Surface T/S Data RV "Heincke"

HE404

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 HE404 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.

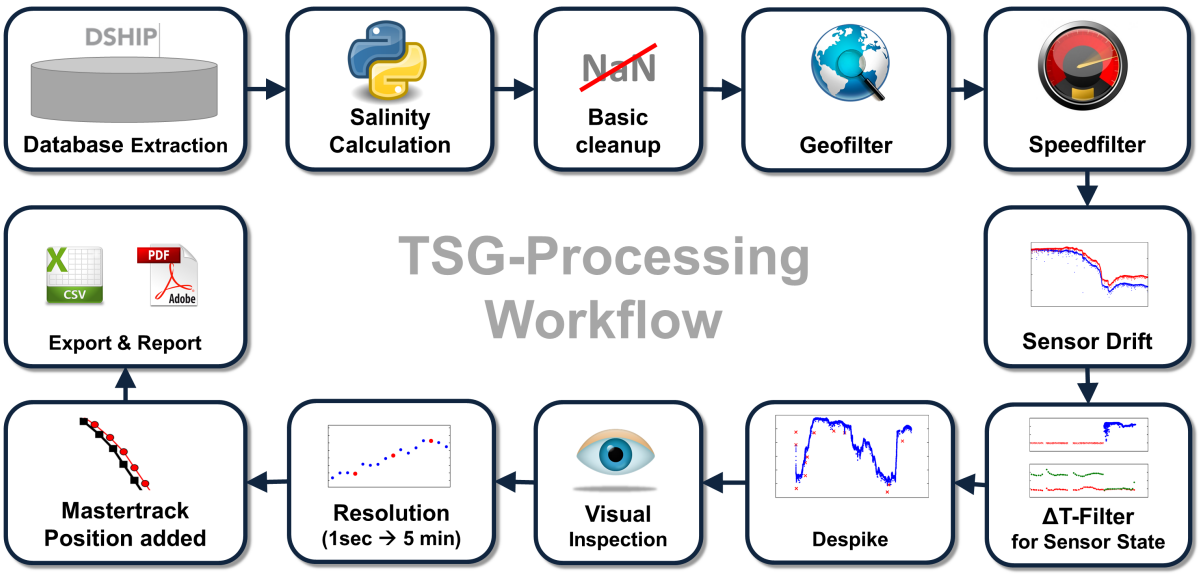

Figure 1: Workflow of TSG data processing

3 Cruise details

Vessel name	RV "Heincke"
Cruise name	HE404
Cruise start	20.06.2013 Bremerhaven
Cruise end	25.06.2013 Bremerhaven
Cruise duration	5 days

