Delayed Mode Quality Control of MOCCA Argo float 3901882

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Short Summary

Float is drifting from profile 65 to 105. The OWC correction was applied with QC=1, err=0.005.

WMO number	DM correction
3901882	Drift detected

Table 1: Correction applied in delayed mode.

Contents

1 Introduction

Delayed mode analysis was performed for float number 360617i (3901882) 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 360617i (3901882) click on the following link: http://www.ifremer.fr/argoMonitoring/float/3901882

2 Quality Check of Argo Float Data

2.1 Time Series of Vertical Distribution of Data

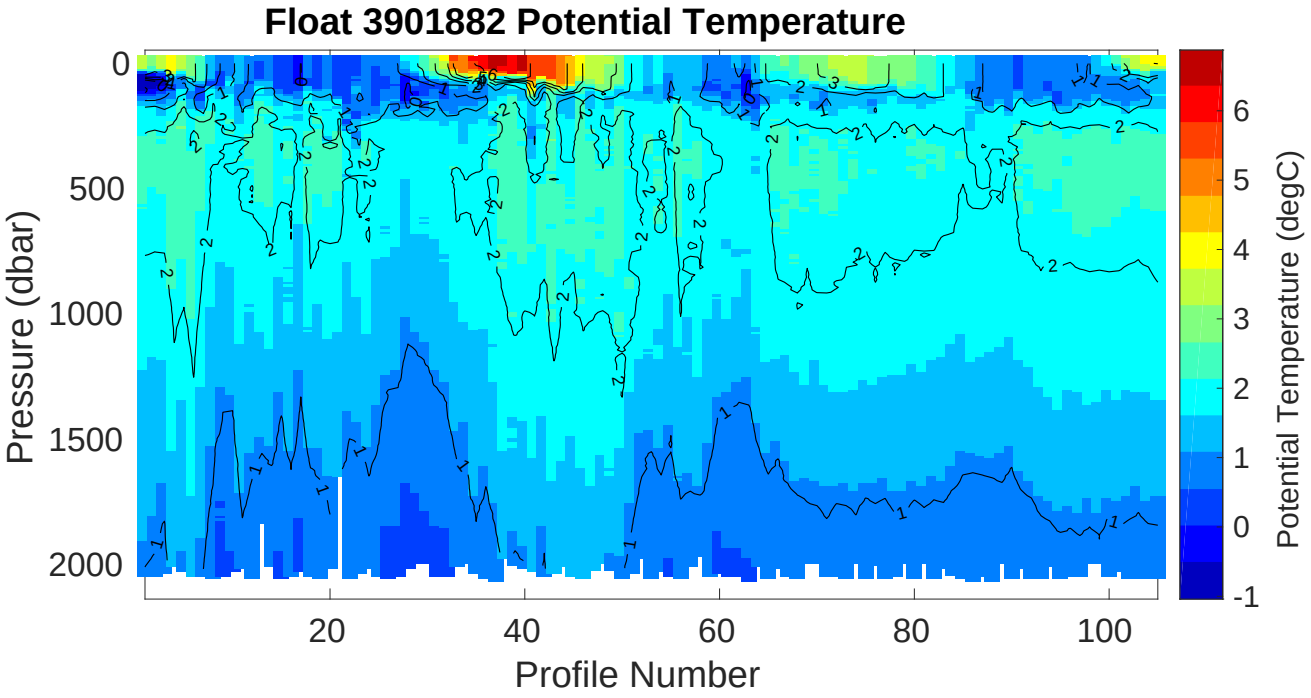

Figure 1: Float 3901882. Time series of the vertical distribution of potential temperature (°C).

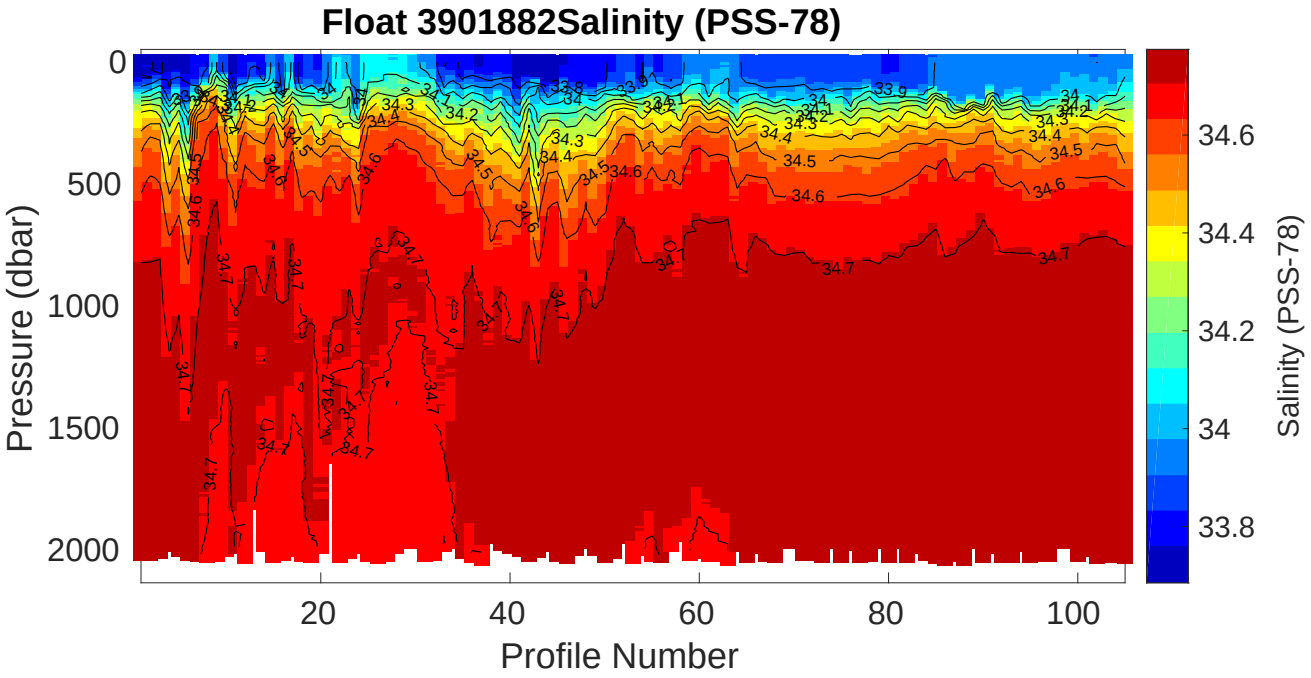

Figure 2: Float 3901882. Time series of the vertical distribution of salinity (PSS-78).

2.2 Comparison between Argo Float and Climatology

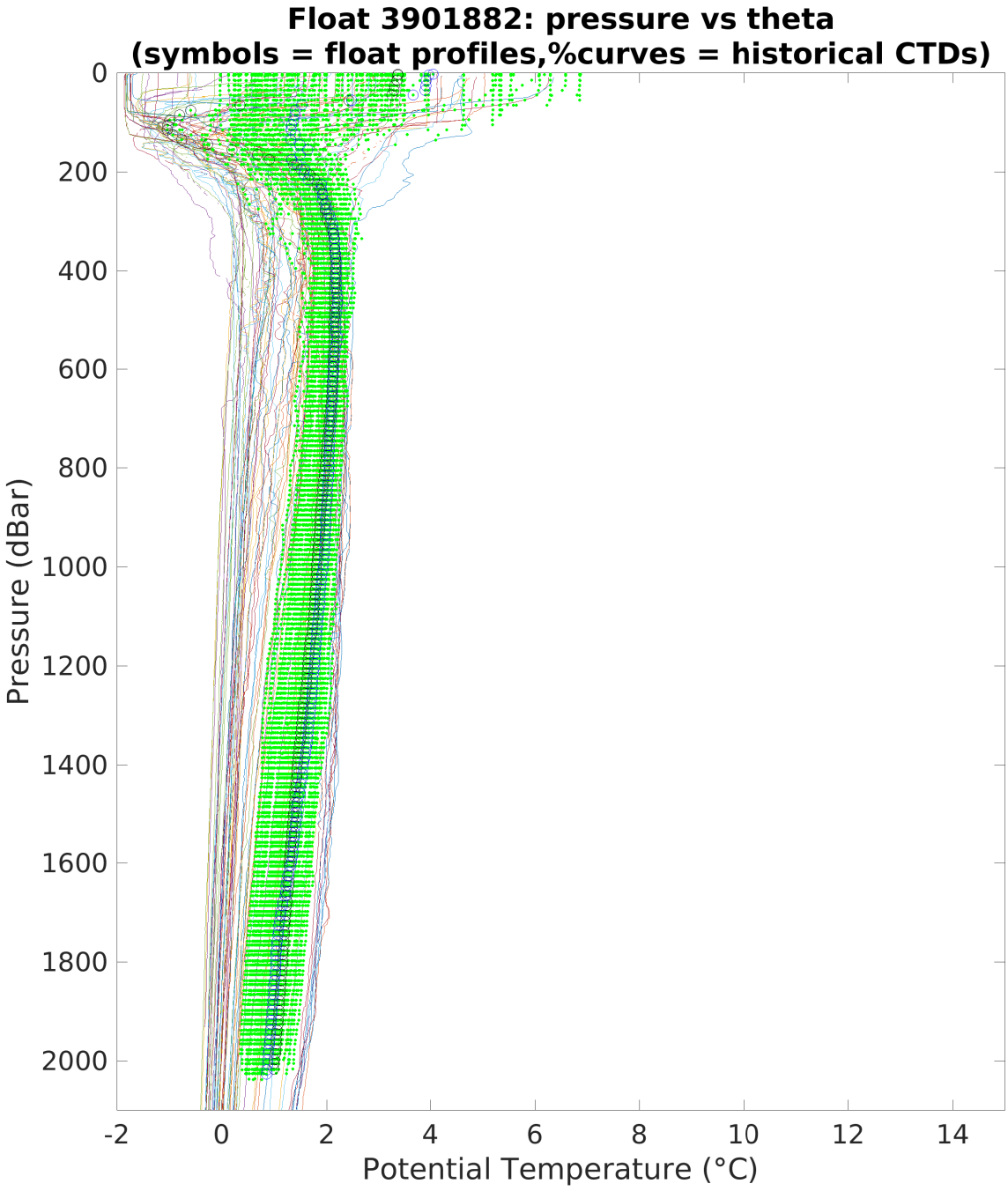

Figure 3: Float 3901882. Potential temperature (˚C) plotted with pressure (dBar) and data from WMO boxes of CTD reference data (CTD for DMQC 2019V01) +/- 10 ˚of latitude and longitude. The black and blue cycles indicates the first and the last Argo profile, respectively. Green symbols represent other Argo profiles from this float. The thin colors lines indicate the reference data

