Delayed Mode Quality Control of Argo float 6901174

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Float decision

Profile 1-263 QC=1, error=0.01, salty offset detected offset, offset -0.015 applied. Profiles 264-336, salty drift detected QC=4.

Contents

1   Introduction

Delayed mode analysis was performed for float number mb004 (WMO: 6901174) 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 6901174click on the following link: http://www.ifremer.fr/argoMonitoring/float/6901174

2   Quality Check of Argo Float Data

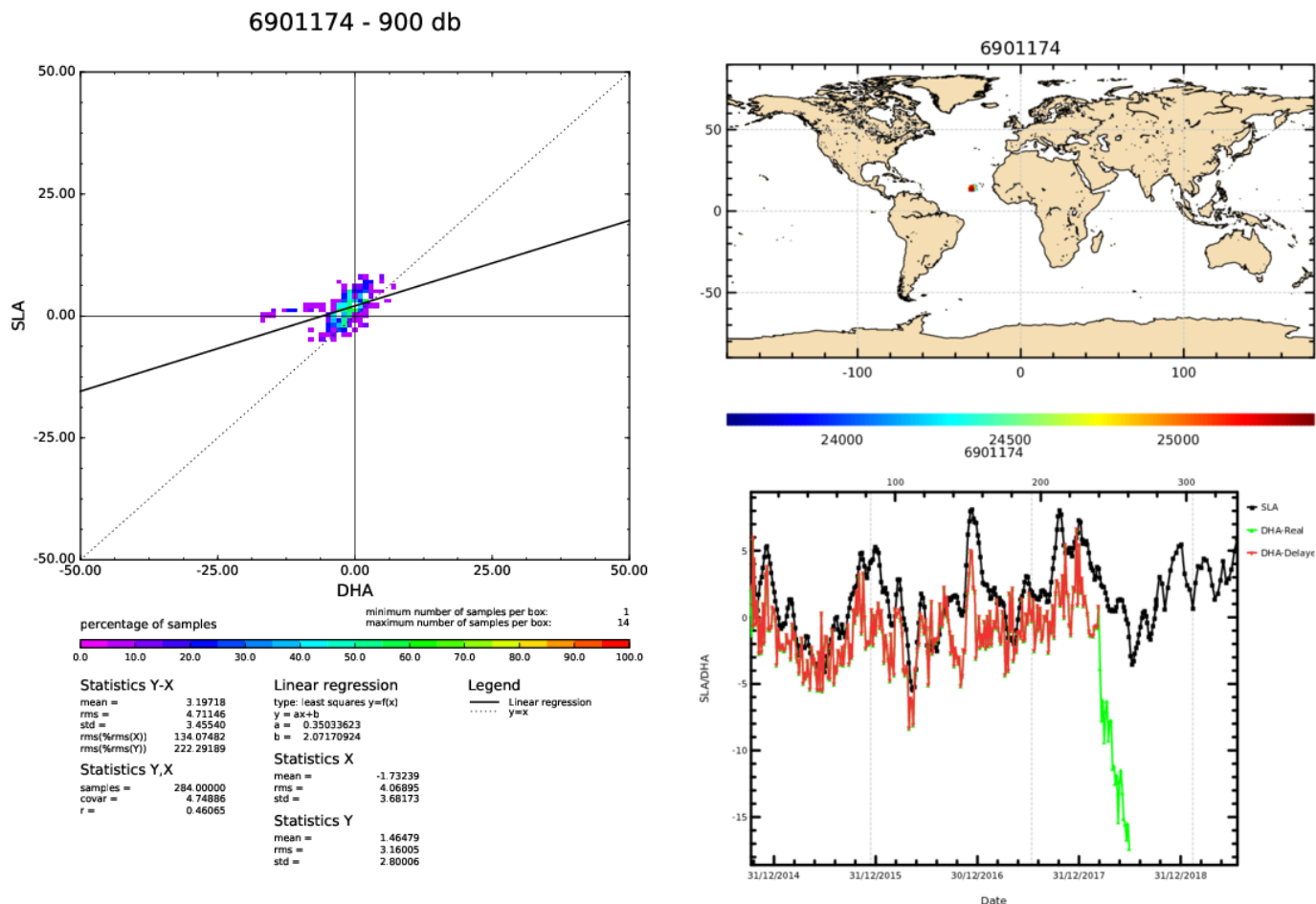## 2.1   Satellite Altimeter comparison

Figure 1:   Float 6901174.   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/).

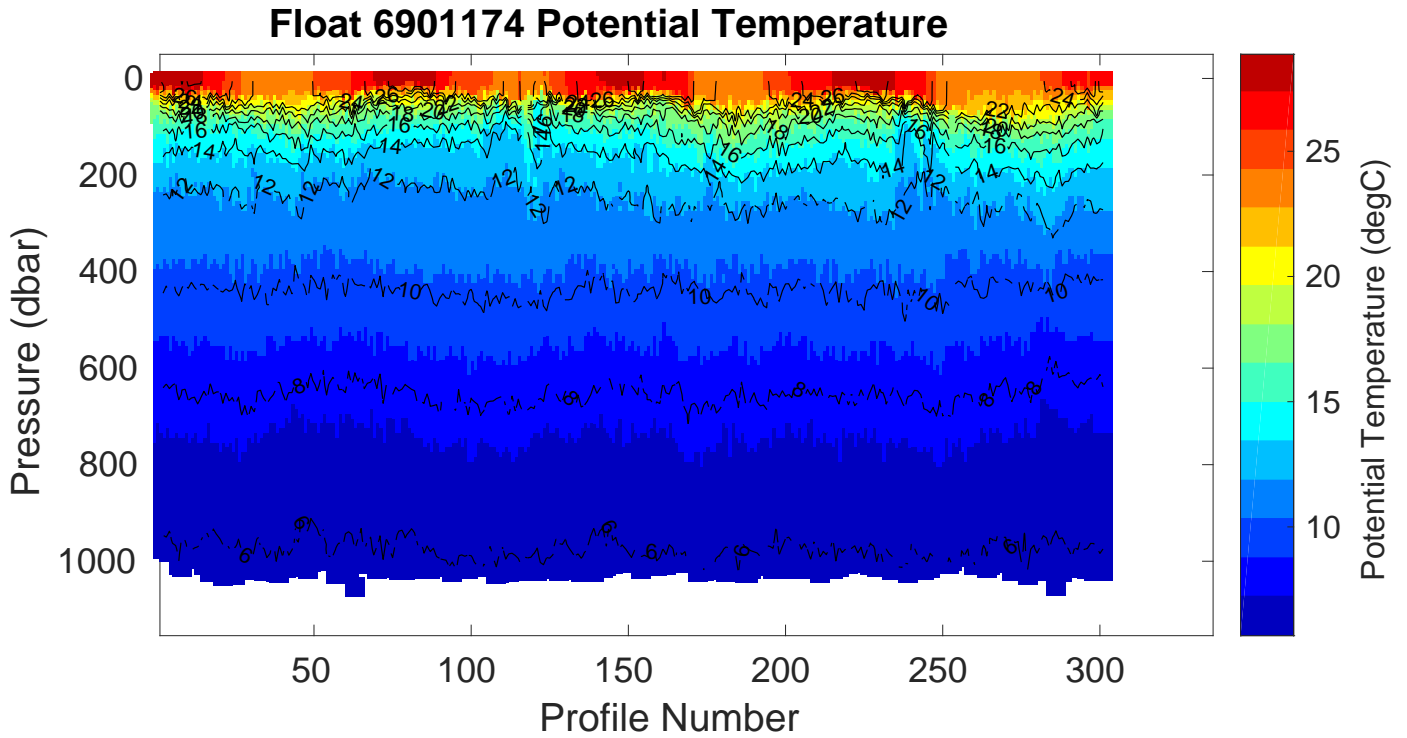## 2.2 Time Series of Vertical Distribution of Data

Float 6901174 Potential Temperature

Figure 2: Float 6901174. Time series of the vertical distribution of potential temperature (°C).

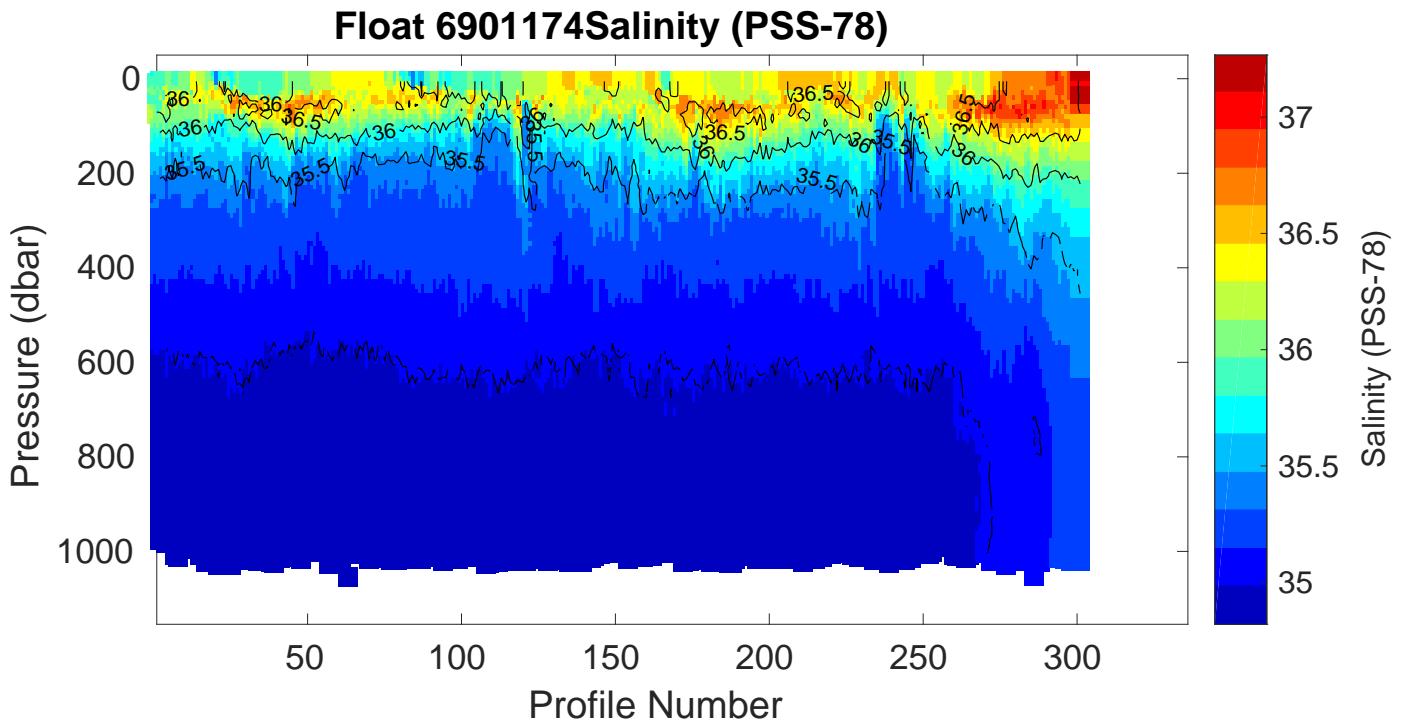### Float 6901174 Salinity (PSS-78)

