Note of Delayed Mode Quality Control of Argo float WMO 3901849

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This note includes the results of OWC performed for the WMO 3901849 float. The reference dataset used is composed of the following CTD and Argo historical datasets:

CTD:
CMEMS:

- INSITU_MED_PHYBGCWAV_DISCRETE_MYNRT_013_035
- Coriolis: CTD_for_DMQC_2024V01
- Historical CTD profiles provided through personal contact

Argo:

- ARGO_for_DMQC_2025V03

Float 3901849 is the Arvor float, where the pressure sensor is auto corrected and no adjustment is required. The OWC was run to estimate a salinity offset and a salinity drift (Cabanes et al., 2016).

Configurations

Parameters	Value
CONFIG_MAX_CASTS	300
MAP_USE_PV	1
MAP_USE_SAF	0
MAPSCALE_LONGITUDE_LARGE	4
MAPSCALE_LONGITUDE_SMALL	1.33
MAPSCALE_LATITUDE_LARGE	4
MAPSCALE_LATITUDE_SMALL	1.33
MAPSCALE_PHI_LARGE	0.5
MAPSCALE_PHI_SMALL	0.1
MAPSCALE_AGE	10
MAP_P_EXCLUDE	700
MAP_P_DELTA	250
THETA_LT	13.05

OWC Results

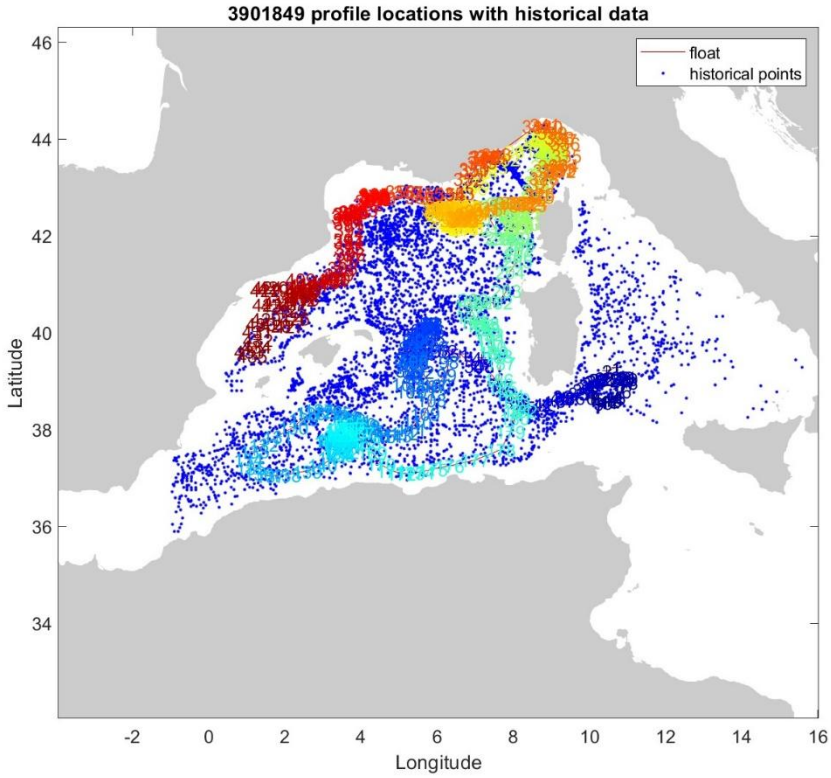

Figure 1: Location of the float profiles (red line with colored numbers) and the reference data selected for mapping (blue dots).

