Argo-España

Parte de la estrategia global de observación del océano

Report on Delayed Mode for Argo float WMO 6901268

ARGO ESPAÑA - IEO / 21 - 70

Delayed Mode Quality Control for Argo float WMO 6901268

September 8, 2021

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1 Introduction

During its initial analysis, anomalous data in salinity were detected in the 85 profiles carried out.

Transmision system	ARGOS
Transmission ID	n/a
Platform Model	ARVOR
Platform ID	6901268
Platform ID	AL2500-17SP017
Controller Board	70-10-444
Data Centre	IF
Project Name	ARGO SPAIN
Format Version	3.1
Float Owner	IEO
PI Name	Pedro VELEZ BELCHI
Parking Depth (dbar)	1000
Profile depth (dbar)	2000
Number of Profiles	85
Status	Active
Deployment Date	2019 03 18
Deployment Latitude	-9.454
Deployment Longitude	-30.255
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 potential drift of the salinity signal was detected from profile number 30 to profile number 85. A large stretch of the signal (Fig. 7) showed salinity variations outside the error bounds of the Argo program (> 0.02 PSU); Owens and Wong calibration has been applied with a break point adjustment = 3 to achieve an optimum salinity calibration.

According to Argo Quality Control Manual:

PSAL ADJUSTED = FillValue, PSAL ADJUSTED QC = 4, PSAL ADJUSTED ERROR = FillValue,

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

Config_max_casts	85
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	5
p_delta	250
p_exclude	200

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

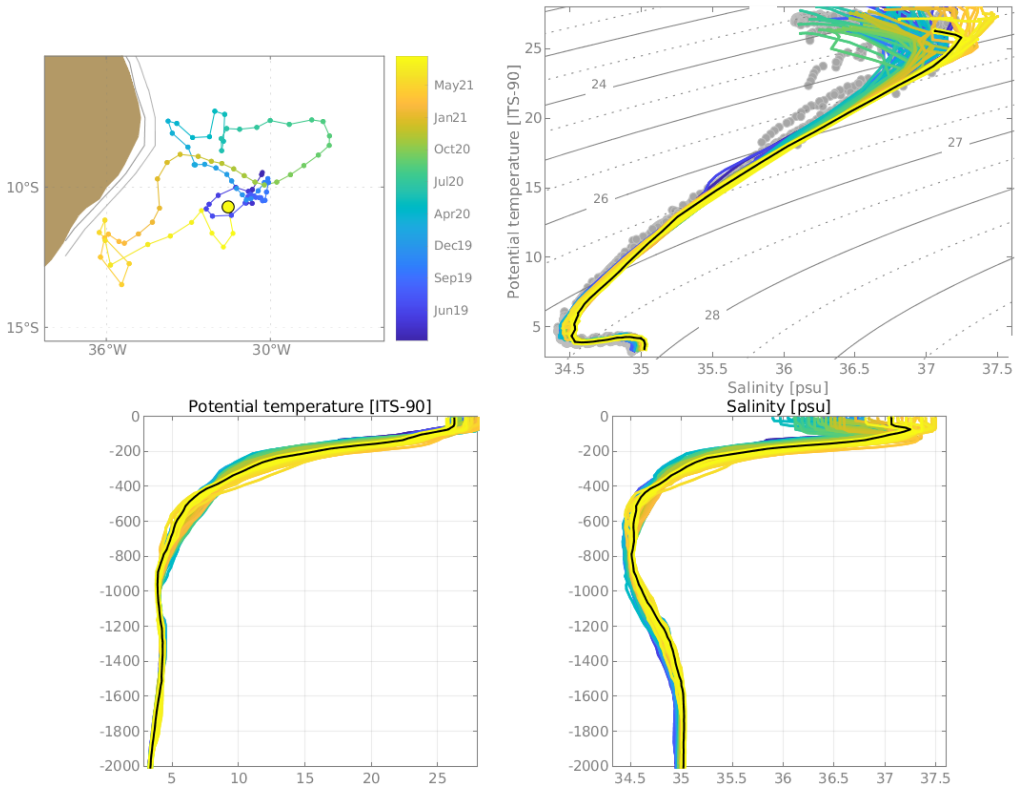

Figure 1: Argo float trajectory (a). T-S Diagram (b). Potential Temperature profiles (c). Salinity profiles (d).

