Argo-España

Parte de la estrategia global de observación del océano

Report on Delayed Mode for Argo float WMO 1900278

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Delayed Mode Quality Control for Argo float WMO 1900278

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1 Introduction

The Delayed Mode Quality Control (DMQC) has been developed for float WMO 1900278 and delivered on 11/01/2018 to ifremer.

Transmision system	ARGOS
Transmission ID	40820 02412
Platform Model	APEX SBE APF8
Platform ID	
Sensors	
Sensores s/n	
Data Centre (Format Version)	IF (2.2)
Project Name	ARGO SPAIN
Data Centre (Format Version)	IF (2.2)
Project Name	ARGO SPAIN
Float Owner	
PI Name	Gregorio PARRILLA
Parking Depth (dbar)	
Profile depth (dbar)	2025
Number of Profiles	237
Status	Inactive
Deployment Date	19-Sep-2003 00:00:00
Deployment Position	Lat 22.83 Lon -26.00
Last Surfacing Date	15-Mar-2010 23:21:53
Deployed Position	Lat 21.03 Lon -68.80
Age (years)	6.5
Voltage (v)	7.4

Table 1. Technical information of the float.

A deep analysis could not be developed due to the lack of data. A total of 227 profiles were unsuccessfully developed and only the first 32 profiles were declared as valid. However, trajectory data was reported form the beginning to the end during 6.5 years. The 1900278 was the first float deployed on 19/9/2003 by Gregorio Parrilla as PI at the Instituto Español de Oceanografía since the beginning of ARGO España. There is no solid reason to explain the lack of data for 1900278. Battery pack readings reported a normal depleting since the float worked for 6.7 years.

Pressure surface offset and internal vacuum malfunction was reported. There is no clear information about the mounted sensors but since the float was deployed in 2003, it might be appropriate to consider the next information about pressure sensors: "Prior 2003, Druck company has rectified some issues and the sensors were thought to be very stable, that is, until a recent discovery of a significant number of sensors now appear to suffer from a ' microleak ', whereby oil leaks from the inner sensor chamber through fine cracks in the seals at the back of the sensor."

Barker, P. M., J. R. Dunn, C. M. Domingues, and S. E. Wijffels, 2011: Pressure Sensor Drifts in Argo and Their Impacts. Journal of Atmospheric and Oceanic Technology, 28, 1036-1049, http://dx.doi.org/10.1175/2011JTECHO831.1

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.

Drift or bias evidence cannot be seen in the salinity measurement for WMO 1900278 float. Therefore after the manual evaluation and inspection, no adjustment is needed according to Argo Quality Control Manual: PSAL ADJUSTED = PSAL (original value), PSAL ADJUSTED ERROR = Uncertainty provided by PI, PSAL ADJUSTED QC = 1, 2 or 3.

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

Config_max_casts	227
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 .

