Delayed mode quality control of MOCCA Argo float 3901883

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Summary

The assessed error of salinity for cycles 1-72 is 0.005; from cycle 73 to 109 there has been detected a strong salinity, the QC of these data is 4;

WMO number	DM correction
3901883	Drift detected

Table 1: Correction applied in delayed mode.

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1 Introduction

Delayed mode analysis was performed for float number 360623i (3901883) 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/or a salinity drift. For more information about float 360623i (3901883) click on the following link: http://www.ifremer.fr/argoMonitoring/float/3901883

2 Quality Check of Argo Float Data

2.1 Time Series of Vertical Distribution of Data

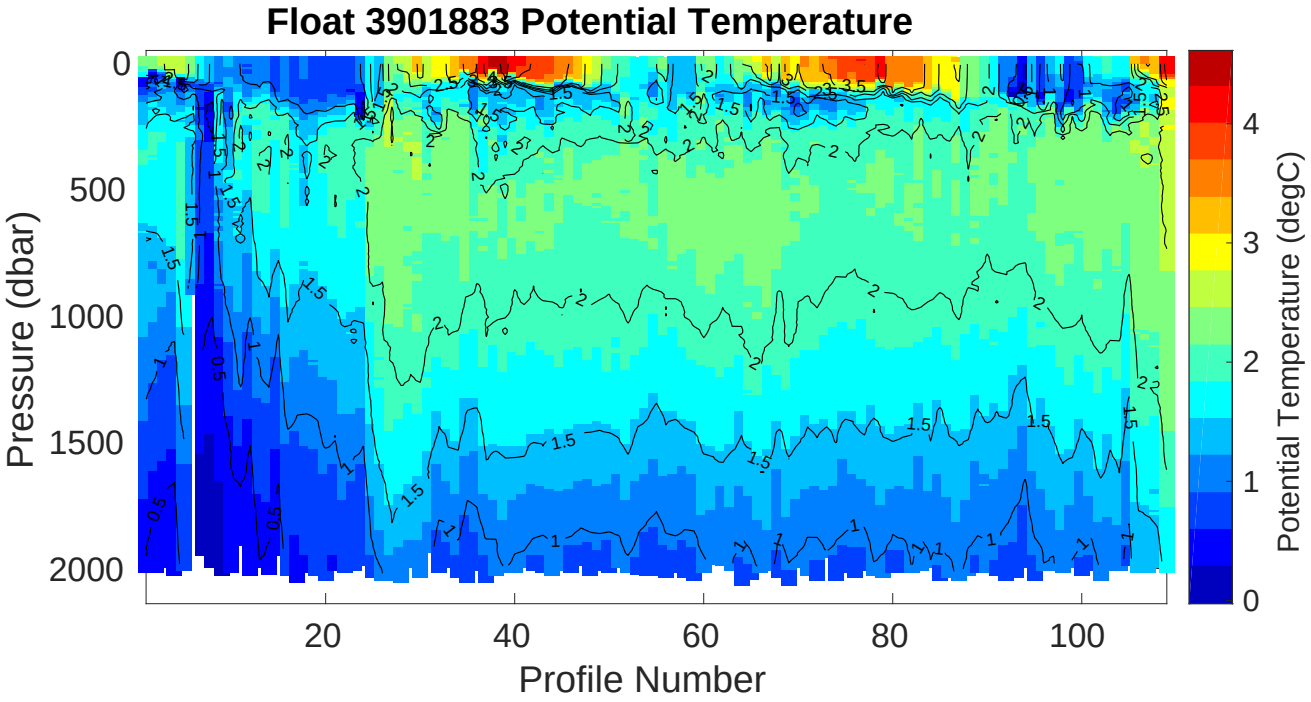

Figure 1: Float 3901883. Time series of the vertical distribution of potential temperature (°C).

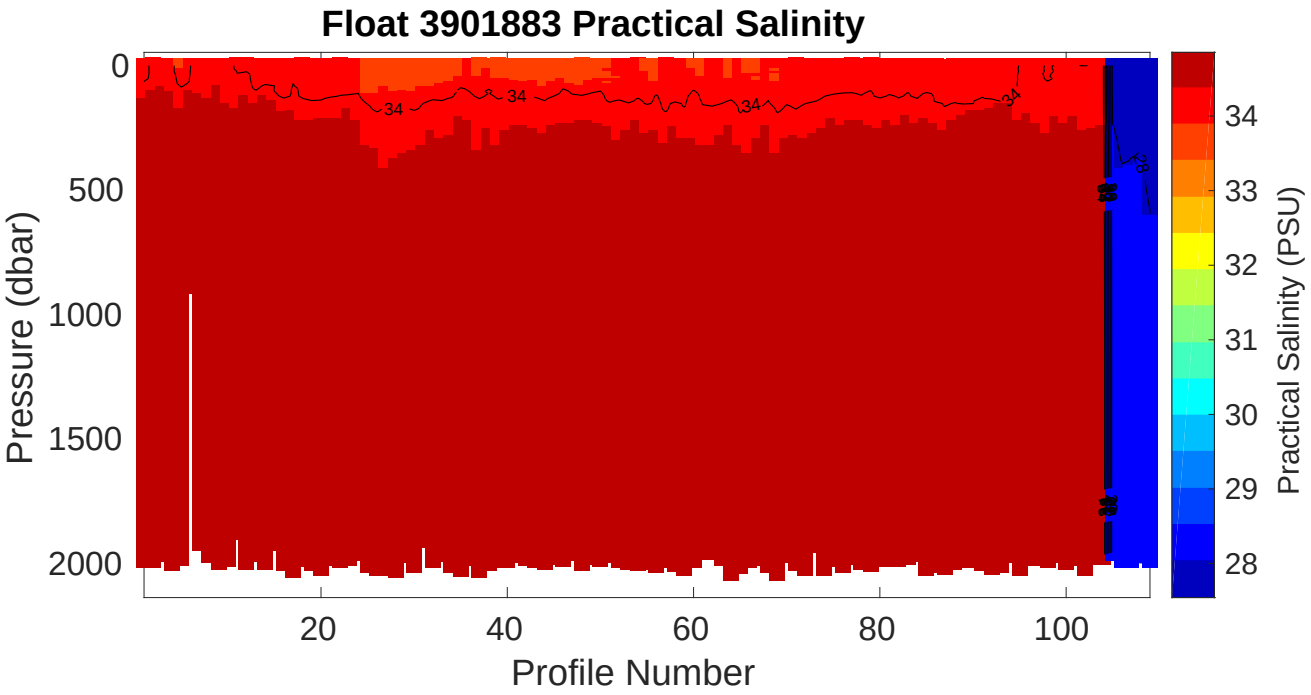

Figure 2: Float 3901883. Time series of the vertical distribution of practical salinity (PSU).

2.2 Comparison between Argo Float and Climatology

The comparison between float 3901883 and data from WMO boxes +/- 10°of latitude and longitude shows that the Argo profiles fit within the expected ranges (Figures 3, 4 and 5). This result confirms that float 3901883 represents relatively stable and consistent with the expected physical conditions in this region.

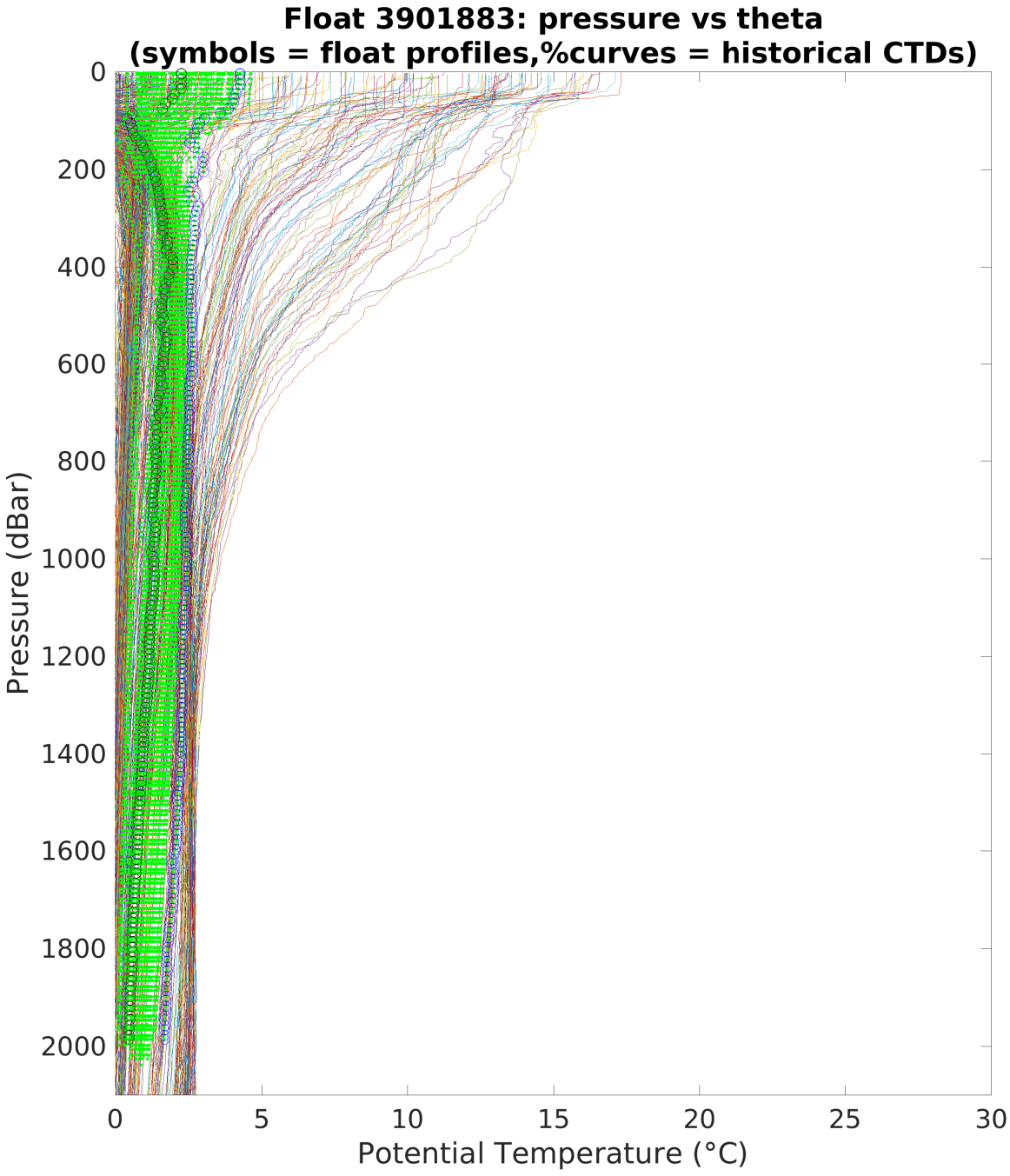

Figure 3: Float 3901883. Float profile of potential temperature (˚C) plotted with climatology from the spatial range of 10 ˚. The black and blue cycles indicates the first and the last Argo profile, respectively. Green symbols represent other Argo profiles.

