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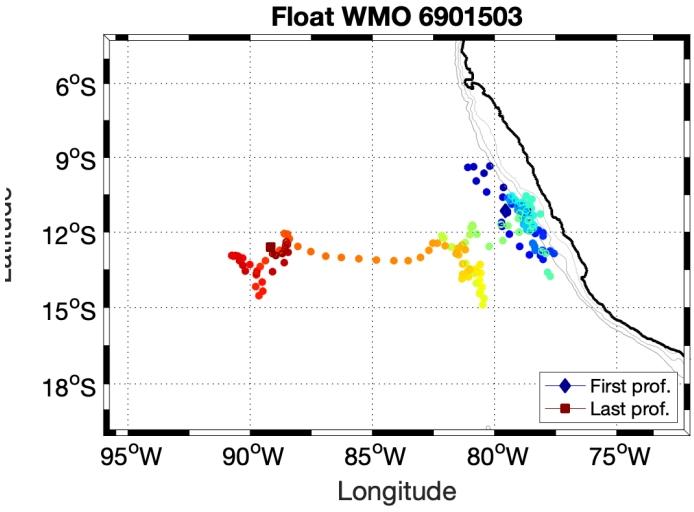
DELAYED MODE QUALITY CONTROL OF ARGO DATA FROM DAC CORIOLIS

FLOAT WMO 6901503

Auteur : Carole Saout
March 29, 2019



1 General Presentation

Platform Number	6901503
DAC	IF-CORIOLIS
Float Status	DEAD
Project	AMOP
Deployment Platform	ATALANTE
Name of the cruise	AMOP
Institution	IRD Brest, France
Name of the PI	Christophe MAES
Platform Model	ARVOR (844)
Serial Number	OIN-13-AR-014
Sensor type	SBE41 CP
Positionning System	ARGOS
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	2014/02/03
Deployment position	long = -79.51 , lat = -11.23
Last studied cycle number	181
last studied cycle date	2019/01/10
last studied cycle position	long = -89.18 , lat = -13

Table 2: Programmation and evolution.

2 Trajectory, positions and dates

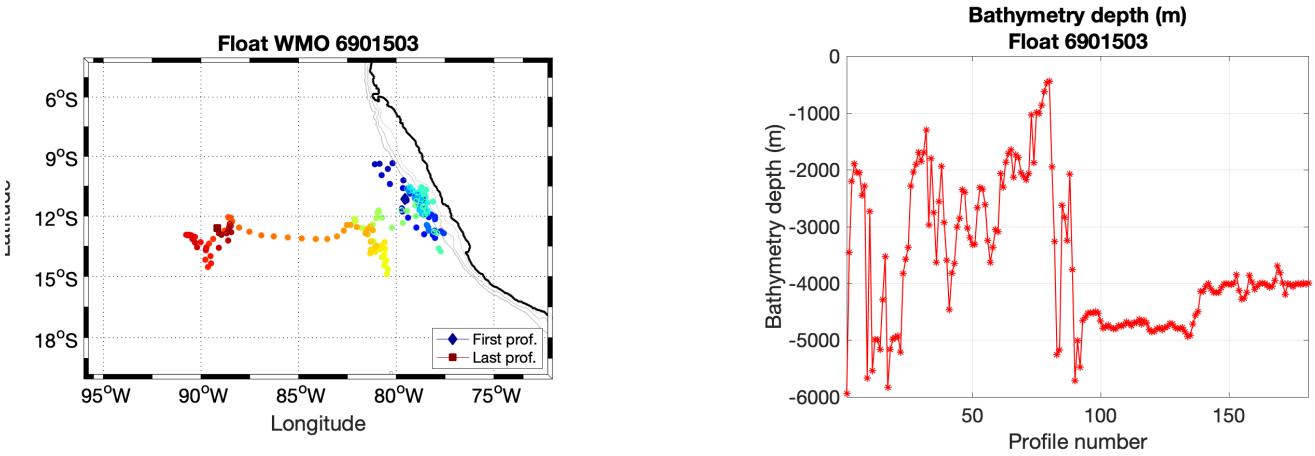


Figure 1: (left) : Profiles position, (right) : bathymetry depth function of cycle number.

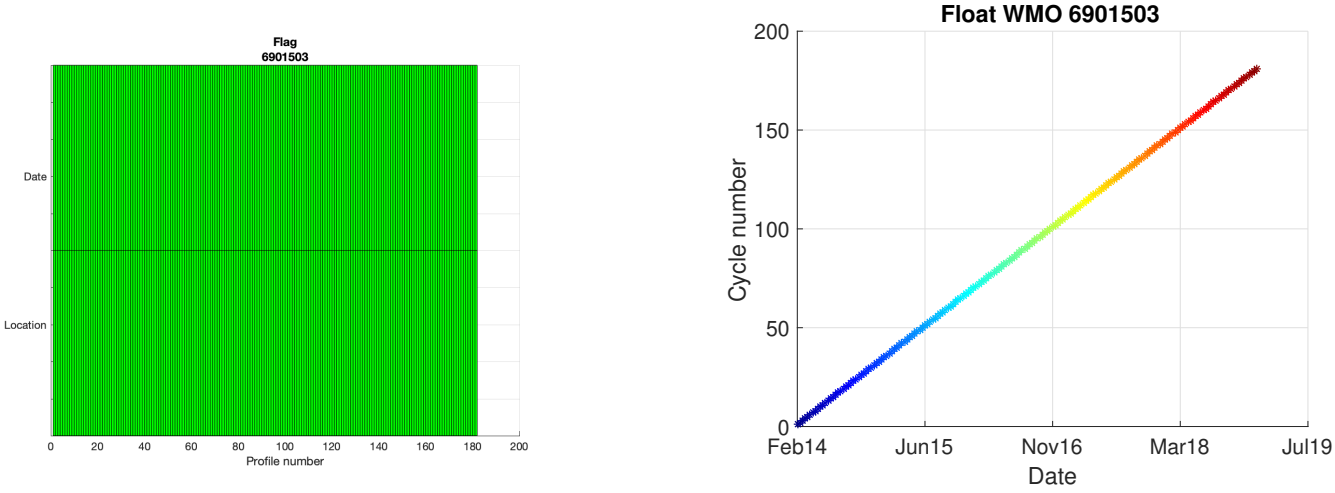


Figure 2: (left) : flags on profiles positions and dates.
(right) : relationship between cycle number, date and color.

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

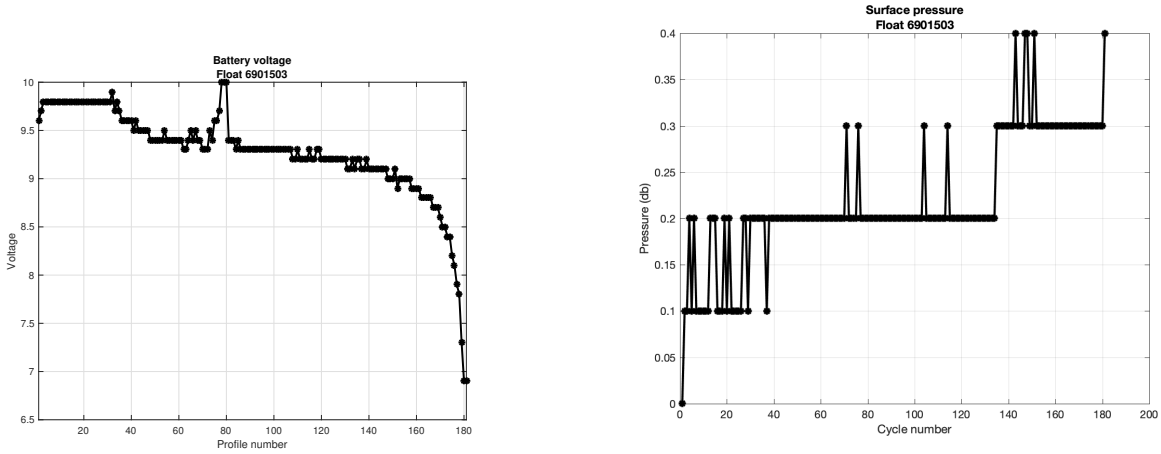


Figure 3: (left) : battery voltage - (right) : surface pressure from technical files.

