# Delayed Mode Quality Control of Argo float 3901893

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**Float decision**

Profile 1-82, QC=1, error=0.02, no corrections. Profiles 83-143, QC=4 due to strong salty and further fresh drift. No corrections required.

# Contents

# 1 Introduction

Delayed mode analysis was performed for float WMO number 3901893 (WMO: 3901893) where salinity and temperature values were separately compared to nearby historical CTD profiles and nearby Argo profiles as a reference database. The OWC (Cabanes et al., 2016) method was run to estimate a salinity offset and a salinity drift. For more information about float 3901893click on the following link: http://www.ifremer.fr/argoMonitoring/float/3901893

# 2 Quality Check of Argo Float Data

## 2.1 Visual check of float data

The visual inspection showed no further need of manual corrections of QC flags on this float.

## 2.2 Satellite Altimeter comparison

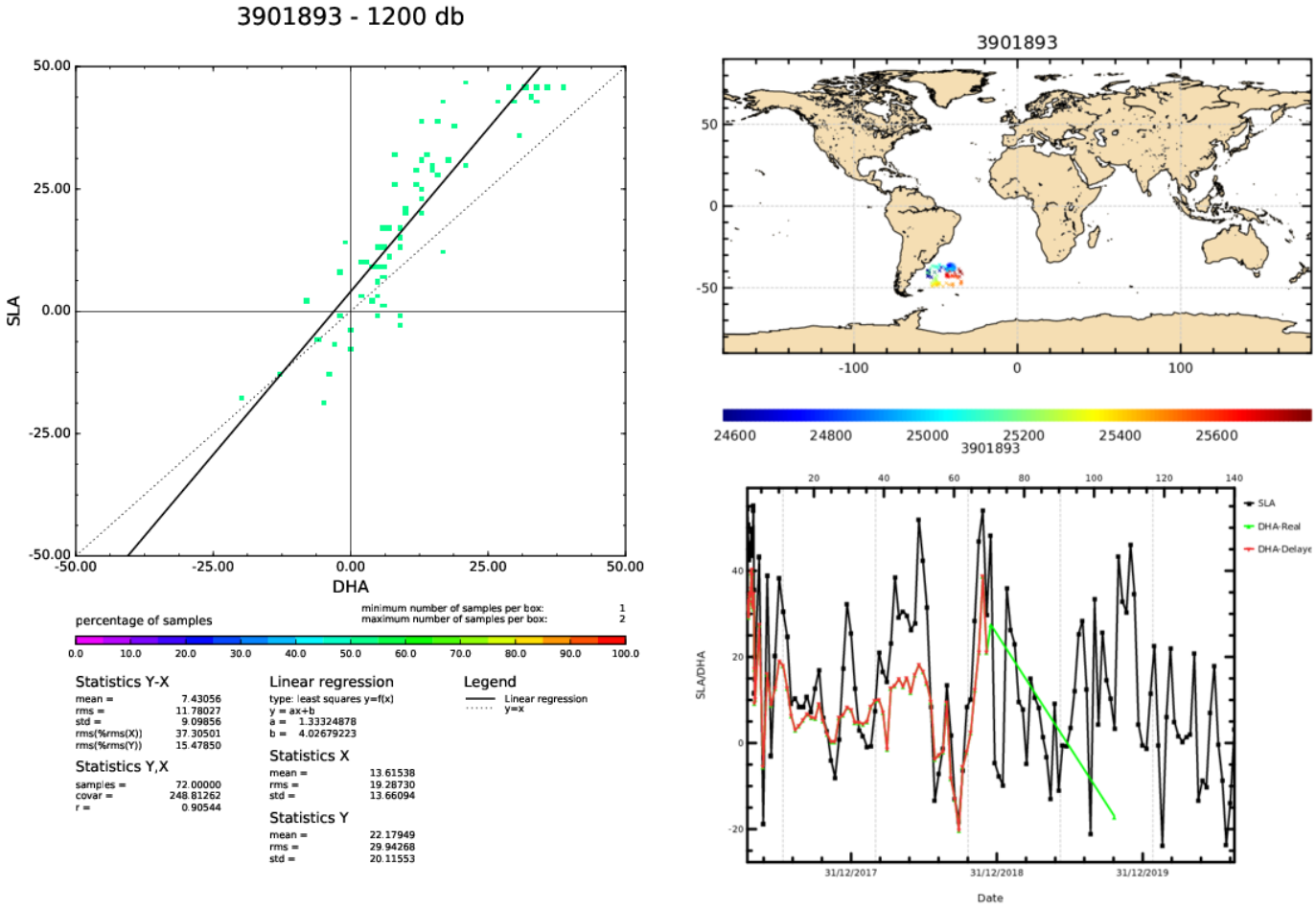


Figure 1: Float 3901893. The comparison betweeen the Sea Surface Height (SSH) from the satellite altimetry and Dynamic Height Anomaly (DHA) extracted from the Argo float temperature and salinity data (ftp://ftp.ifremer.fr/ifremer/argo/etc/argo-ast9-item13-AltimeterComparison/figures/).

### 2.3 Time Series of Vertical Distribution of Data

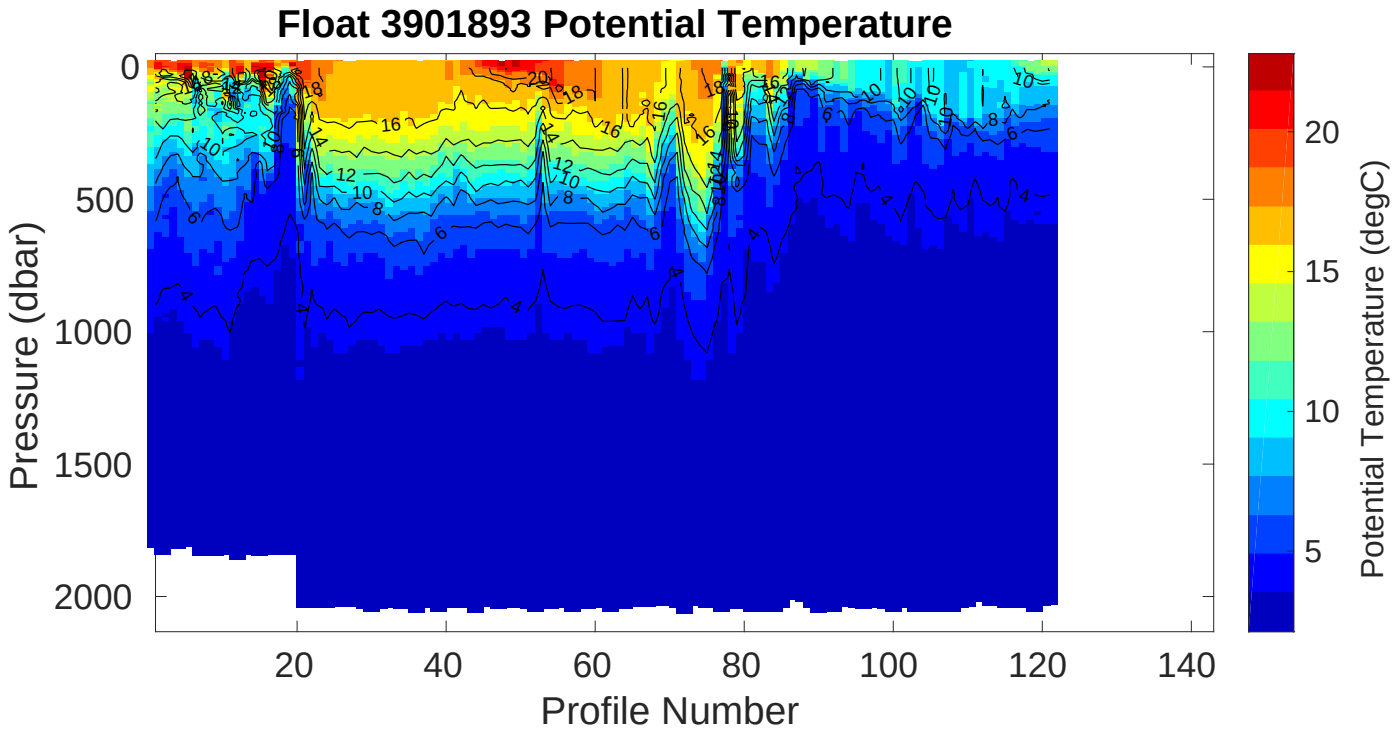


Figure 2: Float 3901893. Time series of the vertical distribution of potential temperature (°C).

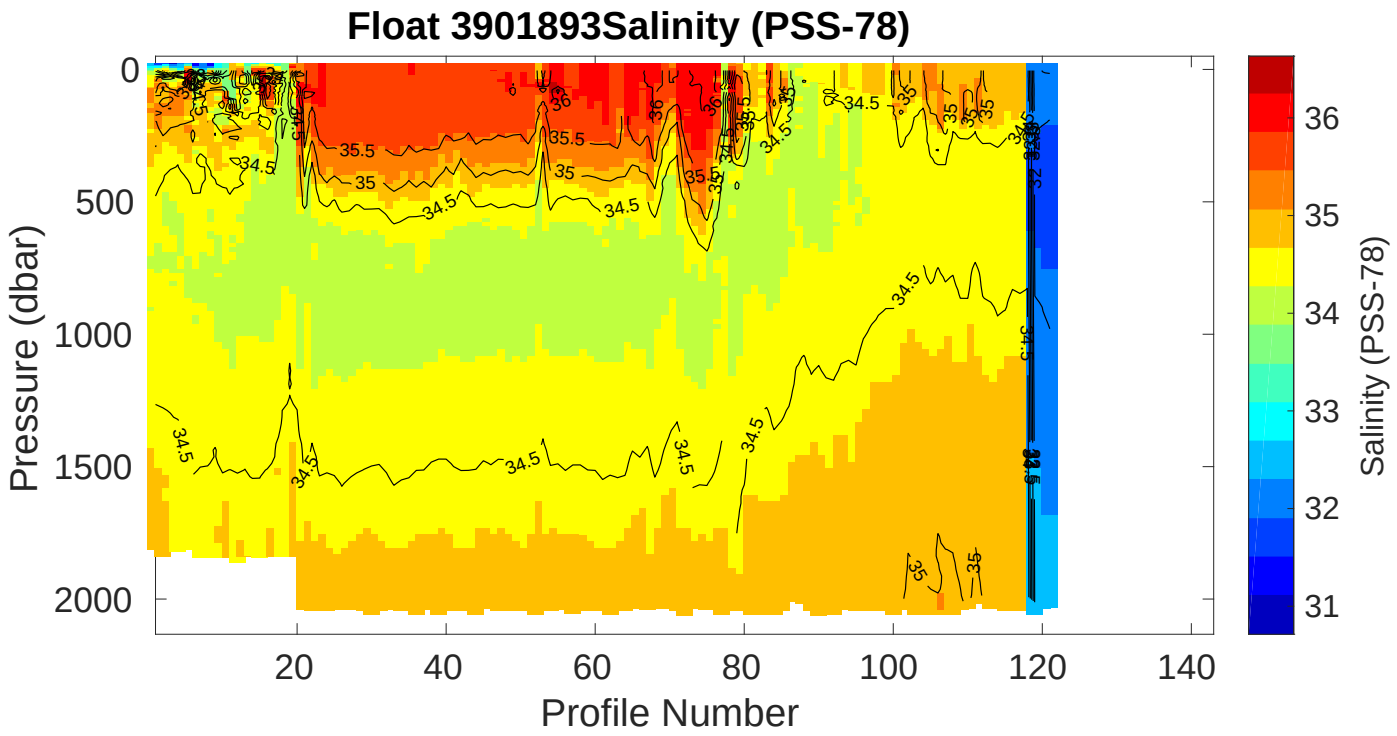


Figure 3: Float 3901893. Time series of the vertical distribution of salinity (PSS-78).

