Check of DM corrections of NAARC floats (DAC: AOML) (Argo Snapshot: 06/2019)

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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 the floats of the AOML data center

Contents

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_PHI_LARGE	0.1	**0.5**	0.1	0.1	0.1
MAPSCALE_PHI_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 (2018v01)				

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 - MAP-SCALE_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)
3900267	03/04/2004	AO	Breck Owens	180(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.

- **3900267**: The current salinity correction shows jumps between cycle 140-180. These jumps are not realistic, no correction should be applied cycle 140-180.

2.2   Float 3900267

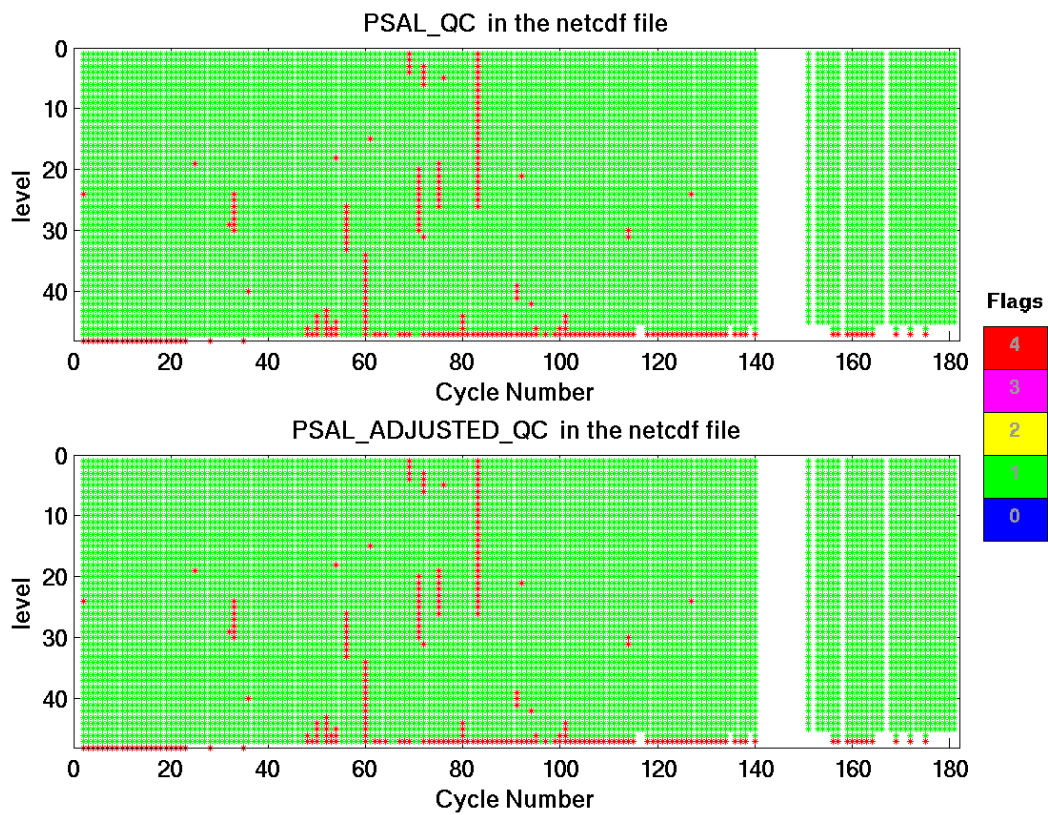### 2.2.1   Current Flags in the netcdf files

Figure 1: Float 3900267. Flags assigned to PSAL_QC and PSAL_ADJUSTED_QC in the netcdf file available on GDAC