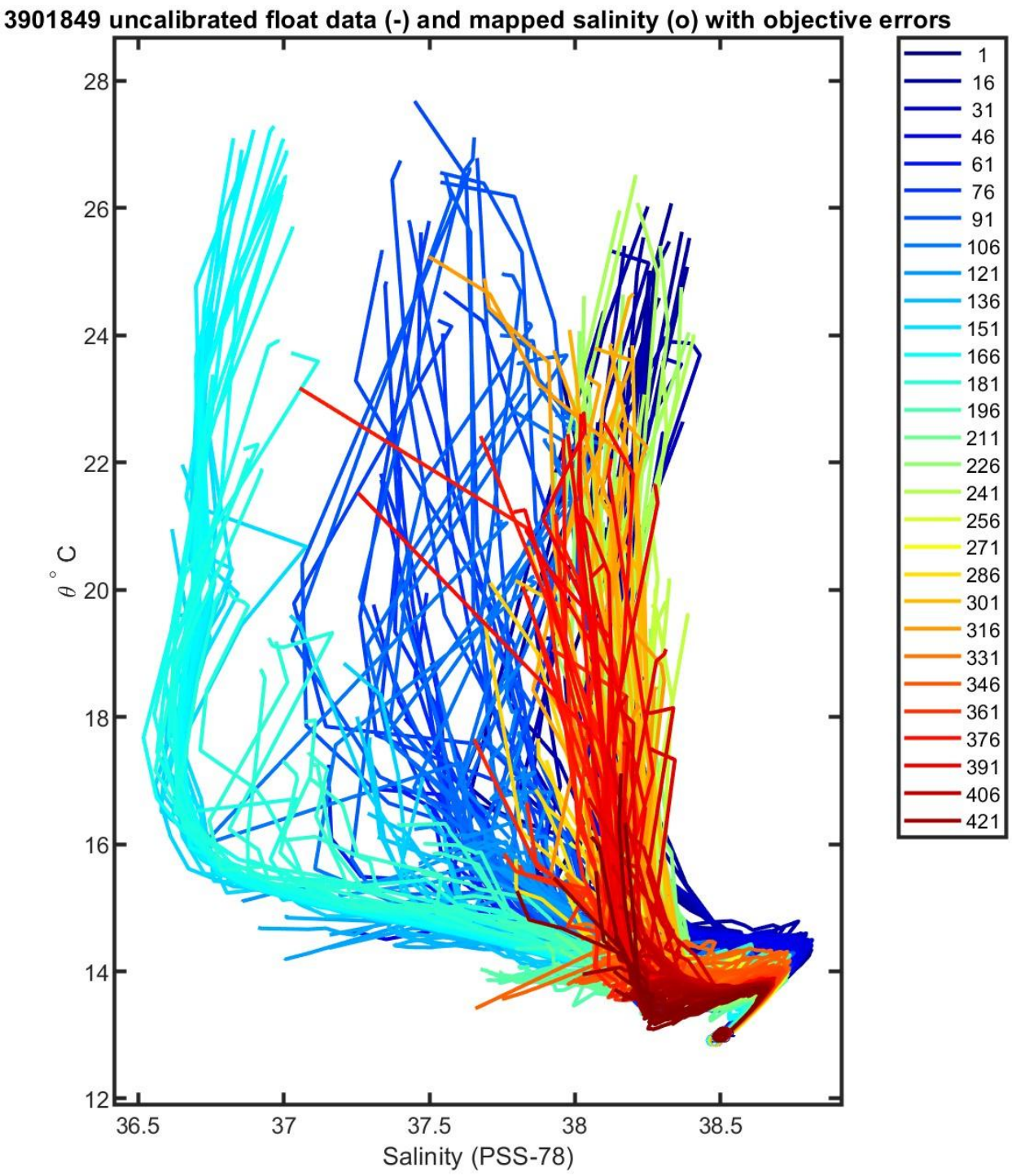

Figure 2: Plot the original float salinity and the objectively estimated reference salinity at the 10 float theta levels that are used in calibration.

