# Note of Delayed Mode Quality Control of Argo float WMO 6901250

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This note includes the results of OWC performed for the WMO 6901250 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_2022V03

Float 6901250 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 |
| Calseries_split | 182 |

## OWC Results

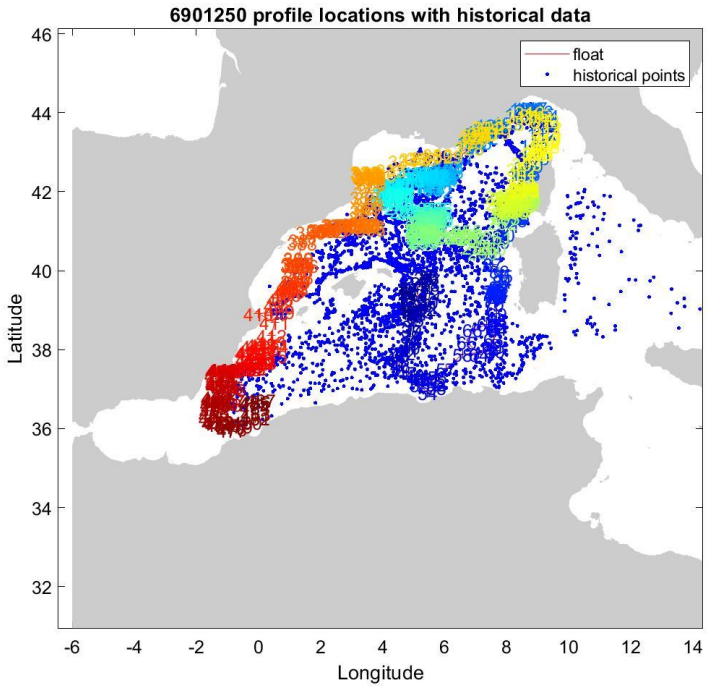


**Figure 1:** Location of the float profiles (red line with colored numbers) and the reference data selected for mapping (blue dots).