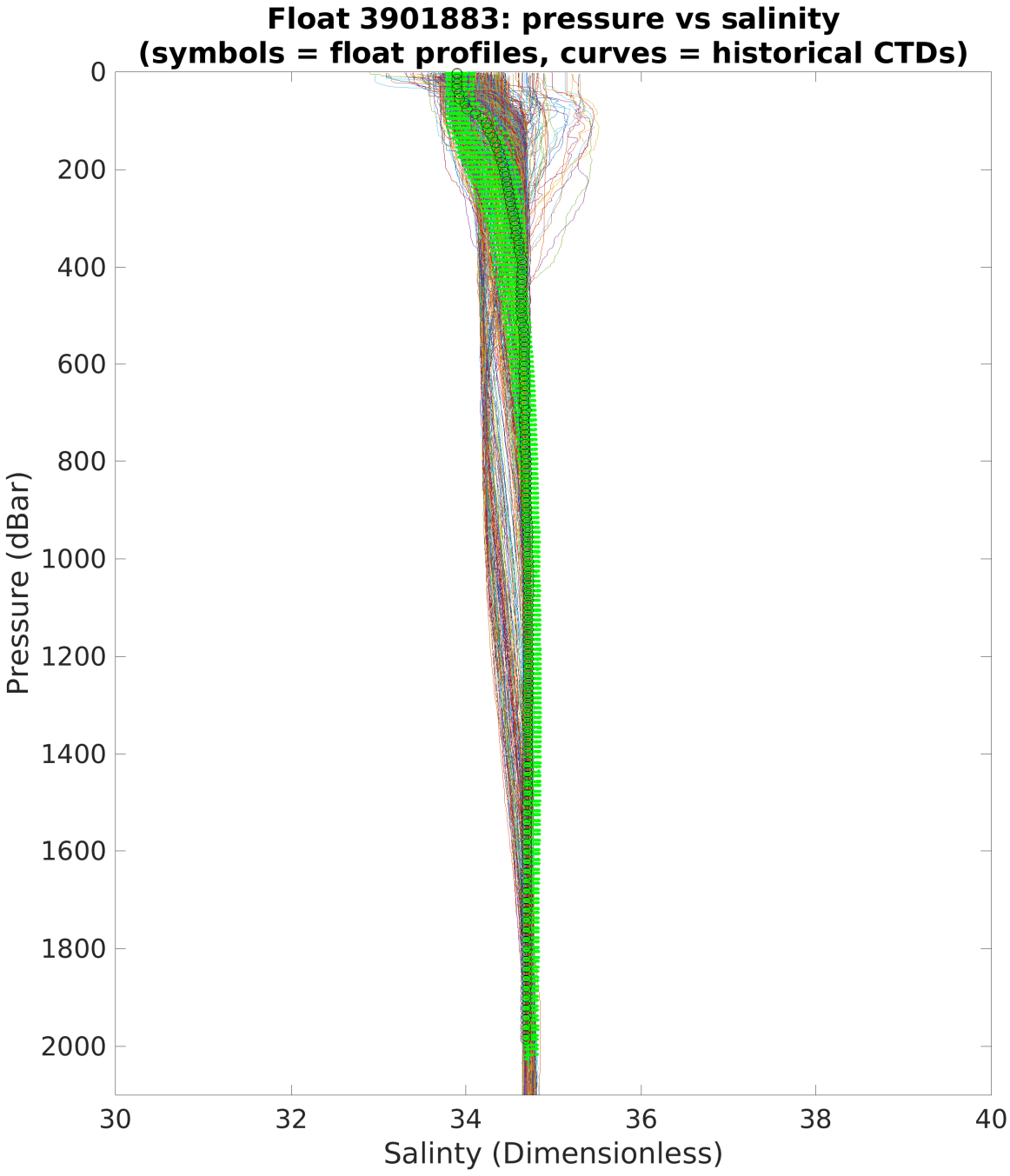

Figure 4: Float 3901883. Float profile of salinity (dimensionless) plotted with climatology from the spatial range of 10 ˚. The black and blue cycles indicates the first and the last Argo profile, respectively. Green symbols represent other Argo profiles.

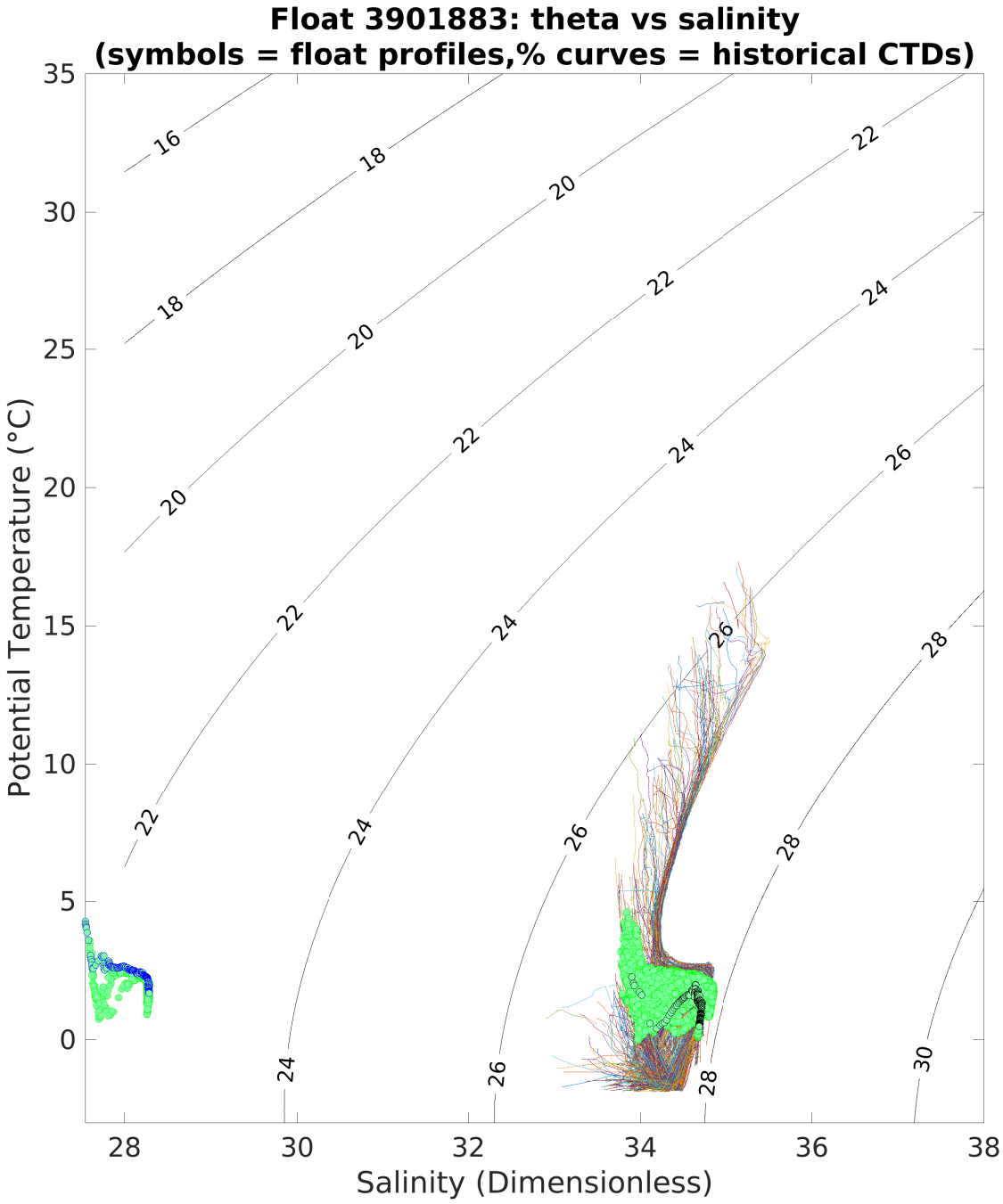

Figure 5: Float 3901883. Theta/S plotted with climatology from the spatial range of 10 °. The black and blue cycles indicates the first and the last Argo profile, respectively. Green symbols represent other Argo profiles.

2.3 Satellite Altimeter comparison

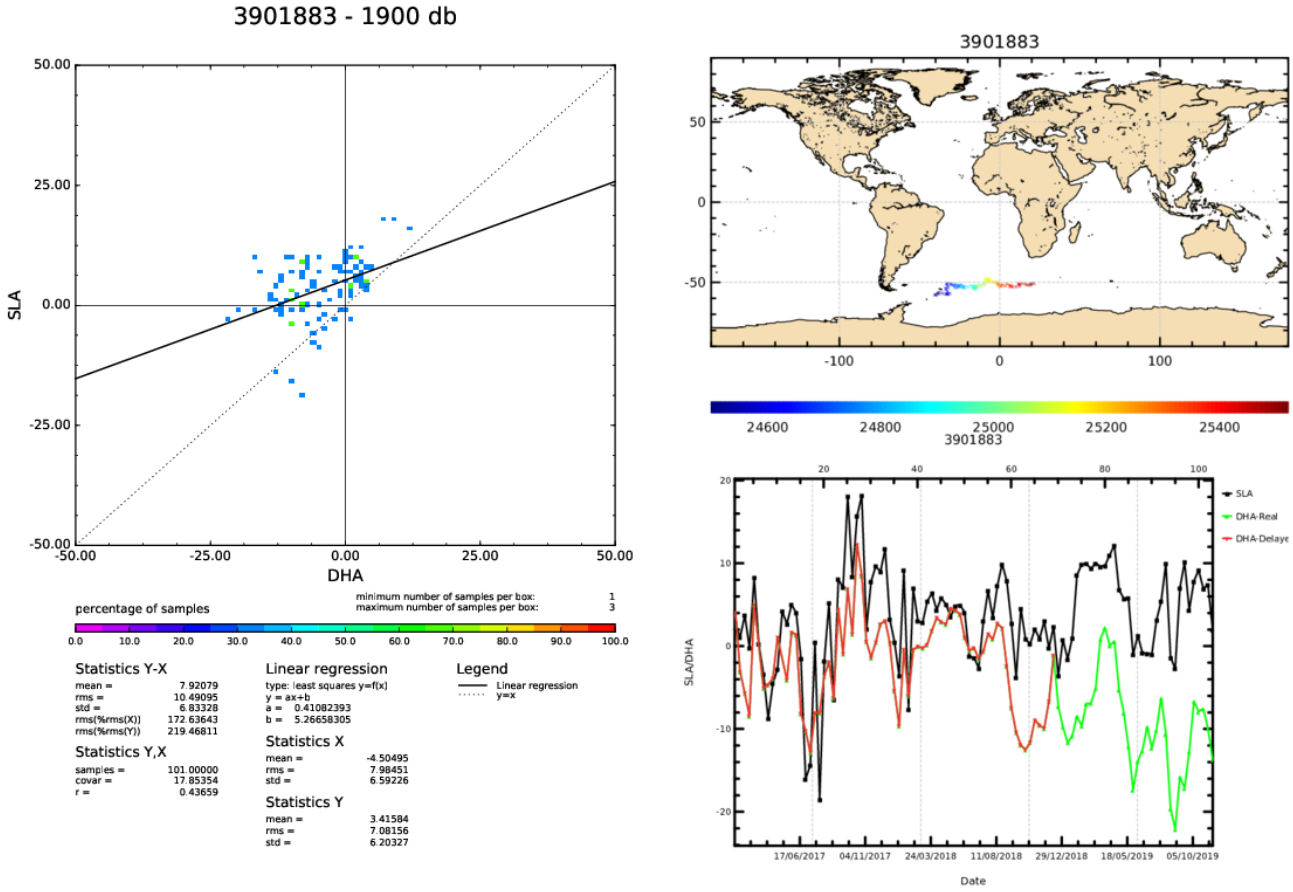

Figure 6: Float 3901883. The comparison betweeen the Sea Surface Height(SSH) from the satellite altimetry and Dynamic Height Anomaly(DHA)extracted from the Argo float temperature and salinity data