4 Sensor

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

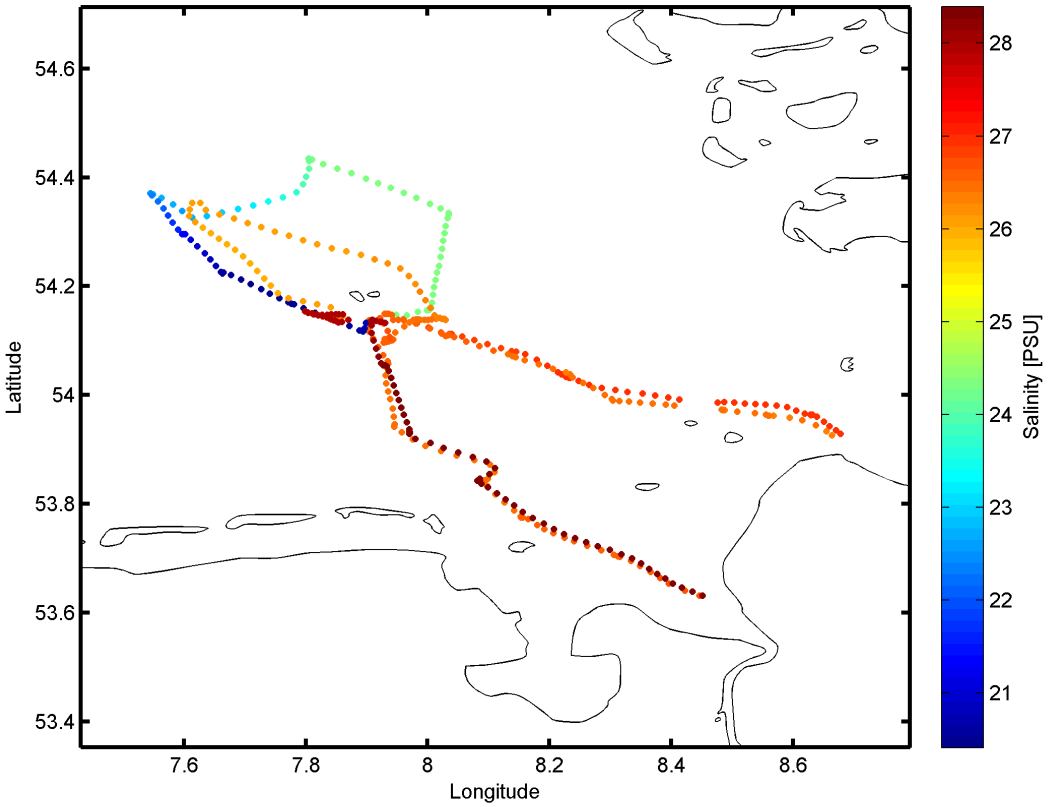

Figure 2: Cruisemap of HE404.

5 Processing Report

Database Extraction

Data source	DSHIP database (dship.awi.de)
Exported values	518401
First dataset	2013-06-20T00:00:03 UTC
Last dataset	2013-06-26T00:00:00 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	518401	100 %	—	—
Basic	516825	99.70 %	1576	0.30 %
Geo	125544	24.22 %	392857	75.78 %
Speed	119507	23.05 %	398894	76.95 %
Temperature	119507	23.05 %	398894	76.95 %
Despike	107204	20.68 %	411197	79.32 %
Manual	107204	20.68 %	411197	79.32 %
5-min-Mean	415	0.08 %	517986	99.92 %

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	4.2009e-002 [PSU]
Maximal offset	4.3142e-002 [PSU]

Process evolution

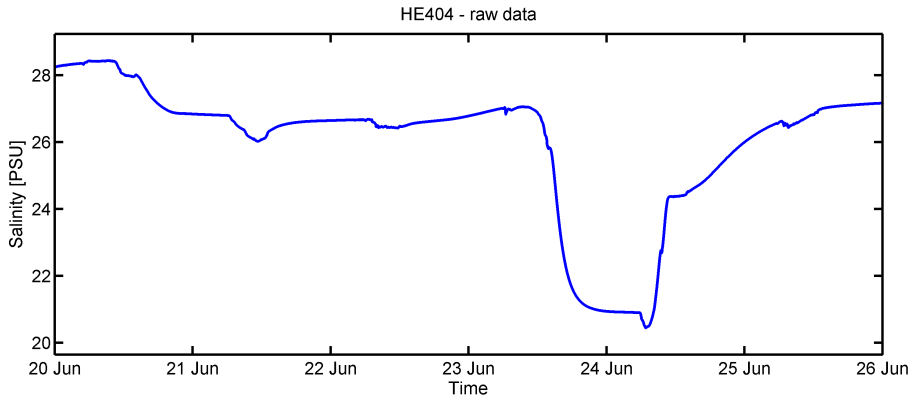

Figure 3: Raw salinity data.

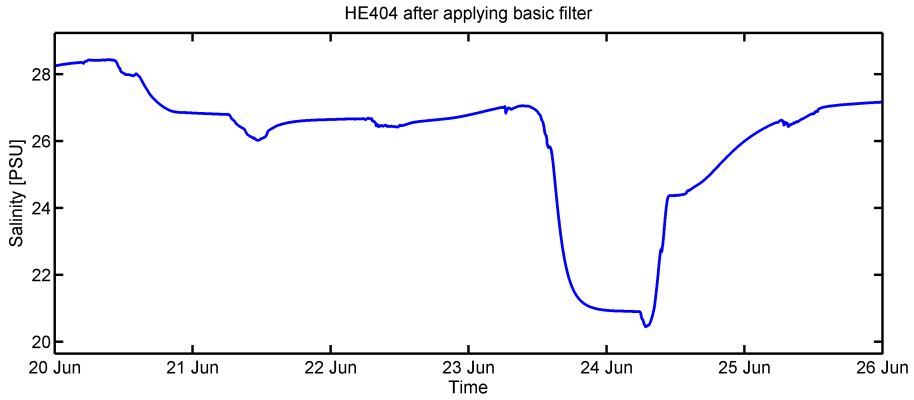

Figure 4: Salinity after basic filter.