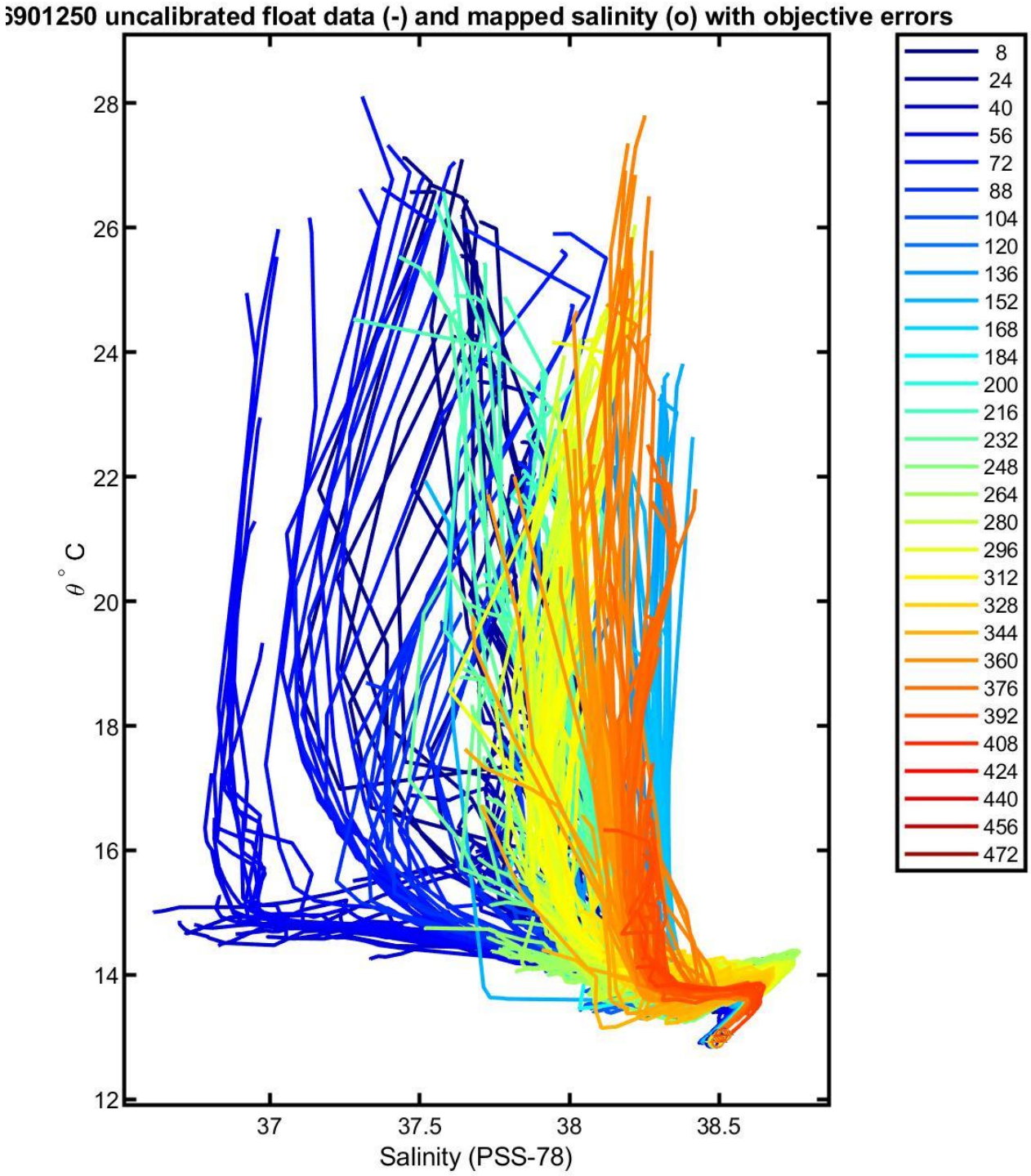


**Figure 2:** Plot the original float salinity and the objectively estimated reference salinity at the 10 float theta levels that are used in calibration.

