
Check of DM corrections of NAARC floats (DAC: CORIOLIS) (Argo Snapshot: 06/2019, DM OPERATOR: B. Klein)

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As part of North Atlantic ARC activities, the floats processed in delayed mode in the NAARC region have been checked again. Here we present the results for some floats of the CORIOLIS data center with DM OPERATOR: B. Klein

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1 Method

In the snapshot of May 2019, 2531 floats have been processed in DM in the NAARC region (North of 20°S). Among them, we found 418 floats for which the PI applied a salinity correction and 2084 floats for which no salinity correction was necessary (i.e. the adjusted salinity profile is equal to the raw salinity profile). For each 2531 floats, we run a modified OW method using four sets of configuration parameters given in table 1, namely configurations 129, 1291, 1292, 1293. Compared to the OW original method (Owens and Wong, 2009), our modified method better take into account the interannual variability and provide more realistic error bars (see Cabanes et al., 2016). Particularly, a Gaussian decay was added to compute the covariance matrix that is used to estimate the large scale field at the float profile position, allowing to give more weight to contemporary reference data.

We further checked the DM salinity correction of a float only if the results get for all of the four configurations differ significantly from the result obtained by the PI of the float. Note that we used an additional run (configuration 124, see table 1) for floats that sample Mediterranean Water masses. We were then able to isolate a small number of floats for which salinity profiles were further checked: sections along the float trajectory, comparison of some profiles with the closest reference data or with the closest real-time argo data available, if needed. Finally, when we thought it was necessary, we suggested to modify the salinity corrections.

OW CONFIGURATION	129	1291	1292	1293	1294
CONFIG.MAX_CASTS	250	250	250	250	250
MAP_USE_PV	1	1	1	1	1
MAP_USE_SAF	0	0	0	0	0
MAPSCALE.LONGITUDE.LARGE	3.2	1	3.2	3.2	3.2
MAPSCALE.LONGITUDE.SMALL	0.8	0.5	0.8	0.8	0.8
MAPSCALE.LATITUDE.LARGE	2	0.5	2	2	2
MAPSCALE.LATITUDE.SMALL	0.5	0.25	0.5	0.5	0.5
MAPSCALE.PH.LARGE	0.1	0.5	0.1	0.1	0.1
MAPSCALE.PH.SMALL	0.02	0.1	0.02	0.02	0.02
MAPSCALE.AGE	0.69	0.69	0.69	0.69	0.69
MAPSCALE.AGE.LARGE	2	2	10	2	2
MAP_P_EXCLUDE	0	0	0	0	0
MAP_P_DELTA	250	250	250	250	250
Constraint on chosen levels	none	none	none	> 1000m	< 1000m
Reference data base	ARGO (2018v01) and CTD (2018v02)				

Table 1: Parameters of the OW method for different configurations used in this study. Compared to the original OW method, the large scale mapping use a Gaussian decay - MAPSCALE_AGE_LARGE -, the calculation of the mapping error is modified and the horizontal covariance is taken into account for the computation of the error on the fit.

2 Results

2.1 Summary and suggestions

It may be necessary to revise the correction for 1 float listed in table 2.

WMO Number	Launch date	Centre	PI	Last cycle analysed (Active/NotActive)	netcdf files version (prof files)
4901422	06/06/2015	IF	B.Klein	97(NA)	3.1

Table 2: Floats for which it may be necessary to revise the DM correction

Here, we summarize our suggestions for DM salinity correction for each float.

- **4901422:** The current correction is a constant offset of about -0.13 . However, no correction seems necessary for this float. The surrounding Argo profiles seem to indicate that salinity increased between 2006 and 2016 in the 3-4° layer (see figure 4), which could lead to overestimation of the correction if no more weight is given to the recent data. Moreover, comparison of profile 57 with a profile of another Argo float (float 6901457, already DMQCed) very close in time and space (figure 5) shows a good agreement under 1000m, the salinity of 4901422 being only 0.005 higher.