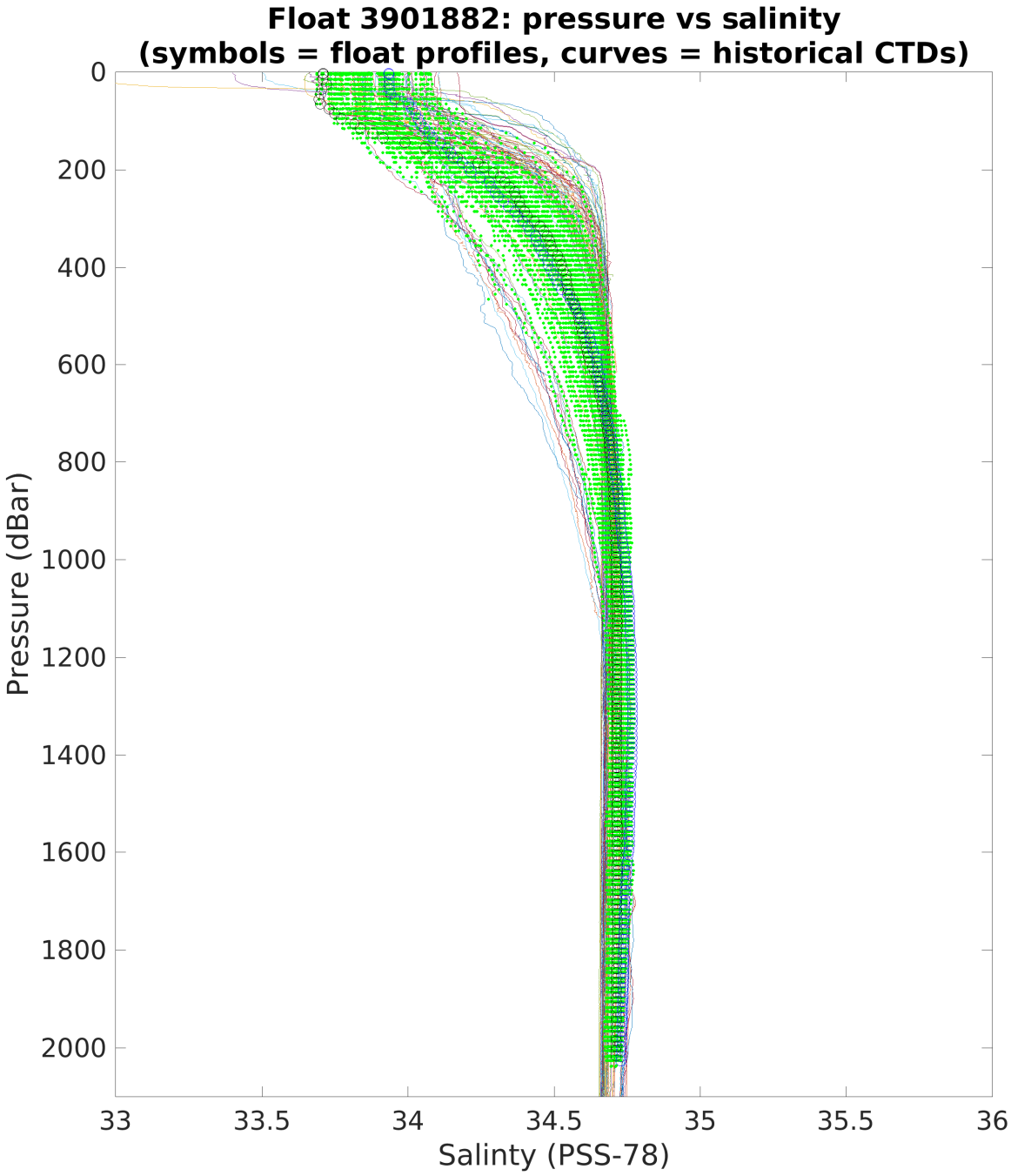

Figure 4: Float 3901882. Salinity (PSS-78) plotted with pressure (dBar) and data from WMO boxes of CTD reference data (CTD for DMQC 2019V01) +/- 10°of latitude and longitude. The black and blue cycles indicates the first and the last Argo profile, respectively. Green symbols represent other Argo profiles from this float. The thin colors lines indicate the reference data.

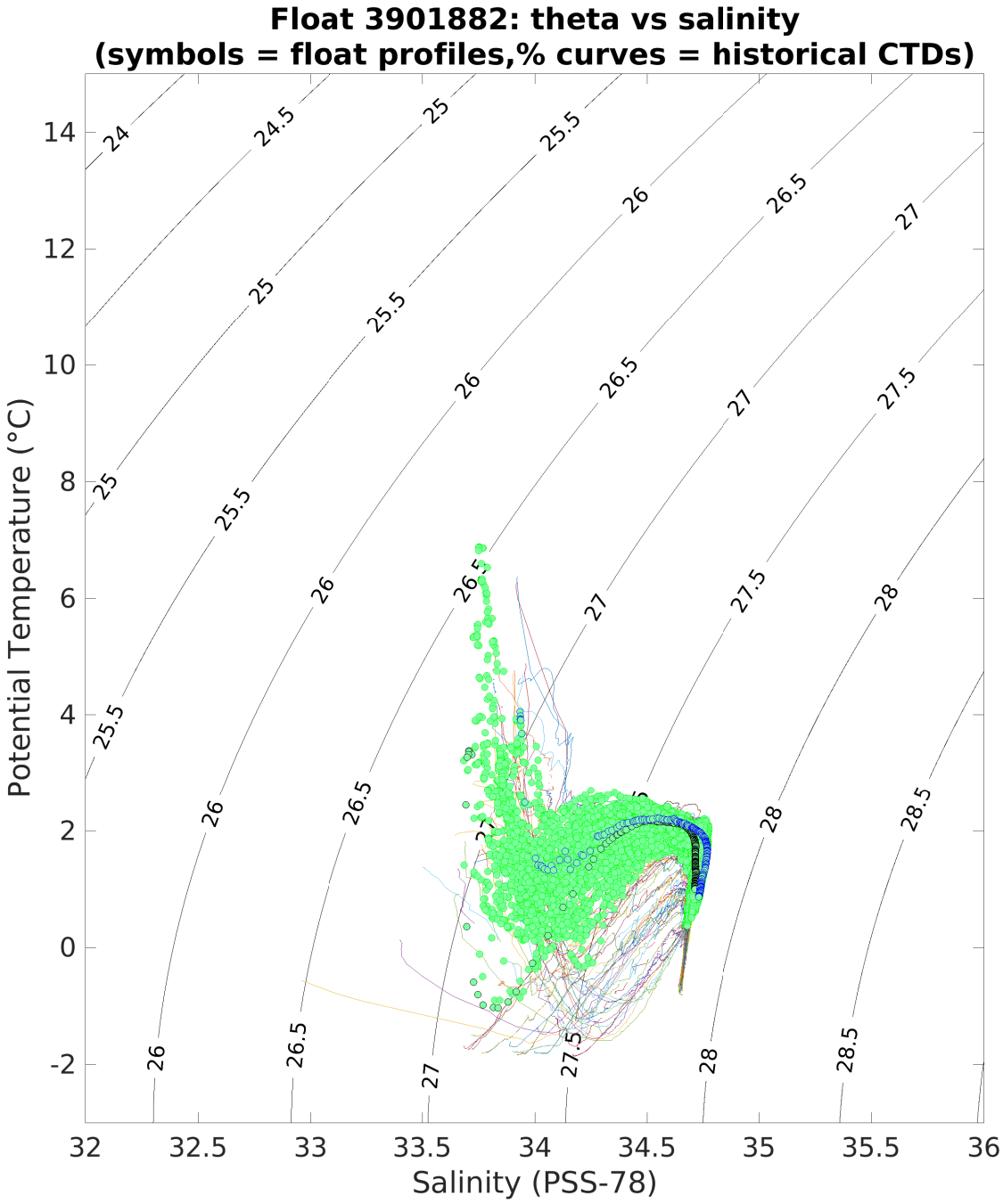

Figure 5: Float 3901882. T/S diagram plotted with and data from WMO boxes of CTD reference data (CTD for DMQC 2019V01) +/- 10˚of latitude and longitude. The black and blue cycles indicates the first and the last Argo profile, respectively. Green symbols represent other Argo profiles from this float.

2.3 Satellite Altimeter comparison

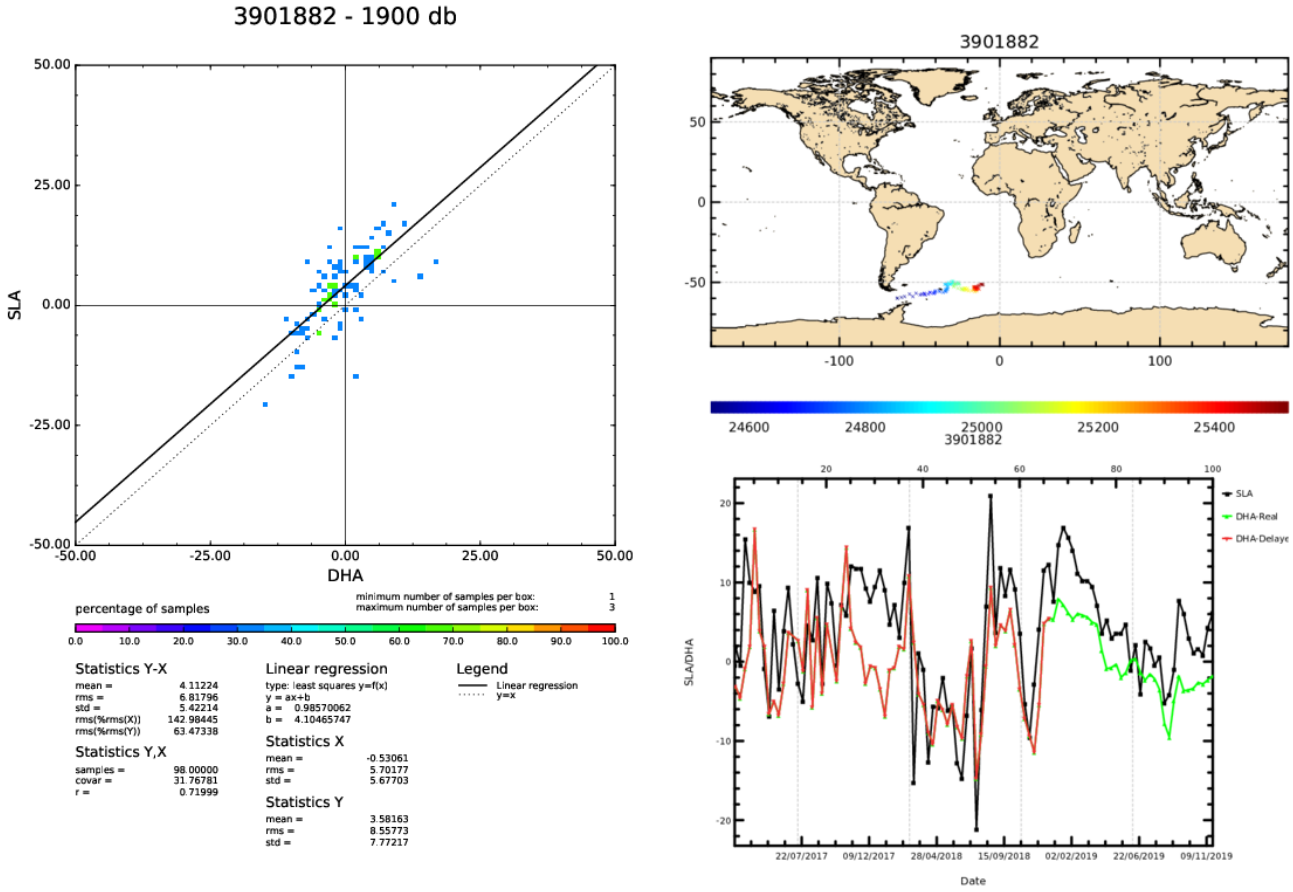

Figure 6: Float 3901882. The comparison betweeen the Sea Surface Height (SSH) from the satellite altimetry and Dynamic Height Anomaly (DHA) extracted from the Argo float temperature and salinity data (ftp://ftp.ifremer.fr/ifremer/argo/etc/argo-ast9-item13-AltimeterComparison/figures/).