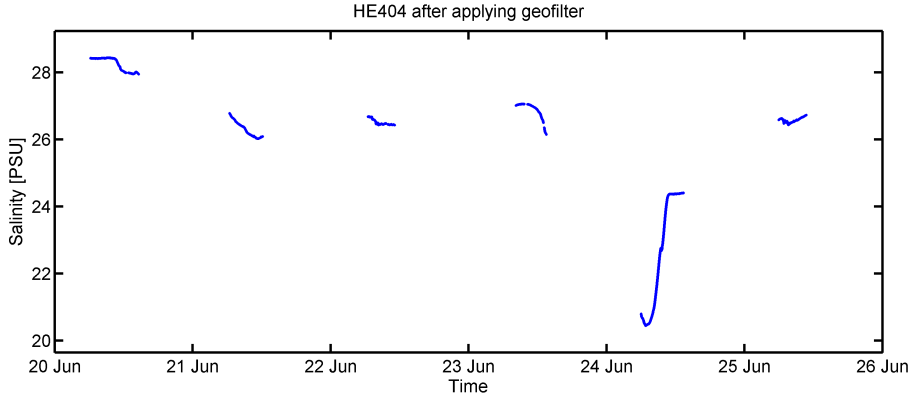

Figure 5: Salinity after geofilter.

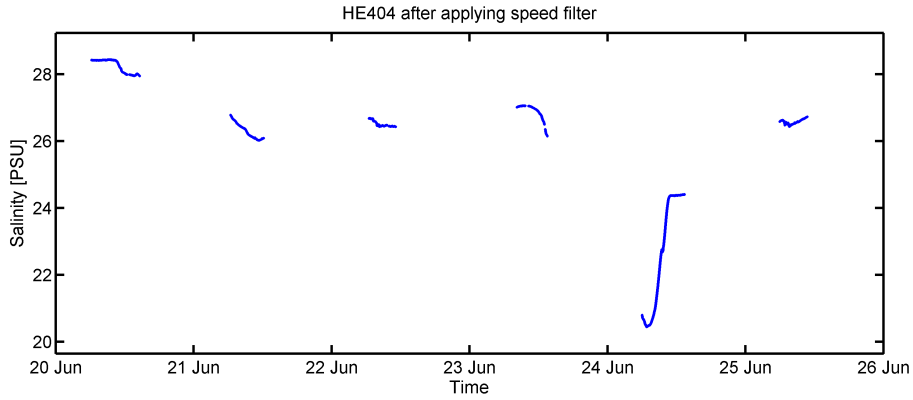

Figure 6: Salinity after speed filter.

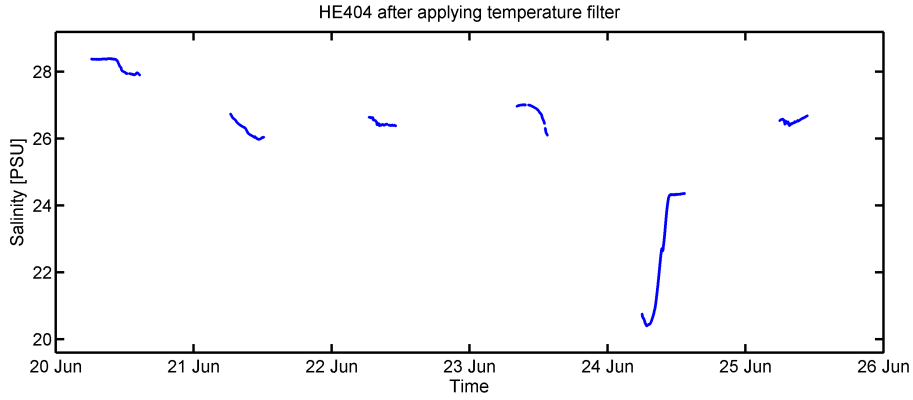

Figure 7: Salinity after temperature filter.

