Delayed mode quality control of MOCCA Argo float 3901948

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Summary

The cycles from 1 to 55 well reflect the Argo referenced data, the associated error 0.01, QC=1. The CTD data after cycle around 30 showed are very poor distributed. From cycle 56 to 77 there has been detected drift. The OWC correction has been applied, QC=1, error 0.014.

WMO number	DM correction
3901948	Drift detected

Table 1: Correction applied in delayed mode.

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1 Introduction

Delayed mode analysis was performed for float number 470894i (3901948) 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 470894i (3901948) click on the following link: http://www.ifremer.fr/argoMonitoring/float/3901948

2 Quality Check of Argo Float Data

2.1 Time Series of Vertical Distribution of Data

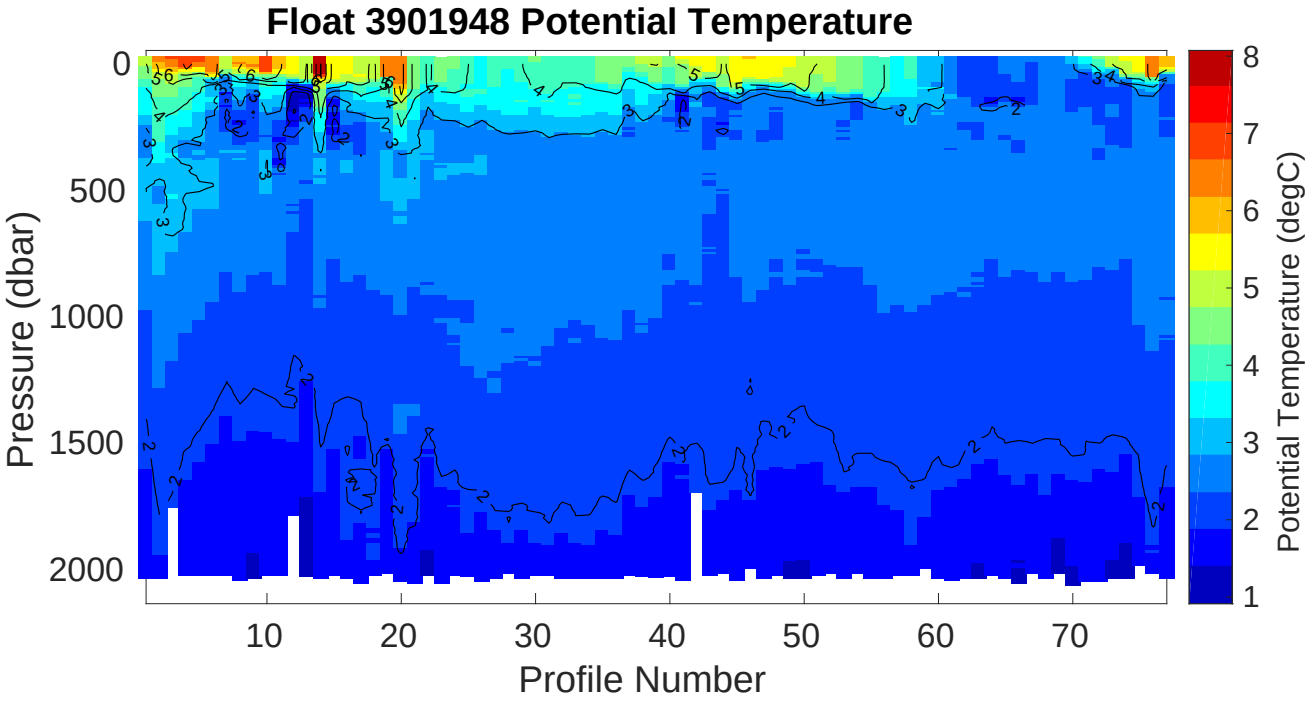

Figure 1: Float 3901948. Time series of the vertical distribution of potential temperature (°C).

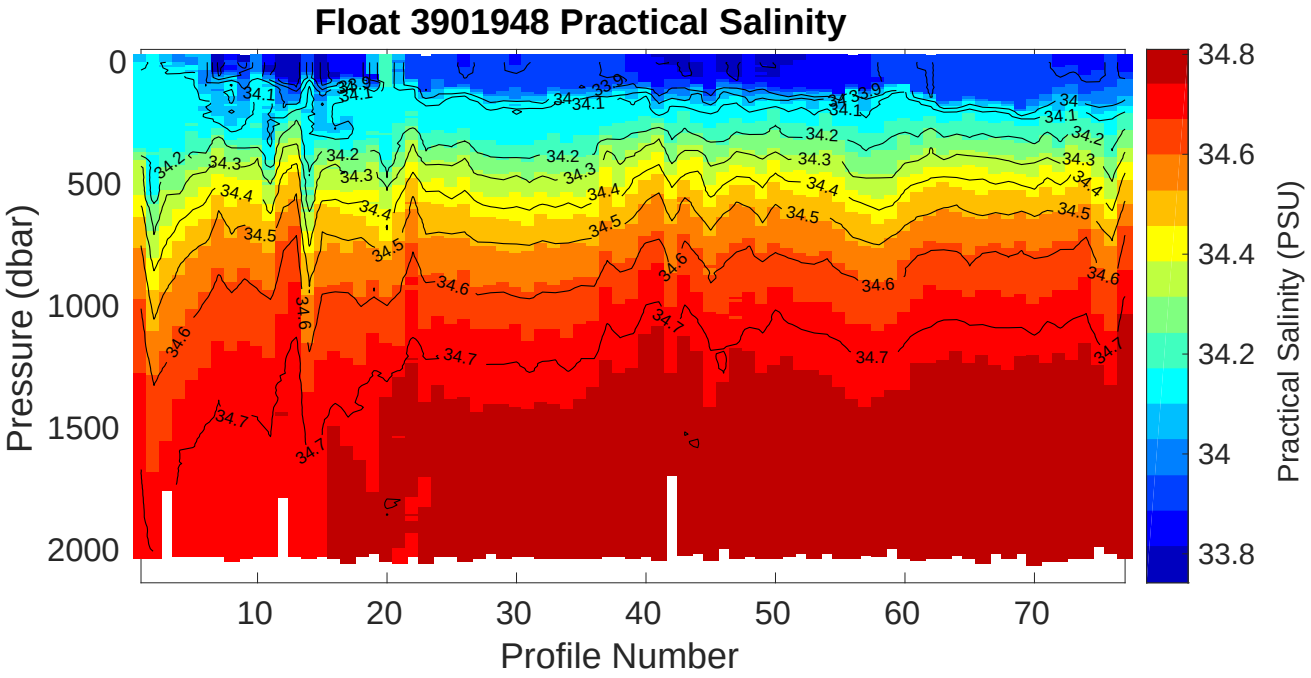

Figure 2: Float 3901948. Time series of the vertical distribution of practical salinity (PSU).

2.2 Comparison between Argo Float and Climatology

The comparison between float 3901948 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 3901948 represents relatively stable and consistent with the expected physical conditions in this region.

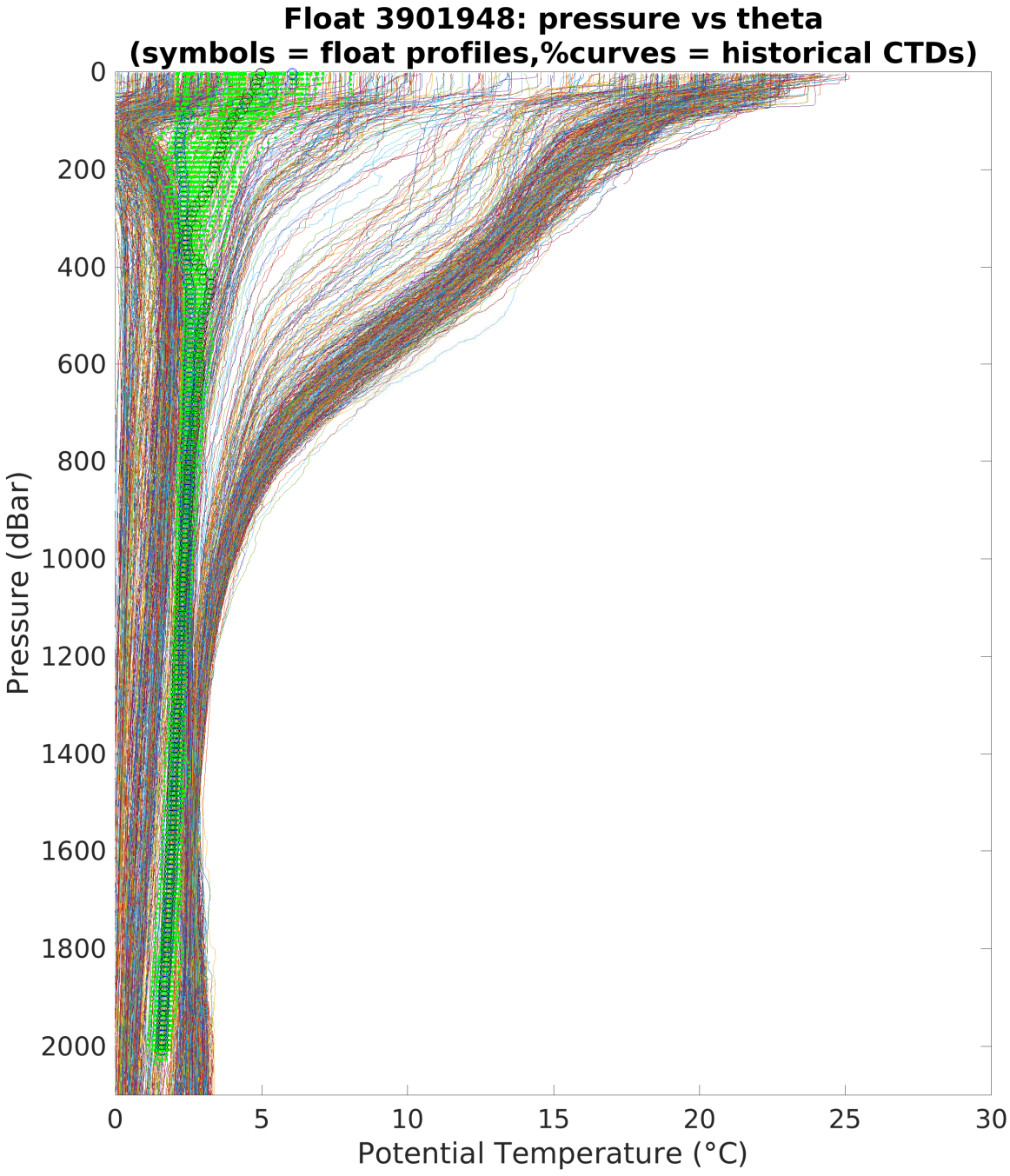

Figure 3: Float 3901948. Float profile of potential temperature (˚C) plotted with climatology from the spatial range of 10 ˚. The black and blue cycles indicates the first and the last Argo profile, respectively. Green symbols represent other Argo profiles.