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_2019V03/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

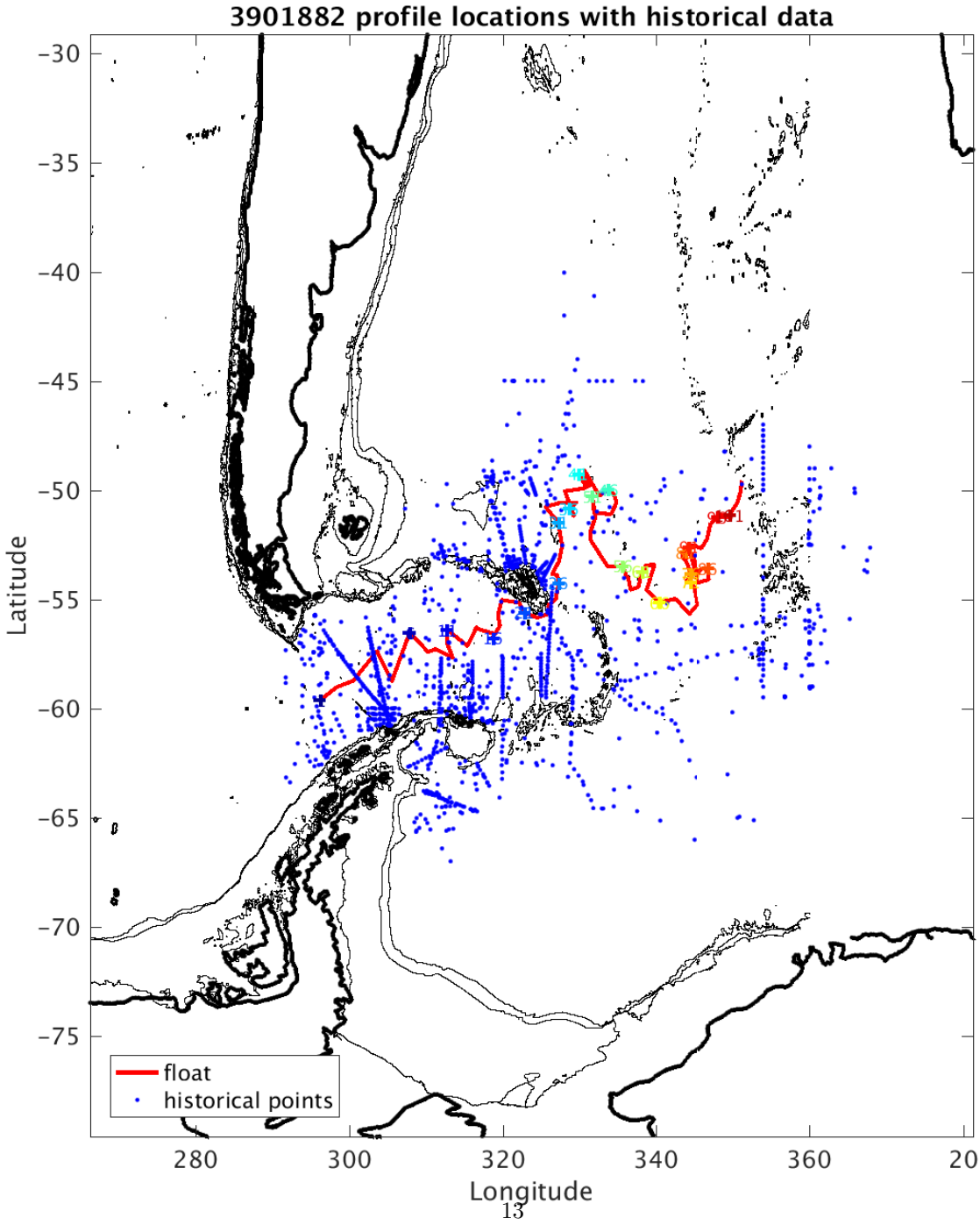

Figure 7: Float 3901882. Location of the float profiles (red line with coloured numbers) and the CTD reference data selected for mapping (blue dots). The black contours indicate the bathymetry at 0, 200, 1000 and 2000 m.

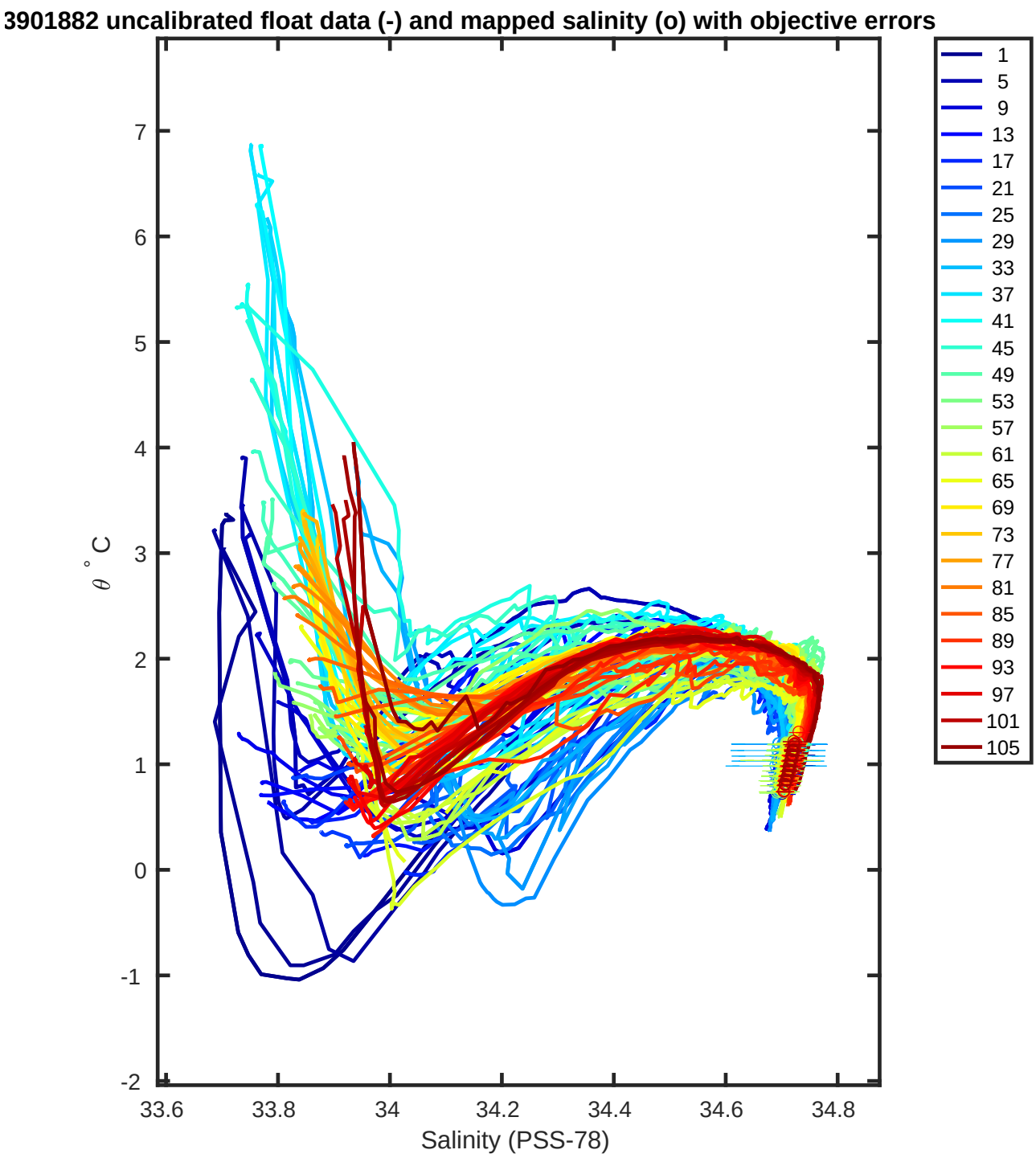

Figure 8: Float 3901882. Plots the original float salinity and the objectively estimated reference salinity at the 10 float theta levels that are used in calibration.

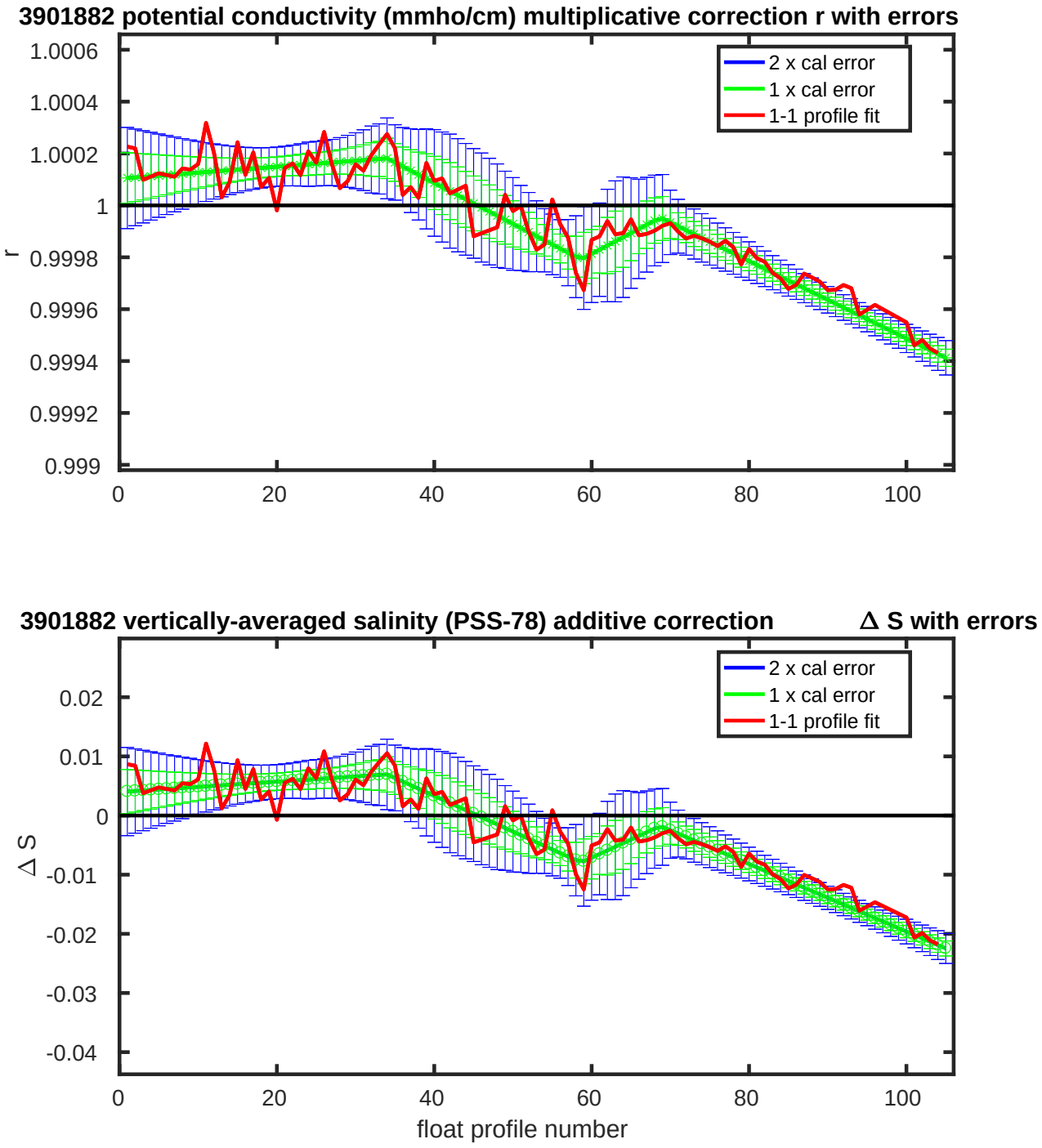

Figure 9: Float 3901882. Evolution of the suggested adjustment with time. The top panel plots the potential conductivity multiplicative adjustment. The bottom panel plots the equivalent salinity additive adjustment. The red line denotes one-to-one profile fit that uses the vertically weighted mean of each profile. The red line can be used to check for anomalous profiles relative to the optimal fit.

