

Continuous thermosalinograph oceanography along RV POLARSTERN cruise track PS120

Data Processing Report

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Ref.: PS120_TSG.pdf	Vers.: 1	Date: 2019/08/26	Status: final
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1 Introduction

This report describes the processing of raw data acquired by the thermosalinographs on board RV Polarstern during expedition PS120 to receive cleaned up and corrected salinity data. Detailed description of the processing of the data and the workflow is given in the general report “General Processing Report of Surface T/S Data RV Polarstern Cruises PS116, PS117, PS118, PS119 and PS120”.

Cruise details

Vessel name: RV Polarstern
Cruise name: PS120
Cruise start: 2019-06-02
Cruise end: 2019-06-29
Cruise duration: 27 days
Working area: Atlantic, transit cruise

2 Sensor Details

Following sensors were installed during cruise PS120. Only data from **TSG2** are uploaded to PAN-GAEA for cruise PS120 and are furthermore considered in this report (for reasoning see General Processing Report).

	TSG1	TSG2
Serial number	SBE21-3203	SBE21-3271
Installation	2018-10-16	2018-10-16
Deinstallation	2019-06-28	2019-06-28
Days installed	255	255
External temperature sensor	SBE38-110	SBE38-119

3 Processing Report

Database Extraction

Data source	DSHIP database (dship.awi.de)
Start of raw file	2019-06-02T16:00:00
End of raw file	2019-06-29T05:59:59
Number of lines in hexadecimal raw file	2296800
First dataset	2019-06-03T11:27:32
Last dataset	2019-06-28T12:39:59
TSG1 valid data	531332

Calculation of 10min means

The calculation of 10min means included the removal of outliers outside a 2-times standard deviation for each data interval. The number of outliers for each parameter are given here.

Number of outliers >2*std	
Internal temperature	14998
Conductivity	14234
External temperature	15220
Salinity	18960
Result after outlier removal	
Number 10-min-means	3546

Manual flagging

After processing the data were visually inspected. The whole data from a specific timestamp were deleted if there was only one parameter to be manually flagged. **9** data points were manually removed from the TSG2 dataset of PS120.

Assigning navigation data

Data from the corrected mastertrack of cruise PS120 were assigned to the 10min means of TSG2. A speed filter of 0.5 knots minimum speed is applied to avoid redundant data. See Figure 1 and Figure 2 for the processed and corrected data of TSG2.