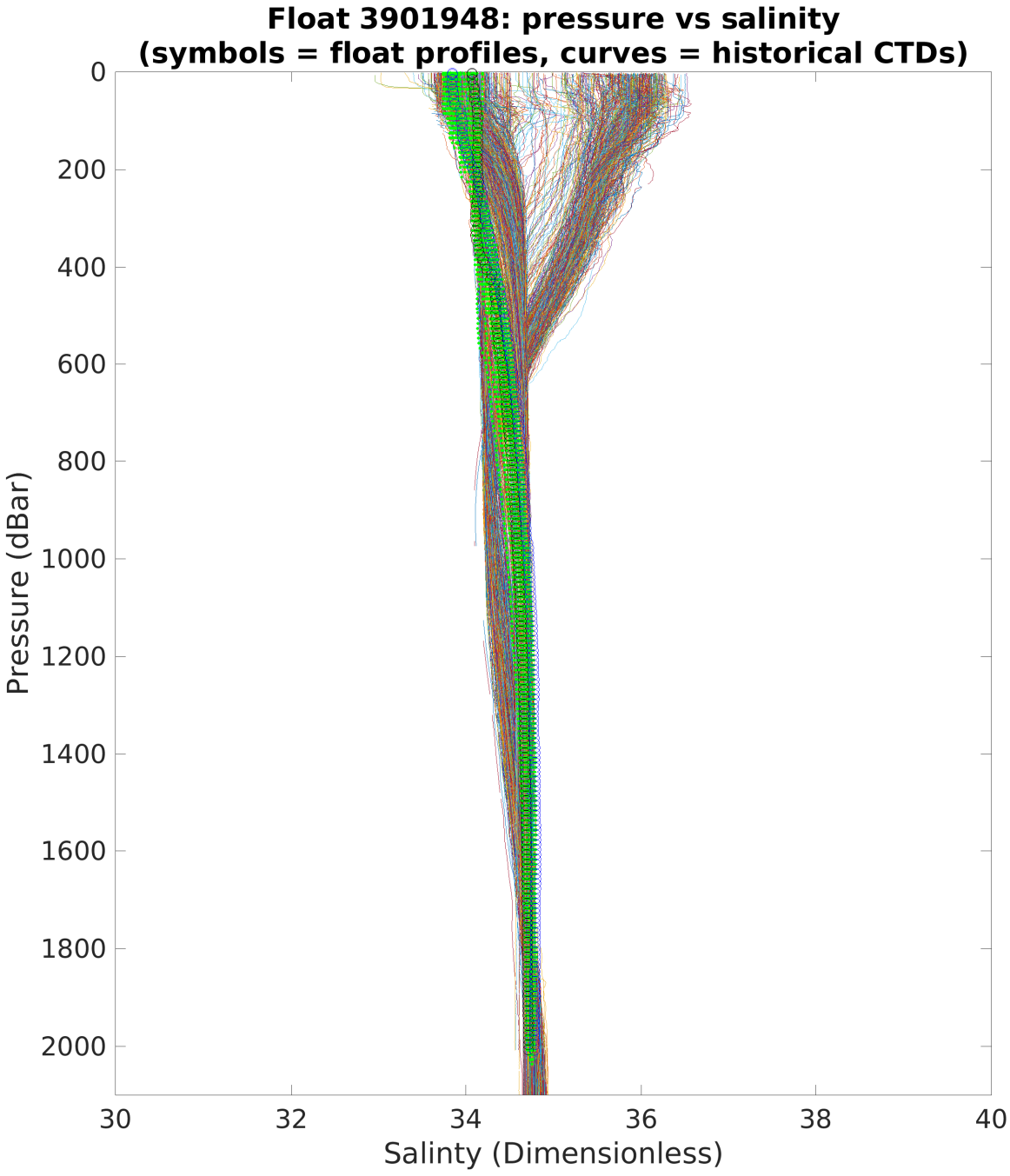

Figure 4: Float 3901948. Float profile of salinity (dimensionless) plotted with climatology from the spatial range of 10 ˚. The black and blue cycles indicates the first and the last Argo profile, respectively. Green symbols represent other Argo profiles.

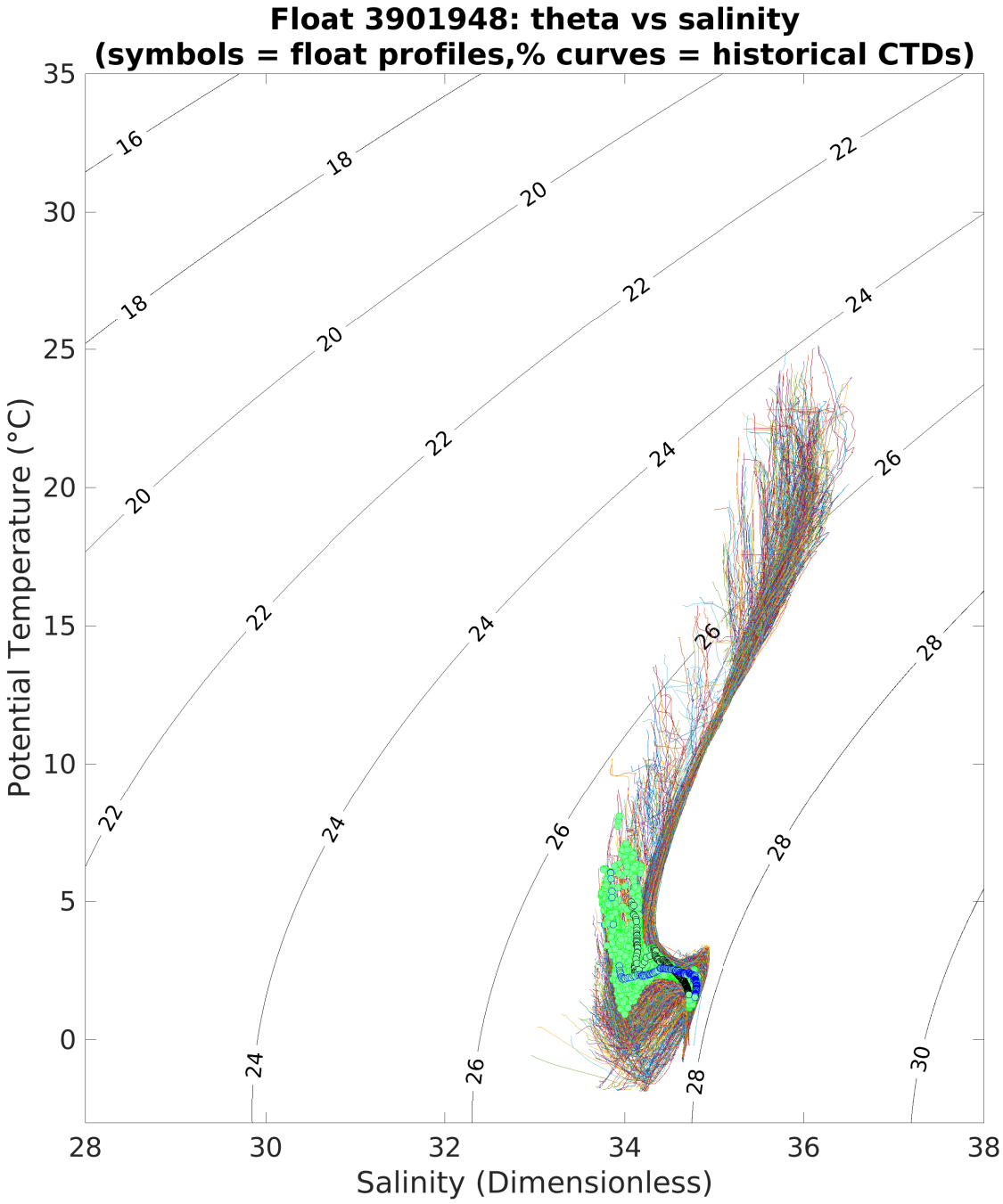

Figure 5: Float 3901948. Theta/S plotted with climatology from the spatial range of 10 °. The black and blue cycles indicates the first and the last Argo profile, respectively. Green symbols represent other Argo profiles.

2.3 Satellite Altimeter comparison

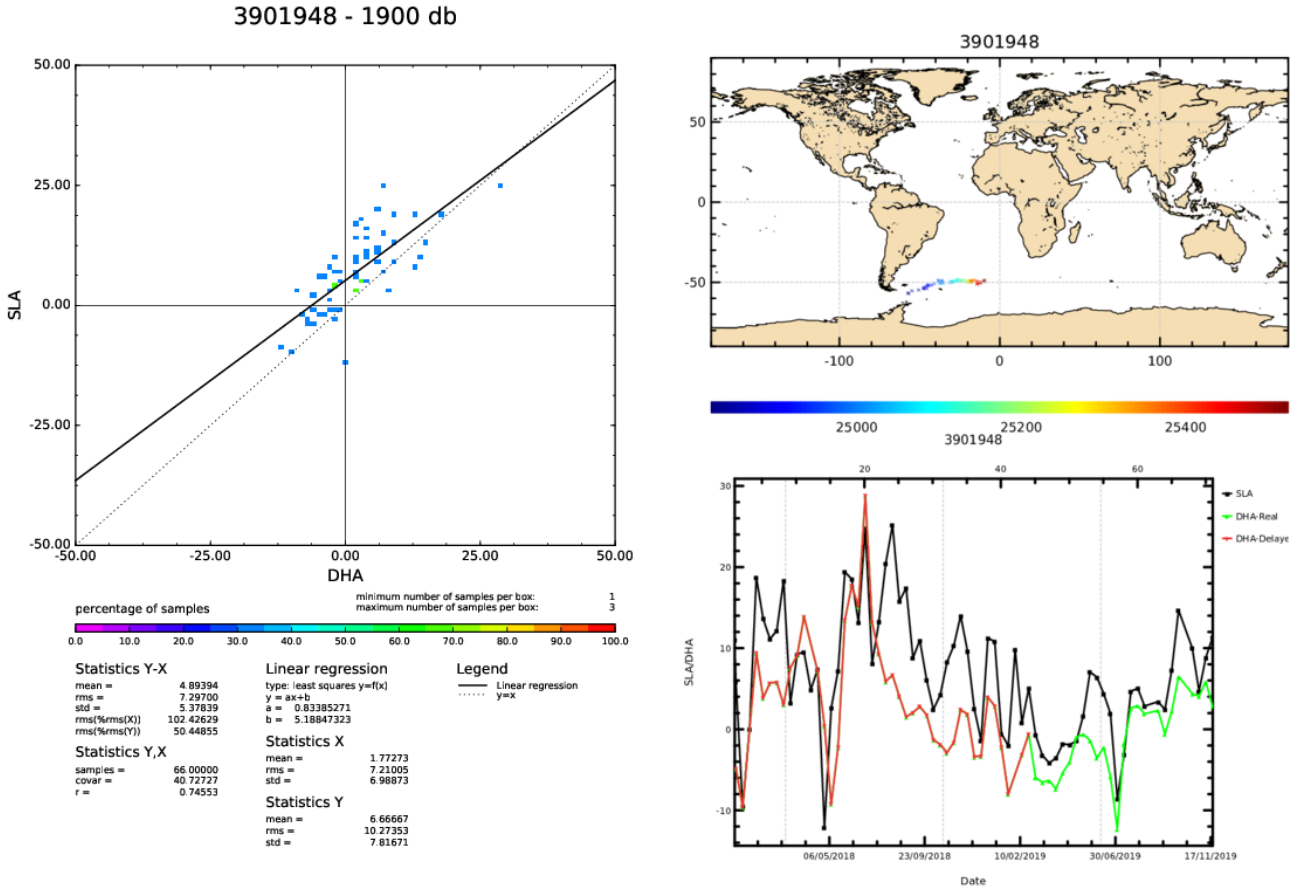

Figure 6: Float 3901948. The comparison betweeen the Sea Surface Height(SSH) from the satellite altimetry and Dynamic Height Anomaly(DHA)extracted from the Argo float temperature and salinity data

