



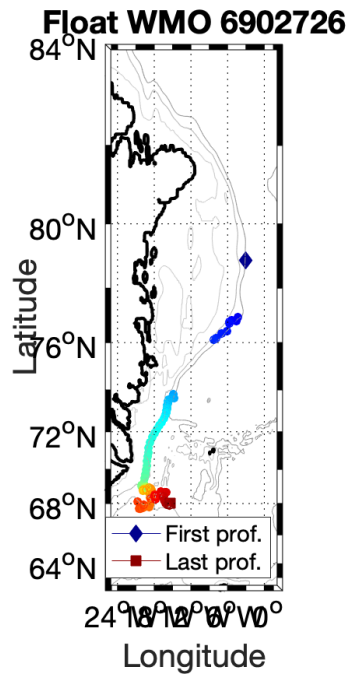
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DELAYED MODE QUALITY CONTROL OF ARGO DATA FROM DAC CORIOLIS

FLOAT WMO 6902726

Auteur : Carole Saout
March 25, 2020



1 General Presentation

Platform Number	6902726
DAC	IF-CORIOLIS
Float Status	Active
Project	NARVAL
Deployment Platform	POURQUOI PAS?
Institution	SHOM
Name of the PI	C.Daubord
Platform Model	ARVOR (844)
Serial Number	AI2600-16FR309
Sensor type	SBE41 CP
Positioning System	GPS-IRIDIUM
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	2017/09/19
Deployment position	long = -3.11, lat = 78.94
Last studied cycle number	141
last studied cycle date	2019/09/05
last studied cycle position	long = -15.35 , lat = 68

Table 2: Programmation and evolution.

2 Trajectory, positions and dates

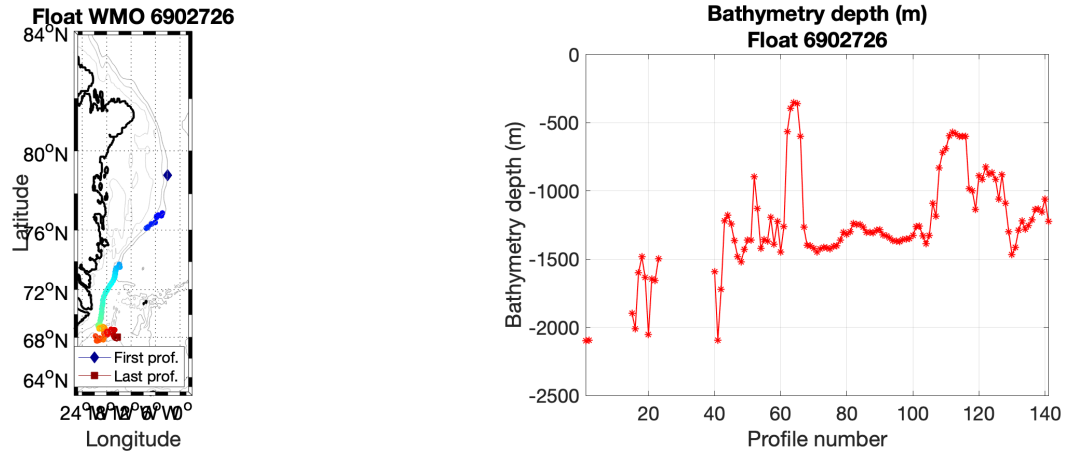


Figure 1: (left) : Profiles position, (right) : bathymetry depth function of cycle number.

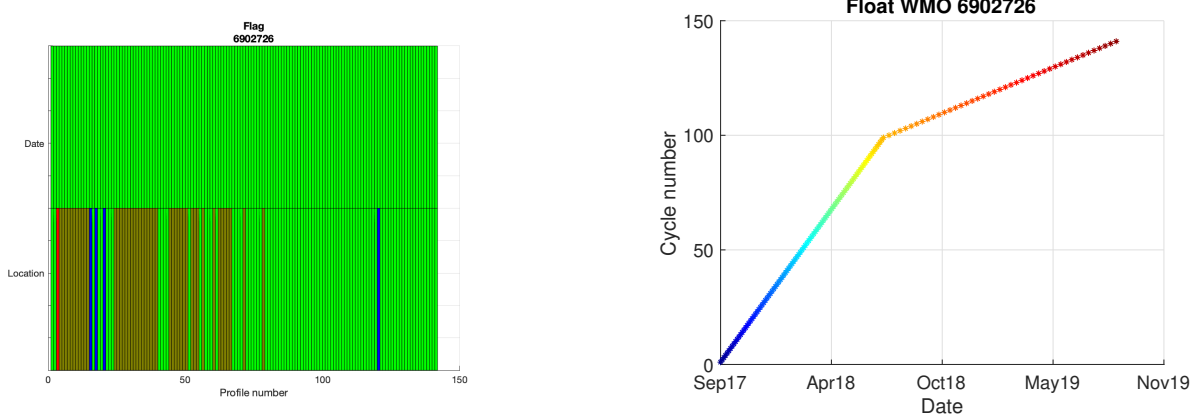


Figure 2: (left) : flags on profiles positions and dates.
(right) : relationship between cycle number, date and color.

3 Informations on Meta-Data

NAME
ANOMALY
CONTROLLER_BOARD_TYPE_SECONDARY
CONTROLLER_BOARD_SERIAL_NO_SECONDARY
SPECIAL_FEATURES
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

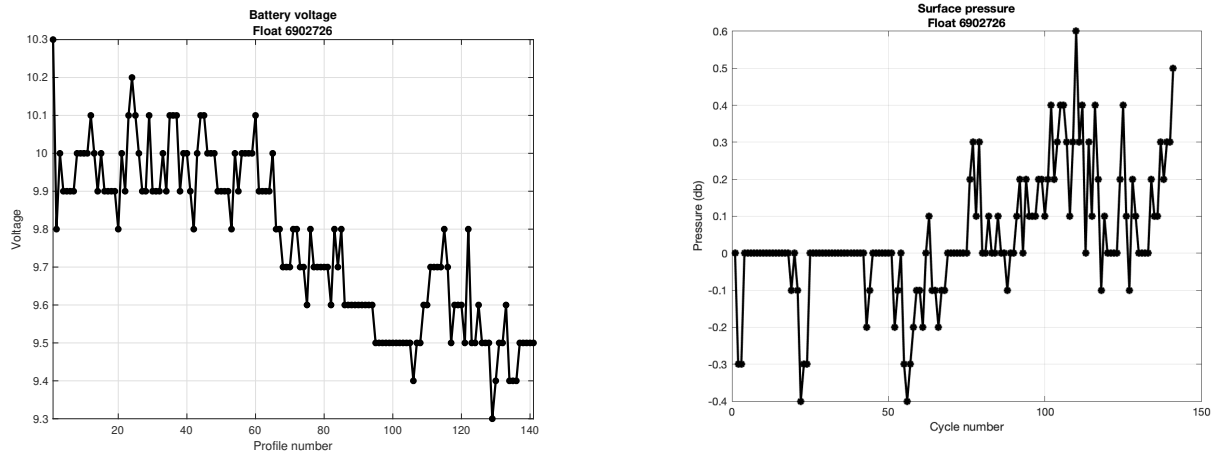


Figure 3: (left) : battery voltage - (right) : surface pressure from technical files.

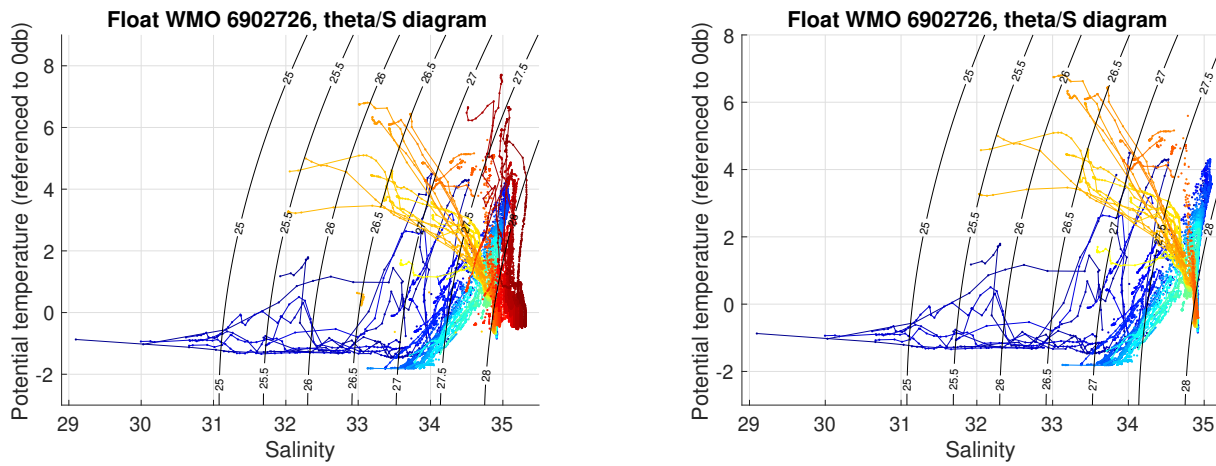


Figure 4: θ/S diagrams.
(left panel) Flags are not taken into account.
(right panel) Quality flags are taken into account.

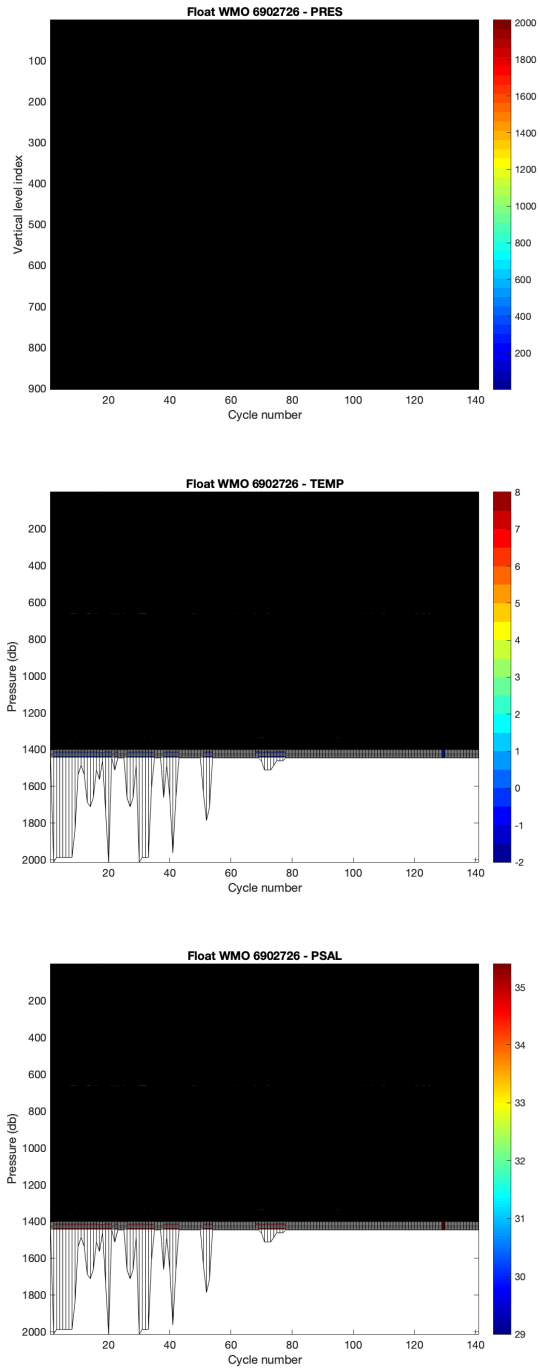


Figure 5: Sections of pressure (top), temperature (middle) and salinity (bottom) section along the float trajectory. Quality flags are not taken into account.

