CTD Data RV Heincke HE586

Data Processing Report

Contents

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1 Introduction

This report describes the processing of CTD raw data acquired by Seabird SBE 911plus CTD on board RV Heincke during expedition HE586.

2 Workflow

The different steps of processing and validation are visualized in Figure 1. The CTD raw data are delivered from Dr. Sandra Tippenhauer (AWI). The station book of the RV Heincke cruise is extracted from the DAVIS SHIP data base (https://dship.awi.de). The first CTD station and cast is processed manually in SBE Data Processing to configure the *.psa Seabird routines *Data Conversion*, *Wild Edit*, *Bottle Summary*, *Split*, *Translate*, *Cell Thermal Mass*, *Loop Edit* and *Bin Average*. The Seabird routines are then run in a batch job *CTDjob* in ManageCTD to process the complete CTD data set. The downcast of each CTD station/cast is used for further processing. In *CTDjob* the start record and the lowest altimeter point of the downcast is selected. From the downcast data figures to compare both oxygen sensors are generated. The oxygen sensor choice and the offset between the two oxygen sensors is documented in the processing summary table. With the *Utilities* → *Dship Ebook* function of ManageCTD the DAVIS SHIP station book extraction is used for getting the header information of all CTD stations/casts of the cruise. ManageCTD *Utilities* → *Find Profile* function compares station times of the header with the entries in the station book to find out the correct naming of the stations and casts. In *CTDheader* in ManageCTD the header information of each CTD station/cast is displayed, controlled and corrected if necessary. *CTDdespike* in ManageCTD is used for a visual check of the data and to erase/interpolate spikes in the data if necessary. Additionally, a sensor pair (Temp1/Sal1 or Temp2/Sal2) is chosen for each station/cast of the RV Heincke cruise in *CTDdespike*.

ManageCTD *Utilities* → *CheckDoubleSensors* controls the quality of temperature and conductivity sensors. For this purpose outliers of too high sensor pair differences could be removed. The data is then converted to spreadsheet format with *dsp2odv* for visualization of the data in Ocean Data View (ODV). The second visual inspection of the CTD data allows a comparison with data from other CTD casts from close-by stations to verify the oxygen sensor data. Therefore, potential reference cruise data is downloaded from PANGAEA (http://www.PANGAEA.de). The reference data is converted to *.mat format. In the ManageCTD Final Processing the CTD data is displayed together with the reference data. Bad data points, sensors or casts are interpolated or erased from the data set and filters are applied if necessary. The processed CTD data are written to text files and imported to PANGAEA (http://www.PANGAEA.de) for publication.

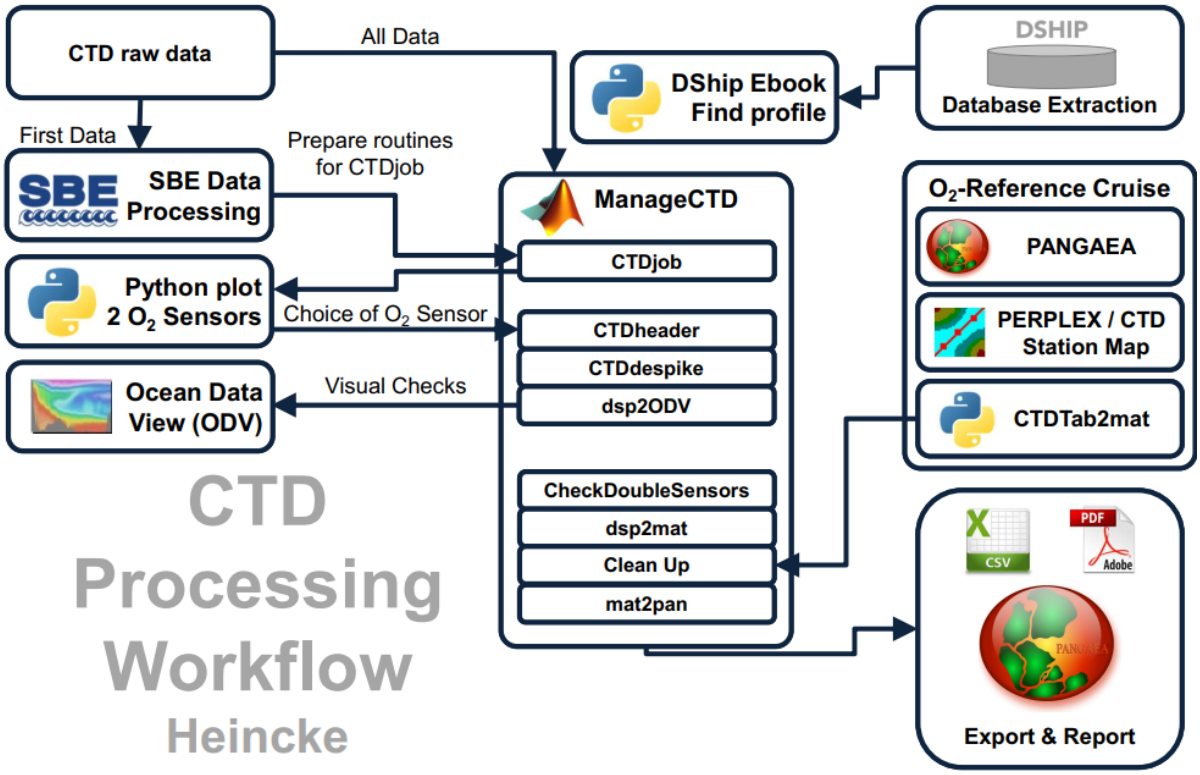

Figure 1: CTD data Processing Workflow

3 Cruise details

Vessel name	RV Heincke
Cruise name	HE586
Cruise start	04.10.2021 Bremerhaven
Cruise end	16.10.2021 Bremerhaven
Cruise duration	12 days
No. of CTD casts	122

4 Sensor Layout

This chapter describes the CTD sensors mounted during this cruise:
SBE 911plus CTD (SN: 1015), SBE Instrument Configuration Version 7.23.0.1.

