# Rapport interne LPO/15-13

| UMR 6523<br>**Laboratoire de<br>Physique des Océans** | **DELAYED MODE QUALITY CONTROL<br>OF OVIDE ARGO DATA**<br><br>**FLOAT WMO 6900451** | |
|---|---|---|
| Date :<br>**27 octobre 2015** | Auteurs : **Lagadec Catherine<br>Thierry Virginie<br>Cabanes Cécile** | Archivage : **LPO** |

# DELAYED MODE QUALITY CONTROL OF OVIDE ARGO DATA FLOAT WMO 6900451

## Internal Report LPO 15-13

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December 21, 2015

# 1 Presentation and DMQC summary

| Number | Deployment (cycle OD) cycle OD | Last cycle 203 |
|---|---|---|
| Provor WMO 6900451 | 26/06/2006 23 h 00 | |
| CTS3 05-S3-40 | 61.999 N 34.993 W | |
| Date of control | Float status | Last cycle |
| Feb. 2010 | DEAD | 17/01/2012 |
| Coriolis transmission | | 11/04/2012 |
| Date of last control | Float status | Last cycle |
| October 2015 | DEAD | 17/01/2012 (+52) |
| Coriolis transmission | | 29/10/2015 |

Table 1: Status of the float

**Warning : Note that all the figures are plotted with the latest QC flag values (the modifications mentionned table 2 are taken into account).**

## 1.1 QC flag checks and interesting profiles

| Cycle | Para-meter | Vertical level | Old flag | New flag | Comments | Coriolis transm |
|---|---|---|---|---|---|---|
| 3A | TEMP | 1,2 | 4 | 1 | | 17/05/201 |
| all cycles (except 0D,74A) | PSAL | 1 (PRES inf 5) | 1 | 4 | untrustable data | 17/05/201 |
| 67 113,116 128 | TEMP,PSAL TEMP,PSAL PSAL | 0-500 dbar 1,2 1200-1800 dbar | | | mixed layer TEMP sup. 28 degrees interesting | |
| 176 | TEMP,PSAL | about 950m | 4 | 1 | | 27/03/12 |
| 184 | PSAL | about 800m | 4 | 1 | | 27/03/12 |
| 52 | | profile decoded in june 2015 | | | | |

Table 2: Float 6900451. Summary of the modifications of the real-time QC flags and of the interesting or suspicous data.

Warning : the resolution is equal to 50 dbar from the surface to 500 dbar, then 60 dbar from 500 to 2000 dbar. Salinity data between 0 and 5 dbar are suspicious because they are acquired when the pump of the CTD is turned off.

## 1.2 Salinity correction from the OW method

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

value between 0.01 and those determined from the OW method with parameters from the OW configuration 129.

| OW CONFIGURATION | 129 |
|---|---|
| CONFIG_MAX_CASTS | 250 |
| MAP_USE_PV | 1 |
| MAP_USE_PV_ELLIPSE | 1 |
| MAP_USE_FACTEUR | 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 | 500 |
| MAP_P_DELTA | 250 |
| Reference data base | CTD and ARGO |

Table 3: Parameters of the OW method.

## 2 Data

Float WMO 6900451

First prof.
Last prof.
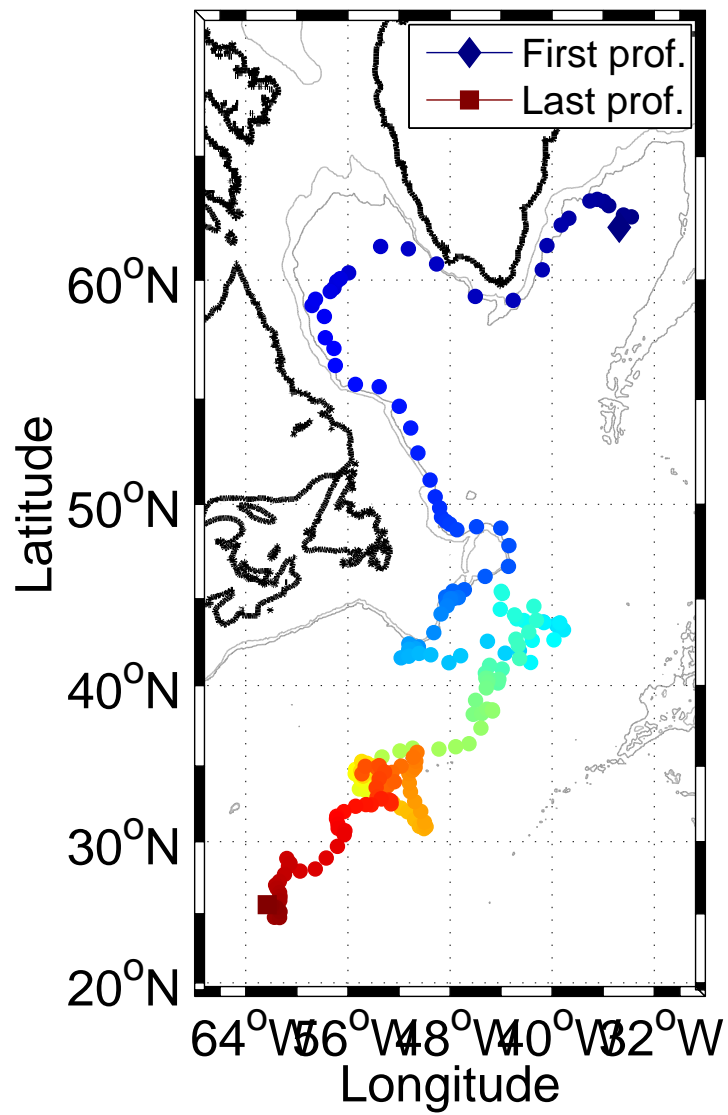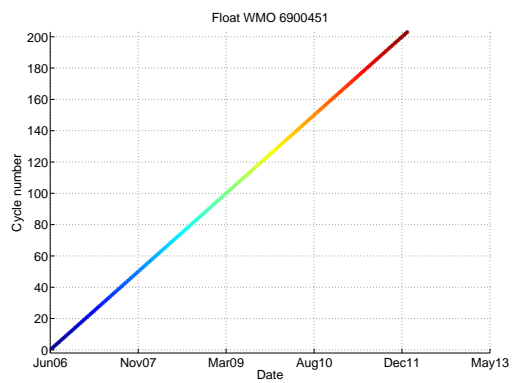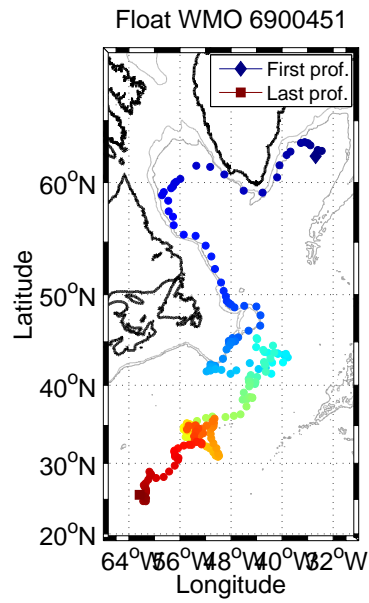
Figure 1: Profiles position and relationship between cycle number, date and color.
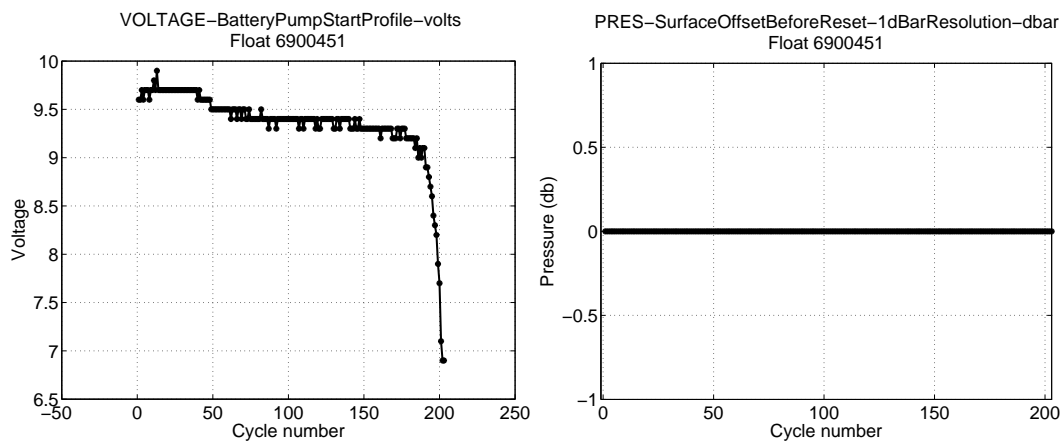


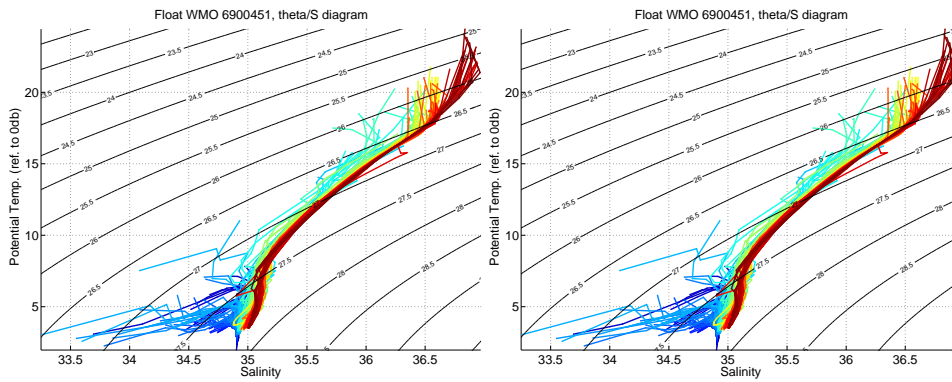Figure 2: Battery Voltage and Surface Pressure

Figure 3: $\theta$/S diagrams. (Left panel) Flags are not taken into account. (Right panel) Quality flags are taken into account.
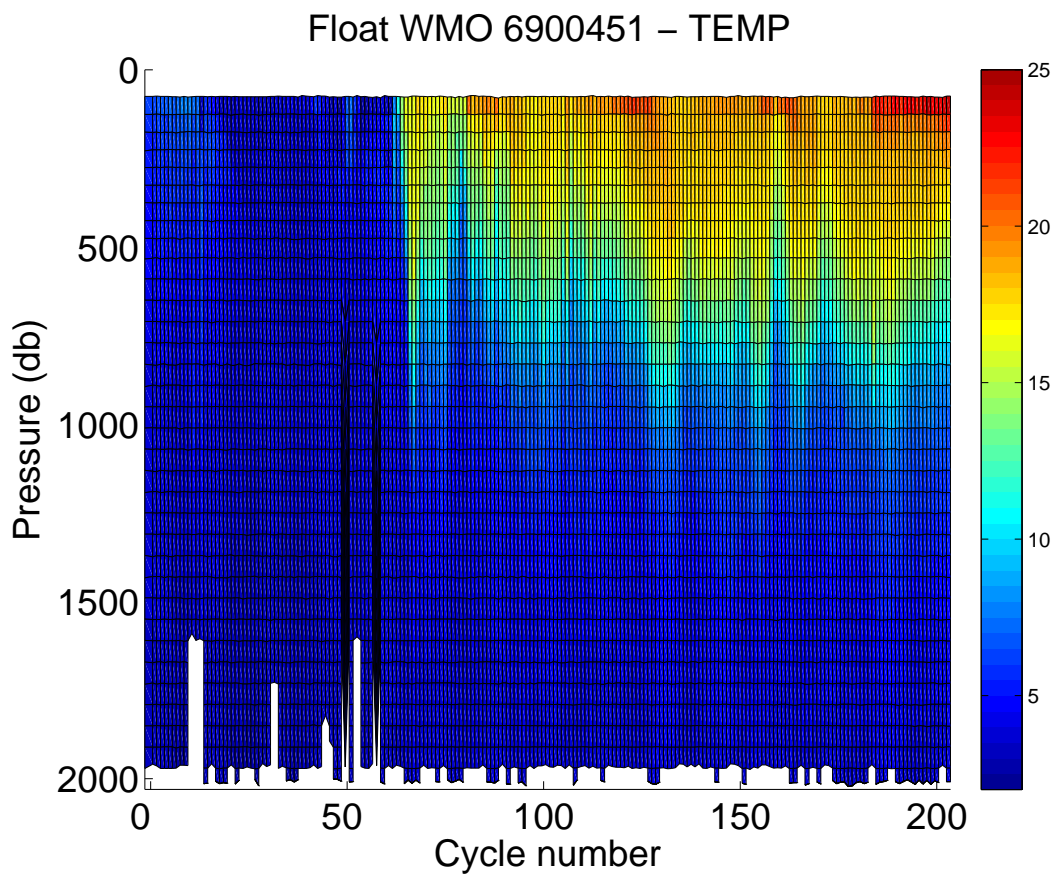