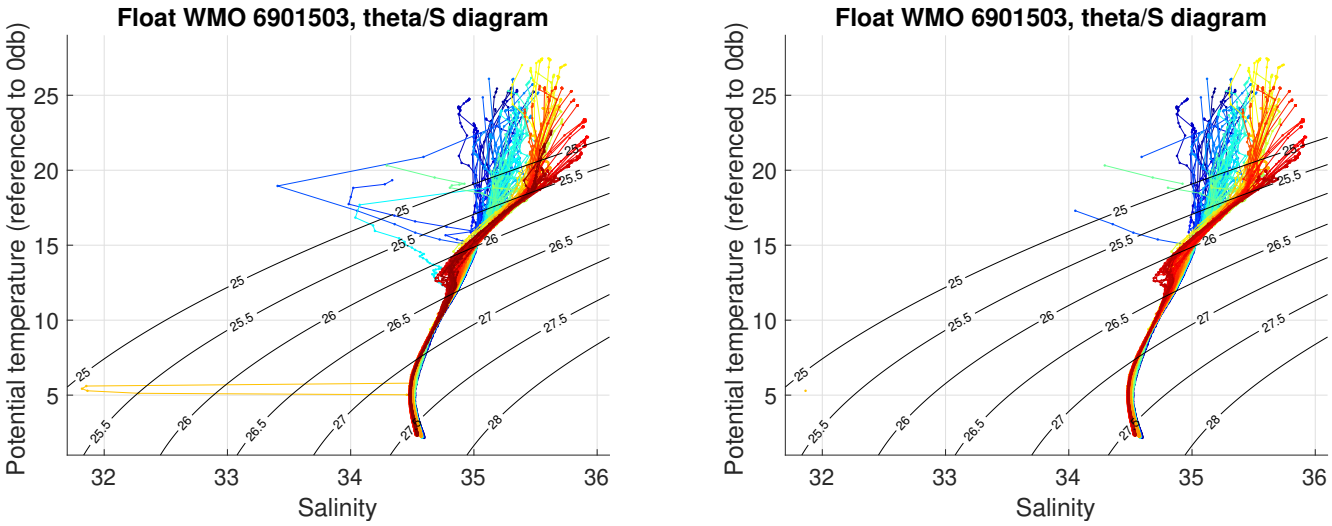


Figure 4: θ/S diagrams. (Left panel) Flags are not taken into account - (right panel) Quality flags are taken into account.

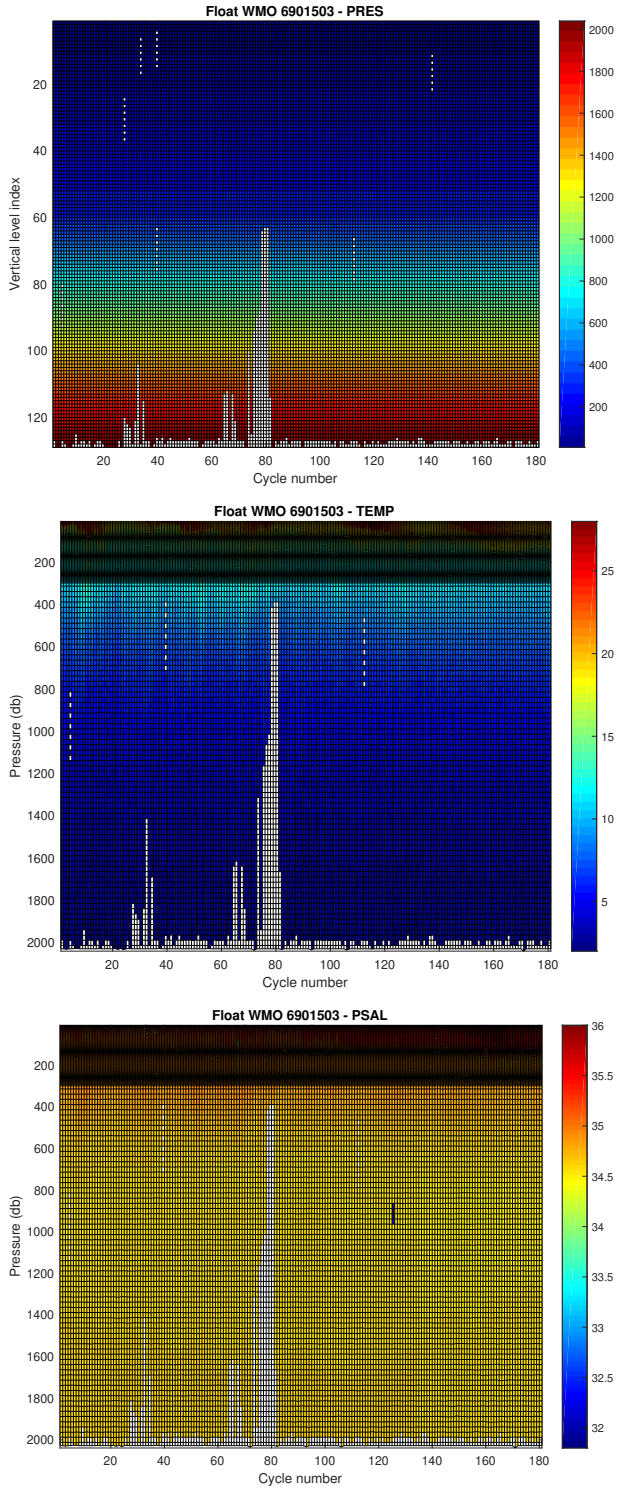


Figure 5: Sections of pressure (top), temperature (middle) and salinity (bottom) section along the float trajectory. Quality flags are not taken into account.

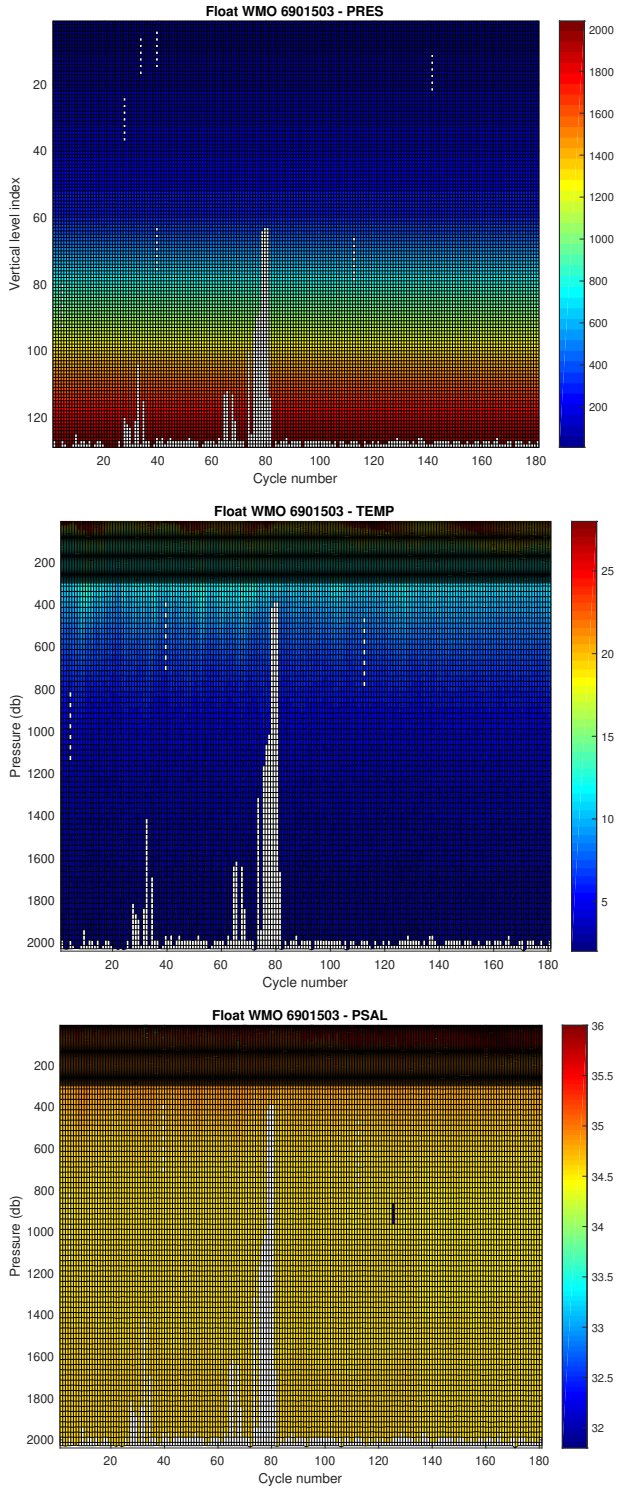


Figure 6: Sections of pressure (top), temperature (middle) and salinity (bottom) section along the float trajectory. Quality flags are taken into account.

