

Surface T/S Data RV "Heincke"

HE475

Data Processing Report

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1 Introduction

This report describes the processing of raw data acquired by the thermosalinograph on board RV "Heincke" during expedition HE475 to receive cleaned up and drift corrected salinity data.

2 Workflow

The different steps of processing are visualized in Figure 1. Unvalidated data of 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 by applying the Practical Salinity Scale 1978 (PSS-78). Furthermore the sound velocity was derived by using the Del Grosso equation.

As first step, a basic cleanup was performed to remove missing or flagged data. 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 the difference between the external and internal temperature is taken to identify an improper usage of the thermosalinograph. This filter is ignored if more than 90% of the data would get removed. After despiking, a visual screening is performed to enhance the data quality. In the last step the temporal resolution is reduced to 5-minutes-means.

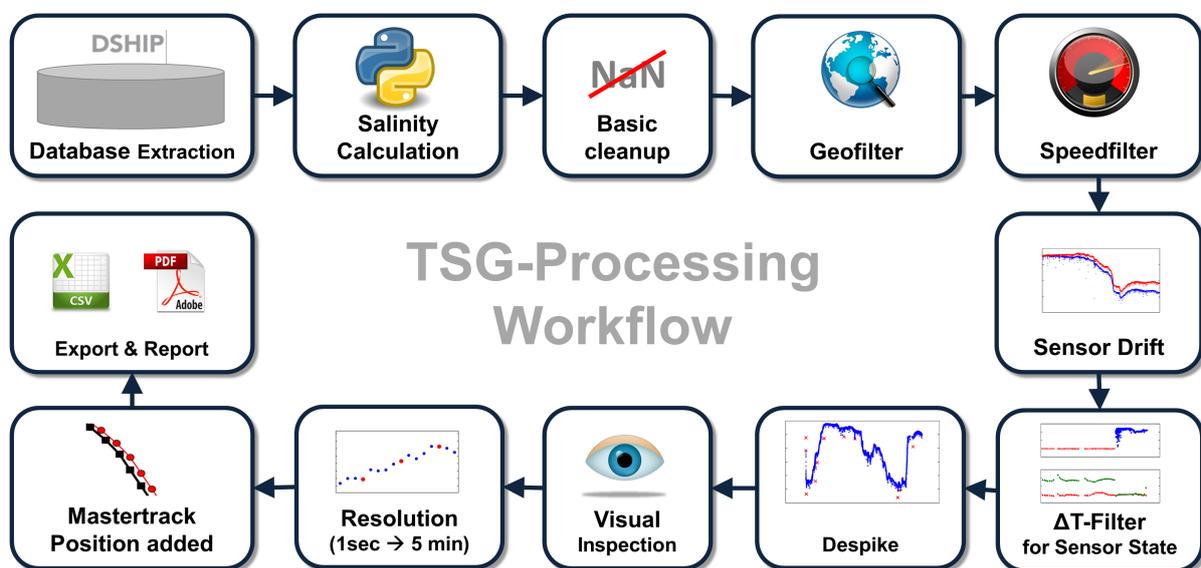


Figure 1: Workflow of TSG data processing

3 Cruise details

Vessel name RV "Heincke"
Cruise name HE475
Cruise start 25.10.2016 Bremerhaven
Cruise end 11.01.2017 Bremerhaven
Cruise duration 79 days

4 Sensor

Thermosalinograph: Seabird SEACAT SBE21 (SN: 3334)
External Temperature: SBE38

5 Processing Report

Database Extraction

Data source	DSHIP database (dship.awi.de)
Exported values	864001
First dataset	2016-10-27T00:00:00 UTC
Last dataset	2016-11-06T00:00:00 UTC

Automatic Validation

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

Min. speed	Minimum 0.5 kn between two datapoints.
Max. speed	Maximum 15 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	864001	100 %	—	—
Basic	857742	99.28 %	6259	0.72 %
Geo	668939	77.42 %	195062	22.58 %
Speed	659052	76.28 %	204949	23.72 %
Temperature	646776	74.86 %	217225	25.14 %
Despike	646746	74.85 %	217255	25.15 %
Manual	0	0.00 %	864001	100.00 %
5-min-Mean	—	—	—	—

