Surface T/S Data RV "Heincke"

HE412

Data Processing Report

Contents

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1 Introduction

This report describes the processing of raw data acquired by the thermosalinograph on board RV "Heincke" during expedition HE412 to receive cleaned up and drift corrected salinity data.

2 Workflow

The different steps of processing are visualized in Figure 2. 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 for cruises from 2009 to 2014. 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 unproper 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.

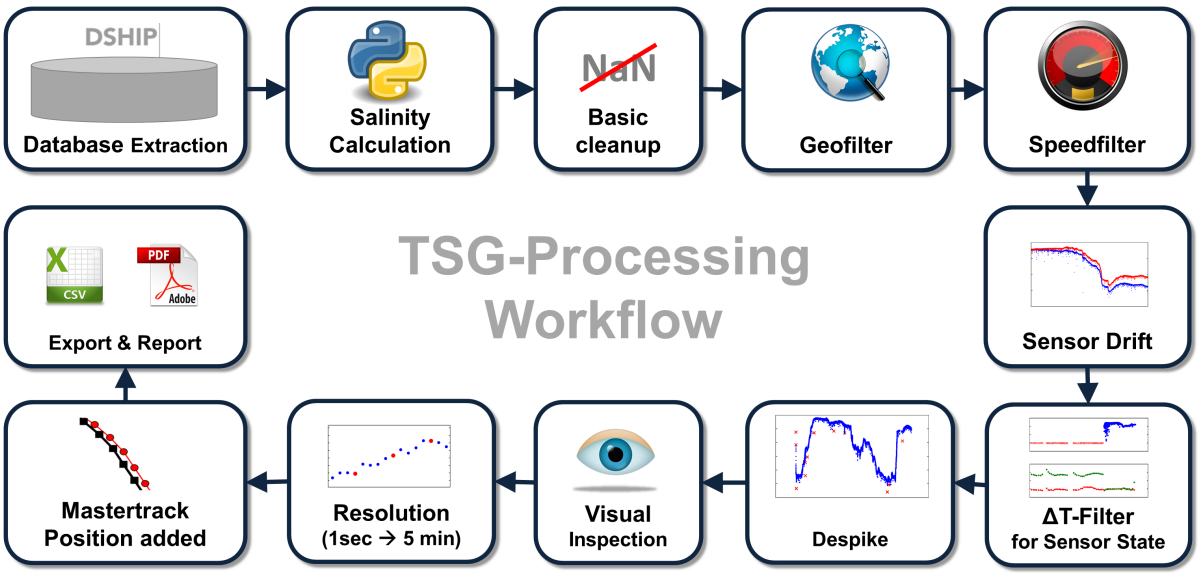

Figure 1: Workflow of TSG data processing

3 Cruise details

Vessel name	RV "Heincke"
Cruise name	HE412
Cruise start	29.10.2013 Bremerhaven
Cruise end	13.11.2013 Bremerhaven
Cruise duration	15 days