2.2 Float 4901422

2.2.1 Current Flags in the netcdf files

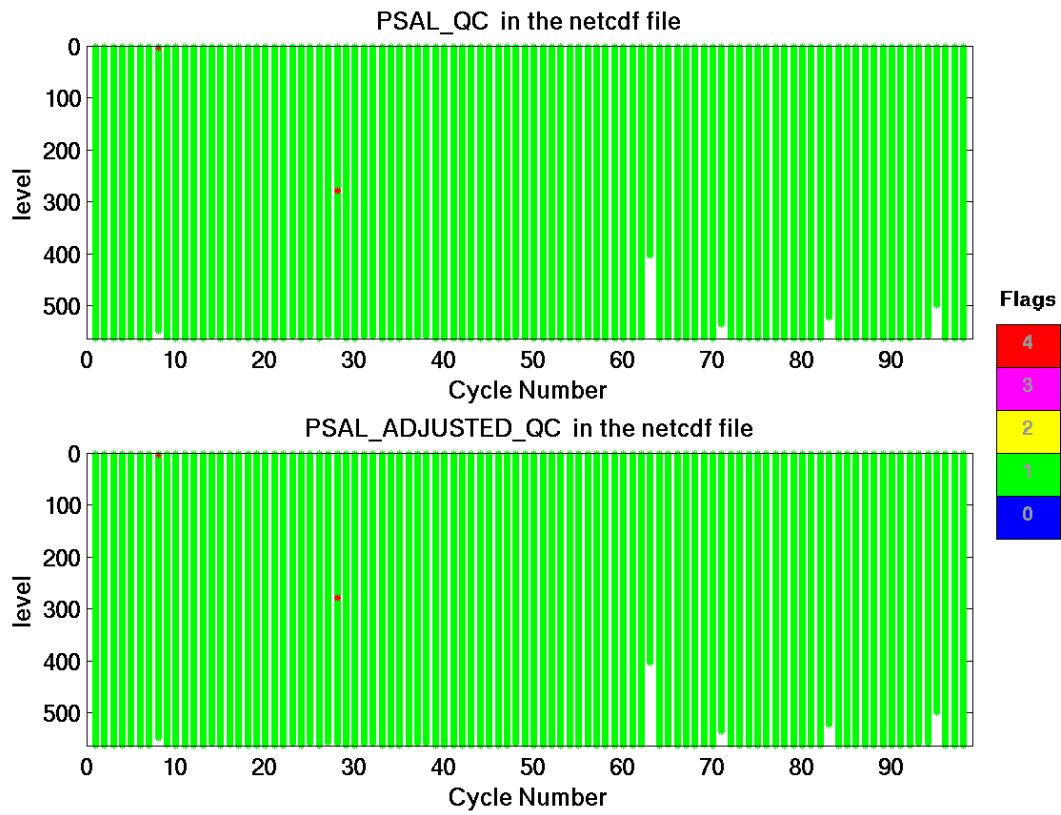


Figure 1: Float 4901422. Flags assigned to PSAL_QC and PSAL_ADJUSTED_QC in the netcdf file available on GDAC

