Delayed mode quality control of Argo float 6901924

Kamila Walicka

British National Data Centre (BODC), National Oceanography Centre
Joseph Proudman Building, 6, Brownlow St, Liverpool L3 5DA

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Summary

The pressure sensor in Apex float is not truncated with a negative pressure drift, QC=1, error = 2.4 dbar. Float serial number is in the suspicious potential drifting floats (6628). Floats from 1 to 28 shows a relatively good match error 0.01. From float 29 to 109 there has been reported drift, and salinity correction suggested by OWC method has been applied QC=2. error=0.01.

WMO number	DM correction
6901924	OWC corrections applied

Table 1: Correction applied in delayed mode.

Contents

1 Introduction

Delayed mode analysis was performed for float number 146032 (6901924) 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 146032 (6901924) click on the following link: http://www.ifremer.fr/argoMonitoring/float

2 Quality Check of Argo Float Data

2.1 Time Series of Vertical Distribution of Data

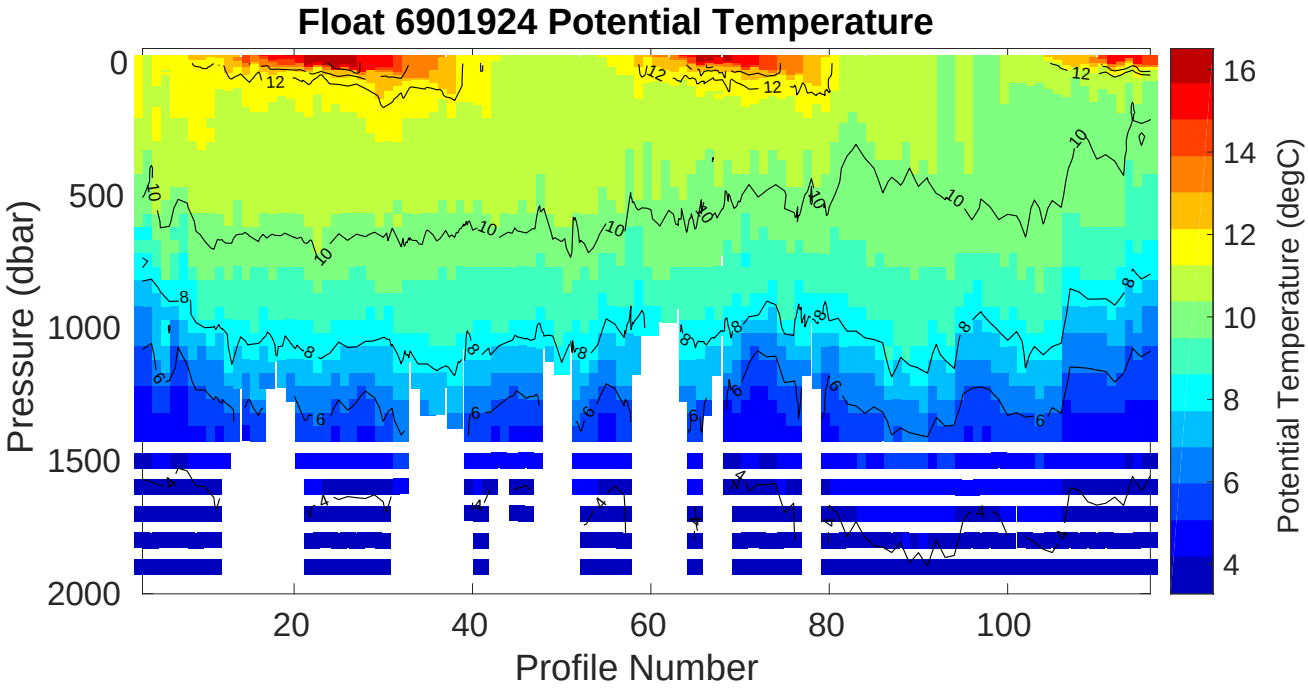

Figure 1: Float 6901924. Time series of the vertical distribution of potential temperature (°C).

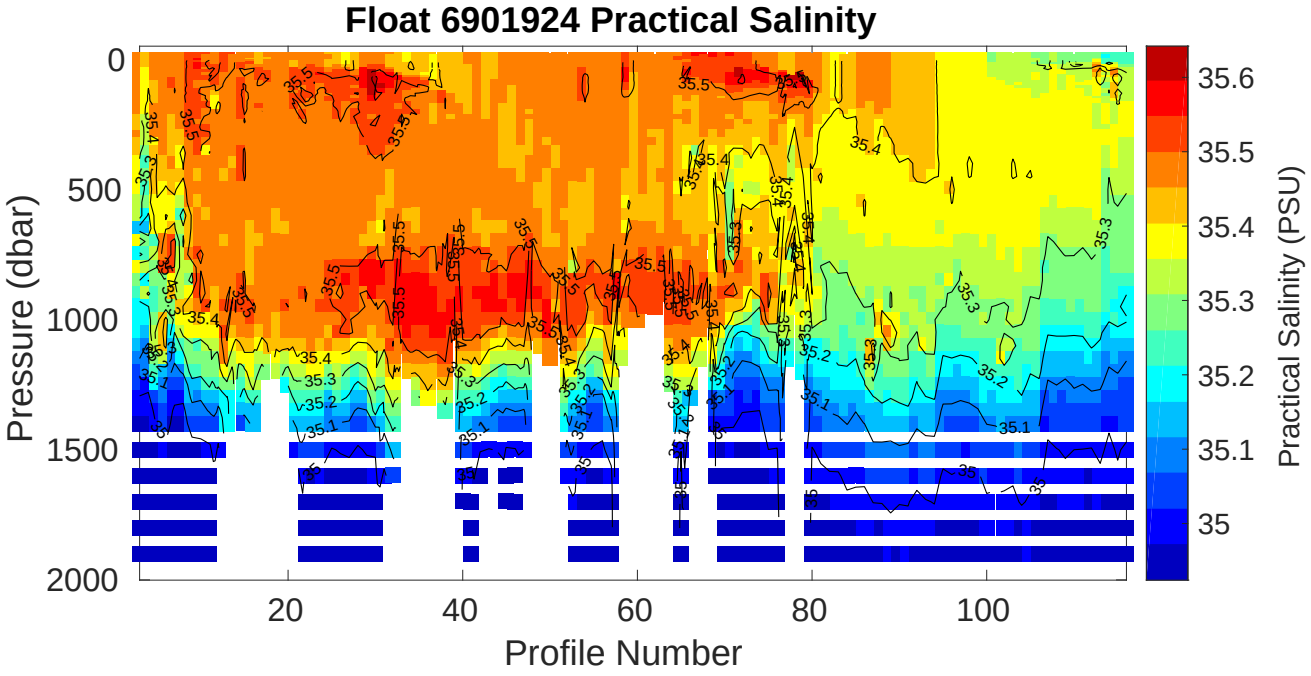

Figure 2: Float 6901924. Time series of the vertical distribution of practical salinity (PSU).

2.2 Comparison between Argo Float and Climatology

The comparison between float 6901924 and data from WMO boxes +/- 10˚of latitude and longitude shows that the Argo profiles fit within the expected ranges (Figures **??**, **??** and **??**). This result confirms that float 6901924 represents relatively stable and consistent with the expected physical conditions in this region.

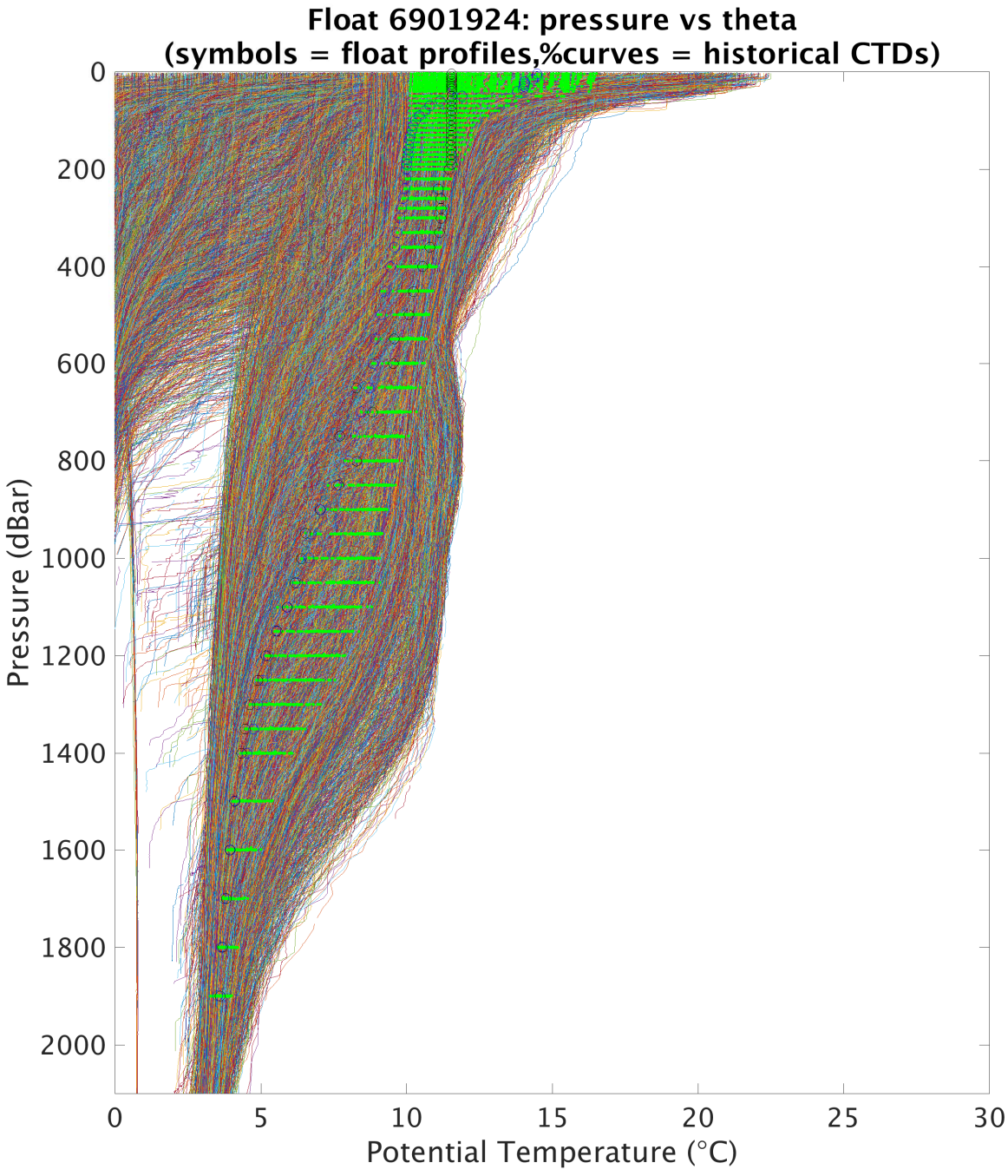

Figure 3: Float 6901924. Float profile of potential temperature (°C) plotted with climatology from the spatial range of 10 °. The black and blue cycles indicates the first and the last Argo profile, respectively. Green symbols represent other Argo profiles.

