Sentry Operations Report for the AT33-03 Kurz Cruise DRAFT

WHOI Sentry Operations Group
Sean Kelley, Justin Fujii, Stefano Suman, Michael McCarthy, Hayden Radke

Sentry Expedition Leader: Sean Kelley

Chief Scientist: Mark Kurz, WHOI
Co-PI: Eric Mittelstaedt, University of Idaho

R/V Atlantis — March 7, 2016 to April 3, 2016

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1 Summary

This document summarizes operations with the *Sentry* autonomous underwater vehicle (AUV) during the AT33-03 Kurz cruise. Included in this report is the vehicle configuration; basic vehicle and sensor performance; and post-dive reports (with summary statistics and narratives). This report does not attempt to describe the scientific results or conclusions. A detailed description of the data files resulting from this cruise is provided in a separate document. Individual dive summaries for Sentry dives 371 - 379 follow — each of these is a free-standing document summarizing the dive.

2 Cruise Log

This section provides a brief chronological summary of *Sentry* activities during the cruise. Additional information on specific dives is available in the dive reports.

7 March 2016 Departed Bridgetown Barbados on RV Atlantis. TowCam Lowering and CASIUS survey.

8 March 2016 Alvin Engineering Dive

9 March 2016 to 10 March 2016 Transit to station

11 March 2016 Sentry Engineering dive on station. Sentry371

12 March 2016 Recovery of sentry371. Launch Sentry372.

13 March 2016 Recovery of Sentry372. Launch Sentry373.

14 March 2016 Recovery of Sentry373. Launch Sentry 374

15 March 2016 Recovery of Sentry374. Launch Sentry375.

16 March 2016 Recovery of Sentry375. Launch Sentry376

17 March 2016 Recovery of Sentry376. Launch Sentry377

18 March 2016 Recovery of Sentry377, Launch Sentry378

19 March2016 Recovery of Sentry378, Launch Sentry379

20 March 2016 Recovery of Sentry379. Final Alvin Dive and transit to Charleston

21 March 2016 to 3 April 2016 Transit to Charleston

2/3 April 2016 Arrive Charleston

3 Vehicle Configuration

Table 1 lists the science sensors installed on *Sentry* on this cruise.

Table 1: Sentry Sensor Configuration

Sensor
APS 1540 Magnetometers (3)
Edgetech 4-24kHz Sub-Bottom Profiler (SBP)
Reson 7125 Multibeam Sonar
Seabird SBE49 Conductivity-Temperature-Depth (CTD)
Seapoint optical backscatter sensor (OBS)
Anderaa optode model 4330
300kHz RDI Doppler Velocity Log (DVL)
Digital Still Camera
IXEA PHINS
Reson Sound Velocity Probe
NOAA PMEL ORP Sensor

4 Navigation

All dives were navigated using realtime DVL velocity inertial measurement unit (IMU) attitude measurements. External aiding during descent was performed with Ultra-Short Baseline (USBL) throughout the cruise. Dive specific notes on navigation are included in the dive reports. All final navigation consists of a track where the DVL/IMU track was fused with the USBL fixes in post-processing.

4.1 Coordinate origins

The vehicle's control system uses simple equidistant coordinates. This system uses an origin, defined in terms of latitude and longitude with the World Geodetic System 1984 (WGS84) datum, and a fixed scaling between meters displacement from the origin. We use the identical routines that have been used by the National Deep Submergence Facility (NDSF) assets Alvin and Jason for decades. Likewise we always used the same origin for Sentry and Alvin at each site. These simple coordinates have several advantages for realtime control of a vehicle. Unlike Universal Transverse Mercator (UTM) grid coordinates, the x and y axes intersect at right angles and align with true east and north respectively at the origin. These coordinates distort quickly as one moves away from the origin, but we solve that problem by putting the origin close to the operating area. We almost always report our results in latitude/longitude, so most users need not be aware of these details.

4.2 USBL Calibration and Performance Notes

A CASIUS calibration of the USBL system was conducted By the Sentry Group prior to arrivalal on station. A copy of the USBL calibration report is included in this report.

5 Items of Note

This section summarized details which are worthy of note or mention for future reference but which do not constitute problems:

N.1: USBL PHINS data feed was moved after the USBL CASIUS calibration from the sonardyne computer to the sonardyne NCU. This was an immediate improvement in nav.

N.2: Due to the USBL transciever head repair and removal from the stem, the USBL calibration was required.

N.3: The first dive of the cruise was an engineering dive used to test various upgrades and installed equipment on Sentry.

N.4: Sentry Ops were conducted outside of Alvin ops, running at night when Alvin was not in the water.

6 Ship Specific Information

This section summarizes ship specific information factual, good, and bad and is meant primarily to facilitate more effective use of the same vessel in the future.

S.1: Atlantis is an ideal platform for Sentry operations. Atlantis crew are experianced in our operations and make launch,surveys, and recoveries effortless.

S.2: The embedded USBL system on the Atlantis requires more maintance and care than what is currently being performed.

7 Technical Issues

This section summarizes technical issues encountered by the *Sentry* operations group on the cruise. Issues which affected primarily individual dives are listed in the individual dive reports.

T.1: Systematic issues throughout the cruise were not present. Individual issues are noted within the dive reports.

T.2: The sonardyne system required attention at the beginning of the cruise to aquire reliable tracking. We found the time between SMS messages needed to be greater than 30 seconds. The WHOI micro modem also caused vehicle tracking to stop or even crash the sonardyne software.

8 Sentry Operations Team

The *Sentry* team was comprised of 5 members on this cruise — Sean Kelley, Justin Fujii, Stefano Suman, Mike McCarthy, Hayden Radke. Sean Kelley was the Expedition Leader and principal author of this report.

9 Sensor and Post Processing Configurations

9.1 Multibeam Parameters and processing

The Multibeam parameters used during the cruise can be seen in the following tables. The Engineering dive used a different time offset due to an issue with the automatic time sync on the reson computer. The timeoffset used for this dive (sentry371) was 57.3 seconds. This issue was cleared after the dive. MBsystems was used to process all multibeam data along with the sentry pipline and renav. In the data drives, a refrence to the most up to date grids is located in /2016-kurz/multibeam in the file mb_grids.txt.

Table 2: Multibeam Configuration and offsets

Setting	**value**
time Offset	0.125s
Roll Bias	-1.2
Pitch Bias	0.0
Heading Offset	1.81
VRUOffsety	-0.5
VRUOffsetz	-1.0
Reson Driver Mode	0
Range	160
Power	218
Pulse width	0.00066
Gain	25
Max Rate	5
Coverage Angle Degs	120
Min Range Gate	1
Max Range Gate	300
Min Depth Gate	1
Max Depth Gate	150

Table 3: Multibeam Processed Grid Spacing

Dive	**Grid**
Sentry371	1.0x1.0
Sentry372	1.0x1.0
Sentry373	1.0x1.0
Sentry374	1.0x1.0
Sentry375	1.0x1.0
Sentry376	1.0x1.0
Sentry377	1.0x1.0
Sentry378	1.0x1.0
Sentry379	1.0x1.0
Area1	1.0x1.0 and 0.5x0.5
Area2	1.0x1.0

9.2 Sub-bottom and sidescan parameters and processing

The first dive of the cruise used the Edgetech HF dynamic focused sidescan. At the time of the cruise, there was no way to process this data onboard and the sidescan data was pushed to shore for processing. This system is not equiped with a subbottom.
The remainder of the cruise used the Edgetech 2200N. Processing was completed using OTS software Sonarwiz. Sonarwiz settings used for processing can be seen below. Sonarwiz also created the segy files for subbottom data. An experimental pipeline was tested to create additional segy files and postscript plots which are located in the dives folder 'sbp-su' under sss-sbp.

Table 4: Sub Bottom configuration used by Edgetech

Config	**value**
Ping Trigger	1
Trigger Mask	1
Trigger InInversion	1
Trigger Out Length	30000
PingRate	8000
Ping Range	150000

Table 5: Sidescan Configuration used by Edgetech

Config	**value**
Ping Trigger	2
200Khz Ping rate	2100
200Khz Ping Range	350000
400Khz Ping Trigger	2
400Khz Ping Rate	5000
400Khz Ping Range	150000

Table 6: Sonarwiz HF Sidescan Post Processing settings Per Dive

Dive	**Import**	**Gain**
Sentry372	G4,CH 3+4,100	EGN 32
Sentry373	G4,CH 3+4,100	EGN 30
Sentry374	G4,CH 3+4,100	None
Sentry375	G2,CH 3+4,100	None
Sentry376	G8,CH 3+4,100	EGN 6
Sentry377	G8,CH 3+4,100	AGC R30 I25
Sentry378	G8,CH 3+4,100	AGC R30 I25
Sentry379	G8,CH 3+4,100	None

Table 7: Sonarwiz LF Sidescan Post Processing settings Per Dive

Dive	Import	Gain
Sentry372	G2,CH 1+2,100	AGC R30 I20
Sentry373	G4,CH 1+2,300	AGC R30 I20
Sentry374	G2,CH 1+2,100	AGC R30 I20
Sentry375	G2,CH 1+2,100	AGC R30 I20
Sentry376	G2,CH 1+2,100	AGC R30 I20
Sentry377	G2,CH 1+2,100	AGC R30 I20
Sentry378	G2,CH 1+2,100	AGC R30 I20
Sentry379	G2,CH 1+2,100	AGC R30 I20

Table 8: Sonarwiz Subottom Post Processing settings Per Dive

Dive	Import	Gain
Sentry372	G16	AGC R30 I20
Sentry373	G16	AGC R30 I20
Sentry374	G16	AGC R30 I20
Sentry375	G16	AGC R30 I20
Sentry376	G16	AGC R30 I20
Sentry377	G16	AGC R30 I20
Sentry378	G32	AGC R30 I20
Sentry379	G32	AGC R30 I20

Table 9: MB experimental subbottom processing settings

Dive	norm	suGain
Sentry372	rms	4 gagc
Sentry373	rms	4 gagc
Sentry374	rms	4 gagc
Sentry375	rms	4 gagc
Sentry376	rms	4 gagc
Sentry377	rms	4 gagc
Sentry378	rms	4 gagc
Sentry379	rms	4 gagc

10 Acknowledgments

1. Thank you to the ship for excellent support in deck operations, integration support and feeding us so well!

2. Thank you to the National Science Foundation for funding this expedition.

Sentry 371 Dive Report
DRAFT

WHOI Sentry Operations Group
Sean Kelley, Justin Fujii, Stefano Suman, Michael McCarthy, Hayden Radke

Sentry Expedition Leader: Sean Kelley

Chief Scientist: Mark Kurz, WHOI
Co-PI: Eric Mittelstaedt, University of Idaho

Summary

Weather: The seas were approximately 1-5 ft for both launch and recovery and were not a factor in operations. Wind was 5 to 10 knots.

Reason for end of dive: The dive was ended due to time constraints.

Vehicle Configuration

The science sensing suite for this dive was:

Table 10: Sentry Sensor Configuration

Sensor
APS 1540 Magnetometers (3)
Edgetech 2205 850KHz DF Sidescan
Reson 7125 Multibeam Sonar
Seabird SBE49 CTD
Seapoint OBS
Anderaa optode model 4330
300kHz RDI DVL
Digital Still Camera
IXEA PHINS
Reson Sound Velocity Probe
NOAA PMEL ORP Sensor

This dive was navigated using the DVL/INS system in real time. USBL provided post-dive corrections.

Important Positions

Dive Origin: 13 44 -45 -4

Launch Position: sentry371 launch position: 13 46.034'N 045 1.088'W

Narrative

This was an engineering dive testing various system upgrades and improvements. The multibeam, DF sidescan and camera were the primary survey parameters used for the dive.

The dive began by running the DF sidescan on what appeared to be the flattest terrain. A box pattern was completed twice in the this configuration while running the DF sidscan. While the terrain was not optimal for this survey, it was the flattest lowest risk area that the vehicle could run at. The mission file parameter, DO_SS_10_slow was used for this part of the mission. Running at 10m Altitude, 3m envelope, and a forward speed of 0.4ms

The following survey was a larger multibeam survey covering most of the mound feature that was also an area of interest for science. The mutlibeam survey included the necessary crossing line as well as a reciprocal line to determine the roll bias in the system. The standard DO_MB_high parameter was used for the survey with a reson configuration of 0. The multibeam survey went well and accomplished the full survey. Post processing following this dive worked out the offsets introduced into the vehicle by removal of sensors during the overhaul period.

The final survey was a camera survey. This was included to test the camera which had been returned after repair. The camera survey went without issue. Post processing on the images showed no sign of any problems with the camera or system. An overall improvement in image processing time could easily be seen with the new data processing machine (DPB).

Navigation and tracking was poor due to issues with the Sonardyne system. The pitch roll and heading source for the Sonardyne system was moved from the computer serial port to the NCU serial port during the dive. This created a significant improvement in fix density. The Sonardyne system software,Ranger, would often crash during the course of the dive, requiring frequent restarts of the system, both software and hardware.

0.1 Items Under Test

0.1.1 Camera Testing

The prosilica camera was returned from the manufacture after repair of the lens which was loose inside the housing. The engineering dive was the first opportunity to test the camera since return. The photos captured from the dive were in focus and looked acceptable and no other action is required.

0.1.2 Navest Updates

Navest updated to include geodetic navigation,wave glider operations,GPS fixes, and reading from the tracks file. Not all of these updates were tested, there were no issues from this update.

0.1.3 IP Changeover

The IP address range used for Sentry (213.123.1.1) was changed over to (192.168.100.1). This changeover was system wide including Sentry and topside hardware. The Changeover went very well with no issues.

0.1.4 DF Sidescan

The dynamic focused sidescan collected data during the low altitude survey. The survey went well and without issue. The data was pushed to shore for processing.

0.1.5 New TIM configuration

The #TIM timing was updated to account for the new DF sidescan. The timing was specifically changed to account for sensitivity of the sidescan to other acoustic sensors. After the engineering dive, the configuration was reverted to the normal timing setup.

0.1.6 Paro in nano resolution

The paro depth sensor was changed to a nano resolution configuration. This improved overall resolution of the sensor from 2ppm to 45ppb. The data rate was changed to twice the normal data rate. The improved resolution and timing worked well and was used for the remainder of the cruise.

0.1.7 INS navigation in passive mode

A separate report on the INS navigation from this dive is being produced. First pass indicates unexpected deviations in the INS data that need to be looked into.

0.1.8 Vehicle Ballast

The ballast on the dive was satisfactory with no changes required.

0.1.9 DPB replacement

Due to a failing motherboard in DPB before the cruise, this machine had to be replaced. This opportunity was used to upgrade to a more powerful machine. A very clear improvement in performance could be seen overall,in particular when processing photos, up to a 10X speed improvement.

0.1.10 ORP servicing

ORP sensor was returned to Sharron Walker for servicing in the months before the cruise. The sensor was then re-installed prior to the engineering dive. The sensor was worked well for the duration of the cruise.

0.1.11 Xeos Voltage change

The Xeos iridium was previously using a lower voltage(24v) that would cause the iridium to use the batteries in place of the vehicle power. A higher voltage was used to stop the iridium from using the batteries due to the OR'ing diode. This change went without issue and worked well.

0.1.12 Matlab update

Matlab was updated on all processing machines to R2015b, there was no significant issues from the update.

0.1.13 10Gig backbone

A 10gig fiber backbone replaced the copper 1gig backbone between the lab and server van. The 10gig fiber backbone worked well and without issue.

0.1.14 Removal of #AM,#YW, & #DP

Three legacy sensors were removed from the chassis. The #AM, #YW, and #DP. All three are out of date and are no longer required for operations. There was no issue with the removal of any of these sensors.

0.1.15 New Navigation Computer

The operations navigation computer was upgraded to a lenovo mini-pc that is mounted to the wings three monitor display. The computer worked well with minor issues. There were some noticeable graphics issues. The navG background map would not display. Some web browser pages will not properly display content. No action was taken.

0.1.16 Netgear GSS108e 8-port lab Switches

The Netgear GSS108e 8-port switches were throughout the network in the lab space. Overall the switches Work fine when used by themselves. However, when paired with fiber GS752TXS switch, there were network issues that caused the GSS108e switches to be unplugged for the remainder of the cruise.

0.1.17 New Syntactic foam

Upgraded syntactic foam replaced four pieces of foam around the main housing, the main body,stbd main body,port main body, and pyramid blocks of foam. Overall these worked as expected and were inspected at the end of the cruise. There was some small swelling on the port side of the pyramid piece of foam where filler was used by the manufacture.

0.1.18 Servo overhaul

The vehicles two servo's were overhauled during the maintenance period. Both of these worked well and without any issue on the vehicle through the dive and remainder of the cruise.

0.1.19 Junction box cleanup and wire cleanup

Various wires were pulled through the junction box's to improve cable length and remove unnecessary cable weight. There were no issues with any of the instruments that were part of this work.

1 Issues and Proposed Solutions

USBL USBL tracking was poor and insufficient. We believe this was in part to the Micromodem and the short period of SMS message less than 30 seconds apart.

