

SOCIB Glider Mission Summary Report

SOCIB_preCALYPSO21.A_20210206_sdeep09_GFMR0112

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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.A_20210206_sdeep09_GFMR0112
Platform model	G3 Electric
Platform ID / Name / WMO Code	U830/ sdeep09/ 6801640
Software NAV version	Version 10.00 tags/V10.00-0-gdfe501e2 (0, 1)
Software SCI version	Version 10.00 tags/V10.00-0-gdfe501e2 (0, 1)
FWD bay sn	0606
SCI bay sn	1351
Mission duration	1.1 days
Mission start	2021-02-16 12:00:00
Mission end	2021-02-17 14:52:51
Total distance	20.25[km] 10.93[nm]
Deployment point [dd°mm.mmmm']	N 39°52.3885' E 02°40.8057'
Recovery point [dd°mm.mmmm']	N 39°39.9979' E 02°34.8581'
Battery Consumption (Ah)	9.6(from 5.1 to 14.7)
Battery specification	20210111 SN046/ TWR 4S lithium (550Ah)
Survey area	North Soller
Objetive	The broad objective is to test the new glider U830 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 sdeep09 in FUTURE endurance line GIRONA FEB2021 (SOCIB operational program), aiming the coverage of the Girona channel (8 transects) from FEB to APR 2021, sampling physical and biogeochemical parmeters (CTD, BSK, fluorescence and turbidity, oxygen, and PAR).
NAV events	<ul style="list-style-type: none"> ▪ Event 1: First mission for sdeep09 ▪ Event 2: Mission aborted due to leak in forward section, though the altimeter connection. See 1.3 and 1.2 figures ▪ Event 3: Forced to send the entire forward section to refurbishment
SCI events	<ul style="list-style-type: none"> ▪ Event 1: No significant data to analyze ▪ Event 2: ▪ Event 3:

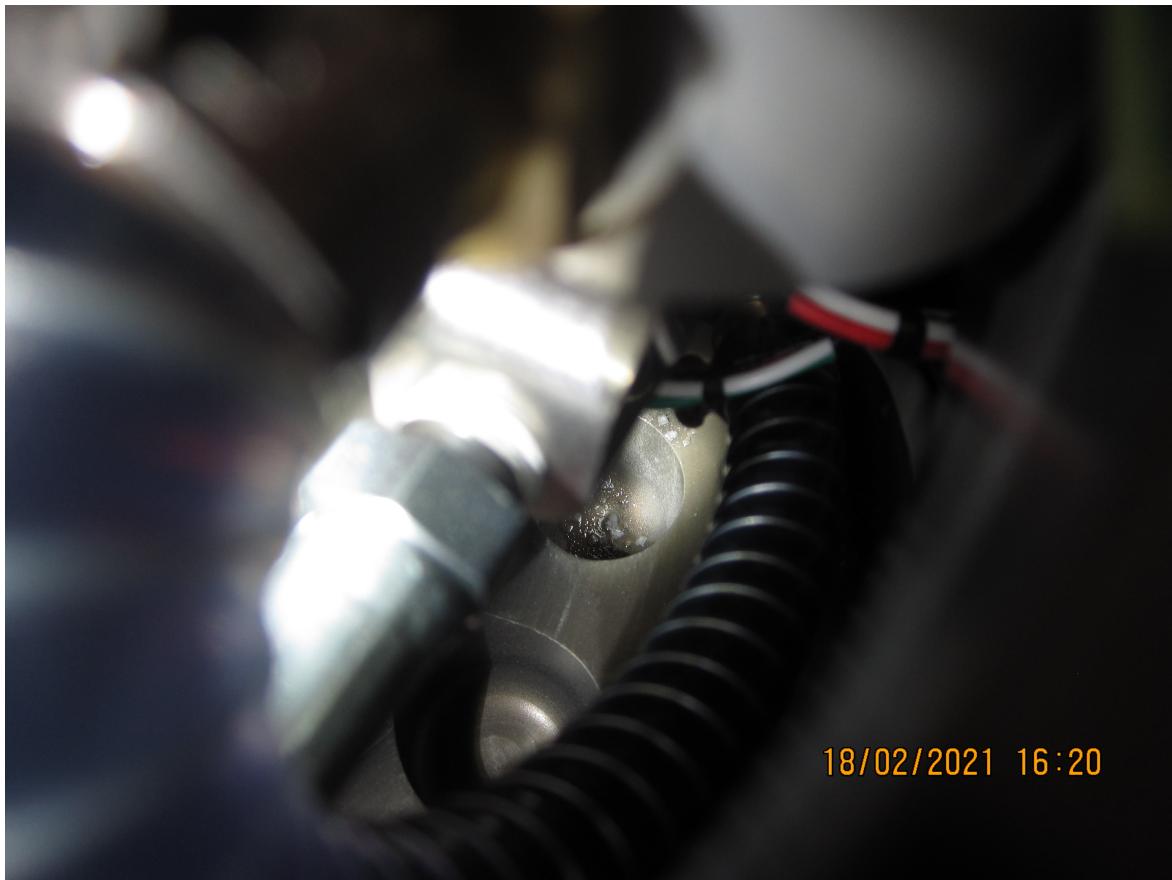


Figure 1.2: Altimeter leak

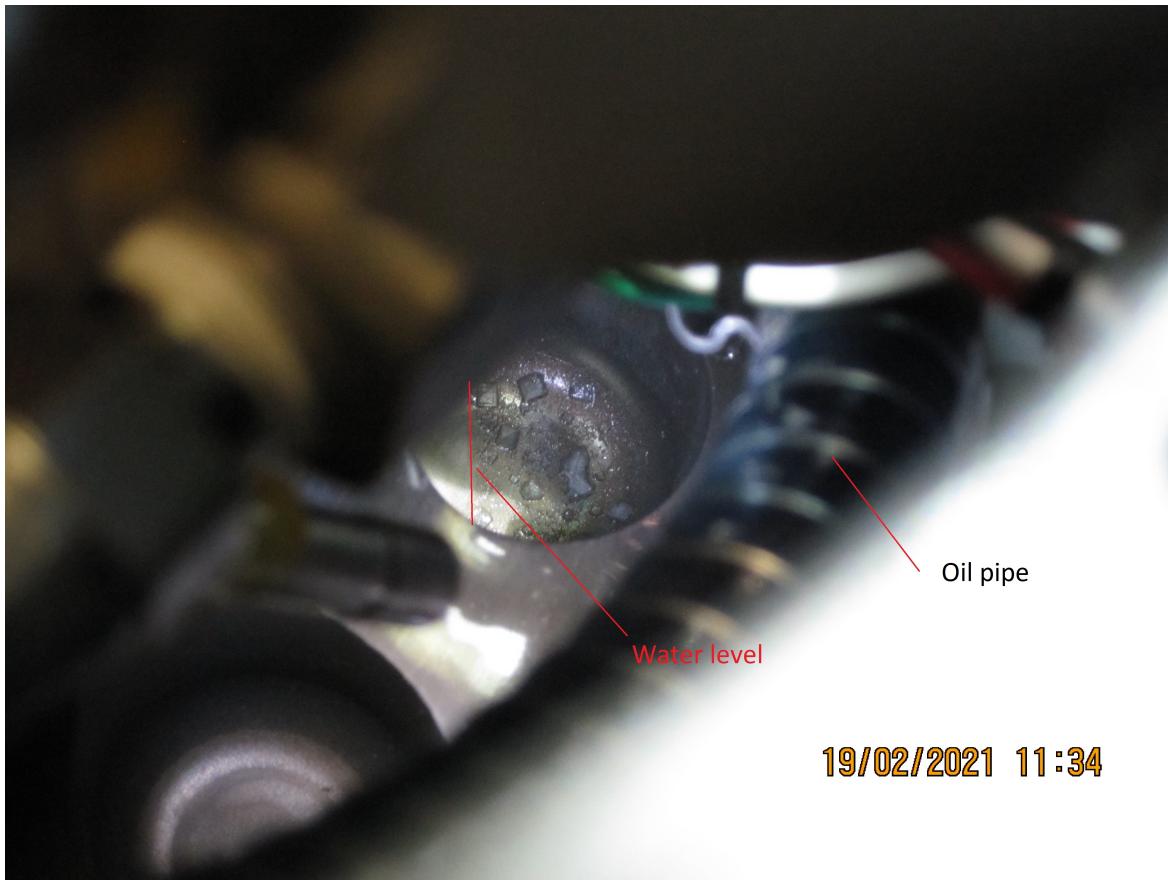


Figure 1.3: Altimeter leak

1.2 Metadata

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

*Available netCDF data product:

- L0: https://thredds.socib.es/thredds/fileServer/auv/glider/sdeep09-scb_s1deep009/L0/2021/dep0001_sdeep09_scb-s1deep009_L0_2021-02-16_data_dt.nc
- L1: https://thredds.socib.es/thredds/fileServer/auv/glider/sdeep09-scb_s1deep009/L1/2021/dep0001_sdeep09_scb-s1deep009_L1_2021-02-16_data_dt.nc
- L2: https://thredds.socib.es/thredds/fileServer/auv/glider/sdeep09-scb_s1deep009/L2/2021/dep0001_sdeep09_scb-s1deep009_L2_2021-02-16_data_dt.nc

2 Engineering Review

2.1 Preparation

- Premission: ok, First mission for U830
- 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
GPS	0	3	0
pitch motor	4	0	0
diginfin	21	6	0
IRIDIUM	27	0	0
coulomb	5	0	0

- Communication Systems (see appendix for Iridium states):
 - Total number iridium calls [num]: 38
 - Iridium calls to secondary [num]: 2
 - ON overall iridium period [h]: 2.2
 - Iridium calls state from MODE NO CARRIER to MODE UNKNOWN [num]: 20
 - Iridium calls state from MODE CONNECT to MODE UNKNOWN [num]: 14
 - Iridium calls state from MODE ERROR to MODE UNKNOWN [num]: 2
 - Iridium calls state from MODE UNKNOWN to MODE AWAITING OK [num]: 39
 - Iridium calls state from MODE AWAITING OK to MODE UNKNOWN [num]: 2

- Drop calls (Iridium state from 2 to 99 with c iridium on = 1) [num]: 2
- Total time at surface [h]: 1.78
- Total time at surface [%]: 6.64
- 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