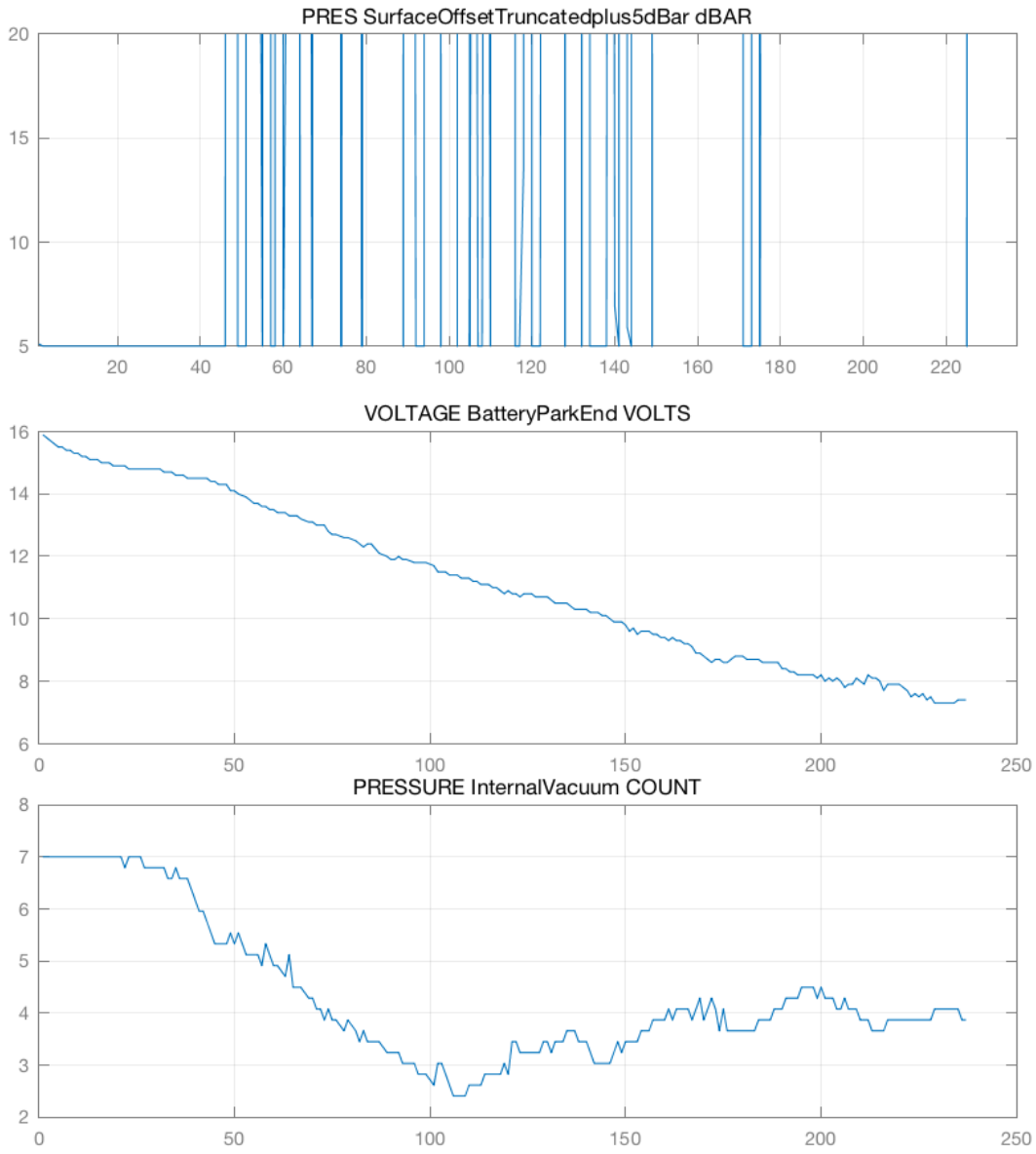


Figure 1: Pressure record (a). Voltage record (b).