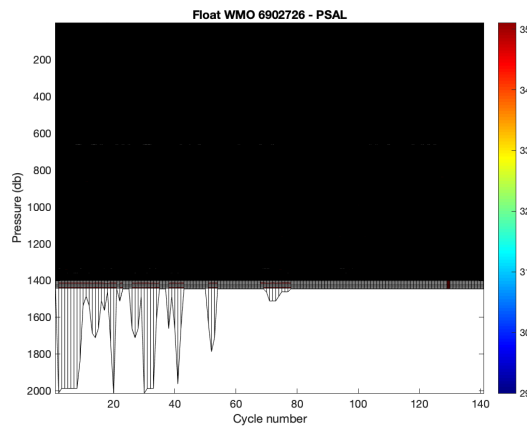
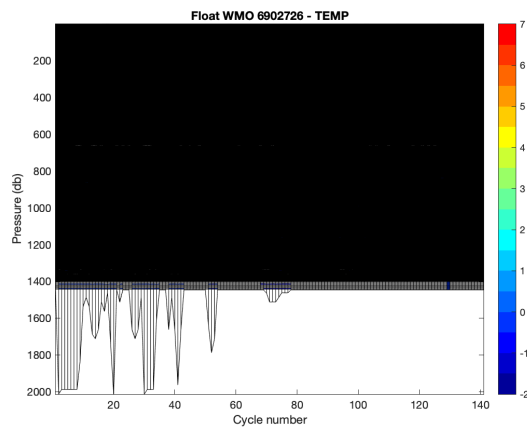
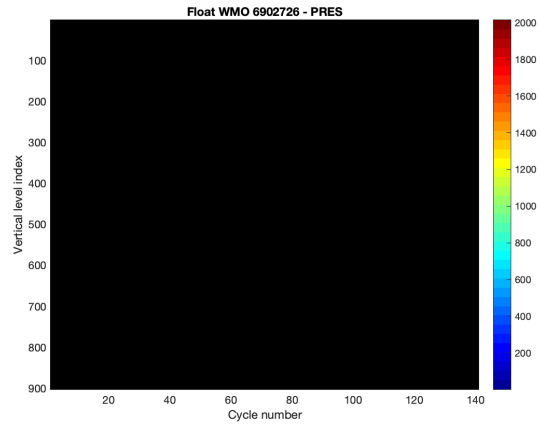


Figure 6: Sections of pressure (top), temperature (middle) and salinity (bottom) section along the float trajectory. Quality flags are taken into account.

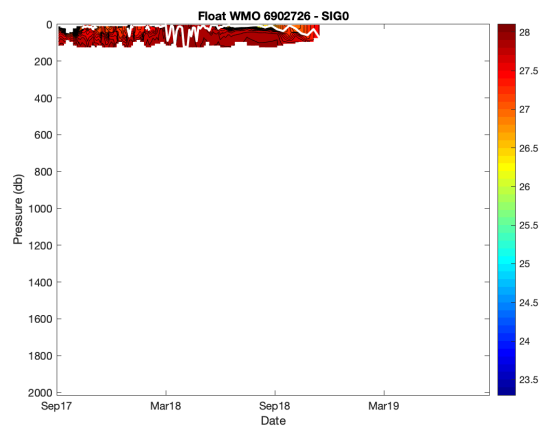
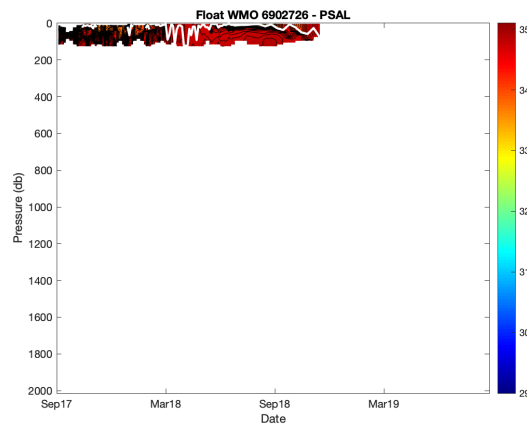
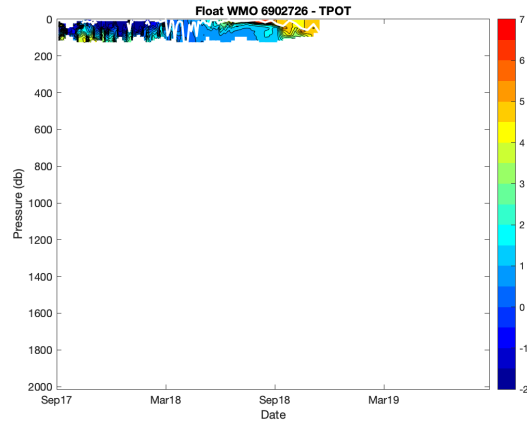


Figure 7: Sections of pressure (top), temperature (middle) and salinity (bottom) section along the float trajectory. Quality flags are taken into account.

5 QC flag checks and interesting profiles

Cycle	Parameter	Vertical level	Old flag	New flag	Comments
44:1:50, 52:1:54, 56,60, 62:1:66,71,78	LAT/LONG	-	8	8	interpolated values
4:1:14, 24:1:39	LAT/LONG	-	9	9	missing values
18	T/S	21.5-22.5 dbar	4	4	bad S
21	T/S	31.8 - 42.3 dbar	4	4	density inversions
58	T/S	37-37.9 dbar	4	restore Qc(T,S)=1 at 37 dbar add Qc(S)=4 at 20,9 and 29,1 dbar	bad data, density inversions
59	T/S	18.9-33.9 dbar	4	4	density inversions
61	T/S	18.8-19.9 dbar	4	add Qc(T,S)=4 at 21.2, 44.1 and 44.9 dbar	
65	T/S	17-17.8 dbar	4	add Qc(T,S)=4 at 13.8, 21.8 and 48.9 dbar	
95	S or T/S	1237.5-1313 dbar	4	add Qc(T,S)=4 from 1138 t to 1212.5 dbar	density inversions
100	S	255.4-465.2 dbar	4	4	bad data
114	S	all levels	4	4	bad salinity profile
115	S	all levels	4	4	bad salinity profile
129	S or T/S	all levels	4	4	bad salinity profile
131	S or T/S	all levels	4	4	bad salinity profile
136	S or T/S	all levels	4	4	bad salinity profile
137	S or T/S	all levels	4	4	bad salinity profile

Table 4: Profiles 0 to 141 for float #WMO 6902726 with flags 3 or 4, and proposition of modifications.

6 Cycle 18 : comparison to the nearest CTD profiles.

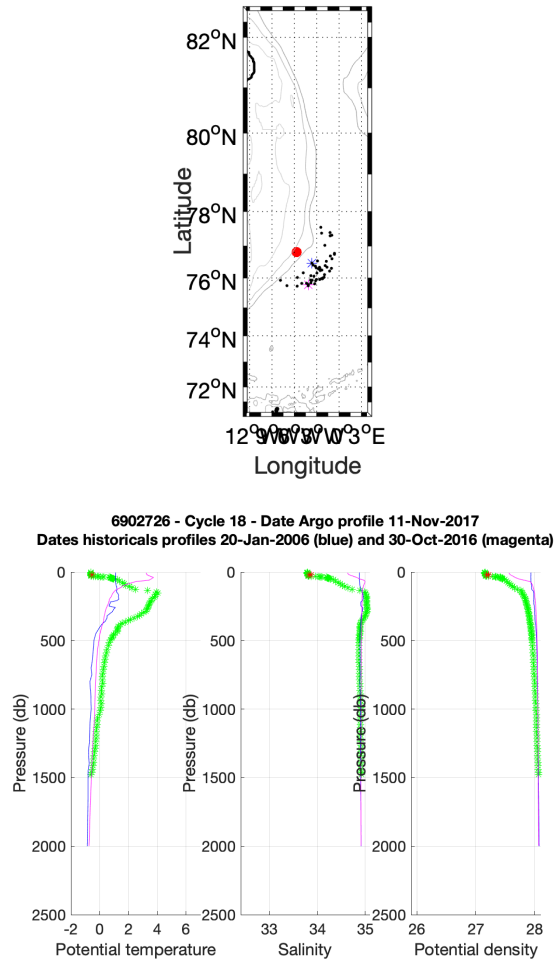


Figure 8: Float 6902726, cycle 18 - (**Upper panel**) Position of the Argo profile (red) and of the nearest CTD profiles (black). The nearest ARGO profile in time is in magenta while the nearest ARGO profile in space is in blue. (**Lower panels**) Temperature, salinity and potential density as function 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).

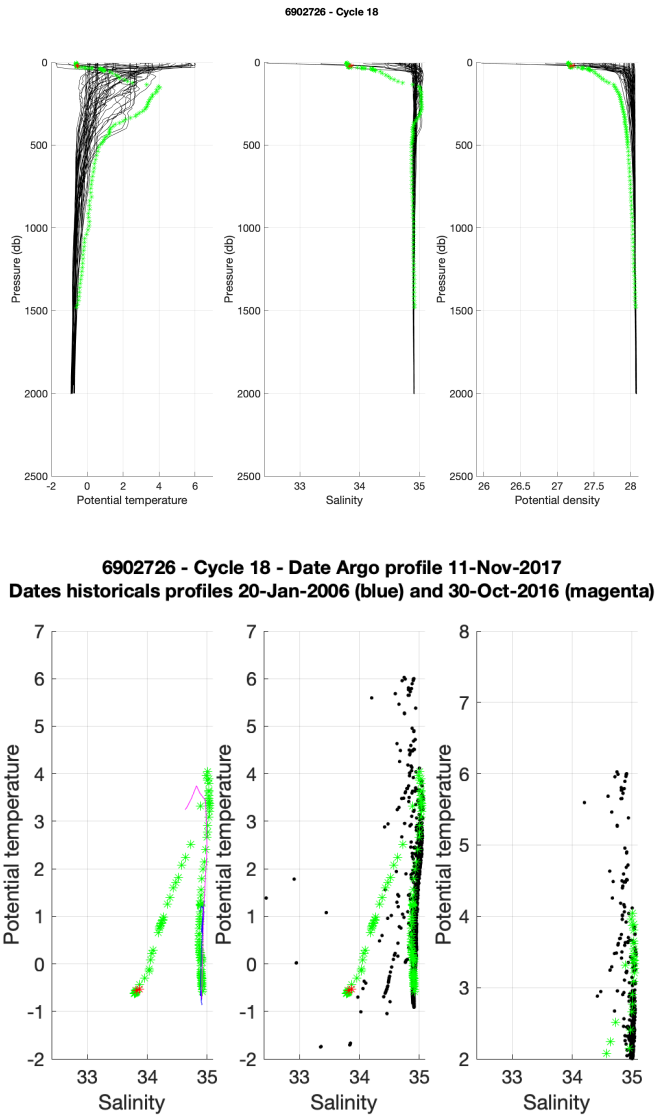


Figure 9: Float 6902726, cycle 18 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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 21 : comparison to the nearest CTD profiles.

