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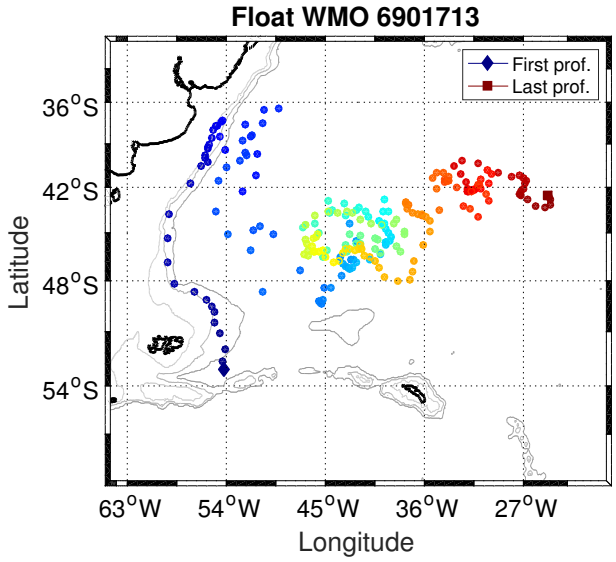
DELAYED MODE QUALITY CONTROL OF ARGO DATA FROM DAC CORIOLIS

FLOAT WMO 6901713

Auteur : Carole Saout
December 5, 2018



1 General Presentation

Platform Number	6901713
DAC	IF-CORIOLIS
Float Status	DEAD
Project	Coriolis Euro-Argo
Deployment Platform	RRS James Clark Ross
Institution	IFREMER, France
Name of the PI	Jean-Baptiste SALLEE
Platform Model	ARVOR (844)
Serial number	OIN-14-AR-052
Sensor type	SeaBird - SBE41-CP
Positionning System	ARGOS
Format Version	3.1

Table 1: Float characteristics.

Deepest pressure in ascending profile (m)	2000
Parking depth (m)	500
Cycle time (hours)	120
Deployment date	2015/05/02
Deployment position	long = -54.30 , lat = -53.07
Last studied cycle number	223
last studied cycle date	2018/05/17
last studied cycle position	long = -24.79 , lat = -43

Table 2: Programmation and evolution.

2 Trajectory, positions and dates

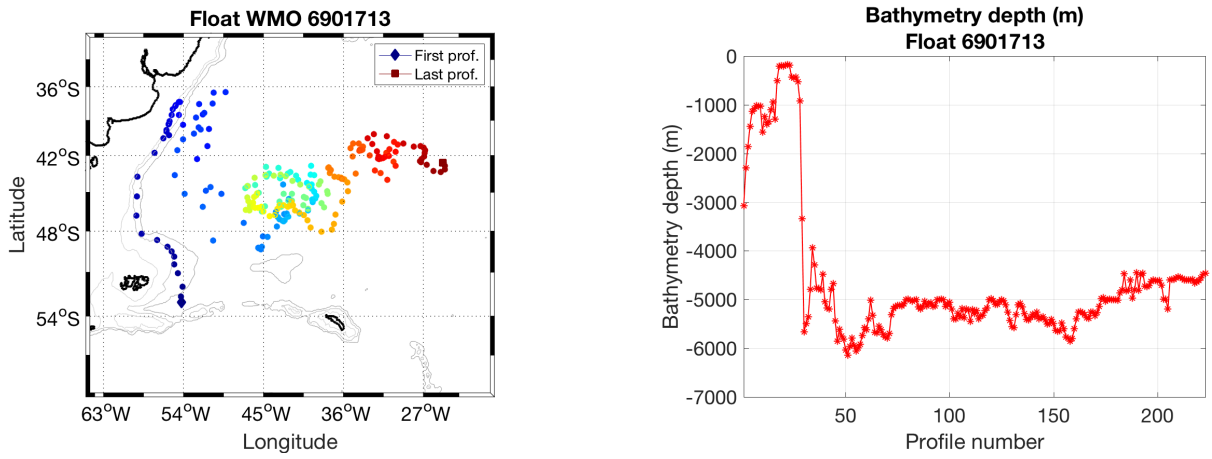


Figure 1: (left) : Profiles position - (right) : bathymetry depth function of cycle number.

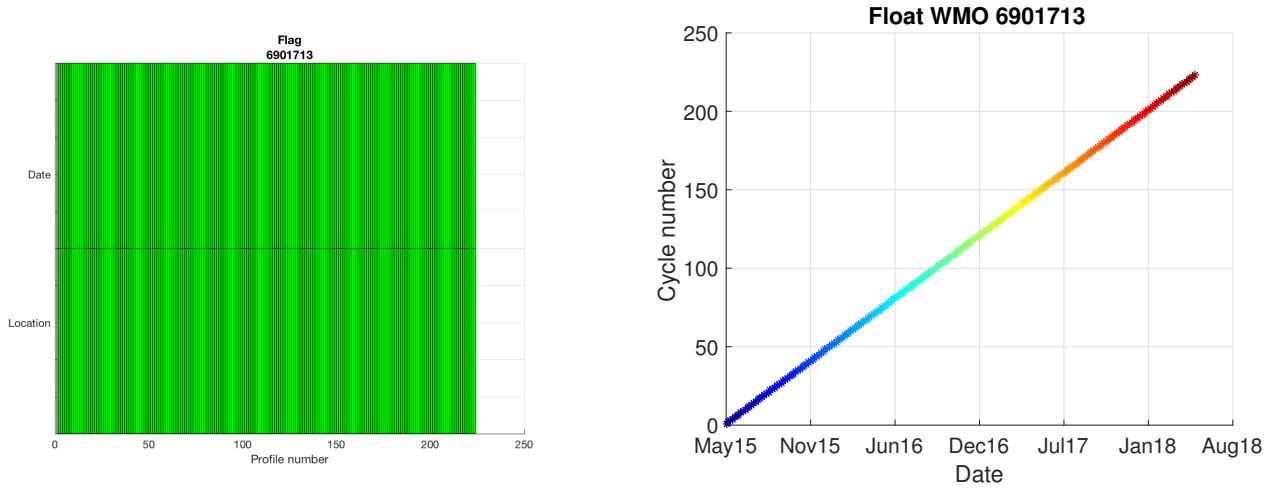


Figure 2: (left) : flags on profiles positions and dates - (right) : relationship between cycle number, date and color.

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

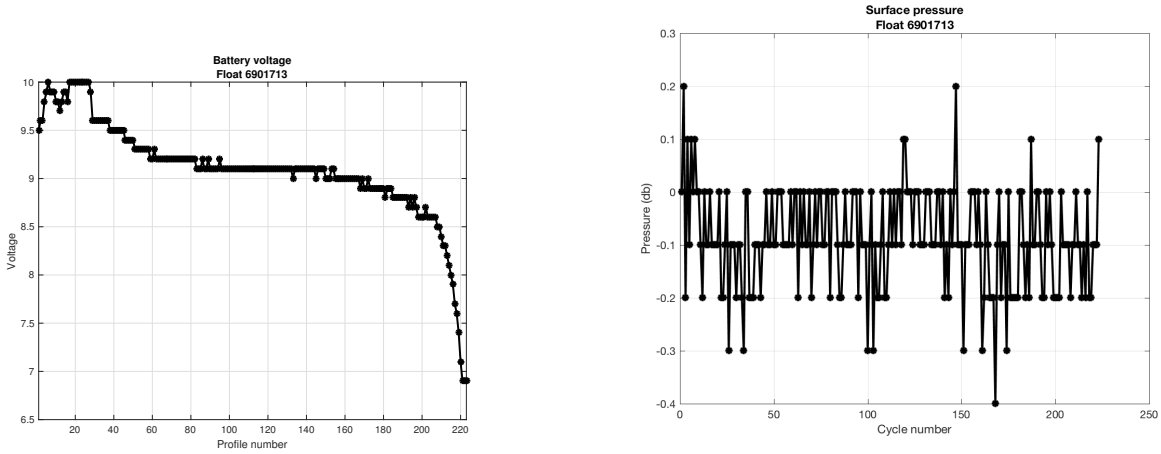


Figure 3: (left) : battery voltage - (right) : surface pressure from technical files.

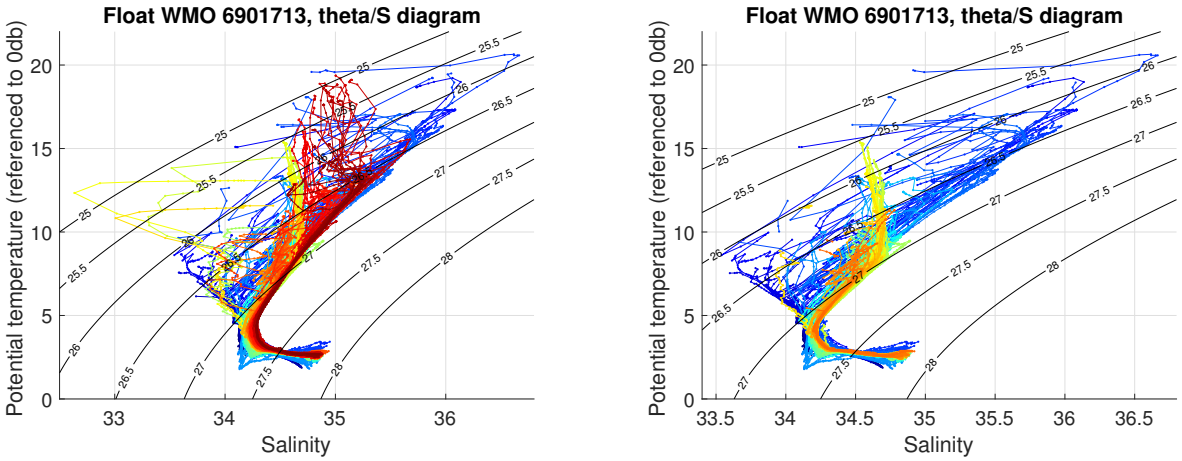


Figure 4: θ/S diagrams.(left panel) Flags are not taken into account - (right panel) Quality flags are taken into account.

