Surface T/S Data RV "Heincke"

HE511

Data Processing Report

Contents

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Report History

Version No.	Author	Date	Comments or Changes
Vers. 1	FIELAX GmbH	11.04.2016	first edition
Vers. 1.1	FIELAX GmbH	27.02.2018	Flow Rate Filter added; minor text changes

1 Introduction

This report describes the processing of raw data acquired by the thermosalinograph on board RV "Heincke" during expedition HE511 to receive cleaned up and drift corrected salinity data.

2 Workflow

The different steps of processing are visualized in Figure 1. Unvalidated data of conductivity sensor, internal and external temperature are extracted from the DAVIS SHIP data base (https://dship.awi.de) in a 1-second interval. The salinity was calculated using conductivity and internal temperature by applying the Practical Salinity Scale 1978 (PSS-78).
As a first step, a basic cleanup was performed to remove missing or flagged data. Then, too low flow rates are taken as indicator for an unproper usage of the thermosalinograph. Since the salinity measurements in coastal areas (e.g. rivers and ports) are less reliable, measurements in a buffer of 2 nautical miles (NM) along the coast are filtered. In the Norwegian area (fjords) the buffer is set to 200 meters (0.108 NM). After the exclusion of data outside the speed interval of 0.5 kn to 15 kn, the salinity is driftcorrected with lab calibration data. In the next processing step, data with differences between external and internal temperature sensor > 5 K are removed. After despiking, a visual screening is performed to enhance the data quality. Then, the temporal resolution is reduced to 5-minutes-means. In the last step, the 5-minute-means of salinity and external temperature are exported.

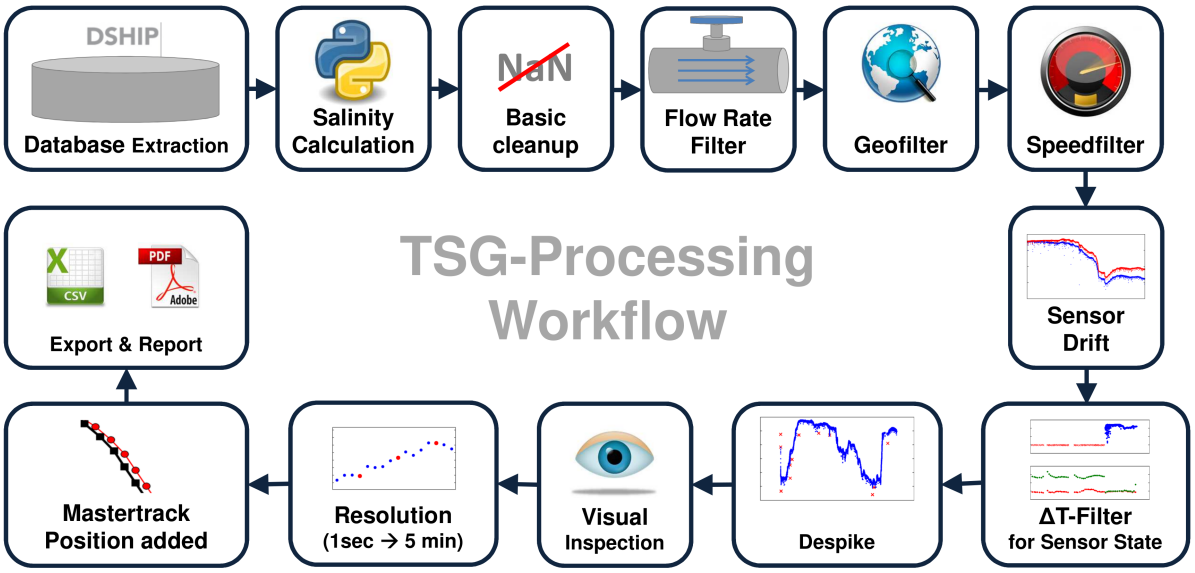

Figure 1: Workflow of TSG data processing

3 Cruise details

Vessel name	RV "Heincke"
Cruise name	HE511
Cruise start	17.05.2018 Bremerhaven
Cruise end	29.05.2018 Bremerhaven
Cruise duration	13 days

