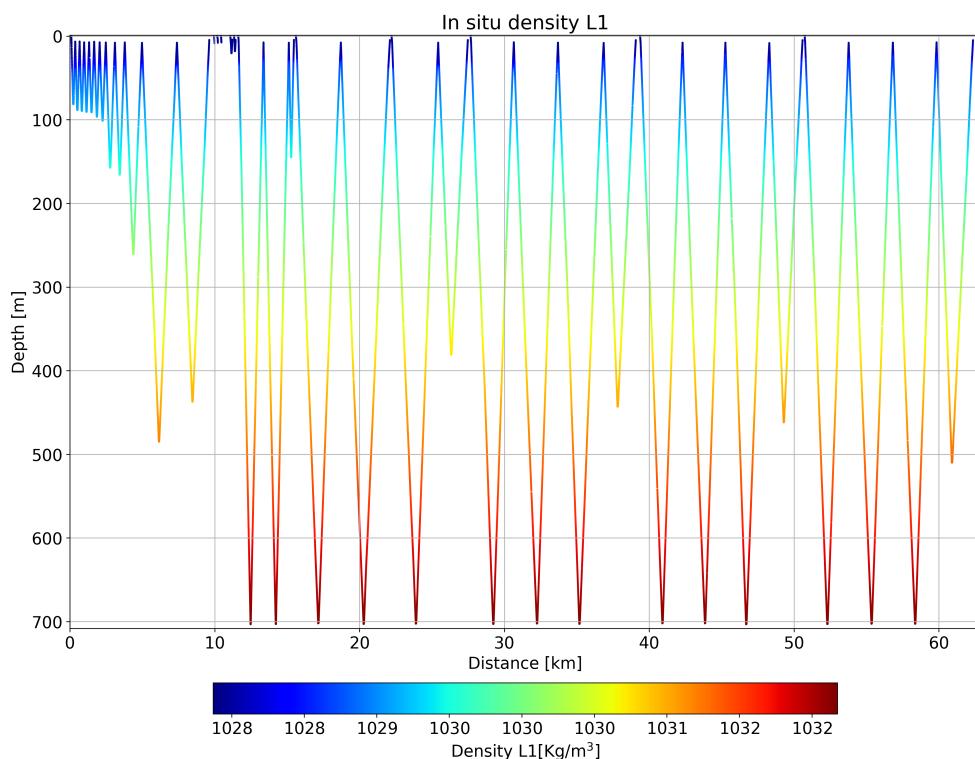


Figure 3.9: CTD Density

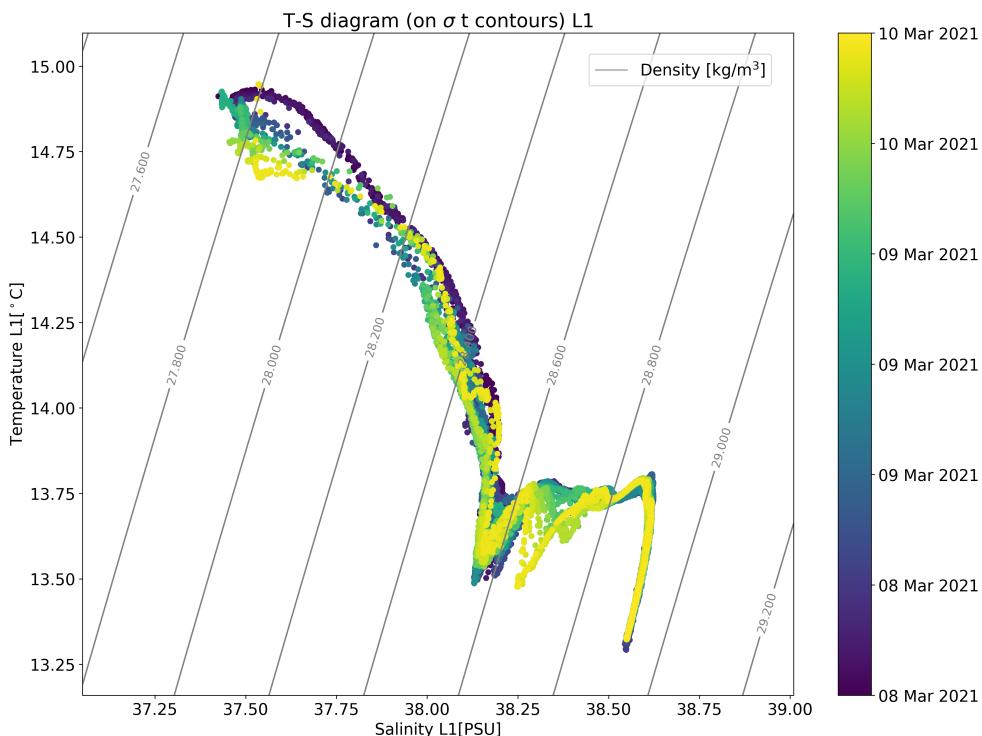


Figure 3.10: TS diagram (CTD)

