

Note of Delayed Mode Quality Control of Argo float WMO 6901827

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This note includes the results of OWC performed for the WMO 6901827 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 6901827 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	13.50

OWC Results

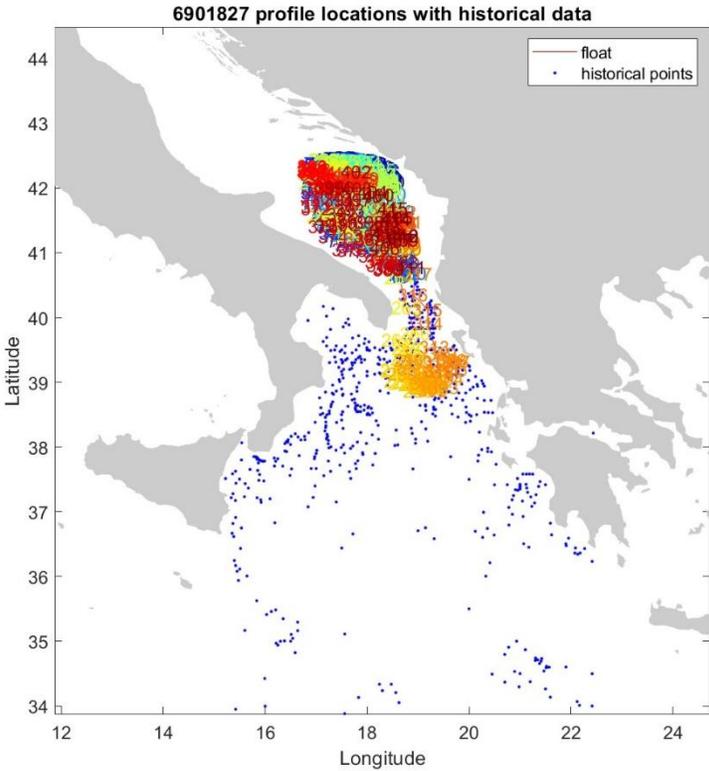


Figure 1: Location of the float profiles (red line with colored numbers) and the reference data selected for mapping (blue dots).

6901827 uncalibrated float data (-) and mapped salinity (o) with objective errors