4 Sensor

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

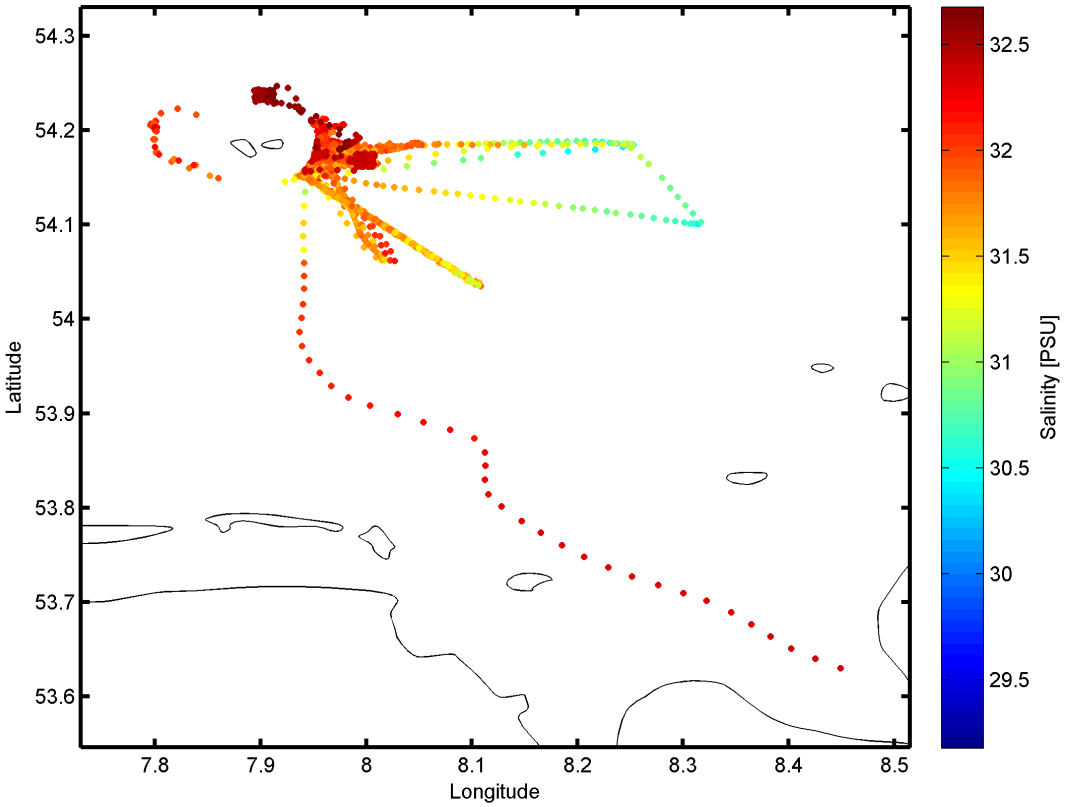

Figure 2: Cruisemap of HE412.

5 Processing Report

Database Extraction

Data source	DSHIP database (dship.awi.de)
Exported values	1296001
First dataset	2013-10-30T00:00:03 UTC
Last dataset	2013-11-14T00:00:00 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	1296001	100 %	—	—
Basic	1292738	99.75 %	3263	0.25 %
Geo	704341	54.35 %	591660	45.65 %
Speed	581740	44.89 %	714261	55.11 %
Temperature	529376	40.85 %	766625	59.15 %
Despike	233233	18.00 %	1062768	82.00 %
Manual	221065	17.06 %	1074936	82.94 %
5-min-Mean	1731	0.13 %	1294270	99.87 %

Sensordrift

Last calibration	24.05.2011
Current calibration	12.12.2013
Start of deployment	10.12.2012
End of deployment	10.12.2013
Scaled drift	-6.6460e-003 [PSU/month]
Minimal offset	7.0888e-002 [PSU]
Maximal offset	7.3551e-002 [PSU]

Process evolution

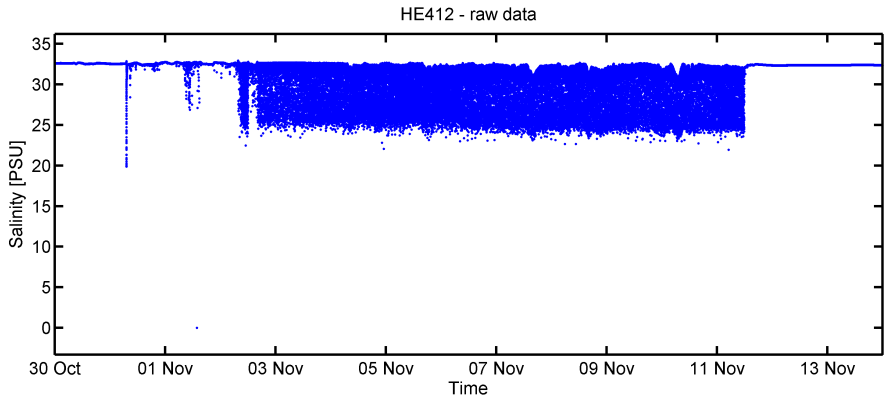

Figure 3: Raw salinity data.