## 2.4 Comparison between Argo Float and Climatology

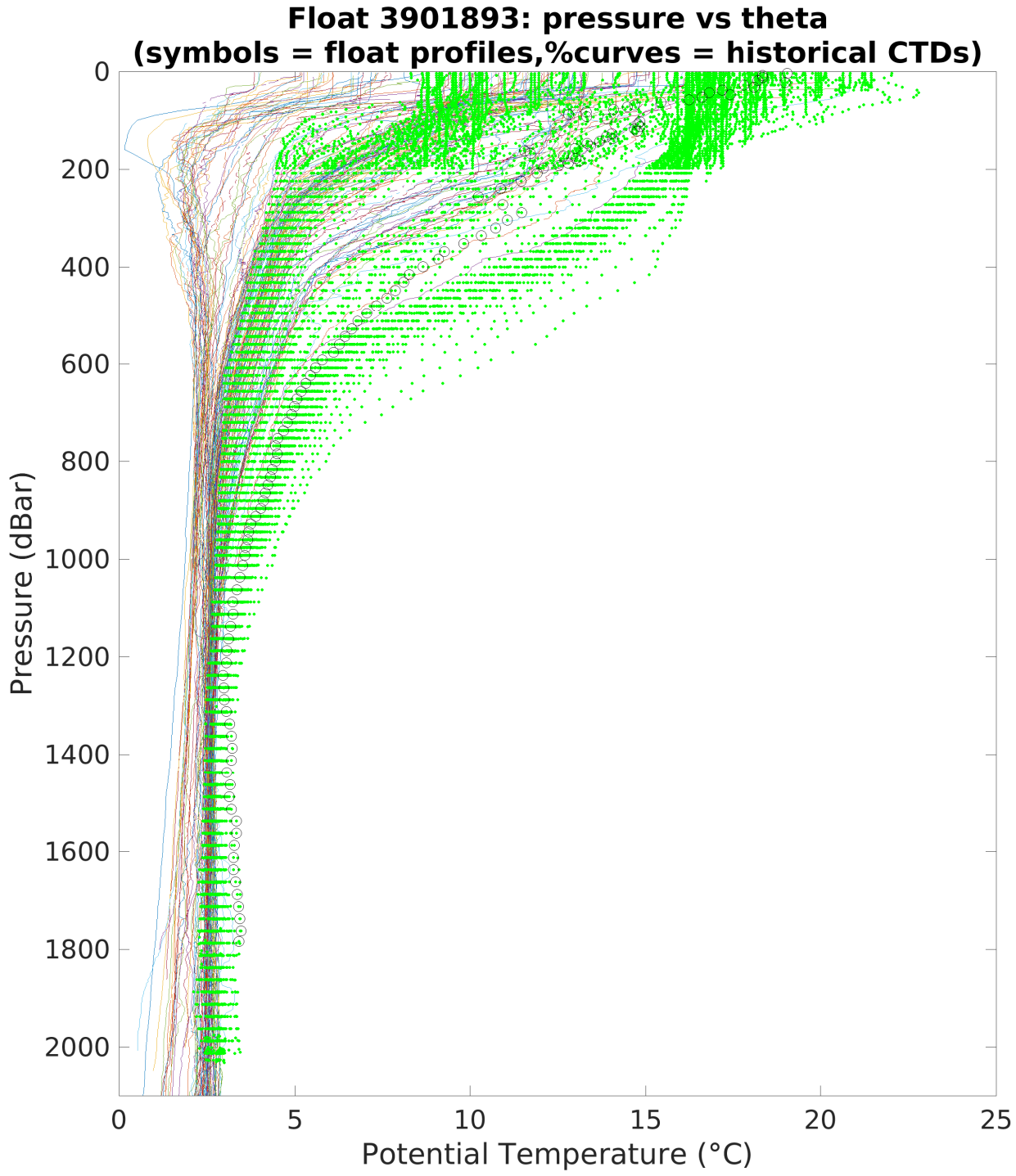


Figure 4: Float 3901893. Potential temperature (°C) plotted with pressure (dBar) and data from WMO boxes of CTD reference data (CTD for DMQC 2019V01) +/- 10 °of latitude and longitude. The black and blue cycles indicates the first and the last Argo profile, respectively. Green symbols represent other Argo profiles from this float. The thin colors lines indicate the reference data

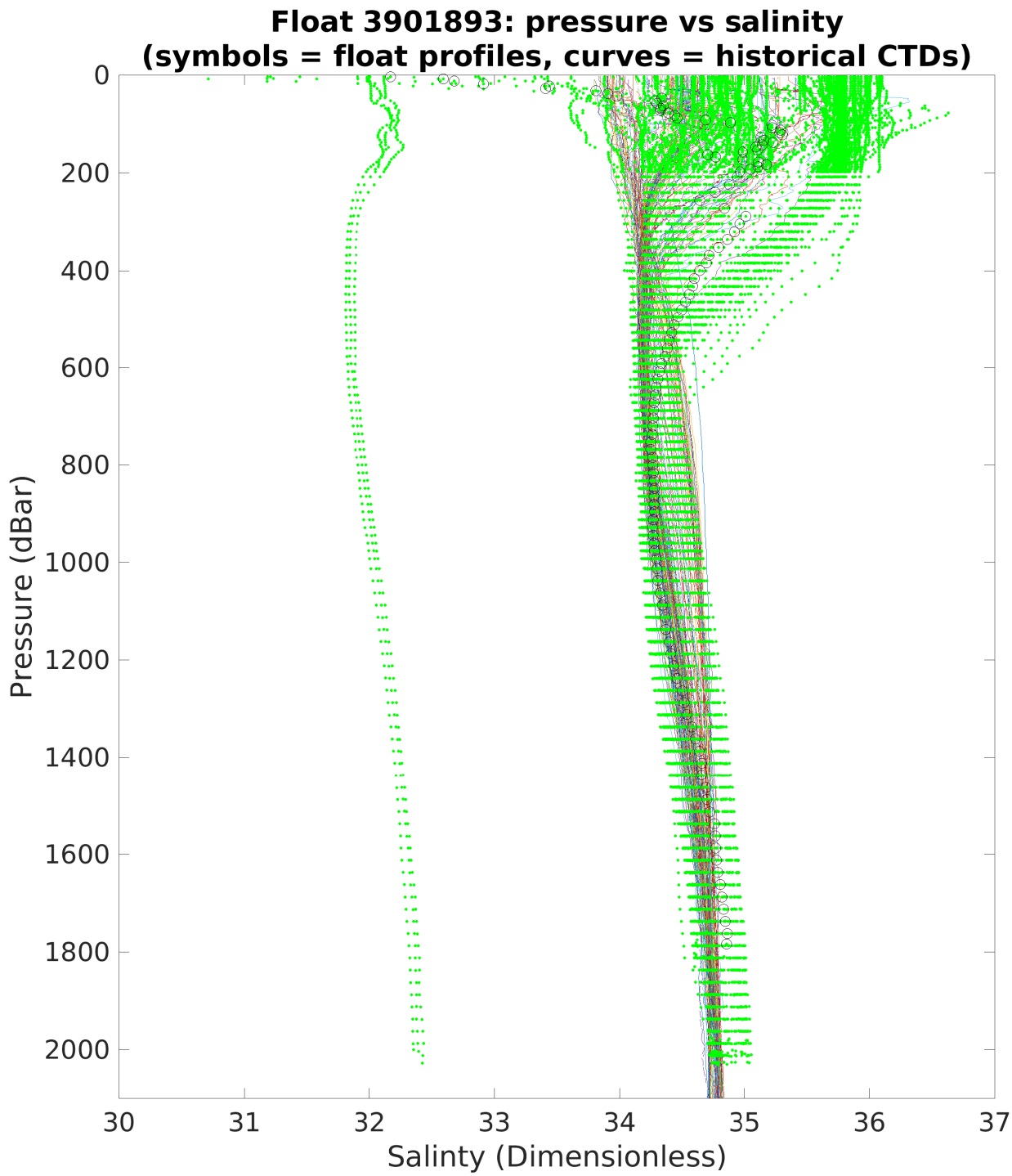


Figure 5: Float 3901893. Salinity (PSS-78) plotted with pressure (dBar) and data from WMO boxes of CTD reference data (CTD for DMQC 2019V01) +/- 10°of latitude and longitude. The black and blue cycles indicates the first and the last Argo profile, respectively. Green symbols represent other Argo profiles from this float. The thin colors lines indicate the reference data.

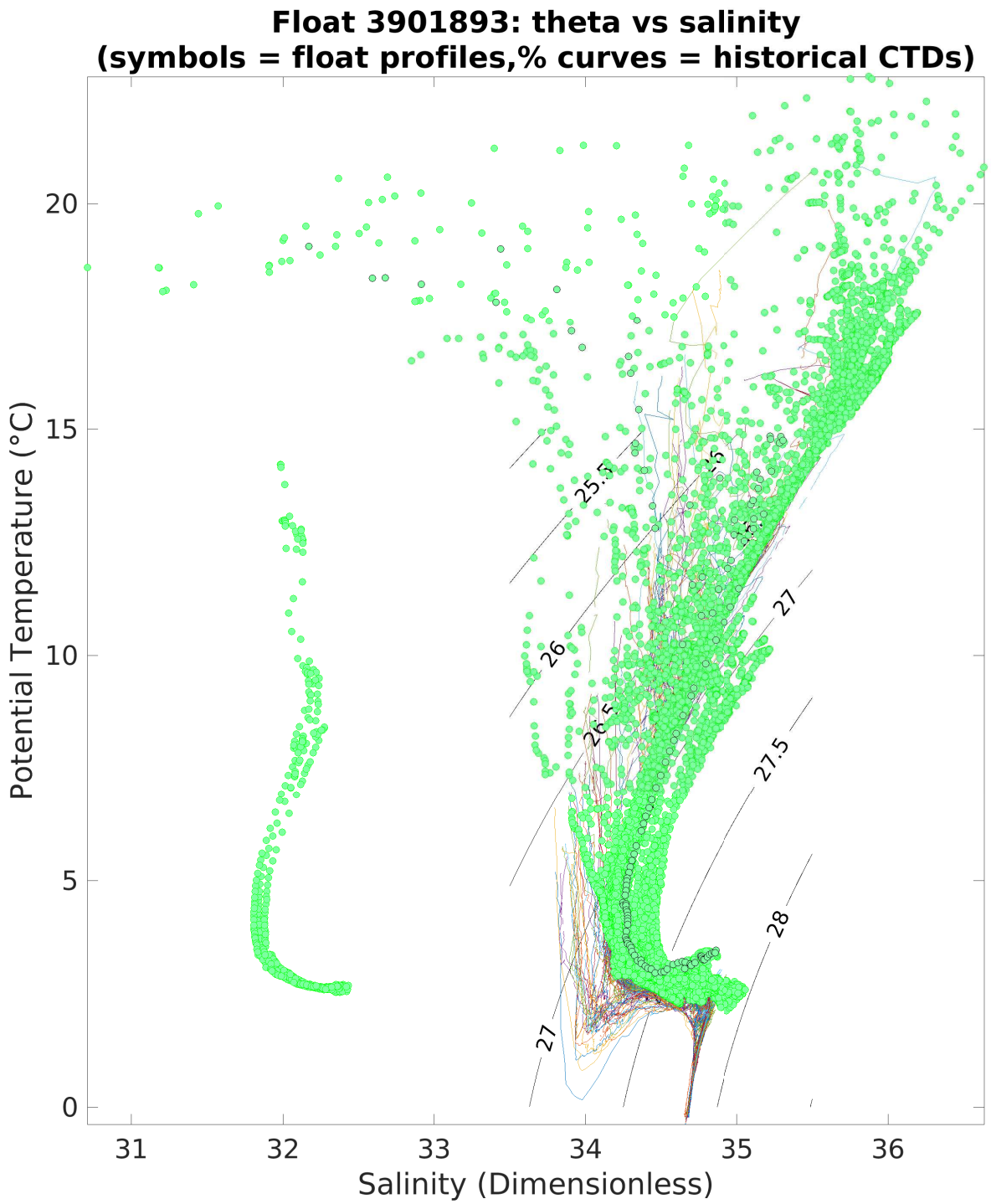


Figure 6: Float 3901893. T/S diagram plotted with and data from WMO boxes of CTD reference data (CTD for DMQC 2019V01) +/- 10˚of latitude and longitude. The black and blue cycles indicates the first and the last Argo profile, respectively. Green symbols represent other Argo profiles from this float.