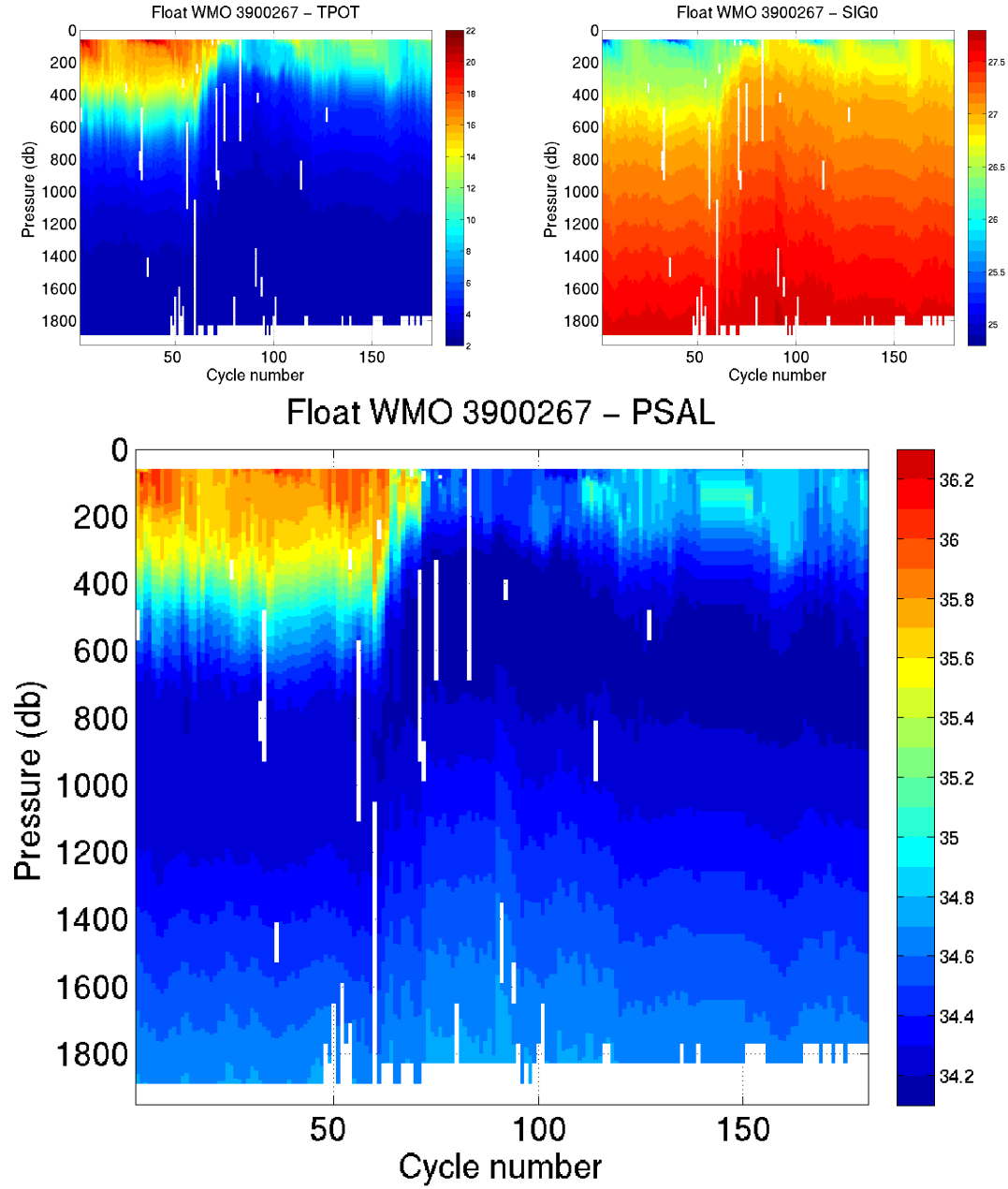## 2.2.2 Sections along the float trajectory - raw data

Figure 2: Float 3900267. Potential temperature, Sig0 and salinity sections along the float trajectory (raw data, bad data with quality flags > 2 are not plotted)