OBS OBS did not collect data due to a intermittent cable.

Chief Scientist Comments

The Chief scientist is requested to include any desired comments.

Dive Statistics

1.1 sentry371 Summary

sentry371 Summary
Origin: 13.733333 -45.066667
Origin: 13 44.000'N 045 4.000'W
Launch: 2016/03/12 00:21:02
Survey start: 2016/03/12 02:05:34
Survey start: Lat:13.768054 Lon:-45.016919
Survey start: Lat:13 46.083'N Lon:045 1.015'W
Survey end: 2016/03/12 08:09:22
Survey end: Lat:13.777448 Lon:-45.017716
Survey end: Lat:13 46.647'N Lon:045 1.063'W
Ascent begins: 2016/03/12 08:09:22
On the surface: 2016/03/12 09:18:36
On deck: 2016/03/12 09:22:40
descent rate: 36.4 m/min
ascent rate: 52.4 m/min
survey time: 6.1 hours
deck-to-deck time 9.0 hours
Mean survey depth: 3634m
Mean survey height: 45m
distance travelled: 14.37km
average speed; 0.66m/s
average speed during photo runs: 0.45 m/s over 1.22 km
average speed during multibeam runs: 0.68 m/s over 13.21 km
total vertical during survey: 3627m
Battery energy at launch: 20.8 kwhr
Battery energy at survey end: 15.7 kwhr
Battery energy on deck: 15.5 kwhr

Sensor Information

This is a recently added section with selected sensor metadata. This section will be expanded in coming months. Additional data is available in the sentryxxx/nav-sci/proc directory within the sentryxxx_config matlab structure as well as in ascii text logs in sentryxxx/metadata. At present metadata is not yet automatically collected on all sensors.

1.2 sentry371 Devices

Instrument	Model	Serial Num.	Comments
USBL	Sonardyne AvTrak2	S/N: 1201	
Magnetometer	APS 1540	APS 0689 Ver: 3.85BD7716F	
	APS 1540	APS 0688 Ver: 3.85BD7716F	
	APS 1540	APS 0690 Ver: 3.85BD7716F	
CTD	SBE 49	S/N: 222	

Plots and Images

This section contains selected images of data products and plots of vehicle navigation and selected sensors.

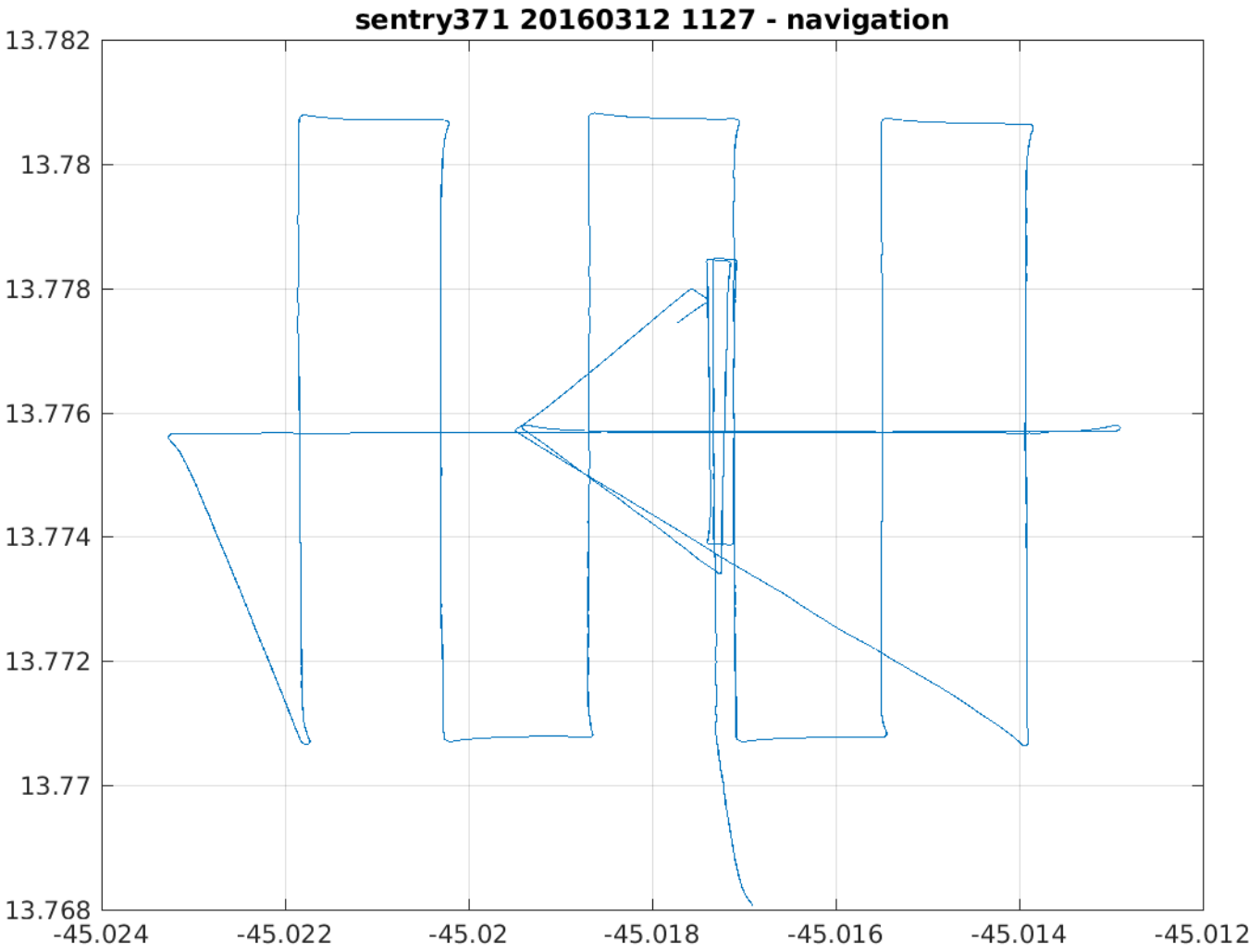

Figure 1: Latitude/Longitude plot of Sentry dive 371 based on post-processed navigation.

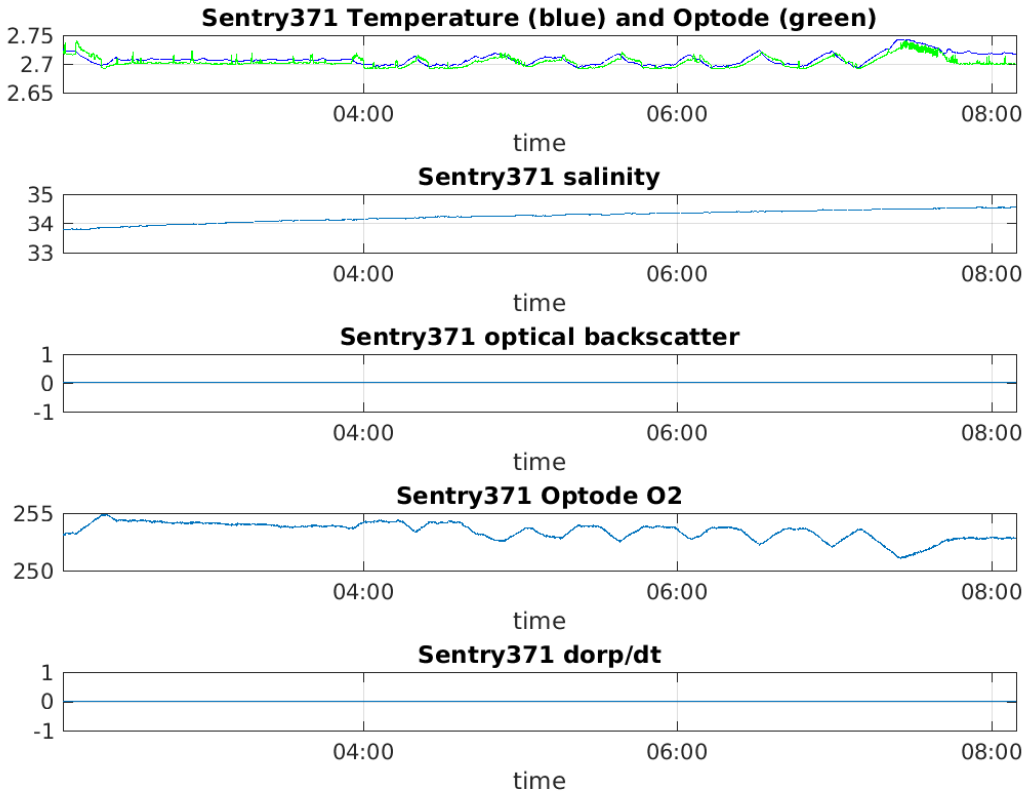

Figure 2: Time series plot of five of the basic sensors on Sentry, from top to bottom, temperature, salinity, optical backscatter, dissolved Oxygen, and ORP.

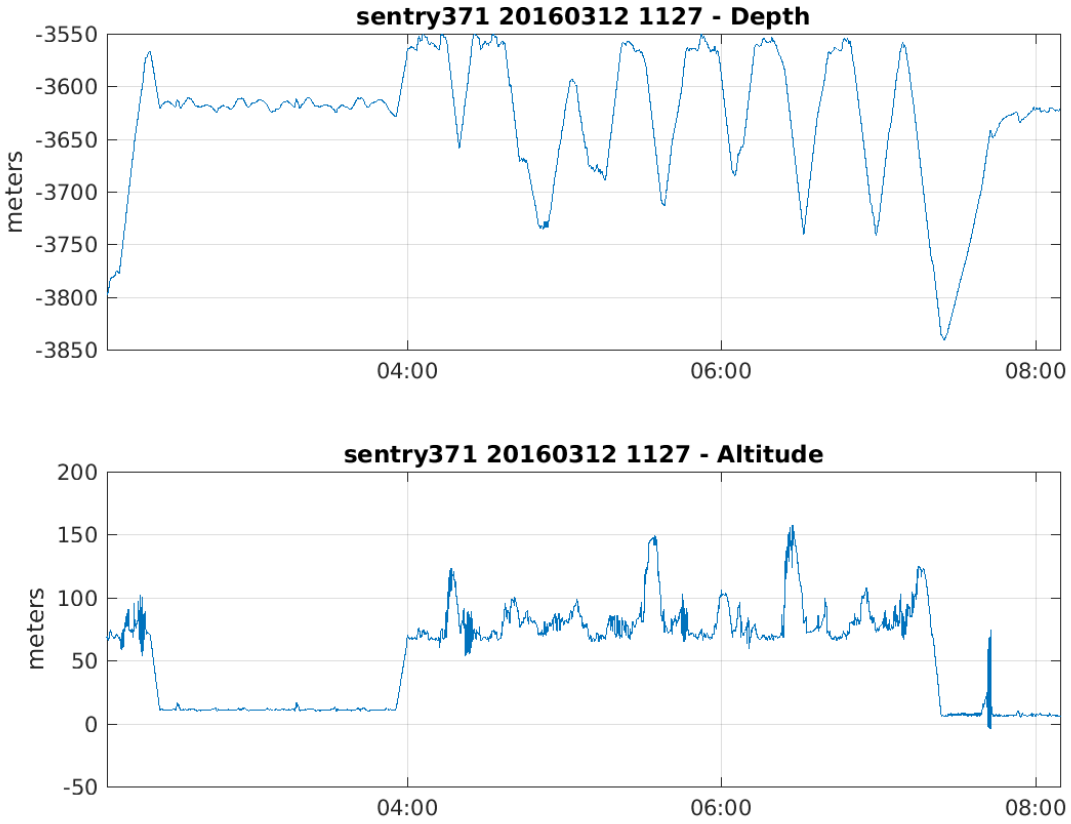

Figure 3: Depth and Altitude of Sentry during dive 371.

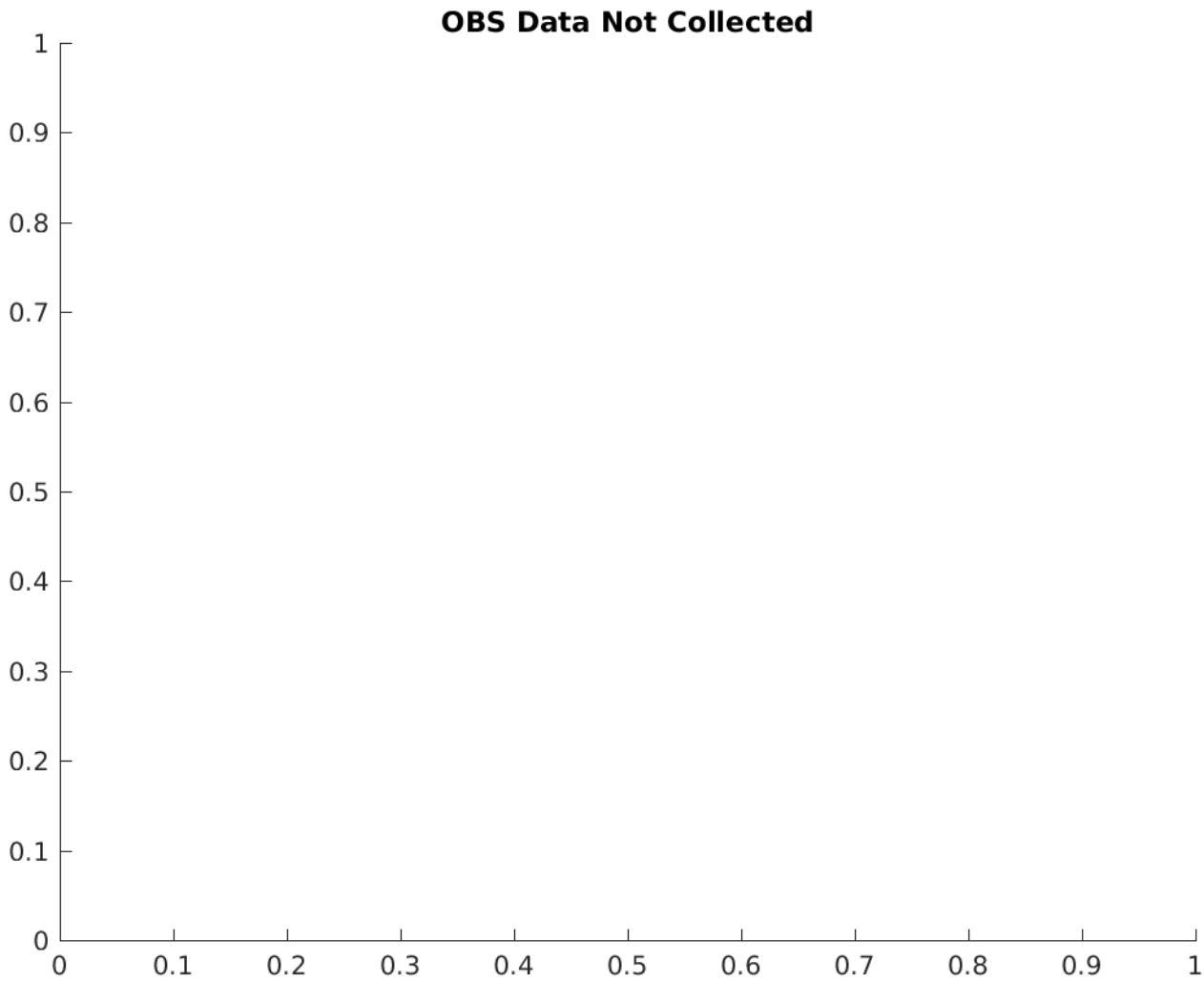

Figure 4: Optical backscatter on dive 371.