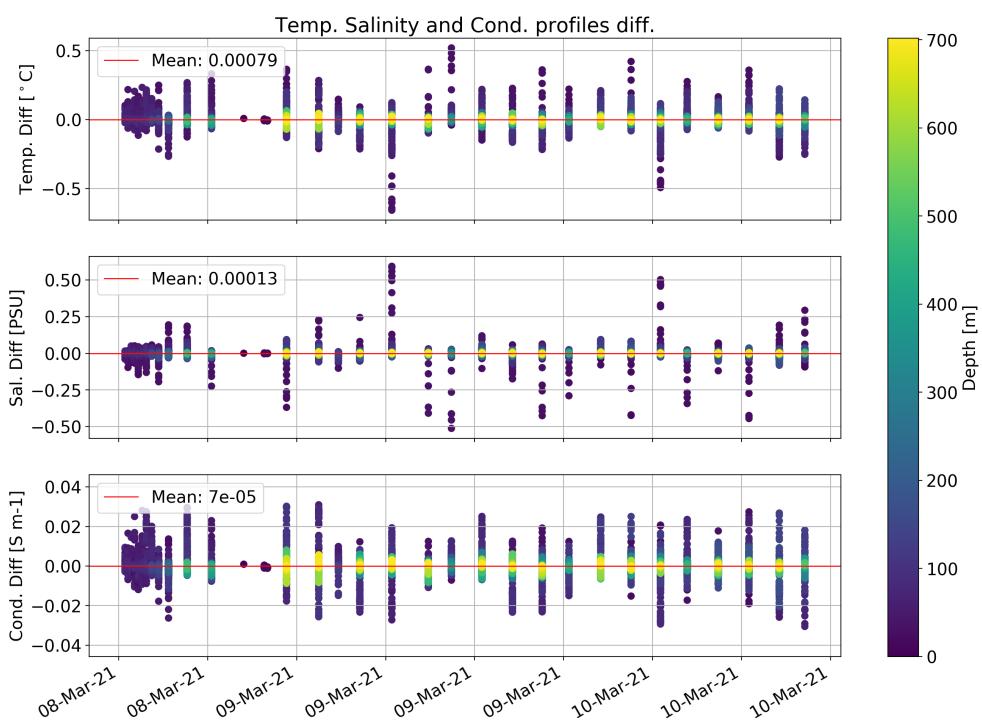


Figure 3.11: Profile consistency (CTD)