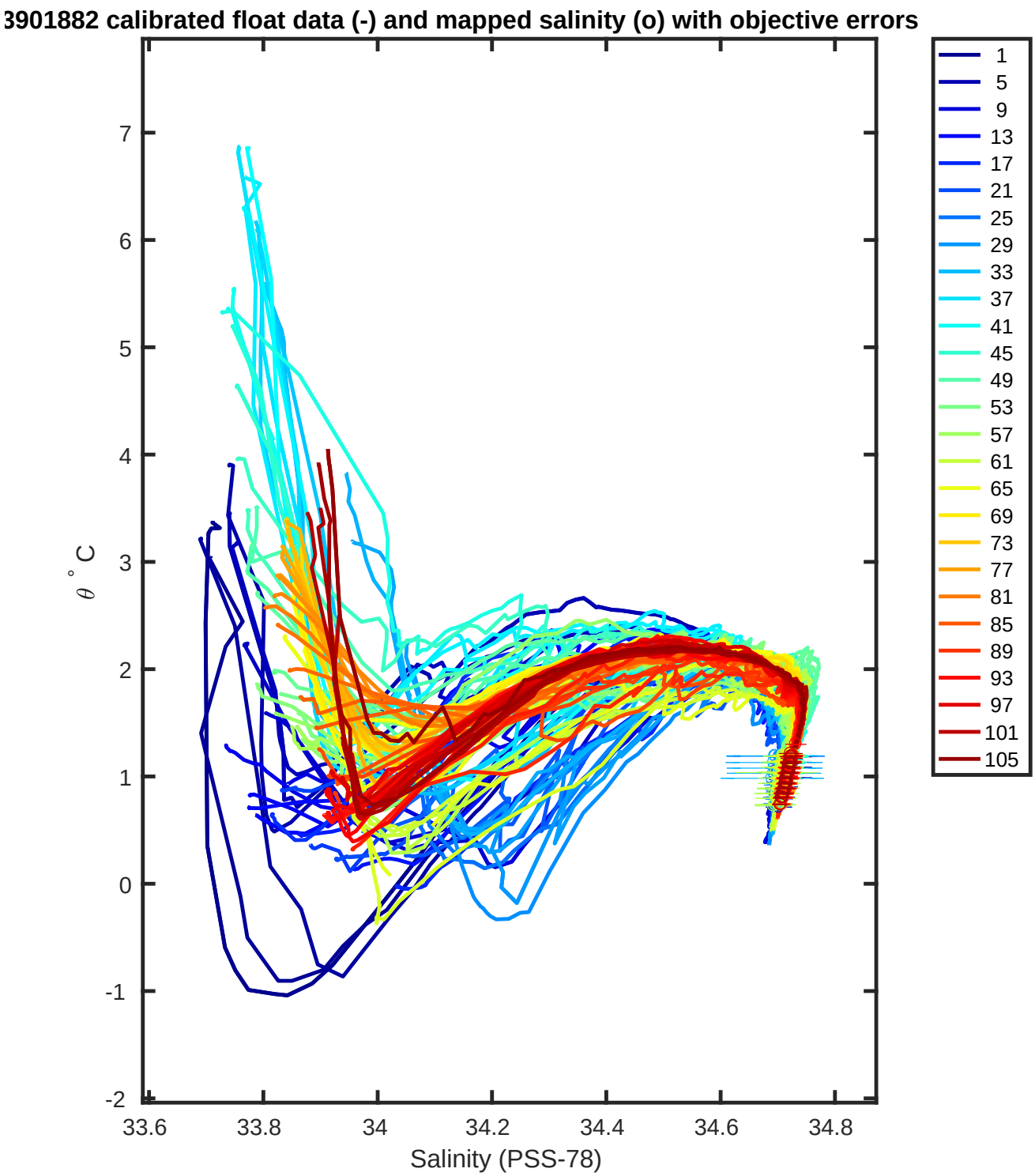

Figure 10: Float 3901882. Plots of calibrated float salinity and the objectively estimated reference salinity at the 10 float theta levels that are used in calibration.

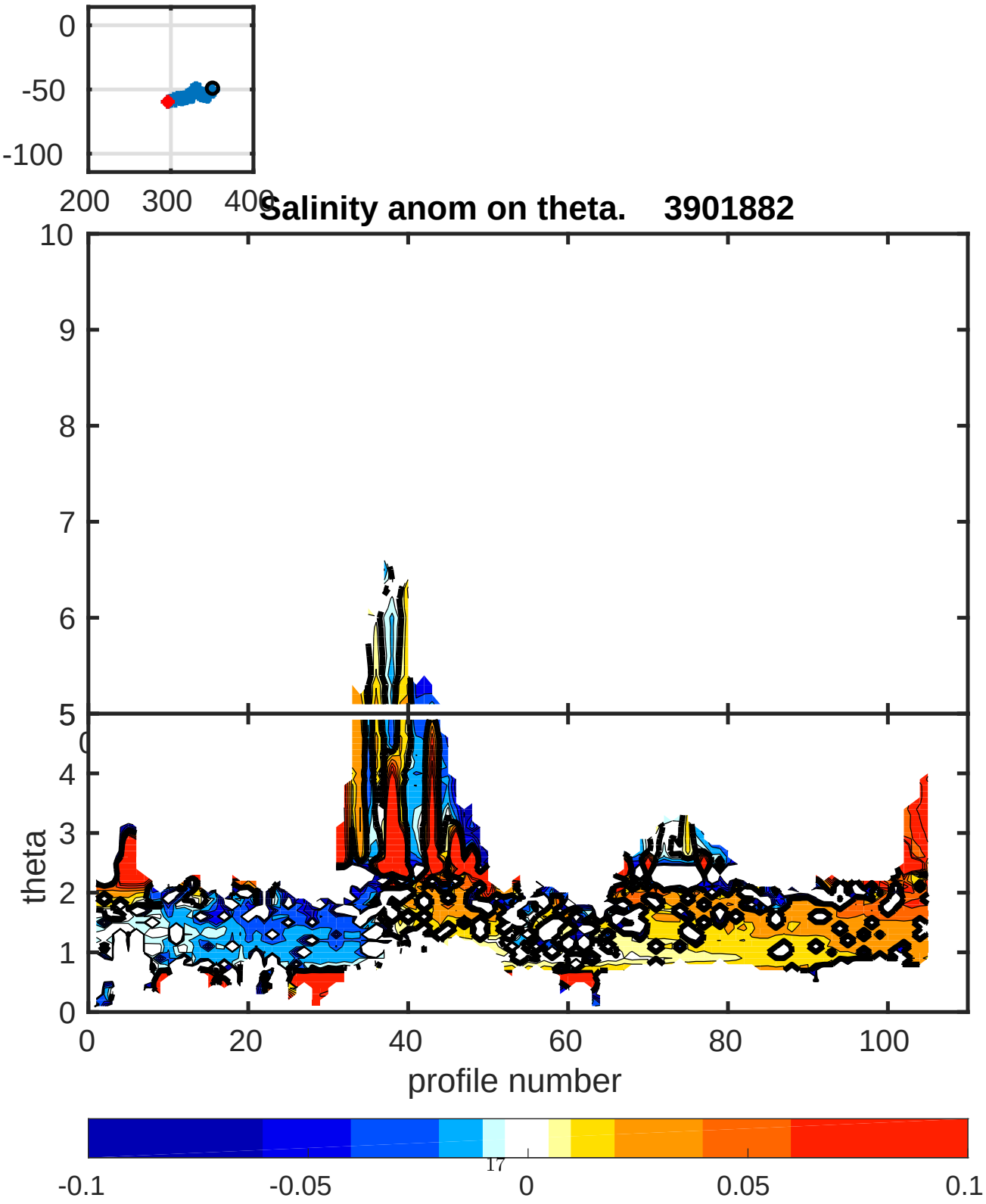

Figure 11: Float 3901882. Salinity anomaly on theta levels.

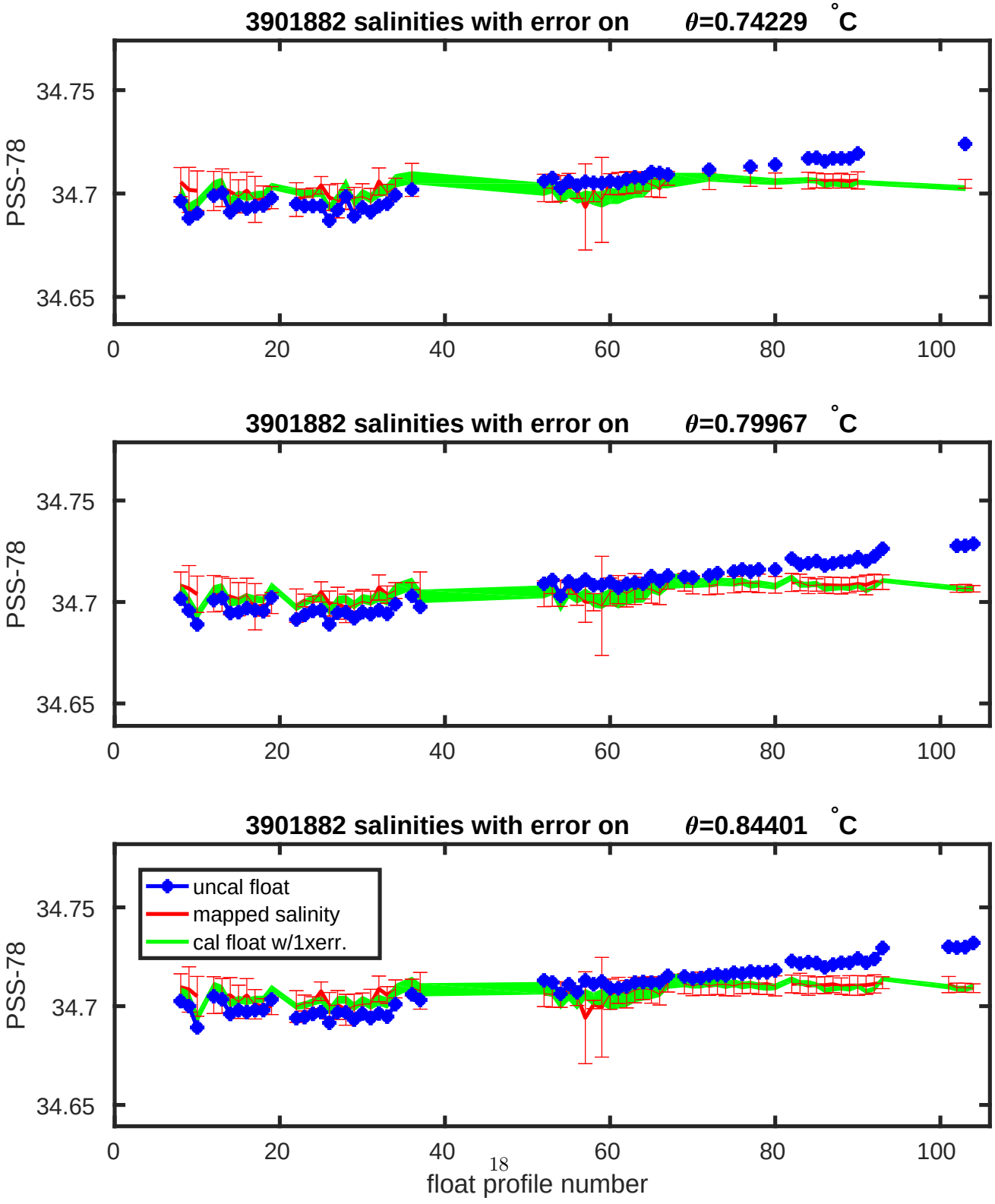

Figure 12: Float 3901882. Plots of the evolution of salinity with time along with selected theta levels with minimum salinity variance.

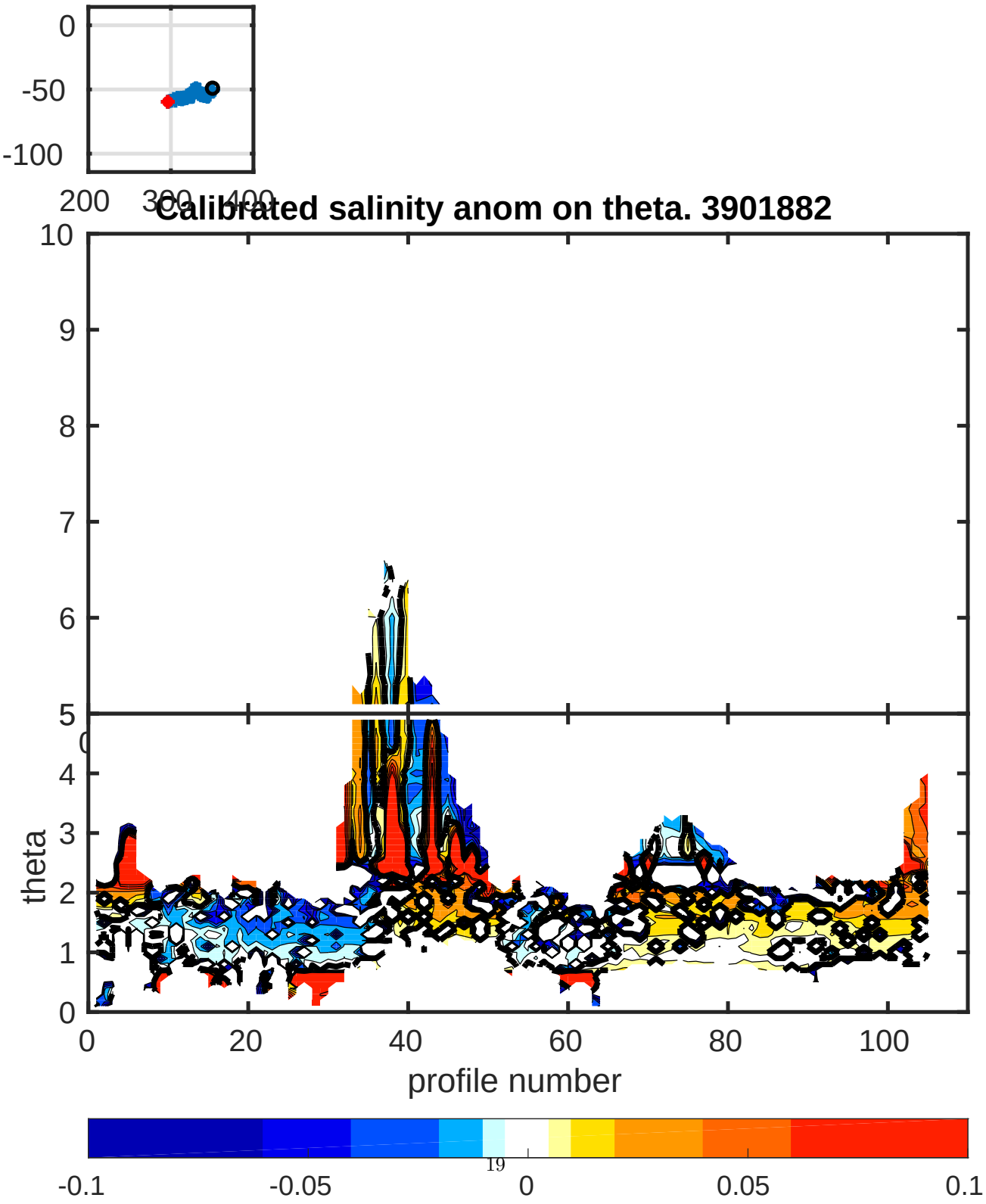

Figure 13: Float 3901882. Calibrated salinity anomaly on theta levels.

