

# Surface T/S Data RV Polarstern PS98 (ANT-XXXI/4) Data Processing Report

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Ref.: PS98\_TSG.pdf

Vers.: 2

Date: 2017/03/07

Status: final

# 1 Introduction

This report describes the processing of raw data acquired by the thermosalinographs on board RV Polarstern during expedition PS98 to receive cleaned up and drift corrected salinity data.

# 2 Workflow

The different steps of processing are visualized in Figure 1. During the cruise, water samples are taken every two days directly from the water inlet of the two thermosalinographs (keel & bow) and measured after temperature equalization with an OPTIMARE Precision Salinometer (OPS) onboard. After the cruise, the measured salinity and temperature data of both sensors are extracted from the DAVIS SHIP database (<https://dship.awi.de>) as 10-minute-means and send together with the salinometer reference measurements to FIELAX for further processing.

First, the data of every cruise is processed separately to determine the offset between the salinometer and the thermosalinograph measurements during the time of water sampling. These offsets are stored until the sensor is replaced and the sensor drift can be calculated for the whole deployment time. The sensor drift of the salinity data is treated as a linear function of months since installation where offset and slope are derived using a least-squares-optimization procedure.

After applying the drift to the 10-min-means from DSHIP, a speed-filter of 0.5 knots minimum is applied, the data are manually despiked and finally, the positions from the corrected mastertracks are assigned as spot-positions for the corresponding times.

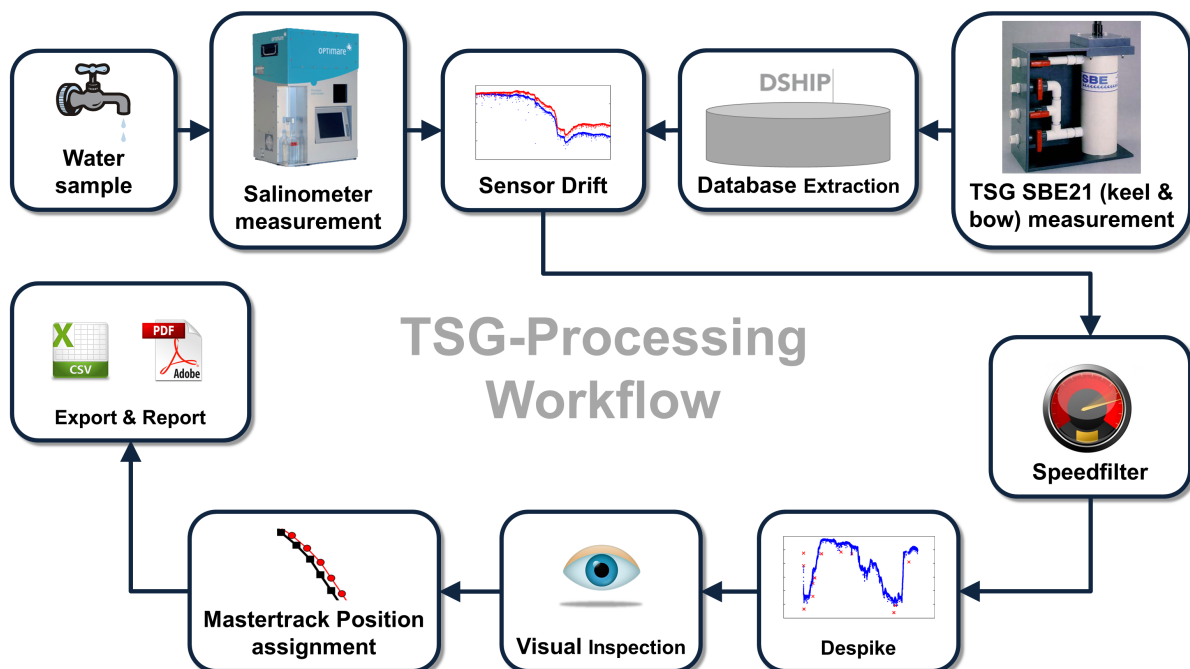


Figure 1: Workflow of Salinity data processing

### 3 Cruise details

Vessel name      RV Polarstern  
 Cruise name      PS98 (ANT-XXXI/4)  
 Cruise start      10.04.2016 Punta Arenas  
 Cruise end        11.05.2016 Bremerhaven  
 Cruise duration   32 days

### 4 Sensors

TS Bow Sensor SBE21 Serial Number: 3189  
 TS Keel Sensor SBE21 Serial Number: 3190

