Argo-España

Parte de la estrategia global de observación del océano

Report on Delayed Mode for Argo float WMO 6901253

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Delayed Mode Quality Control for Argo float WMO 6901253

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1 Introduction

The Delayed Mode Quality Control (DMQC) has been developed for float WMO 6901253 and delivered on 29/08/2023 to Ifremer. Anomalous profiles (number 50 to 165) were detected during its initial analysis in the 165 profiles carried out.

Transmision system	ARGOS
Transmission ID	n/a
Platform Model	ARVOR
Platform ID	6901253
Platform ID	AL2500-17SP002
Controller Board	n/a
Data Centre	IF
Project Name	ARGO SPAIN
Format Version	3.1
Float Owner	IEO
PI Name	Pedro Velez
Parking Depth (dbar)	1000
Profile depth (dbar)	2000
Number of Profiles	165
Status	Inactive
Deployment Date	2018 05 29
Deployment Latitude	21.2022
Deployment Longitude	-20.9288
Sensors	CTD-PRES,CTD-TEMP,CTD-CNDC

Table 1. Technical information of the float.

Several checks were performed: Pressure values were studied to avoid possible TNDP anomalies. The Thermal Mass Error was also calculated in order to avoid possible errors due to the temperature gradients. The Owens and Wong Objective Mapping Analysis (2003) was applied to achieve an optimum calibration of the salinity.

2 Salinity correction from the OW method

Owens and Wong Objective Mapping Analysis (2003):

This calibration model assumes that salinity measurements drifts slowly over time. To correct possible salinity drifts, the model makes use of adjacent profiles (a time series) to estimate a time-varying multiplicative correction term "r" by fitting to the estimated climatological potential conductivities on theta surfaces. The inclusion of contemporary high quality calibrated hydrographic data with regional temperature - salinity relationships (by using nearby historical hydrographic data) helps to determine whether a measured trend is due to sensor drift or due to natural variability.

After manual evaluation and inspection, a salinity drift was detected from profile number 50 roughly (figure 7) until the end of the record. This is possibly a float suffering from Abrupt Salinity Drift (ASD), a type of sensor behaviour studied by the Argo community and documented in the Argo Quality Control Manual for CTD and Trajectory Data v 3.7:

- The sensor drift accelerates rates rapidly and abruptly.
- The sensor drift trend is erratic, often with jumps between consecutive profiles, and can reverse in direction.
- The onset of (a) and/or (b) can sometimes be seen as an inflection point or a jump in the float salinity time series.

These characteristics suggest failure of the conductivity cell to produce healthy salinity measurements. Hence float salinity data from the ASD phase is considered as bad and unadjustable in delayed mode (QC=4).

According to Argo Quality Control Manual:

- PSAL ADJUSTED = FillValue.
- PSAL ADJUSTED ERROR = FillValue.
- PSAL ADJUSTED QC = 4.

The following parameters has been set up for the Owens and Wong Objective Mapping Analysis method:

Config_max_casts	165
use_pv	0
scale_long_large	2
scale_lat_large	2
scale_long_small	1
scale_lat_small	1
scale_phi_small	0
scale_phi_large	0
scale_age	10
p_delta	250
p_exclude	200

Table 2. Owens and Wong Objective Mapping Analysis method parameters .