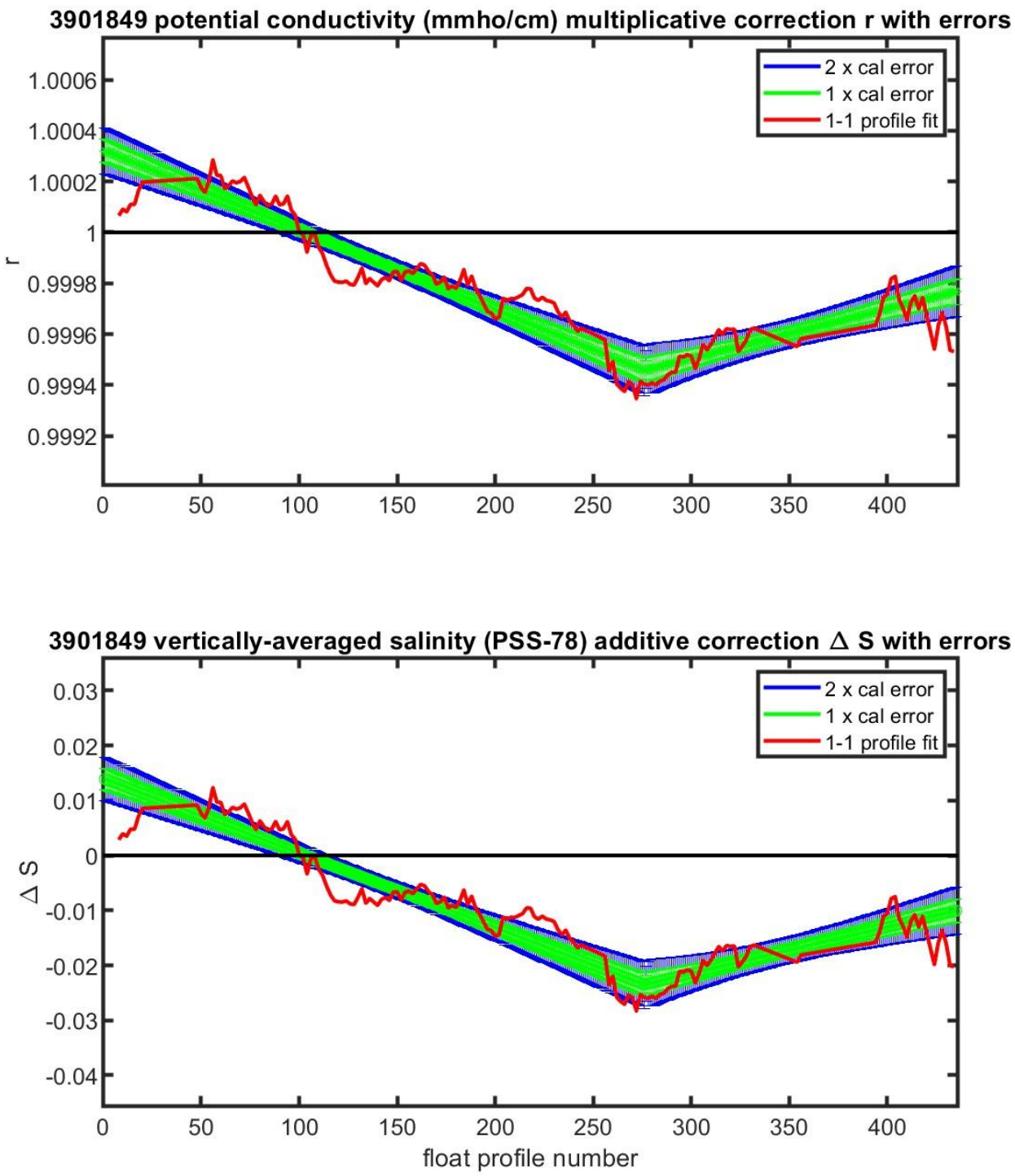

Figure 3: Evolution of the suggested adjustment with time. The top panel plots the potential conductivity multiplicative adjustment. The bottom panel plots the equivalent salinity additive adjustment. The red line denotes one-to-one profile fit that uses the vertically weighted mean of each profile. The red line can be used to check for anomalous profiles relative to the optimal fit.