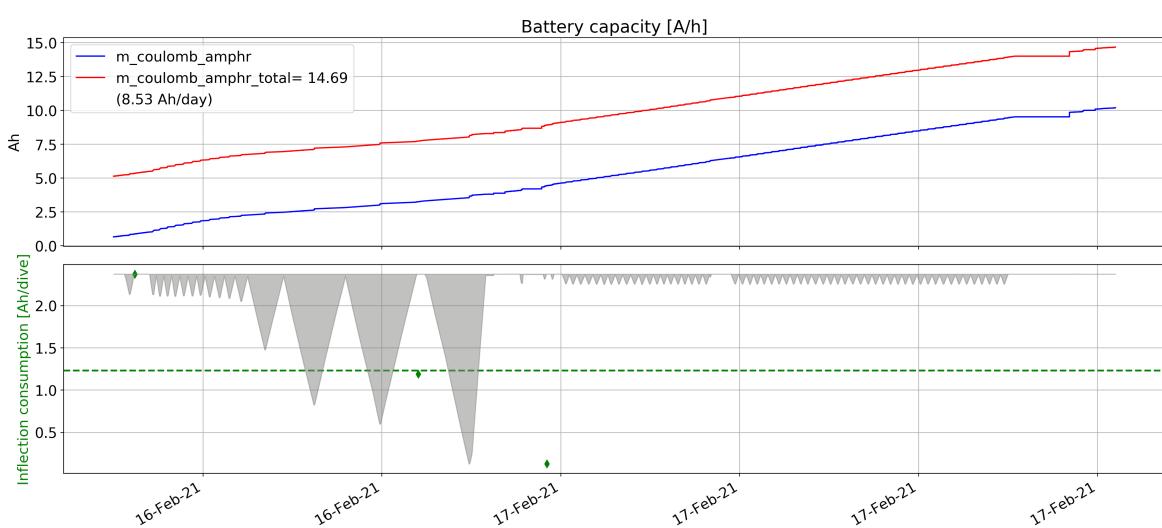


Figure 2.1: Battery capacity

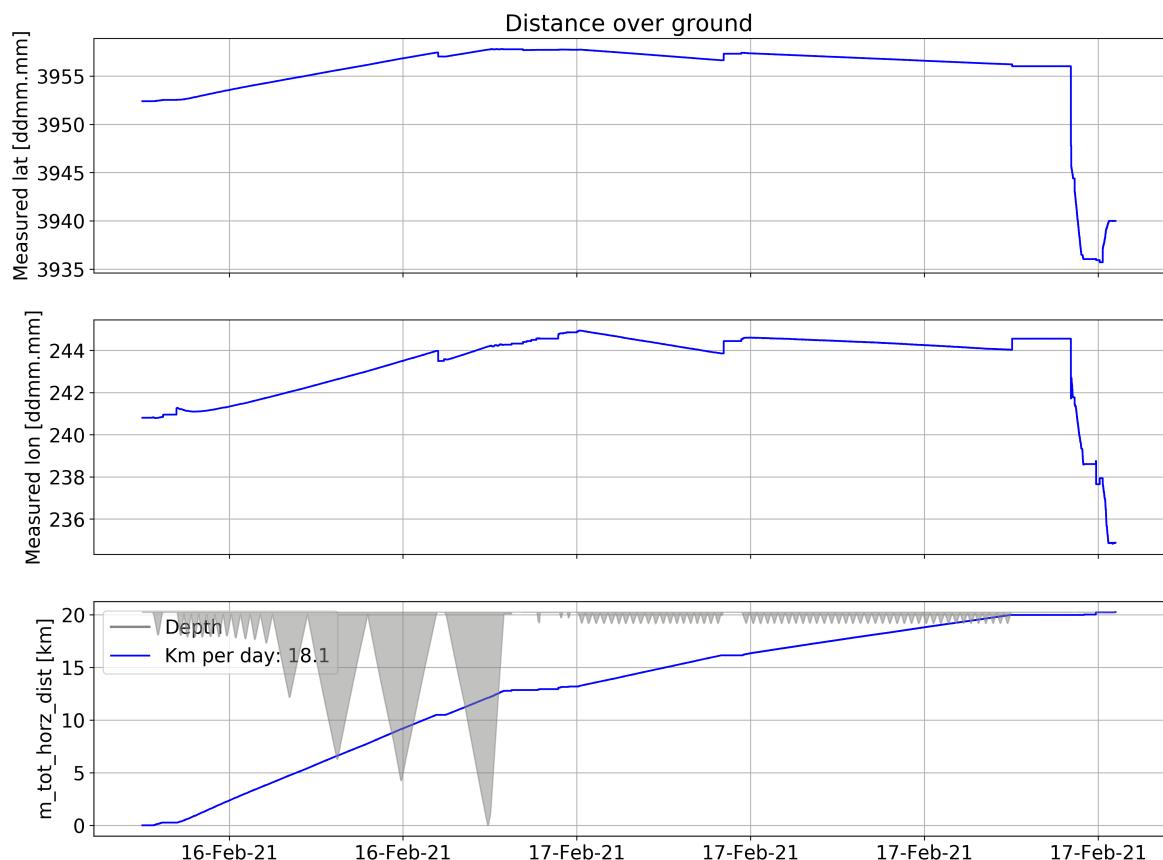


Figure 2.2: Distance over ground

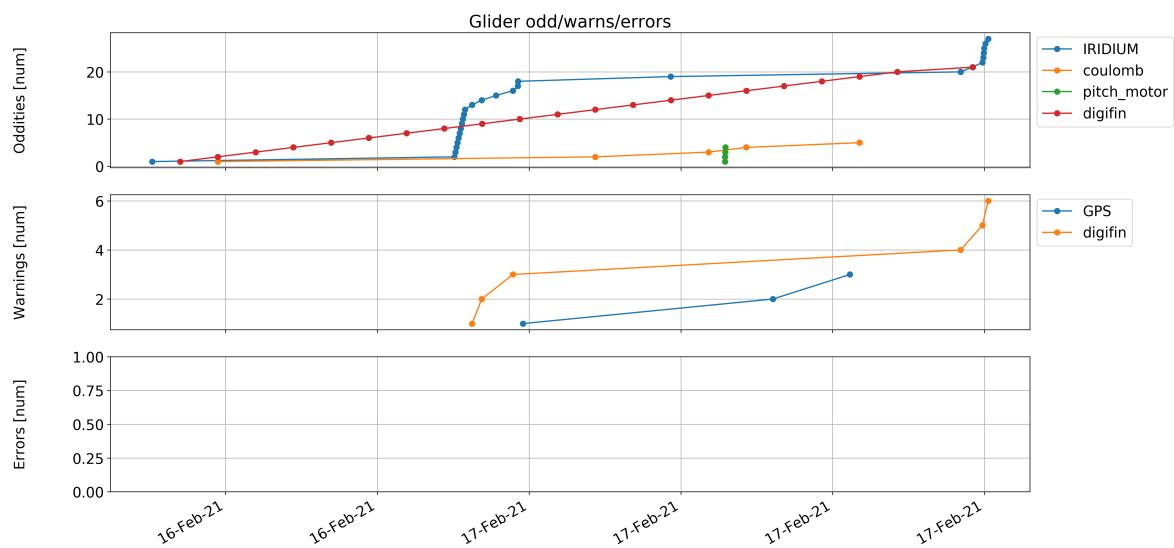


Figure 2.3: Glider Odd Warn and Err

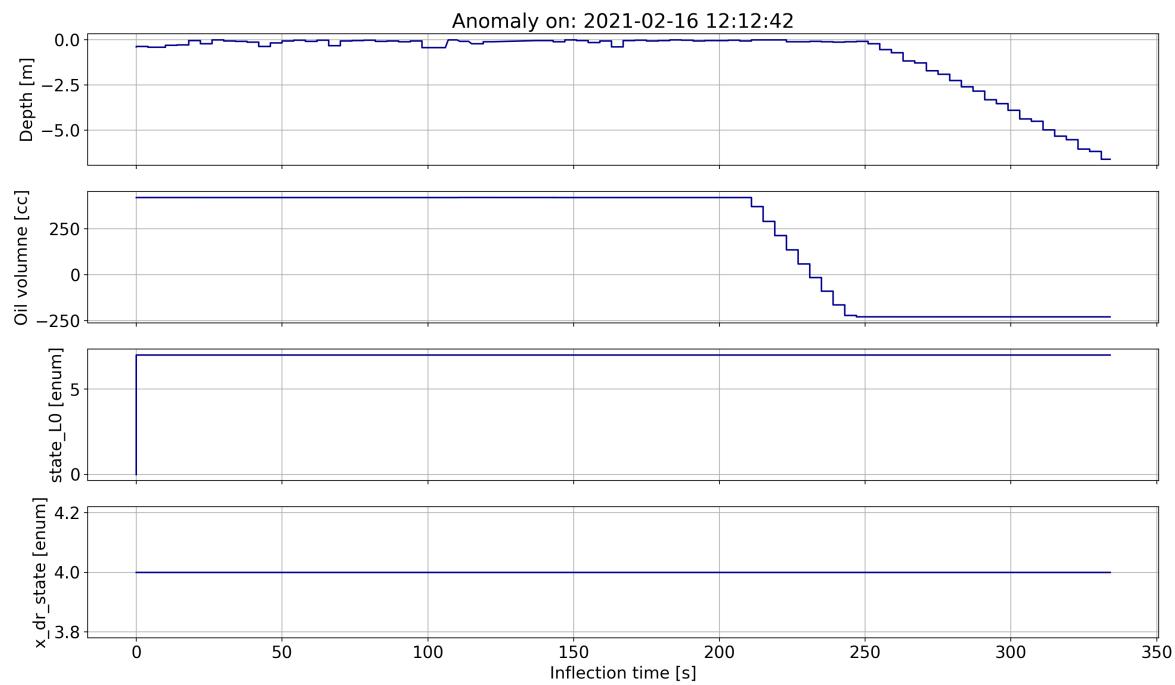


Figure 2.4: 20210216T121242 Anomaly 1

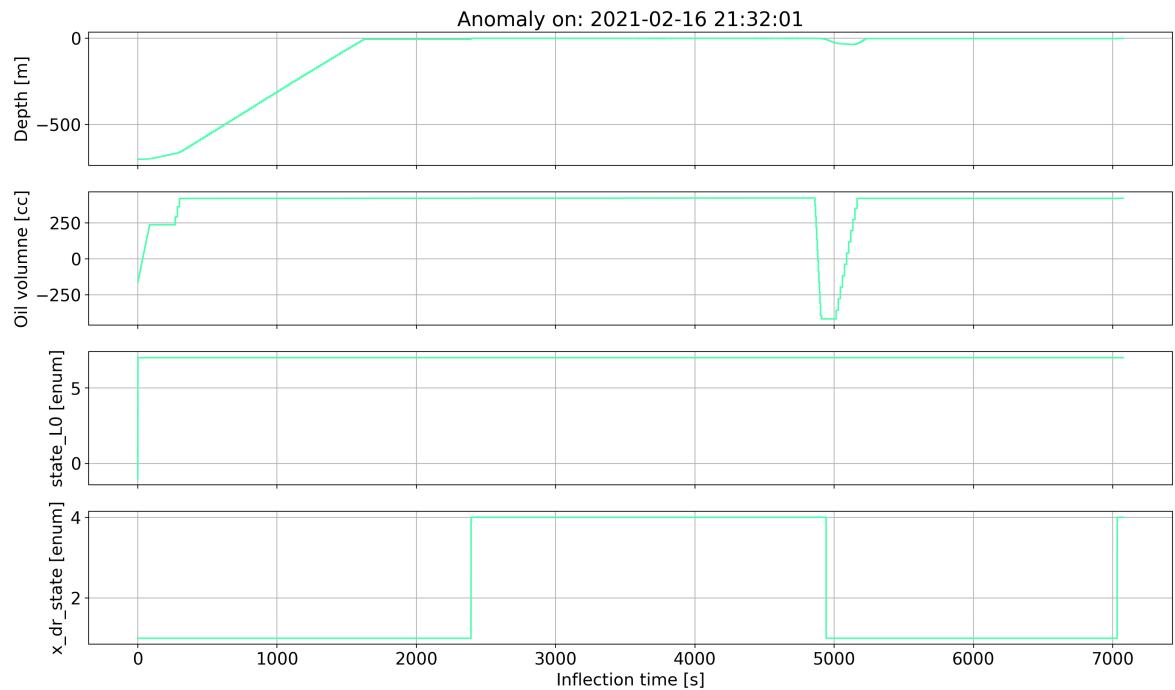


Figure 2.5: 20210216T213201 Anomaly 2

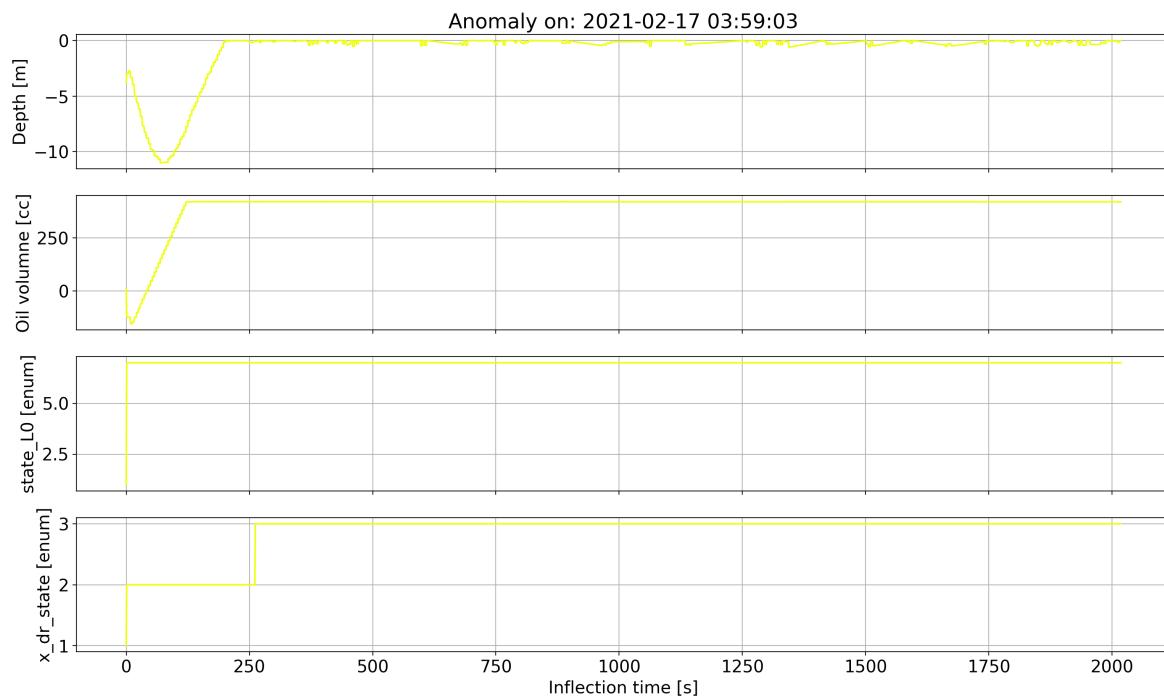


Figure 2.6: 20210217T035903 Anomaly 3

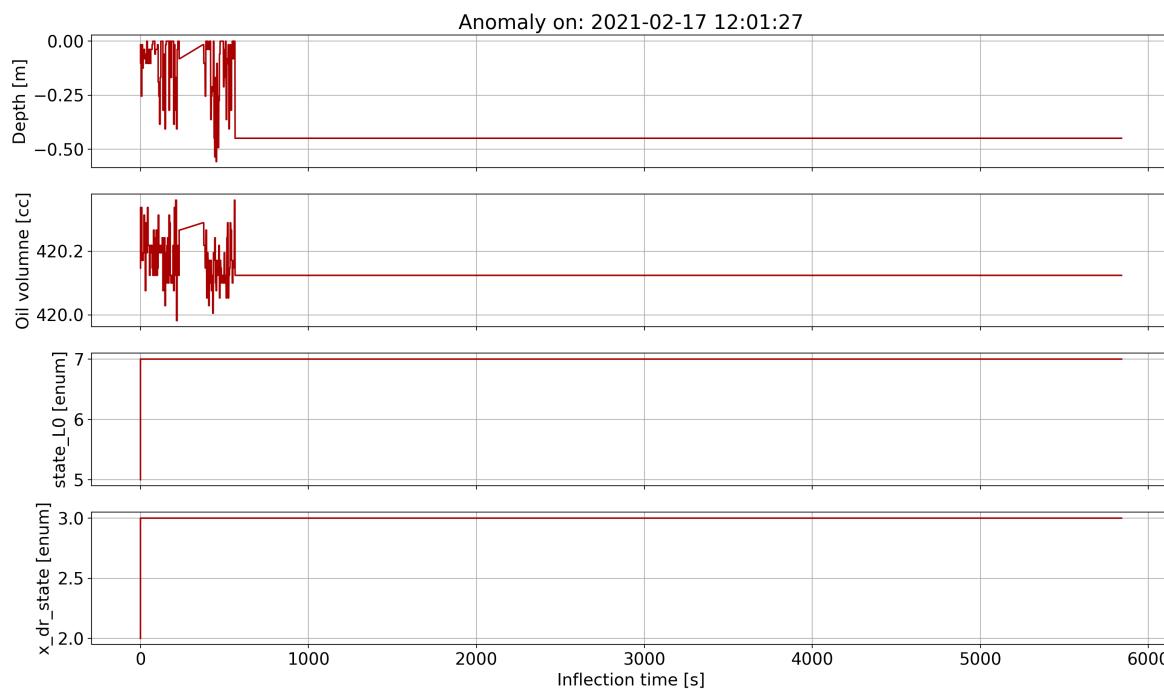


Figure 2.7: 20210217T120127 Anomaly 4



Figure 2.8: 20210217T133931 Anomaly 5

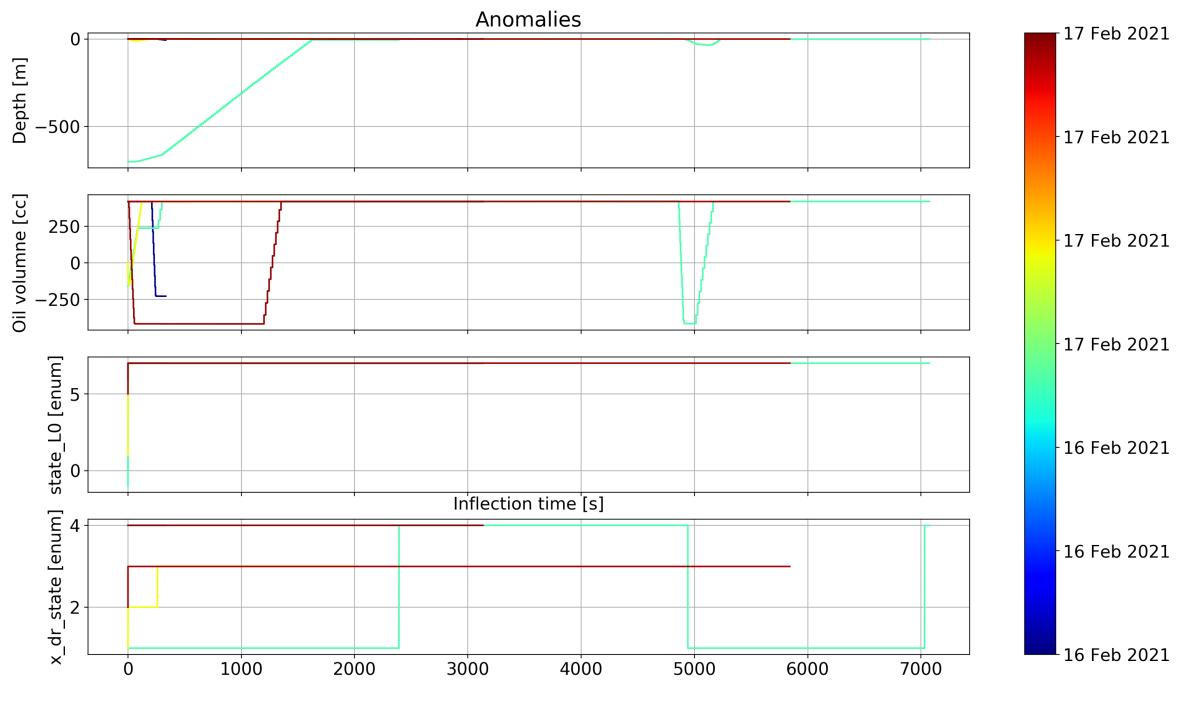


Figure 2.9: Anomalies (time)