Figure 3: Float 6901174. Time series of the vertical distribution of salinity (PSS-78).
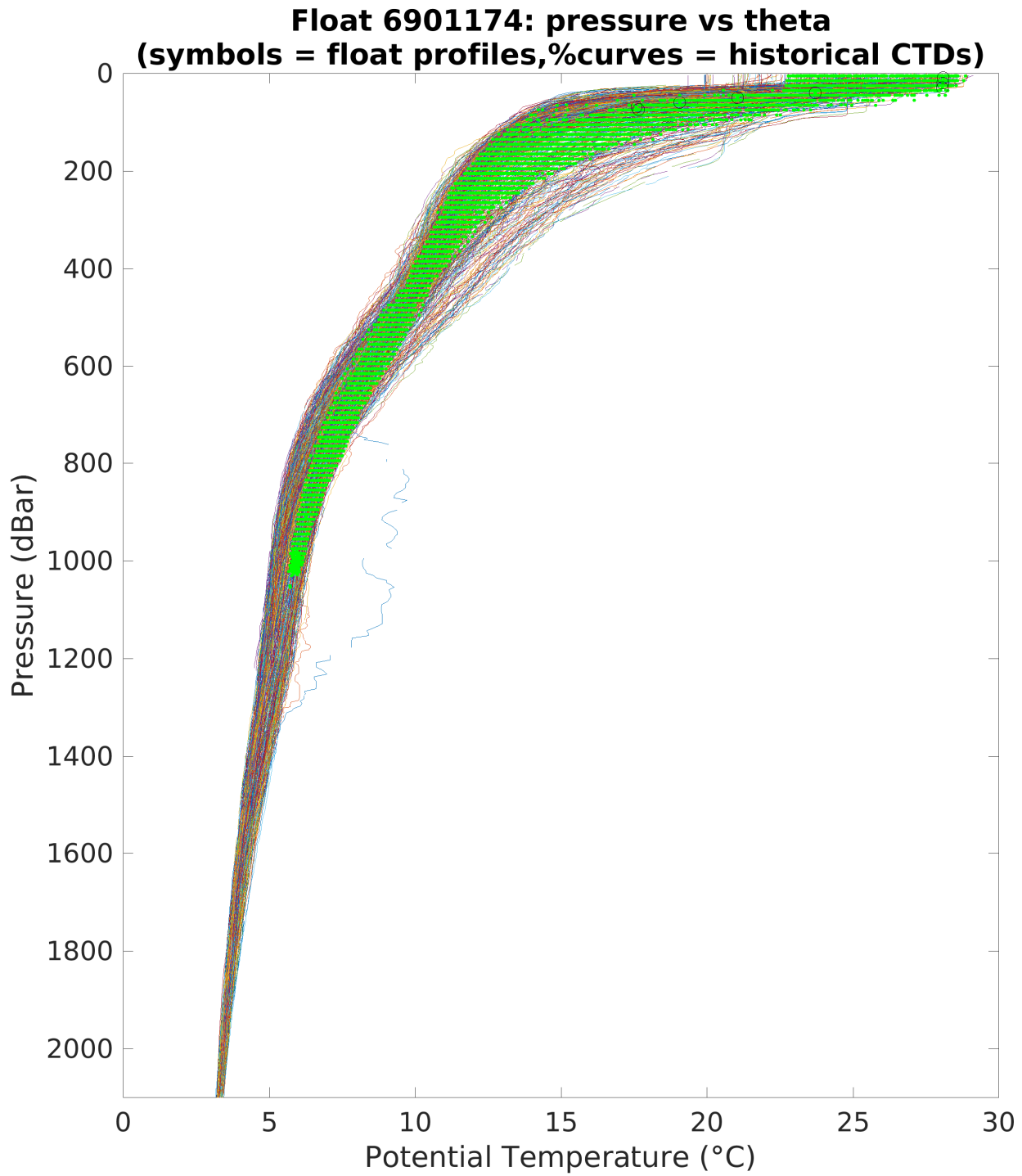
2.3 Comparison between Argo Float and Climatology

Figure 4: Float 6901174. 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
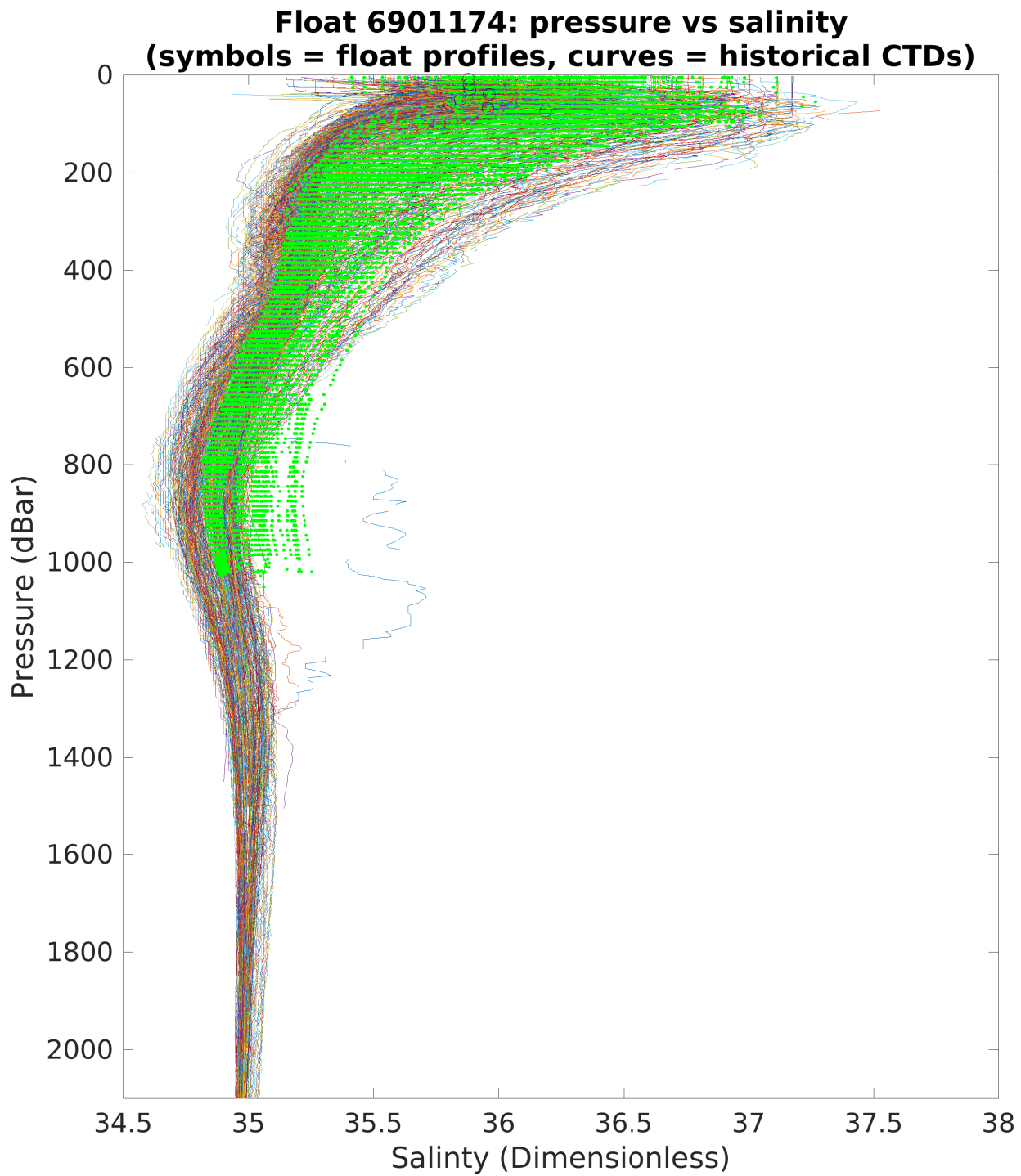
Figure 5: Float 6901174. Salinity (PSS-78) plotted with pressure (dBar) and data from WMO boxes of CTD reference data (CTD for DMQC 2019V01) +/- 10°of latitude and longitude. The black and blue cycles indicates the first and the last Argo profile, respectively. Green symbols represent other Argo profiles from this float. The thin colors lines indicate the reference data.
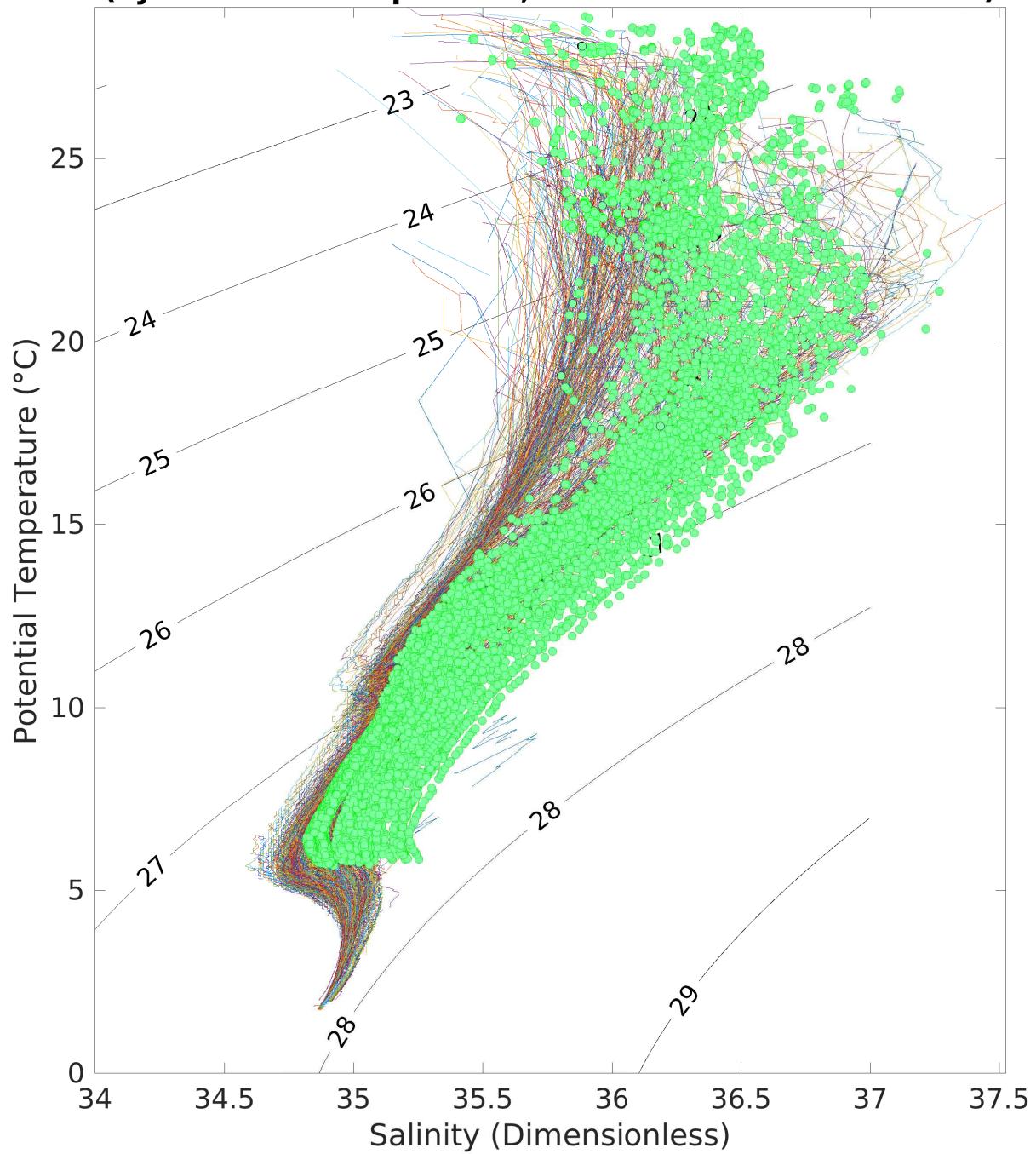
Figure 6: Float 6901174. T/S diagram plotted with and data from WMO boxes of CTD reference data (CTD for DMQC 2019V01) +/- 10°of latitude and longitude. The black and blue cycles indicates the first and the last Argo profile, respectively. Green symbols represent other Argo profiles from this float.