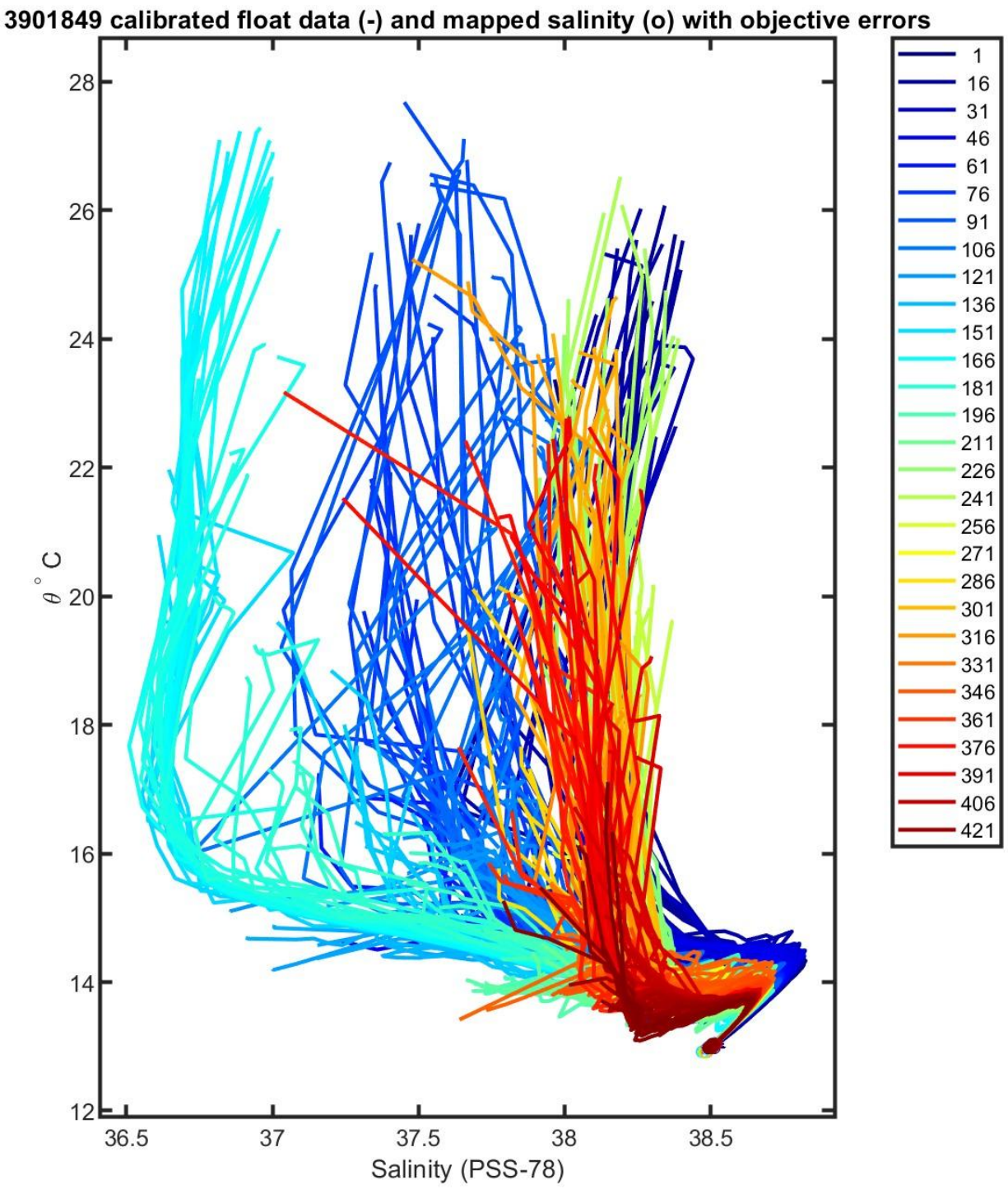

Figure 4: The plot of calibrated float salinity and the objectively estimated reference salinity at the 10 float theta levels that are used in calibration.