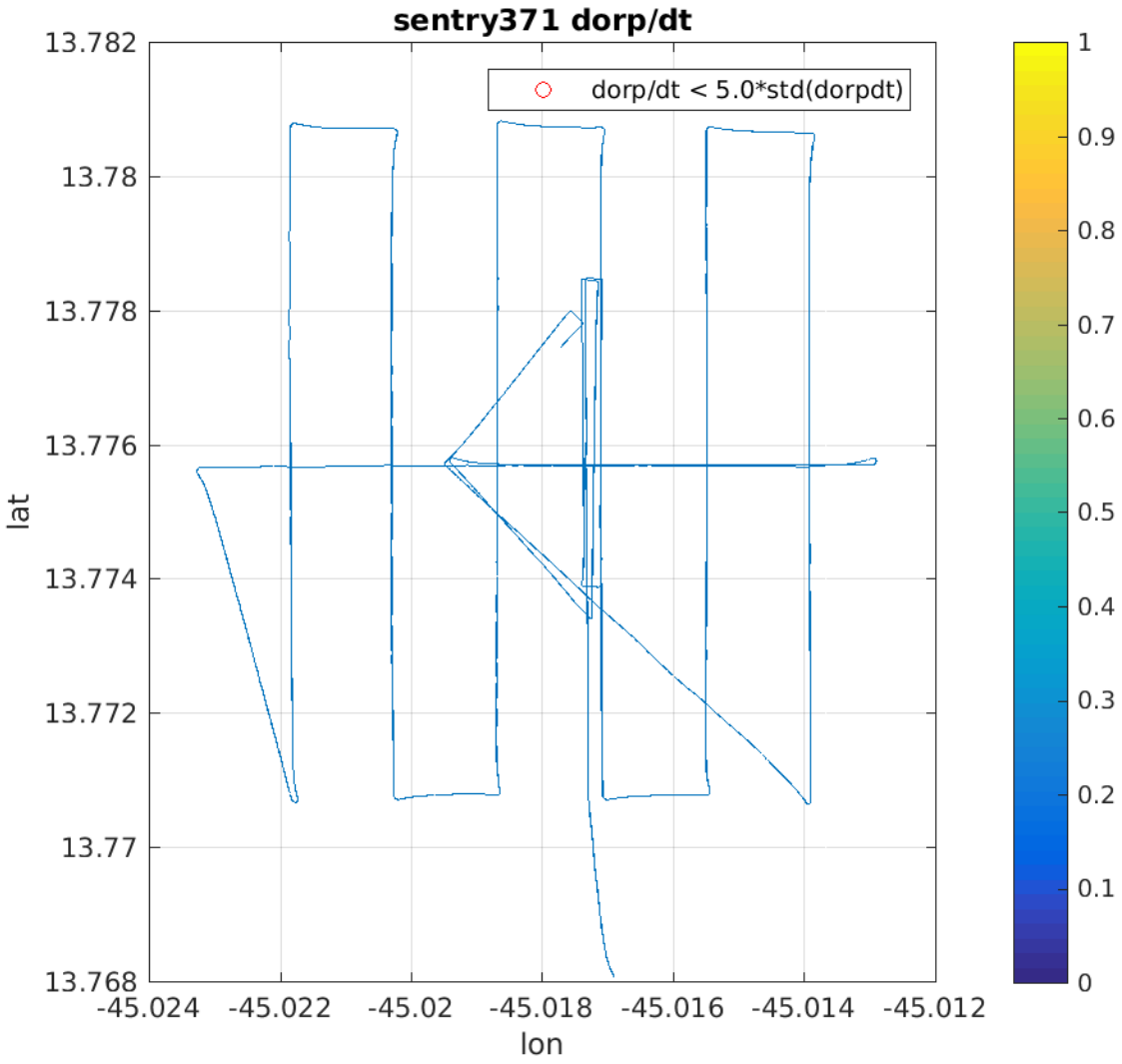

Figure 5: ORP sensor data during dive 371.

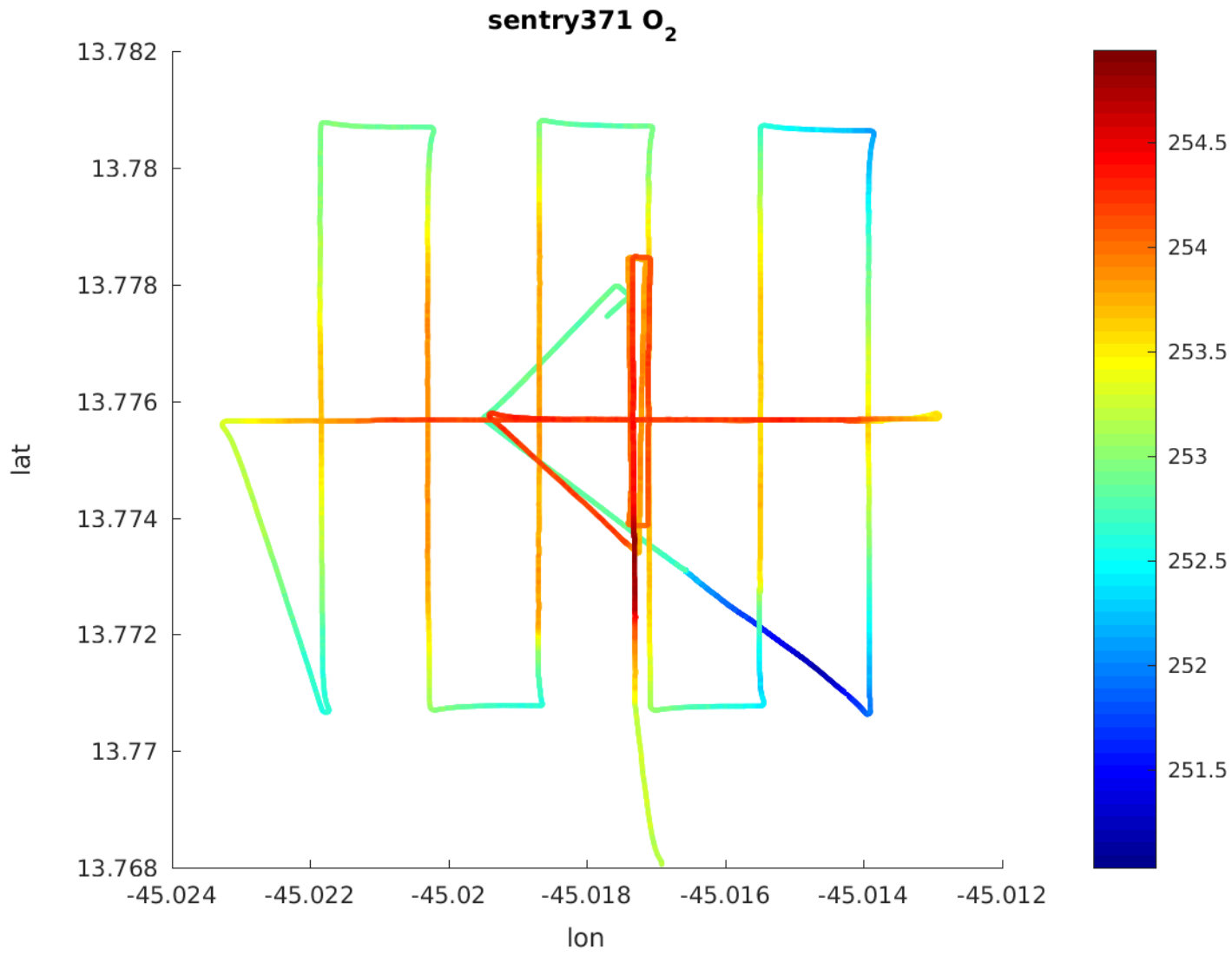

Figure 6: O2 sensor data during dive 371.

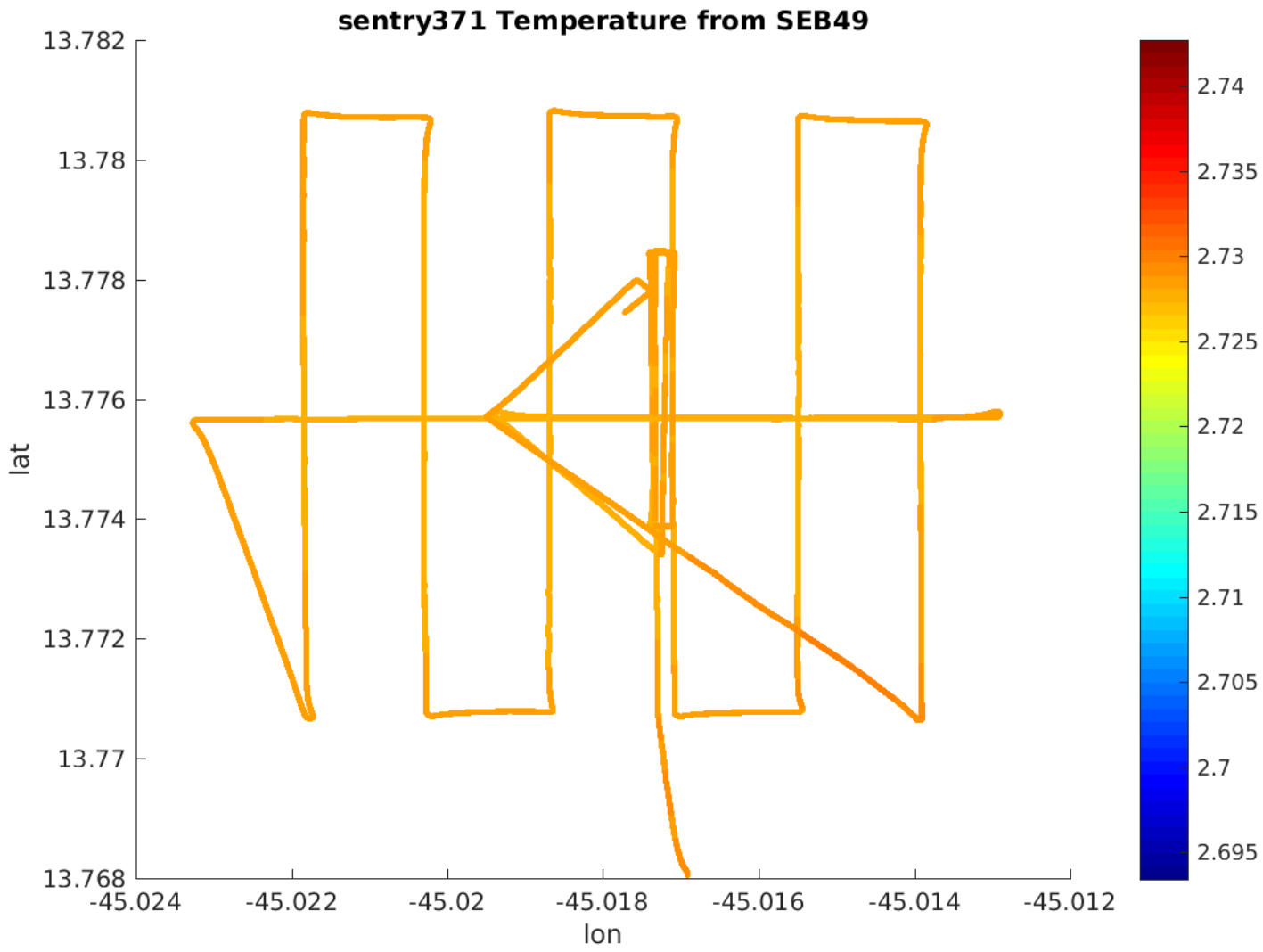

Figure 7: Temperature sensor data during dive 371.

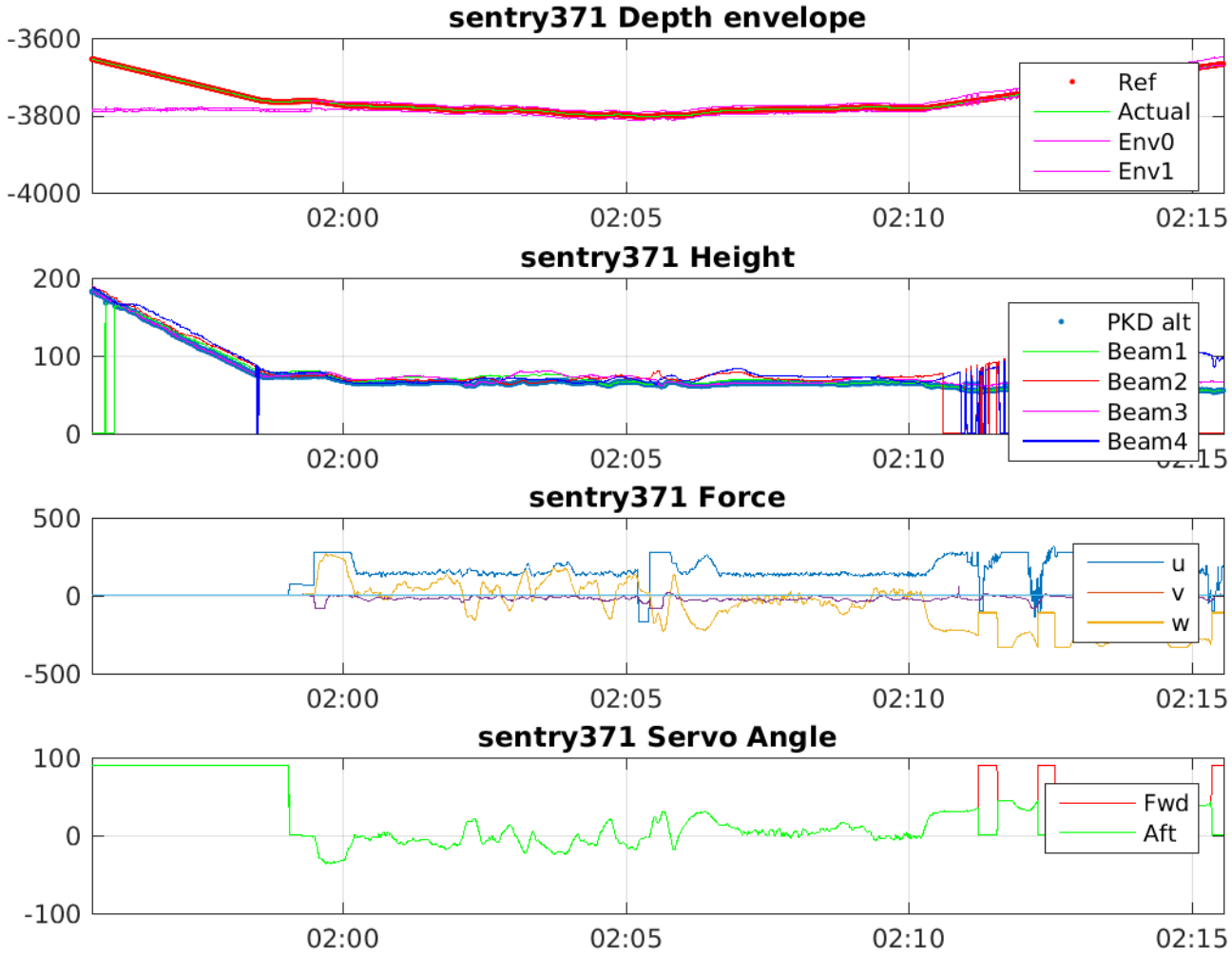

Figure 8: Bottom Approach for during dive 371.

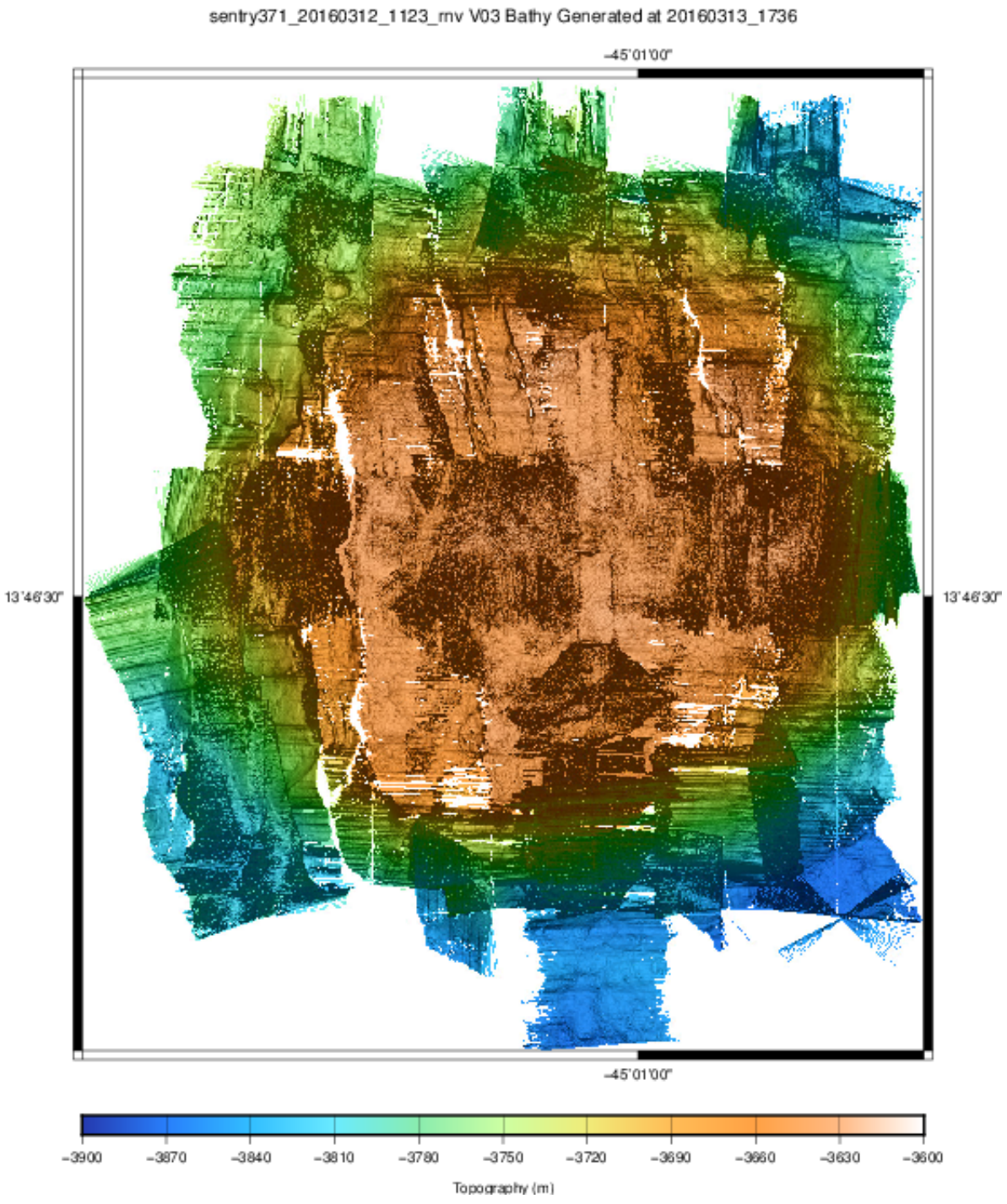

Figure 9: Processed multibeam data from dive 371.