Figure 4: Temperature section along the float trajectory. Quality flags are not taken into account.
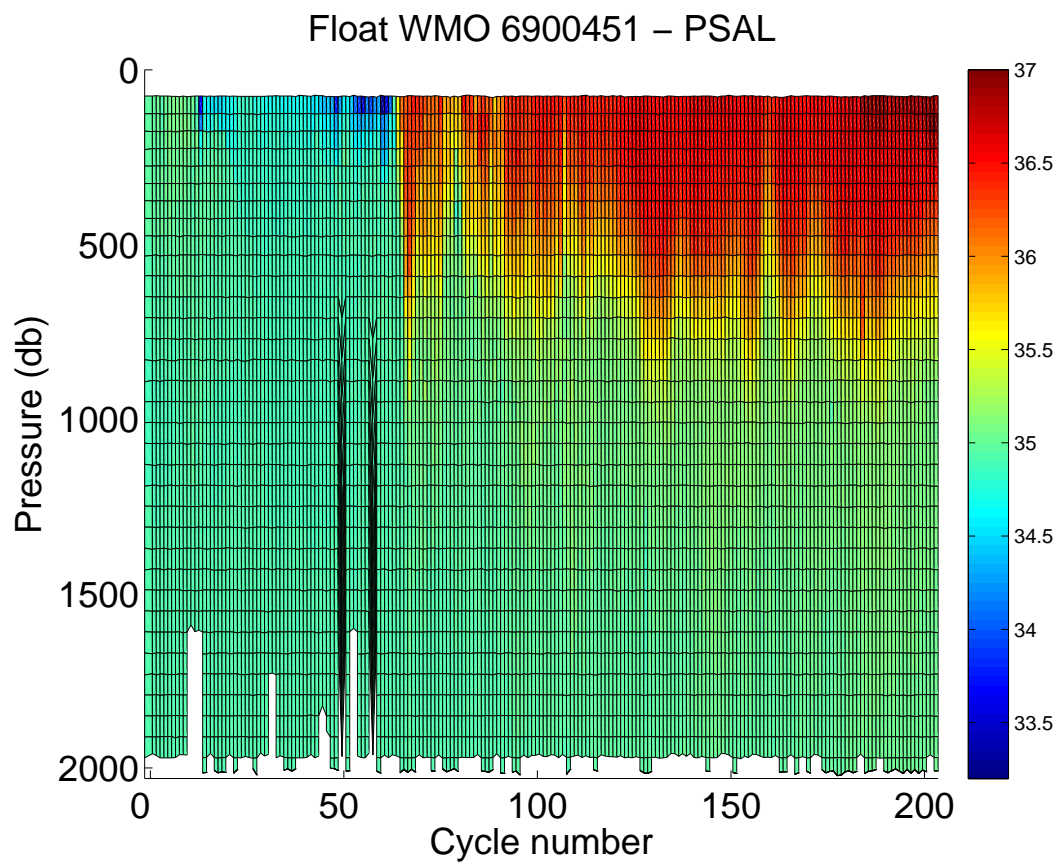
Figure 5: Salinity section along the float trajectory. Quality flags are not taken into account.
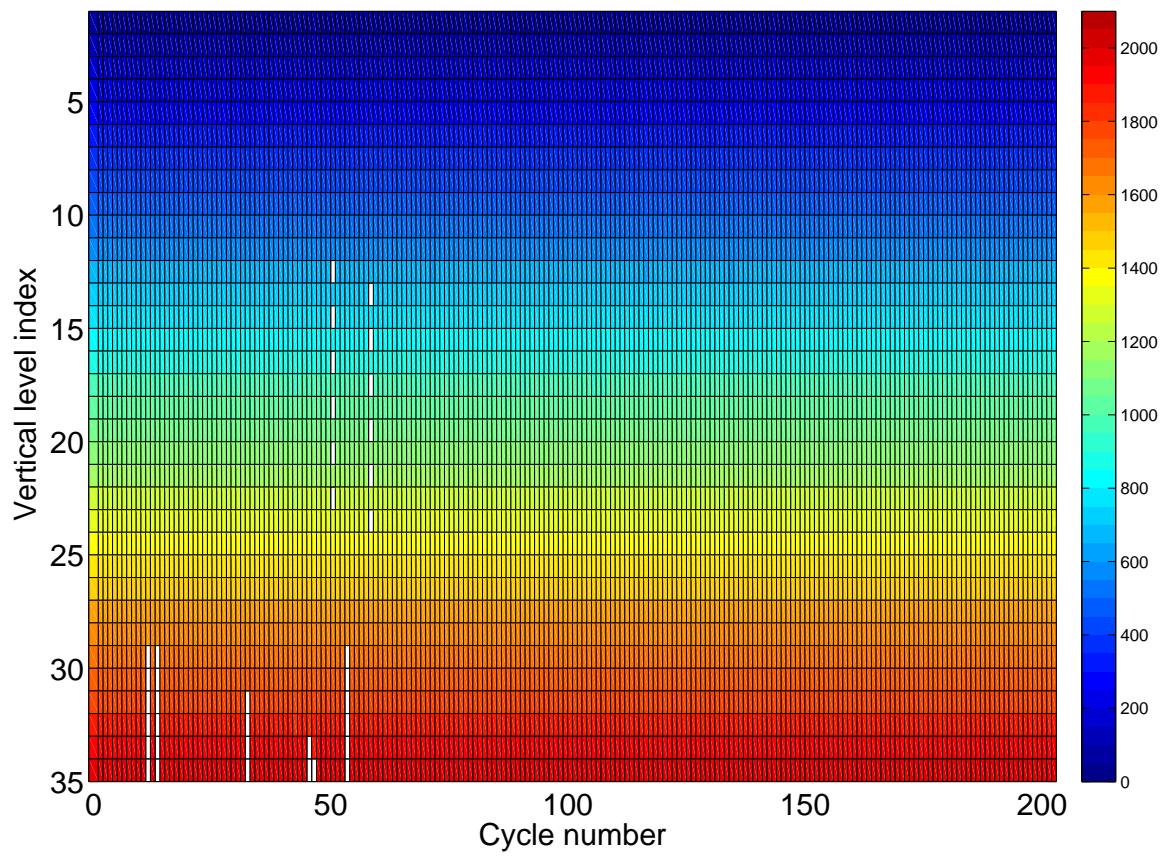
Figure 6: Pression as fonction of cycle number and vertical level index along the float trajectory. Quality flags are taken into account.
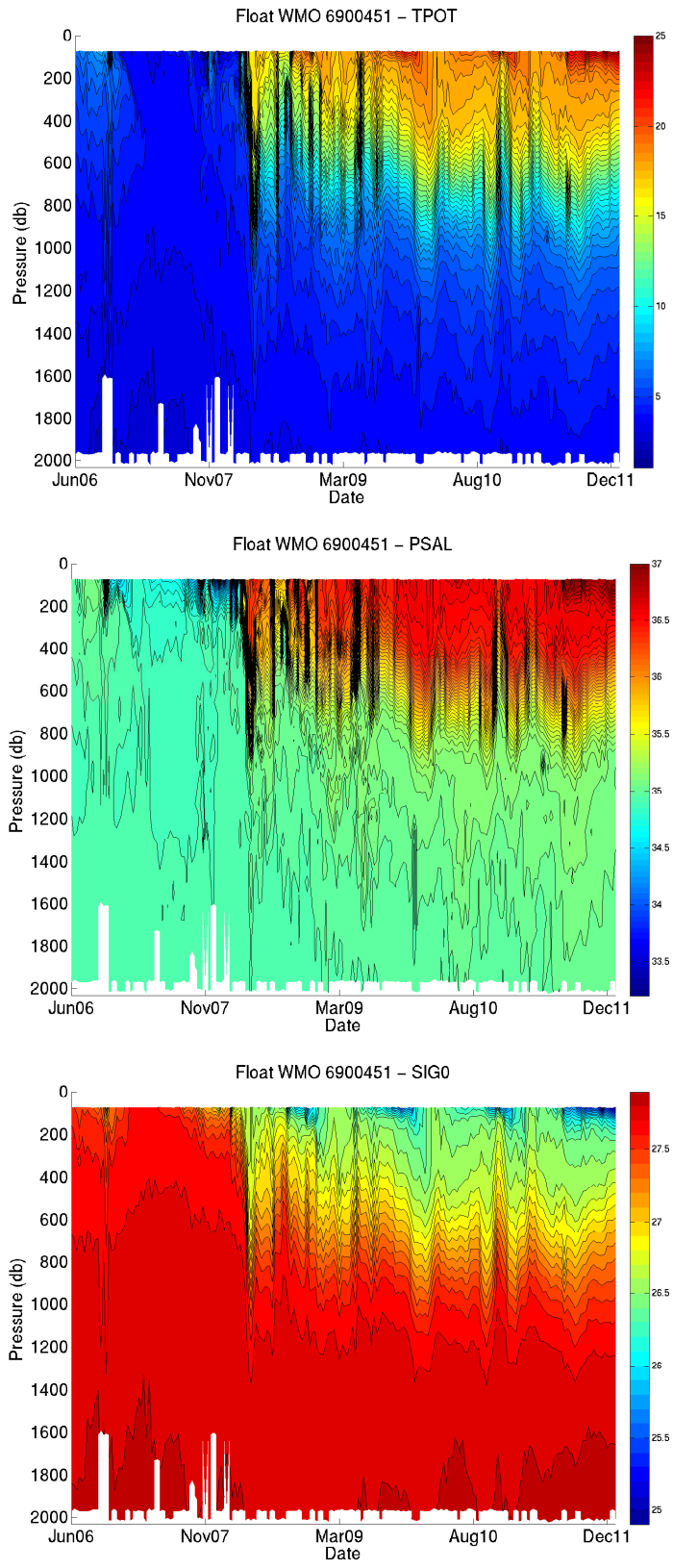
Figure 7: Potential temperature, salinity and potential density sections along the float trajectory (interpolated on standard levels). Quality flags are taken into account.
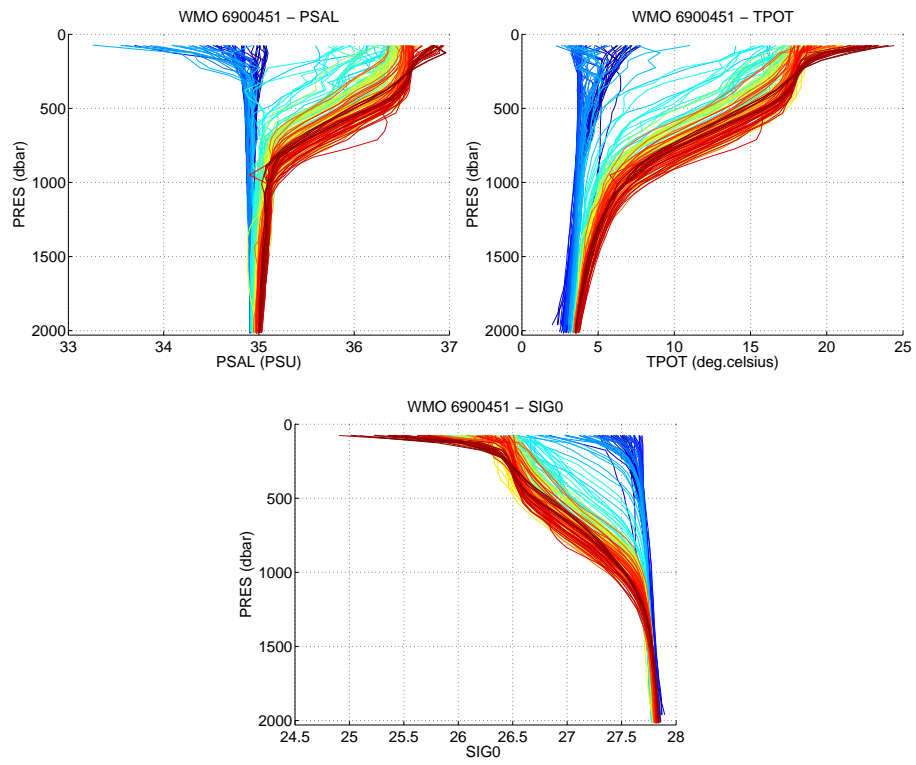
Figure 8: Salinity, Potential Temperature and Potential Density profiles. Quality flags are taken into account.
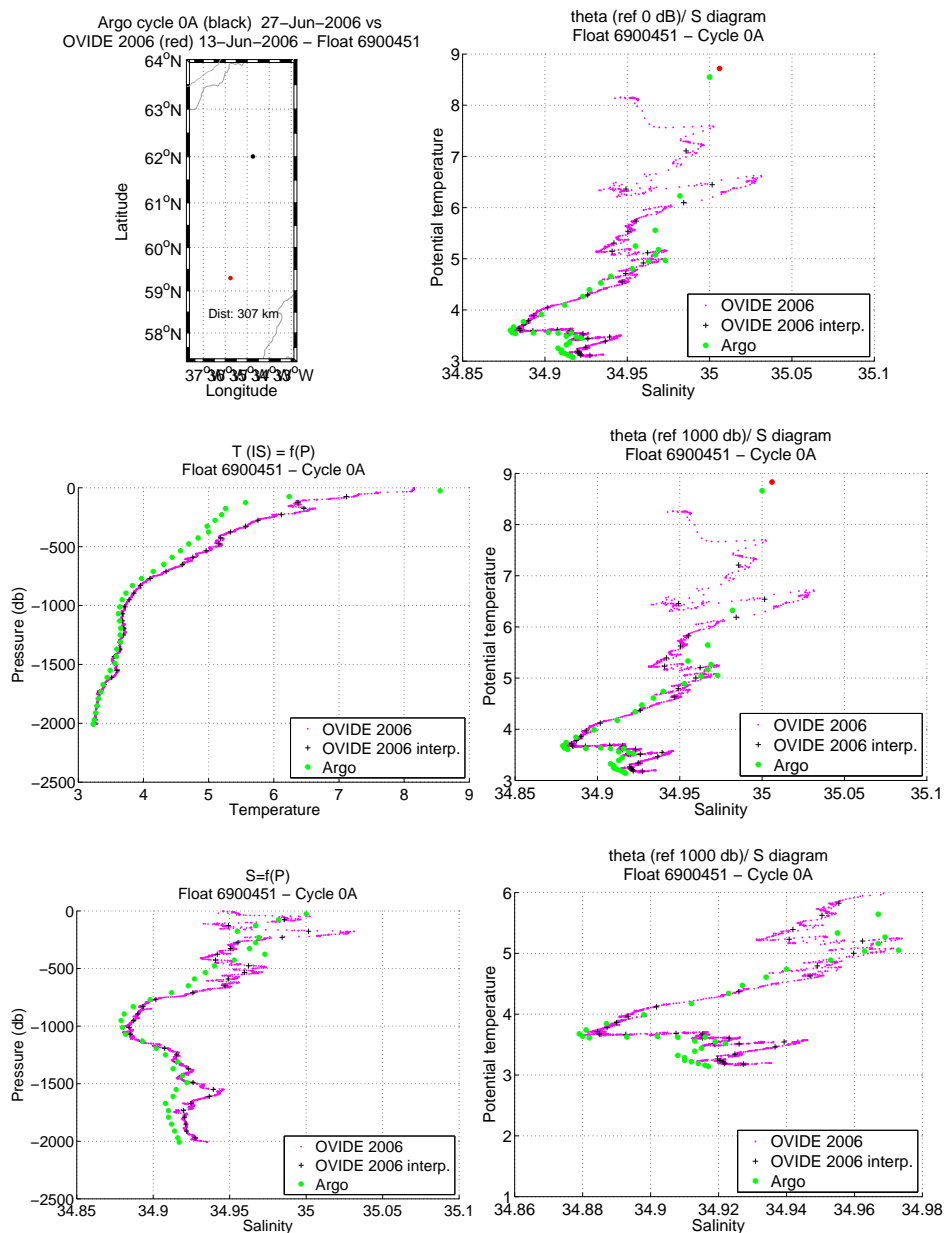
# 3 Comparison to the OVIDE 2006 nearest CTD profile

Figure 9: Comparison of the cycle 0A with the nearest CTD profile done after the float deployment.