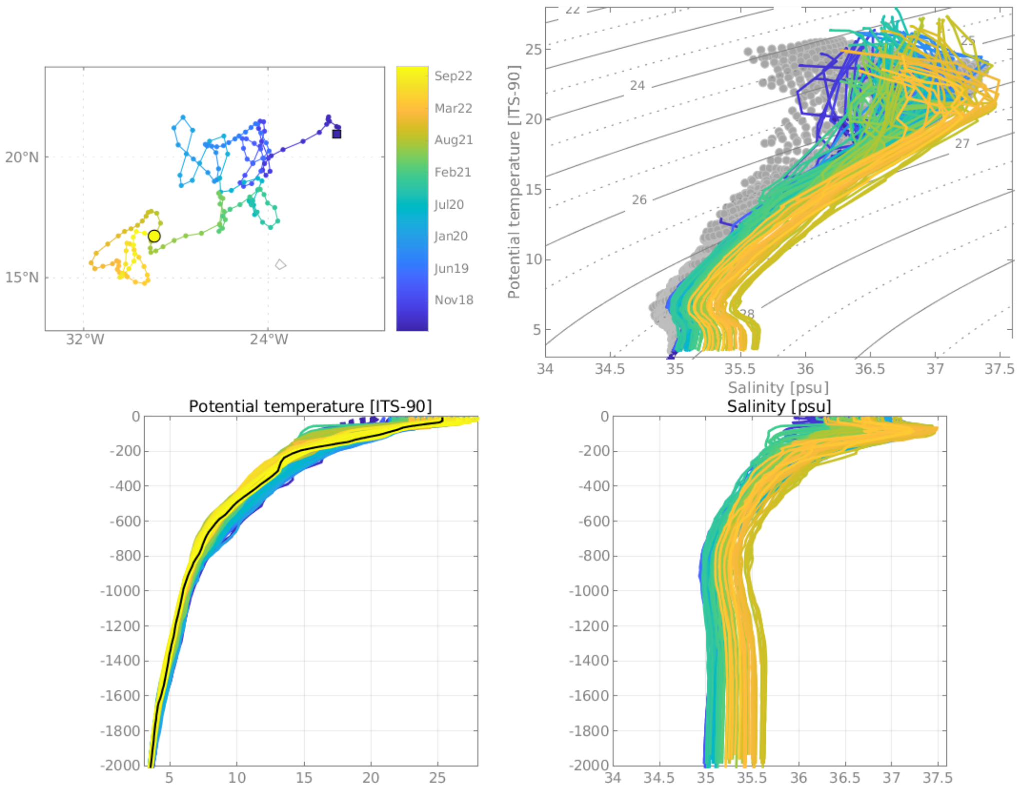


Figure 1: Argo float trajectory (a). T-S Diagram (b). Potential Temperature profiles (c). Salinity profiles (d).

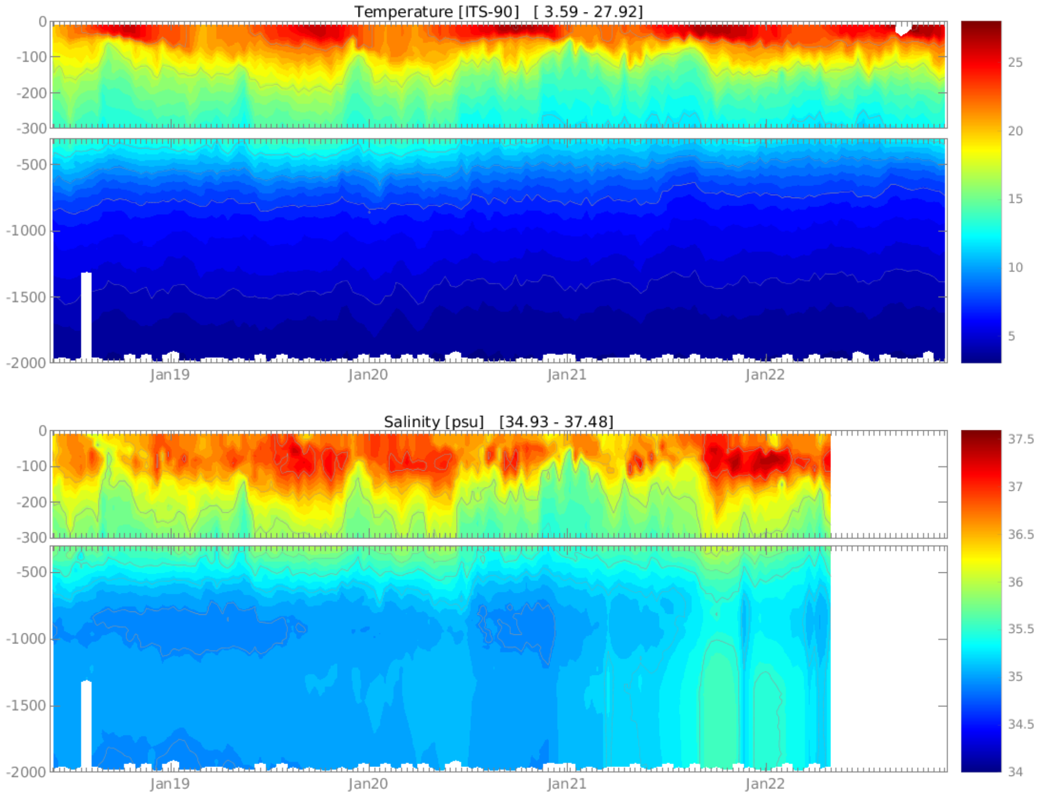


Figure 2: Potential temperature and salinity sections.