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

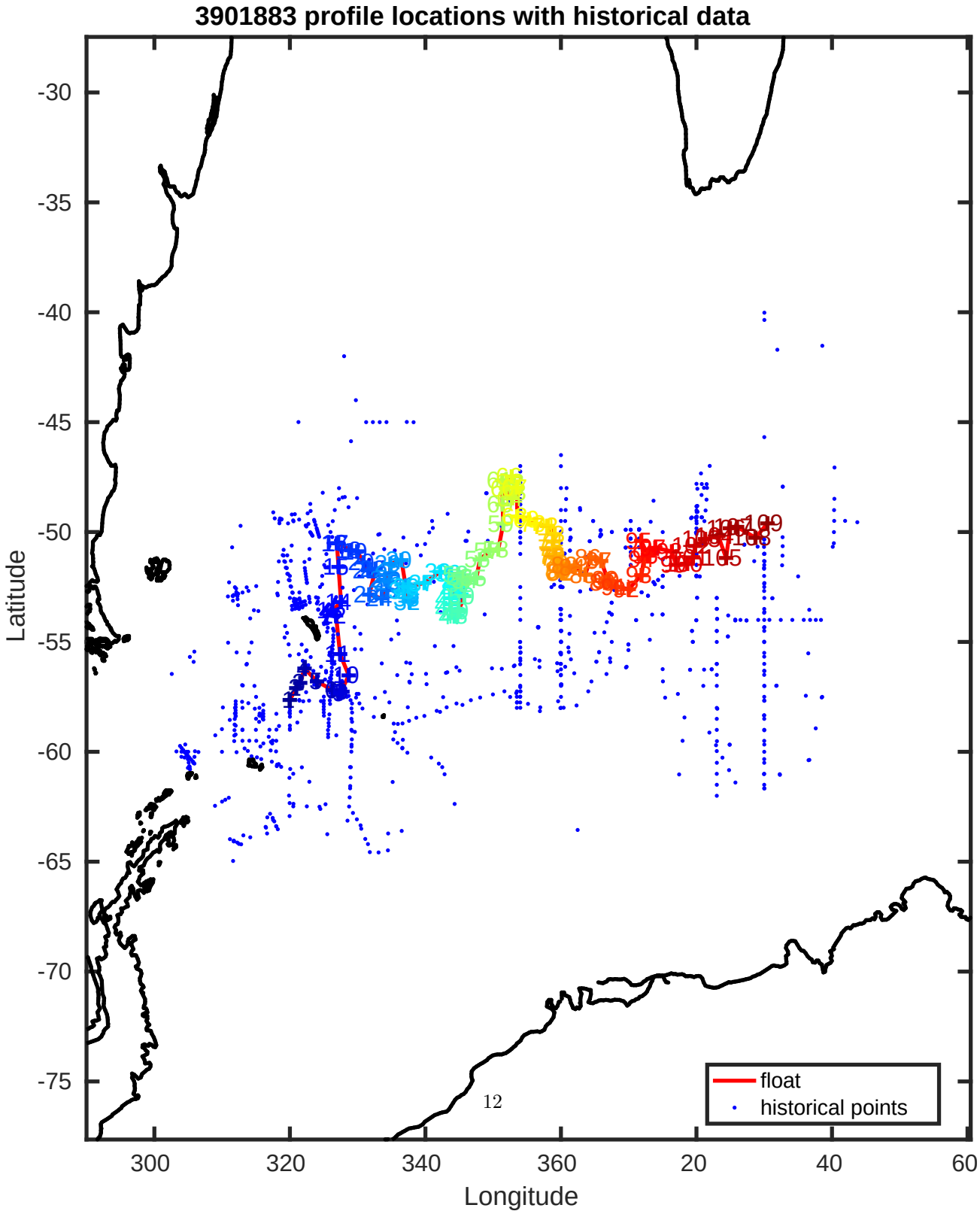

Figure 7: Float 3901883. Trajectory of the float with historical CTD data. The black contours indicate the bathymetry at 0, 200, 1000 and 2000 m.

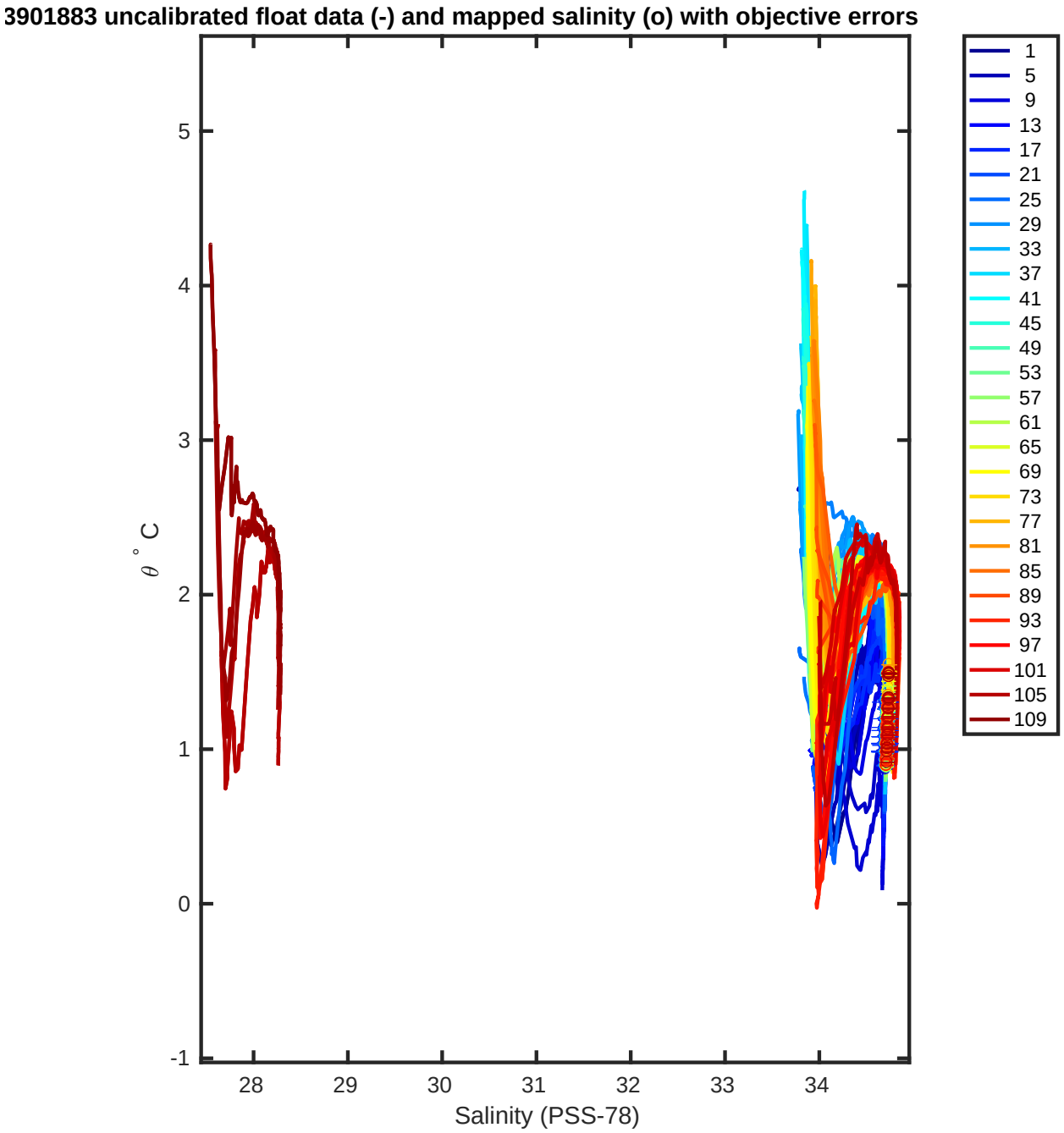

Figure 8: Float 3901883. Uncalibrated float data and mapped salinity.

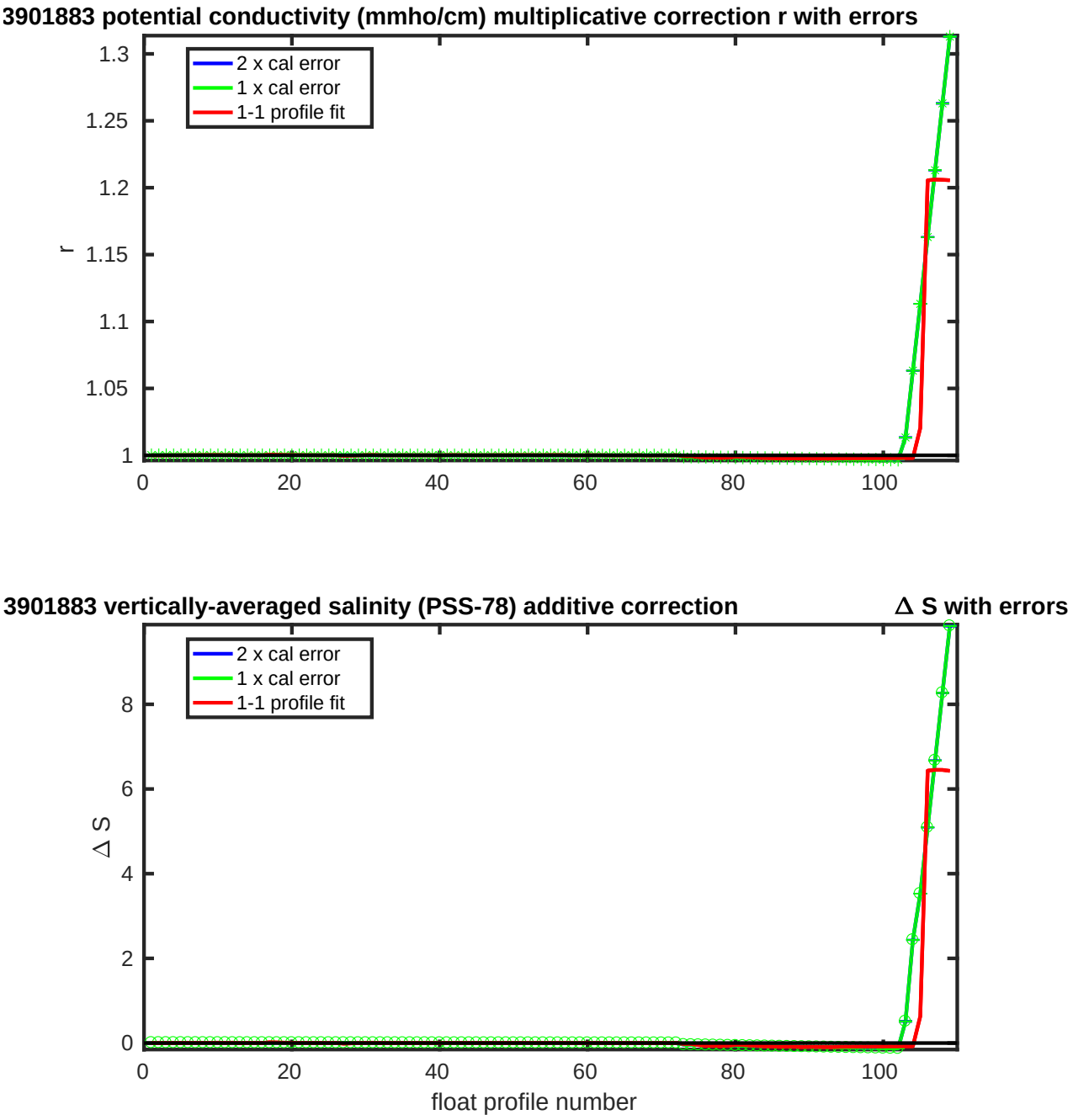

Figure 9: Float 3901883. Potential conductivity (top) and vertically averaged salinity (bottom) with errors.

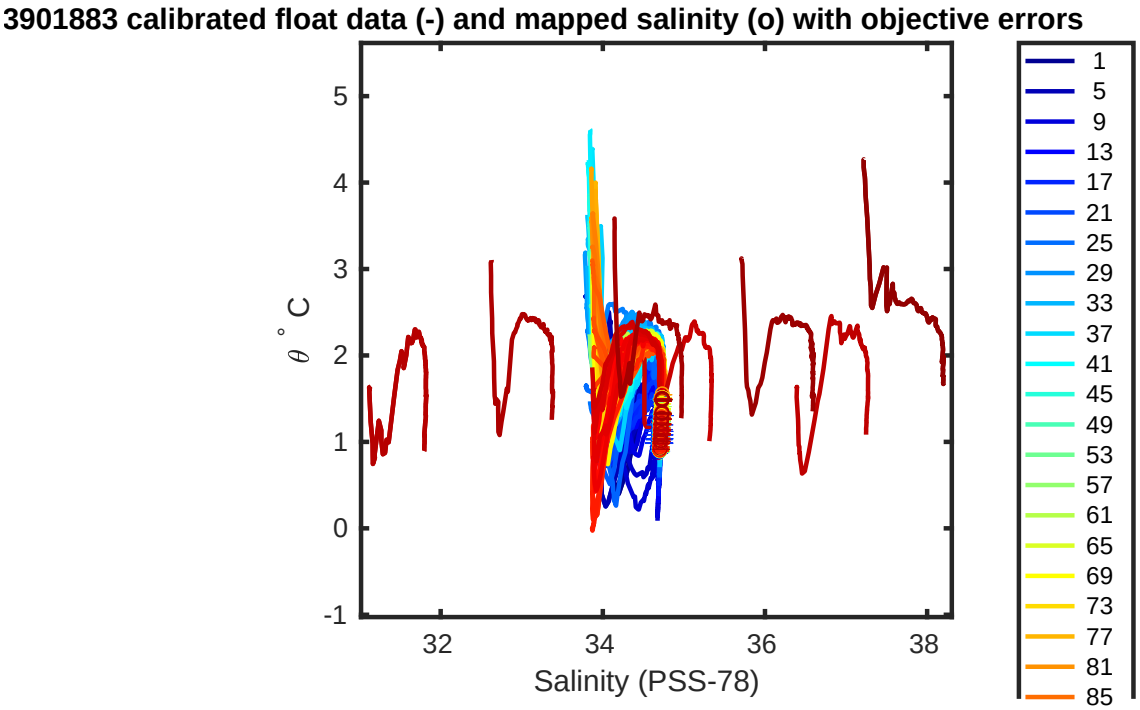

Figure 10: Float 3901883. Calibrated float data and mapped salinity.