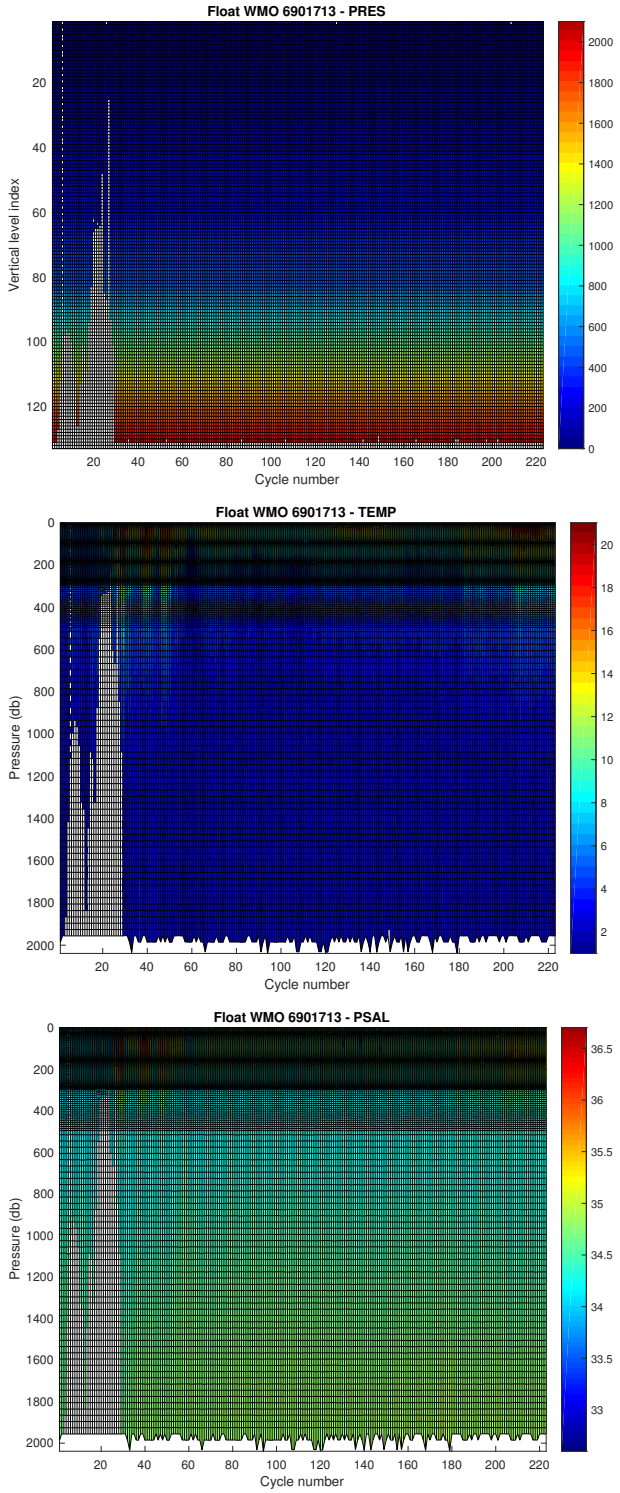


Figure 5: Sections of pressure (top), temperature (middle) and salinity (bottom) section along the float trajectory. Quality flags are not taken into account.

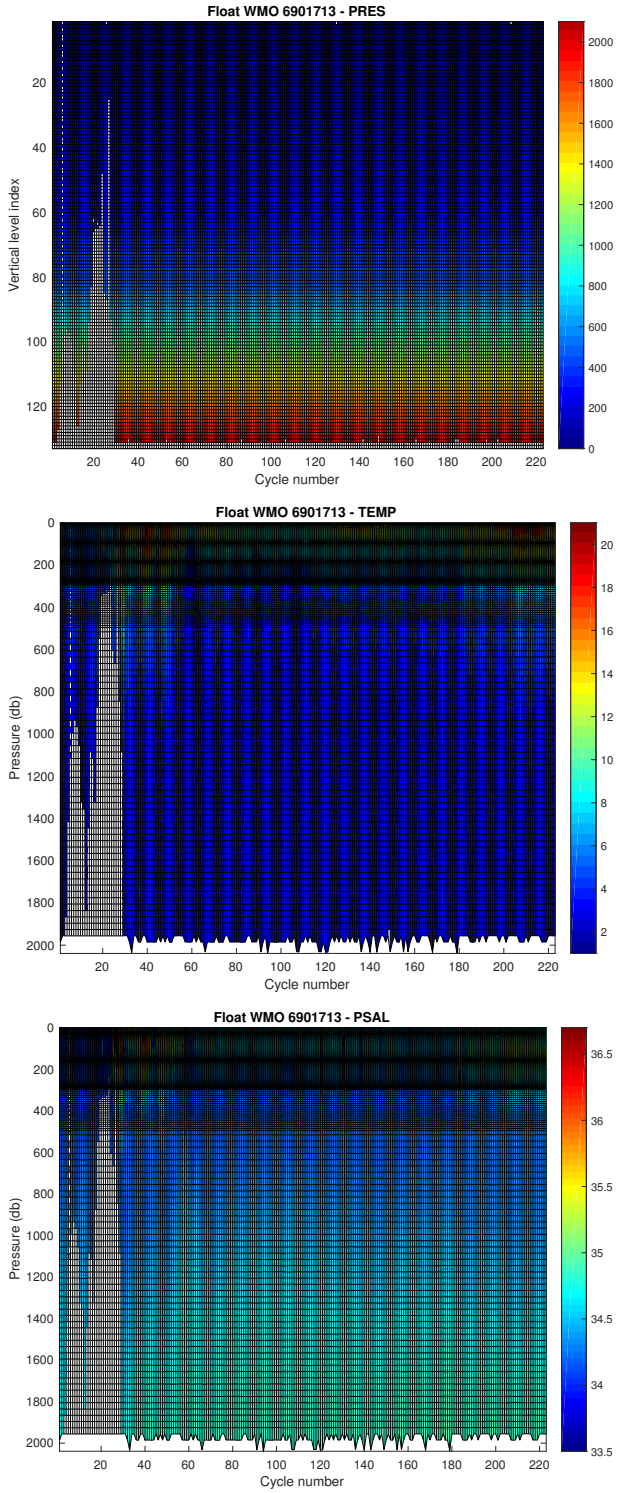


Figure 6: Sections of pressure (top), temperature (middle) and salinity (bottom) section along the float trajectory. Quality flags are taken into account.

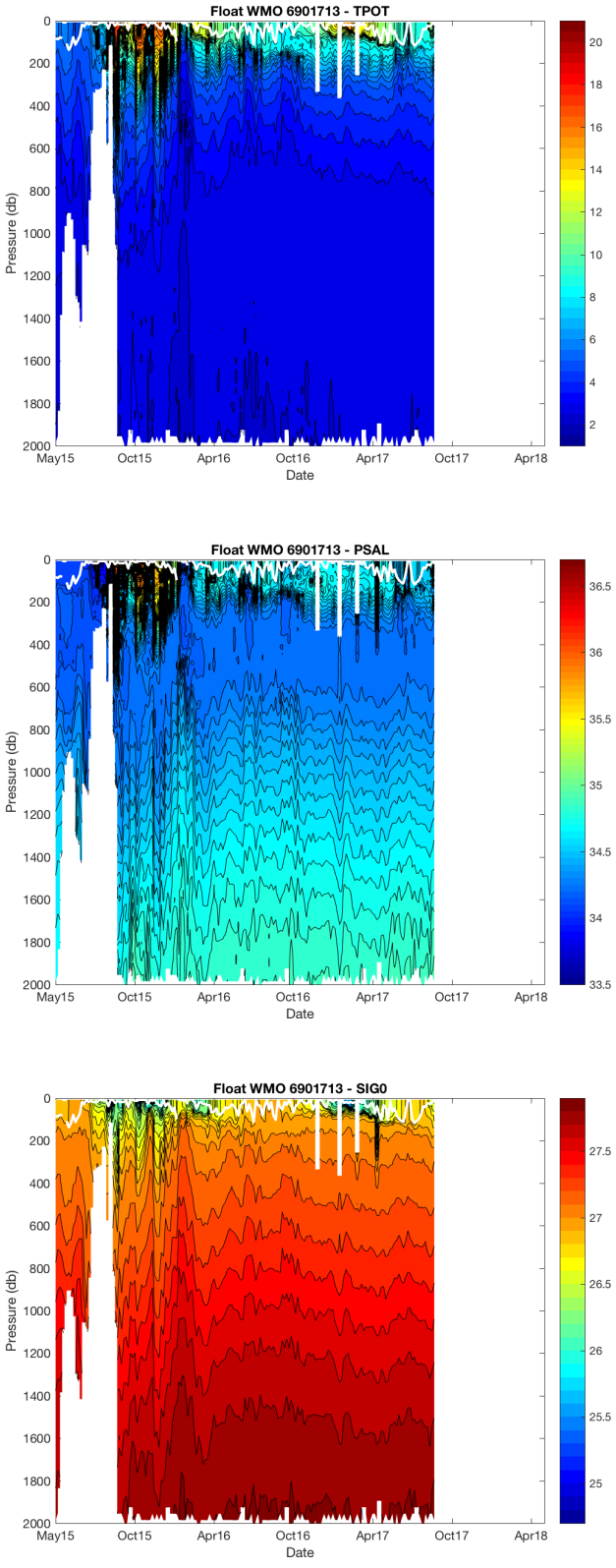


Figure 7: Sections of pressure (top), temperature (middle) and salinity (bottom) section along the float trajectory. Quality flags are taken into account.