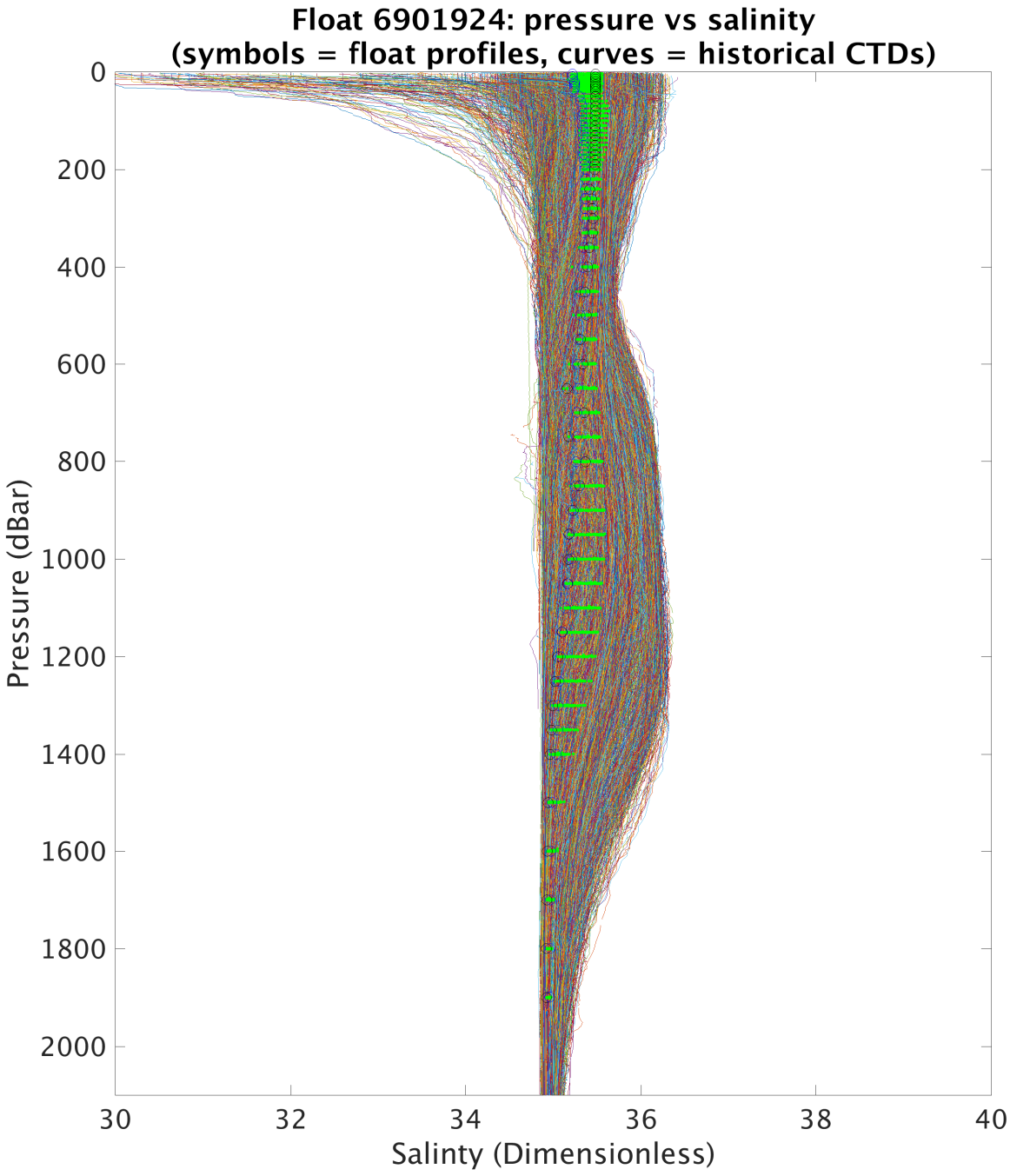

Figure 4: Float 6901924. Float profile of salinity (dimensionless) plotted with climatology from the spatial range of 10 °. The black and blue cycles indicates the first and the last Argo profile, respectively. Green symbols represent other Argo profiles.

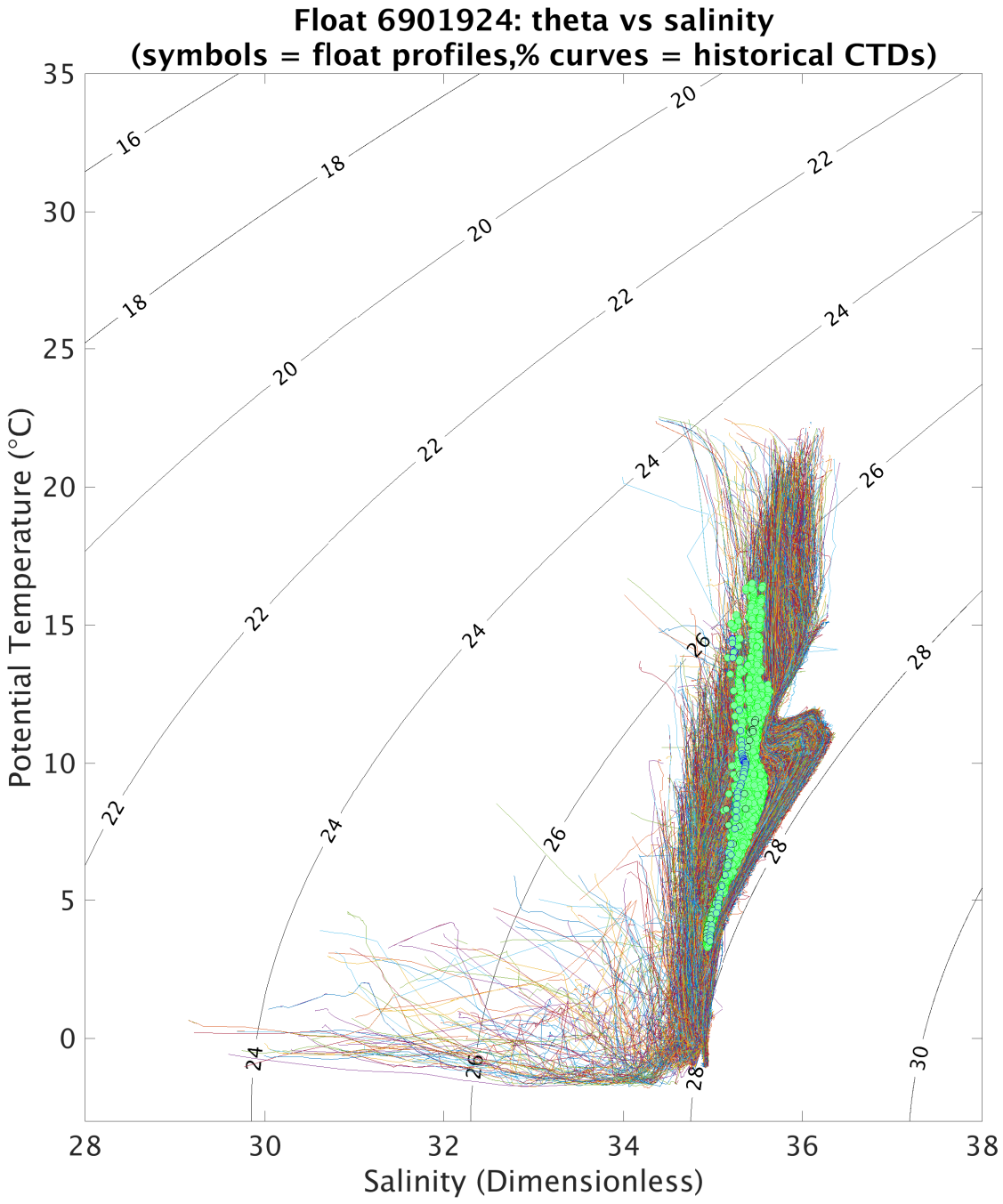

Figure 5: Float 6901924. Theta/S plotted with climatology from the spatial range of 10 °. The black and blue cycles indicates the first and the last Argo profile, respectively. Green symbols represent other Argo profiles.

2.3 Satellite Altimeter comparison

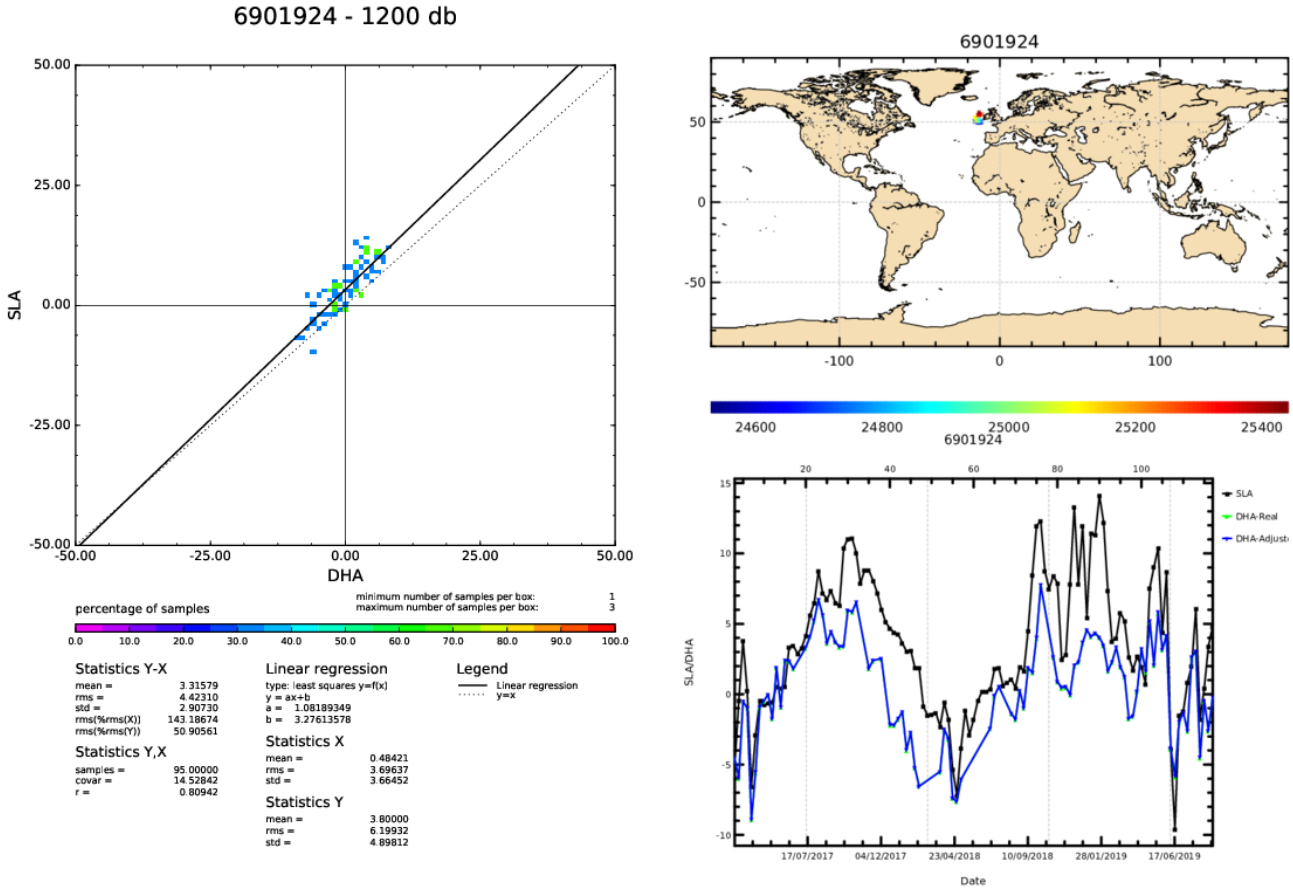

Figure 6: Float 6901924. The comparison betweeen the Sea Surface Height(SSH) from the satellite altimetry and Dynamic Height Anomaly(DHA)extracted from the Argo float temperature and salinity data

3 Pressure Adjustment for APEX Floats

Float 6901924 is the Apex float, where the pressure sensor is not auto-corrected to zero while at the sea surface, hence the pressure data in Apex float have to be corrected during processing in delayed-mode. The procedures of adjusting sea surface pressure are described in Argo User's Manual, 2017 (https://archimer.ifremer.fr/doc/00228/33951/32470.pdf). The pressure sensor in Apex float 6901924 is not truncated, QC=1, error = 2.4 dbar (Figure **??**).