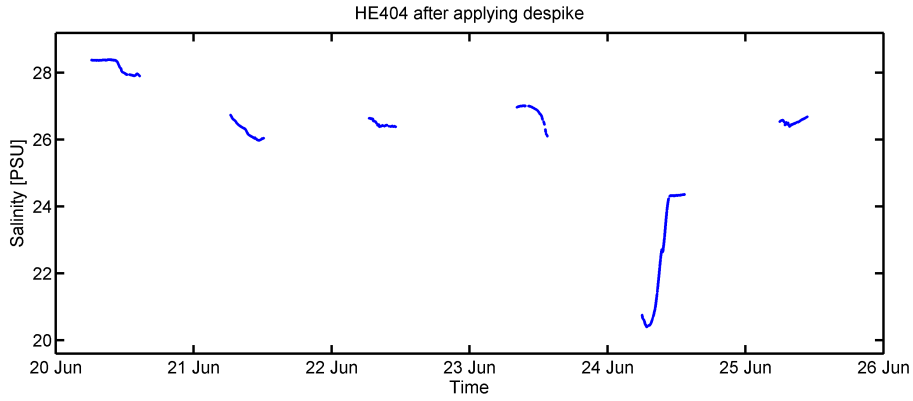

Figure 8: Salinity after despike.

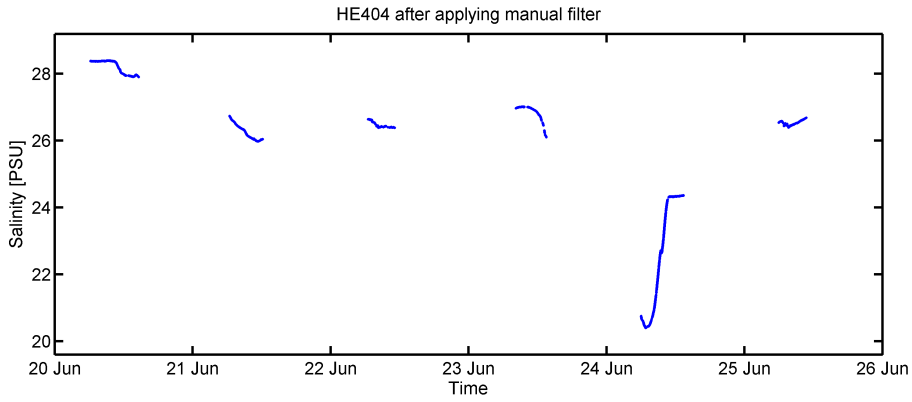

Figure 9: Salinity after manual filter.

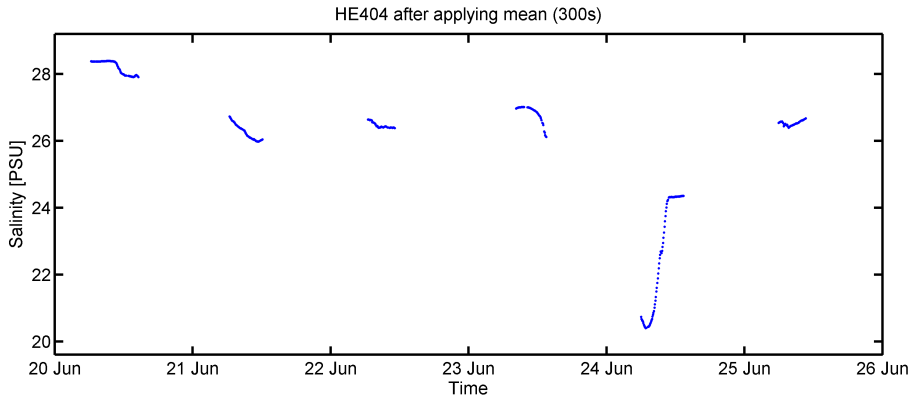

Figure 10: Salinity in 5-min-mean values.

Result file

Text File (HE404_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.