4 Sensor

Thermosalinograph:	Seabird SEACAT SBE21 (SN: 3333)
External Temperature:	SBE38

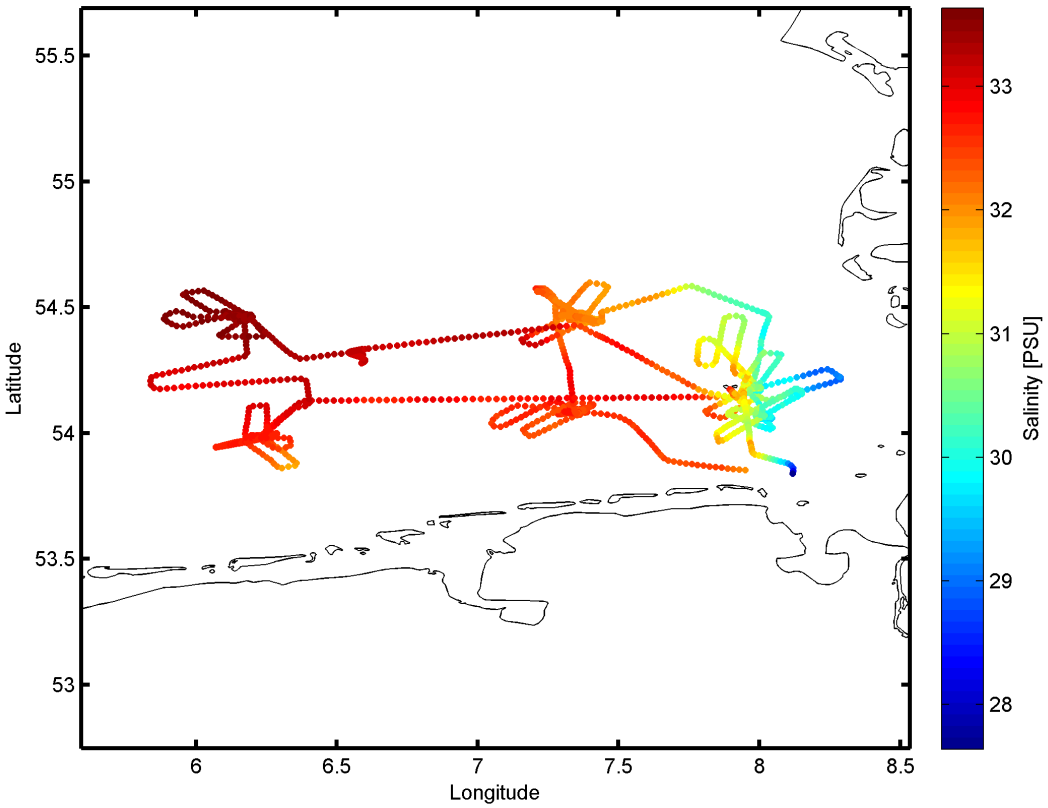

Figure 2: Cruisemap of HE511.

5 Processing Report

Database Extraction

Data source	DSHIP database (dship.awi.de)
Exported values	1389149
First dataset	2018-05-15T06:18:14 UTC
Last dataset	2018-05-31T08:10:42 UTC

Automatic Validation

The following thresholds were applied for the automatic flagging of the data:

Min. flow rate	Minimum 2.5
Min. speed	Minimum 0.5 kn between two datapoints.
Max. speed	Maximum 40 kn between two datapoints.
GeoBuffer	0.1080 NM around Norway, 2 NM anywhere else
Temperature	Maximum T-difference of 5 K.