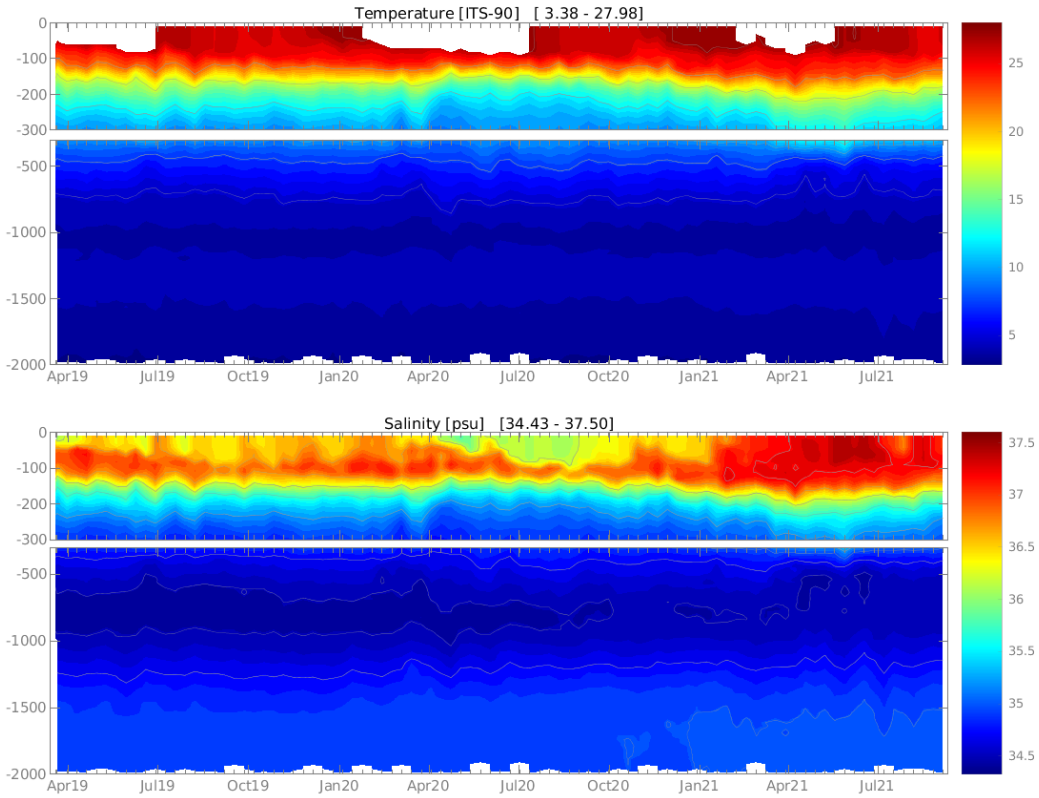

Figure 2: Potential temperature and salinity sections.

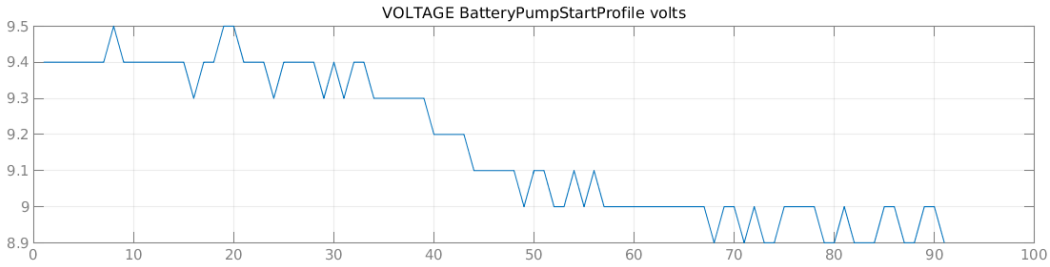

Figure 3: Pressure record (a). Voltage record (b).