### 5 Processing Report

#### Database Extraction

|                 |                               |
|-----------------|-------------------------------|
| Data source     | DSHIP database (dship.awi.de) |
| Exported values | 4555                          |
| First dataset   | 2016-04-10T16:30:00 UTC       |
| Last dataset    | 2016-05-11T15:00:00 UTC       |

#### Flagging Result

| Deleted Data      | TS Bow               | TS Keel            |
|-------------------|----------------------|--------------------|
| No measurement    | 570 (12.5%)          | 457 (10.0%)        |
| Speed < 0.5 knots | 34 (0.7%)            | 62 (1.4%)          |
| Manually deleted  | 3951 (86.7%)         | 0 (0.0%)           |
| <b>Total</b>      | <b>4555 (100.0%)</b> | <b>519 (11.4%)</b> |

#### Comments

Due to a large offset between the Keel and the Bow sensor, the salinity and temperature data of the TS Bow Sensor are omitted.

### Sensor Drift TS Bow

|                              |                        |
|------------------------------|------------------------|
| Last calibration             | 02.07.2014             |
| Current calibration          | 24.11.2016             |
| Start of deployment          | 06.12.2015             |
| End of deployment            | 23.10.2016             |
| Drift (between calibrations) | -0.0001 PSU/month      |
| Drift (during deployment)    | -0.000271517 PSU/month |
| Calculated slope             | -0.000715342           |
| Calculated offset            | -0.012201579           |