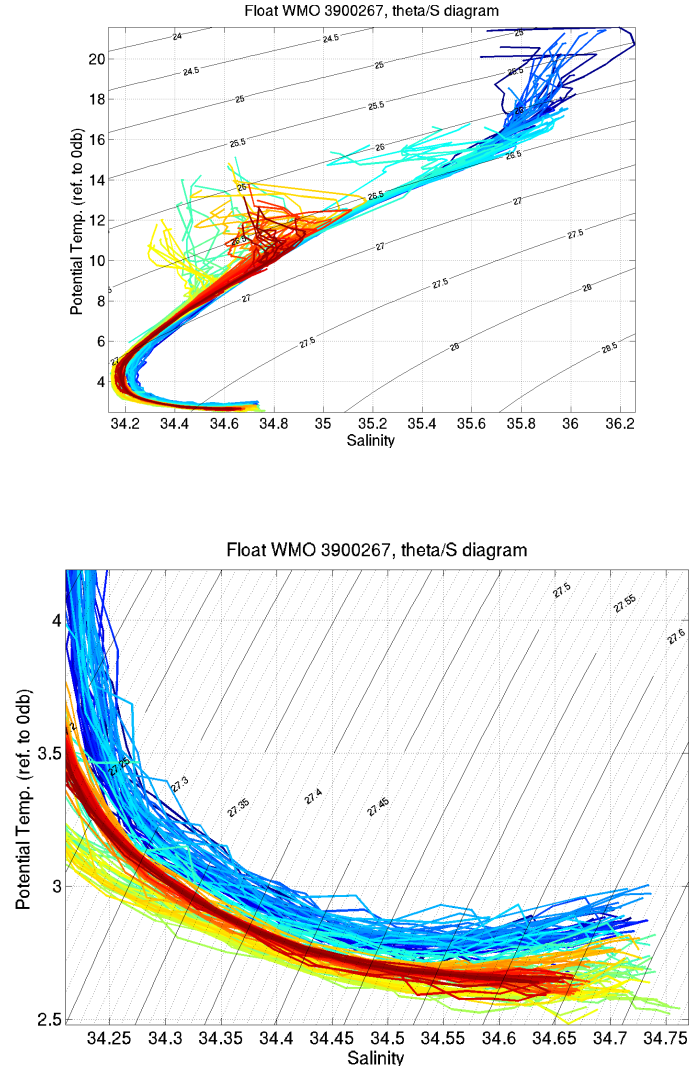### 2.2.3   Theta/S diagrams - raw data

Figure 3: Float 3900267. 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 Theta/S diagrams - adjusted data as currently available on GDAC
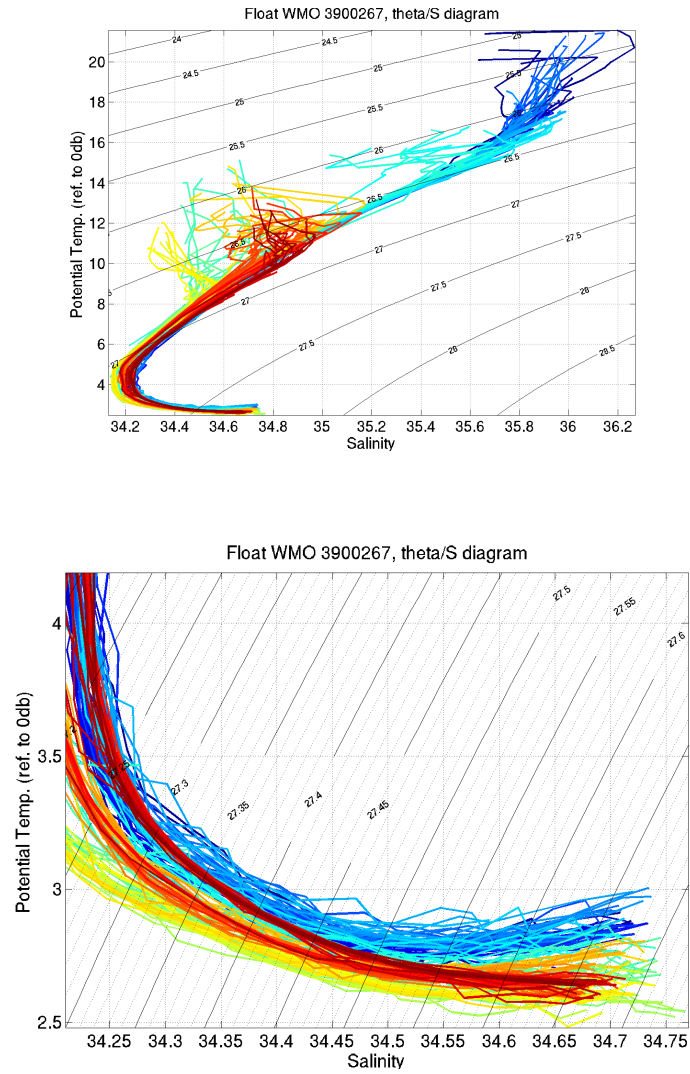