# 3 Correction of Salinity Data

## 3.1 Comparison between Argo floats and CTD Climatlogy

### 3.1.1 Configuration

```
% ================================
%
%    Climatology Data Input Paths
%

HISTORICAL_DIRECTORY=/users/argo/climatology
HISTORICAL_CTD_PREFIX=/historical_ctd/CTD_for_DMQC_2019V01/ctd_
HISTORICAL_BOTTLE_PREFIX=/historical_bot/WOD2001_v2/bot_
HISTORICAL_ARGO_PREFIX=/argo_profiles/ARGO_for_DMQC_2020V01/argo_

% ================================
%
%    Float Input Path
%

FLOAT_SOURCE_DIRECTORY=/users/argo/ow/matlabow-2.0.1/data/float_source/
FLOAT_SOURCE_POSTFIX=.mat

% ================================
%
%    Mapping Output Path
%

FLOAT_MAPPED_DIRECTORY=/users/argo/ow/matlabow-2.0.1/data/float_mapped/ctd/
FLOAT_MAPPED_PREFIX=map_
FLOAT_MAPPED_POSTFIX=.mat

% ================================
%
%    Calibration Output Path
%

FLOAT_CALIB_DIRECTORY=/users/argo/ow/matlabow-2.0.1/data/float_calib/ctd/
FLOAT_CALIB_PREFIX=cal_
FLOAT_CALSERIES_PREFIX=calseries_
FLOAT_CALIB_POSTFIX=.mat

% ================================
%
%    Diagnostic Plots Output Path
%

FLOAT_PLOTS_DIRECTORY=/users/argo/ow/matlabow-2.0.1/data/float_plots/ctd/

% ================================
%
%    Constants File Path
%

CONFIG_DIRECTORY=/users/argo/ow/matlabow-2.0.1/data/constants/
CONFIG_COASTLINES=coastdat.mat
CONFIG_WMO_BOXES=wmo_boxes_ctd.mat
CONFIG_SAF=TypicalProfileAroundSAF.mat
```

```
% ================================
%
% max number of historical casts used in objective mapping
CONFIG_MAX_CASTS=310

% 1=use PV constraint, 0=don't use PV constraint, in objective mapping
MAP_USE_PV=1

% 1=use SAF separation criteria, 0=don't use SAF separation criteria, in objective mapping
MAP_USE_SAF=1

% spatial decorrelation scales, in degrees
MAPSCALE_LONGITUDE_LARGE=6
MAPSCALE_LONGITUDE_SMALL=3
MAPSCALE_LATITUDE_LARGE=4
MAPSCALE_LATITUDE_SMALL=2

% cross-isobath scales, dimensionless, see BS(2005)
MAPSCALE_PHI_LARGE=0.1
MAPSCALE_PHI_SMALL=0.02

% temporal decorrelation scale, in years
MAPSCALE_AGE=5
MAPSCALE_AGE_LARGE=10

% exclude the top xxx dbar of the water column
MAP_P_EXCLUDE=100

% only use historical data that are within +/- yyy dbar from float data
MAP_P_DELTA=200
```

### 3.1.2 Results

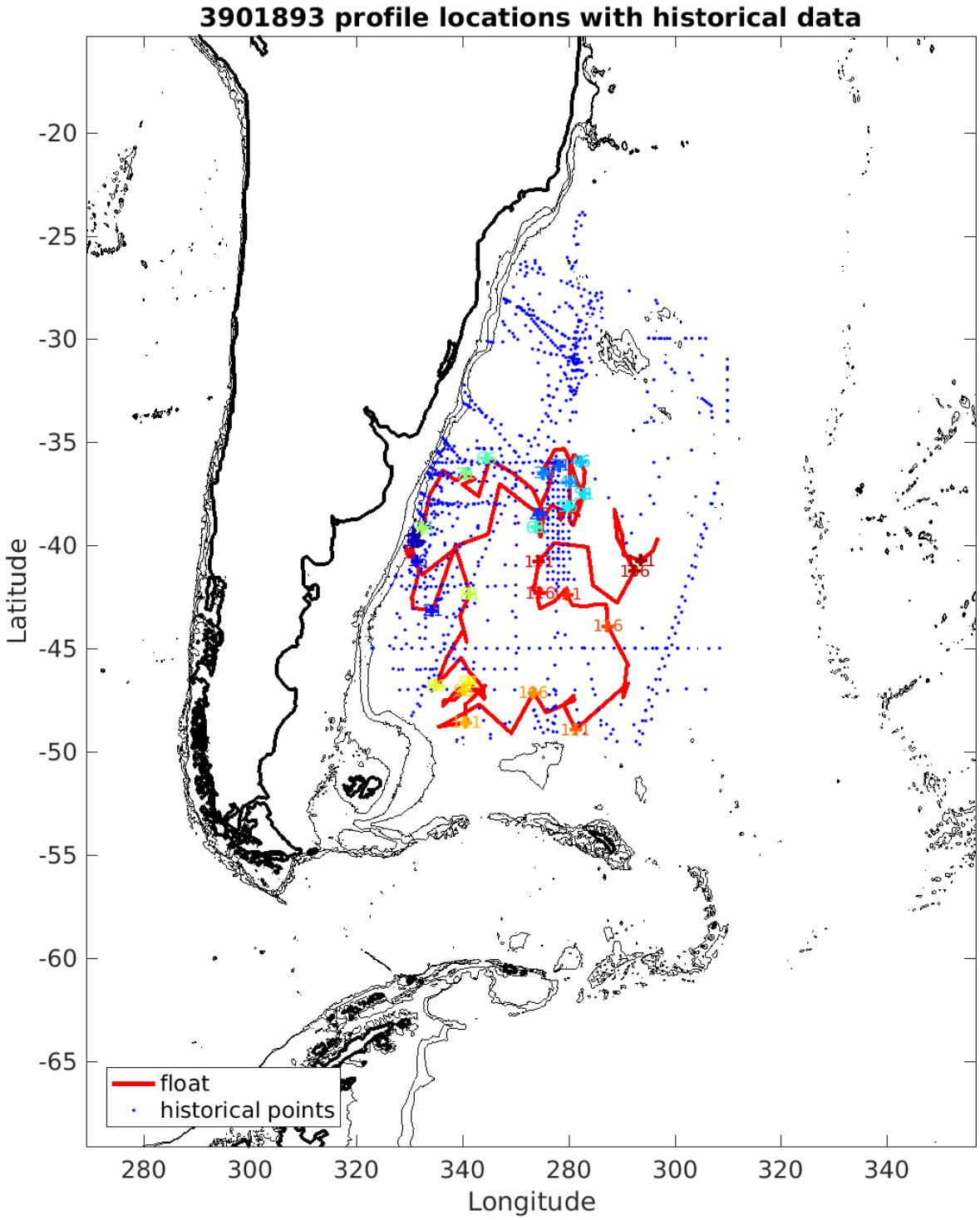


Figure 7: Float 3901893. Location of the float profiles (red line with coloured numbers) and the CTD reference data selected for mapping (blue dots). The black contours indicate the bathymetry at 0, 200, 1000 and 2000 m.

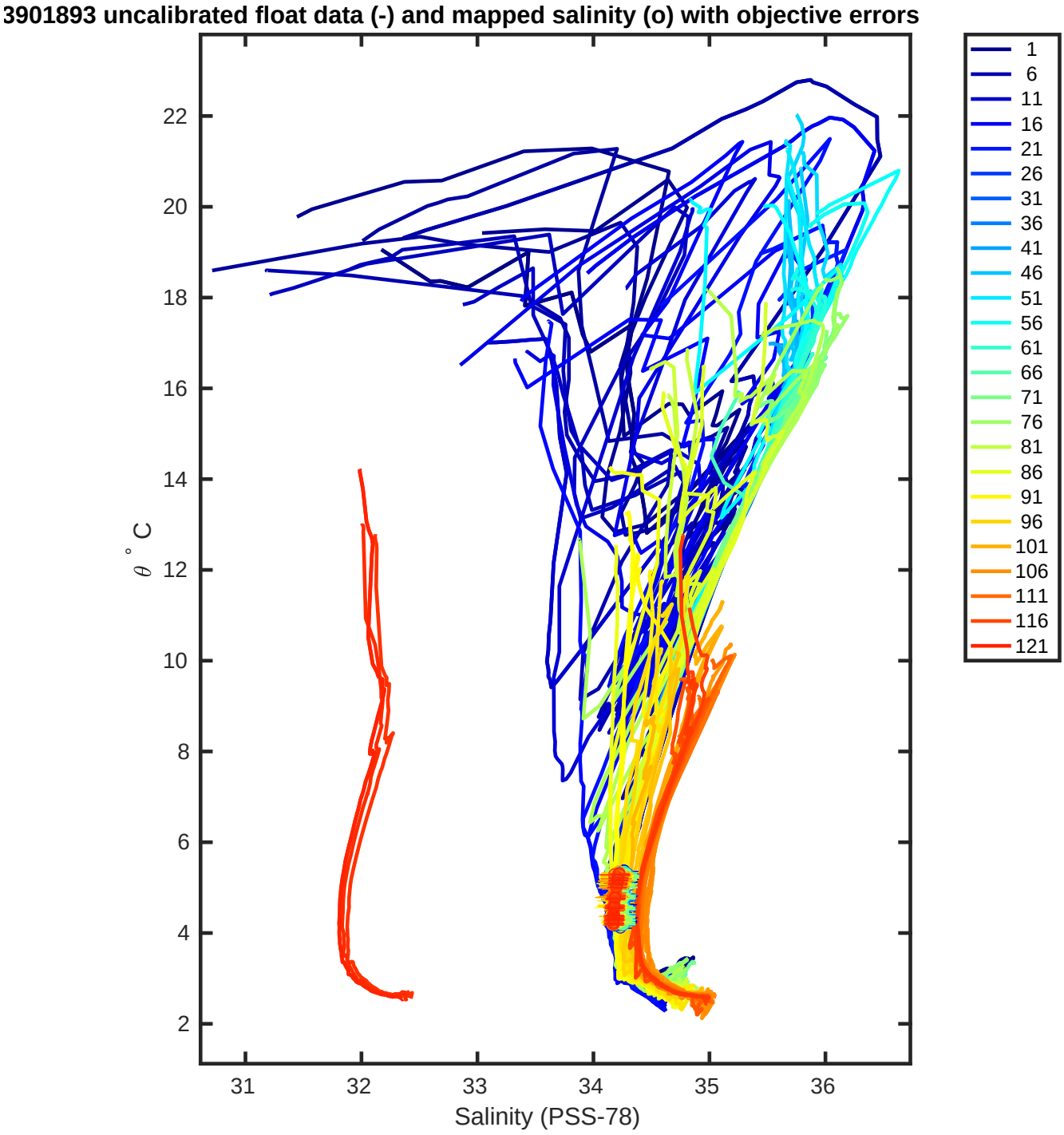


Figure 8: Float 3901893. Plots the original float salinity and the objectively estimated reference salinity at the 10 float theta levels that are used in calibration.