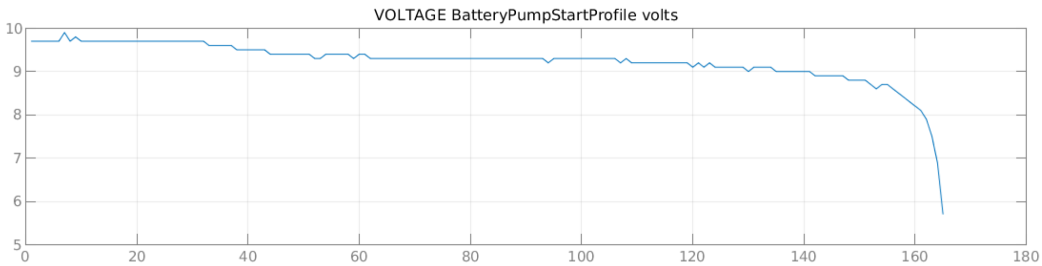


Figure 3: Pressure record (a). Voltage record (b).

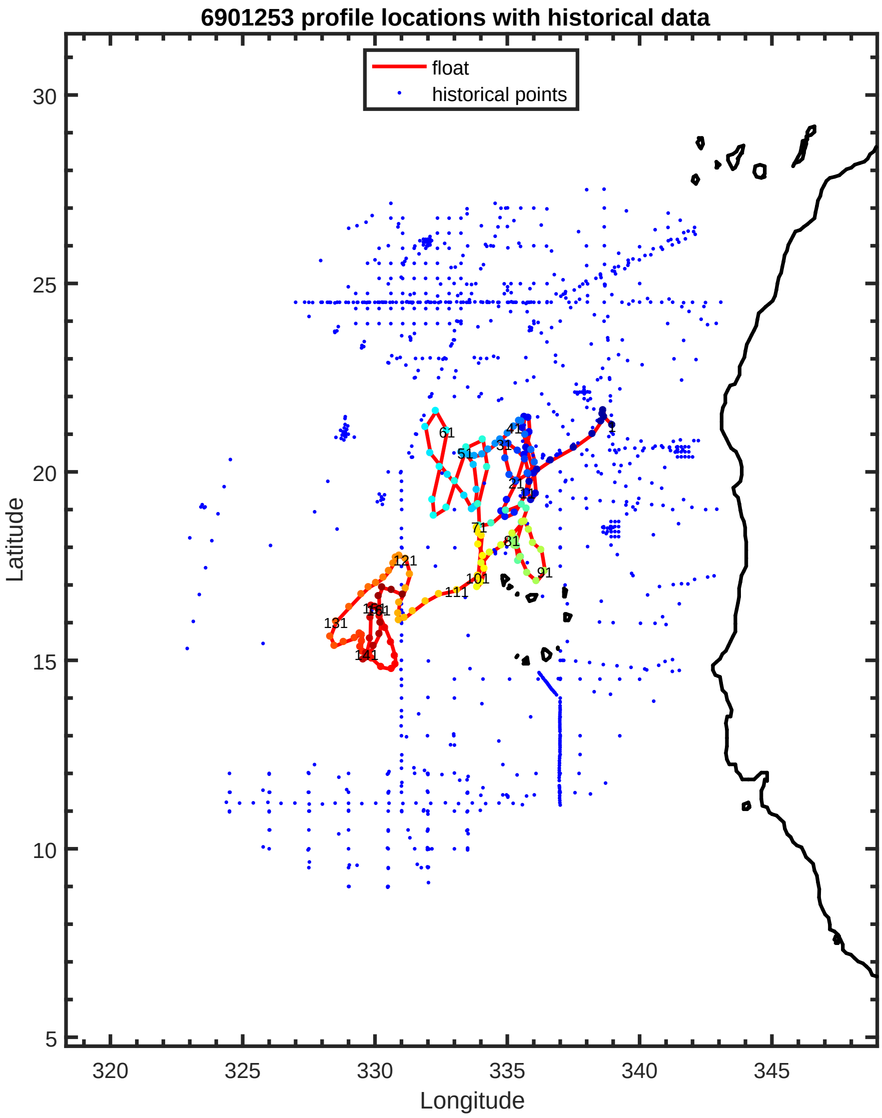
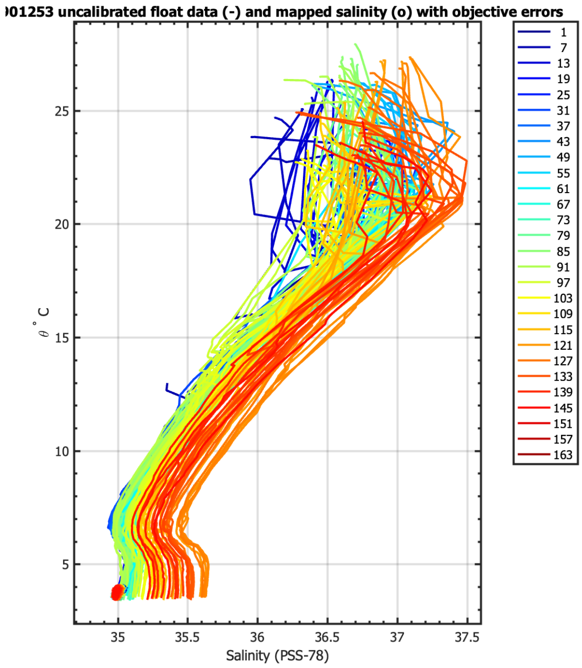
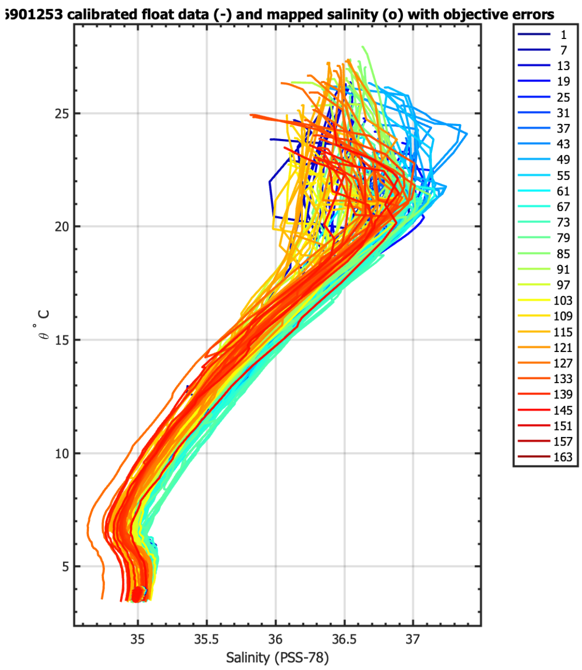


Figure 4: Historical points around the current ARGO float trajectory. These historical points are used by Owens and Wong Objective Mapping Analysis to make a model for an ARGO float data calibration.



(a) T-S Diagram



(b) T-S Diagram after a potential calibration

Figure 5: Both graphs show T-S diagrams before and after a potential calibration. This is useful to identify water masses, to detect some possible offsets or to identify some anomalous profiles.

