

Surface T/S Data RV "Heincke"

HE488

Data Processing Report

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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 HE488 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 improper 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.

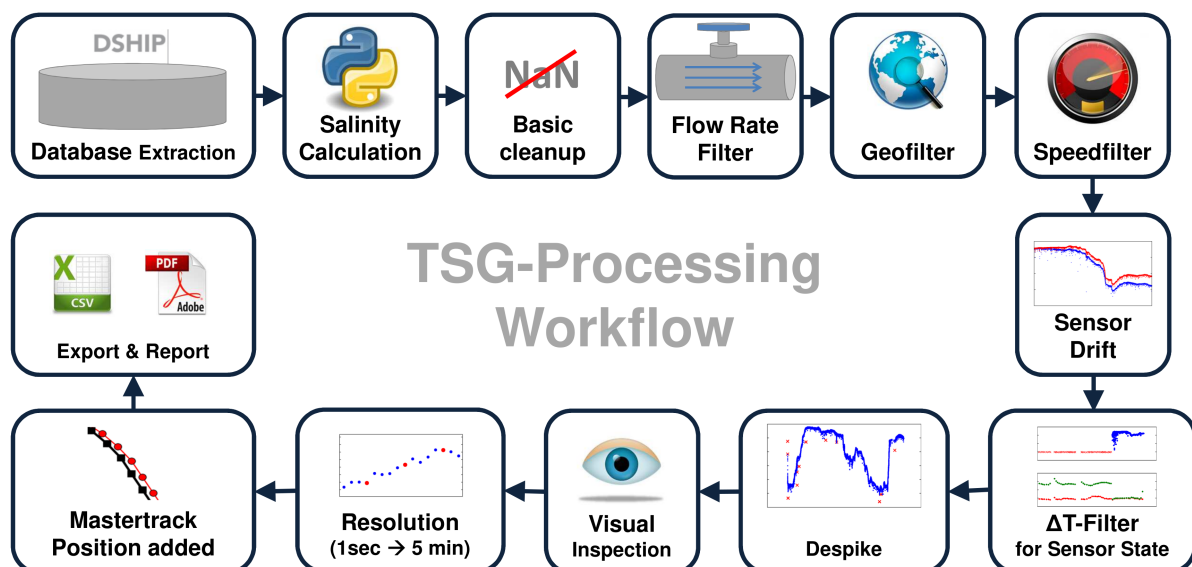


Figure 1: Workflow of TSG data processing

3 Cruise details

Vessel name RV "Heincke"
Cruise name HE488
Cruise start 24.05.2017 Bremerhaven
Cruise end 05.06.2017 Bremerhaven
Cruise duration 13 days

4 Sensor

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

5 Processing Report

Database Extraction

Data source	DSHIP database (dship.awi.de)
Exported values	1209600
First dataset	2017-05-24T00:00:00 UTC
Last dataset	2017-06-06T23:59:59 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	1209600	100 %	—	—
Basic	1770	0.15 %	1207830	99.85 %
Flow rate	1492	0.12 %	1208108	99.88 %
Geo	1492	0.12 %	1208108	99.88 %
Speed	854	0.07 %	1208746	99.93 %
Temperature	820	0.07 %	1208780	99.93 %
Despike	820	0.07 %	1208780	99.93 %
Manual	0	0.00 %	1209600	100.00 %
5-min-Mean	—	—	—	—

Sensordrift

Last calibration	31.05.2016
Current calibration	05.09.2017
Start of deployment	01.12.2016
End of deployment	07.07.2017
Scaled drift	8.0923e-004 [PSU/month]
Minimal offset	4.6292e-003 [PSU]
Maximal offset	5.0017e-003 [PSU]

Comments

Sensor No. 3333 exchange ahead from schedule due to broken conductivity cell. No reasonable post cruise calibration possible.

