ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG

FIELAX

Surface T/S Data RV Polarstern PS92 (ARK-XXIX/1)

Data Processing Report

Contents

Contact:
Gerd Rohardt
Alfred-Wegener-Institute
Am Handelshafen 12, D-27570 Bremerhaven, GERMANY
Mail: info@awi.de

Processing Agency:
FIELAX
Schleusenstr. 14, D-27568 Bremerhaven, GERMANY
Mail: info@fielax.de

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1 Introduction

This report describes the processing of raw data acquired by the thermosalinographs on board RV Polarstern during expedition PS92 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 sended 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.

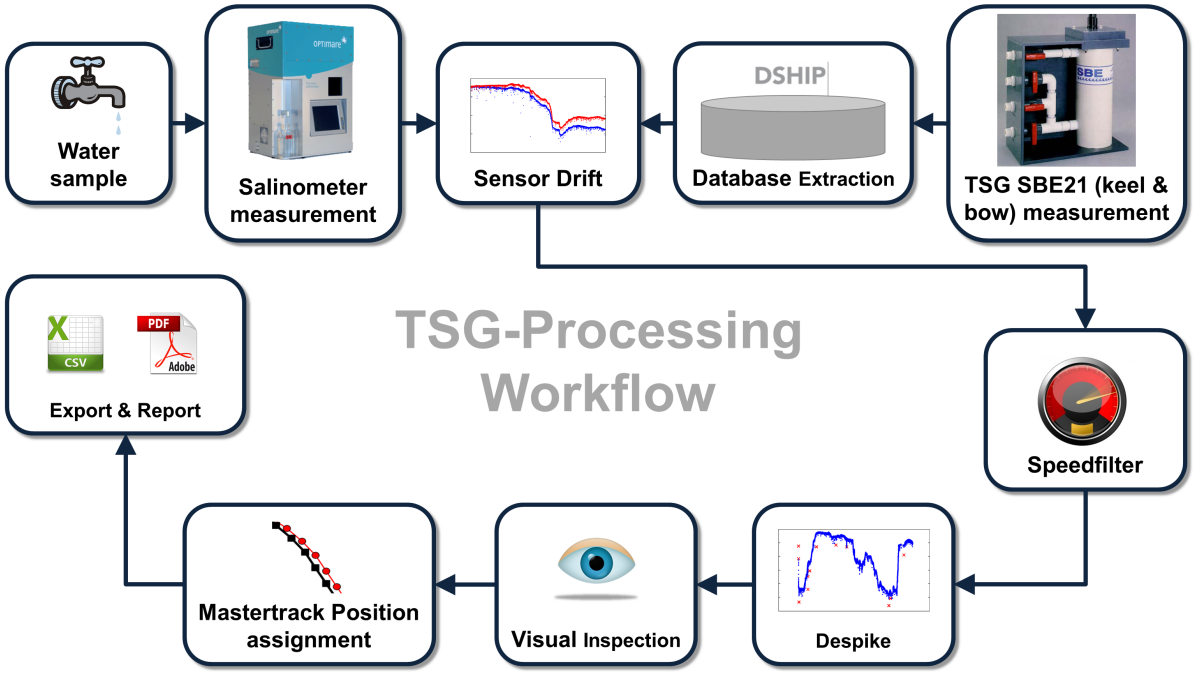

Figure 1: Workflow of Salinity data processing

3 Cruise details

Vessel name	RV Polarstern
Cruise name	PS92 (ARK-XXIX/1)
Cruise start	19.05.2015 Bremerhaven
Cruise end	28.06.2015 Longyearbyen
Cruise duration	41 days

4 Sensors

TS Bow Sensor SBE21 Serial Number:	3203
TS Keel Sensor SBE21 Serial Number:	3354

5 Processing Report

Database Extraction

Data source	DSHIP database (dship.awi.de)
Exported values	5785
First dataset	2015-05-19T00:00:00 UTC
Last dataset	2015-06-28T04:00:00 UTC

