

SOCIB Glider Mission Summary Report

GF-MR-0128-SOCIB-ENL-Calypso2022-U244

Authors: P. Rivera, M. Rubio, N. Zarokanellos, A. Miralles (SOCIB glider team)

Contributors: ETD and DC team

PI: J. Tintoré

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Balearic Islands
Coastal Observing
and Forecasting
System

Parc Bit. Ctra. Valldemossa, km. 7,4
Edifici Naorte, Bloc A
Planta 2a, Porta 3
07121 Palma (Illes Balears, Espanya)
Tel.: +34 971 43 99 98 - Fax: +34 971 43 99 79
info@socib.es · www.socib.es

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.

1. Engineering Review

1.1 Summary

Mission name	GF-MR-0128-SOCIB-ENL-Calypso2022-U244
Platform Model	Slocum 1000m G2
Platform ID / Name / WMO Code	U244 / sdeep01 / 68967
Glider Software NAV Version	Version 8.2 Under Ice
Glider Software SCI Version	Version 8.2 Under Ice
Mission duration	83.1 days
Mission start	2022-02-09 09:17:00
Mission end	2022-05-03 10:39:17
Total distance	2036.62[km] 1099.69[nm]
Deployment point [dd°mm.mmmm']	N 39°51.0432' E 02°35.7304'
Recovery point [dd°mm.mmmm']	N 39°22.5341' E 02°31.1146'
Battery Consumption (Ah)	357.0(from 7.1 to 364.0)
Survey Area	Western Mediteranean sea
Objective(s)	The broader objective is to improve our understanding of what shapes the three dimensional trajectories of water parcels and semi-Lagrangian objects in the surface ocean
Abstract	Mesoscale (10 to 100 km) and submesoscale (0.1 to 10 km) ocean structures play a major role in the redistribution of properties such as heat, salt, and biochemical tracers, with a significant impact on the ocean's primary productivity (Levy et al., 2001; Ramachandran et al., 2004; Omand et al., 2015).). A delayed intercalibration with the RV will be available https://doi.org/10.25704/QMZF-VV36
NAV events	<ul style="list-style-type: none"> • Event 1: Long time at surface in xdrstate 4 • Event 2: Shallow inflection longer than deeper • Event 3: CTD drift during 27th of March to 6th of April, which is lead us to recover and clean the CTD. The issue has been fixed afterwards. Recovered and redeployed on mission (8th of April)
SCI events	<ul style="list-style-type: none"> • Event 1: During the mission mesoscales eddies have been observed. • Event 2: Low salinity waters (<37.9 psu) observed in the first 50m of the water column. • Event 3: Enhancement of the CHL associated with mesoscale activity. • Event 4: Significant increase of the stratification has been observed at the last month of the glider deployment in the upper 50m of the water column.



Figure 1.1: Map providing general overview of the Survey Area

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	Internal
Partnership / Participation	<ul style="list-style-type: none"> • SOCIB • IMEDEA(CSIC-UIB)
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/sdeep01-scb_sldeep001/L0/2022/dep0037_sdeep01_scb_sldeep001_L0_2022-02-09_data_dt.nc
- L1: https://thredds.socib.es/thredds/fileServer/auv/glider/sdeep01-scb_sldeep001/L1/2022/dep0037_sdeep01_scb_sldeep001_L1_2022-02-09_data_dt.nc
- L2: https://thredds.socib.es/thredds/fileServer/auv/glider/sdeep01-scb_sldeep001/L2/2022/dep0037_sdeep01_scb_sldeep001_L2_2022-02-09_data_dt.nc

1.3 Preparation

- Premission: ok
- HardWare: ok
- Batteries: ok
- Comm: ok
- SCI: ok
- Ballasting: ok
- Sealing: ok
- Fileset: ok

- CEM: na
- Calanova: ok
- Deployment: ok
- Deployment Notification: ok
- Recovery: ok
- Conclusion: ok, by RF. Used for next CANALES GFMR0132

1.4 Mission Survey

- Deployment:
 - Vessel: Socib I
 - Personnel: 1 ETD + 1 GF
 - Location: Cala Figuera
- Navigation: It was satisfactory during most mission time. The glider responded well to the commanded target waypoints.
- Underwater Maneuvering: Performed well
- Engineering sensors:

Sensor	Oddities	Warnings	Errors
GPS	5	0	0
attitude rev	0	5	0
ocean pres- sure	1	0	0
pitch motor	7	0	0
science super	83	1	0
digifin	1719	3	0
IRIDIUM	356	5	0
DE PUMP	2	0	0

- Communication Systems (see appendix for Iridium states):
 - Total number iridium calls [num]: 357
 - Iridium calls to secondary [num]: 1
 - ON overall iridium period [h]: 17.2
 - Iridium calls state from MODE NO CARRIER to MODE UNKNOWN [num]: 28
 - Iridium calls state from MODE CONNECT to MODE UNKNOWN [num]: 293
 - Iridium calls state from MODE UNKNOWN to MODE AWAITING OK [num]: 321
 - Drop calls (Iridium state from 2 to 99 with c iridium on = 1) [num]: 9
 - Total time at surface [h]: 46.15
 - Total time at surface [%]: 2.32
- Hull/Hydrodynamics: No signs of problems
- Mission Runs: 2 SCI abort
- Recovery:
 - Vessel: Socib I
 - Personnel: 1 ETD + 2 GF
 - Location: Cala Figuera