5 QC flag checks and interesting profiles

Cycle	Parameter	Vertical level	Old flag	New flag	Comments
all cycles	PSAL	the first ones	4	4	suspicious data
all cycles	PSAL	all levels	1	2	potential PSAL drift with SBE CTD (s/n 7016)
44	TEMP/PSAL	28-38 dbar	4	put Qc 4 from 0 to 43 dbar	bad salinity
97	TEMP/PSAL	178-183 dbar	4	4	density inversions
103	TEMP/PSAL	148 dbar	1	4	one density inversion
112	TEMP/PSAL	168 dbar	3	add Qc 3 at 163 dbar	density inversions
120	TEMP and/or PSAL	0-325 dbar	4	4	bad salinity
130	TEMP/PSAL	0-355 dbar	4	4	bad salinity
138	TEMP/PSAL	0-253 dbar	3 or 4	put all Qc 4 from 0 to 253 dbar	bad salinity
147	TEMP/PSAL	68-108 dbar	4	put all Qc 4 from 0 to 108 dbar	bad salinity
173	TEMP/PSAL	0-223 dbar (by sections)	4	put all Qc 4 from 0 to 238 dbar	bad salinity
174-223	PSAL	all levels	3	2	suspicious salinities

Table 4: Float #WMO 6901713. Cycles [0A-223A] : summary of the modifications of the real-time Qc flags and of the interesting or suspicious data

Comments :

The resolution is equal to 10 dbar from the surface to 500 dbar, then 25 dbar from 500 to 2000 dbar. Salinity data between 0 and 10 dbar are acquired when the pump of the CTD is turned off, and may be thus suspicious.

This float is potentially affected by problems in salinity detected for SBE CTDs (s/n 6000-7000) so that we flag PSAL at 2, following ADMT recommendations.

6 Cycle 44 : comparison to the nearest Argo (OW) profiles.

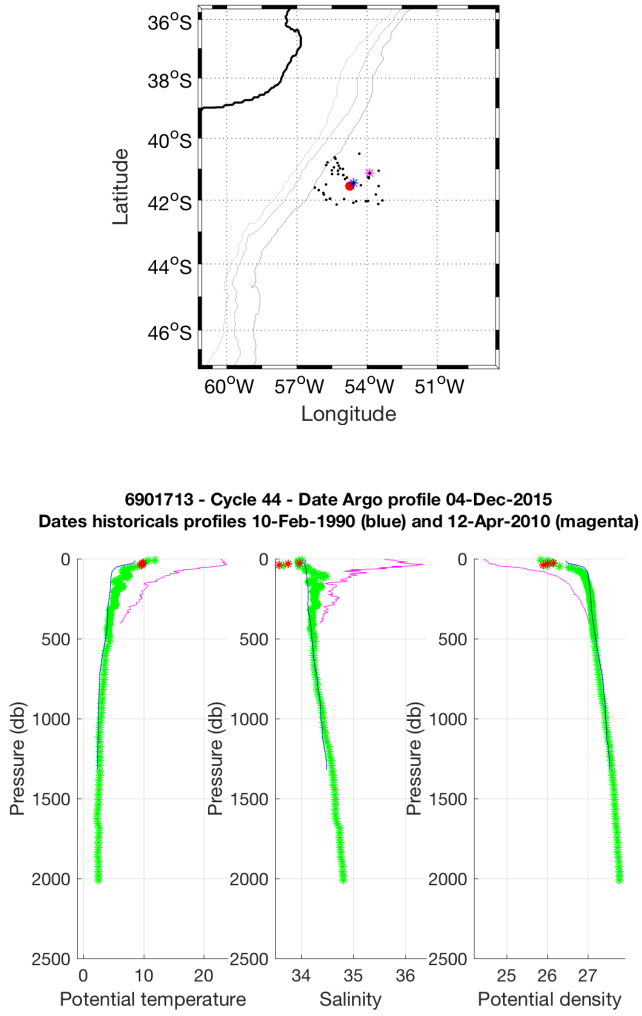


Figure 8: Float 6901713, cycle 44 - **(Upper panel)** Position of the Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest Argo profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

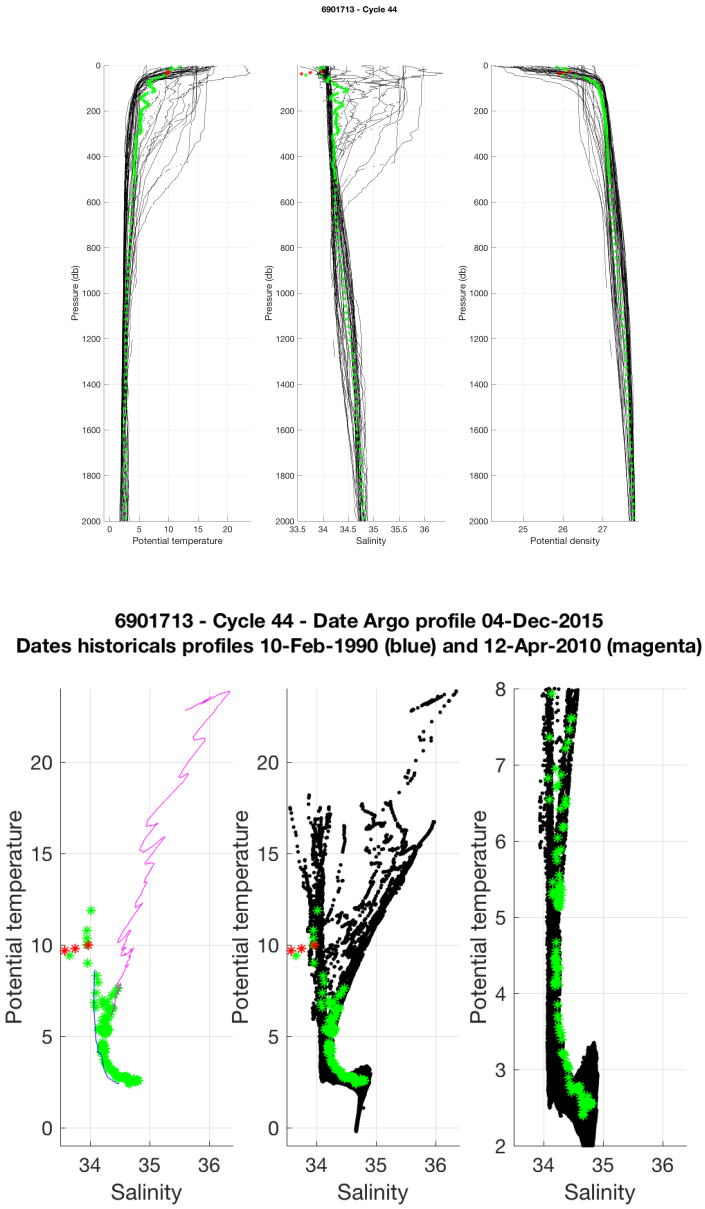


Figure 9: Float 6901713, cycle 44 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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 97 : comparison to the nearest Argo (OW) profiles.

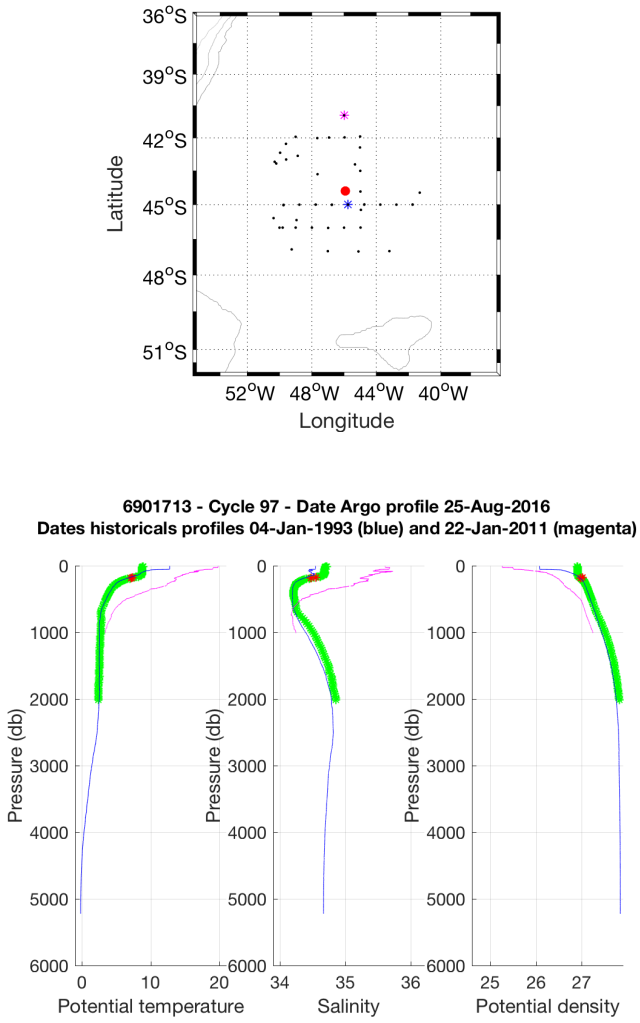


Figure 10: Float 6901713, cycle 97 - **(Upper panel)** Position of the Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest Argo profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