2.2.2 Sections along the float trajectory - raw data

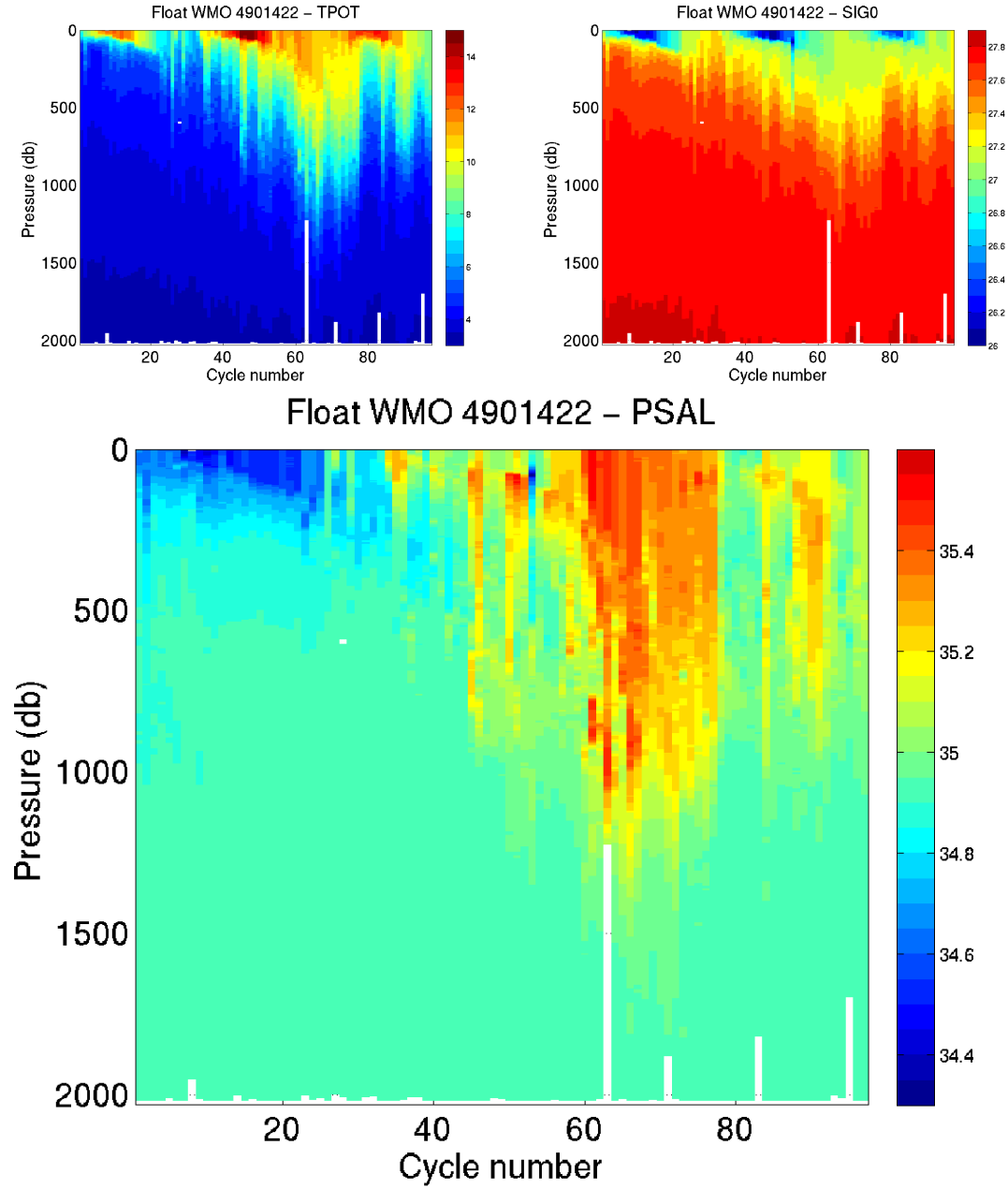


Figure 2: Float 4901422. Potential temperature, Sig0 and salinity sections along the float trajectory (raw data, bad data with quality flags > 2 are not plotted)

2.2.3 Theta/S diagrams - raw data

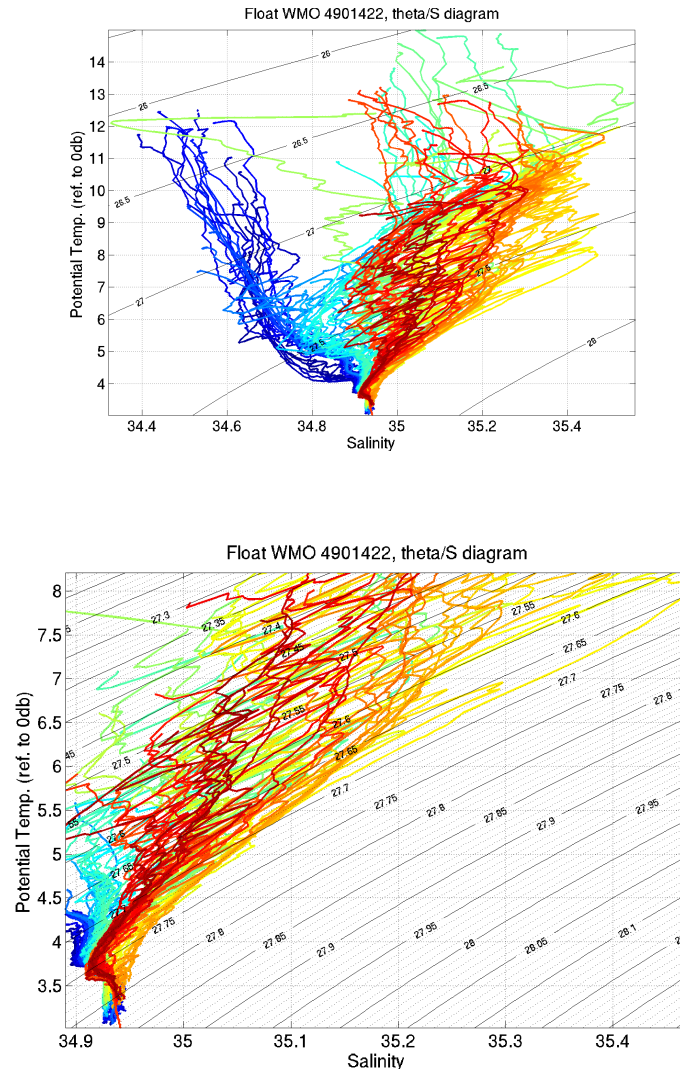


Figure 3: Float 4901422. Theta/S diagrams of the raw data, with the potential temperature referenced to 0db. Bad data with quality flags > 2 are not plotted. Lower panel is a zoom on the deepest layers