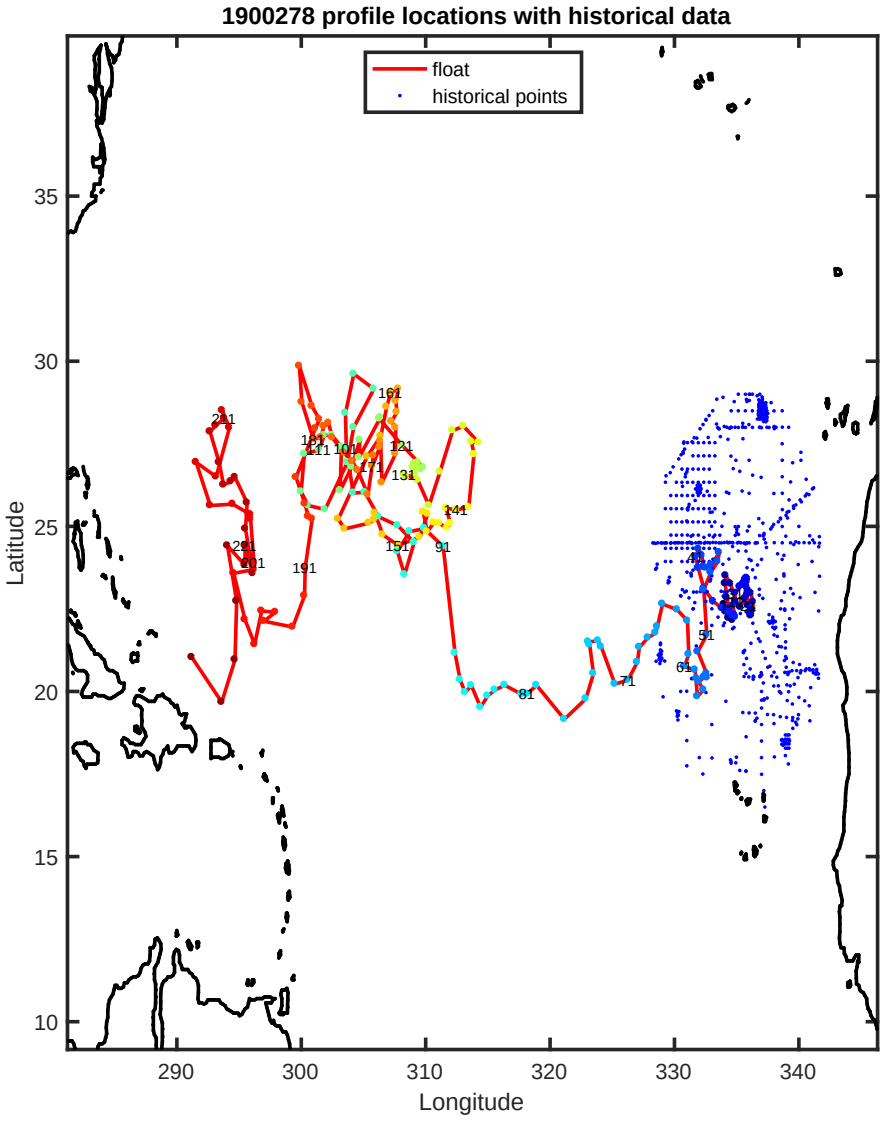
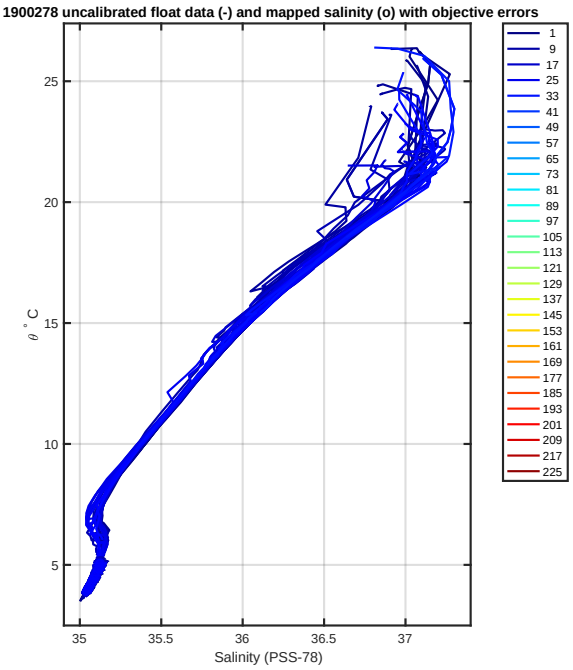
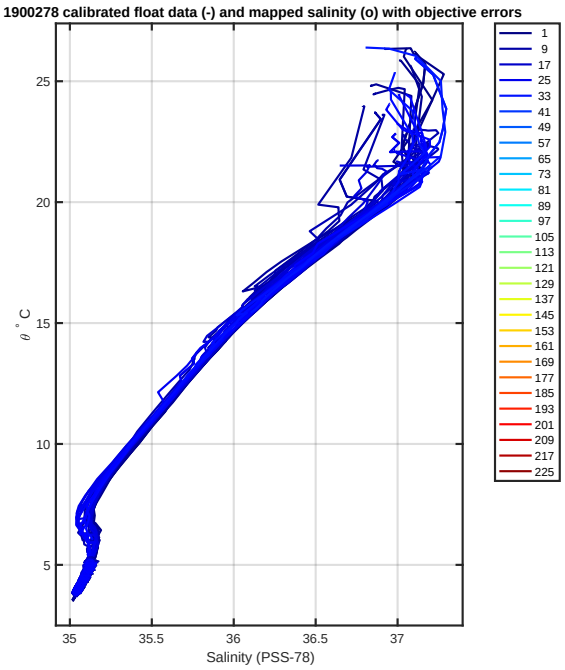


Figure 2: Historical points around the current ARGO float trajectory. These historical points are used by Owens and Wong Objective Mapping Analysis to make a model for an ARGO float data calibration.



(a) T-S Diagram



(b) T-S Diagram after a potential calibration

Figure 3: 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.