Figure 4: Float 3900267. Theta/S diagrams of the adjusted data **as currently available on GDAC**, with the potential temperature referenced to 0db. Bad data with quality flags > 2 are not plotted. Lower panel is a zoom on the deepest layers

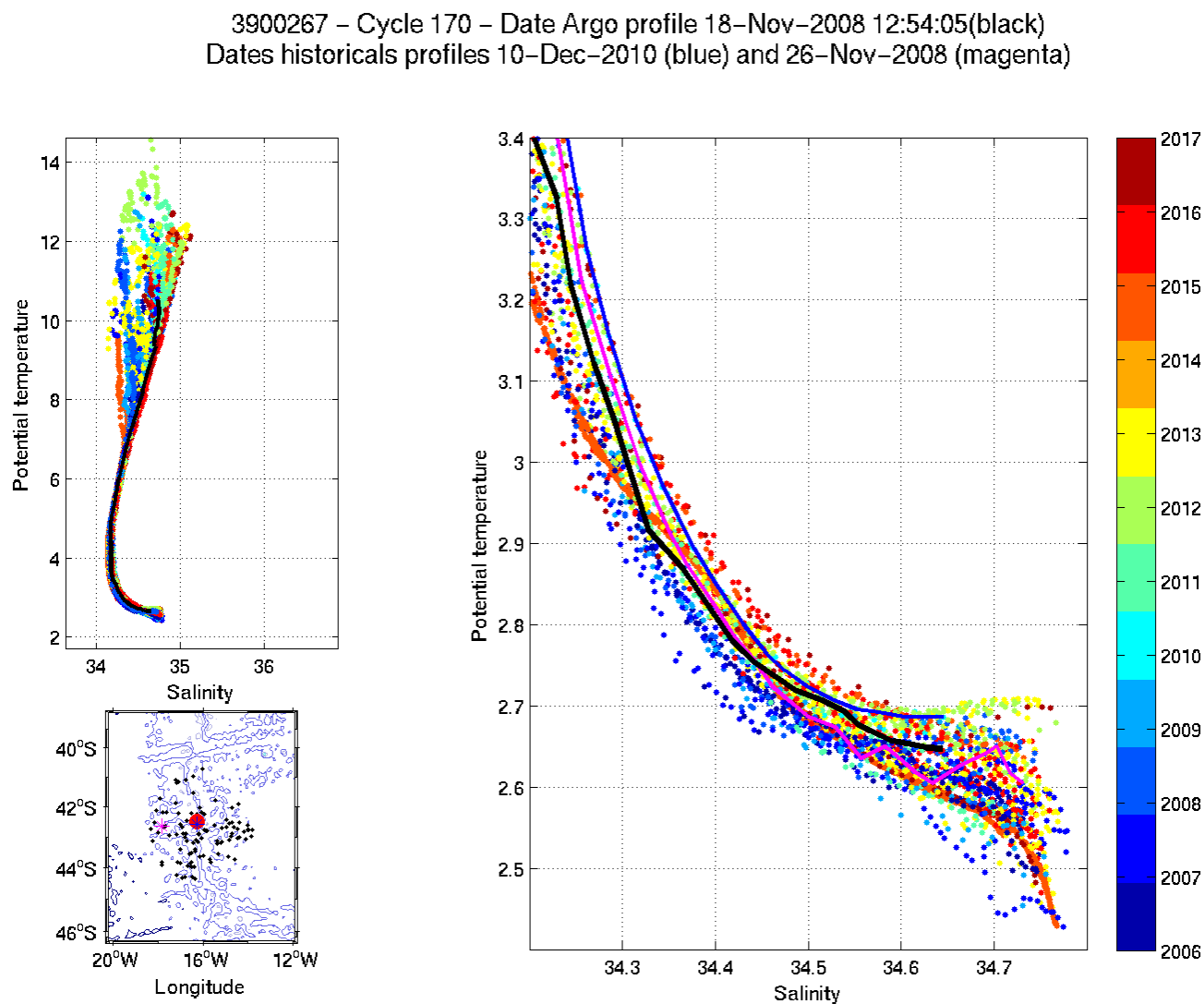### 2.2.5   Comparison to reference Argo profiles

Figure 5: Float 3900267 Cycle 170. 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).