Number of speed flags: 196

Number of data in final output file: 3341

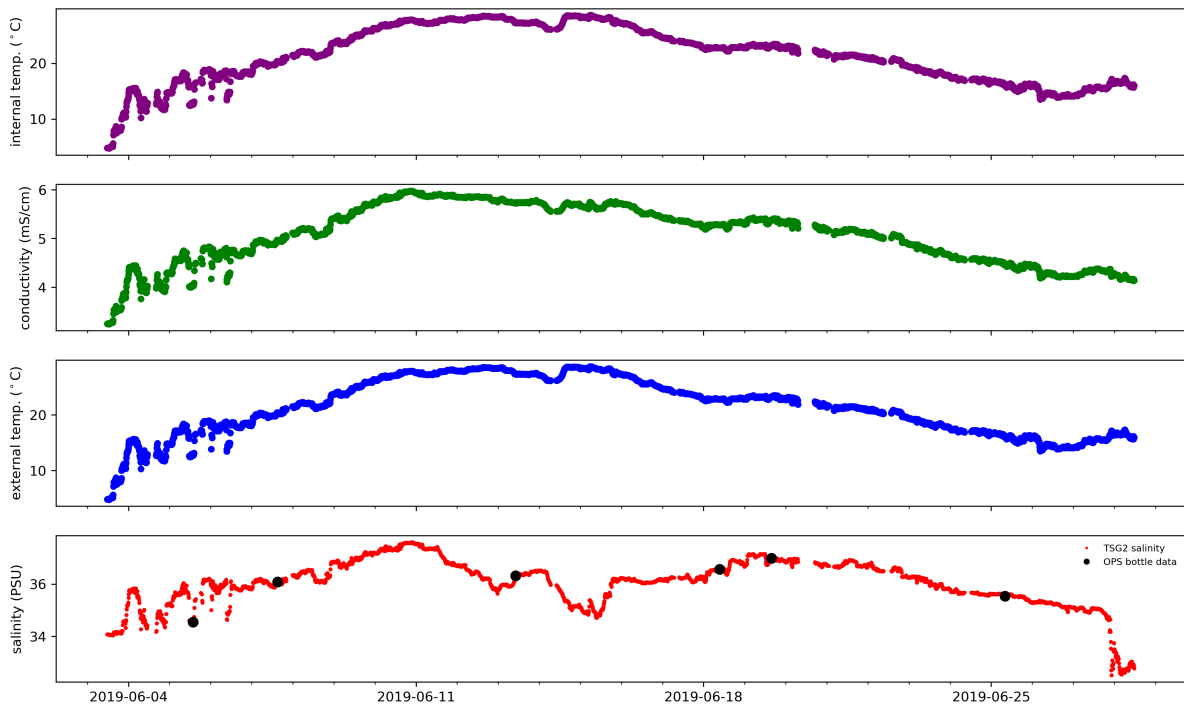


Figure 1: 10min means of data from TSG2

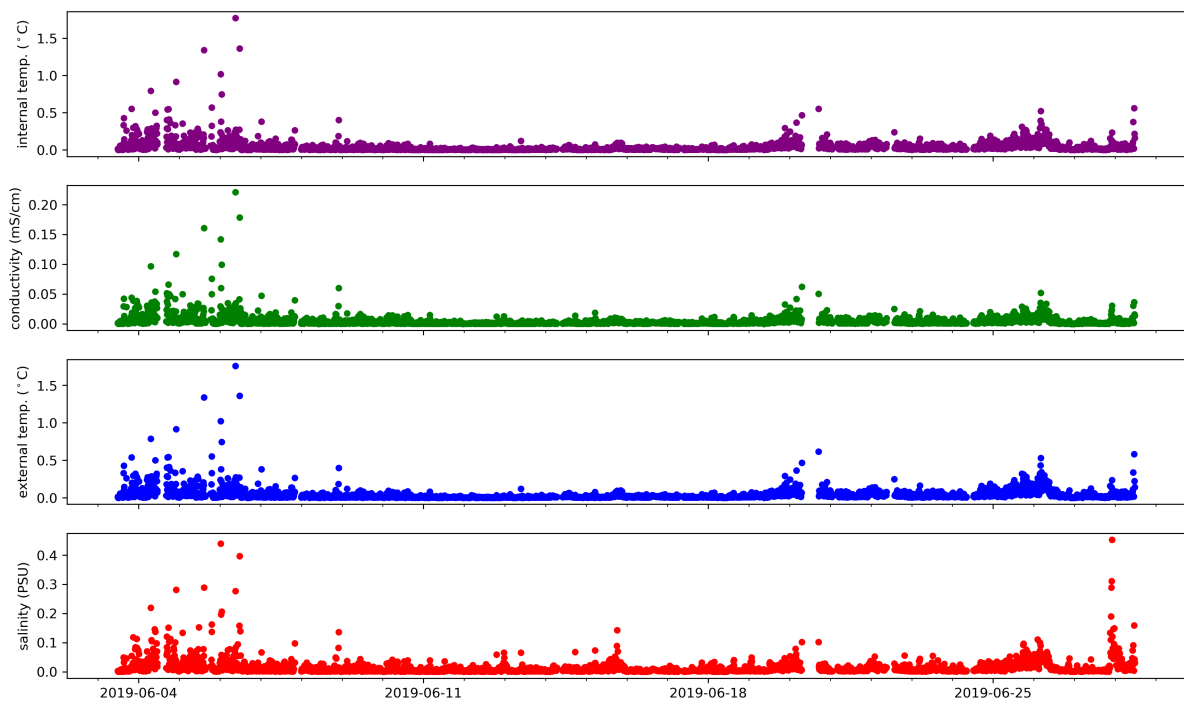


Figure 2: Standard deviations of 10min means of data from TSG2

Differences between internal and external temperature of TSG2 temperature sensors