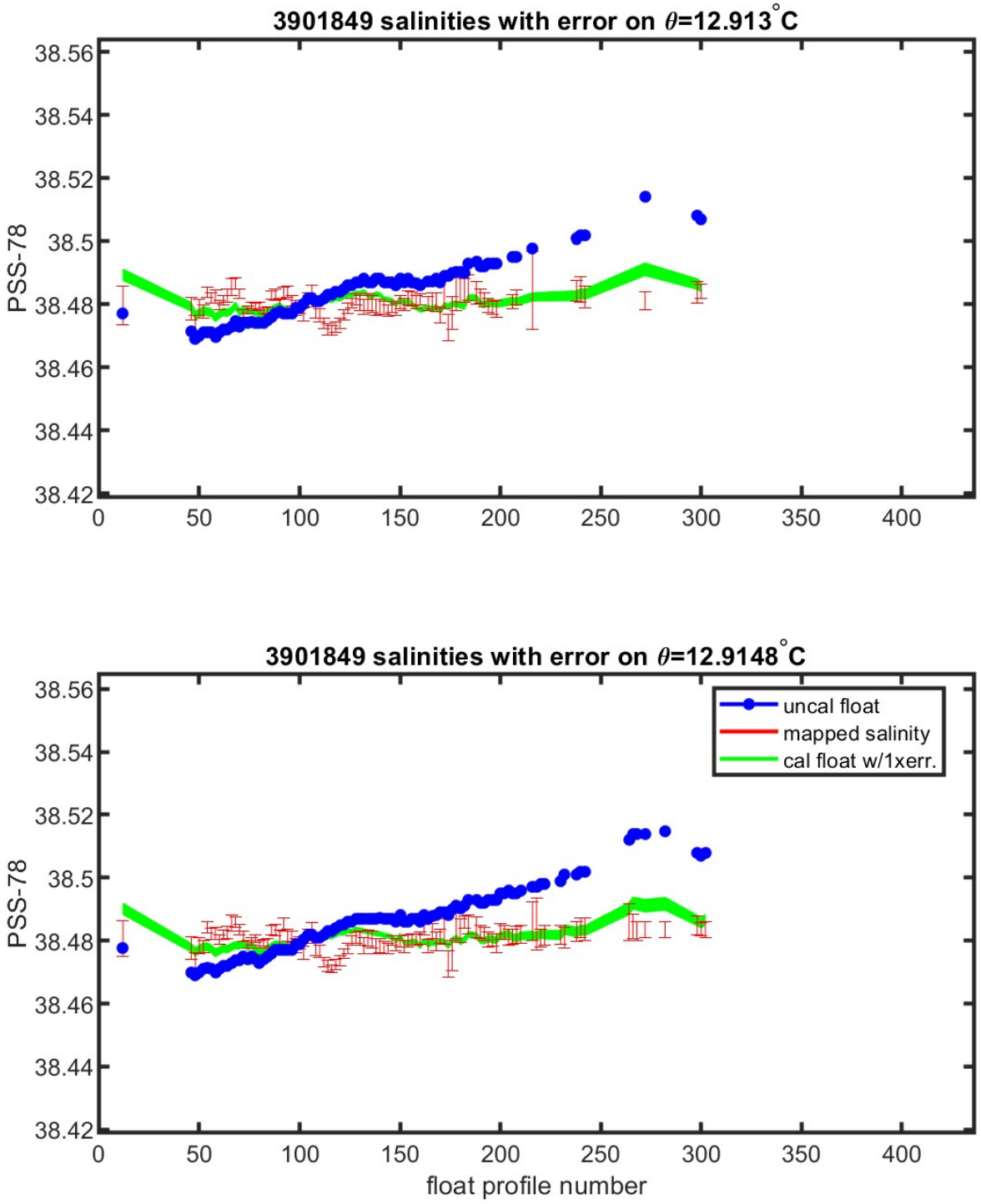

Figure 5: Plots of the evolution of salinity with time along with selected theta levels with minimum salinity variance.