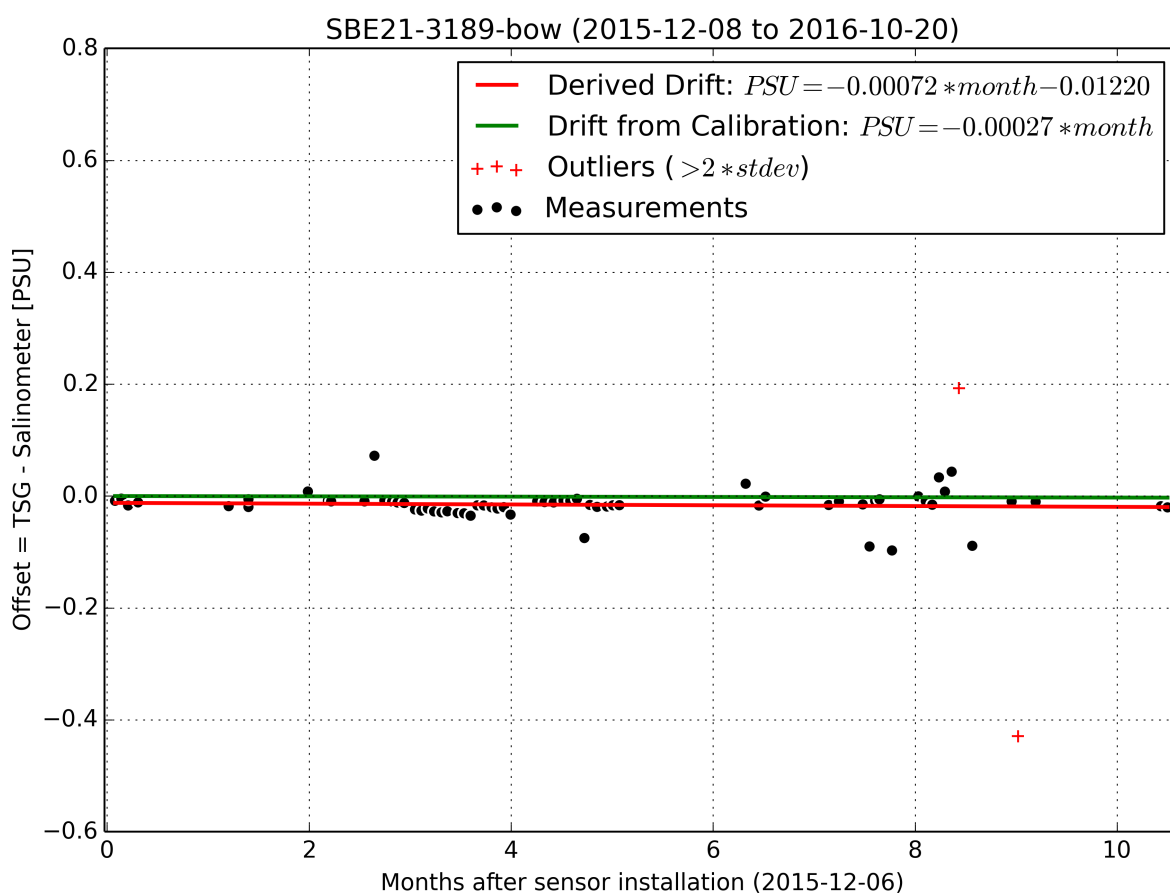


Figure 2: Sensor drift of TS Bow

### Sensor Drift TS Keel

|                              |                       |
|------------------------------|-----------------------|
| Last calibration             | 06.03.2015            |
| Current calibration          | 24.11.2016            |
| Start of deployment          | 06.12.2015            |
| End of deployment            | 23.10.2016            |
| Drift (between calibrations) | 0.0006 PSU/month      |
| Drift (during deployment)    | 0.001056966 PSU/month |
| Calculated slope             | 0.003658363           |
| Calculated offset            | -0.061233122          |

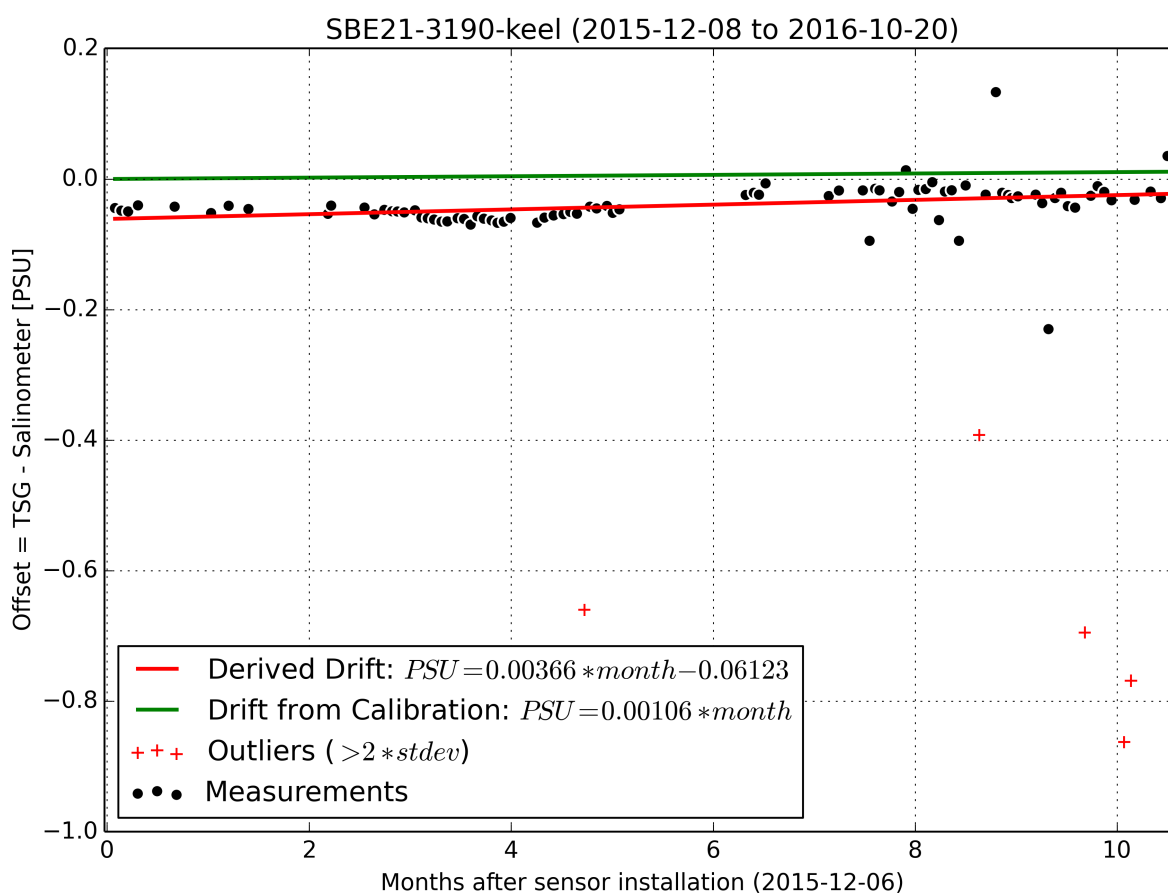


Figure 3: Sensor drift of TS Keel

## Result files

Text File (PS98\_surf\_oce.tab):

The format is a plain text (tab-delimited values) file.

|                  |   |
|------------------|---|
| Column separator | Tabulator "\t"  |
| Column 1         | Date and time expressed according to ISO 8601                 |
| Column 2         | Latitude in decimal format, unit degree                       |
| Column 3         | Longitude in decimal format, unit degree                      |
| Column 4         | Depth below water surface (Bow = 5m, Keel = 11 m), unit meter |
| Column 5         | Temperature, unit degree                                      |
| Column 6         | Salinity, unit PSU  |

Processing Report (PS98\_TSG.pdf):

This PDF document.