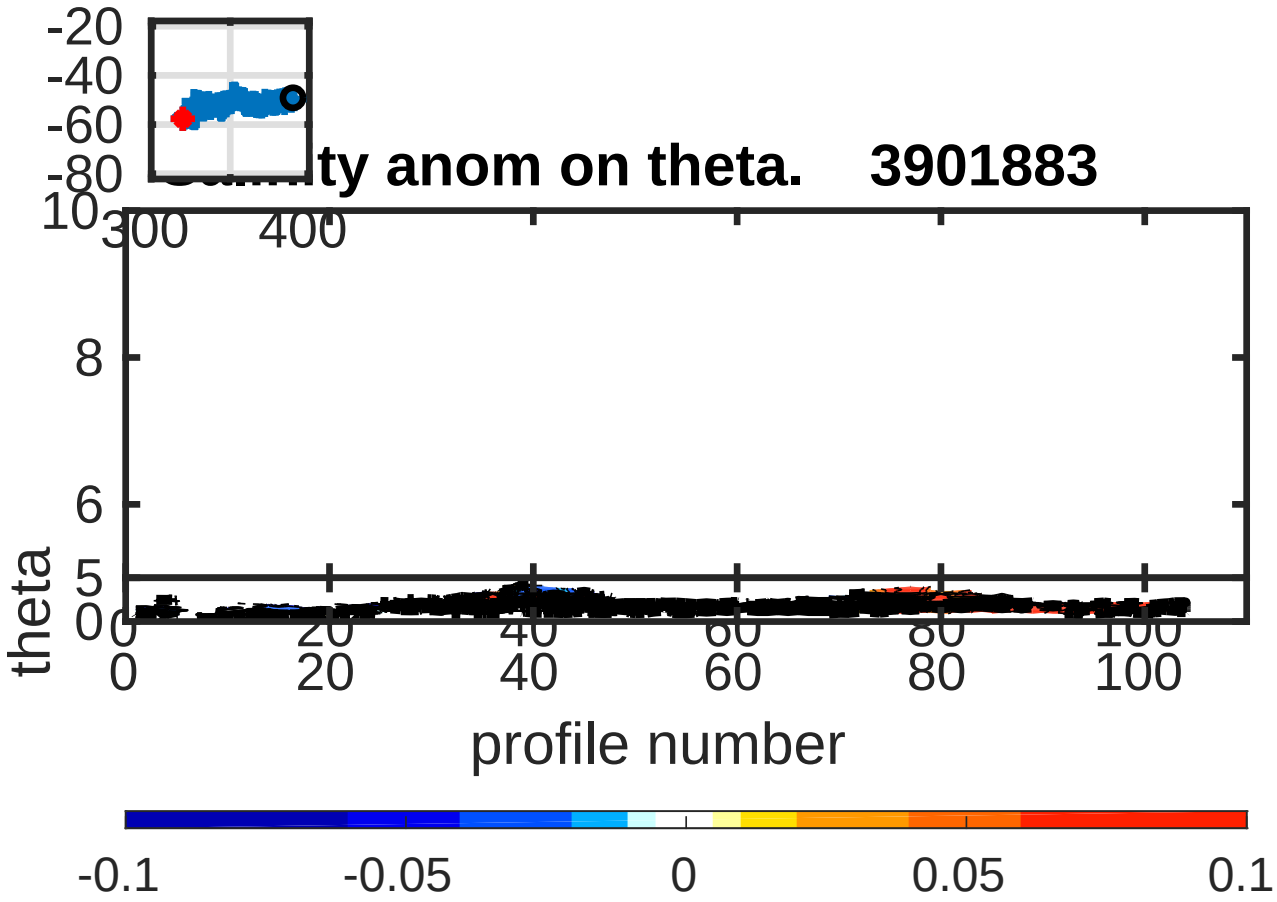

Figure 11: Float 3901883. Salinity anomaly on θ levels.

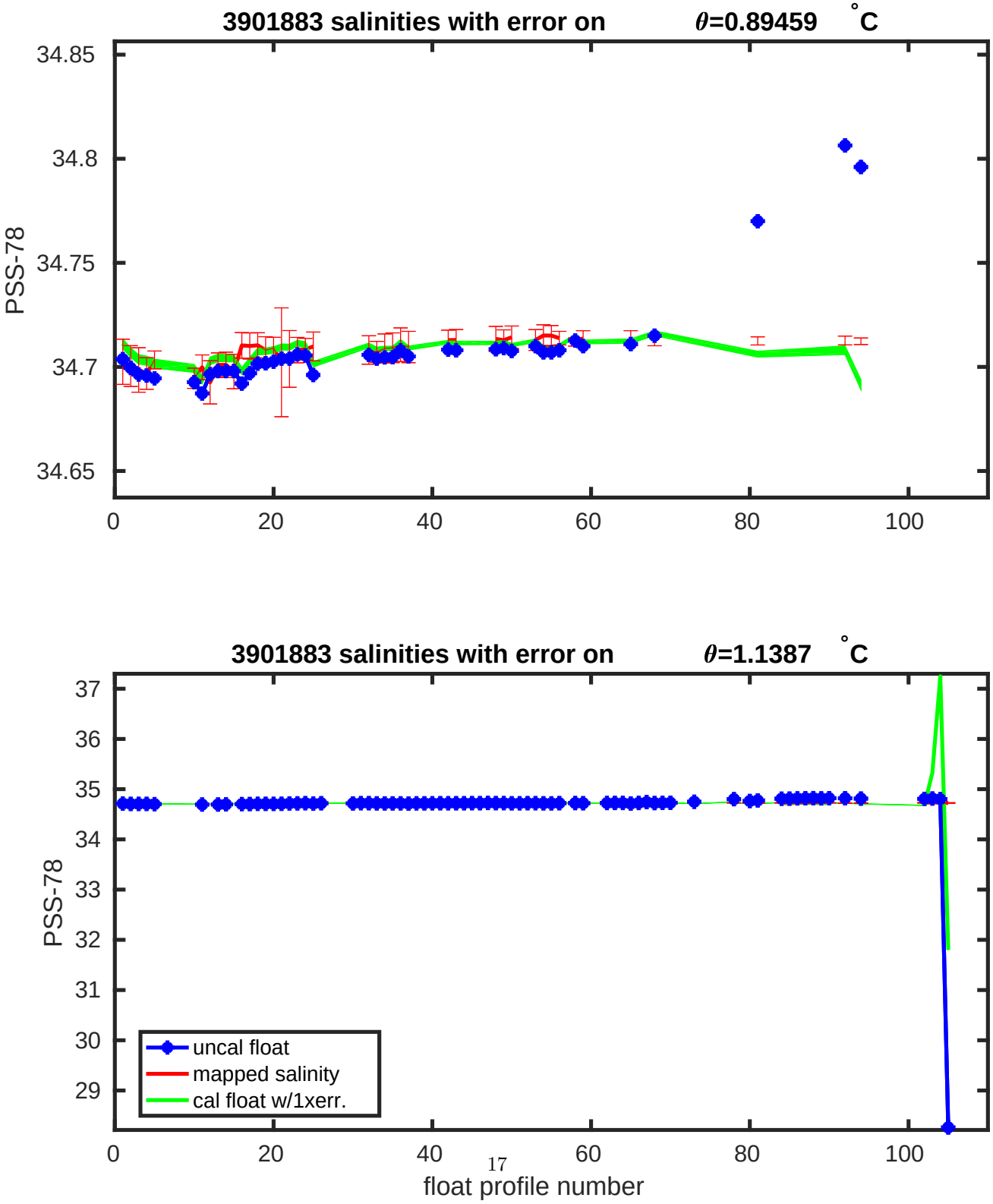

Figure 12: Float 3901883. Salinities with errors on θ levels.

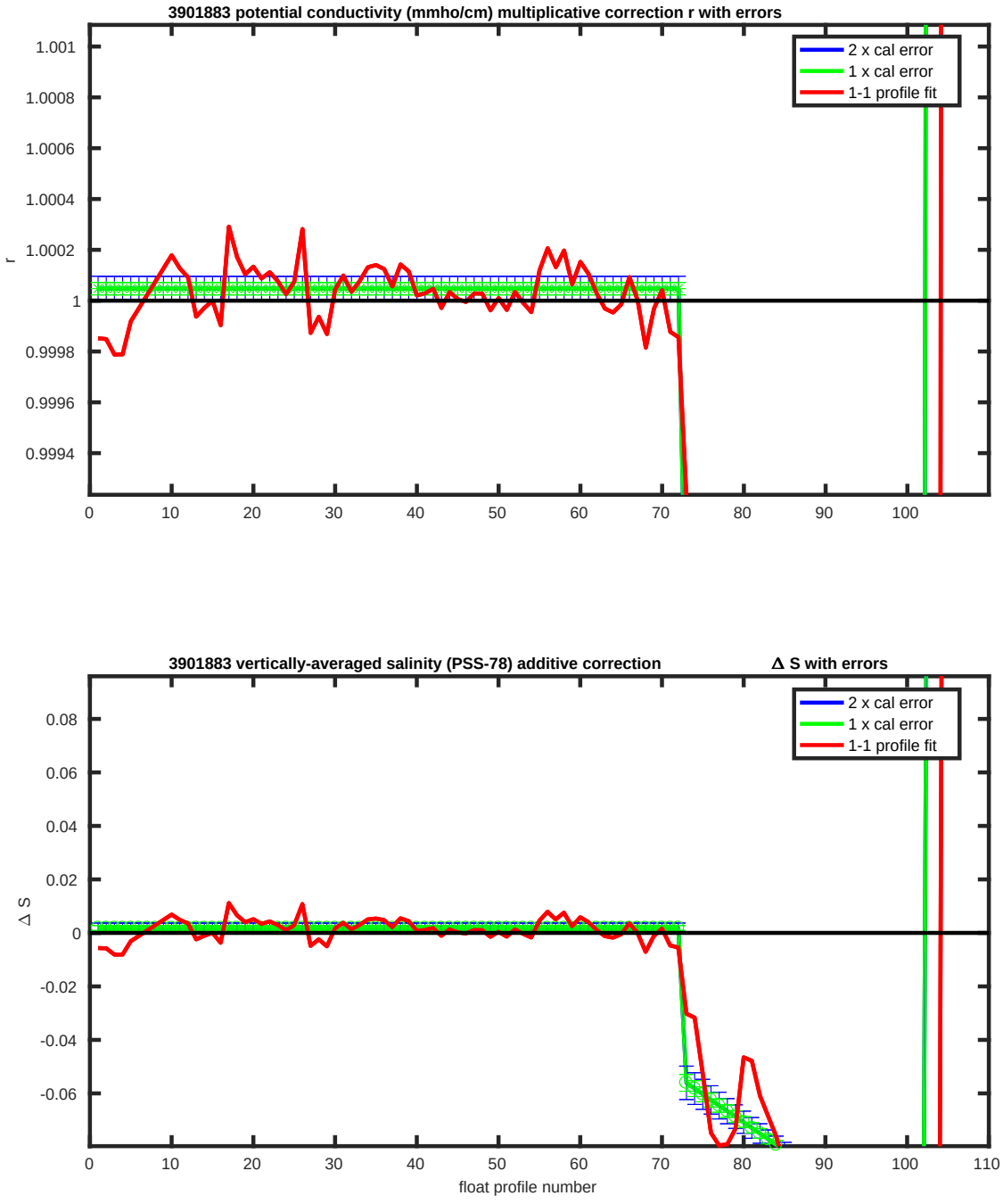

Figure 13: Float 3901883. Salinities with errors on θ levels with adjusted y axis