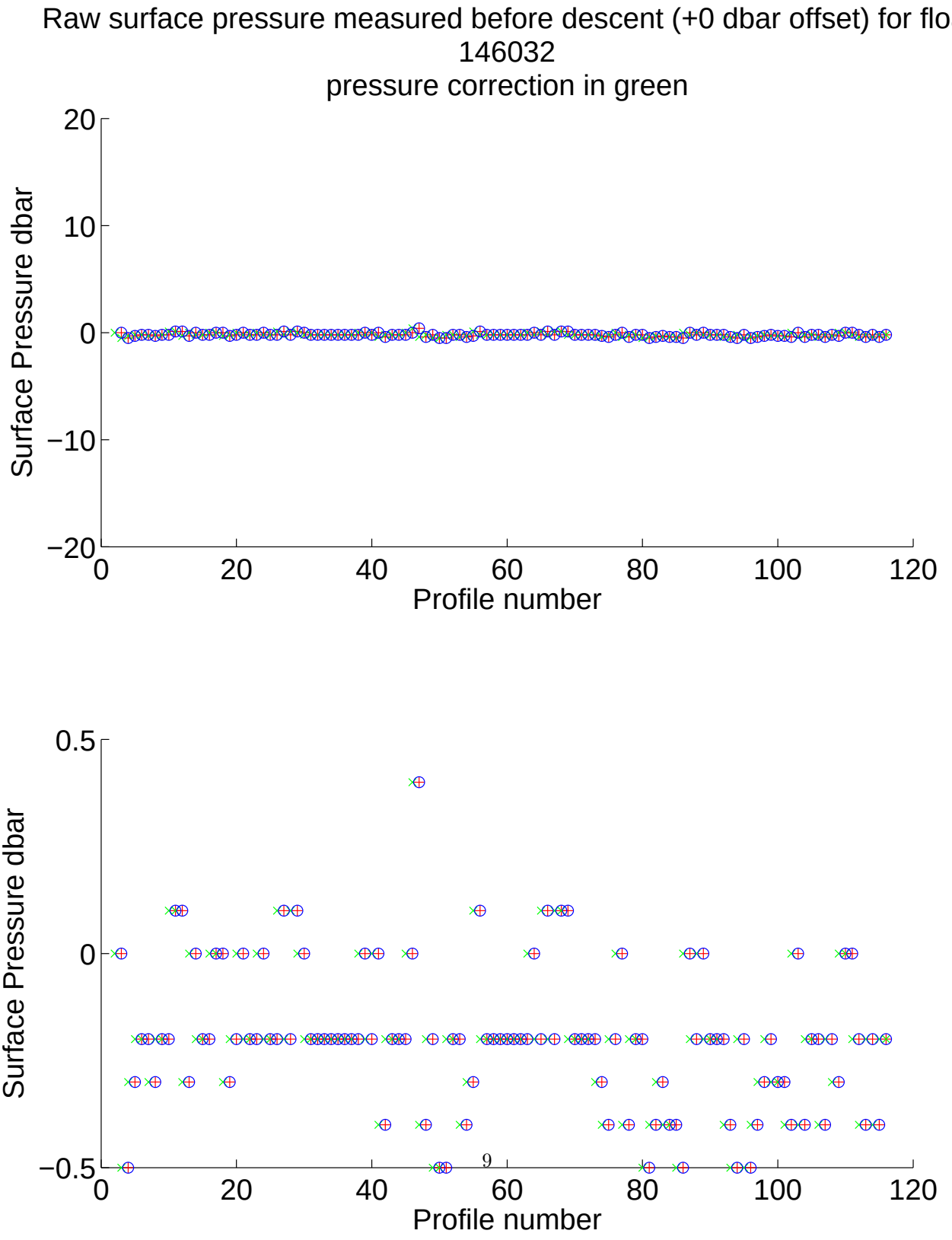

Figure 7: Float 6901924. Sea surface pressure data. The red cross indicate the raw pressure before float descent, recorded after sending data to GDAC. Blue circle indicate pressure value in the real-time. Green rotated cross shows the pressure correction applied from the previous float cycle.

4 Correction of Salinity Data

4.1 Comparison between Argo floats and CTD Climatlogy

4.1.1 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/bot_
HISTORICAL_ARGO_PREFIX=/argo_profiles/ARGO_for_DMQC_2018V01/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

% ================================
%
%    Objective Mapping Parameters
%

% max number of historical casts used in objective mapping
CONFIG_MAX_CASTS=300

% 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=0

% spatial decorrelation scales, in degrees
MAPSCALE_LONGITUDE_LARGE=2
MAPSCALE_LONGITUDE_SMALL=0.5
MAPSCALE_LATITUDE_LARGE=3.2
MAPSCALE_LATITUDE_SMALL=0.8