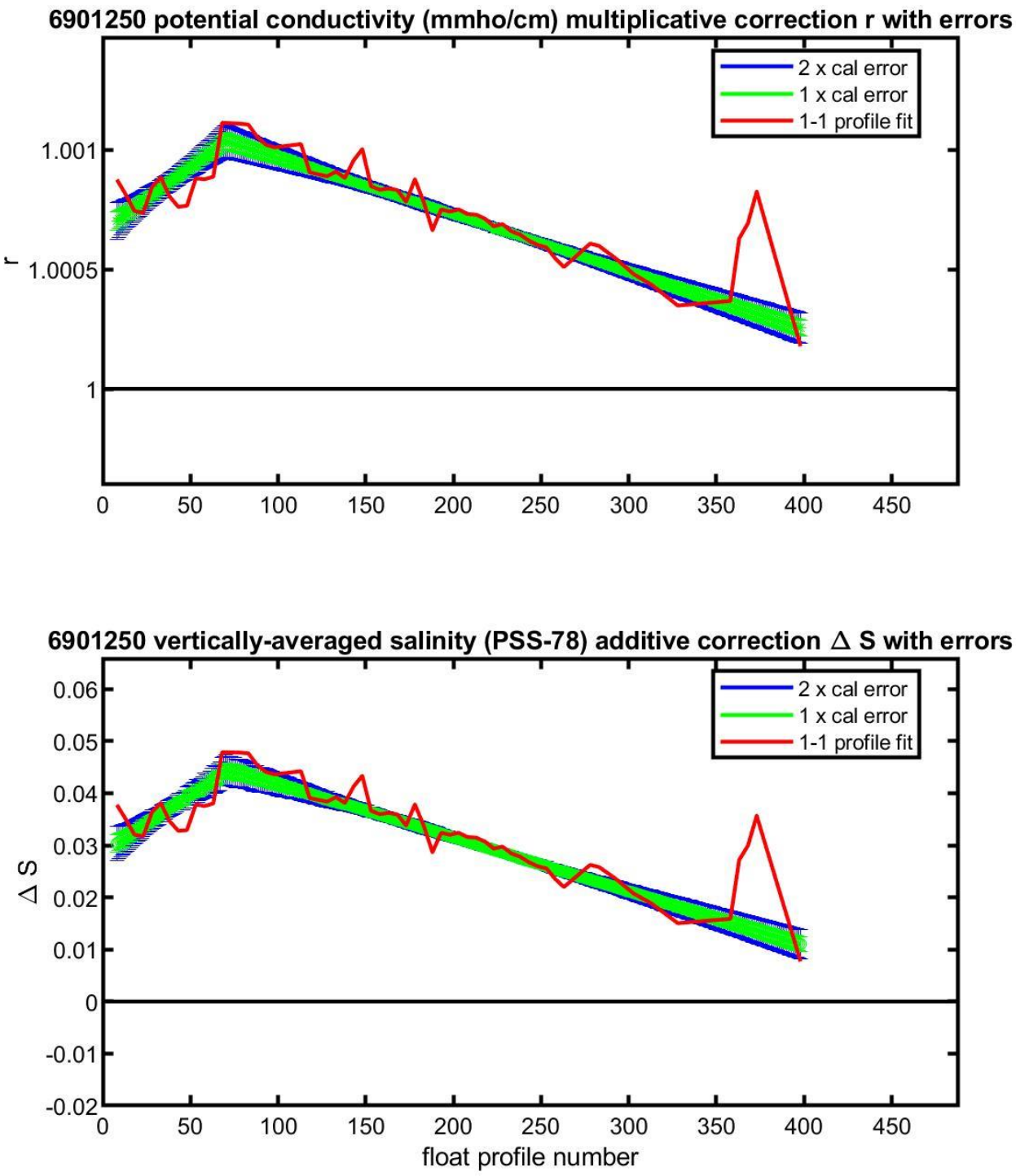


**Figure 3**: Evolution of the suggested adjustment with time. The top panel plots the potential conductivity multiplicative adjustment. The bottom panel plots the equivalent salinity additive adjustment. The red line denotes one-to-one profile fit that uses the vertically weighted mean of each profile.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