Temperature differences between the internal and the external temperature sensors have to be small under normal circulation conditions. Means and standard deviations for the temperature differences as well as the number of data with a difference larger than 1 °C are given in the following table and are shown in Figure 3. As can be seen in Figure 3 some abnormalities occurred during cruise PS120. Usually, internal temperatures are slightly higher than external temperatures because of flow conditions in the TSG system. However, during the first part of cruise PS120 the opposite is the case with internal temperatures being smaller than external temperatures and scatter being strikingly reduced. Things changed to normal after port time in Las Palmas where the whole system was restarted. No further explanations could be obtained by concrete demands. Therefore we suggest careful handling of the data of cruise PS120.

	TSG2 temperature difference	
	mean ± standard dev.	no. > 1°C
Spot values	-0.0213 ± 0.0434°C	5
10-min means	-0.0214 ± 0.0366°C	0

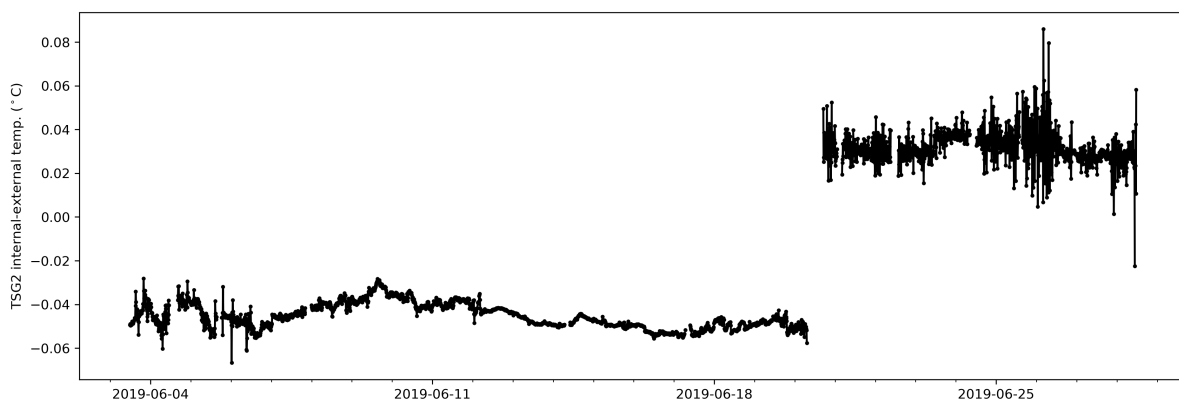


Figure 3: Differences between internal and external temperature sensors of TSG2

Result file

The result file is a plain text (tab-delimited values) file named **PS120_surf_oce.tab** with one data row in 10-min interval. For further information on the result file see the General Processing Report.

Comments

Data gaps due to system maintenance or system shutdown during harbour time:

- 19.06.2019 07:00 UTC till 08:23 UTC Update of Dship data acquisition

- 19.06.2019 08:35 UTC till 08:53 UTC Update of Dship data acquisition
- 20.06.2019 07:30 UTC till 16:42 UTC harbour time at Las Palmas

Apart from this, data gaps are caused by speed flagging or manual removal of outliers.

