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DELAYED MODE QUALITY CONTROL OF ARGO DATA FROM DAC CORIOLIS

FLOAT WMO 5903133

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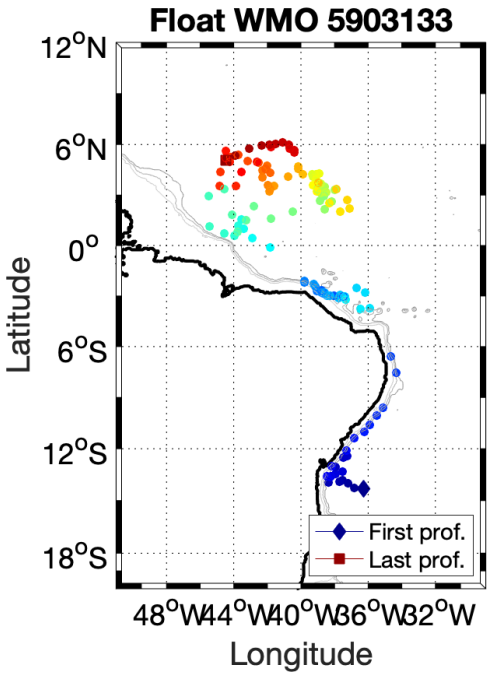
February 4, 2020



1 General Presentation

Platform Number	**5903133**
DAC	IF-CORIOLIS
Float Status	Inactive
Project	Brazilian Navy Argo Program
Deployment Platform	NHo Cruzeiro do Sul
Institution	Brazil
Name of the cruise	PIRATABRXI
Name of the PI	Luis Felipe Silva Santos
Platform Model	Arvor-L (844)
Serial Number	OIN-14BR-ARL-07
Sensor type	SBE41 CP
Positioning System	ARGOS
Data handbook	1.2
Format Version	3.1

Table 1: Float characteristics.

Deepest pressure in ascending profile (m)	2000
Parking depth (m)	1000
Cycle time (hours)	240
Deployment date	2015/11/22
Deployment position	long = -36.20, lat = -14.24
Last studied cycle number	121
last studied cycle date	2019/03/08
last studied cycle position	long = -44.45 , lat = 5

Table 2: Programmation and evolution.

2 Trajectory, positions and dates

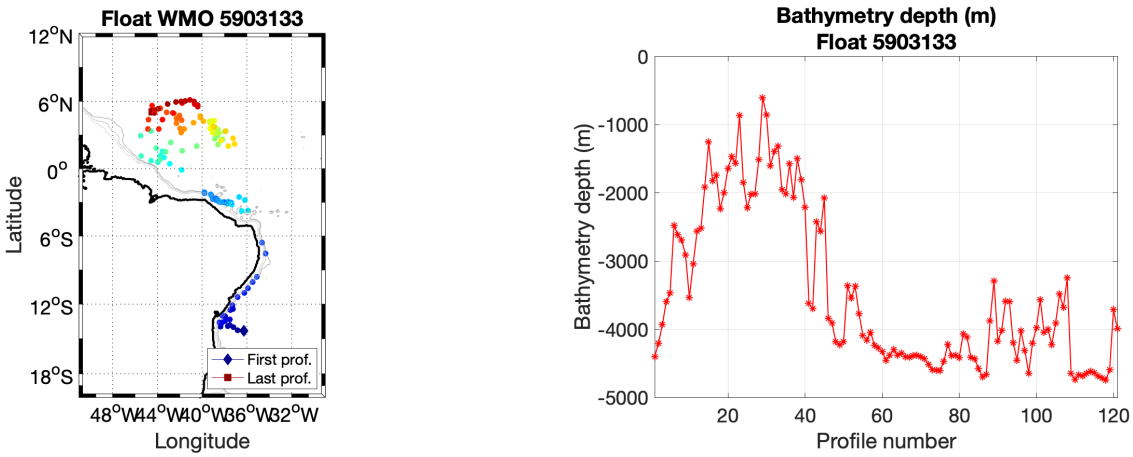


Figure 1: (left) : Profiles position, (right) : bathymetry depth function of cycle number.

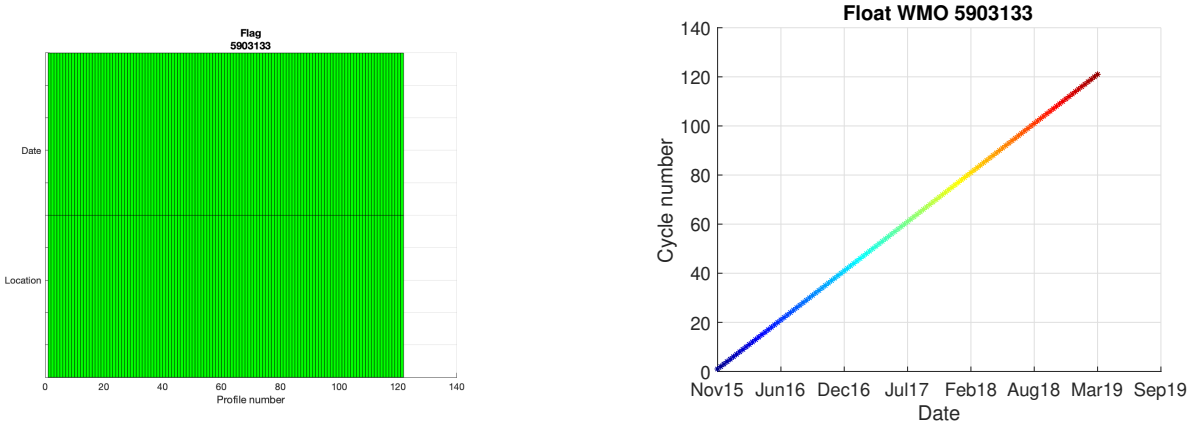


Figure 2: (left) : flags on profiles positions and dates.
(right) : relationship between cycle number, date and color.

3 Informations on Meta-Data

NAME
ANOMALY
BATTERY_PACKS
CONTROLLER_BOARD_TYPE_SECONDARY
CONTROLLER_BOARD_SERIAL_NO_SECONDARY
SPECIAL_FEATURES
FLOAT_OWNER
OPERATING_INSTITUTION
CUSTOMISATION
STARTUP_DATE
STARTUP_DATE_QC
DEPLOYMENT_CRUISE_ID
END_MISSION_DATE
END_MISSION_STATUS
CONFIG_MISSION_COMMENT
PREDEPLOYMENT_CALIB_COMMENT

Table 3: Missing on Meta Data.