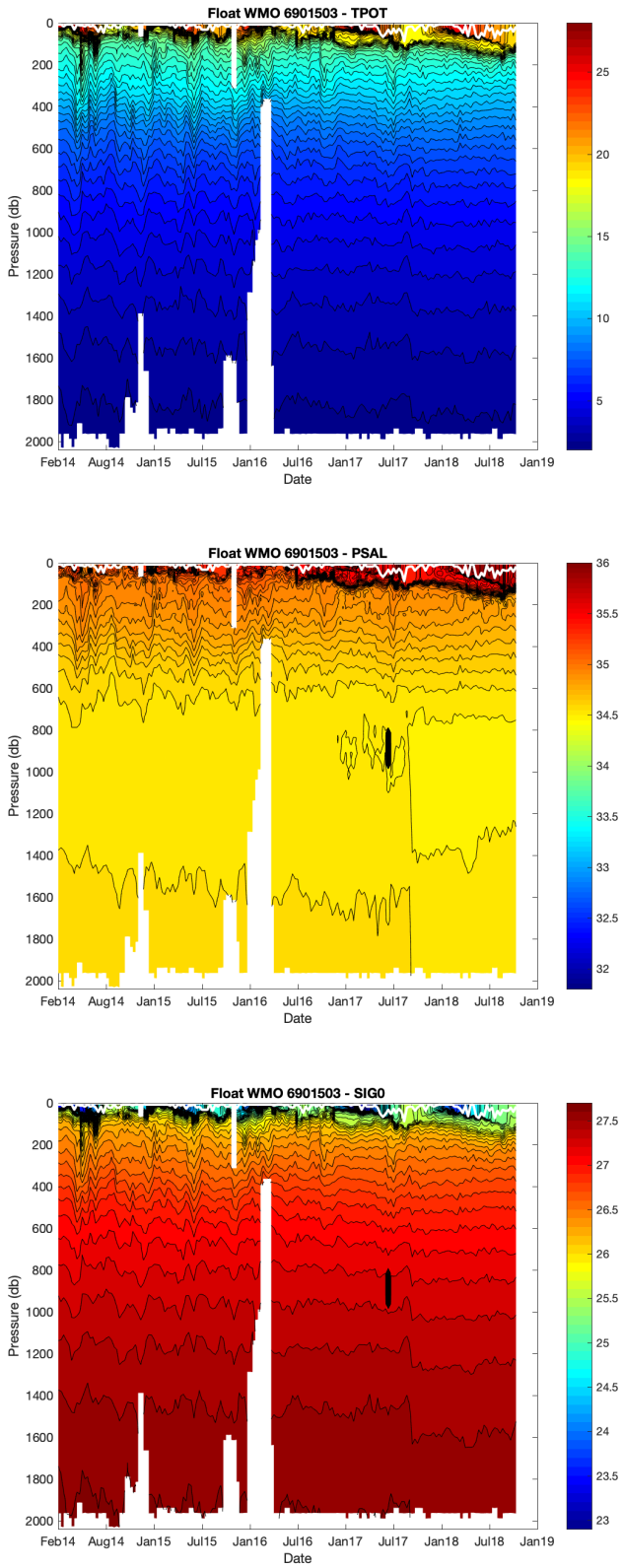


Figure 7: Sections of potential temperature (top), salinity (middle) and potential density (bottom) along the float trajectory, interpolated on standard levels with quality flags taken into account.

5 QC flag checks and interesting profiles

Cycle	Parameter	Vertical level	Old flag	New flag	Comments
32	TEMP/PSAL	8-64 dbar	1 or 4	restore all Qc(temp) at 1	adjust flags, bad S data only
36	TEMP/PSAL	33 dbar	4	put Qc(T,S)=4 from 28 to 58 dbar	adjust flags, bad θ-S
67	PSAL	0-298 dbar	4	4	bad salinity
87	TEMP/PSAL	23-28 dbar	4	put Qc(psal)=4 from 0 to 38 dbar, restore all Qc(temp) at 1	adjust flags, bad θ-S
125	TEMP/PSAL	814-963 dbar	1 or 4	put only Qc(psal)=4 from 863 to 939 dbar, all others Qc(temp,psal) at 1	adjust flags, bad θ-S
174 -181	PSAL	all levels	3	1	suspicious drift in negative salinity below 700 dbar only, see OW to know more.

Table 4: Float #WMO 6901503. Cycles [0A-181A] : summary of the modifications of the real-time Qc flags and of the interesting or suspicious data

6 Cycle 32 : comparison to the nearest Argo (OW) profiles.

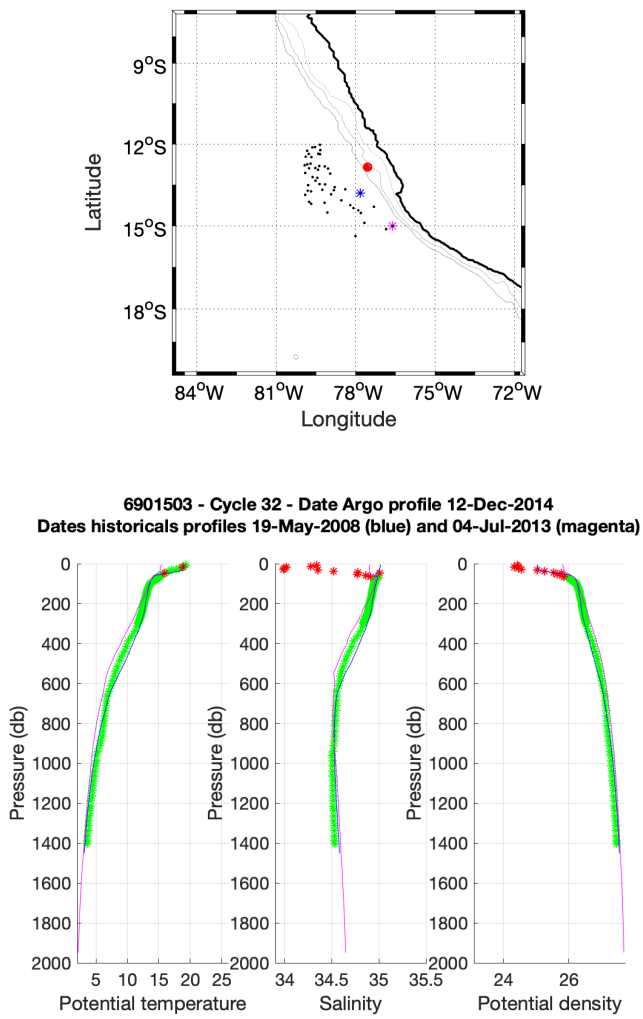


Figure 8: Float 6901503, cycle 32 - **(Upper panel)** Position of the Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest Argo profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

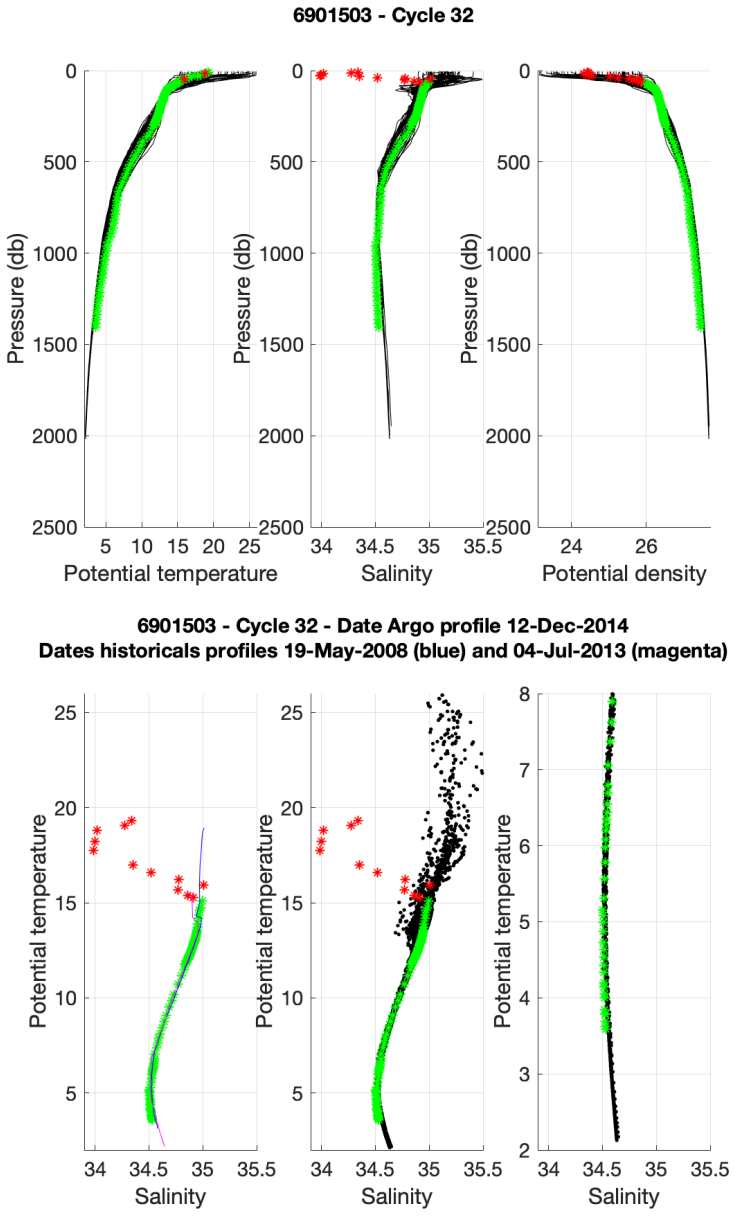


Figure 9: Float 6901503, cycle 32 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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 36 : comparison to the nearest Argo (OW) profiles.