Sentry 372 Dive Report
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Summary

Weather: The seas were appriximately 1-5 ft for both launch and recovery and were not a factor in operations. Wind was 5 to 10 knots.

Reason for end of dive: The dive was ended due to time constraints.

Vehicle Configuration

The science sensing suite for this dive was:

Table 11: Sentry Sensor Configuration

Sensor
APS 1540 Magnetometers (3)
Edgetech 4-24kHz SBP
Reson 7125 Multibeam Sonar
Seabird SBE49 CTD
Seapoint OBS
Anderaa optode model 4330
300kHz RDI DVL
Digital Still Camera
IXEA PHINS
Reson Sound Velocity Probe
NOAA PMEL ORP Sensor

This dive was navigated using the DVL/INS system in real time. USBL provided post-dive corrections.

Important Positions

Dive Origin: 13 43.8 -45 -3

Launch Position: sentry372 launch position: 13 46.014'N 044 59.035'W

Narrative

This was the first science dive of the cruise. The survey was entirely multibeam mapping covering the trawl area that had first discovered the popping rocks in this location. The survey went very well in particularly difficult terrain.

1 Issues and Proposed Solutions

ORP ORP data was not collected due to water in the intermediate sensor. Sensor was flushed and repaired.

Chief Scientist Comments

The Chief scientist is requested to include any desired comments.

Dive Statistics

1.1 sentry372 Summary

sentry372 Summary
Origin: 13.730000 -45.050000
Origin: 13 43.800'N 045 3.000'W
Launch: 2016/03/12 22:42:43
Survey start: 2016/03/13 00:05:57
Survey start: Lat:13.767407 Lon:-44.985059
Survey start: Lat:13 46.044'N Lon:044 59.104'W
Survey end: 2016/03/13 08:19:35
Survey end: Lat:13.763209 Lon:-44.995158
Survey end: Lat:13 45.793'N Lon:044 59.709'W
Ascent begins: 2016/03/13 08:19:35
On the surface: 2016/03/13 09:29:05
On deck: 2016/03/13 09:38:19
descent rate: 41.0 m/min
ascent rate: 49.9 m/min
survey time: 8.2 hours
deck-to-deck time 10.9 hours
Mean survey depth: 3610m
Mean survey height: 66m
distance travelled: 25.23km
average speed; 0.85m/s
average speed during photo runs: NaN m/s over 0.00 km
average speed during multibeam runs: 0.85 m/s over 25.23 km
total vertical during survey: 6197m
Battery energy at launch: 20.6 kwhr
Battery energy at survey end: 13.4 kwhr
Battery energy on deck: 13.3 kwhr

Sensor Information

This is a recently added section with selected sensor metadata. This section will be expanded in coming months. Additional data is available in the sentryxxx/nav-sci/proc directory within the sentryxxx_config matlab structure as well as in ascii text logs in sentryxxx/metadata. At present metadata is not yet automatically collected on all sensors.

1.2 sentry372 Devices

Instrument	Model	Serial Num.	Comments
USBL	Sonardyne AvTrak2	S/N: 1201	
Magnetometer	APS 1540	APS 0689 Ver: 3.85BD7716F	
	APS 1540	APS 0688 Ver: 3.85BD7716F	
	APS 1540	APS 0690 Ver: 3.85BD7716F	
CTD	SBE 49	S/N: 222	

Plots and Images

This section contains selected images of data products and plots of vehicle navigation and selected sensors.

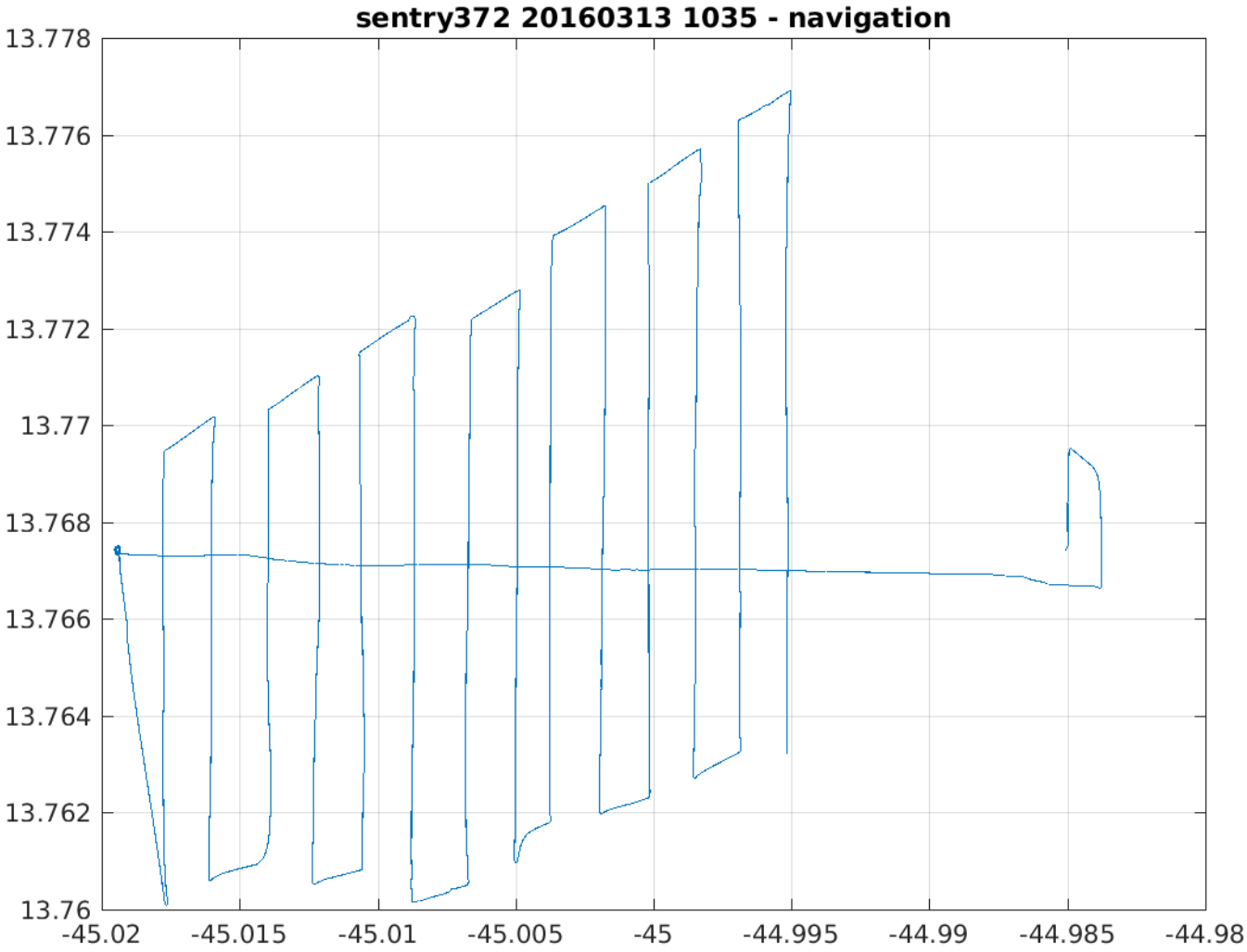


Figure 10: Latitude/Longitude plot of Sentry dive 372 based on post-processed navigation.

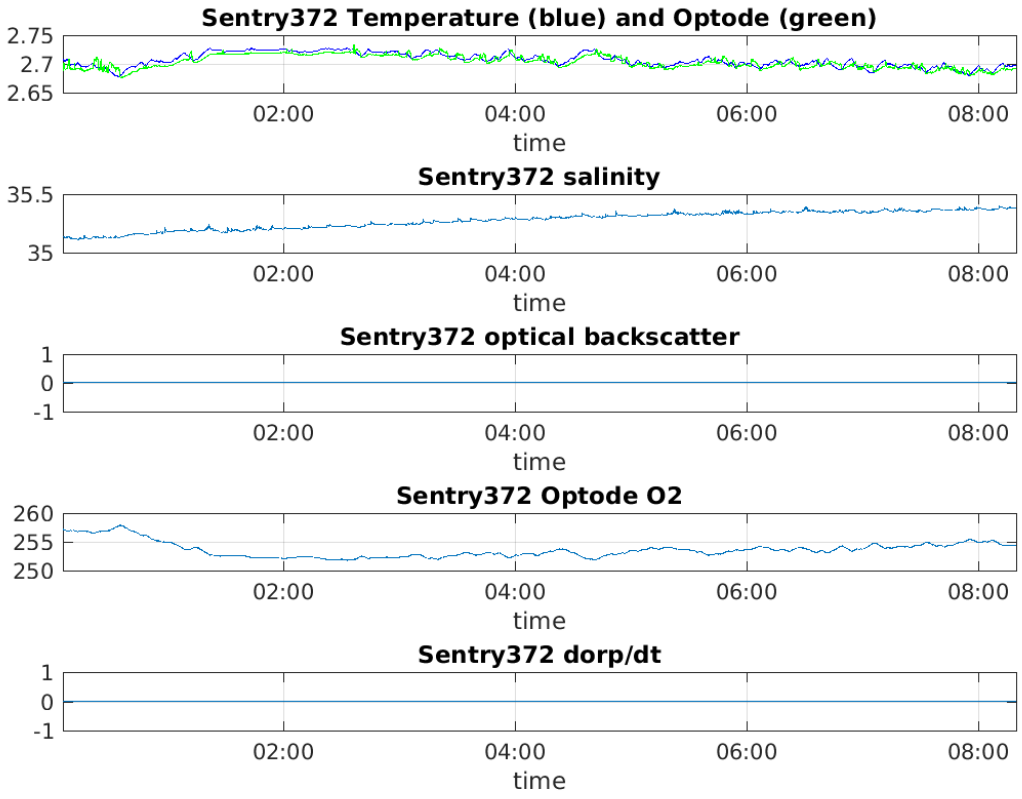


Figure 11: Time series plot of five of the basic sensors on Sentry, from top to bottom, temperature, salinity, optical backscatter, dissolved Oxygen, and ORP.

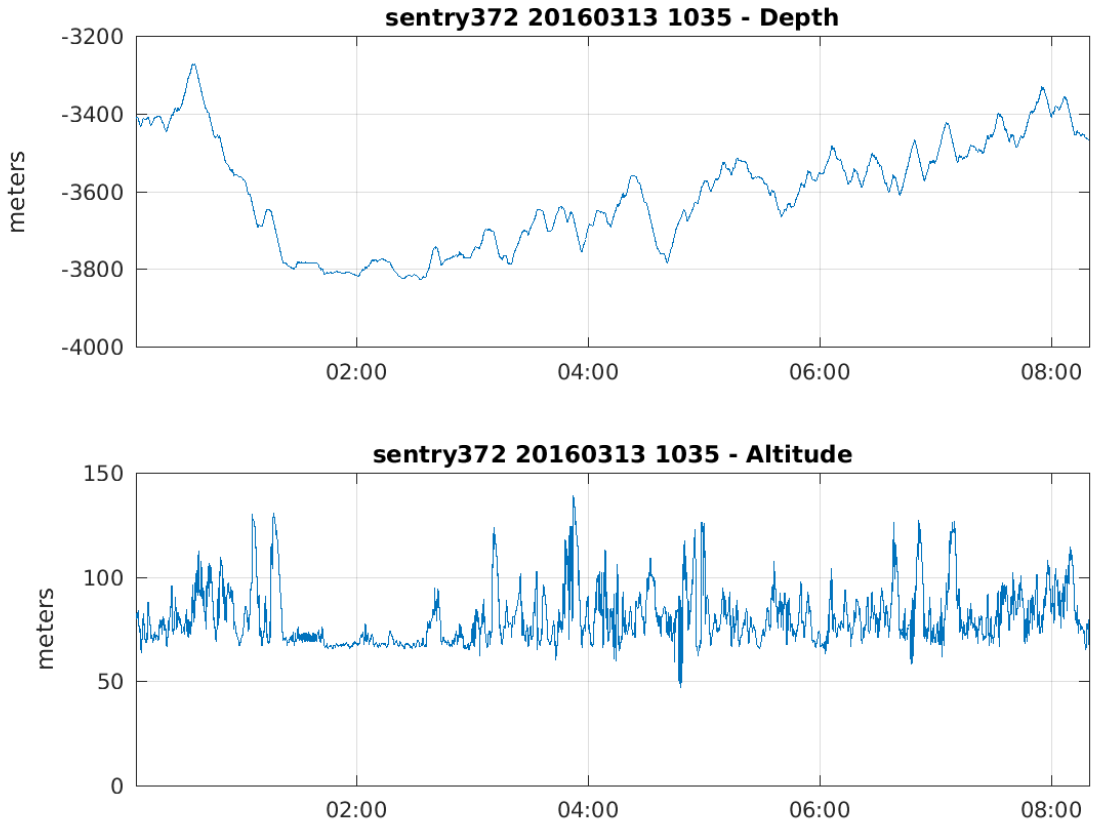


Figure 12: Depth and Altitude of Sentry during dive 372.

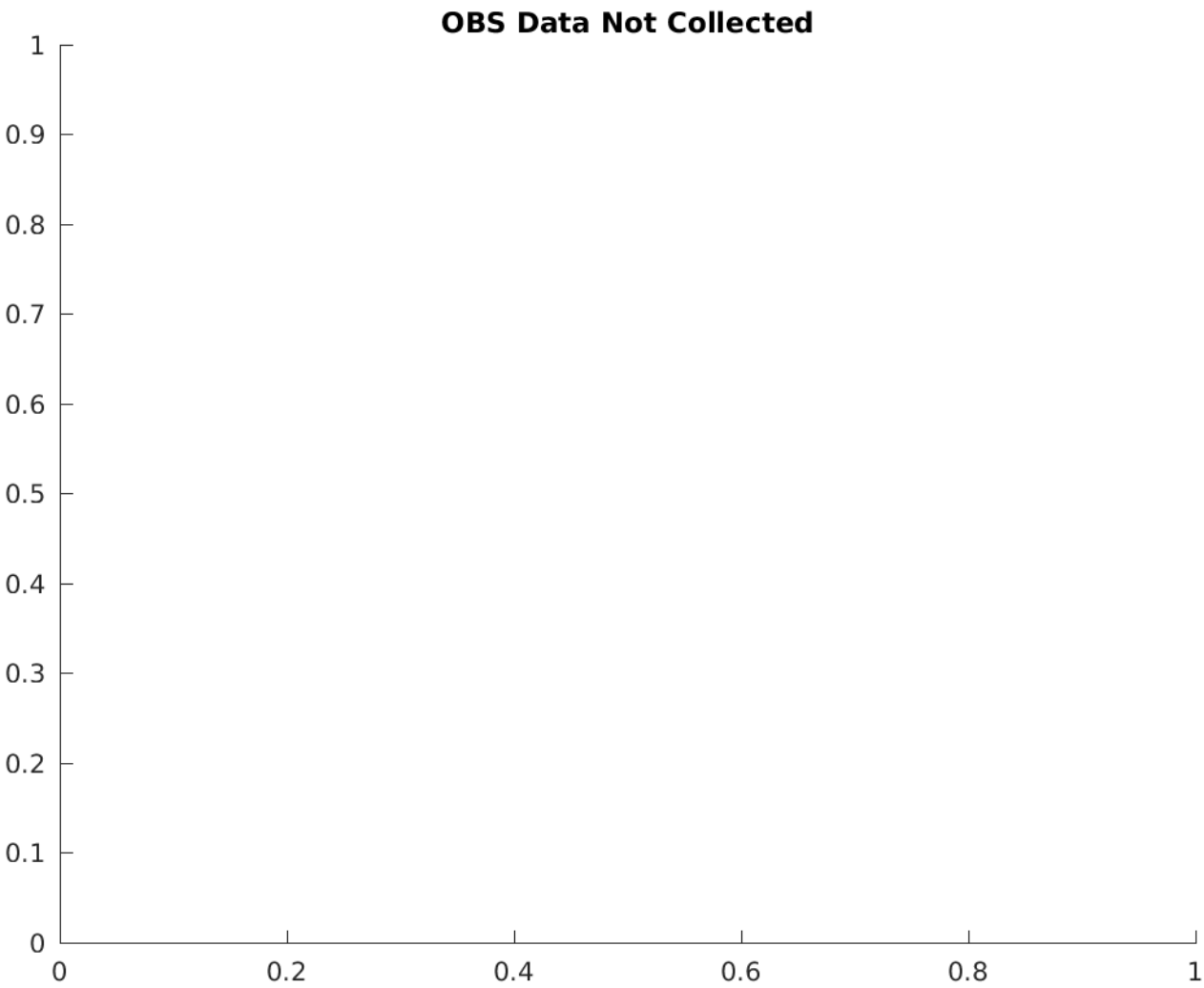


Figure 13: Optical backscatter on dive 372.