4 Quality check on basic parameters

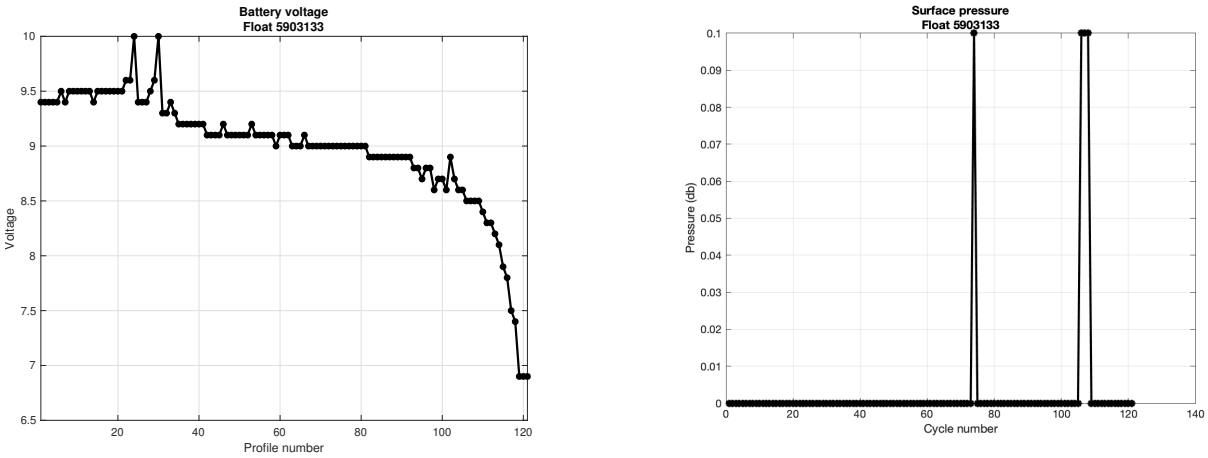


Figure 3: (left) : battery voltage - (right) : surface pressure from technical files.

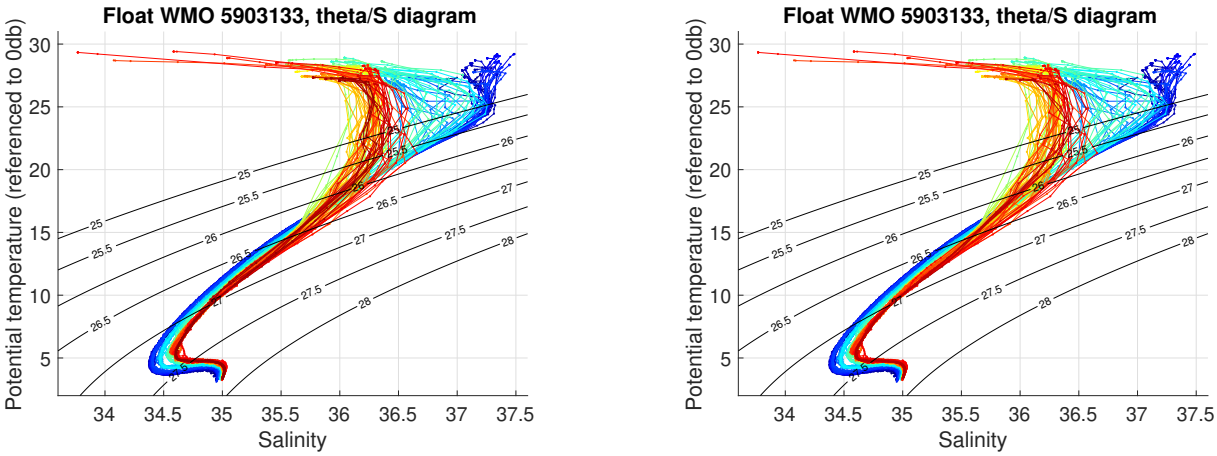


Figure 4: θ/S diagrams.
(left panel) Flags are not taken into account.
(right panel) Quality flags are taken into account.

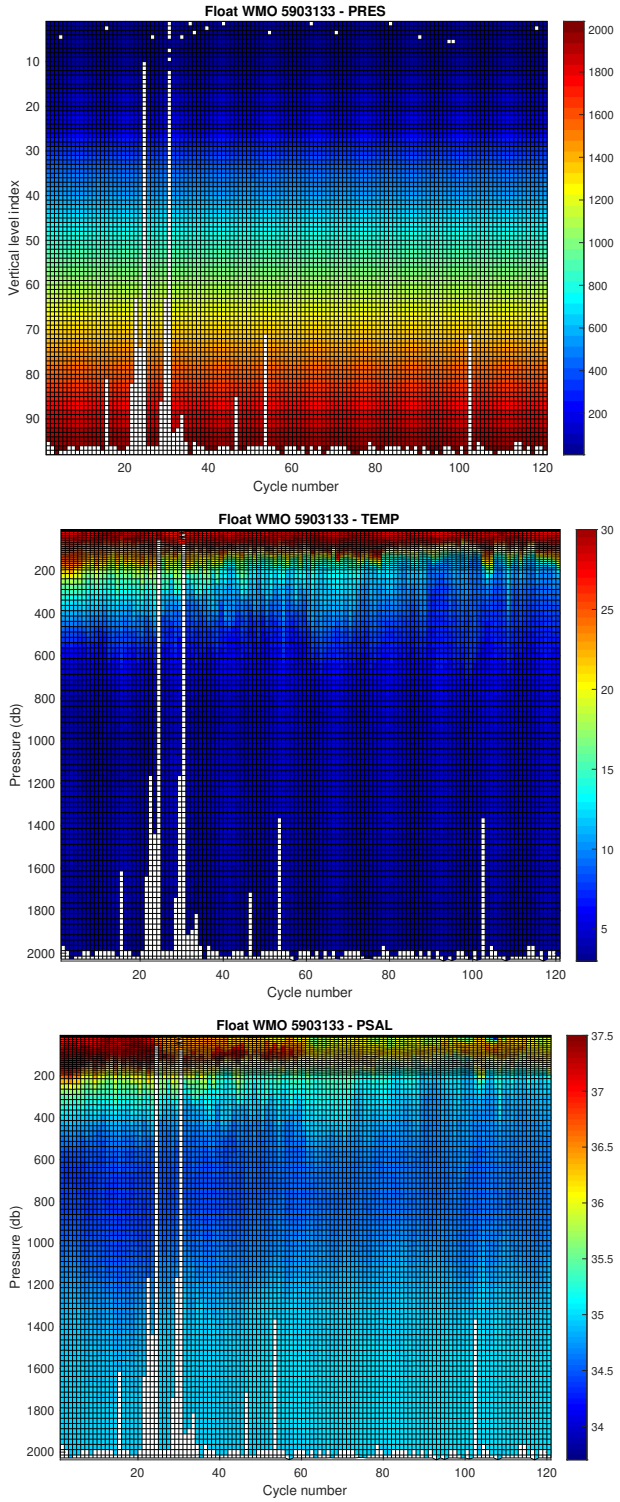


Figure 5: Sections of pressure (top), temperature (middle) and salinity (bottom) section along the float trajectory. Quality flags are not taken into account.