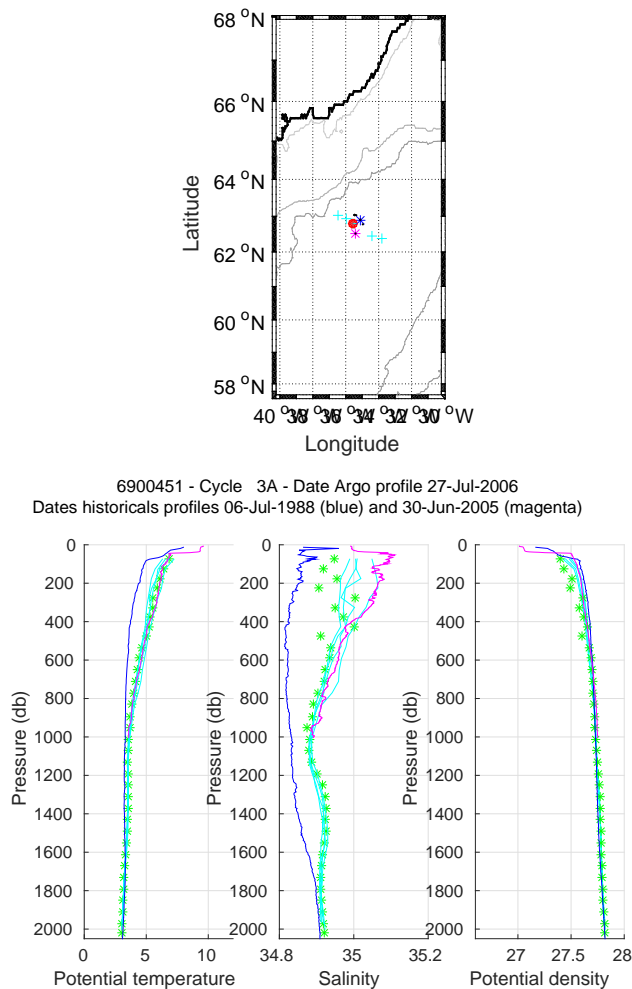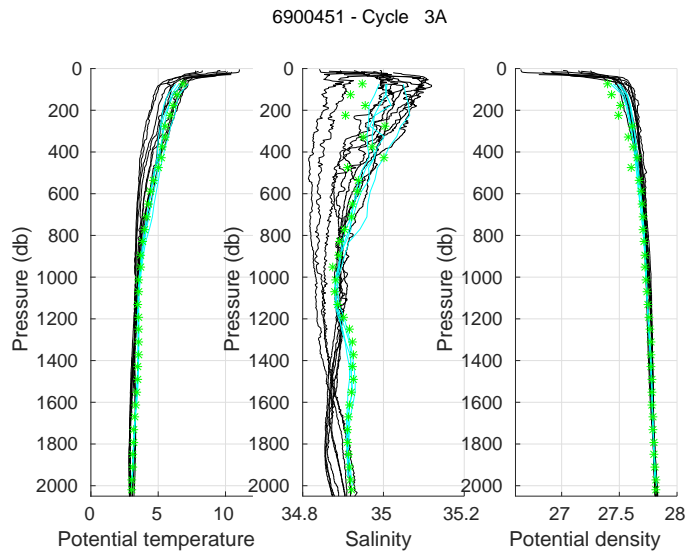# 4 Cycle 3 - Comparaison to the nearest historical CTD profiles



Figure 10: Flotteur 6900451, cycle 3. Upper panel: Position of the analysed Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest CTD profile in space is in blue. Lower panels: Temperature, salinity and potential density as function of pressure for the analysed 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 analysed 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).
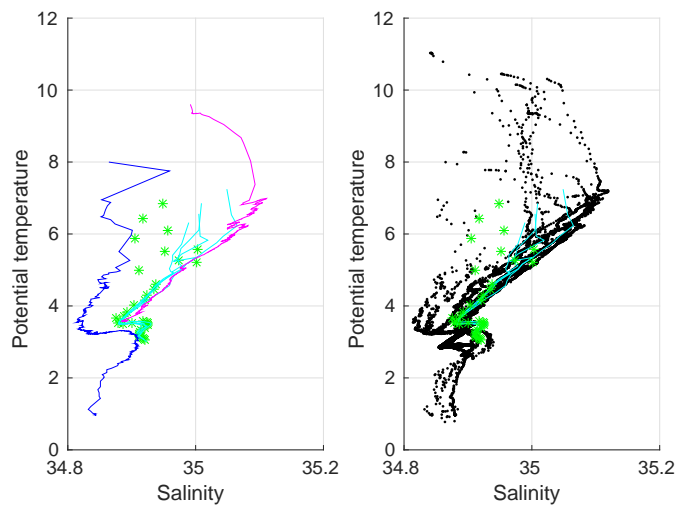
Figure 11: Float 6900451, cycle 3. The analysed Argo profile (stars) is compared to the nearest Argo profiles (black line) and to two specific profiles: the nearest Argo profile in time (magenta) and the nearest Argo profile in space (blue). The color of the analysed Argo profile represents the QC flag (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) $\theta$/S diagrams.

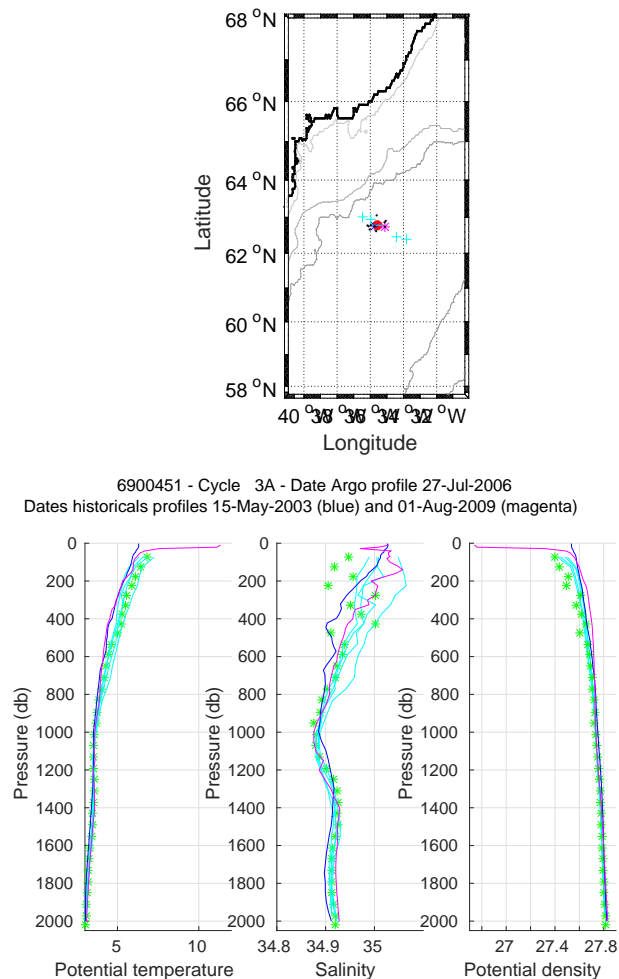# 5  Cycle 3 - Comparaison to the nearest ARGO profiles



Figure 12: Flotteur 6900451, cycle 3. Upper panel: Position of the analysed Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest CTD profile in space is in blue. Lower panels: Temperature, salinity and potential density as function of pressure for the analysed 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 analysed 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).
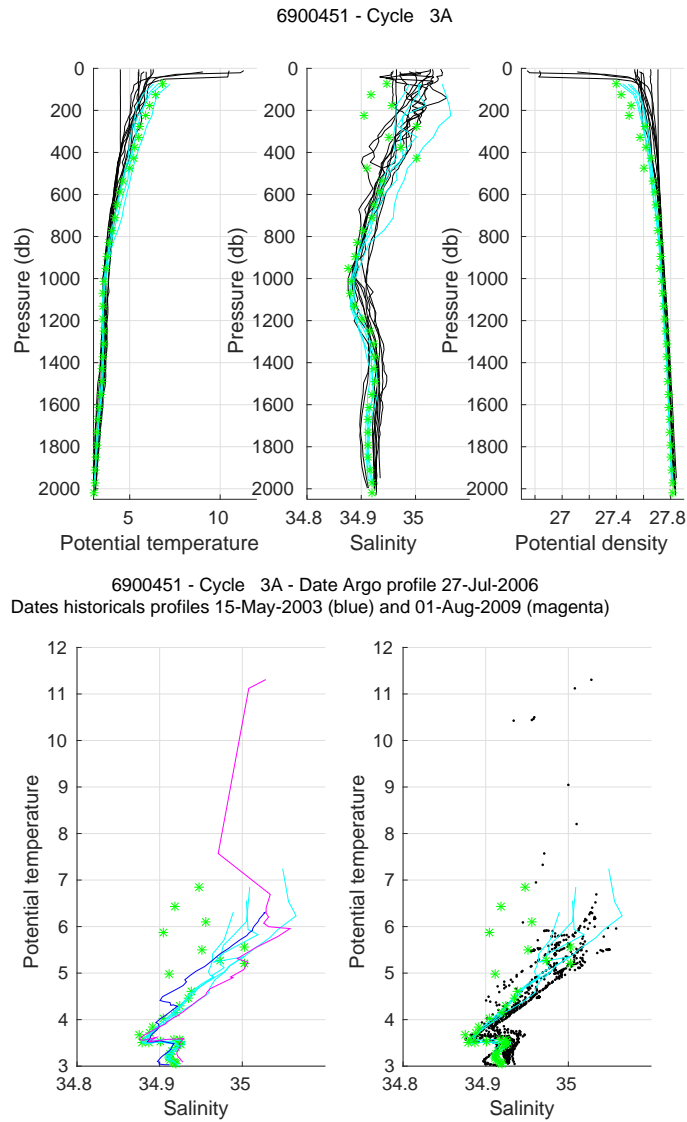
Figure 13: Float 6900451, cycle 3. The analysed Argo profile (stars) is compared to the nearest Argo profiles (black line) and to two specific profiles: the nearest Argo profile in time (magenta) and the nearest Argo profile in space (blue). The color of the analysed Argo profile represents the QC flag (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) $\theta$/S diagrams.

