

Salinity Data RV Polarstern PS89 (ANT-XXX/2) Data Processing Report

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1 Introduction

This report describes the processing of raw data acquired by the thermosalinographs on board RV Polarstern during expedition PS89 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 sented 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.

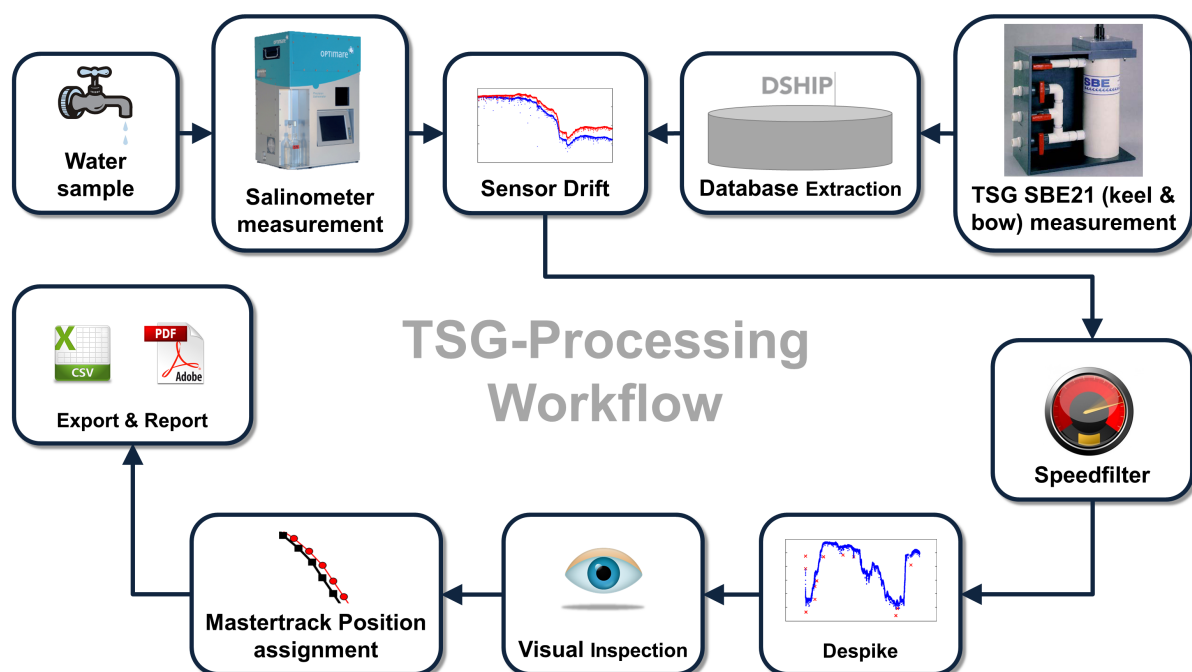


Figure 1: Workflow of Salinity data processing

3 Cruise details

Vessel name RV Polarstern
 Cruise name PS89 (ANT-XXX/2)
 Cruise start 02.12.2014 Cape Town
 Cruise end 31.01.2015 Cape Town
 Cruise duration 61 days

4 Sensors

TS Bow Sensor SBE21 Serial Number: 3191
 TS Keel Sensor SBE21 Serial Number: 3271

5 Processing Report

Database Extraction

Data source	DSHIP database (dship.awi.de)
Exported values	8809
First dataset	2014-12-02T00:00:00 UTC
Last dataset	2015-02-01T04:00:00 UTC

Flagging Result

Flag	TS Bow	TS Keel
NaN	5291 (60.06%)	2811 (31.91%)
No measurement	4669 (53.00%)	156 (1.77%)
Correction not possible	0 (0.00%)	0 (0.00%)
Speed < 0.5 knots	2755 (31.27%)	2755 (31.27%)
Manually deleted	3 (0.03%)	0 (0.00%)
Manually interpolated	0 (0.00%)	0 (0.00%)
Suspicious (Temperature < freezing point)	0 (0.00%)	0 (0.00%)
Suspicious (Density Keel < Density Bow)	3316 (37.64%)	3316 (37.64%)

Sensor Drift TS Bow

Last calibration	04.12.2012
Current calibration	29.04.2015
Start of deployment	06.06.2014
End of deployment	10.03.2015
Drift (between calibrations)	0.0006 PSU/month
Drift (during deployment)	0.001897473 PSU/month
Calculated slope	0.000890073
Calculated offset	-0.00116523