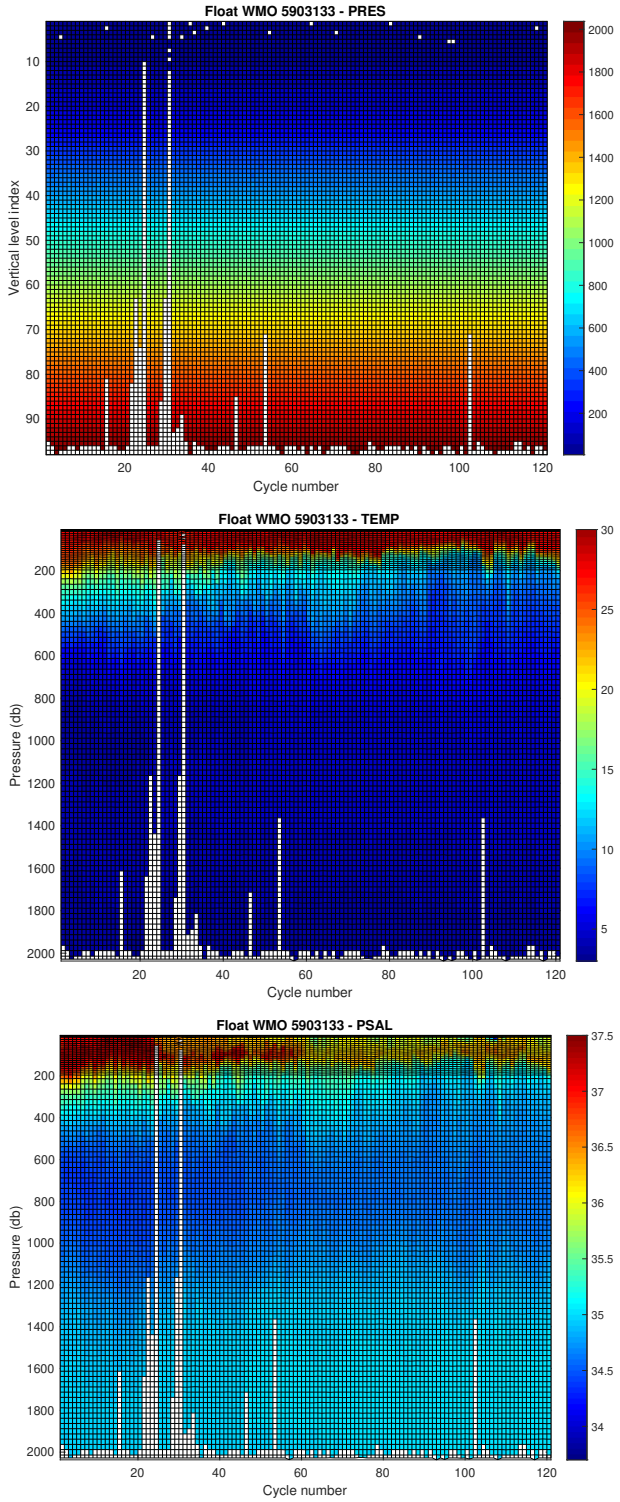


Figure 6: Sections of pressure (top), temperature (middle) and salinity (bottom) section along the float trajectory. Quality flags are taken into account.

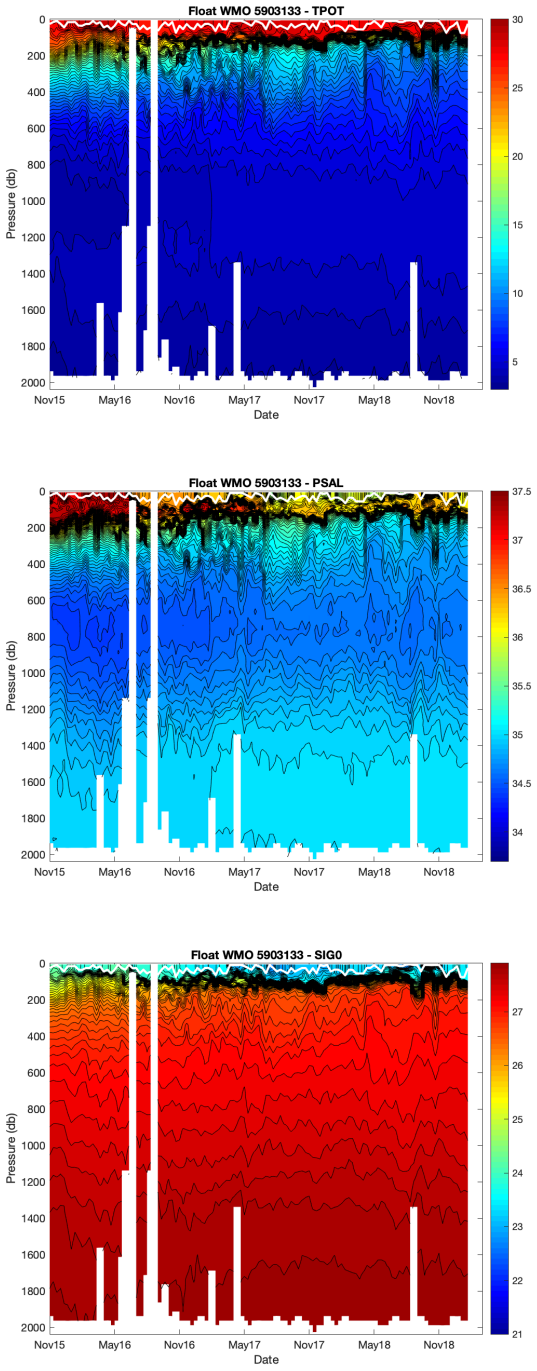


Figure 7: Sections of pressure (top), temperature (middle) and salinity (bottom) section along the float trajectory. Quality flags are taken into account.