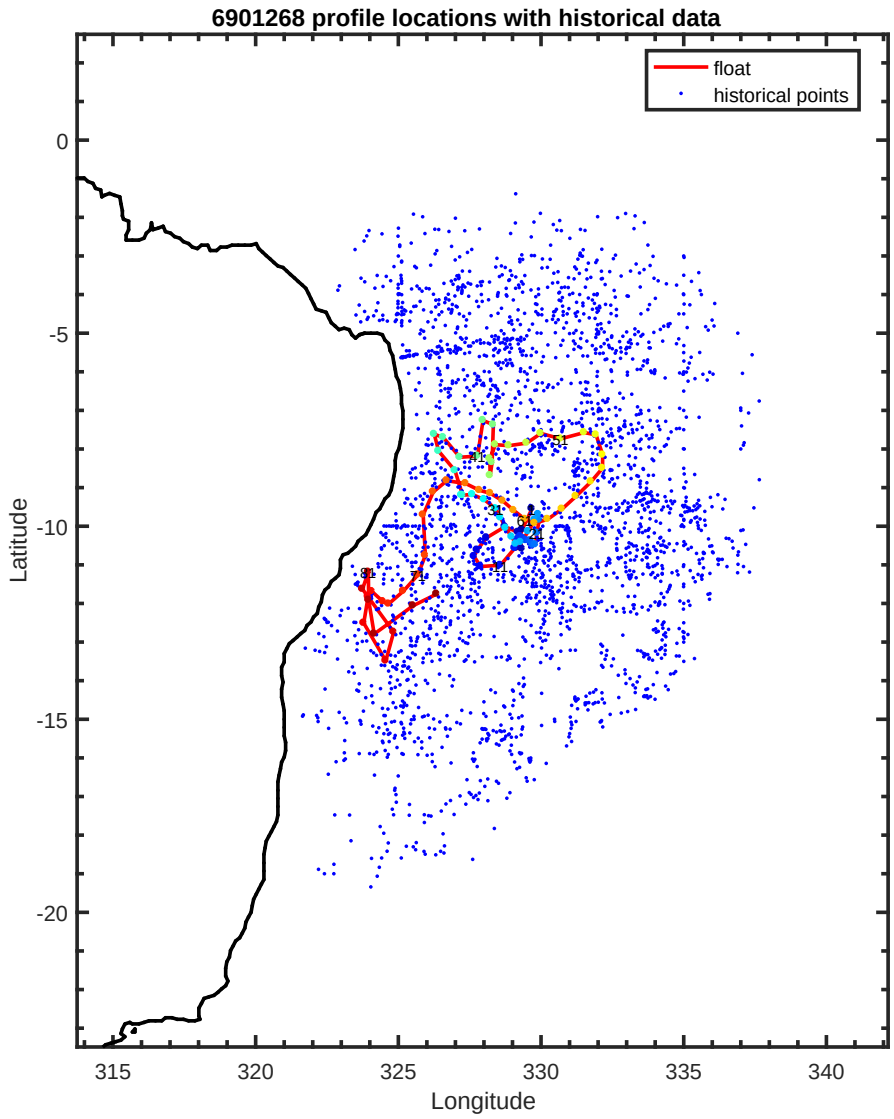

Figure 4: Historical data around the current ARGO float trajectory. These historical data are used by Owens and Wong Objective Mapping Analysis to make a model for an ARGO float data calibration.