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

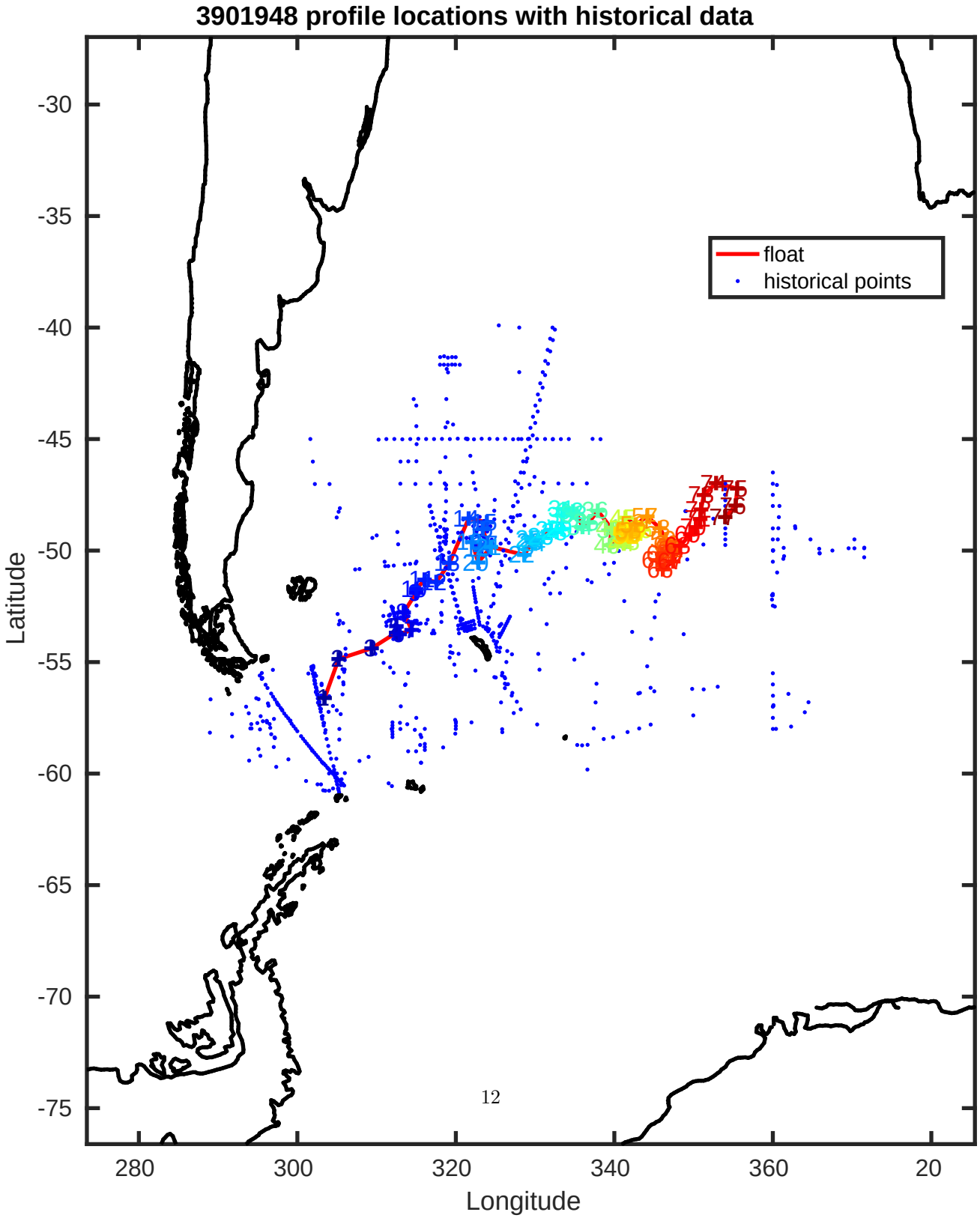

Figure 7: Float 3901948. Trajectory of the Argo float plotted with historical CTD data (blue dots). The black contours indicate continent contours.

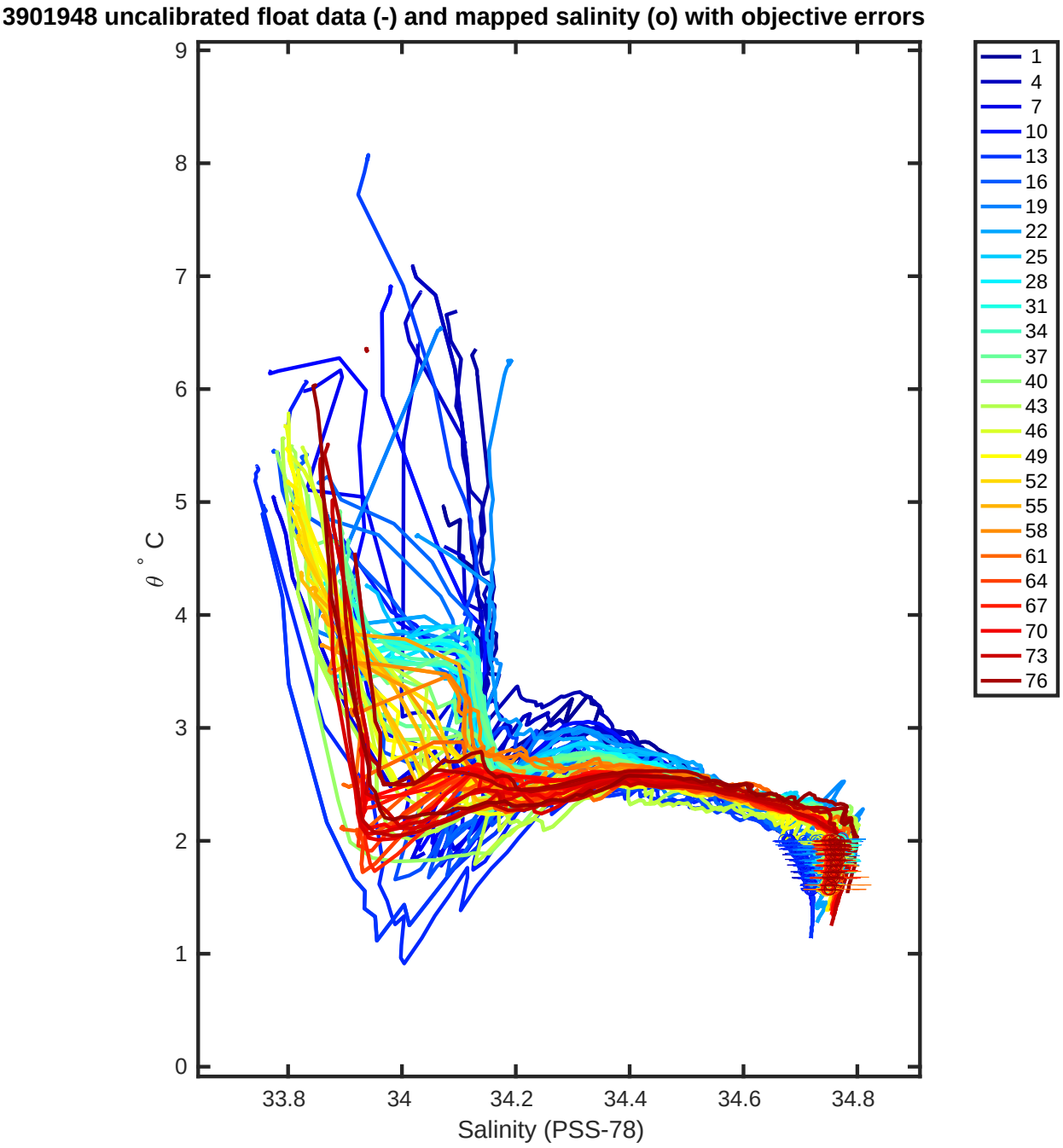

Figure 8: Float 3901948. T/S diagram for the uncalibrated float data and mapped salinity. The collared circles indicate the theta levels with an objective errors. Diagram is showing every 3rd Argo profile.

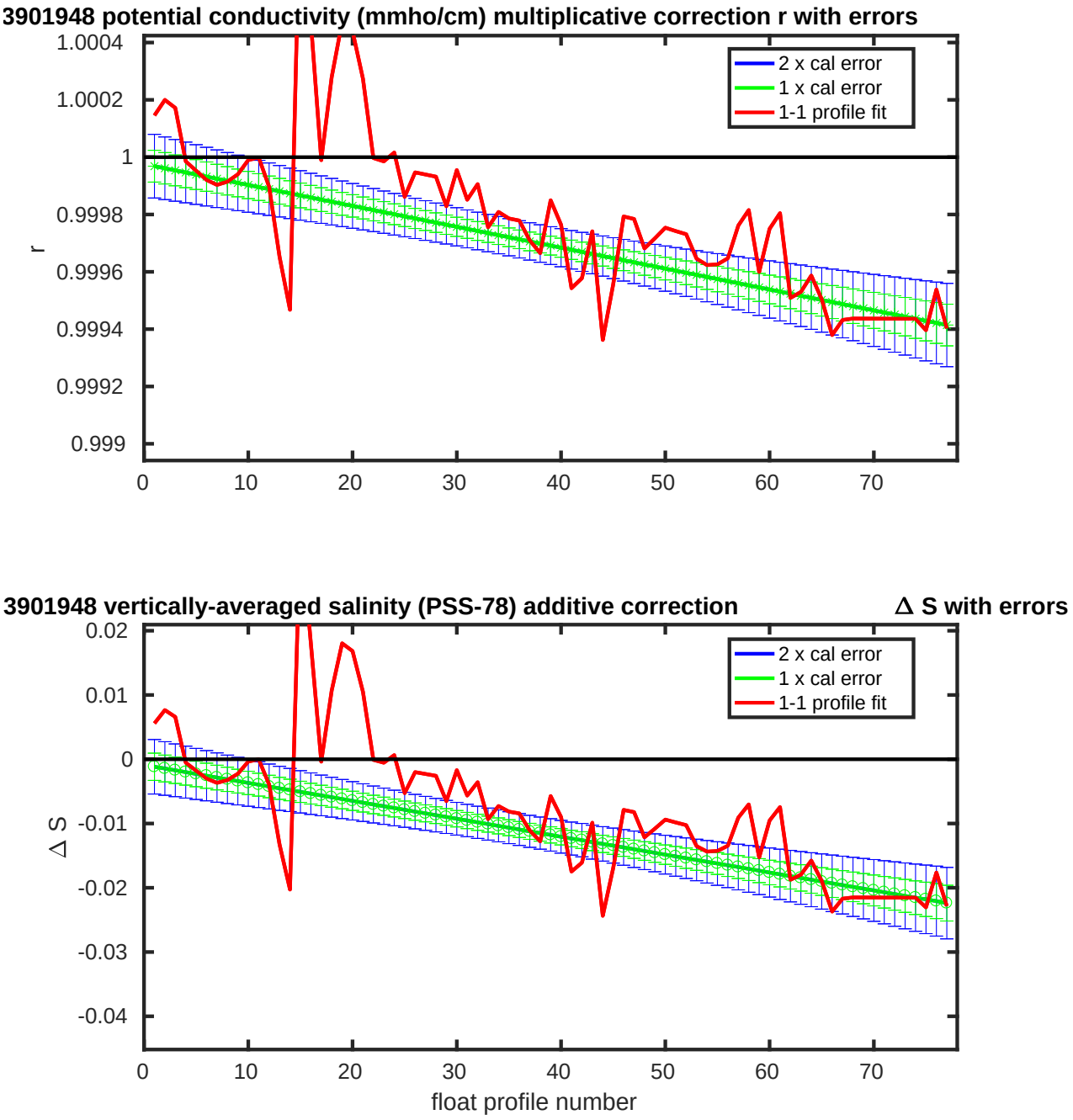

Figure 9: Float 3901948. Time series of profiles of the potential conductivity (top) and vertically averaged salinity (bottom) with errors.