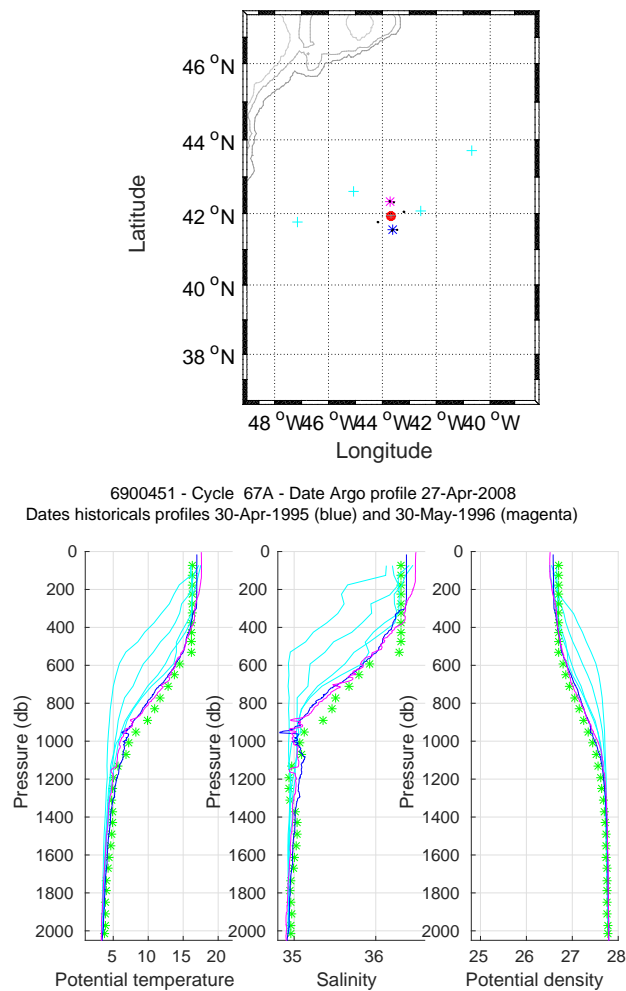# 6 Cycle 67 - Comparaison to the nearest historical CTD profiles



Figure 14: Flotteur 6900451, cycle 67. Upper panel: Position of the analysed Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest CTD profile in space is in blue. Lower panels: Temperature, salinity and potential density as function of pressure for the analysed 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 analysed 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).
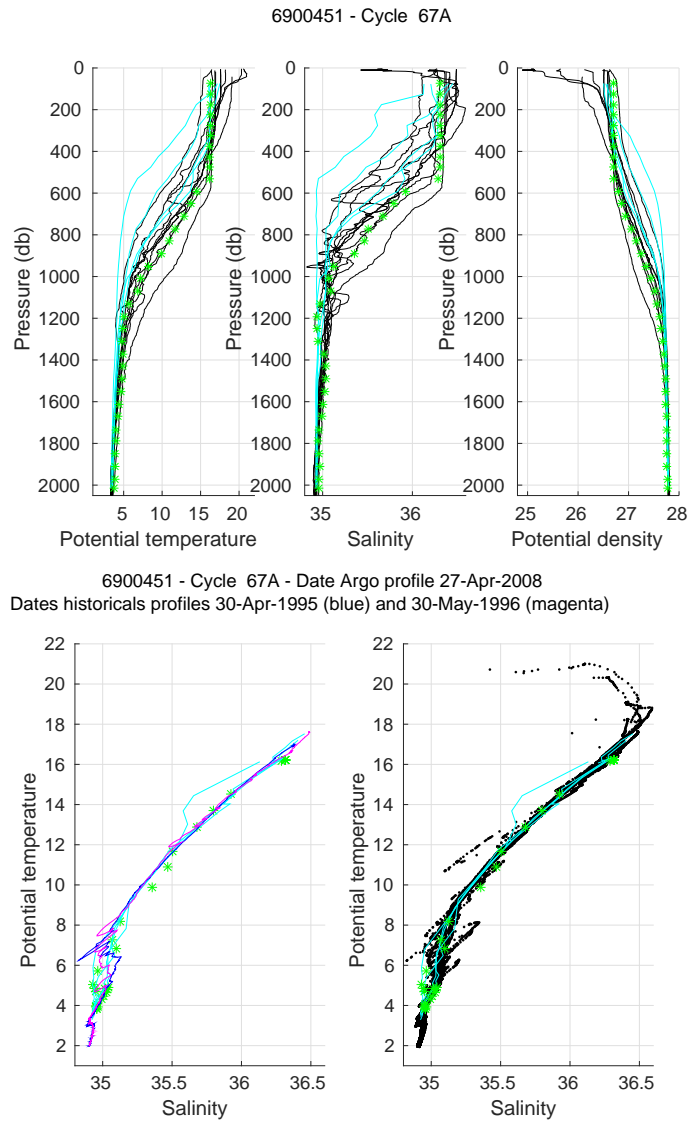
Figure 15: Float 6900451, cycle 67. The analysed Argo profile (stars) is compared to the nearest Argo profiles (black line) and to two specific profiles: the nearest Argo profile in time (magenta) and the nearest Argo profile in space (blue). The color of the analysed Argo profile represents the QC flag (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) $\theta$/S diagrams.

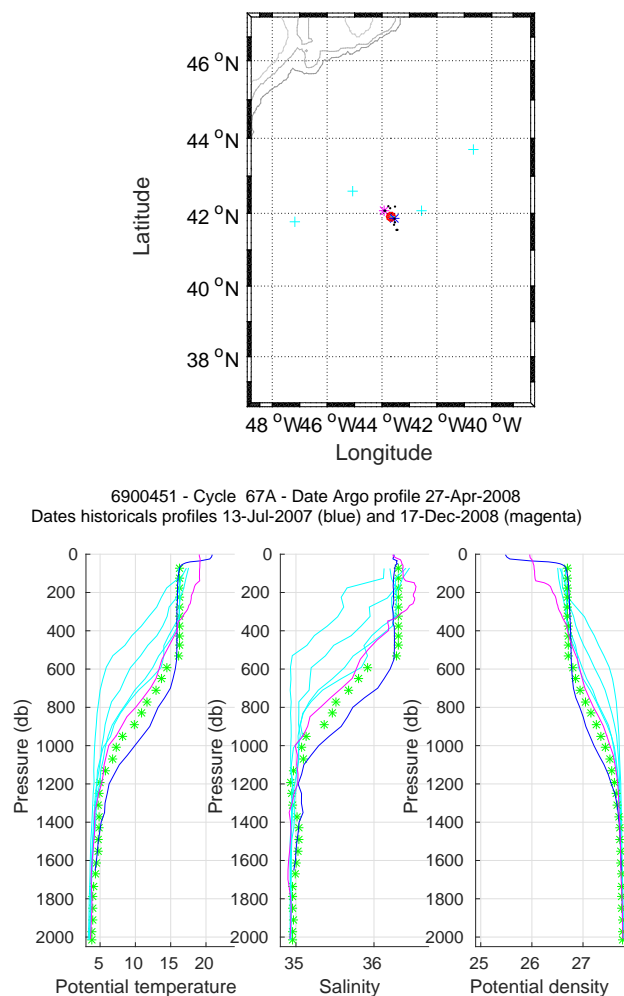# 7 Cycle 67 - Comparaison to the nearest ARGO profiles



Figure 16: Flotteur 6900451, cycle 67. Upper panel: Position of the analysed Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest CTD profile in space is in blue. Lower panels: Temperature, salinity and potential density as function of pressure for the analysed 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 analysed 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).
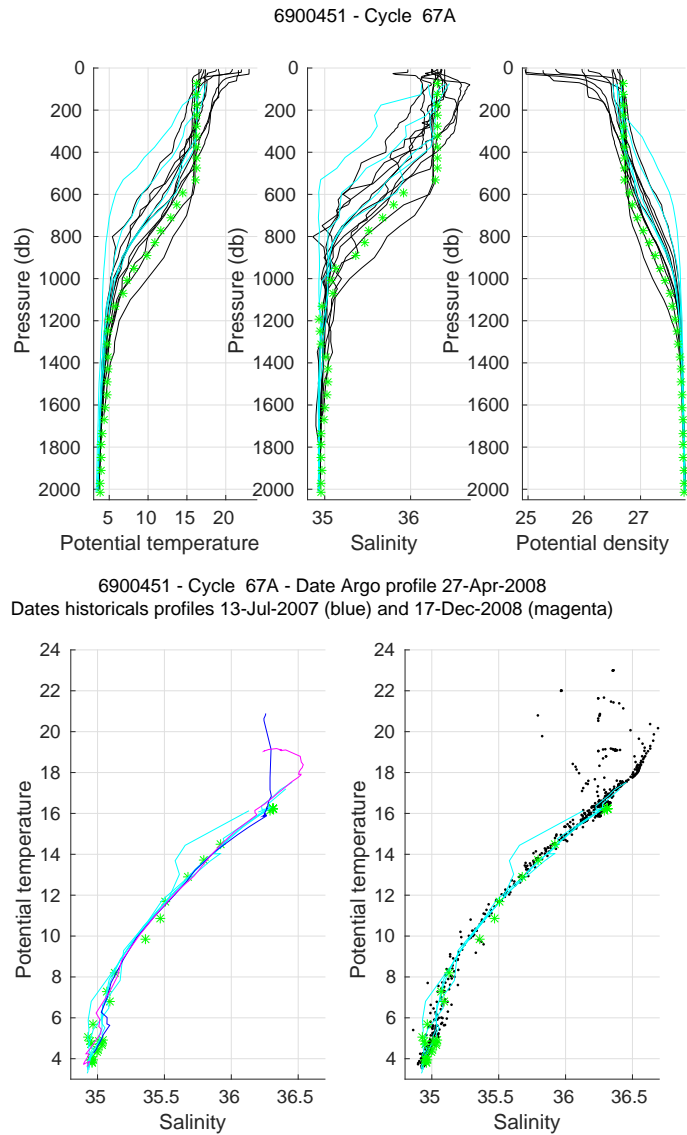
Figure 17: Float 6900451, cycle 67. The analysed Argo profile (stars) is compared to the nearest Argo profiles (black line) and to two specific profiles: the nearest Argo profile in time (magenta) and the nearest Argo profile in space (blue). The color of the analysed Argo profile represents the QC flag (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) $\theta$/S diagrams.

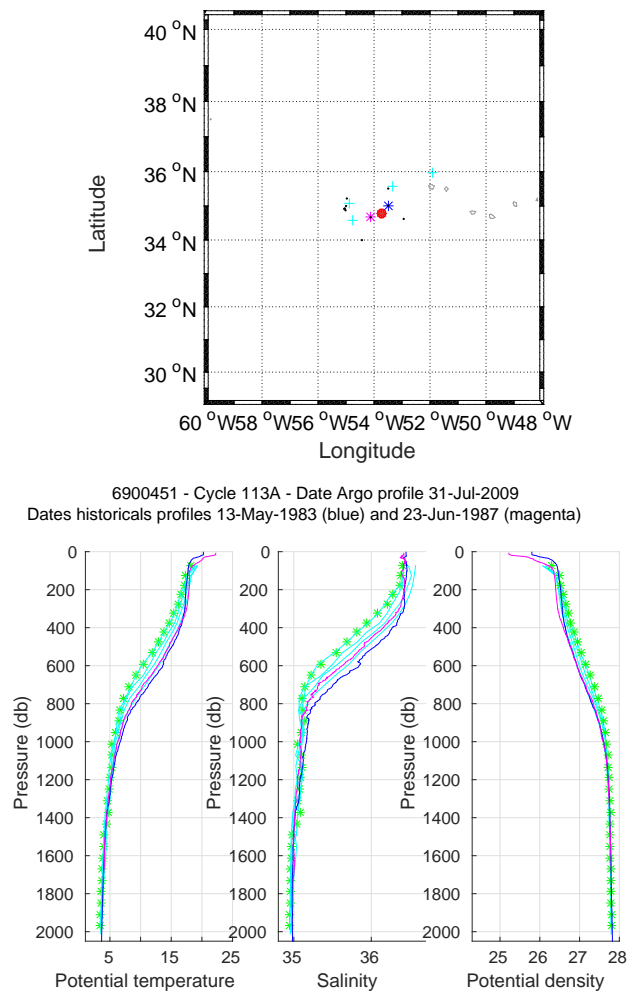# 8   Cycle 113 - Comparaison to the nearest historical CTD profiles



Figure 18: Flotteur 6900451, cycle 113. Upper panel: Position of the analysed CTD profile (red) and of the nearest CTD profiles (black). The nearest CTD profile in time is in magenta while the nearest CTD profile in space is in blue. Lower panels: Temperature, salinity and potential density as function of pressure for the analysed CTD profile (stars) and for the nearest CTD profile in time (magenta line) and for the nearest CTD profile in space (blue line). The color of the analysed CTD 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).
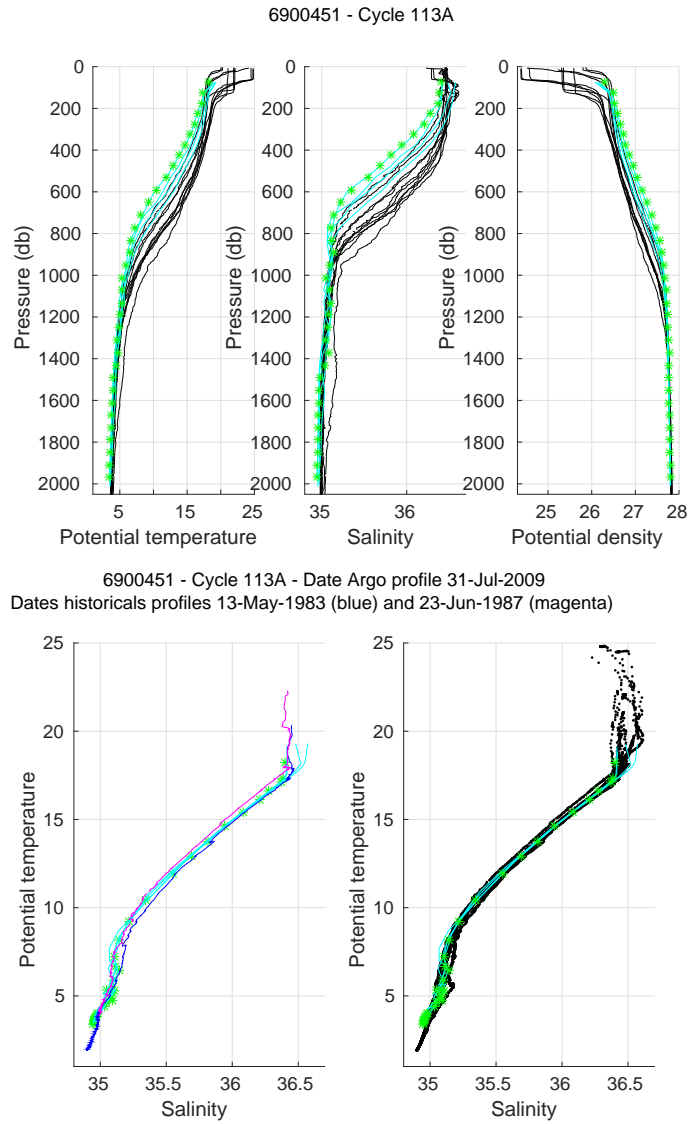
Figure 19: Float 6900451, cycle 113. The analysed CTD profile (stars) is compared to the nearest CTD profiles (black line) and to two specific profiles: the nearest CTD profile in time (magenta) and the nearest CTD profile in space (blue). The color of the analysed CTD profile represents the QC flag (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) $\theta$/S diagrams.