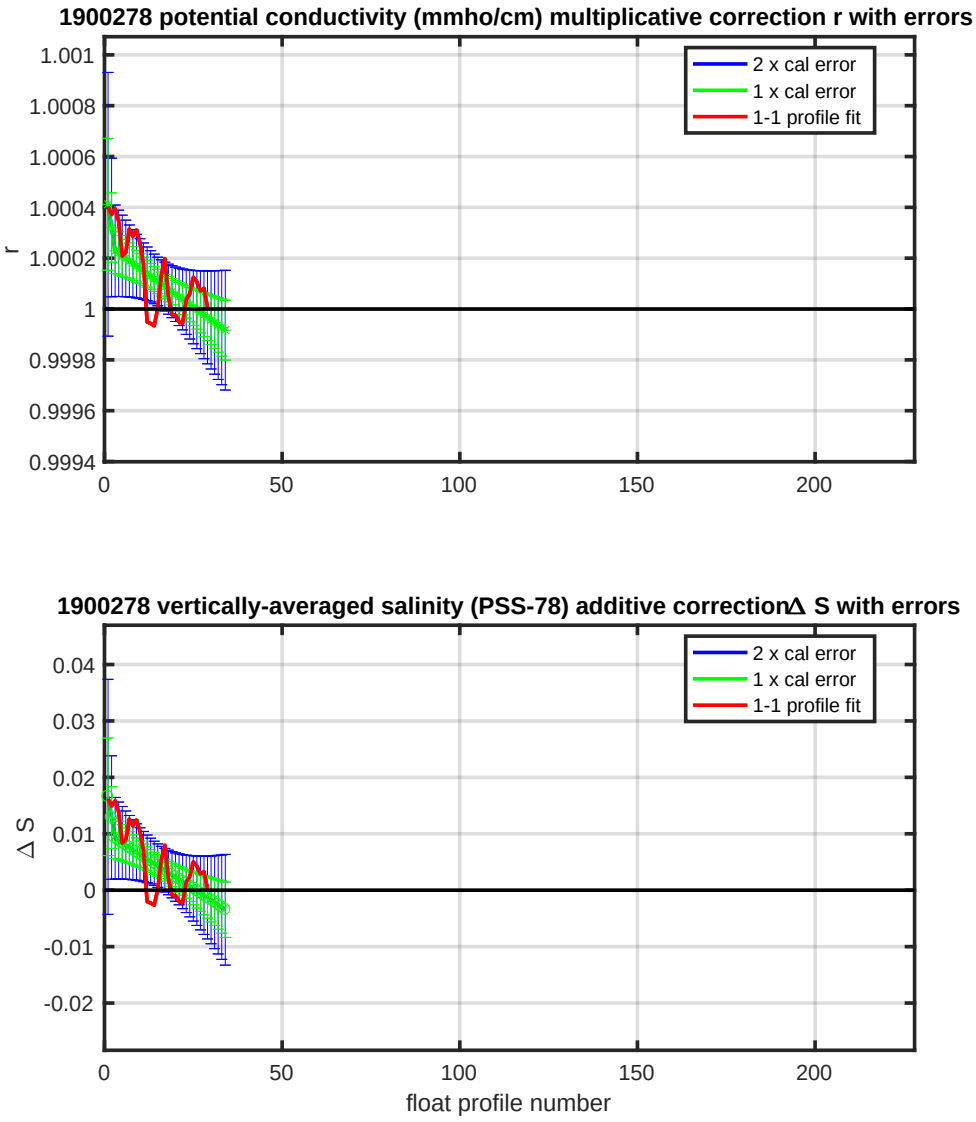


Figure 4: Salinity variation between each profile. Owens and Wong Objective Mapping Analysis builds its model based in a programmed number of break points.