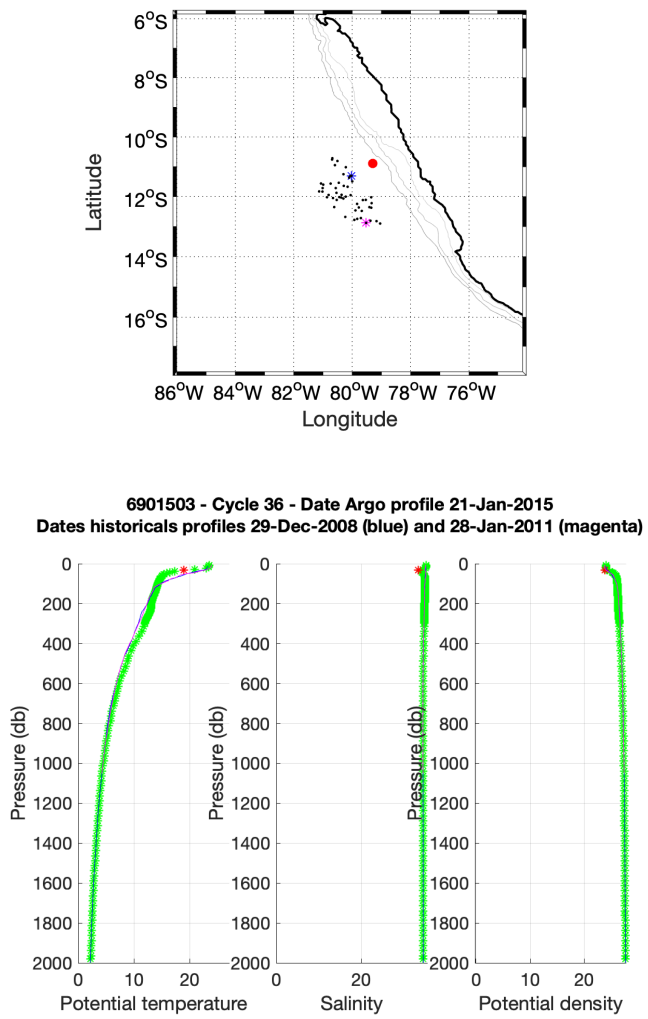


Figure 10: Float 6901503, cycle 36 - **(Upper panel)** Position of the Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest Argo profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

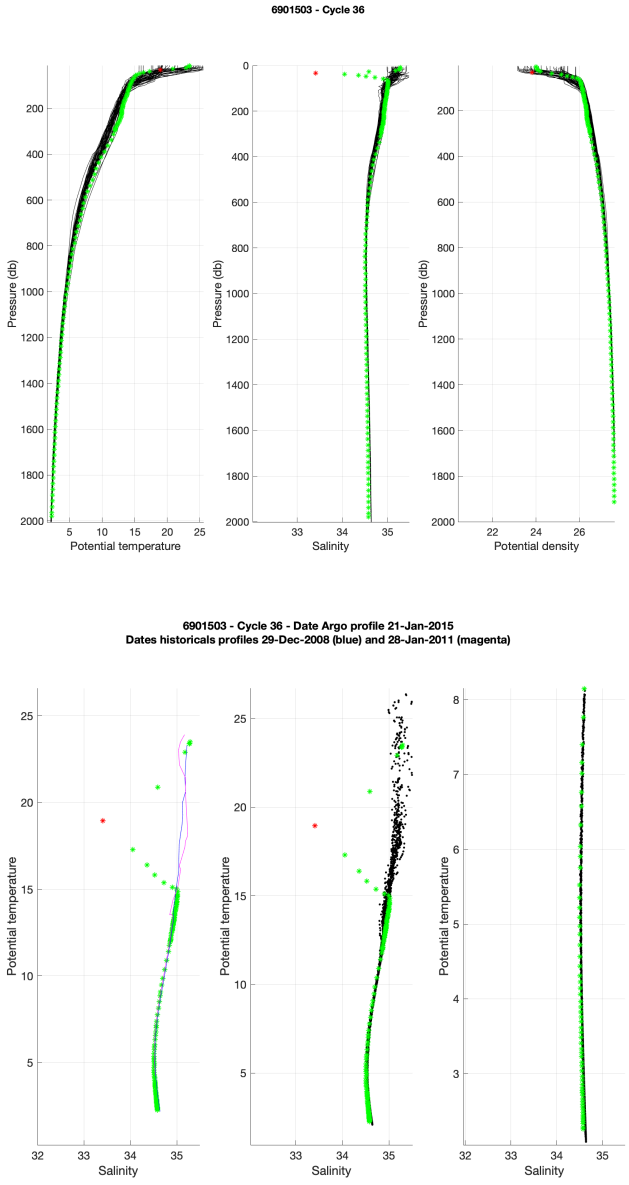


Figure 11: Float 6901503, cycle 36 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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 67 : comparison to the nearest Argo (OW) profiles.

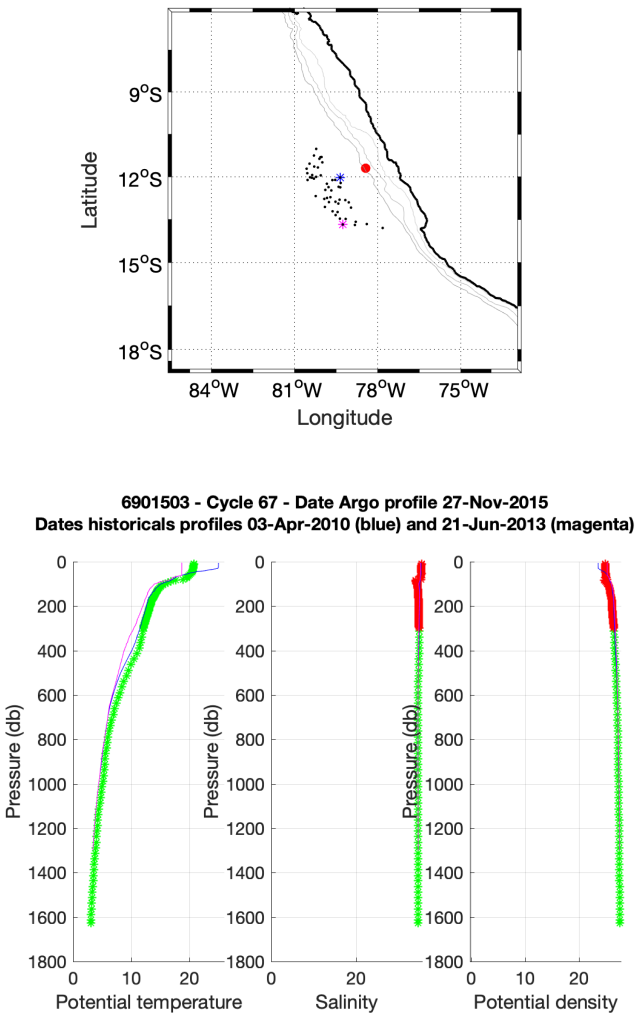


Figure 12: Float 6901503, cycle 67 - **(Upper panel)** Position of the Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest Argo profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