1.5 NAV plots

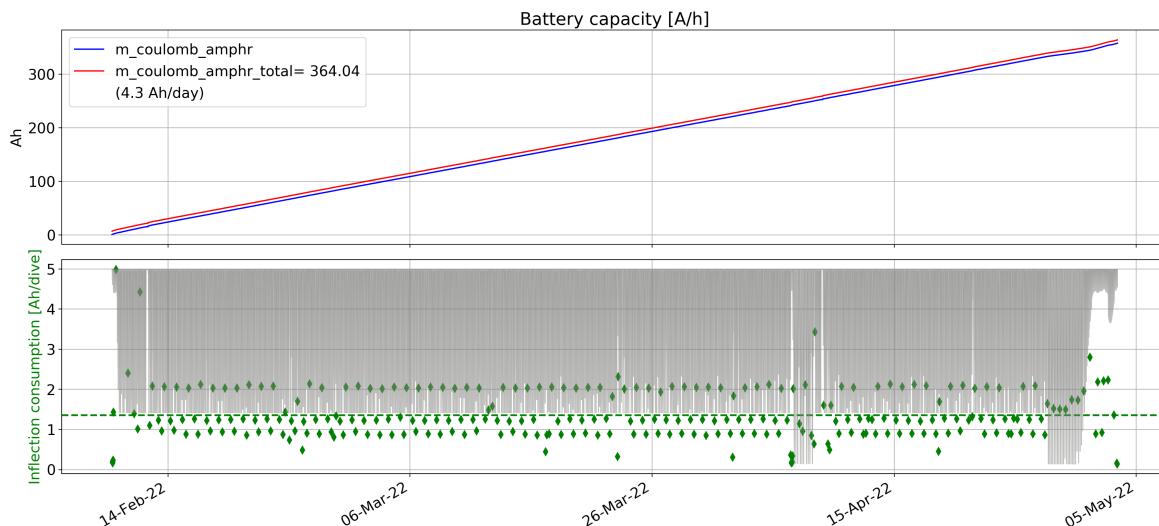


Figure 1.2: Battery capacity

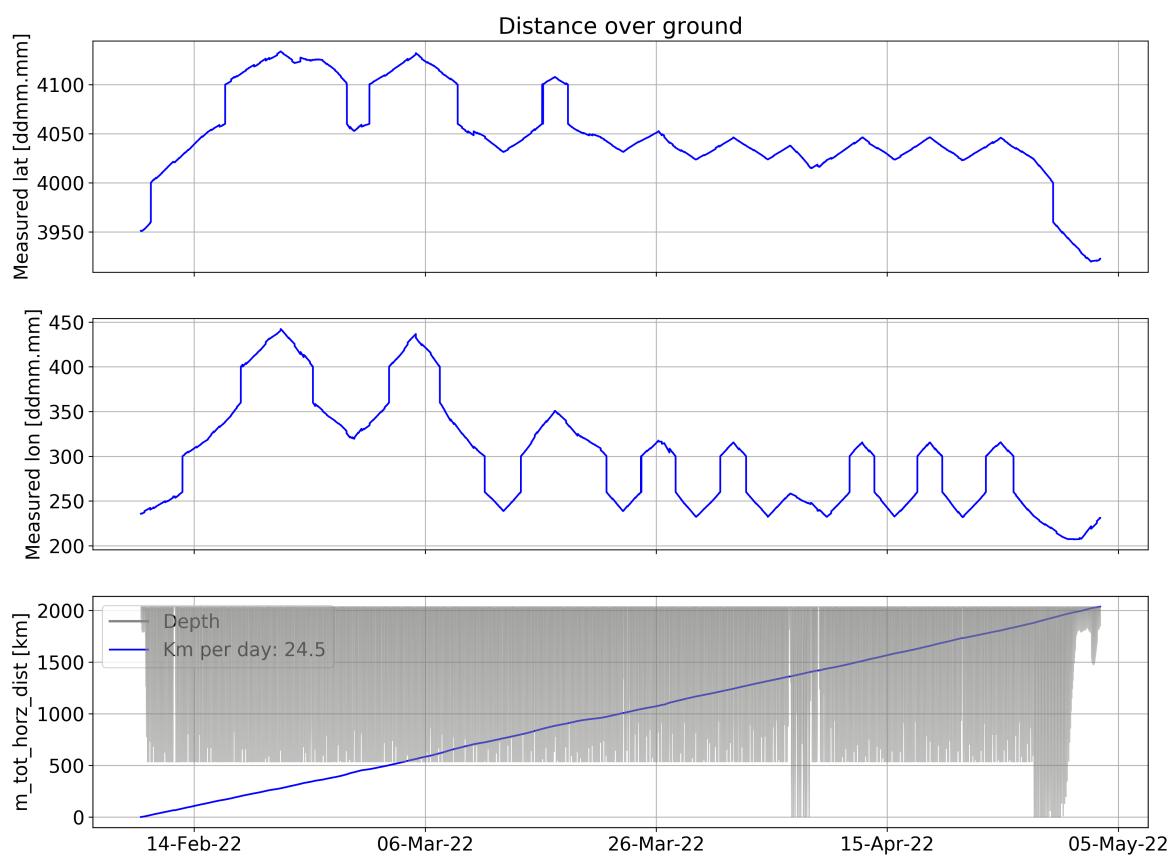


Figure 1.3: Distance over ground

GF-MR-0128-SOCIB-ENL-Calypso2022-U244

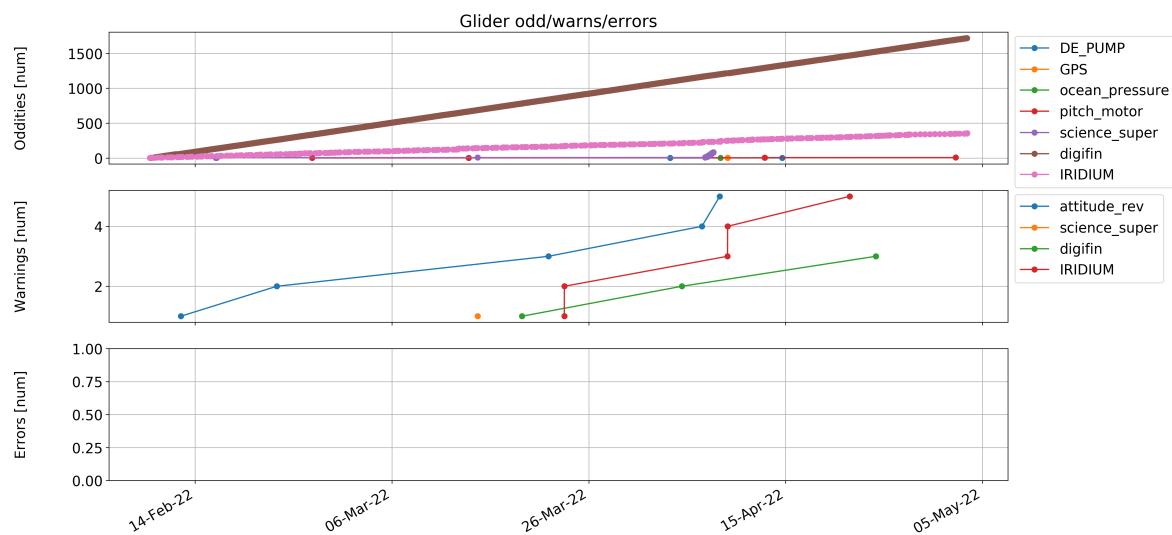


Figure 1.4: Glider Odd Warn and Err

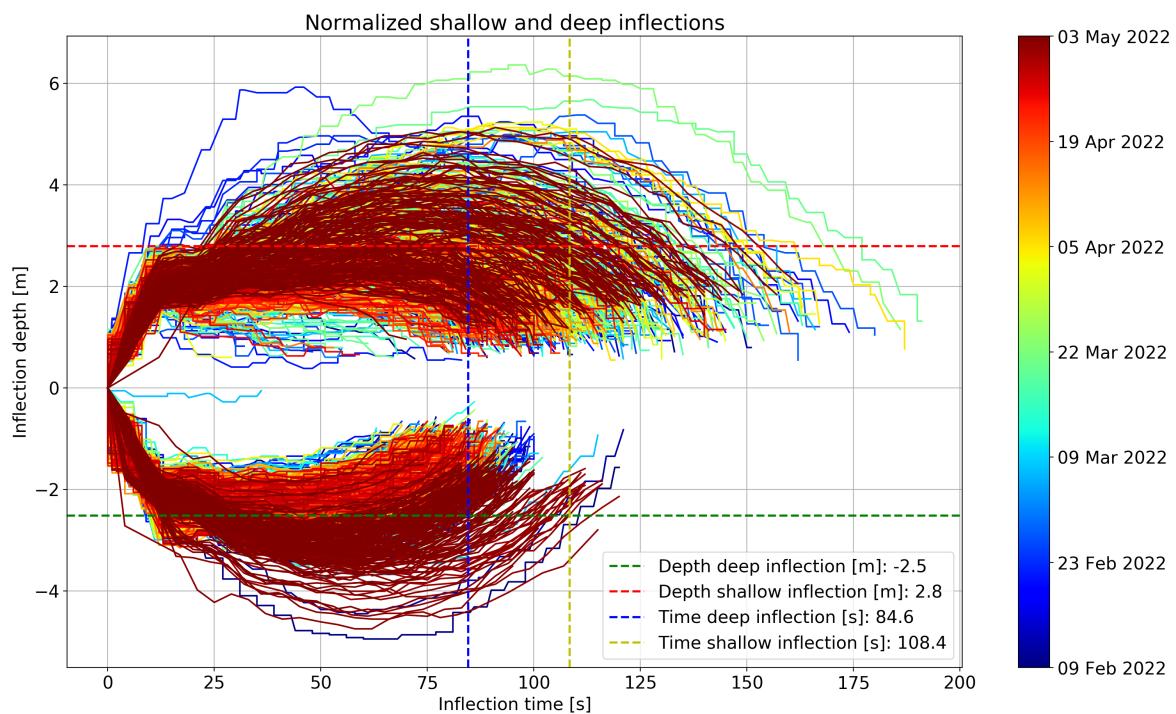


Figure 1.5: Depth inflections

GF-MR-0128-SOCIB-ENL-Calypso2022-U244

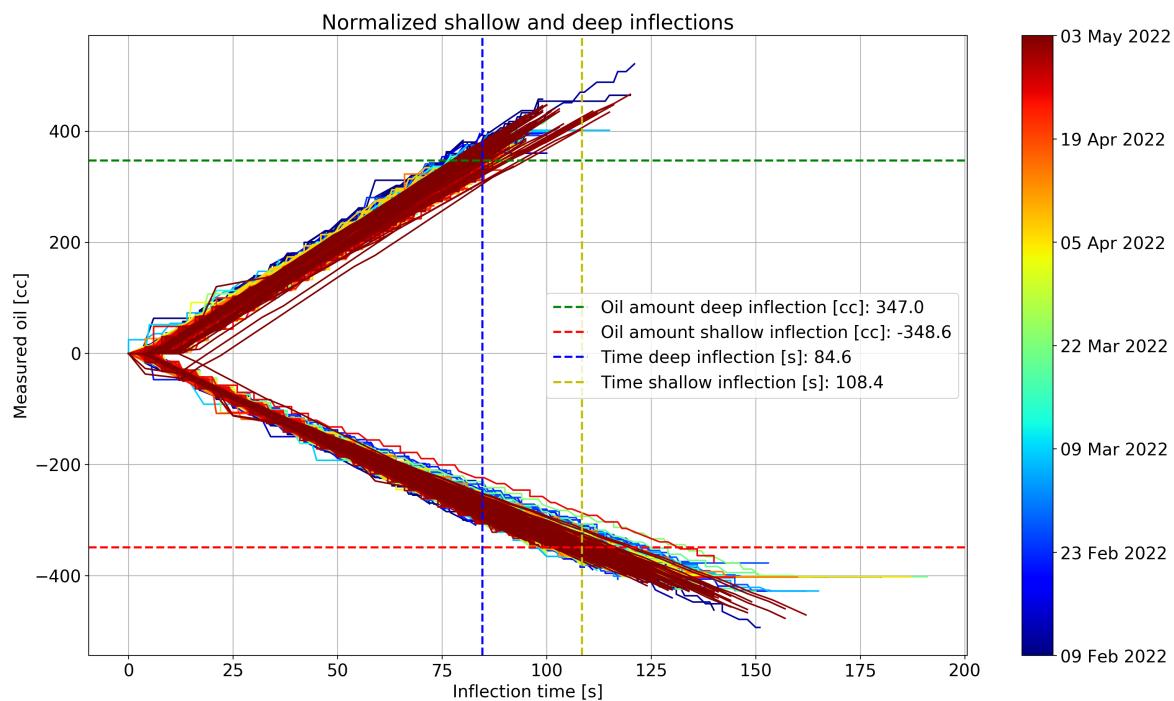