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/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
```

```
% ================================
%
%    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=3
MAPSCALE_LONGITUDE_SMALL=1
MAPSCALE_LATITUDE_LARGE=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=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=50
```

Figure 7: Float 6901174. 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.
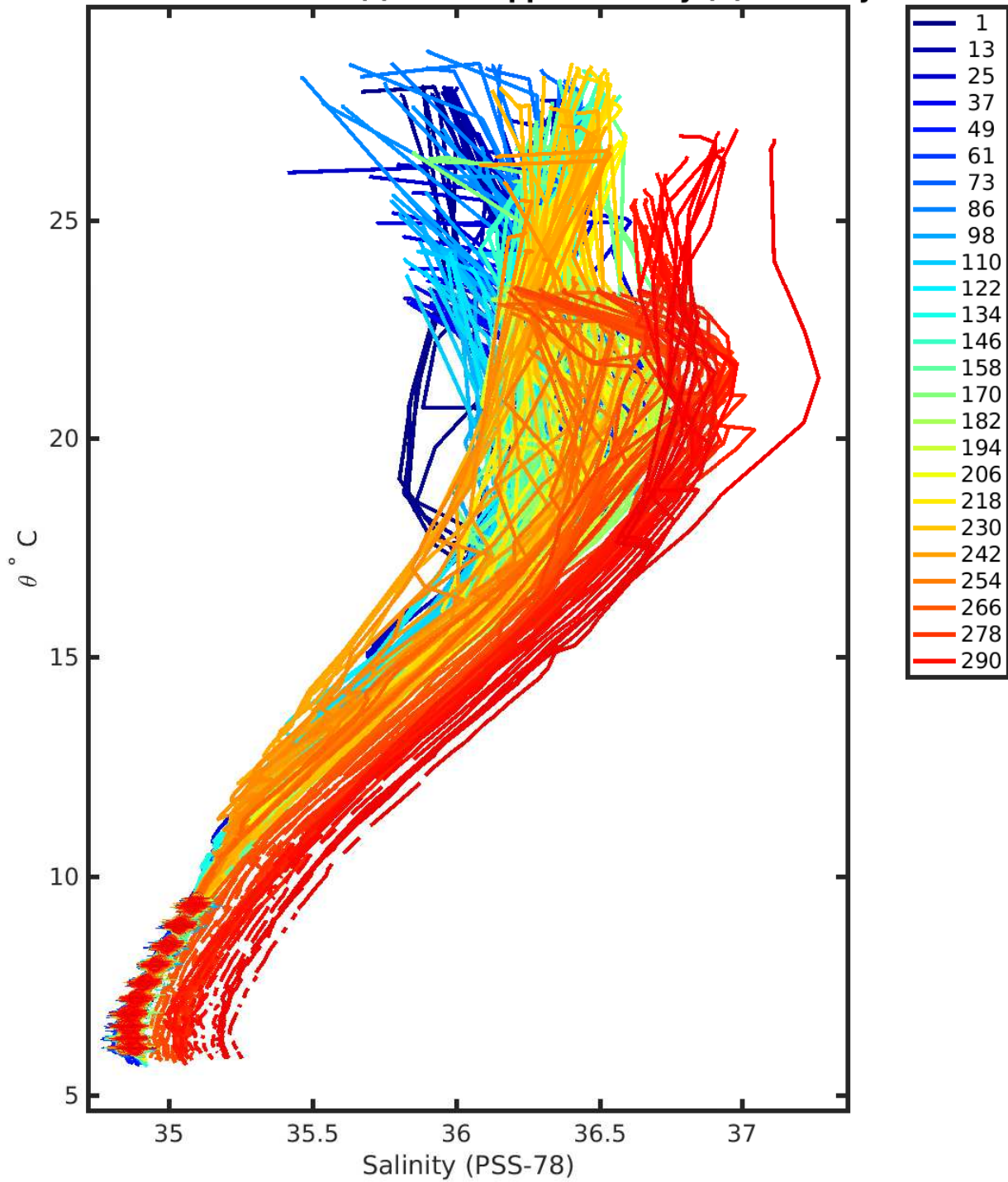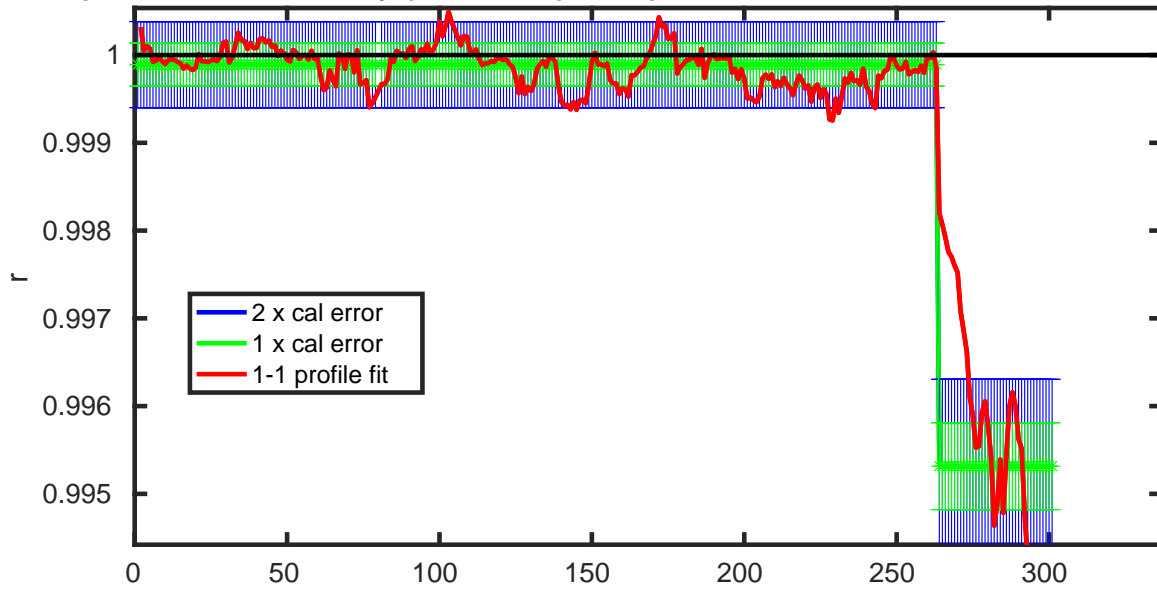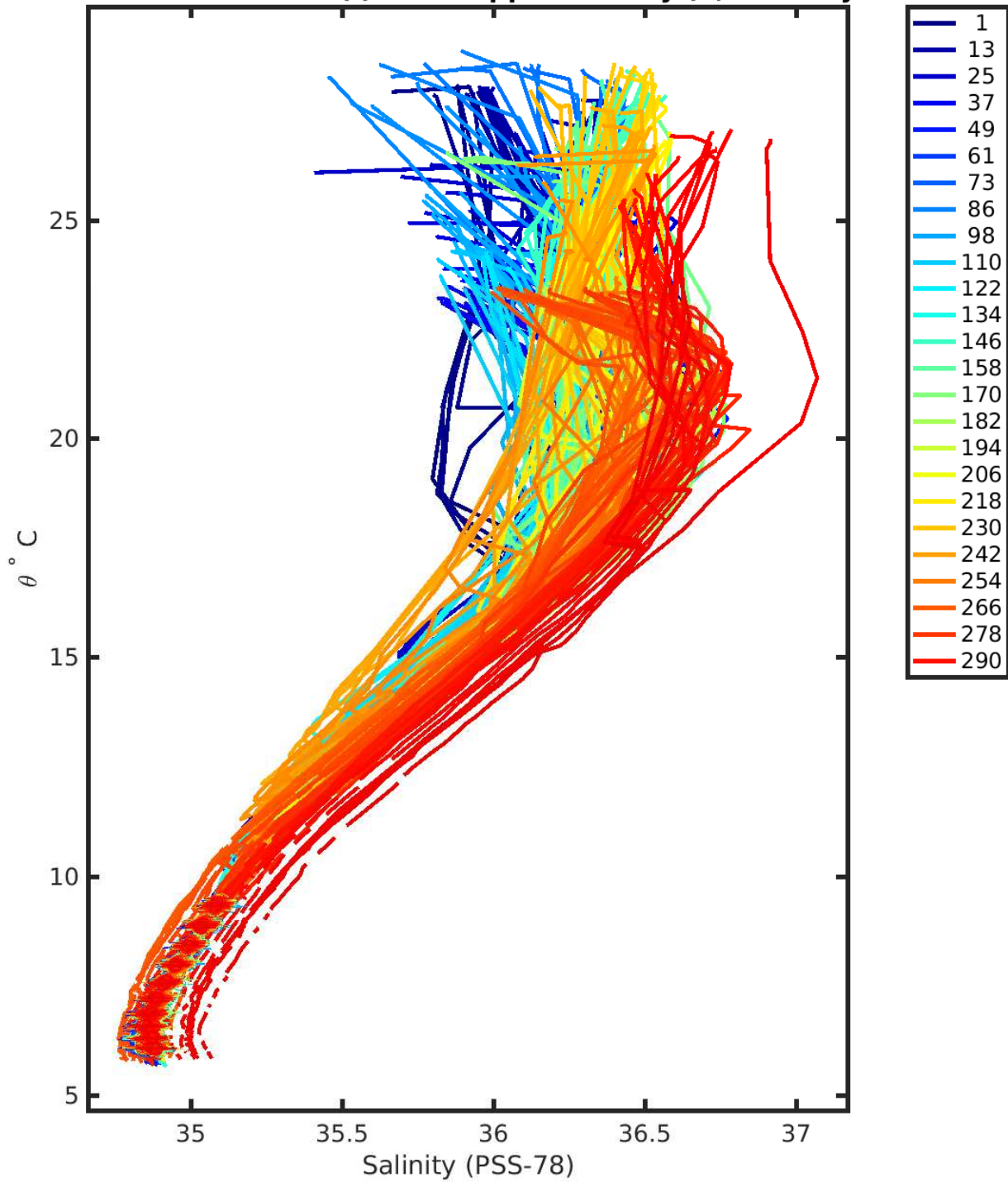