5 QC flag checks and interesting profiles

Cycle	Parameter	Vertical level	Old flag	New flag	Comments
118-121	S	all levels	3	3	suspicious positive drift in salinity, see OW's results

Table 4: Profiles 0 to 121 for float #WMO 5903133 with flags 3 or 4, and proposition for modifications.

6 Cycle 118 : comparison to the nearest ARGO profiles.

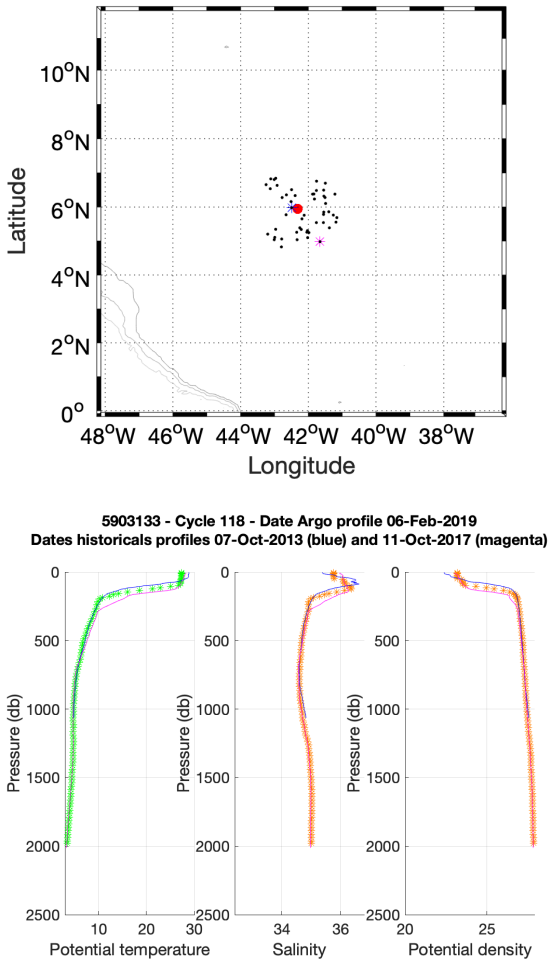


Figure 8: Float 5903133, cycle 118 - **(Upper panel)** Position of the Argo profile (red) and of the nearest CTD profiles (black). The nearest ARGO profile in time is in magenta while the nearest ARGO profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function of pressure for the Argo profile (stars) and for the nearest ARGO profile in time (magenta line) and for the nearest ARGO profile in space (blue line). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue for a QC=2 ; orange for a QC=3 and red for a QC=4).

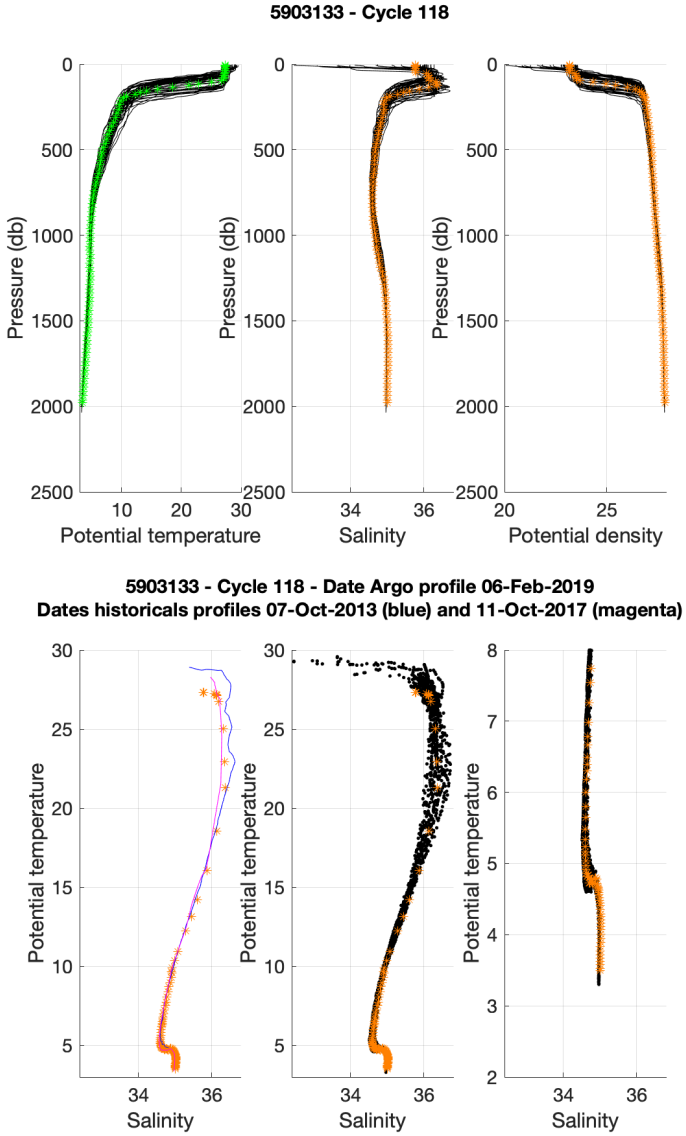


Figure 9: Float 5903133, cycle 118 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue for a QC=2 ; orange for a QC=3 and red for a QC=4). **(Upper panels)** Temperature (left panel), salinity (middle panel) and potential density (right panel) as function of pressure. **(Lower panels)** θ/S diagrams.