Figure 1.6: Oil inflections

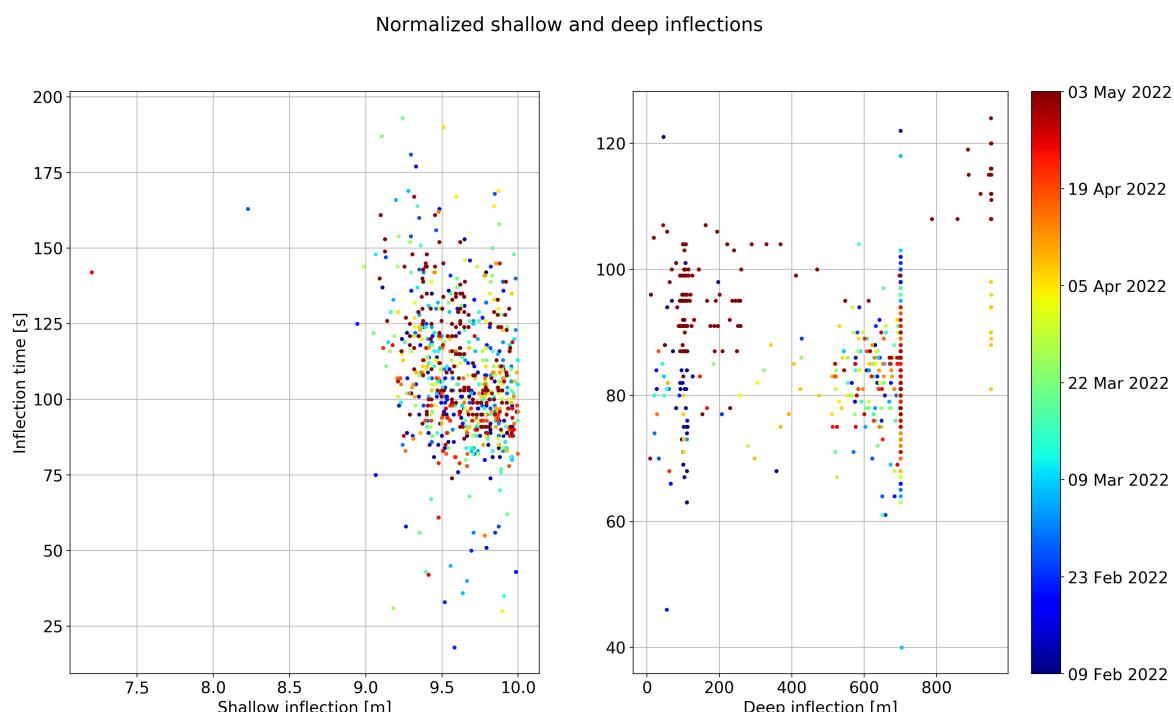


Figure 1.7: Duration inflections

GF-MR-0128-SOCIB-ENL-Calypso2022-U244

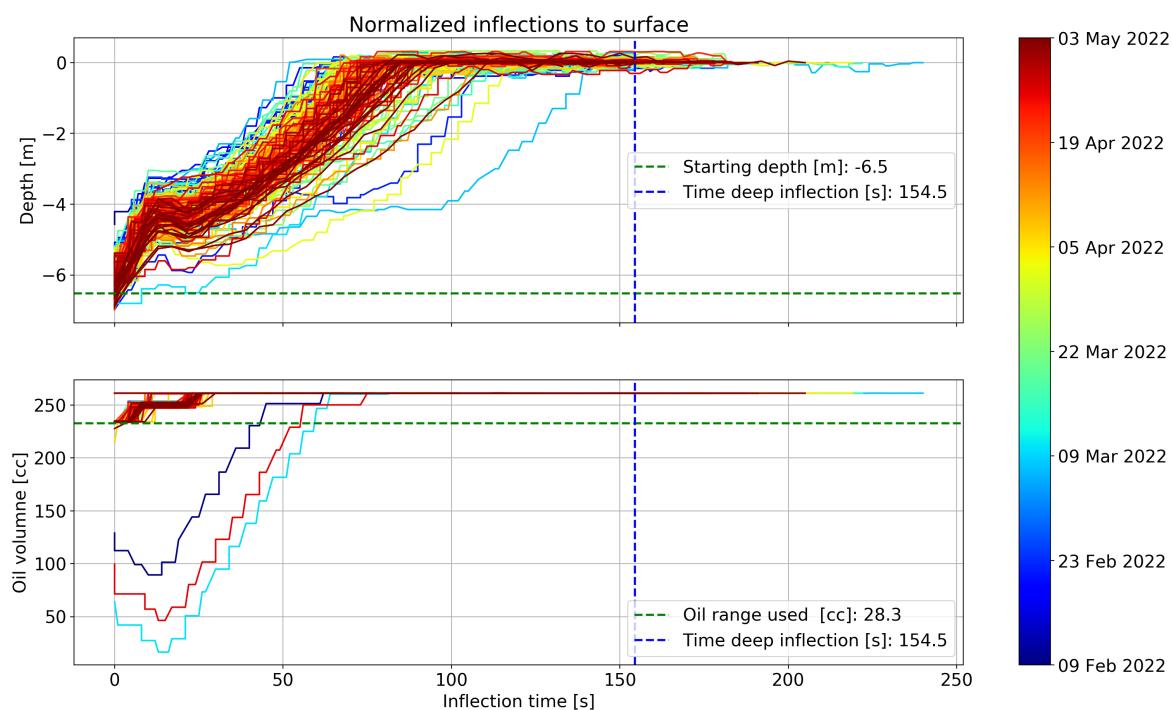


Figure 1.8: Surface Oil inflections

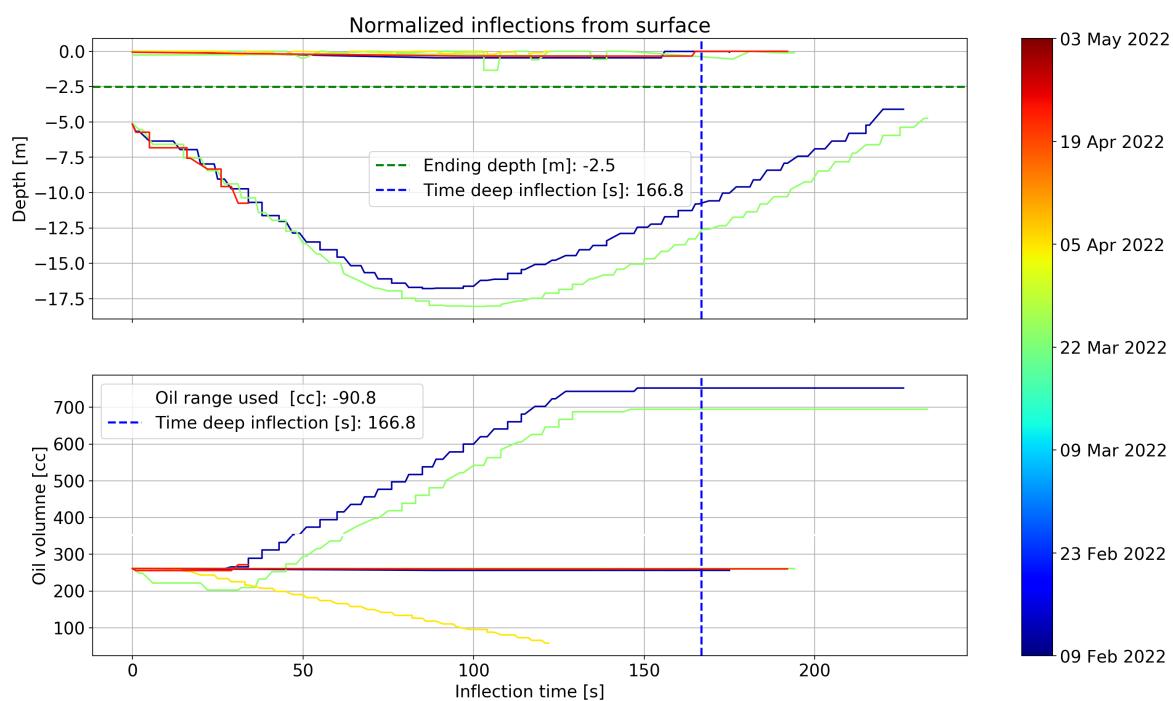


Figure 1.9: Surface Duration inflections

GF-MR-0128-SOCIB-ENL-Calypso2022-U244

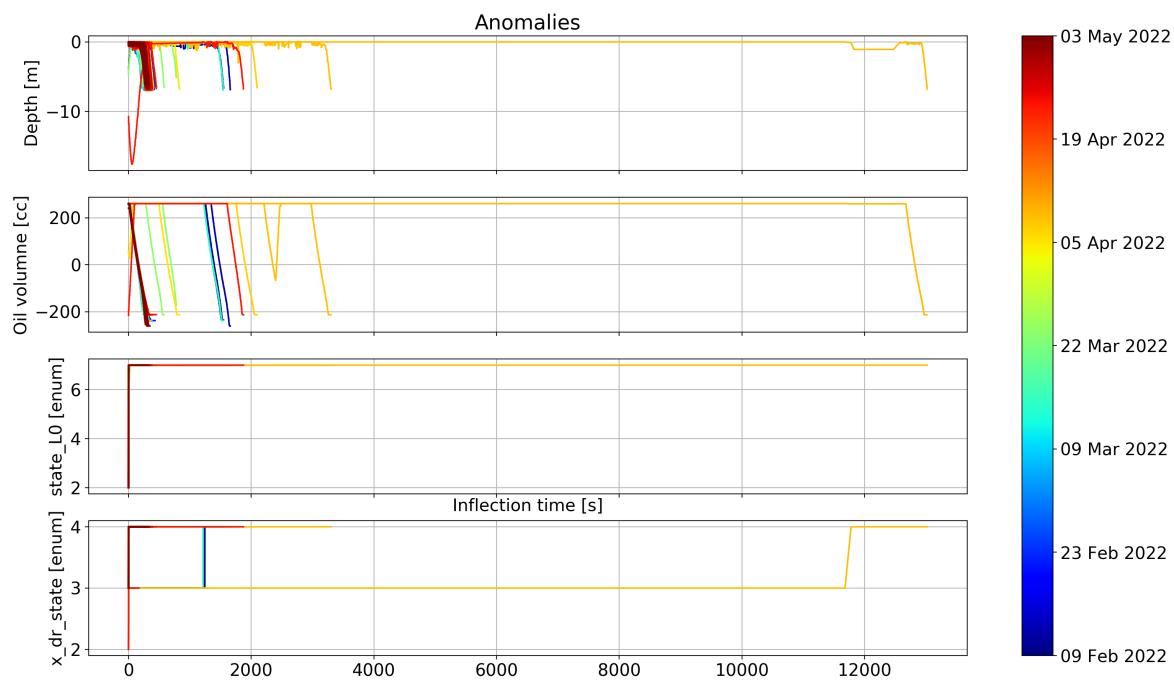


Figure 1.10: Anomalies (time)