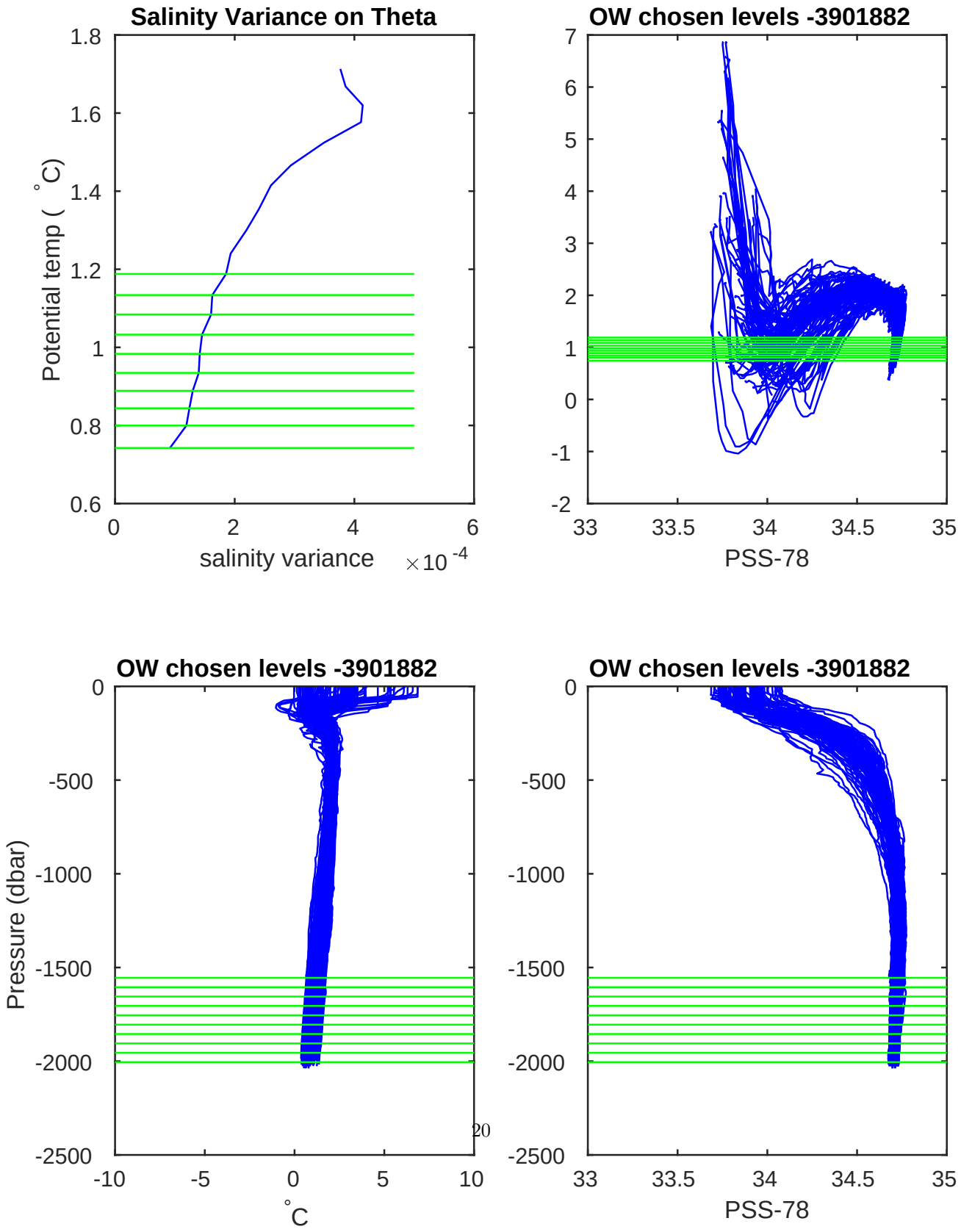

Figure 14: Float 3901882. Plots including the theta levels chosen for calibration: Top left: Salinity variance at theta levels. Top right: T/S diagram of all profiles of Argo float. Bottom left: potential temperature plotted against pressure. Bottom right: salinity plotted against pressure.

3.2 Comparison between Argo floats and Argo Climatlogy

3.2.1 Configuration

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```

3.2.2 Results

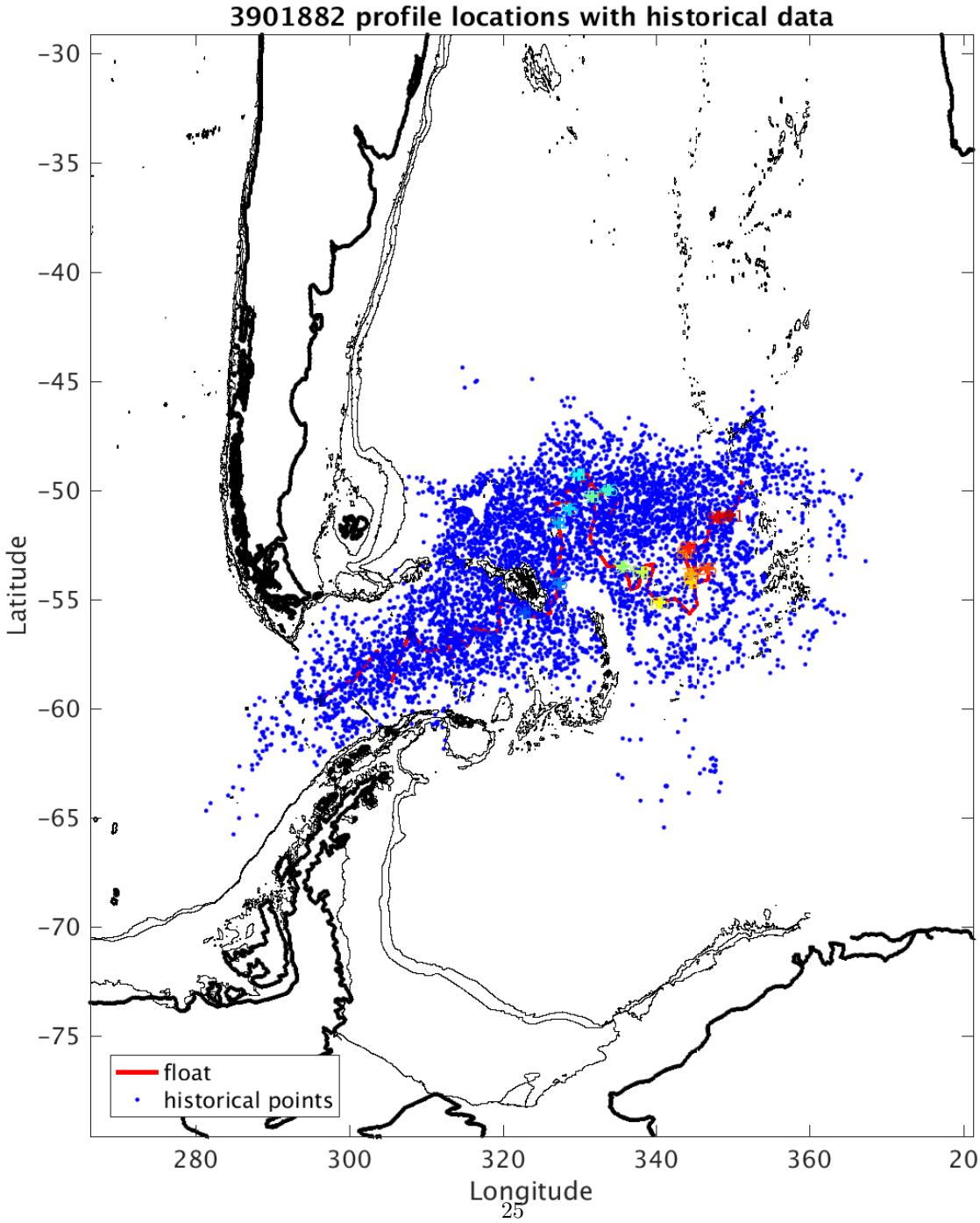

Figure 15: Float 3901882. Location of the float profiles (red line with coloured numbers) and the CTD reference data selected for mapping (blue dots). The black contours indicate the bathymetry at 0, 200, 1000 and 2000 m.

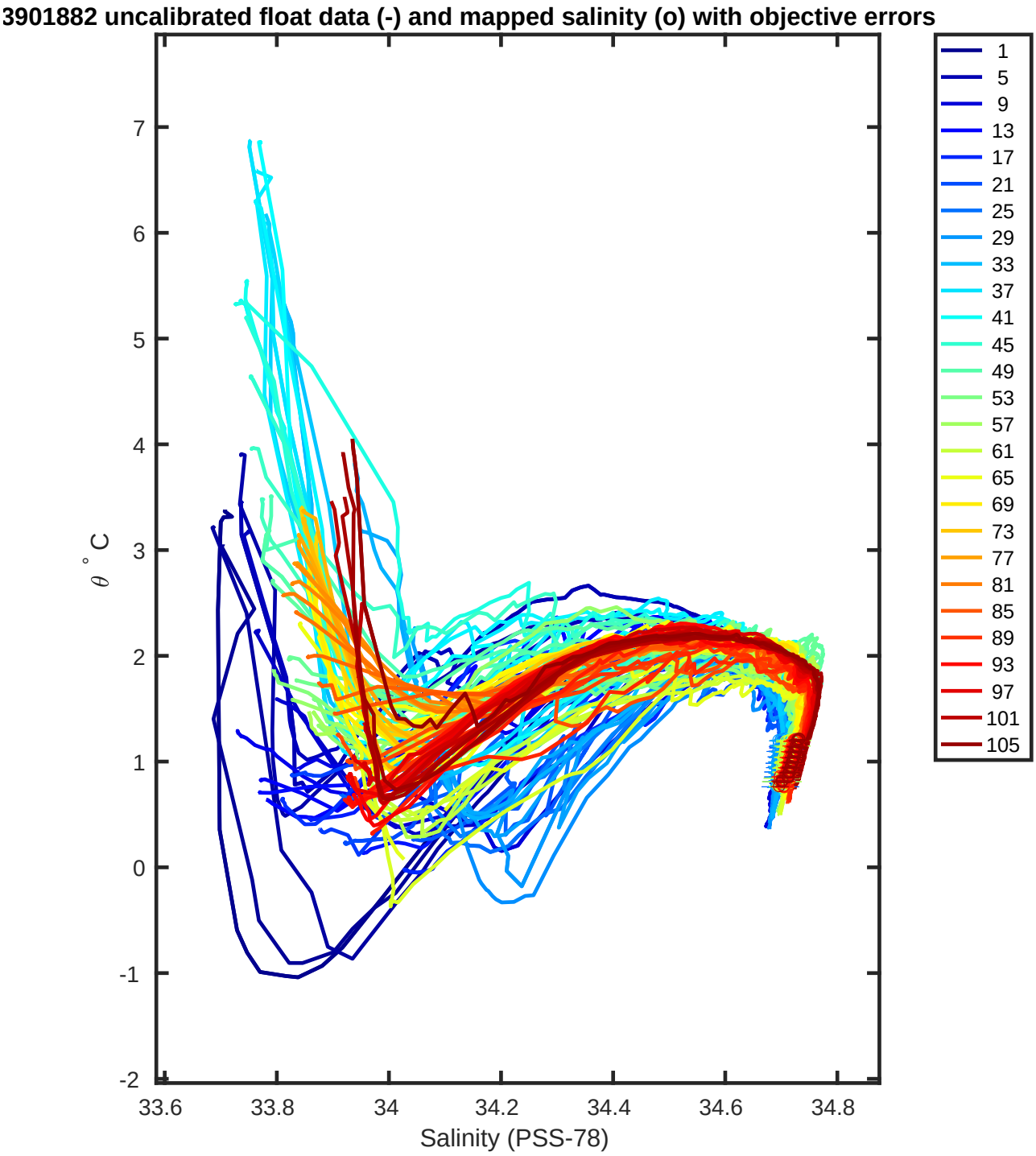

Figure 16: Float 3901882. Plots the original float salinity and the objectively estimated reference salinity at the 10 float theta levels that are used in calibration.