7 Cycle 119 : comparison to the nearest ARGO profiles.

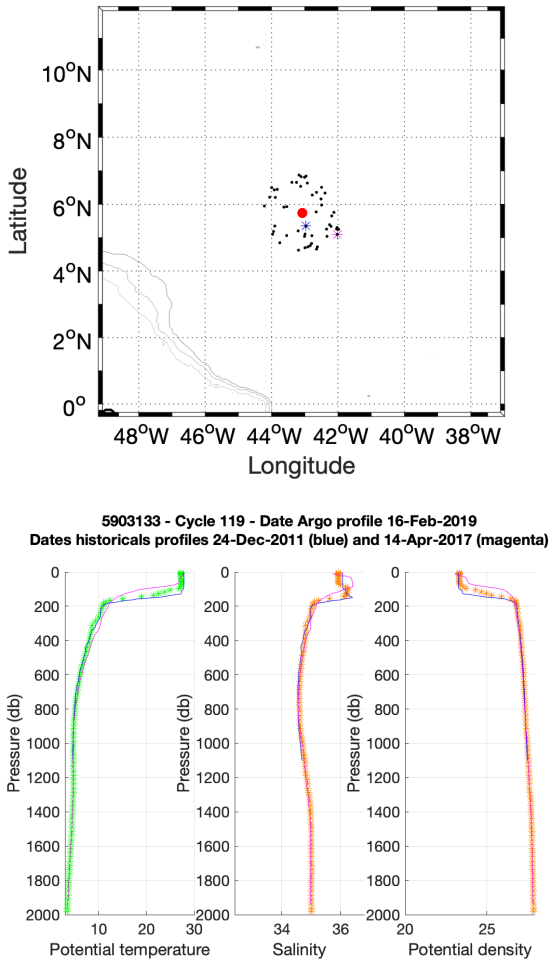


Figure 10: Float 5903133, cycle 119 - **(Upper panel)** Position of the Argo profile (red) and of the nearest CTD profiles (black). The nearest ARGO profile in time is in magenta while the nearest ARGO profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function of pressure for the Argo profile (stars) and for the nearest ARGO profile in time (magenta line) and for the nearest ARGO profile in space (blue line). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue for a QC=2 ; orange for a QC=3 and red for a QC=4).

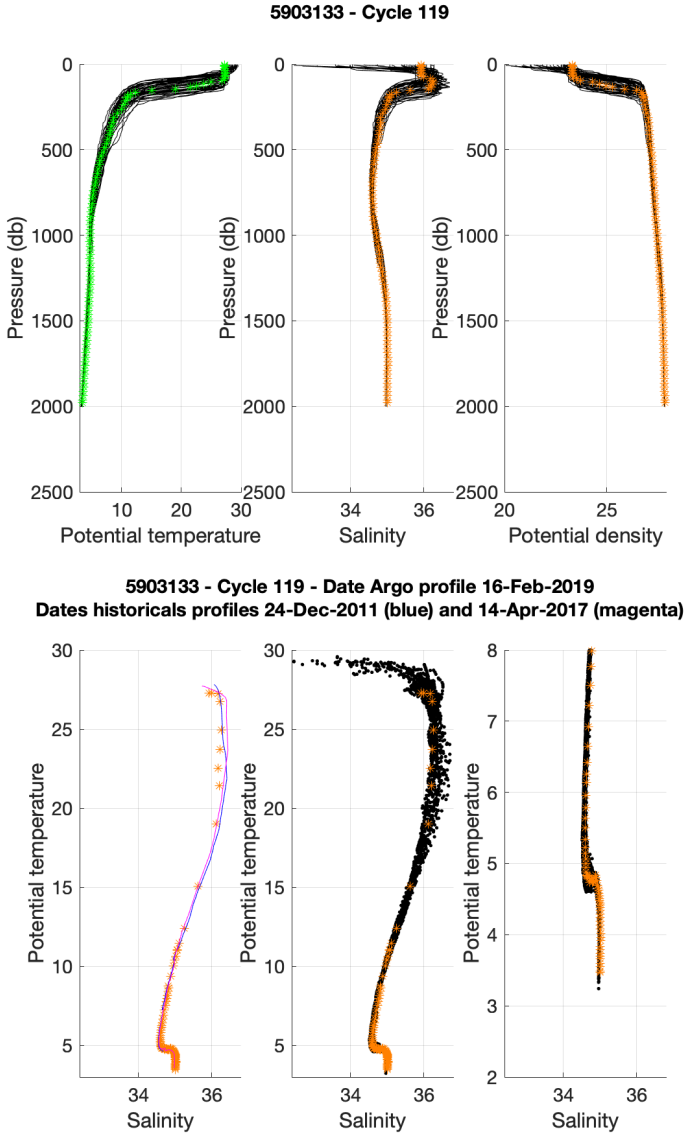


Figure 11: Float 5903133, cycle 119 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue for a QC=2 ; orange for a QC=3 and red for a QC=4). **(Upper panels)** Temperature (left panel), salinity (middle panel) and potential density (right panel) as function of pressure. **(Lower panels)** θ/S diagrams.

8 Cycle 120 : comparison to the nearest ARGO profiles.

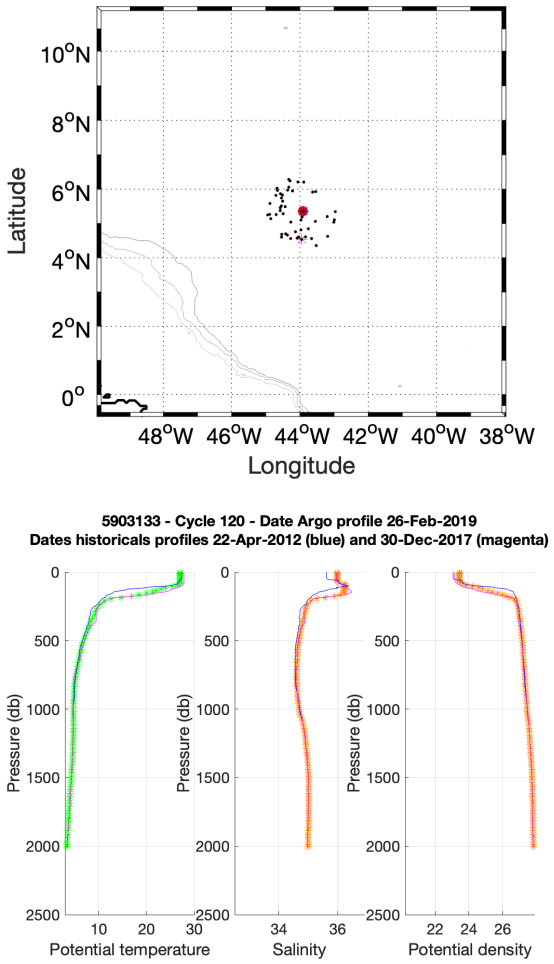


Figure 12: Float 5903133, cycle 120 - **(Upper panel)** Position of the Argo profile (red) and of the nearest CTD profiles (black). The nearest ARGO profile in time is in magenta while the nearest ARGO profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function of pressure for the Argo profile (stars) and for the nearest ARGO profile in time (magenta line) and for the nearest ARGO profile in space (blue line). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue for a QC=2 ; orange for a QC=3 and red for a QC=4).