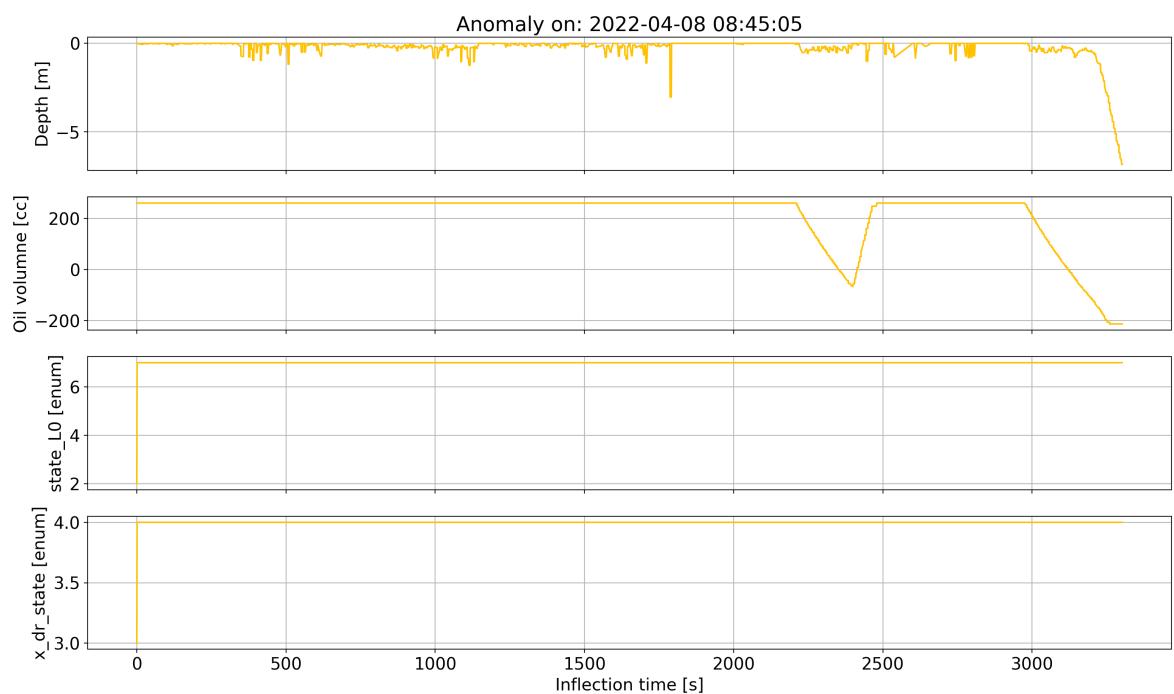


Figure 1.11: 20220408T084505 Anomaly 196

GF-MR-0128-SOCIB-ENL-Calypso2022-U244

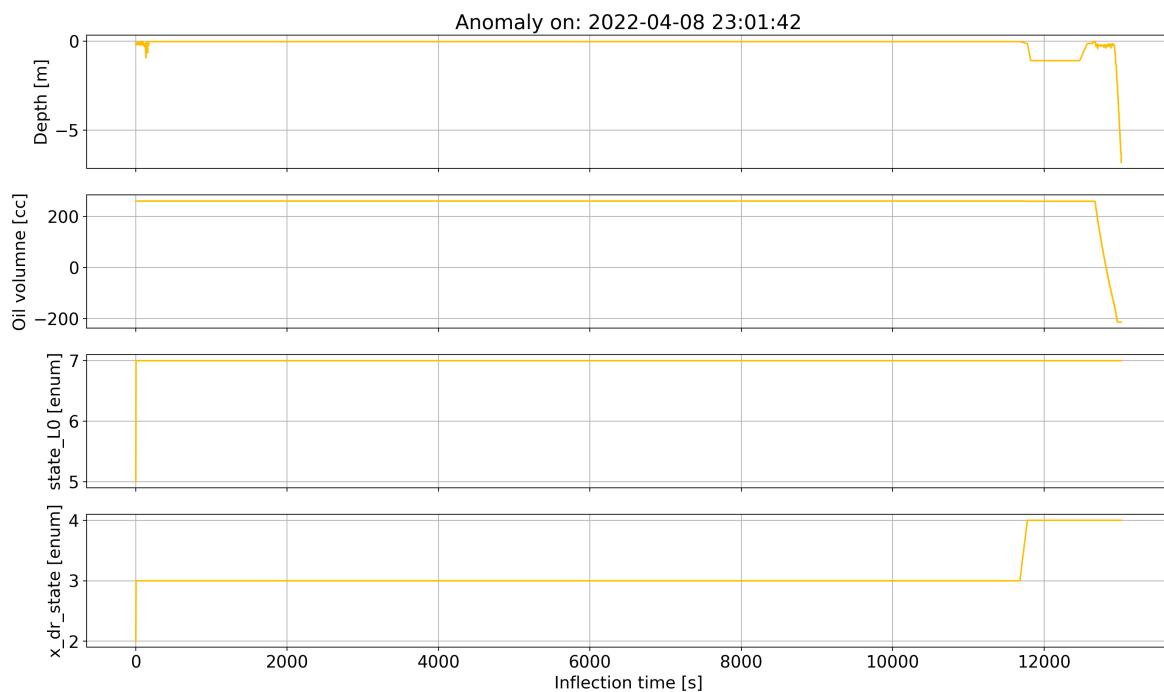


Figure 1.12: 20220408T230142 Anomaly 198

Pitch and roll flying

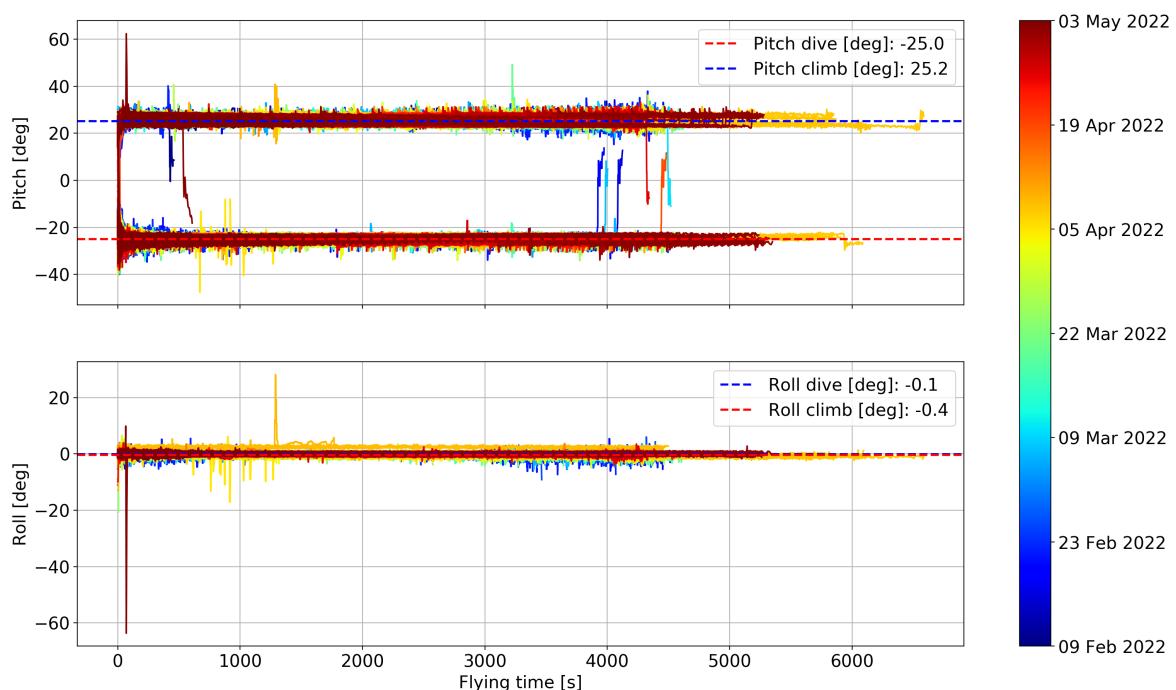


Figure 1.13: Pitch and roll, when climbing and diving

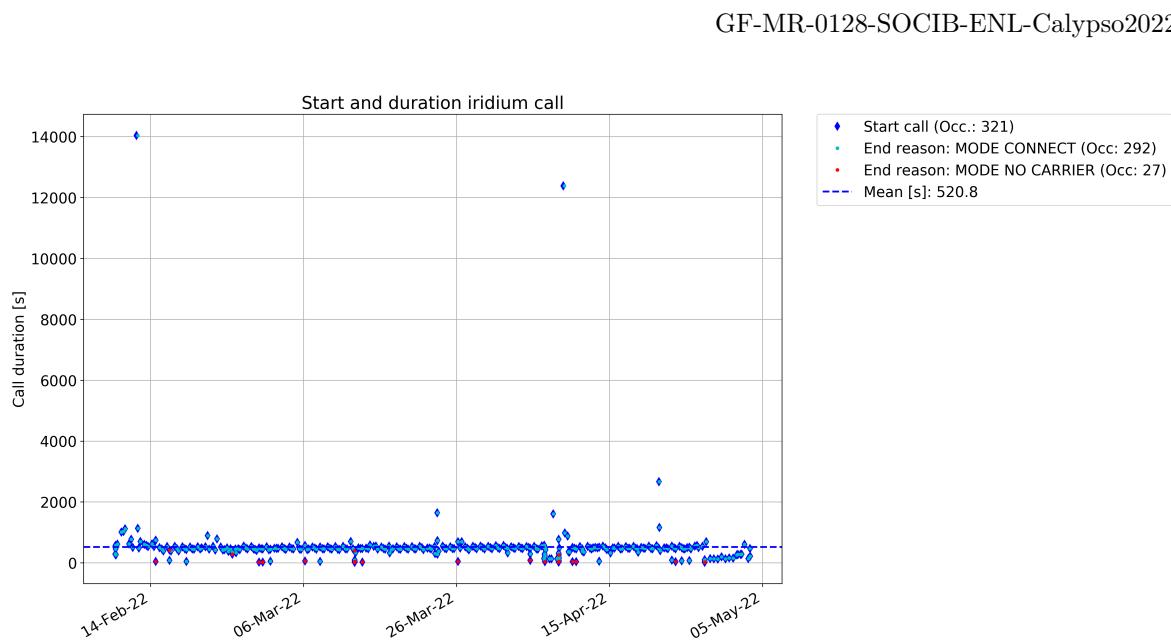


Figure 1.14: Iridium Status

2. Scientific Preliminary Review

2.1 SCI Profiles

Calibration sheets available upon request to glider@socib.es
See appendix for sampling strategy details

Sensor Type	CTD	FLNTU	OXY	PAR
Serial number	CTD sn0064	sn3934	OXY sn0411	na
Calibration date	20200818	20200205	20200124	na
Casts	1629	1629	1629	na
Half Yos	1973	1973	1973	na
Samples	1138668	509418	1010051	na
Intersample time [s]*	5.224	11.682	5.89	na
Sampled distance [km]	1031.8	1030.9	1031.8	na