Flagging Result

Flag	**TS Bow**	**TS Keel**
NaN	4627 (79.98%)	2234 (38.62%)
No measurement	4622 (79.90%)	307 (5.31%)
Correction not possible	0 (0.00%)	0 (0.00%)
Speed < 0.5 knots	2000 (34.57%)	2000 (34.57%)
Manually deleted	0 (0.00%)	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)	470 (8.12%)	470 (8.12%)

Sensor Drift TS Bow

Last calibration	05.01.2013
Current calibration	31.05.2016
Start of deployment	19.05.2015
End of deployment	01.12.2015
Drift (between calibrations)	-0.0002 PSU/month
Drift (during deployment)	-0.00106311 PSU/month
Calculated slope	-0.006603183
Calculated offset	-0.011723677

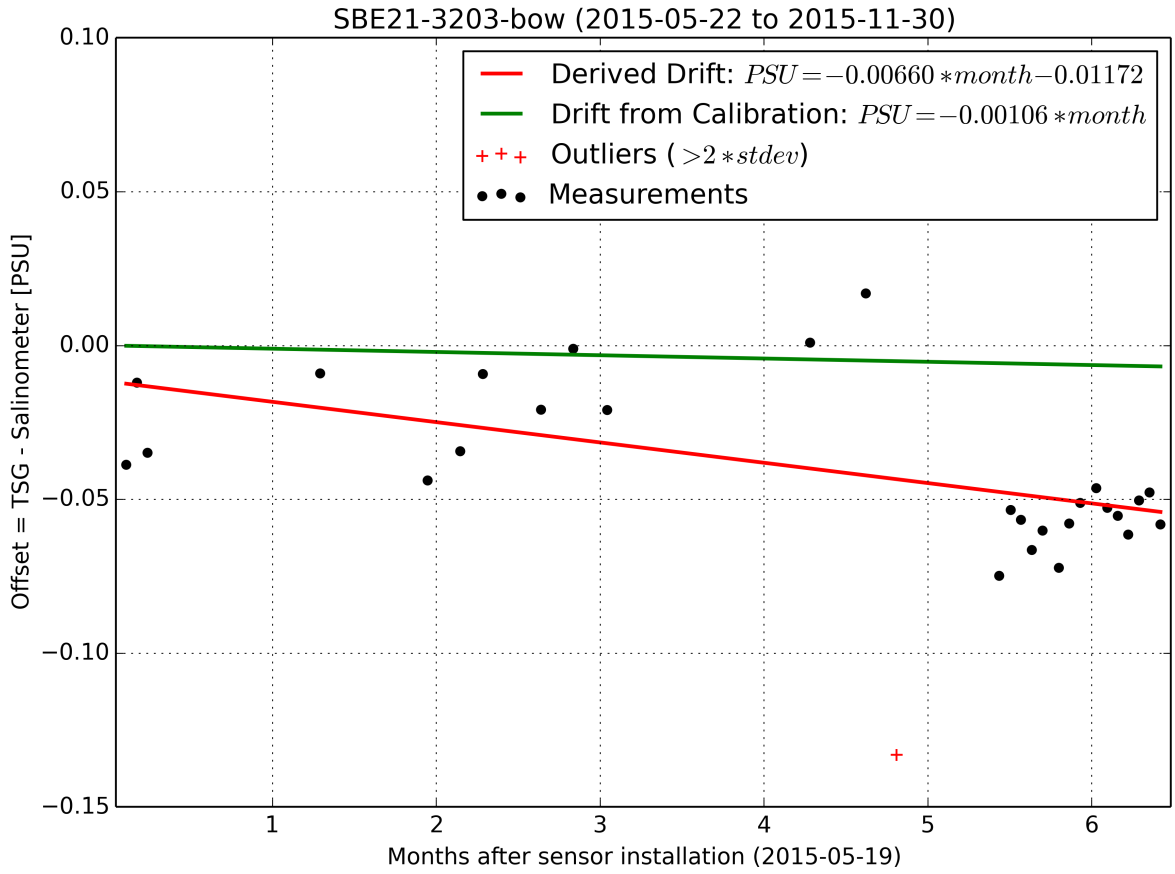

Figure 2: Sensordrift of TS Bow

Sensor Drift TS Keel

Last calibration	02.07.2014
Current calibration	31.05.2016
Start of deployment	19.05.2015
End of deployment	01.12.2015
Drift (between calibrations)	-0.0002 PSU/month
Drift (during deployment)	-0.00066058 PSU/month
Calculated slope	-0.004254498
Calculated offset	-0.008609532