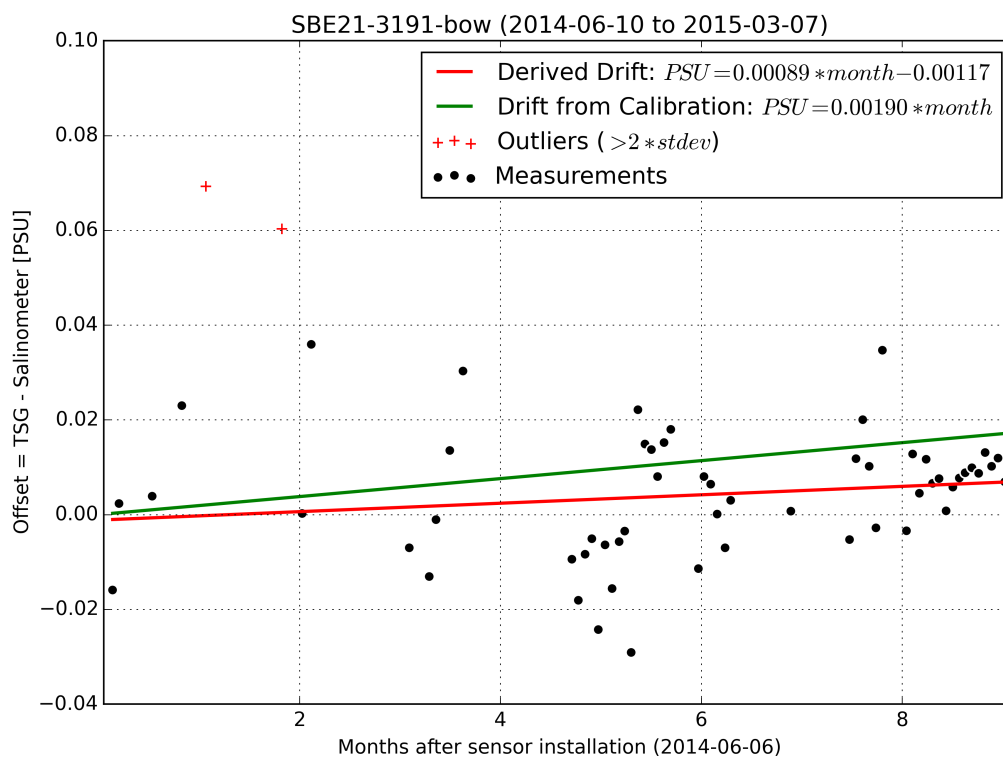


Figure 2: Sensor drift of TS Bow

Sensor Drift TS Keel

Last calibration	03.12.2011
Current calibration	29.04.2015
Start of deployment	25.10.2014
End of deployment	10.03.2015
Drift (between calibrations)	-0.0002 PSU/month
Drift (during deployment)	-0.001827941 PSU/month
Calculated slope	-0.000167865
Calculated offset	-0.017265293