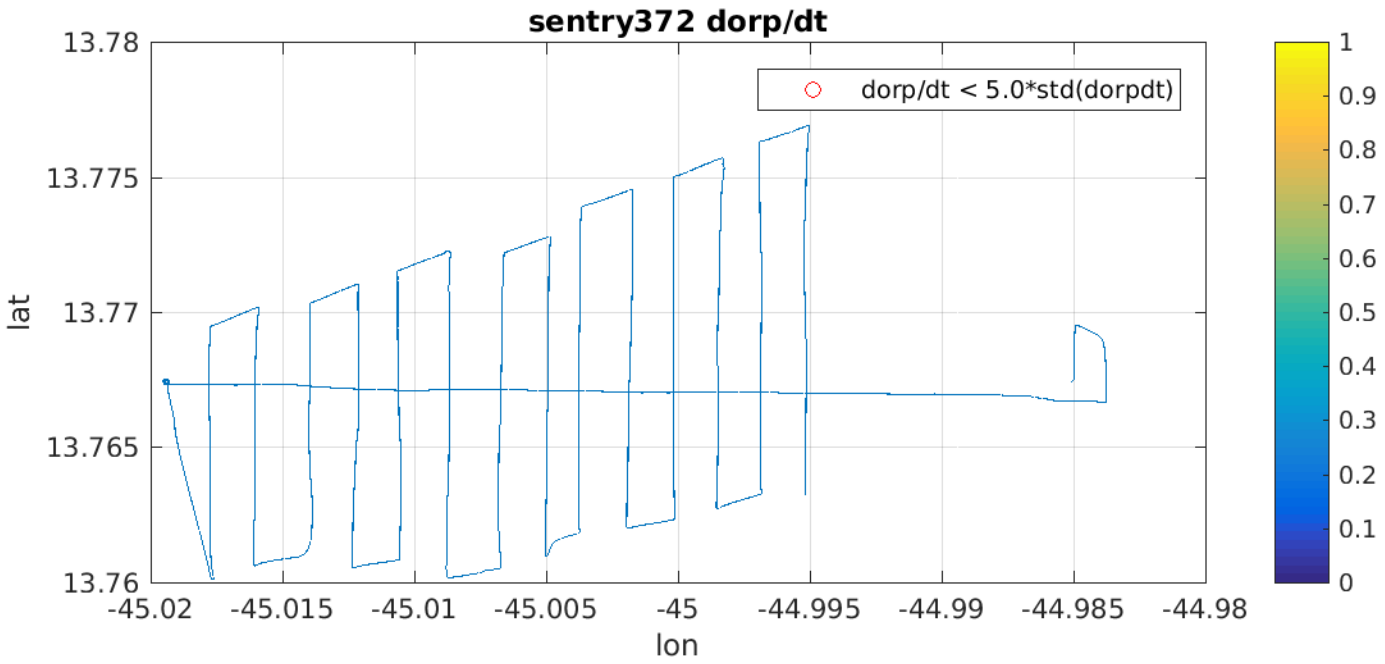


Figure 14: ORP sensor data during dive 372.

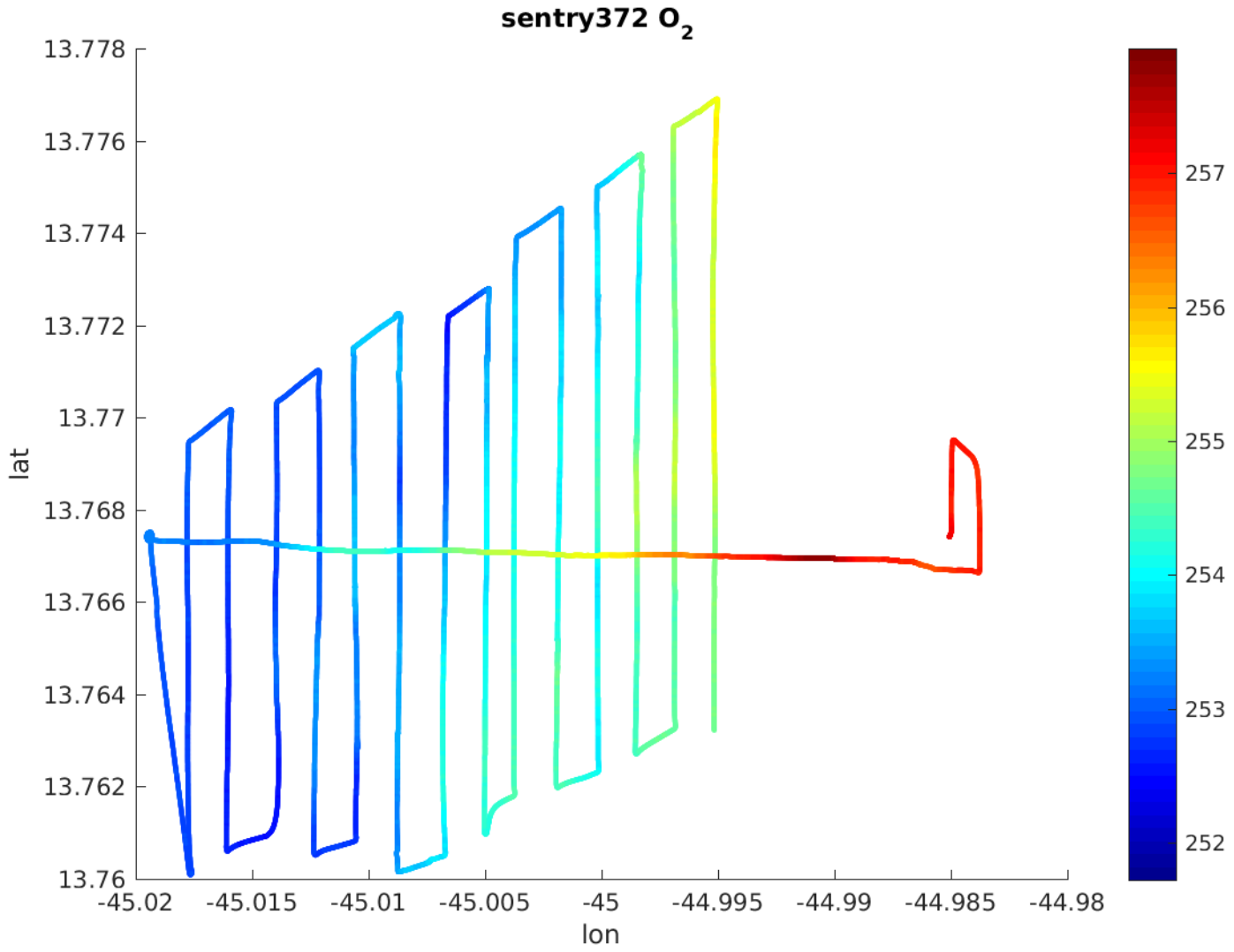


Figure 15: O2 sensor data during dive 372.

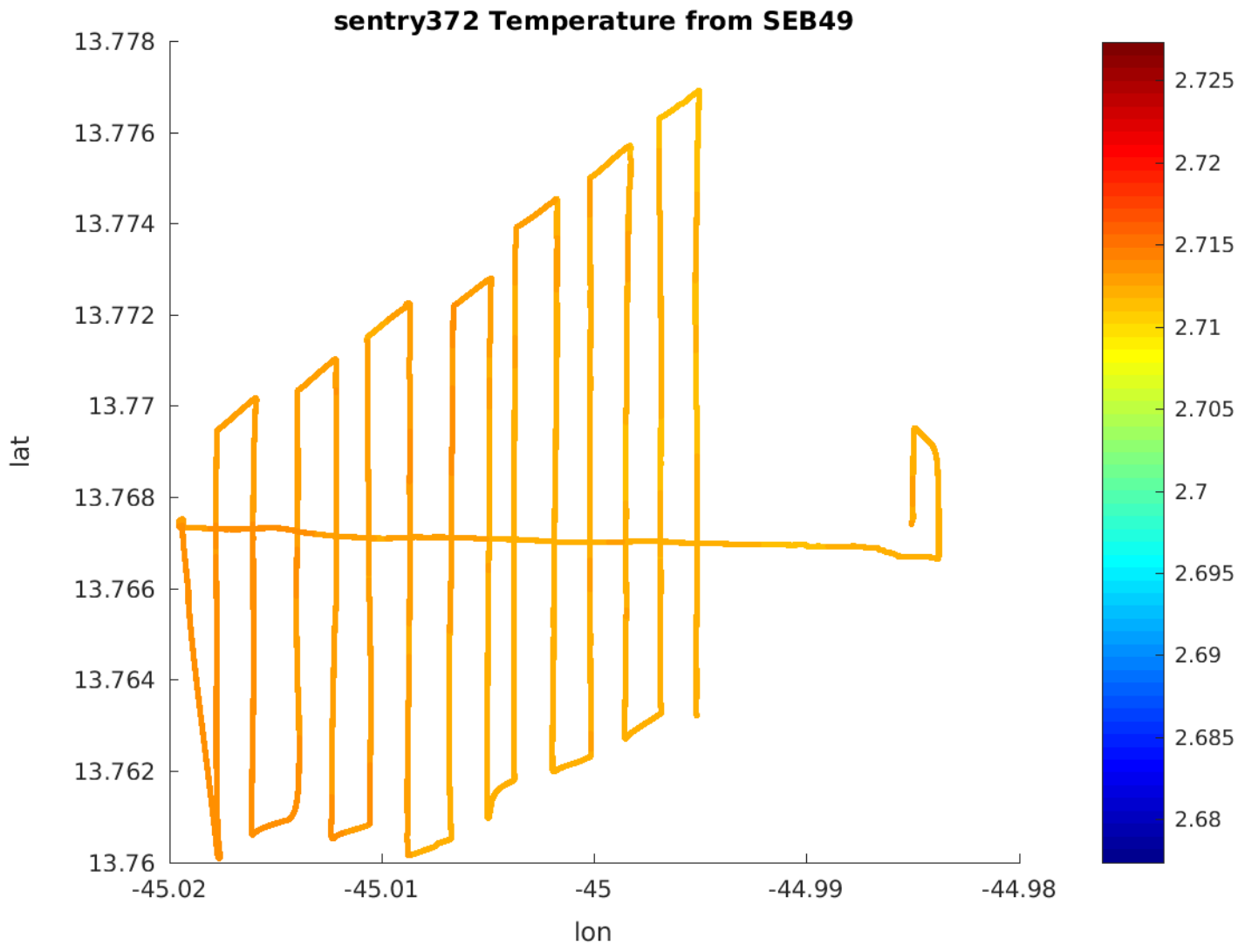


Figure 16: Temperature sensor data during dive 372.

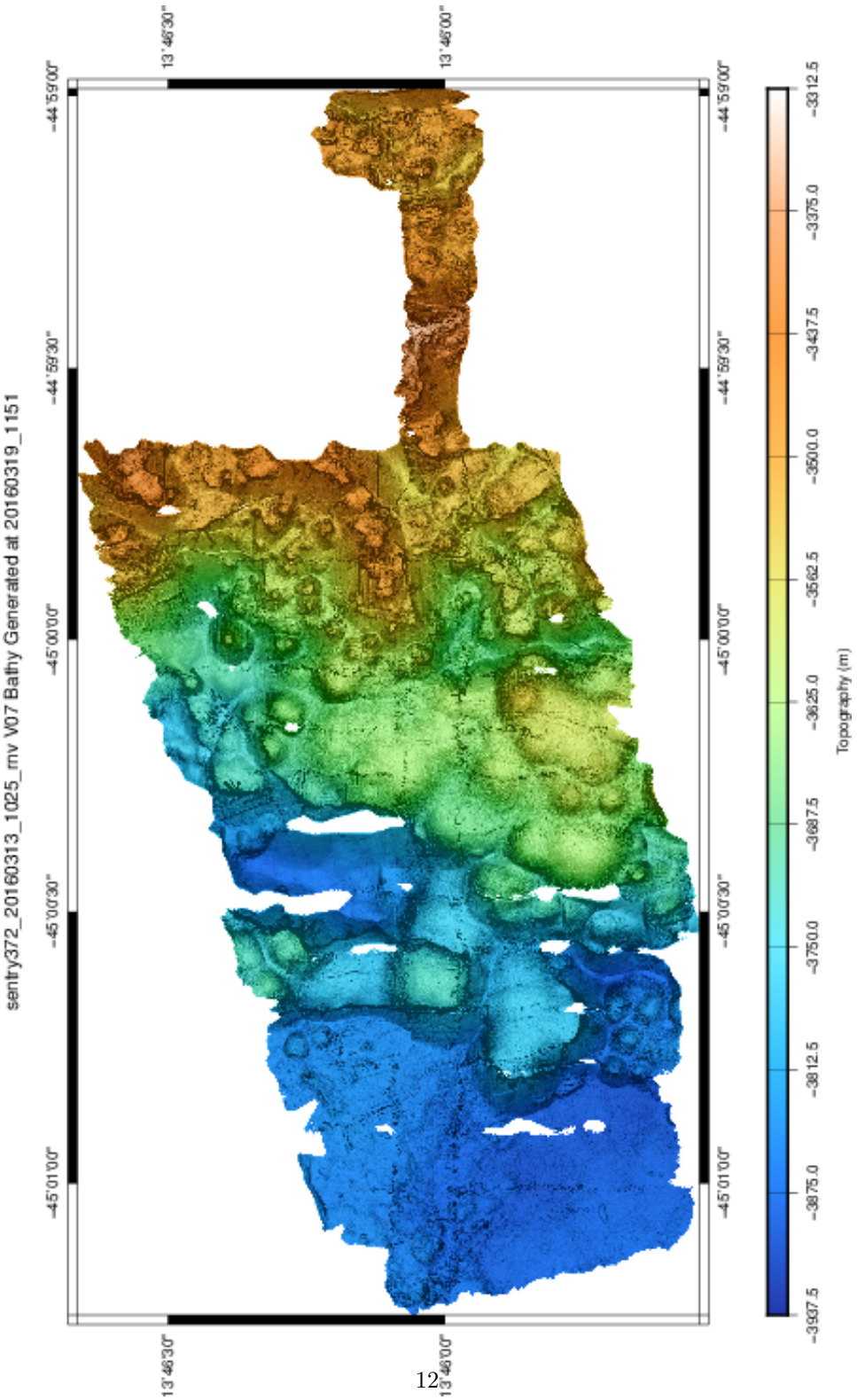


Figure 17: Processed multibeam data from dive 372.

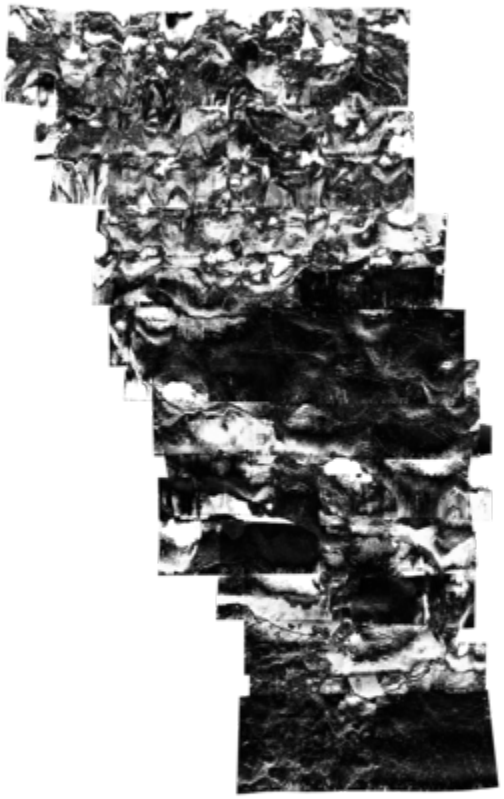


Figure 18: Sidescan mosaic East data from dive 372.

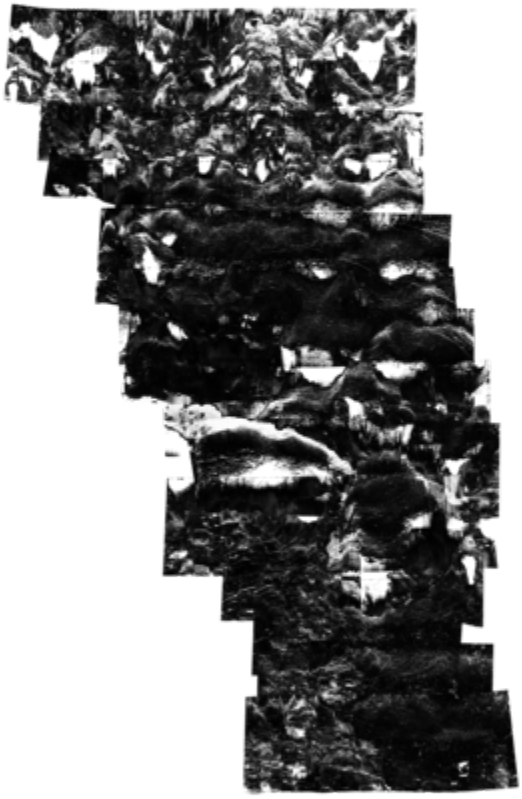


Figure 19: Sidescan mosaic West data from dive 372.