ID	Sensor Name	Serial No.	Calibration Date
55	TemperatureSensor	1373	11-Oct-19
3	ConductivitySensor	1198	17-Sep-19
45	PressureSensor	1015	26-Jan-17
55	TemperatureSensor	2929	13-Sep-19
3	ConductivitySensor	1199	17-Sep-19
0	AltimeterSensor	46466	23-Mar-09
71	WET_LabsCStar	1348DR	28-Jan-2016
20	FluoroWetlabECO_AFL_FL_Sensor	1365	15-Jan-2016
38	OxygenSensor	2292	26-Aug-20
38	OxygenSensor	3654	13-Feb-20

5 Processing

Details of processing procedures and processing parameters are described in *CTD Processing Logbook of RV Heincke* (hdl: 10013/epic.47427).

Density Inversions and Manual Validation

Obvious outliers were removed manually. For the visual check density inversions > 0.005 kg/m^3 and > 0.01 kg/m^3 were flagged differently for display but not removed automatically. Decisions whether the flagged values were manually removed or not are based on the description in *CTD Processing Logbook of RV Heincke* (hdl: 10013/epic.47427).

Sensor Differences

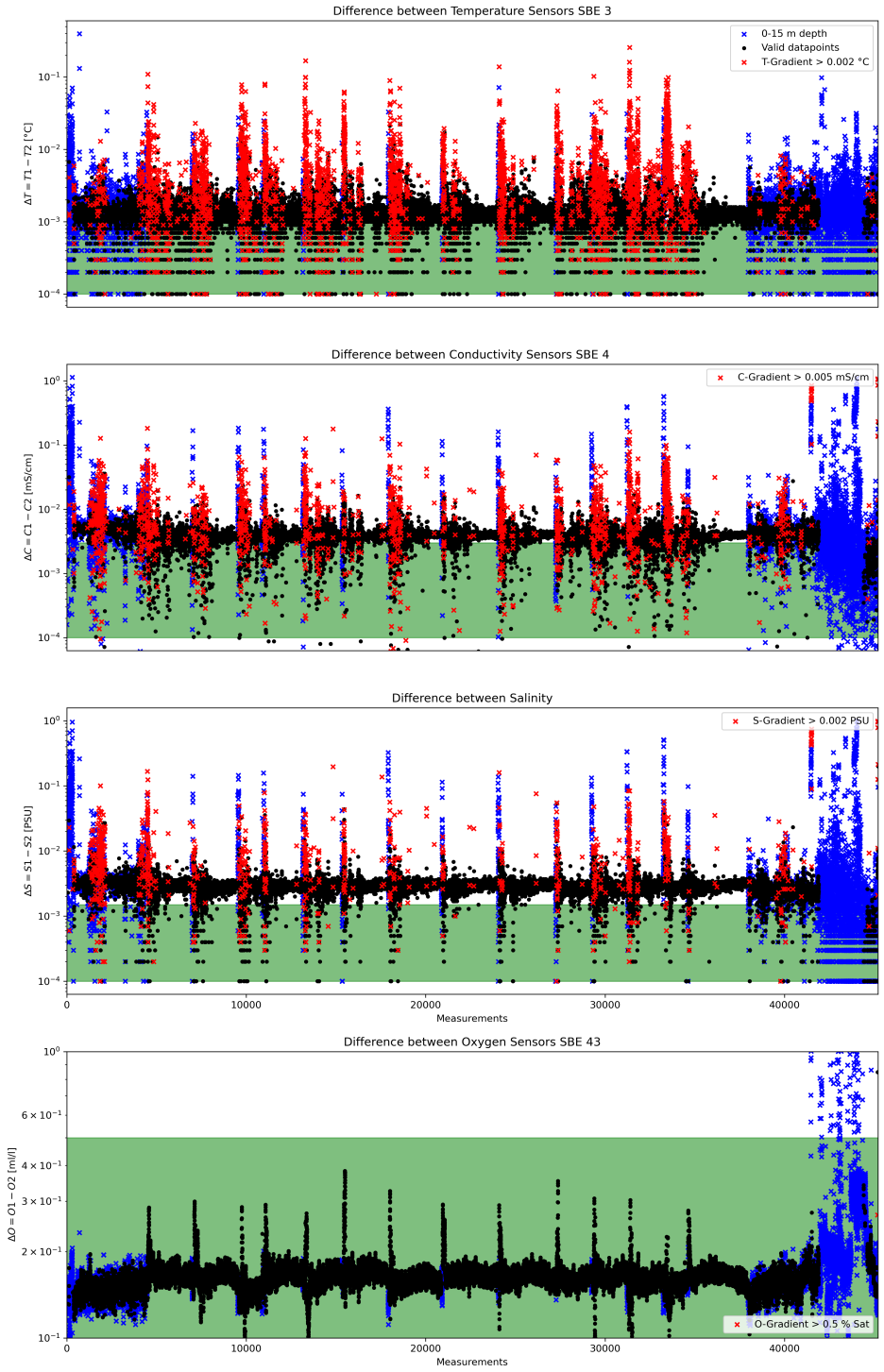

Figure 2: Data accuracy of sensor pairs HE586

6 Results

A complete processing overview for each sensor at each station is summarized in the table in the Appendix (Figure 3).