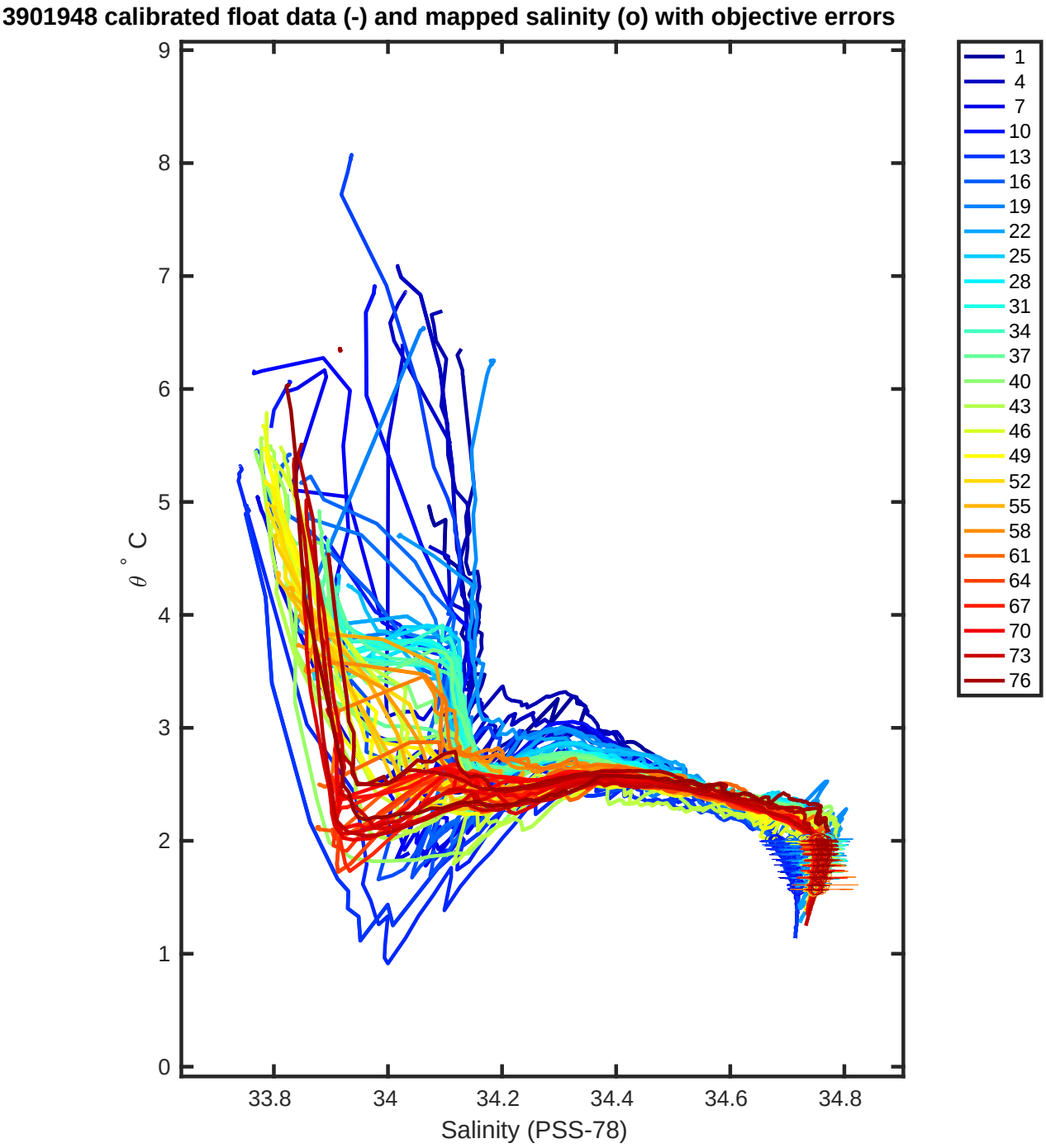

Figure 10: Float 3901948. Calibrated float data and mapped salinity.

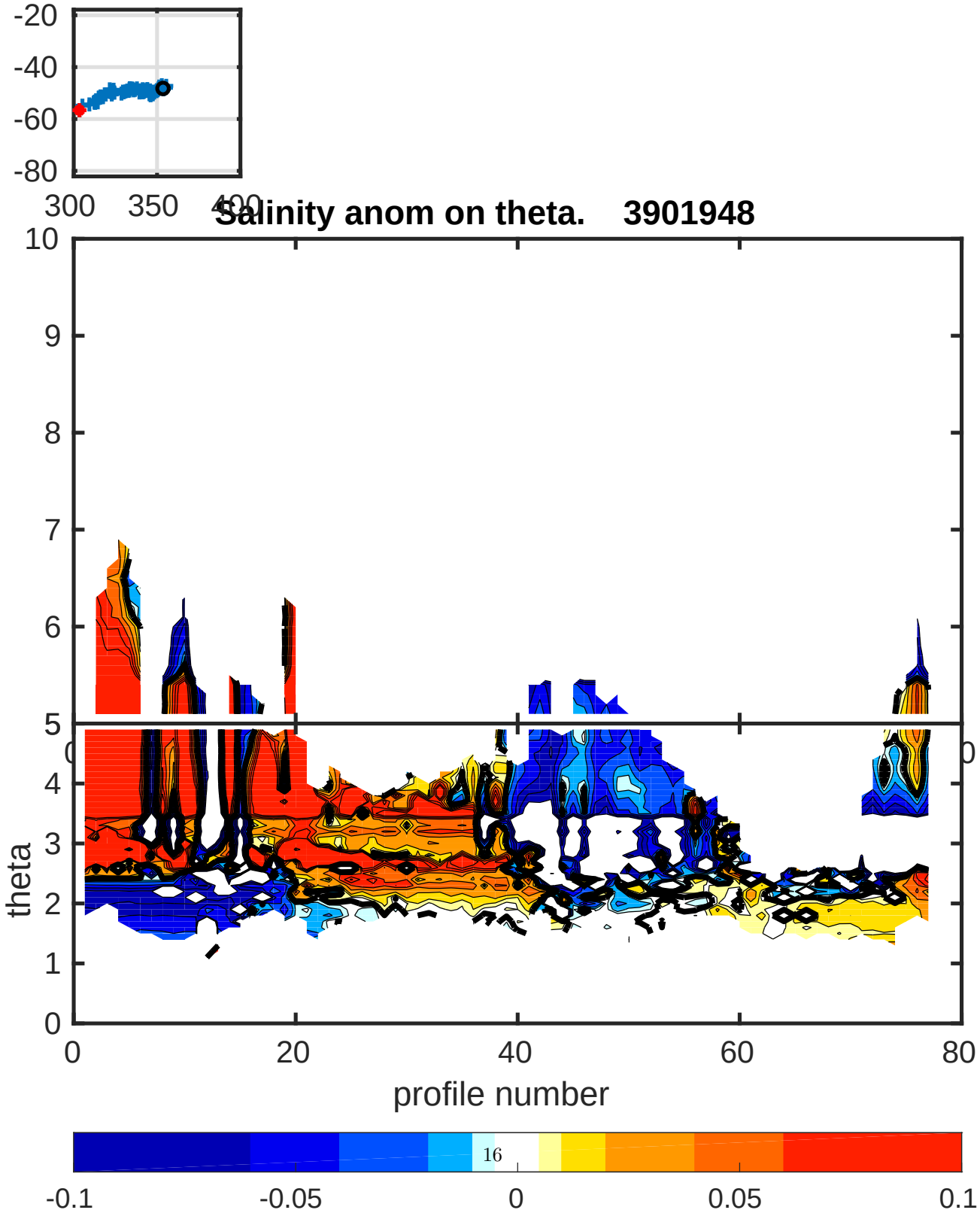

Figure 11: Float 3901948. Salinity anomaly on θ levels.

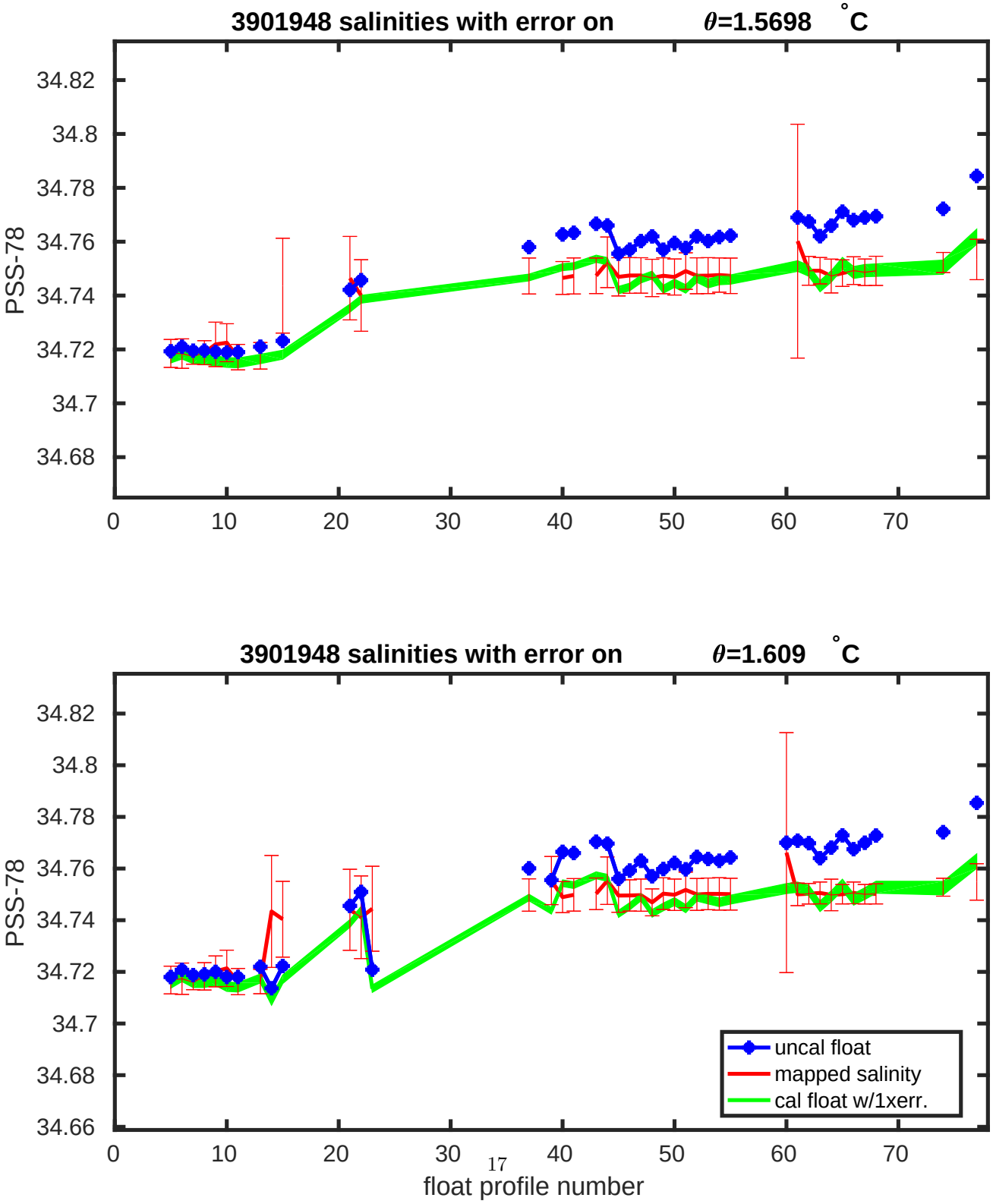

Figure 12: Float 3901948. Salinities with errors on θ levels.

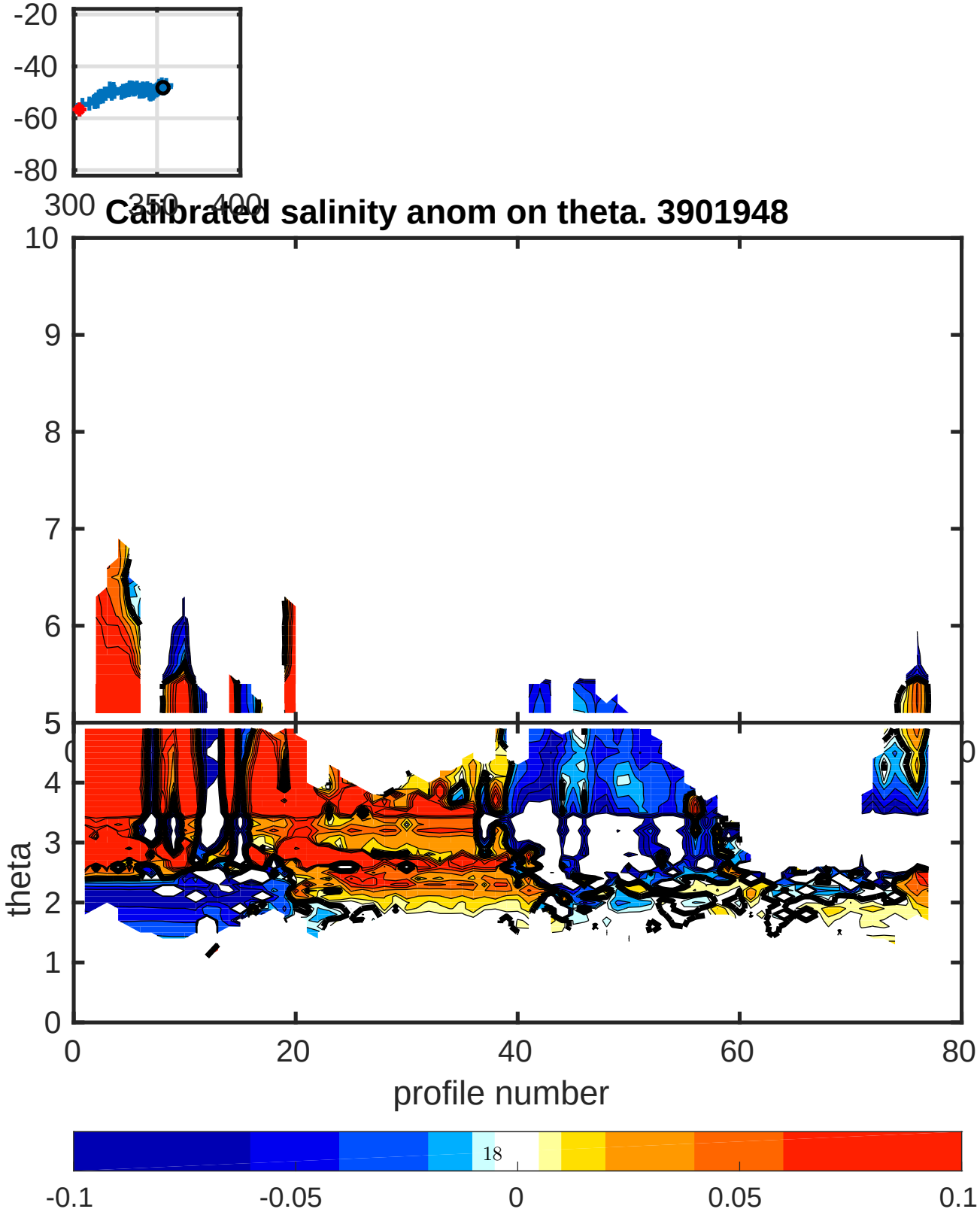

Figure 13: Float 3901948. Calibrated salinity anomaly on θ levels.