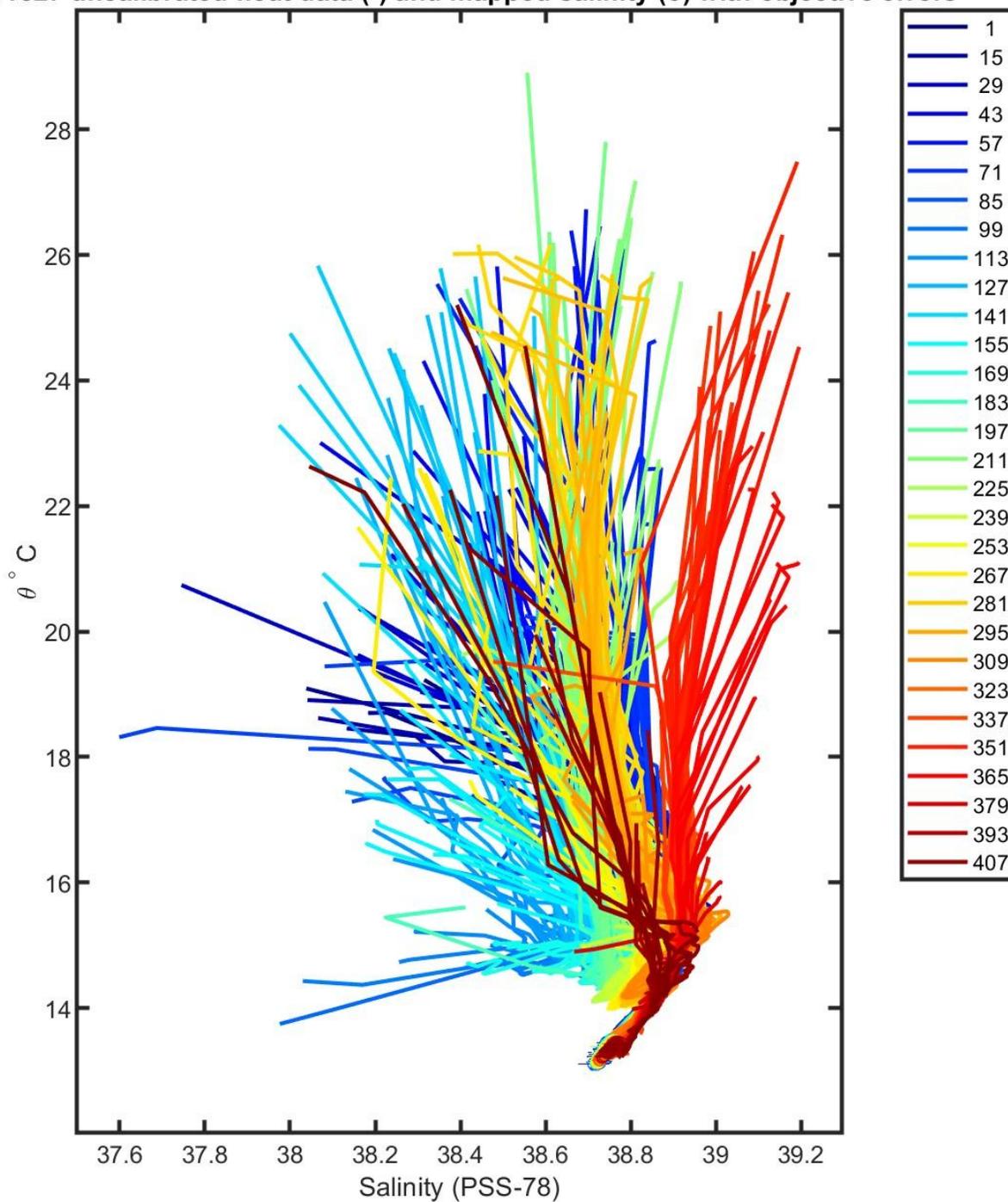


Figure 2: Plot the original float salinity and the objectively estimated reference salinity at the 10 float theta levels that are used in calibration.