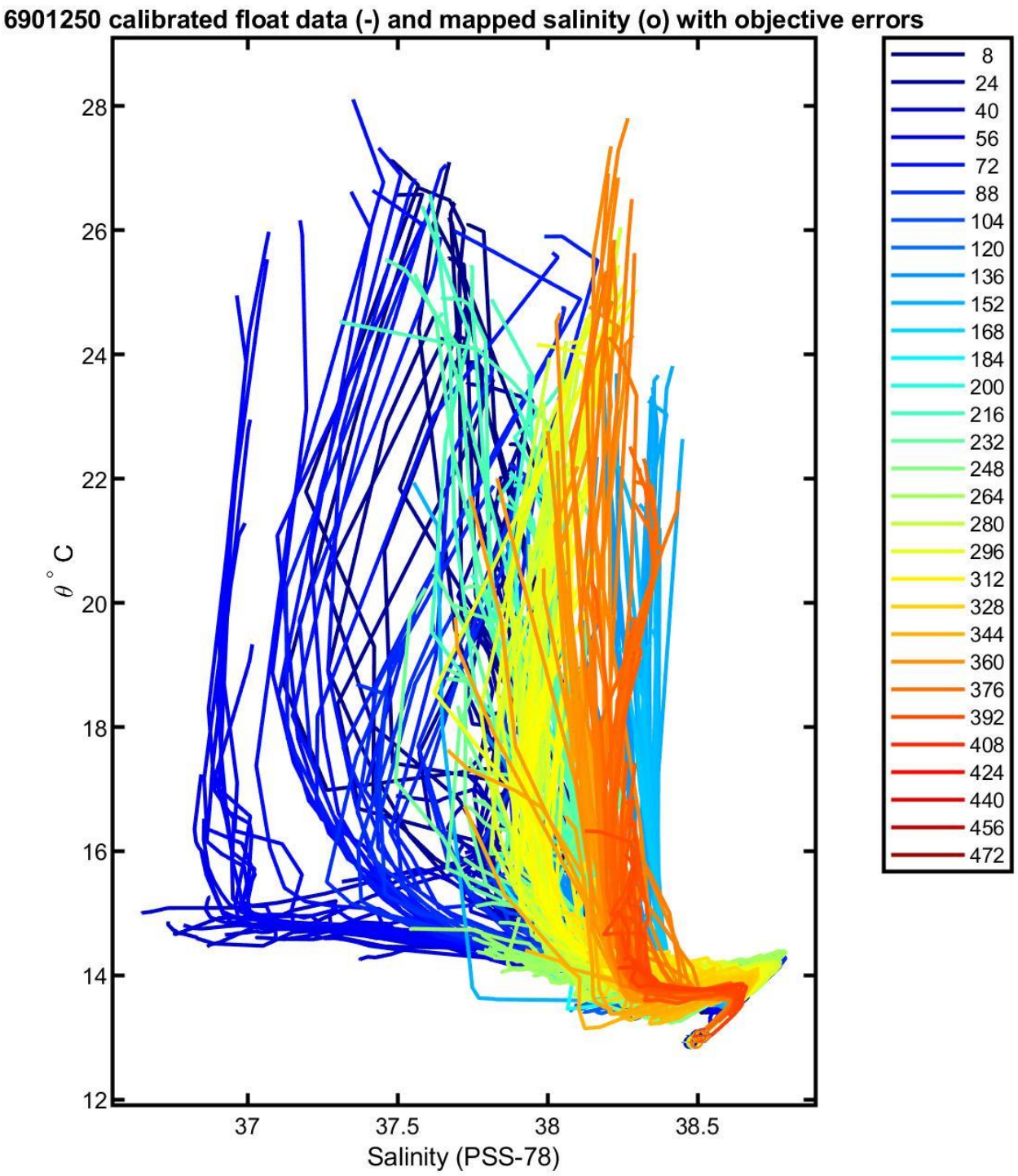


**Figure 4:** The plot of calibrated float salinity and the objectively estimated reference salinity at the 10 float theta levels that are used in calibration.