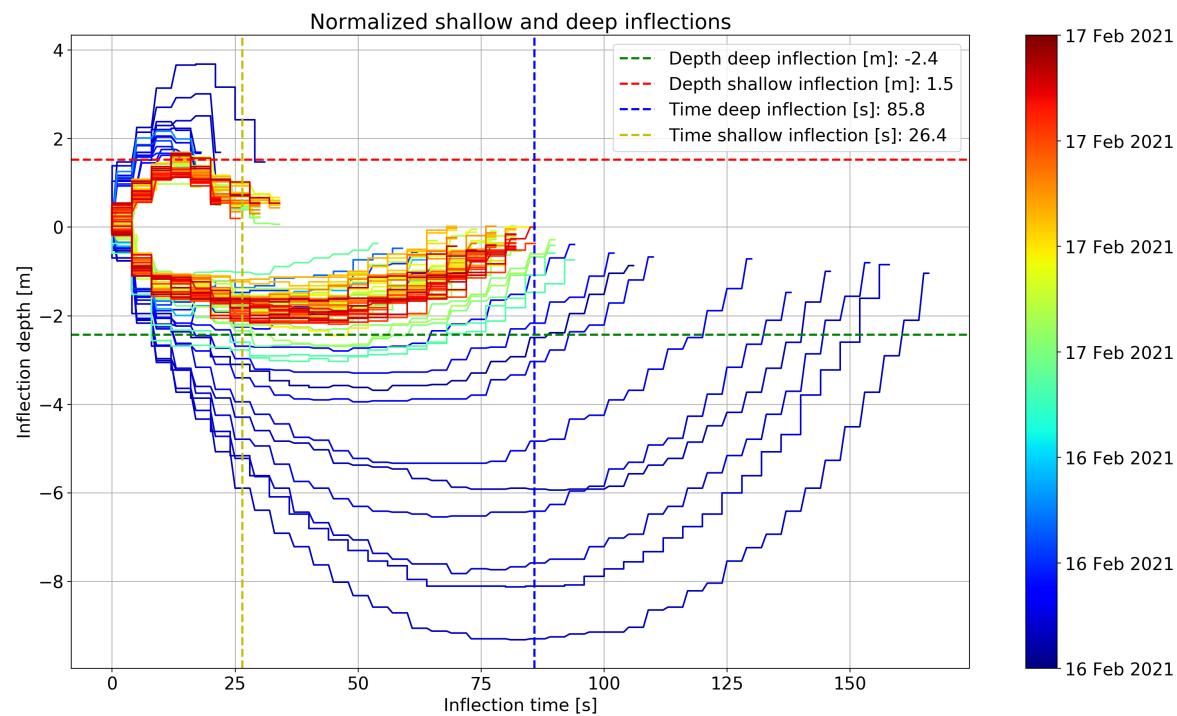


Figure 2.10: Depth inflections

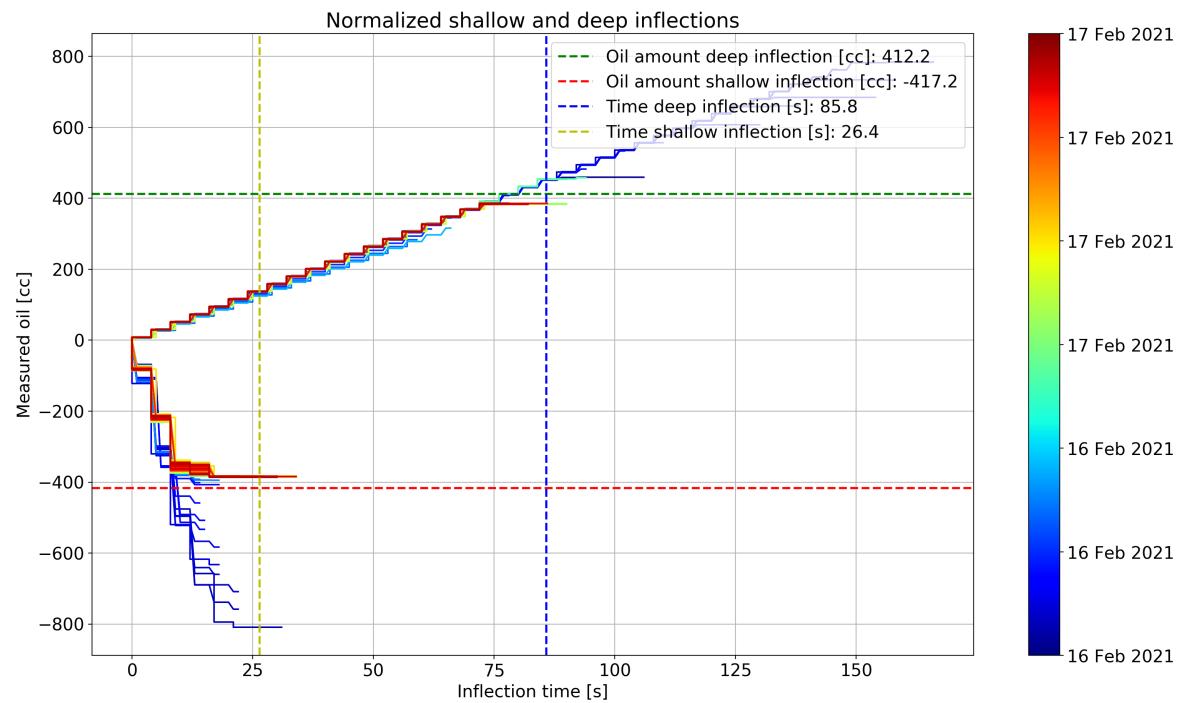


Figure 2.11: Oil inflections

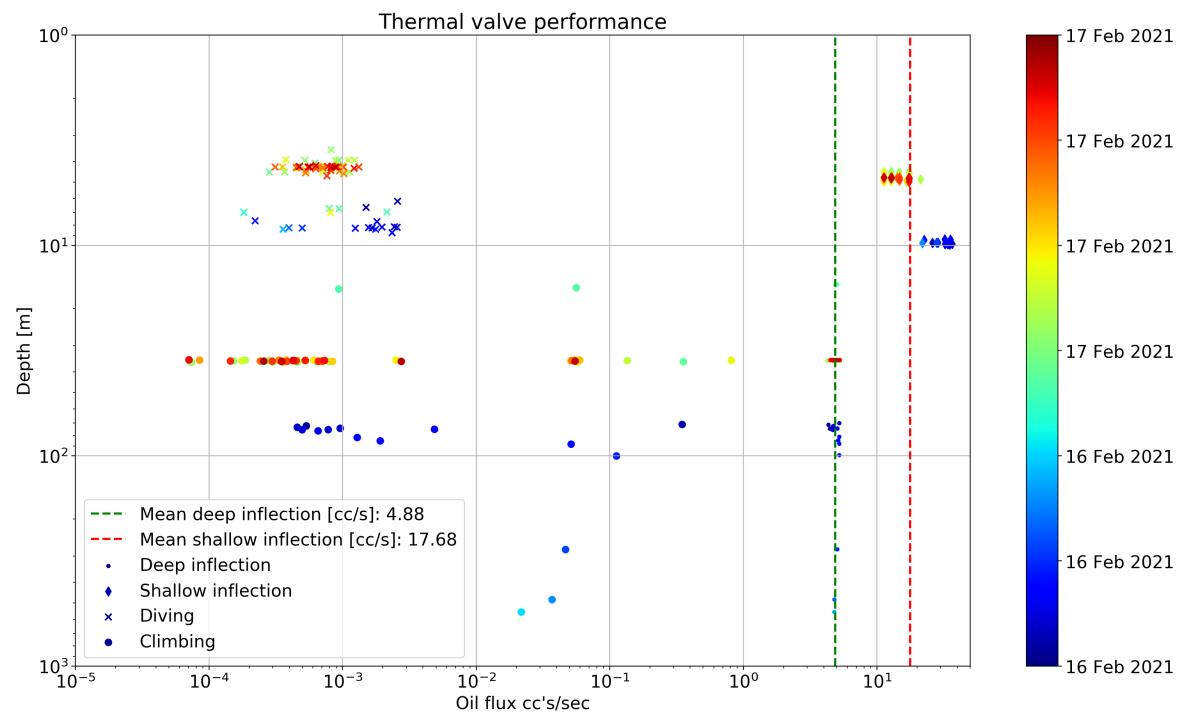


Figure 2.12: Oil flux

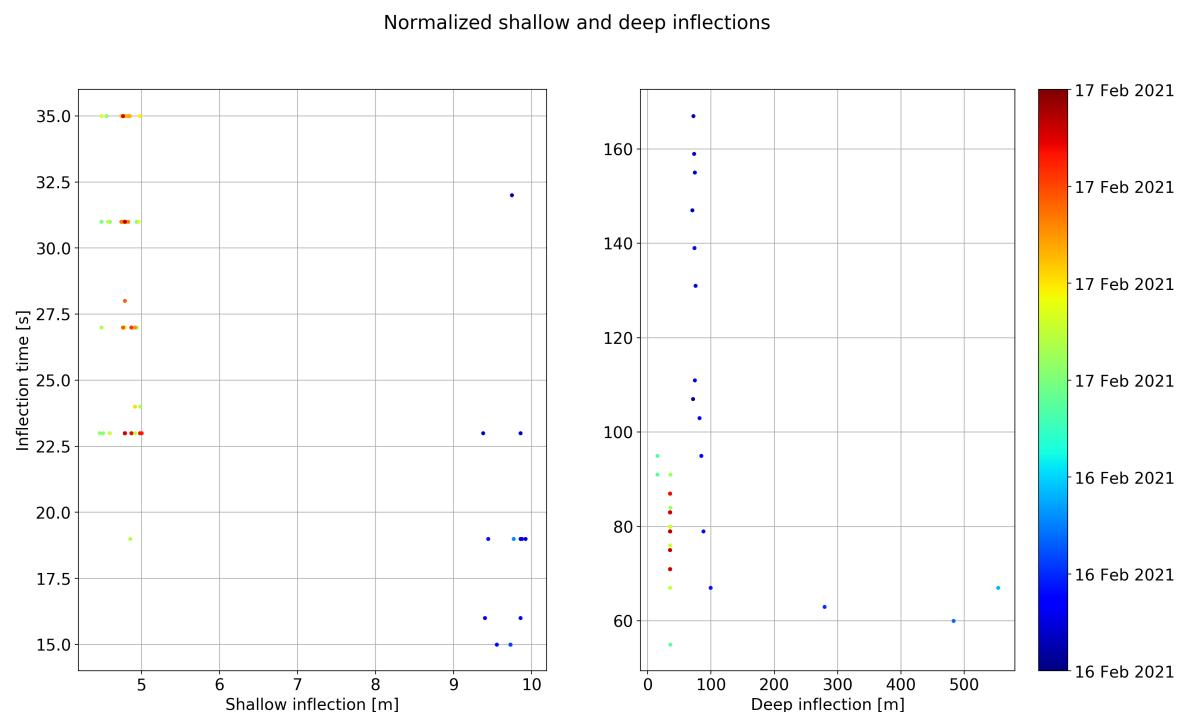


Figure 2.13: Duration inflections

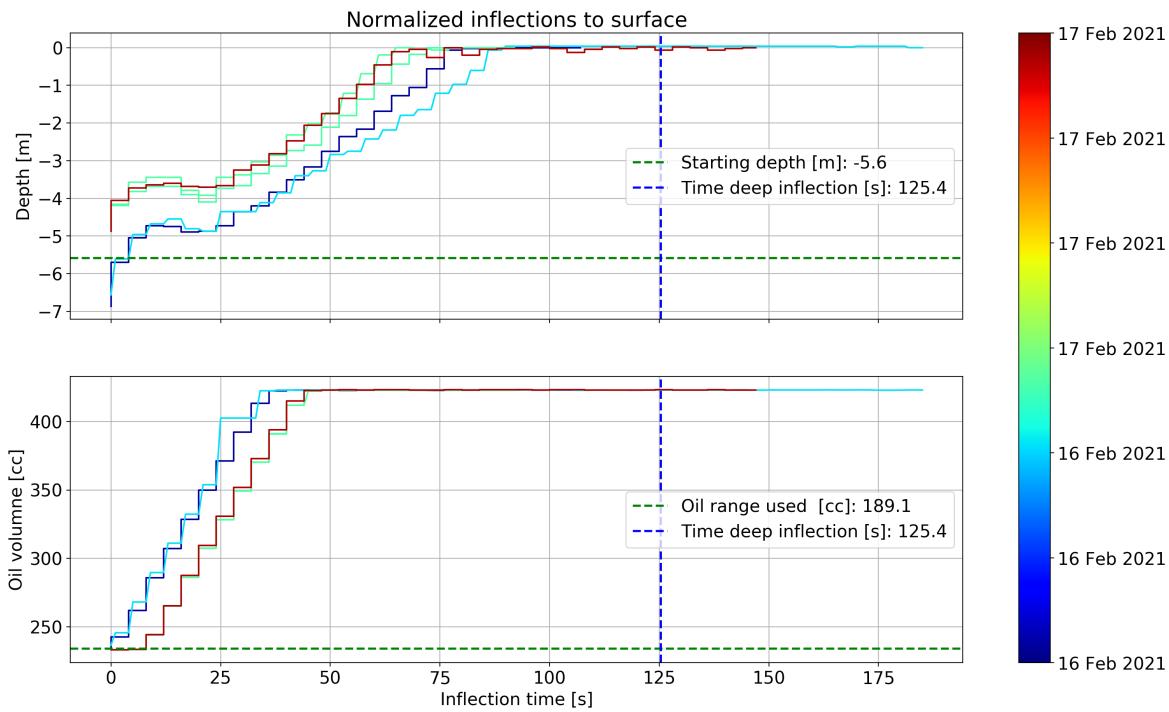


Figure 2.14: Surface Oil inflections

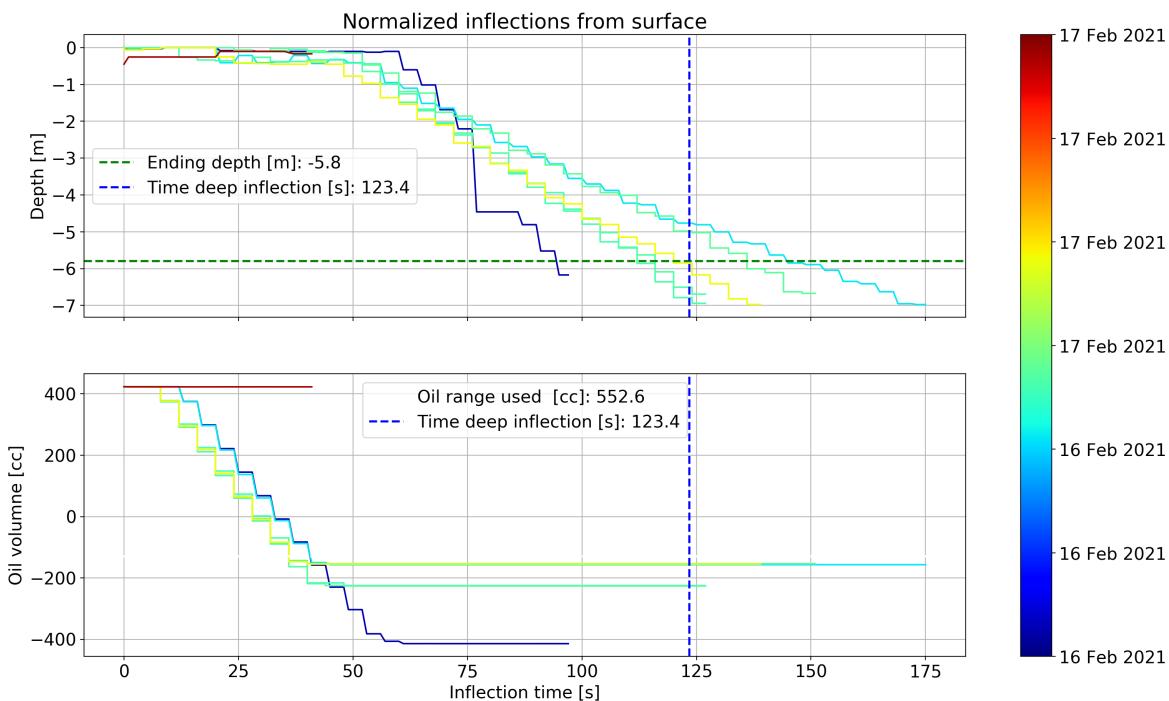


Figure 2.15: Surface Duration inflections

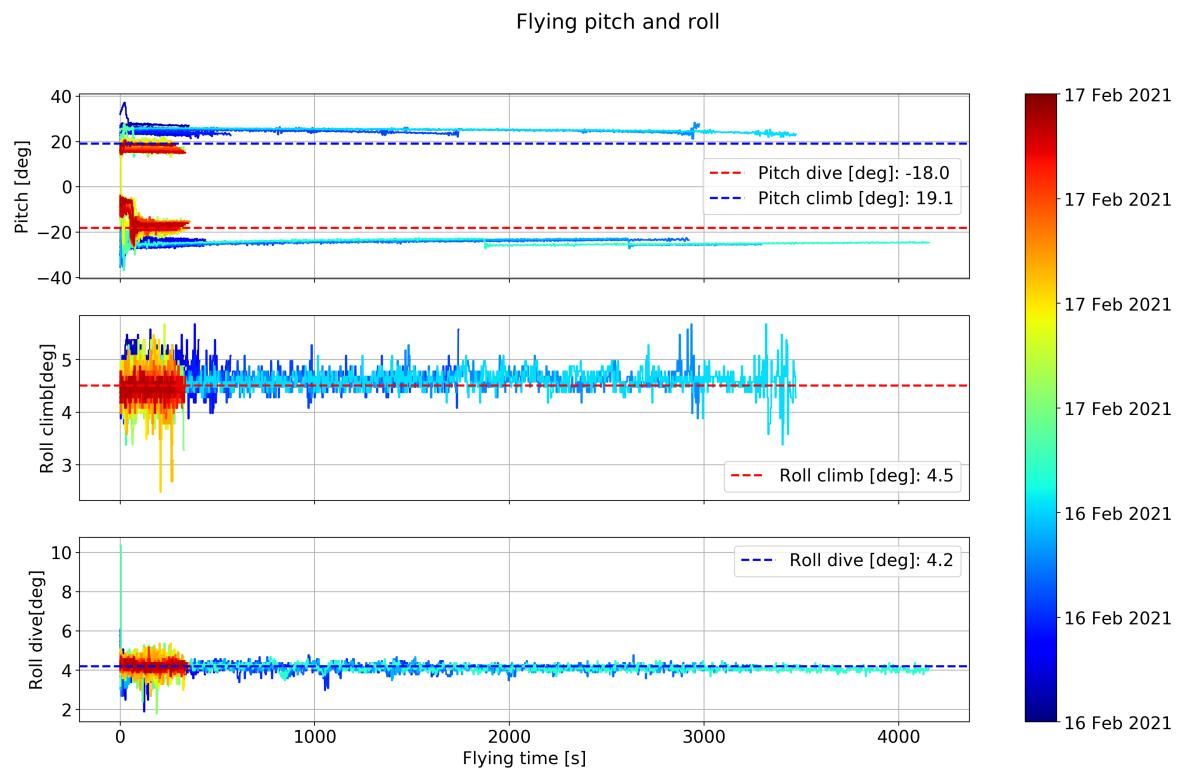