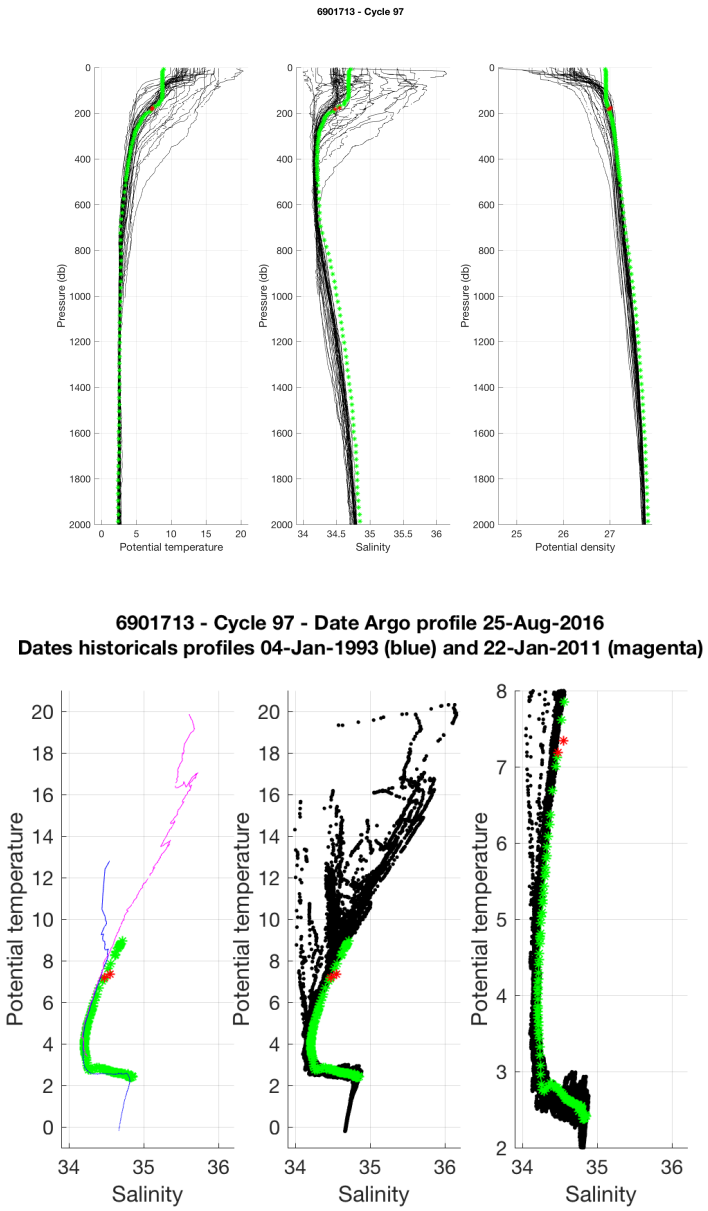


Figure 11: Float 6901713, cycle 97 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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 103 : comparison to the nearest Argo (OW) profiles.

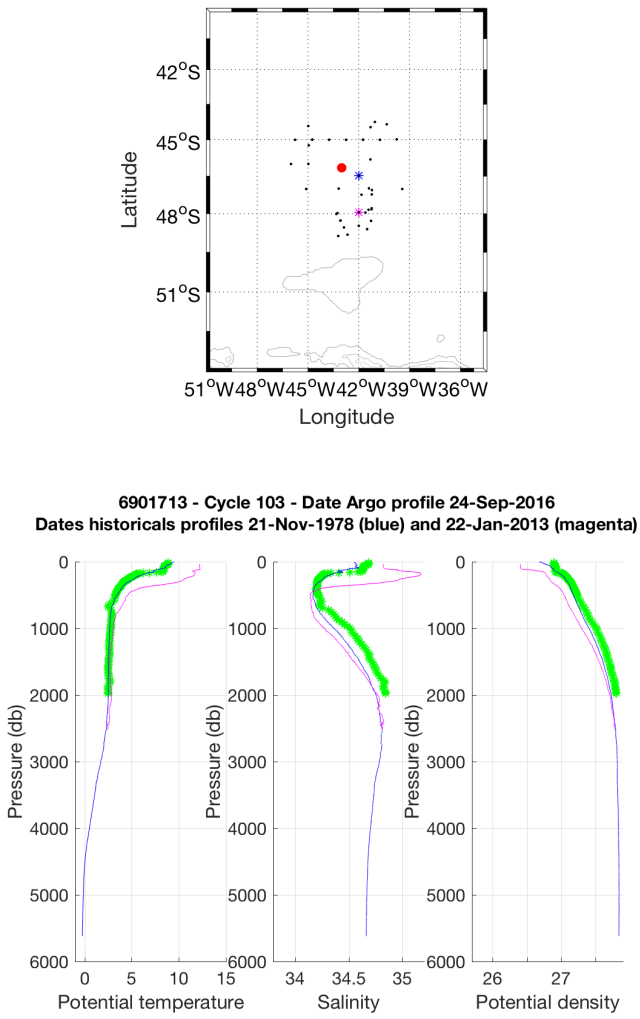


Figure 12: Float 6901713, cycle 103 - **(Upper panel)** Position of the Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest Argo profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

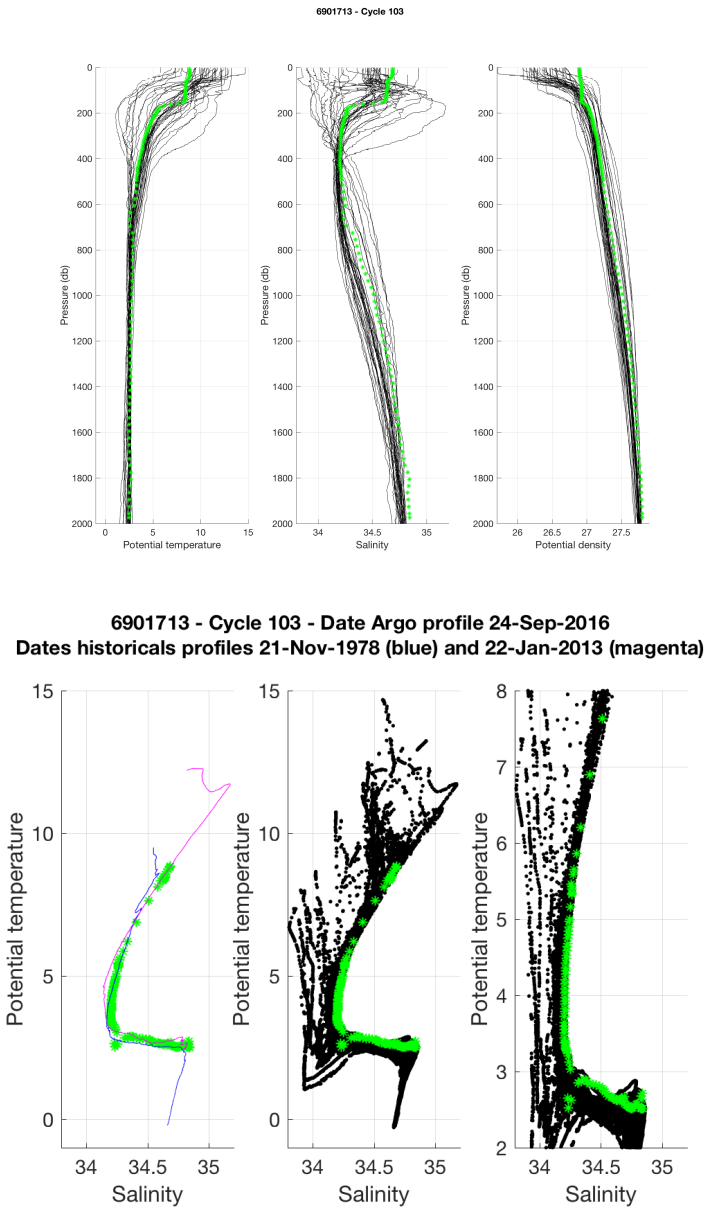


Figure 13: Float 6901713, cycle 103 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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 112 : comparison to the nearest Argo (OW) profiles.

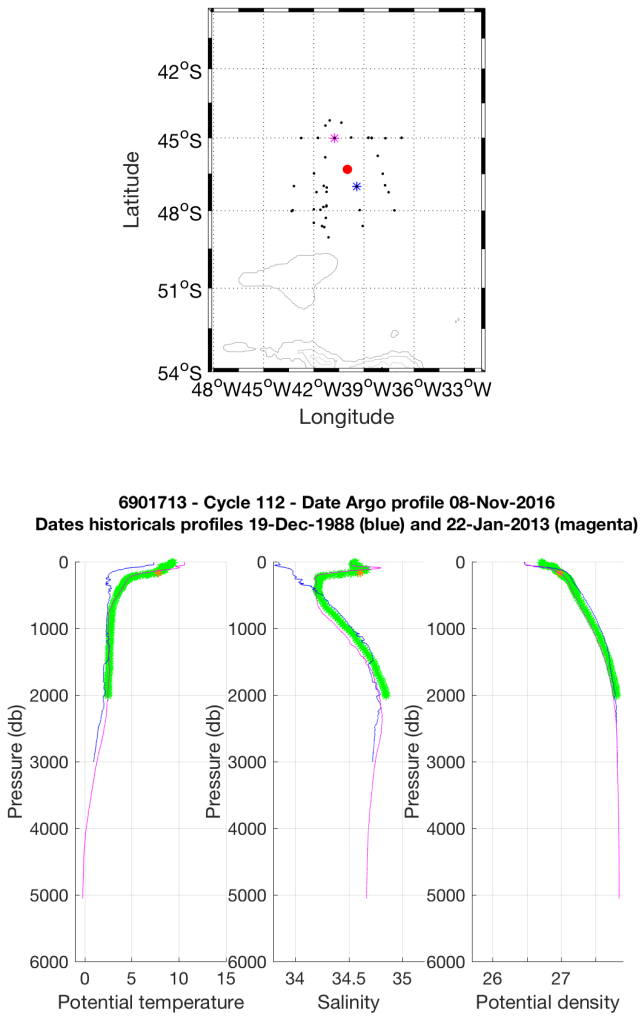


Figure 14: Float 6901713, cycle 112 - **(Upper panel)** Position of the Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest Argo profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