Sensordrift

Last calibration	19.05.2015
Current calibration	15.12.2016
Start of deployment	09.05.2016
End of deployment	02.12.2016
Scaled drift	-2.1650e-004 [PSU/month]
Minimal offset	1.2171e-003 [PSU]
Maximal offset	1.2883e-003 [PSU]

Comments

Unreliable salinity values: Inconsistent values of external and internal temperature sensors.

Process evolution

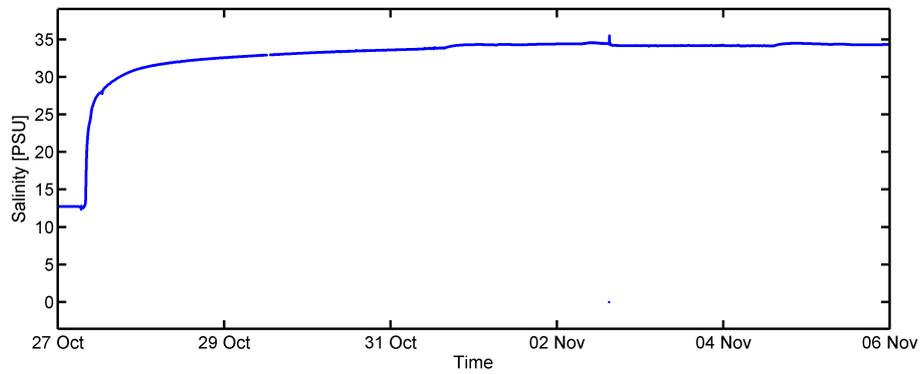


Figure 2: Raw salinity data.

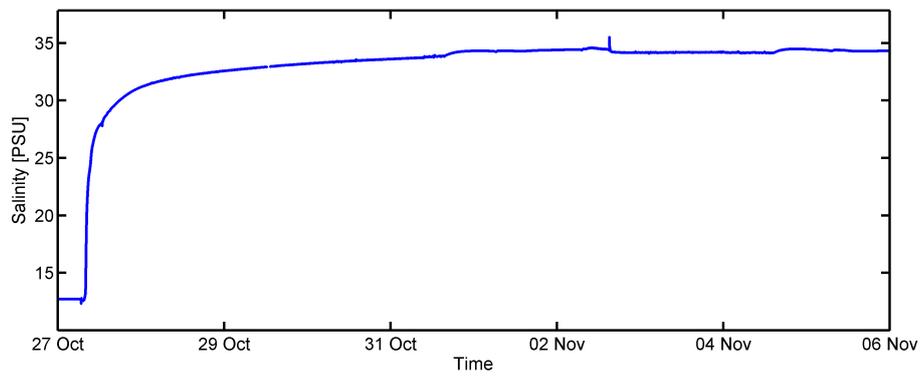


Figure 3: Salinity after basic filter.

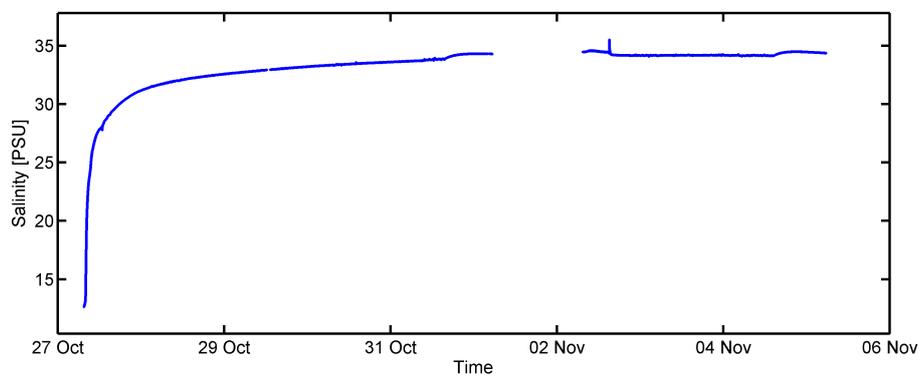


Figure 4: Salinity after geofilter.