4 Appendix

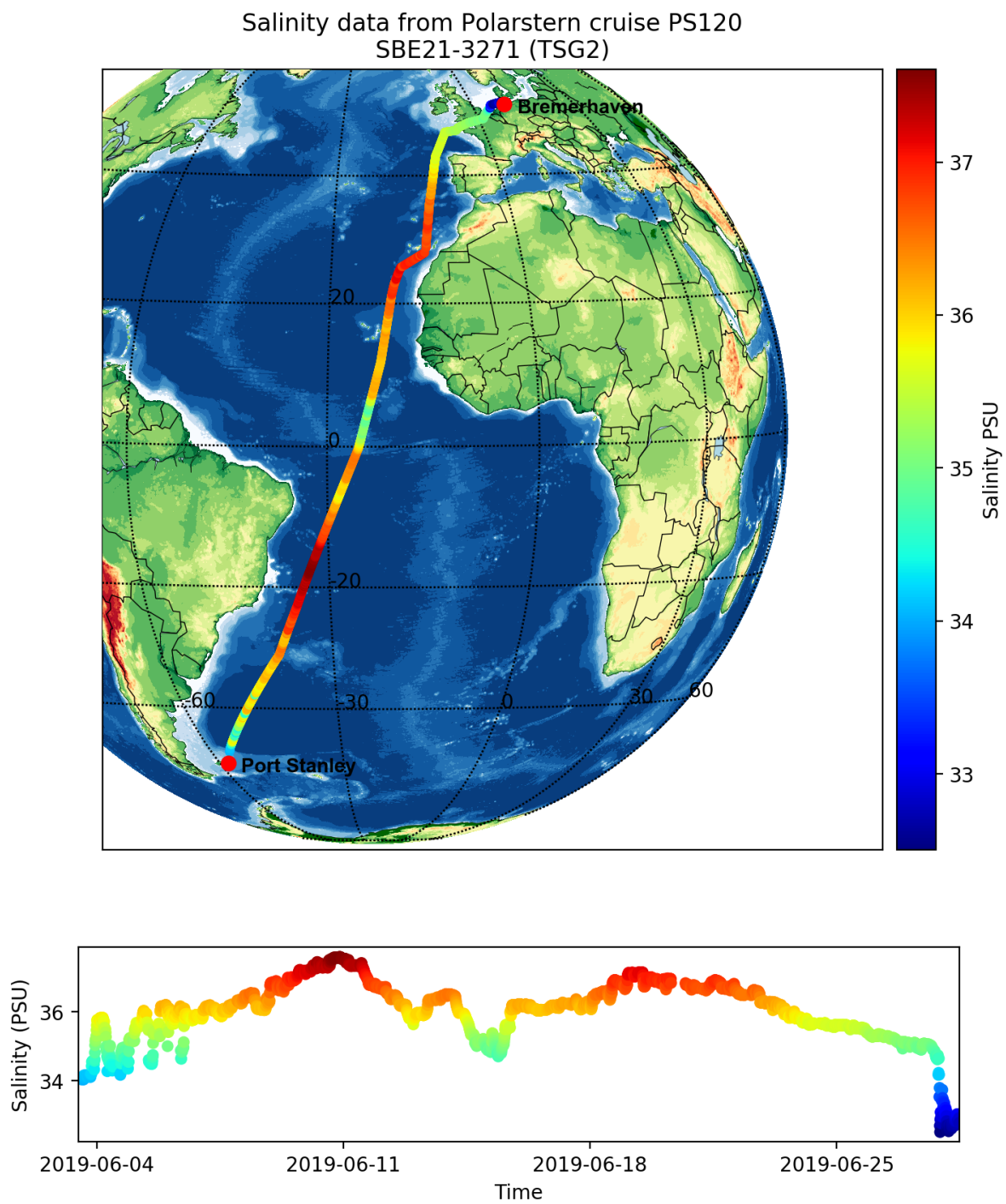


Figure 4: Salinity data from TSG2

Water temperature from Polarstern cruise PS120
SBE38-119 (TSG2)