2.2.4 Comparison to reference Argo profiles

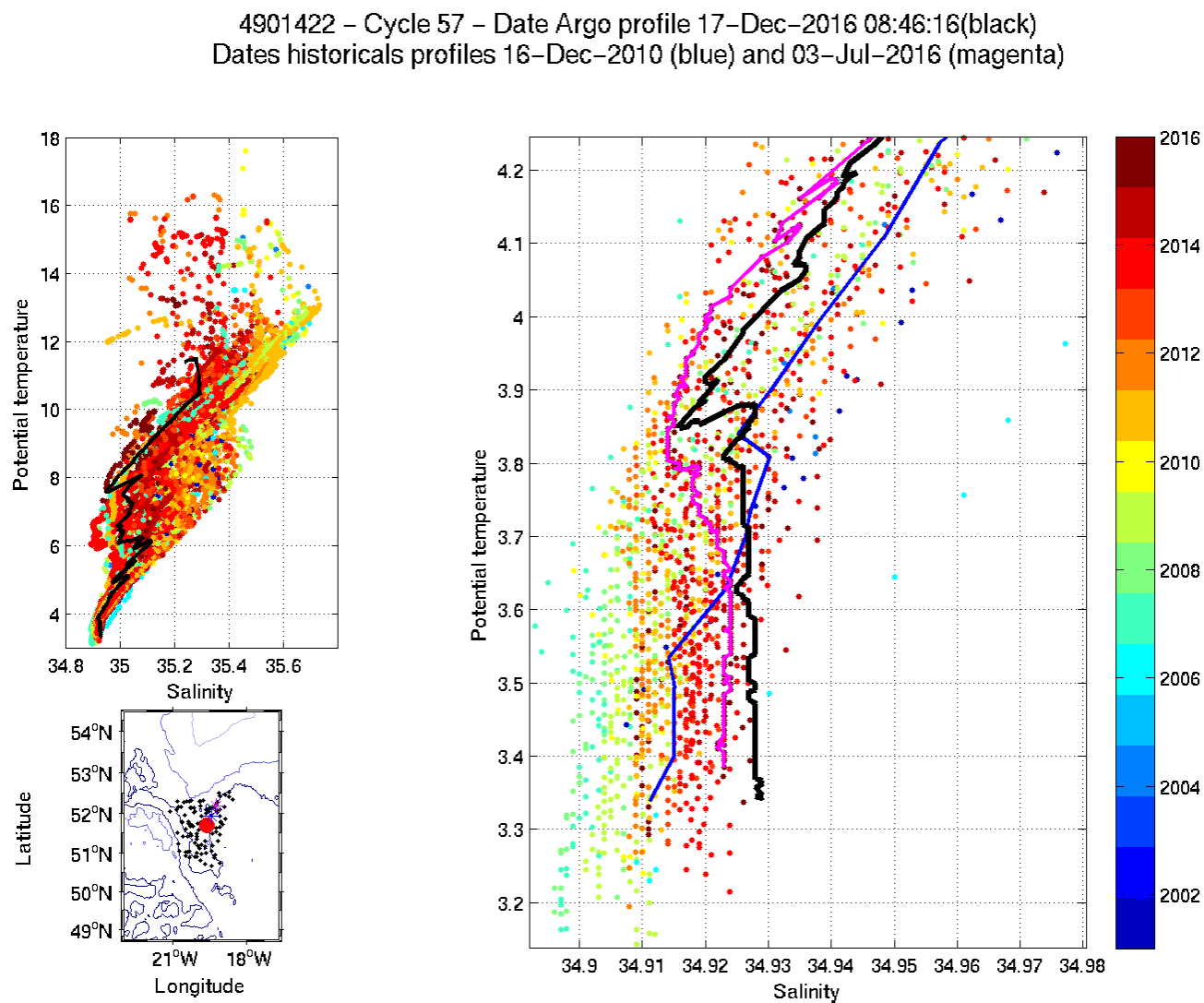


Figure 4: Float 4901422 Cycle 57. The analysed Argo profile (black) is compared to the 50 nearest reference Argo profiles and to two specific profiles: the nearest reference profile in time (magenta) and the nearest reference profile in space (blue). The color of reference profiles represents the year of acquisition. θ/S diagram (left panel) and a zoom on the deepest layers (right panel).