Figure 8: Float 6901174. Plots the original float salinity and the objectively estimated reference salinity at the 10 float theta levels that are used in calibration.

Figure 9: Float 6901174. 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 6901174. Plots of calibrated float salinity and the objectively estimated reference salinity at the 10 float theta levels that are used in calibration.
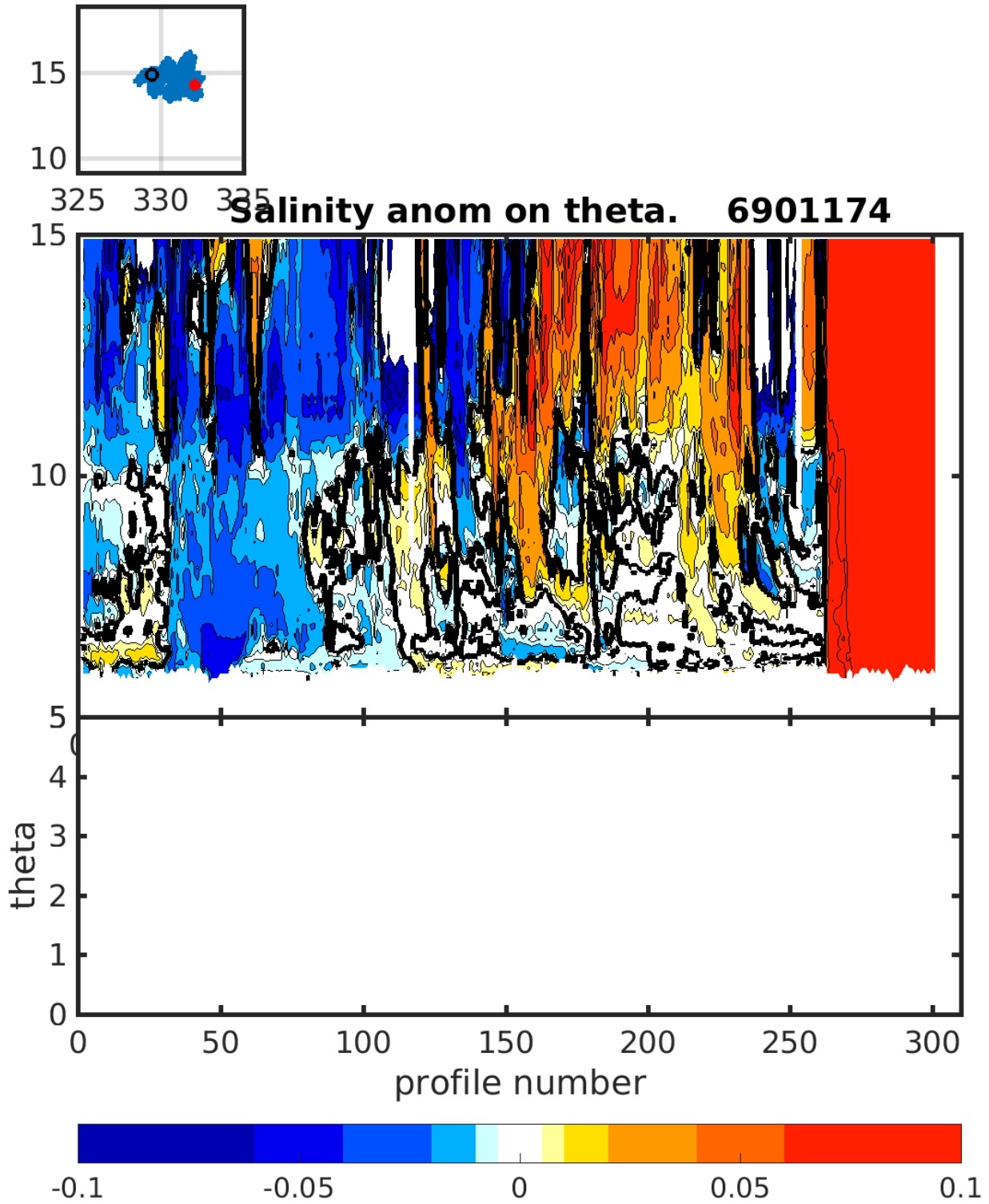
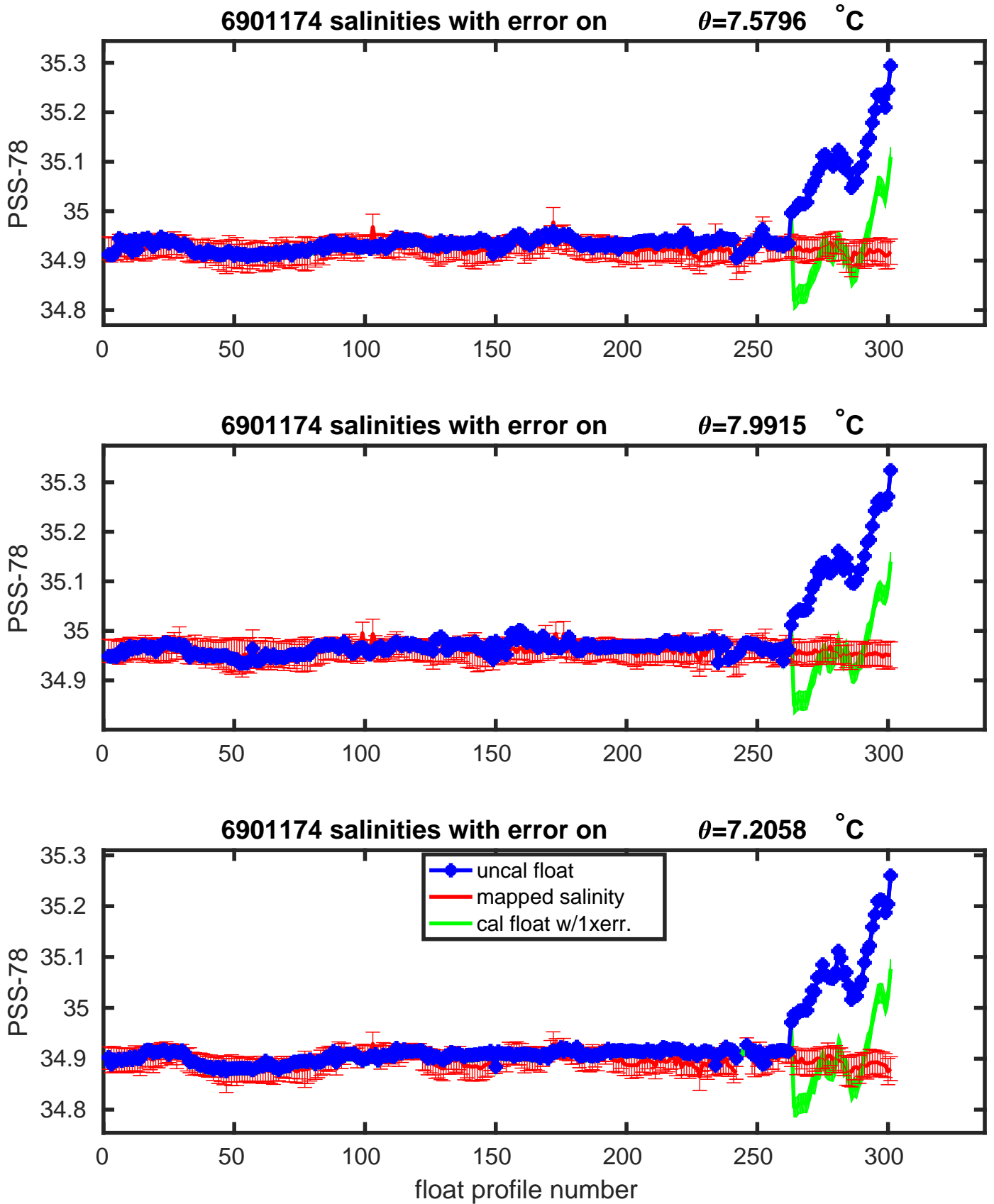Figure 11: Float 6901174. Salinity anomaly on theta levels.

Figure 12: Float 6901174. Plots of the evolution of salinity with time along with selected theta levels with minimum salinity variance.