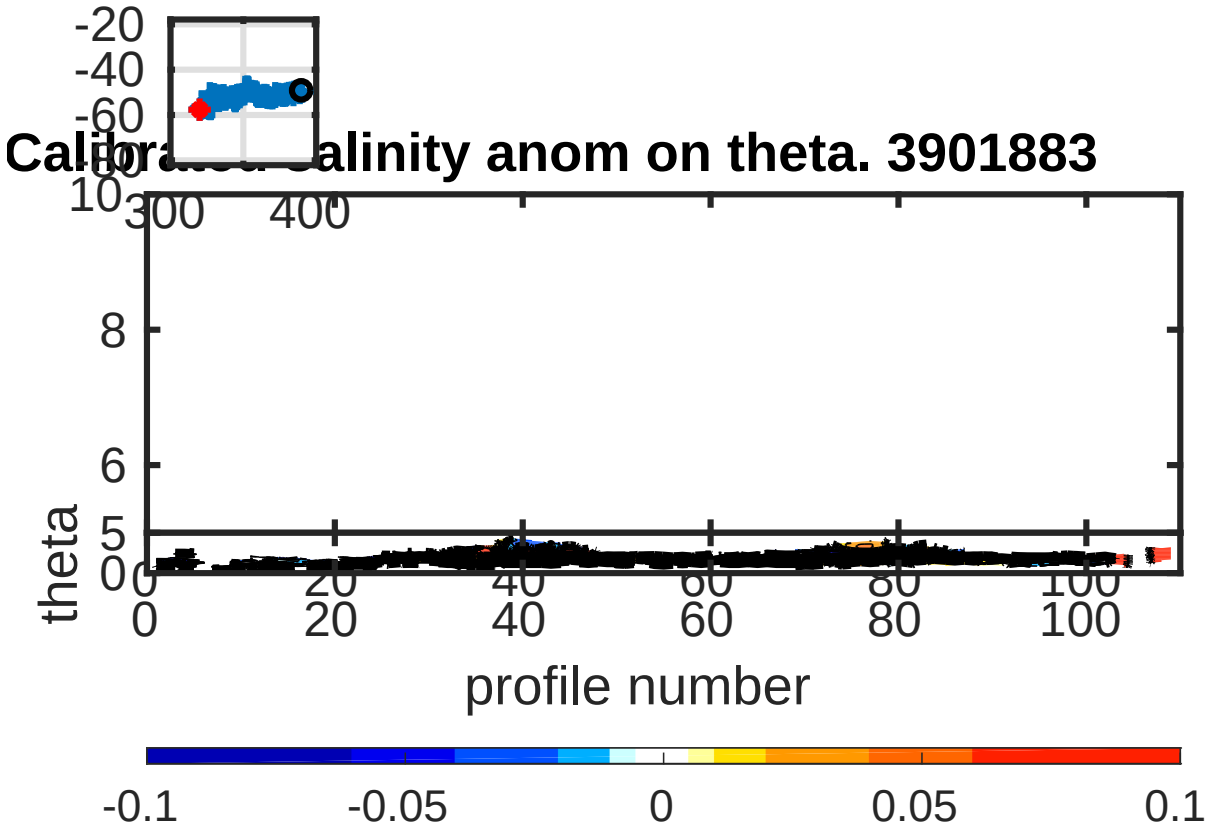

Figure 14: Float 3901883. Calibrated salinity anomaly on θ levels.

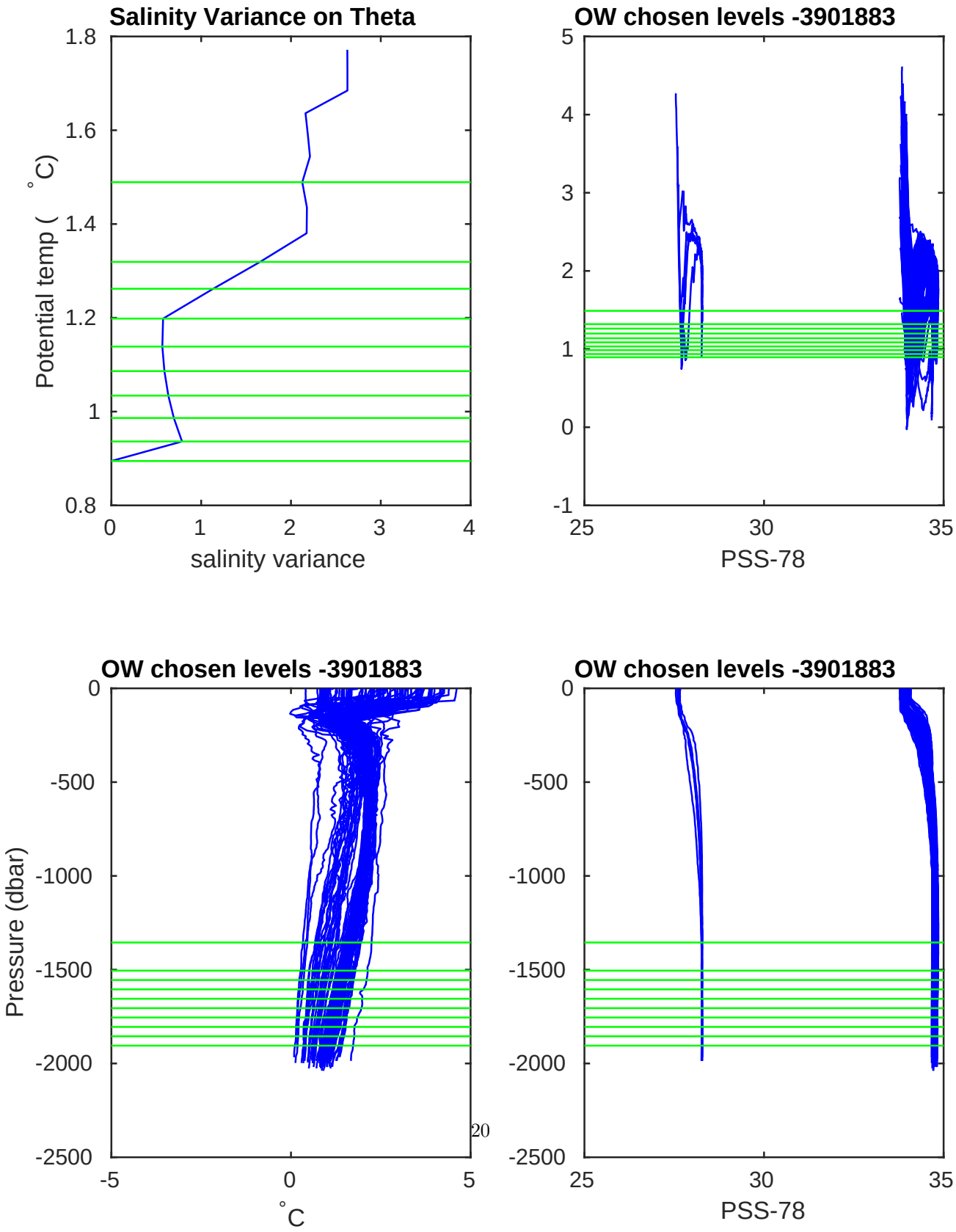

Figure 15: Float 3901883. Salinity, salinity variance on theta and OW chosen levels.

3.2 Comparison between Argo floats and Argo Climatlogy

3.2.1 Configuration

```
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%    Climatology Data Input Paths
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HISTORICAL_ARGO_PREFIX=/argo_profiles/ARGO_for_DMQC_2019V03/argo_

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FLOAT_SOURCE_POSTFIX=.mat

% ================================
%
%    Mapping Output Path
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FLOAT_MAPPED_PREFIX=map_
FLOAT_MAPPED_POSTFIX=.mat

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

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

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

```
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CONFIG_SAF=TypicalProfileAroundSAF.mat

% ================================
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MAPSCALE_LATITUDE_LARGE=4
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MAPSCALE_PHI_SMALL=0.02

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

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MAP_P_EXCLUDE=100

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

3.2.2 Results

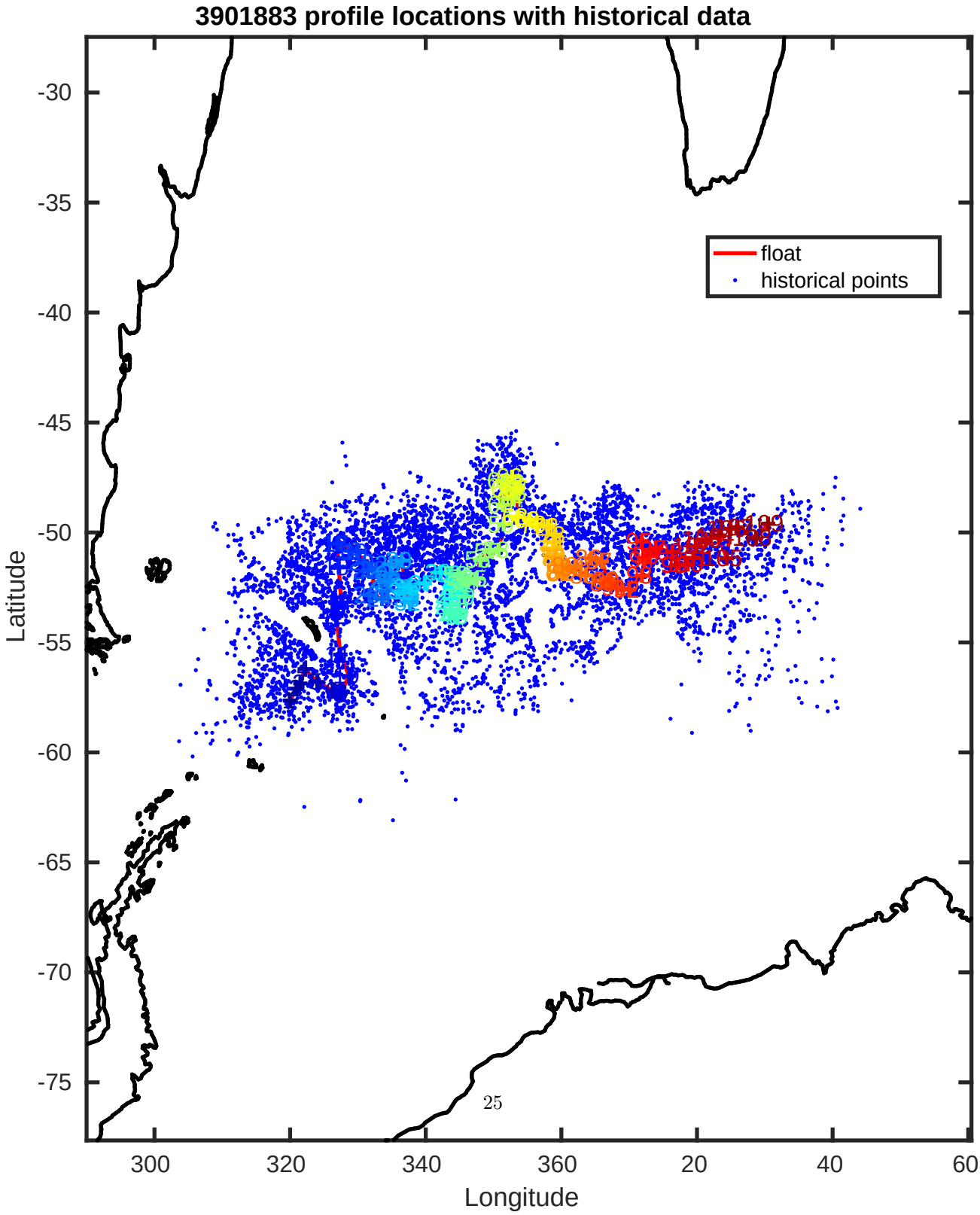

Figure 16: Float 3901883. Trajectory of the float with historical CTD data. The black contours indicate the bathymetry at 0, 200, 1000 and 2000 m.