Sentry 373 Dive Report
DRAFT

WHOI Sentry Operations Group
Sean Kelley, Justin Fujii, Stefano Suman, Michael McCarthy, Hayden Radke

Sentry Expedition Leader: Sean Kelley

Chief Scientist: Mark Kurz, WHOI
Co-PI: Eric Mittelstaedt, University of Idaho

Summary

Weather: The seas were appriximately 1-5 ft for both launch and recovery and were not a factor in operations. Wind was 5 to 10 knots.

Reason for end of dive: The dive was ended due to time constraints.

Vehicle Configuration

The science sensing suite for this dive was:

Table 12: Sentry Sensor Configuration

Sensor
APS 1540 Magnetometers (3)
Edgetech 4-24kHz SBP
Reson 7125 Multibeam Sonar
Seabird SBE49 CTD
Seapoint OBS
Anderaa optode model 4330
300kHz RDI DVL
Digital Still Camera
IXEA PHINS
Reson Sound Velocity Probe
NOAA PMEL ORP Sensor

This dive was navigated using the DVL/INS system in real time. USBL provided post-dive corrections.

Important Positions

Dive Origin: 13 43.8 -45 -3

Launch Position: sentry373 launch position: 13 46.918'N 045 1.780'W

Narrative

Multibeam survey covering the area of the first Alvin science dive where the popping rocks were picked up. Particularly focusing on the large mound.

1 Issues and Proposed Solutions

NONE None

Chief Scientist Comments

The Chief scientist is requested to include any desired comments.

Dive Statistics

1.1 sentry373 Summary

sentry373 Summary
Origin: 13.730000 -45.050000
Origin: 13 43.800'N 045 3.000'W
Launch: 2016/03/13 22:20:06
Survey start: 2016/03/13 23:48:13
Survey start: Lat:13.767160 Lon:-45.034896
Survey start: Lat:13 46.030'N Lon:045 2.094'W
Survey end: 2016/03/14 08:26:42
Survey end: Lat:13.782772 Lon:-45.022211
Survey end: Lat:13 46.966'N Lon:045 1.333'W
Ascent begins: 2016/03/14 08:26:42
On the surface: 2016/03/14 09:38:55
On deck: 2016/03/14 09:50:17
descent rate: 40.4 m/min
ascent rate: 50.4 m/min
survey time: 8.6 hours
deck-to-deck time 11.5 hours
Mean survey depth: 3682m
Mean survey height: 67m
distance travelled: 26.50km
average speed; 0.85m/s
average speed during photo runs: NaN m/s over 0.00 km
average speed during multibeam runs: 0.84 m/s over 26.50 km
total vertical during survey: 6835m
Battery energy at launch: 20.0 kwhr
Battery energy at survey end: 12.6 kwhr
Battery energy on deck: 12.4 kwhr

Sensor Information

This is a recently added section with selected sensor metadata. This section will be expanded in coming months. Additional data is available in the sentryxxx/nav-sci/proc directory within the sentryxxx_config matlab structure as well as in ascii text logs in sentryxxx/metadata. At present metadata is not yet automatically collected on all sensors.

1.2 sentry373 Devices

Instrument	Model	Serial Num.	Comments
USBL	Sonardyne AvTrak2	S/N: 1201	
Magnetometer	APS 1540	APS 0689 Ver: 3.85BD7716F	
	APS 1540	APS 0688 Ver: 3.85BD7716F	
	APS 1540	APS 0690 Ver: 3.85BD7716F	
CTD	SBE 49	S/N: 222	

Plots and Images

This section contains selected images of data products and plots of vehicle navigation and selected sensors.

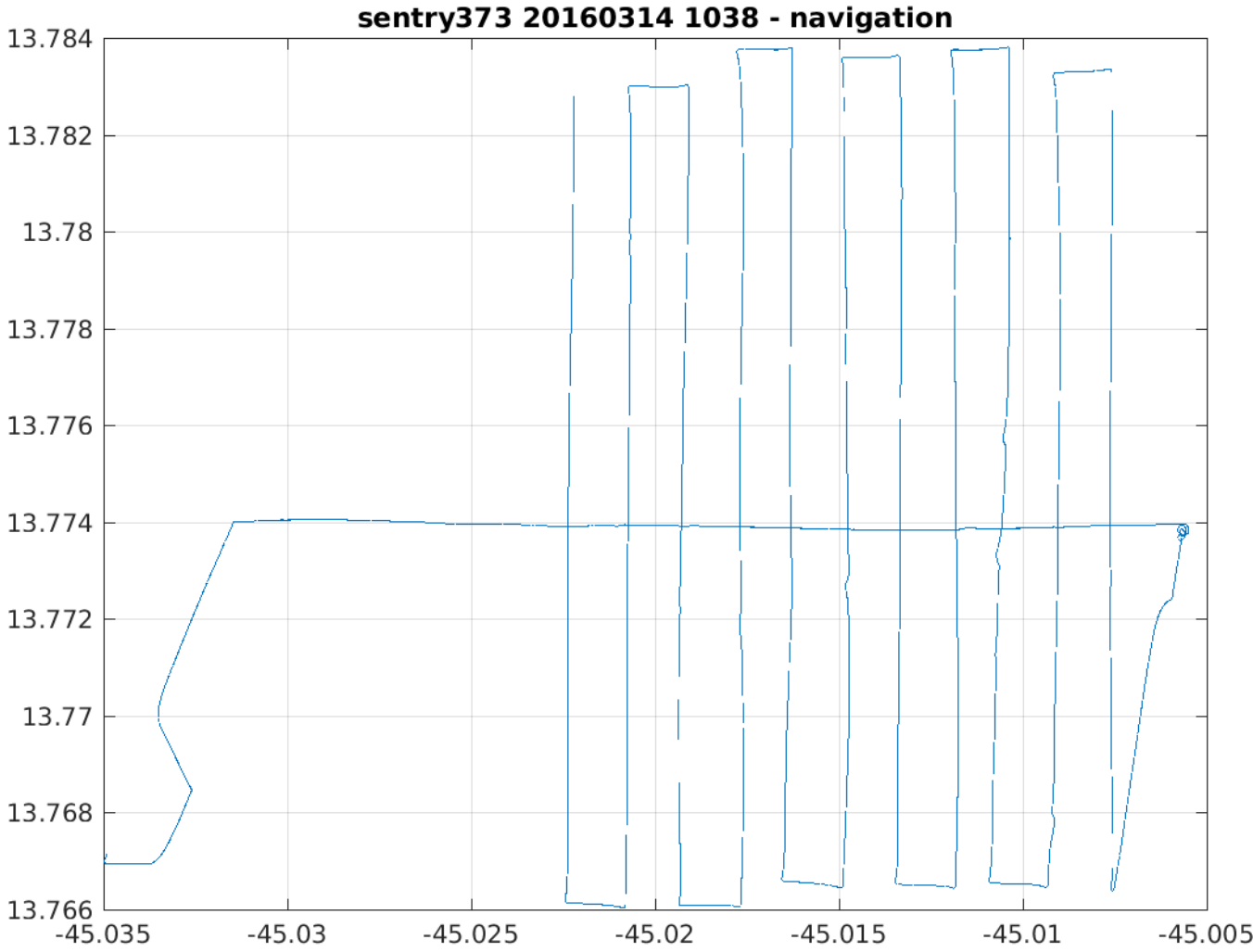


Figure 20: Latitude/Longitude plot of Sentry dive 373 based on post-processed navigation.

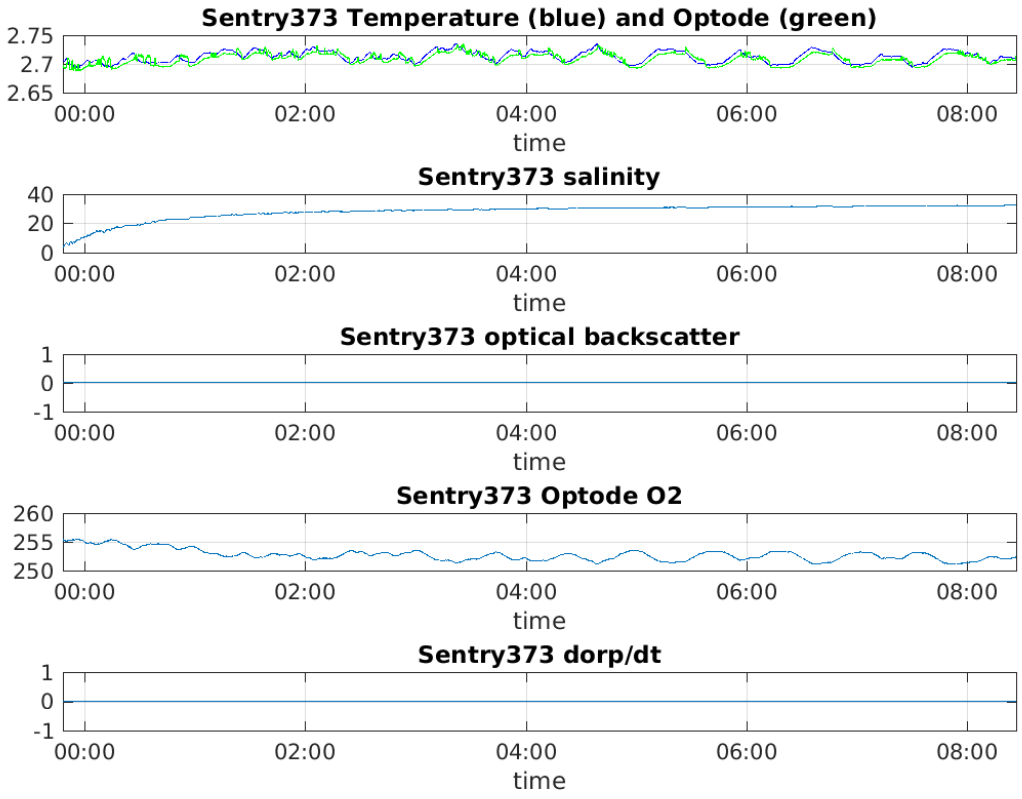


Figure 21: Time series plot of five of the basic sensors on Sentry, from top to bottom, temperature, salinity, optical backscatter, dissolved Oxygen, and ORP.

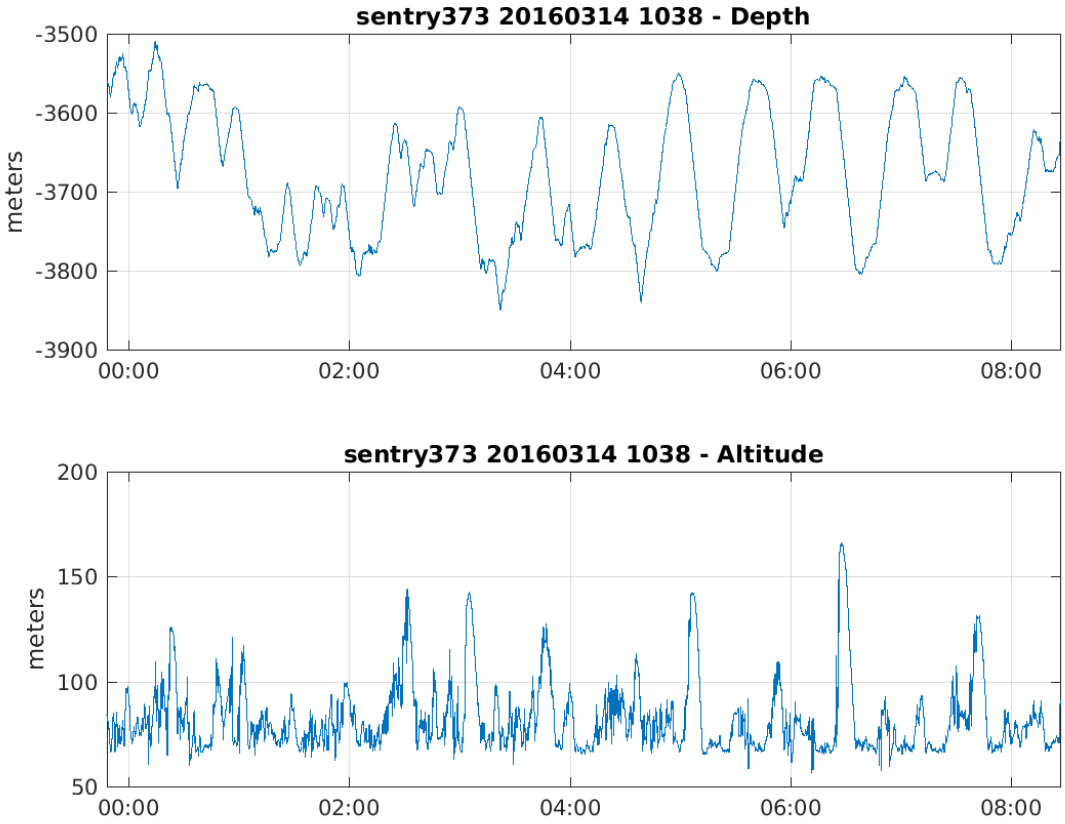


Figure 22: Depth and Altitude of Sentry during dive 373.

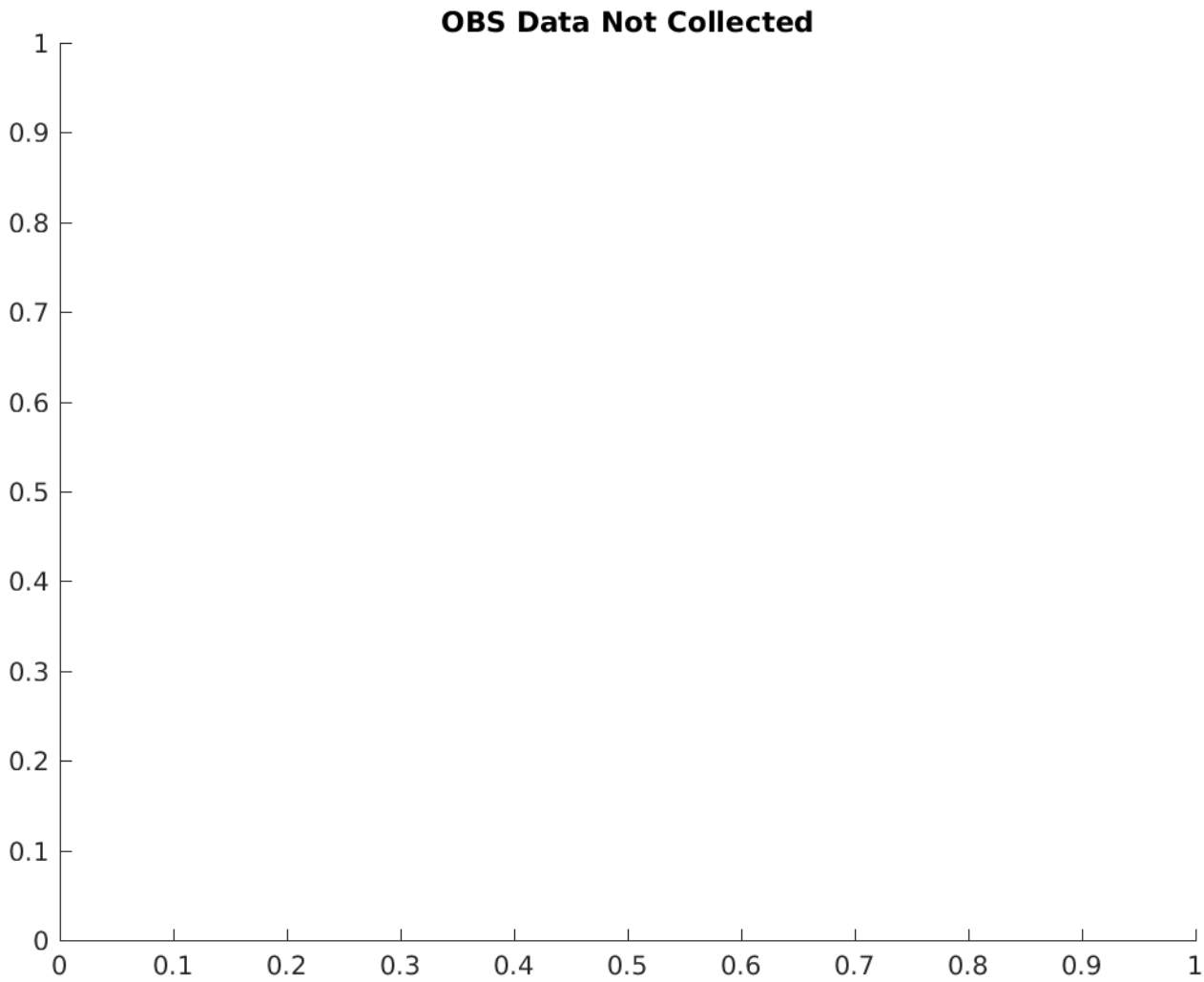


Figure 23: Optical backscatter on dive 373.