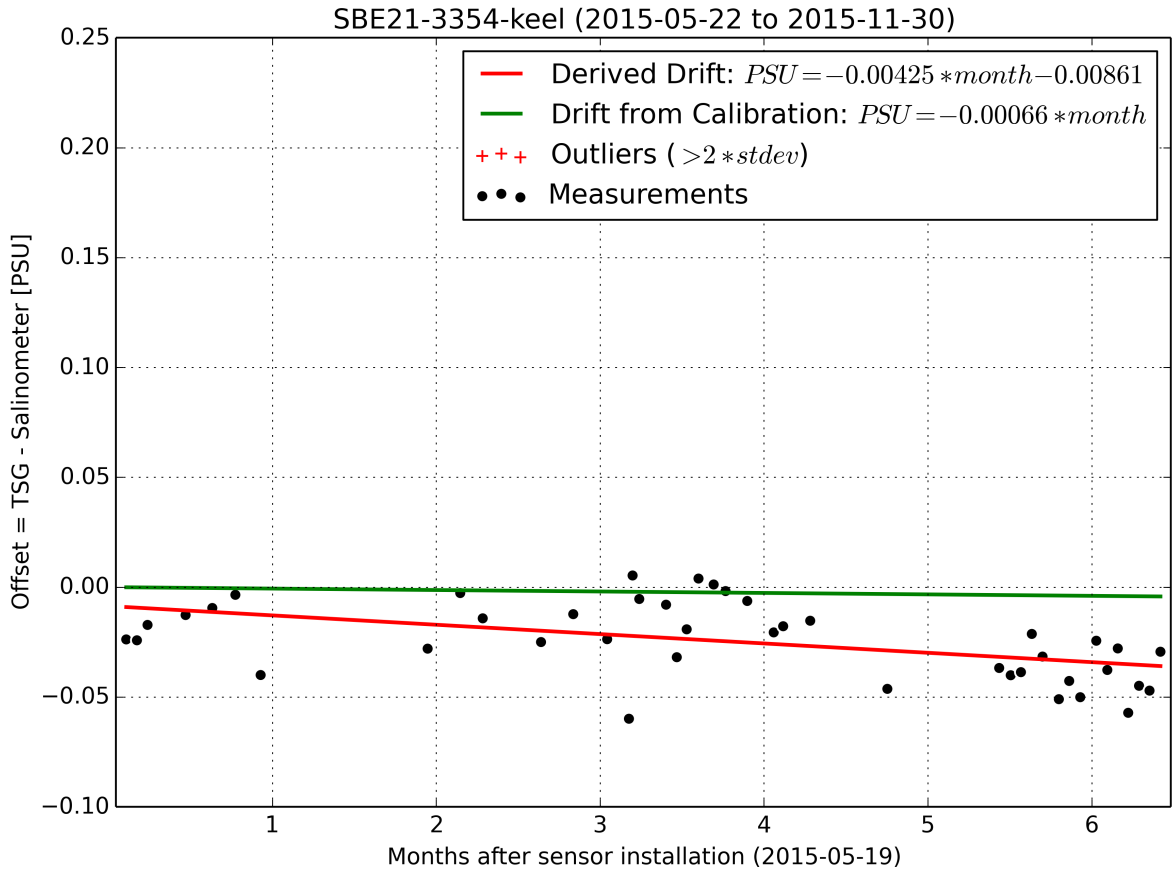

Figure 3: Sensordrift of TS Keel

Result files

Text File (PS92_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 (PS92_TSG.pdf):

This PDF document.