Double Sensor Check

In Figure 2, the absolute residuals between the sensorpairs are shown for the measured parameters *Temperature* and *Conductivity*, the derived parameter *Salinity* and the measured parameter *Oxygen*. Measurements in shallow water depths < 15 m (blue crosses) and gradients between two datapoints exceeding a defined threshold (red crosses) were omitted for accuracy calculation.

Parameter	**Accuracy** given by manufacturer	**Measurements removed** Surface 0-15m + gradient filter	**Remaining measurements** within accuracy specifications
Temperature	$\pm 0.001\ °C$	26.66%	16.30%
Conductivity	$\pm 0.003\ mS/cm$	23.16%	9.25%
Salinity	$\pm 0.0015\ PSU$	21.27%	3.74%
Oxygen	$\pm 2.0\ \%\ of saturation$	19.21%	99.98%

Comments

- 112 CTD "max depth/on ground" entries in DShip station book
- 153 CTD raw data sets delivered
- 39 CTD cast were invalid (p005a07b, p014a01b and p031b01) or Jo-Jo stations (treated separately)
- 114 CTD casts processed and uploaded
- of these 114 processed CTD casts:
  - 0 oxygen profiles deleted (spiky and not matching to reference casts)
  - 1291 data points interpolated
  - 4 data points erased

Result files

Text File (HE586_phys_oce.tab):

The format is a plain text (tab-delimited values) file.

Column separator	Tabulator "\t"
Column 1	Event label
Column 2	Date/Time of event
Column 3	Latitude of event
Column 4	Longitude of event
Column 5	Elevation of event
Column 6	DEPTH, water
Column 7	Pressure, water
Column 8	Temperature, water
Column 9	Conductivity
Column 10	Salinity
Column 11	Temperature, water, potential
Column 12	Density, sigma-theta (0)
Column 13	Oxygen
Column 14	Oxygen, saturation
Column 15	Attenuation, optical beam transmission
Column 16	Fluorometer
Column 17	Number of observations

Processing Report (CTD-HE586-report.pdf):
This PDF document.