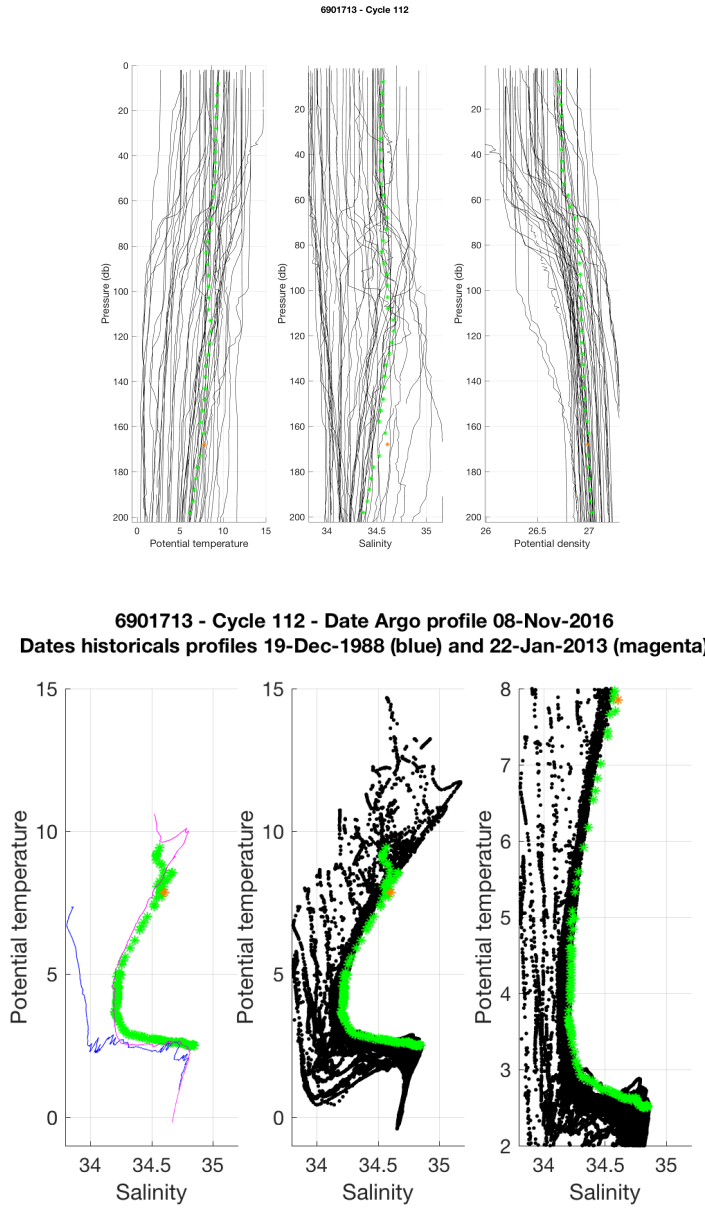


Figure 15: Float 6901713, cycle 112 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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 120 : comparison to the nearest Argo (OW) profiles.

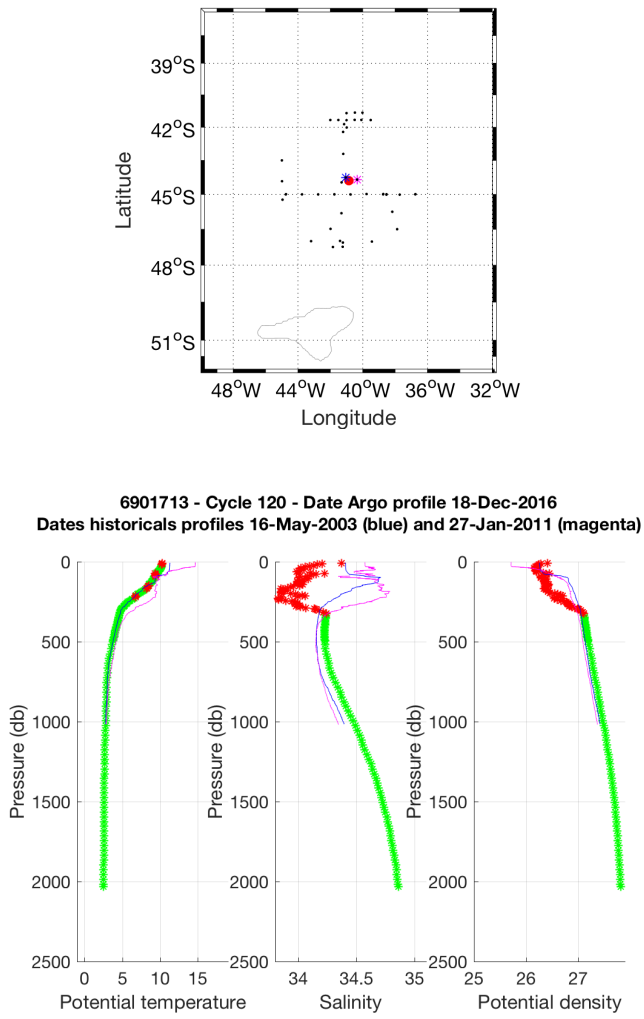


Figure 16: Float 6901713, cycle 120 - **(Upper panel)** Position of the Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest Argo profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

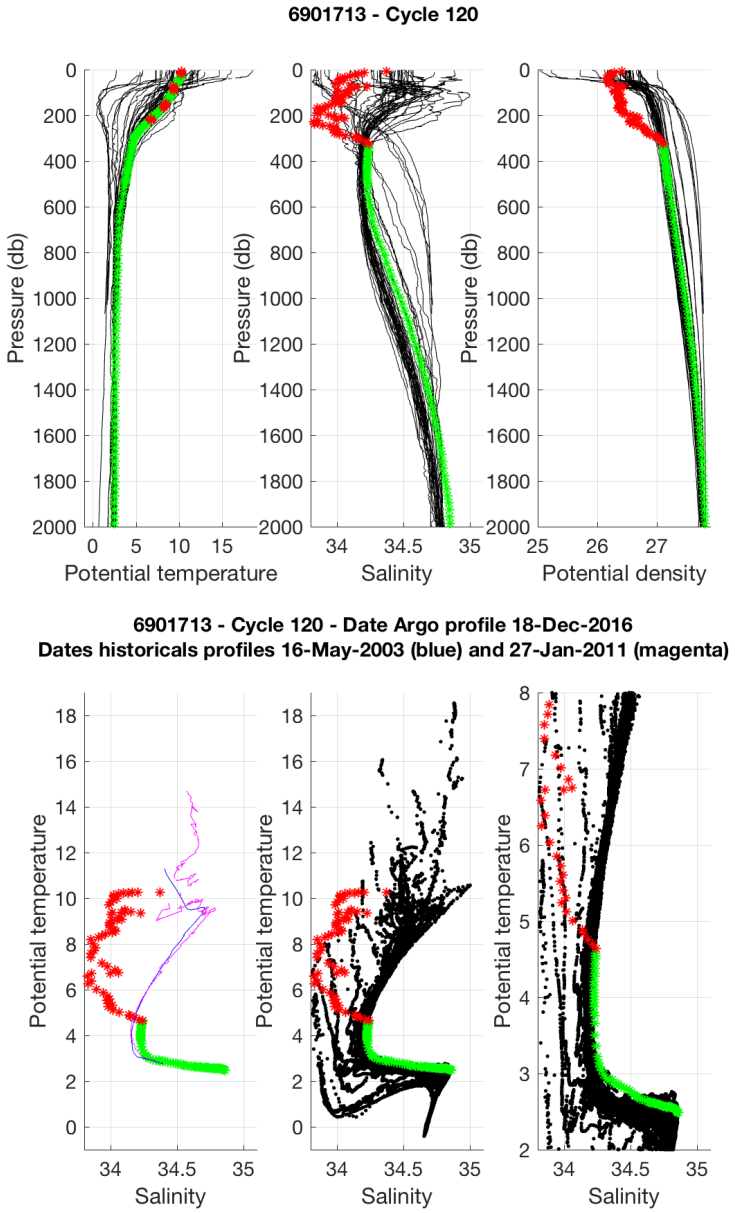


Figure 17: Float 6901713, cycle 120 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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.

11 Cycle 130 : comparison to the nearest Argo (OW) profiles.

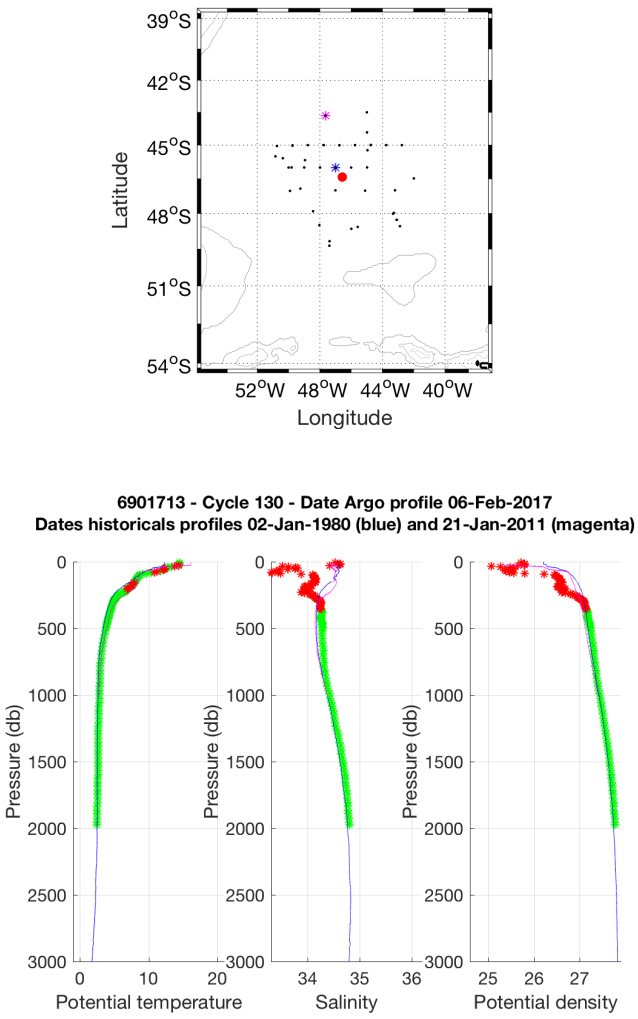


Figure 18: Float 6901713, cycle 130 - **(Upper panel)** Position of the Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest Argo profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