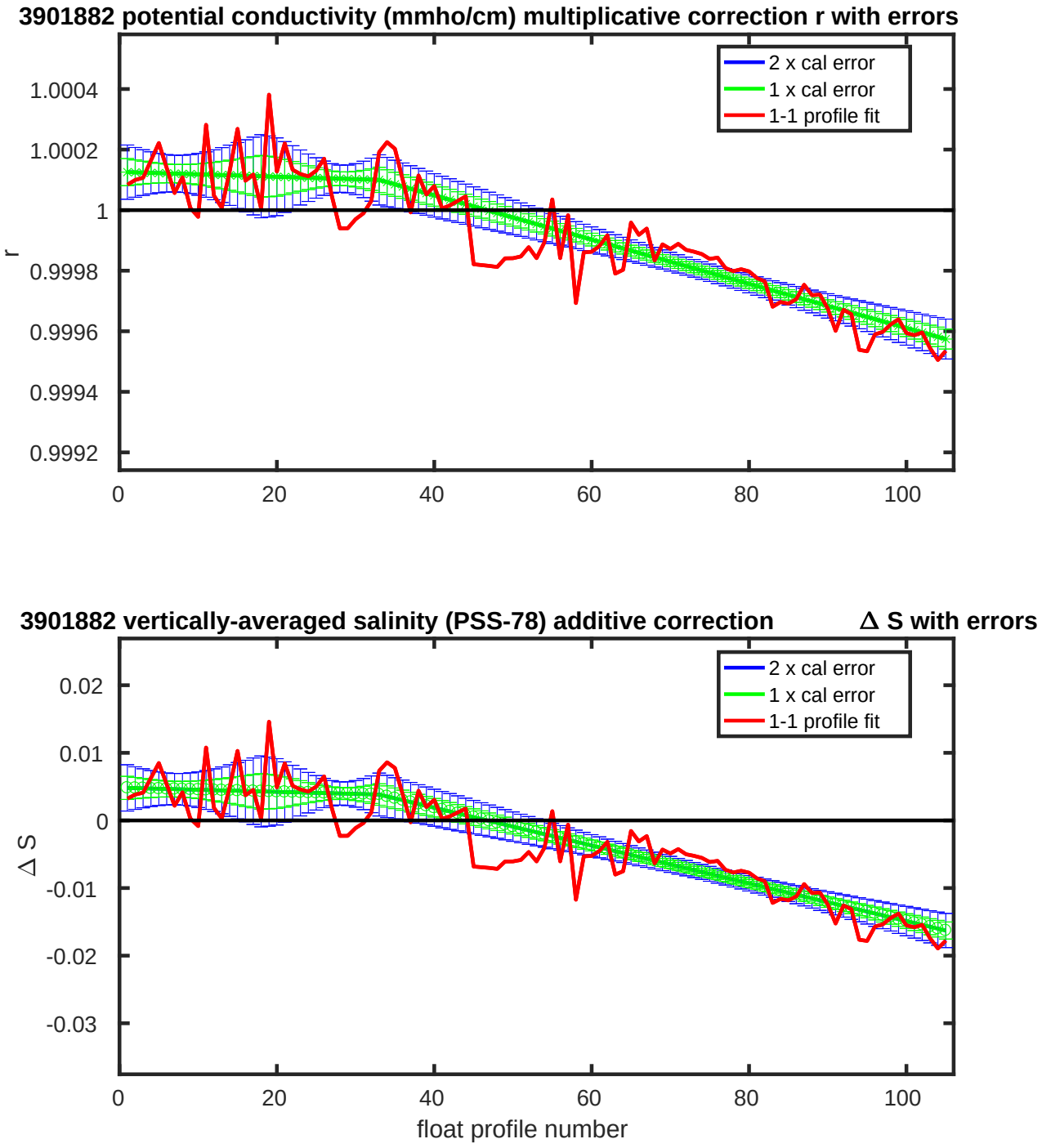

Figure 17: Float 3901882. Evolution of the suggested adjustment with time. The top panel plots the potential conductivity multiplicative adjustment. The bottom panel plots the equivalent salinity additive adjustment. The red line denotes one-to-one profile fit that uses the vertically weighted mean of each profile. The red line can be used to check for anomalous profiles relative to the optimal fit.

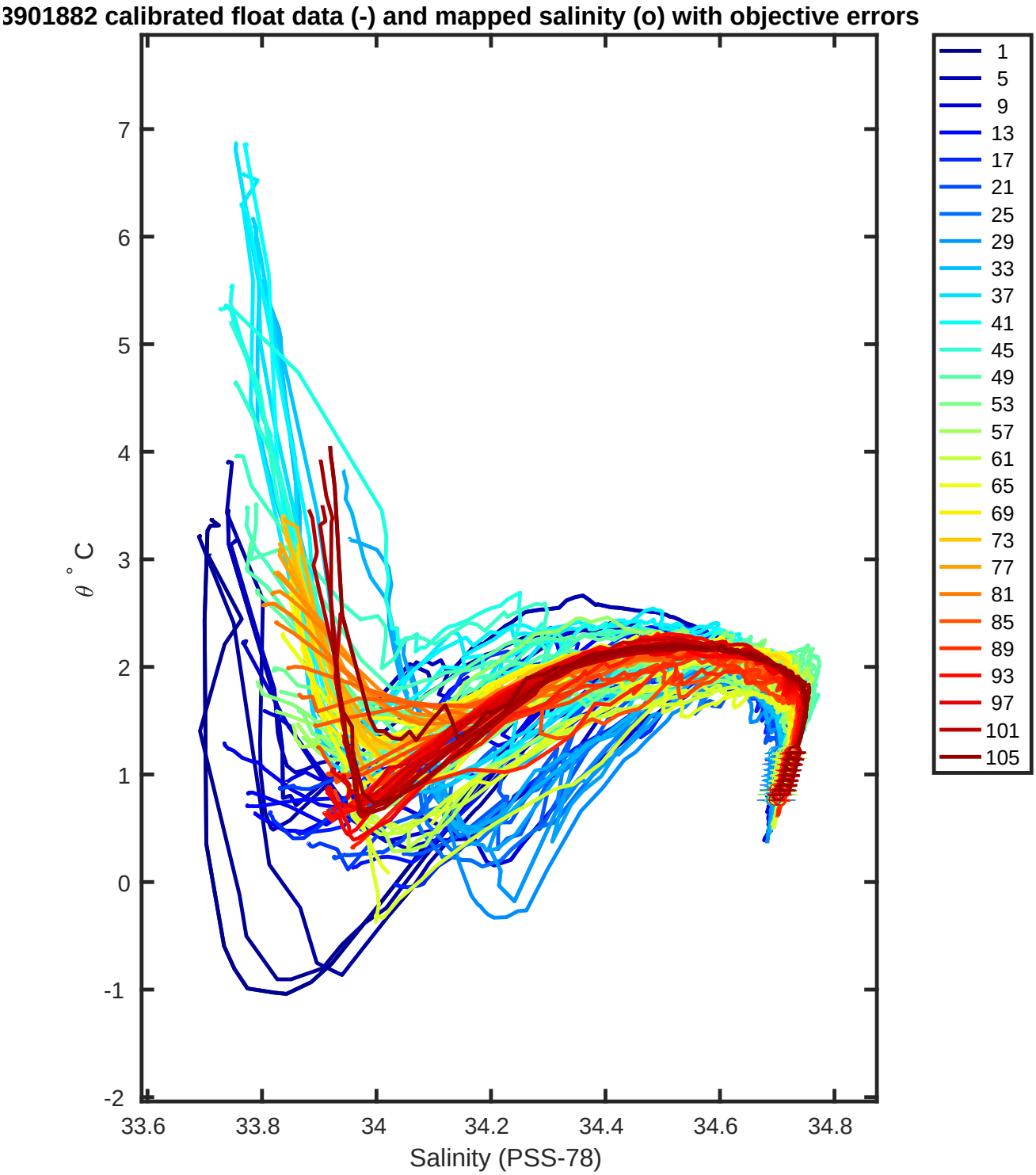

Figure 18: Float 3901882. Plots of calibrated float salinity and the objectively estimated reference salinity at the 10 float theta levels that are used in calibration.

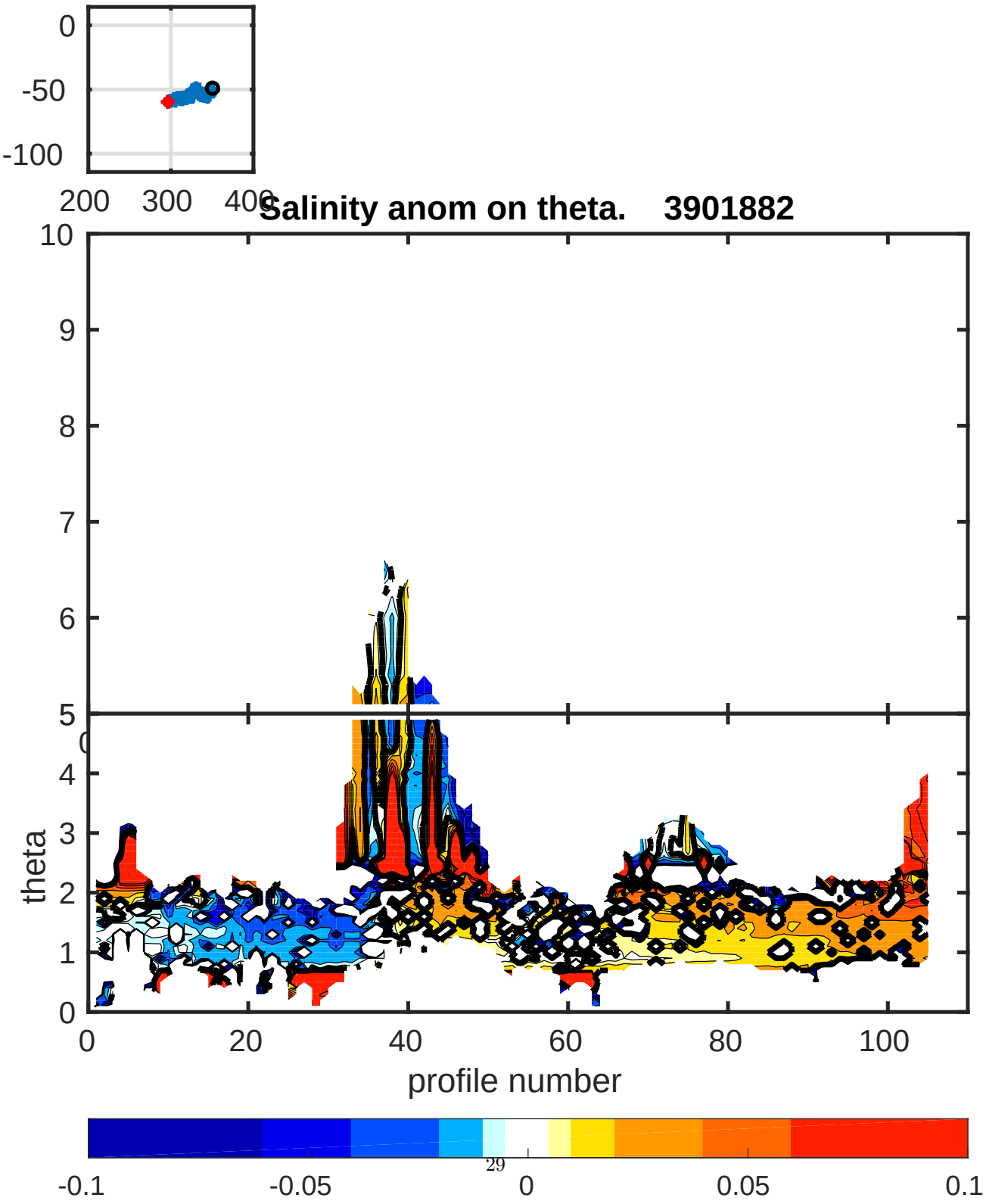

Figure 19: Float 3901882. Salinity anomaly on theta levels.