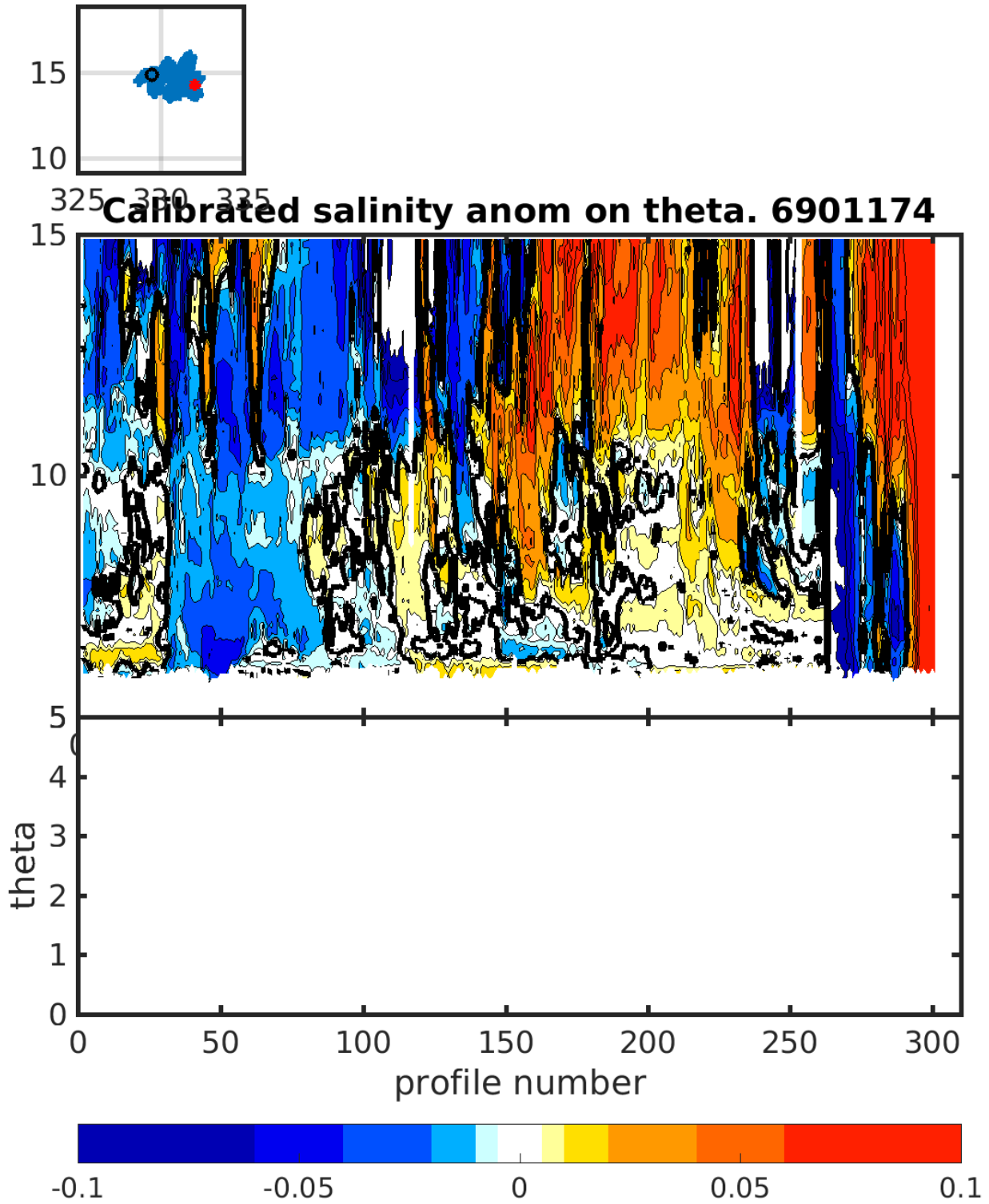
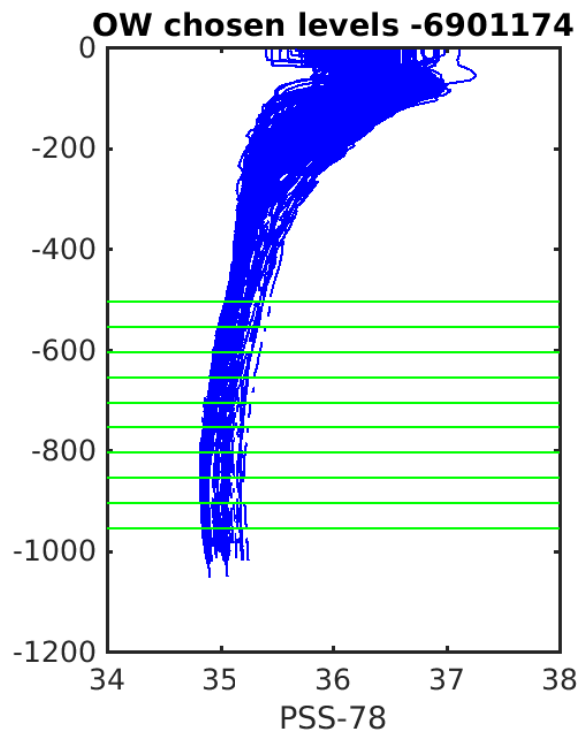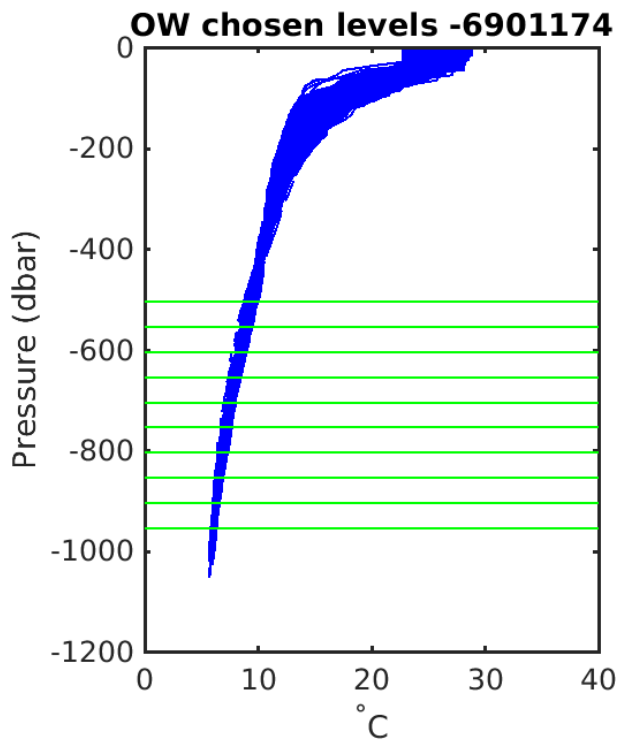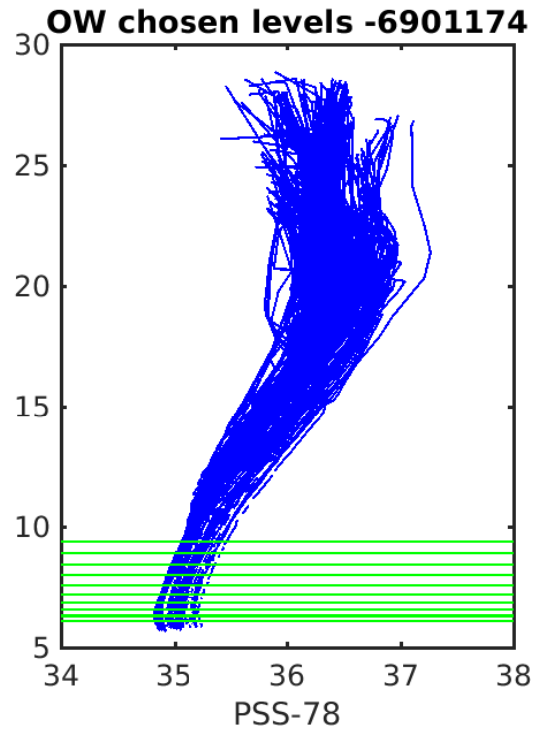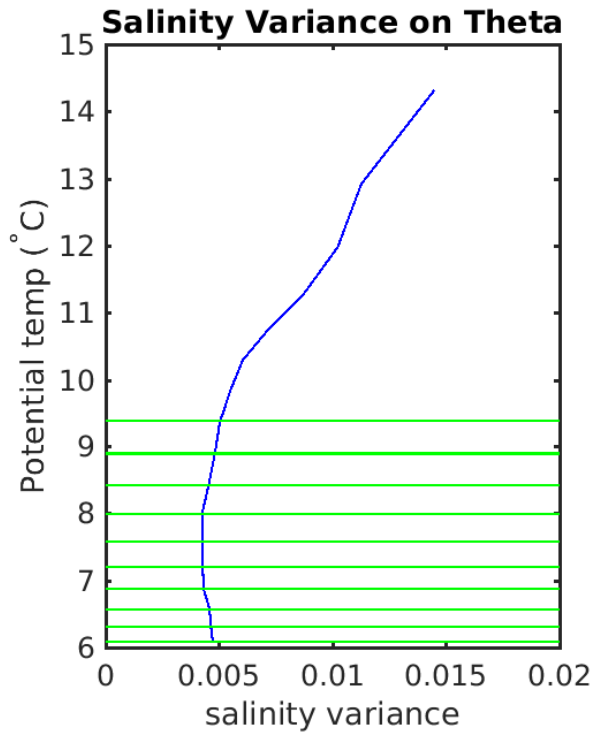Figure 13: Float 6901174. Calibrated salinity anomaly on theta levels.

Figure 14: Float 6901174. 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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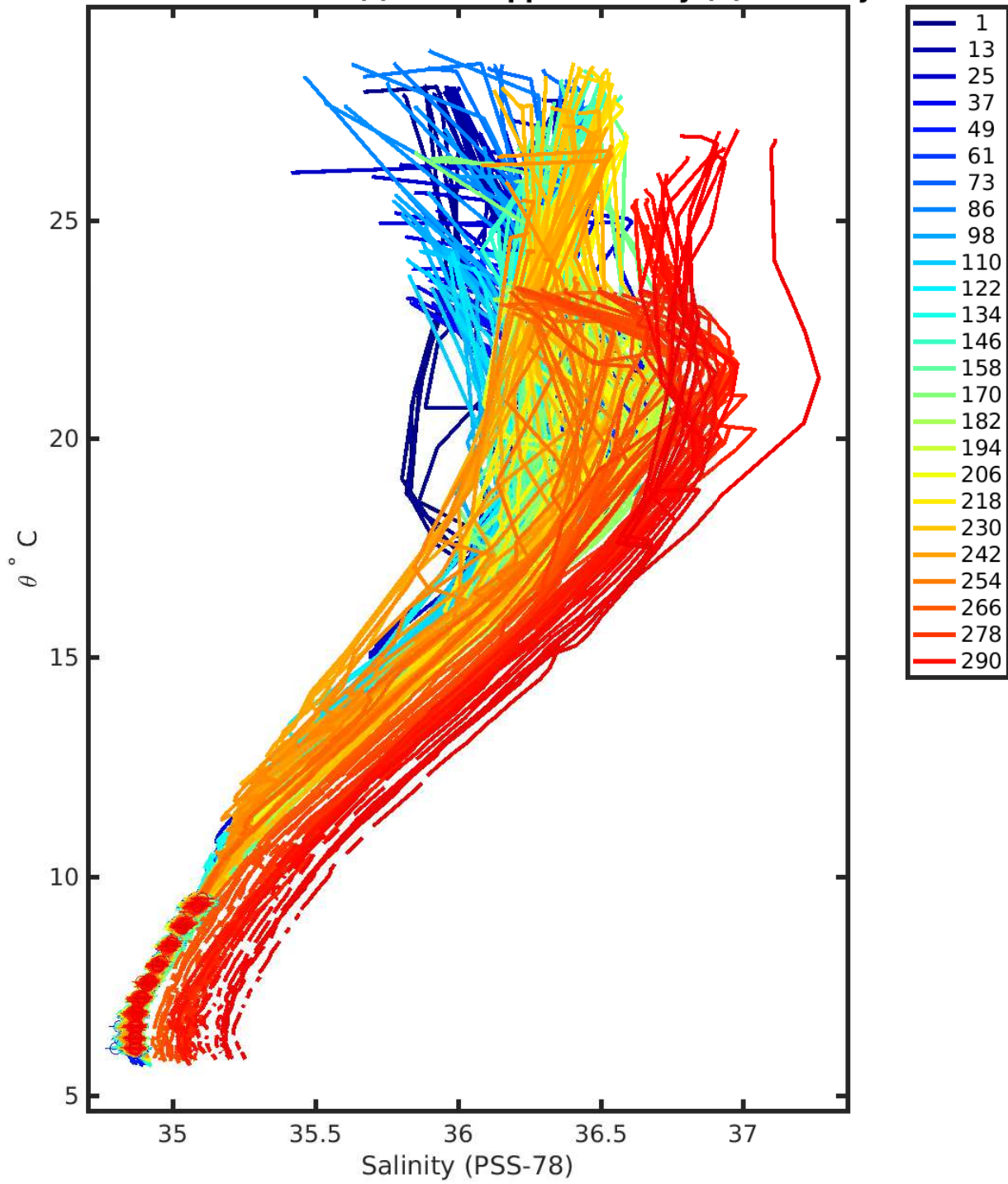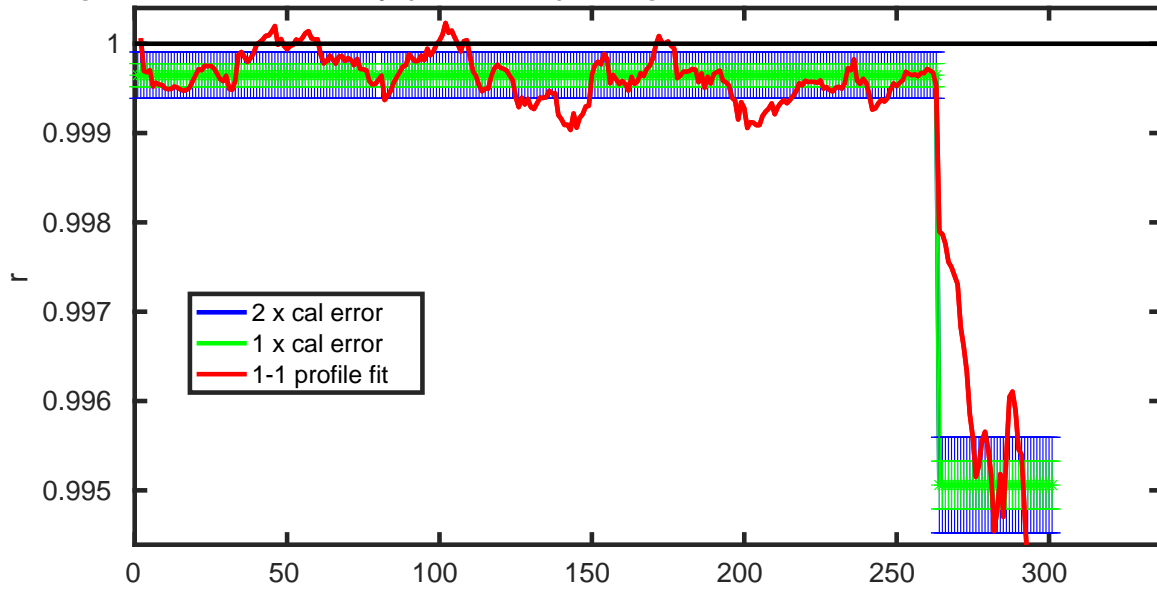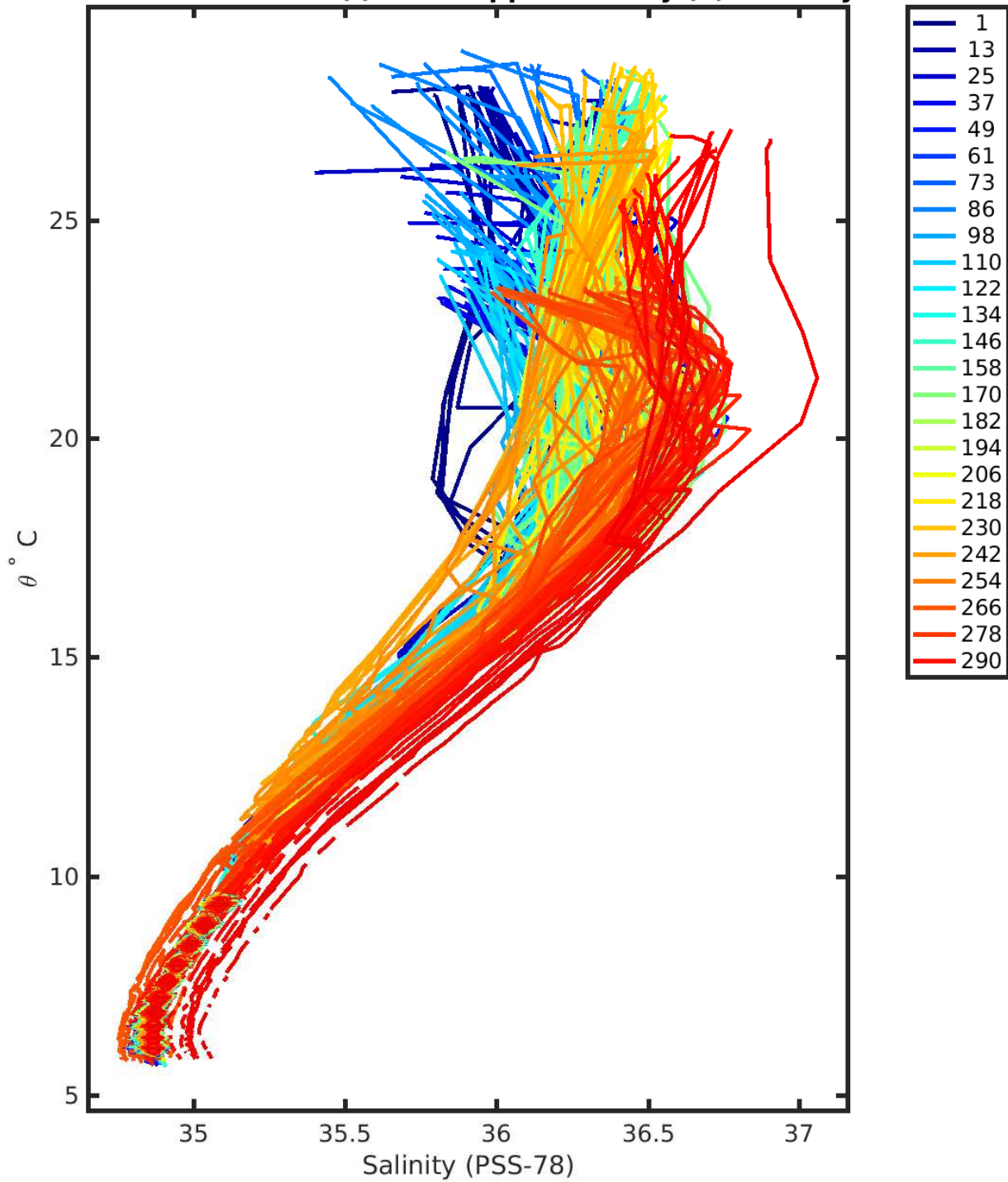
Figure 16: Float 6901174. Plots the original float salinity and the objectively estimated reference salinity at the 10 float theta levels that are used in calibration.