Salinity maps

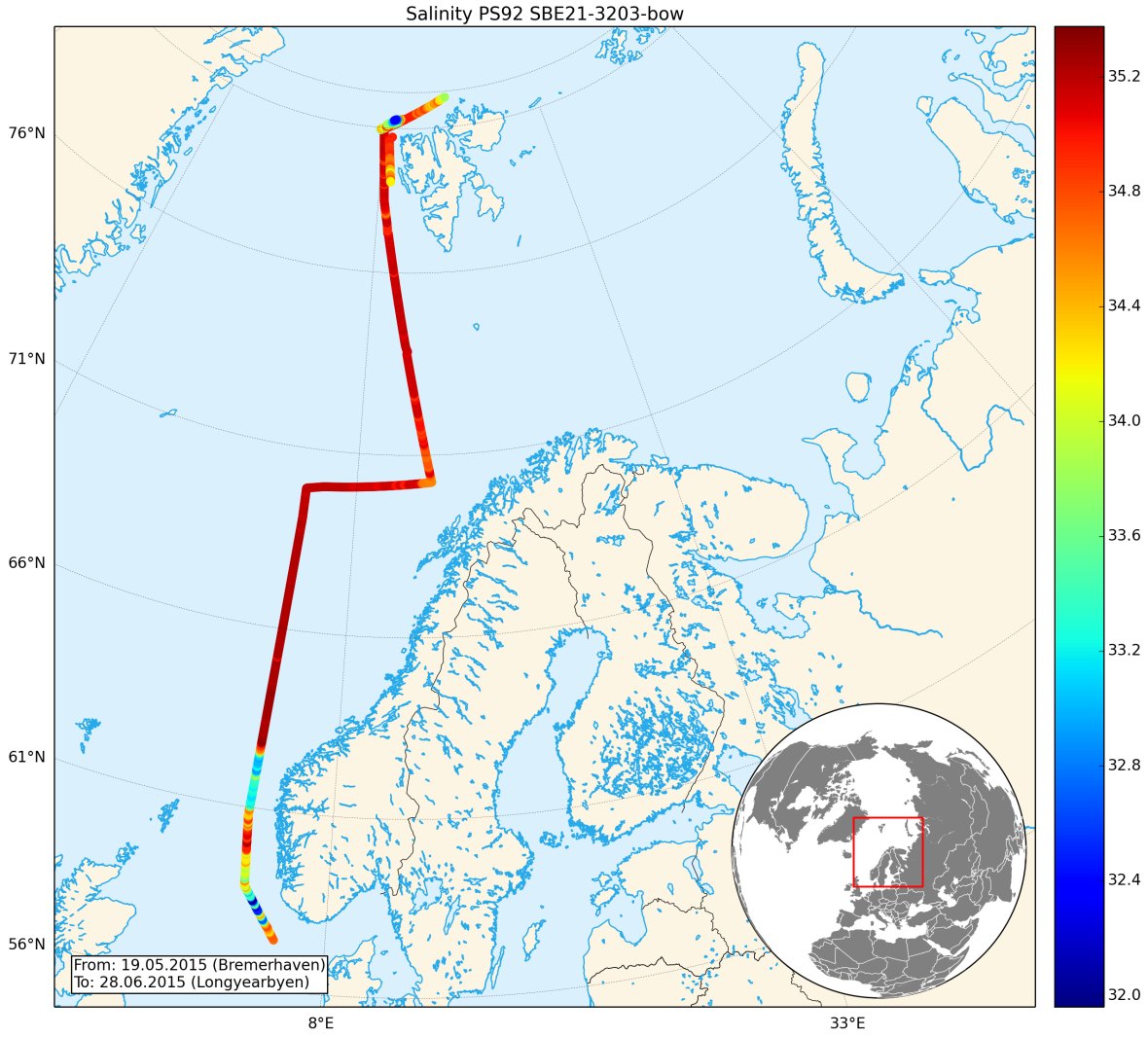

Figure 4: Salinity map of TS Bow