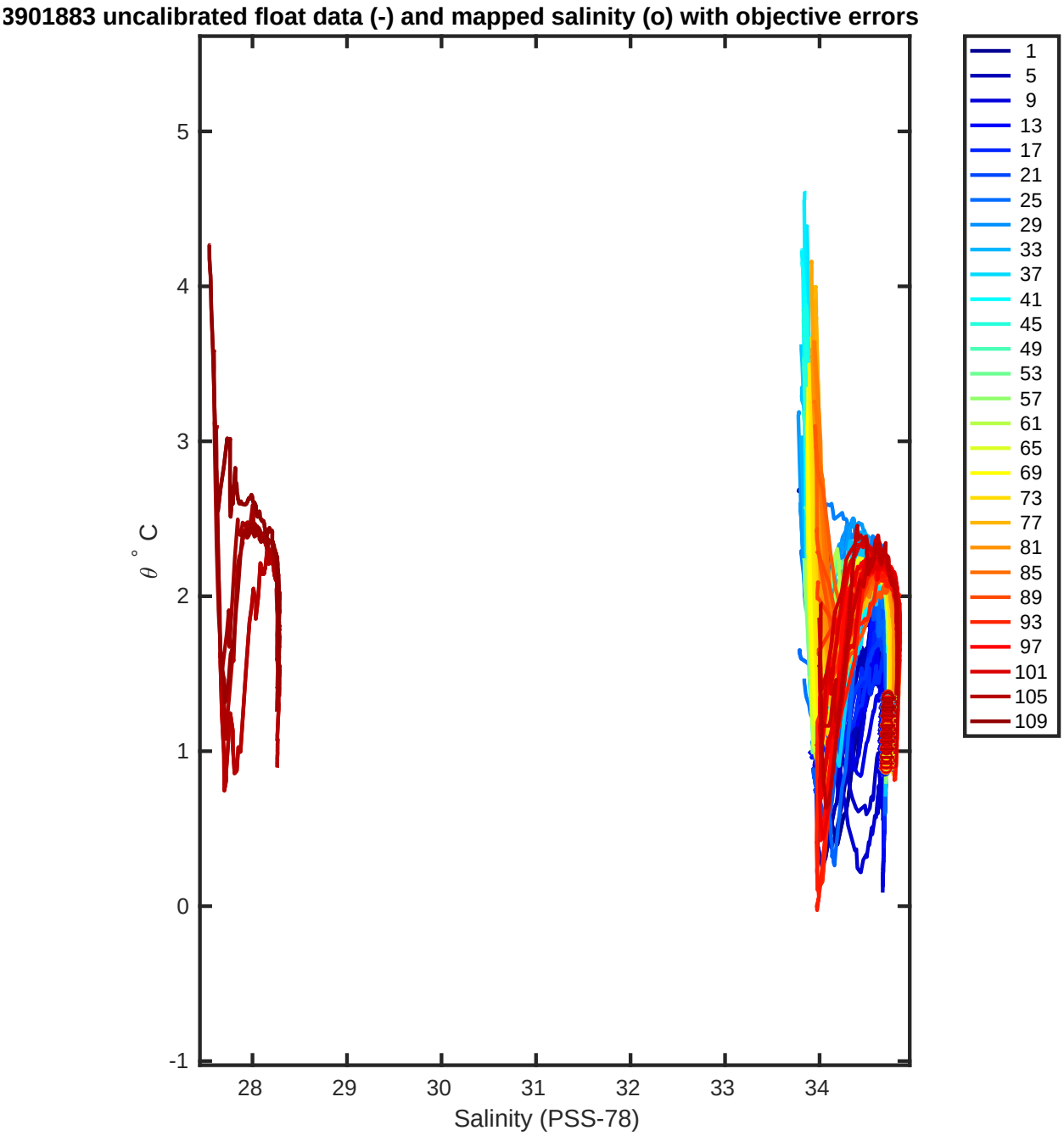

Figure 17: Float 3901883. Uncalibrated float data and mapped salinity.

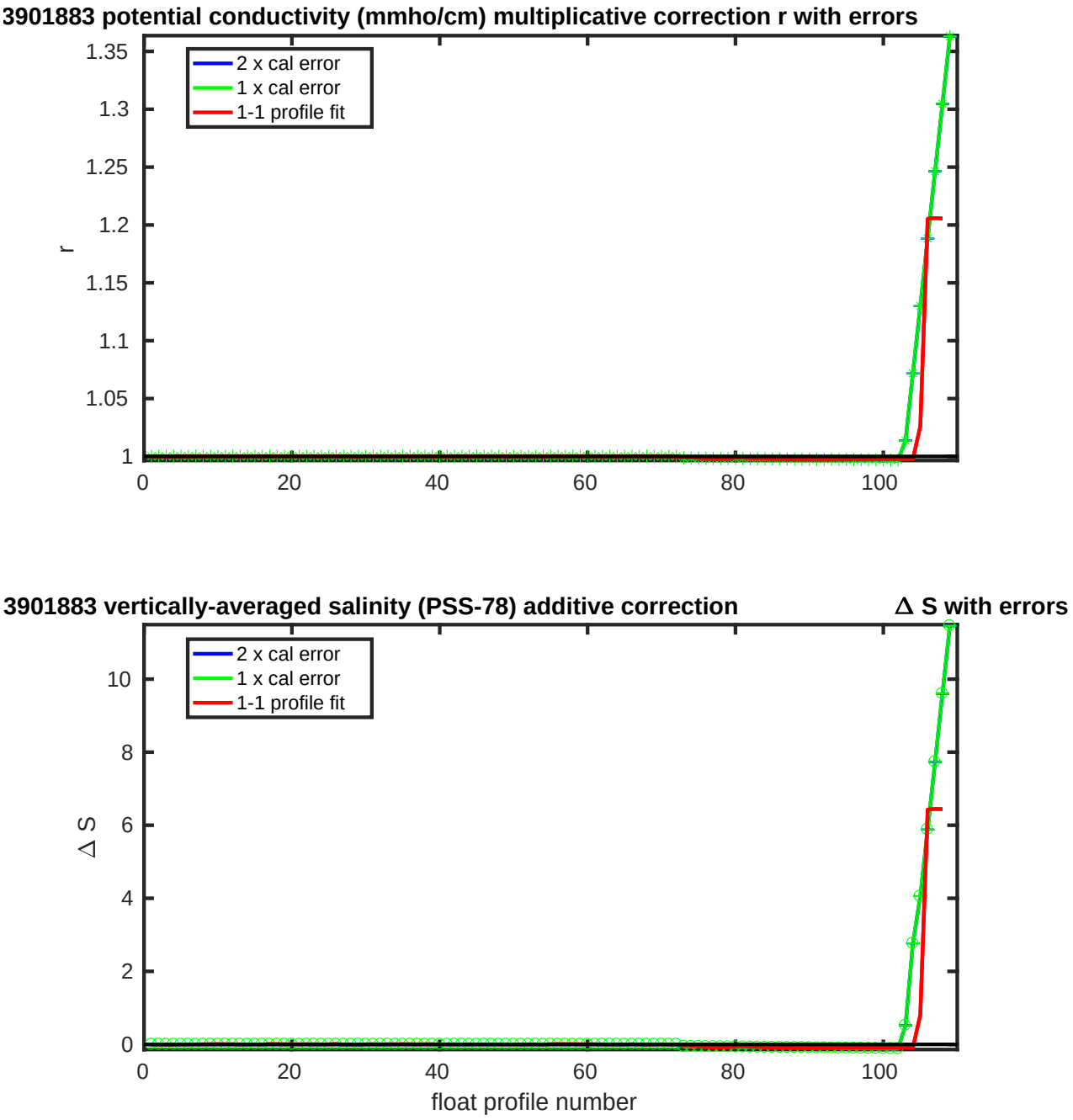

Figure 18: Float 3901883. Potential conductivity (top) and vertically averaged salinity (bottom) with errors.

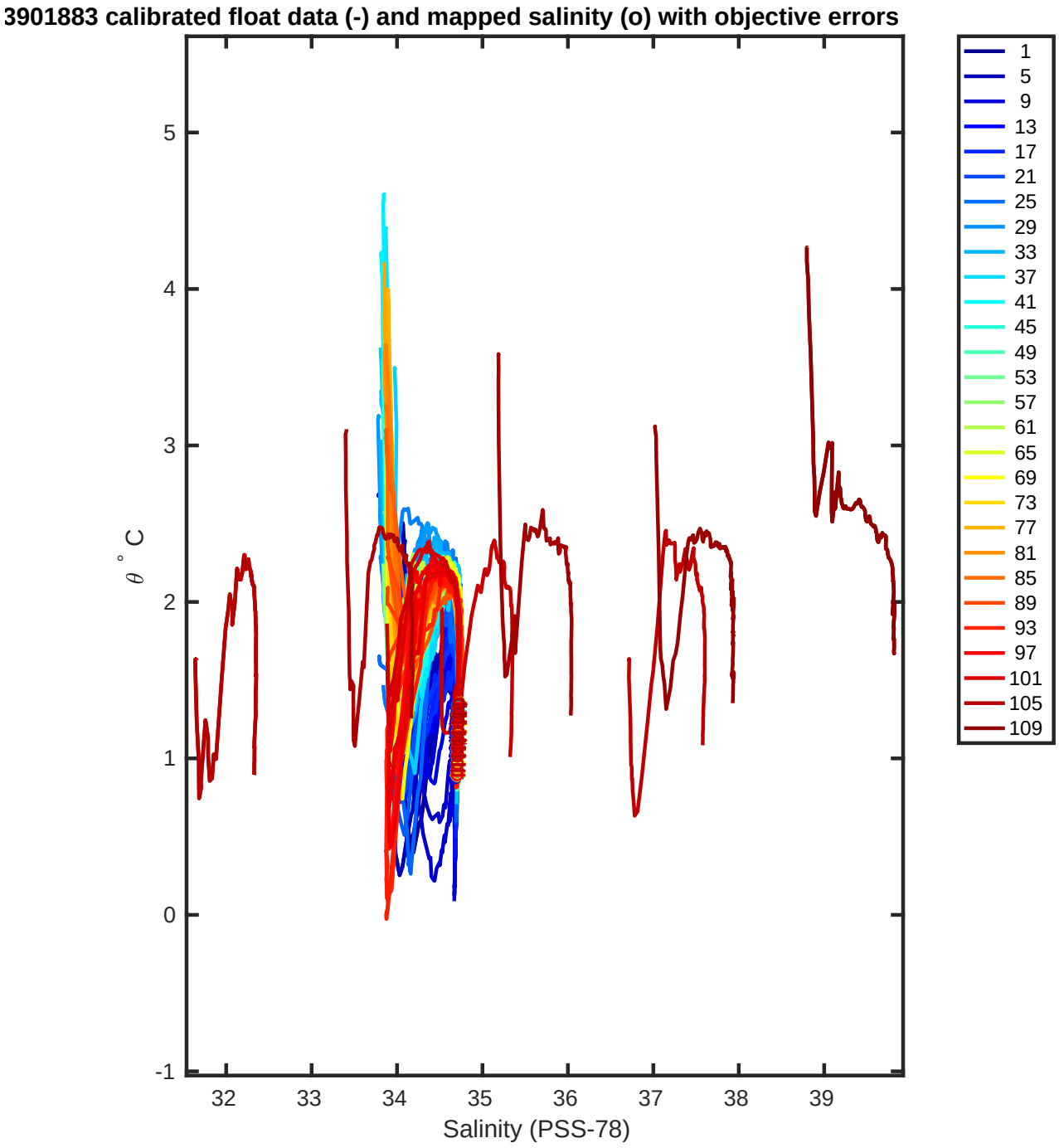

Figure 19: Float 3901883. Calibrated float data and mapped salinity.