2.2.6 Results of the OW method

A) Argo float 3900267, BRECK OWENS, AO, 129

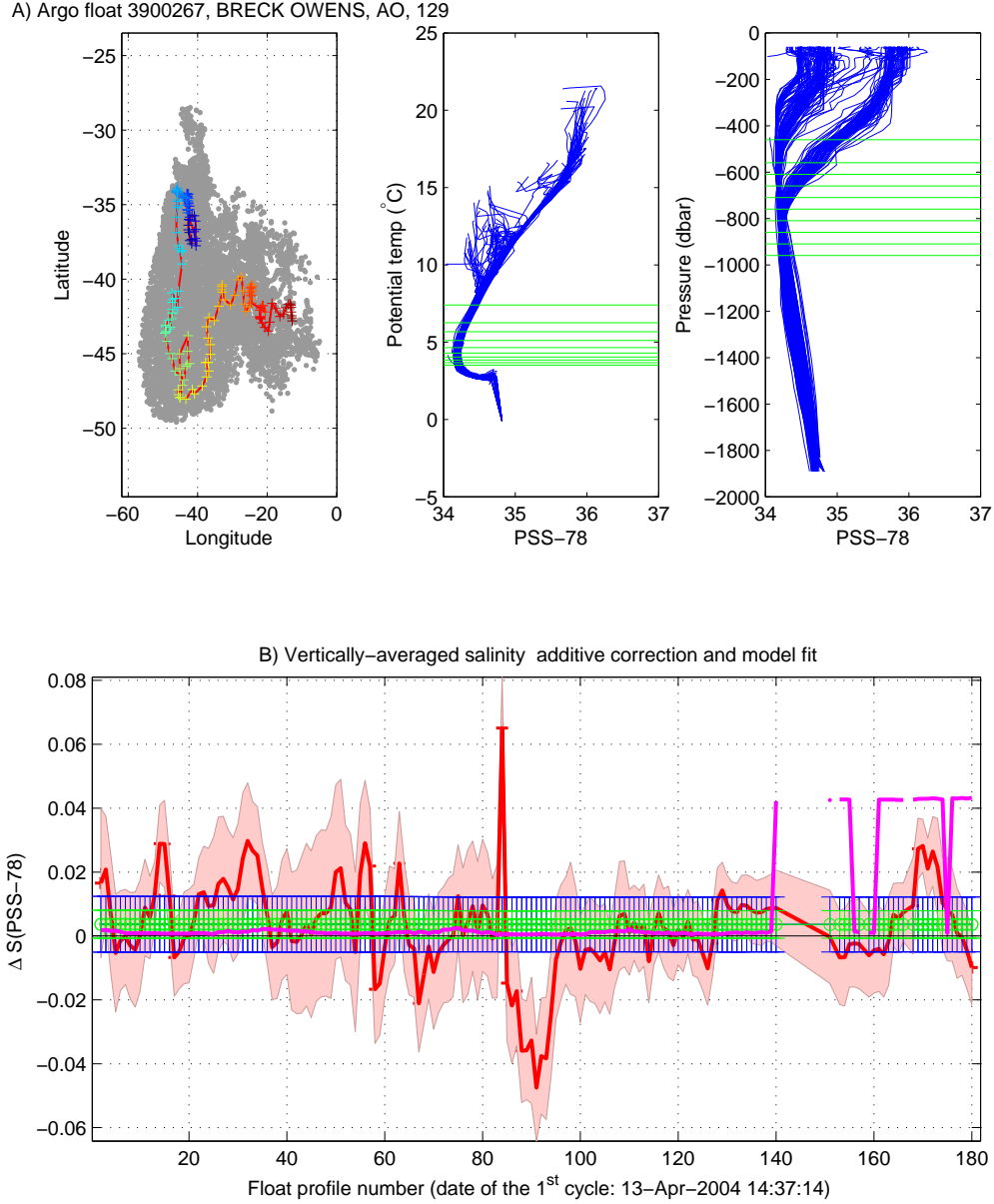B) Vertically−averaged salinity additive correction and model fit

Figure 6: Float 3900267. 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.