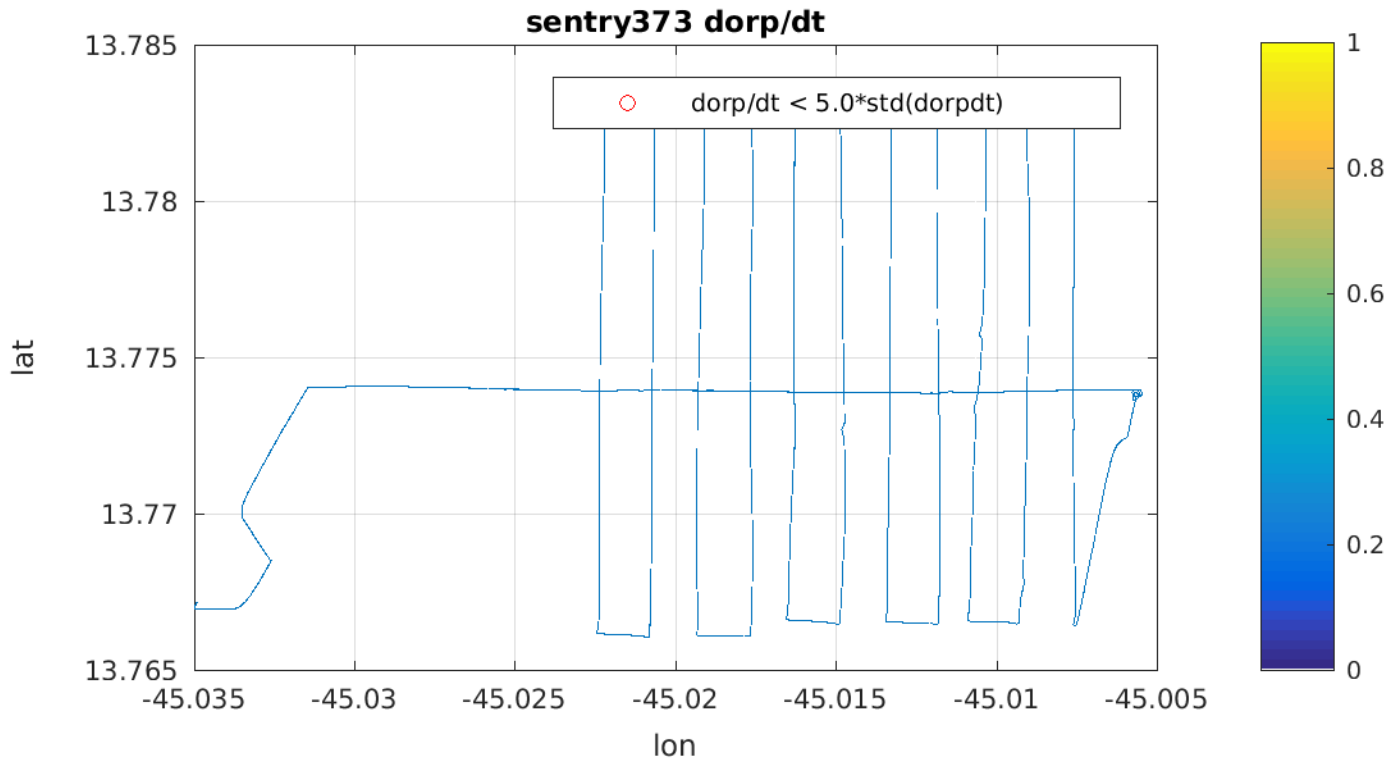


Figure 24: ORP sensor data during dive 373.

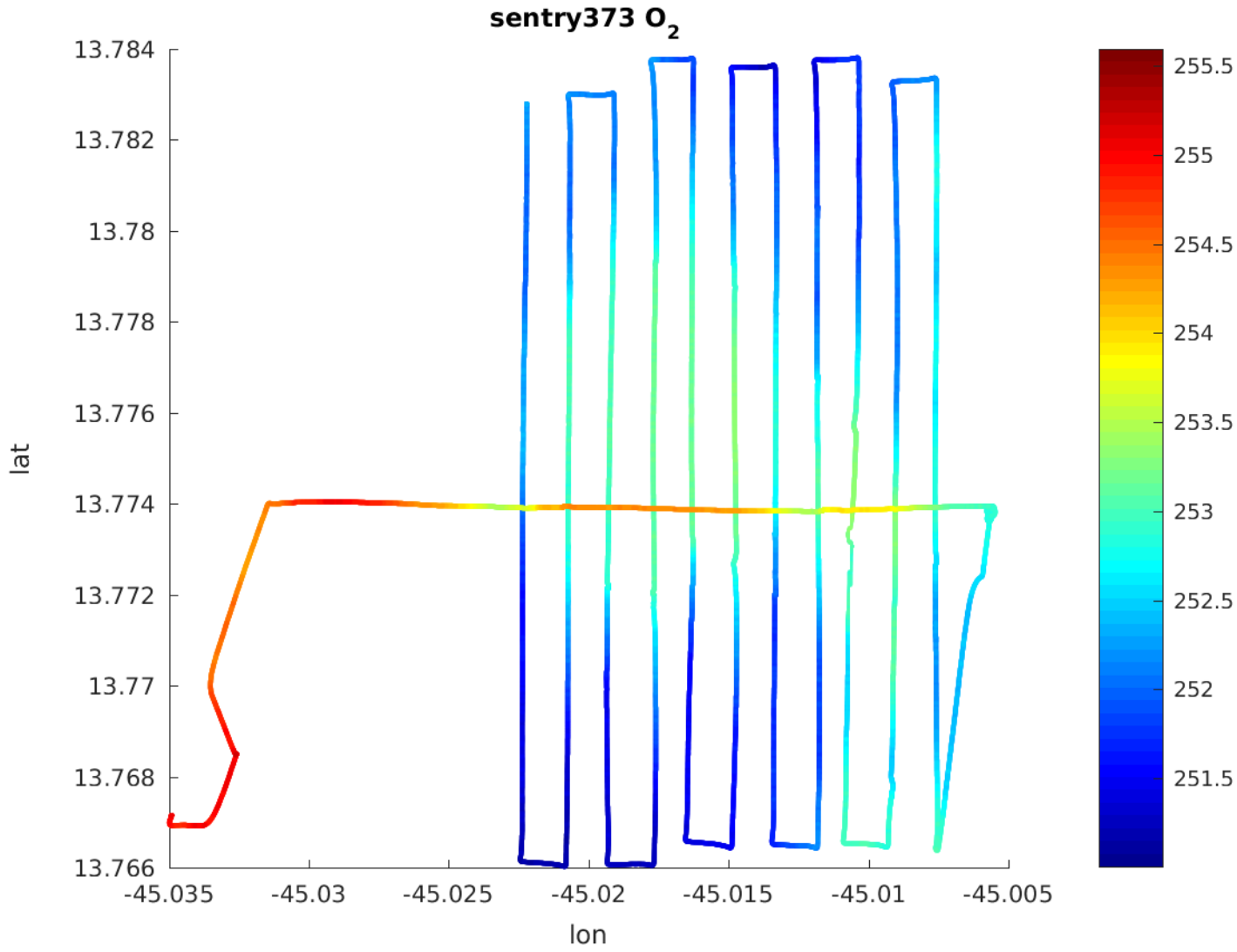


Figure 25: O2 sensor data during dive 373.

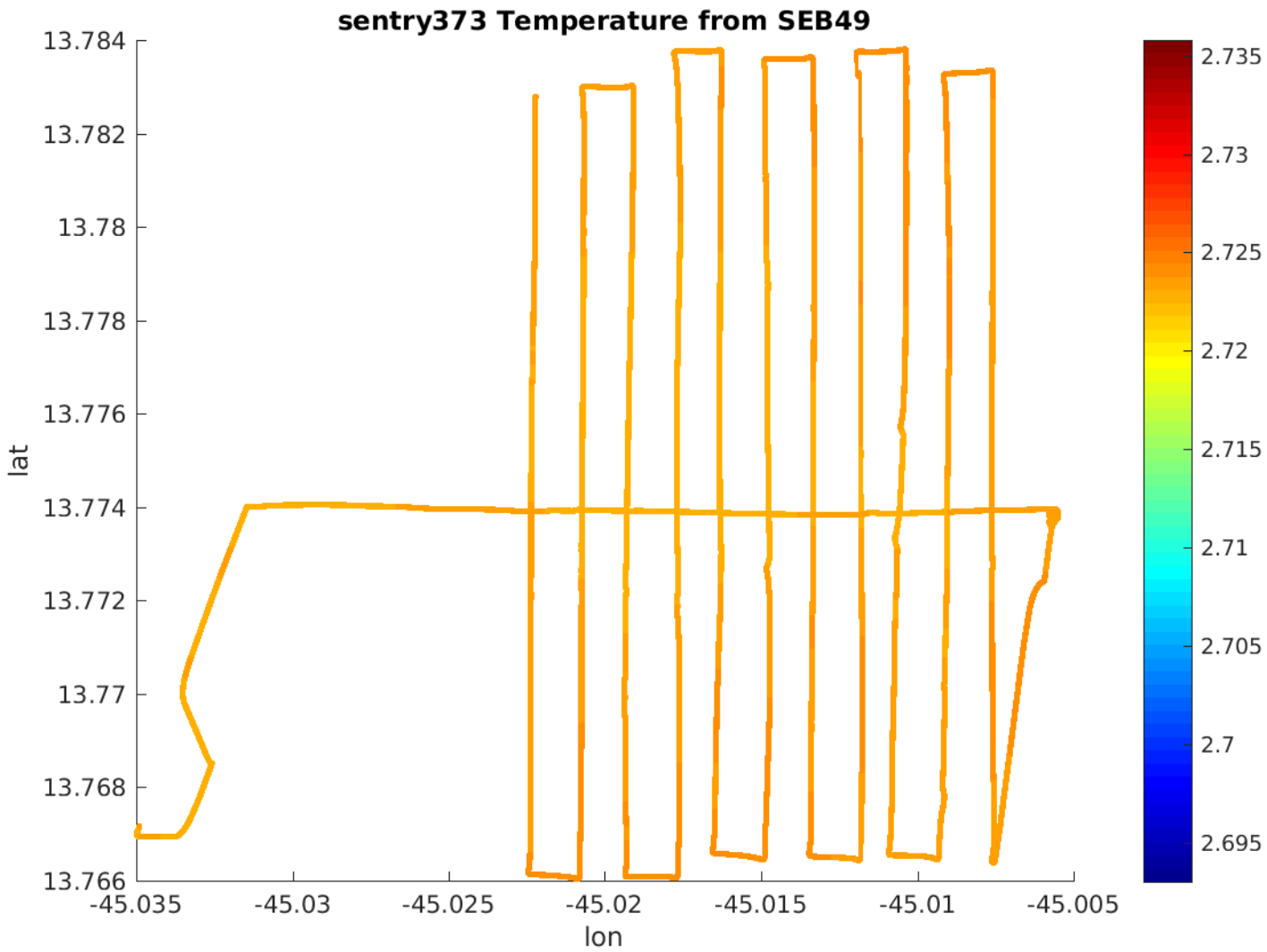


Figure 26: Temperature sensor data during dive 373.

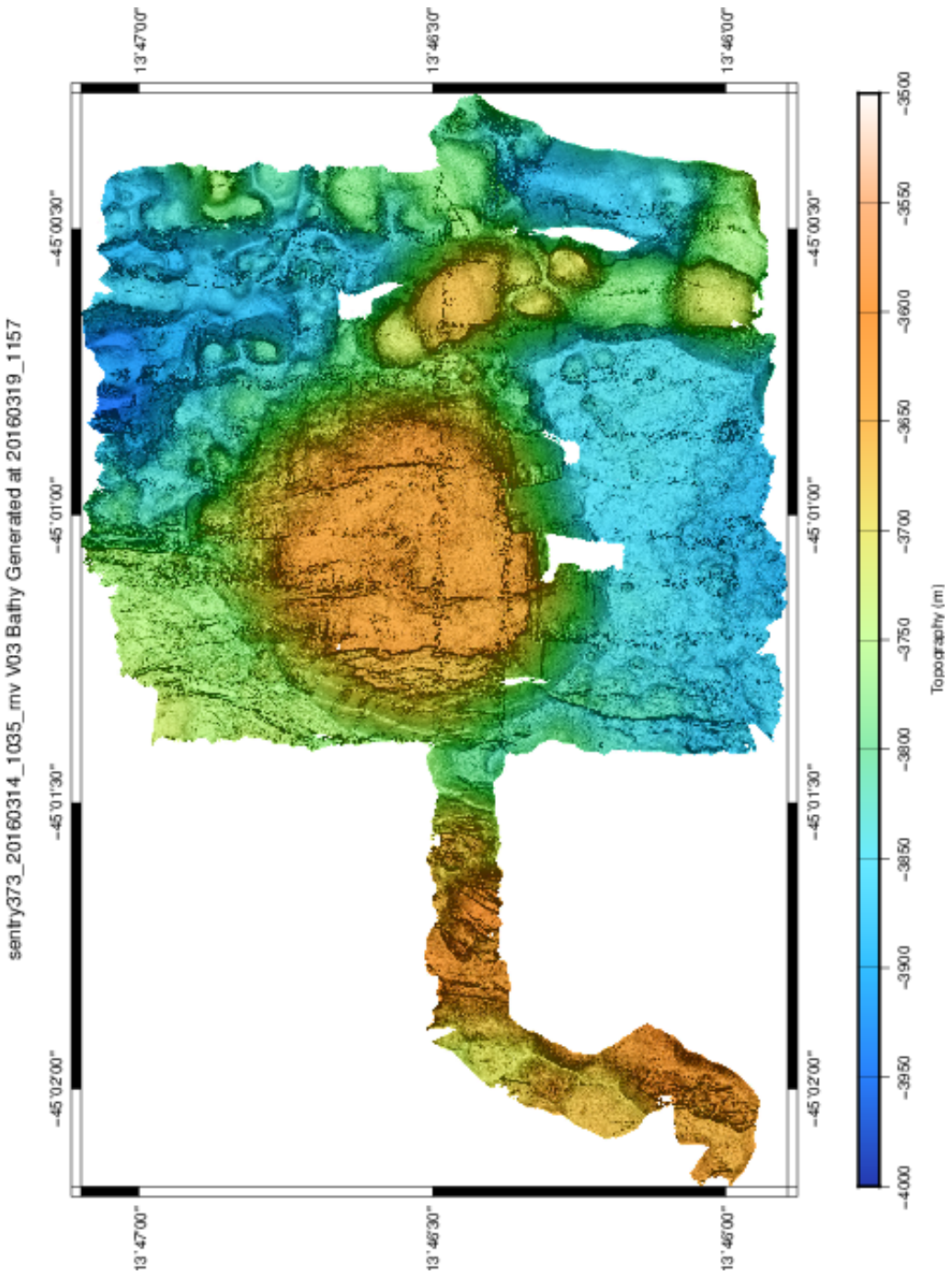


Figure 27: Processed multibeam data from dive 373.

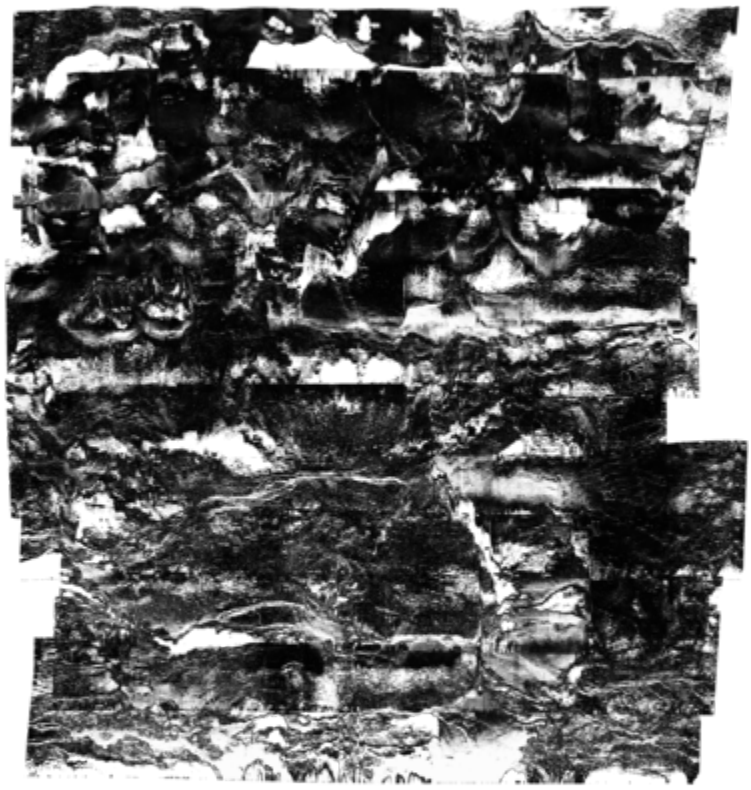


Figure 28: Sidescan mosaic East data from dive 373.