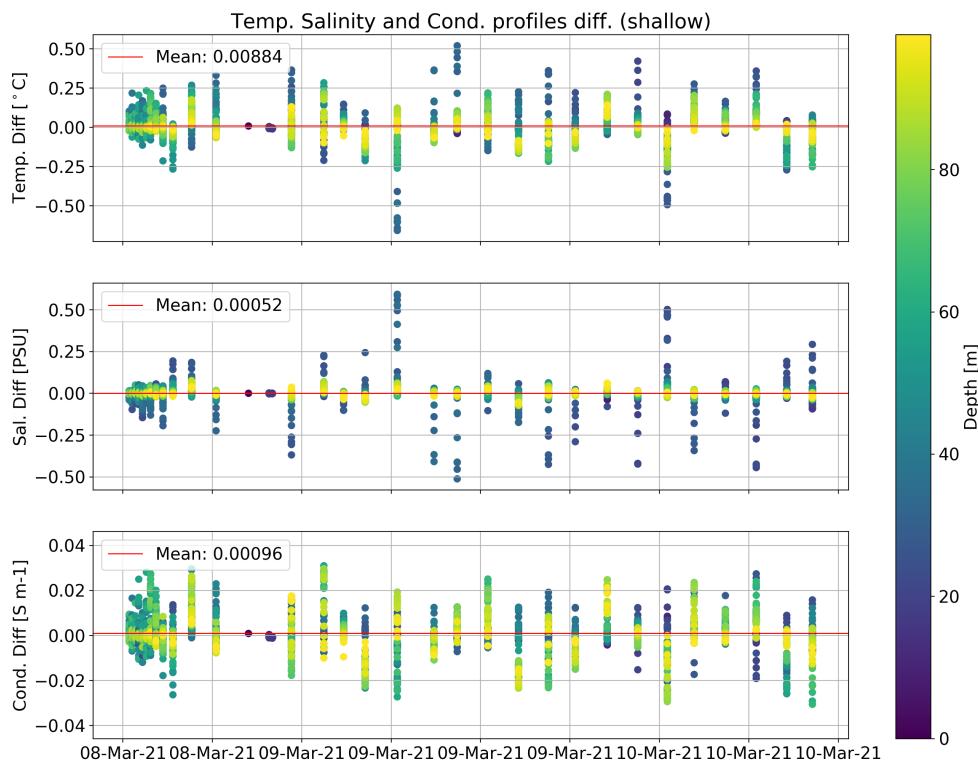


Figure 3.12: Profile consistency (CTD) zoom

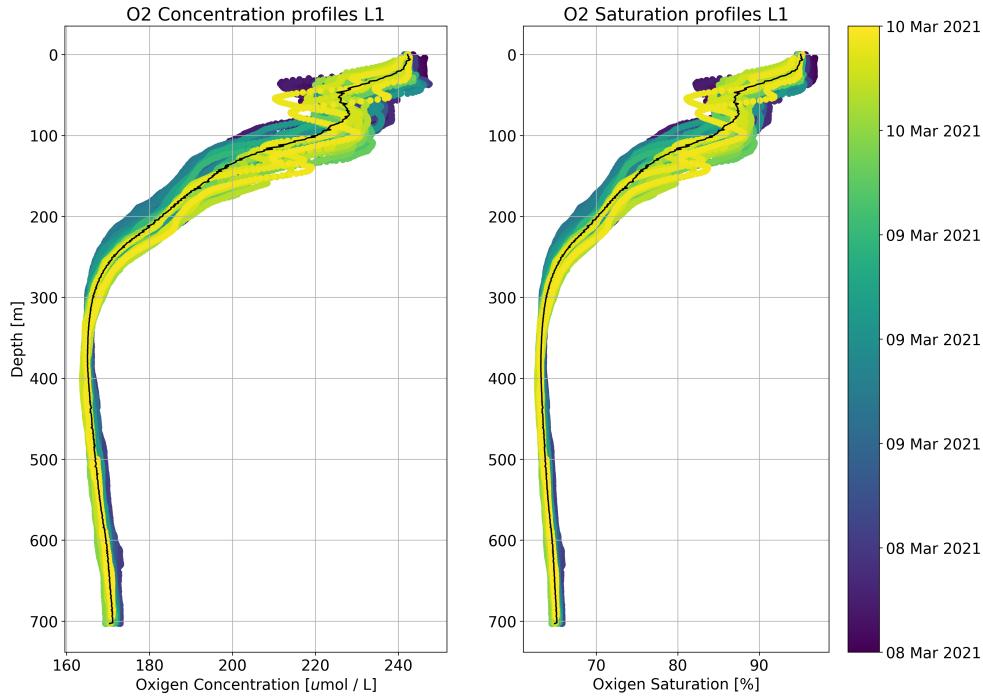


Figure 3.13: Oxygen profiles

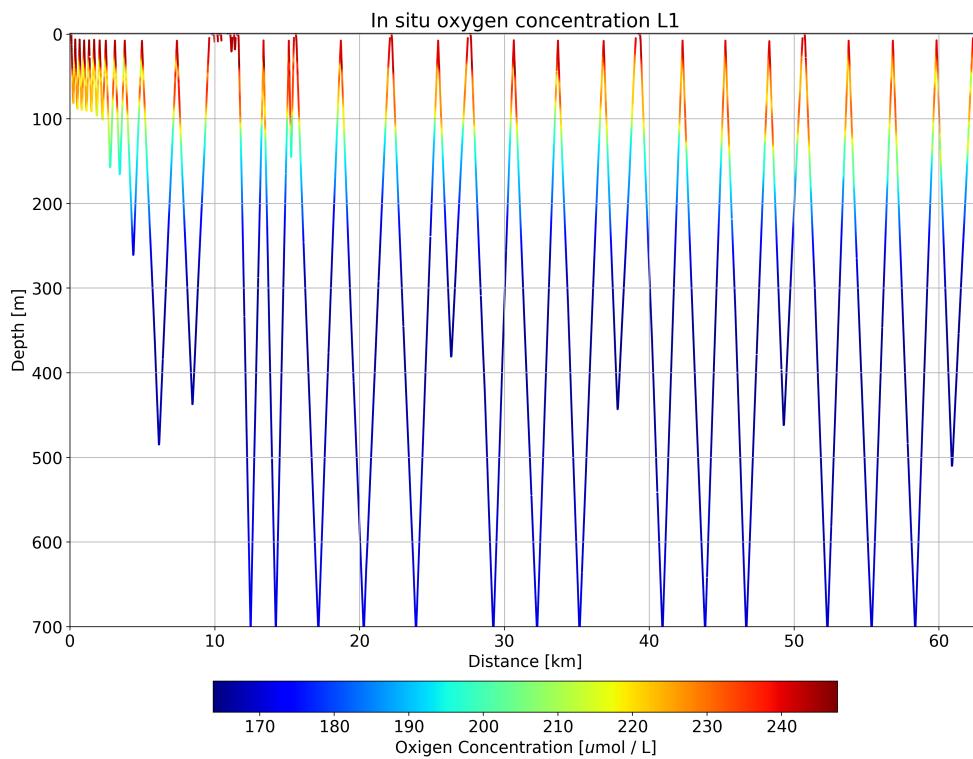


