Surface T/S Data RV "Heincke"

HE464

Data Processing Report

Contents

Contact:
Gerd Rohardt
Alfred-Wegener-Institute
Am Handelshafen 12, D-27570 Bremerhaven, GERMANY
Mail: info@awi.de

Processing Agency:
FIELAX
Schleusenstr. 14, D-27568 Bremerhaven, GERMANY
Mail: info@fielax.de

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1 Introduction

This report describes the processing of raw data acquired by the thermosalinograph on board RV "Heincke" during expedition HE464 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 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.

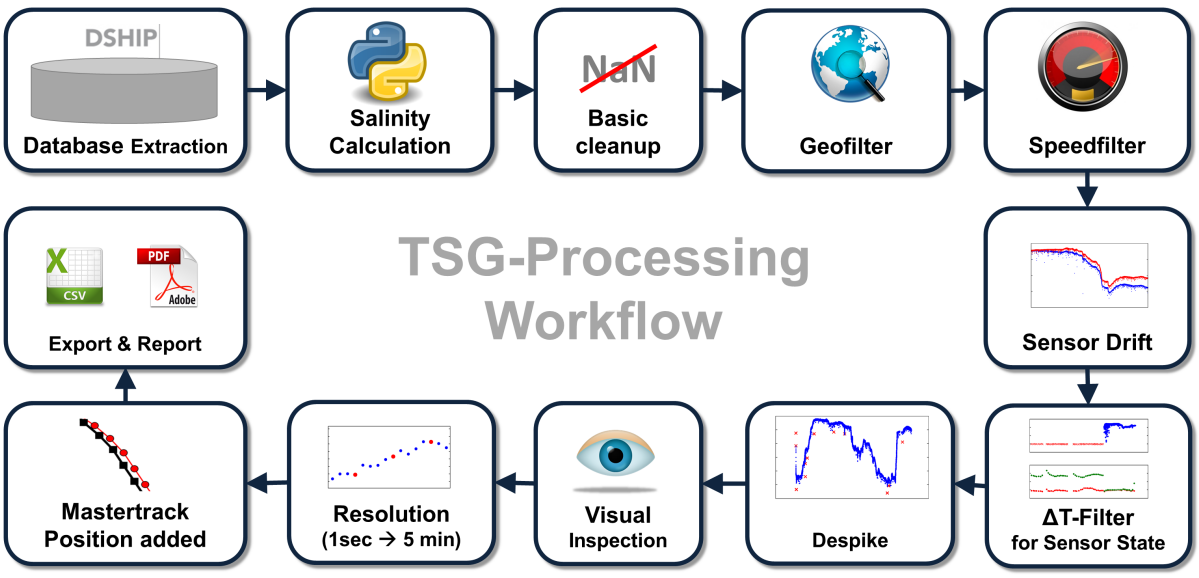

Figure 1: Workflow of TSG data processing

3 Cruise details

Vessel name	RV "Heincke"
Cruise name	HE464
Cruise start	01.06.2016 Bremerhaven
Cruise end	01.06.2016 Bremerhaven
Cruise duration	1 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	86401
First dataset	2016-06-01T00:00:00 UTC
Last dataset	2016-06-02T00:00:00 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	86401	100 %	—	—
Basic	86225	99.80 %	176	0.20 %
Geo	25506	29.52 %	60895	70.48 %
Speed	25160	29.12 %	61241	70.88 %
Temperature	0	0.00 %	86401	100.00 %
Despike	—	—	—	—
Manual	—	—	—	—
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	1.6371e-004 [PSU]
Maximal offset	1.7083e-004 [PSU]

Comments

Unrealistic salinity values around 16 PSU.

Process evolution

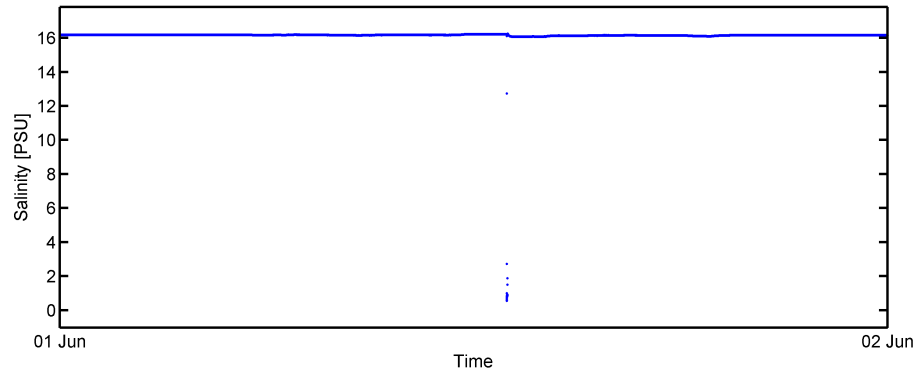

Figure 2: Raw salinity data.