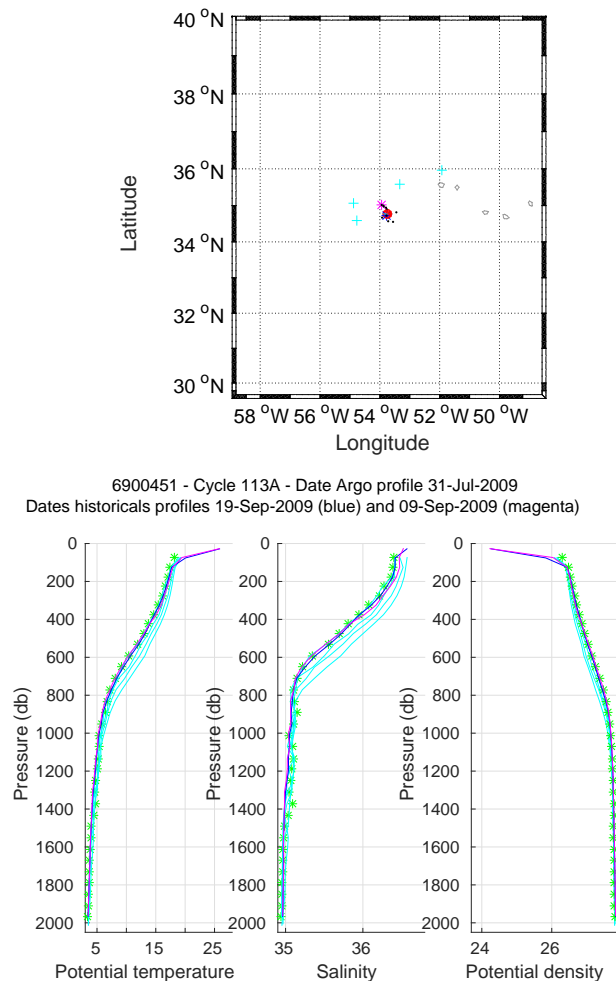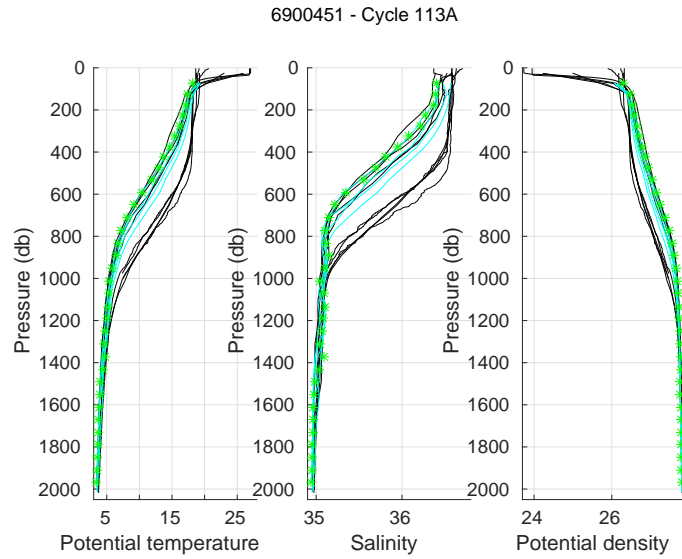# 9    Cycle 113 - Comparaison to the nearest ARGO profiles



Figure 20: Flotteur 6900451, cycle 113. Upper panel: Position of the analysed Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest CTD profile in space is in blue. Lower panels: Temperature, salinity and potential density as function of pressure for the analysed 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 analysed 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).
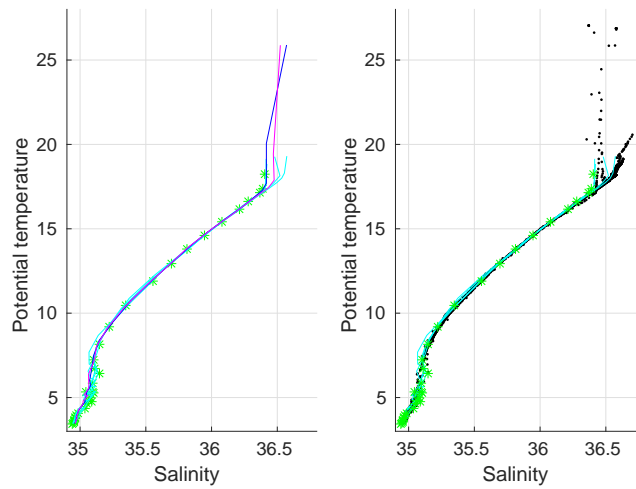
Figure 21: Float 6900451, cycle 113. The analysed Argo profile (stars) is compared to the nearest Argo profiles (black line) and to two specific profiles: the nearest Argo profile in time (magenta) and the nearest Argo profile in space (blue). The color of the analysed Argo profile represents the QC 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) $\theta$/S diagrams.

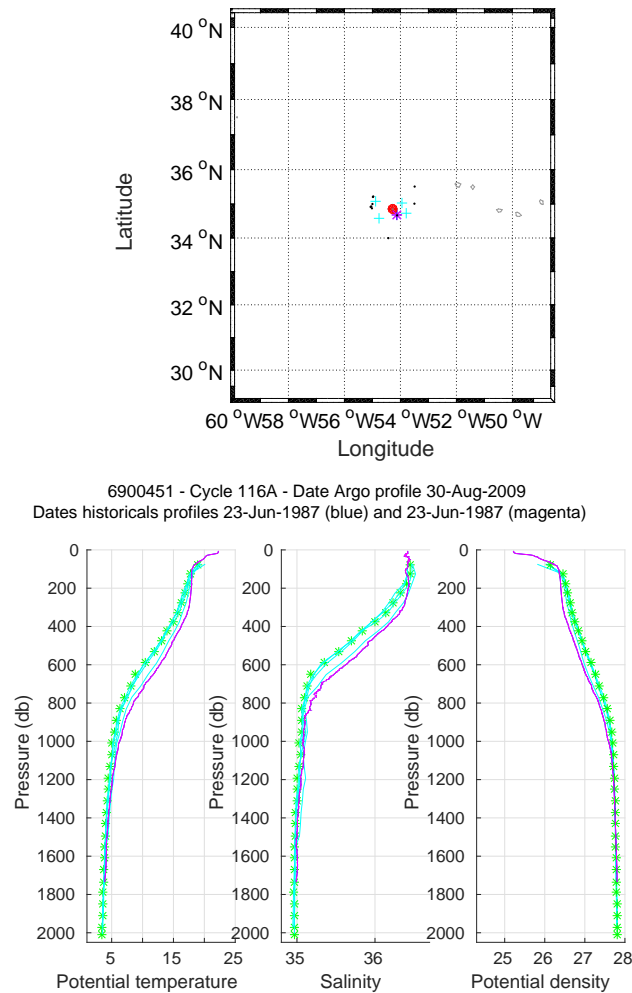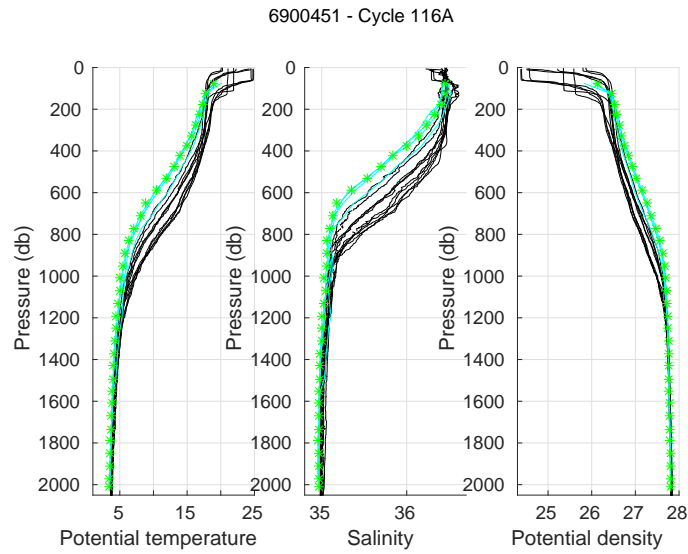# 10 Cycle 116 - Comparaison to the nearest historical CTD profiles



Figure 22: Flotteur 6900451, cycle 116. Upper panel: Position of the analysed CTD profile (red) and of the nearest CTD profiles (black). The nearest CTD profile in time is in magenta while the nearest CTD profile in space is in blue. Lower panels: Temperature, salinity and potential density as function of pressure for the analysed CTD profile (stars) and for the nearest CTD profile in time (magenta line) and for the nearest CTD profile in space (blue line). The color of the analysed CTD 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).
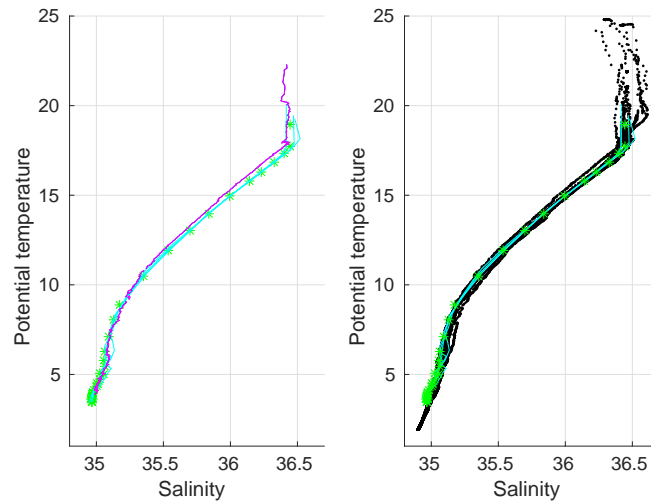
Figure 23: Float 6900451, cycle 116. The analysed CTD profile (stars) is compared to the nearest CTD profiles (black line) and to two specific profiles: the nearest CTD profile in time (magenta) and the nearest CTD profile in space (blue). The color of the analysed CTD profile represents the QC flag (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) $\theta$/S diagrams.

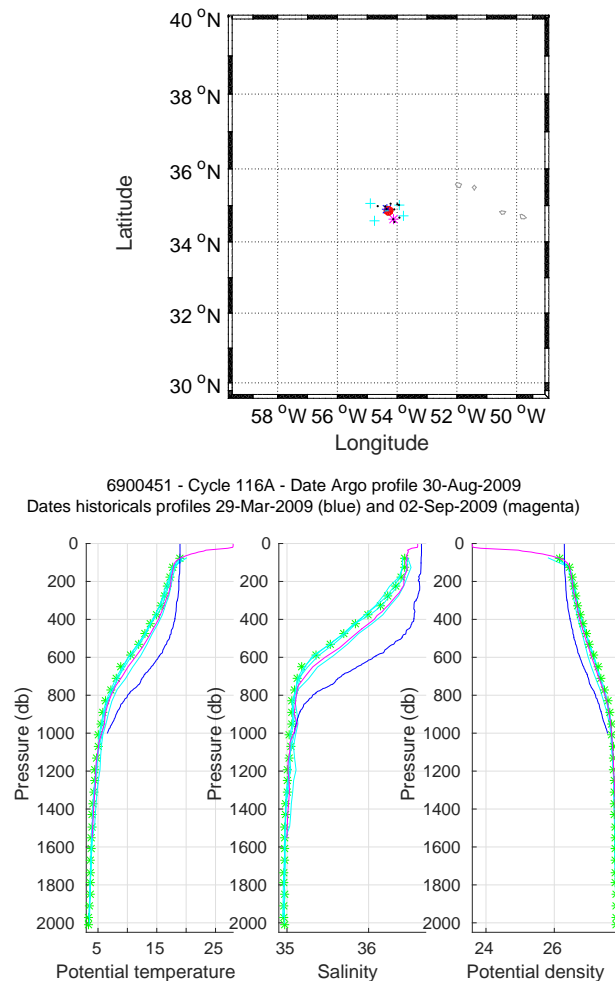# 11   Cycle 116 - Comparaison to the nearest ARGO profiles



Figure 24: Flotteur 6900451, cycle 116. Upper panel: Position of the analysed Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest CTD profile in space is in blue. Lower panels: Temperature, salinity and potential density as function of pressure for the analysed 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 analysed 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).
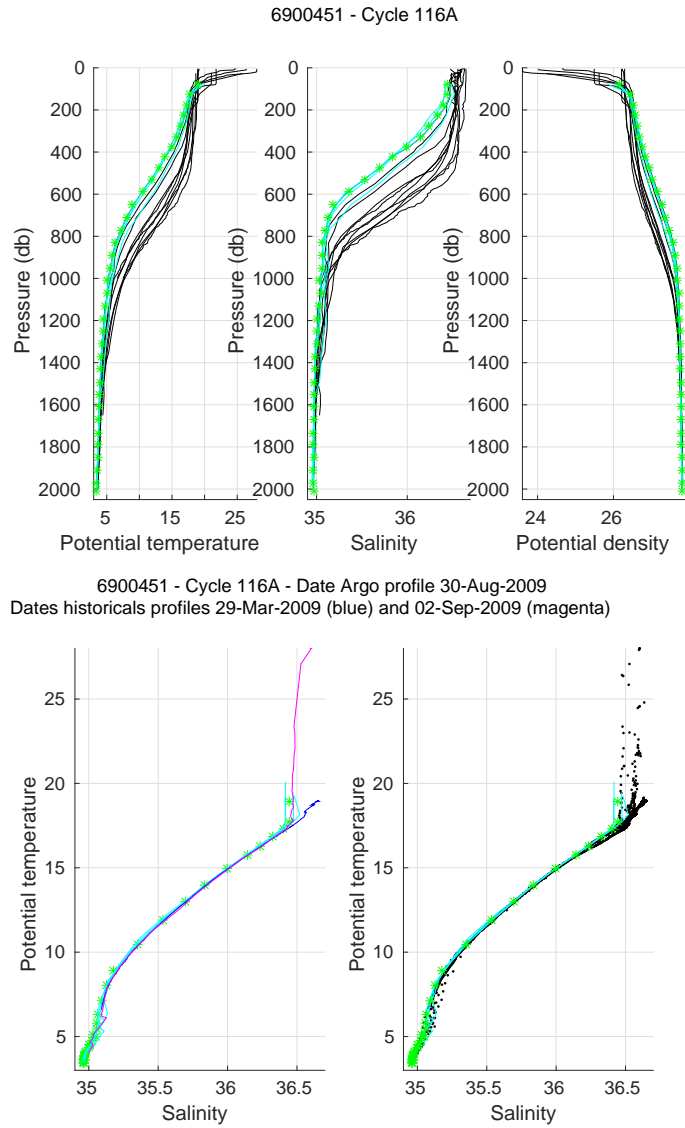
Figure 25: Float 6900451, cycle 116. The analysed Argo profile (stars) is compared to the nearest Argo profiles (black line) and to two specific profiles: the nearest Argo profile in time (magenta) and the nearest Argo profile in space (blue). The color of the analysed Argo profile represents the QC 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) $\theta$/S diagrams.