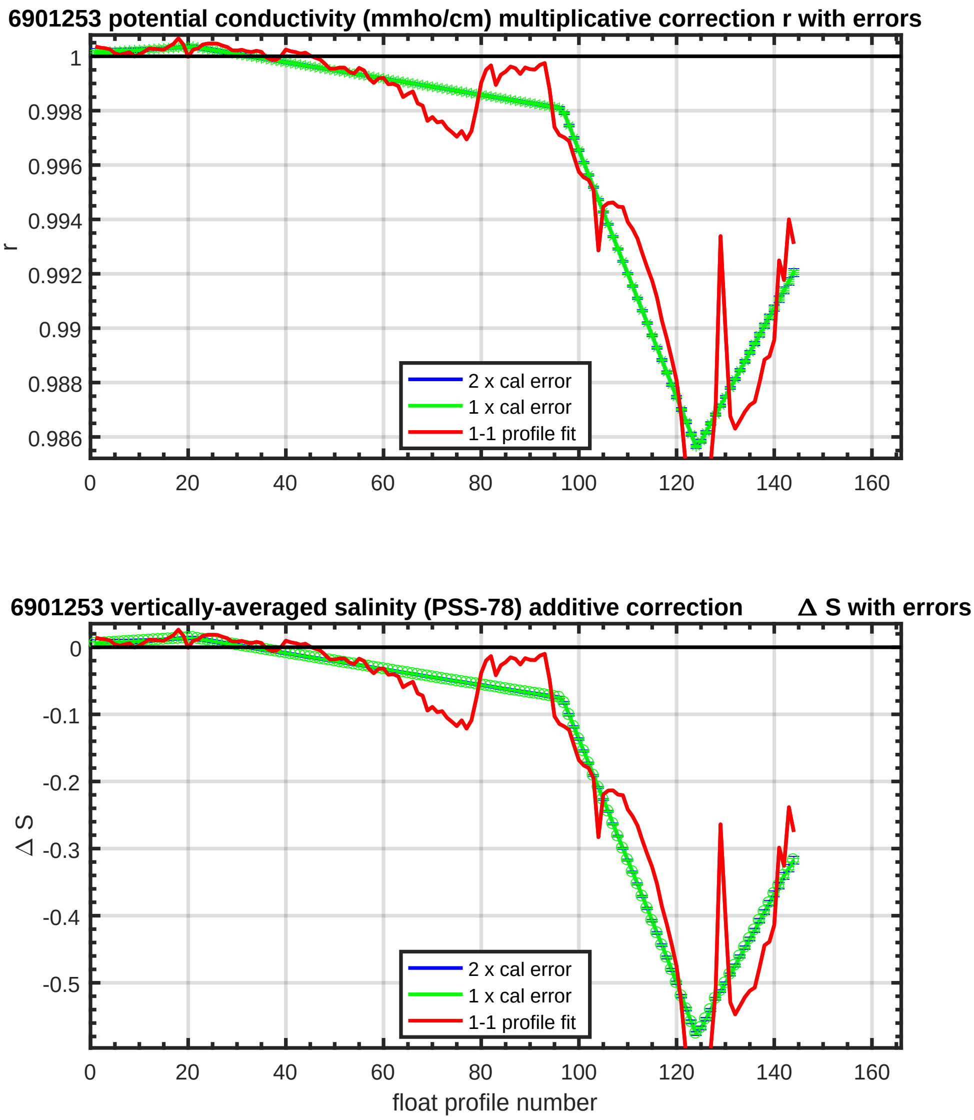


Figure 6: Salinity variation between each profile. Owens and Wong Objective Mapping Analysis builds its model based in a programmed number of break points.