Figure 2.16: Pitch and roll, when climbing and diving

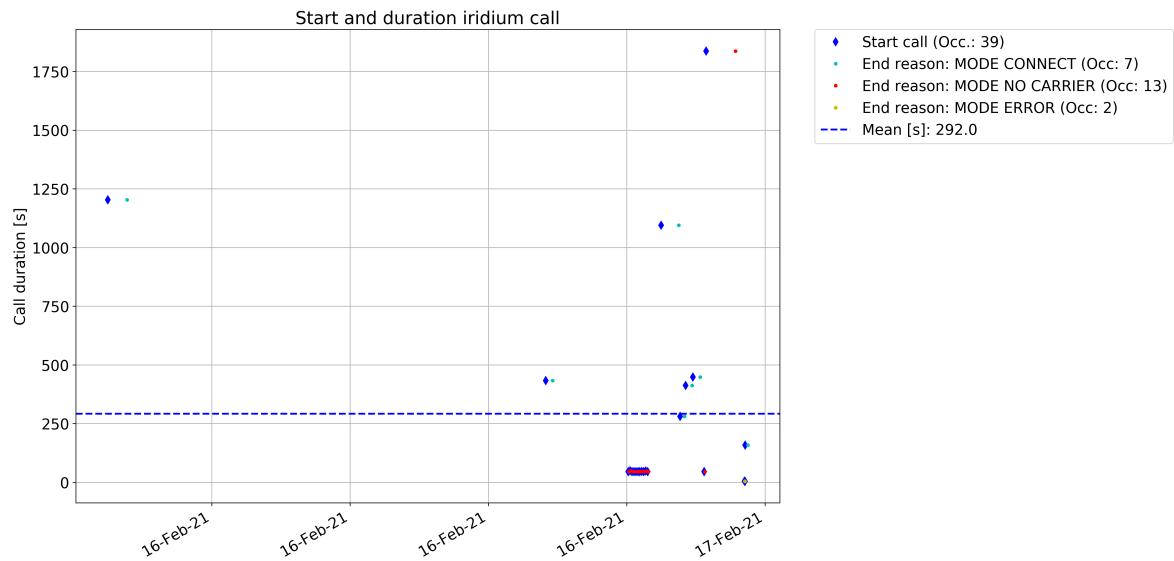


Figure 2.17: Iridium Status

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	1806	20190618	150	153	7738	6.0	9.0
FLNTU-FLBBCDSLC	5986	20191121	75	153	na	na	4.7
OXY 3-4	0846	20190923	150	153	7738	6.0	9.0
PAR	50317	20200203	75	153	1983	16.602	3.8
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	46
FLx	Turbidity dark count	na
FLx	CDOM dark count	50
FLx	BB700 dark count	41