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

% temporal decorrelation scale, in years
MAPSCALE_AGE=0.69
MAPSCALE_AGE_LARGE=5

% 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=250
```

4.1.2 Results

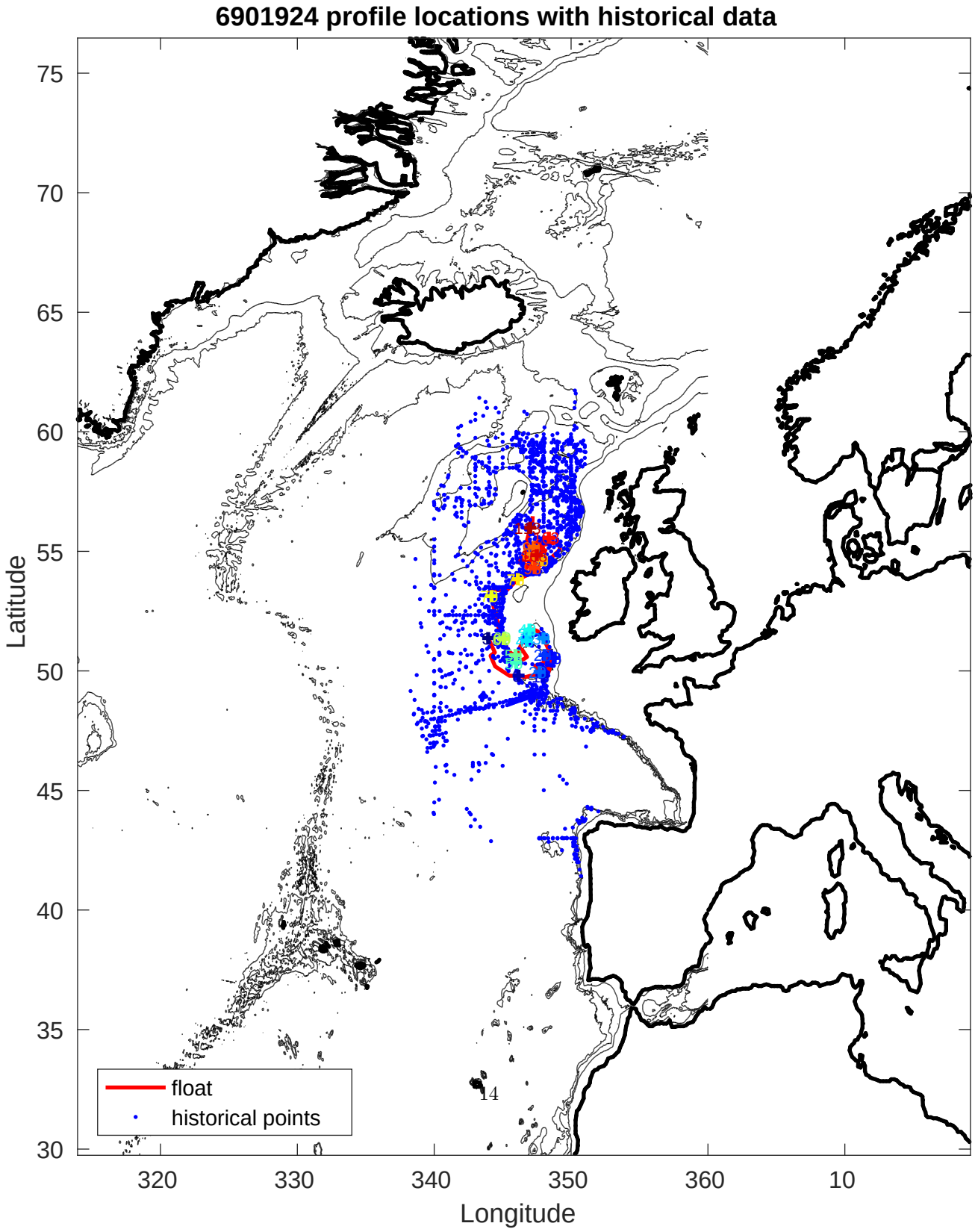

Figure 8: Float 6901924. Trajectory of the float with historical CTD data. The black contours indicate the bathymetry at 0, 200, 1000 and 2000 m.

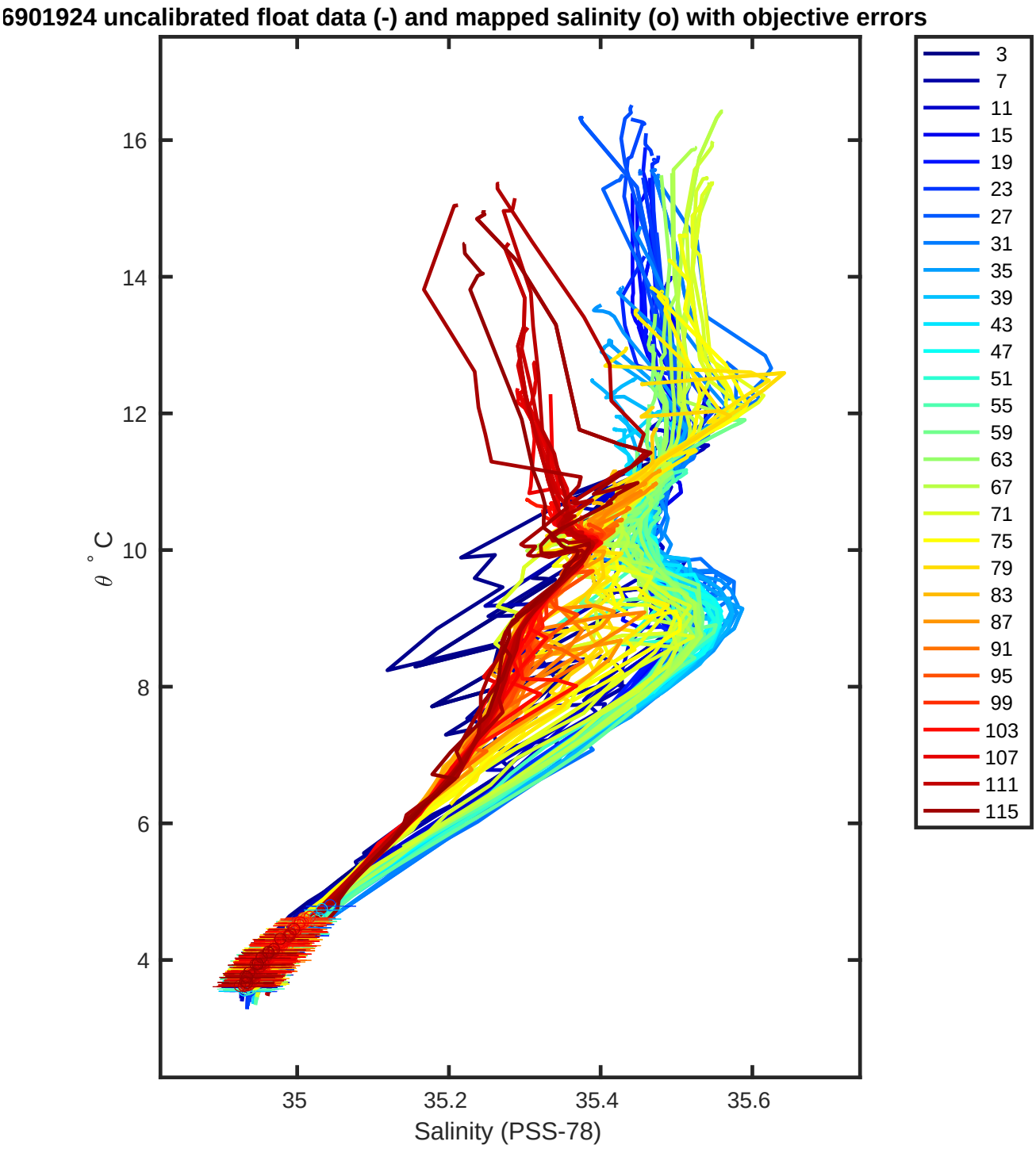

Figure 9: Float 6901924. Uncalibrated float data and mapped salinity.

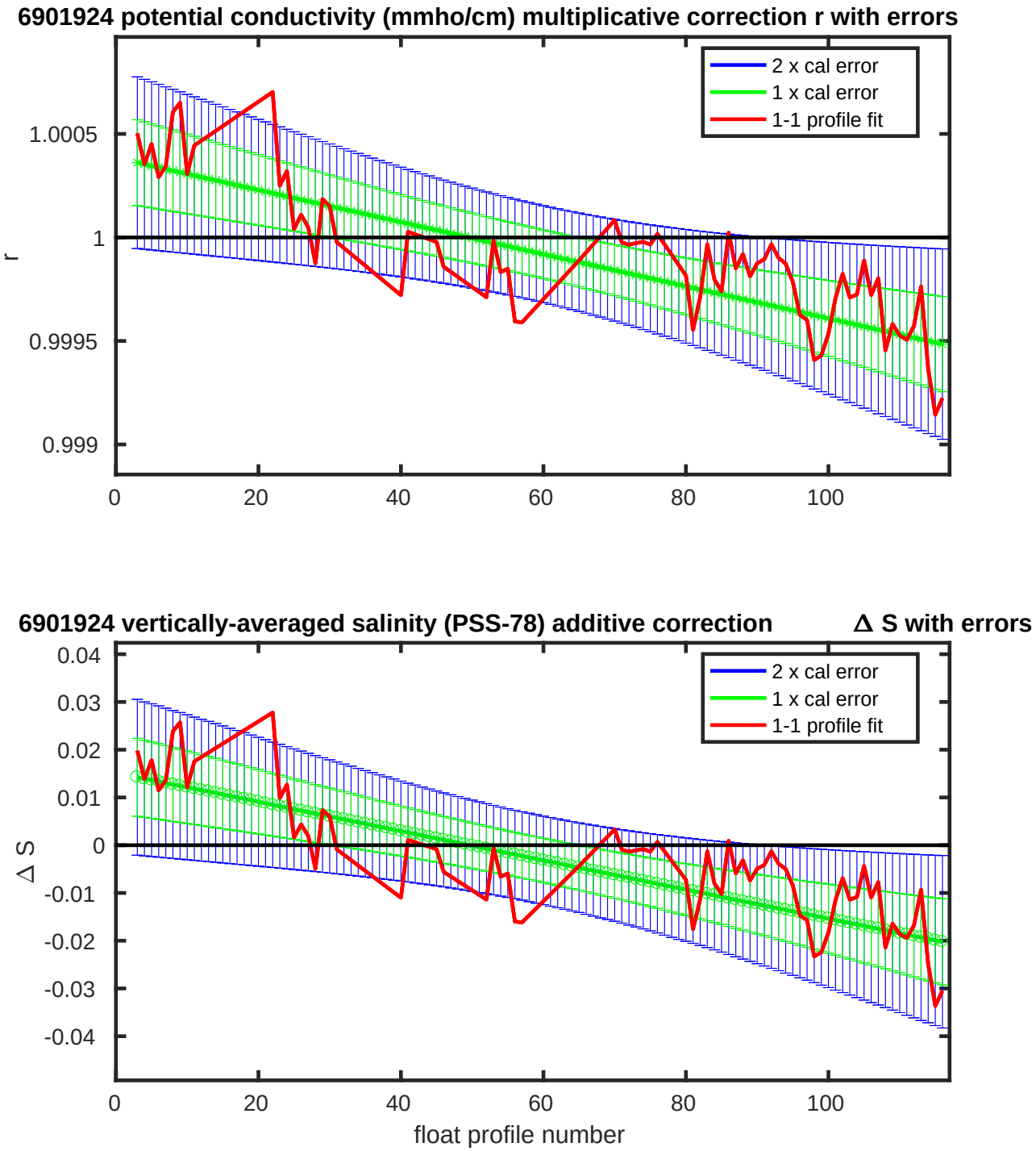

Figure 10: Float 6901924. Potential conductivity (top) and vertically averaged salinity (bottom) with errors.

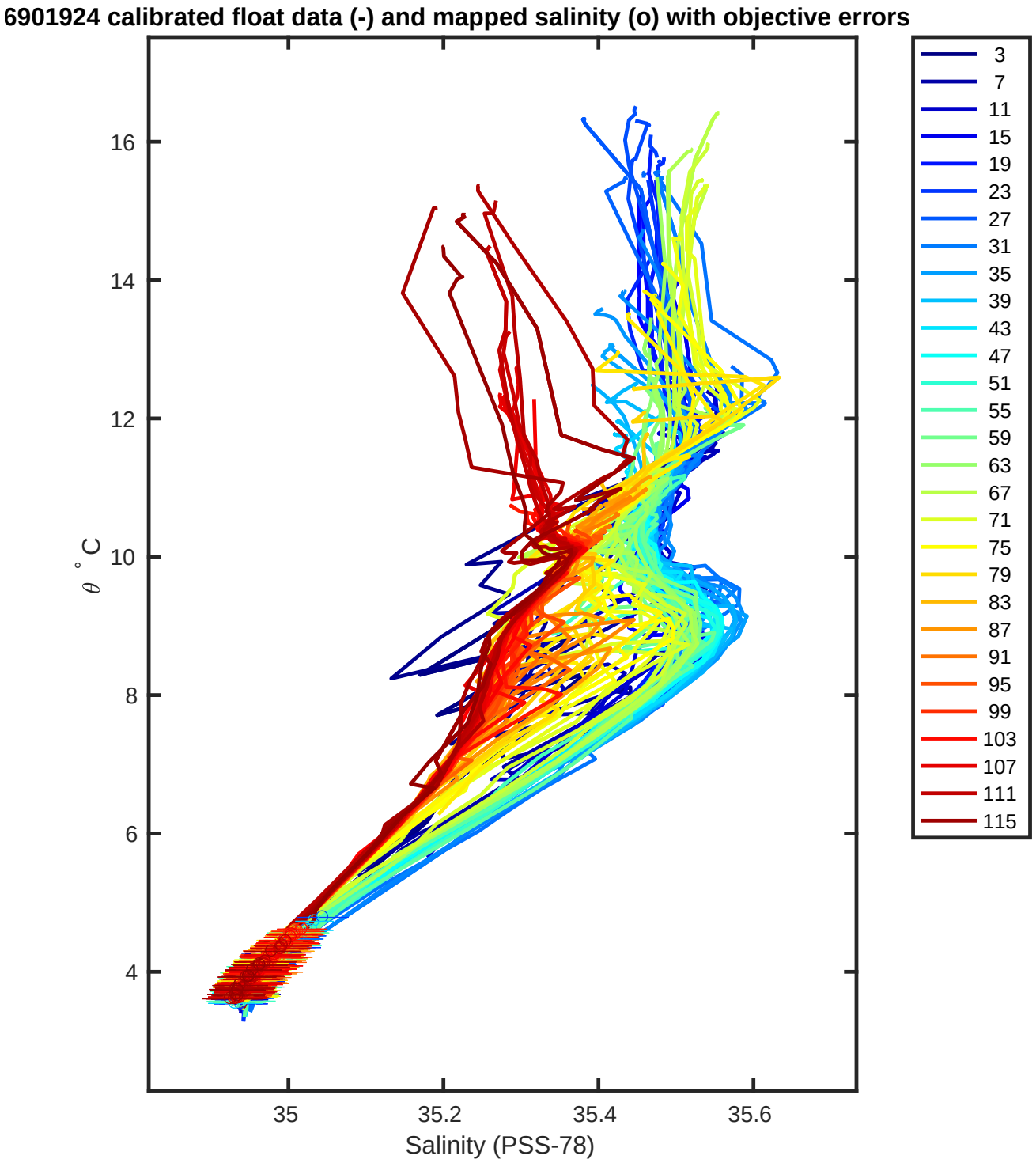

Figure 11: Float 6901924. Calibrated float data and mapped salinity.

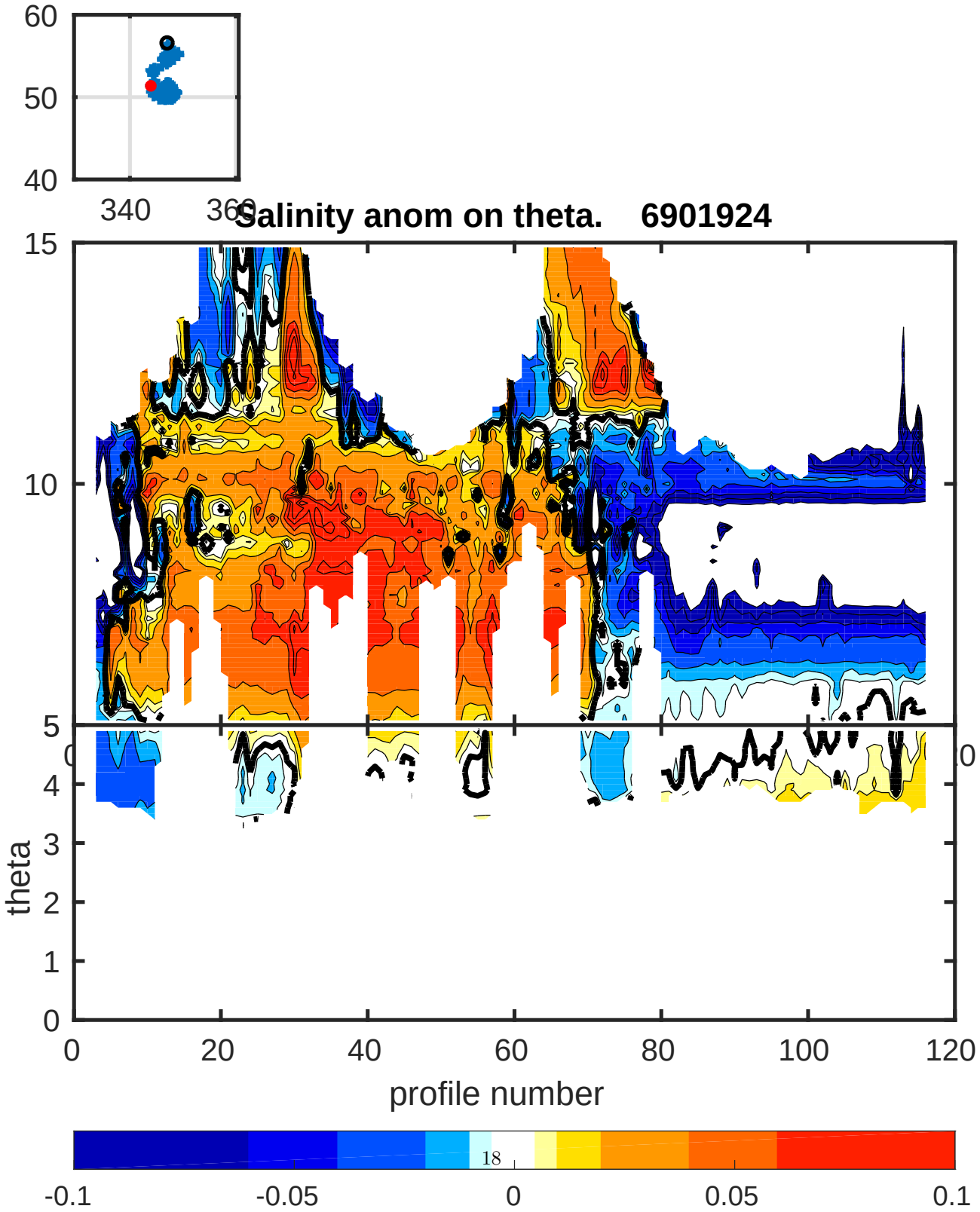

Figure 12: Float 6901924. Salinity anomaly on θ levels.

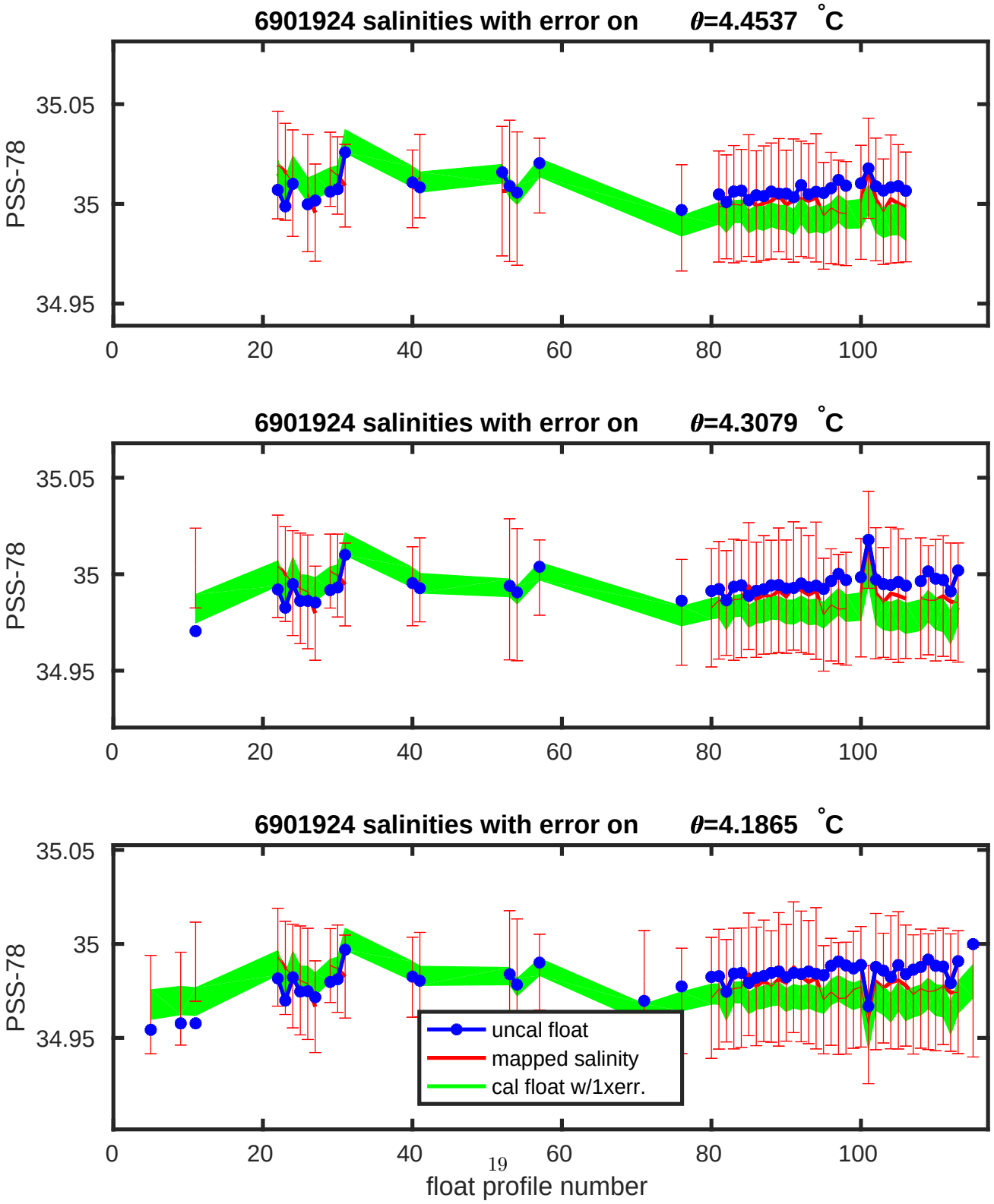

Figure 13: Float 6901924. Salinities with errors on θ levels.

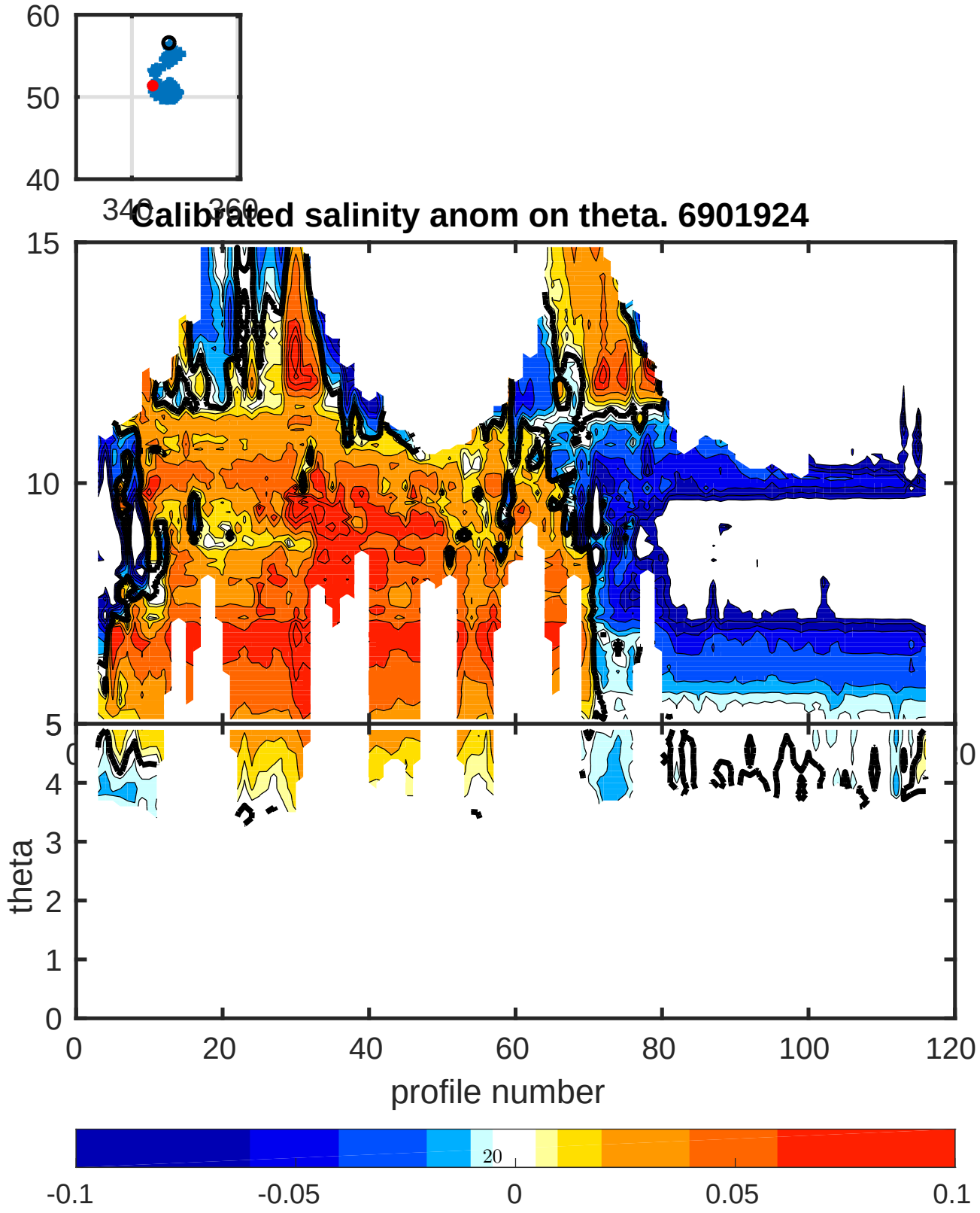

Figure 14: Float 6901924. Calibrated salinity anomaly on θ levels.