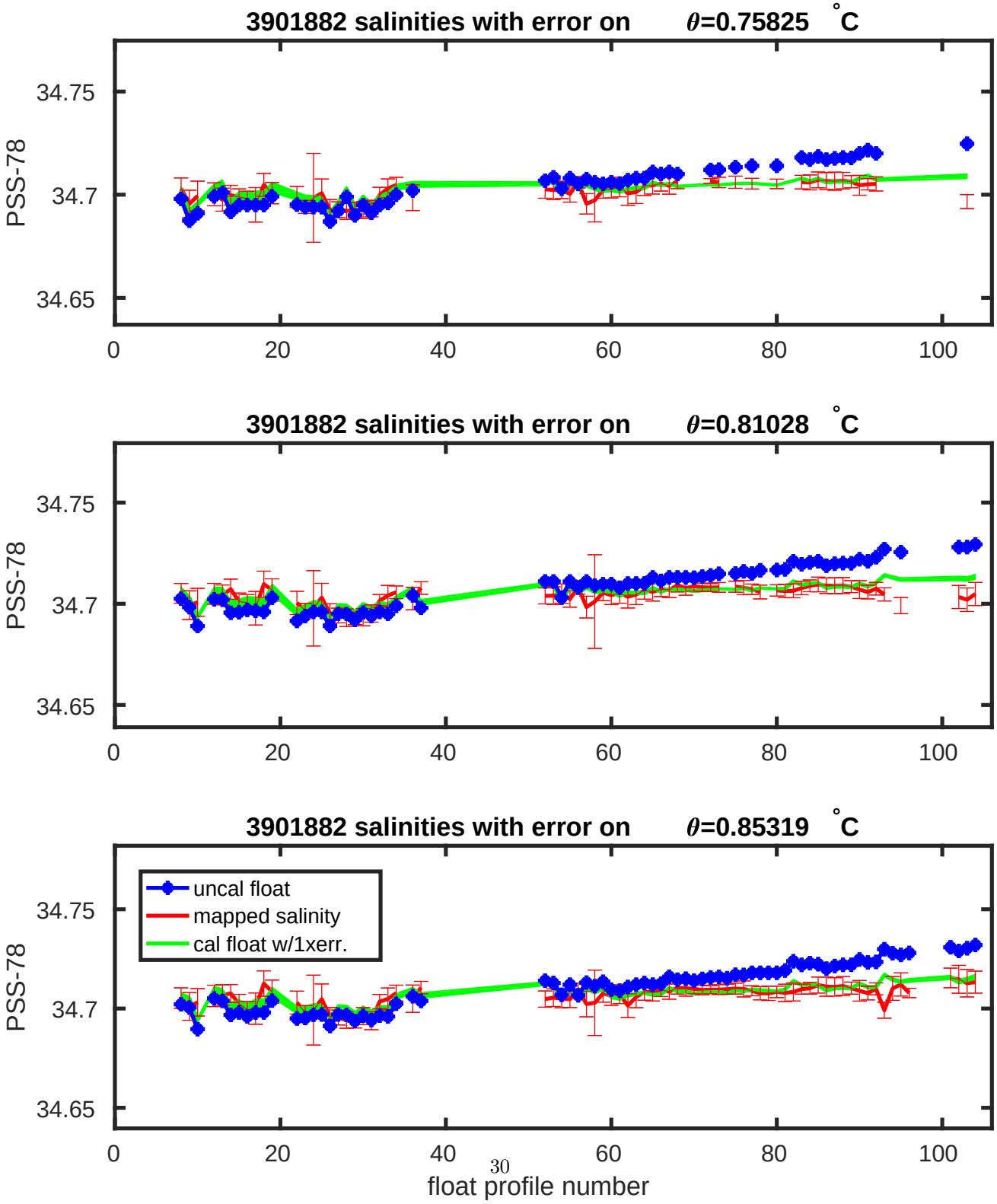

Figure 20: Float 3901882. Plots of the evolution of salinity with time along with selected theta levels with minimum salinity variance.

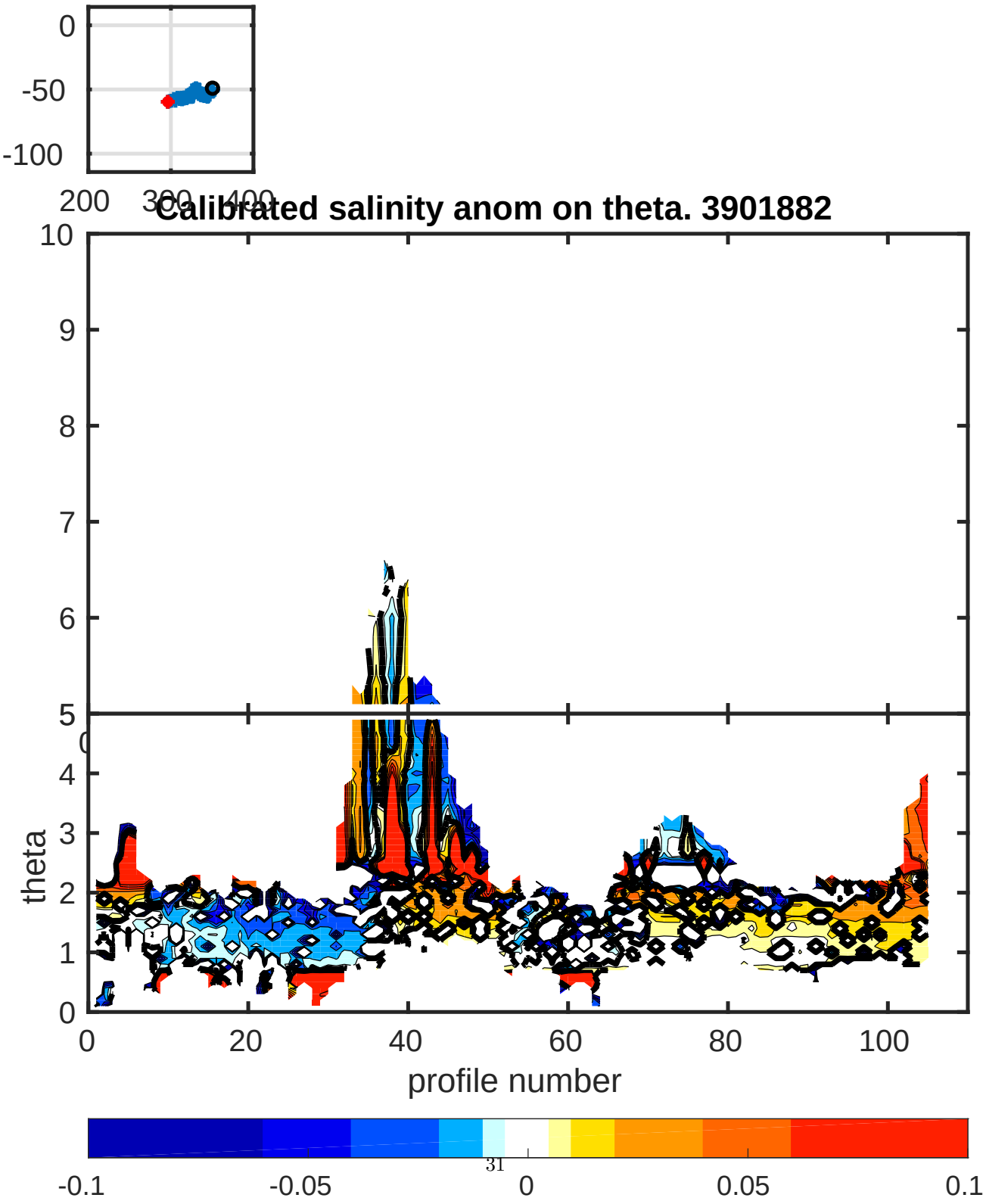

Figure 21: Float 3901882. Calibrated salinity anomaly on theta levels.

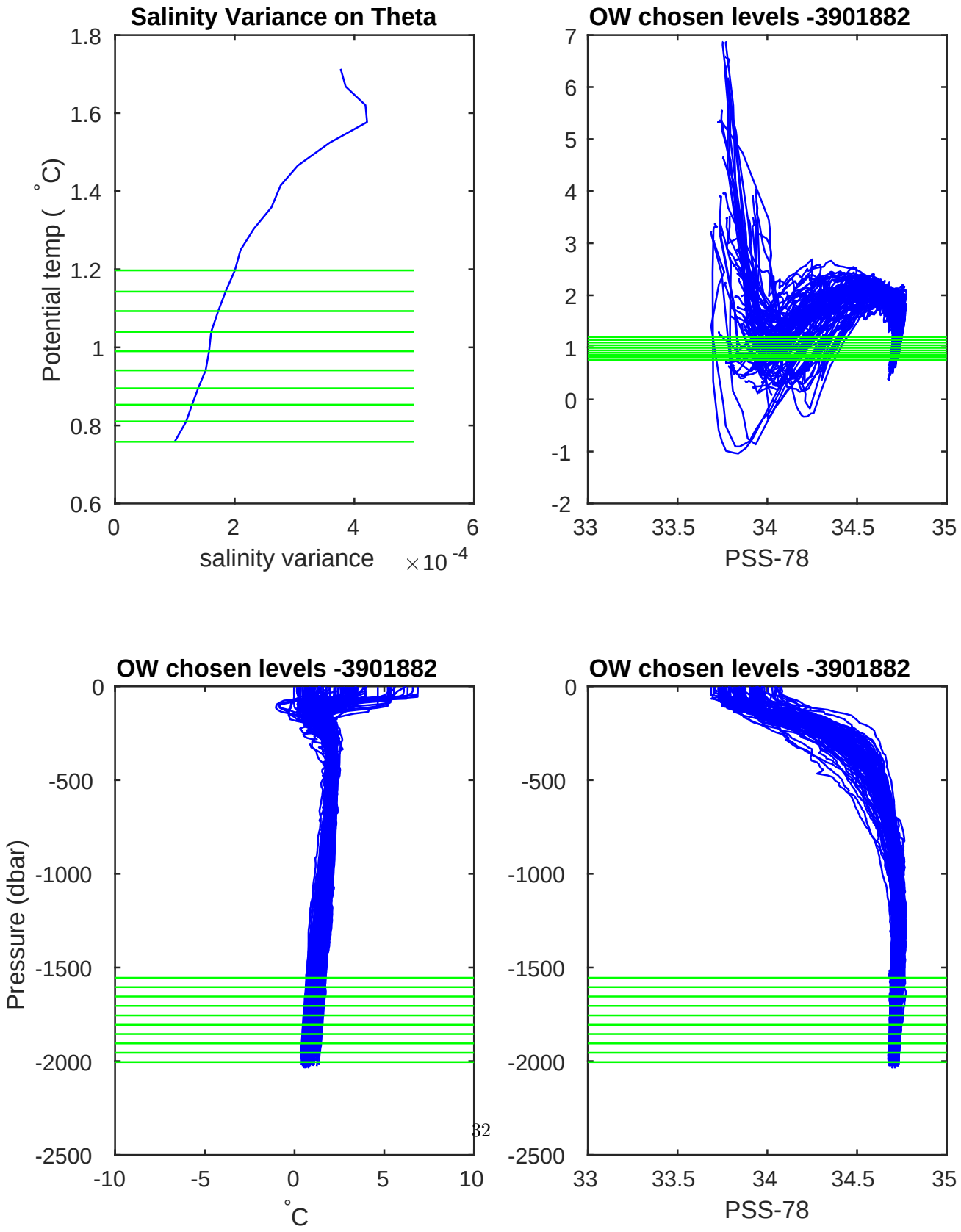

Figure 22: Float 3901882. SPlots including the theta levels chosen for calibration: Top left: Salinity variance at theta levels. Top right: T/S diagram of all profiles of Argo float. Bottom left: potential temperature plotted against pressure. Bottom right: salinity plotted against pressure.