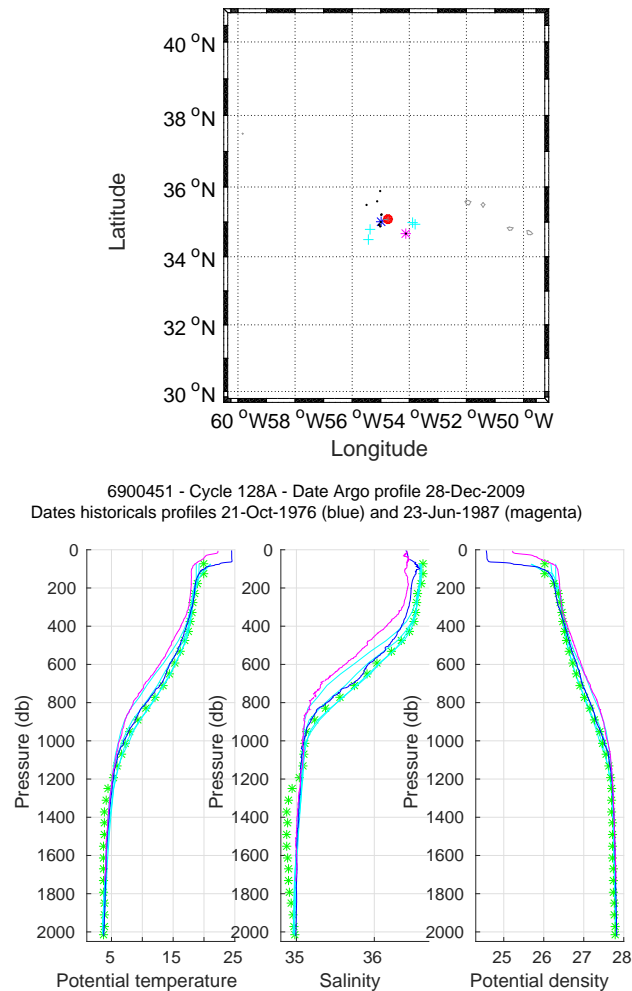# 12 Cycle 128 - Comparaison to the nearest historical CTD profiles



Figure 26: Flotteur 6900451, cycle 128. Upper panel: Position of the analysed CTD profile (red) and of the nearest CTD profiles (black). The nearest CTD profile in time is in magenta while the nearest CTD profile in space is in blue. Lower panels: Temperature, salinity and potential density as function of pressure for the analysed CTD profile (stars) and for the nearest CTD profile in time (magenta line) and for the nearest CTD profile in space (blue line). The color of the analysed CTD 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).
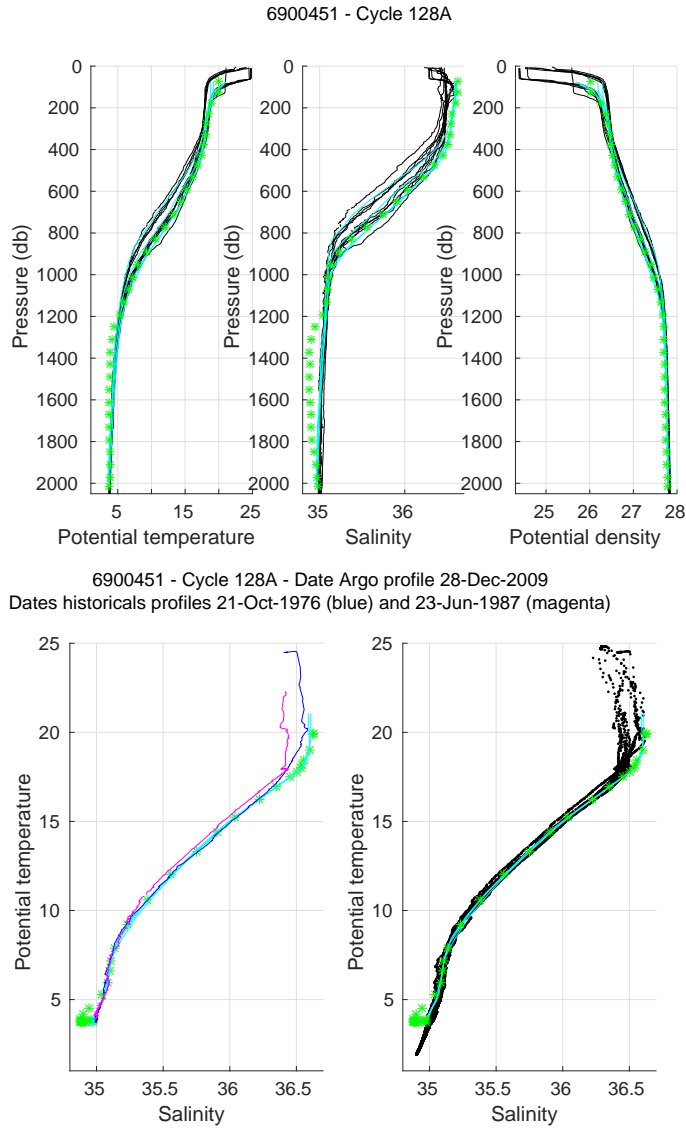
Figure 27: Float 6900451, cycle 128. The analysed CTD profile (stars) is compared to the nearest CTD profiles (black line) and to two specific profiles: the nearest CTD profile in time (magenta) and the nearest CTD profile in space (blue). The color of the analysed CTD profile represents the QC flag (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) $\theta$/S diagrams.

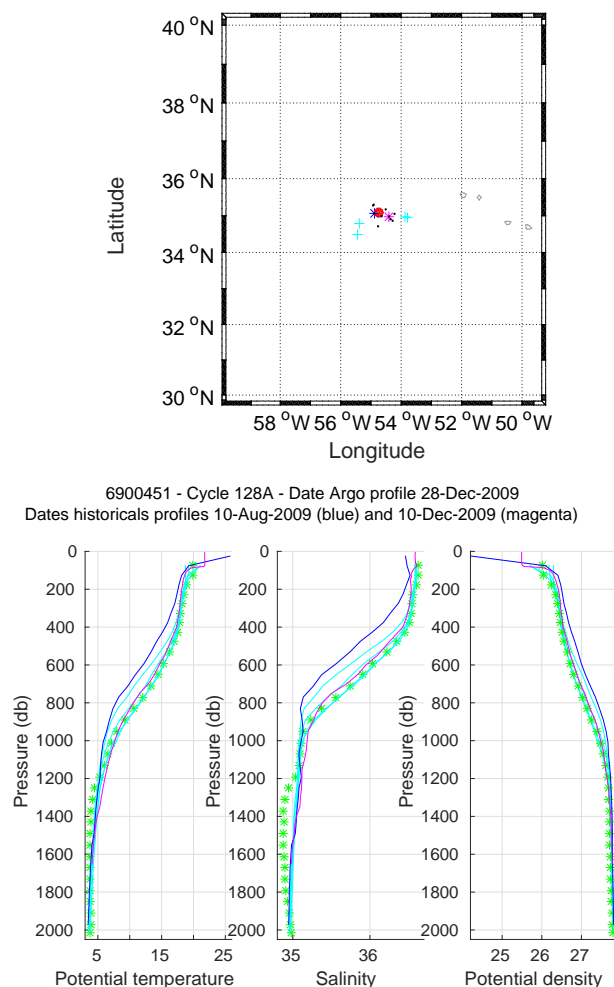# 13 Cycle 128 - Comparaison to the nearest ARGO profiles



Figure 28: Flotteur 6900451, cycle 128. Upper panel: Position of the analysed Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest CTD profile in space is in blue. Lower panels: Temperature, salinity and potential density as function of pressure for the analysed 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 analysed 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).
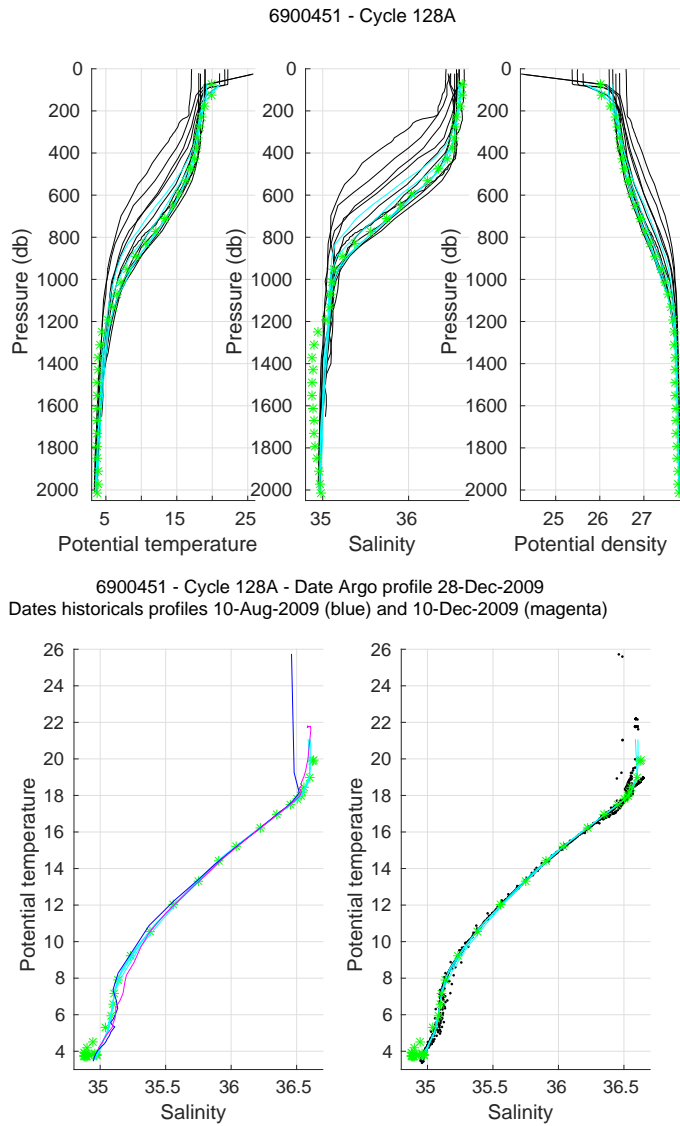
Figure 29: Float 6900451, cycle 128. The analysed Argo profile (stars) is compared to the nearest Argo profiles (black line) and to two specific profiles: the nearest Argo profile in time (magenta) and the nearest Argo profile in space (blue). The color of the analysed Argo profile represents the QC 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) $\theta$/S diagrams.