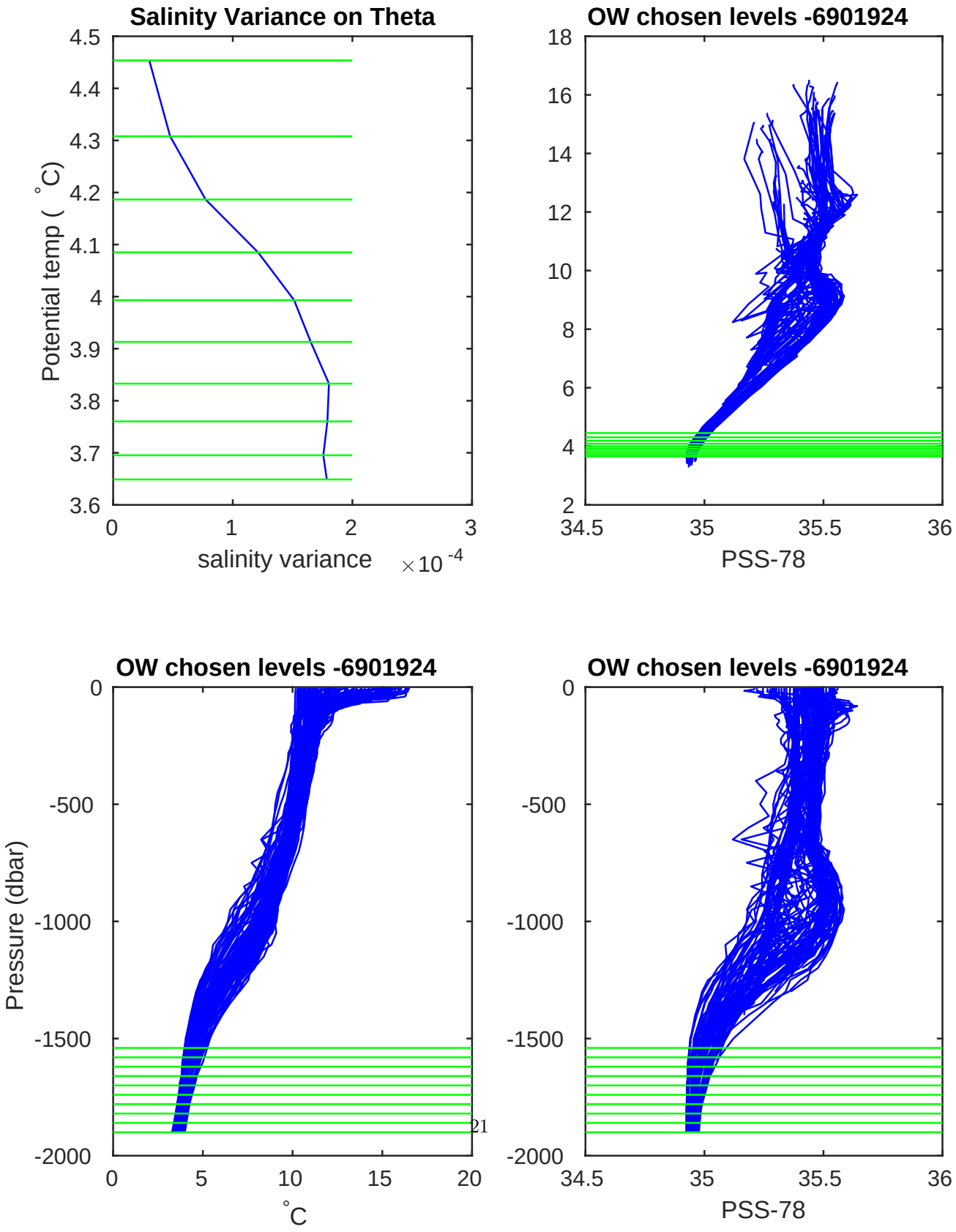

Figure 15: Float 6901924. Salinity, salinity variance on theta and OW chosen levels.

4.2 Comparison between Argo floats and Argo Climatlogy

4.2.1 Configuration

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% ================================
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HISTORICAL_ARGO_PREFIX=/argo_profiles/ARGO_for_DMQC_2018V01/argo_

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%
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FLOAT_CALSERIES_PREFIX=calseries_
FLOAT_CALIB_POSTFIX=.mat

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CONFIG_WMO_BOXES=wmo_boxes_argo.mat
CONFIG_SAF=TypicalProfileAroundSAF.mat

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MAPSCALE_LONGITUDE_SMALL=0.5
MAPSCALE_LATITUDE_LARGE=3.2
MAPSCALE_LATITUDE_SMALL=0.8

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MAPSCALE_PHI_LARGE=0.1
MAPSCALE_PHI_SMALL=0.02

% temporal decorrelation scale, in years
MAPSCALE_AGE=0.69
MAPSCALE_AGE_LARGE=5

% 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=250
```