Figure 3.14: Oxygen Concentration

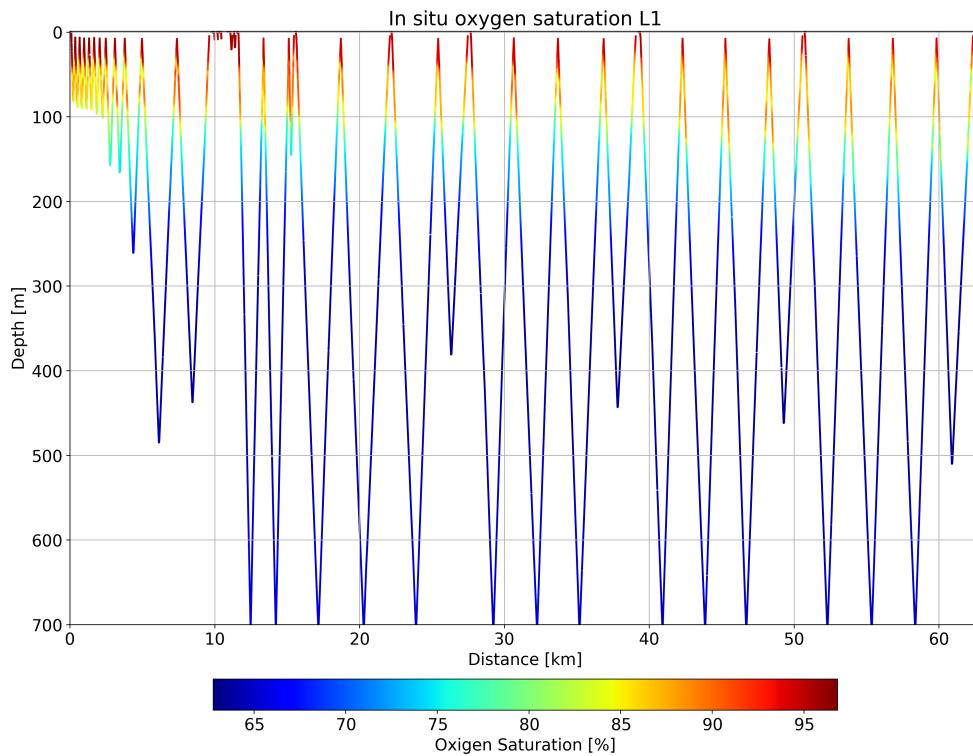


Figure 3.15: Oxygen Saturation

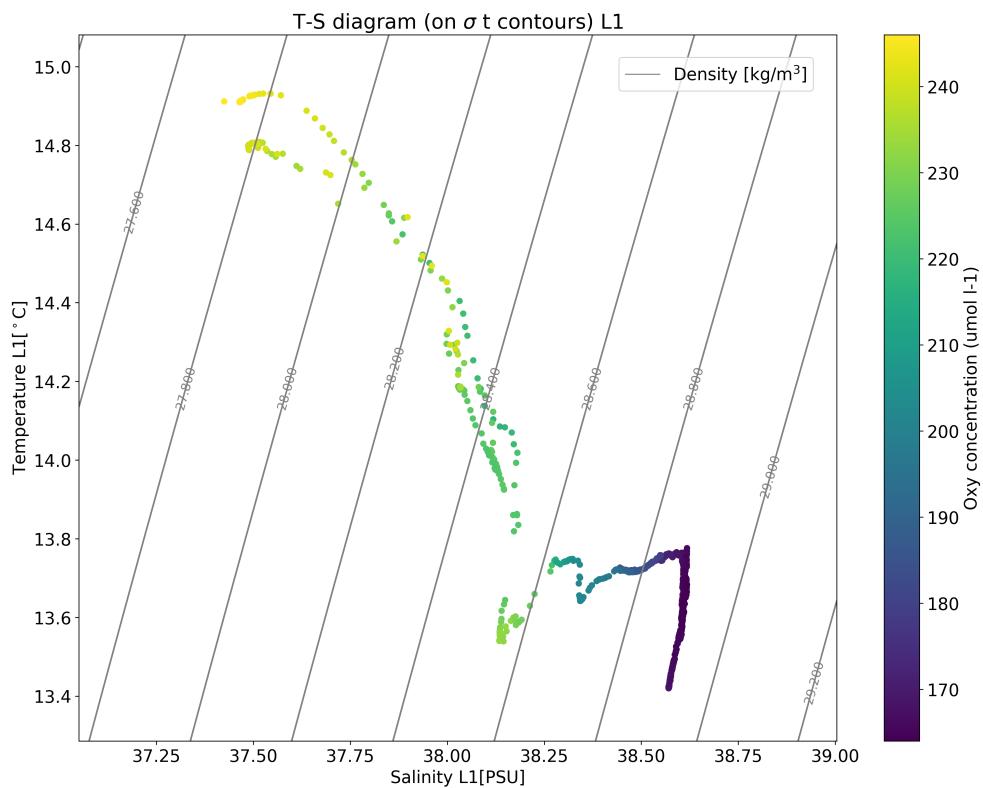


Figure 3.16: TS diagram (OXY)