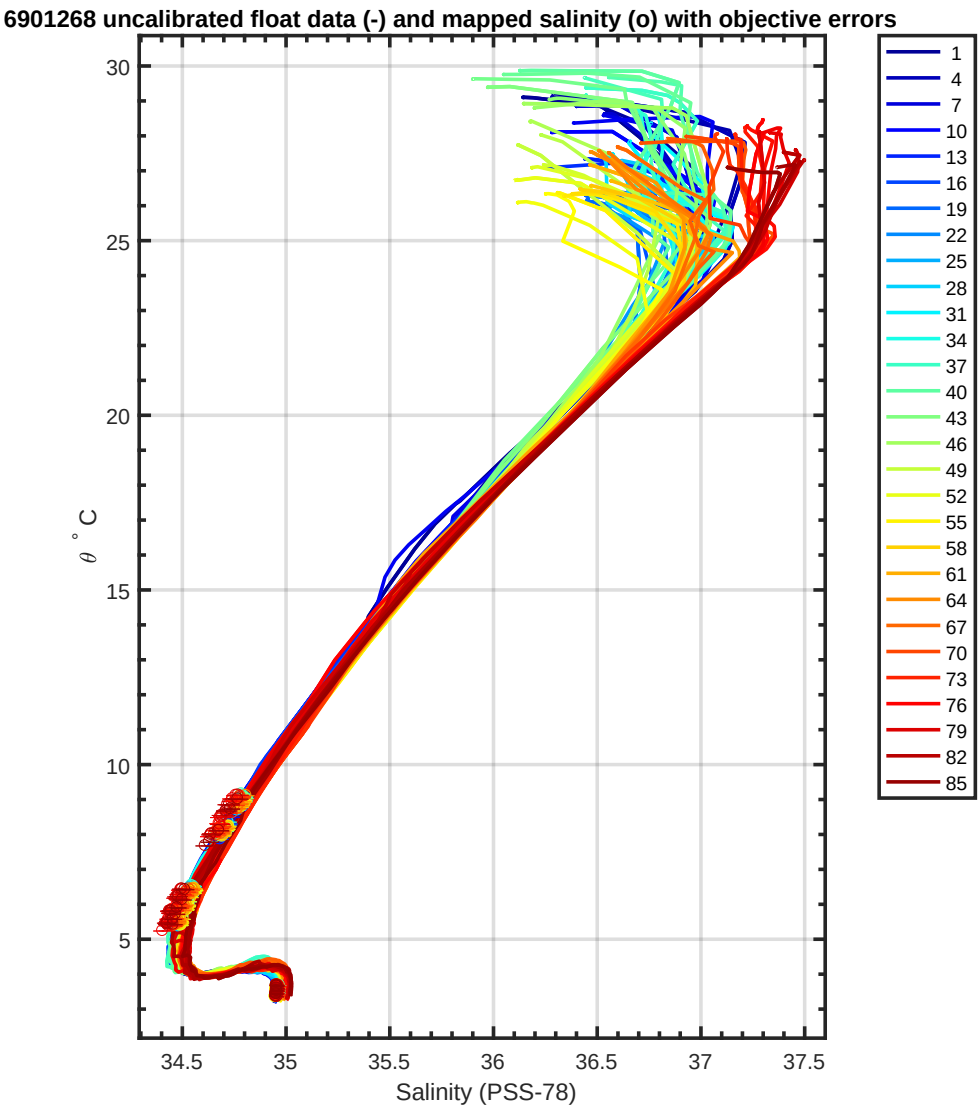

Figure 5: T-S Diagram before the potential calibration.

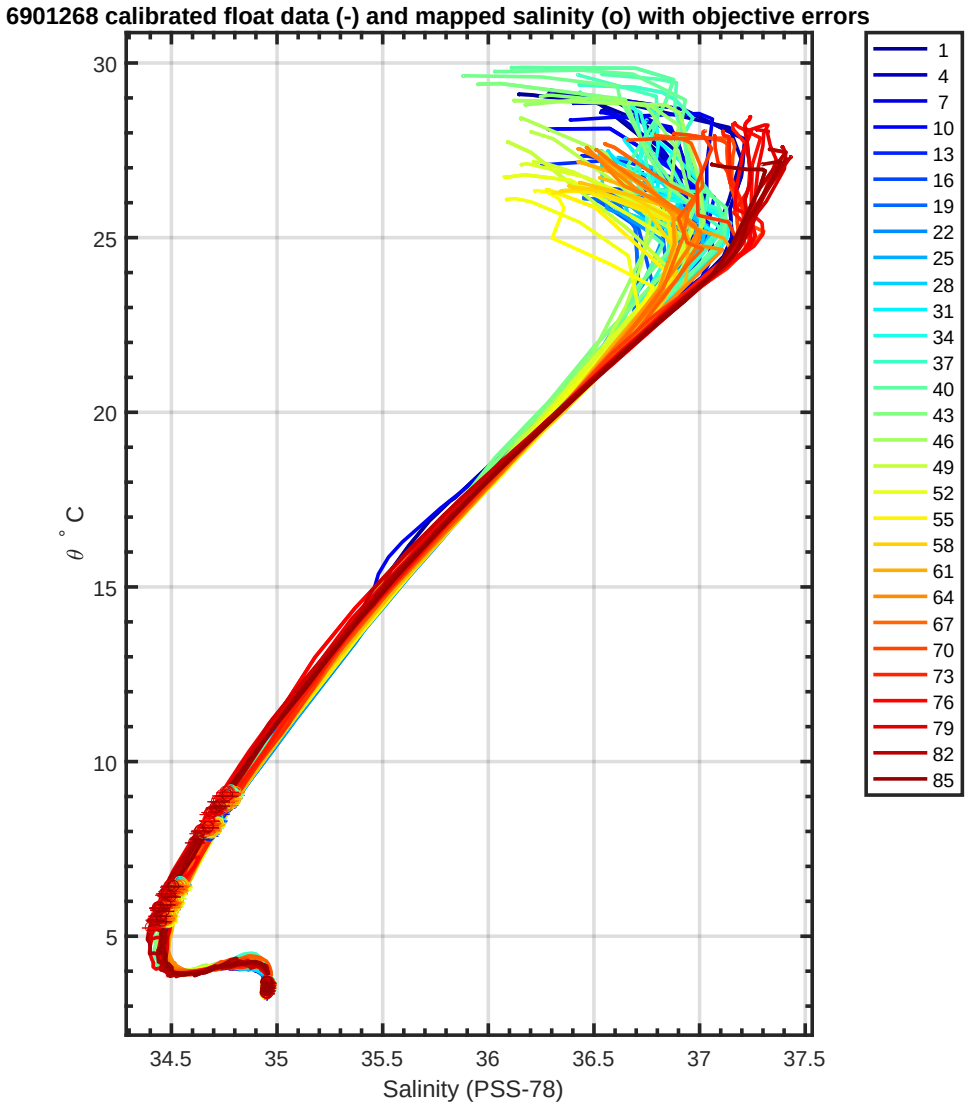

Figure 6: T-S diagram after the potential calibration. This is useful to identify water masses, to detect some possible offsets or to identify some anomalous profiles.