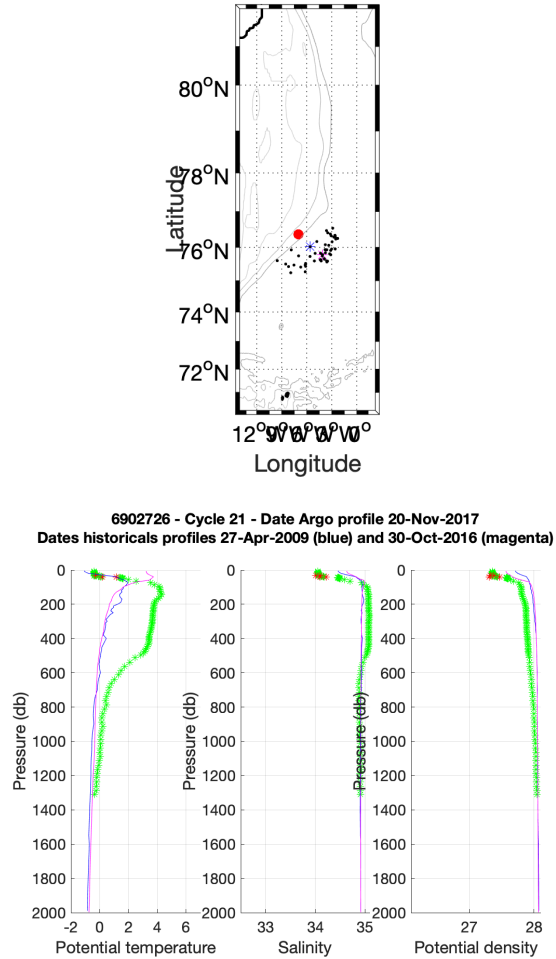


Figure 10: Float 6902726, cycle 21 - (**Upper panel**) Position of the Argo profile (red) and of the nearest CTD profiles (black). The nearest ARGO profile in time is in magenta while the nearest ARGO profile in space is in blue. (**Lower panels**) Temperature, salinity and potential density as function of pressure for the Argo profile (stars) and for the nearest ARGO profile in 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).

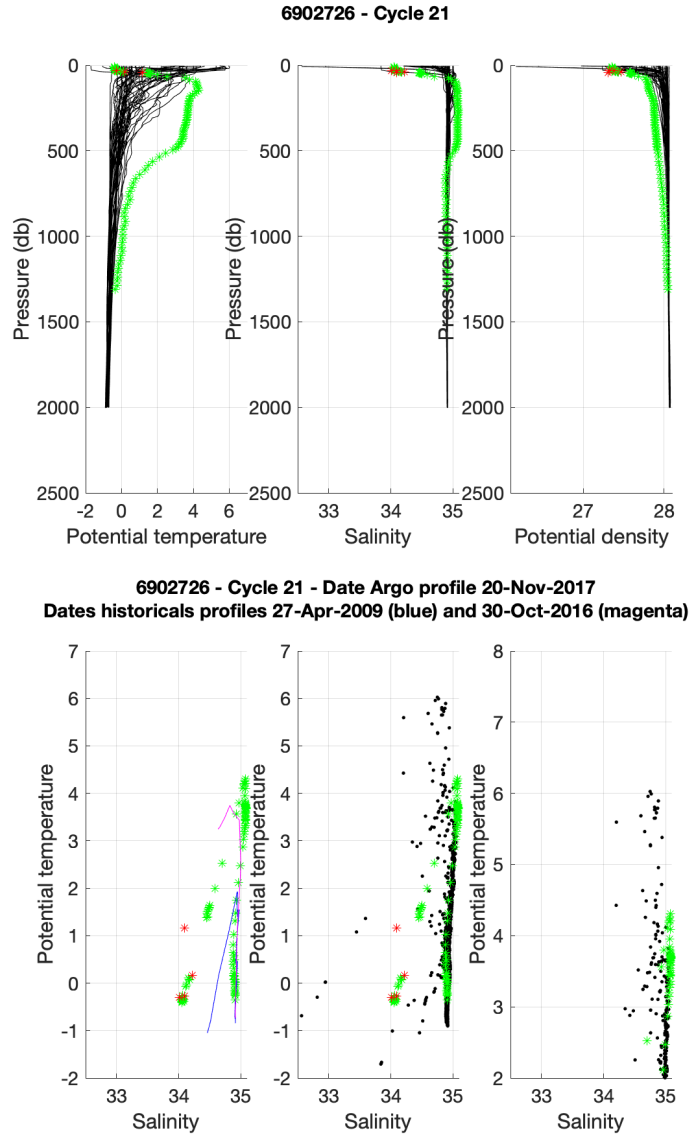


Figure 11: Float 6902726, cycle 21 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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 58 : comparison to the nearest CTD profiles.

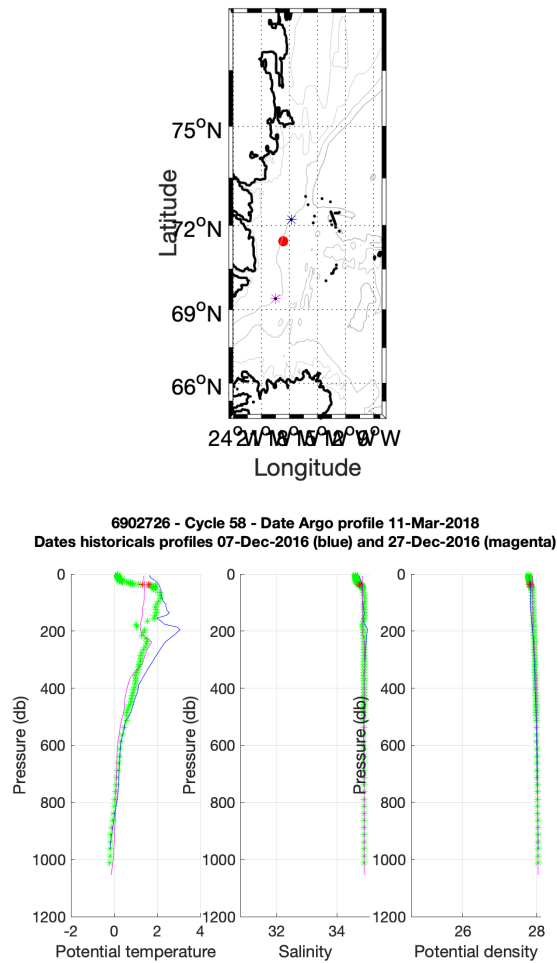


Figure 12: Float 6902726, cycle 58 - **(Upper panel)** Position of the Argo profile (red) and of the nearest CTD profiles (black). The nearest ARGO profile in time is in magenta while the nearest ARGO profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

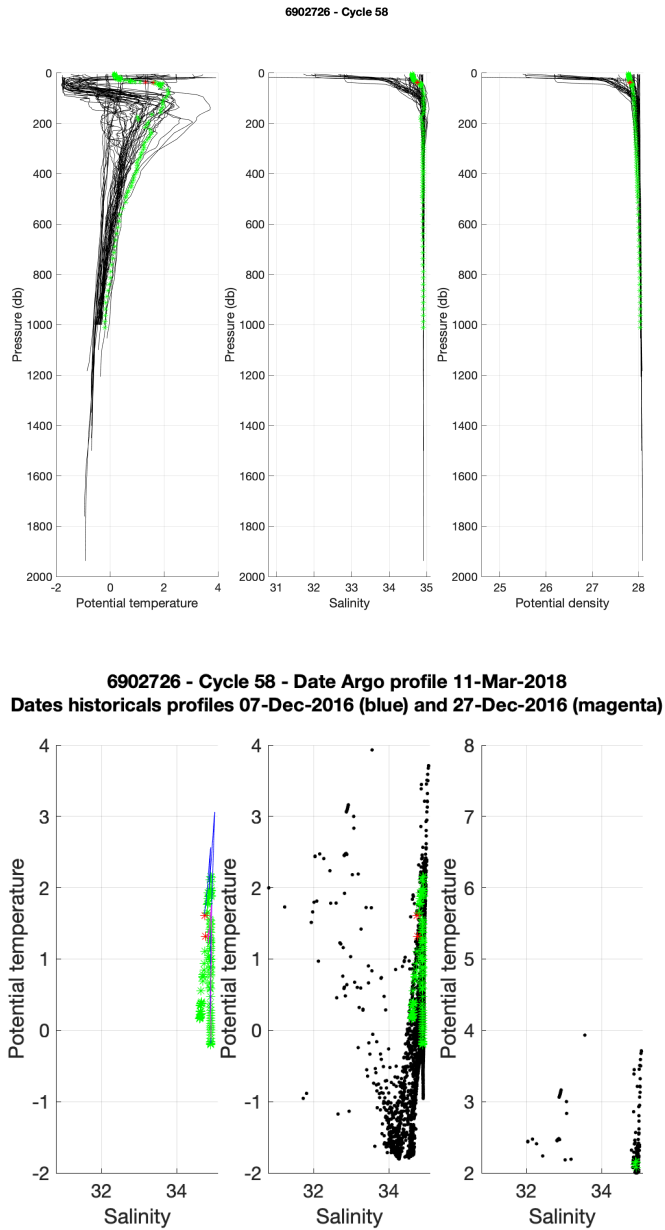


Figure 13: Float 6902726, cycle 58 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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 59 : comparison to the nearest CTD profiles.

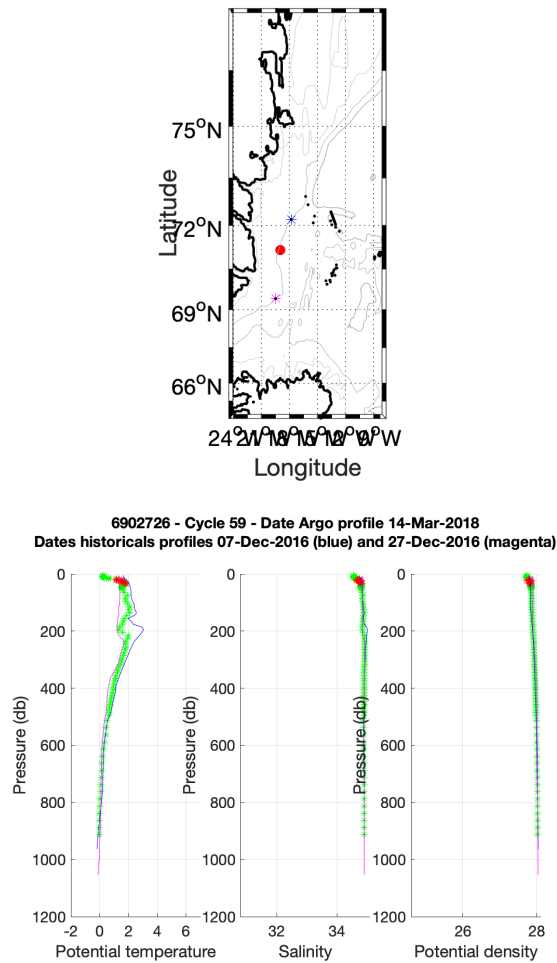
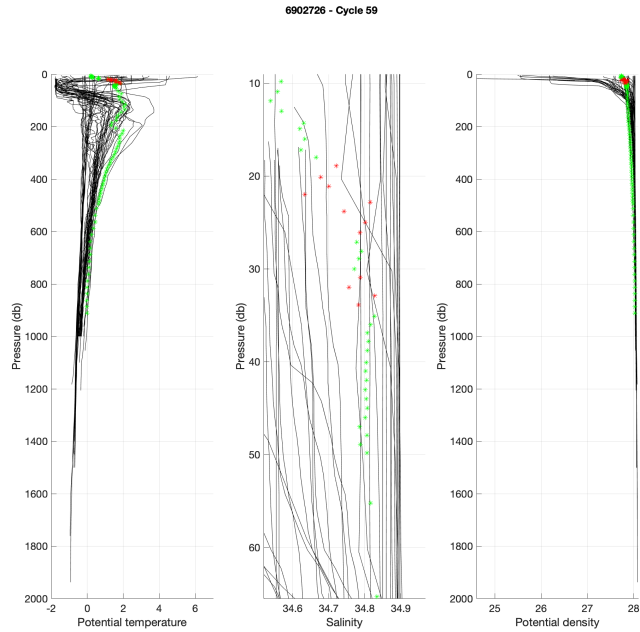


Figure 14: Float 6902726, cycle 59 - **(Upper panel)** Position of the Argo profile (red) and of the nearest CTD profiles (black). The nearest ARGO profile in time is in magenta while the nearest ARGO profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).