2.2.5 Comparison to the closest Real Time Argo profiles

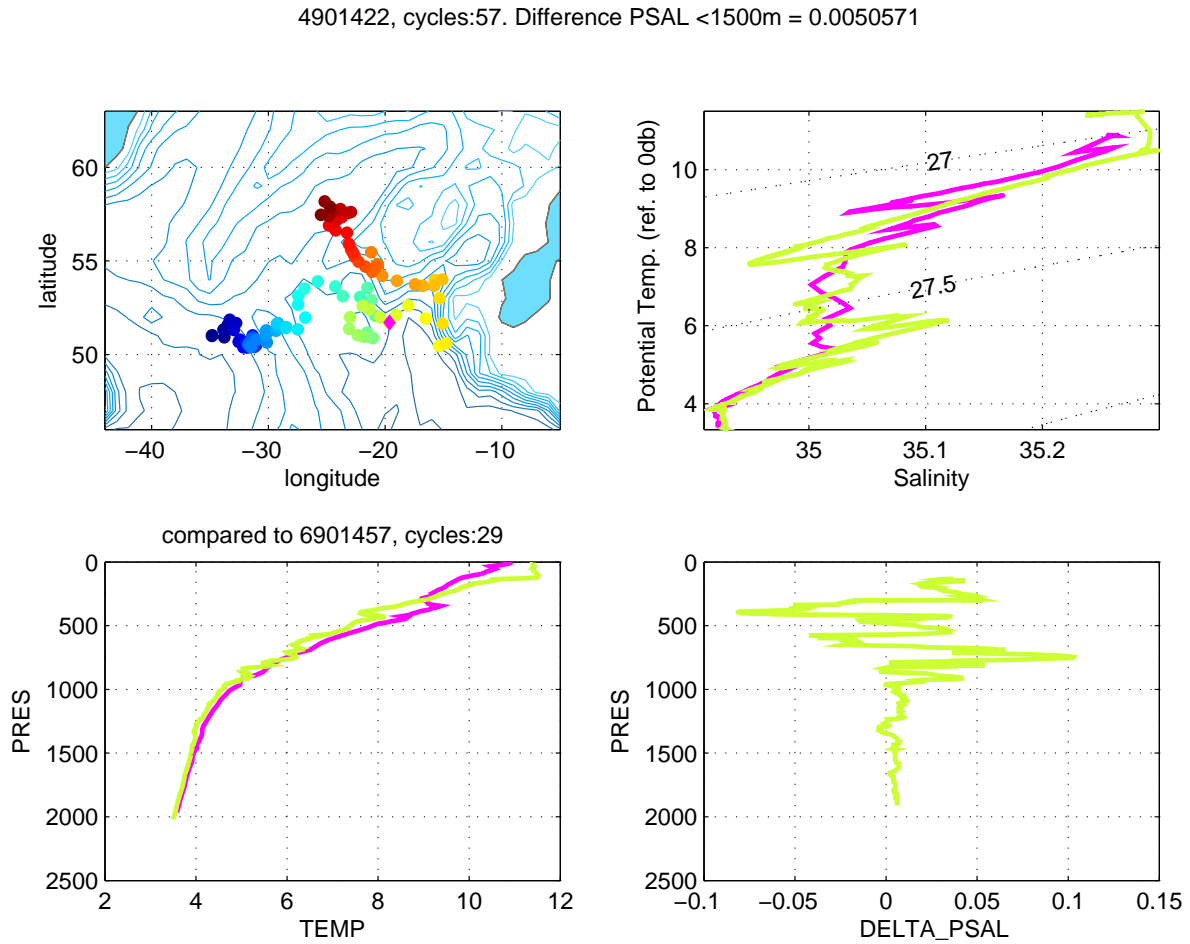


Figure 5: Comparison of the profile 57 of the float 4901422 with close real time Argo profiles (magenta) found within 0.1° in latitude, 0.2° in longitude and 365 days in times. DELTA_PSAL is the differences between the salinity of the float and the salinity of the real time Argo profiles. DELTA_PSAL is computed on theta level and averaged for depth below 1500m.