# 14 Cycle 176 - Comparaison to the nearest historical CTD profiles



6900451 - Cycle 176A - Date Argo profile 22-Apr-2011
Dates historicals profiles 18-May-1981 (blue) and 24-Apr-1989 (magenta)
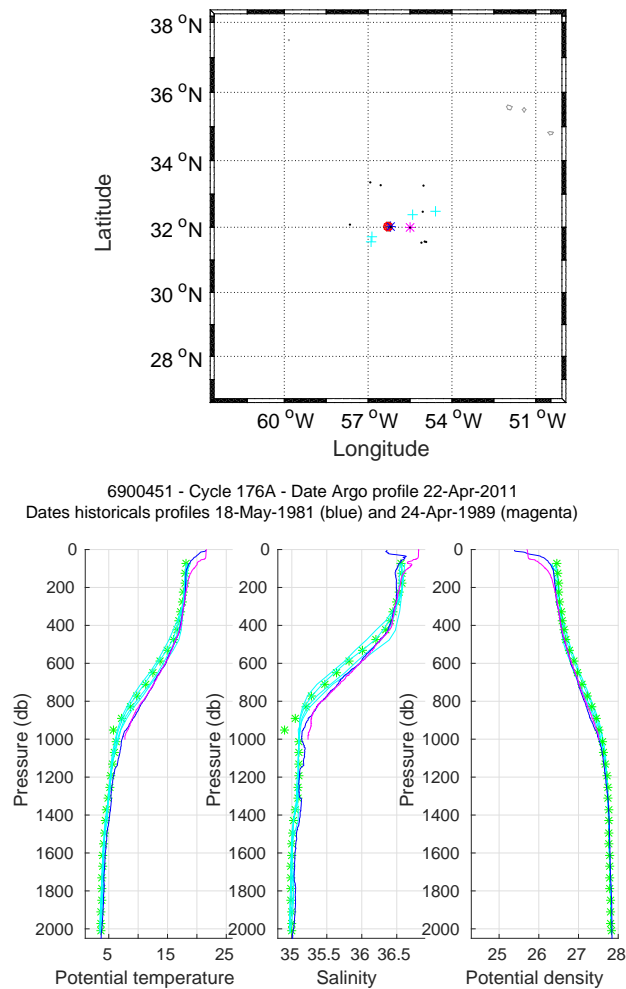
Figure 30: Flotteur 6900451, cycle 176. Upper panel: Position of the analysed CTD profile (red) and of the nearest CTD profiles (black). The nearest CTD profile in time is in magenta while the nearest CTD profile in space is in blue. Lower panels: Temperature, salinity and potential density as function of pressure for the analysed CTD profile (stars) and for the nearest CTD profile in time (magenta line) and for the nearest CTD profile in space (blue line). The color of the analysed CTD 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).
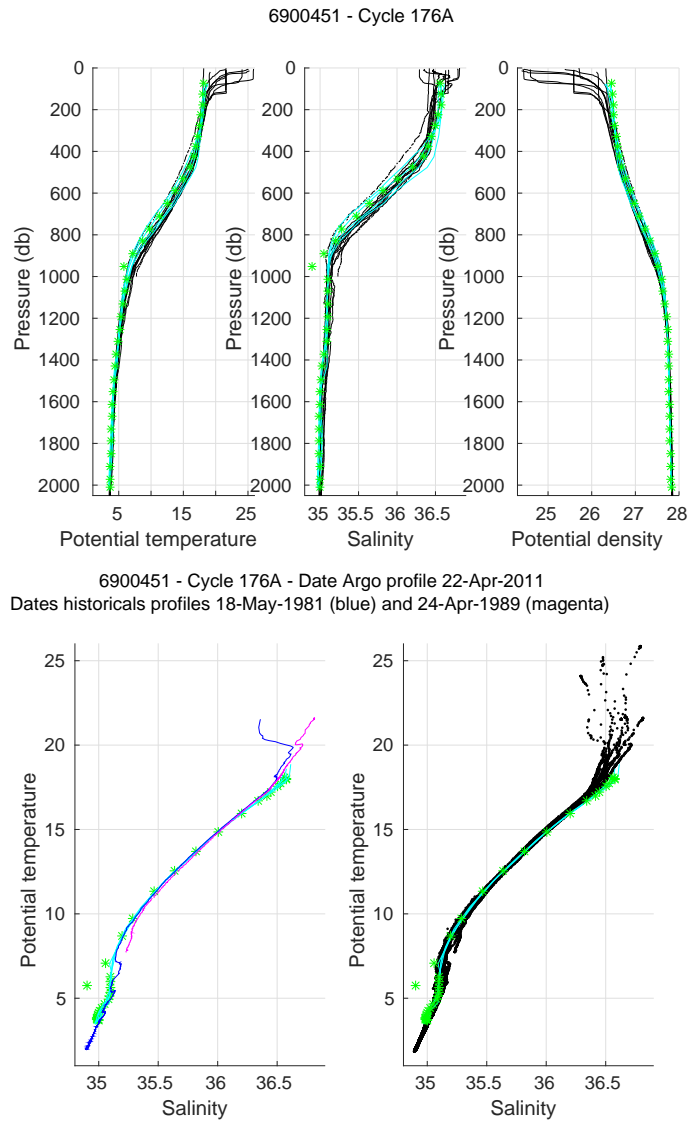
6900451 - Cycle 176A

Figure 31: Float 6900451, cycle 176. The analysed CTD profile (stars) is compared to the nearest CTD profiles (black line) and to two specific profiles: the nearest CTD profile in time (magenta) and the nearest CTD profile in space (blue). The color of the analysed CTD 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) $\theta$/S diagrams.

# 15  Cycle 176 - Comparaison to the nearest ARGO profiles
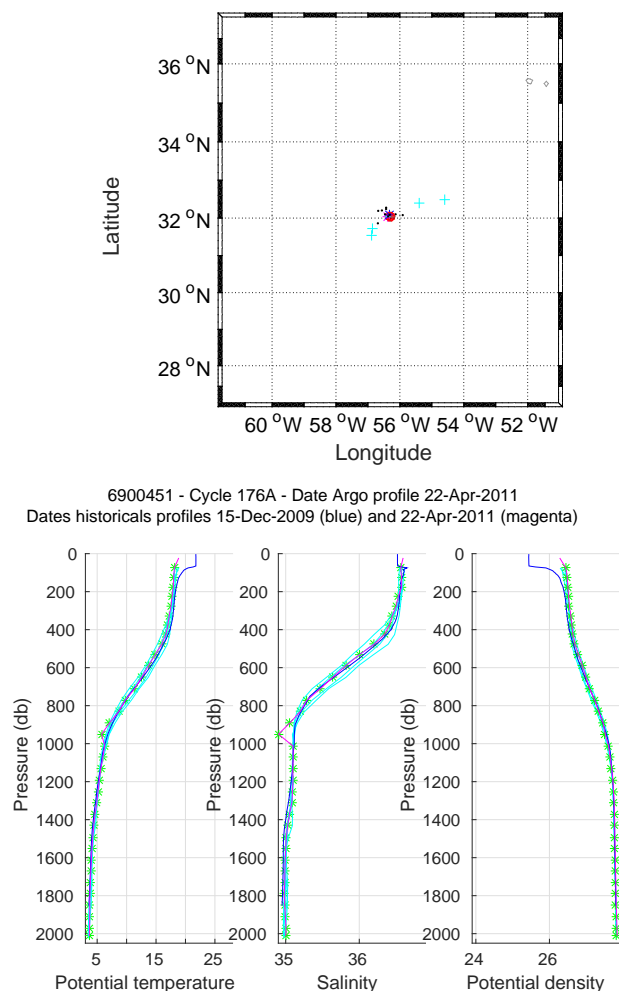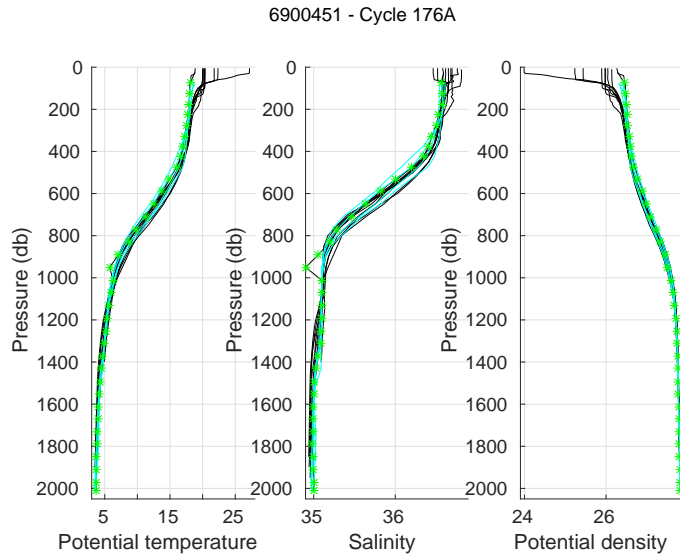


Figure 32: Flotteur 6900451, cycle 176. Upper panel: Position of the analysed Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest CTD profile in space is in blue. Lower panels: Temperature, salinity and potential density as function of pressure for the analysed 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 analysed 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).
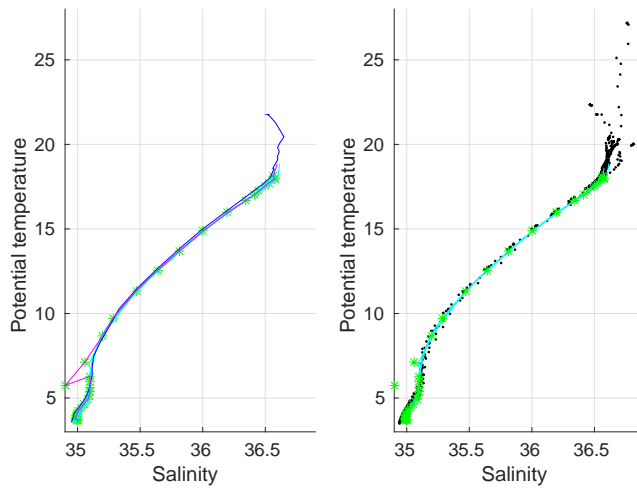
Figure 33: Float 6900451, cycle 176. The analysed Argo profile (stars) is compared to the nearest Argo profiles (black line) and to two specific profiles: the nearest Argo profile in time (magenta) and the nearest Argo profile in space (blue). The color of the analysed Argo profile represents the QC 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) $\theta$/S diagrams.

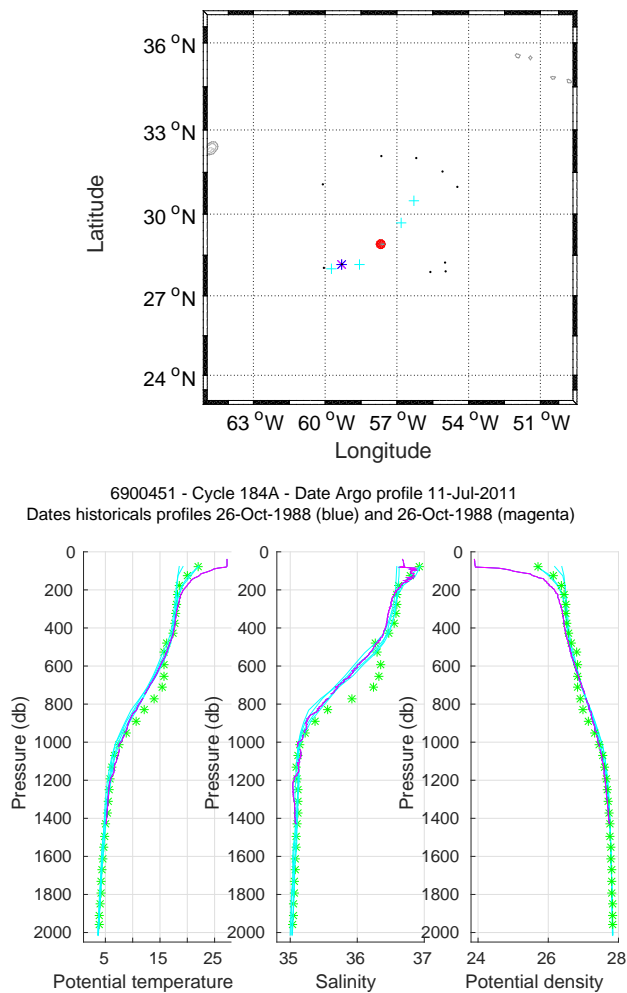# 16 Cycle 184 - Comparaison to the nearest historical CTD profiles



Figure 34: Flotteur 6900451, cycle 184. Upper panel: Position of the analysed Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest CTD profile in space is in blue. Lower panels: Temperature, salinity and potential density as function of pressure for the analysed 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 analysed 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).
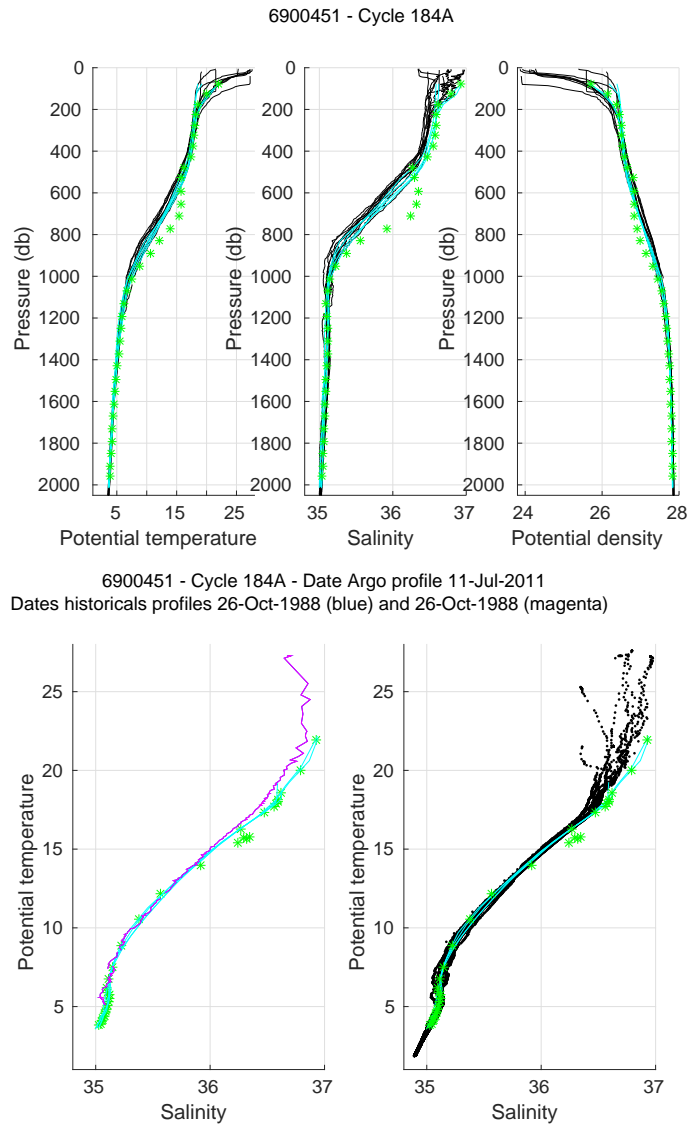
Figure 35: Float 6900451, cycle 184. The analysed Argo profile (stars) is compared to the nearest Argo profiles (black line) and to two specific profiles: the nearest Argo profile in time (magenta) and the nearest Argo profile in space (blue). The color of the analysed Argo profile represents the QC 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) $\theta$/S diagrams.