6902726 - Cycle 59 - Date Argo profile 14-Mar-2018
Dates historicals profiles 07-Dec-2016 (blue) and 27-Dec-2016 (magenta)

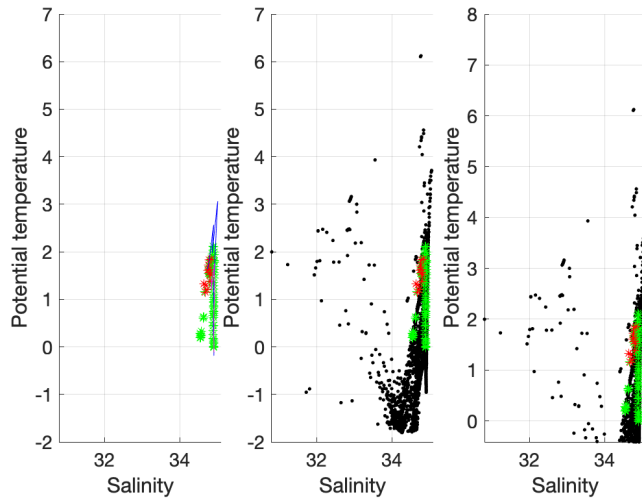


Figure 15: Float 6902726, cycle 59 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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 61 : comparison to the nearest CTD profiles.

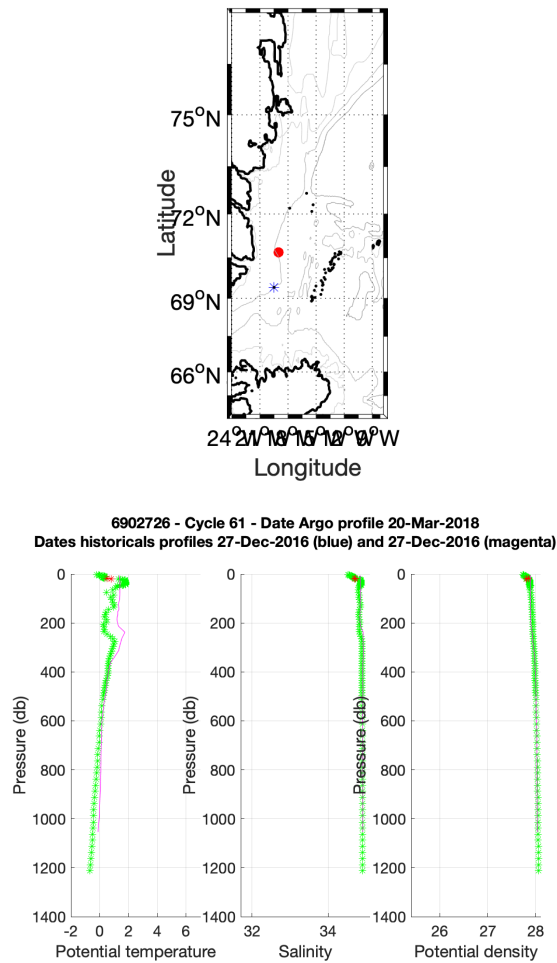
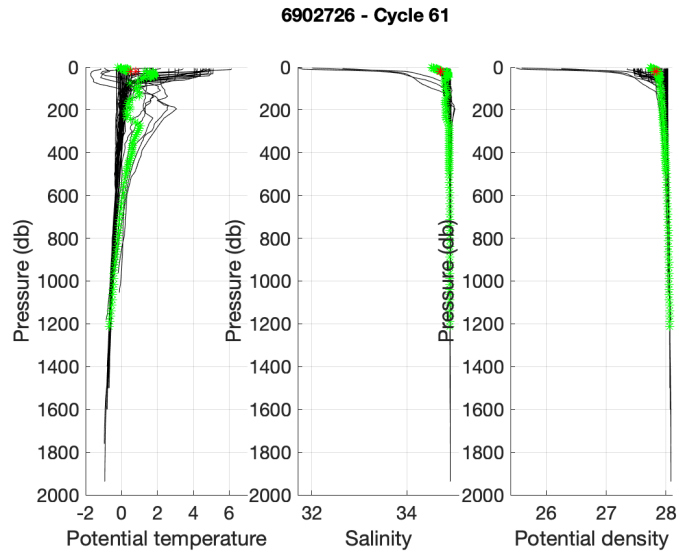


Figure 16: Float 6902726, cycle 61 - (**Upper panel**) Position of the Argo profile (red) and of the nearest CTD profiles (black). The nearest ARGO profile in time is in magenta while the nearest ARGO profile in space is in blue. (**Lower panels**) Temperature, salinity and potential density as function 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).



6902726 - Cycle 61 - Date Argo profile 20-Mar-2018
Dates historicals profiles 27-Dec-2016 (blue) and 27-Dec-2016 (magenta)

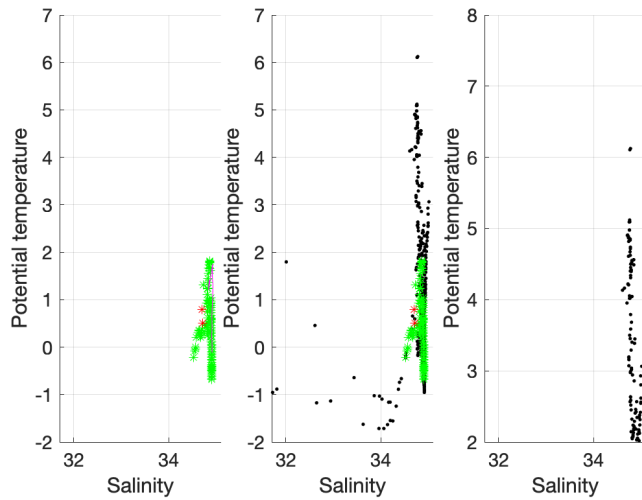


Figure 17: Float 6902726, cycle 61 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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 65 : comparison to the nearest CTD profiles.

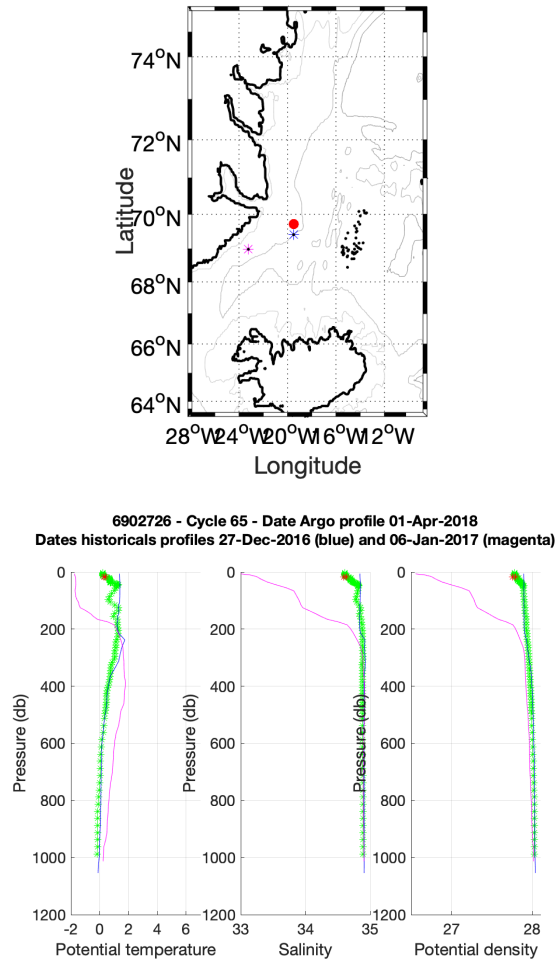


Figure 18: Float 6902726, cycle 65 - **(Upper panel)** Position of the Argo profile (red) and of the nearest CTD profiles (black). The nearest ARGO profile in time is in magenta while the nearest ARGO profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

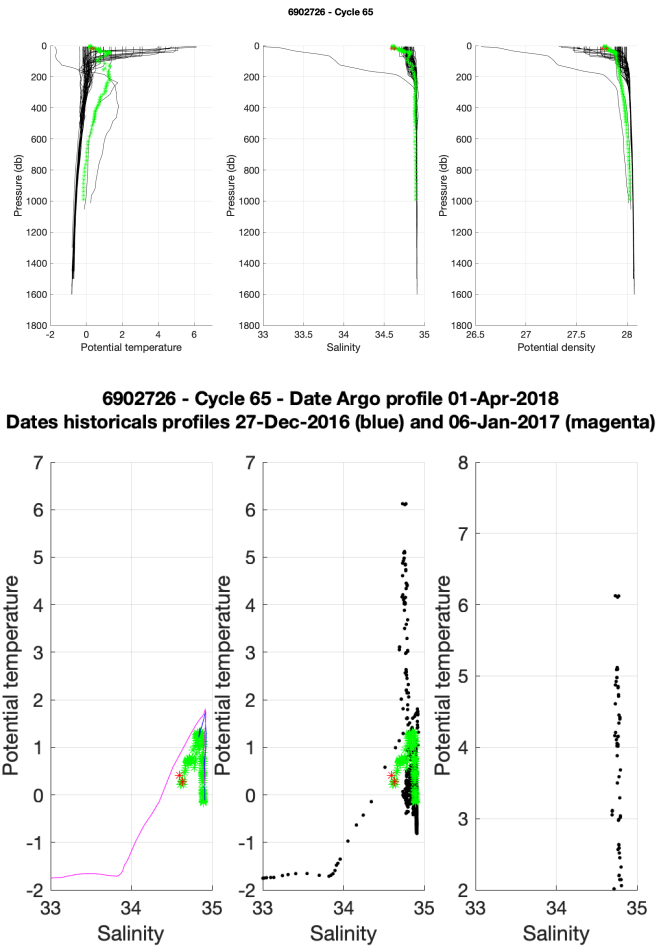


Figure 19: Float 6902726, cycle 65 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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 95 : comparison to the nearest CTD profiles.