Station HE586_	Gear Abbr.	Date	Time	Position Latitude	Position Longitude	Depth [m]	File Name	Sensor pair	Temp		Sal		Trans		Fluor		Oxy		Complete		2 Oxy Sensors		Oxygen reference			Comments
									interp	erased	interp	erased	interp	erased	interp	erased	interp	erased	interp	erased	Sensor	Offset	cruise/sss-cc	dist. (km)	Offset	
1-1	CTD	04.10.2021	14:02	53° 31,538' N	008° 33,936' E	13.5	p001a01hex	1													3654	-0.14	HE473/001-2	0.89	0.7	no btl
1-2	CTD	04.10.2021	14:14	53° 31,566' N	008° 33,972' E	13.9	p001a02	1													3654	-0.14	HE473/001-2	0.98	0.7	no btl
1-3	CTD	04.10.2021	14:26	53° 31,523' N	008° 33,904' E	12.8	p001a03	1													3654	-0.10	HE473/001-2	0.85	0.7	no btl
1-4	CTD	04.10.2021	14:35	53° 31,575' N	008° 34,006' E	13.3	p001a04	1													3654	-0.15	HE473/001-2	0.99	0.7	no btl
1-5	CTD	04.10.2021	14:44	53° 31,565' N	008° 34,009' E	13.2	p001a05	1													3654	-0.16	HE473/001-2	0.98	0.7	
2-2	CTD	05.10.2021	06:07	54° 28,221' N	007° 33,761' E	19.7	p002a01	1													3654	-0.13	HE473/034-1	9.68	0.2	
2-5	CTD	05.10.2021	07:06	54° 28,245' N	007° 33,847' E	20.9	p002a02	1													3654	-0.14	HE473/034-1	9.76	0.2	no btl
2-6	CTD	05.10.2021	07:36	54° 28,287' N	007° 33,776' E	20.2	p002a03	1													3654	-0.14	HE473/034-1	9.66	0.2	no btl
2-7	CTD	05.10.2021	08:06	54° 28,232' N	007° 33,735' E	20.8	p002a04	1													3654	-0.14	HE473/034-1	9.65	0.2	no btl
2-9	CTD	05.10.2021	08:34	54° 28,221' N	007° 33,975' E	21.2	p002a05	1	1		1		1		1		1	4	5	4	3654	-0.14	HE473/034-1	9.9	0.2	no btl
2-12	CTD	05.10.2021	09:34	54° 28,170' N	007° 33,791' E	21.8	p002a06	1													3654	-0.15	HE473/034-1	9.75	0.2	no btl
2-14	CTD	05.10.2021	10:09	54° 27,924' N	007° 33,695' E	23.2	p002a07	1													3654	-0.15	HE473/034-1	9.82	0.2	no btl
2-16	CTD	05.10.2021	10:35	54° 28,162' N	007° 33,261' E	3.9	p002a08	1													3654	-0.15	HE473/034-1	9.22	0.2	no btl
2-18	CTD	05.10.2021	11:04	54° 28,370' N	007° 33,492' E	20.3	p002a09	1	3		3		3		3				15	0	3654	-0.14	HE473/034-1	9.32	0.2	no btl
2-20	CTD	05.10.2021	11:36	54° 28,448' N	007° 33,548' E	20.3	p002a10	1													3654	-0.15	HE473/034-1	9.33	0.2	no btl
3-1	CTD	05.10.2021	12:38	54° 29,866' N	007° 36,909' E	20.9	p003a01	1	1		1		1		1		1		5	0	3654	-0.17	HE473/034-1	12.52	0.3	
3-3	CTD	05.10.2021	13:33	54° 29,904' N	007° 36,911' E	20.6	p003a02	1													3654	-0.14	HE473/034-1	12.52	0.3	no btl
3-5	CTD	05.10.2021	14:04	54° 29,748' N	007° 37,042' E	20.8	p003a03	1	2		2		2		2		2		10	0	3654	-0.15	HE473/034-1	12.67	0.2	no btl
3-7	CTD	05.10.2021	14:34	54° 29,796' N	007° 37,003' E	21.0	p003a04	1													3654	-0.14	HE473/034-1	12.62	0.2	no btl
3-10	CTD	05.10.2021	15:06	54° 29,758' N	007° 37,096' E	21.2	p003a05	1													3654	-0.15	HE473/034-1	12.73	0.2	no btl
3-11	CTD	05.10.2021	15:34	54° 29,756' N	007° 37,181' E	21.3	p003a06	1													3654	-0.15	HE473/034-1	12.82	0.2	no btl
3-12	CTD	05.10.2021	16:06	54° 29,779' N	007° 37,159' E	19.9	p003a07	1													3654	-0.14	HE473/034-1	12.79	0.2	no btl
3-13	CTD	05.10.2021	16:34	54° 29,811' N	007° 37,063' E	19.3	p003a08	1													3654	-0.15	HE473/034-1	12.69	0.2	no btl
3-14	CTD	05.10.2021	17:05	54° 29,772' N	007° 37,205' E	20.5	p003a09	1													3654	-0.14	HE473/034-1	12.84	0.2	no btl