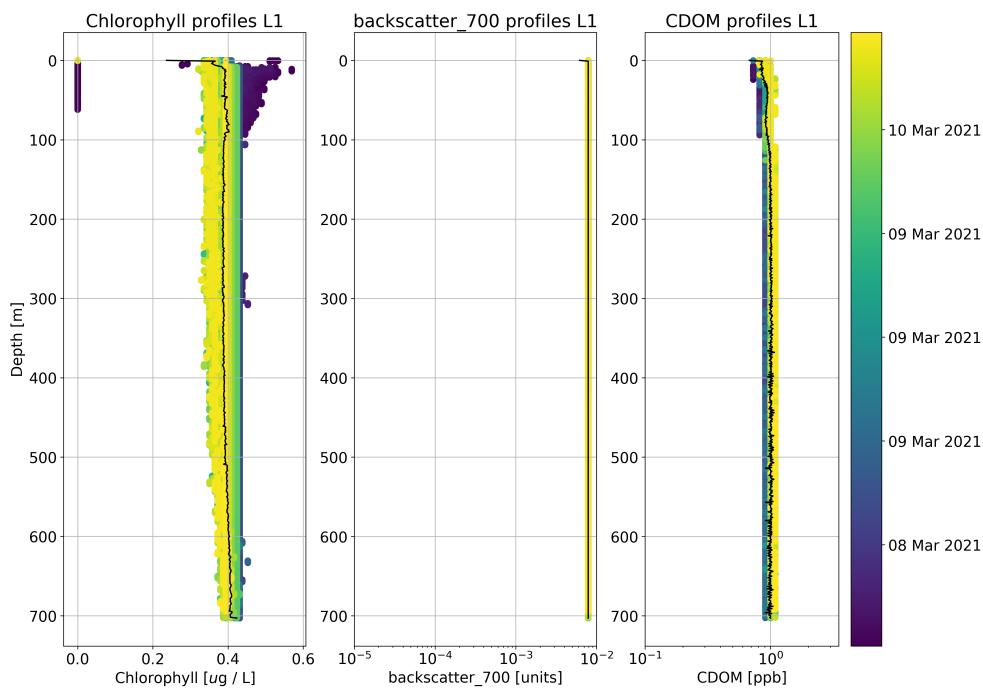


Figure 3.17: Chlorophyll-a, CDOM and BB700 profiles

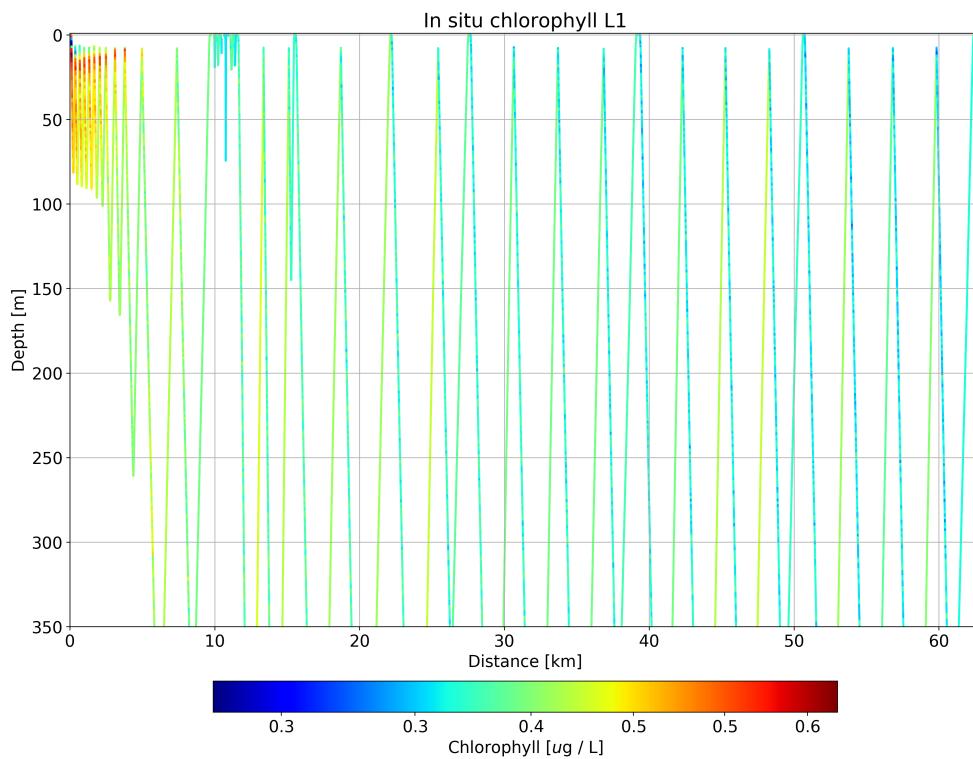


Figure 3.18: Chlorophyll-a

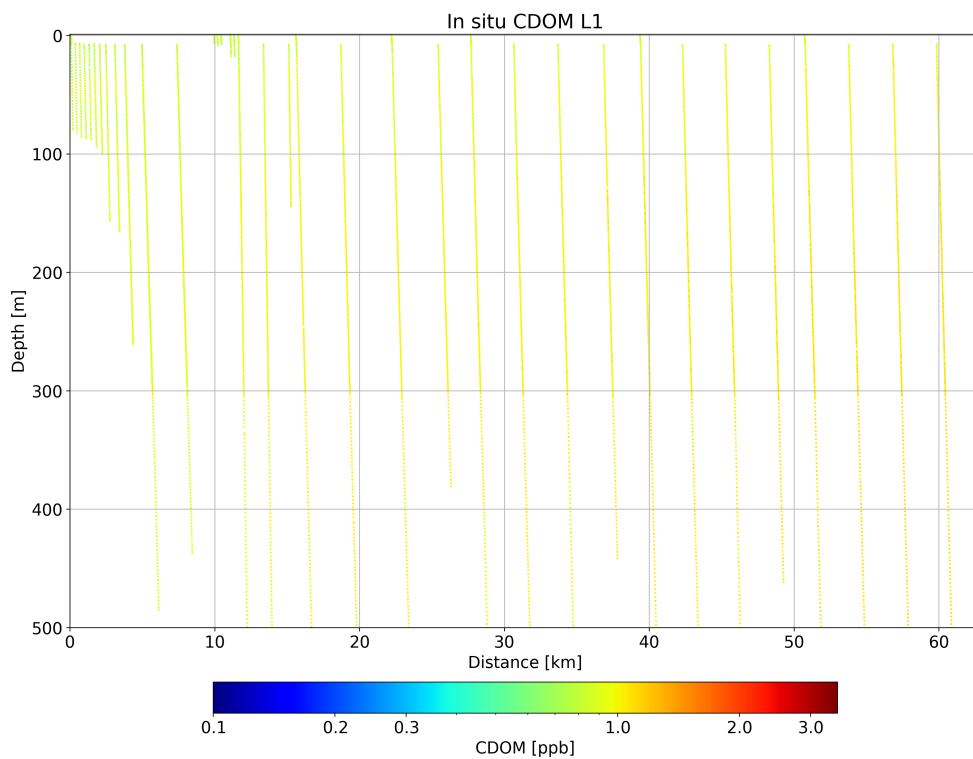


Figure 3.19: CDOM

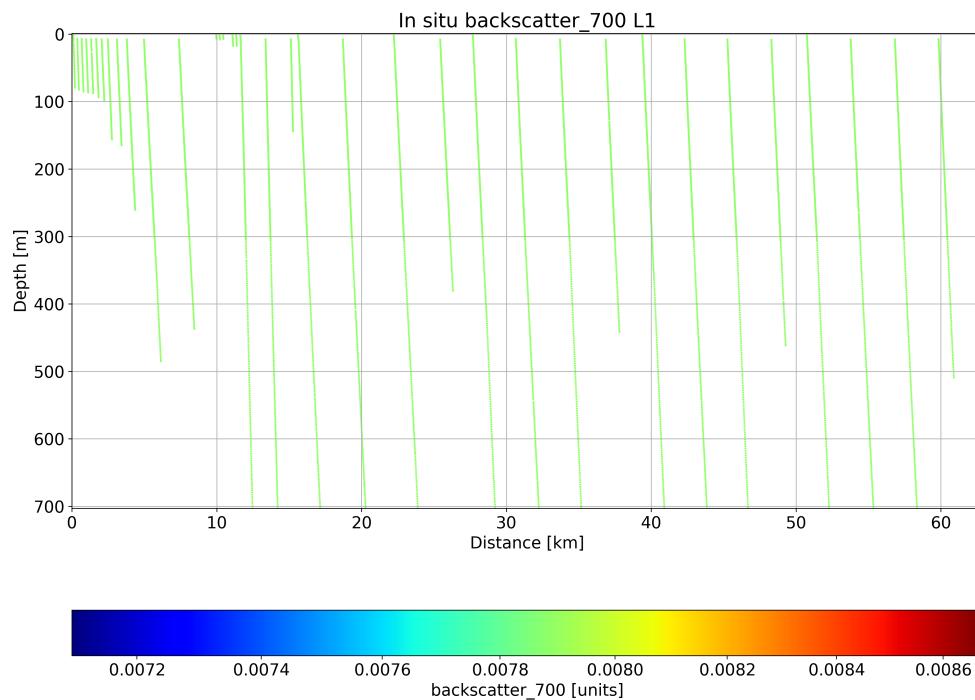


Figure 3.20: Backscatter 700

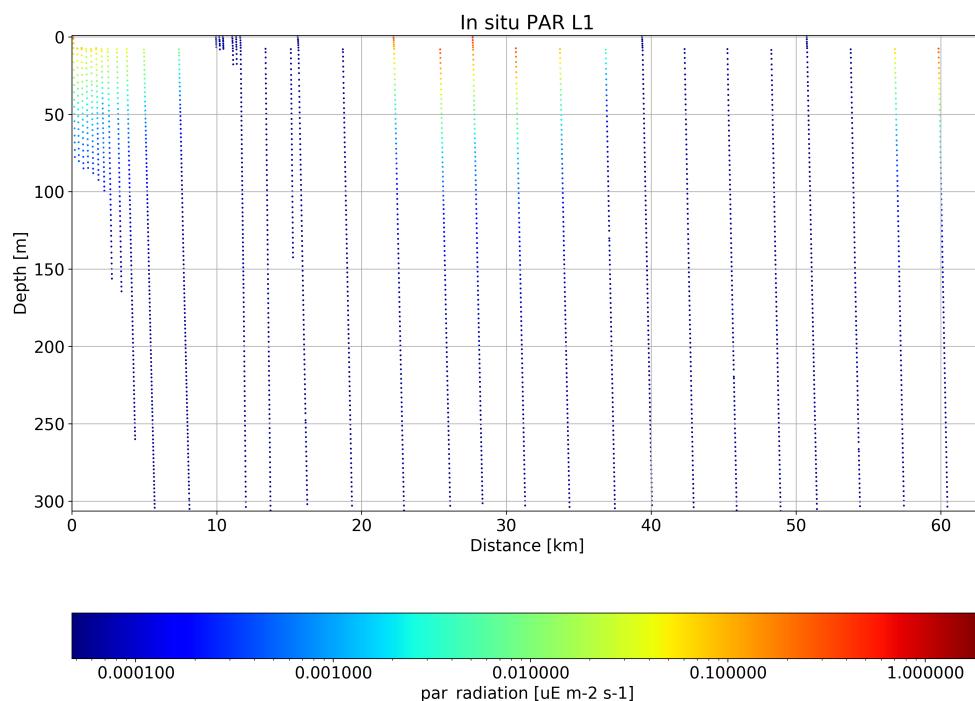


Figure 3.21: PAR radiation

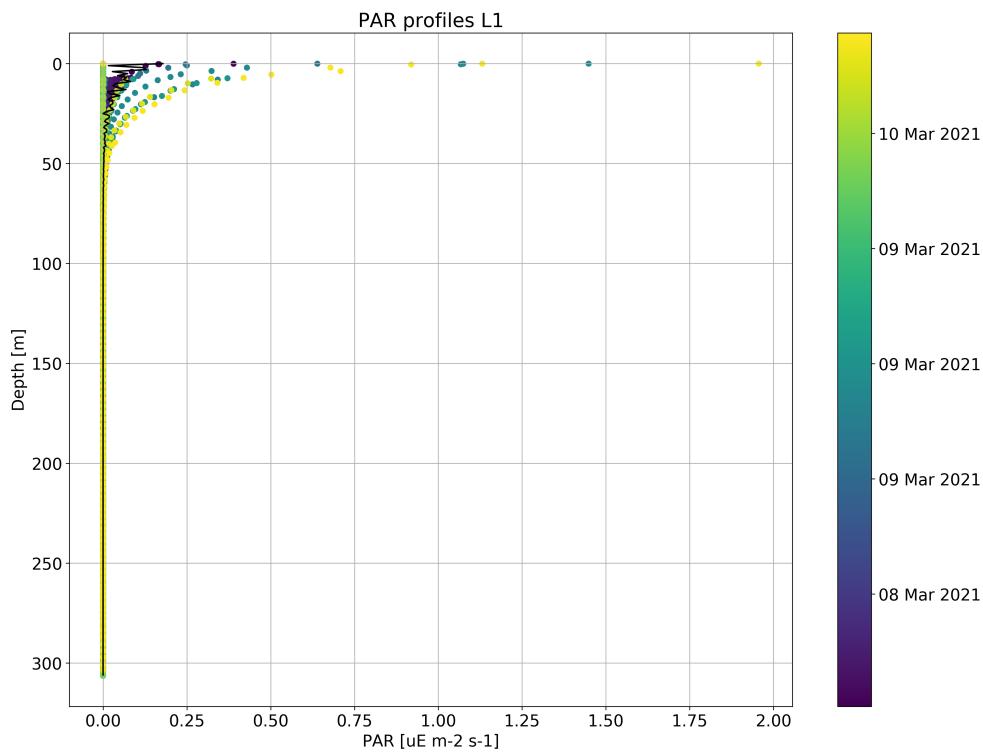


Figure 3.22: PAR profiles

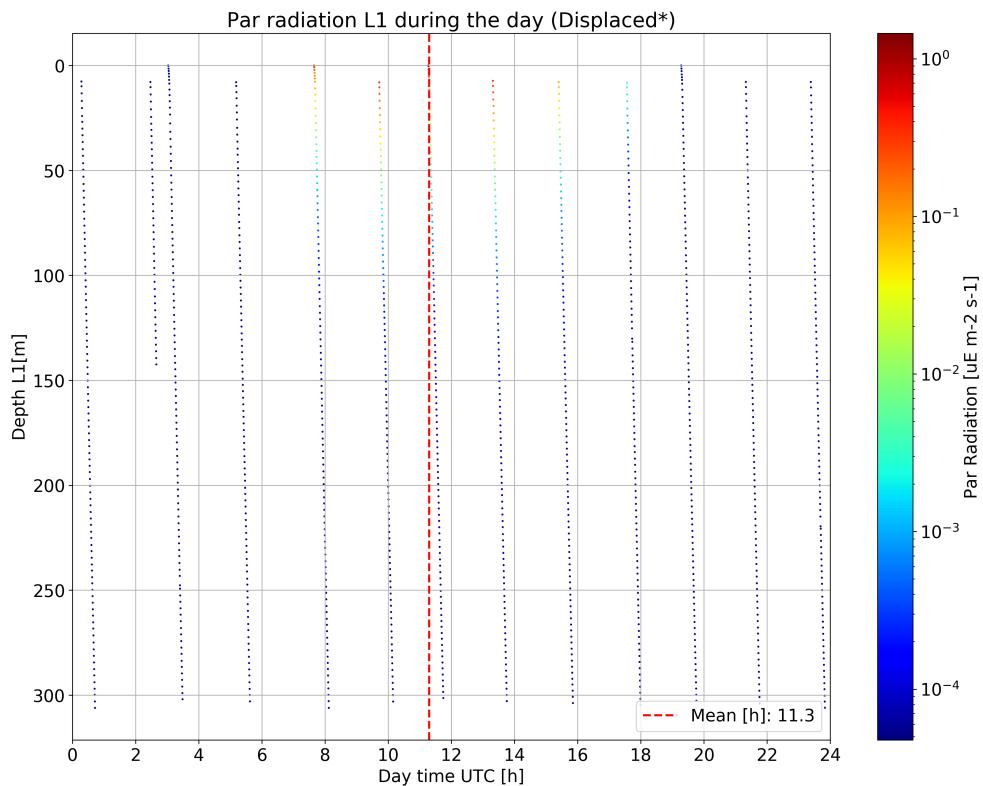


Figure 3.23: Daily par

4 Appendix

4.1 Glider behaviour

MLG FILES ! Total MLG files: 50 Used: 34 Showing changes on Sampling (behaviour 16):

- 08 Mar 2021 11:09:30 @ Sampling of: SAMPLE15.MA PAR(0m to -300m) 20200203 PAR sn50315