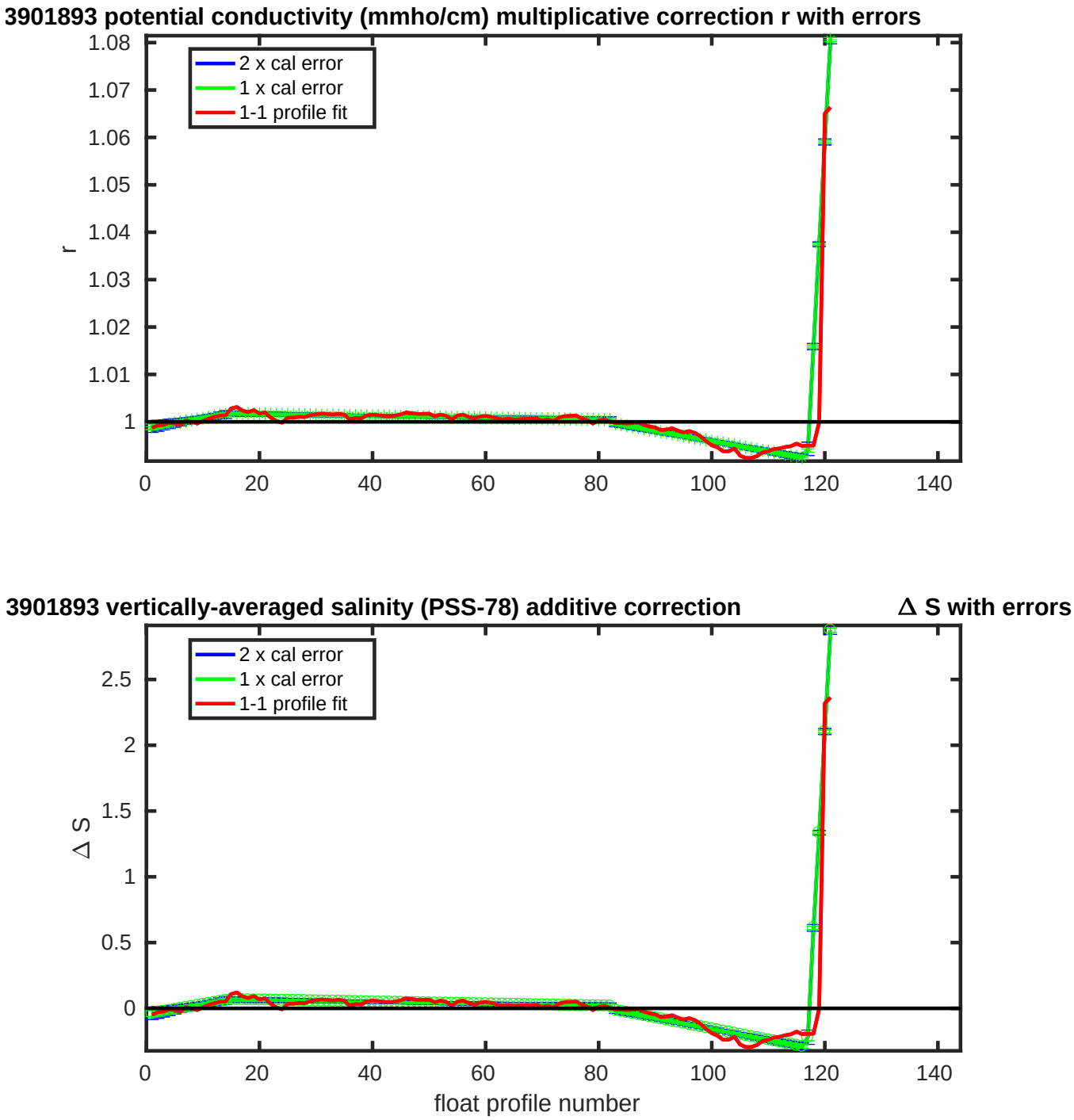


Figure 9: Float 3901893. Evolution of the suggested adjustment with time. The top panel plots the potential conductivity multiplicative adjustment. The bottom panel plots the equivalent salinity additive adjustment. The red line denotes one-to-one profile fit that uses the vertically weighted mean of each profile. The red line can be used to check for anomalous profiles relative to the optimal fit.

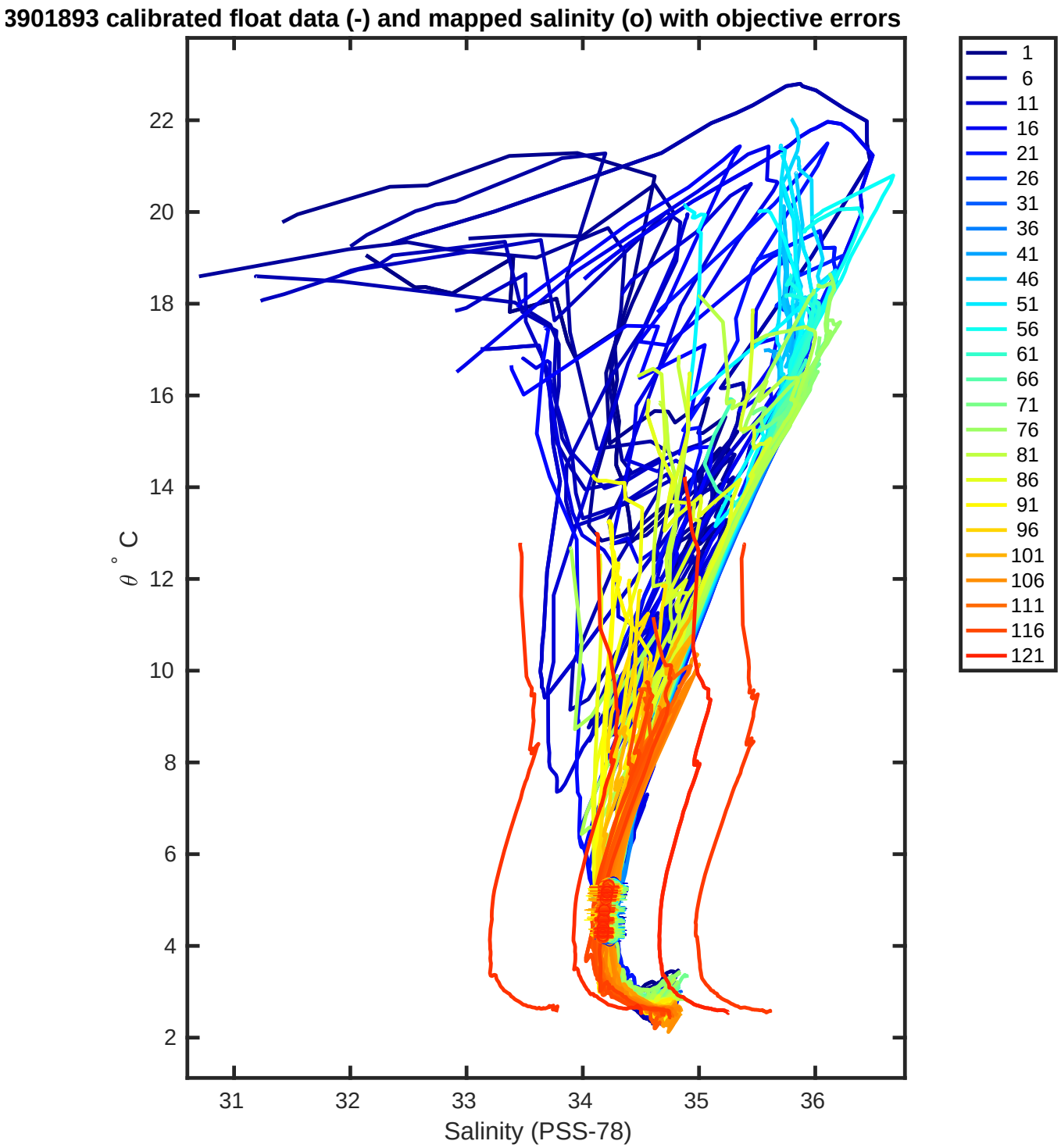


Figure 10: Float 3901893. Plots of calibrated float salinity and the objectively estimated reference salinity at the 10 float theta levels that are used in calibration.

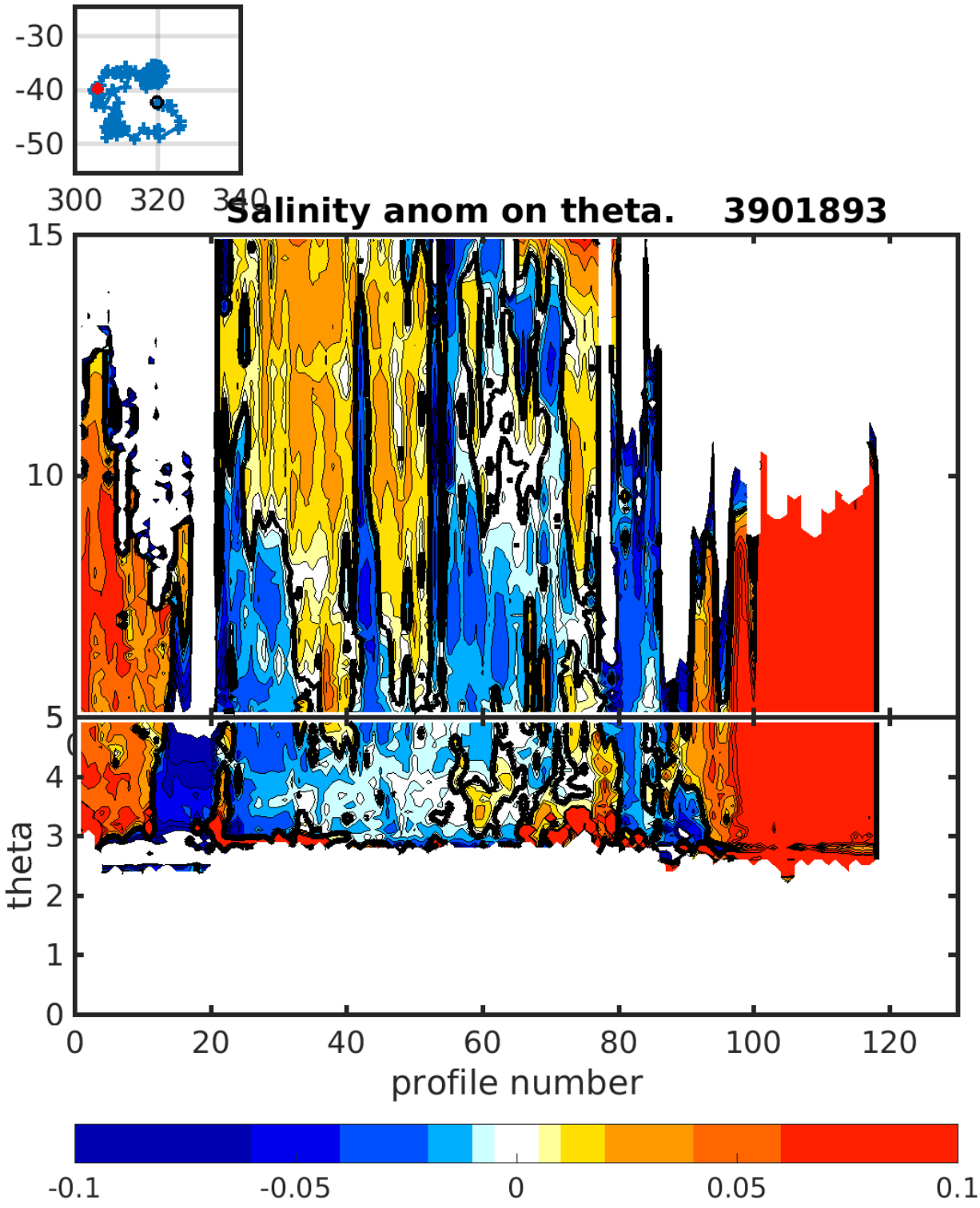


Figure 11: Float 3901893. Salinity anomaly on theta levels.