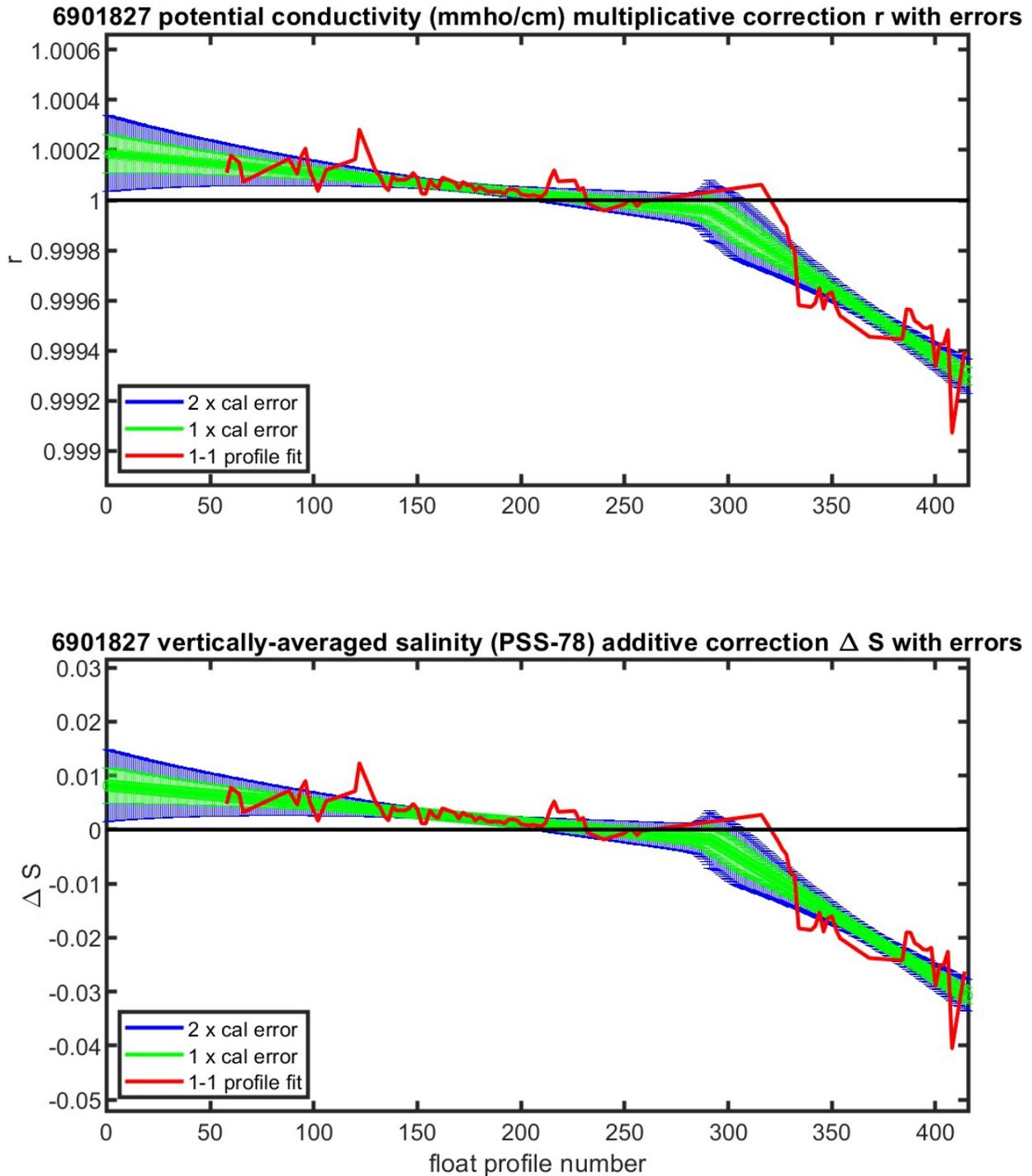


Figure 3: Evolution of the suggested adjustment with time. The top panel plots the potential conductivity multiplicative adjustment. The bottom panel plots the equivalent salinity additive adjustment. The red line denotes one-to-one profile fit that uses the vertically weighted mean of each profile.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