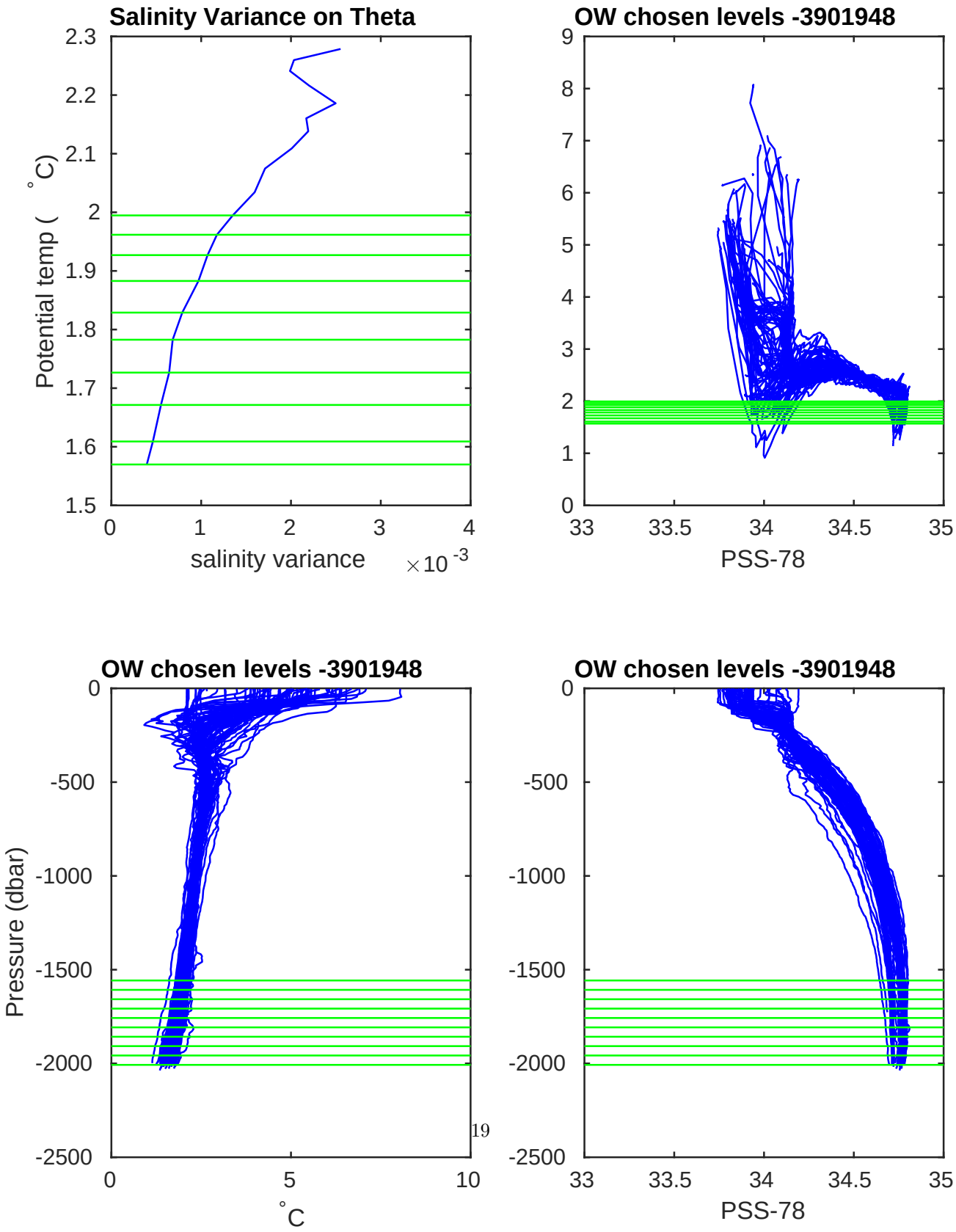

Figure 14: Float 3901948. Salinity, salinity variance on theta and OW chosen levels.