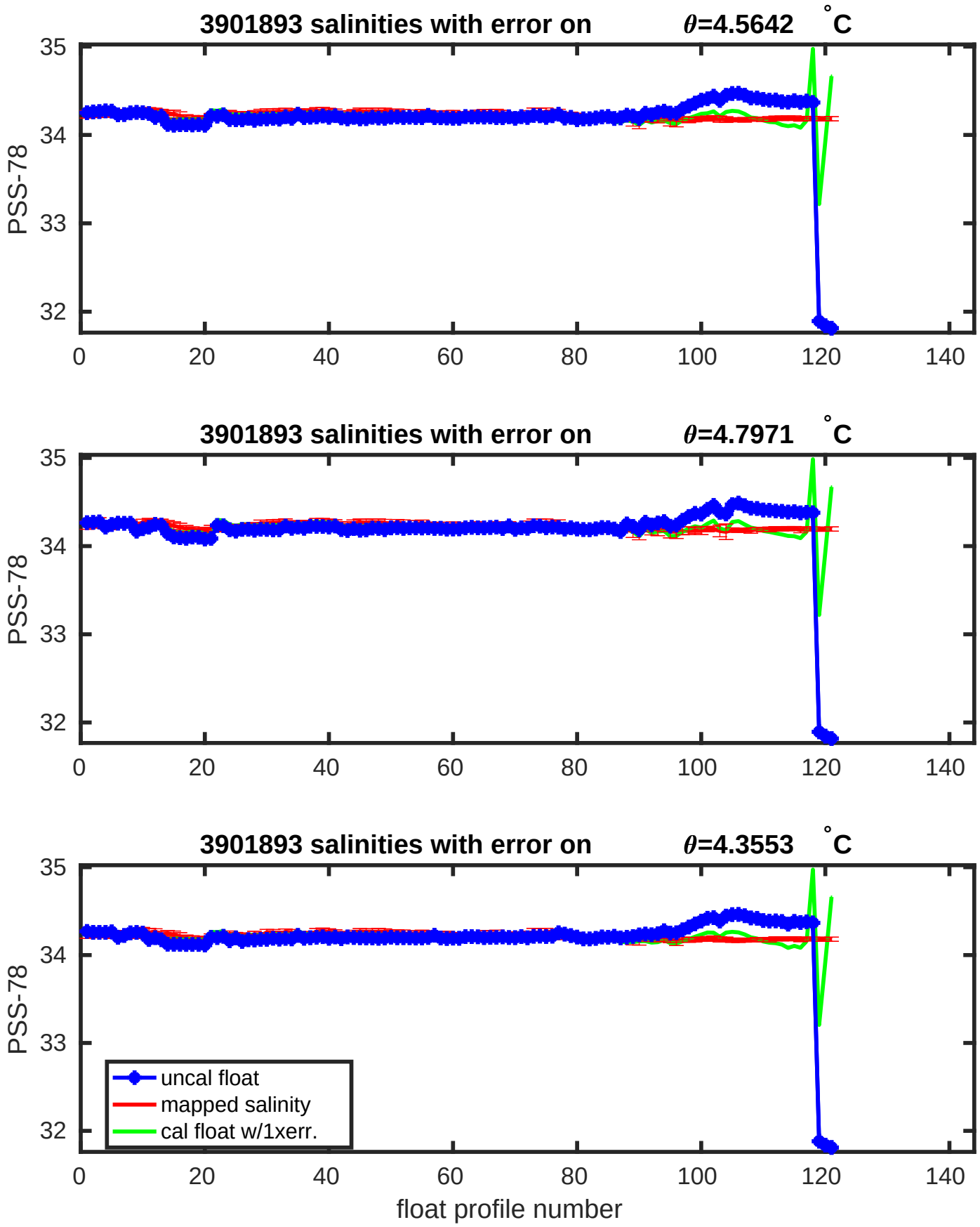


Figure 12: Float 3901893. Plots of the evolution of salinity with time along with selected theta levels with minimum salinity variance.

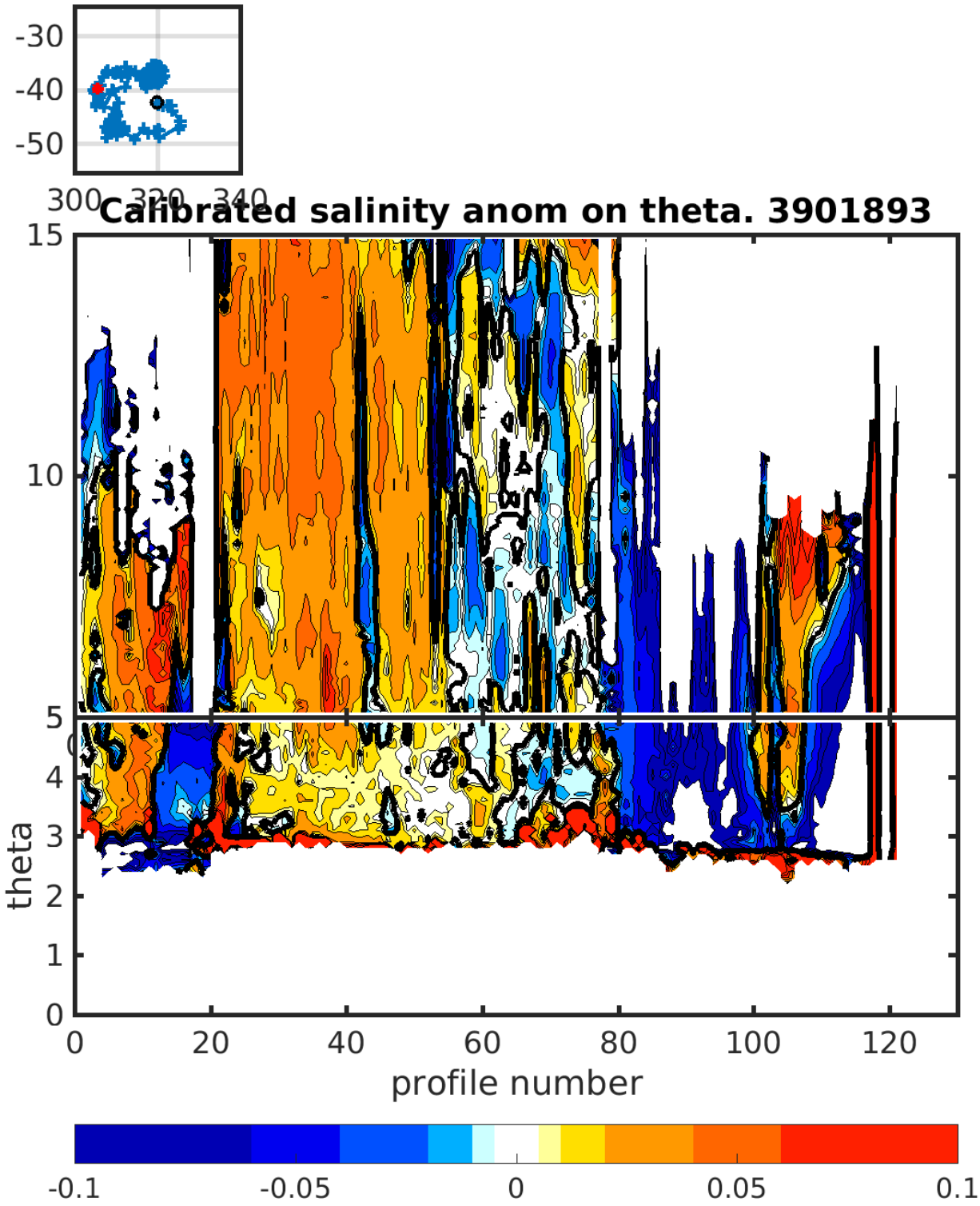


Figure 13: Float 3901893. Calibrated salinity anomaly on theta levels.