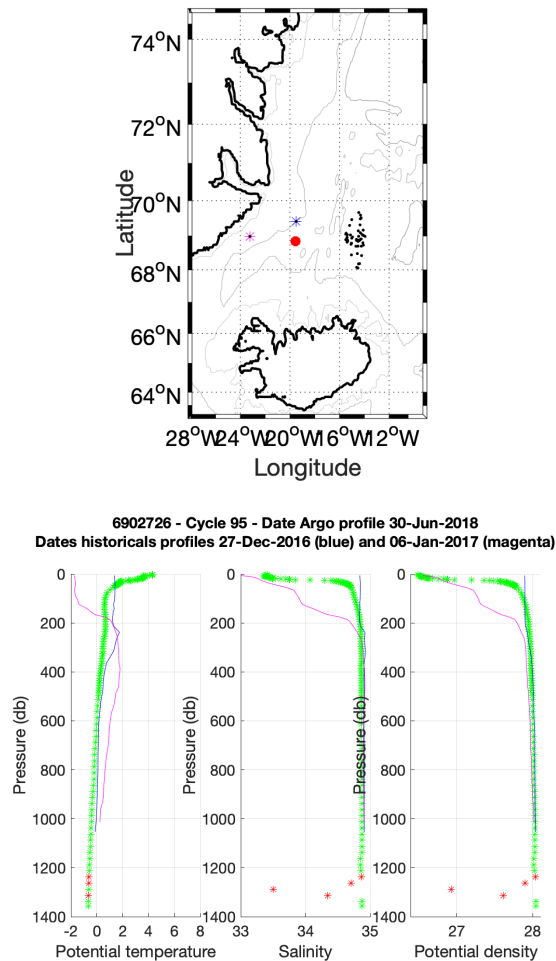


Figure 20: Float 6902726, cycle 95 - **(Upper panel)** Position of the Argo profile (red) and of the nearest CTD profiles (black). The nearest ARGO profile in time is in magenta while the nearest ARGO profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

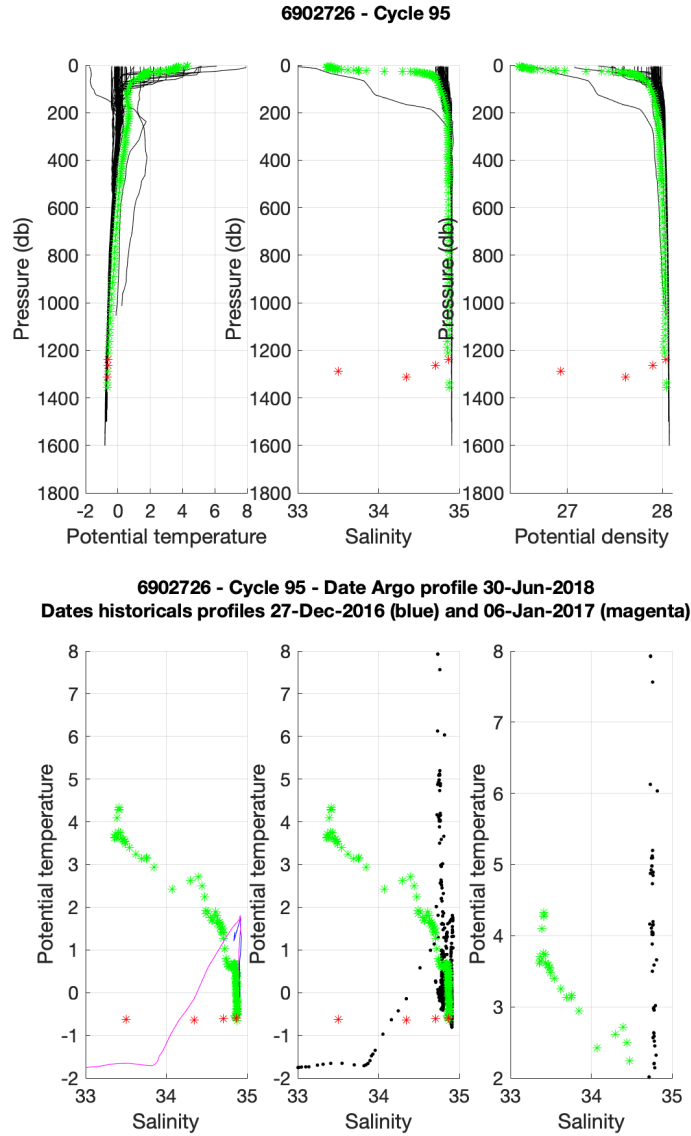


Figure 21: Float 6902726, cycle 95 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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 100 : comparison to the nearest CTD profiles.

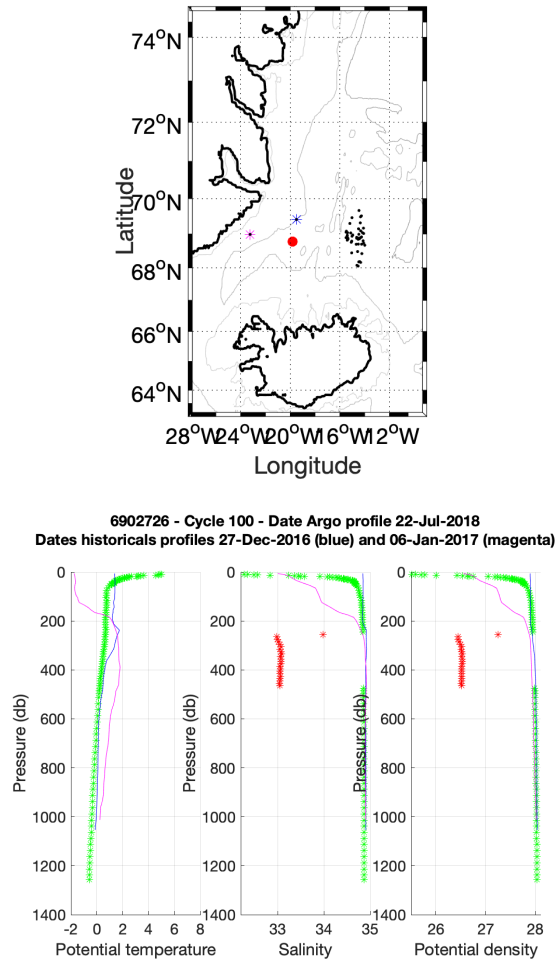


Figure 22: Float 6902726, cycle 100 - **(Upper panel)** Position of the Argo profile (red) and of the nearest CTD profiles (black). The nearest ARGO profile in time is in magenta while the nearest ARGO profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

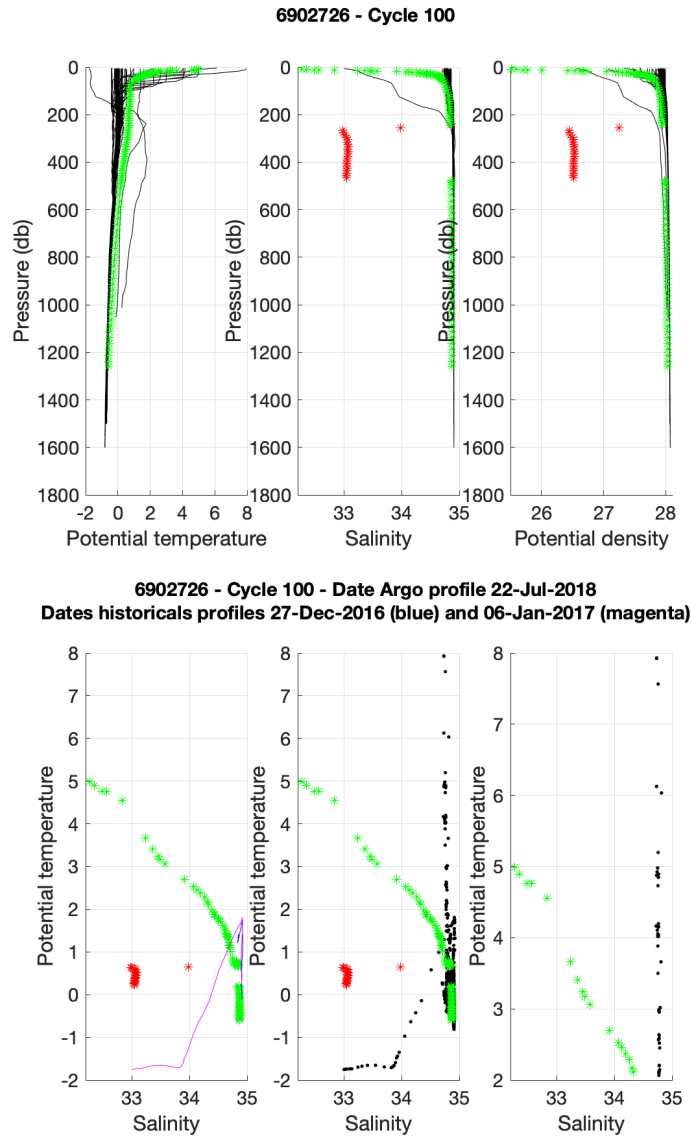


Figure 23: Float 6902726, cycle 100 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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 114 : comparison to the nearest CTD profiles.

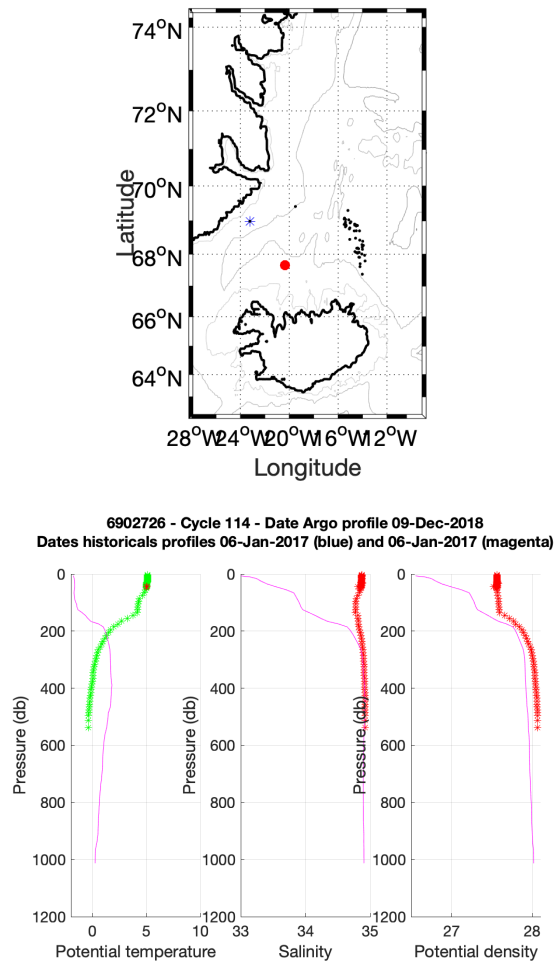


Figure 24: Float 6902726, cycle 114 - **(Upper panel)** Position of the Argo profile (red) and of the nearest CTD profiles (black). The nearest ARGO profile in time is in magenta while the nearest ARGO profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

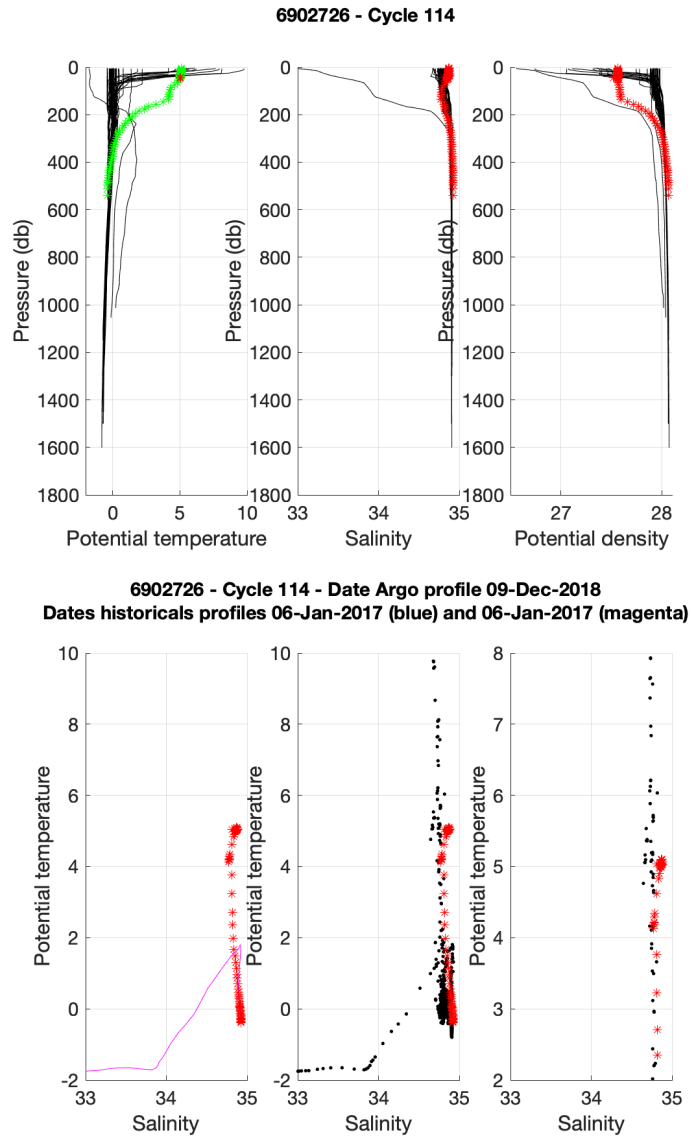


Figure 25: Float 6902726, cycle 114 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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 Cycle 115 : comparison to the nearest CTD profiles.