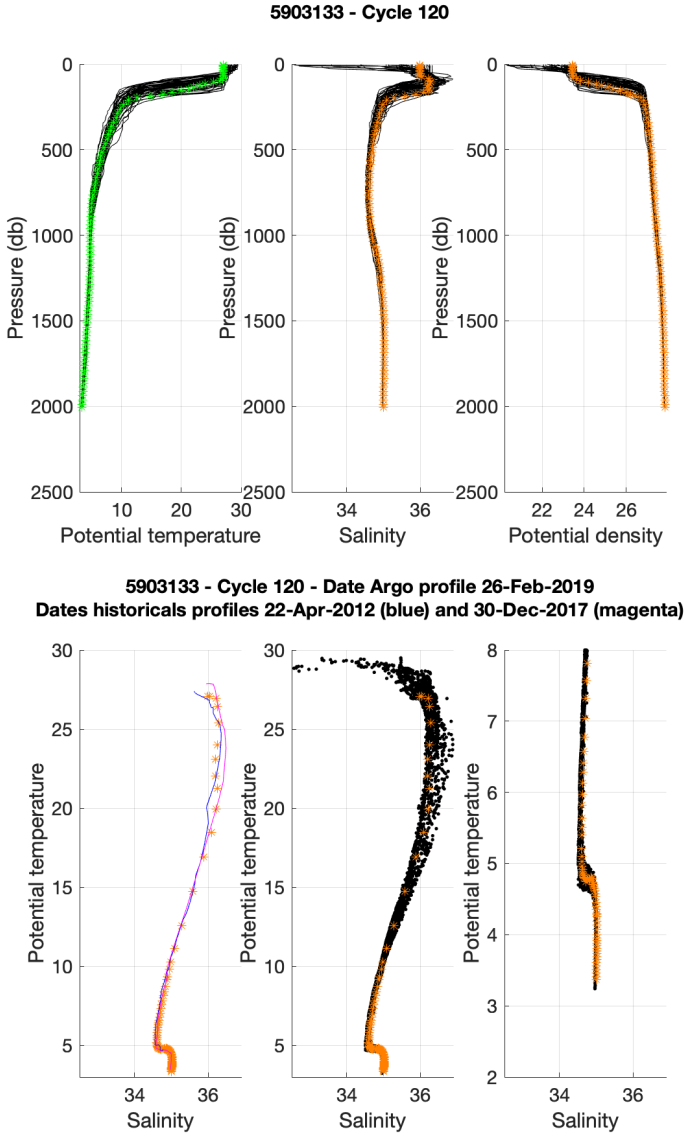


Figure 13: Float 5903133, cycle 120 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue for a QC=2 ; orange for a QC=3 and red for a QC=4). **(Upper panels)** Temperature (left panel), salinity (middle panel) and potential density (right panel) as function of pressure. **(Lower panels)** θ/S diagrams.

9 Cycle 121 : comparison to the nearest ARGO profiles.

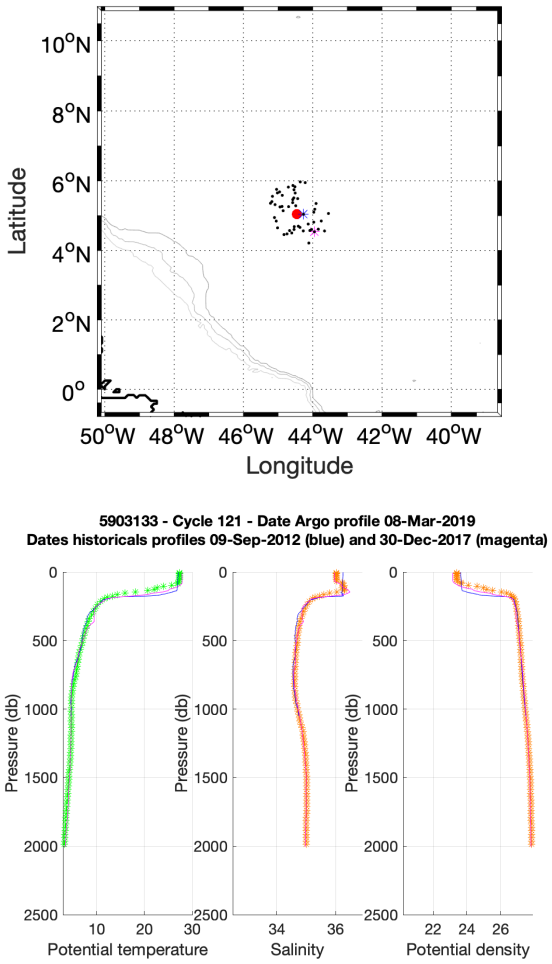


Figure 14: Float 5903133, cycle 121 - **(Upper panel)** Position of the Argo profile (red) and of the nearest CTD profiles (black). The nearest ARGO profile in time is in magenta while the nearest ARGO profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function of pressure for the Argo profile (stars) and for the nearest ARGO profile in time (magenta line) and for the nearest ARGO profile in space (blue line). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue for a QC=2 ; orange for a QC=3 and red for a QC=4).