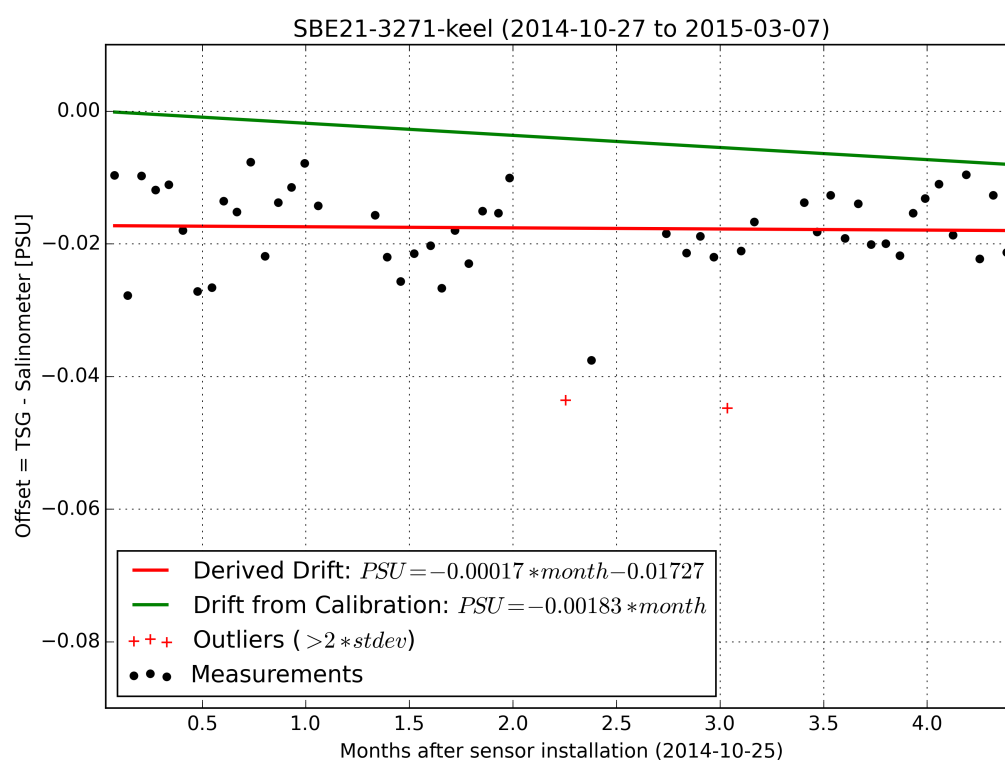


Figure 3: Sensordrift of TS Keel

Result files

Text File (PS89_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 3	Latitude in decimal format, unit degree
Column 4	Longitude in decimal format, unit degree
Column 5	Depth below water surface (Bow = 5m, Keel = 11 m), unit meter
Column 6	Temperature, unit degree
Column 7	Salinity, unit PSU

Processing Report (PS89_TSG.pdf):

This PDF document.