6901827 calibrated float data (-) and mapped salinity (o) with objective errors

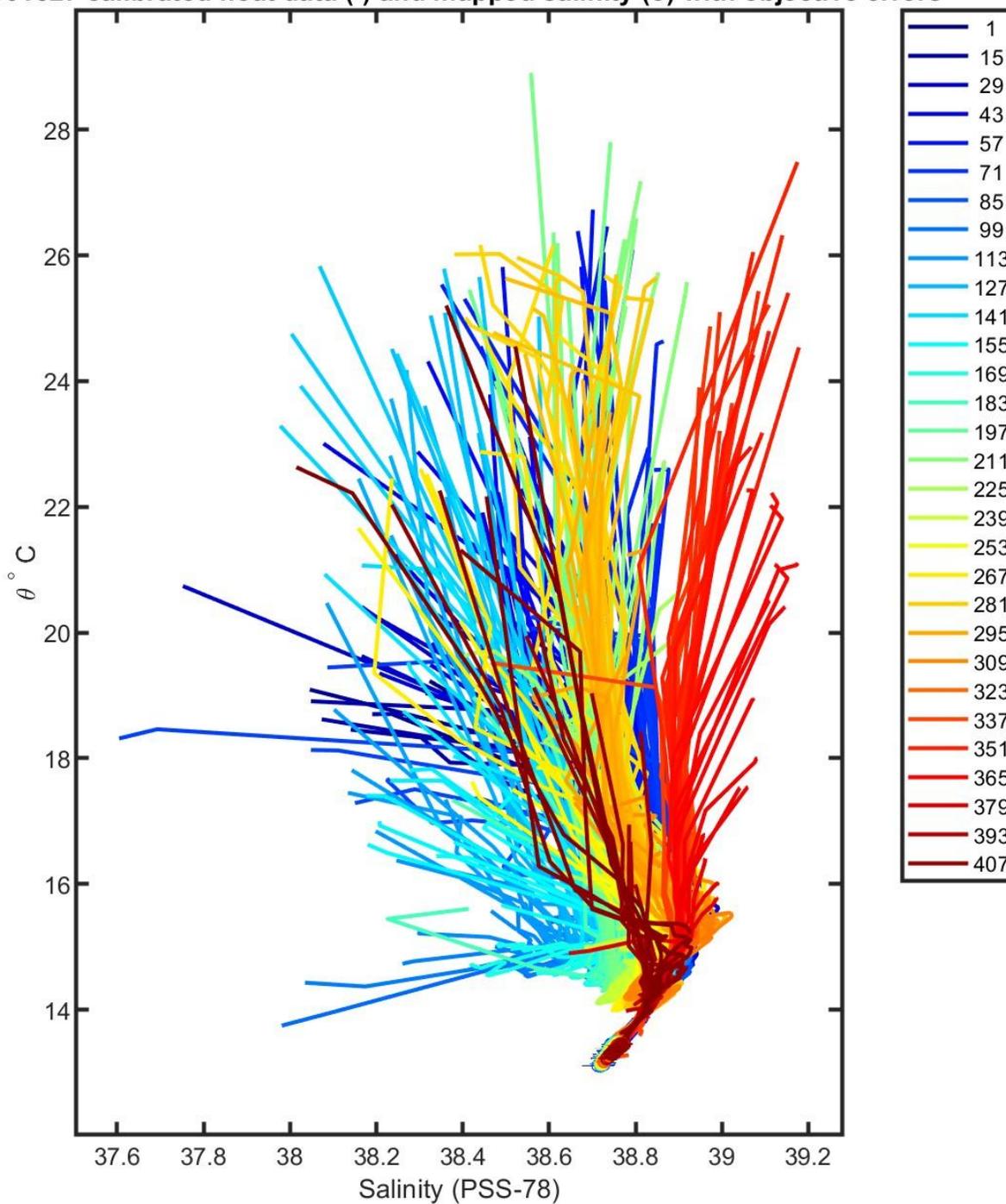


Figure 4: The plot of calibrated float salinity and the objectively estimated reference salinity at the 10 float theta levels that are used in calibration.