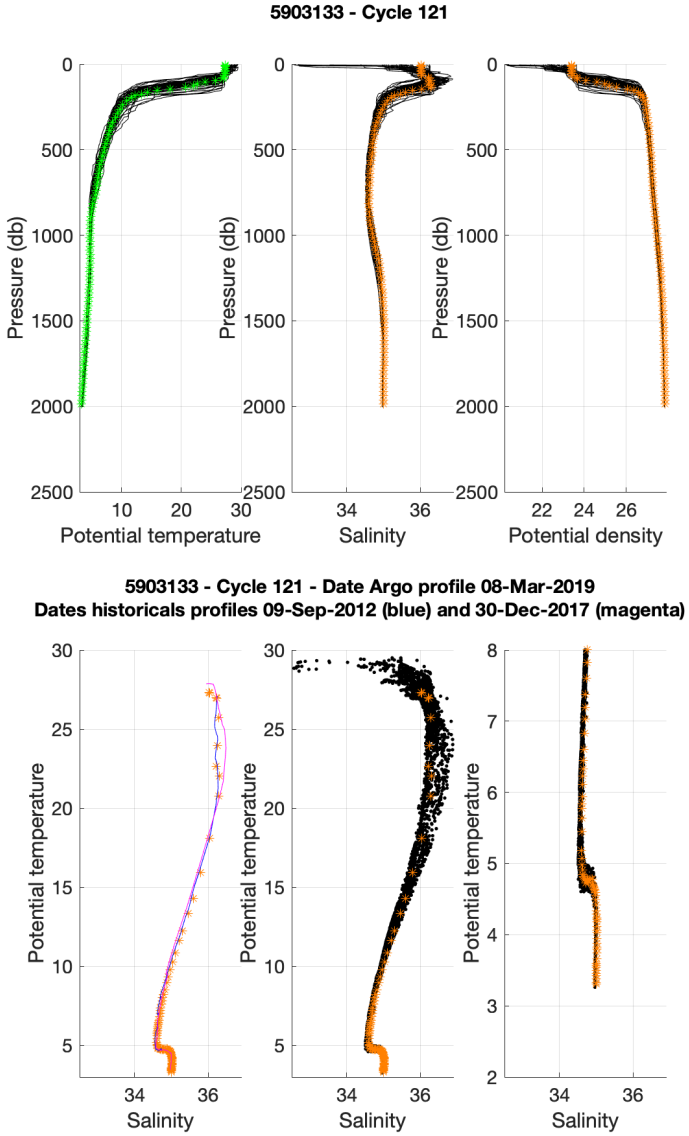


Figure 15: Float 5903133, cycle 121 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue for a QC=2 ; orange for a QC=3 and red for a QC=4). **(Upper panels)** Temperature (left panel), salinity (middle panel) and potential density (right panel) as function of pressure. **(Lower panels)** θ/S diagrams.

10 Pressure Calibration :

ARVOR float with $PRES\_SurfaceOffsetCorrectedNotResetNegative\_1cBarResolution\_dBar$ i.e. correction on-board, no need to do DM adjustment in pressure.

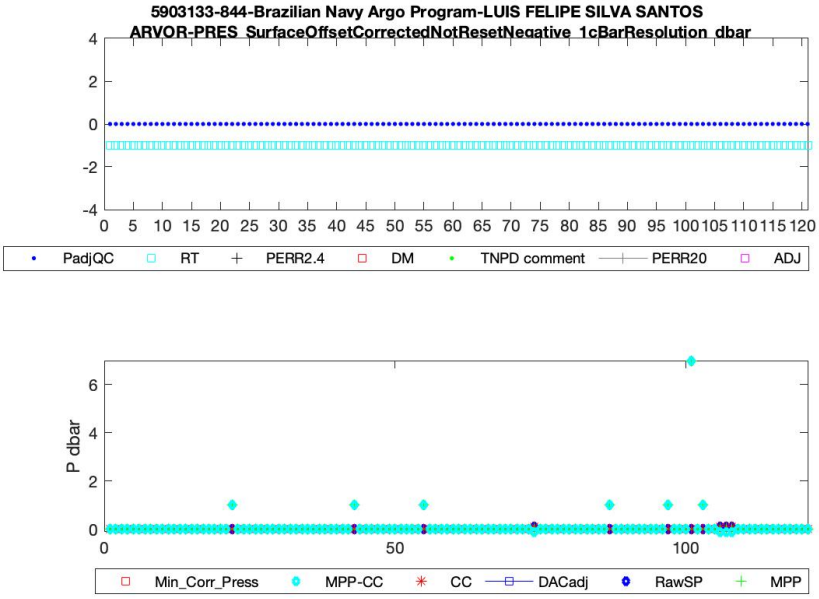


Figure 16: Surface pressure time serie for float 5903133. Legend : blue diamonds : Raw Surface Pressure ; blue squares : DAC adjustment (if DM exist) ; red points : calculated correction CC ; green diamonds with the minimal profile pressure value (MPP) ; pink squares : corrected minimal surface pressure ; cyan diamonds : $MPP - CC$

11 OW method, CONFIGURATION #NA_ARGO

We use OW method adjusted by Cabanes et al., 2016. The method excludes profiles flagged at 4 in real-time. Input salinities are raw float profiles measurements.

We cannot see any evidence of a drift or bias in the salinity measurements.
We thus conclude that it is not necessary to correct the salinity data.

ARGO CLIMATOLOGY	2019V03
CTD CLIMATOLOGY	2019V01
CONFIG_MAX_CASTS	300
MAP_USE_PV	1
MAP_USE_SAF	1
MAPSCALE_LONGITUDE_LARGE	3.2
MAPSCALE_LONGITUDE_SMALL	0.8
MAPSCALE_LATITUDE_LARGE	2
MAPSCALE_LATITUDE_SMALL	0.5
MAPSCALE_PHI_LARGE	0.1
MAPSCALE_PHI_SMALL	0.02
MAPSCALE_AGE	0.69
MAPSCALE_AGE_LARGE	2
MAP_P_EXCLUDE	0
MAP_P_DELTA	250

Table 5: Mapping parameters.

breaks	none
max_breaks	0
use_percent_gt	0.5

Table 6: Calibration parameters.

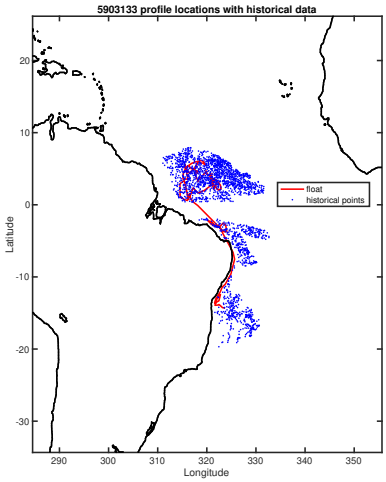


Figure 17: Position of the historical and float data.