3.2 SCI plots

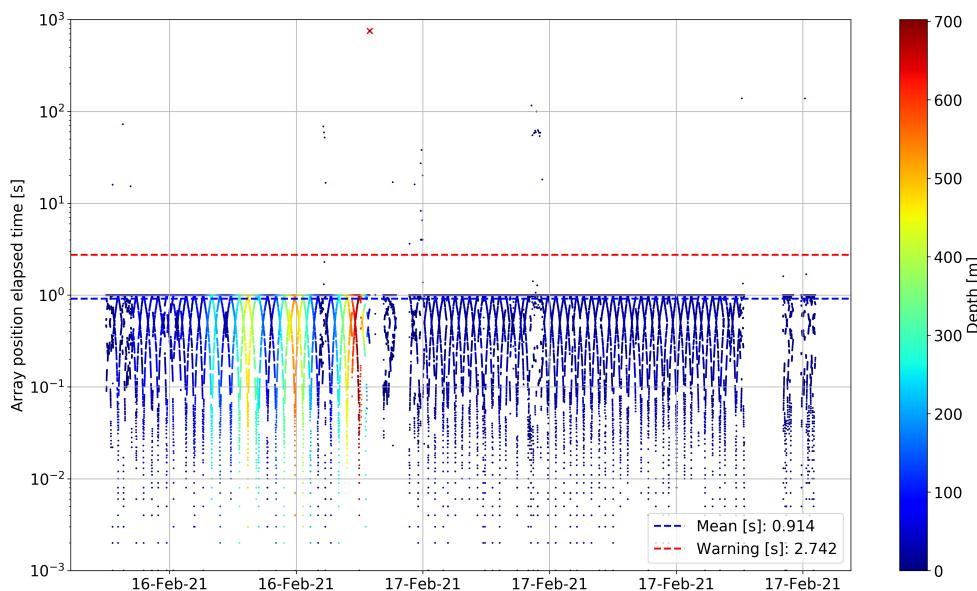


Figure 3.1: Array time

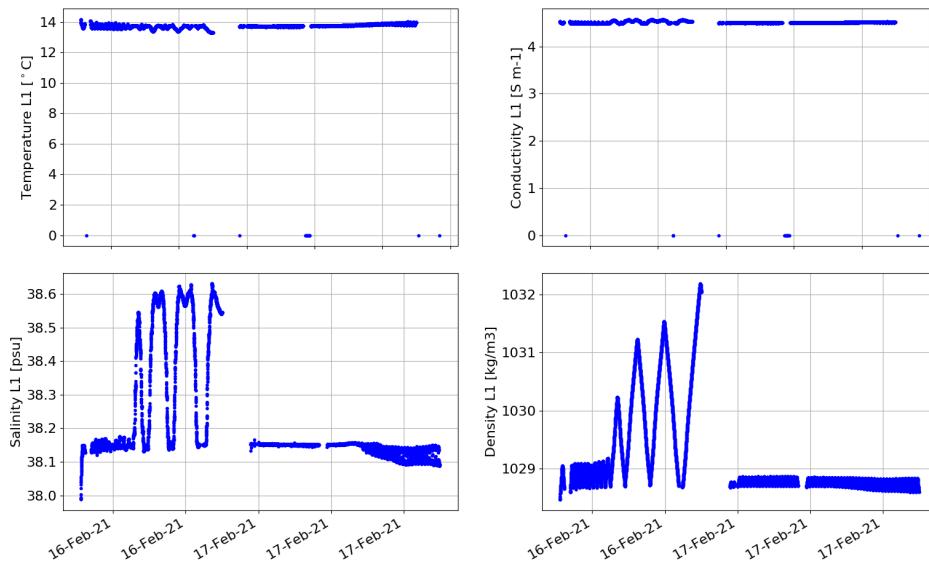


Figure 3.2: Raw CTD L1

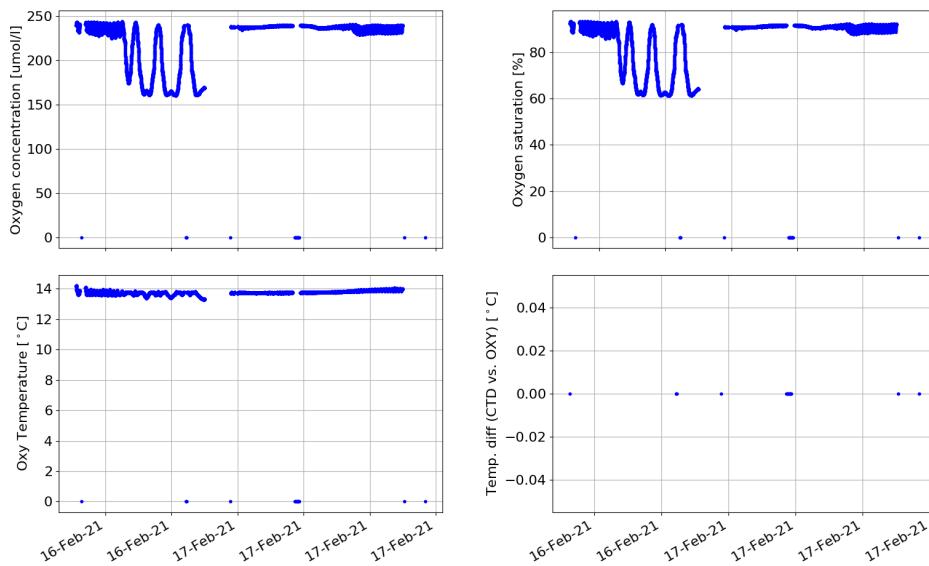


Figure 3.3: Raw OXY L1

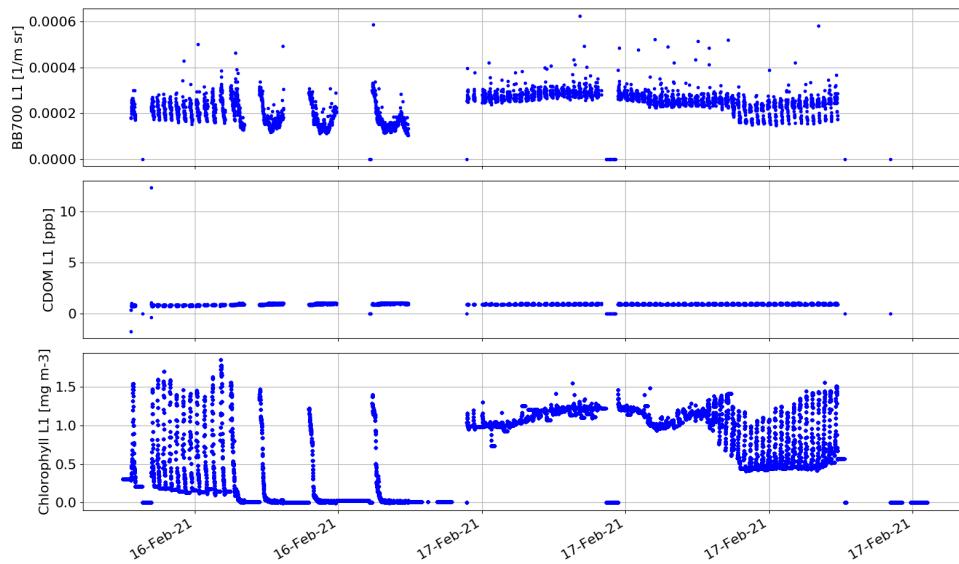


Figure 3.4: Raw FLBBCDSLC L1

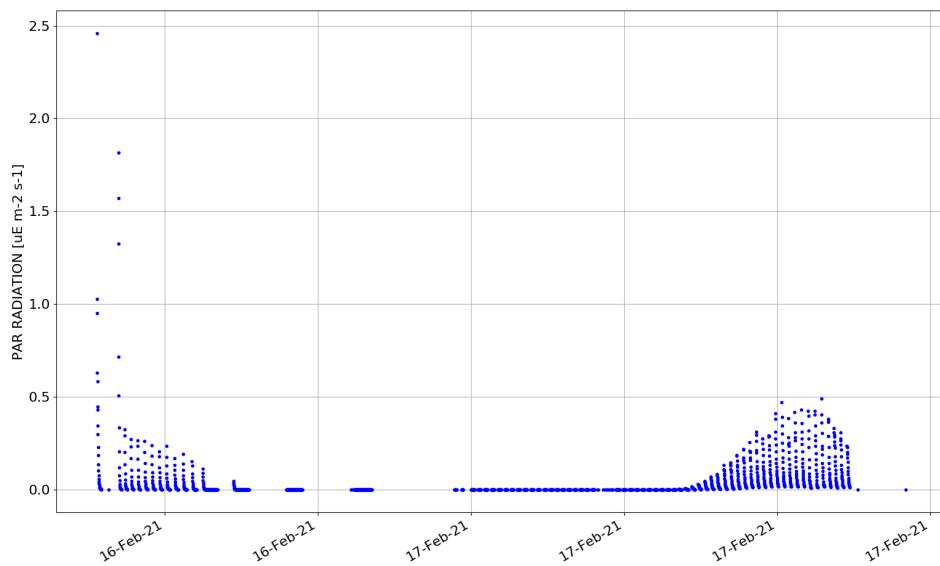


Figure 3.5: Raw PAR L1

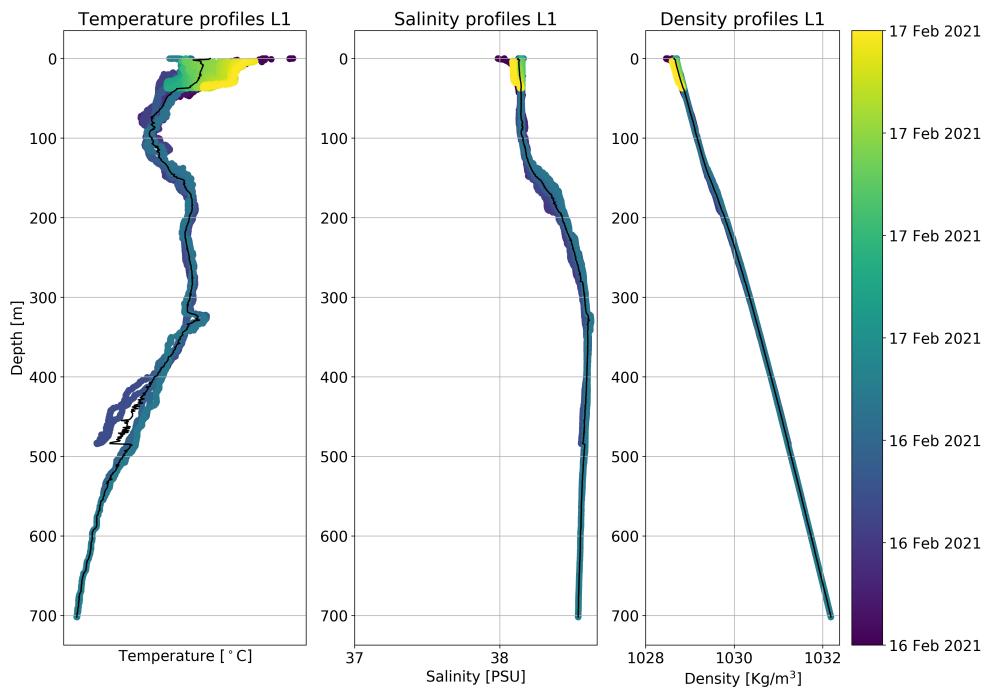