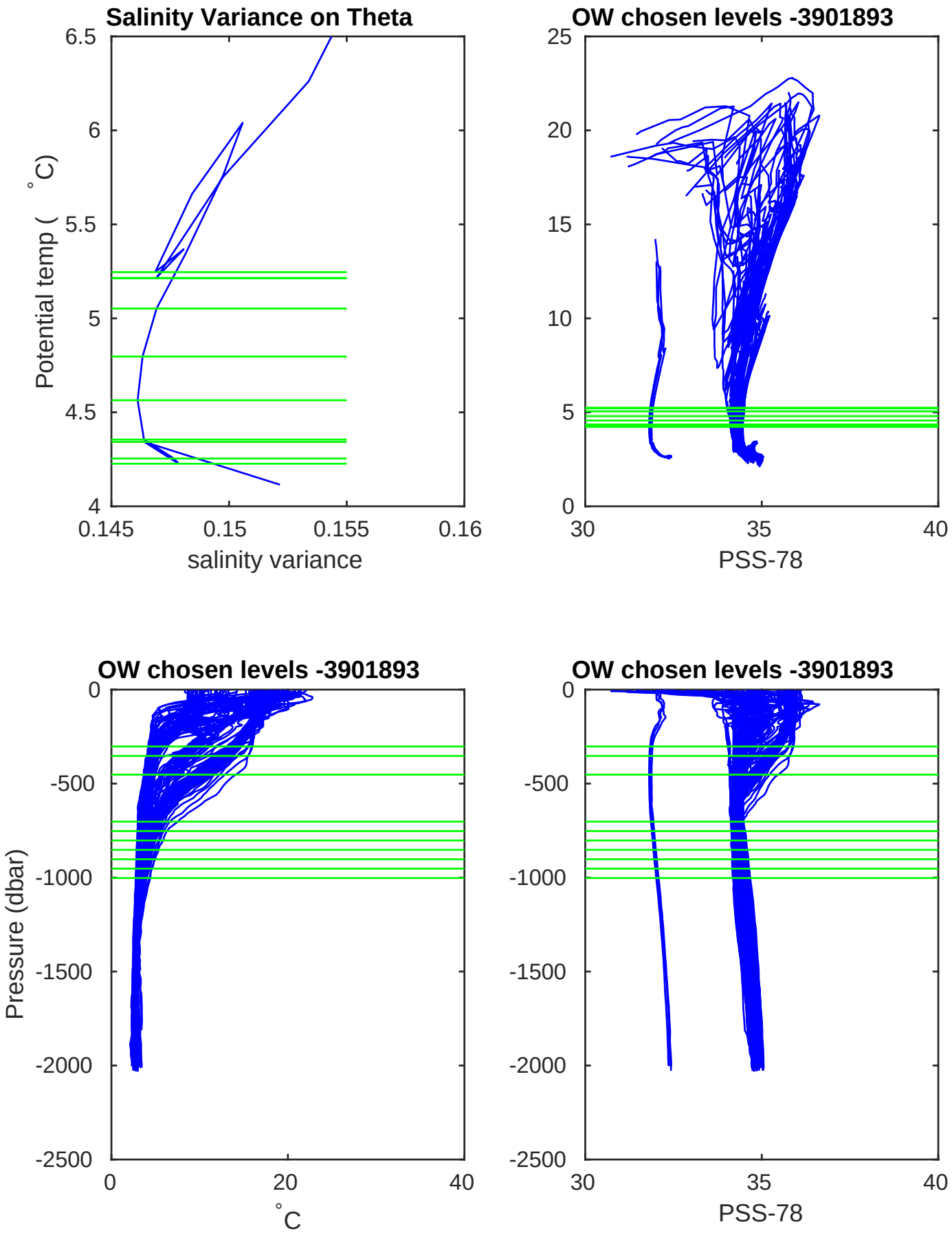


Figure 14: Float 3901893. Plots including the theta levels chosen for calibration: Top left: Salinity variance at theta levels. Top right: T/S diagram of all profiles of Argo float. Bottom left: potential temperature plotted against pressure. Bottom right: salinity plotted against pressure.

## 3.2 Comparison between Argo floats and Argo Climatlogy

### 3.2.1 Configuration

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```

### 3.2.2 Results

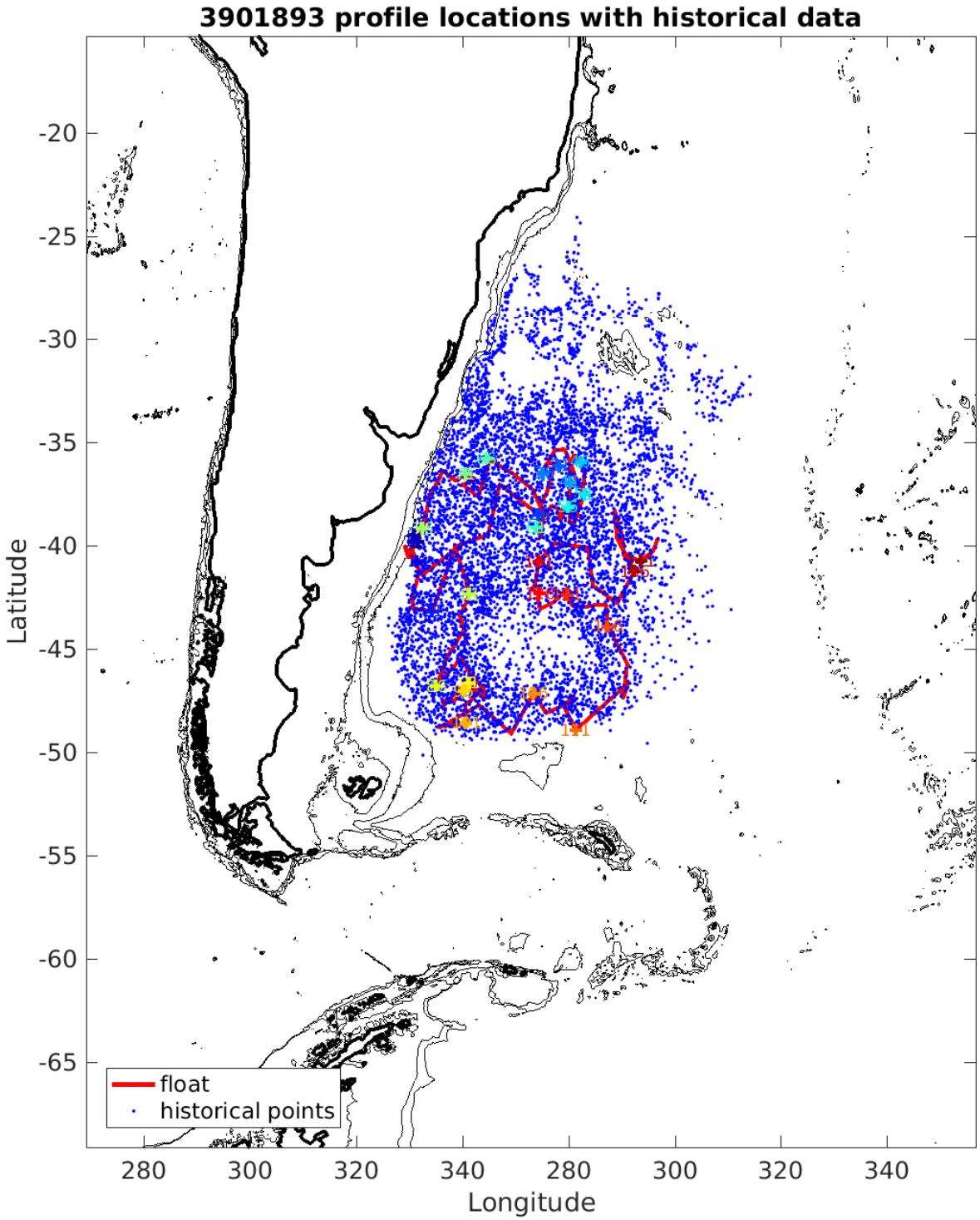


Figure 15: Float 3901893. Location of the float profiles (red line with coloured numbers) and the CTD reference data selected for mapping (blue dots). The black contours indicate the bathymetry at 0, 200, 1000 and 2000 m.

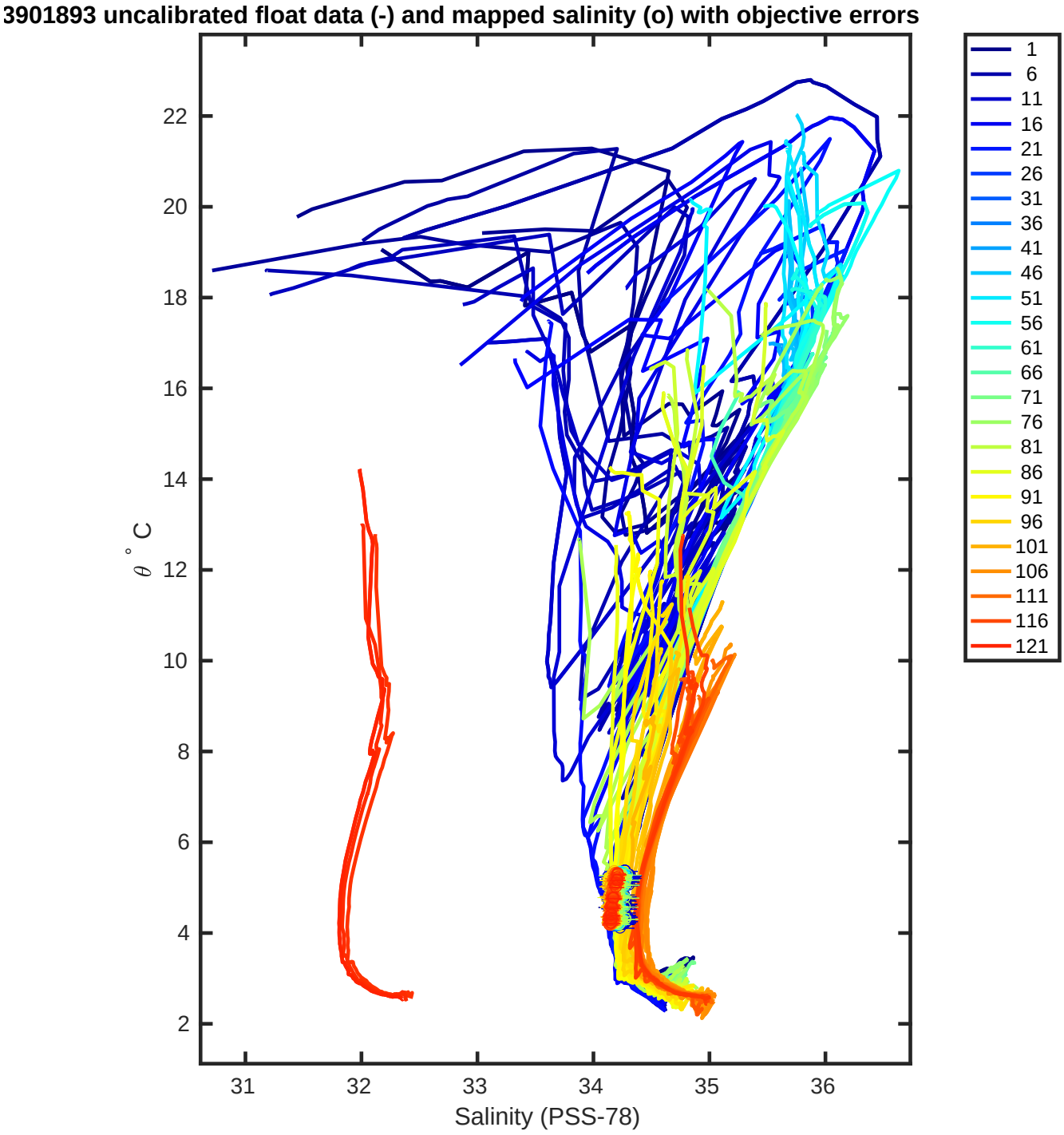


Figure 16: Float 3901893. Plots the original float salinity and the objectively estimated reference salinity at the 10 float theta levels that are used in calibration.