2.2.6 Results of the OW method

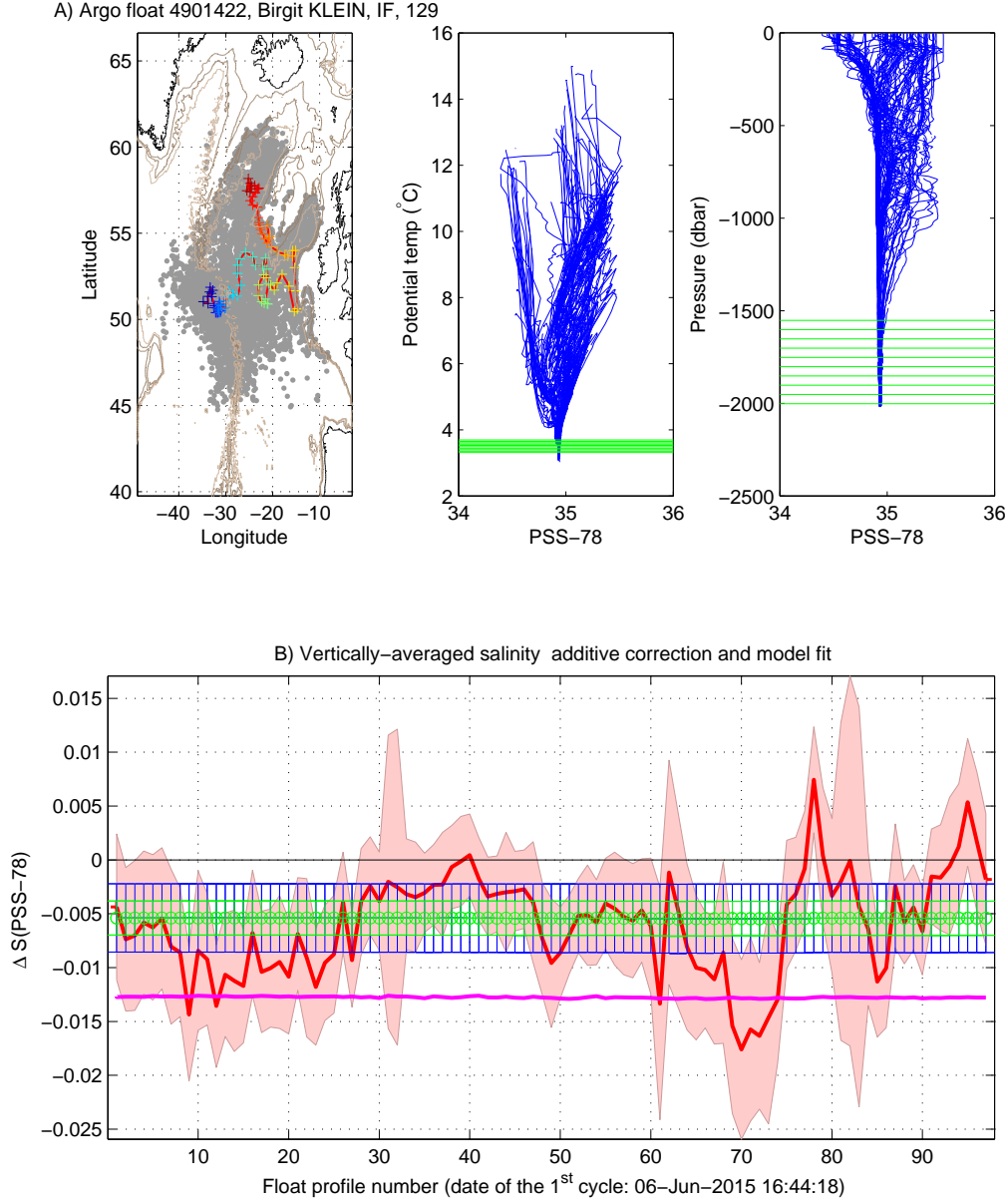


Figure 6: Float 4901422. Results of the OW method (configuration 129). Upper panels: Reference profiles used for the mapping (grey dots) are shown on a map along with the float trajectory. On the two most right-handed figures are displayed in green the ten most stable θ levels used to compute the fit. Lower panel: vertically-averaged mapped salinities minus float salinities on the 10 most stable θ levels (red line) and the offset obtained by a linear fit (green circles). The mapping errors are shaded in red. Green error bars show the fit error and blue error bars show the doubled fit error. The **salinity correction currently available on the GDAC** is displayed in magenta.