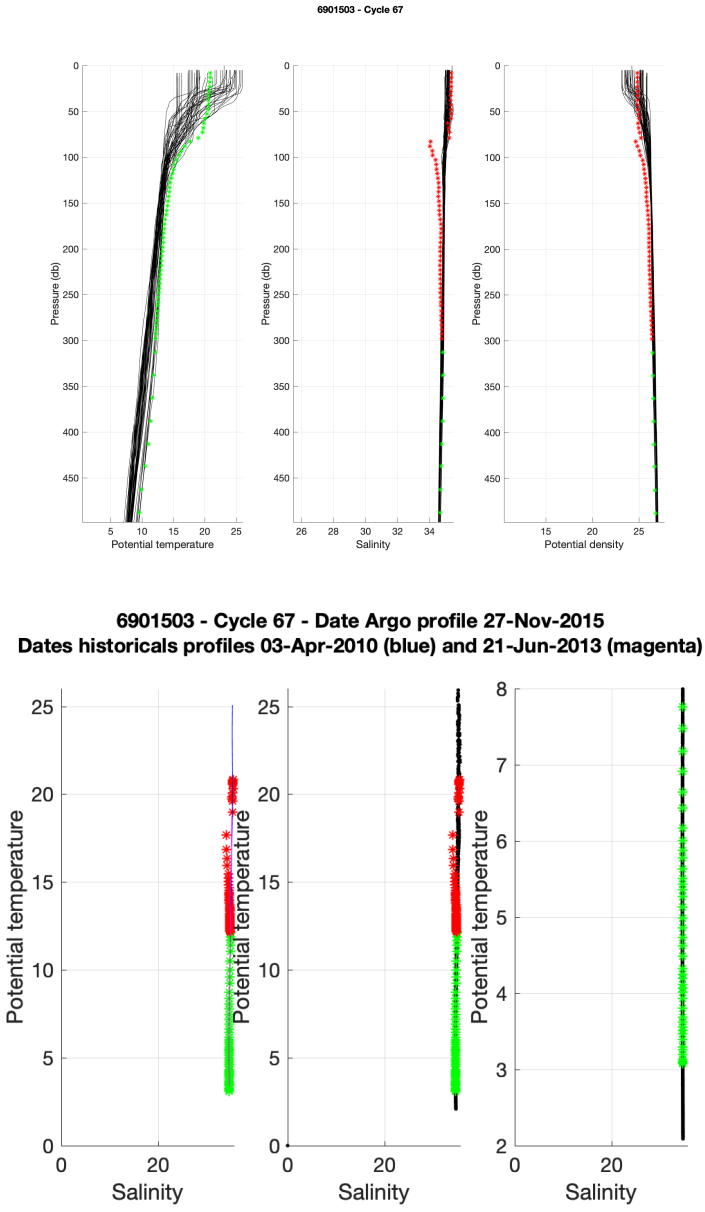


Figure 13: Float 6901503, cycle 67 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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 87 : comparison to the nearest Argo (OW) profiles.

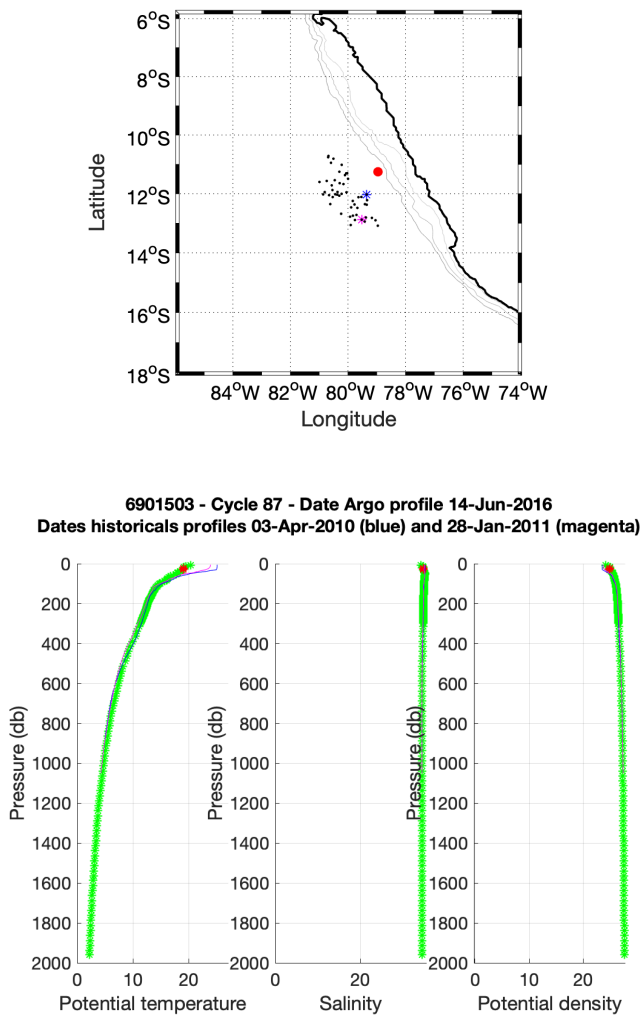


Figure 14: Float 6901503, cycle 87 - **(Upper panel)** Position of the Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest Argo profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

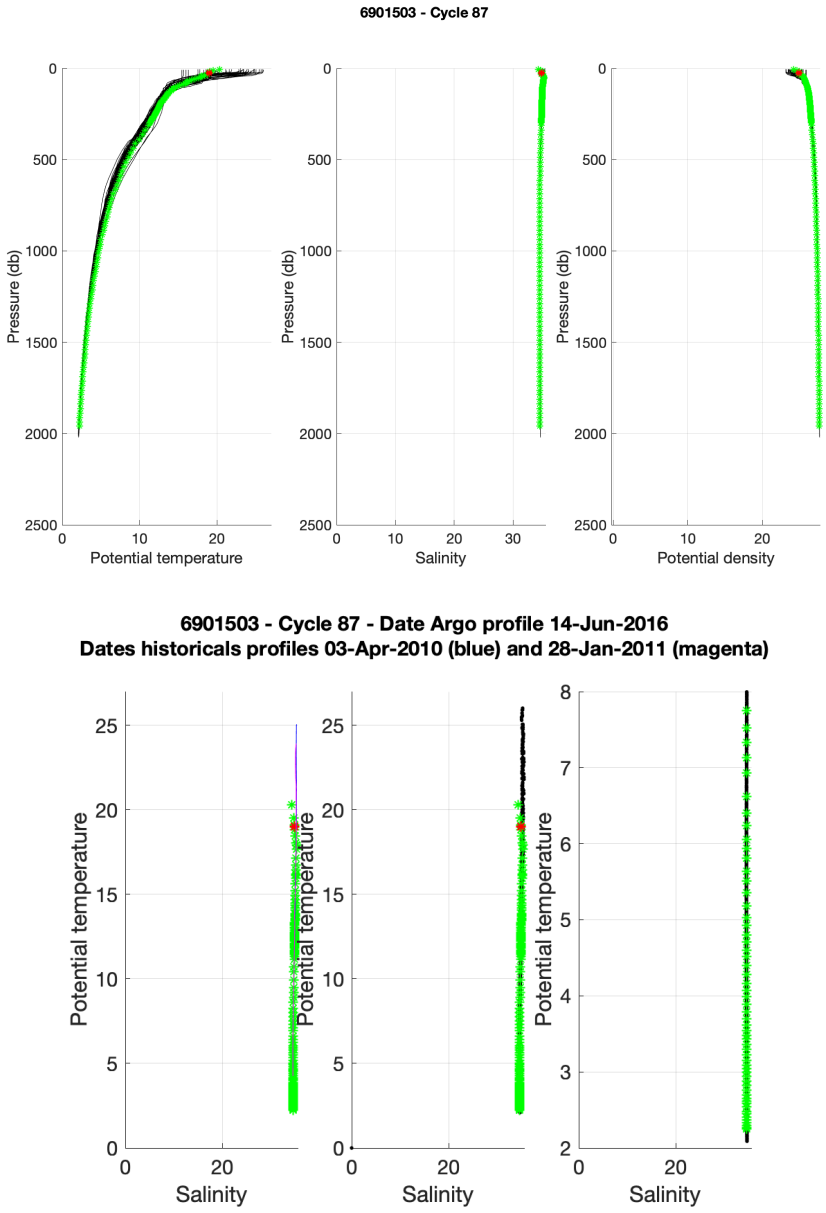


Figure 15: Float 6901503, cycle 87 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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 Cycle 125 : comparison to the nearest Argo (OW) profiles.