6901174 potential conductivity (mmho/cm) multiplicative correction r with errors

6901174 vertically-averaged salinity (PSS-78) additive correction   Δ S with errors
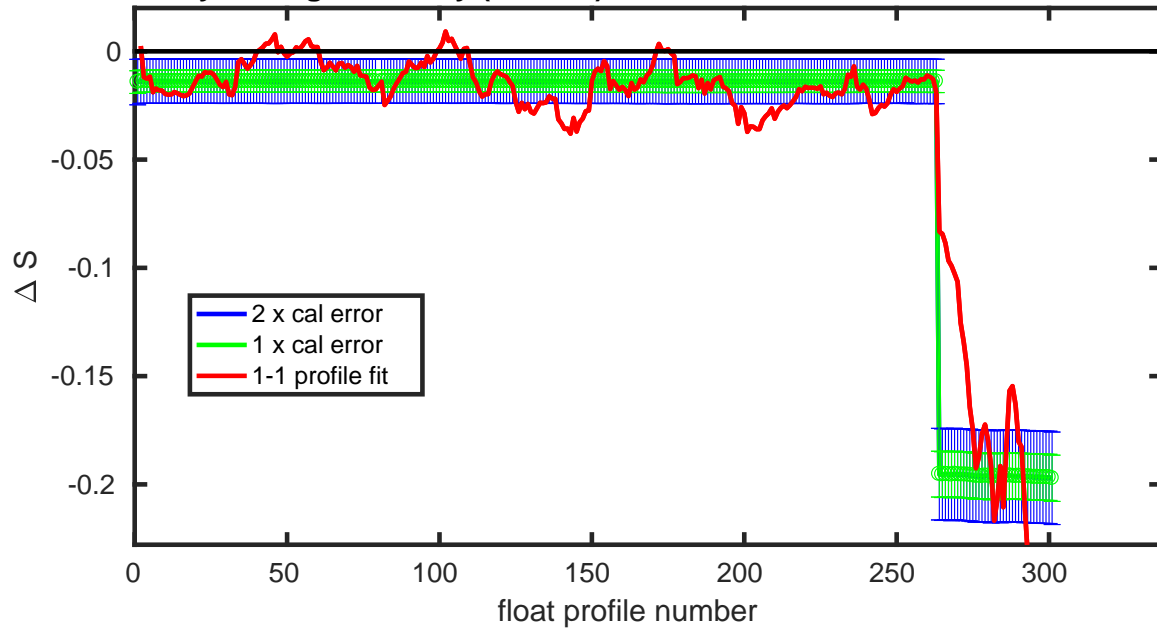
Figure 17: Float 6901174. Evolution of the suggested adjustment with time. The top panel plots the potential conductivity multiplicative adjustment. The bottom panel plots the equivalent salinity additive adjustment. The red line denotes one-to-one profile fit that uses the vertically weighted mean of each profile. The red line can be used to check for anomalous profiles relative to the optimal fit.