4.2.2 Results

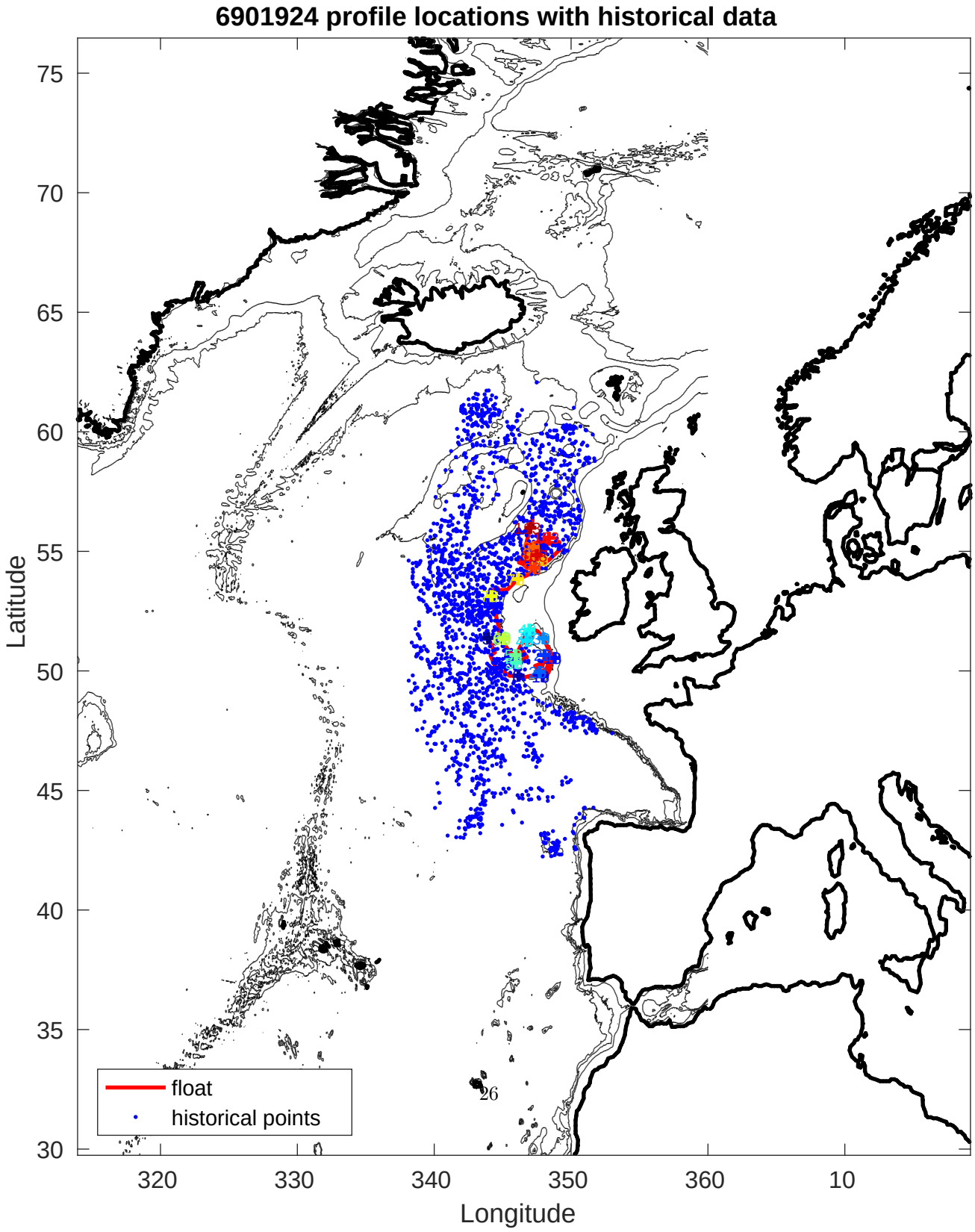

Figure 16: Float 6901924. Trajectory of the float with historical CTD data. The black contours indicate the bathymetry at 0, 200, 1000 and 2000 m.

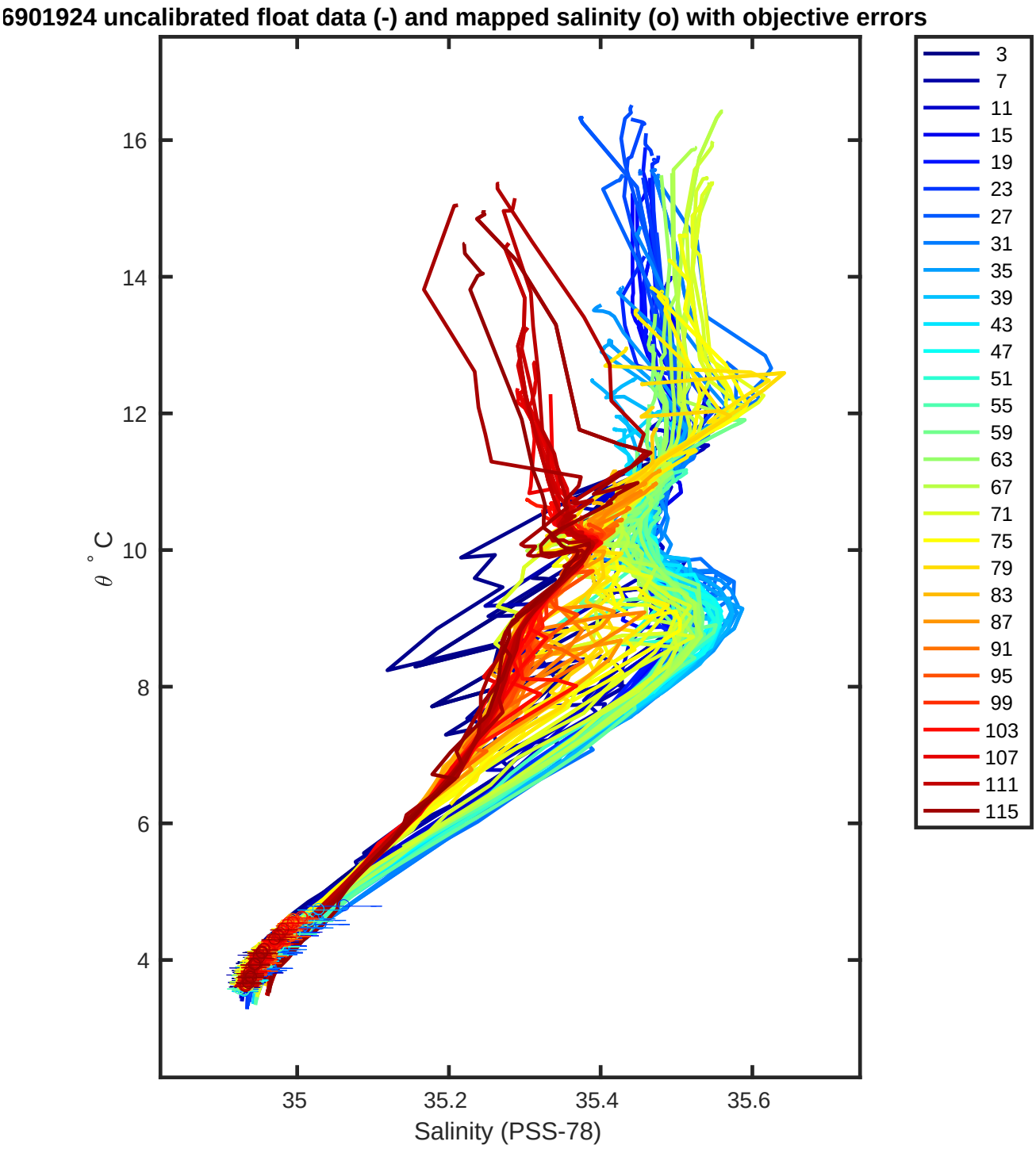

Figure 17: Float 6901924. Uncalibrated float data and mapped salinity.