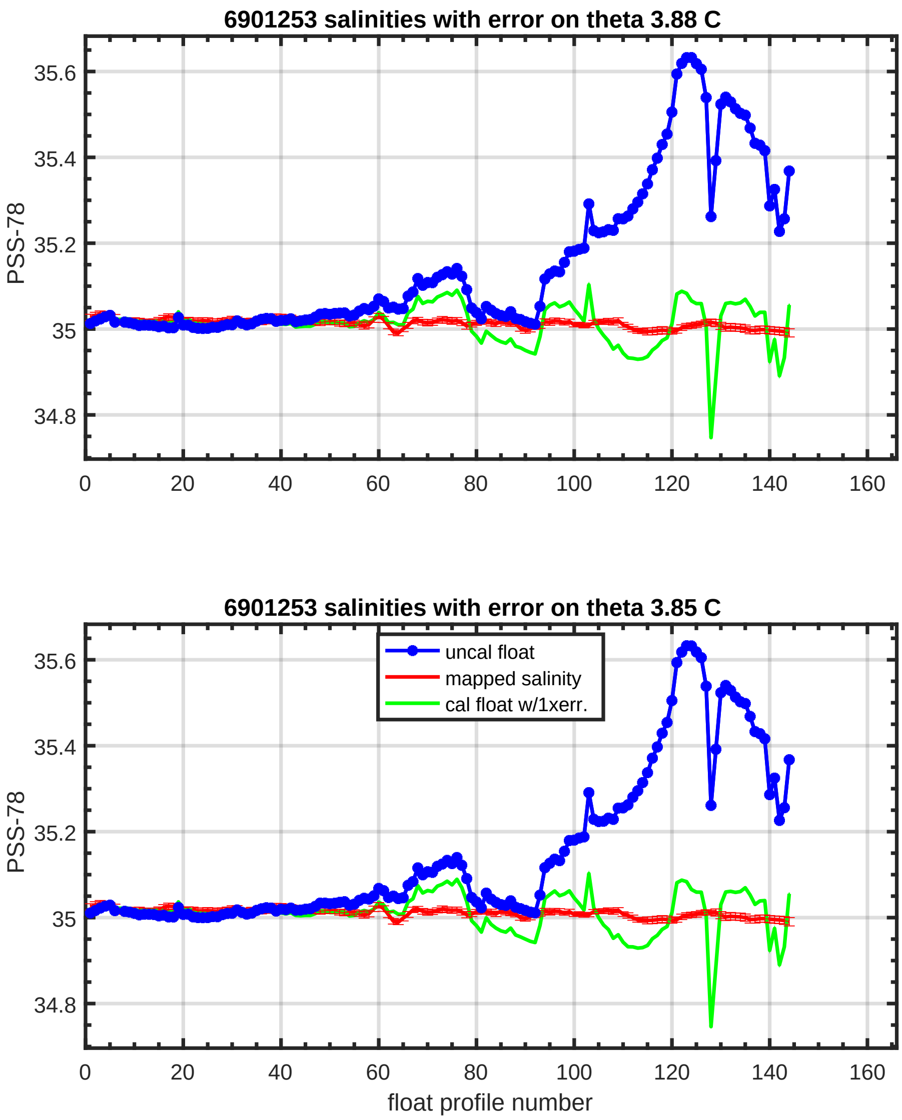
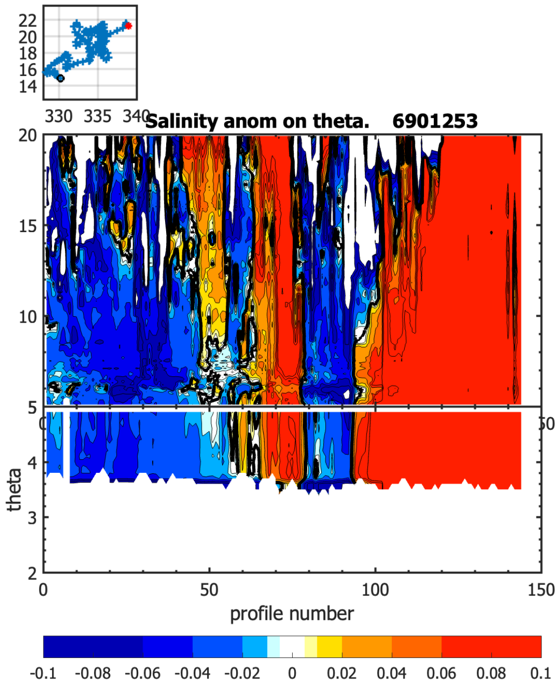
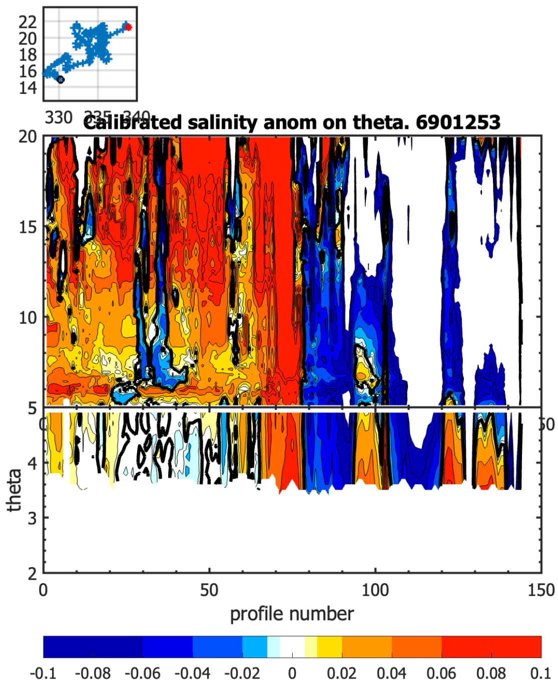


Figure 7: This figure gives a rough idea how uncalibrated (blue line) and calibrated (green line) signals fit each other. Bear in mind that mapped salinity depends on the historical hydrographic points of the area (Figure 1). The less historical points, the less approximated is the model.