3-15	CTD	05.10.2021	17:36	54° 29,823' N	007° 37,206' E	21.0	p003a10	1													3654	-0.15	HE473/034-1	12.84	0.2	no btl
4-1	CTD	05.10.2021	18:31	54° 31,802' N	007° 30,380' E	22.5	p004a01	1	2		2		2		2		2		10	0	3654	-0.15	HE473/034-1	6.46	0.3	
4-2	CTD	05.10.2021	19:13	54° 31,794' N	007° 30,825' E	21.3	p004a02	1													3654	-0.15	HE473/034-1	6.87	0.3	no btl
4-3	CTD	05.10.2021	19:37	54° 31,910' N	007° 30,800' E	23.1	p004a03	1	1		1		1		1		1		5	0	3654	-0.15	HE473/034-1	6.95	0.3	no btl
4-4	CTD	05.10.2021	20:03	54° 31,776' N	007° 30,679' E	20.3	p004a04	1													3654	-0.15	HE473/034-1	6.72	0.3	no btl
4-5	CTD	05.10.2021	20:34	54° 31,914' N	007° 30,541' E	22.6	p004a05	1													3654	-0.14	HE473/034-1	6.72	0.3	no btl
4-6	CTD	05.10.2021	21:00	54° 32,054' N	007° 30,829' E	23.0	p004a06	1													3654	-0.15	HE473/034-1	7.12	0.3	no btl
4-7	CTD	05.10.2021	21:33	54° 31,833' N	007° 31,034' E	23.5	p004a07	1													3654	-0.15	HE473/034-1	7.1	0.3	no btl
4-8	CTD	05.10.2021	22:05	54° 31,916' N	007° 31,200' E	23.4	p004a08	1													3654	-0.15	HE473/034-1	7.33	0.3	no btl
4-9	CTD	05.10.2021	22:34	54° 31,896' N	007° 30,910' E	22.7	p004a09	1													3654	-0.16	HE473/034-1	7.05	0.3	no btl
4-10	CTD	05.10.2021	23:04	54° 31,960' N	007° 30,661' E	23.7	p004a10	1													3654	-0.15	HE473/034-1	6.88	0.3	no btl
4-11	CTD	05.10.2021	23:34	54° 31,989' N	007° 30,378' E	26.1	p004a11	1	1		1		1		1		1		5	0	3654	-0.15	HE473/034-1	6.66	0.3	no btl
5-1	CTD	06.10.2021	00:38	54° 32,381' N	007° 35,501' E	23.2	p005a01	1													3654	-0.16	HE473/034-1	11.88	0.3	
5-2	CTD	06.10.2021	01:14	54° 32,438' N	007° 35,548' E	23.3	p005a02	1	1		1		1		1		1		5	0	3654	-0.16	HE473/034-1	11.97	0.3	
5-3	CTD	06.10.2021	01:38	54° 32,437' N	007° 35,609' E	22.1	p005a03	1	1		1		1		1		1		5	0	3654	-0.16	HE473/034-1	12.03	0.3	no btl
5-4	CTD	06.10.2021	02:04	54° 32,415' N	007° 35,645' E	21.7	p005a04	1													3654	-0.14	HE473/034-1	12.05	0.3	no btl
5-5	CTD	06.10.2021	02:34	54° 32,296' N	007° 35,390' E	22.4	p005a05	1													3654	-0.15	HE473/034-1	11.71	0.3	no btl
5-6	CTD	06.10.2021	03:03	54° 32,331' N	007° 35,587' E	21.3	p005a06	1													3654	-0.15	HE473/034-1	11.93	0.3	no btl
5-7	CTD	06.10.2021	03:35	54° 32,304' N	007° 35,722' E	21.6	p005a07	1													3654	-0.14	HE473/034-1	12.05	0.3	no btl
							p005a07b																			no valid cast
5-8	CTD	06.10.2021	04:04	54° 32,349' N	007° 35,808' E	19.9	p005a08	1													3654	-0.15	HE473/034-1	12.16	0.3	no btl
5-9	CTD	06.10.2021	04:34	54° 32,319' N	007° 35,832' E	21.1	p005a09	1													3654	-0.15	HE473/034-1	12.16	0.3	no btl
5-10	CTD	06.10.2021	05:04	54° 32,318' N	007° 35,690' E	20.7	p005a10	1	1		1		1		1		1		5	0	3654	-0.16	HE473/034-1	12.02	0.3	no btl
5-11	CTD	06.10.2021	05:35	54° 32,314' N	007° 35,824' E	21.8	p005a11	1	1		1		1		1		1		5	0	3654	-0.15	HE473/034-1	12.16	0.3	
5-12	CTD	06.10.2021	06:05	54° 32,349' N	007° 35,910' E	22.4	p005a12	1													3654	-0.15	HE473/034-1	12.27	0.3	no btl
7-1	CTD	06.10.2021	09:40	54° 53,936' N	007° 24,777' E	22.4	p007a01	1													3654	-0.15	HE473/077-1	8.5	0.2	
8-2	CTD	07.10.2021	06:19	57° 49,803' N	007° 59,876' E	510.6	p008a01	1	17		17		17		17		17		85	0	3654	-0.17	HE497/22-1	206.81	0.8	
9-1	CTD	07.10.2021	11:36	57° 59,795' N	008° 29,761' E	515.6	p009a01	1	24		24		24		24		24		120	0	3654	-0.17	HE497/22-1	232.31	0.7	