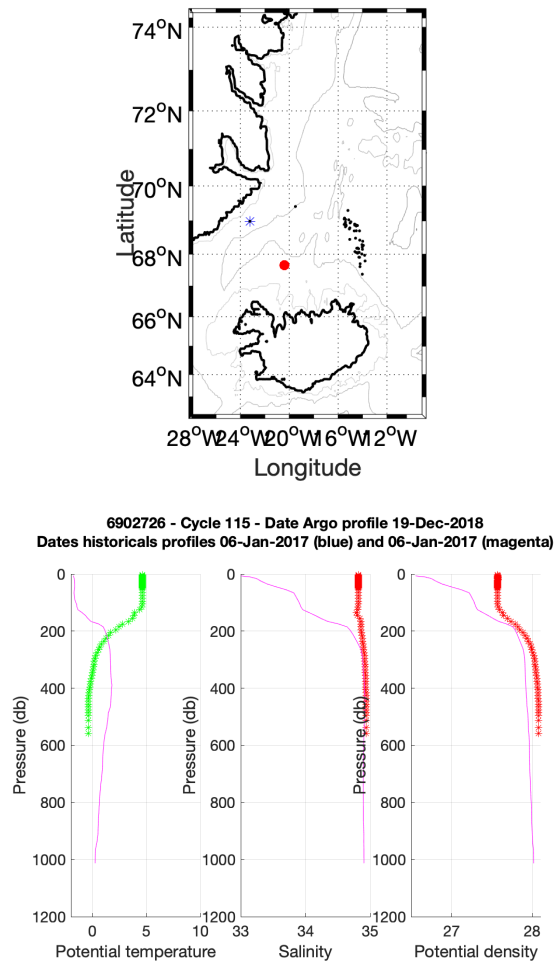


Figure 26: Float 6902726, cycle 115 - **(Upper panel)** Position of the Argo profile (red) and of the nearest CTD profiles (black). The nearest ARGO profile in time is in magenta while the nearest ARGO profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

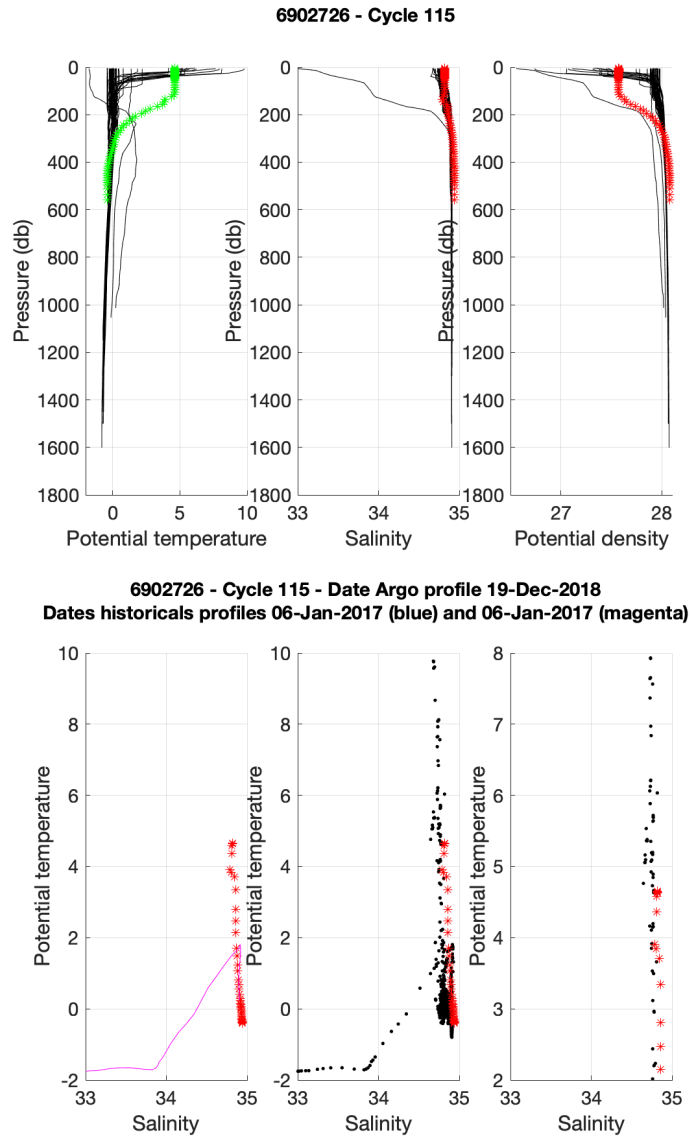


Figure 27: Float 6902726, cycle 115 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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.

16 Cycle 129 : comparison to the nearest CTD profiles.

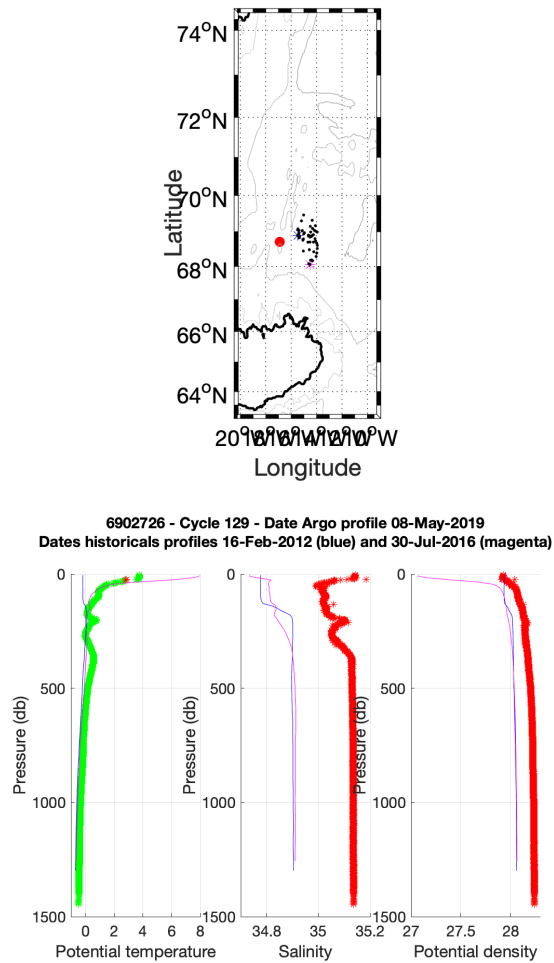


Figure 28: Float 6902726, cycle 129 - **(Upper panel)** Position of the Argo profile (red) and of the nearest CTD profiles (black). The nearest ARGO profile in time is in magenta while the nearest ARGO profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

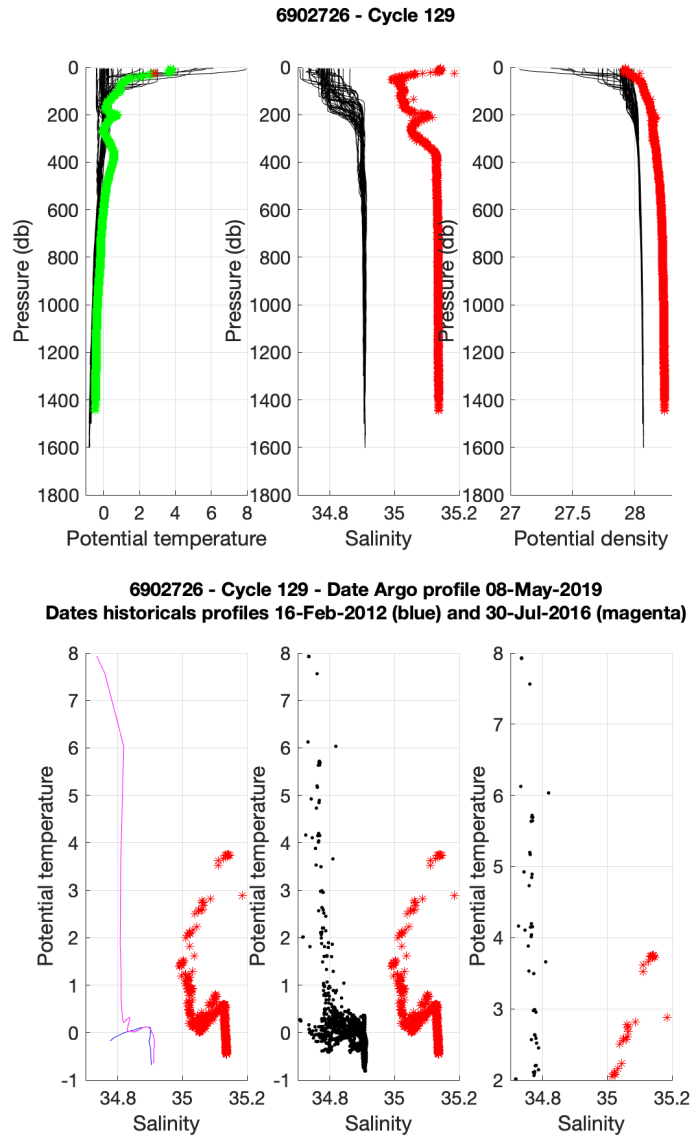


Figure 29: Float 6902726, cycle 129 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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.