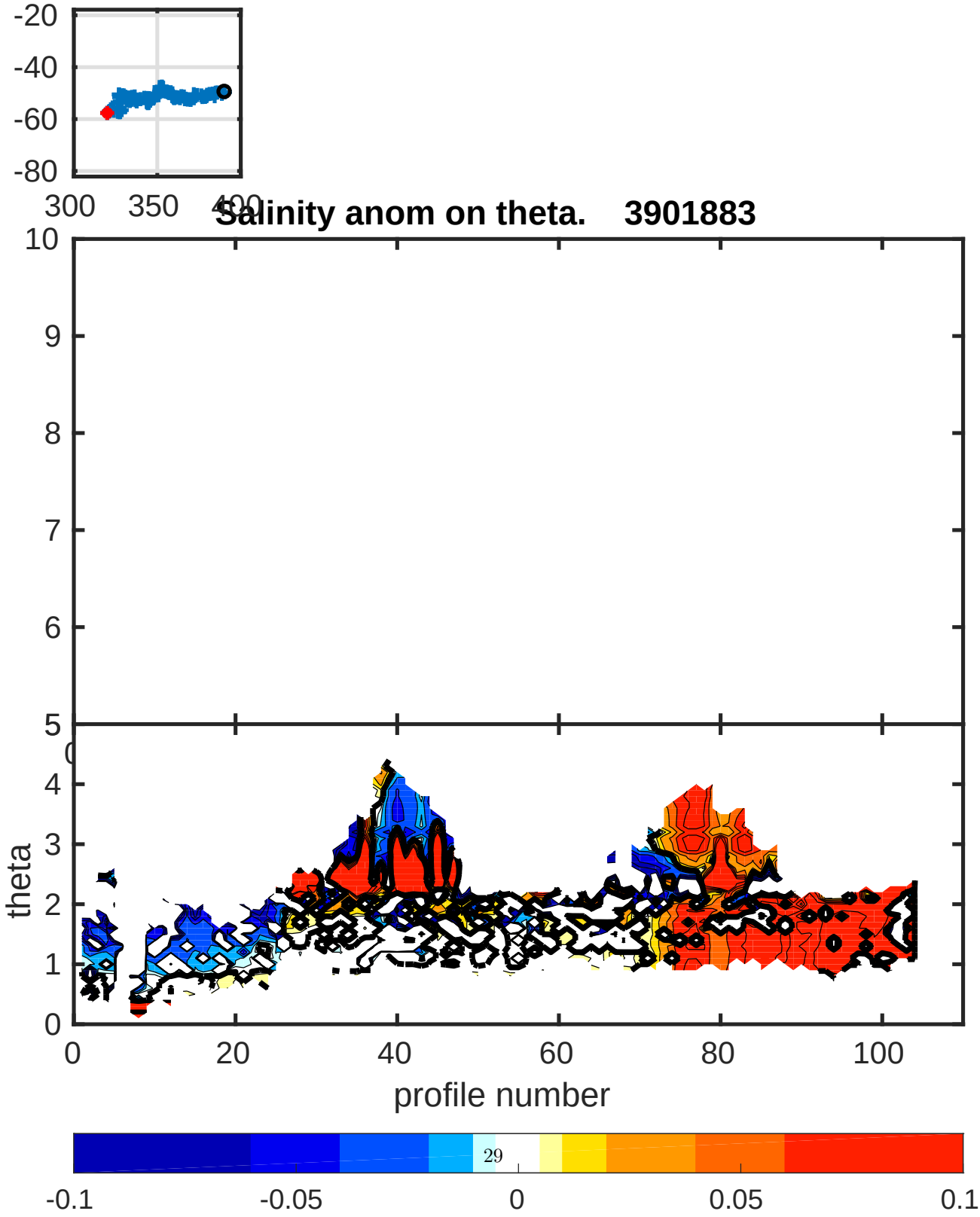

Figure 20: Float 3901883. Salinity anomaly on Theta

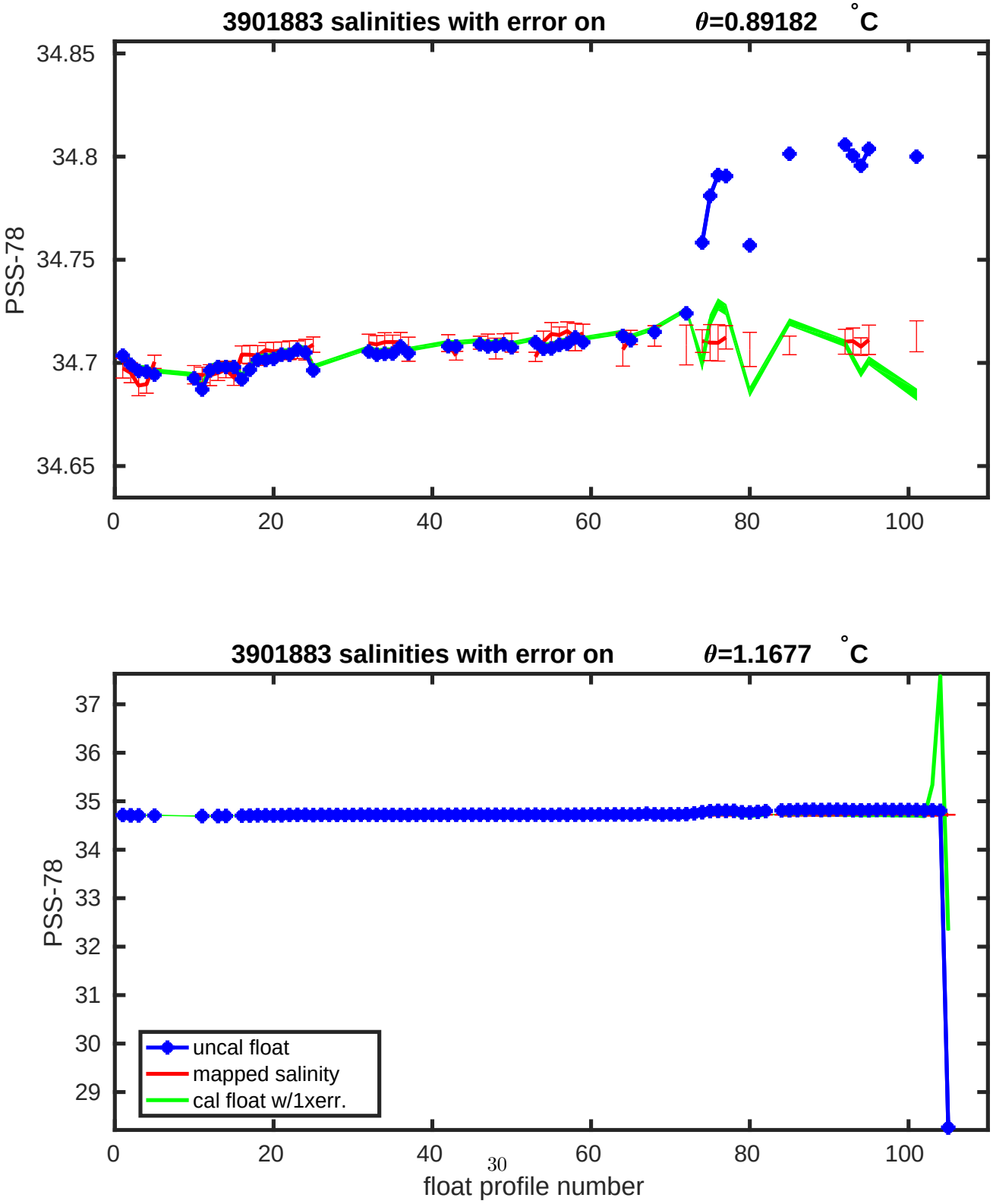

Figure 21: Float 3901883. Salinities with errors on θ.

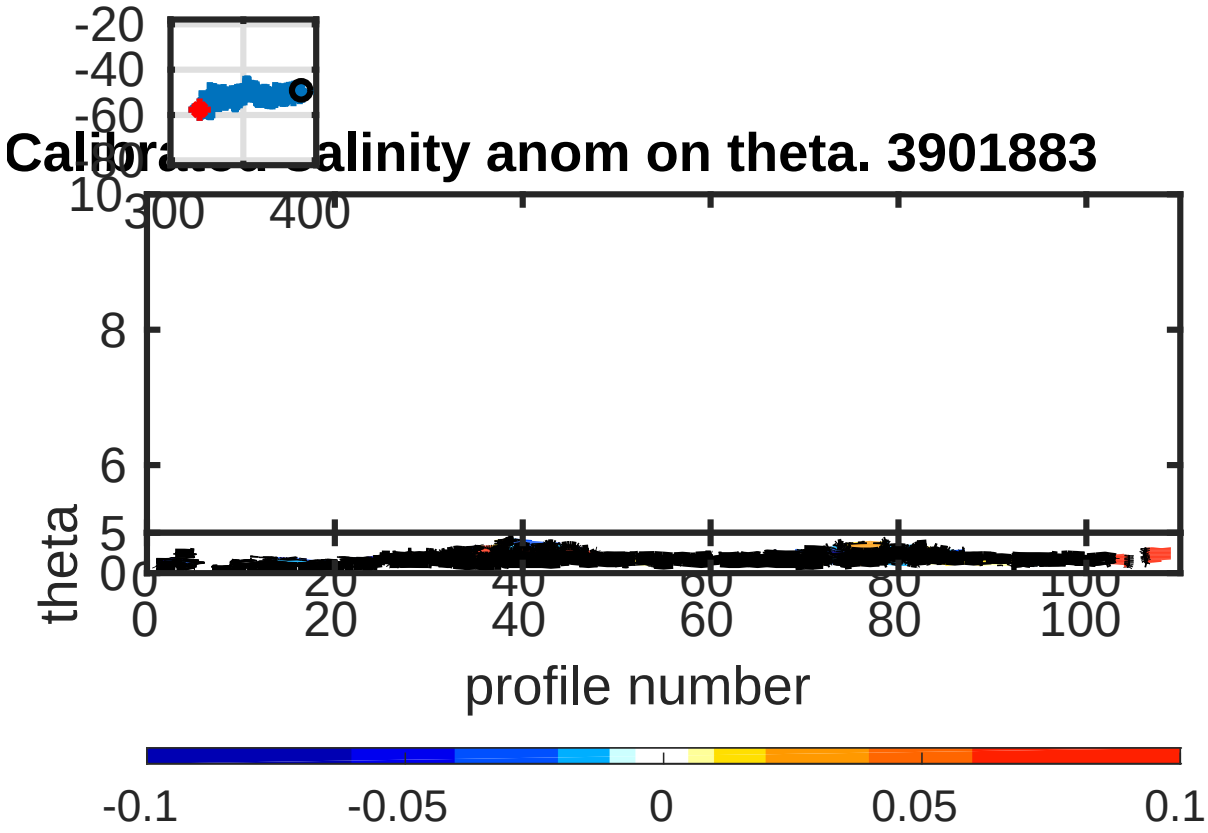

Figure 22: Float 3901883. Calibrated salinity anomaly on θ.

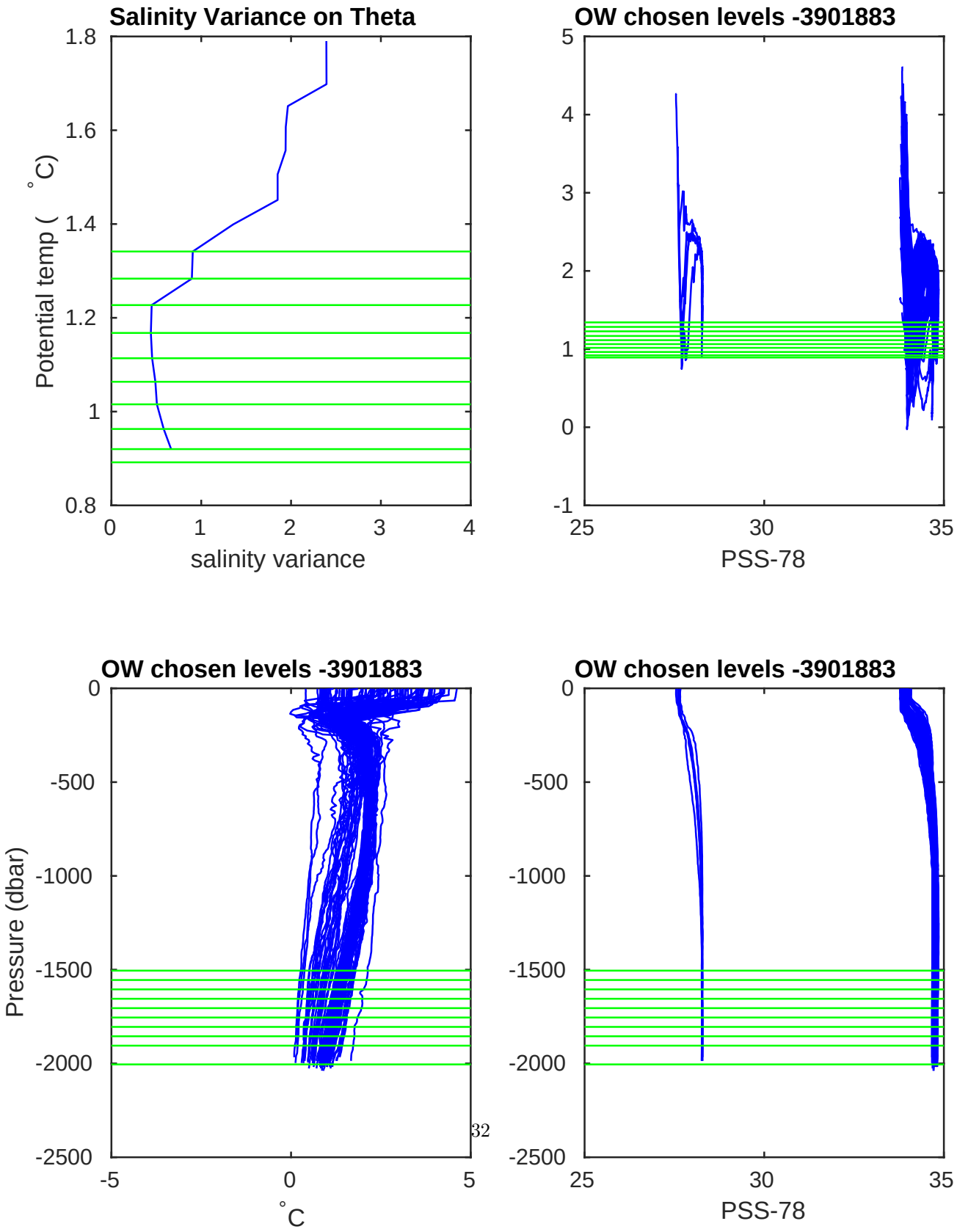

Figure 23: Float 3901883. Salinity, salinity variance on theta and OW chosen levels.