3.2 Comparison between Argo floats and Argo Climatlogy

3.2.1 Configuration

```
% ================================
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FLOAT_MAPPED_POSTFIX=.mat

% ================================
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FLOAT_CALSERIES_PREFIX=calseries_
FLOAT_CALIB_POSTFIX=.mat

% ================================
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CONFIG_WMO_BOXES=wmo_boxes_argo.mat
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% ================================
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MAPSCALE_PHI_SMALL=0.02

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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

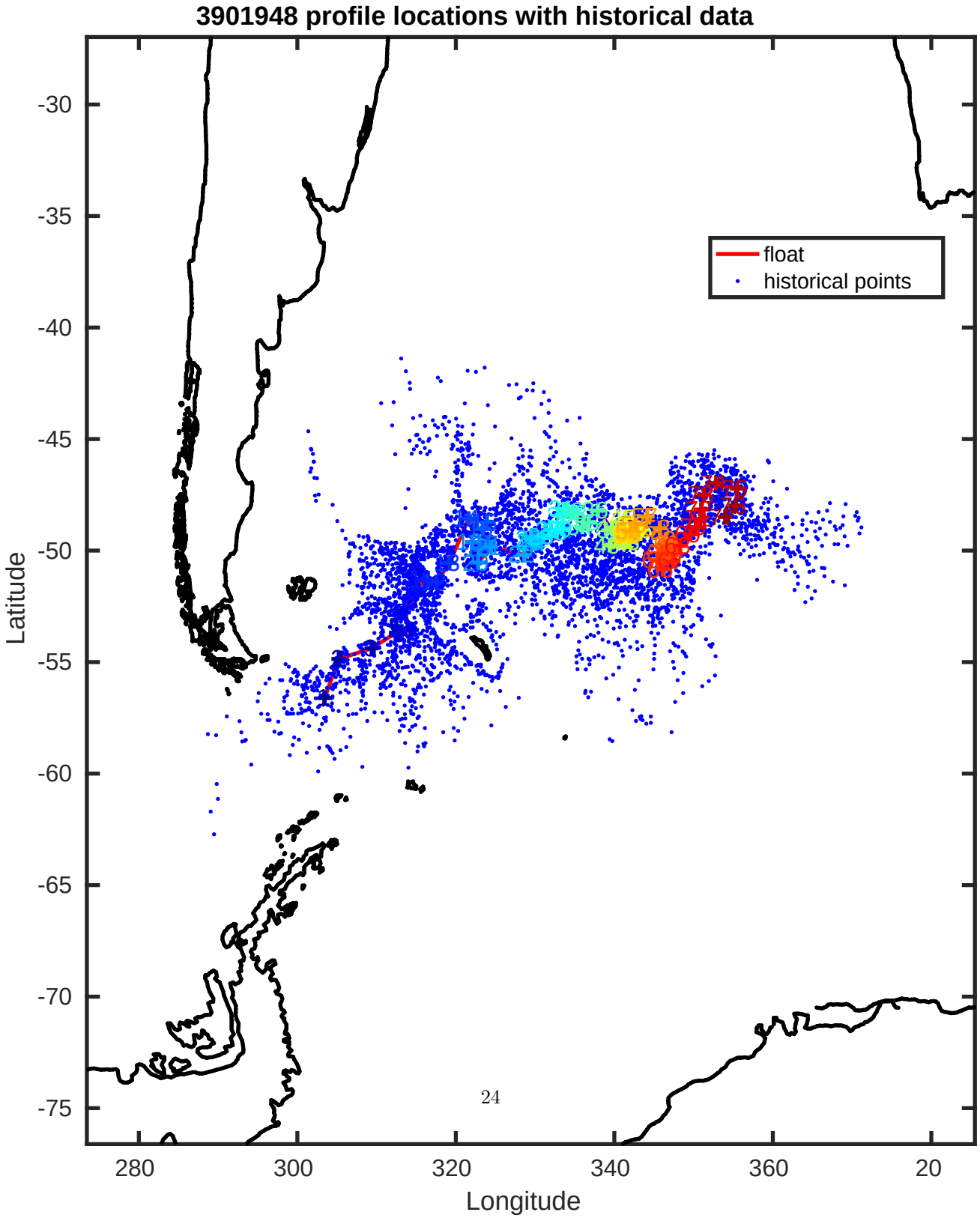

Figure 15: Float 3901948. Trajectory of the Argo float plotted with historical Argo data (blue dots). The black contours indicate continent contours.

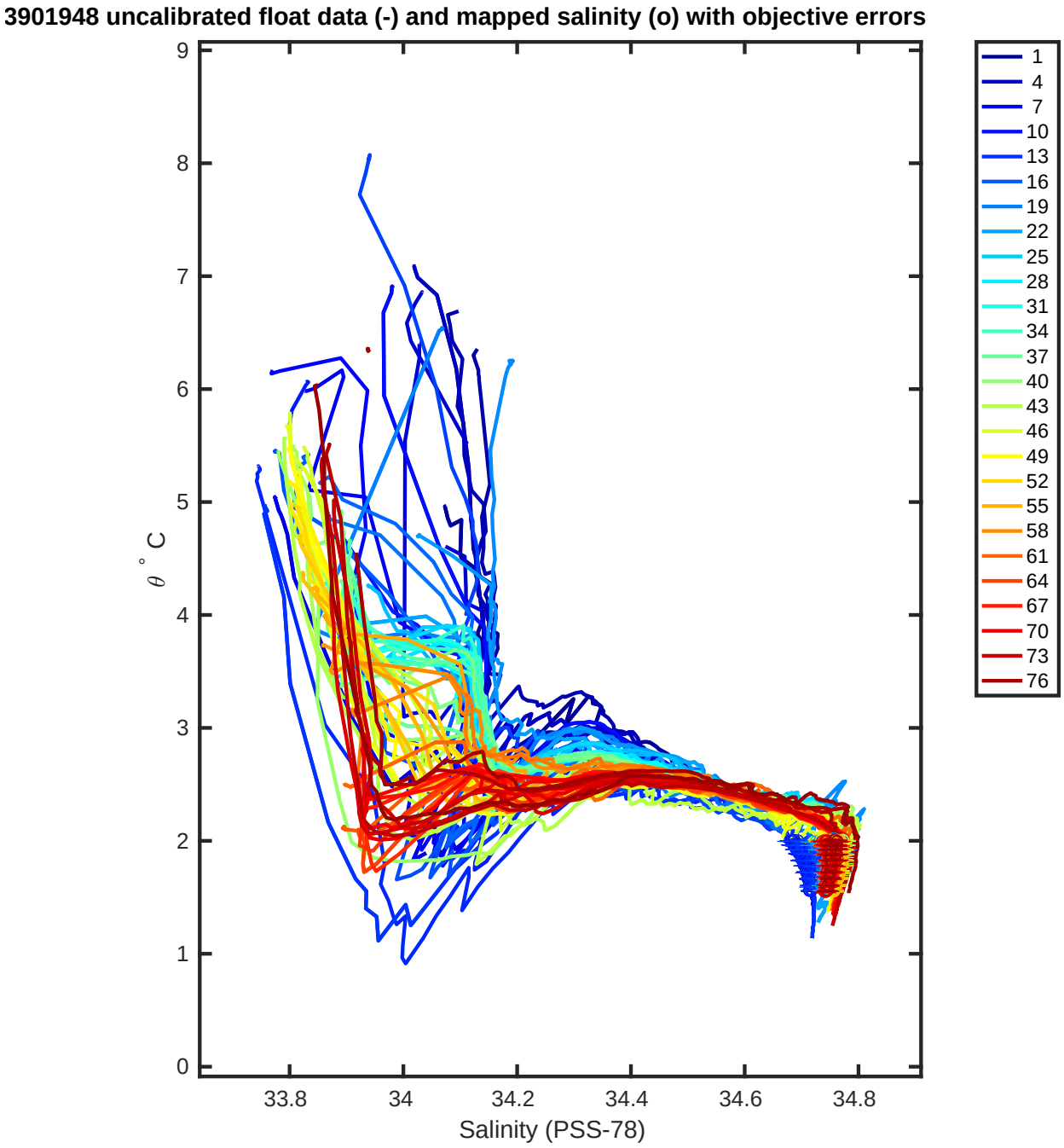

Figure 16: Float 3901948. T/S diagram for the uncalibrated float data and mapped salinity. The collared circles indicate the theta levels with an objective errors. Diagram is showing every 3rd Argo profile.

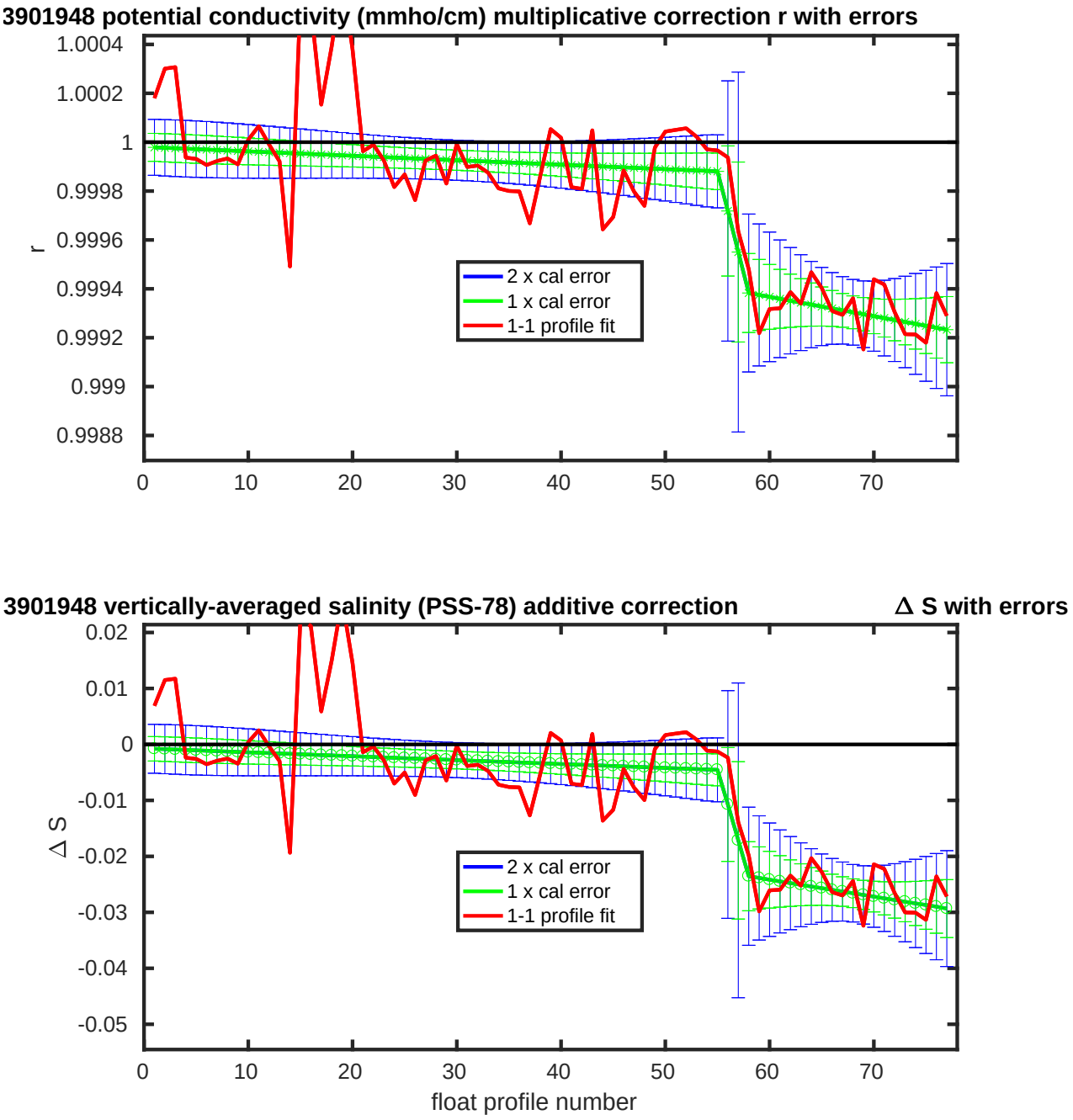

Figure 17: Float 3901948. Potential conductivity (top) and vertically averaged salinity (bottom) with errors.

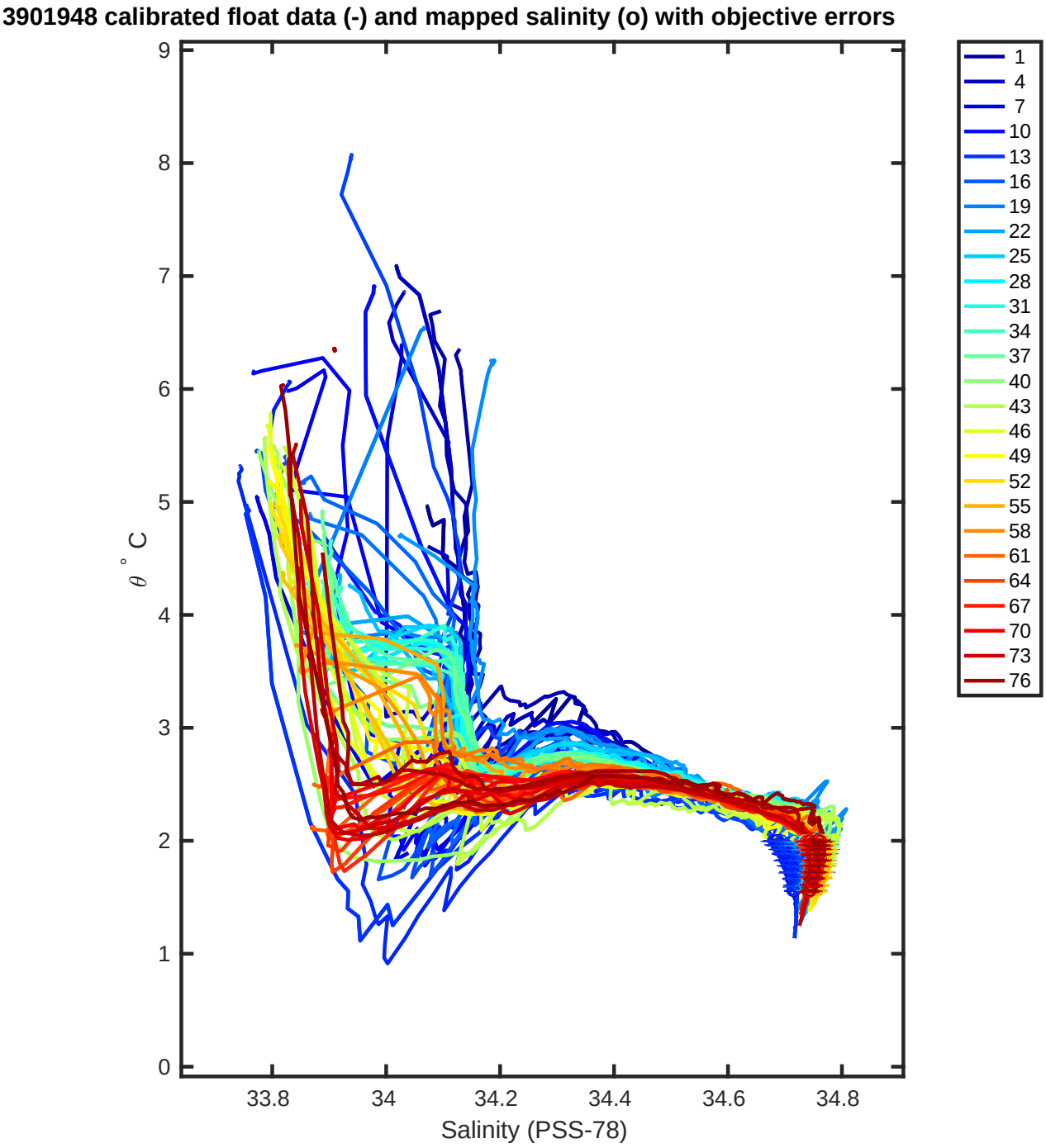

Figure 18: Float 3901948. Calibrated float data and mapped salinity.

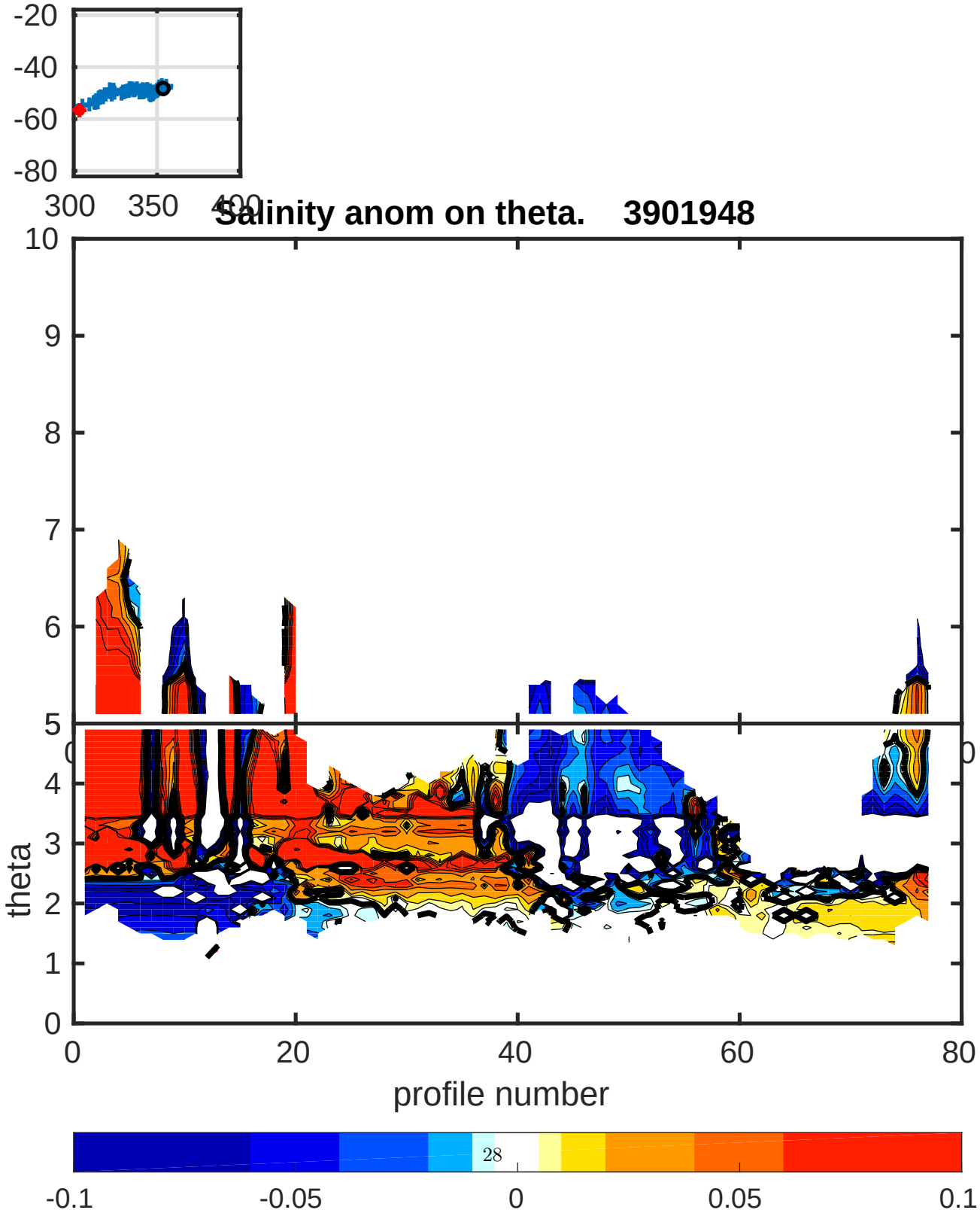