* See appendix for changes during the mission

2.2 SCI plots

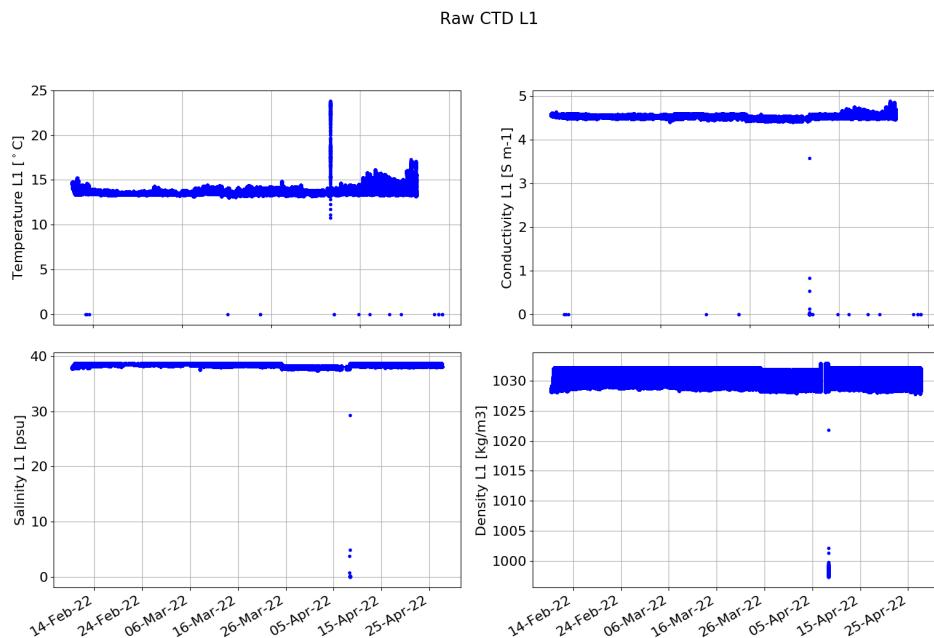


Figure 2.15: Raw CTD L1

GF-MR-0128-SOCIB-ENL-Calypso2022-U244

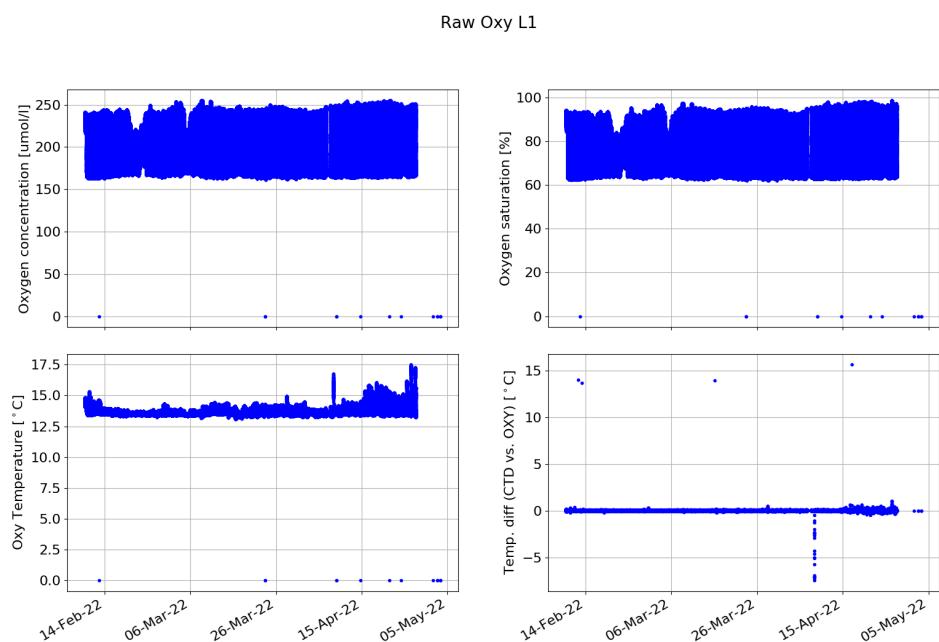


Figure 2.16: Raw OXY L1

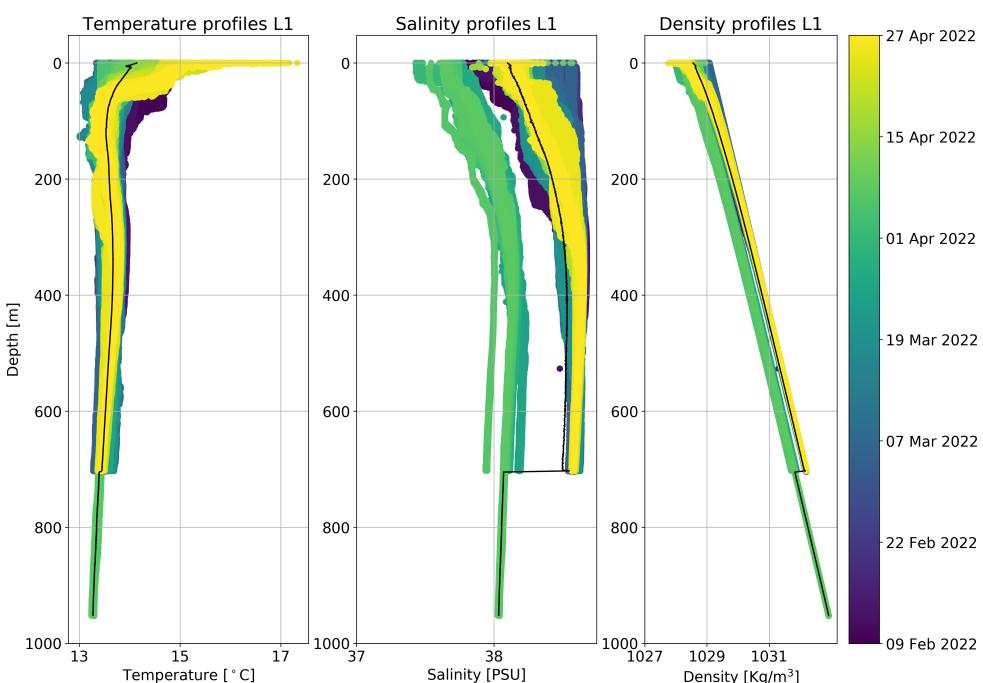


Figure 2.17: CTD profiles

GF-MR-0128-SOCIB-ENL-Calypso2022-U244

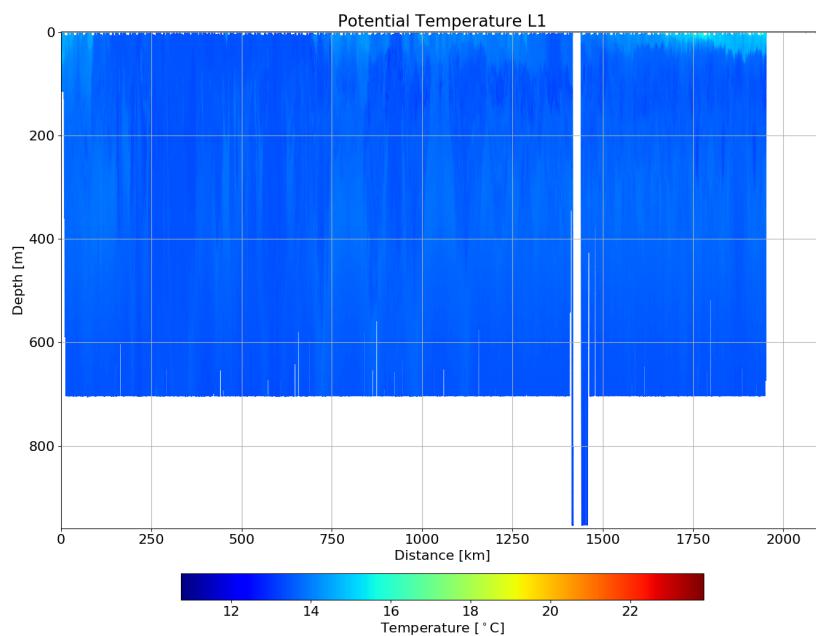


