Note of Delayed Mode Quality Control
of Argo float WMO 6903237

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This note includes the results of OWC performed for the WMO 6903237 float. The reference dataset used is composed of the following CTD and Argo historical datasets:

CTD:
- CMEMS: INSITU_GLO_TS_REP_OBSERVATIONS_013_001_b
- Coriolis: CTD_for_DMQC_2021V02
- Historical CTD profiles provided through personal contact

Argo:
- ARGO_for_DMQC_2020V03

Float 6903237 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).
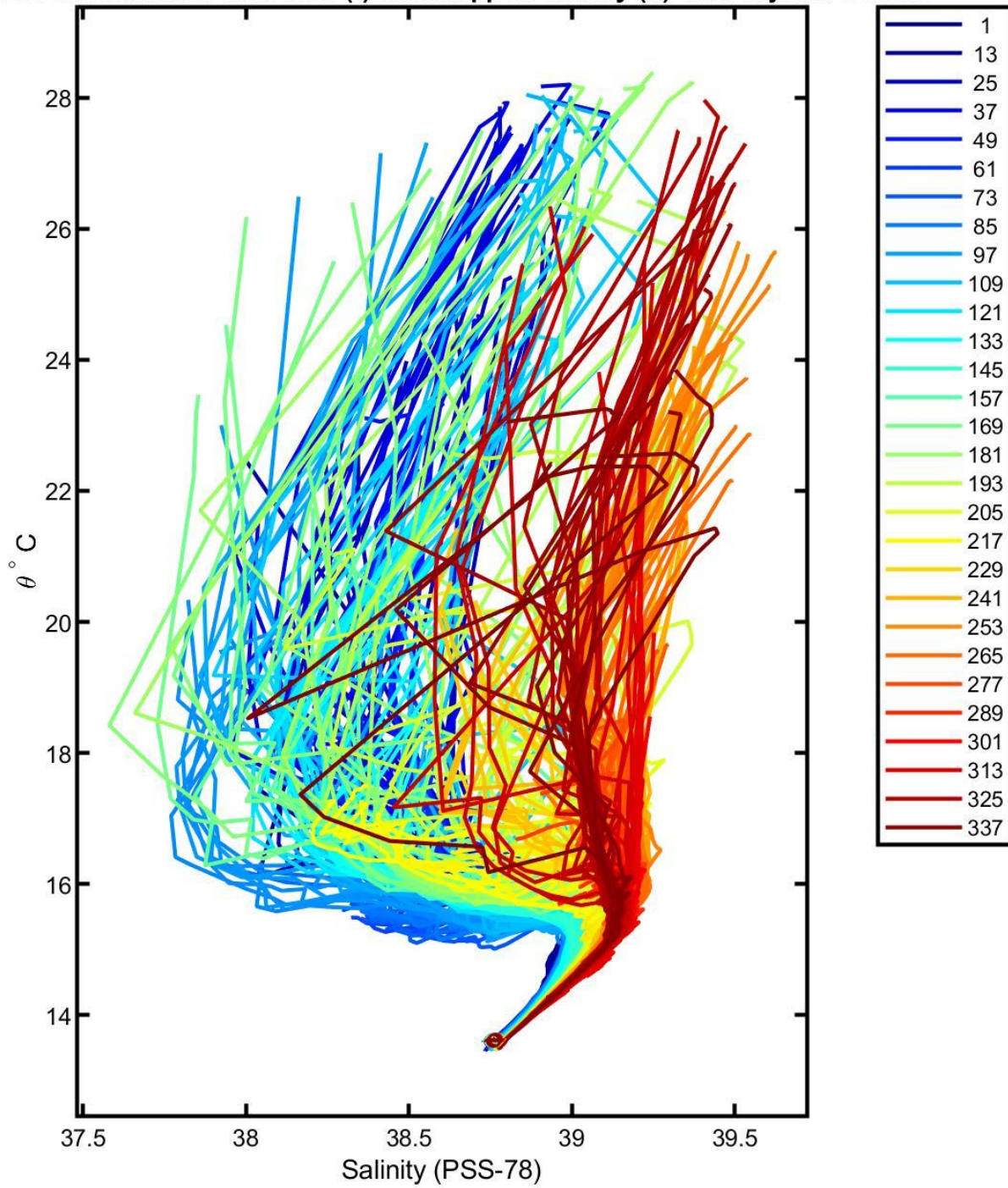
Configurations

| 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
use_theta_lt	13.65
use_theta_gt	13.60
breaks	158