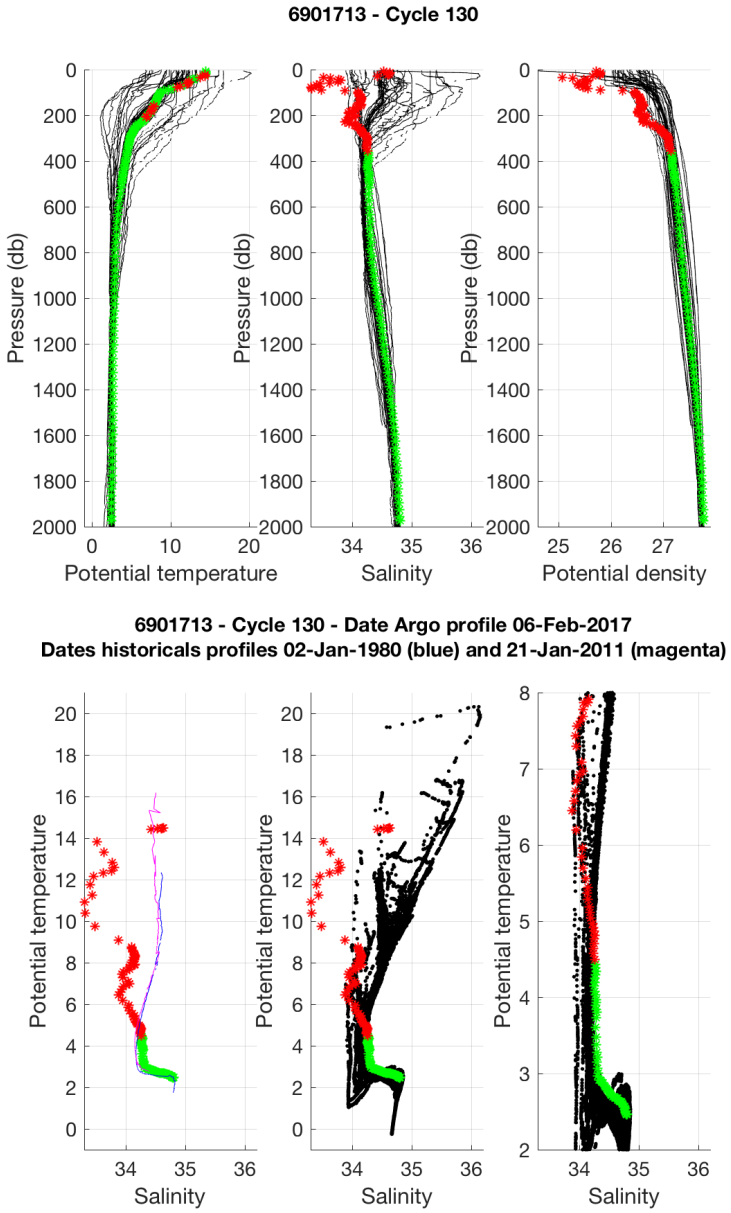


Figure 19: Float 6901713, cycle 130 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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 138 : comparison to the nearest Argo (OW) profiles.

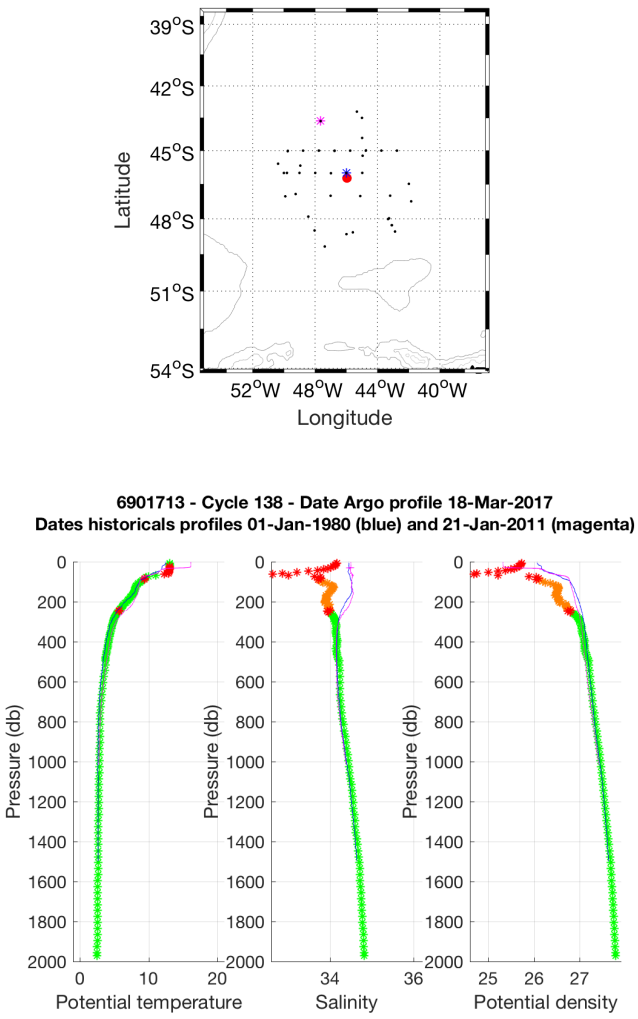


Figure 20: Float 6901713, cycle 138 - **(Upper panel)** Position of the Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest Argo profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

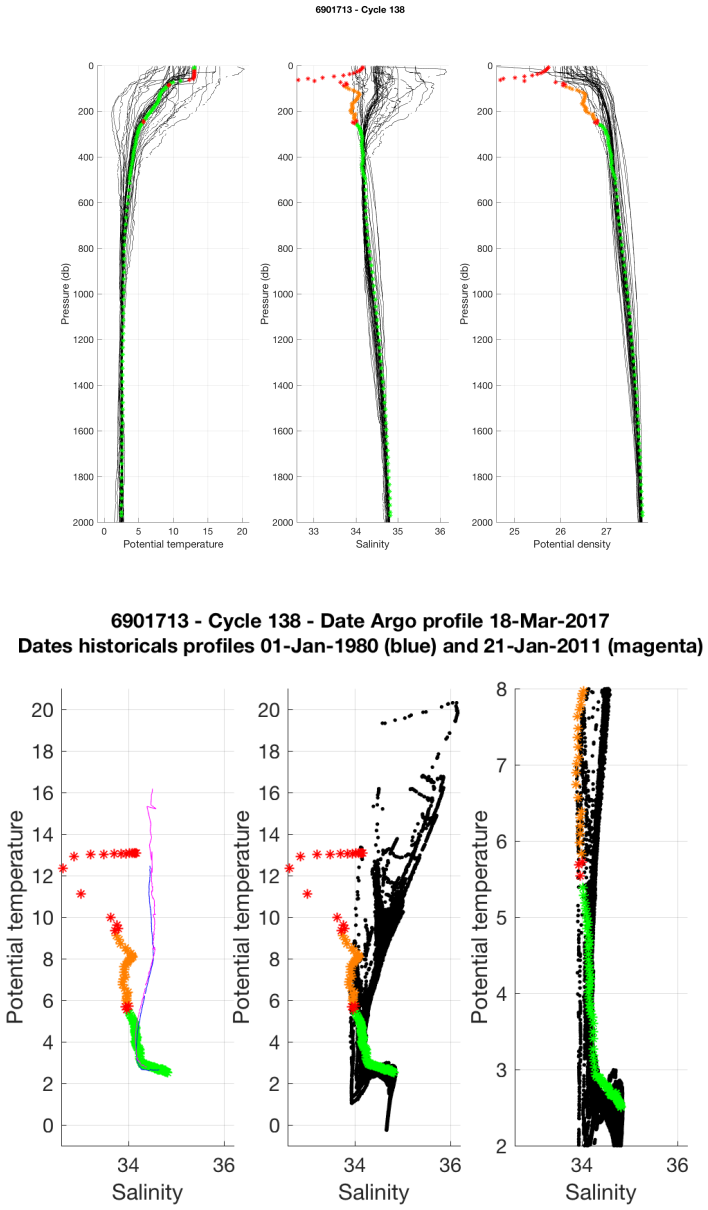


Figure 21: Float 6901713, cycle 138 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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 Cycle 147 : comparison to the nearest Argo (OW) profiles.

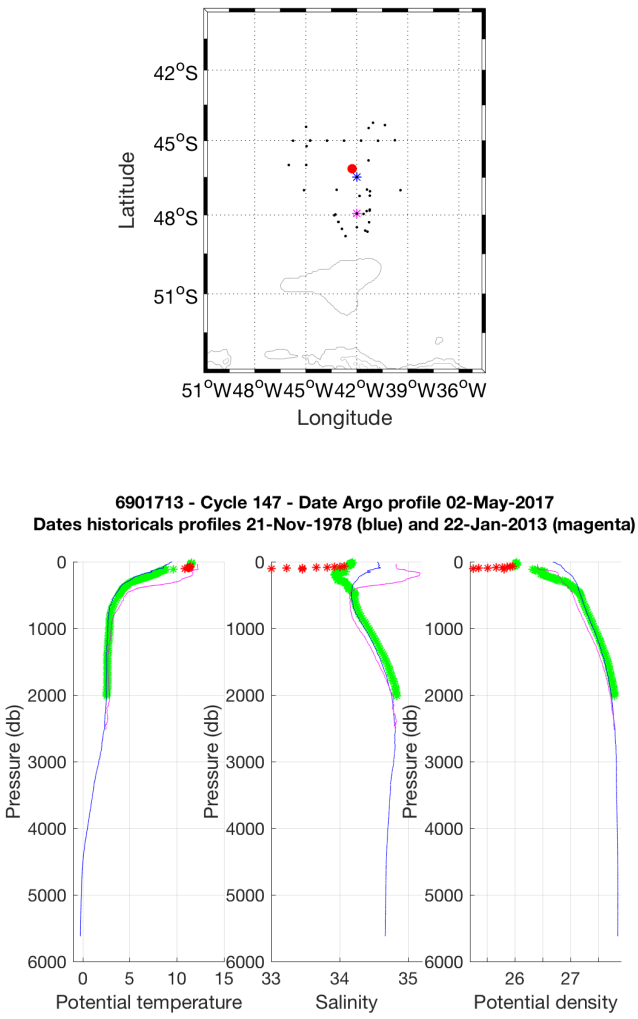


Figure 22: Float 6901713, cycle 147 - **(Upper panel)** Position of the Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest Argo profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