## Salinity maps

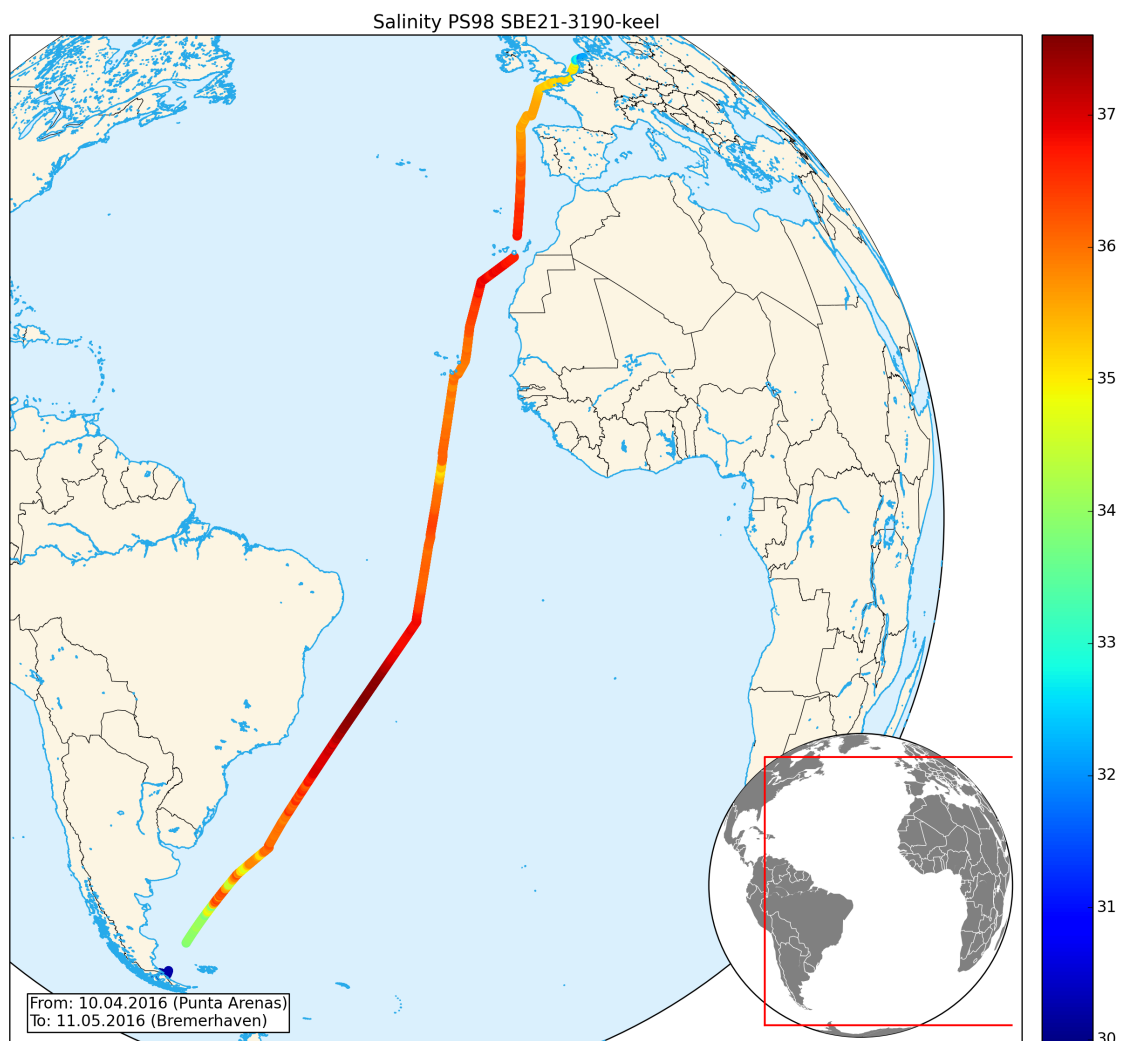


Figure 4: Salinity map of TS Keel