Figure 3.6: CTD profiles

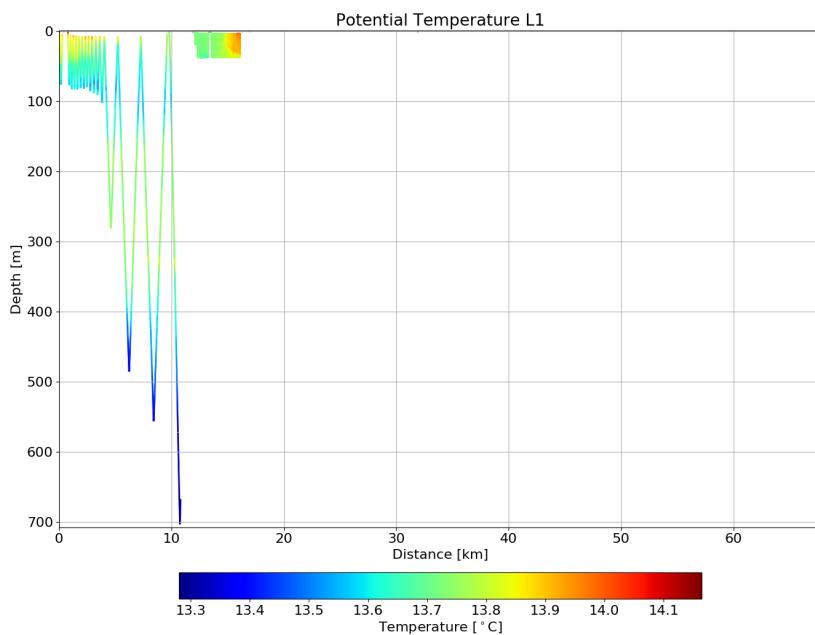


Figure 3.7: CTD temperature

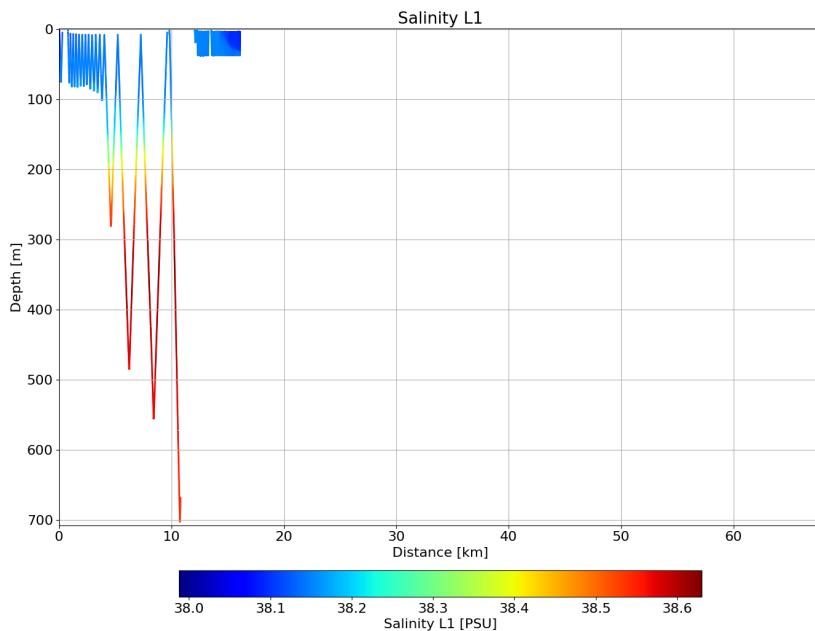


Figure 3.8: CTD Salinity

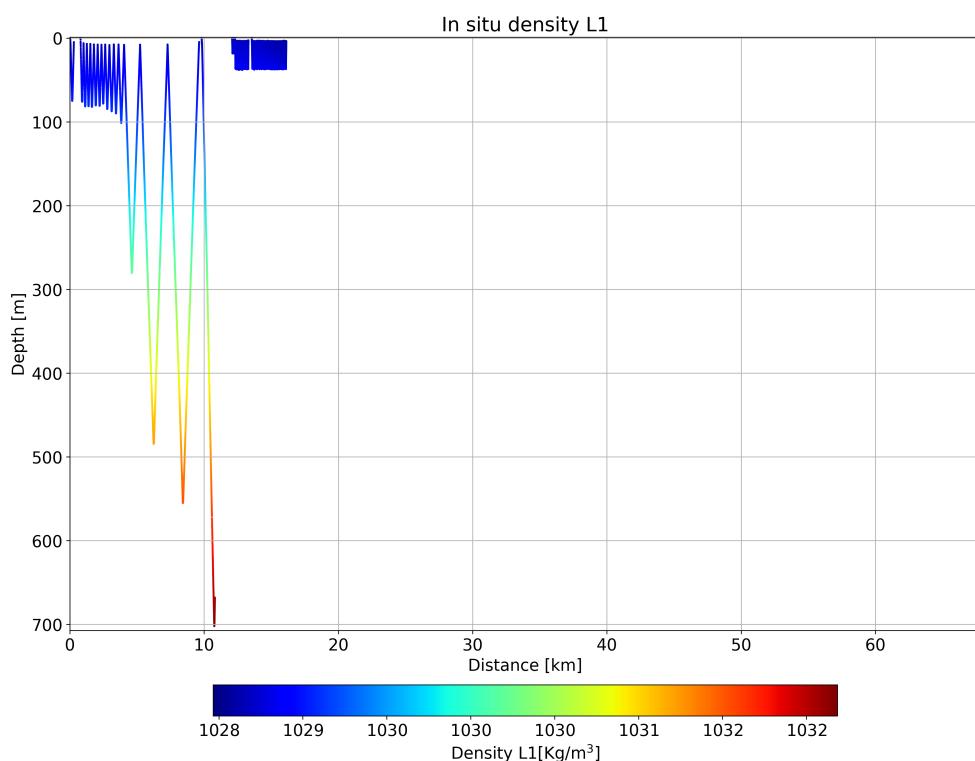


Figure 3.9: CTD Density

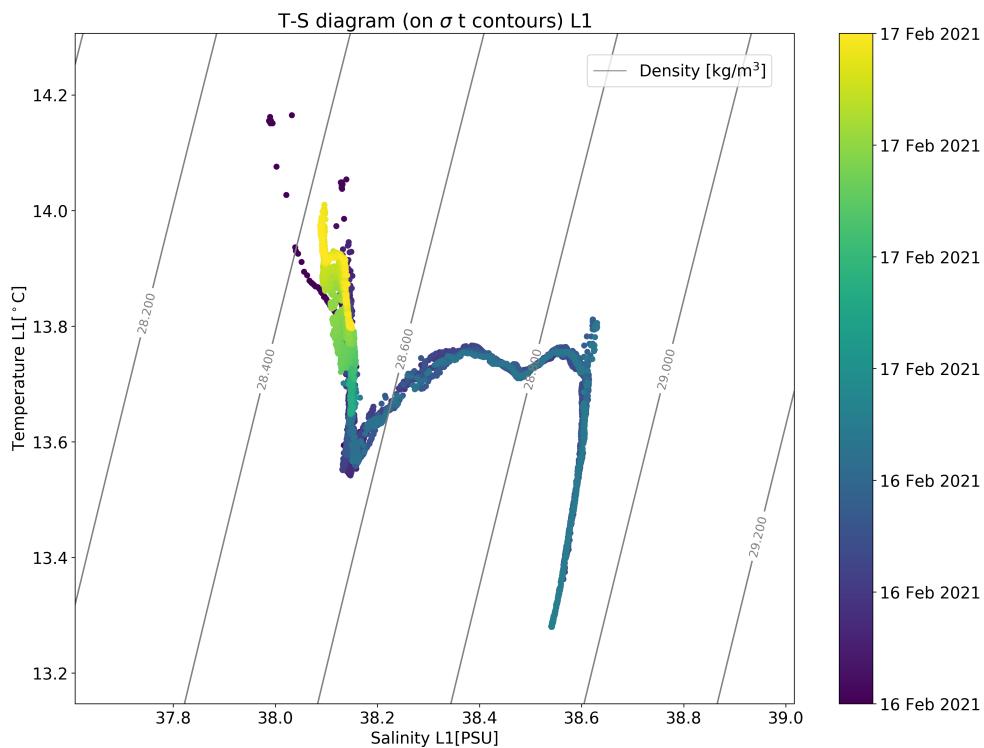


Figure 3.10: TS diagram (CTD)

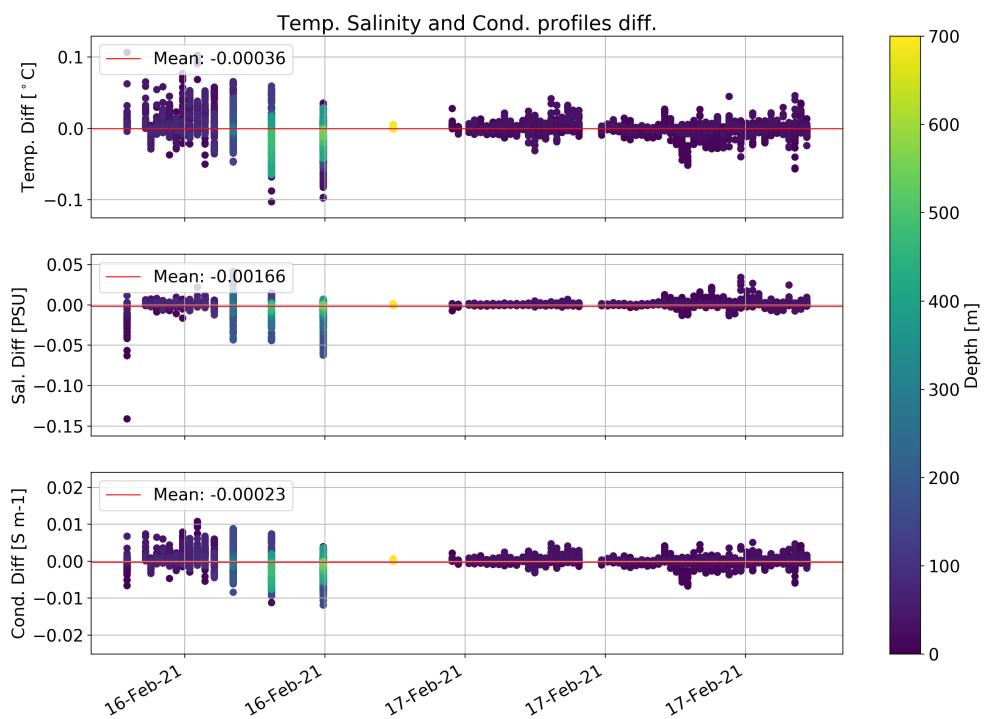


Figure 3.11: Profile consistency (CTD)