3.3 Summary and Conclusions

The theta levels were set below 1000 m. The time series separated onto two time steps due to a drift detected after cycle 72. The assessed error of salinity for cycles 1-72 is 0.005, QC=1. Data from cycles from 73 to 109 are not adjustable, QC=4;

4 Final Checks

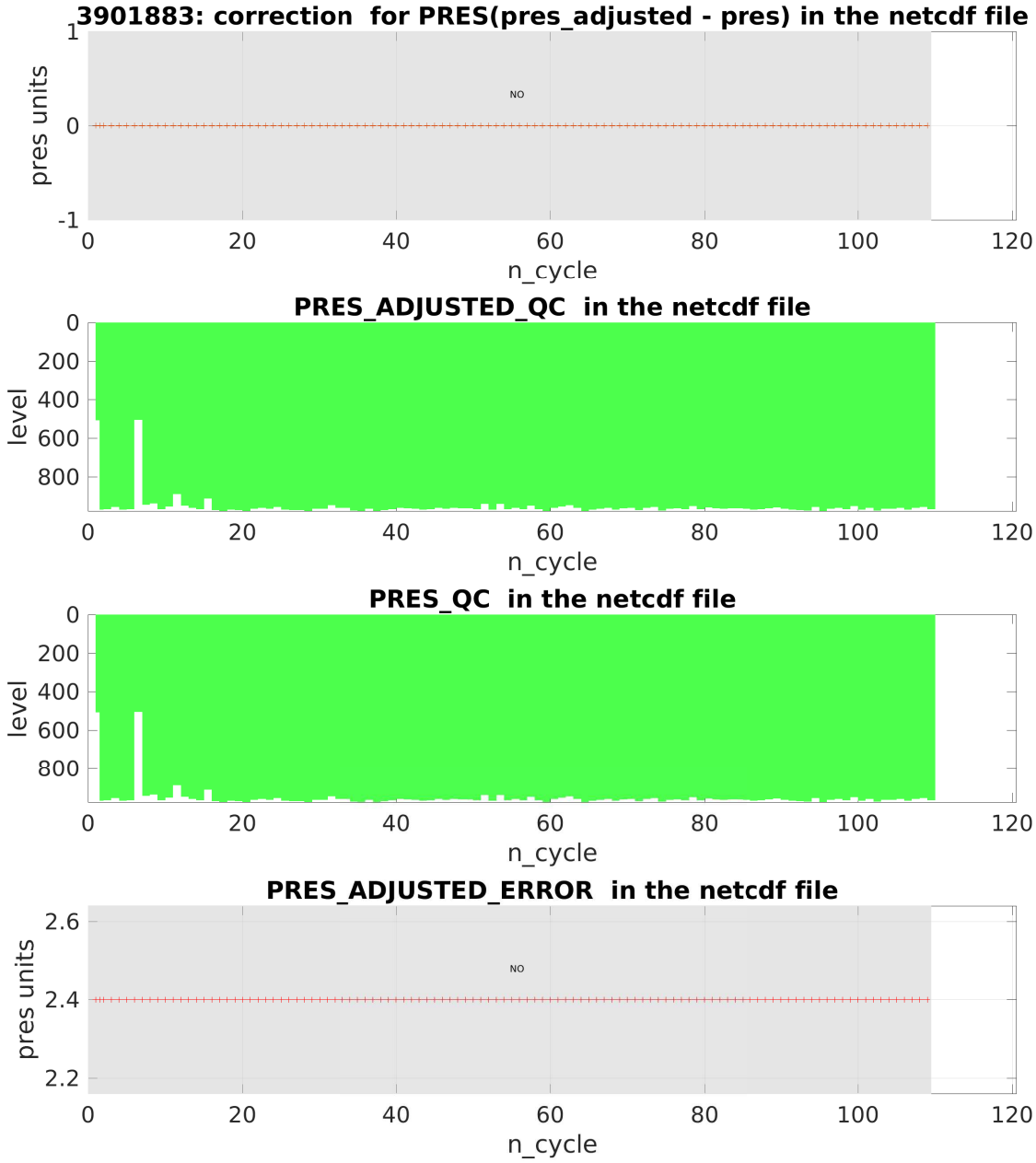

Figure 24: Float 3901883. Time series of applied pressure corrections.

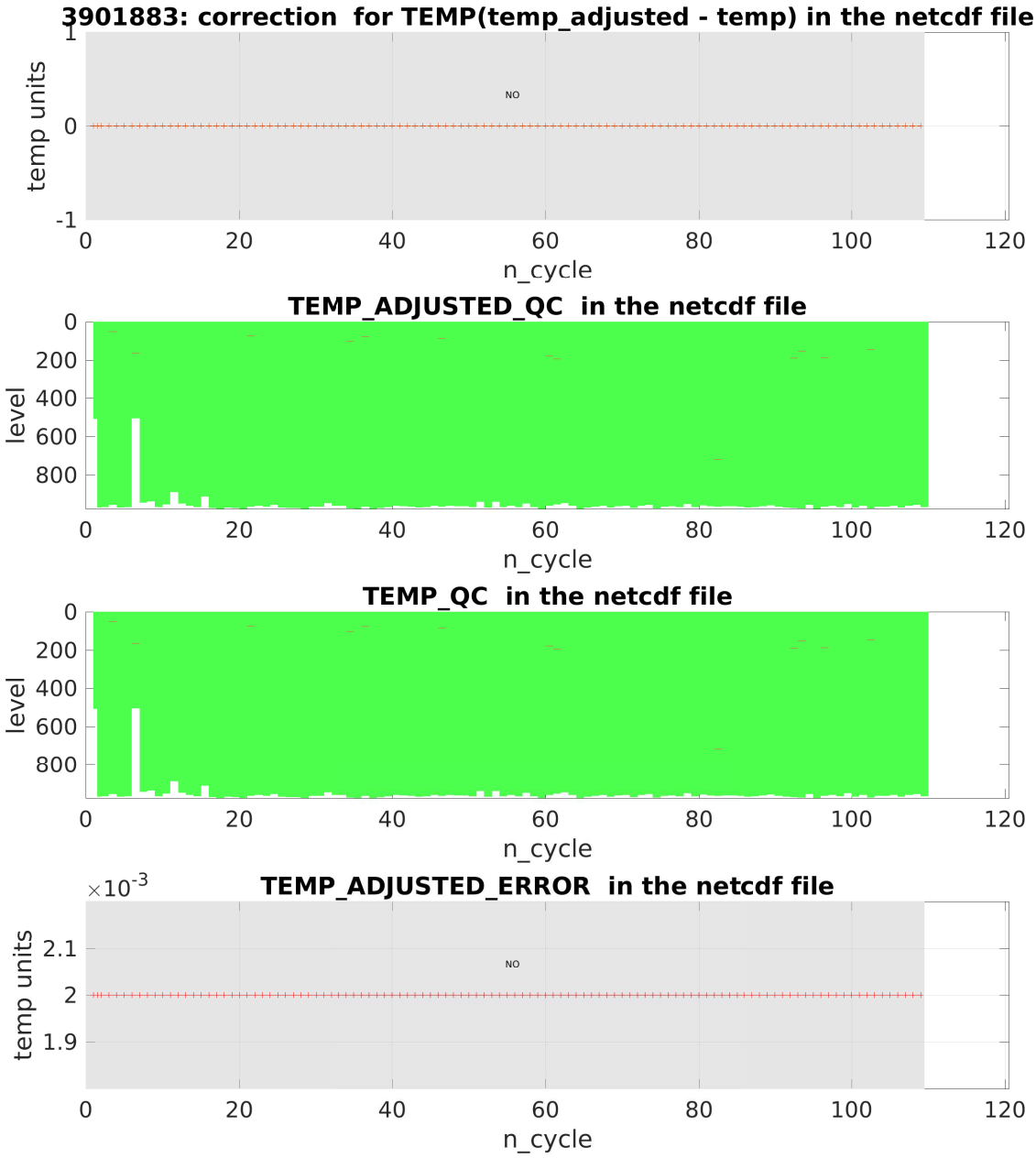

Figure 25: Float 3901883. Time series of applied temperature corrections.

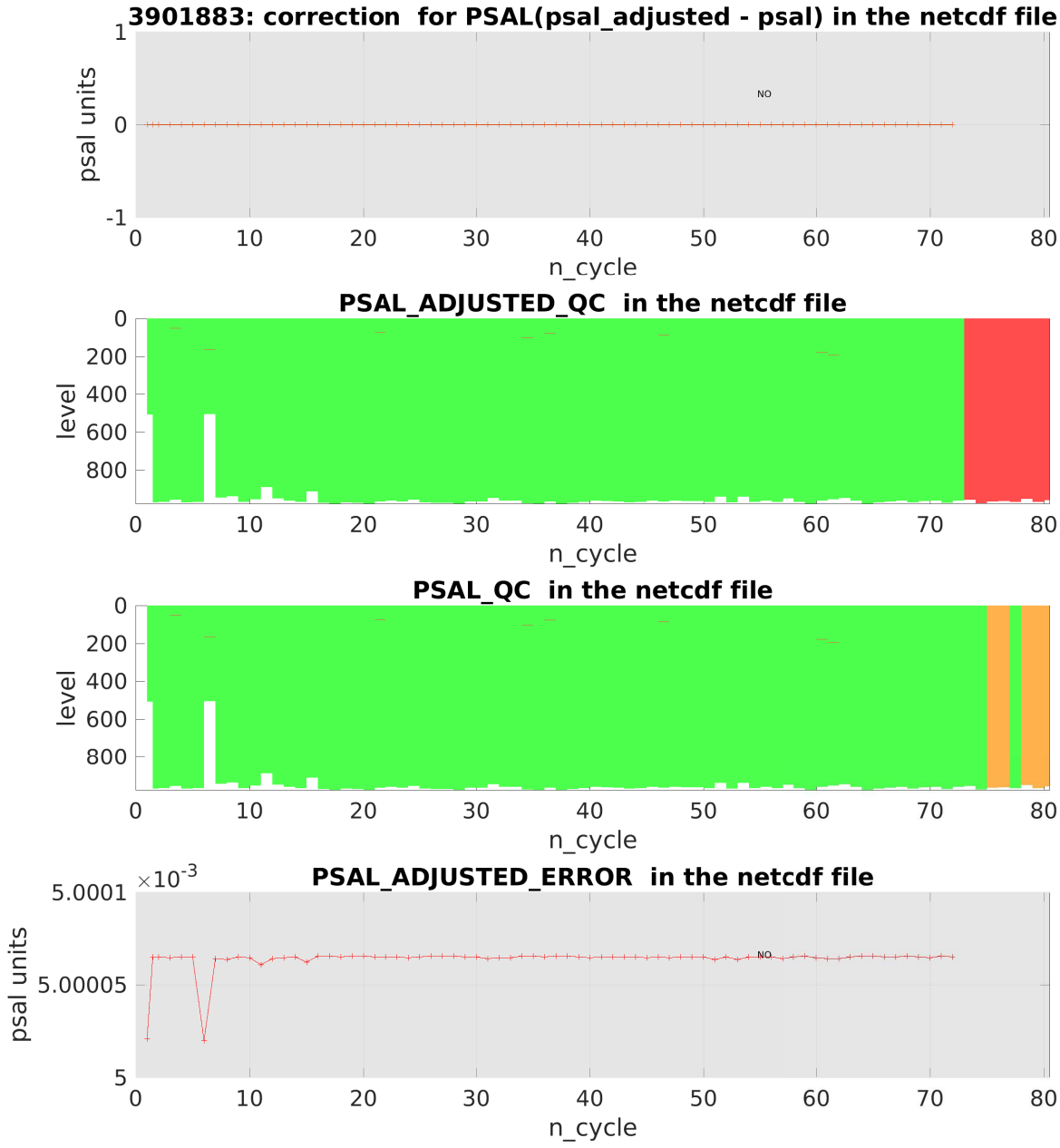

Figure 26: Float 3901883. Time series of applied salinity corrections.