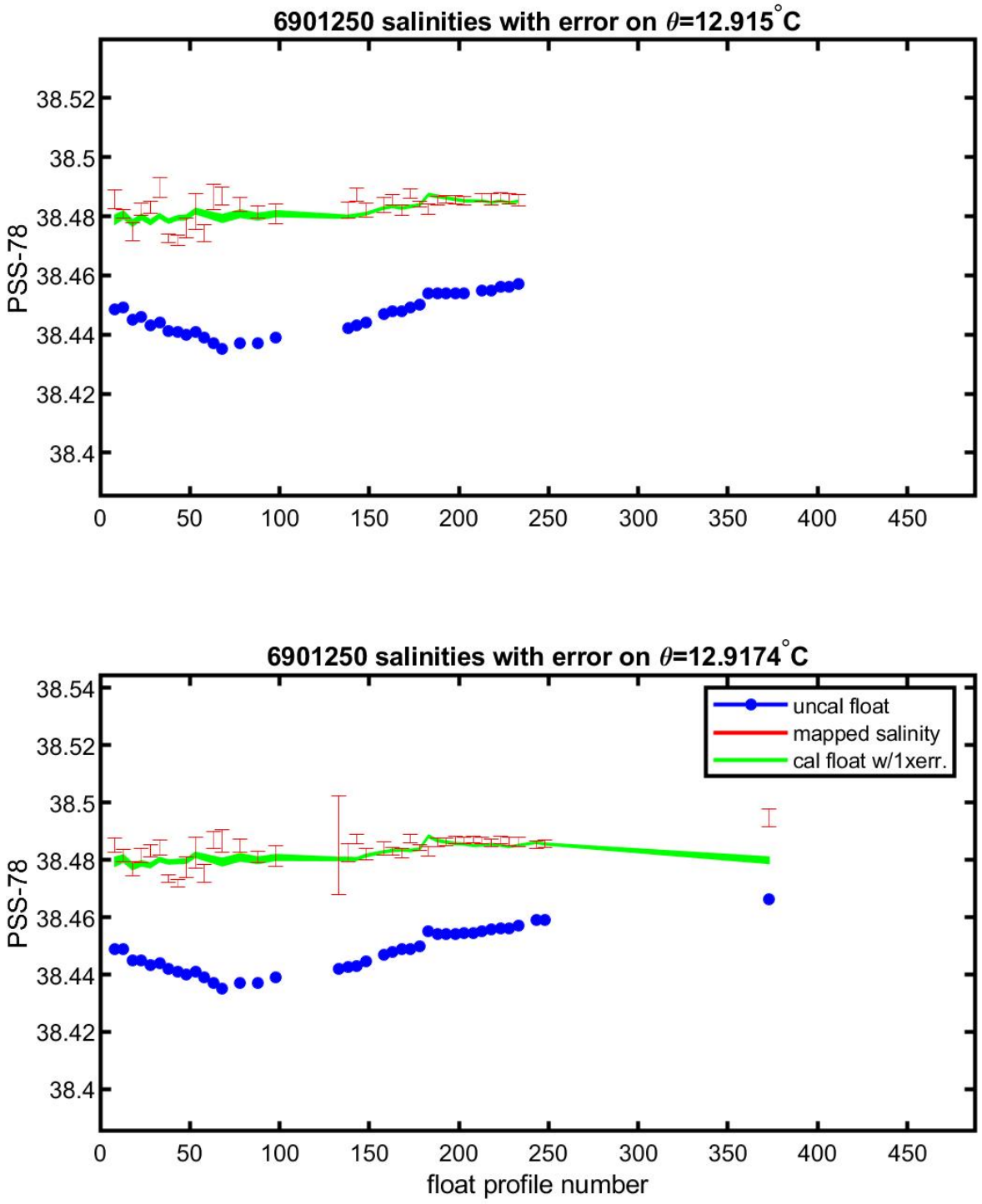


**Figure 5:** Plots of the evolution of salinity with time along with selected theta levels with minimum salinity variance.