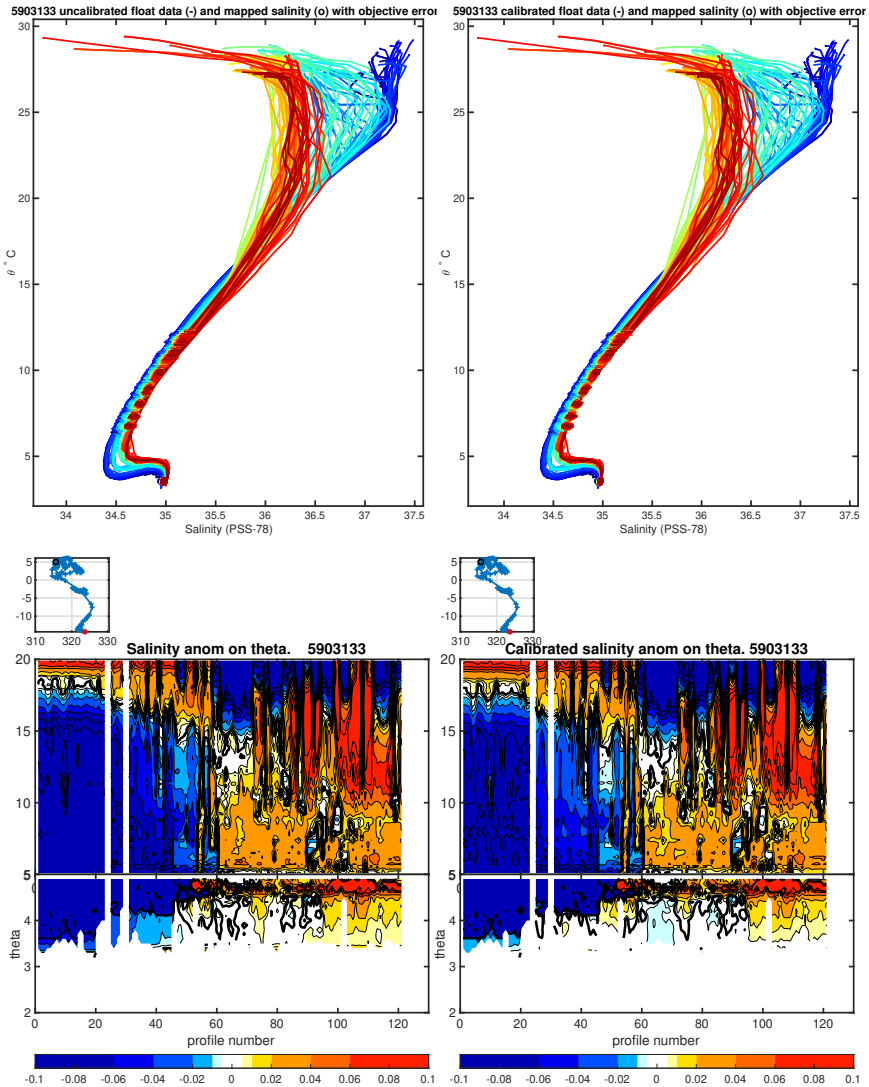


Figure 18: **(top panel)** : Comparison of the θ/S diagram of the float with the historial database. (left) raw data. (right) corrected data using the OW correction.
(bottom panel) : Salinity anomaly. (left) raw data. (right) corrected data using the OW correction.

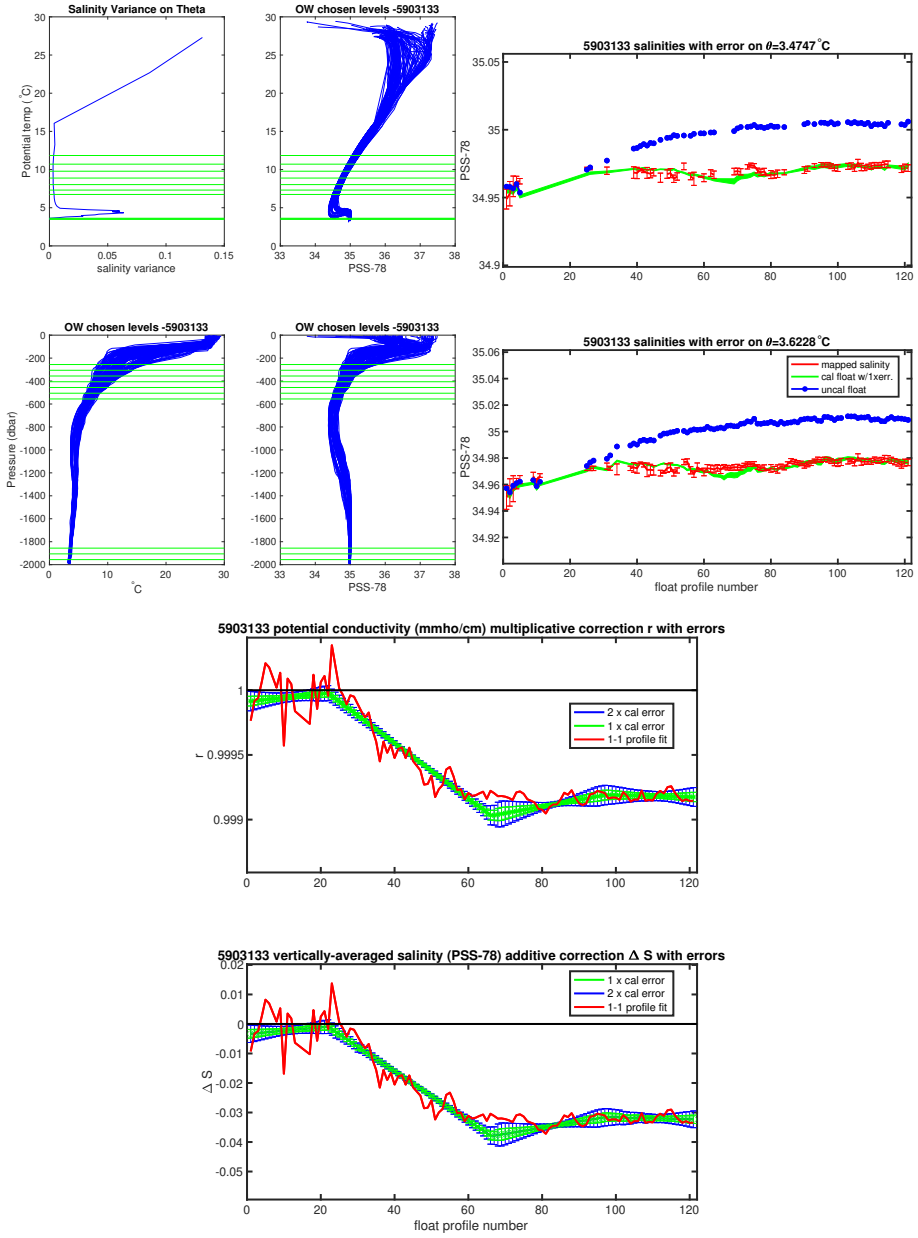


Figure 19: (top left) : θ- levels chosen for the calibration. (top right) : comparison, on various θ levels, between the float data and the historical data interpolated at the float position. (bottom): Correction proposed by the OW method.