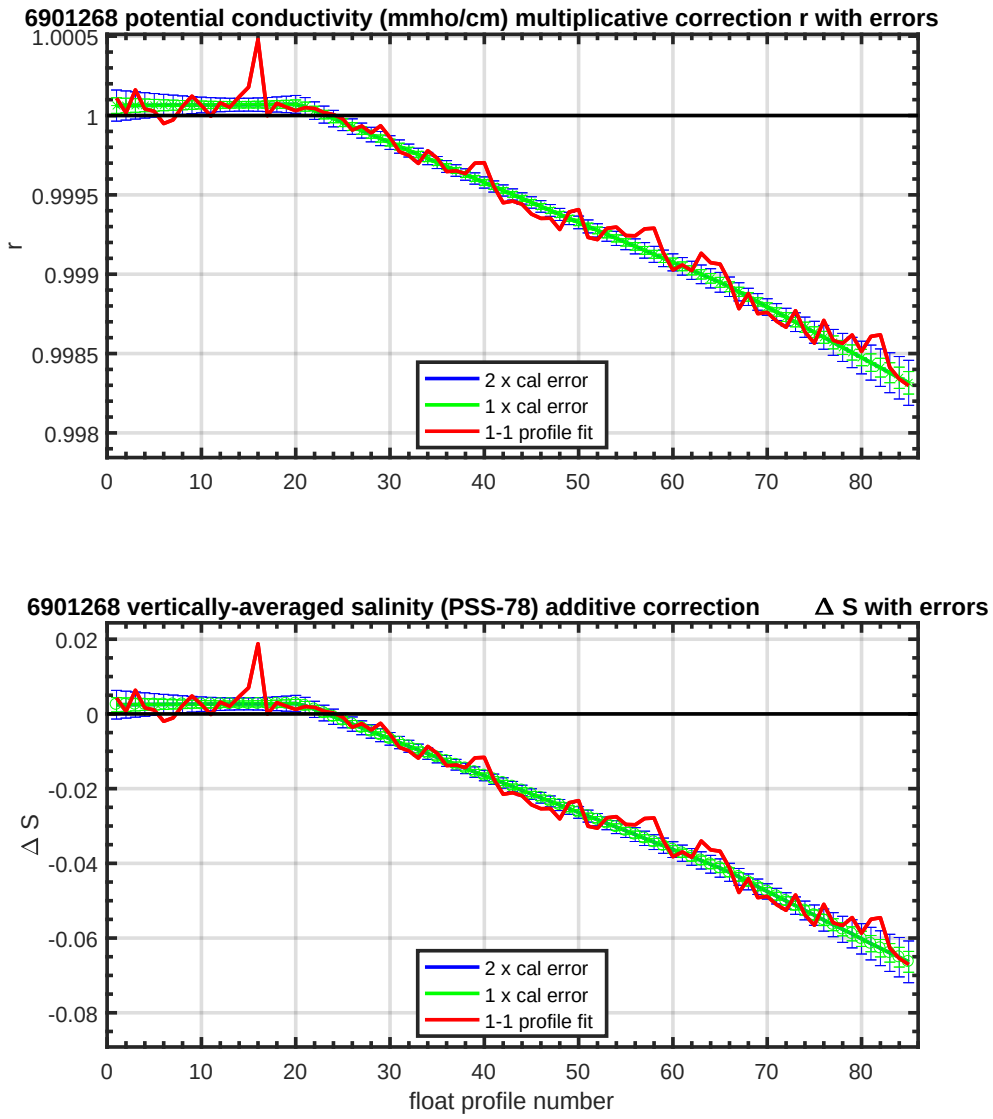

Figure 7: Salinity variation between each profile. Owens and Wong Objective Mapping Analysis builds its model based in a programmed number of break points.