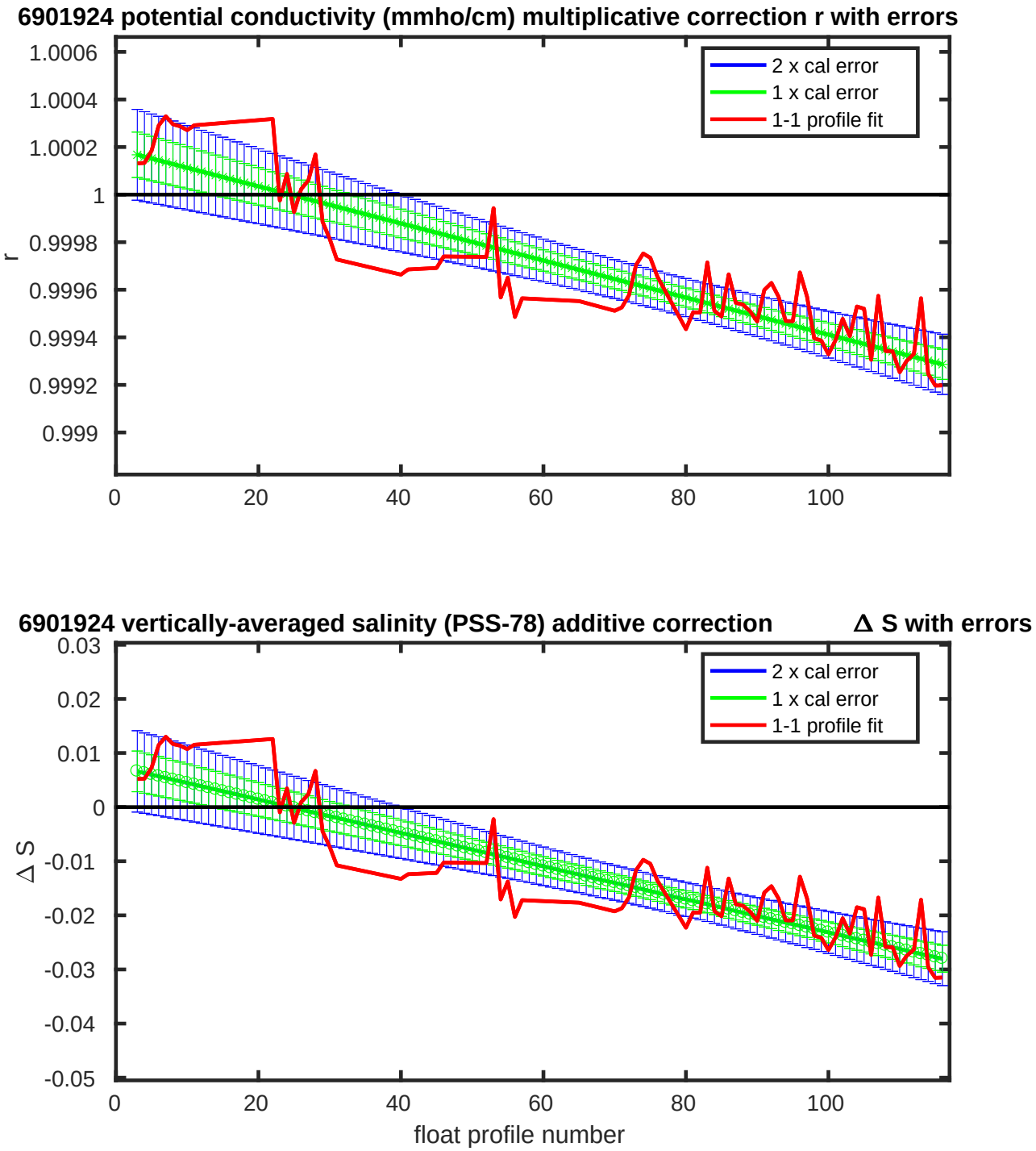

Figure 18: Float 6901924. Potential conductivity (top) and vertically averaged salinity (bottom) with errors.

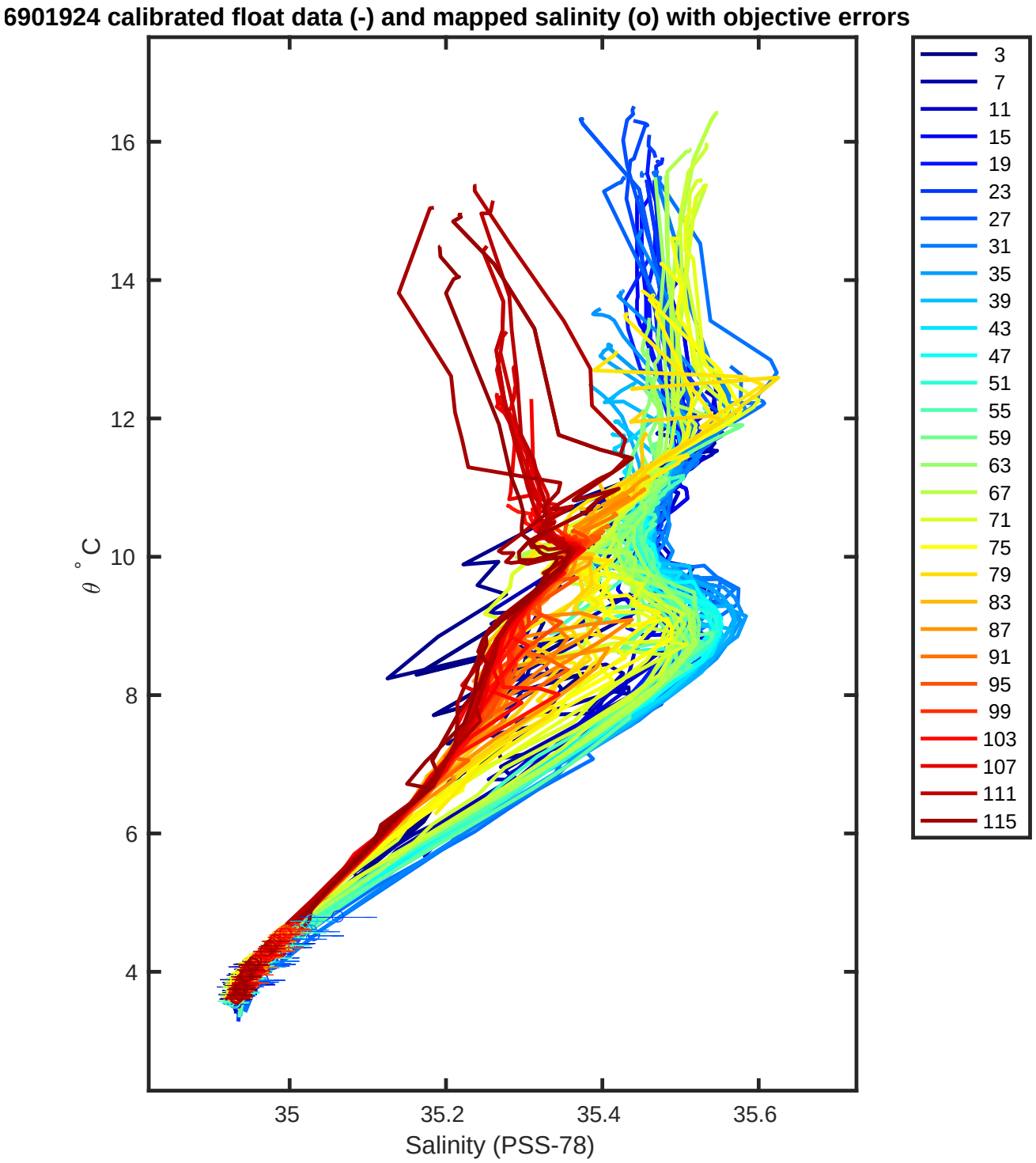

Figure 19: Float 6901924. Calibrated float data and mapped salinity.