17 Cycle 131 : comparison to the nearest CTD profiles.

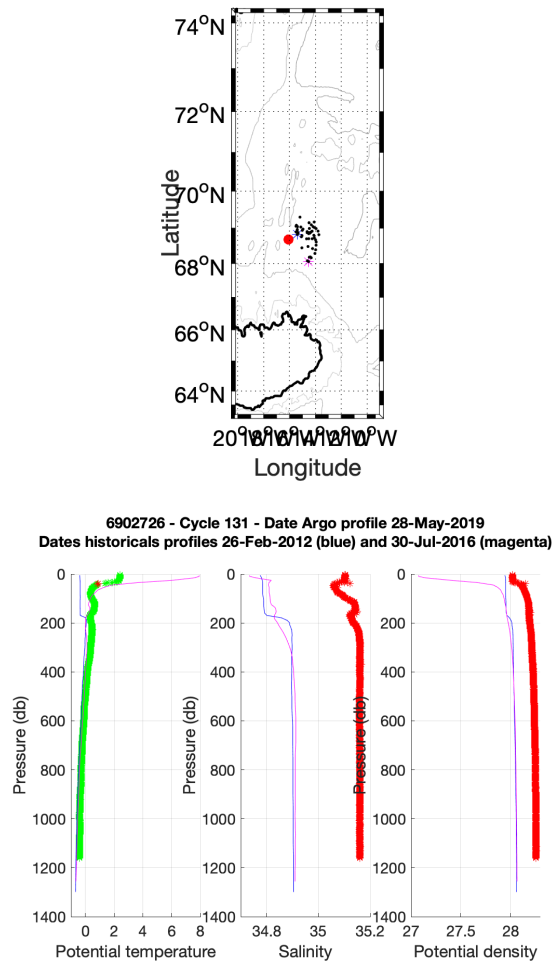


Figure 30: Float 6902726, cycle 131 - **(Upper panel)** Position of the Argo profile (red) and of the nearest CTD profiles (black). The nearest ARGO profile in time is in magenta while the nearest ARGO profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

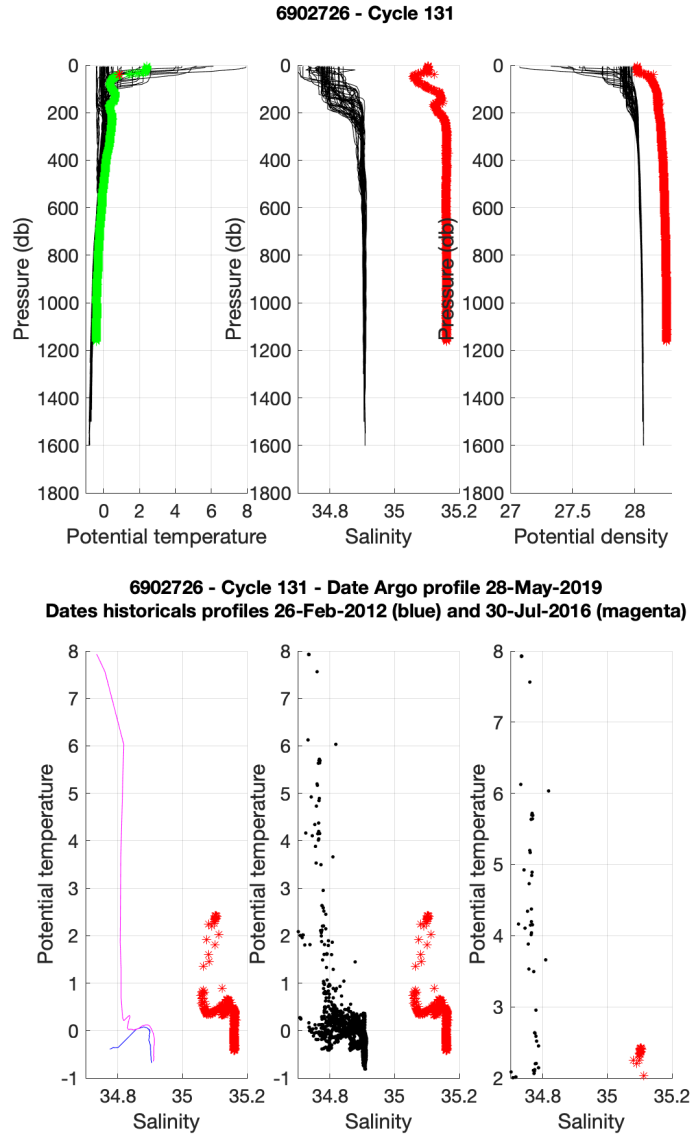


Figure 31: Float 6902726, cycle 131 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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.

18 Cycle 136 : comparison to the nearest CTD profiles.

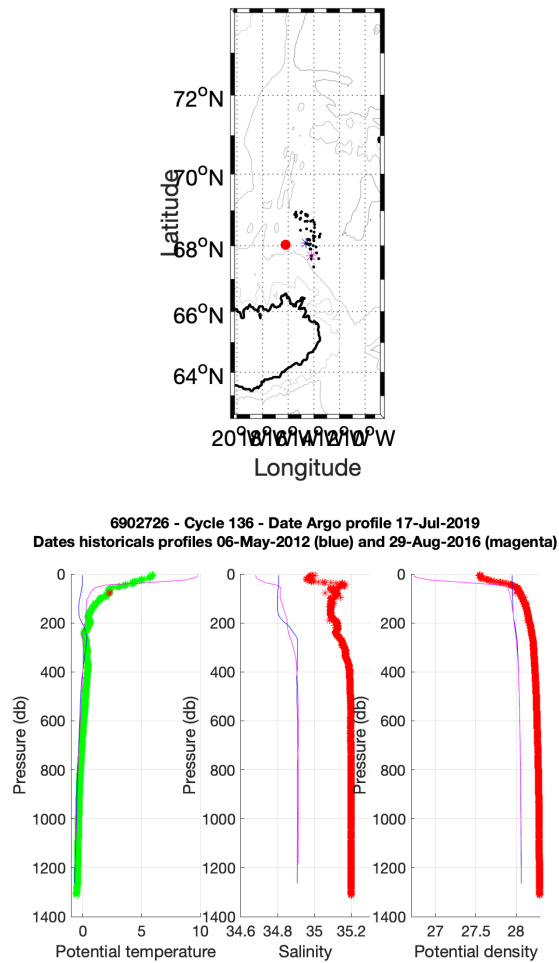
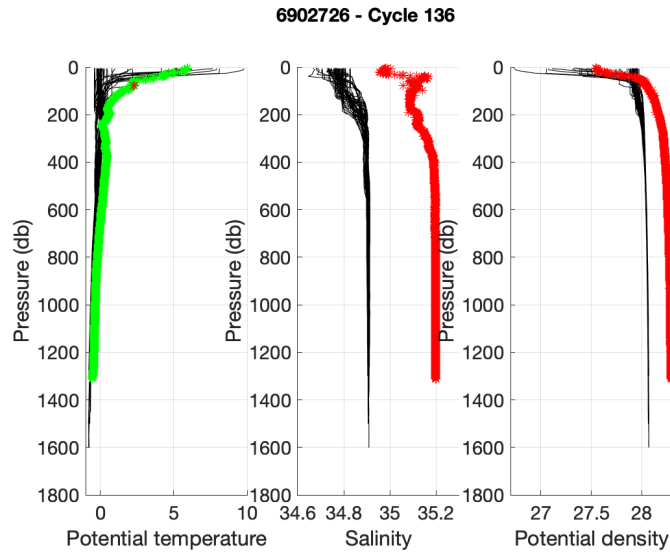


Figure 32: Float 6902726, cycle 136 - (**Upper panel**) Position of the Argo profile (red) and of the nearest CTD profiles (black). The nearest ARGO profile in time is in magenta while the nearest ARGO profile in space is in blue. (**Lower panels**) Temperature, salinity and potential density as function 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).



6902726 - Cycle 136 - Date Argo profile 17-Jul-2019
Dates historical profiles 06-May-2012 (blue) and 29-Aug-2016 (magenta)

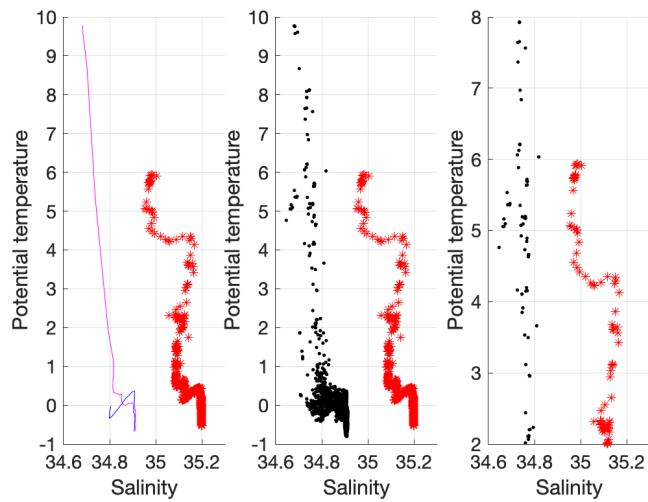


Figure 33: Float 6902726, cycle 136 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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.

19 Cycle 137 : comparison to the nearest CTD profiles.

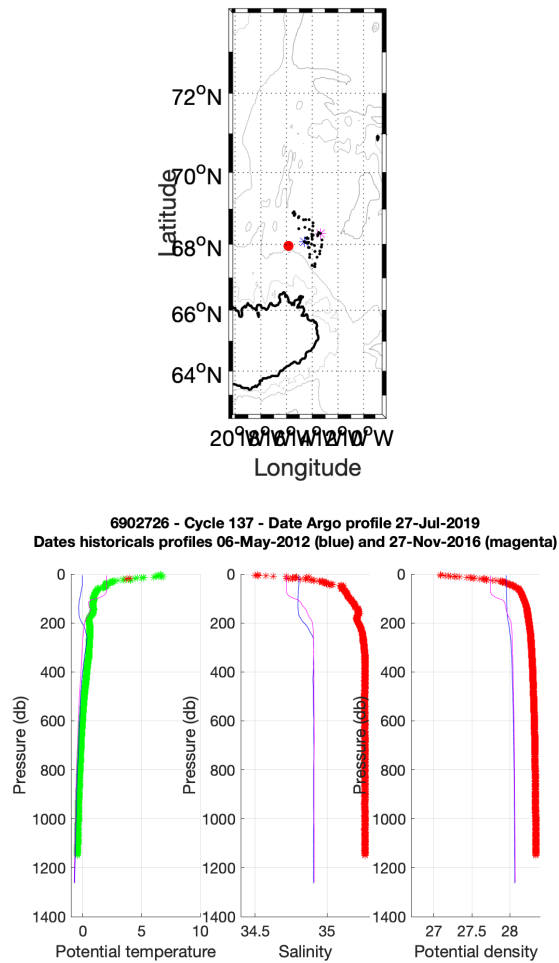


Figure 34: Float 6902726, cycle 137 - **(Upper panel)** Position of the Argo profile (red) and of the nearest CTD profiles (black). The nearest ARGO profile in time is in magenta while the nearest ARGO profile in space is in blue. **(Lower panels)** Temperature, salinity and potential density as function 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).

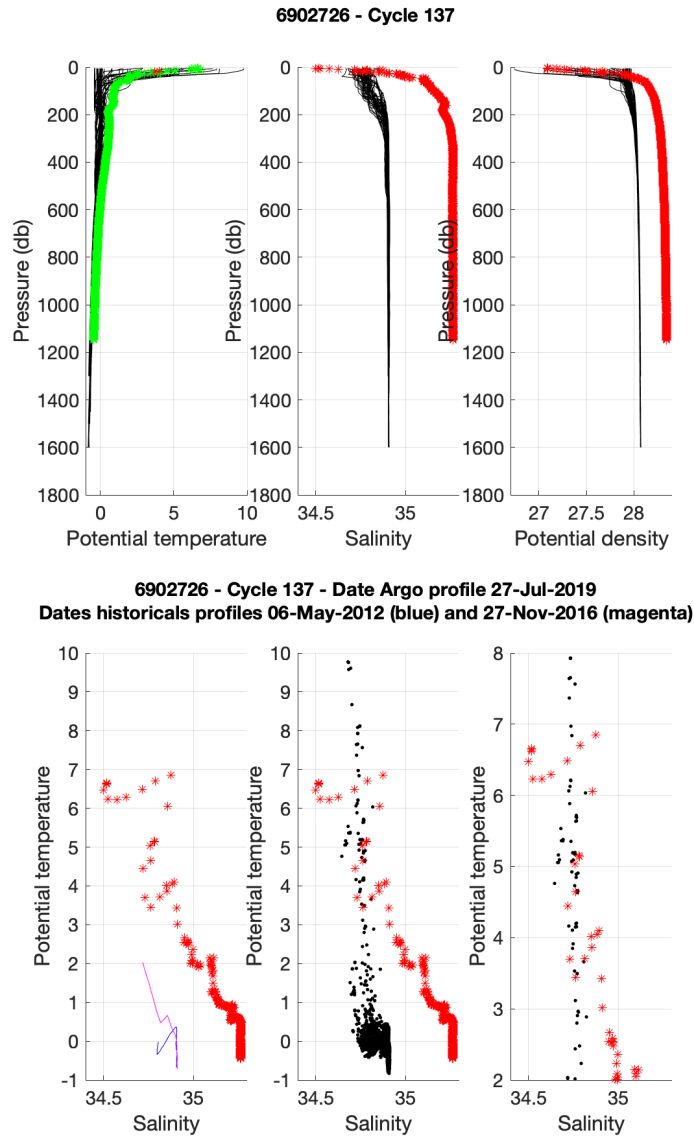


Figure 35: Float 6902726, cycle 137 : The Argo profile (stars) is compared to the nearest ARGO profiles (black line) and to two specific profiles : the nearest profile in time (magenta) and the nearest profile in space (blue). The color of the Argo profile represents the QC flag (green for a QC=1 ; blue 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.