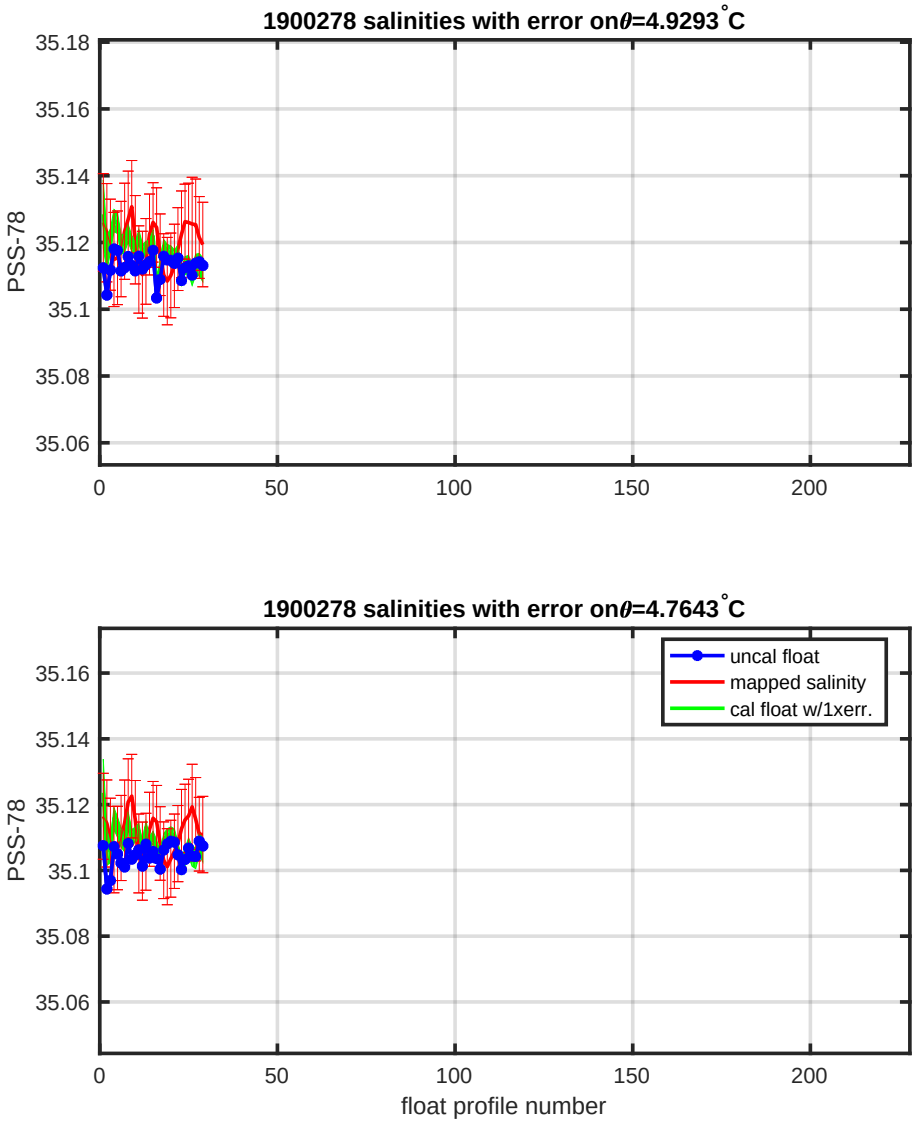
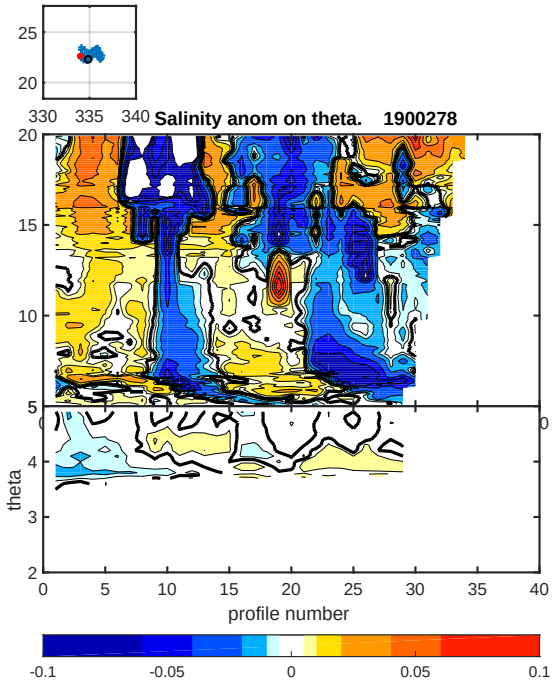
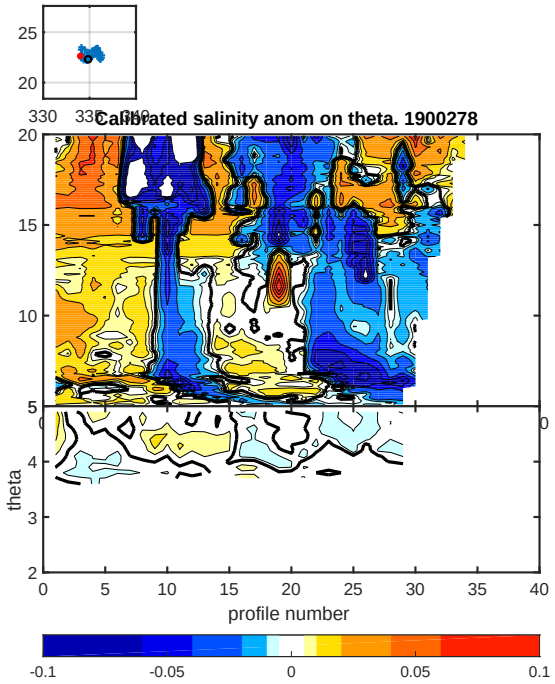


Figure 5: This figure gives a rough idea how uncalibrated (blue line) and calibrated (green line) signals fit each other. Bear in mind that mapped salinity depends on the historical hydrographic points of the area (Figure 1). The less historical points, the less approximated is the model.