Process evolution

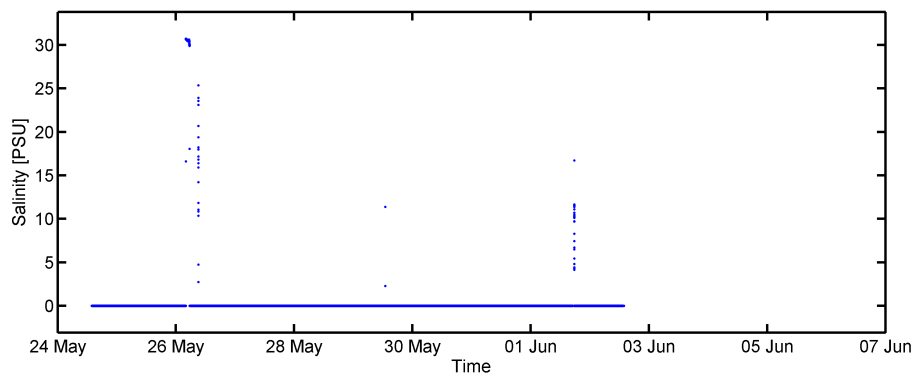


Figure 2: Raw salinity data.

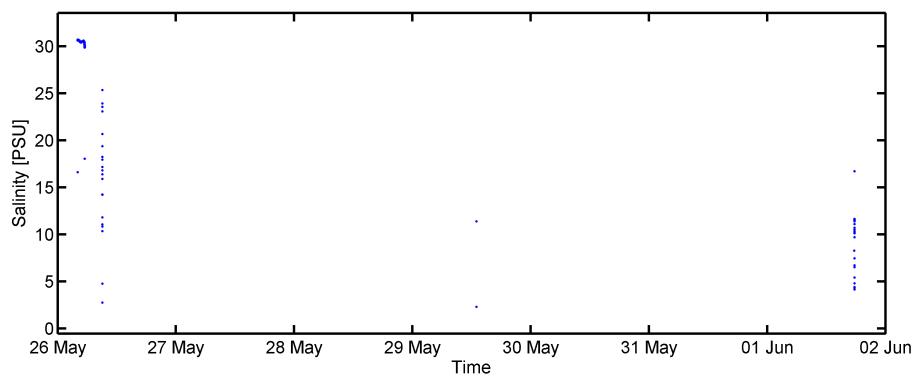


Figure 3: Salinity after basic filter.

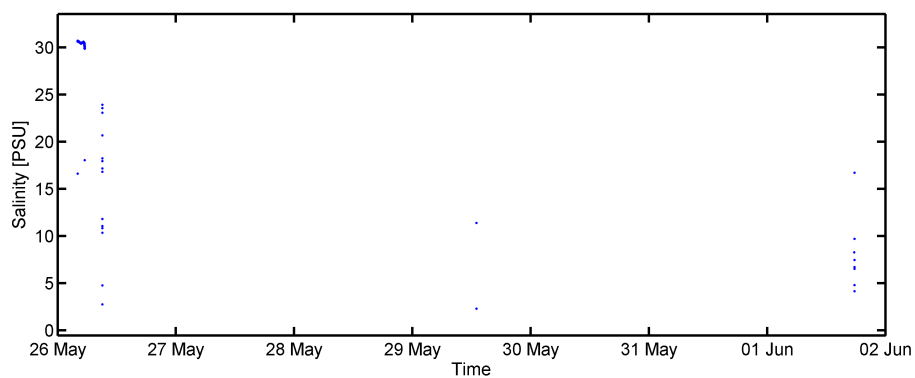


Figure 4: Salinity after flow rate filter.

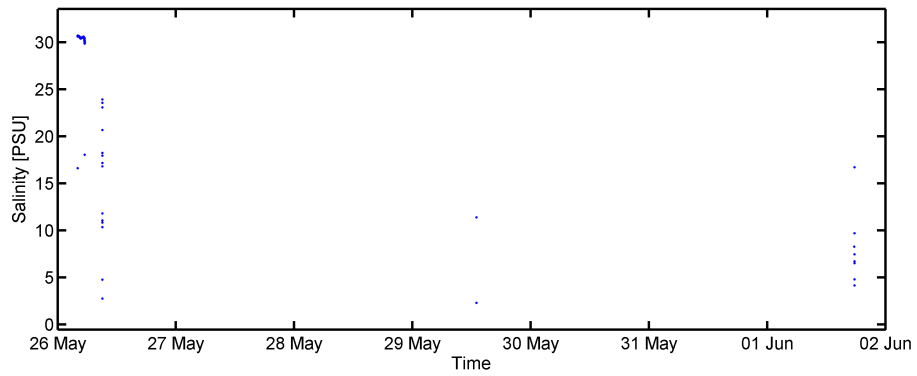


Figure 5: Salinity after geofilter.