3.3 Summary and Conclusions

The comparison of Argo float to the CTD reference data within 10 ˚of longitude and latitude showed a drift of Argo float data toward higher salinities. The comparison between SLA and DHA-Real from the satellite altimeter data reflect a small offset that can be better visible from around cycle 65. The Argo float was separately compared to the CTD and Argo referenced data and in set calseries the theta levels were changed for deeper than 1000 m. For the profiles from 1 to 45 float behaved well and no corrections is required. Both outputs from OWC using CTD and Argo reference data showed a drift of the float from around cycle 65, QC=1, error =0.01. The OWC corrections was applied for the cycles from 65 to 105. Float has been reported to the gray list with QC=3.

4 Final Checks

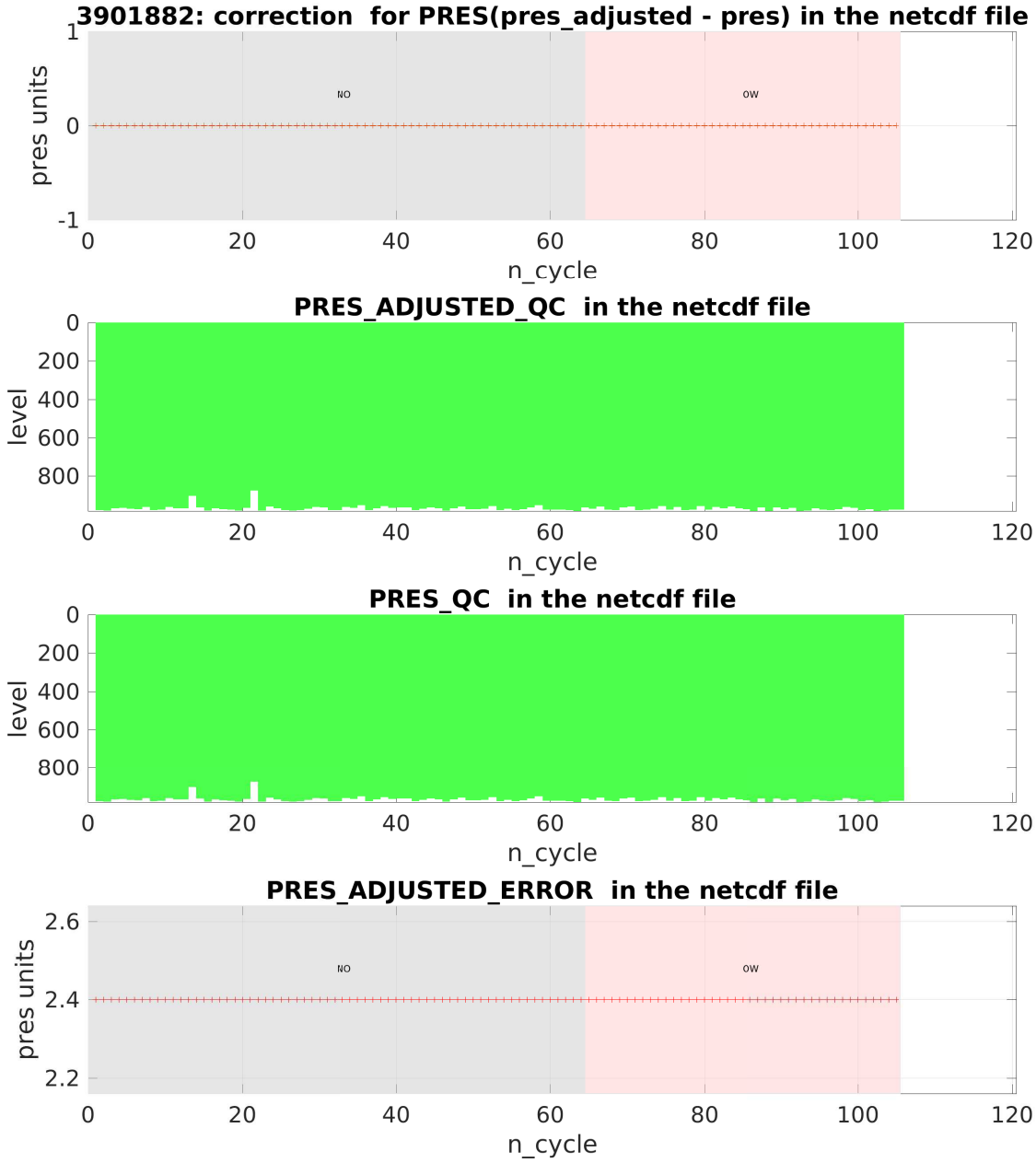

Figure 23: Float 3901882. Time series of applied pressure corrections.

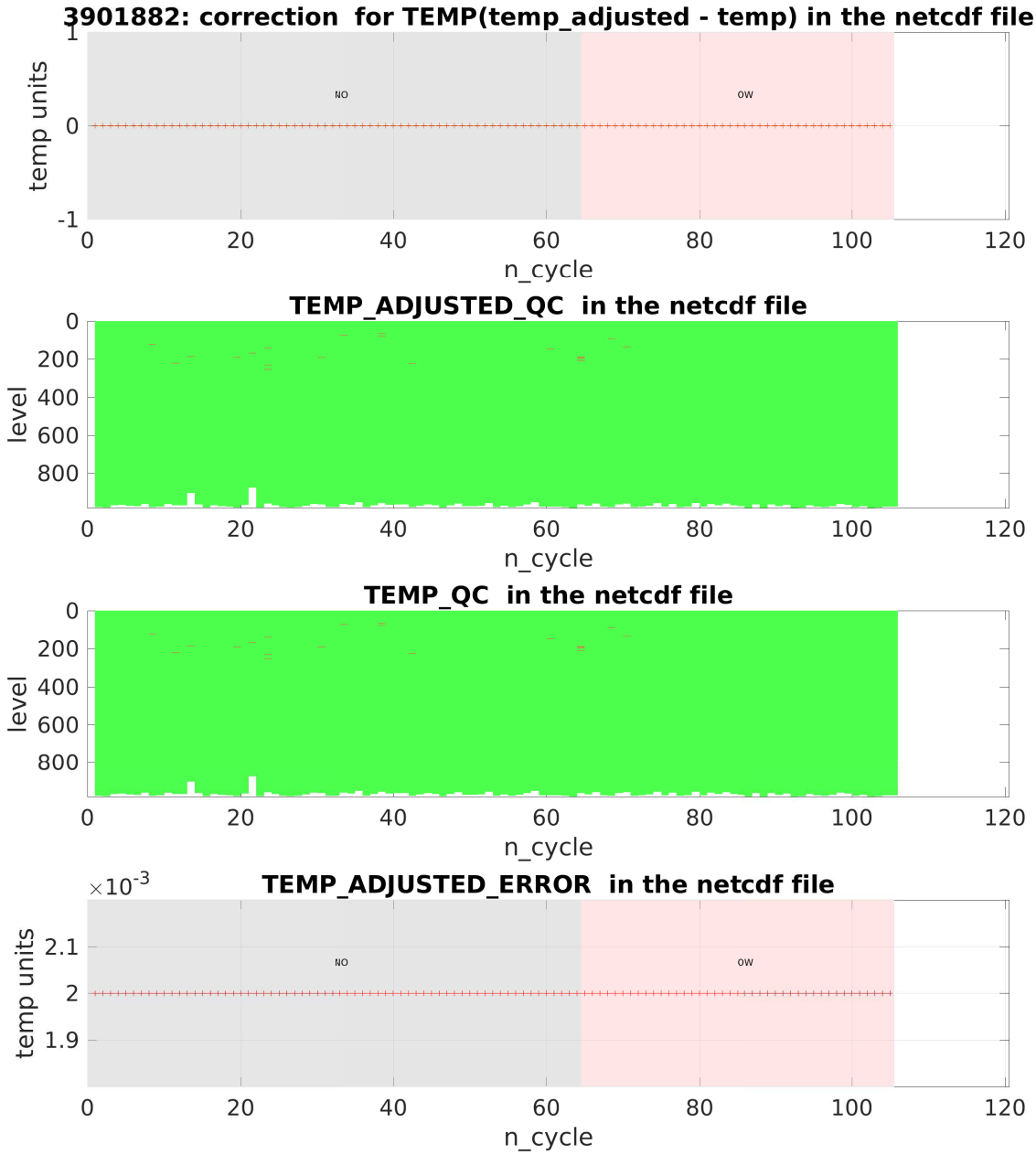

Figure 24: Float 3901882. Time series of applied temperature corrections.

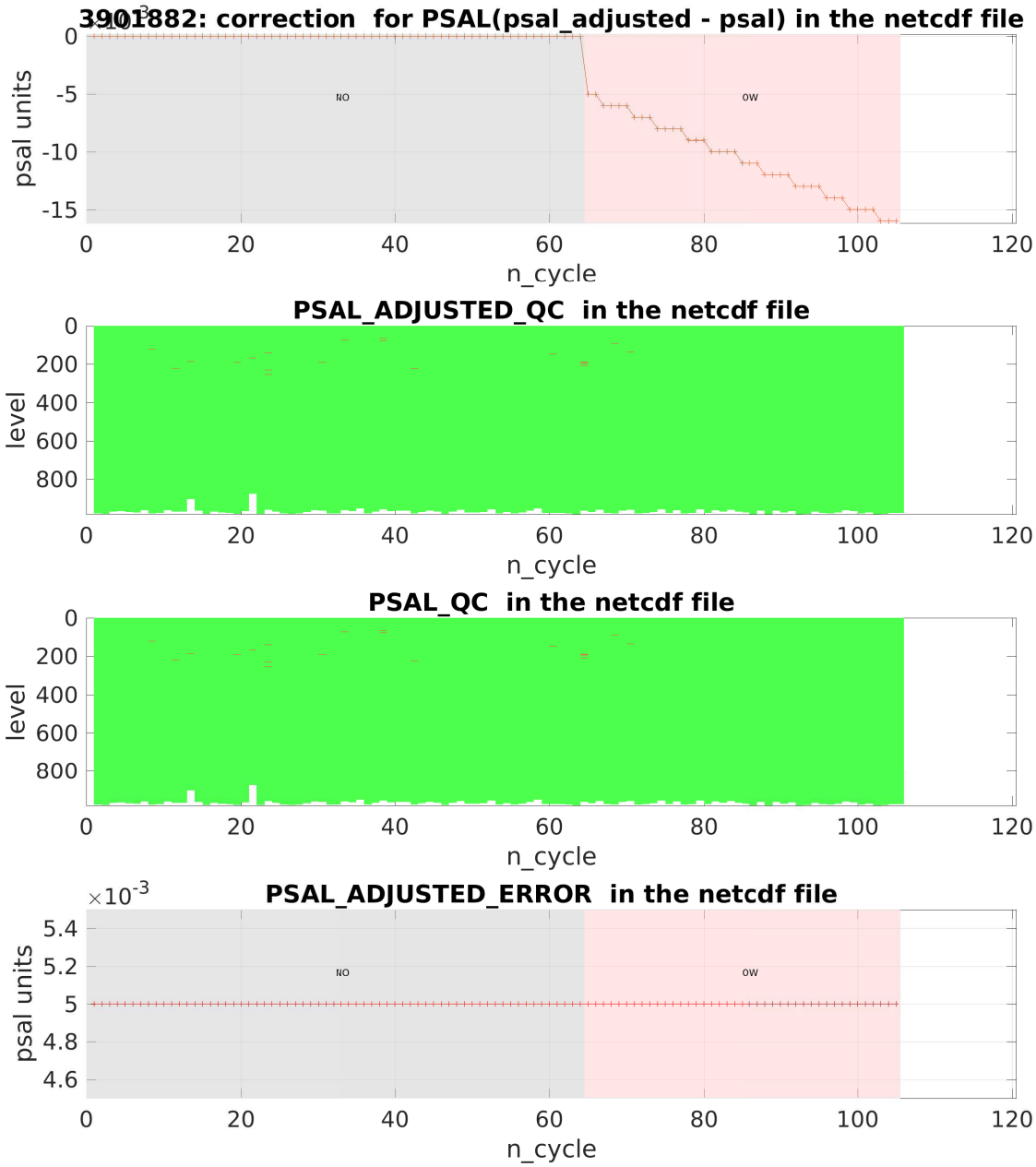

Figure 25: Float 3901882. Time series of applied salinity corrections.

5 References