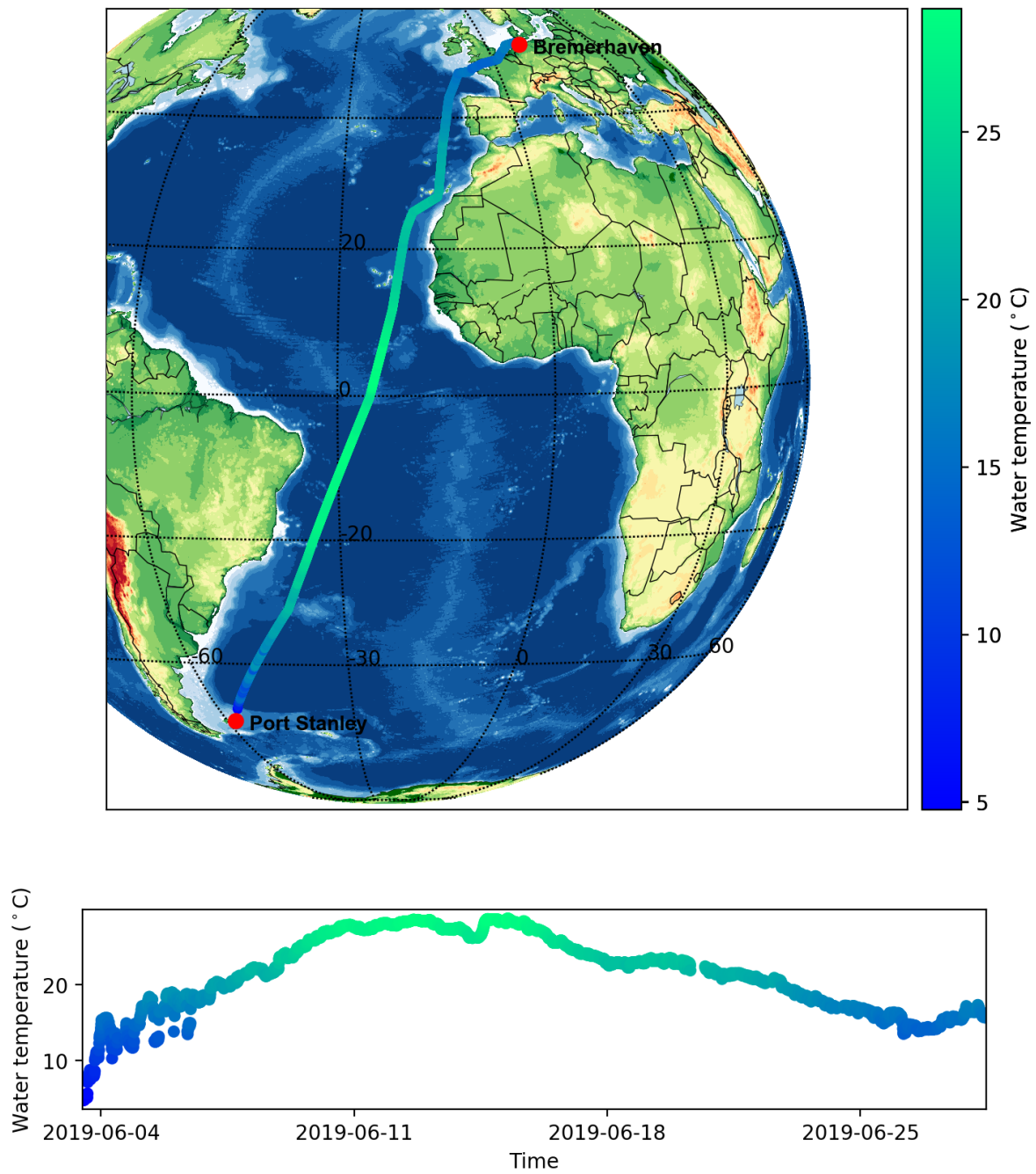


Figure 5: Temperature data from TSG2