Figure 2.18: CTD temperature

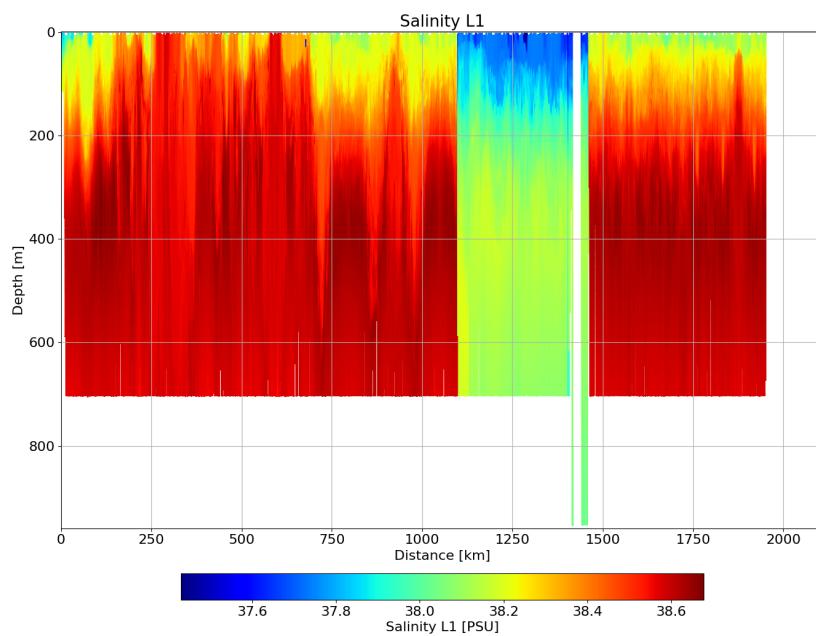


Figure 2.19: CTD Salinity

GF-MR-0128-SOCIB-ENL-Calypso2022-U244

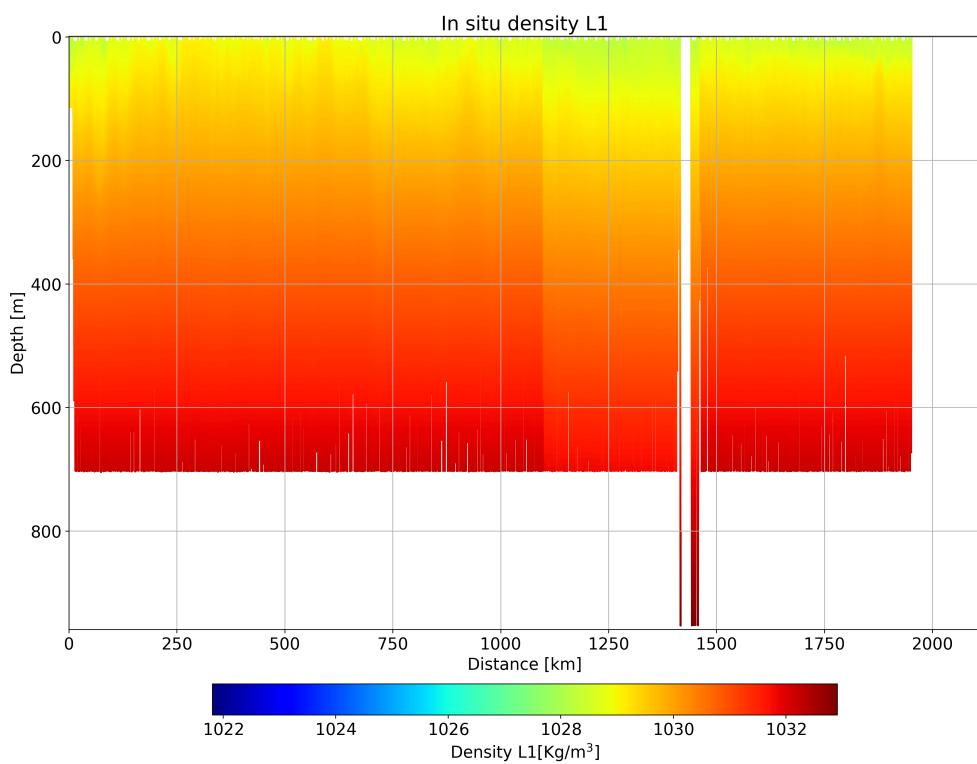


Figure 2.20: CTD Density

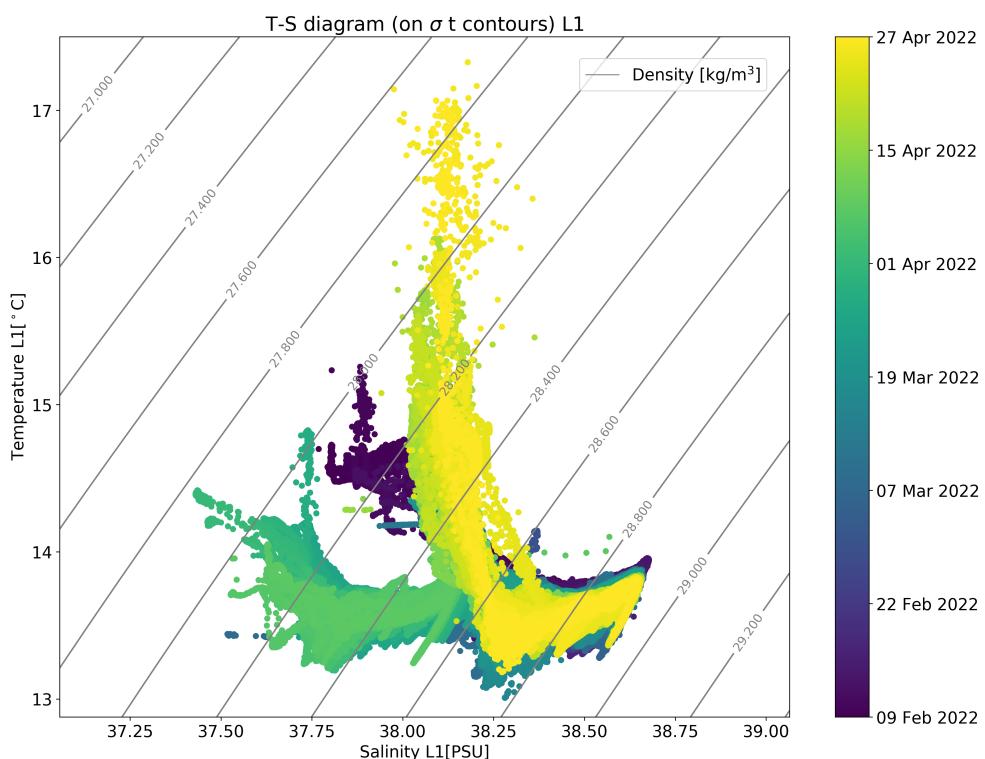


Figure 2.21: TS diagram (CTD)

GF-MR-0128-SOCIB-ENL-Calypso2022-U244

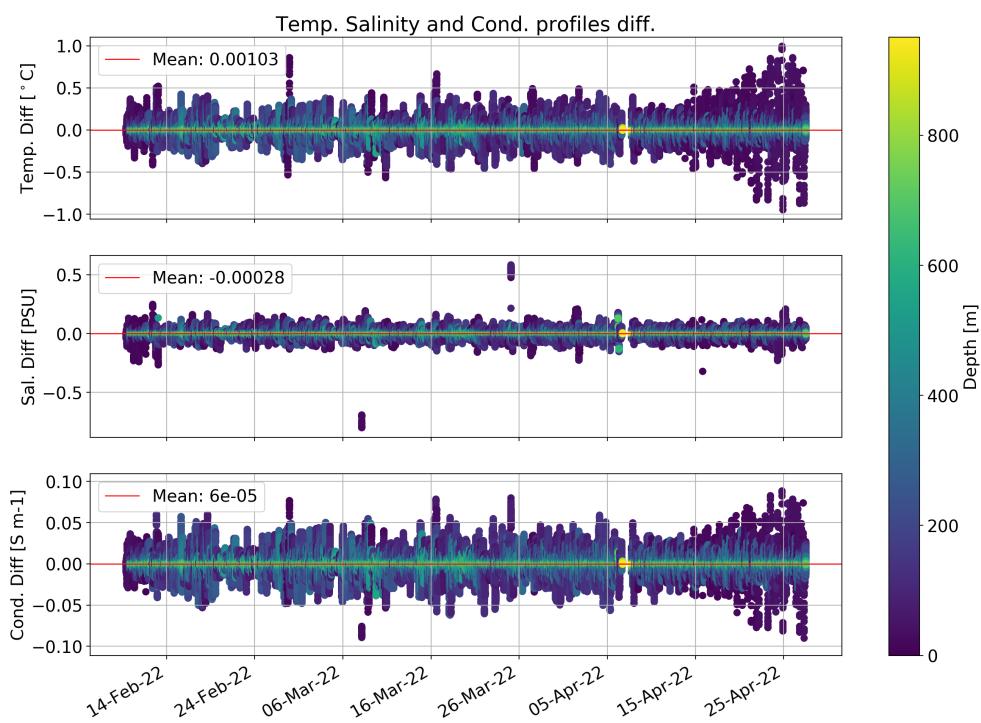


Figure 2.22: Profile consistency (CTD)