Flagging result

Filter	Data left (abs.)	Data left (rel.)	Data removed (abs.)	Data removed (rel.)
Raw data	1389149	100 %	—	—
Basic	354703	25.53 %	1034446	74.47 %
Flow rate	302407	21.77 %	1086742	78.23 %
Geo	302407	21.77 %	1086742	78.23 %
Speed	212502	15.30 %	1176647	84.70 %
Temperature	212454	15.29 %	1176695	84.71 %
Despike	212212	15.28 %	1176937	84.72 %
Manual	212129	15.27 %	1177020	84.73 %
5-min-Mean	2997	0.22 %	1386152	99.78 %

Sensordrift

Last calibration	05.09.2017
Current calibration	22.11.2018
Start of deployment	10.01.2018
End of deployment	15.11.2018
Scaled drift	-1.2596e-004 [PSU/month]
Minimal offset	5.1874e-004 [PSU]
Maximal offset	5.8532e-004 [PSU]

Comments

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Process evolution

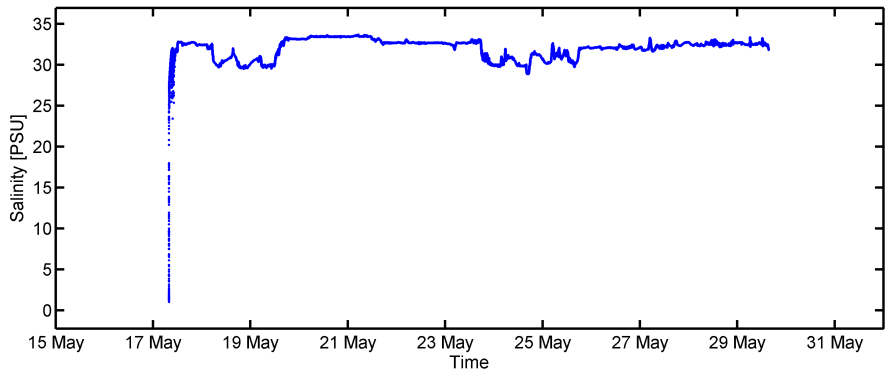

Figure 3: Raw salinity data.

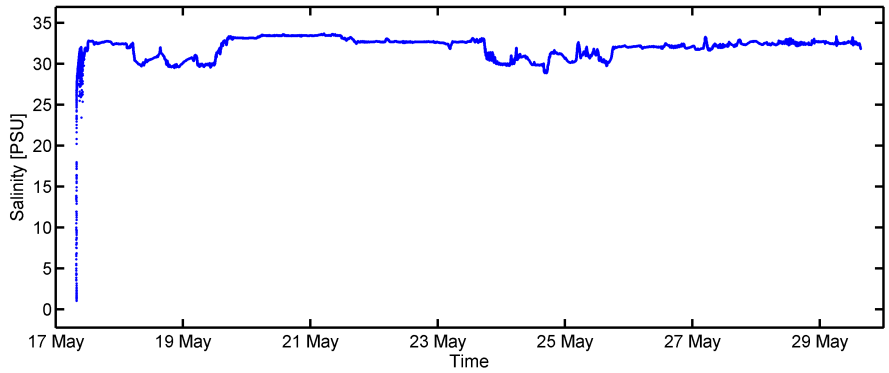

Figure 4: Salinity after basic filter.

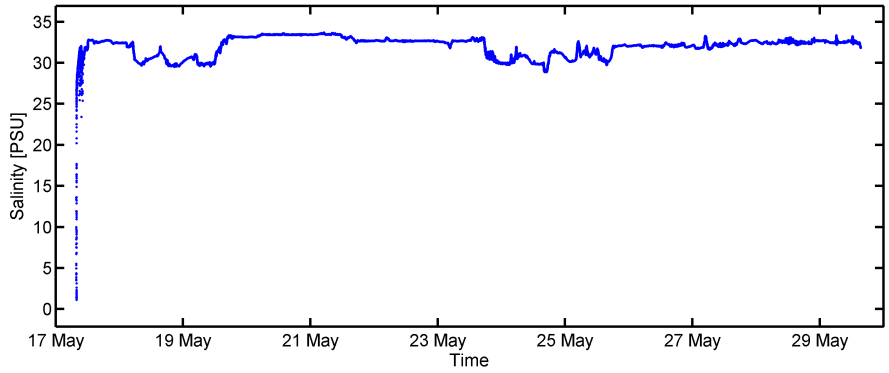

Figure 5: Salinity after flow rate filter.