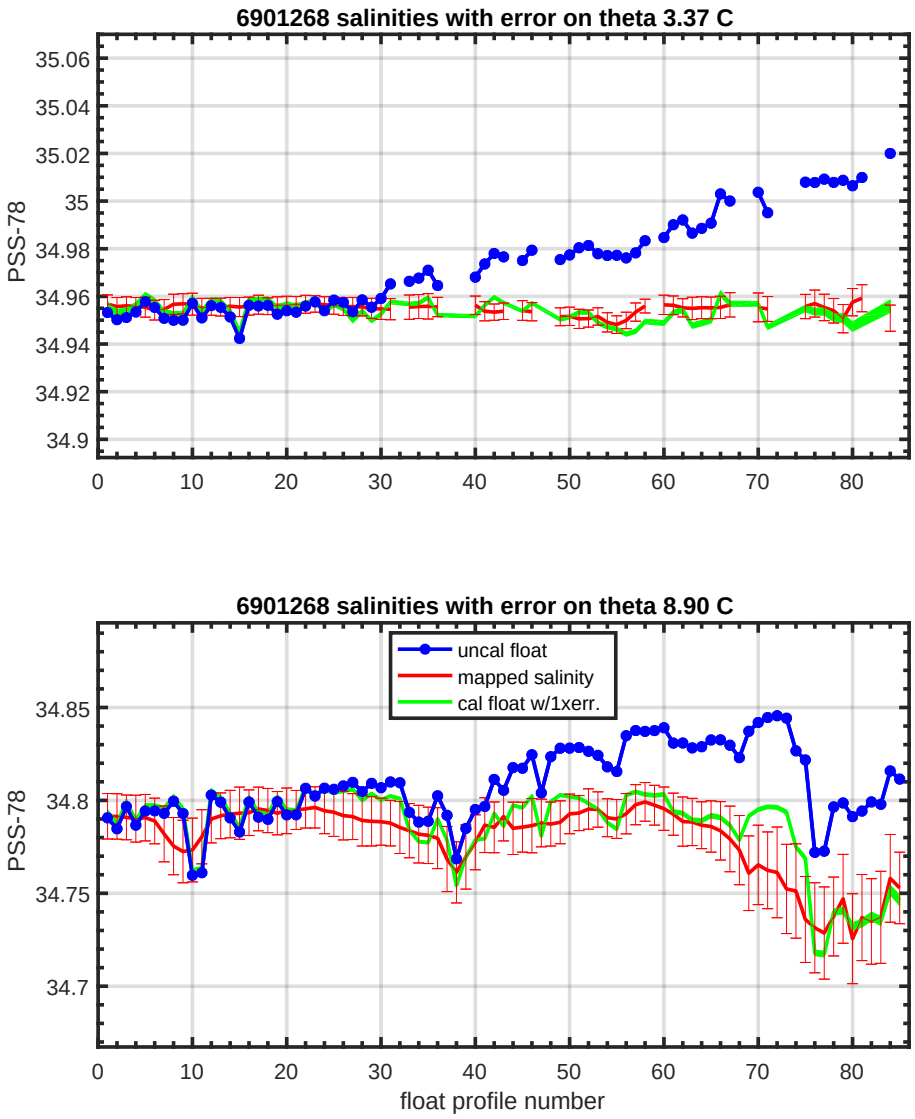

Figure 8: This figure gives a rough idea how uncalibrated (blue line) and calibrated (green line) signals fit each other. Bear in mind that mapped salinity depends on the historical hydrographic points of the area (Figure 1). The less historical points, the less approximated is the model.