Figure 18: Float 6901174. Plots of calibrated float salinity and the objectively estimated reference salinity at the 10 float theta levels that are used in calibration.
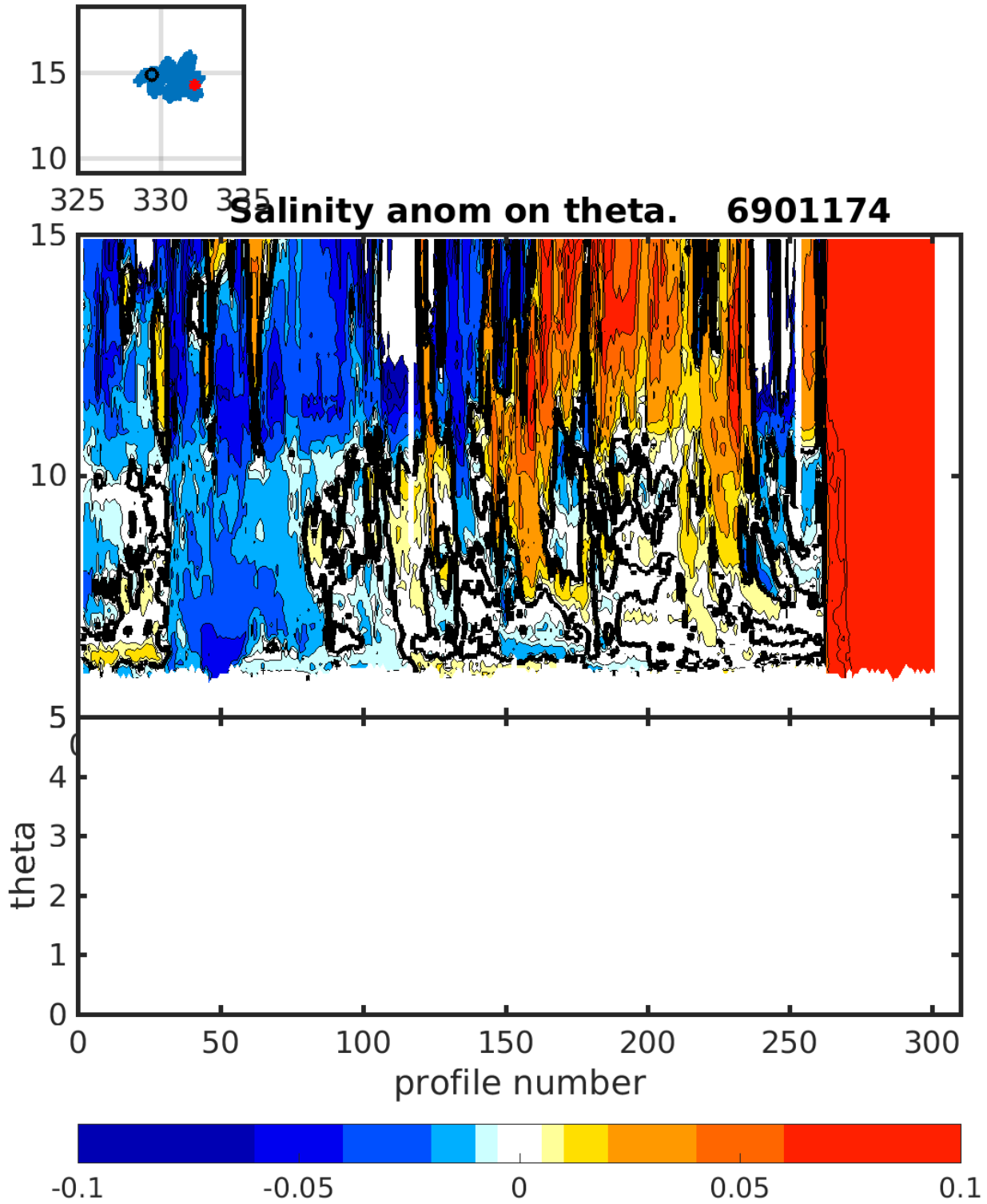
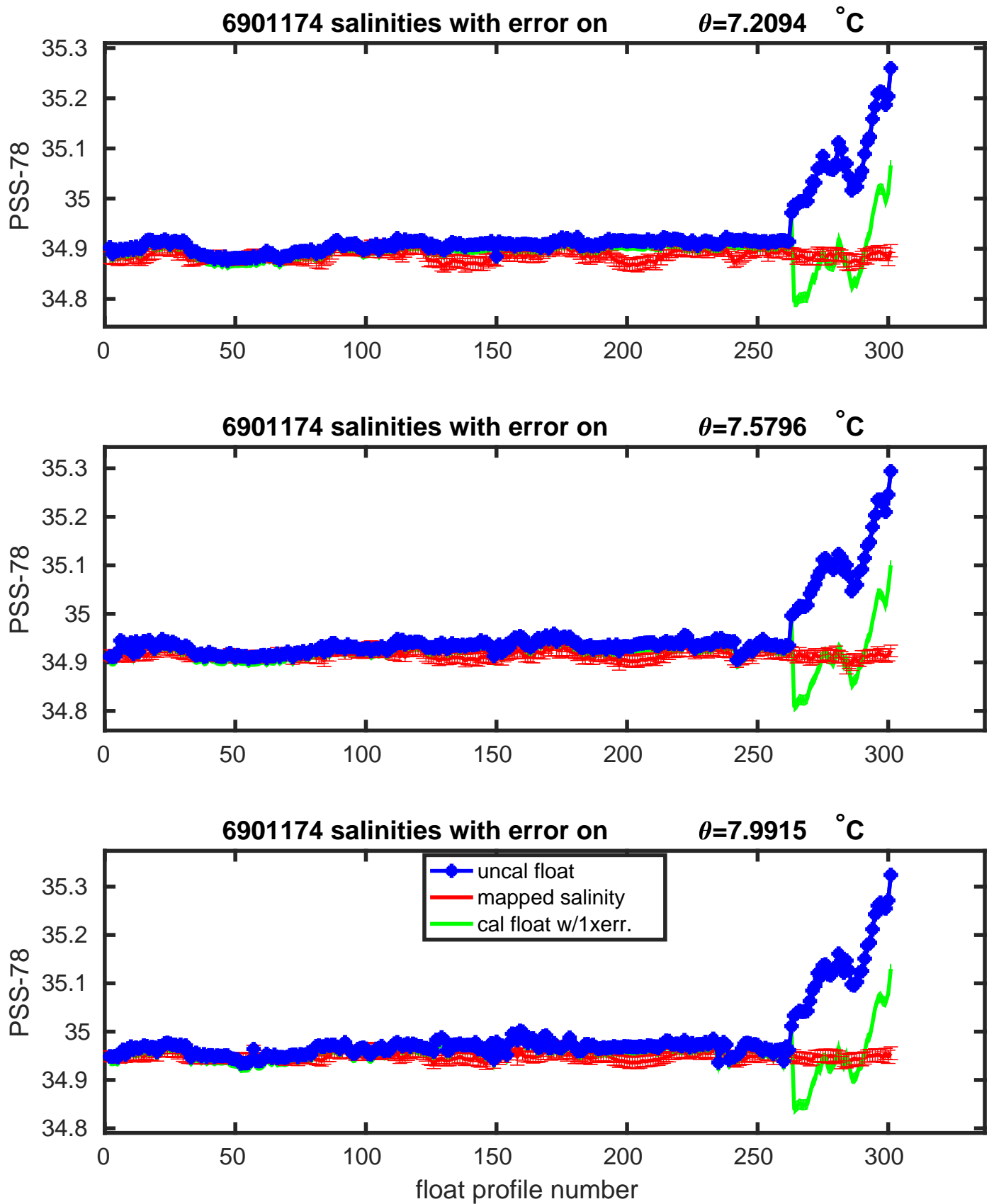Figure 19: Float 6901174. Salinity anomaly on theta levels.

Figure 20: Float 6901174. Plots of the evolution of salinity with time along with selected theta levels with minimum salinity variance.
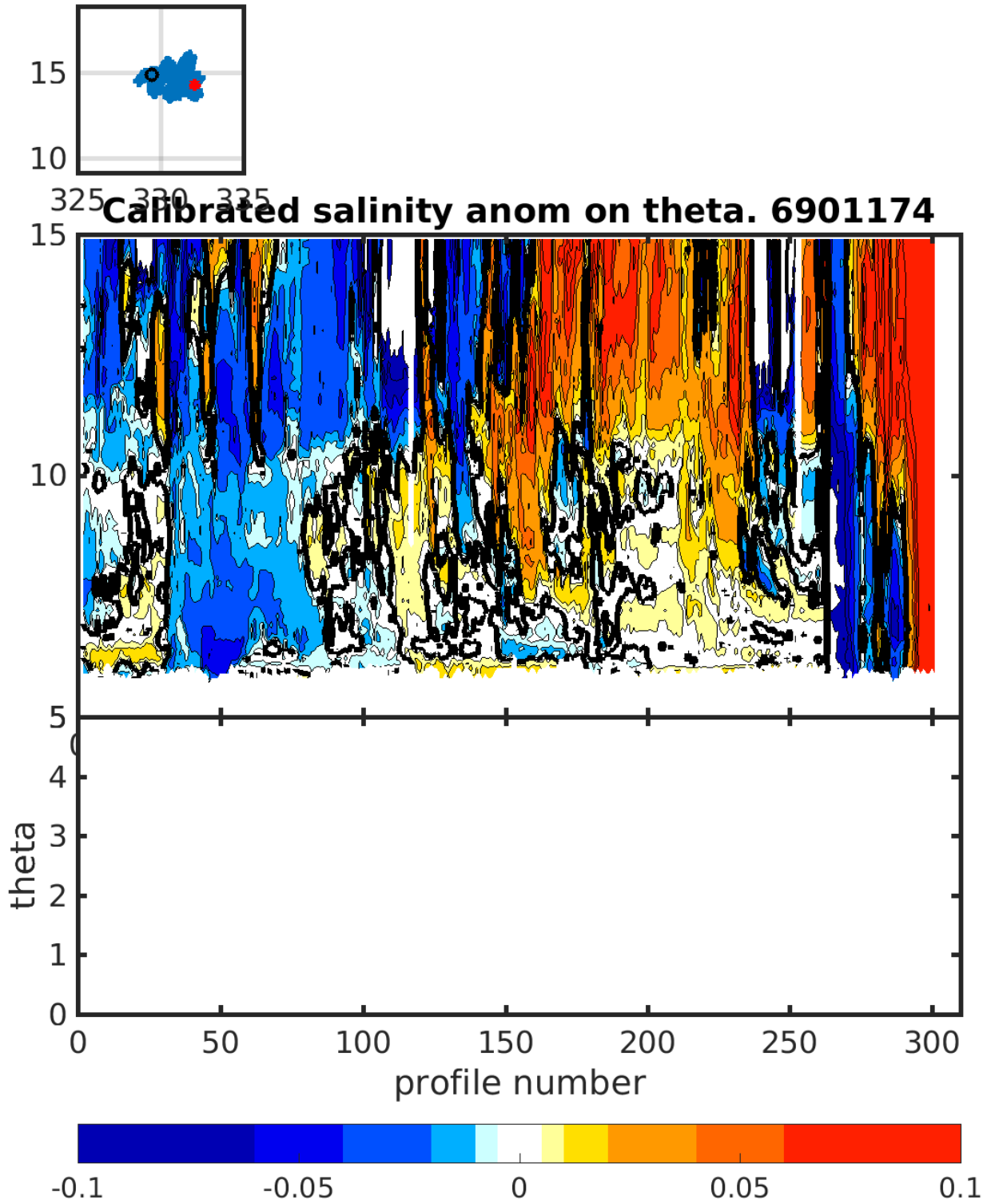
