

# Note of Delayed Mode Quality Control of Argo float WMO 7900466

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This note includes the results of OWC performed for the WMO 7900466 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:

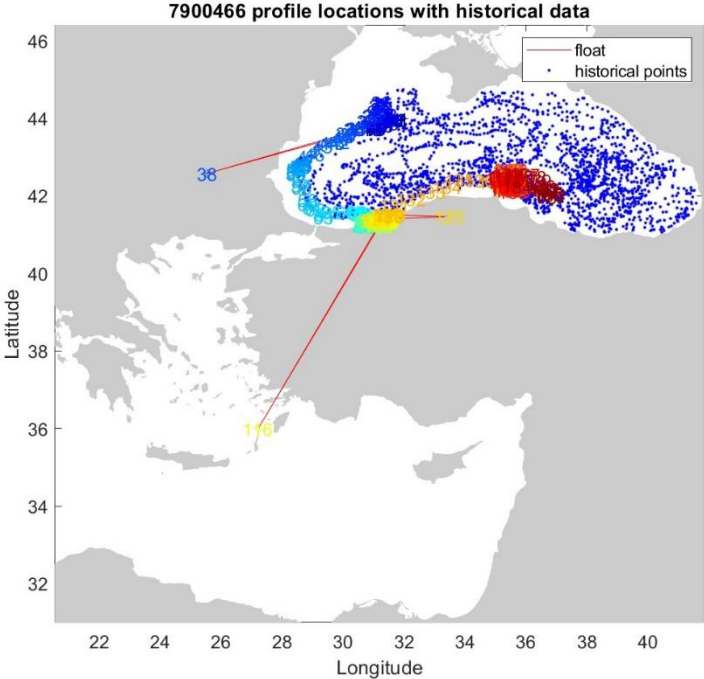
- ARGO\_for\_DMQC\_2025V03

Float 7900466 is the Nemo 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 (Cabanès et al., 2016).

## Configurations

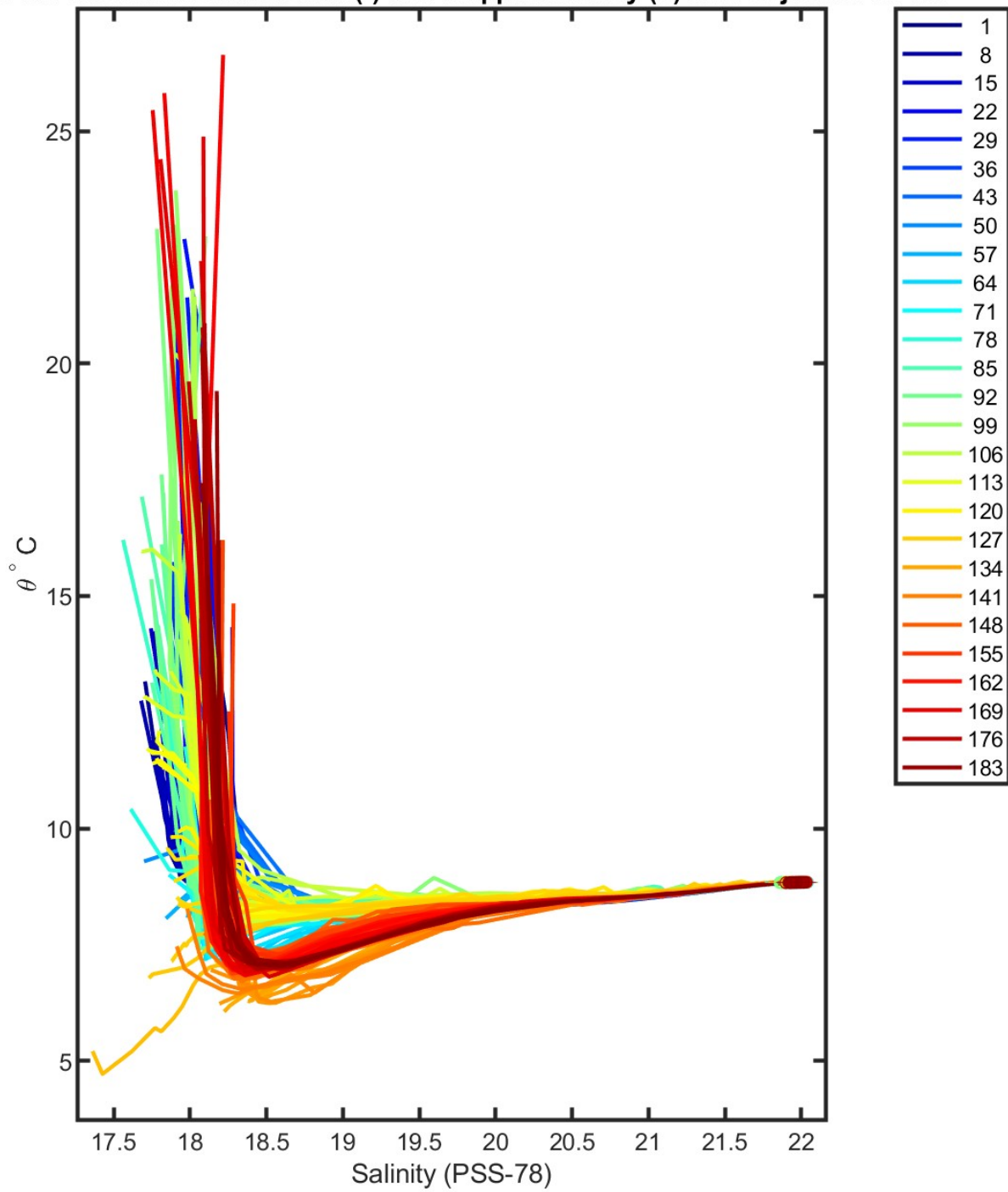
| Parameters               | Value |
|--------------------------|-------|
| CONFIG_MAX_CASTS         | 300   |
| MAP_USE_PV               | 1     |
| MAP_USE_SAF              | 0     |
| MAPSCALE_LONGITUDE_LARGE | 4     |
| MAPSCALE_LONGITUDE_SMALL | 1.33  |
| MAPSCALE_LATITUDE_LARGE  | 4     |
| MAPSCALE_LATITUDE_SMALL  | 1.33  |
| MAPSCALE_PHI_LARGE       | 0.5   |
| MAPSCALE_PHI_SMALL       | 0.1   |
| MAPSCALE_AGE             | 10    |
| MAP_P_EXCLUDE            | 400   |
| MAP_P_DELTA              | 100   |