20 Pressure Calibration :

ARVOR float with *PRES_SurfaceOffsetCorrectedNotResetNegative_1cBarResolution_dBar*
 i.e. correction on-board, no need to do DM adjustment in pressure.

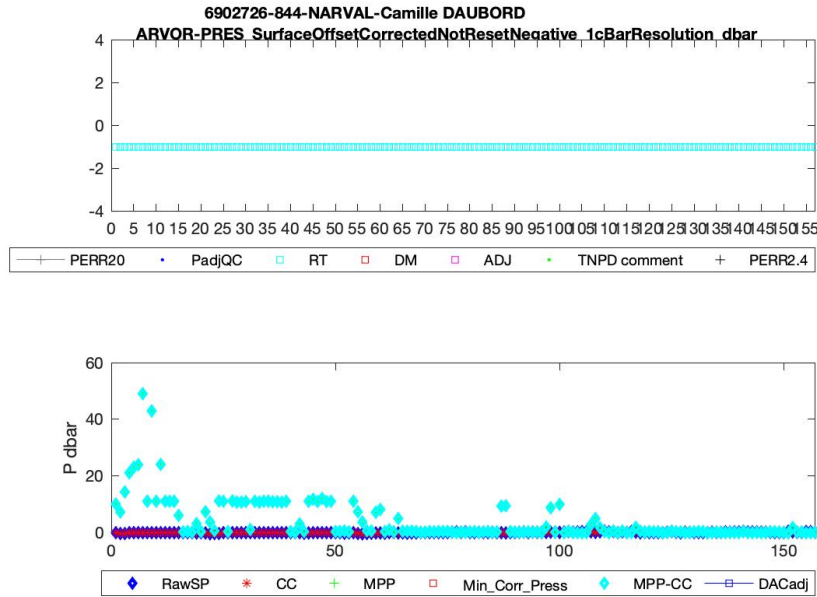


Figure 36: Surface pressure time serie for float 6902726. Legend : blue diamonds : Raw Surface Pressure ; blue squares : DAC adjustment (if DM exist) ; red points : calculated correction CC ; green diamonds with the minimal profile pressure value (MPP) ; pink squares : corrected minimal surface pressure ; cyan diamonds : $MPP - CC$

21 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 observe a negative drift in the salinity measurements, from cycle 50 to the last one. We suggest to apply the OW's correction to the salinity data for those cycles.

ARGO CLIMATOLOGY	2019V03
CTD CLIMATOLOGY	2019V01
CONFIG_MAX_CASTS	250
MAP_USE_PV	1
MAP_USE_SAF	0
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

breaks	none
max_breaks	0
use_percent_gt	0.5
use_pres_gt	1000

Table 6: Calibration parameters.

Table 5: Mapping parameters.

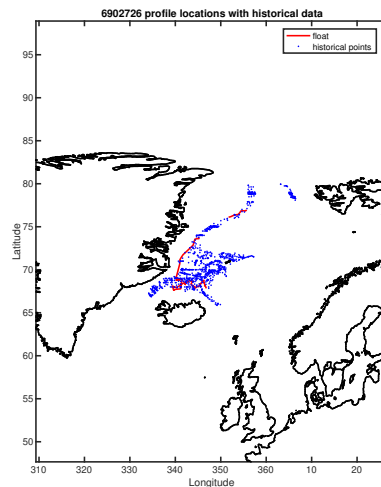


Figure 37: Position of the historical and float data.

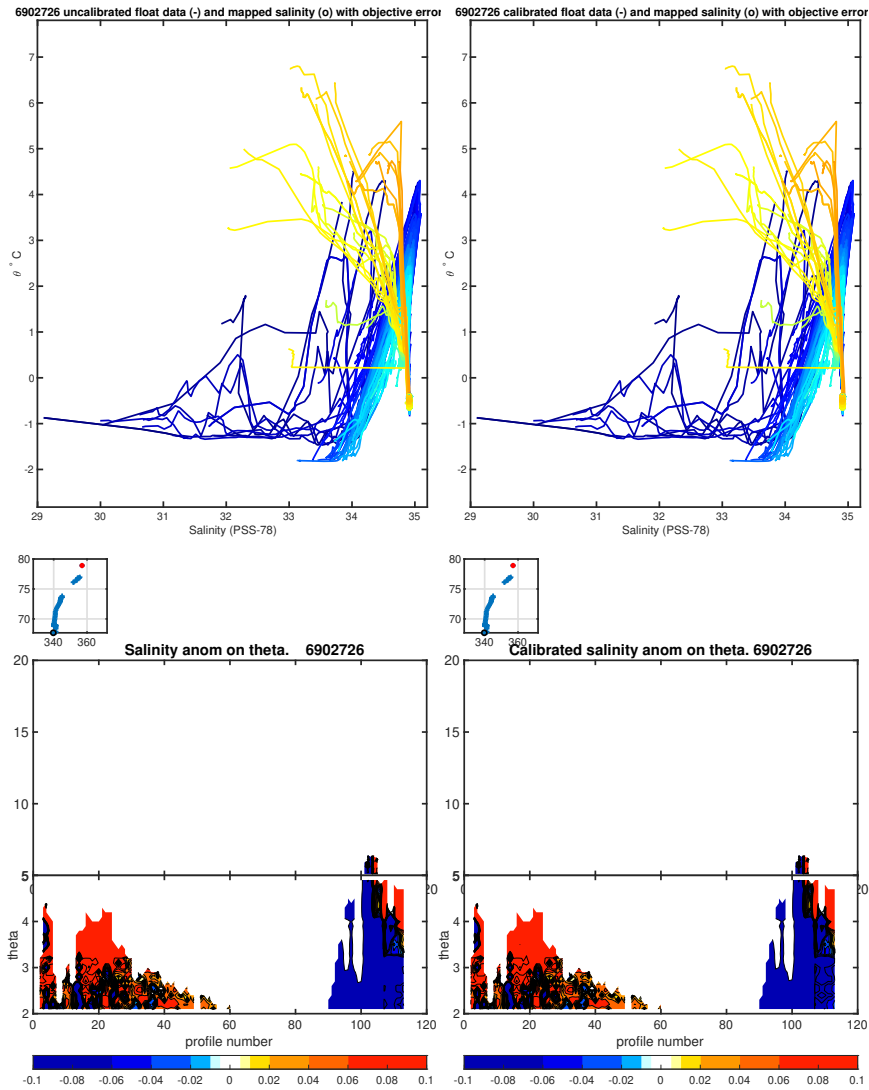


Figure 38: (**top panel**) : Comparison of the θ/S diagram of the float with the historial database. (left) raw data. (right) corrected data using the OW correction.
(bottom panel) : Salinity anomaly. (left) raw data. (right) corrected data using the OW correction.

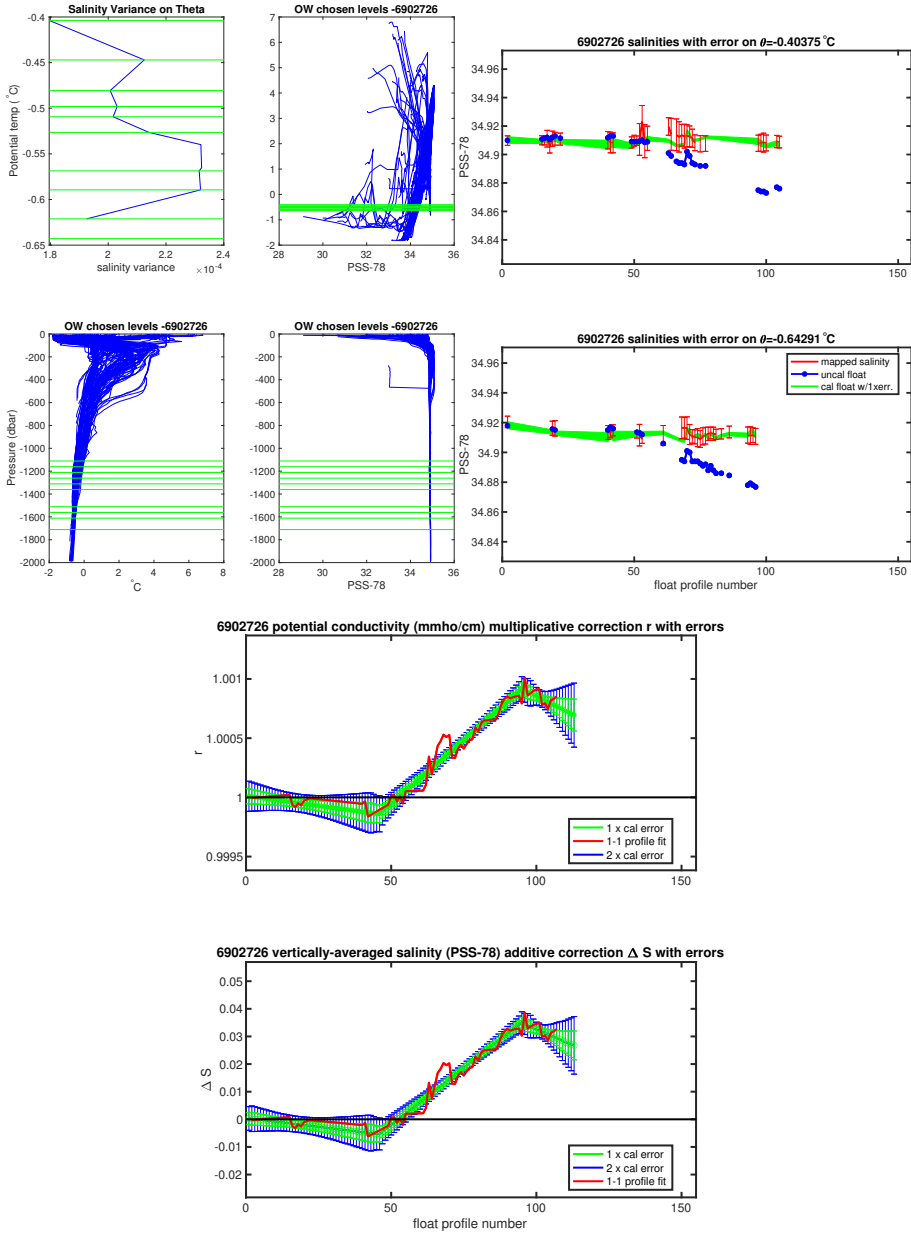


Figure 39: (top left) : θ - levels chosen for the calibration. (top right) : comparison, on various θ levels, between the float data and the historical data interpolated at the float position. (bottom): Correction proposed by the OW method.