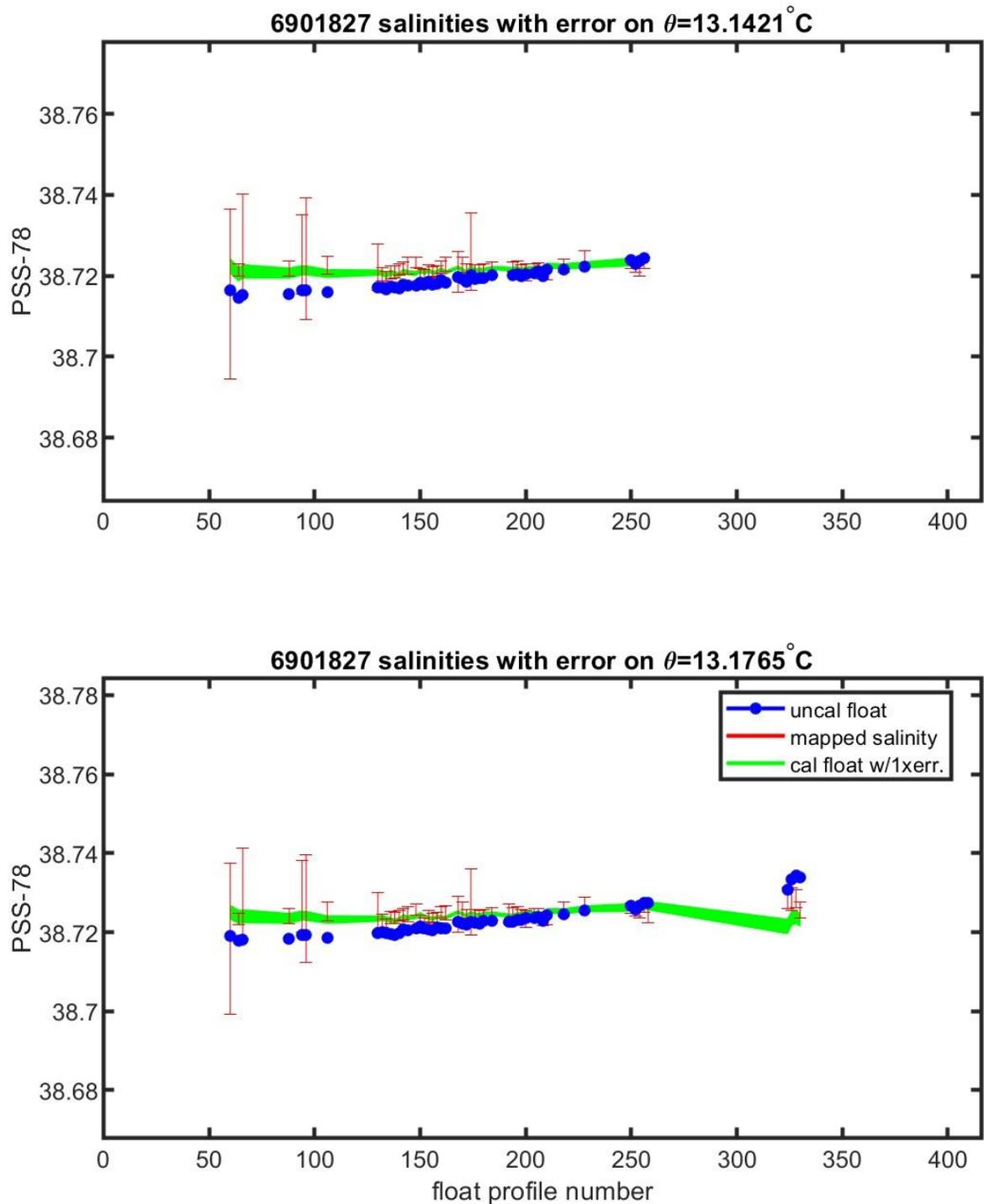


Figure 5: Plots of the evolution of salinity with time along with selected theta levels with minimum salinity variance.