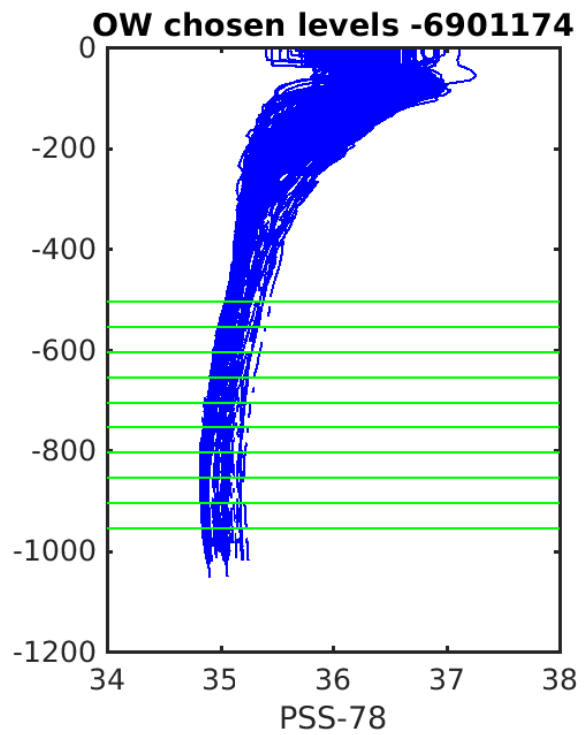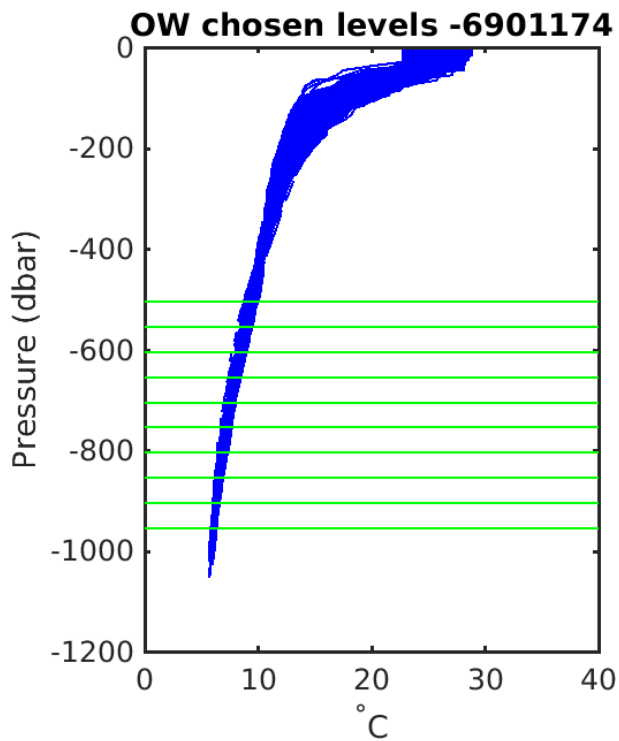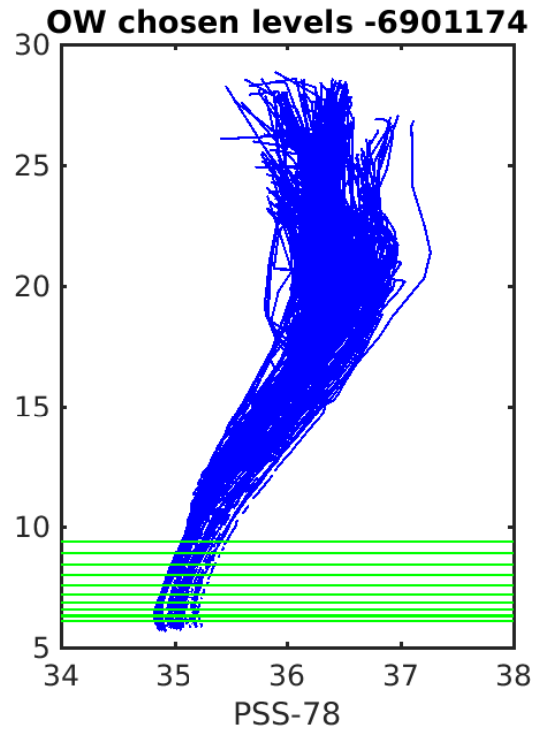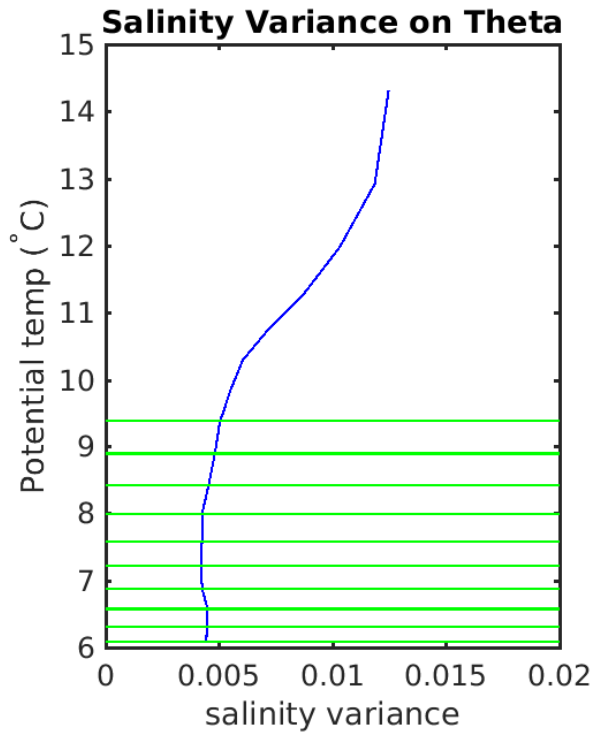Figure 21: Float 6901174. Calibrated salinity anomaly on theta levels.

Figure 22: Float 6901174. 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.
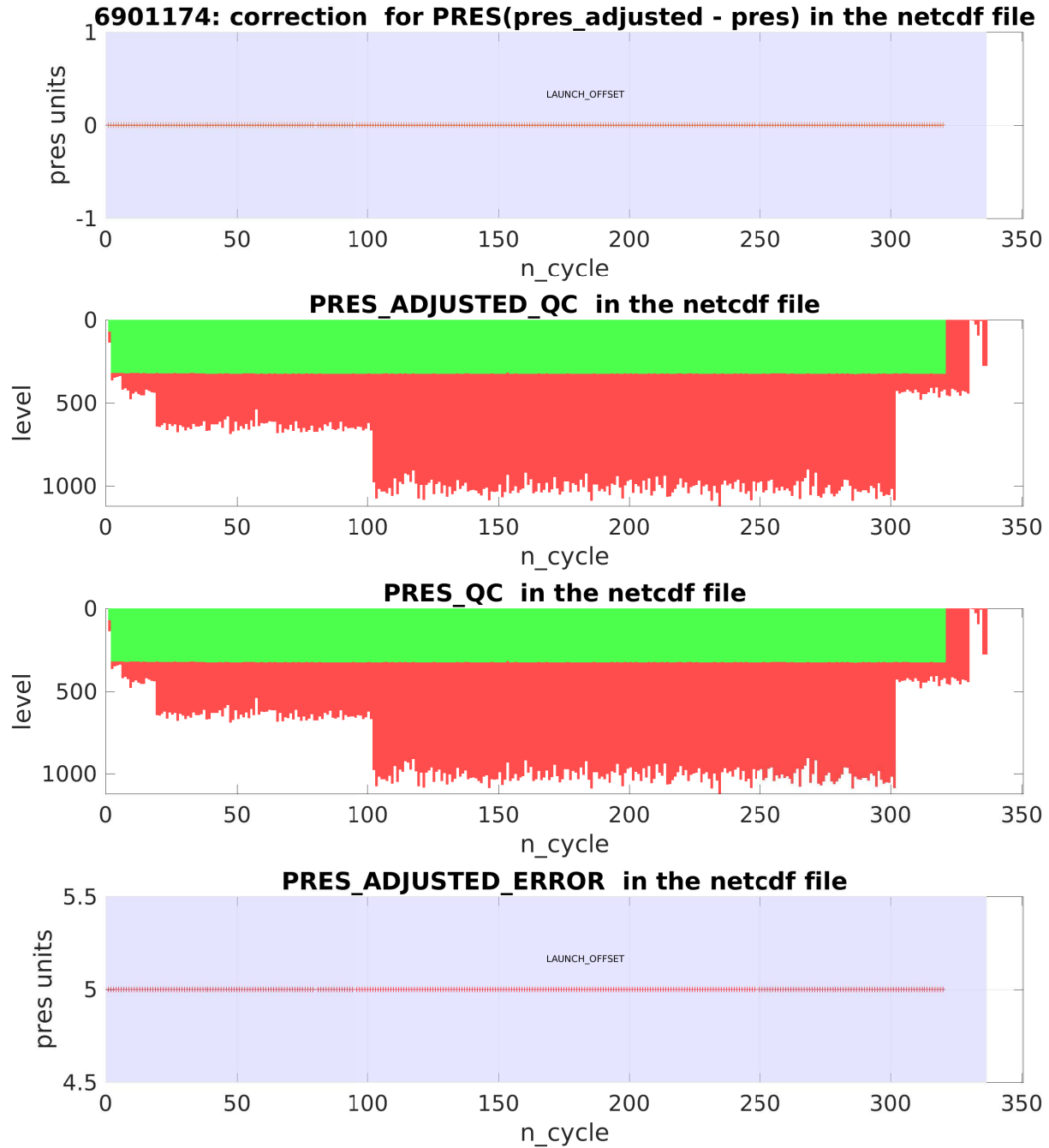
4 Final Checks

Figure 23: Float 6901174. Time series of applied pressure corrections.
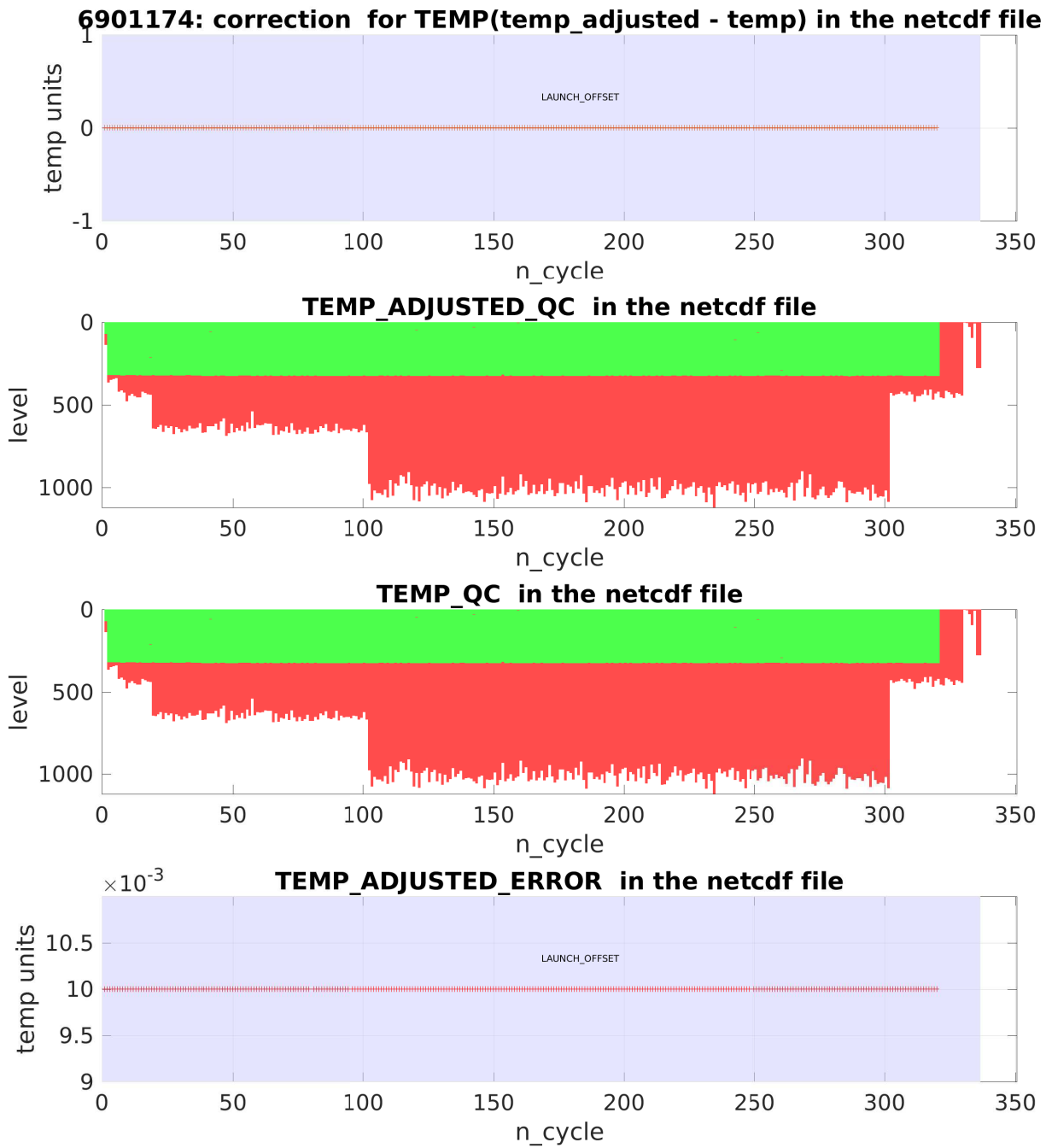
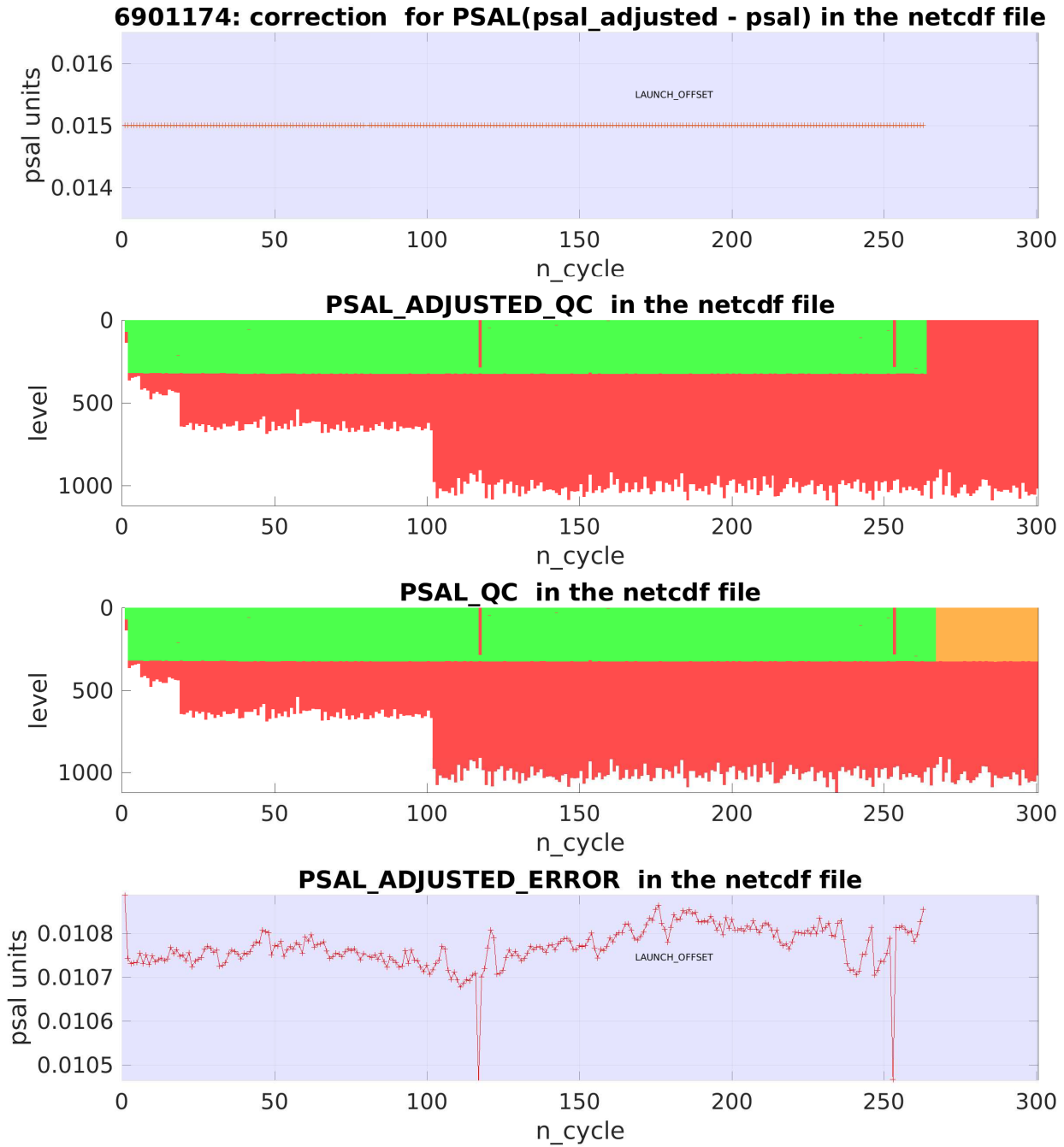Figure 24: Float 6901174. Time series of applied temperature corrections.

Figure 25: Float 6901174. Time series of applied salinity corrections.

4.1 Summary and Conclusions