OWC Results
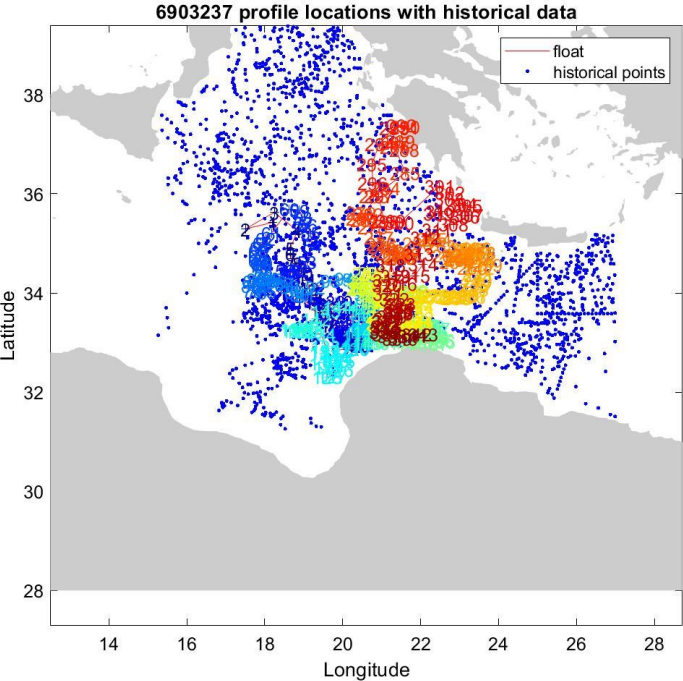
Figure 1: Location of the float profiles (red line with colored numbers) and the reference data selected for mapping (blue dots).
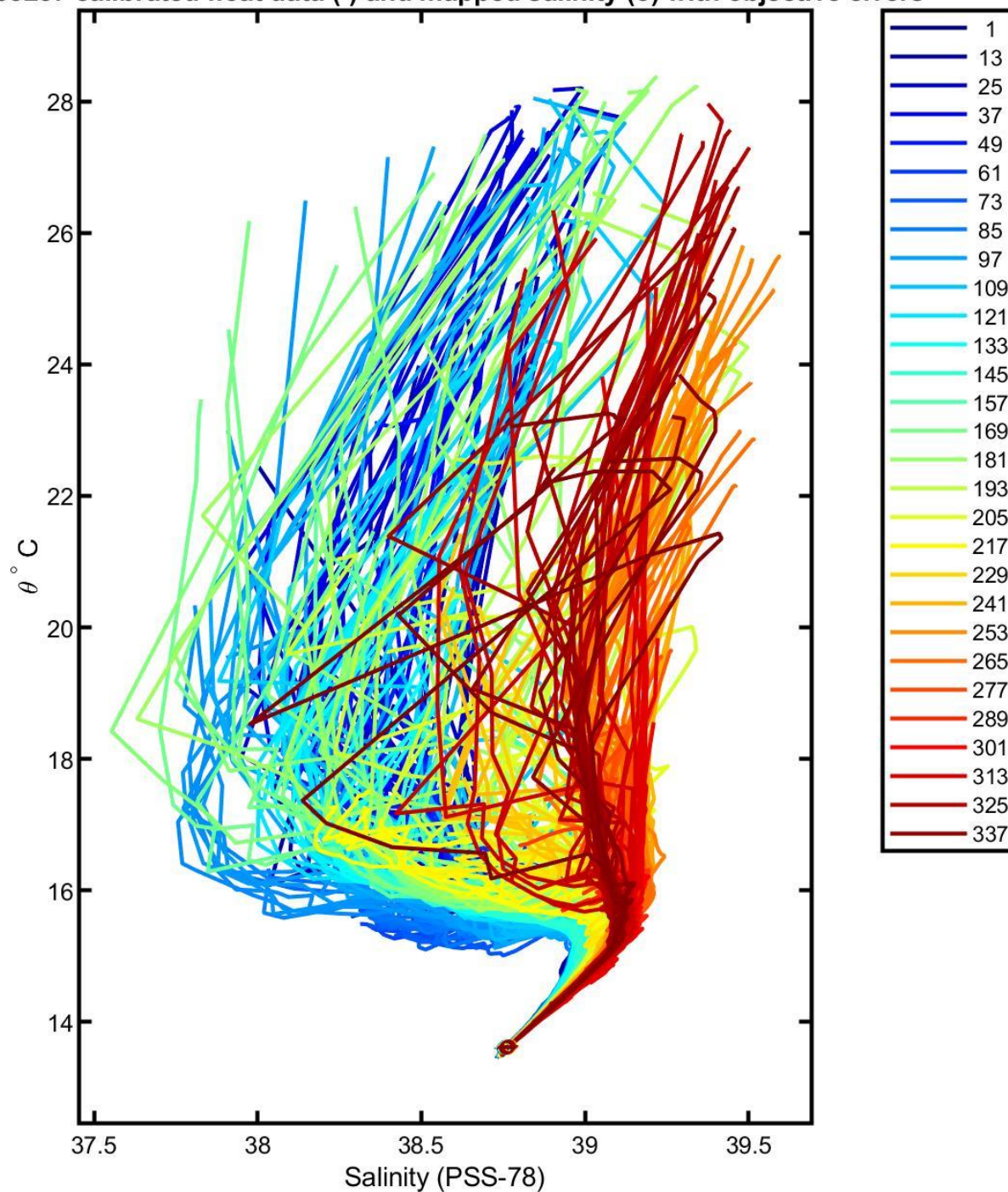
Figure 2: Plot the original float salinity and the objectively estimated reference salinity at the 10 float theta levels that are used in calibration.
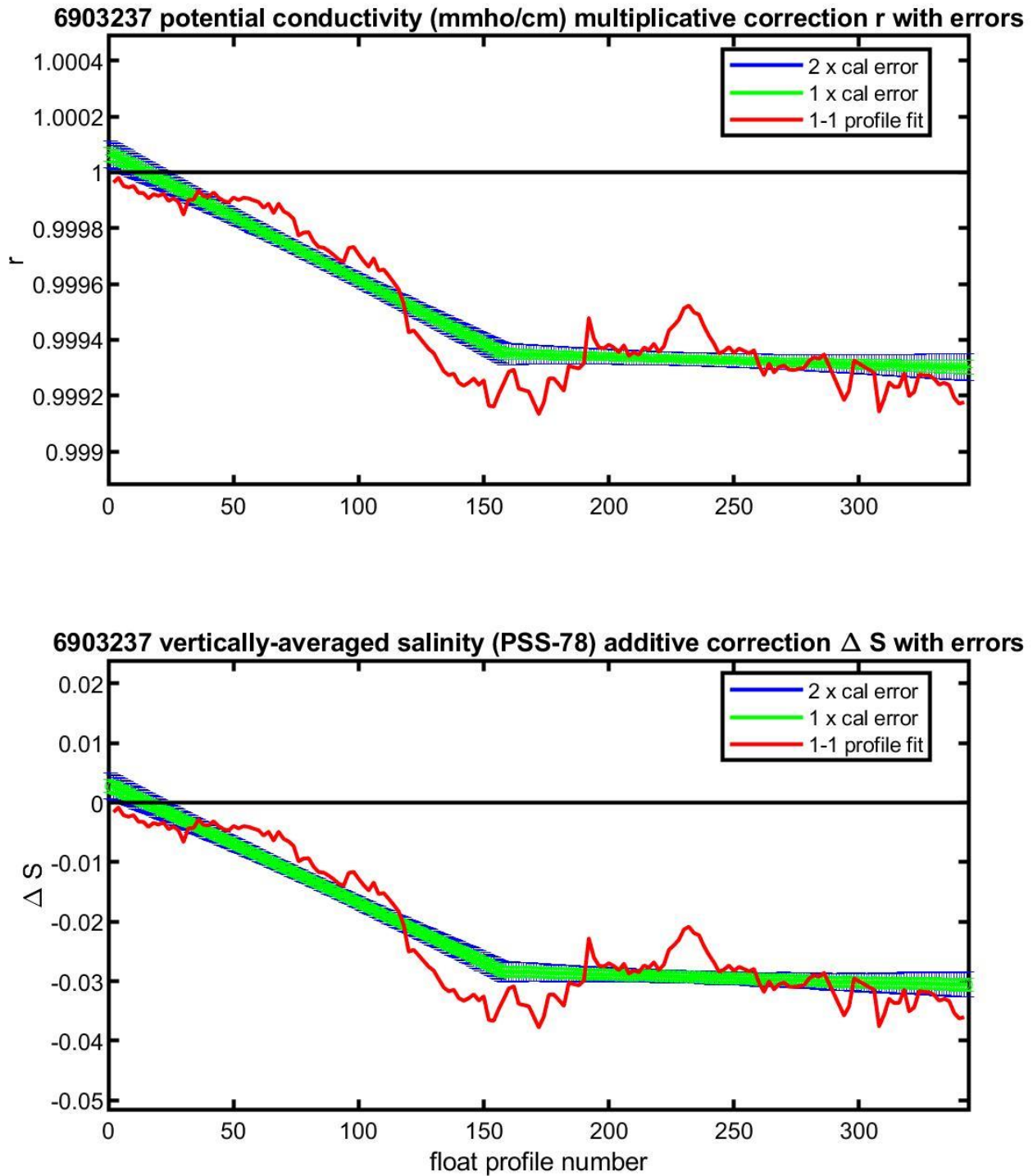
Figure 3: Evolution of the suggested adjustment with time. The top panel plots the potential conductivity multiplicative adjustment. The bottom panel plots the equivalent salinity additive adjustment. The red line denotes one-to-one profile fit that uses the vertically weighted mean of each profile. The red line can be used to check for anomalous profiles relative to the optimal fit.