Figure 3.12: Profile consistency (CTD) zoom

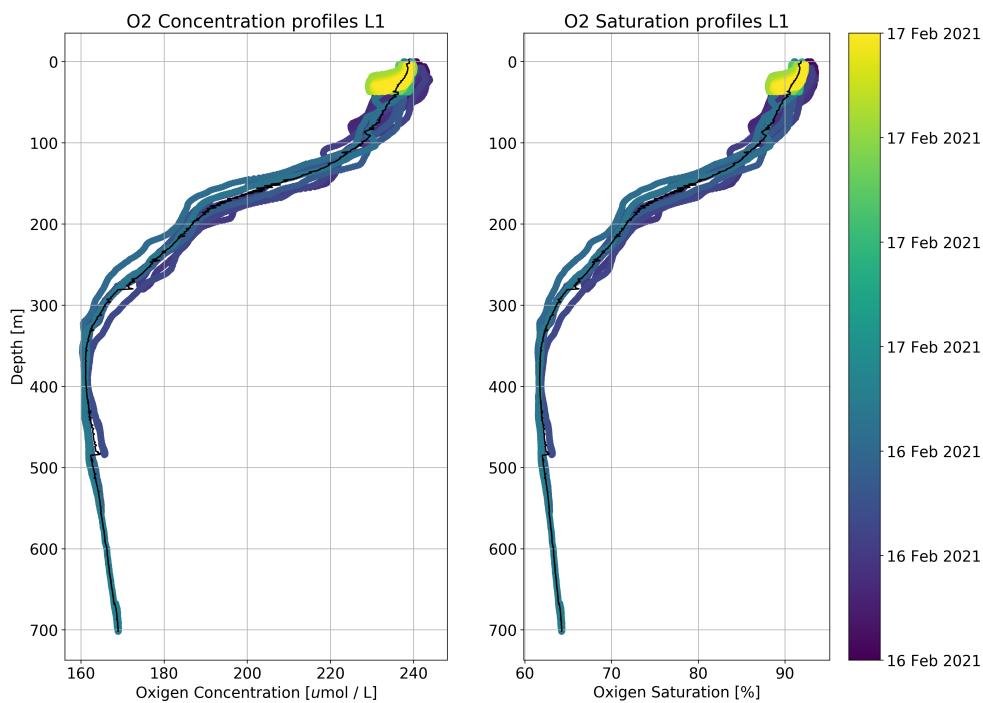


Figure 3.13: Oxygen profiles

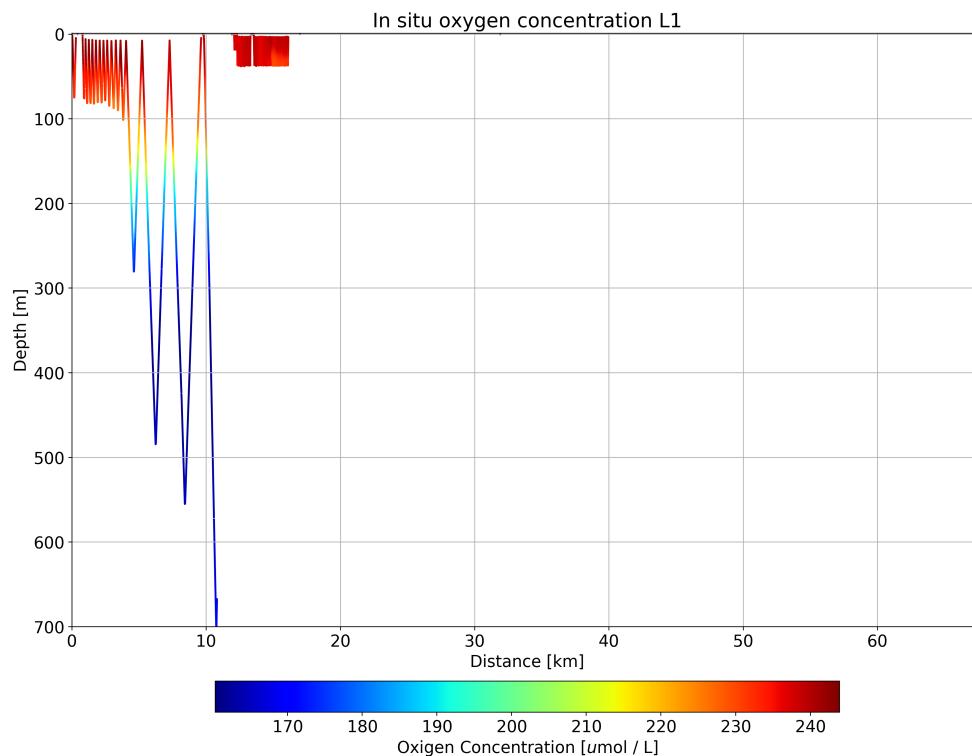


Figure 3.14: Oxygen Concentration

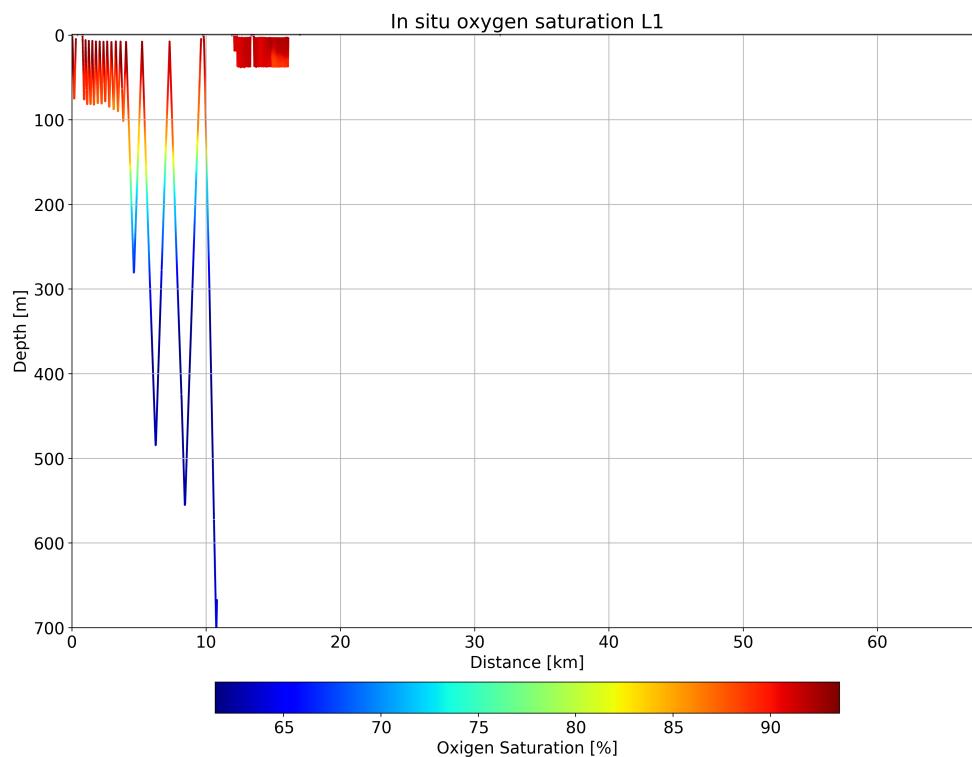


Figure 3.15: Oxygen Saturation

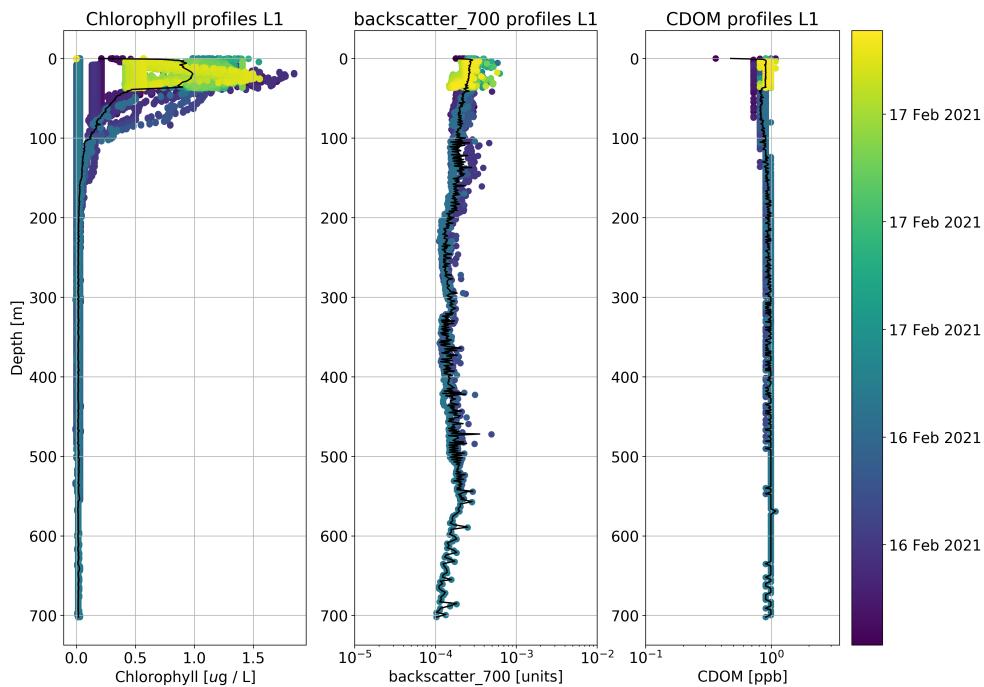


Figure 3.16: Chlorophyll-a, CDOM and BB700 profiles

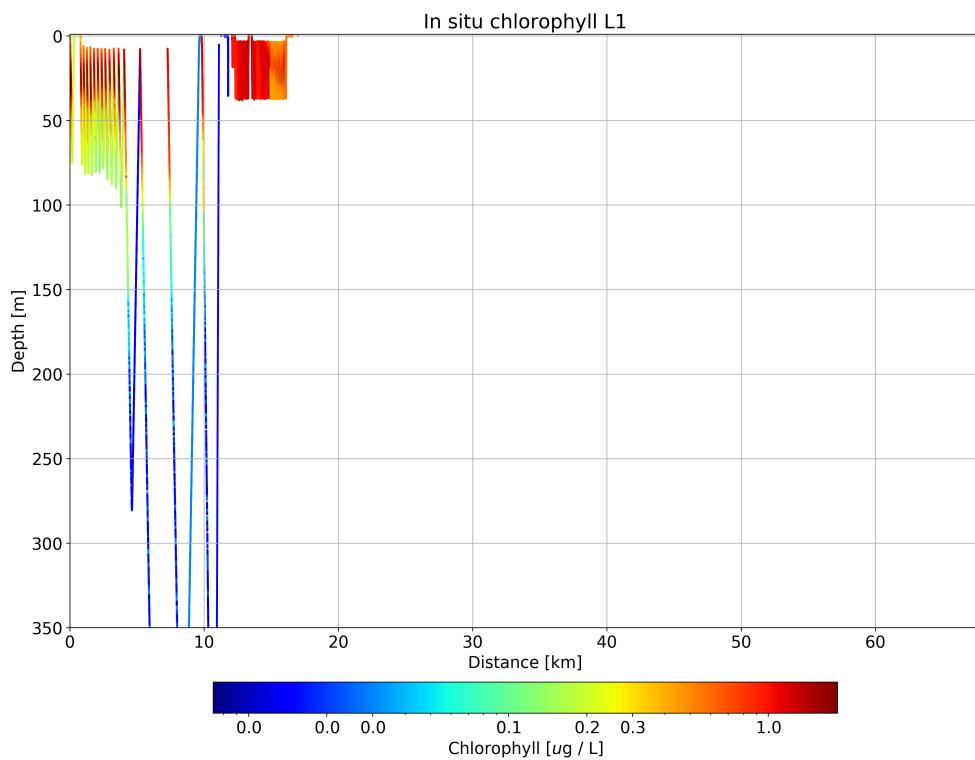


Figure 3.17: Chlorophyll-a

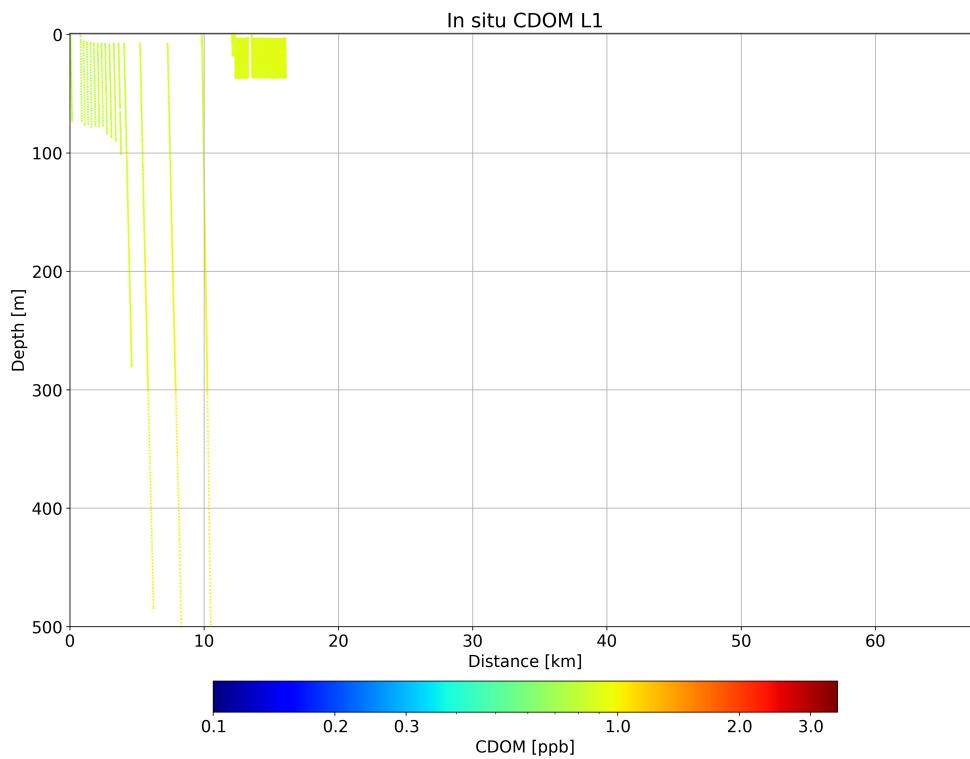


Figure 3.18: CDOM

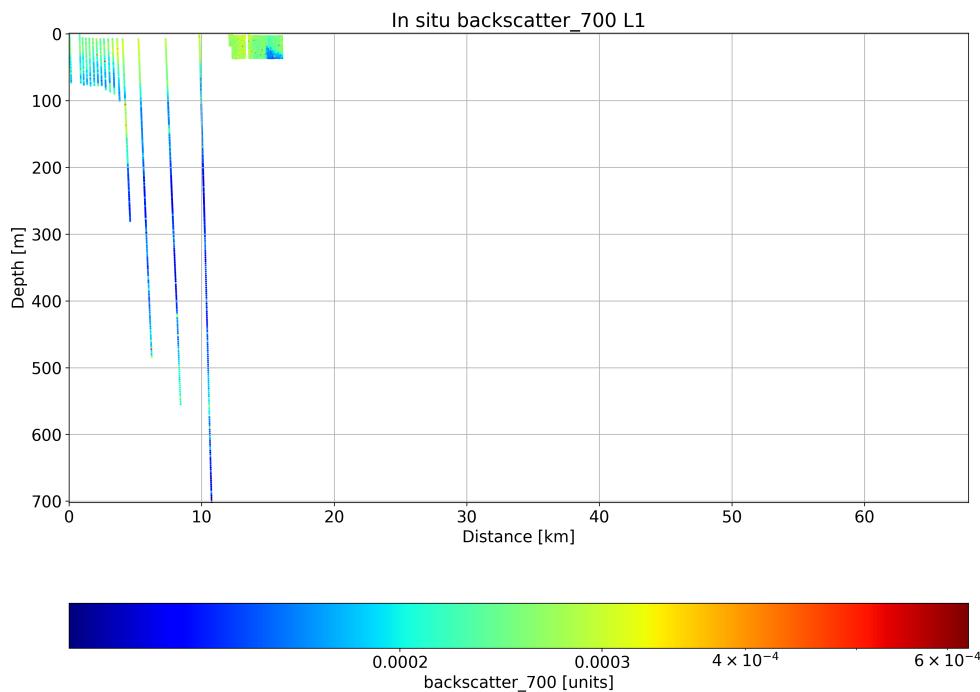


Figure 3.19: Backscatter 700

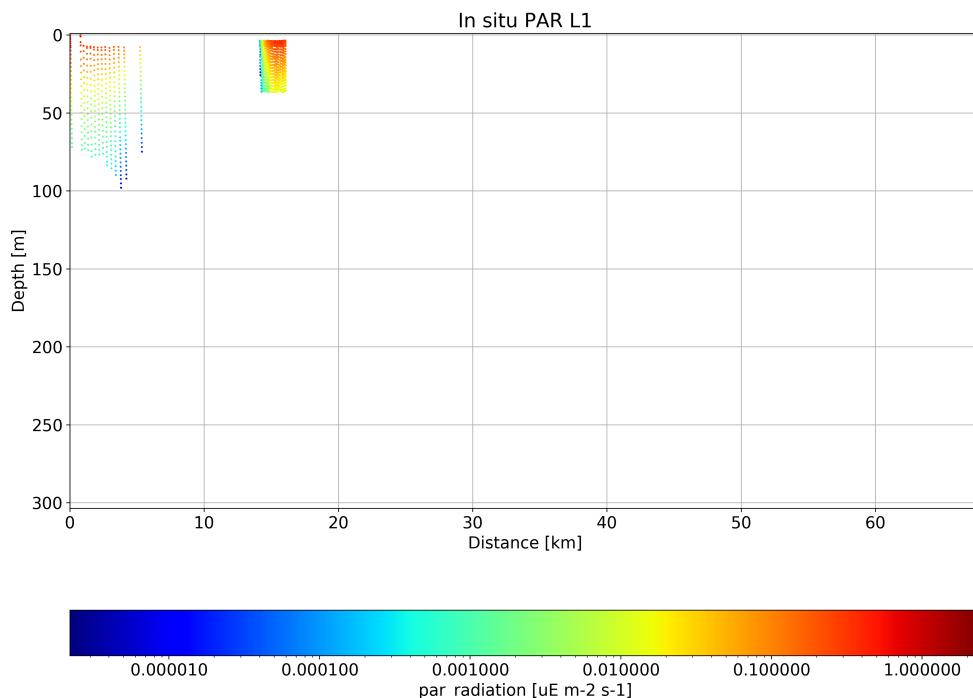


Figure 3.20: PAR radiation

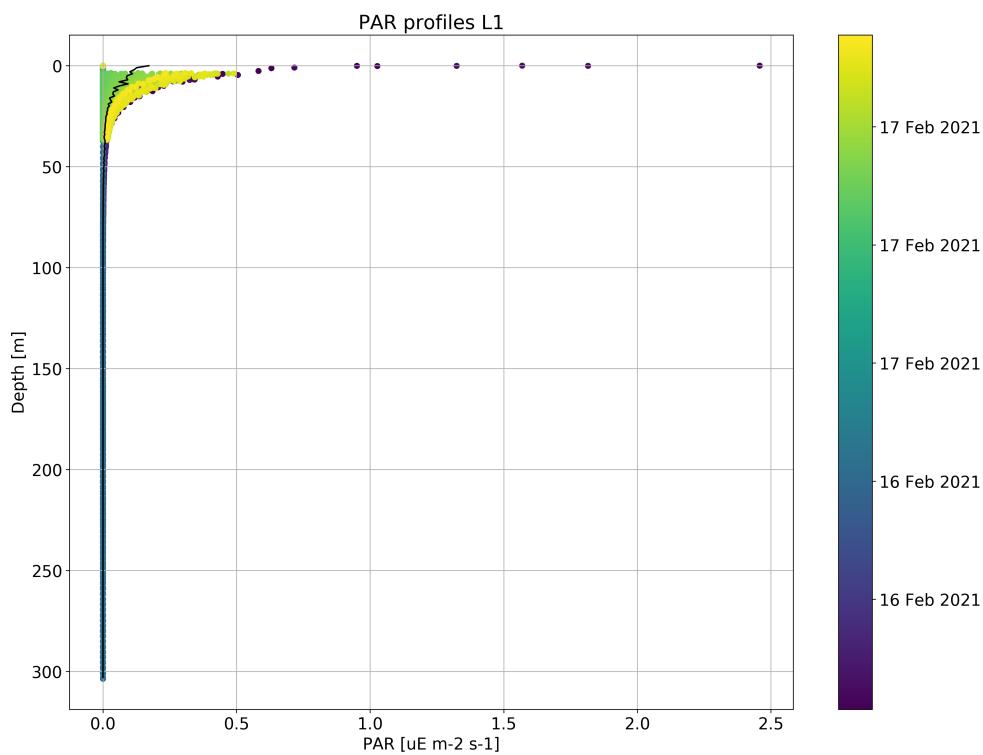


Figure 3.21: PAR profiles

4 Appendix

4.1 Glider behaviour

MLG FILES ! Total MLG files: 34 Used: 26

Showing changes on Sampling (behaviour 16):

- 16 Feb 2021 11:37:51 @ Sampling of: SAMPLE15.MA PAR(0m to -300m) 20200203 PAR sn50317
- 16 Feb 2021 11:37:51 @ Sampling state to sample set to: Diving
- 16 Feb 2021 11:37:51 @ Sampling argument: intersample time set to: 16.0 s
- 16 Feb 2021 11:37:51 @ Sampling nth yo to sample set to: 1.0 nodim
- 16 Feb 2021 11:37:51 @ Sampling argument: min depth set to: 0.0 m
- 16 Feb 2021 11:37:51 @ Sampling argument: max depth set to: 300.0 m

Showing changes on Sampling (behaviour 15):

- 16 Feb 2021 11:37:51 @ Sampling of: SAMPLE13.MA 20190923 OXY sn0846
- 16 Feb 2021 11:37:51 @ Sampling state to sample set to: Diving, climbing and hovering
- 16 Feb 2021 11:37:51 @ Sampling argument: intersample time set to: 4.0 s
- 16 Feb 2021 11:37:51 @ Sampling nth yo to sample set to: 1.0 nodim
- 16 Feb 2021 11:37:51 @ Sampling argument: min depth set to: -5.0 m
- 16 Feb 2021 11:37:51 @ Sampling argument: max depth set to: 2000.0 m

Showing changes on Sampling (behaviour 14):

- 16 Feb 2021 11:37:51 @ Sampling of: SAMPLE14.MA FLNTU(-300m to 700m) 20191121 FLNTU sn5986
- 16 Feb 2021 11:37:51 @ Sampling state to sample set to: Diving
- 16 Feb 2021 11:37:51 @ Sampling argument: intersample time set to: 16.0 s
- 16 Feb 2021 11:37:51 @ Sampling nth yo to sample set to: 1.0 nodim
- 16 Feb 2021 11:37:51 @ Sampling argument: min depth set to: 300.0 m
- 16 Feb 2021 11:37:51 @ Sampling argument: max depth set to: 2000.0 m

Showing changes on Sampling (behaviour 13):

- 16 Feb 2021 11:37:51 @ Sampling of: SAMPLE12.MA FLNTU(surface to -300m) 20191121 FLNTU sn5986
- 16 Feb 2021 11:37:51 @ Sampling state to sample set to: Diving
- 16 Feb 2021 11:37:51 @ Sampling argument: intersample time set to: 8.0 s
- 16 Feb 2021 11:37:51 @ Sampling nth yo to sample set to: 1.0 nodim
- 16 Feb 2021 11:37:51 @ Sampling argument: min depth set to: -5.0 m
- 16 Feb 2021 11:37:51 @ Sampling argument: max depth set to: 300.0 m

Showing changes on Sampling (behaviour 12):

- 16 Feb 2021 11:37:51 @ Sampling of: SAMPLE11.MA CTD(Profile) 20190612 CTD sn9601