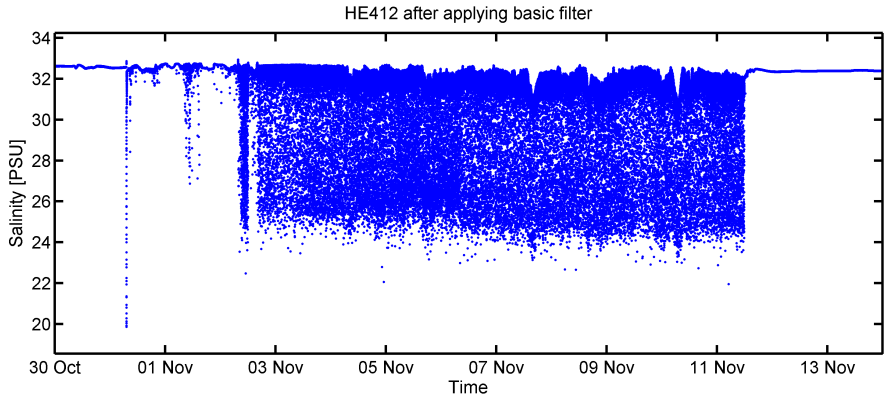

Figure 4: Salinity after basic filter.

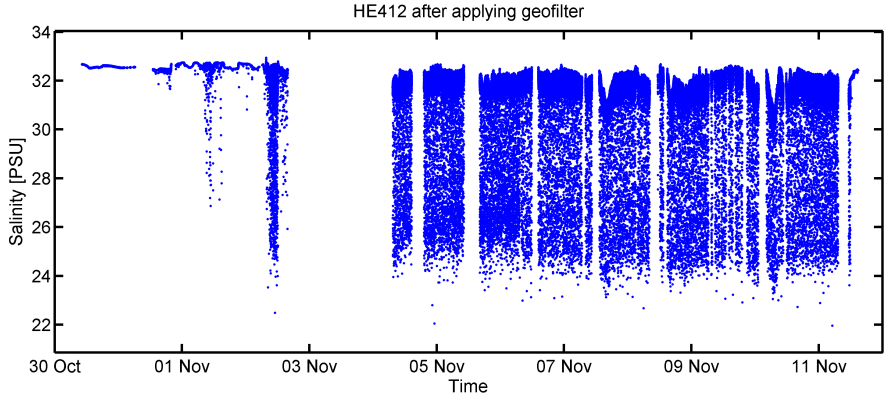

Figure 5: Salinity after geofilter.

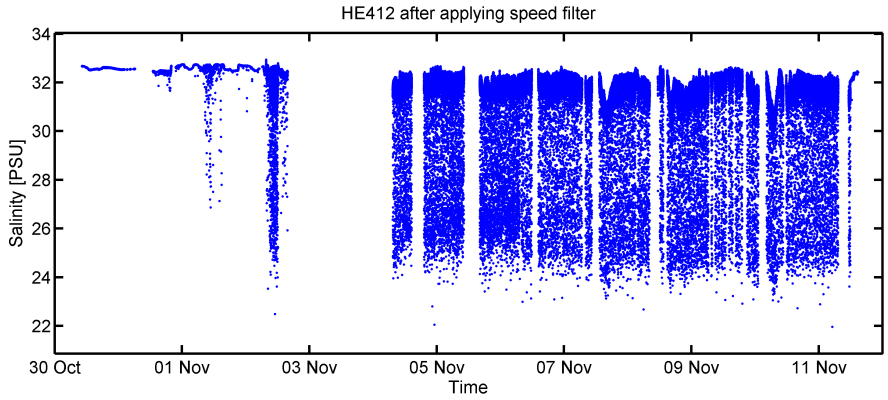

Figure 6: Salinity after speed filter.

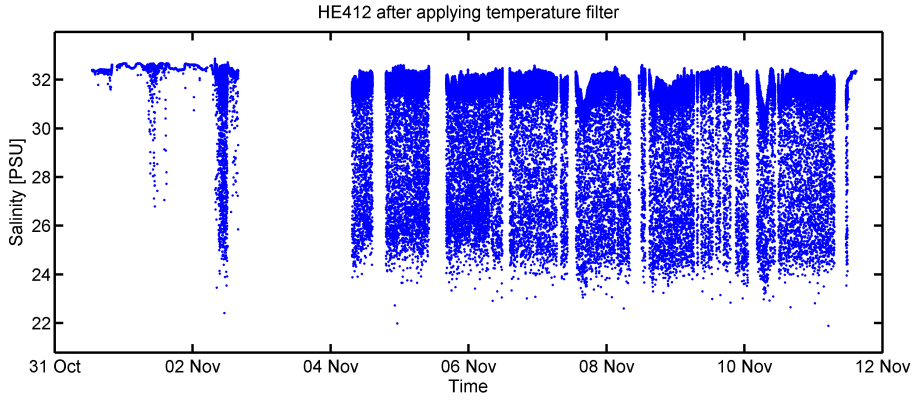

Figure 7: Salinity after temperature filter.