Figure 19: Float 3901948. Salinity anomaly on Theta

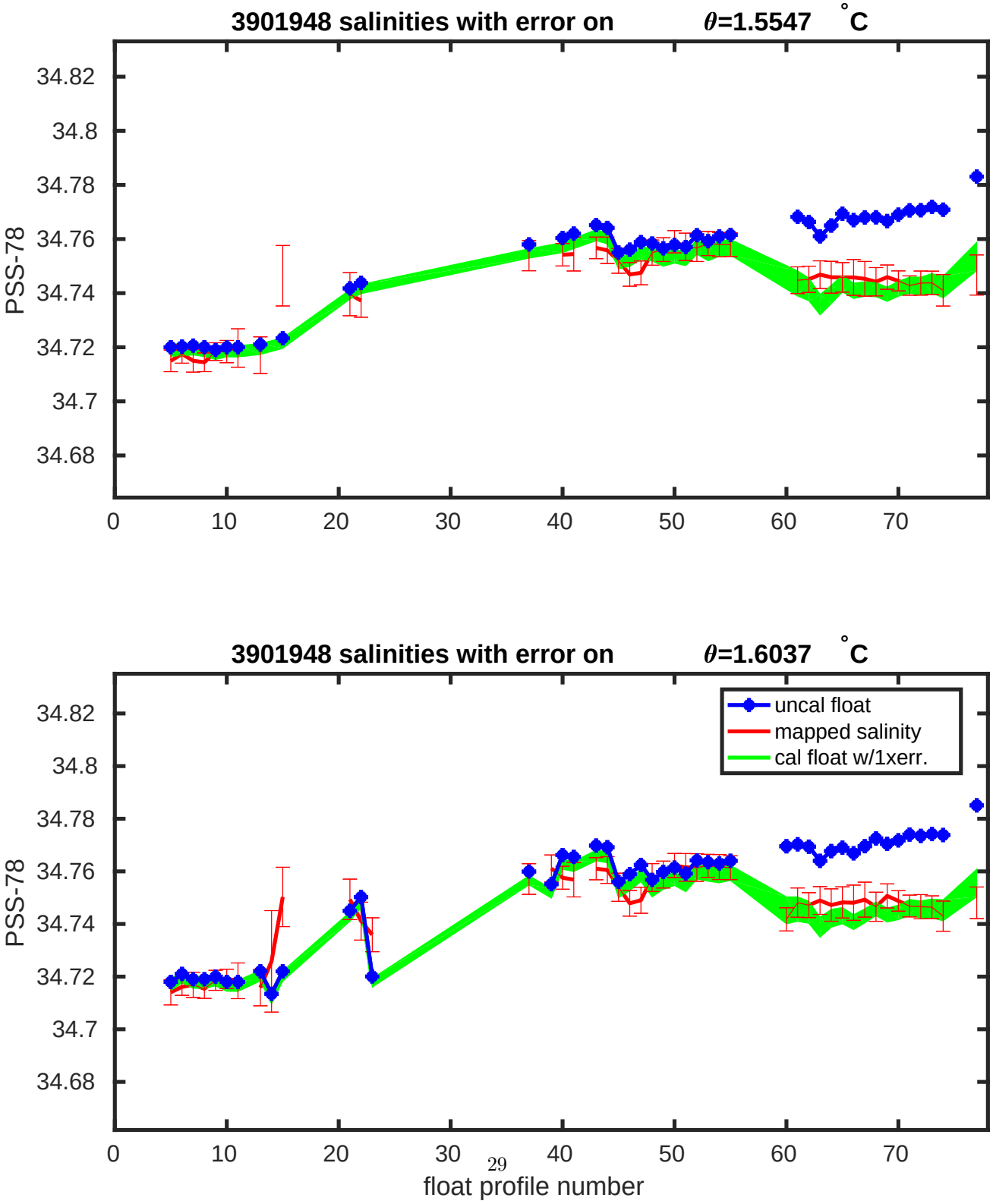

Figure 20: Float 3901948. Salinities with errors on θ.

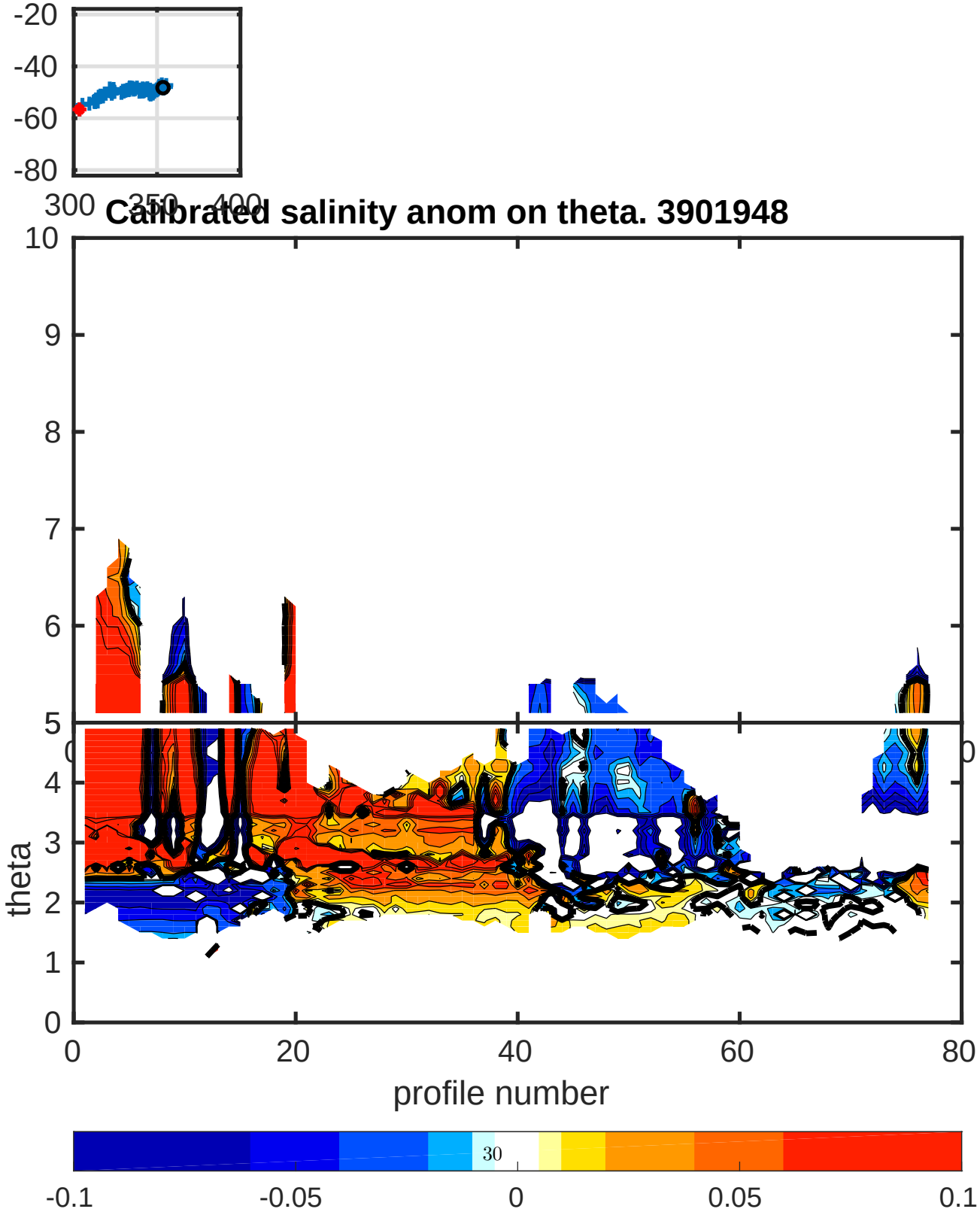

Figure 21: Float 3901948. Calibrated salinity anomaly on θ.

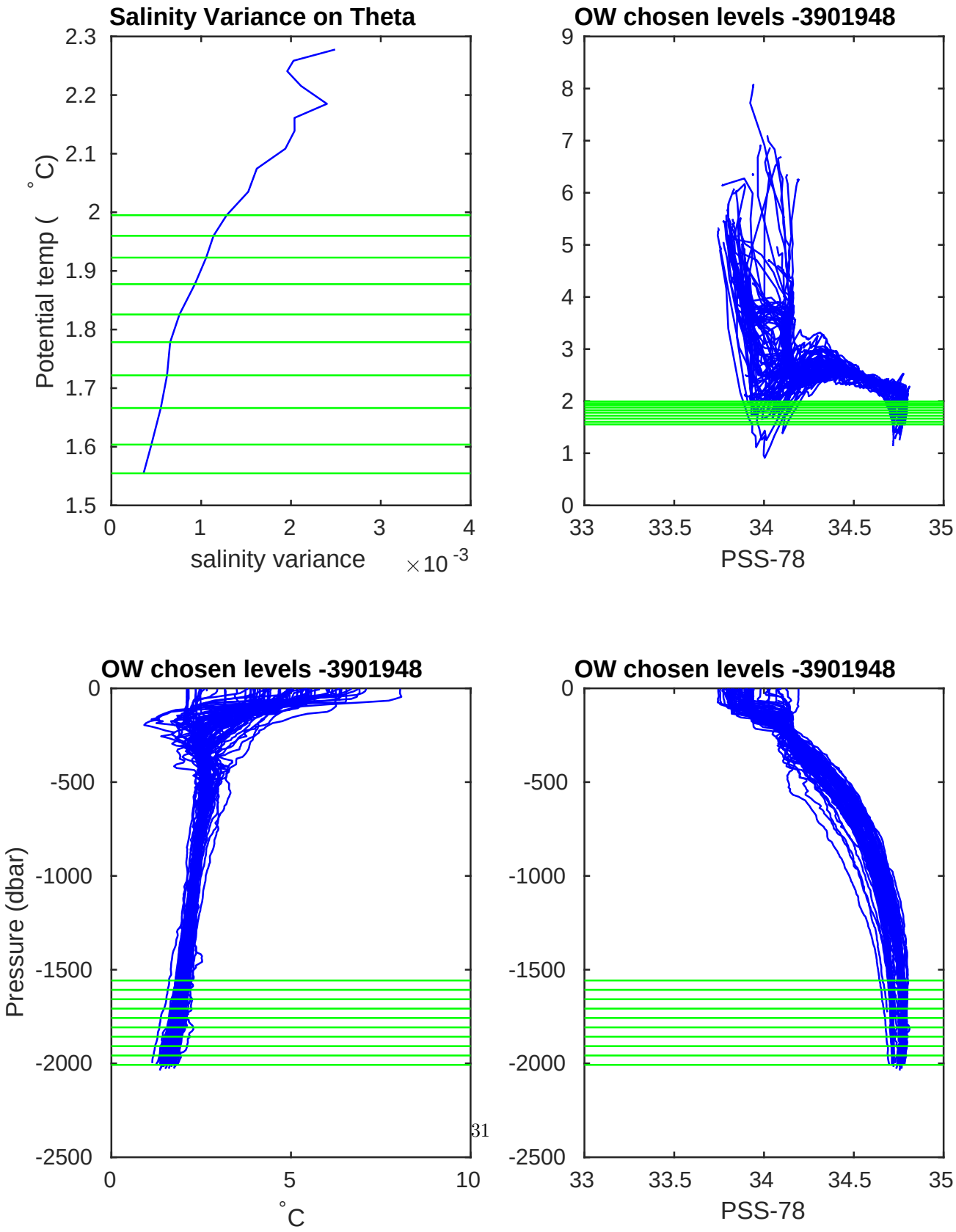

Figure 22: Float 3901948. Salinity, salinity variance on theta and OW chosen levels.

3.3 Summary and Conclusions

4 Final Checks

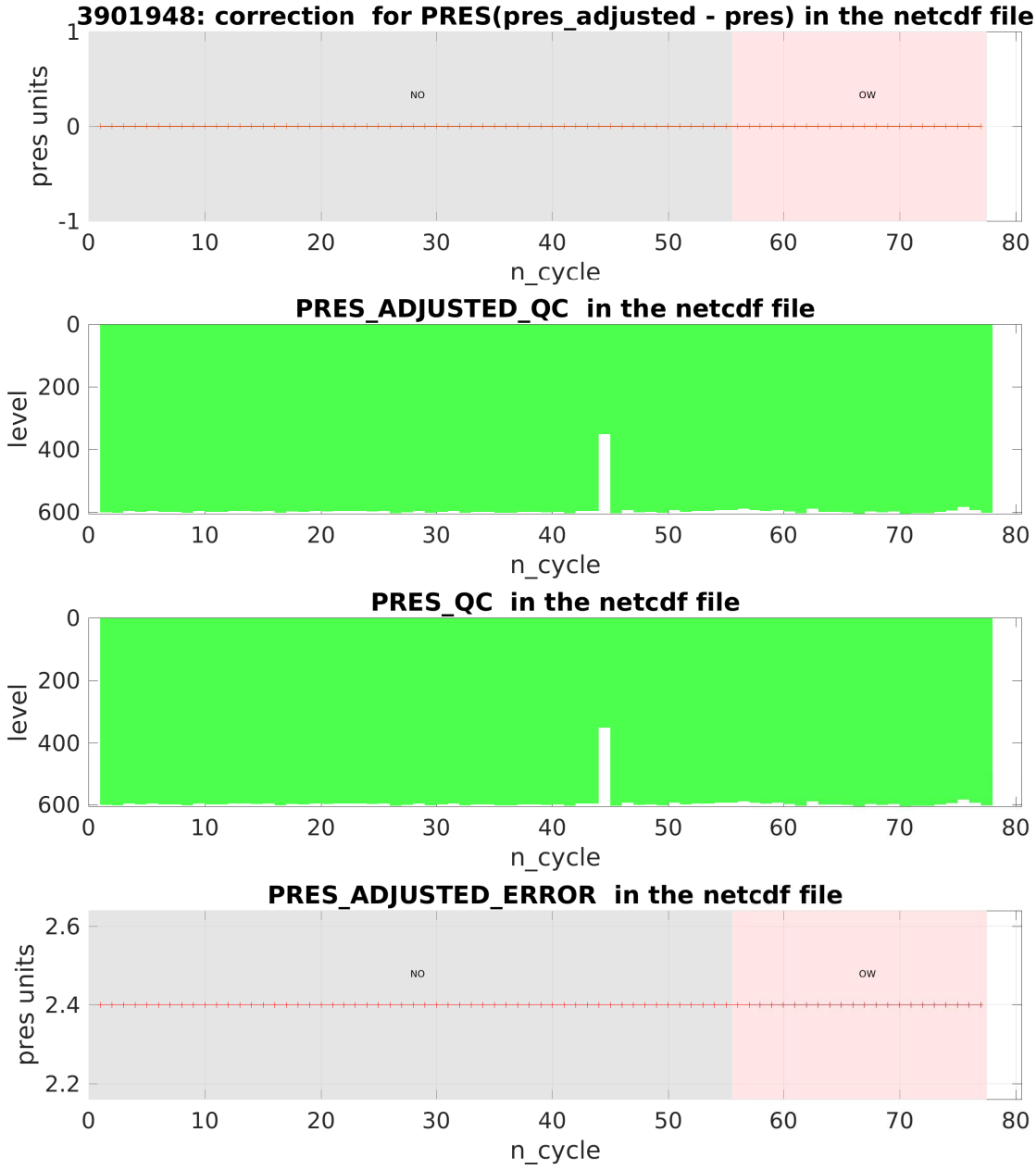

Figure 23: Float 3901948. Time series of applied pressure corrections.

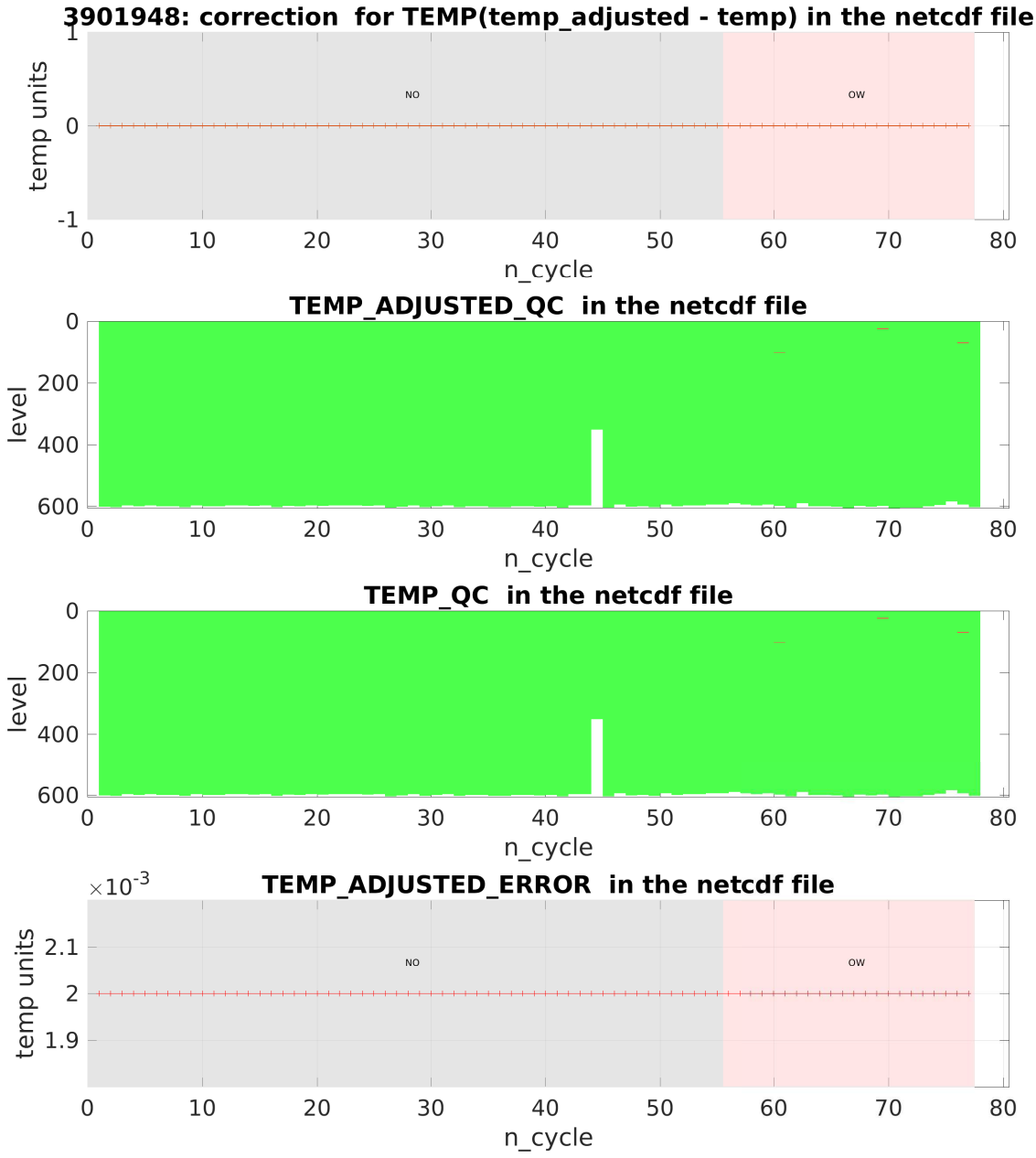

Figure 24: Float 3901948. Time series of applied temperature corrections.

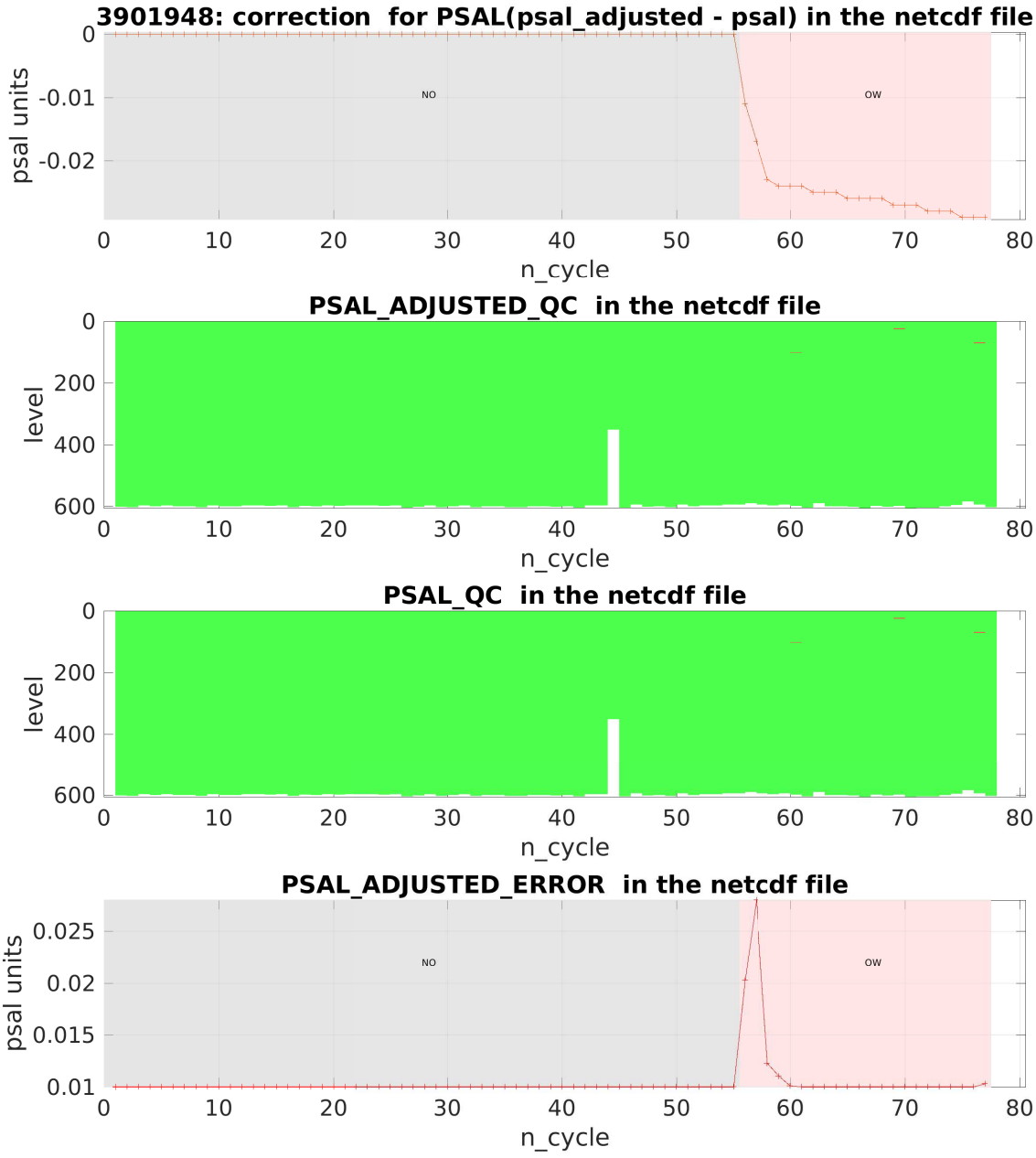

Figure 25: Float 3901948. Time series of applied salinity corrections.