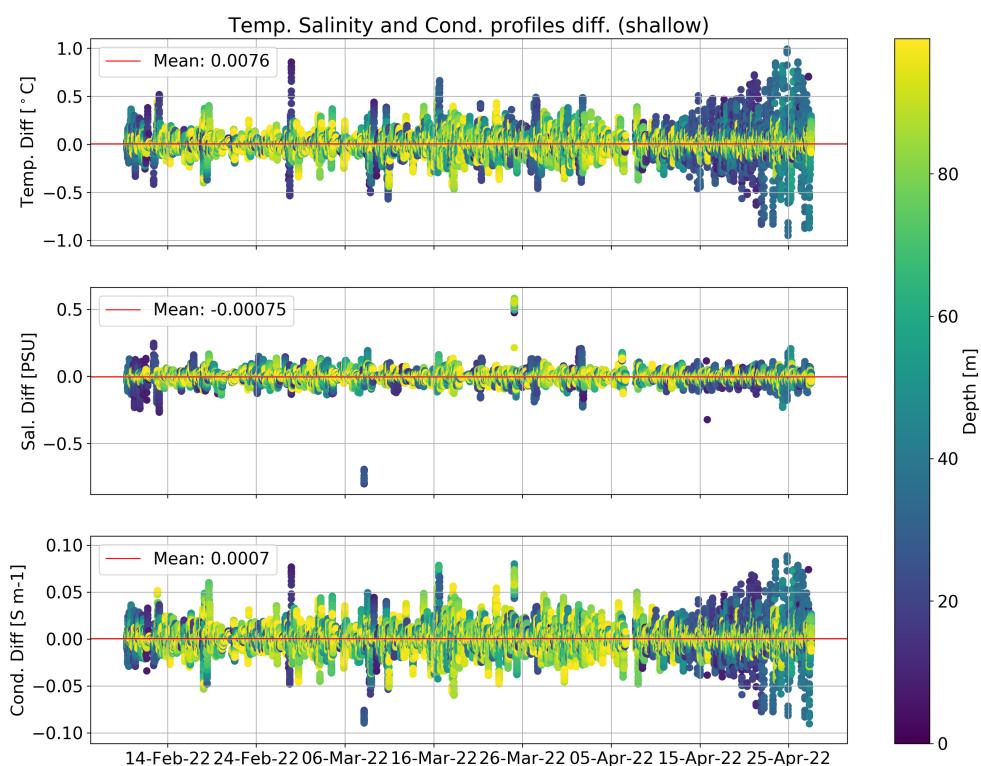


Figure 2.23: Profile consistency (CTD) zoom

GF-MR-0128-SOCIB-ENL-Calypso2022-U244

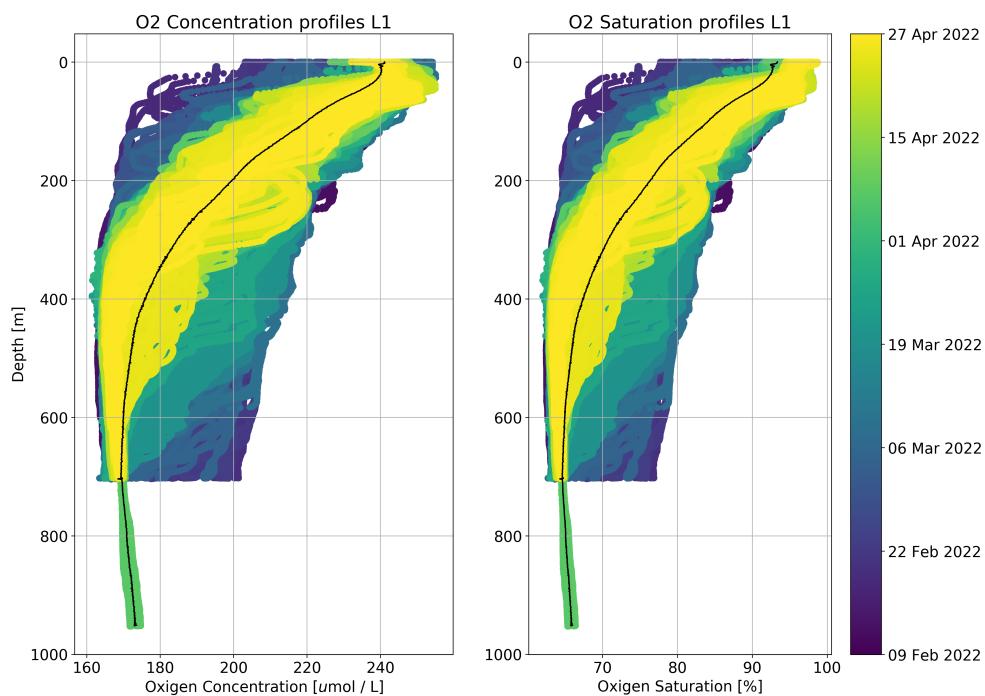


Figure 2.24: Oxygen profiles

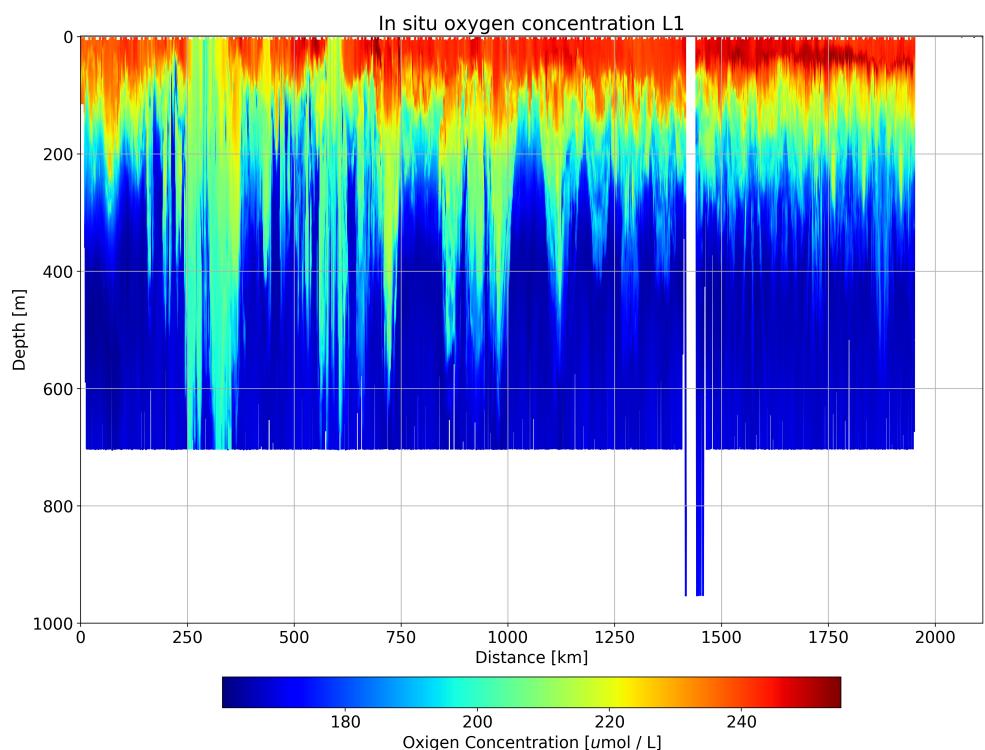


Figure 2.25: Oxygen Concentration

GF-MR-0128-SOCIB-ENL-Calypso2022-U244

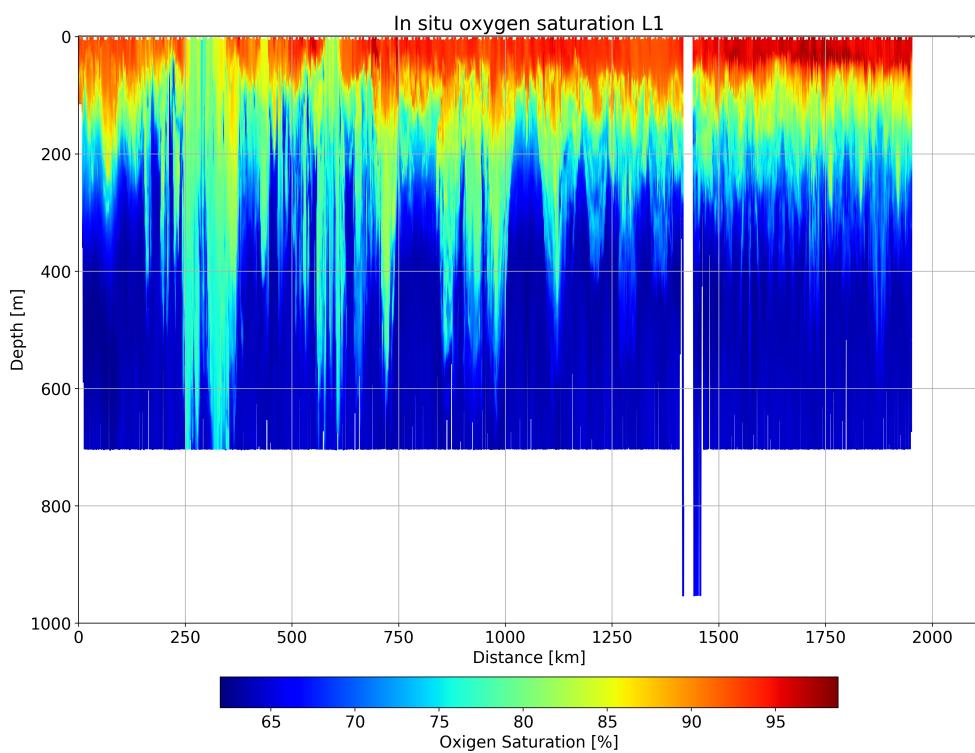


Figure 2.26: Oxygen Saturation

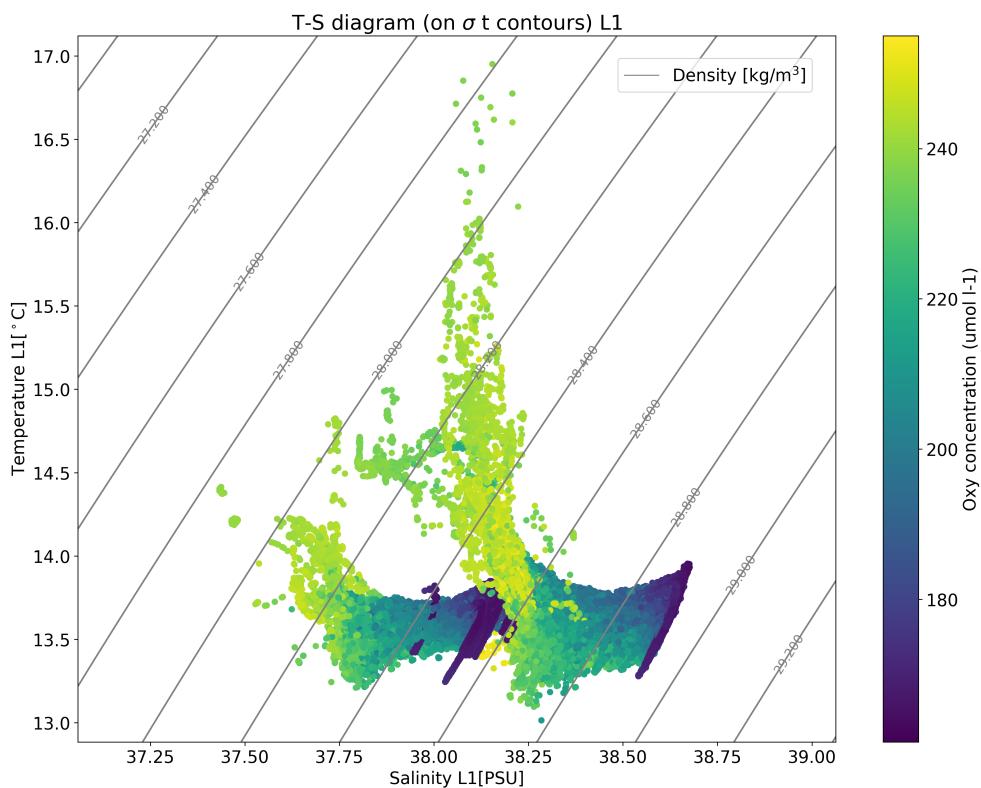


Figure 2.27: TS diagram (OXY)