(a) Original salinity variation



(b) Calibrated salinity variation

Figure 6: 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.

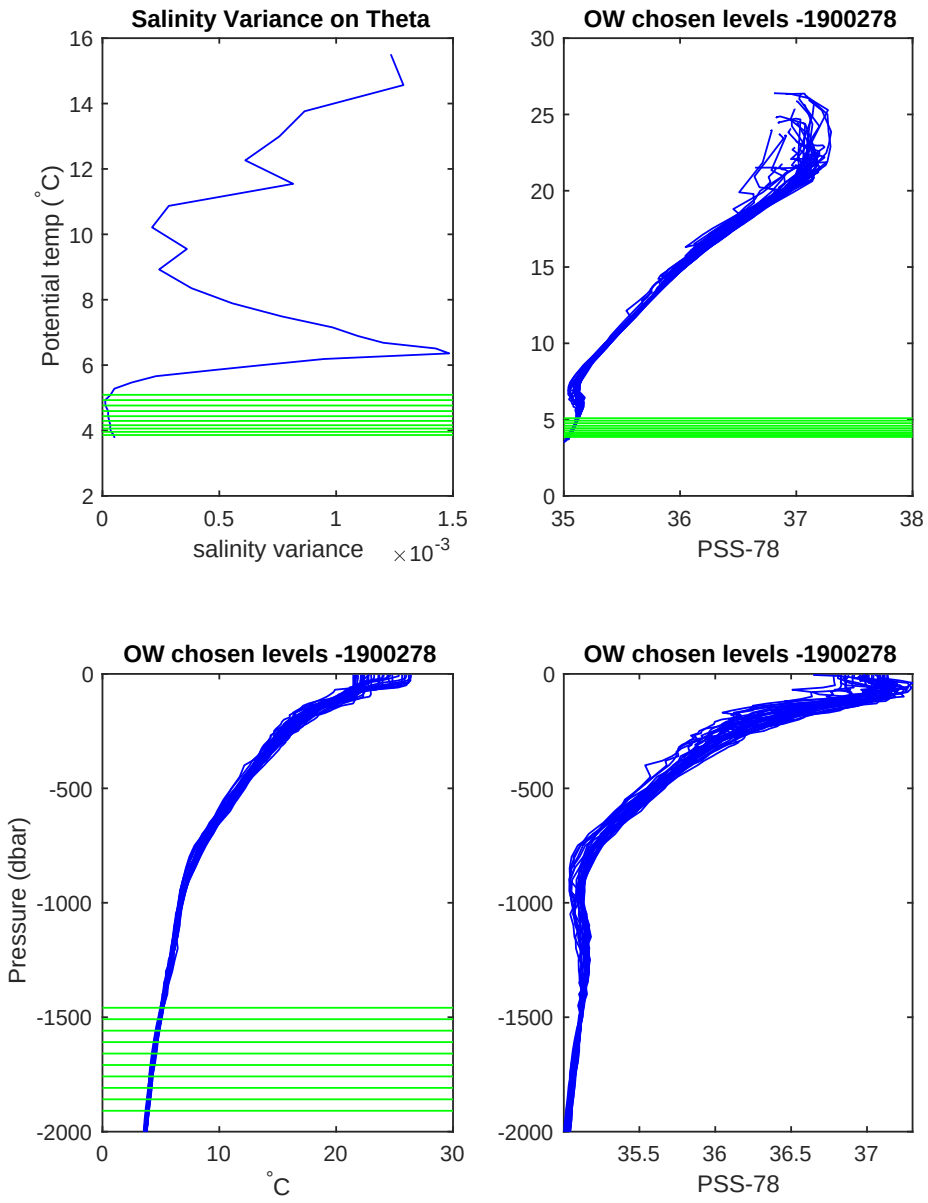


Figure 7: Theta levels are chosen by Owens and Wong Objective Mapping Analysis. The model identifies automatically the theta levels where the salinity variations are smaller.