6903237 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.
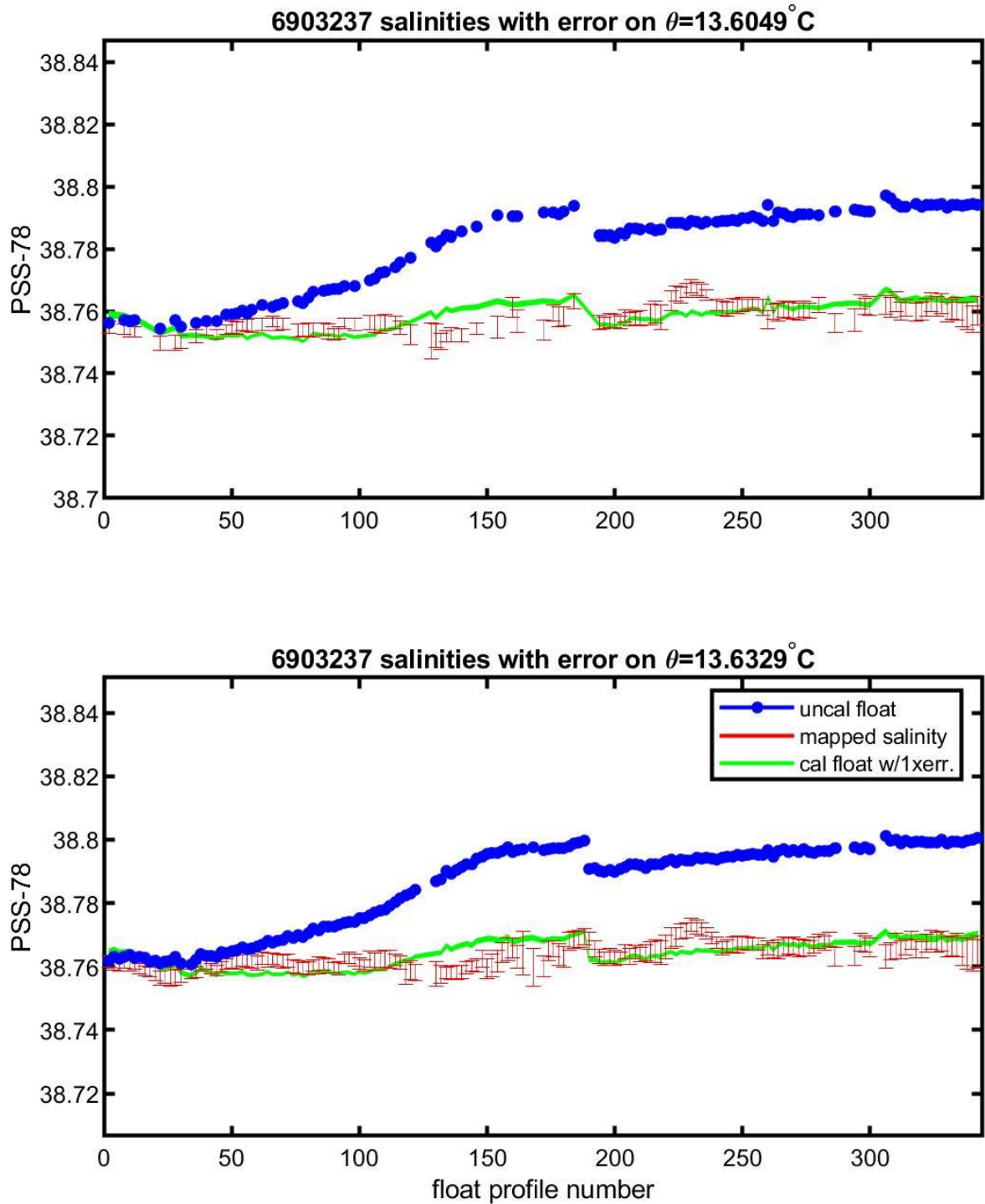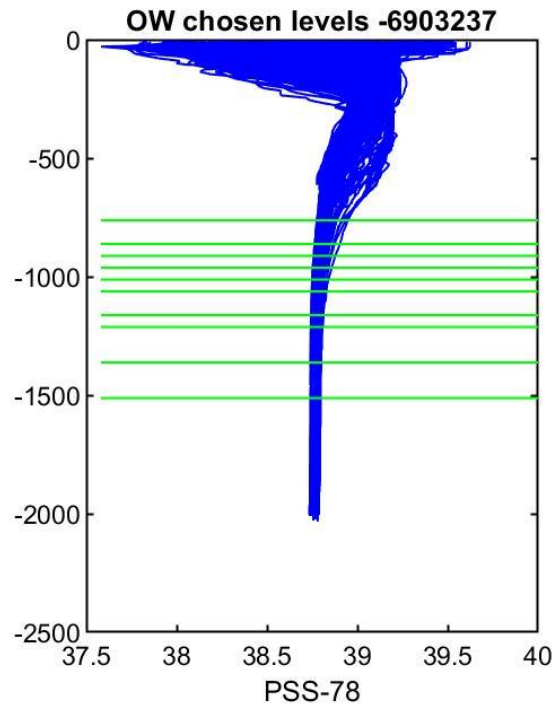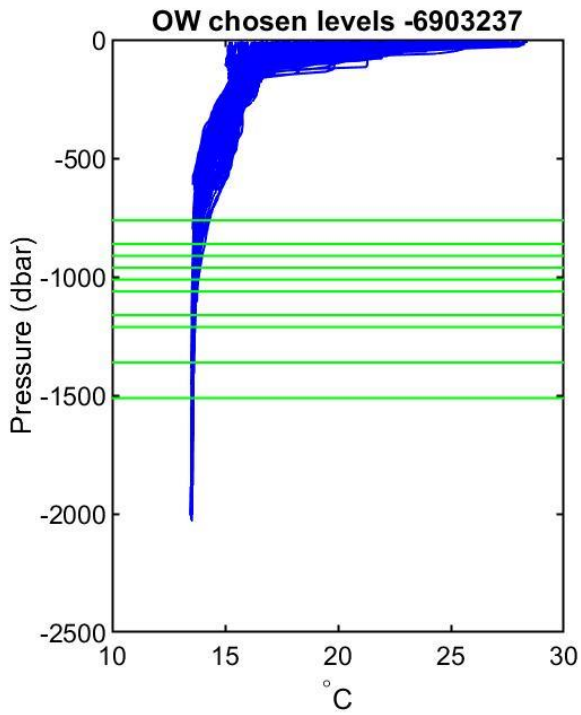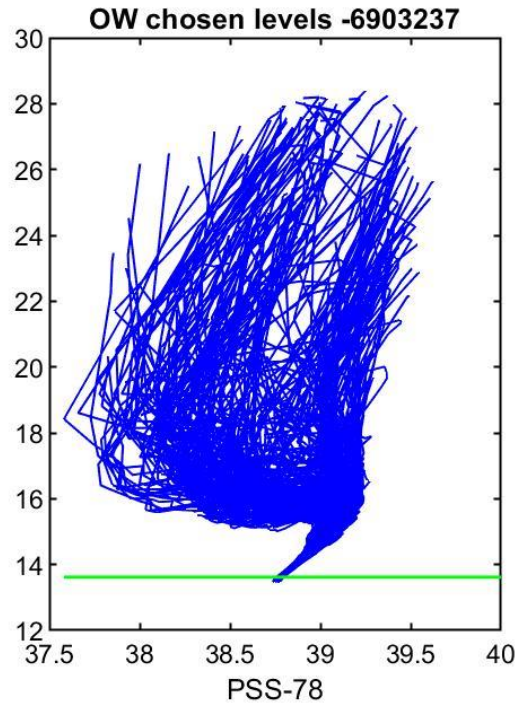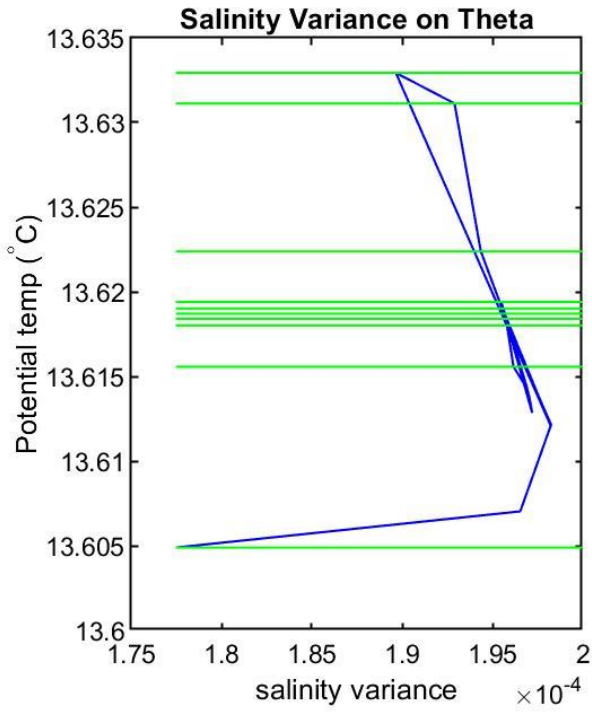
Figure 5: Plots of the evolution of salinity with time along with selected theta levels with minimum salinity variance.

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.

Summary

Float WMO 6903237 was deployed in the Ionian sub-basin, in the Mediterranean Sea. During its life passed in Cretan sub basin. This float was not DMQC-ed before.

The OWC analysis showed a significant salinity drift. Figure 3 reveals that the least square fit is quite reliable. The correction proposed by OWC suggests a correction higher than the Argo requested accuracy (0.01). Figure 5 shows a significant sensor drift on selected θ-levels. Additional analyses (the visual inspection of the deepest portion of the θ-S diagram, 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. These analyses show two different water masses.

After several investigation, the last decision is that the salinity data of float WMO 6903237 need a delayed mode correction. QC 1 is applied.

PSAL_ADJUSTED= PSAL+ ΔS from cycle 1 to 343

The quality flags applied are the following:

PSAL_ADJUSTED_QC='1' from cycle 1 to 343

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