Salinity maps

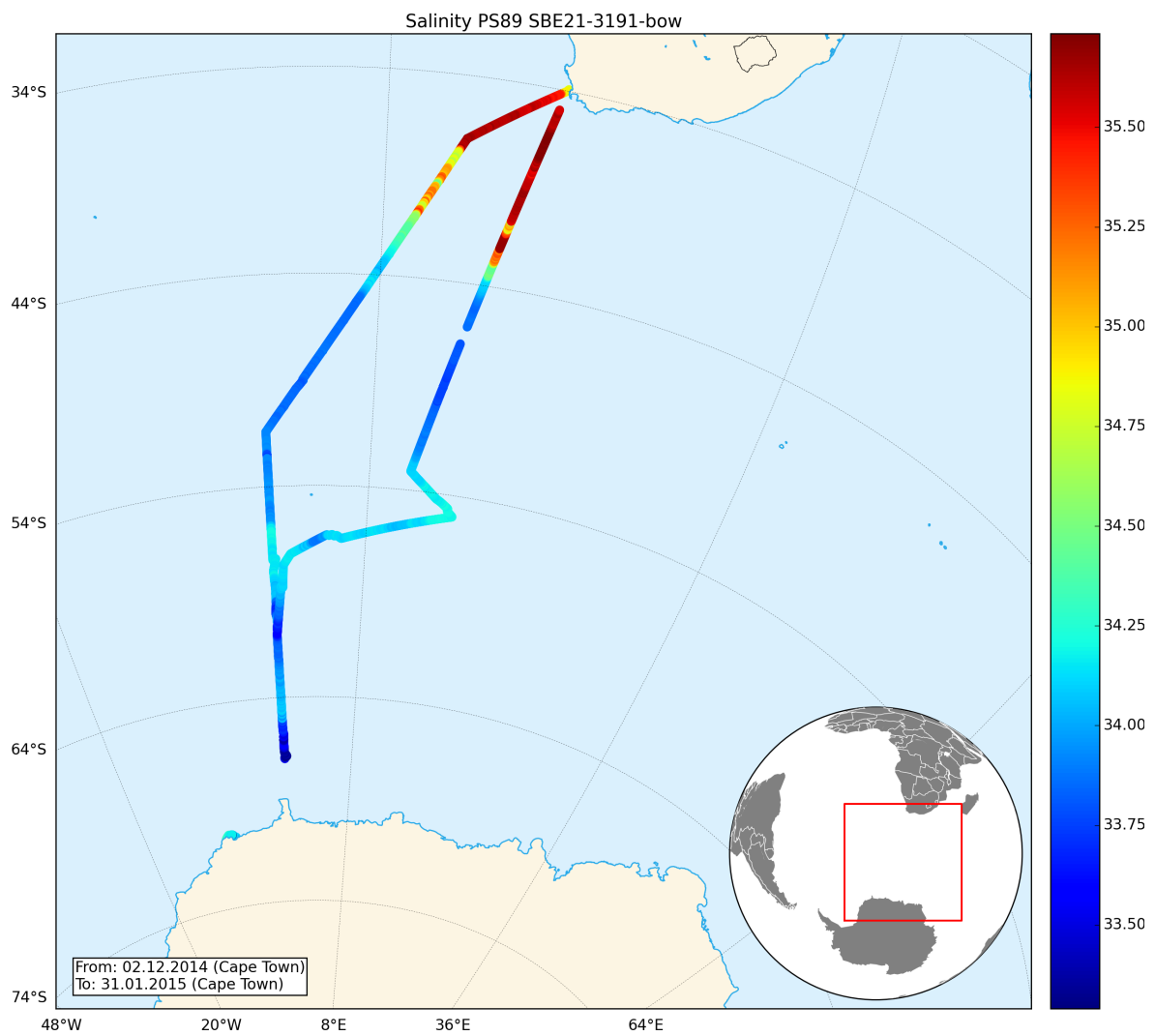


Figure 4: Salinity map of TS Bow

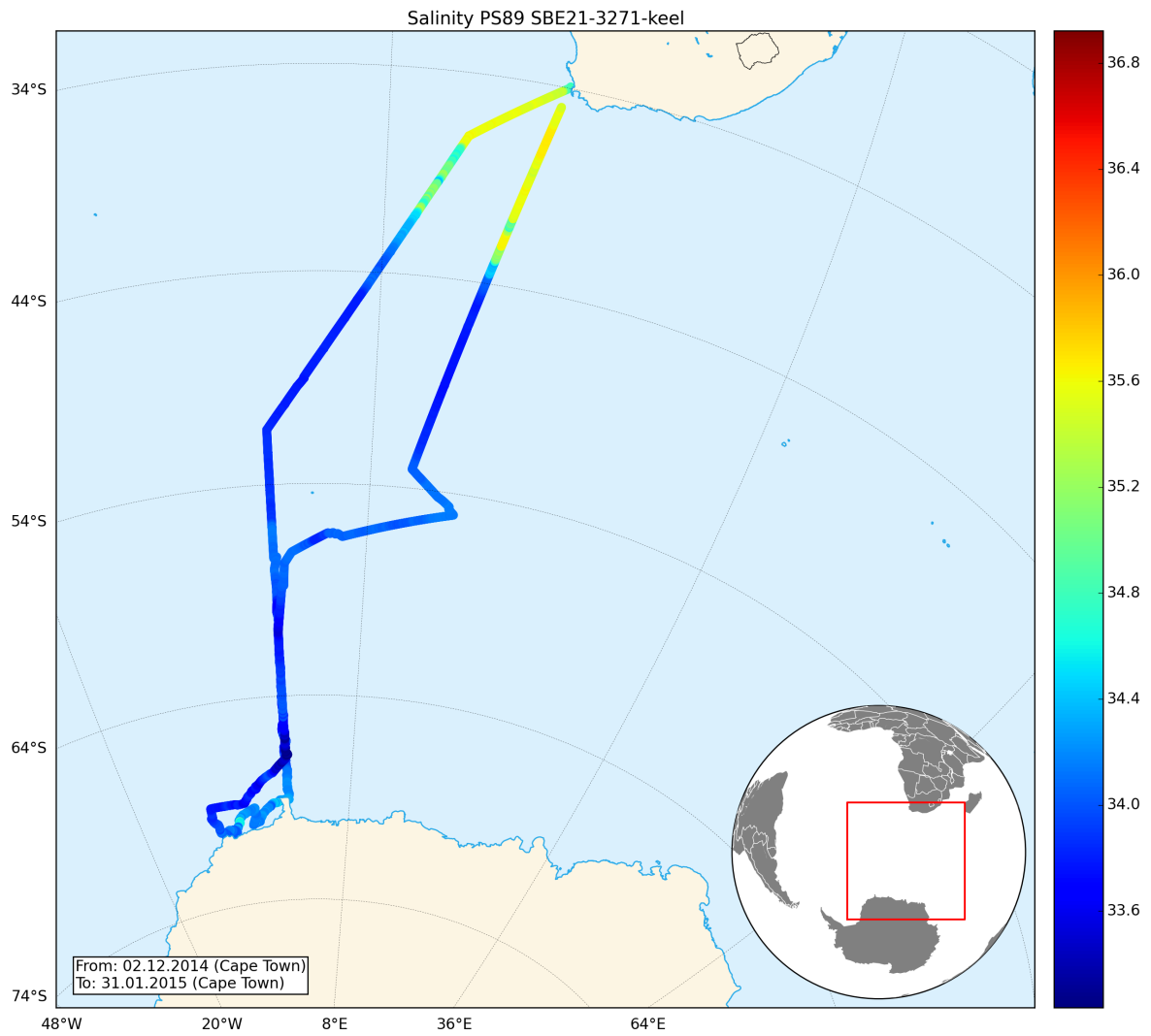


Figure 5: Salinity map of TS Keel