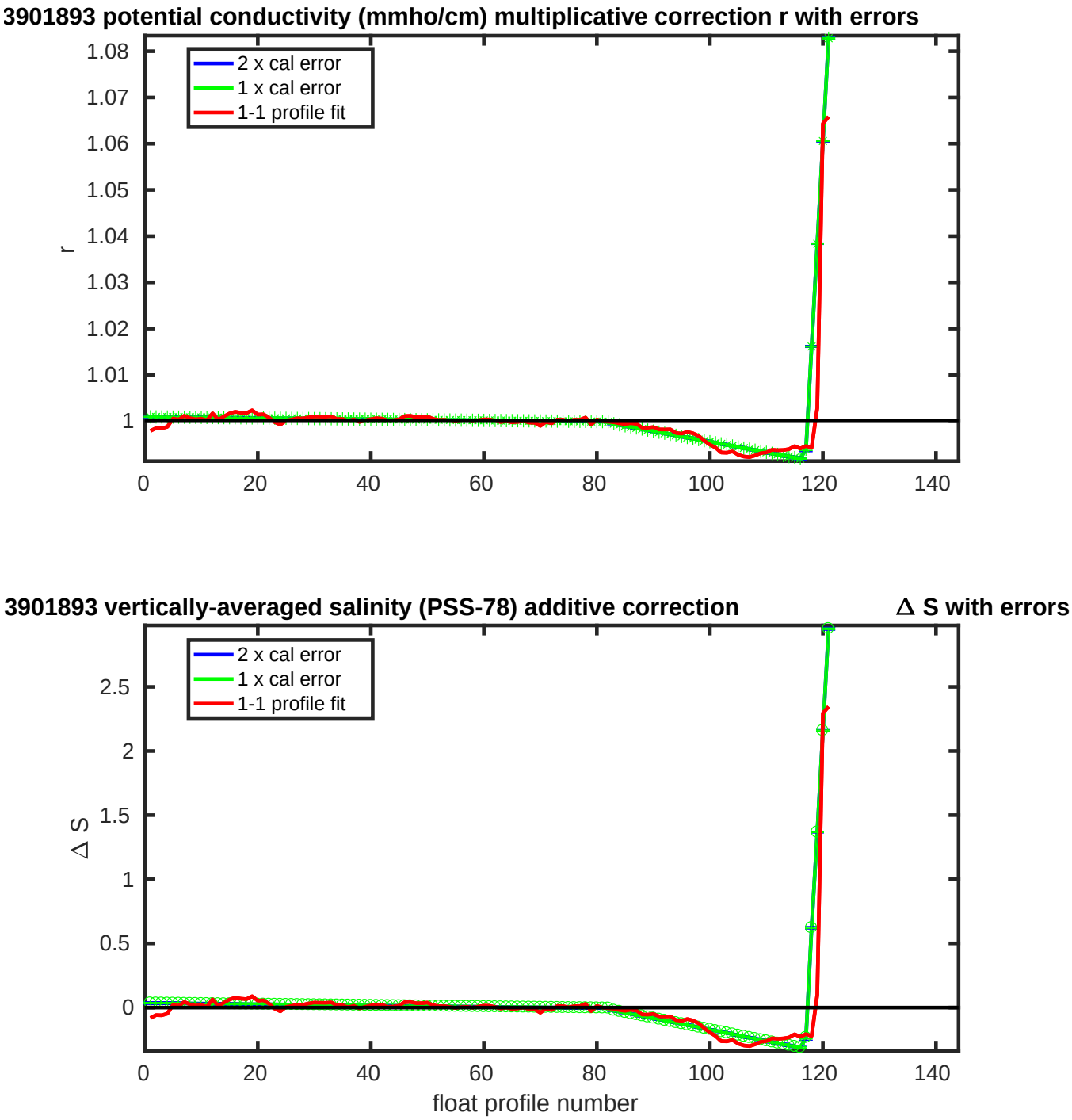


Figure 17: Float 3901893. Evolution of the suggested adjustment with time. The top panel plots the potential conductivity multiplicative adjustment. The bottom panel plots the equivalent salinity additive adjustment. The red line denotes one-to-one profile fit that uses the vertically weighted mean of each profile. The red line can be used to check for anomalous profiles relative to the optimal fit.

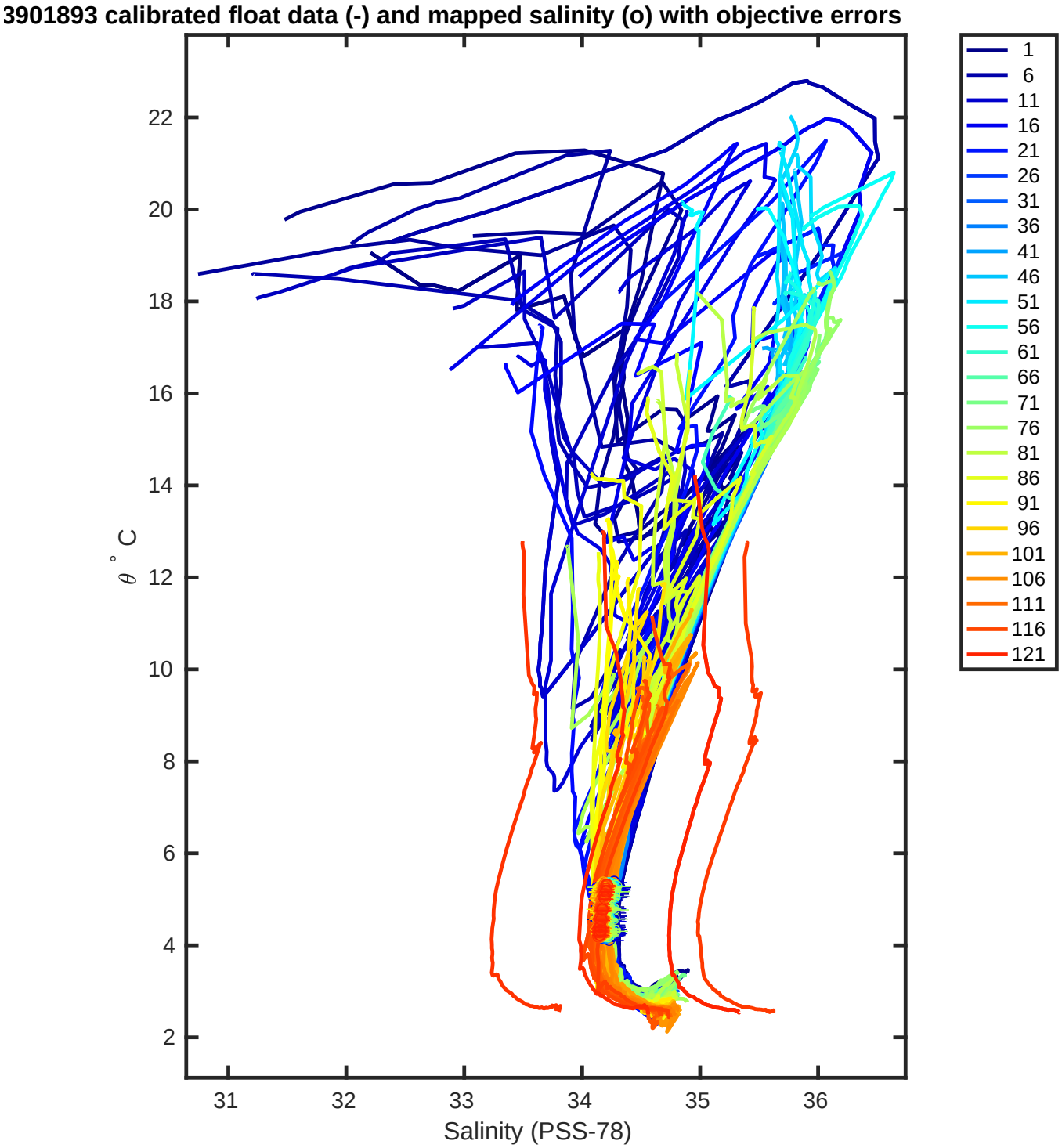


Figure 18: Float 3901893. Plots of calibrated float salinity and the objectively estimated reference salinity at the 10 float theta levels that are used in calibration.

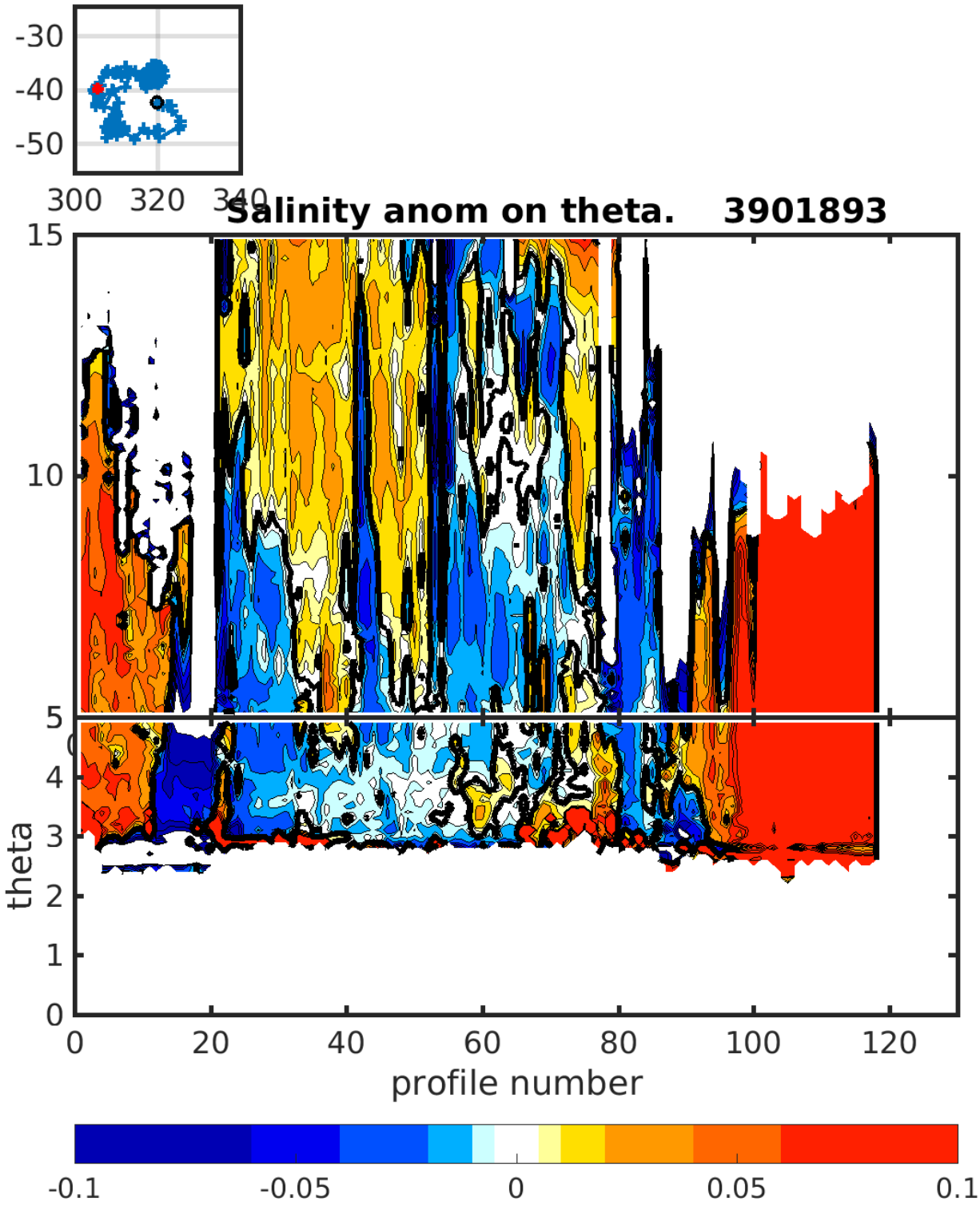


Figure 19: Float 3901893. Salinity anomaly on theta levels.