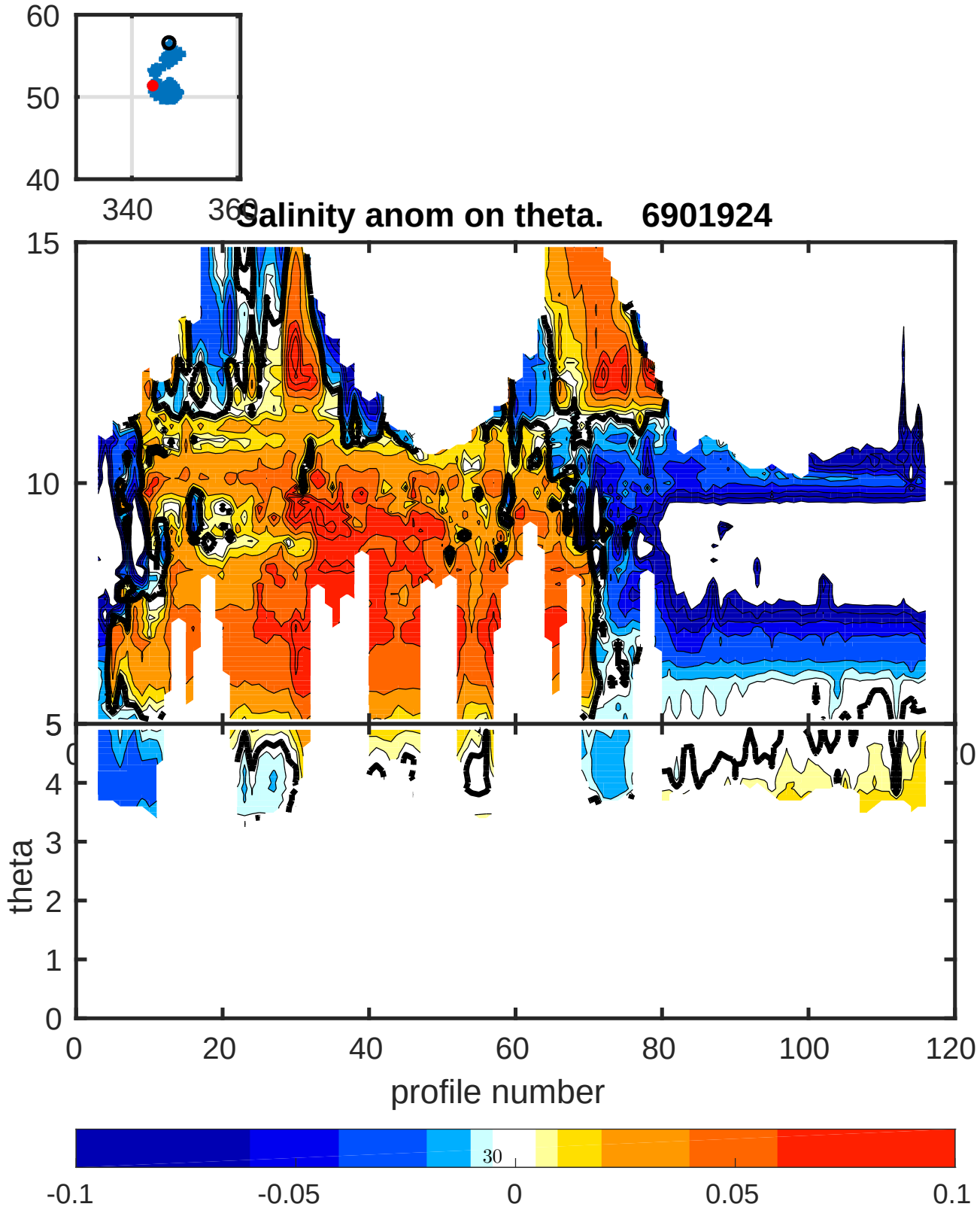

Figure 20: Float 6901924. Salinity anomaly on Theta

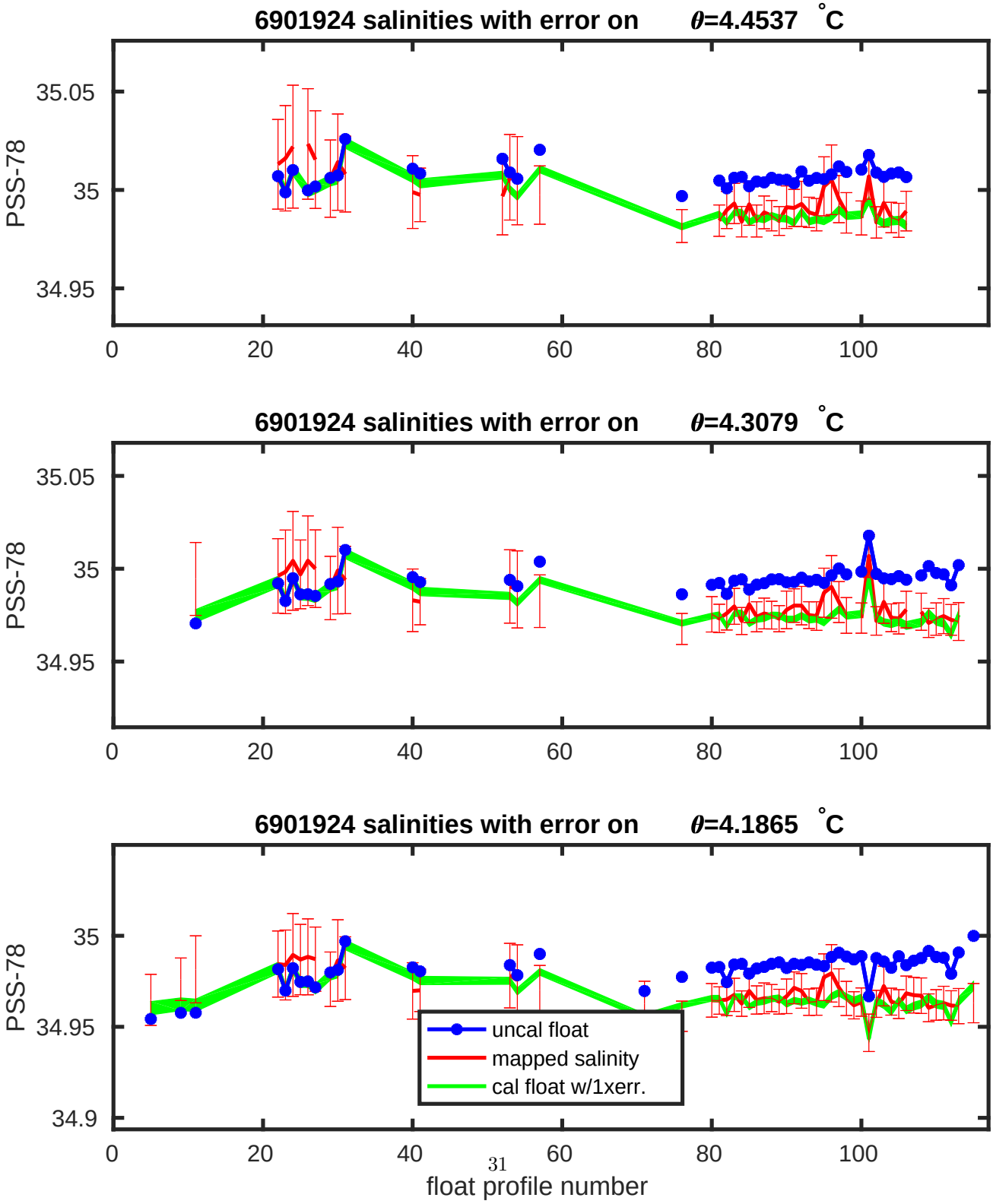

Figure 21: Float 6901924. Salinities with errors on θ.

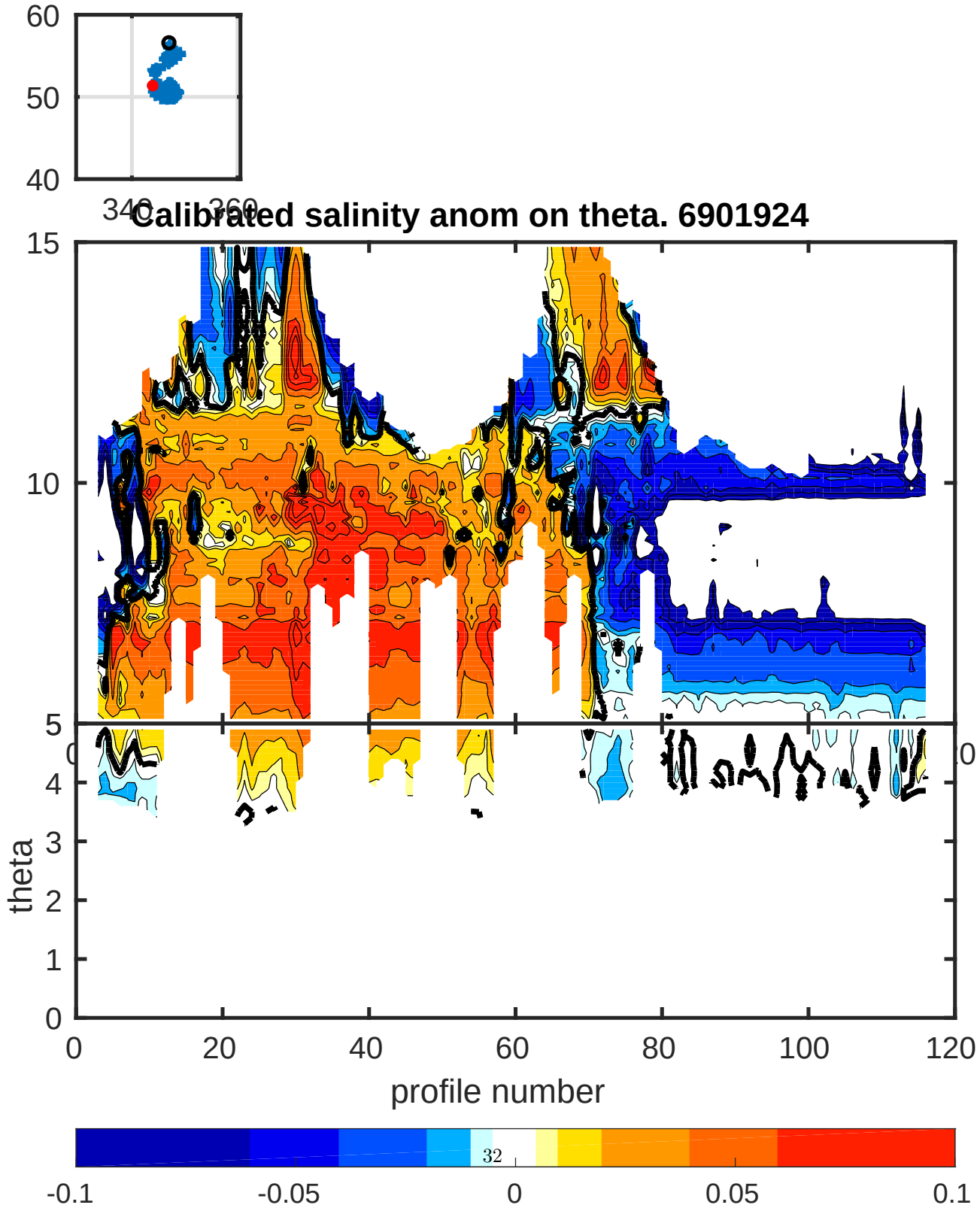

Figure 22: Float 6901924. Calibrated salinity anomaly on θ.

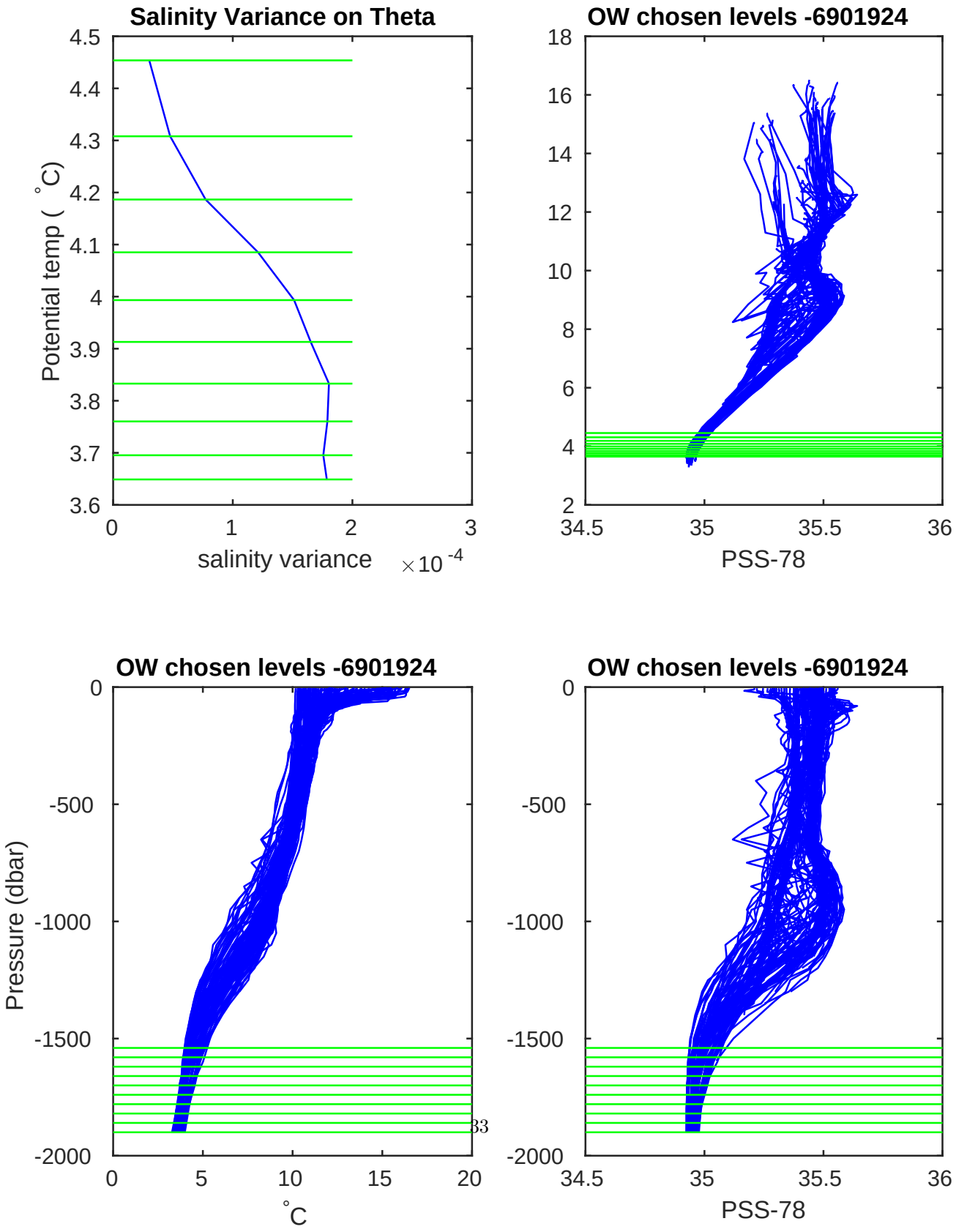

Figure 23: Float 6901924. Salinity, salinity variance on theta and OW chosen levels.

4.3 Summary and Conclusions

The Apex float was adjusted using the sea surface pressure data. The pressure sensor is not truncated, QC=1, error=2.4 dbar. The theta levels were set below 1500 m. Floats from 1 to 28 shows a relatively good match error 0.01. From float 29 to 109 there has been reported drift, and salinity correction suggested by OWC method has been applied QC=2. error=0.01.

5 Final Checks

Figure 24: Float 6901924. Time series of applied pressure corrections.

Figure 25: Float 6901924. Time series of applied temperature corrections.

Figure 26: Float 6901924. Time series of applied salinity corrections.