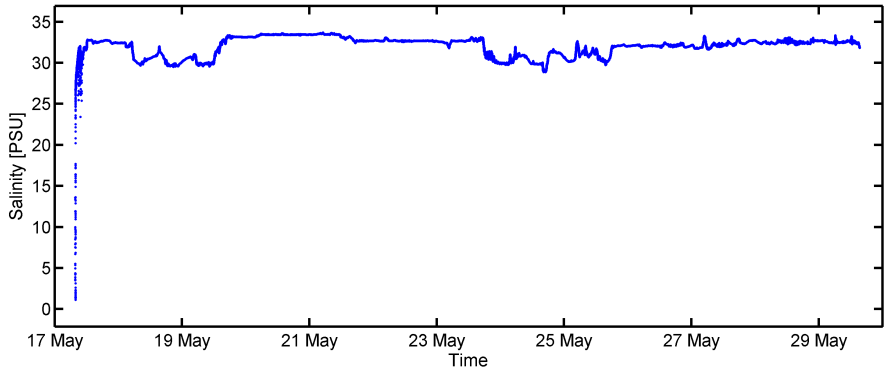

Figure 6: Salinity after geofilter.

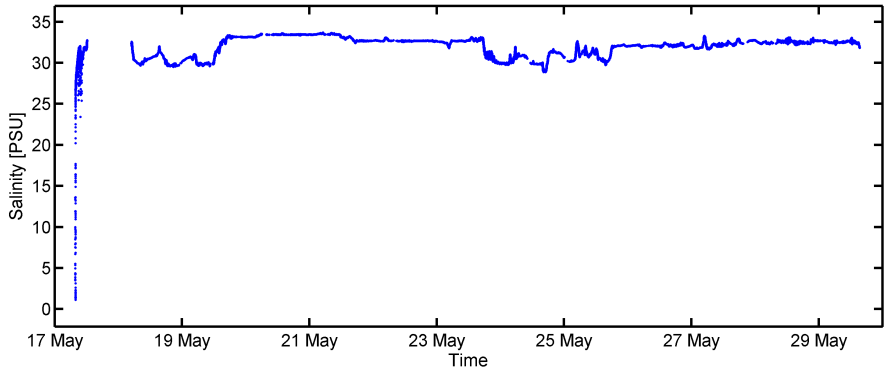

Figure 7: Salinity after speed filter.

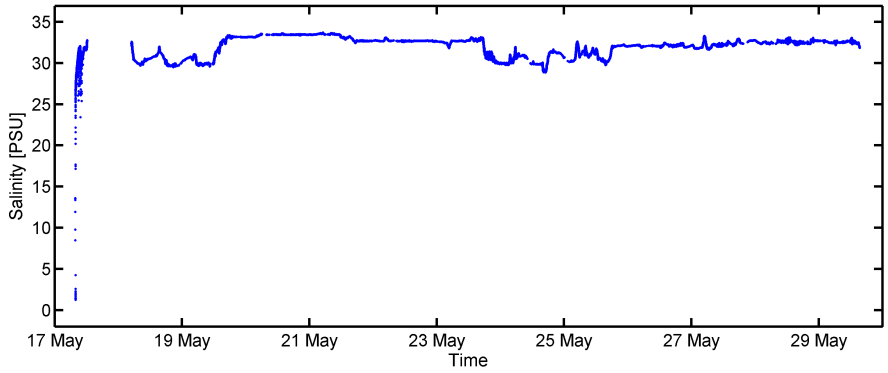

Figure 8: Salinity after temperature filter.