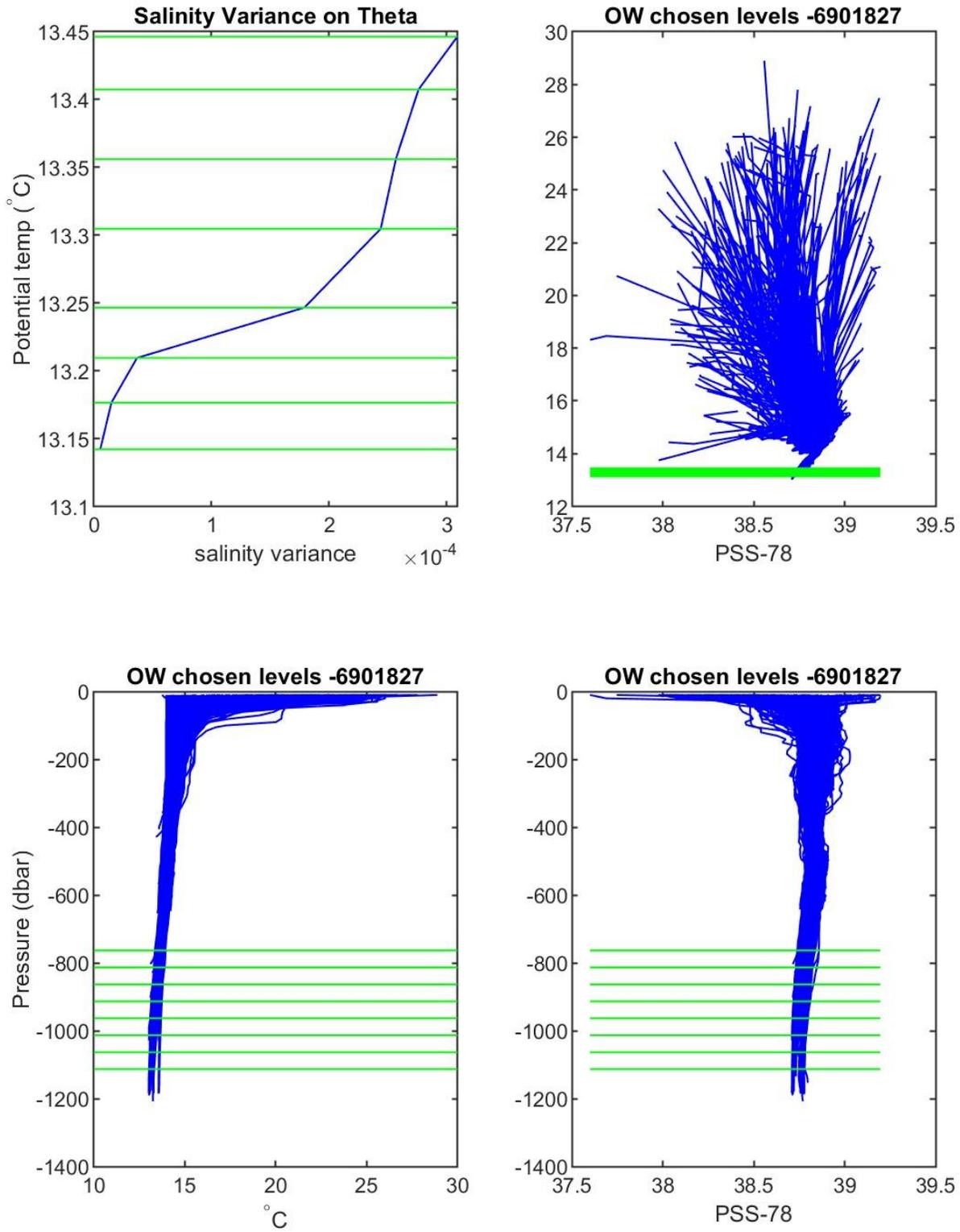


Figure 6: Plots include the theta levels chosen for calibration: Top left: Salinity variance at theta levels. Top right: T/S diagram of all profiles of Argo float. Bottom left: potential temperature plotted against pressure. Bottom right: salinity plotted against pressure.

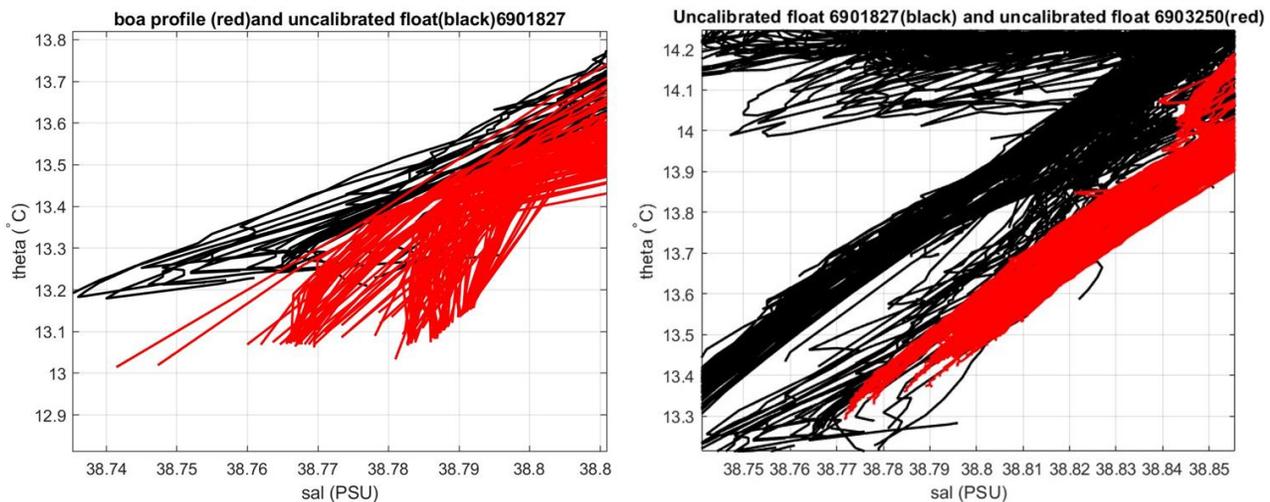


Figure 7: Comparison between float 6901827 (black line) and E2M3A mooring on the left and float 6903250 on the right. (red line), in the most uniform part of the θ -S curve.

Summary

Float WMO 6901827 was deployed in the Adriatic sub-basin of the Mediterranean Sea. During its lifetime, it later moved into the Ionian sub-basin. This float had previously undergone DMQC while active: no correction was applied and QC 1 was assigned to cycles 1–128. We applied the OWC method taking into account the deepest profiles. The OWC analysis showed no significant salinity drift until profile 265, followed by a significant salinity drift. The correction proposed by OWC exceeds the Argo required accuracy (0.01) starting from profile 265. A thermohaline variability analysis in the Adriatic sub-basin showed an increase in salinity of about 0.02 per year, particularly since 2017. 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. In addition, a comparison with salinity measured by the E2M3A mooring and by other floats was carried out to provide further qualitative analysis. Figure 7 shows good agreement between the salinity measured by the mooring and by the float. These comparisons suggest that the observed increase in salinity is due to natural variability. The last decision is that the salinity data of float WMO 6901827 doesn't need a delayed mode correction. QC 1 is applied to all cycles.

PSAL_ADJUSTED=PSAL from cycle 1 to 416

The quality flags applied are the following:

PSAL_ADJUSTED_QC='1' from cycle 1 to 416

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>
- Gallo, A., Notarstefano, G., Pacciaroni, M. (2025) Thermohaline variability below 500 meters in the Mediterranean as observed by Argo floats (2000-2024) and its implications for delayed-mode quality control (DMQC). <https://hdl.handle.net/20.500.14083/45945>