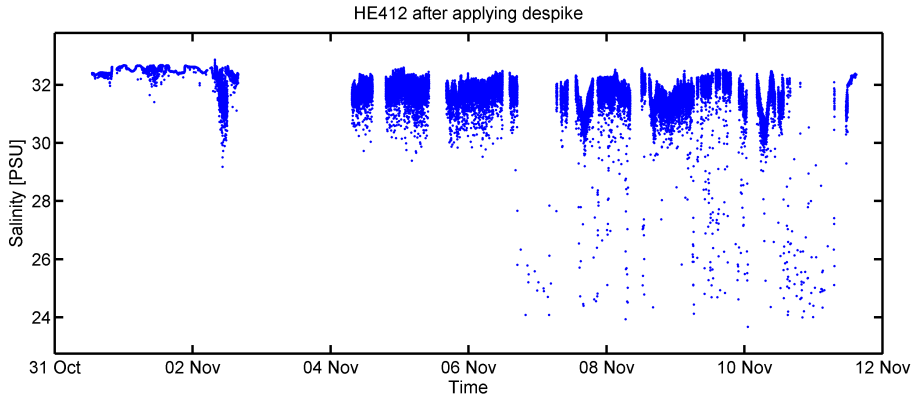

Figure 8: Salinity after despike.

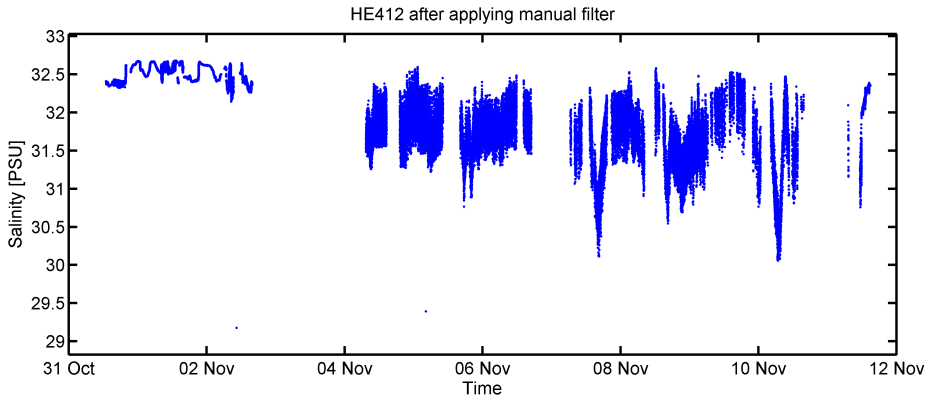

Figure 9: Salinity after manual filter.

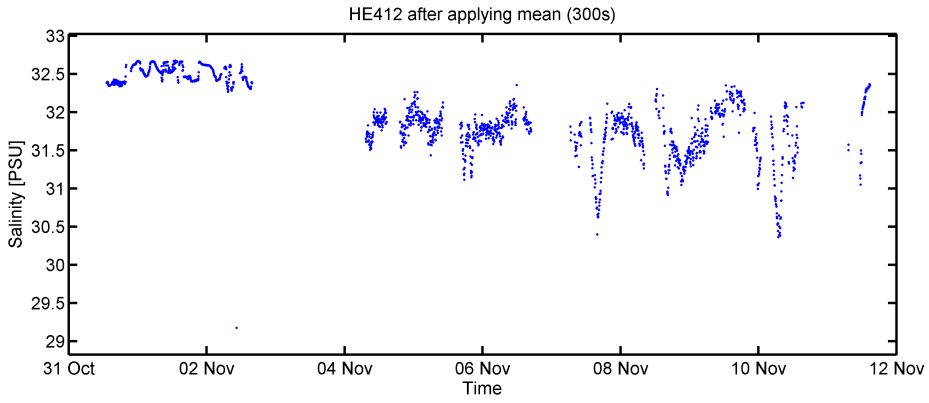

Figure 10: Salinity in 5-min-mean values.

Result file

Text File (HE412_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, unit meter
Column 6	Temperature, unit degree
Column 7	Salinity, unit PSU

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This PDF document.