Figure 3: CTD data Processing Summary HE586

Station HE586_	Gear Abbr.	Date	Time	Position Latitude	Position Longitude	Depth [m]	File Name	Sensor pair	Temp		Sal		Trans		Fluor		Oxy		Complete		2 Oxy Sensors		Oxygen reference			Comments
									interp	erased	interp	erased	interp	erased	interp	erased	interp	erased	interp	erased	Sensor	Offset	cruise/sss-cc	dist. (km)	Offset	
10-1	CTD	07.10.2021	15:43	58° 19,730' N	008° 54,797' E	268.2	p010a01	1	6		6		6		6		6		30	0	3654	-0.14	HE497/22-1	275.33	0.6	
12-1	CTD	08.10.2021	04:34	57° 39,584' N	009° 46,539' E	25.1	p012a01	1			1								1	0	3654	-0.15	HE497/22-1	236.53	0.4	
13-1	CTD	08.10.2021	07:28	58° 04,776' N	009° 34,254' E	451.5	p013a01	1	14		14		14		14		14		70	0	3654	-0.17	HE497/22-1	267.44	0.6	
	CTD	08.10.2021	10:34	58° 00,086' N	009° 20,776' E	445.7	p014a01	1	13		13		13		13		13		65		3654	-0.16	HE497/22-1	253.23	0.8	no btl
14-1							p014a01b																		0.3	no valid cast
15-1	CTD	08.10.2021	11:45	58° 02,662' N	009° 17,279' E	527.8	p015a01	1	22		22		22		22		22		110	0	3654	-0.17	HE497/22-1	255.74	0.7	no btl
16-1	CTD	08.10.2021	12:42	58° 04,867' N	009° 14,231' E	17.7	p016a01	1	16		16		16		16		16		80	0	3654	-0.16	HE497/22-1	257.98	0.7	no btl
17-1	CTD	08.10.2021	13:42	58° 07,483' N	009° 10,824' E	20.8	p017a01	1	26		26		26		26		26		130	0	3654	-0.17	HE497/22-1	260.77	0.8	no btl
18-1	CTD	08.10.2021	14:45	58° 09,895' N	009° 07,715' E	14.4	p018a01	1	31		31		31		31		31		155	0	3654	-0.17	HE497/22-1	263.49	0.7	
19-1	CTD	08.10.2021	15:56	58° 12,399' N	009° 04,414' E	412.3	p019a01	1	8		8		8		8		8		40	0	3654	-0.16	HE497/22-1	266.37	0.7	no btl
20-1	CTD	08.10.2021	16:45	58° 14,867' N	009° 01,262' E	408.3	p020a01	1	8		8		8		8		8		40	0	3654	-0.17	HE497/22-1	269.33	0.7	no btl
21-1	CTD	08.10.2021	17:37	58° 17,338' N	008° 58,098' E	400.1	p021a01	1	13		13		13		13		13		65	0	3654	-0.16	HE497/22-1	272.38	0.8	no btl
22-1	CTD	08.10.2021	18:30	58° 19,845' N	008° 55,158' E	290.5	p022a01	1	7		7		7		7		7		35	0	3654	-0.15	HE497/22-1	275.66	0.7	
24-1	CTD	09.10.2021	06:13	58° 14,138' N	009° 32,203' E	681.8	p024a01	1	22		22		22		22		22		110	0	3654	-0.17	HE497/22-1	281.41	0.9	
25-1	CTD	09.10.2021	14:21	57° 19,783' N	008° 55,567' E	22.9	p025a01	1													3654	-0.13	HE497/22-1	176.57	0.5	
26-1	CTD	09.10.2021	17:21	57° 06,271' N	008° 10,544' E	24.6	p026a01	1	1		1		1		1		1		5	0	3654	-0.13	HE497/22-1	132.68	0.5	
27-1	CTD	10.10.2021	12:22	54° 02,618' N	006° 16,403' E	27.0	p027a01	1													3654	-0.14	HE473/020-1	25.99	0.5	
28-2	CTD	10.10.2021	14:03	53° 52,261' N	006° 17,260' E	25.0	p028a02	1													3654	-0.15	HE473/017-1	24.8	0.4	
28-6	CTD	10.10.2021	14:43	53° 52,123' N	006° 16,771' E	24.6	p028a06	1													3654	-0.15	HE473/017-1	25.29	0.4	no btl
28-7	CTD	10.10.2021	15:04	53° 52,274' N	006° 17,268' E	24.6	p028a07	1													3654	-0.14	HE473/017-1	24.79	0.4	no btl, station name 28-7 exists twice
28-7	CTD	10.10.2021	15:34	53° 52,205' N	006° 17,204' E	24.1	p028b07	1													3654	-0.15	HE473/017-1	24.84	0.4	no btl, station name 28-7 exists twice
28-8	CTD	10.10.2021	16:04	53° 52,126' N	006° 17,326' E	23.7	p028a08	1													3654	-0.15	HE473/017-1	24.69	0.4	no btl
28-9	CTD	10.10.2021	16:34	53° 52,210' N	006° 17,332' E	23.6	p028a09	1													3654	-0.15	HE473/017-1	24.7	0.3	no btl
28-10	CTD	10.10.2021	17:04	53° 52,203' N	006° 17,315' E	23.4	p028a10	1	1		1		1		1		1		5	0	3654	-0.15	HE473/017-1	24.72	0.3	no btl
28-11	CTD	10.10.2021	17:33	53° 52,177' N	006° 17,345' E	23.1	p028a11	1													3654	-0.15	HE473/017-1	24.68	0.3	no btl
28-12	CTD	10.10.2021	18:03	53° 52,232' N	006° 17,624' E	23.3	p028a12	2													3654	-0.14	HE473/017-1	24.4	0.3	no btl
28-13	CTD	10.10.2021	18:34	53° 52,127' N	006° 17,273' E	23.2	p028a13	1													3654	-0.15	HE473/017-1	24.74	0.3	no btl
28-14	CTD	10.10.2021	19:04	53° 52,177' N	006° 17,360' E	23.4	p028a14	2													3654	-0.16	HE473/017-1	24.67	0.3	no btl
28-15	CTD	10.10.2021	19:33	53° 52,260' N	006° 17,409' E	23.8	p028a15	1	1		1		1		1		1		5	0	3654	-0.16	HE473/017-1	24.63	0.3	no btl
29-1	CTD	10.10.2021	20:29	53° 53,245' N	006° 12,492' E	26.8	p029a01	1	1		1		1		1		1		5	0	3654	-0.15	HE473/018-1	30.14	0.3	
29-2	CTD	10.10.2021	21:05	53° 53,246' N	006° 12,500' E	26.8	p029a02	1	1		1		1		1		1		5	0	3654	-0.16	HE473/018-1	30.14	0.3	no btl
29-3	CTD	10.10.2021	21:34	53° 53,256' N	006° 12,556' E	27.1	p029a03	1	3		3		3		3		3		15	0	3654	-0.16	HE473/018-1	30.07	0.3	no btl
30-1	CTD	10.10.2021	22:04	53° 53,216' N	006° 12,835' E	27.1	p030a01	1													3654	-0.16	HE473/018-1	29.78	0.4	no btl
30-2	CTD	10.10.2021	22:34	53° 53,240' N	006° 12,713' E	27.6	p030a02	1													3654	-0.16	HE473/018-1	29.91	0.4	no btl
30-3	CTD	10.10.2021	23:02	53° 53,136' N	006° 12,825' E	27.3	p030a03	1	1		1		1		1		1		5	0	3654	-0.16	HE473/018-1	29.81	0.4	no btl
30-4	CTD	10.10.2021	23:31	53° 53,324' N	006° 12,940' E	27.4	p030a04	1													3654	-0.16	HE473/018-1	29.64	0.4	no btl
30-5	CTD	11.10.2021	00:02	53° 53,311' N	006° 12,952' E	27.7	p030a05	1													3654	-0.15	HE473/018-1	29.63	0.4	no btl
30-6	CTD	11.10.2021	00:32	53° 53,195' N	006° 12,948' E	27.9	p030a06	1													3654	-0.15	HE473/018-1	29.66	0.4	no btl
30-7	CTD	11.10.2021	01:02	53° 53,221' N	006° 12,617' E	27.3	p030a07	1	2		2		2		2		2		10	0	3654	-0.15	HE473/018-1	30.01	0.4	no btl
30-8	CTD	11.10.2021	01:35	53° 53,261' N	006° 12,466' E	27.2	p030a08	1													3654	-0.15	HE473/018-1	30.17	0.4	no btl
31-1	CTD	11.10.2021	02:33	53° 52,593' N	006° 20,129' E	26.0	p031a01	1													3654	-0.17	HE473/017-1	21.84	0.3	
							p031b01																			no valid cast
31-2	CTD	11.10.2021	03:03	53° 52,626' N	006° 20,113' E	25.8	p031a02	2													3654	-0.18	HE473/017-1	21.87	0.3	no btl
31-3	CTD	11.10.2021	03:34	53° 52,664' N	006° 20,047' E	25.7	p031a03	1													3654	-0.18	HE473/017-1	21.96	0.3	no btl
31-4	CTD	11.10.2021	04:04	53° 52,665' N	006° 20,146' E	3.9	p031a04	1													3654	0.49	HE473/017-1	21.85	0.3	no btl
31-5	CTD	11.10.2021	04:34	53° 52,641' N	006° 19,985' E	25.4	p031a05	1													2292	-0.16	HE473/017-1	22.01	0.3	no btl
31-6	CTD	11.10.2021	05:03	53° 52,548' N	006° 19,898' E	25.3	p031a06	1	1		1		1		1		1		5	0	3654	-0.16	HE473/017-1	22.07	0.3	no btl