**OWC Results**

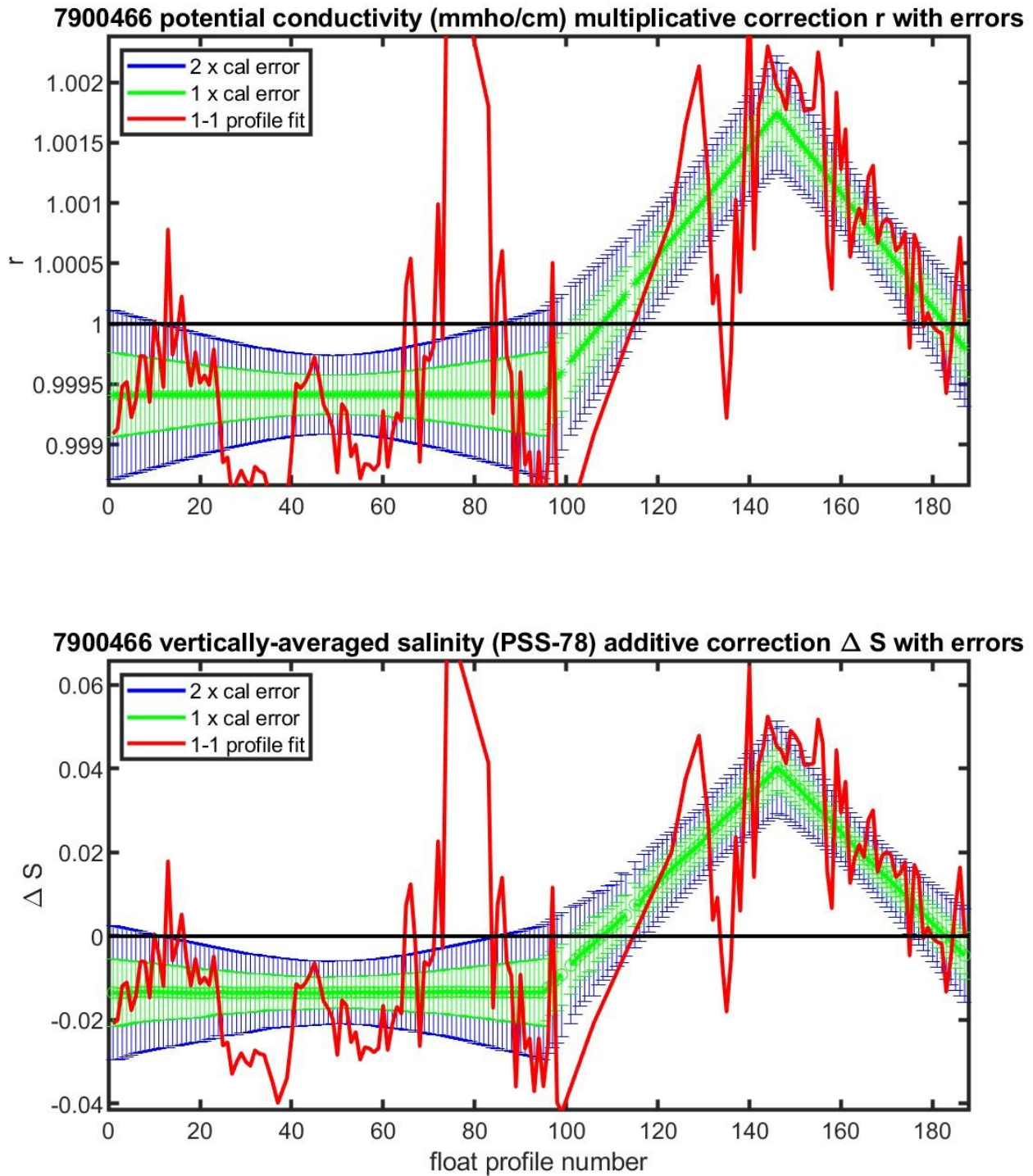


**Figure 1:** Location of the float profiles (red line with colored numbers) and the reference data selected for mapping (blue dots).

7900466 uncalibrated float data (-) and mapped salinity (o) with objective errors