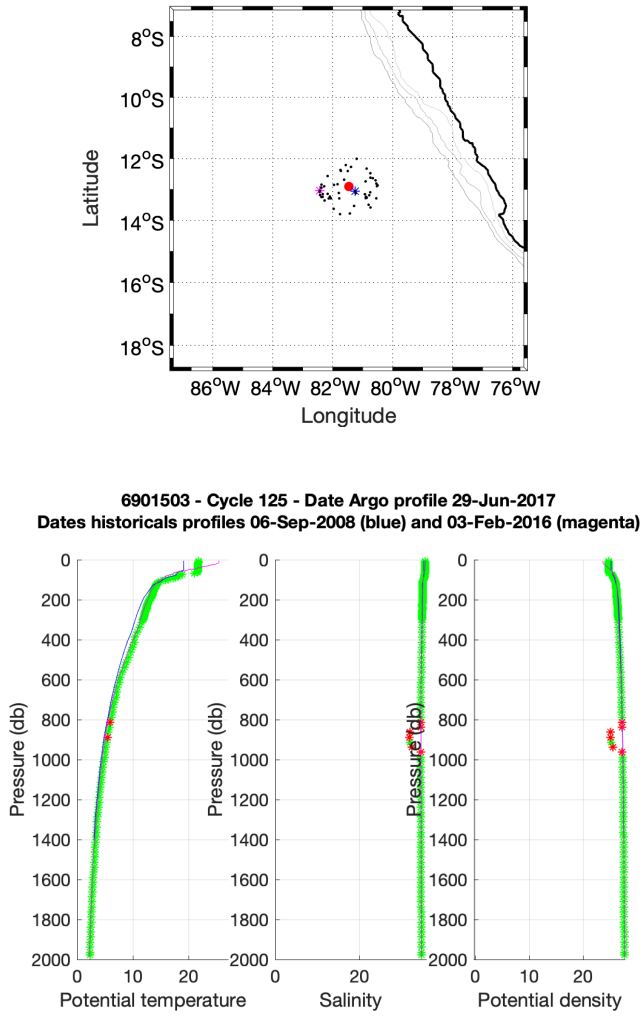


Figure 16: Float 6901503, cycle 125 - **(Upper panel)** Position of the Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest Argo profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

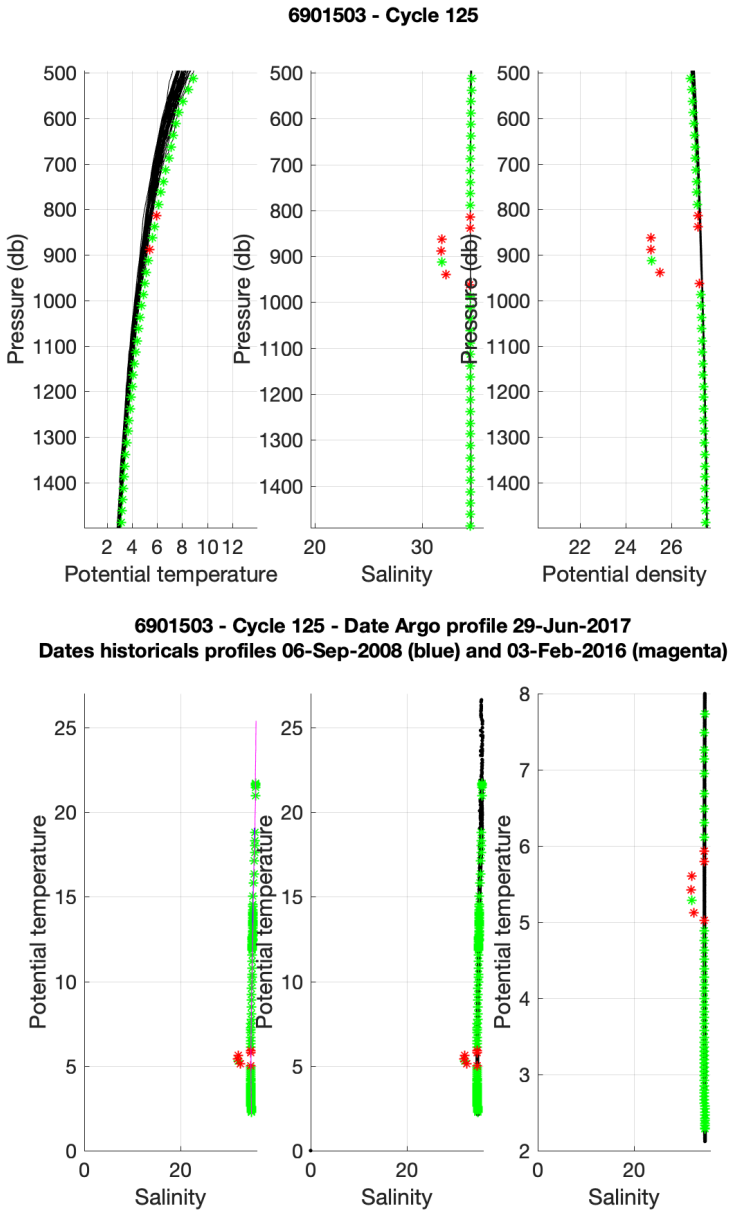


Figure 17: Float 6901503, cycle 125 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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.

11 Cycle 174 : comparison to the nearest Argo (OW) profiles.

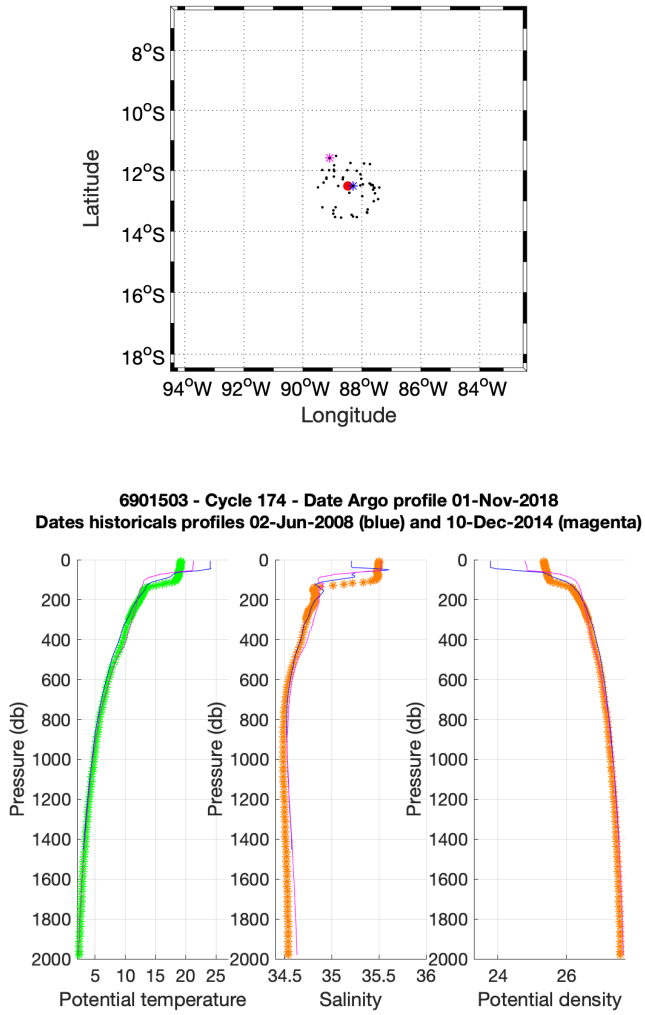


Figure 18: Float 6901503, cycle 174 - **(Upper panel)** Position of the Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest Argo profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

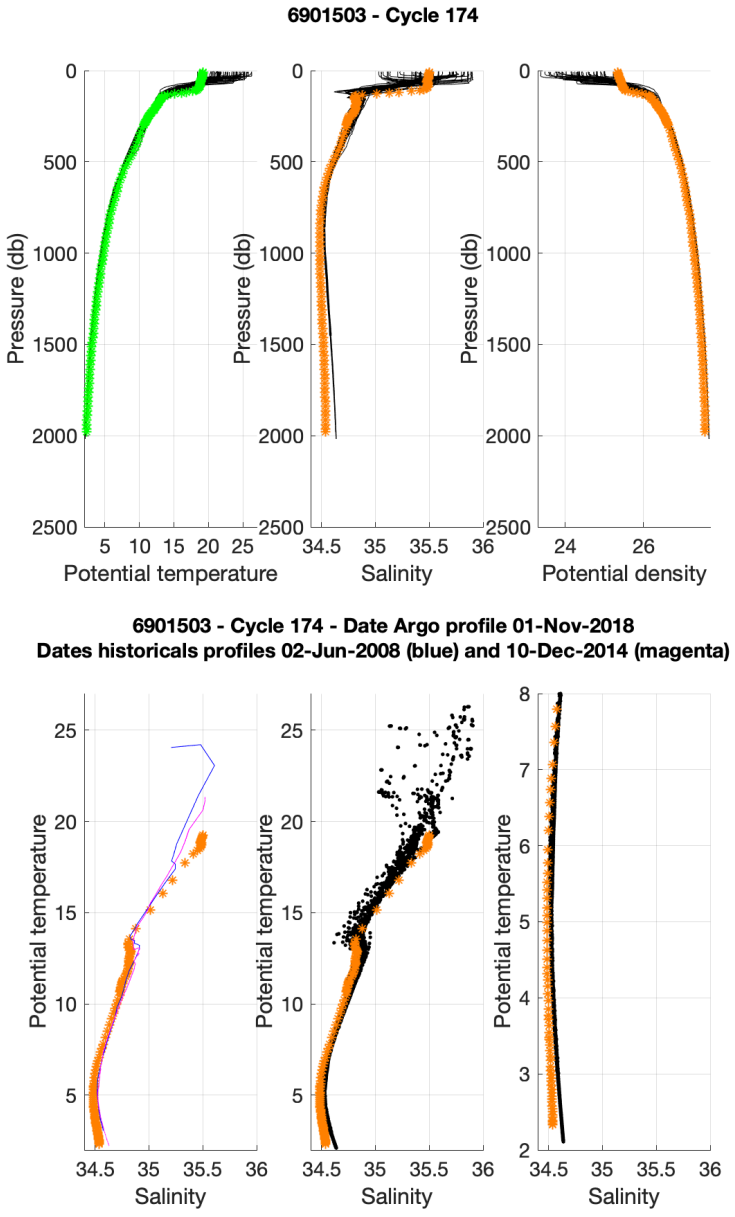


Figure 19: Float 6901503, cycle 174 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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.