Figure 4: CTD data Processing Summary HE586

Station HE586_	Gear Abbr.	Date	Time	Position Latitude	Position Longitude	Depth [m]	File Name	Sensor pair	Temp		Sal		Trans		Fluor		Oxy		Complete		2 Oxy Sensors		Oxygen reference			Comments
									interp	erased	interp	erased	interp	erased	interp	erased	interp	erased	interp	erased	Sensor	Offset	cruise/sss-cc	dist. (km)	Offset	
31-7	CTD	11.10.2021	05:35	53° 52,548' N	006° 19,950' E	24.6	p031a07	1													3654	-0.18	HE473/017-1	22.01	0.3	
32-2	CTD	11.10.2021	06:40	53° 52,416' N	006° 14,291' E	26.0	p032a02	1													3654	-0.18	HE473/017-1	28.05	0.3	
33-1	CTD	12.10.2021	07:00	53° 29,695' N	006° 46,702' E	8.9	p033a01	1													3654	-0.16	HE473/013-5	1.46	0.5	no btl
34-1	CTD	12.10.2021	07:31	53° 29,694' N	006° 46,705' E	8.7	p034a01	1	1		1		1		1		1		5	0	2292	-0.07	HE473/013-5	1.46	0.4	no btl
							p034a02																			Jo-Jo station, processed separately
							p034a02b																			
							p034a03																			
							p034a04																			
							p034a05																			
							p034a06																			
							p034a07																			
							p034a08																			
							p034a09																			
							p034a10																			
							p034a11																			
							p034a12																			
34-1	CTD	12.10.2021	15:31	53° 29,618' N	006° 46,775' E	11.2	p034a13	1													2292	0.06	HE473/013-5	1.33	0.6	
							p034a14																			Jo-Jo station, processed separately
							p034a15																			
							p034a16																			
							p034a17																			
34-2	CTD	12.10.2021	18:03	53° 29,691' N	006° 46,699' E	9.5	p034a18	2													3654	-0.65	HE473/013-5	1.46	0.6	
34-4	CTD	12.10.2021	18:56	53° 29,690' N	006° 46,693' E	9.3	p034a19	1													2292	0.07	HE473/013-5	1.47	0.4	no btl
							p034a20																			Jo-Jo station, processed separately
							p034a21																			
							p034a22																			
							p034a23																			
							p034a24																			
							p034a25																			
							p034a26																			
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							p034a38																			
							p034a39																			
35-1	CTD	13.10.2021	10:05	53° 46,041' N	006° 47,180' E	12.2	p035a01	1													3654	-0.30	HE473/016-1	7.91	0.7	
36-1	CTD	14.10.2021	08:20	53° 35,152' N	008° 10,474' E	13.9	p036a01	1													3654	-0.28	HE473/046-1	0.72	0.2	
37-2	CTD	14.10.2021	10:40	53° 35,211' N	008° 10,594' E	11.5	p037a01	1													3654	-0.29	HE473/046-1	0.66	0.3	
38-1	CTD	15.10.2021	06:41	53° 36,873' N	008° 09,934' E	16.3	p038a01	1													3654	-0.21	HE473/047-1	1.68	0.4	
39-2	CTD	15.10.2021	07:42	53° 34,933' N	008° 10,207' E	17.4	p039a01	1	1		1		1		1		1		5	0	3654	-0.19	HE473/046-1	1.12	0.1	no btl
40-1	CTD	15.10.2021	10:38	53° 42,029' N	008° 04,034' E	15.7	p040a01	1													3654	-0.22	HE473/048-1	8.41	<0.1	
41-1	CTD	15.10.2021	11:38	53° 41,232' N	008° 04,359' E	13.2	p041a01	1	1		1		1		1		1		5	0	3654	-0.25	HE473/048-1	9.93	0.1	
42-1	CTD	15.10.2021	12:43	53° 42,850' N	008° 03,957' E	18.6	p042a01	1	1		1		1		1		1		5	0	3654	-0.17	HE473/048-1	6.9	<0.1	
43-1	CTD	15.10.2021	13:42	53° 42,286' N	008° 03,801' E	12.6	p043a01	1													3654	-0.15	HE473/048-1	7.91	0.1	