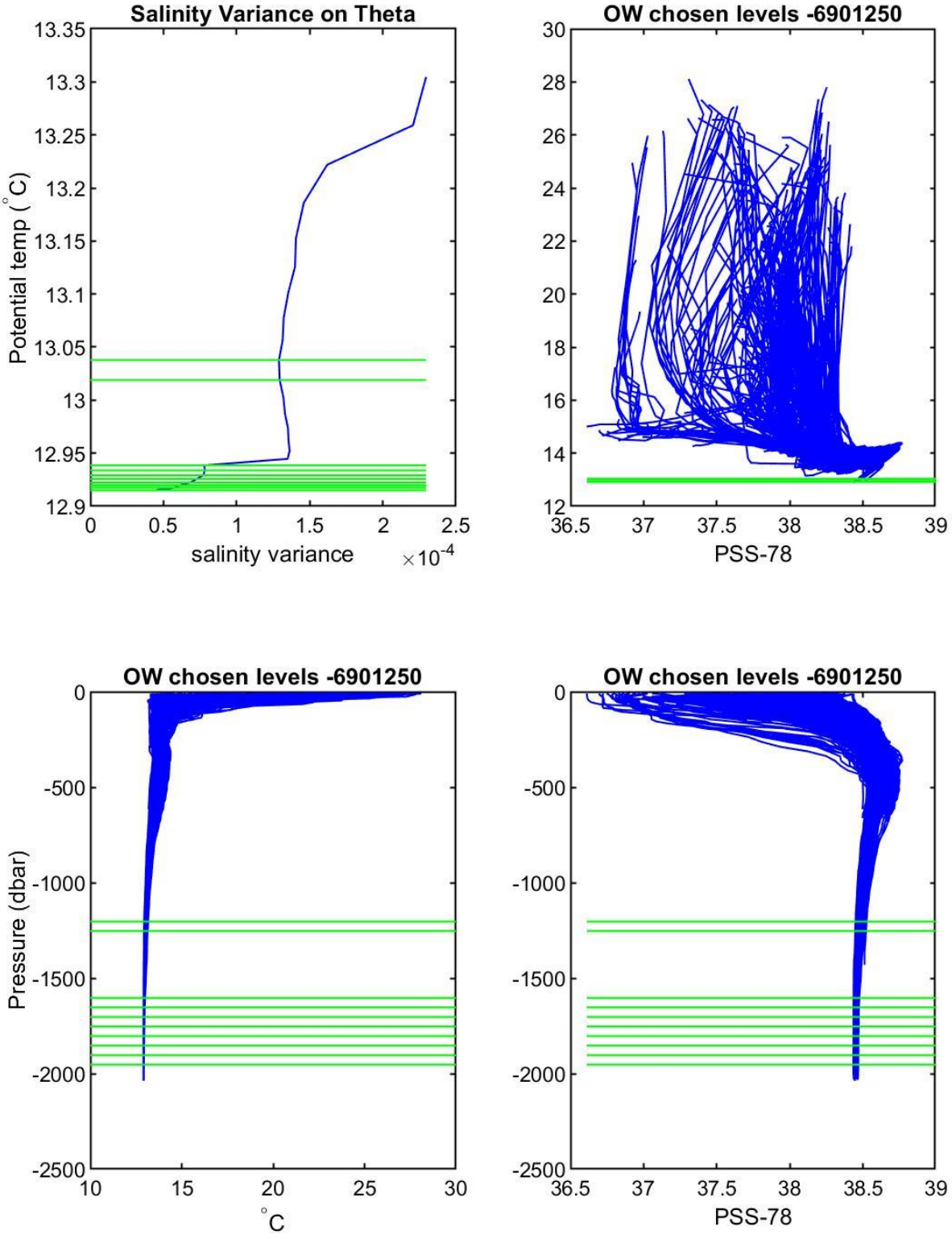


**Figure 6:** Plots include the theta levels chosen for calibration: Top left: Salinity variance at theta levels. Top right: T/S diagram of all profiles of Argo float. Bottom left: potential temperature plotted against pressure. Bottom right: salinity plotted against pressure.