- 08 Mar 2021 11:09:30 @ Sampling state to sample set to: Diving
- 08 Mar 2021 11:09:30 @ Sampling argument: intersample time set to: 16.0 s
- 08 Mar 2021 11:09:30 @ Sampling nth yo to sample set to: 1.0 nodim
- 08 Mar 2021 11:09:30 @ Sampling argument: min depth set to: 0.0 m
- 08 Mar 2021 11:09:30 @ Sampling argument: max depth set to: 300.0 m

Showing changes on Sampling (behaviour 15):

- 08 Mar 2021 11:09:30 @ Sampling of: SAMPLE13.MA 20190923 OXY sn0845
- 08 Mar 2021 11:09:30 @ Sampling state to sample set to: Diving, climbing and hovering
- 08 Mar 2021 11:09:30 @ Sampling argument: intersample time set to: 4.0 s
- 08 Mar 2021 11:09:30 @ Sampling nth yo to sample set to: 1.0 nodim
- 08 Mar 2021 11:09:30 @ Sampling argument: min depth set to: -5.0 m
- 08 Mar 2021 11:09:30 @ Sampling argument: max depth set to: 2000.0 m

Showing changes on Sampling (behaviour 14):

- 08 Mar 2021 11:09:30 @ Sampling of: SAMPLE14.MA FLNTU(-300m to 700m) 20191121 FLNTU sn5988
- 08 Mar 2021 11:09:30 @ Sampling state to sample set to: Diving
- 08 Mar 2021 11:09:30 @ Sampling argument: intersample time set to: 16.0 s
- 08 Mar 2021 11:09:30 @ Sampling nth yo to sample set to: 1.0 nodim
- 08 Mar 2021 11:09:30 @ Sampling argument: min depth set to: 300.0 m
- 08 Mar 2021 11:09:30 @ Sampling argument: max depth set to: 2000.0 m

Showing changes on Sampling (behaviour 13):