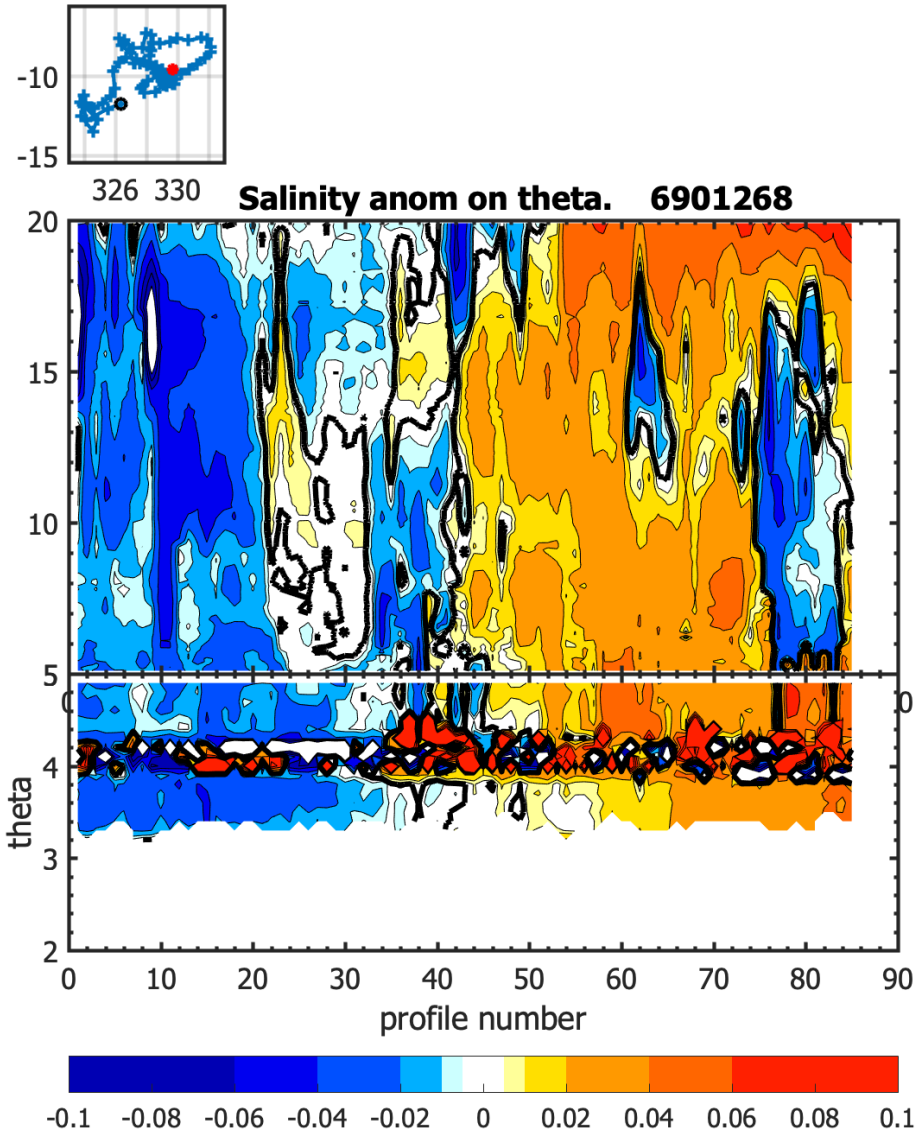

Figure 9: Original salinity variation represented in the Brians King plots. It shows the salinity variation for an each level of theta per profile. A colored scale indicates the salinity variation (white color indicates no variation)