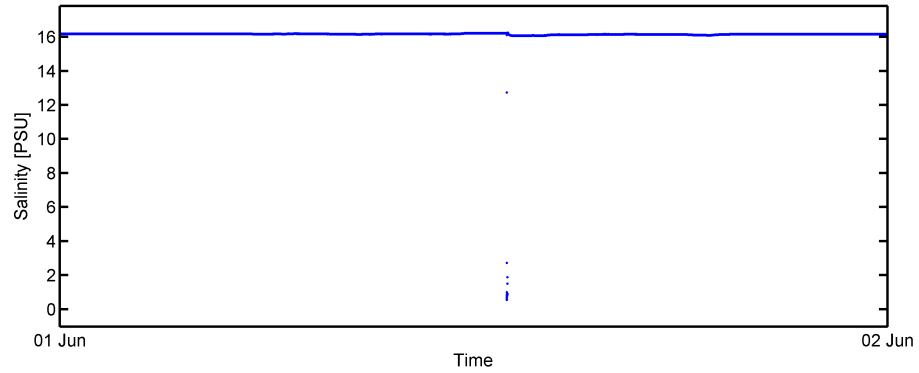

Figure 3: Salinity after basic filter.

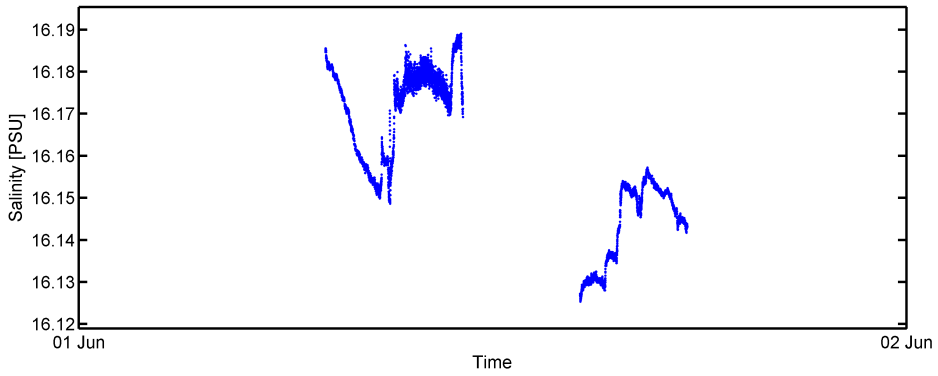

Figure 4: Salinity after geofilter.

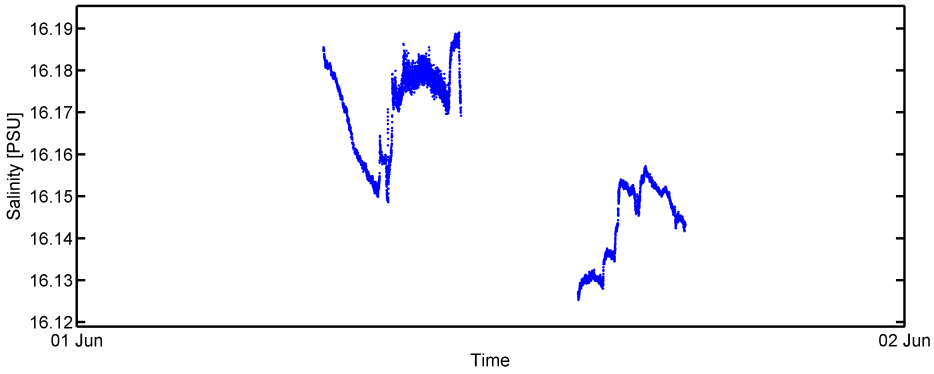

Figure 5: Salinity after speed filter.

Result file

Processing Report (HE464_TSG.pdf):
This PDF document.