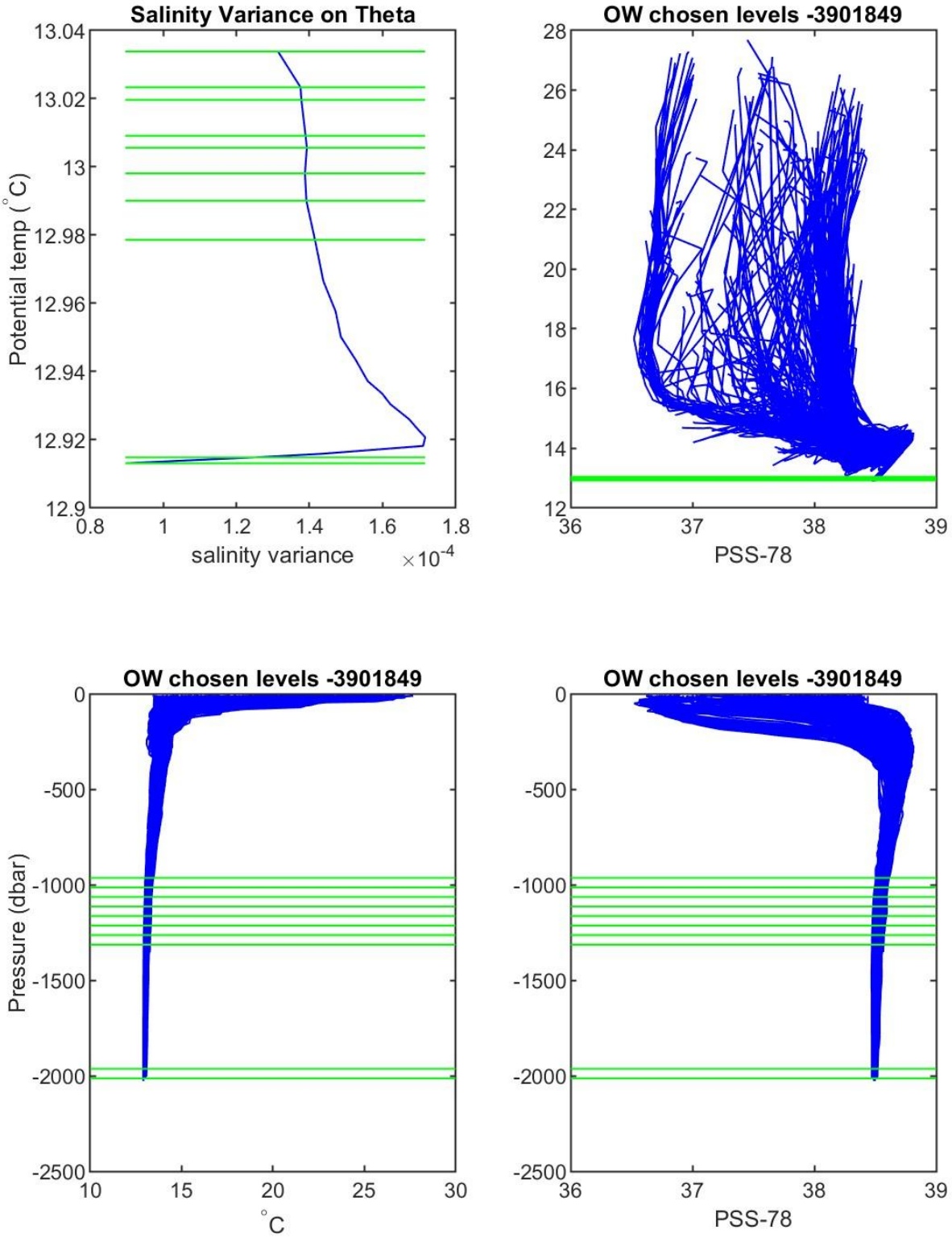

Figure 6: Plots include the theta levels chosen for calibration: Top left: Salinity variance at theta levels. Top right: T/S diagram of all profiles of Argo float. Bottom left: potential temperature plotted against pressure. Bottom right: salinity plotted against pressure.