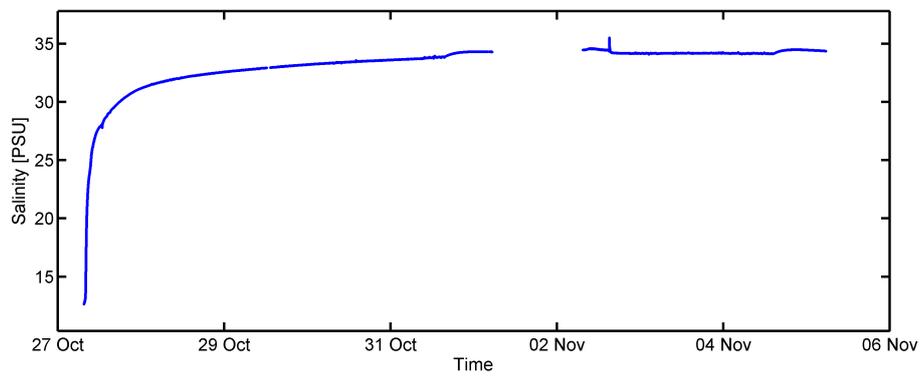


Figure 5: Salinity after speed filter.

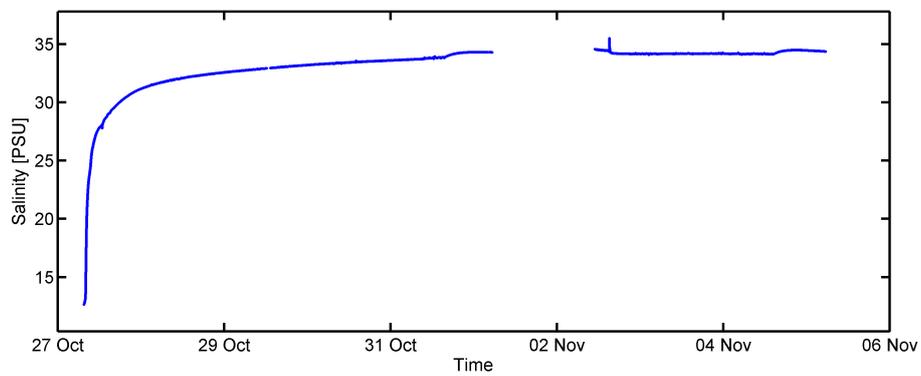


Figure 6: Salinity after temperature filter.

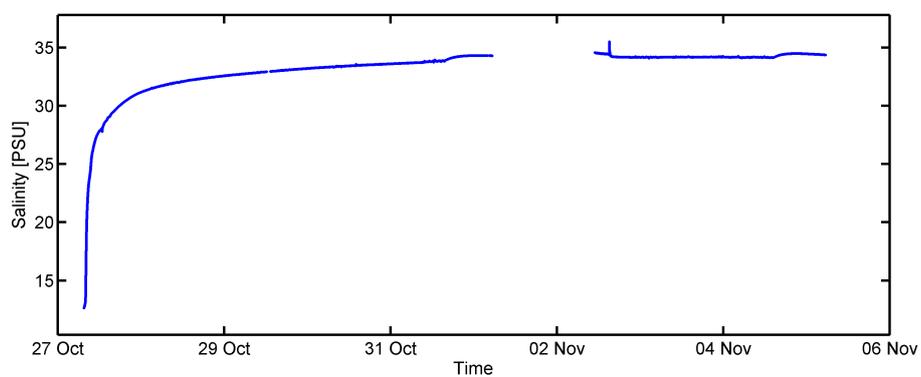


Figure 7: Salinity after despiking.

Result file

Processing Report (HE475_TSG.pdf):
This PDF document.