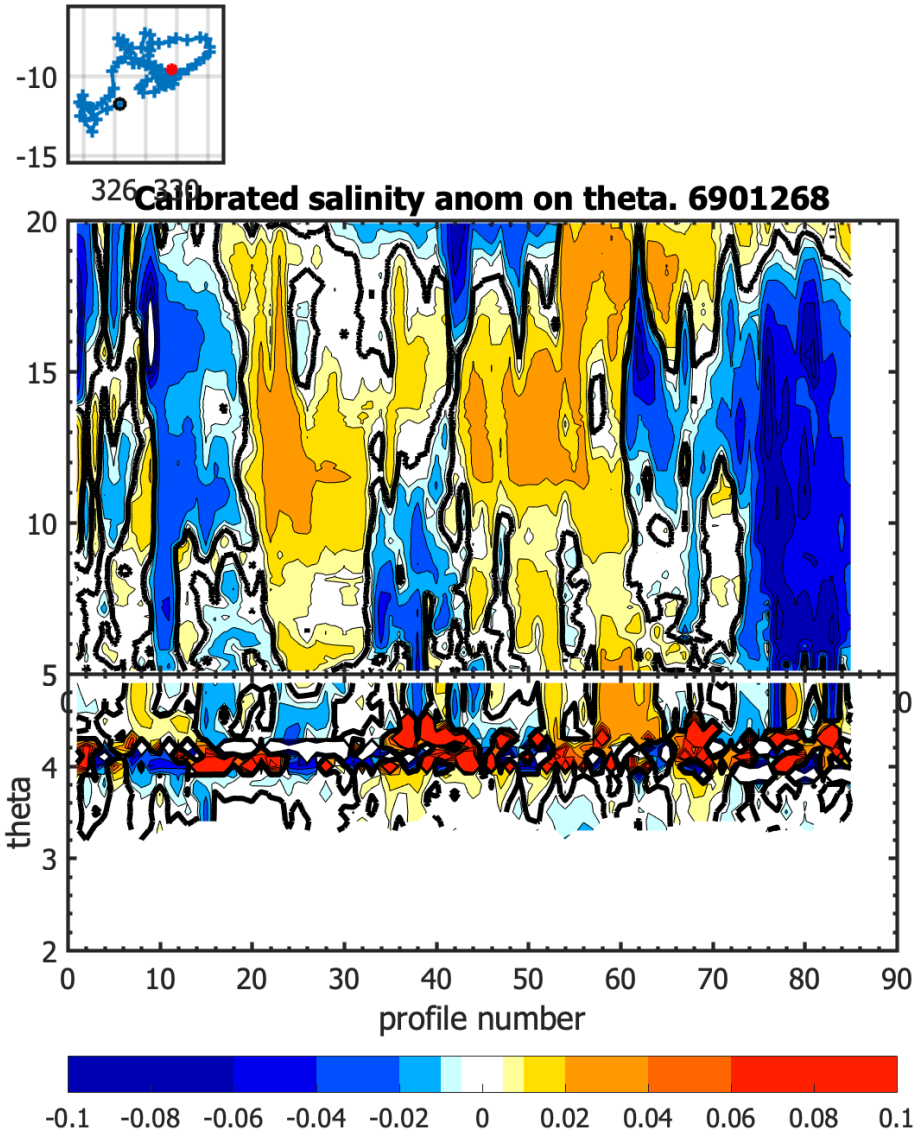

Figure 10: Calibrated salinity variation represented in the Brians King plots. It shows the salinity variation for an each level of theta per profile. Comparing both uncalibrated and calibrated plots, significant salinity variations can be identified.

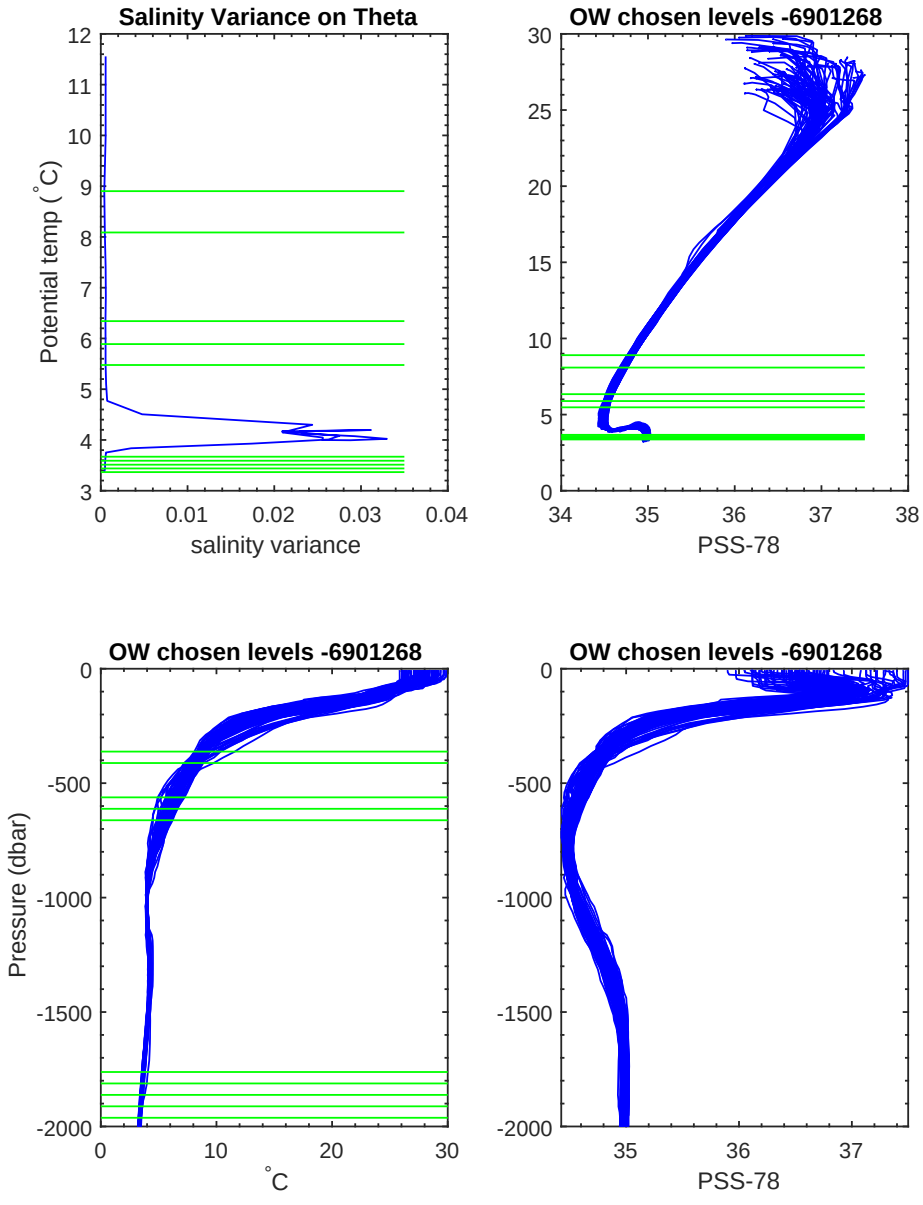

Figure 11: Theta levels are chosen by Owens and Wong Objective Mapping Analysis. The model identifies automatically the theta levels where the salinity variations are smaller.