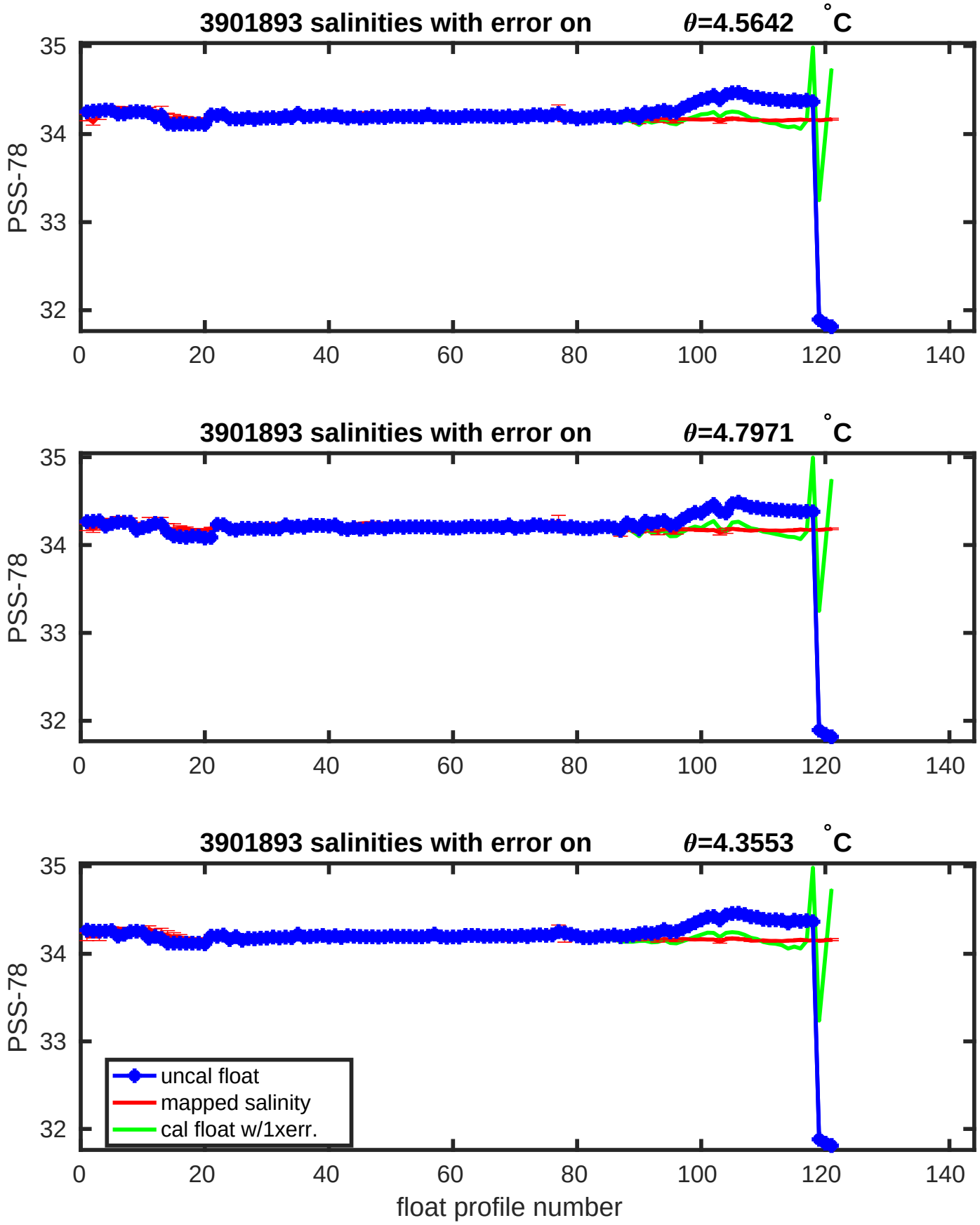


Figure 20: Float 3901893. Plots of the evolution of salinity with time along with selected theta levels with minimum salinity variance.

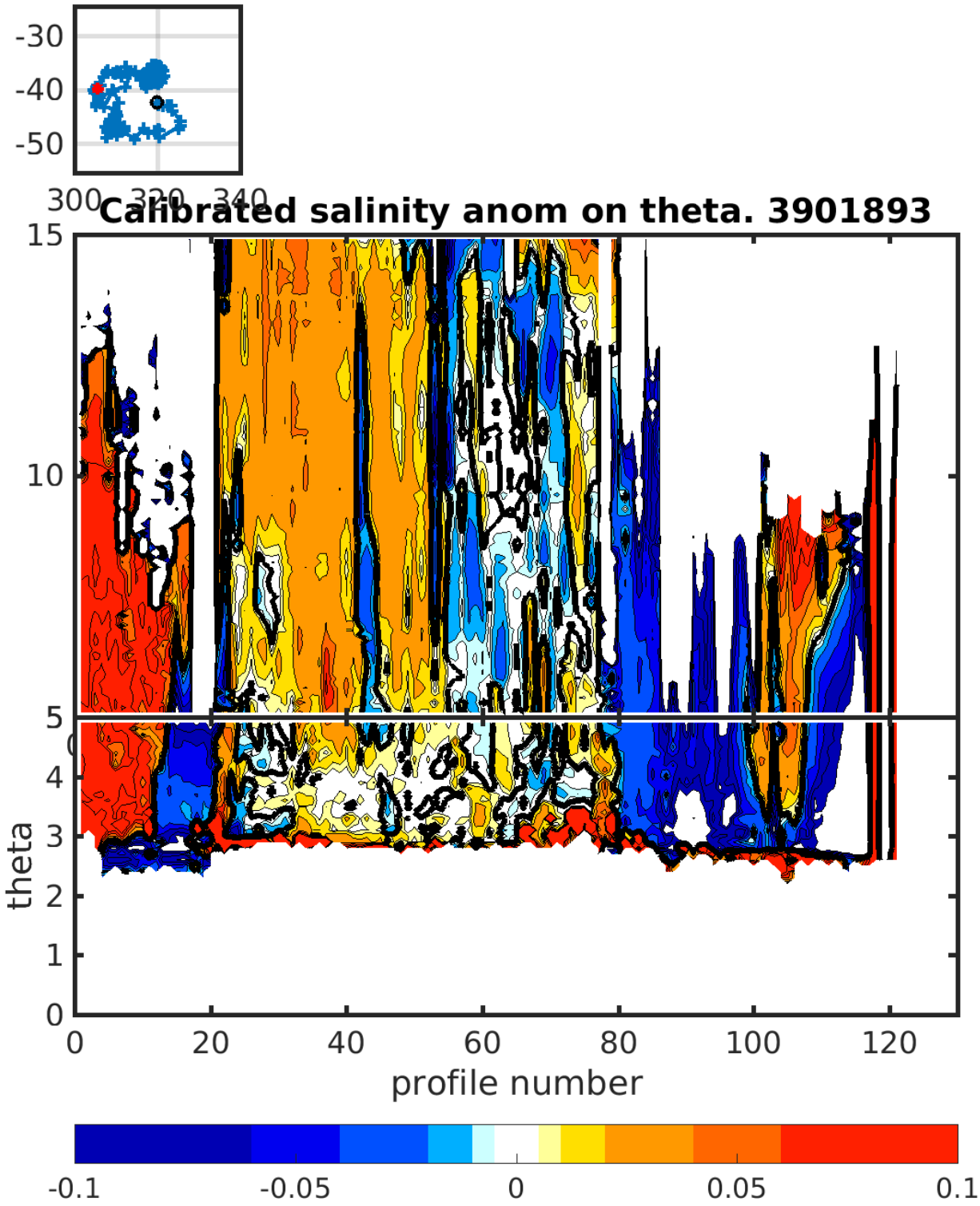


Figure 21: Float 3901893. Calibrated salinity anomaly on theta levels.

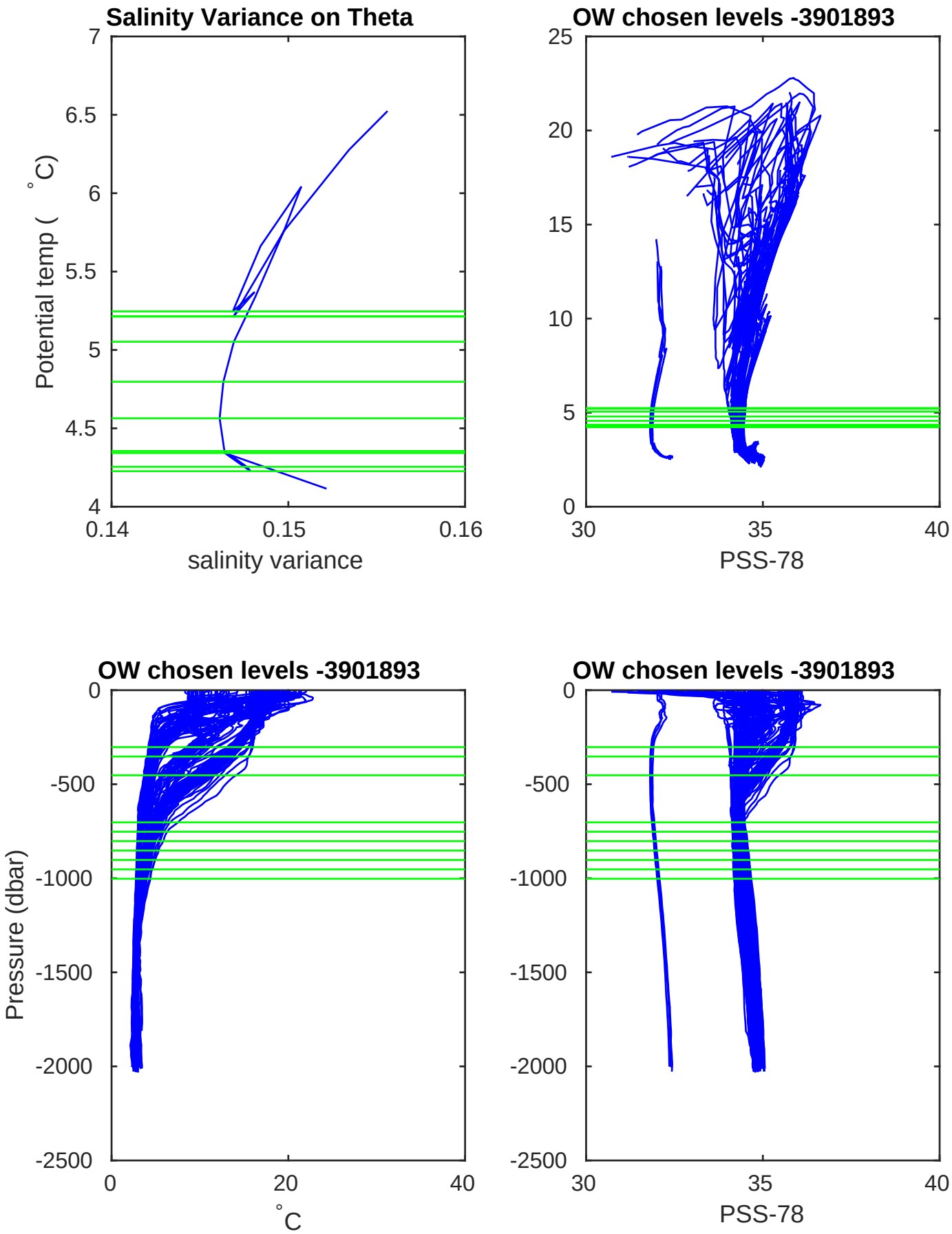


Figure 22: Float 3901893. SPlots including the theta levels chosen for calibration: Top left: Salinity variance at theta levels. Top right: T/S diagram of all profiles of Argo float. Bottom left: potential temperature plotted against pressure. Bottom right: salinity plotted against pressure.

## 3.3 Summary and Conclusions

The float was deployed in the Argentine Basin, where it was circulated in the system of eddies for the entire float life. The analysis has been conducted using both CTD and Argo reference data.

In set calseries the time series has been separated onto two periods, the first from 1 to 82 and the second from 83 to 143, due to detected first salty and further strong fresh drift. Additionally, we constrained the theta levels to be selected below between 4 and 8 degrees. The first 22 cycles were sampled every one day that reflects a very strong variability compared to the referenced data. Further from cycle 23 the sampling was almost 10 days. In result, profiles between 1 and 82 showed a relatively large variability, that is expected in this region, the QC was set to 1 and salinity error = 0.02. Further profiles 83-143 were set to QC=4 due to strong salty and further spikes of very fresh salinity data. This can be result of some issue with the sensors.

# 4 References