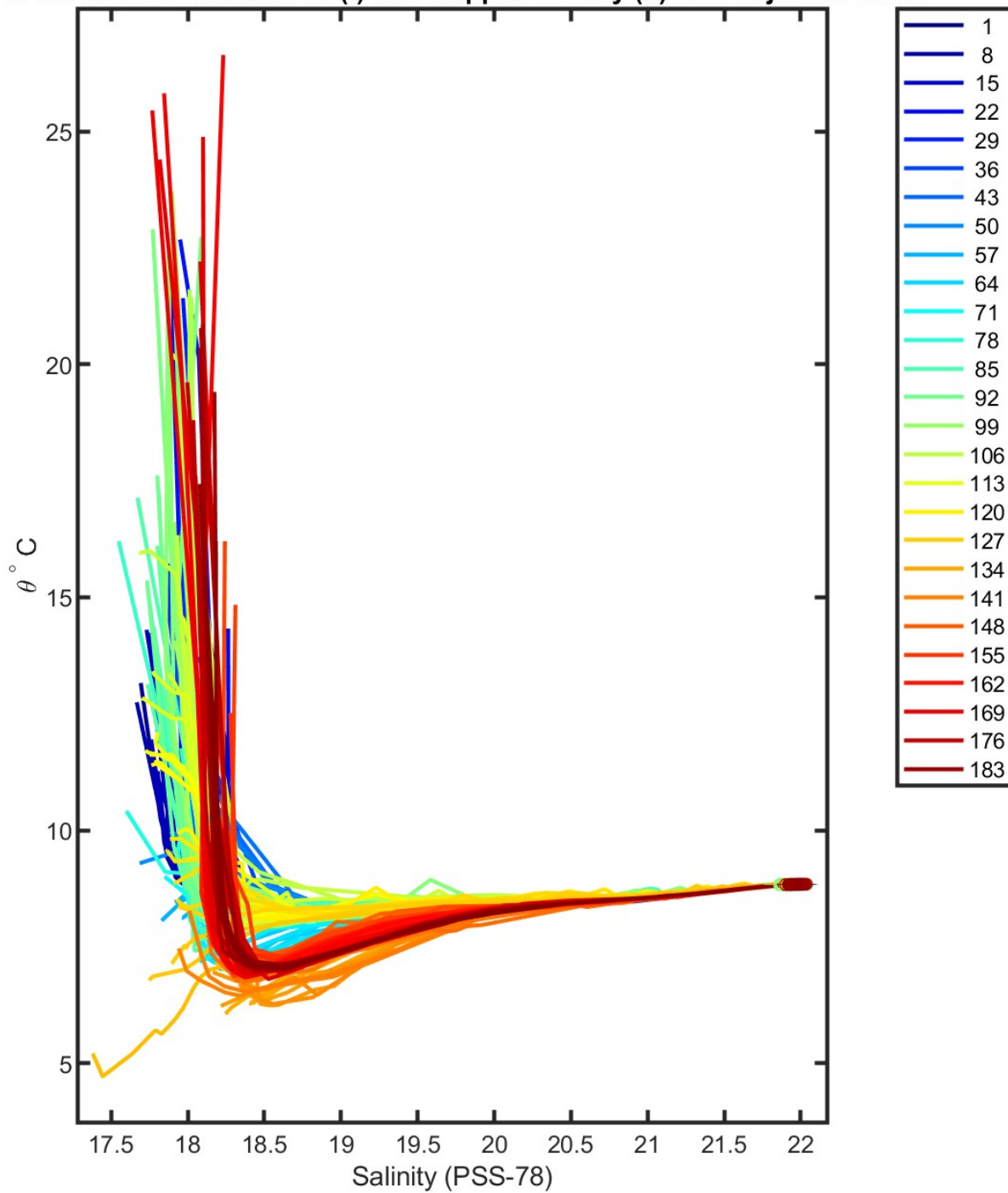


**Figure 2:** Plot the original float salinity and the objectively estimated reference salinity at the 10 float theta levels that are used in calibration.