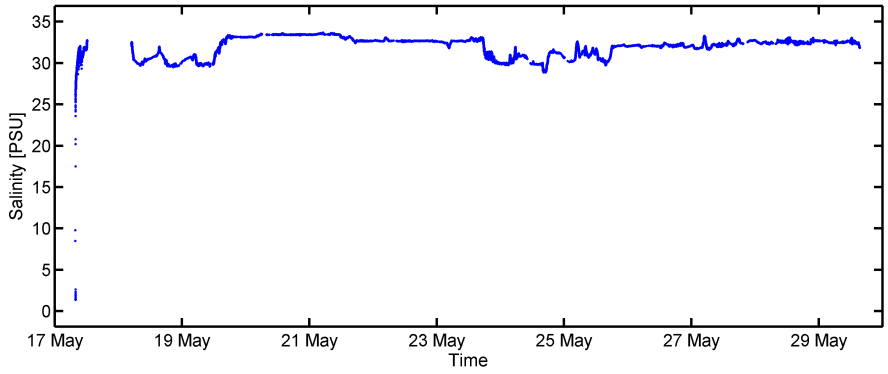

Figure 9: Salinity after despike.

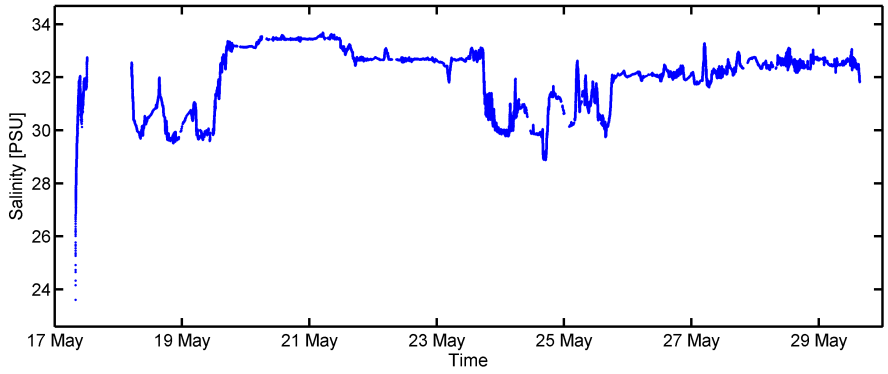

Figure 10: Salinity after manual filter.

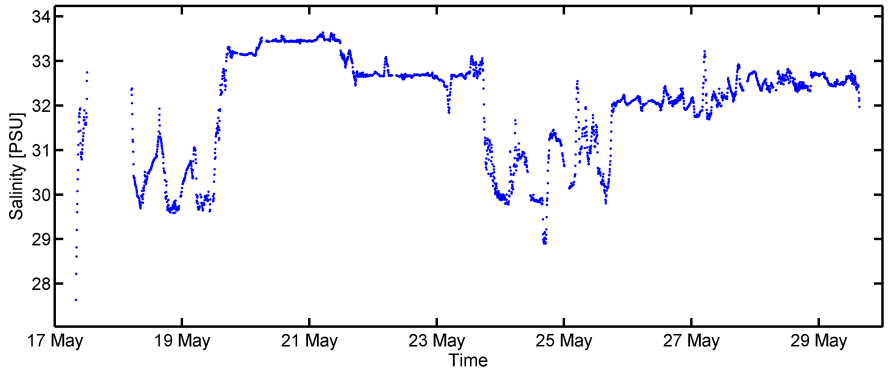

Figure 11: Salinity in 5-min-mean values.

Result file

Text File (HE511_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, unit meter
Column 5	Temperature, unit degree
Column 6	Salinity, unit PSU

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This PDF document.