Figure 5: CTD data Processing Summary HE586

Station HE586_1	Gear Abbr.	Date	Time	Position Latitude	Position Longitude	Depth [m]	File Name	Sensor pair	Temp		Sal		Trans		Fluor		Oxy		Complete		2 Oxy Sensors		Oxygen reference			Comments
									interp	erased	interp	erased	interp	erased	interp	erased	interp	erased	interp	erased	Sensor	Offset	cruise/sss-cc	dist. (km)	Offset	
44-1	CTD	15.10.2021	14:06	53° 42,303' N	008° 03,595' E	13.7	p044a01	1													3654	-0.17	HE473/048-1	7.86	0.1	
44-3	CTD	15.10.2021	15:52	53° 42,146' N	008° 04,223' E	15.2	p044a03	2													3654	-0.56	HE473/048-1	8.24	0.1	
									258	0	259	0	258	0	258	0	258	4	1291	4						

Figure 6: CTD data Processing Summary HE586

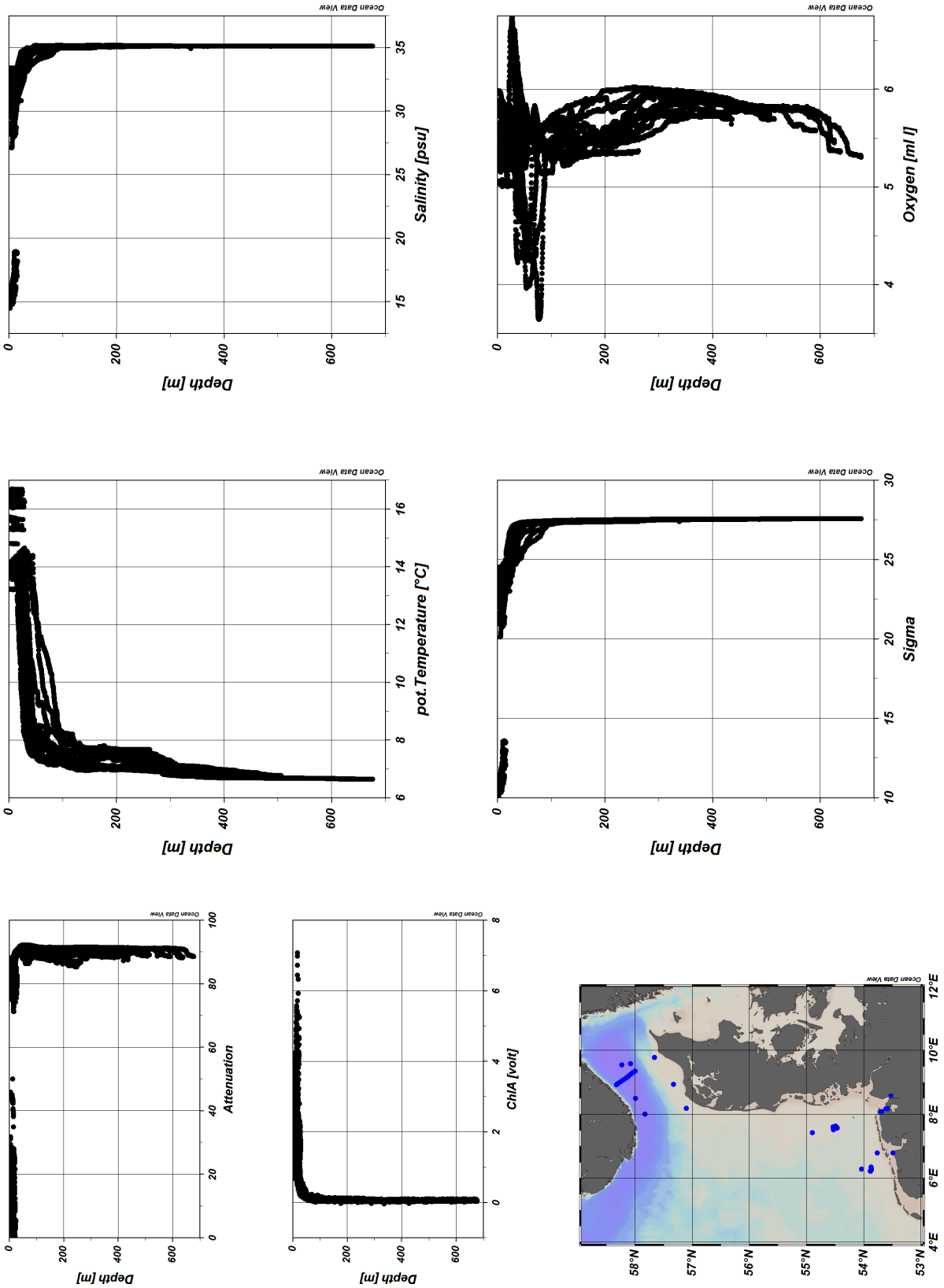

Figure 7: ODV Screenshot of HE586 CTD data