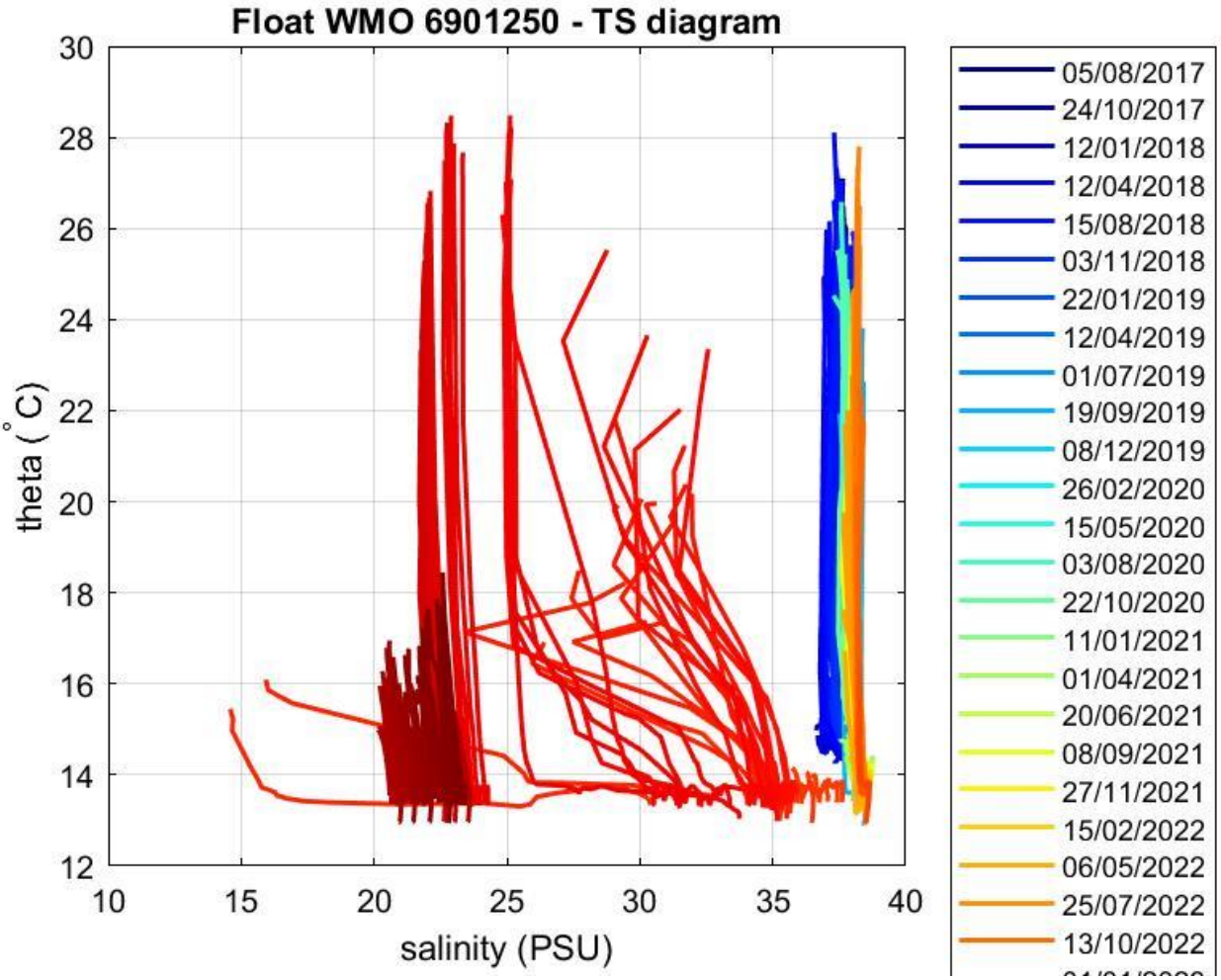


**Figure 7:** θ-S diagram color-coded per cycle number, including salinity profiles with QC 3 and QC 4.

## Summary

Float WMO 6901250 was deployed in the Algerian sub-basin, in the Mediterranean Sea. During its life passed in Liguro-Provencal, Tyrrhenian and Catalan sub basins. This float was DMQC-ed before with salinity correction from cycle 8 to 398 with QC1, no correction from 398 to 430 with QC4.

The OWC analysis showed a significant salinity drift. Figure 3 reveals that the least square fit is not reliable. The correction proposed by OWC suggests a correction above the Argo requested accuracy (0.01) until profile 398 then correction increased. After this profile, the correction became over 0.05 psu. Additional analyses (the visual inspection of the deepest portion of the θ-S diagram and the comparison of selected float salinity profiles with the nearby historical CTD profiles) are applied in complement of the OWC method, to provide the best quality control analysis.

After several investigation, we confirmed the previous DMQC analysis. The salinity data of float WMO 6901250 need a delayed mode correction until cycle 398. QC 1 is applied. Then no correction is applied with QC=4.

PSAL_ADJUSTED= PSAL+ ΔS from cycle 1 to 398

PSAL_ADJUSTED= ΔS from cycle 398 to 487

The quality flags applied are the following:

PSAL_ADJUSTED_QC='1' from cycle 1 to 398

PSAL_ADJUSTED_QC='4' from cycle 399 to 487

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