(a) Original salinity variation



(b) Calibrated salinity variation

Figure 8: Brians King plots. Both show the salinity variation for an each level of theta per profile. A colored scale indicates the salinity variation (white color indicates no varation). Comparing both uncalibrated and calibrated plots, significant salinity variations can be identified.

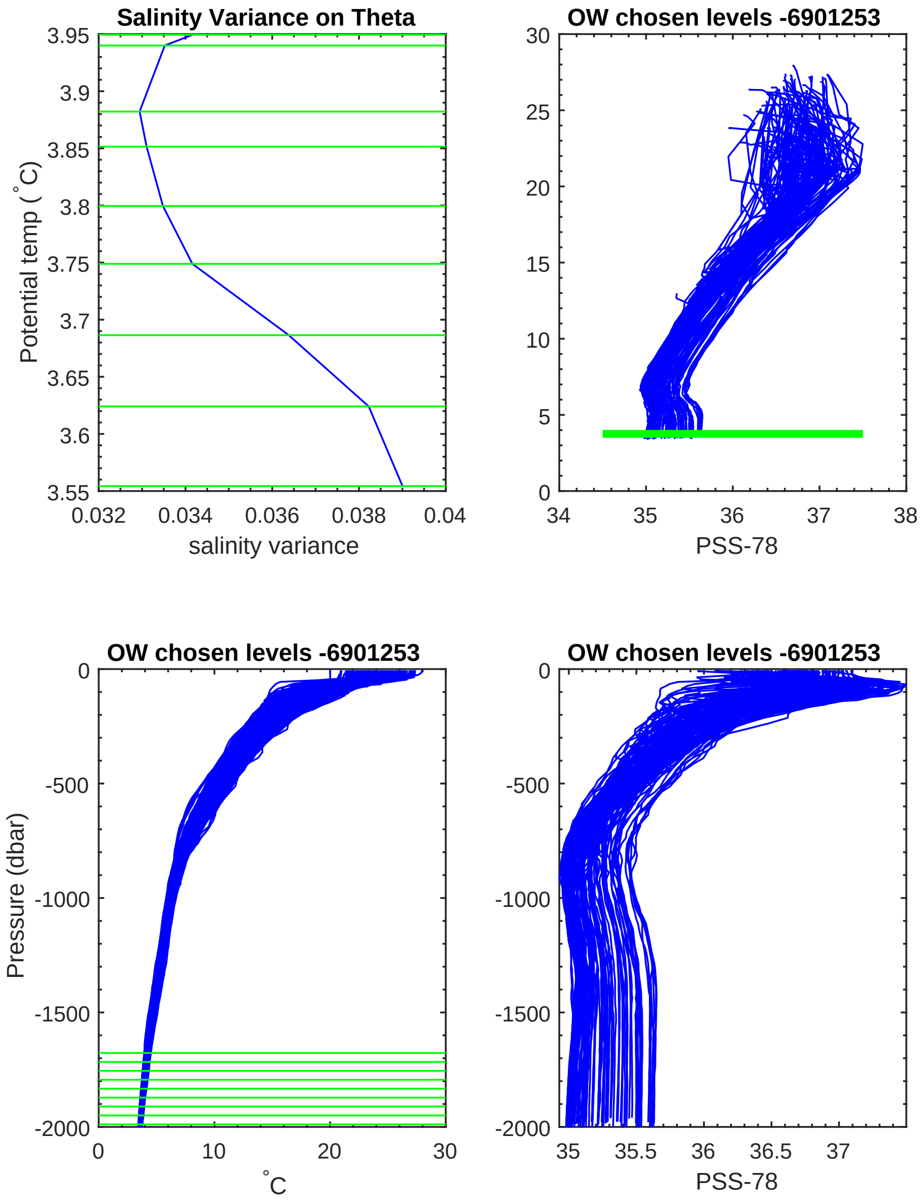


Figure 9: Theta levels are chosen by Owens and Wong Objective Mapping Analysis. The model identifies automatically the theta levels where the salinity variations are smaller.