12 Cycle 181 : comparison to the nearest Argo (OW) profiles.

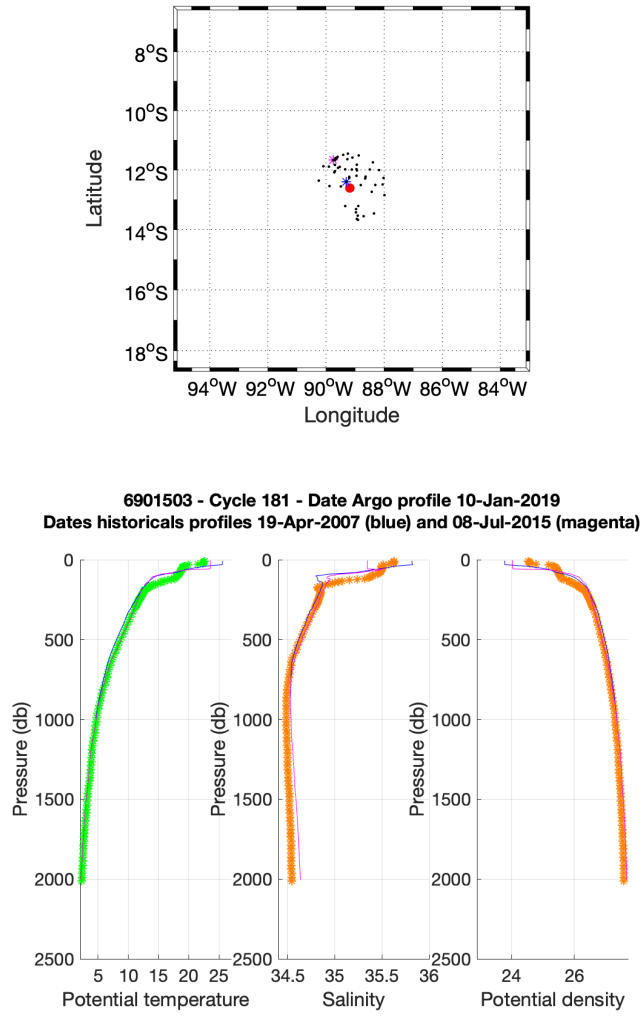


Figure 20: Float 6901503, cycle 181 - **(Upper panel)** Position of the Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest Argo profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

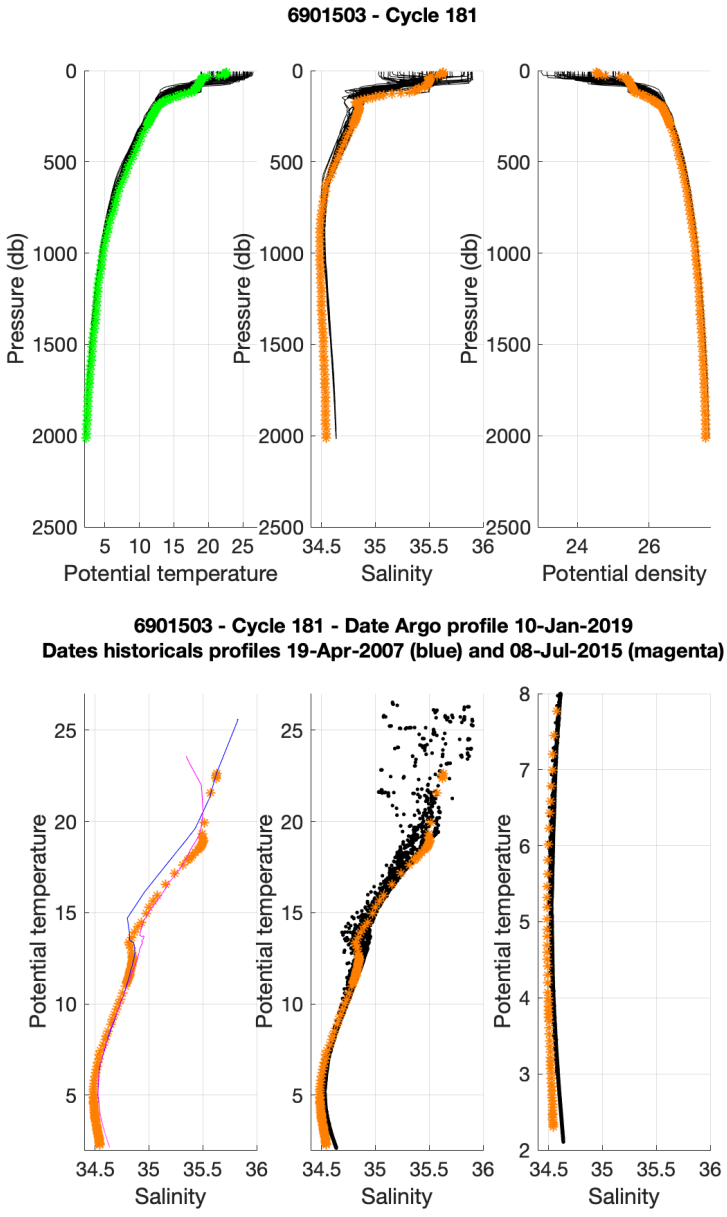


Figure 21: Float 6901503, cycle 181 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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.

13 Pressure Calibration

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

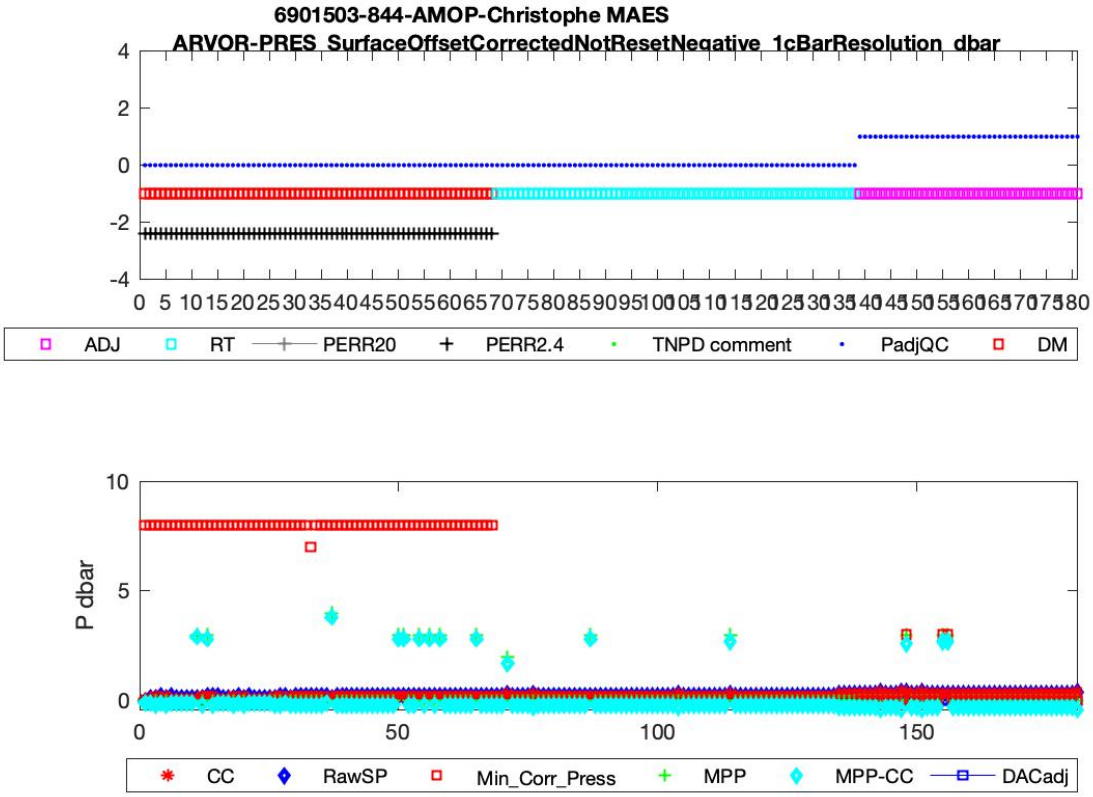


Figure 22: Surface pressure time serie for float 6901503. Legend : blue diamonds : Raw Surface Pressure ; blue squares : DAC adjustment (if DM exist) ; red points : calculated correction CC ; green diamonds with the minimal profile pressure value (MPP) ; pink squares : corrected minimal surface pressure ; cyan diamonds : $MPP - CC$

14 OW method, configuration _ctdandargo

We confirm a bias in the salinity measurement (mentioned by altimetry quality controls). This bias is negative, of about -0.03 psu from cycle OA to cycle 133. It increased to -0.065 psu at cycle 134, reducing progressively to -0.05 psu at its end of life. This float needs OW's correction for its salinity data.