- 08 Mar 2021 11:09:30 @ Sampling of: SAMPLE12.MA FLNTU(surface to -300m) 20191121 FLNTU sn5988
- 08 Mar 2021 11:09:30 @ Sampling state to sample set to: Diving
- 08 Mar 2021 11:09:30 @ Sampling argument: intersample time set to: 8.0 s
- 08 Mar 2021 11:09:30 @ Sampling nth yo to sample set to: 1.0 nodim
- 08 Mar 2021 11:09:30 @ Sampling argument: min depth set to: -5.0 m
- 08 Mar 2021 11:09:30 @ Sampling argument: max depth set to: 300.0 m

Showing changes on Sampling (behaviour 12):

- 08 Mar 2021 11:09:30 @ Sampling of: SAMPLE11.MA CTD(Profile) 20200129 CTD sn9580
- 08 Mar 2021 11:09:30 @ Sampling state to sample set to: Diving, climbing and hovering
- 08 Mar 2021 11:09:30 @ Sampling argument: intersample time set to: 4.0 s
- 08 Mar 2021 11:09:30 @ Sampling nth yo to sample set to: 1.0 nodim
- 08 Mar 2021 11:09:30 @ Sampling argument: min depth set to: -5.0 m
- 08 Mar 2021 11:09:30 @ Sampling argument: max depth set to: 2000.0 m

Showing changes on Yoing (behavior behavior yo 11):

- 08 Mar 2021 11:09:30 @ Yoing num half cycles to do(nodim) set to: 2.0
- 08 Mar 2021 11:09:30 @ Yoing d target depth(m) set to: 5.0
- 08 Mar 2021 11:09:30 @ Yoing d bpump value(X) set to: -230.0
- 08 Mar 2021 11:09:30 @ Yoing d target altitude(m) set to: 20.0
- 08 Mar 2021 11:09:30 @ Yoing d use pitch(enum) set to: 3.0
- 08 Mar 2021 11:09:30 @ Yoing d pitch value(X) set to: -0.453800
- 08 Mar 2021 11:09:30 @ Yoing c use pitch(enum) set to: 3.0
- 08 Mar 2021 11:09:30 @ Yoing c pitch value(X) set to: 0.453800
- 08 Mar 2021 11:45:50 @ Yoing d target depth(m) set to: 950.0
- 08 Mar 2021 12:15:44 @ Yoing num half cycles to do(nodim) set to: -1.0
- 08 Mar 2021 12:15:44 @ Yoing d target depth(m) set to: 700.0
- 08 Mar 2021 12:15:44 @ Yoing d bpump value(X) set to: 400.0

- 08 Mar 2021 20:01:06 @ Yoing num half cycles to do(nodim) set to: 2.0
 - 08 Mar 2021 20:01:06 @ Yoing d target depth(m) set to: 5.0
 - 08 Mar 2021 20:01:06 @ Yoing d bpump value(X) set to: -230.0
 - 08 Mar 2021 20:37:17 @ Yoing num half cycles to do(nodim) set to: -1.0
 - 08 Mar 2021 20:37:17 @ Yoing d target depth(m) set to: 700.0
 - 08 Mar 2021 20:37:17 @ Yoing d bpump value(X) set to: 400.0
 - 08 Mar 2021 21:44:11 @ Yoing num half cycles to do(nodim) set to: 2.0
 - 08 Mar 2021 21:44:11 @ Yoing d target depth(m) set to: 15.0
 - 08 Mar 2021 21:44:11 @ Yoing d bpump value(X) set to: -230.0
 - 08 Mar 2021 22:12:14 @ Yoing num half cycles to do(nodim) set to: -1.0
 - 08 Mar 2021 22:12:14 @ Yoing d target depth(m) set to: 700.0
 - 08 Mar 2021 22:12:14 @ Yoing d bpump value(X) set to: 500.0
 - 10 Mar 2021 11:33:32 @ Yoing d bpump value(X) set to: 600.0
- Showing changes on Altimeter set to (behaviour u alt min depth):
- 08 Mar 2021 11:42:32 @ Altimeter set to u alt min depth set to: 2

4.2 Installed devices (from autoexec.mi)

- Forward section assy _SN: 526
- Payload bay assy _SN: 60179565
- Aft section assy _SN: 1002
- Aft electronic assy _SN: 1002
- Aft end cap assy _SN: 150
- Radomefin _SN: 1219
- Pressure transducer _SN: 123639
- Aft hull _SN: 2418
- Fwd hull _SN: 2439
- Freewave master _SN: 970-5215
- Iridium sim card _SN: 8988169234003166063
- Argos ID _SN: 198869-DEC / OC1635F-HEX
- Altimeter _SN: 60179565
- Pitch motor _SN: 268
- 1000- Motor _SN: controller124
- 1000- Pump assy _SN: 647
- 1000- Valve assy _SN: 638
- Science SOM,STM32 _SN: 0027
- science motherboard _SN: 0013
- seabird CTD _SN: 9580
- Main board _SN: 160
- Communication board _SN: 3
- Iridium phone _SN: 202
- Main SOM,STM32 _SN: 160
- Attitude sensor _SN: 42917
- Air pump _SN: 1290
- Communications Assy _SN: 0003
- Freewave Slave _SN: 968-0390
- GPS _SN: 1472
- Argos X-cat _SN: 1181
- Air bladder _SN: 1783

4.3 Possible Iridium states

- MODEM NO CARRIER = 0
- MODEM OK = 1
- MODEM CONNECT = 2
- MODEM ERROR = 3
- MODEM NO ANSWER = 4
- MODEM BUSY = 5
- MODEM NO DIALTONE = 6
- LOGGING IN = 7
- LOGGED ON = 8
- MODEM AWAITING OK = 10
- MODEM AWAITING CONNECTION = 11
- MODEM TIMEOUT = 12
- MODEM UNKNOWN = 99
- NO CHARS TIMEOUT = 100

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