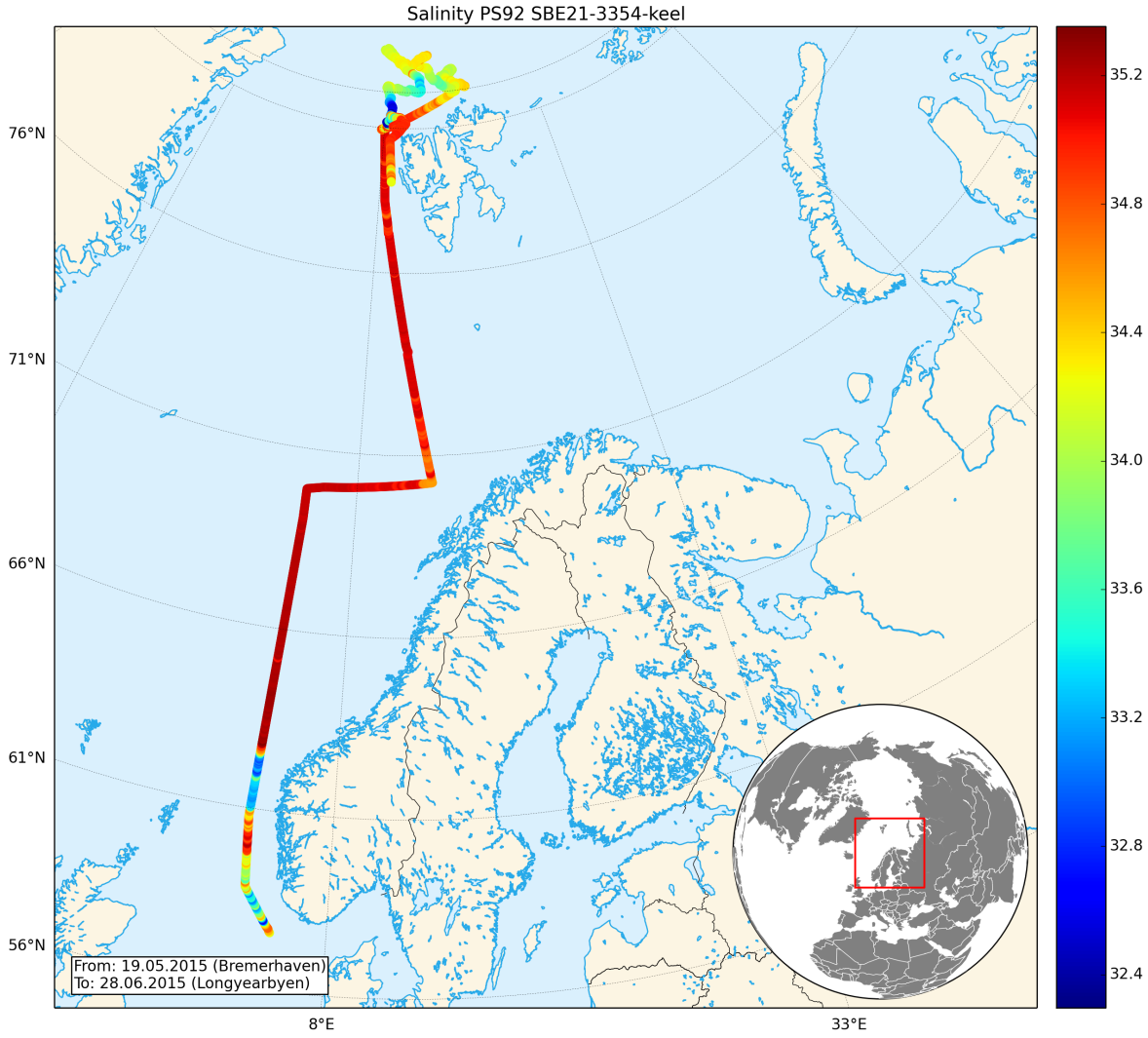

Figure 5: Salinity map of TS Keel