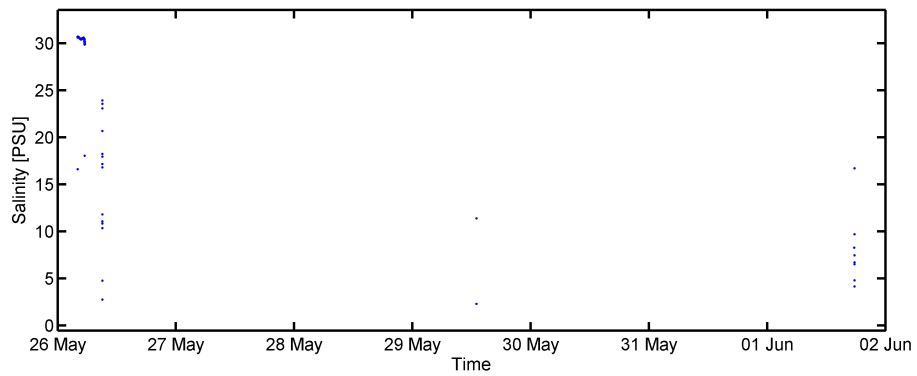


Figure 6: Salinity after speed filter.

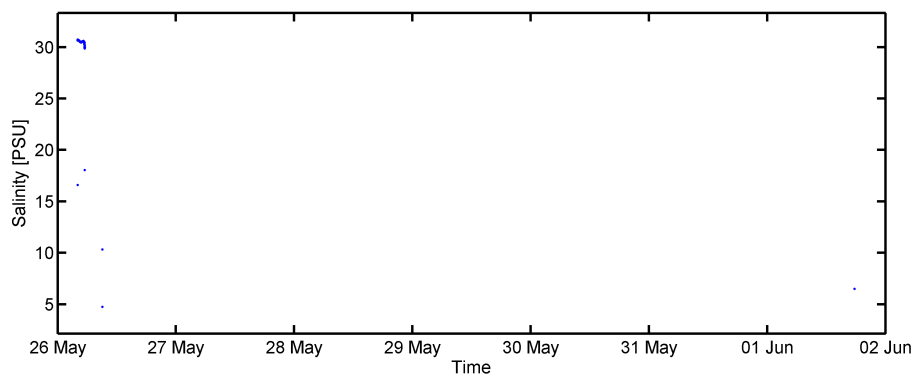


Figure 7: Salinity after temperature filter.

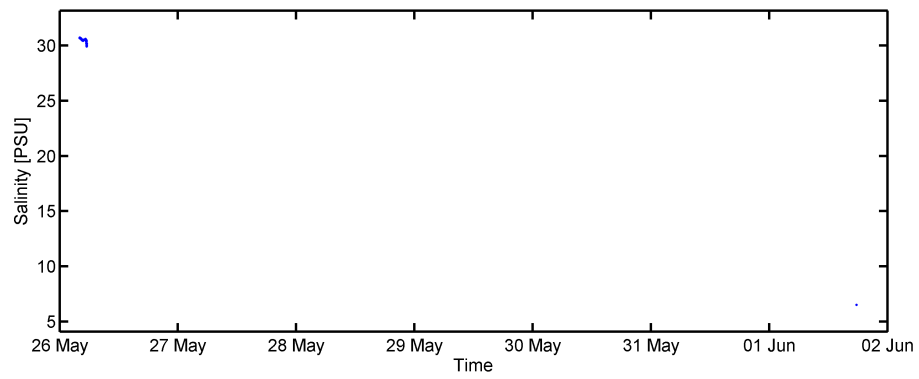


Figure 8: Salinity after despiking.

Result file

Processing Report (HE488_TSG.pdf):

This PDF document.