GF-MR-0128-SOCIB-ENL-Calypso2022-U244

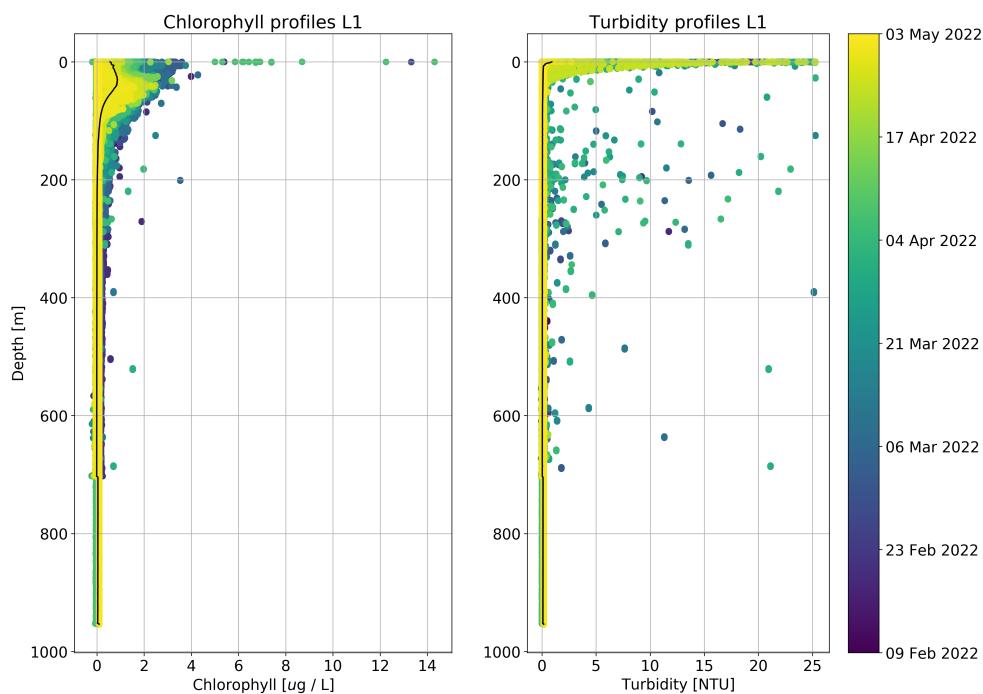


Figure 2.28: Chlorophyll-a and Turbidity profiles

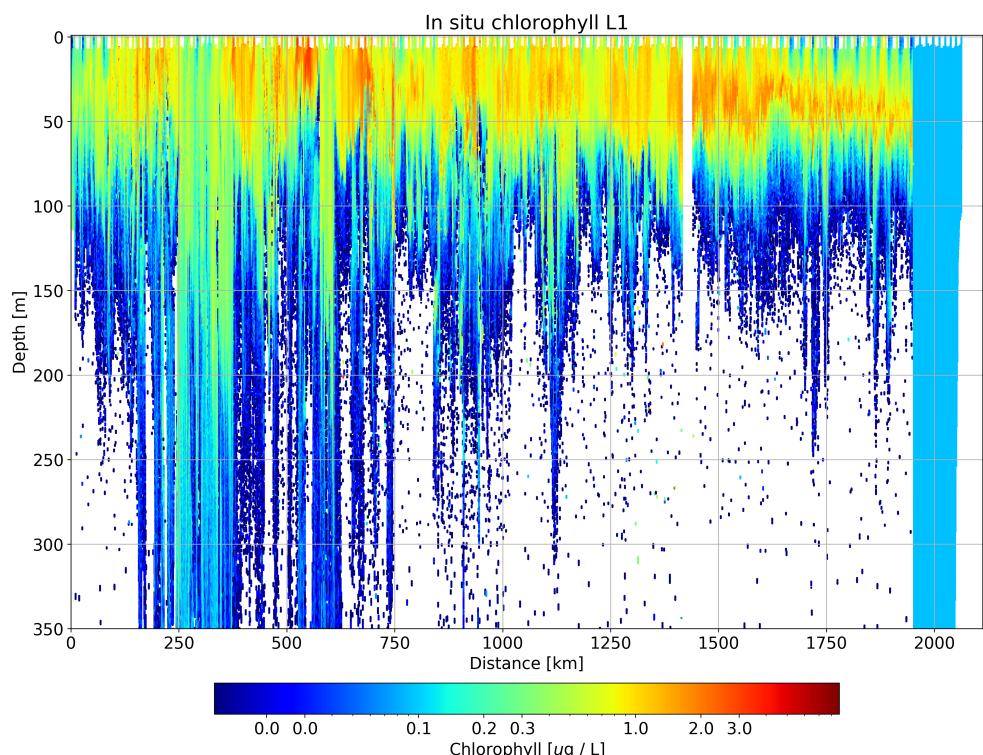


Figure 2.29: Chlorophyll-a

GF-MR-0128-SOCIB-ENL-Calypso2022-U244

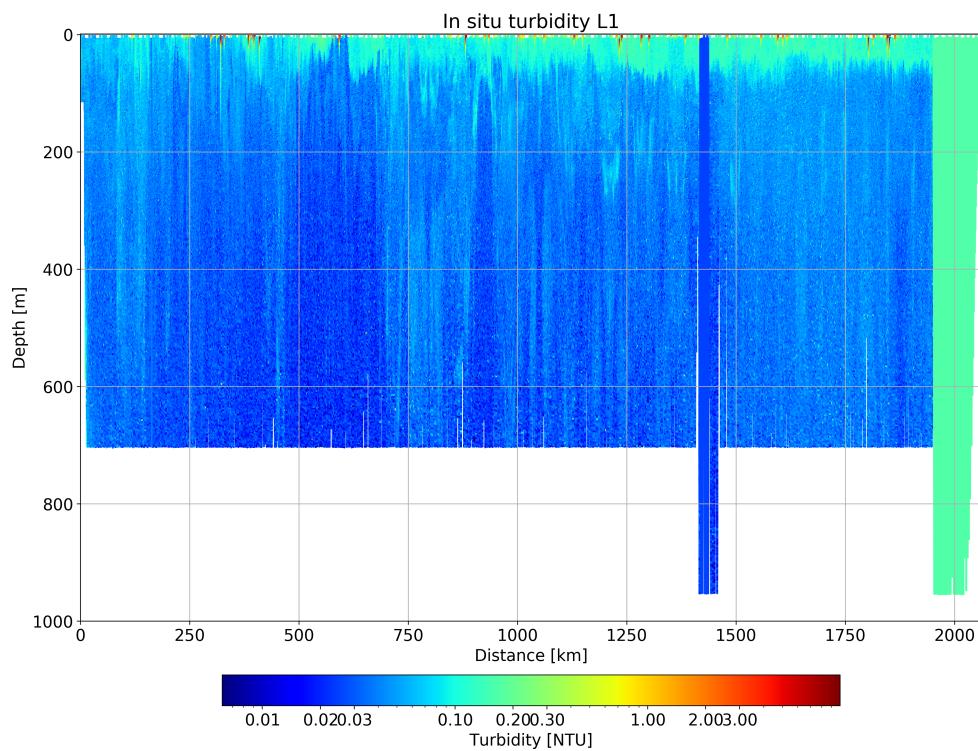


Figure 2.30: Turbidity

Appendix

Glider behaviour.

Showing changes on behaviour 16:

- 09 Feb 2022 08:19:07 @ Sampling of: PAR(0m to -300m)
- 09 Feb 2022 08:19:08 @ Sampling state to sample set to: Diving
- 09 Feb 2022 08:19:08 @ Sampling argument: intersample time set to: 8.0 s
- 09 Feb 2022 08:19:08 @ Sampling nth yo to sample set to: 1.0 nodim
- 09 Feb 2022 08:19:08 @ Sampling argument: min depth set to: 0.0 m
- 09 Feb 2022 08:19:08 @ Sampling argument: max depth set to: 300.0 m
- 27 Apr 2022 15:42:10 @ Sampling argument: intersample time set to: -1.0 s

Showing changes on behaviour 15:

- 09 Feb 2022 08:19:08 @ Sampling of: configuration for CANALES-AUG-2020 (GF-MR-0104)OXY4831-sn0825 SCI-BAY sn1328
- 09 Feb 2022 08:19:09 @ Sampling state to sample set to: On surface, Diving, climbing and hovering
- 09 Feb 2022 08:19:09 @ Sampling argument: intersample time set to: 4.0 s
- 09 Feb 2022 08:19:09 @ Sampling nth yo to sample set to: 1.0 nodim
- 09 Feb 2022 08:19:09 @ Sampling argument: min depth set to: -5.0 m
- 09 Feb 2022 08:19:09 @ Sampling argument: max depth set to: 2000.0 m
- 27 Apr 2022 15:42:11 @ Sampling argument: intersample time set to: -1.0 s

Showing changes on behaviour 14:

- 09 Feb 2022 08:19:10 @ Sampling of: configuration for CANALES-AUG-2020 (GF-MR-0104)FLNTU-SLC sn6171 SCI-BAY sn1328
- 09 Feb 2022 08:19:10 @ Sampling state to sample set to: On surface, Diving, climbing and hovering
- 09 Feb 2022 08:19:10 @ Sampling argument: intersample time set to: 16.0 s
- 09 Feb 2022 08:19:10 @ Sampling nth yo to sample set to: 1.0 nodim
- 09 Feb 2022 08:19:10 @ Sampling argument: min depth set to: 300.0 m
- 09 Feb 2022 08:19:10 @ Sampling argument: max depth set to: 1000.0 m
- 27 Apr 2022 15:42:12 @ Sampling argument: intersample time set to: -1.0 s

Showing changes on behaviour 13:

- 09 Feb 2022 08:19:10 @ Sampling of: configuration for CANALES-AUG-2020 (GF-MR-0104)FLNTU-SLC sn6171 SCI-BAY sn1328
- 09 Feb 2022 08:19:11 @ Sampling state to sample set to: On surface, Diving, climbing and hovering
- 09 Feb 2022 08:19:11 @ Sampling argument: intersample time set to: 8.0 s
- 09 Feb 2022 08:19:11 @ Sampling nth yo to sample set to: 1.0 nodim
- 09 Feb 2022 08:19:11 @ Sampling argument: min depth set to: -5.0 m
- 09 Feb 2022 08:19:11 @ Sampling argument: max depth set to: 300.0 m
- 27 Apr 2022 15:42:13 @ Sampling argument: intersample time set to: -1.0 s

Showing changes on behaviour 12:

- 09 Feb 2022 08:19:11 @ Sampling of: CTD(Profile)
- 09 Feb 2022 08:19:12 @ Sampling state to sample set to: On surface, Diving, climbing and hovering
- 09 Feb 2022 08:19:12 @ Sampling argument: intersample time set to: 4.0 s
- 09 Feb 2022 08:19:12 @ Sampling nth yo to sample set to: 1.0 nodim
- 09 Feb 2022 08:19:12 @ Sampling argument: min depth set to: -5.0 m
- 09 Feb 2022 08:19:12 @ Sampling argument: max depth set to: 2000.0 m
- 27 Apr 2022 15:42:14 @ Sampling argument: intersample time set to: -1.0 s

Showing changes on behaviour behavior yo 11:

- 09 Feb 2022 08:19:12 @ Yoing num half cycles to do(nodim) set to: 2.0

- 09 Feb 2022 08:19:12 @ Yoing d target depth(m) set to: 5.0
- 09 Feb 2022 08:19:13 @ Yoing d target altitude(m) set to: 20.0
- 09 Feb 2022 08:19:13 @ Yoing d use pitch(enum) set to: 3.0
- 09 Feb 2022 08:19:13 @ Yoing d pitch value(X) set to: -0.453800
- 09 Feb 2022 08:19:13 @ Yoing c use pitch(enum) set to: 3.0
- 09 Feb 2022 08:19:13 @ Yoing c pitch value(X) set to: 0.453800
- 09 Feb 2022 08:54:56 @ Yoing d target depth(m) set to: 950.0
- 09 Feb 2022 10:39:19 @ Yoing num half cycles to do(nodim) set to: -1.0
- 09 Feb 2022 10:39:19 @ Yoing d target depth(m) set to: 700.0
- 12 Feb 2022 08:21:53 @ Yoing num half cycles to do(nodim) set to: 2.0
- 12 Feb 2022 08:21:54 @ Yoing d target depth(m) set to: 5.0
- 12 Feb 2022 08:51:11 @ Yoing num half cycles to do(nodim) set to: -1.0
- 12 Feb 2022 08:51:11 @ Yoing d target depth(m) set to: 700.0
- 23 Mar 2022 12:23:33 @ Yoing num half cycles to do(nodim) set to: 2.0
- 23 Mar 2022 12:23:33 @ Yoing d target depth(m) set to: 5.0
- 23 Mar 2022 12:44:07 @ Yoing num half cycles to do(nodim) set to: -1.0
- 23 Mar 2022 12:44:07 @ Yoing d target depth(m) set to: 700.0
- 24 Mar 2022 21:51:01 @ Yoing num half cycles to do(nodim) set to: 2.0
- 24 Mar 2022 21:51:01 @ Yoing d target depth(m) set to: 100.0
- 24 Mar 2022 22:09:47 @ Yoing num half cycles to do(nodim) set to: -1.0
- 24 Mar 2022 22:09:47 @ Yoing d target depth(m) set to: 700.0
- 24 Mar 2022 22:18:13 @ Yoing d target depth(m) set to: 950.0
- 25 Mar 2022 02:23:30 @ Yoing num half cycles to do(nodim) set to: 2.0
- 25 Mar 2022 02:23:30 @ Yoing d target depth(m) set to: 100.0
- 25 Mar 2022 02:28:23 @ Yoing d target depth(m) set to: 700.0
- 25 Mar 2022 02:36:29 @ Yoing num half cycles to do(nodim) set to: -1.0
- 21 Apr 2022 12:14:07 @ Yoing num half cycles to do(nodim) set to: 2.0
- 21 Apr 2022 12:14:07 @ Yoing d target depth(m) set to: 5.0
- 21 Apr 2022 12:43:58 @ Yoing num half cycles to do(nodim) set to: -1.0
- 21 Apr 2022 12:43:58 @ Yoing d target depth(m) set to: 700.0
- 27 Apr 2022 15:42:14 @ Yoing d target depth(m) set to: 950.0
- 22 Apr 2022 16:41:55 @ Yoing num half cycles to do(nodim) set to: 2.0 [H]

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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