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
MAP_P_EXCLUDE	1000
MAP_P_DELTA	250

Table 5: Mapping parameters.

breaks	none
max_breaks	4
use_percent_gt	0.5

Table 6: Calibration parameters.

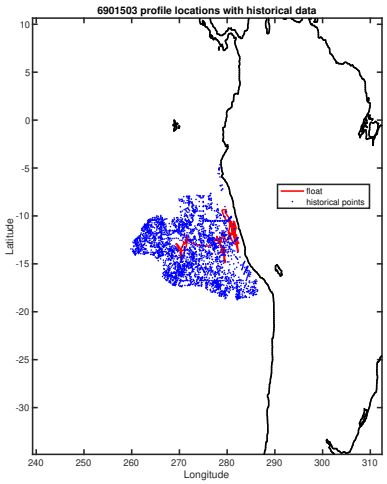


Figure 23: Position of the historical and float data.

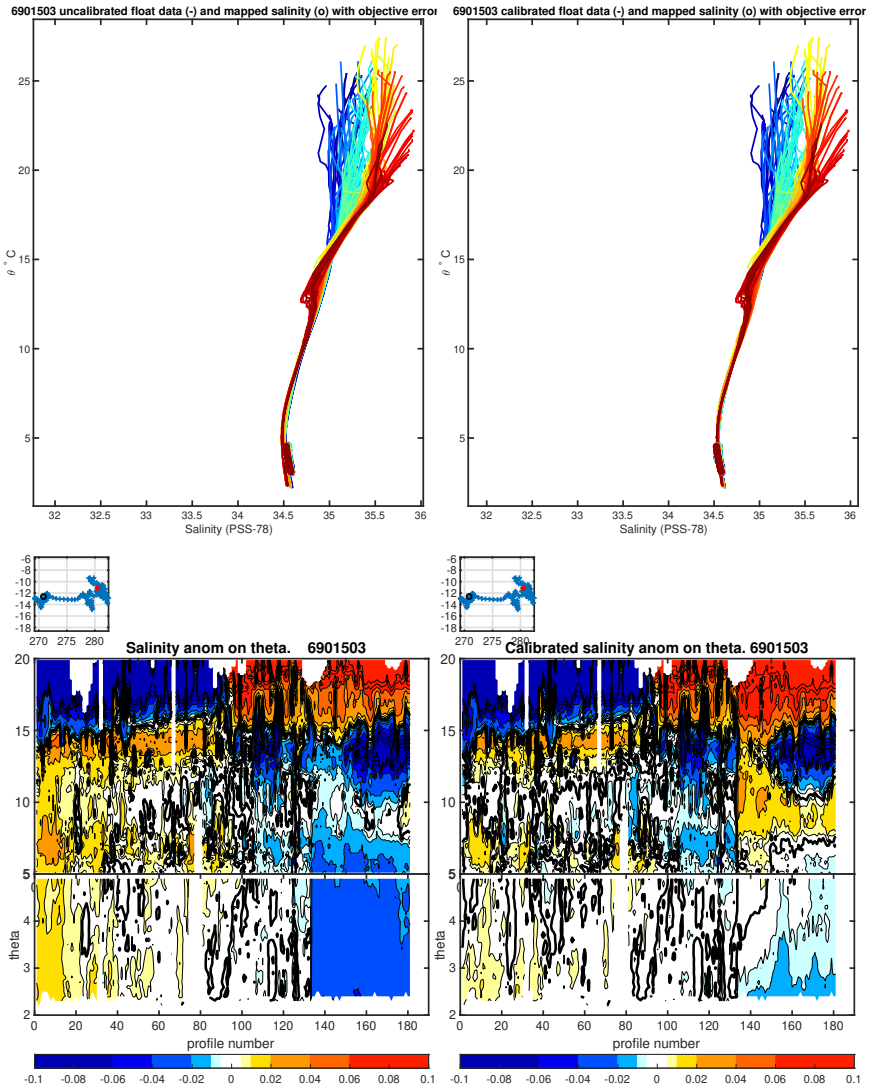


Figure 24: **(top panel)** : Comparison of the θ/S diagram of the float with the historial database. (left) raw data. (right) corrected data using the OW correction.
(bottom panel) : Salinity anomaly. (left) raw data. (right) corrected data using the OW correction.

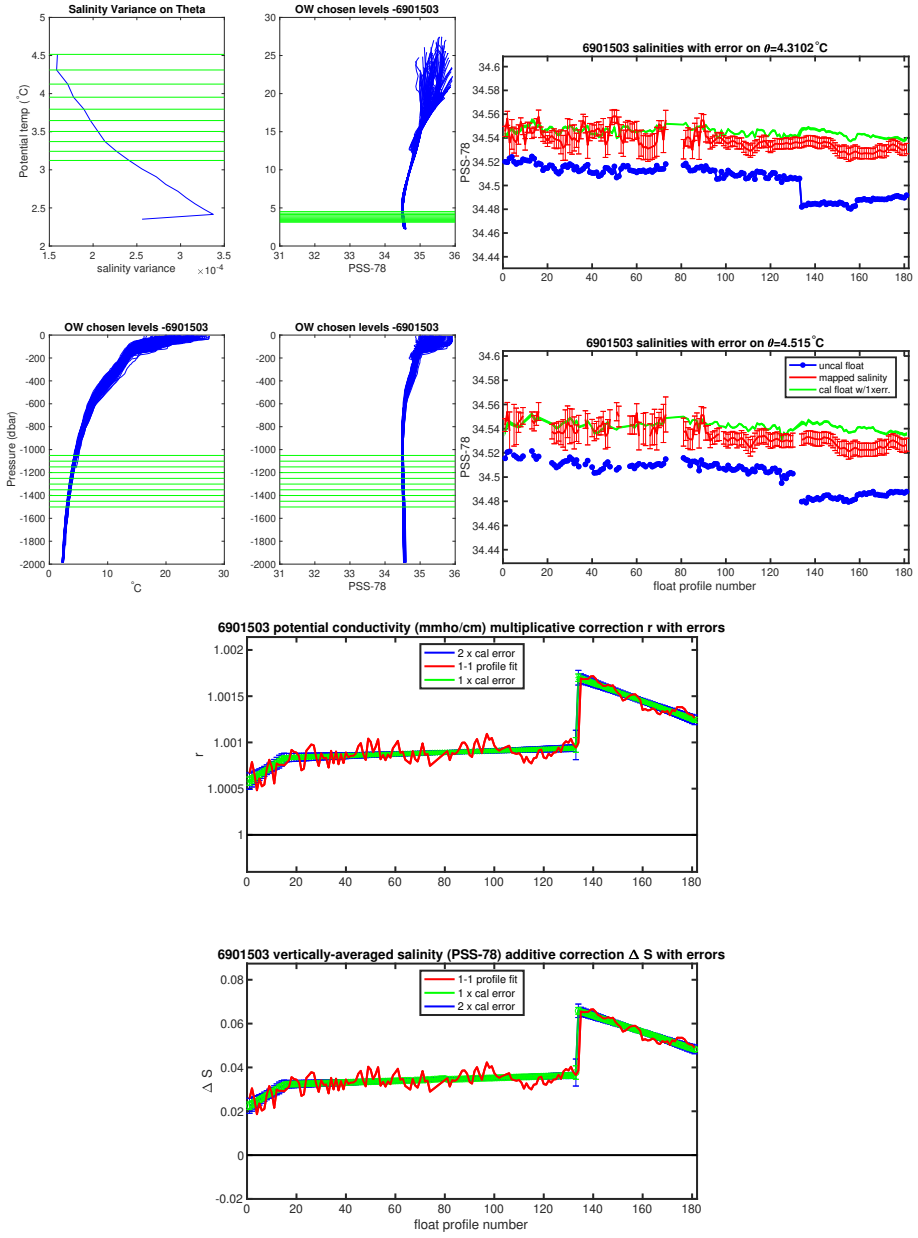


Figure 25: (top left) : θ- levels chosen for the calibration. (top right) : comparison, on various θ levels, between the float data and the historical data interpolated at the float position. (bottom): Correction proposed by the OW method.