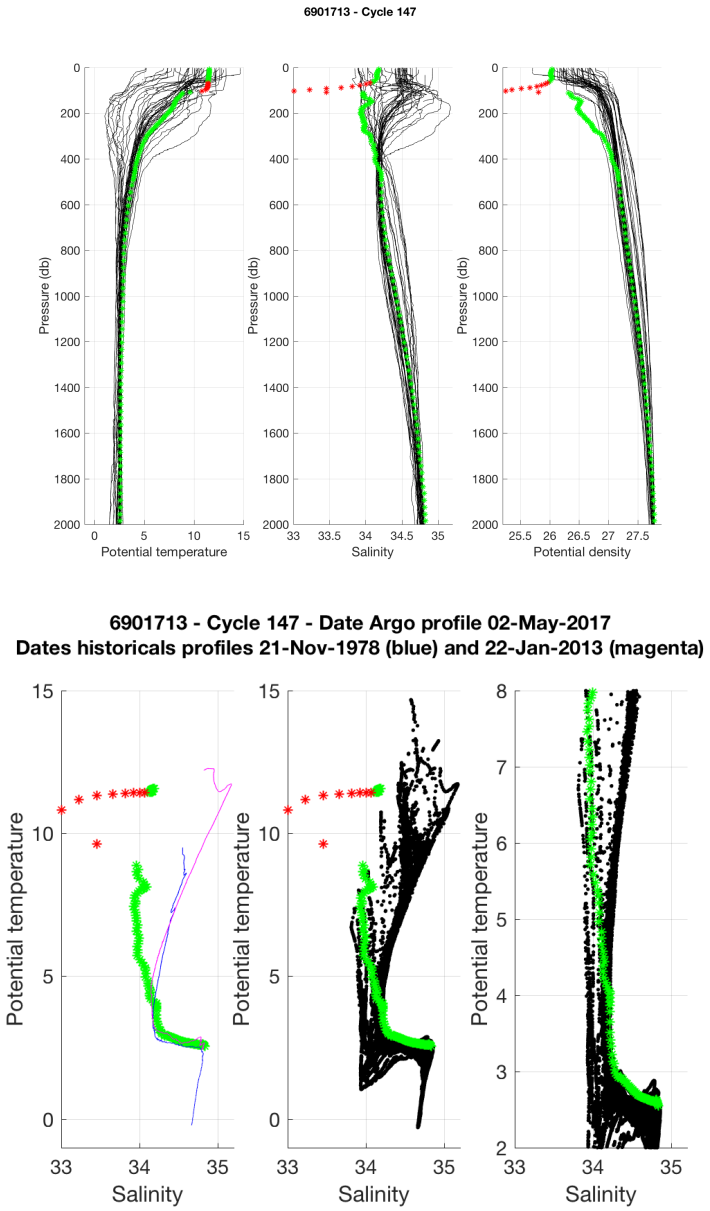


Figure 23: Float 6901713, cycle 147 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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.

14 Cycle 173 : comparison to the nearest Argo (OW) profiles.

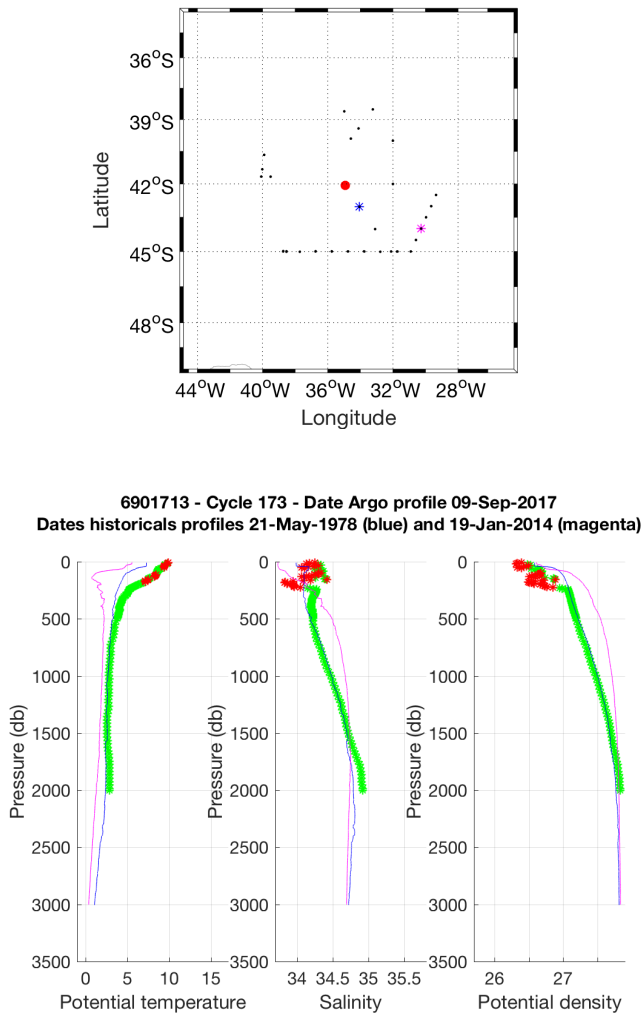


Figure 24: Float 6901713, cycle 173 - **(Upper panel)** Position of the Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest Argo profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

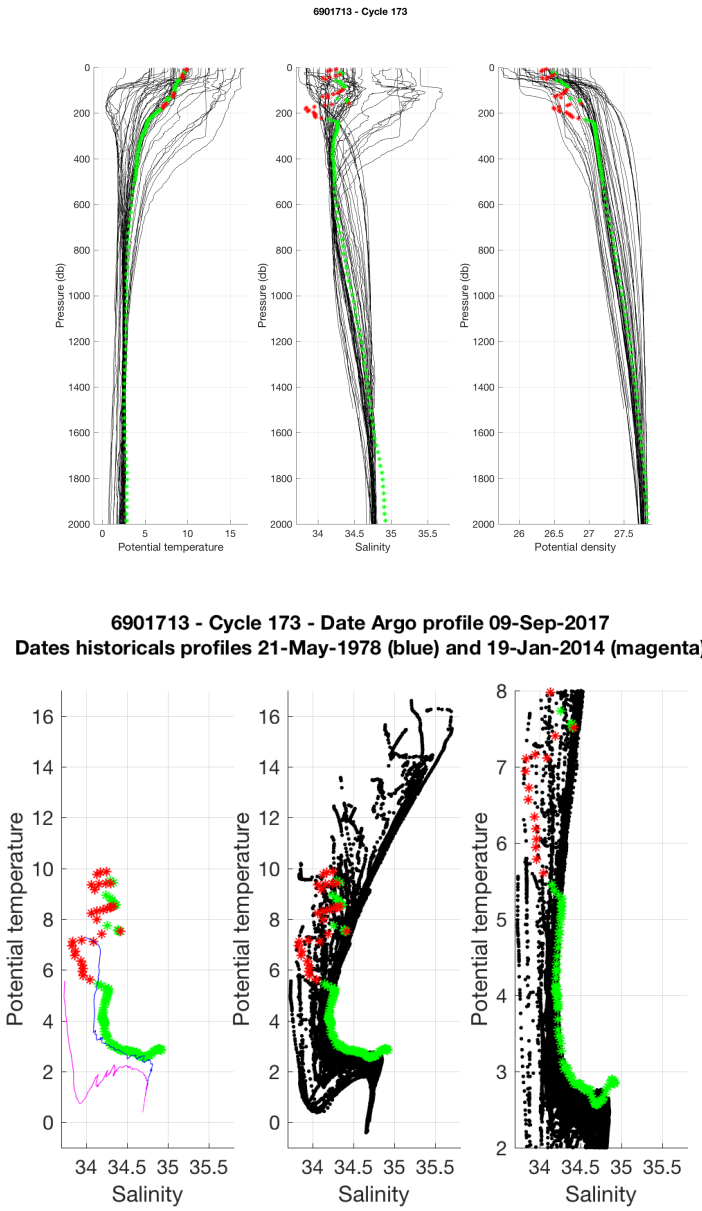


Figure 25: Float 6901713, cycle 173 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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.

15 Pressure Calibration :

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

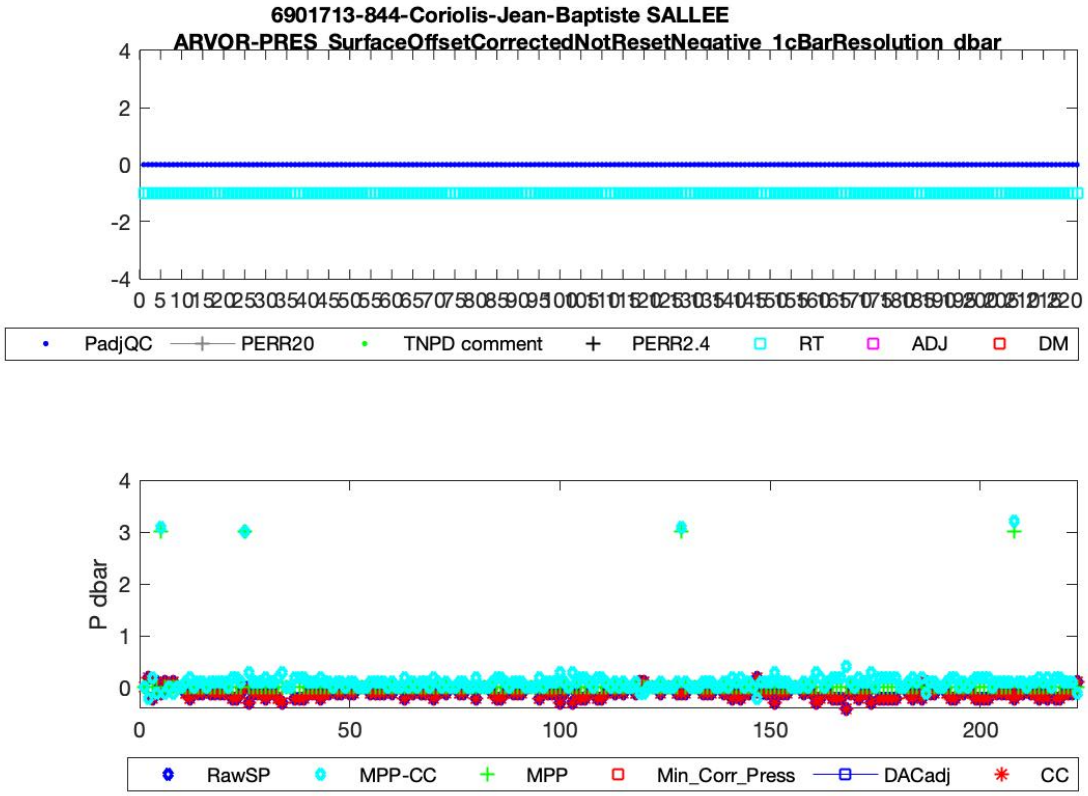


Figure 26: Surface pressure time serie for float 6901713. Legend : blue diamonds : Raw Surface Pressure ; blue squares : DAC adjustment (if DM exist) ; red points : calculated correction CC ; green diamonds with the minimal profile pressure value (MPP) ; pink squares : corrected minimal surface pressure ; cyan diamonds : $MPP - CC$

16 OW method, CONFIGURATION #ctdandargo

We observe a linear drift in the salinity measurement. For DMQC, we propose to apply this OW correction in the salinity data.