- 16 Feb 2021 11:37:51 @ Sampling state to sample set to: Diving, climbing and hovering
- 16 Feb 2021 11:37:51 @ Sampling argument: intersample time set to: 4.0 s
- 16 Feb 2021 11:37:51 @ Sampling nth yo to sample set to: 1.0 nodim
- 16 Feb 2021 11:37:51 @ Sampling argument: min depth set to: -5.0 m
- 16 Feb 2021 11:37:51 @ Sampling argument: max depth set to: 2000.0 m

Showing changes on Yoing (behavior yo 11):

- 16 Feb 2021 11:37:51 @ Yoing num half cycles to do(nodim) set to: 2.0
- 16 Feb 2021 11:37:51 @ Yoing d target depth(m) set to: 5.0
- 16 Feb 2021 11:37:51 @ Yoing d bpump value(X) set to: -230.0
- 16 Feb 2021 11:37:51 @ Yoing d target altitude(m) set to: 20.0
- 16 Feb 2021 11:37:51 @ Yoing d use pitch(enum) set to: 3.0
- 16 Feb 2021 11:37:51 @ Yoing d pitch value(X) set to: -0.453800
- 16 Feb 2021 11:37:51 @ Yoing c use pitch(enum) set to: 3.0
- 16 Feb 2021 11:37:51 @ Yoing c pitch value(X) set to: 0.453800
- 16 Feb 2021 12:11:18 @ Yoing d target depth(m) set to: 950.0
- 16 Feb 2021 12:52:52 @ Yoing num half cycles to do(nodim) set to: -1.0

- 16 Feb 2021 12:52:52 @ Yoing d target depth(m) set to: 700.0
 - 16 Feb 2021 12:52:52 @ Yoing d bpump value(X) set to: 400.0
 - 16 Feb 2021 23:29:13 @ Yoing num half cycles to do(nodim) set to: 2.0
 - 16 Feb 2021 23:29:13 @ Yoing d target depth(m) set to: 15.0
 - 16 Feb 2021 23:29:13 @ Yoing d bpump value(X) set to: -230.0
 - 16 Feb 2021 23:58:04 @ Yoing num half cycles to do(nodim) set to: -1.0
 - 16 Feb 2021 23:58:04 @ Yoing d target depth(m) set to: 35.0
 - 16 Feb 2021 23:58:04 @ Yoing d bpump value(X) set to: -160.0
 - 16 Feb 2021 23:58:04 @ Yoing d pitch value(X) set to: -0.314000
 - 16 Feb 2021 23:58:04 @ Yoing c pitch value(X) set to: 0.314000
- Showing changes on Altimeter set to (behaviour u alt min depth):
- 16 Feb 2021 11:44:36 @ Altimeter set to u alt min depth set to: 2

4.2 Installed devices (from autoexec.mi)

- Forward section assy _SN: 515
- Payload bay assy _SN: 1351
- Aft section assy _SN: 1004
- Aft electronic assy _SN: 0005
- Aft end cap assy _SN: 152
- Radomefin _SN: 1225
- Pressure transducer _SN: 120720
- Frawave master _SN: 9703835
- Iridium sim card _SN: 8988169234003166030
- Argos ID _SN: Dec 198870 Hex 0C1636A
- Pitch motor _SN: 251
- 1000- Pump assy _SN: 626
- 1000- Valve assy _SN: 635
- Science persistor _SN: 00031
- science motherboard _SN: 00011
- seabird CTD _SN: 9601
- Main board _SN: 165
- Communication board _SN: 1005
- Iridium phone _SN: 203
- Main persistor _SN: 25
- Attitude sensor _SN: 42786
- Air pump _SN: 1289
- Communications Assy _SN: 0005
- Frawave Slave _SN: 9680327
- GPS _SN: 1473
- Argos X-cat _SN: 1180
- Air bladder _SN: 39629398-18

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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we share the future*



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