**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.

7900466 calibrated float data (-) and mapped salinity (o) with objective errors



**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.

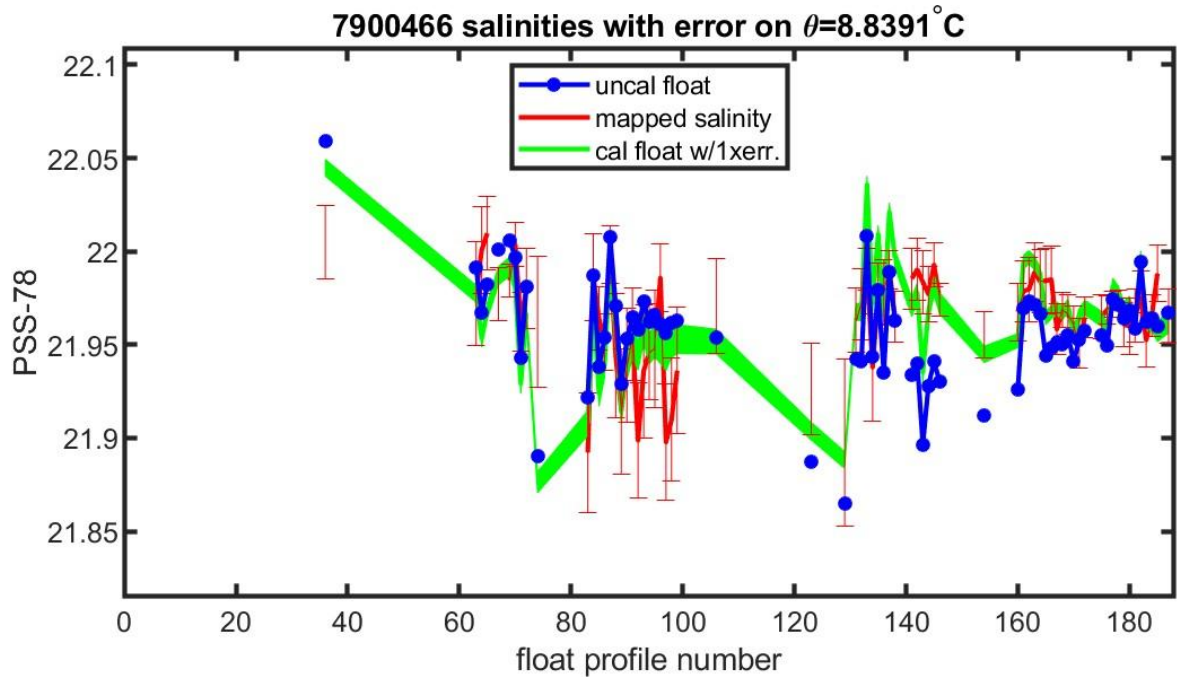
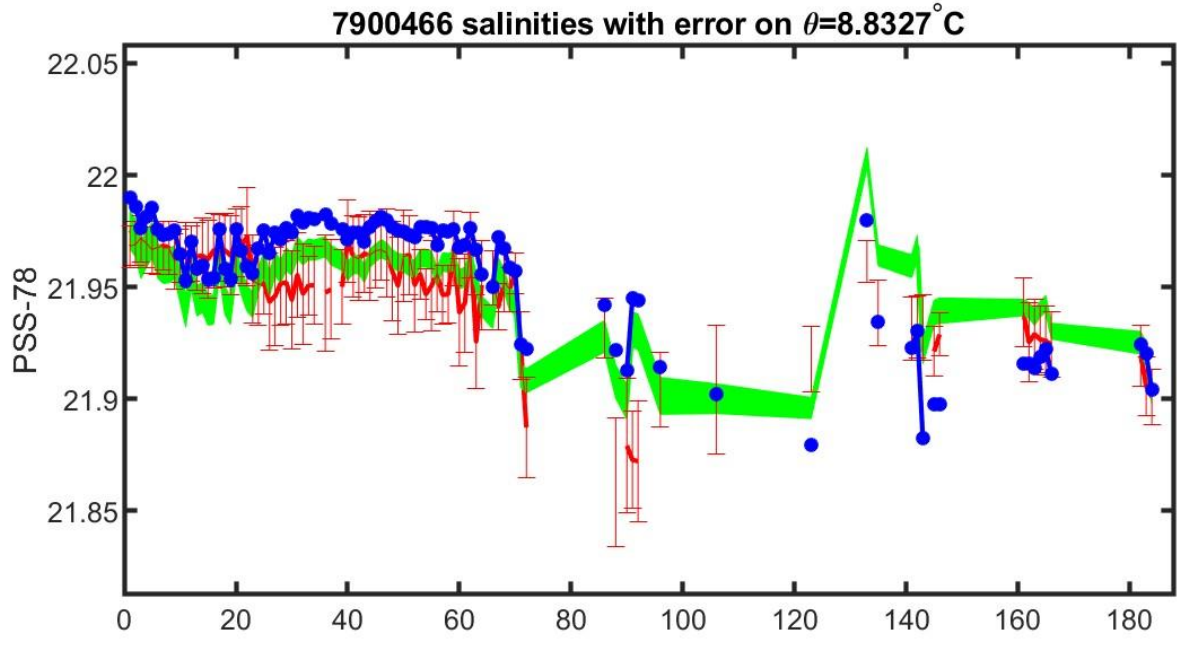
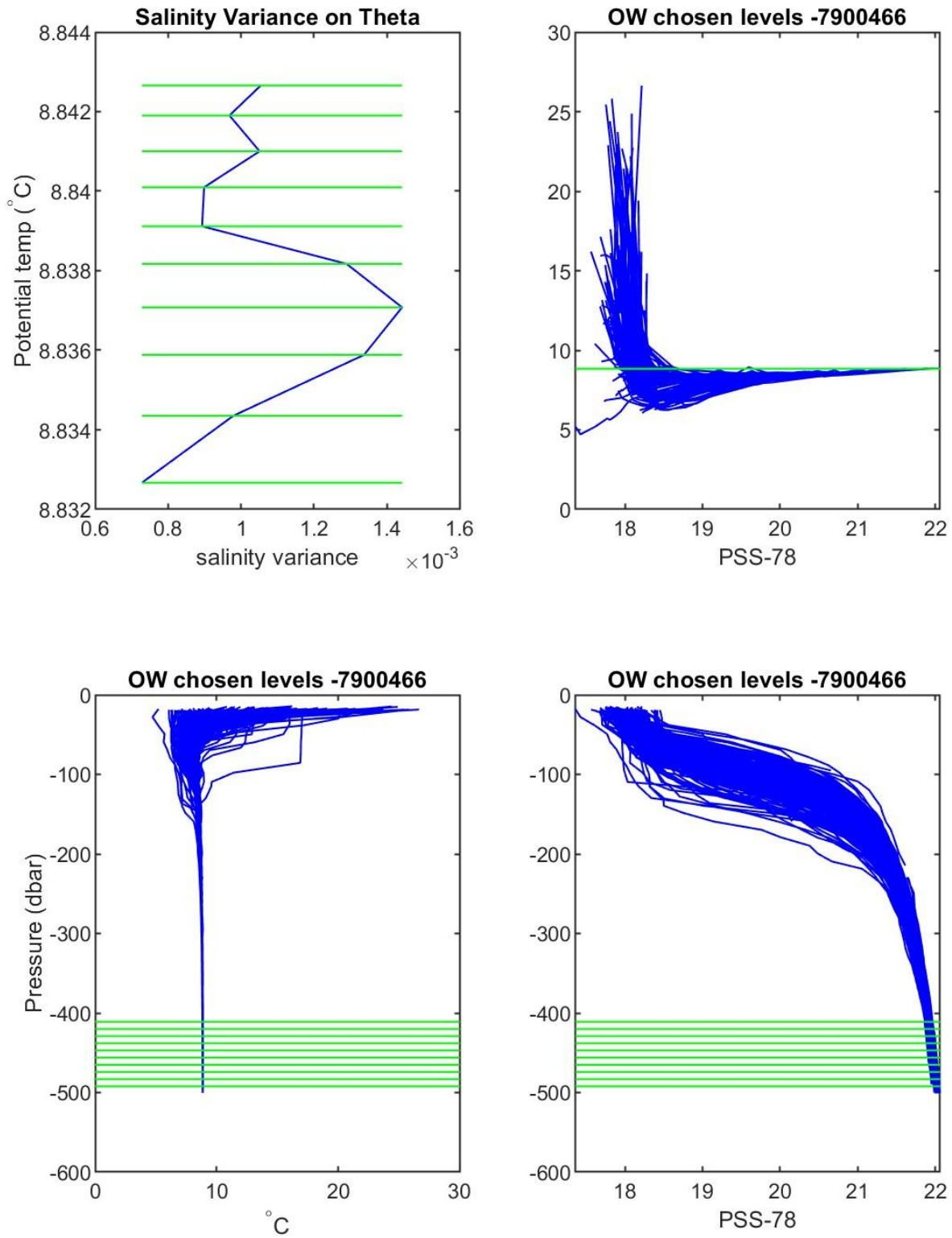
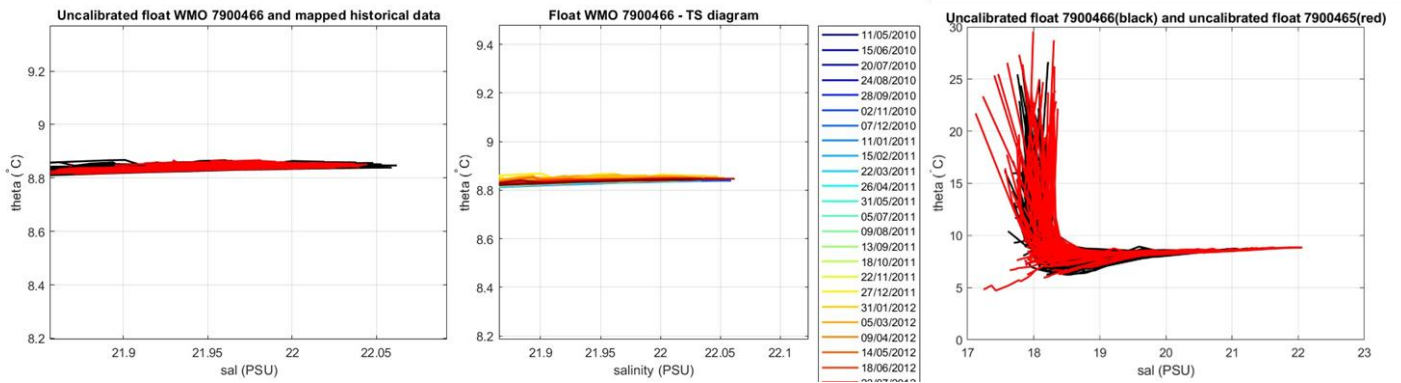


Figure 5: Plots of the evolution of salinity with time along with selected theta levels with minimum salinity variance.



**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 7900466 and historical CTD on the left and  $\theta$ -S diagram color-coded per cycle number in the center, in the most uniform part of the  $\theta$ -S curve. On the right, the comparison between float 7900466 with float 7900465.

## Summary

Float WMO 7900466 was deployed in the Black Sea Sea. This float was not DMQC-ed before. The maximum depth reached by the float was 500 dbar. Despite the shallow profiles, we applied OWC taking into account the high variability at the theta levels. The OWC analysis showed a salinity drift. Additional analyses (visual inspection of the deepest portion of the  $\theta$ -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. Figure 7 shows a good comparison between salinity float profiles with the historical CTD. Also, the  $\theta$ -S diagram is tight in the deeper part. The last decision is that the salinity data of float WMO 7900466 doesn't need a delayed mode correction applied to all cycles. QC 1 is applied. Some positions are bad and QC 4 is applied.

PSAL\_ADJUSTED=PSAL from cycle 1 to 187

The quality flags applied are the following:

PSAL\_ADJUSTED\_QC='1' from cycle 1 to 187

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>