# 17   Cycle 184 - Comparaison to the nearest ARGO profiles



6900451 - Cycle 184A - Date Argo profile 11-Jul-2011
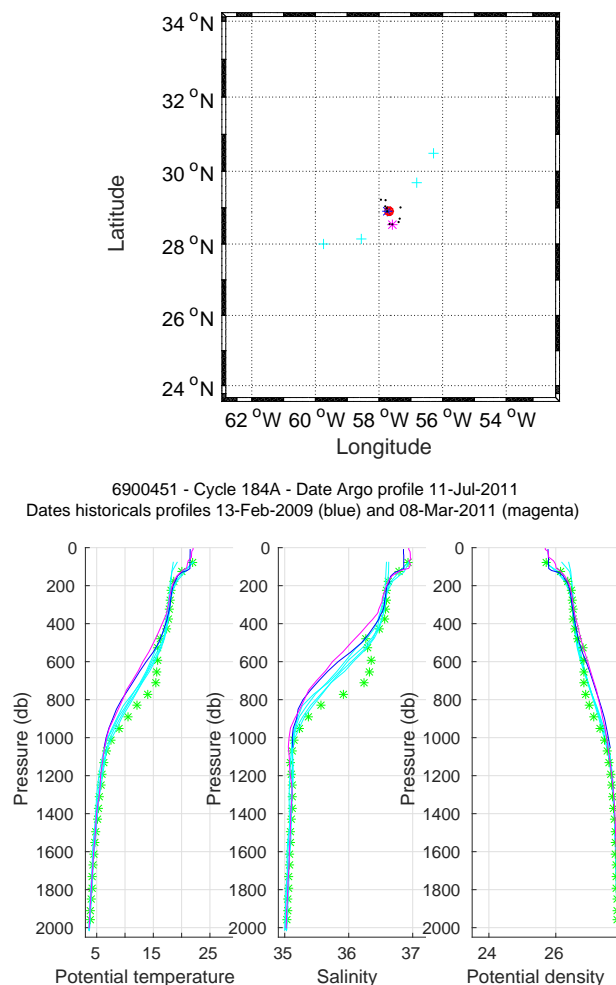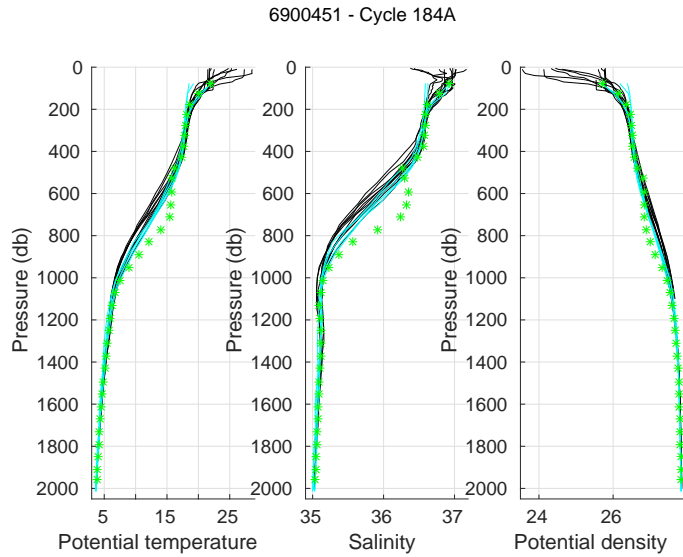Dates historicals profiles 13-Feb-2009 (blue) and 08-Mar-2011 (magenta)

Figure 36: Flotteur 6900451, cycle 184. Upper panel: Position of the analysed Argo profile (red) and of the nearest Argo profiles (black). The nearest Argo profile in time is in magenta while the nearest CTD profile in space is in blue. Lower panels: Temperature, salinity and potential density as function of pressure for the analysed 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 analysed 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).
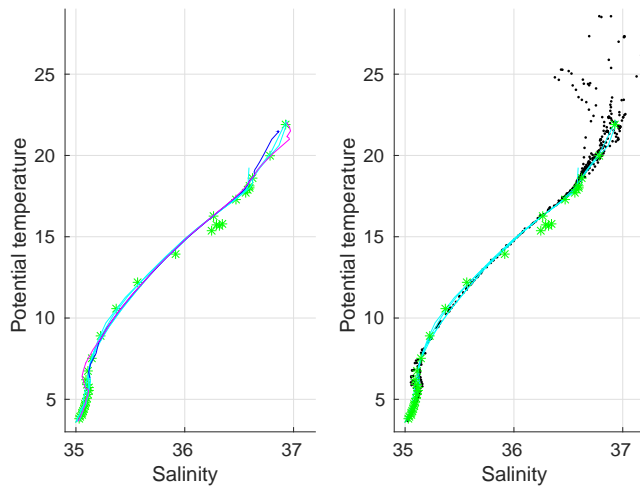
Figure 37: Float 6900451, cycle 184. The analysed Argo profile (stars) is compared to the nearest Argo profiles (black line) and to two specific profiles: the nearest Argo profile in time (magenta) and the nearest Argo profile in space (blue). The color of the analysed Argo profile represents the QC 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) $\theta$/S diagrams.
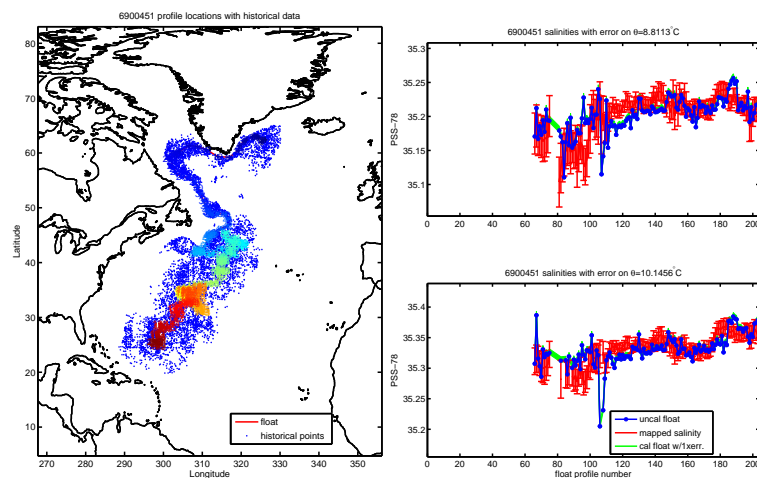
# 18  OW method, CONFIGURATION # 129



Figure 38: Figures from the OW method. (Left) Position of the historical and float data. (Right) Comparison, on various $\theta$ levels, between the float data and the historical data interpolated at the float position.
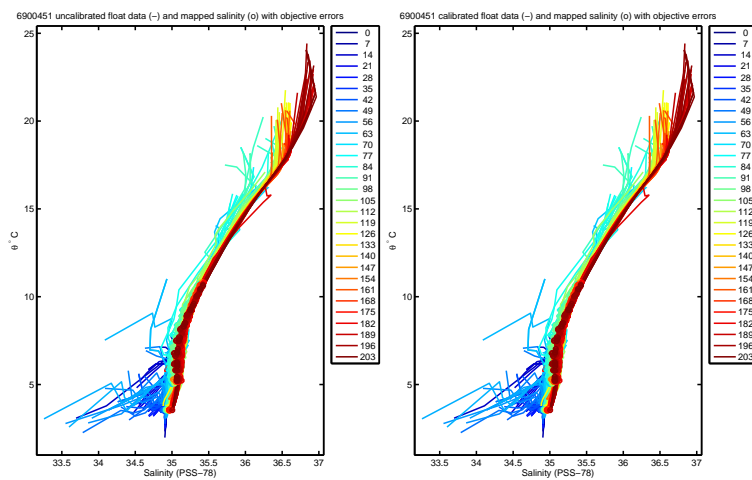


Figure 39: Figures from the OW method. Compararison of the $\theta/S$ diagram of the float with the historial database. (left) raw data; (right) corrected data using the OW correction.
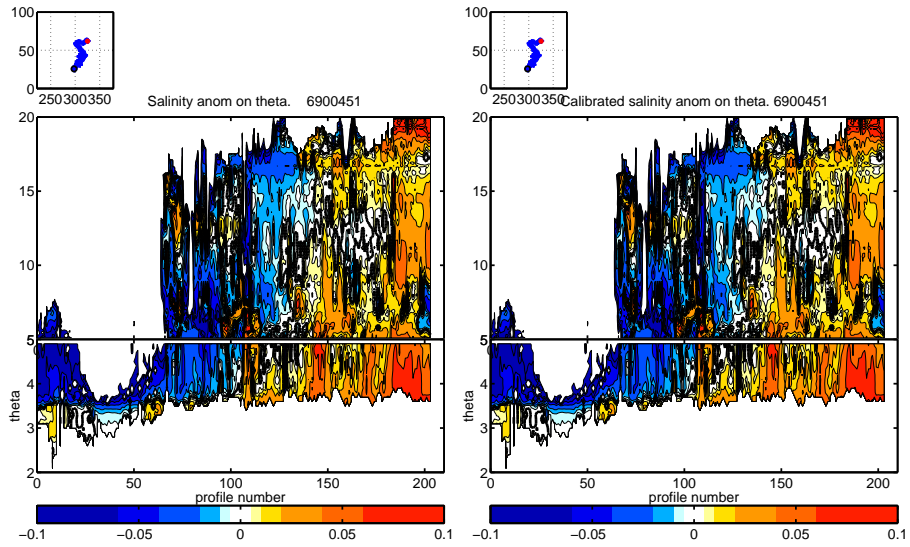
Figure 40: Figures from the OW method. Salinity anomaly:(left) raw data; (right) corrected data using the OW correction.
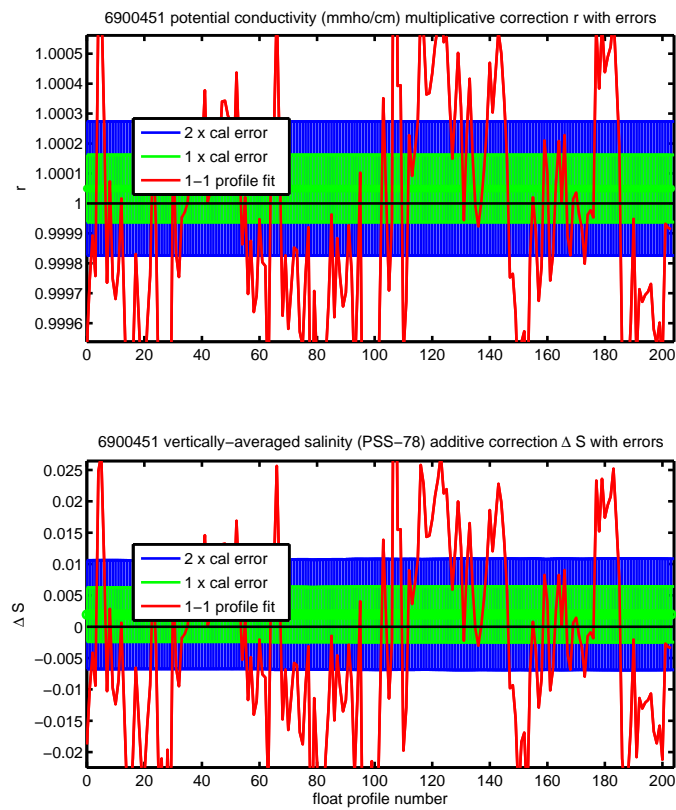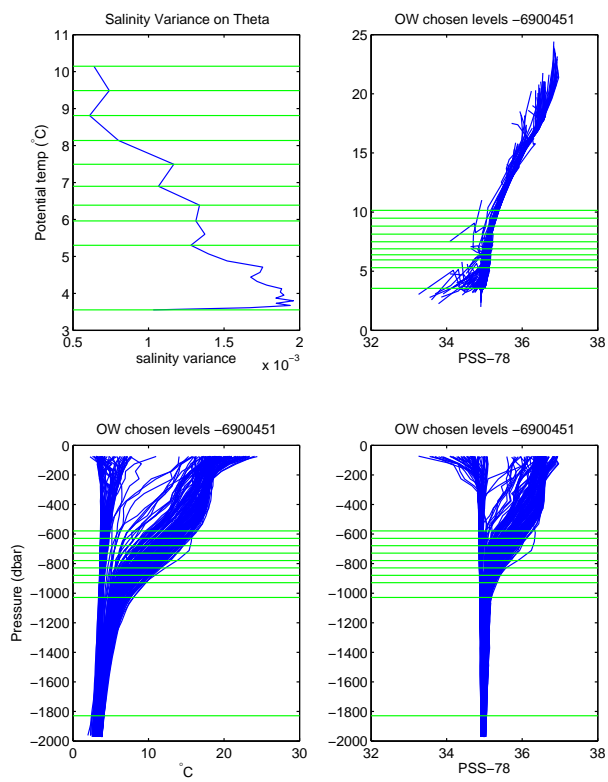


Figure 41: Correction proposed by the OW method.

Figure 42: Chosed levels by the OW method.