CONFIG_MAX_CASTS	300
MAP_USE_PV	1
MAP_USE_SAF	1
MAPSCALE_LONGITUDE_LARGE	8
MAPSCALE_LONGITUDE_SMALL	4
MAPSCALE_LATITUDE_LARGE	4
MAPSCALE_LATITUDE_SMALL	2
MAPSCALE_PHI_LARGE	0.5
MAPSCALE_PHI_SMALL	0.1
MAPSCALE_AGE	10
MAP_P_EXCLUDE	500
MAP_P_DELTA	250

Table 5: Mapping parameters.

breaks	none
max_breaks	4
use_theta_gt	3.5
use_theta_lt	4.5
use_percent_gt	0.5

Table 6: Calibration parameters.

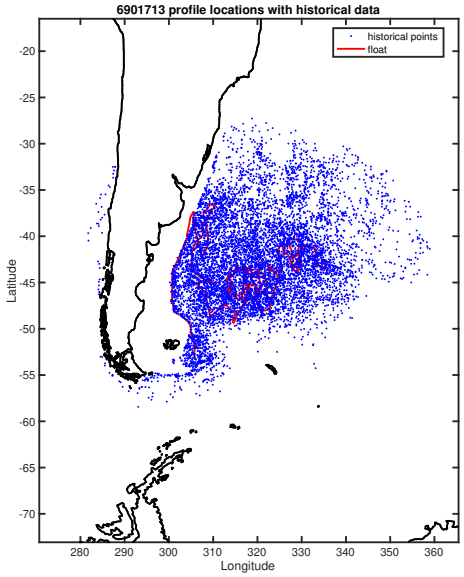


Figure 27: Position of the historical and float data.

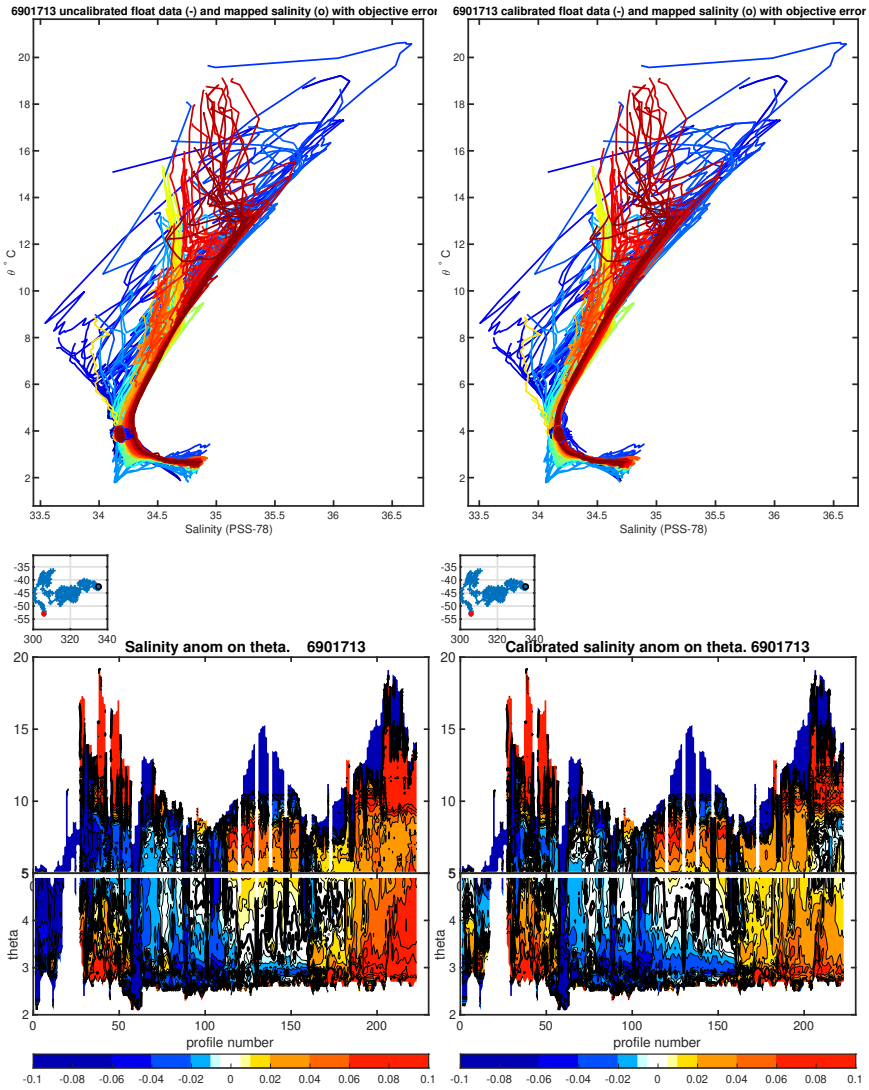


Figure 28: **(top panel)** : Comparison of the θ/S diagram of the float with the historial database. (left) raw data. (right) corrected data using the OW correction.
(bottom panel) : Salinity anomaly. (left) raw data. (right) corrected data using the OW correction.

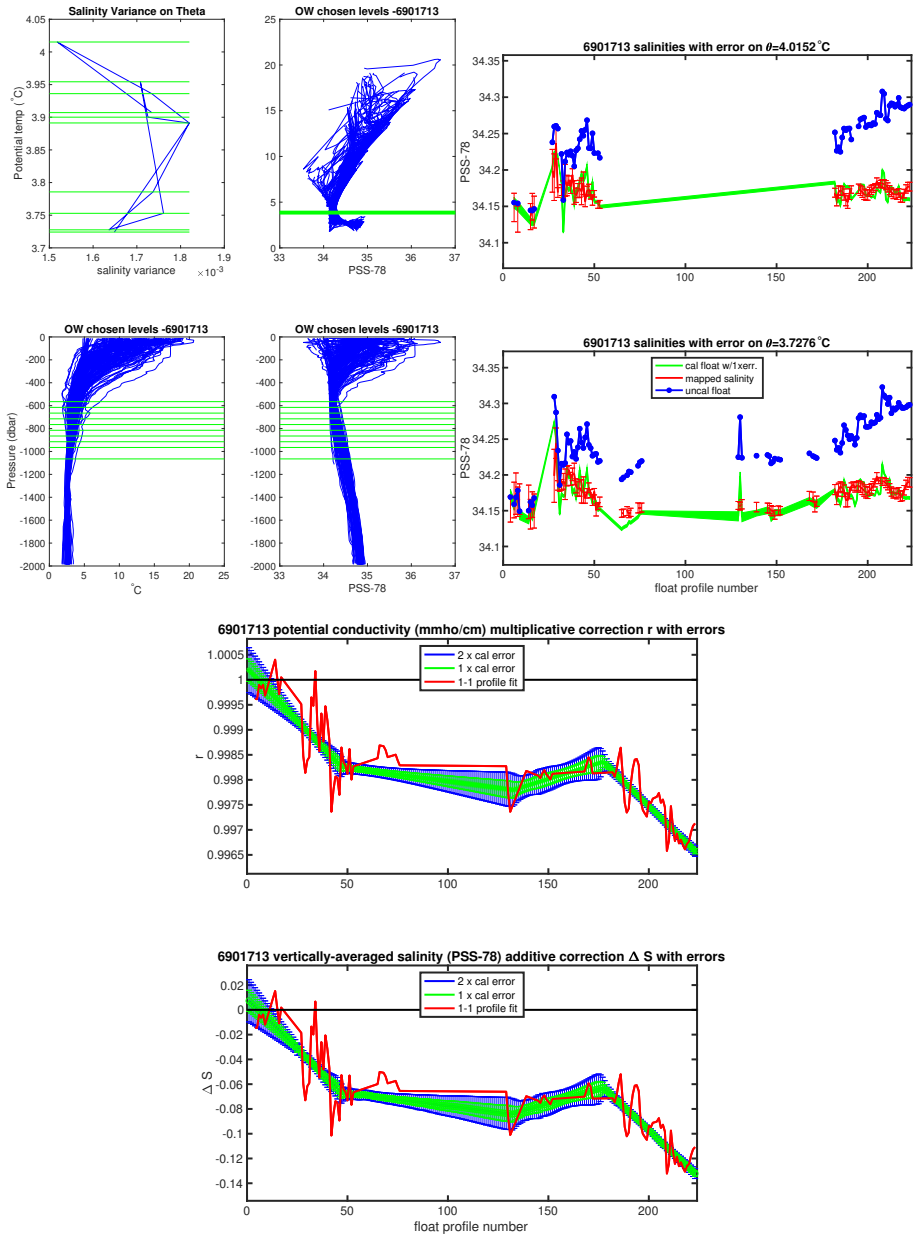


Figure 29: (top left) : θ- levels chosen for the calibration. (top right) : comparison, on various θ levels, between the float data and the historical data interpolated at the float position. (bottom): Correction proposed by the OW method.