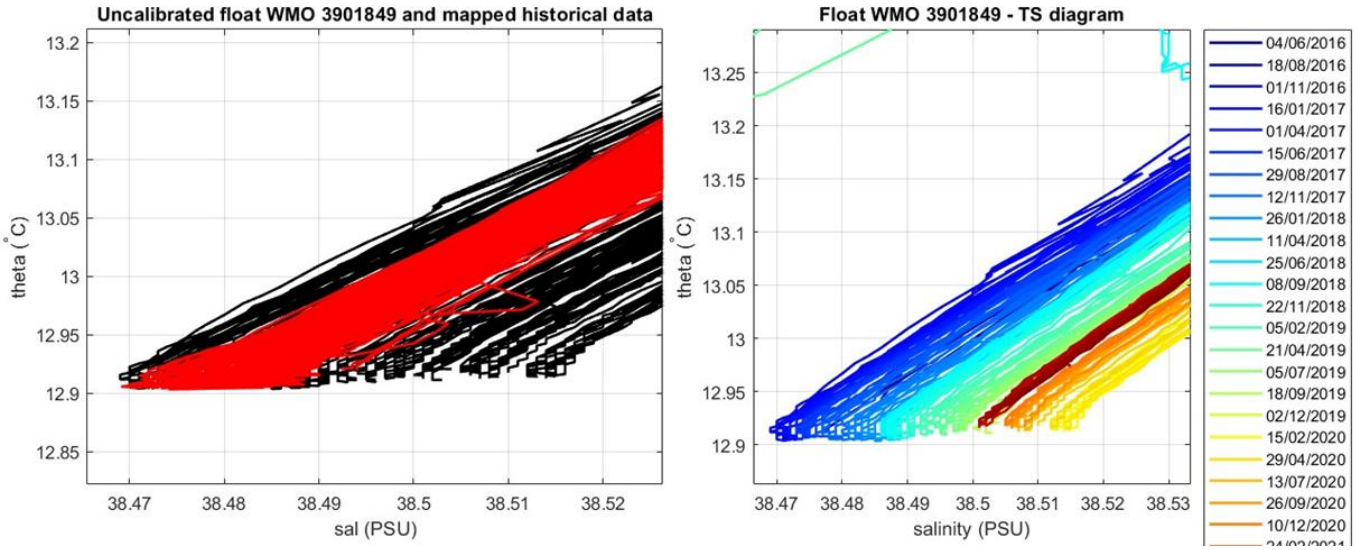

Figure 7: Comparison between float 3901849 and historical CTD on the left and θ-S diagram color-coded per cycle number on the right, in the most uniform part of the θ-S curve.

Summary

Float WMO 3901849 was deployed in the Tyrrehenian sub-basin of the Mediterranean Sea. During its lifetime, it later moved into the Algerian, Catalan and Liguro-Provencal sub-basins. This float was already DMQC-ed before. OWC correction was applied with QC 1. We applied the OWC method taking into account the deepest profiles. The OWC analysis showed a significant salinity drift. The correction proposed by OWC is over the Argo required accuracy (0.01). Additional analyses (visual inspection of the deepest portion of the θ–S diagram and comparison of selected float salinity profiles with nearby historical CTD profiles) were performed to complement the OWC method and provide the best possible quality control assessment. The last decision is that the salinity data of float WMO 3901849 needs a delayed mode correction applied to all cycles. QC 1 is applied.

PSAL_ADJUSTED=PSAL + ΔS from cycle 1 to 435

The quality flags applied are the following:

PSAL_ADJUSTED_QC='1' from cycle 1 to 435

The delayed-mode files (Dfiles) have been created accordingly and sent to the Coriolis GDAC.

References

Cabanes, C., Thierry, V., & Lagadec, C. (2016). Improvement of bias detection in Argo float conductivity sensors and its application in the North Atlantic. Deep-Sea Research Part I: Oceanographic Research Papers, 114, 128–136. https://doi.org/10.1016/j.dsr.2016.05.007