Figure 29: Sidescan mosaic West data from dive 373.

Sentry 374 Dive Report
DRAFT

WHOI Sentry Operations Group
Sean Kelley, Justin Fujii, Stefano Suman, Michael McCarthy, Hayden Radke

Sentry Expedition Leader: Sean Kelley

Chief Scientist: Mark Kurz, WHOI
Co-PI: Eric Mittelstaedt, University of Idaho

Summary

Weather: The seas were appriximately 1-5 ft for both launch and recovery and were not a factor in operations. Wind was 5 to 10 knots.

Reason for end of dive: The dive was ended due to time constraints.

Vehicle Configuration

The science sensing suite for this dive was:

Table 13: Sentry Sensor Configuration

Sensor
APS 1540 Magnetometers (3)
Edgetech 4-24kHz SBP
Reson 7125 Multibeam Sonar
Seabird SBE49 CTD
Seapoint OBS
Anderaa optode model 4330
300kHz RDI DVL
Digital Still Camera
IXEA PHINS
Reson Sound Velocity Probe
NOAA PMEL ORP Sensor

This dive was navigated using the DVL/INS system in real time. USBL provided post-dive corrections.

Important Positions

Dive Origin: 13 46.2 -45 -00

Launch Position: sentry374 launch position: 13 48.668'N 044 56.199'W

Narrative

Multibeam survey over an area of interest north east of the popping rocks trawl site. The survey was excellent and captured the terrain in the bathemetry very well.

1 Issues and Proposed Solutions

NONE None

Chief Scientist Comments

The Chief scientist is requested to include any desired comments.

Dive Statistics

1.1 sentry374 Summary

sentry374 Summary
Origin: 13.770000 -45.000000
Origin: 13 46.200'N 045 0.000'W
Launch: 2016/03/14 21:27:45
Survey start: 2016/03/14 22:29:48
Survey start: Lat:13.808794 Lon:-44.937076
Survey start: Lat:13 48.528'N Lon:044 56.225'W
Survey end: 2016/03/15 08:26:56
Survey end: Lat:13.819717 Lon:-44.938639
Survey end: Lat:13 49.183'N Lon:044 56.318'W
Ascent begins: 2016/03/15 08:26:56
On the surface: 2016/03/15 09:20:24
On deck: 2016/03/15 09:28:45
descent rate: 41.7 m/min
ascent rate: 50.6 m/min
survey time: 10.0 hours
deck-to-deck time 12.0 hours
Mean survey depth: 2818m
Mean survey height: 65m
distance travelled: 31.86km
average speed; 0.88m/s
average speed during photo runs: 0.24 m/s over 0.04 km
average speed during multibeam runs: 0.89 m/s over 31.83 km
total vertical during survey: 6316m
Battery energy at launch: 20.3 kwhr
Battery energy at survey end: 12.1 kwhr
Battery energy on deck: 12.0 kwhr

Sensor Information

This is a recently added section with selected sensor metadata. This section will be expanded in coming months. Additional data is available in the sentryxxx/nav-sci/proc directory within the sentryxxx_config matlab structure as well as in ascii text logs in sentryxxx/metadata. At present metadata is not yet automatically collected on all sensors.

1.2 sentry374 Devices

Instrument	Model	Serial Num.	Comments
USBL	Sonardyne AvTrak2	S/N: 1201	
Magnetometer	APS 1540	APS 0689 Ver: 3.85BD7716F	
	APS 1540	APS 0688 Ver: 3.85BD7716F	
	APS 1540	APS 0690 Ver: 3.85BD7716F	
CTD	SBE 49	S/N: 222	

Plots and Images

This section contains selected images of data products and plots of vehicle navigation and selected sensors.

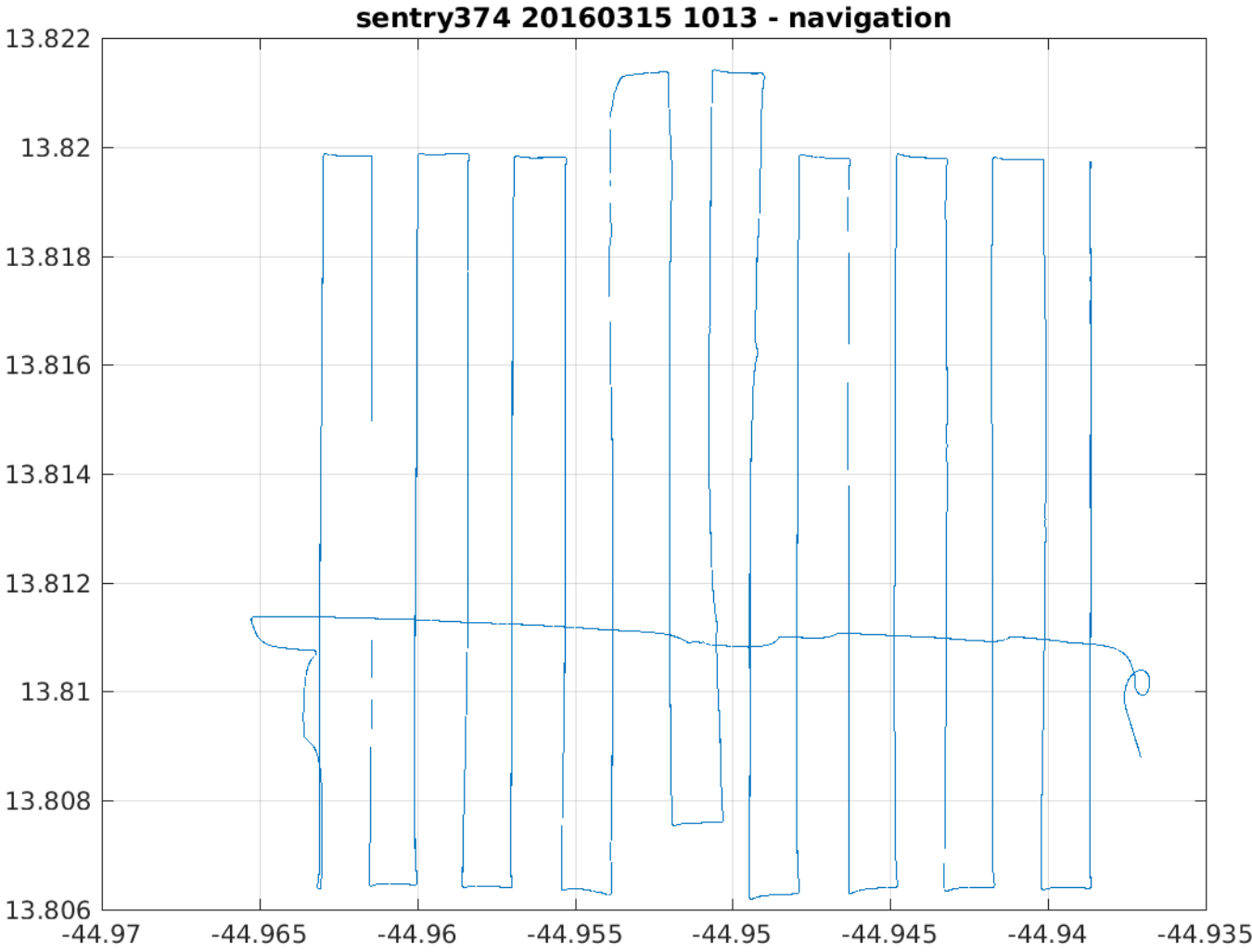


Figure 30: Latitude/Longitude plot of Sentry dive 374 based on post-processed navigation.

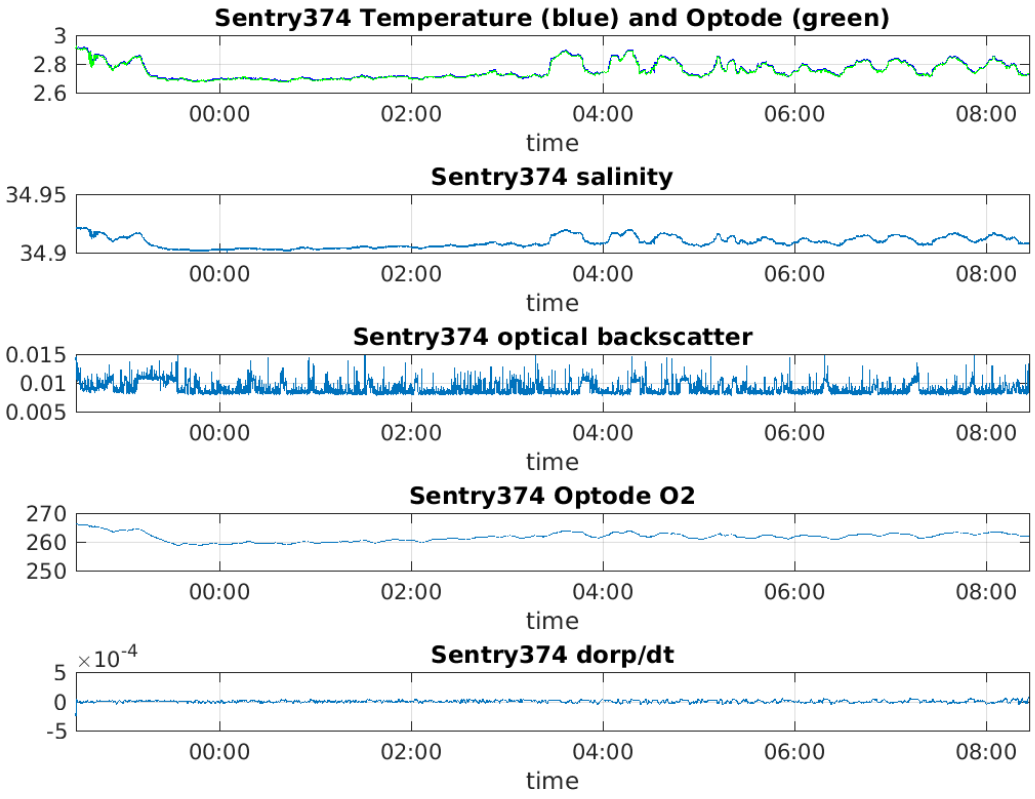


Figure 31: Time series plot of five of the basic sensors on Sentry, from top to bottom, temperature, salinity, optical backscatter, dissolved Oxygen, and ORP.

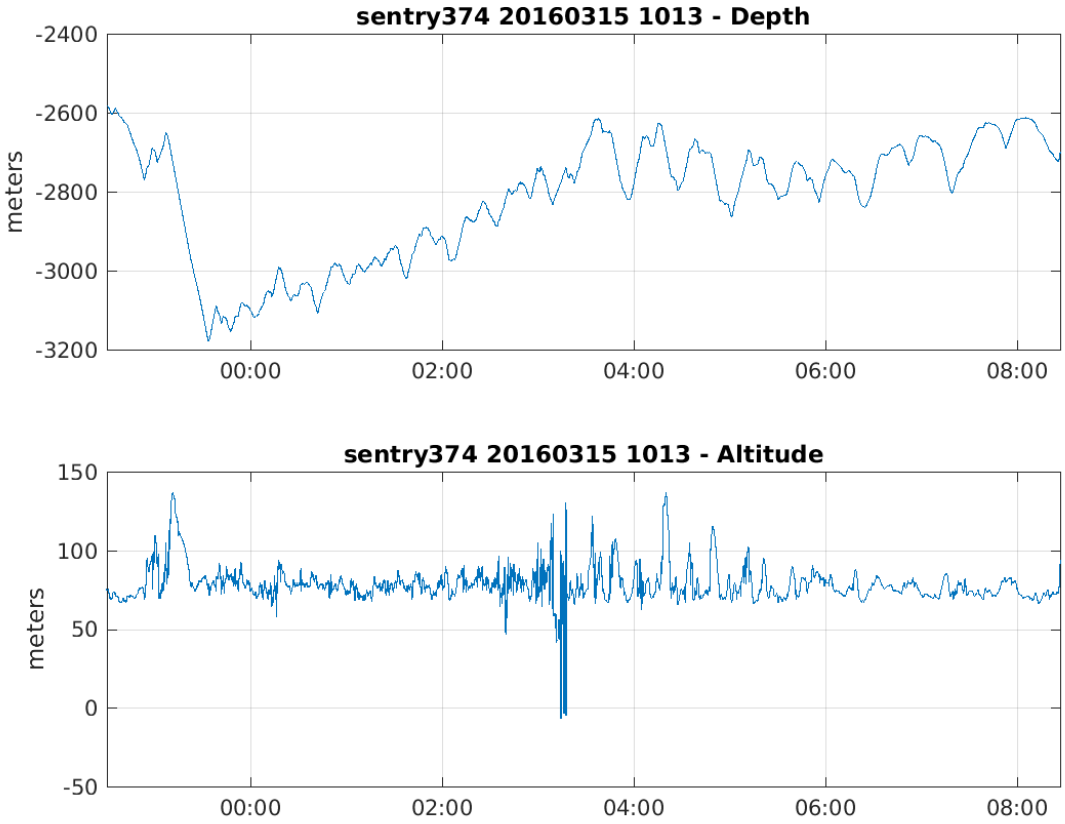


Figure 32: Depth and Altitude of Sentry during dive 374.

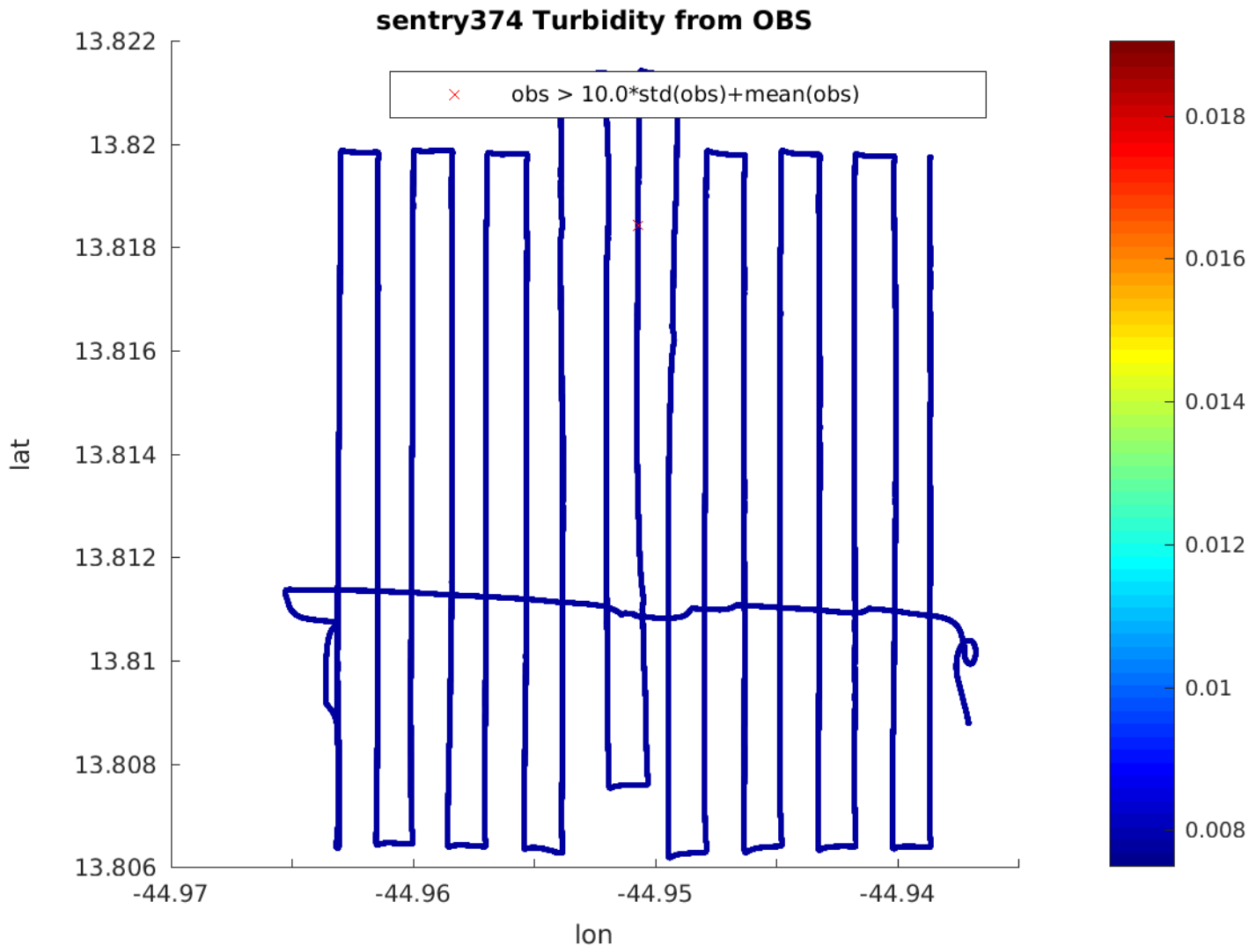


Figure 33: Optical backscatter on dive 374.

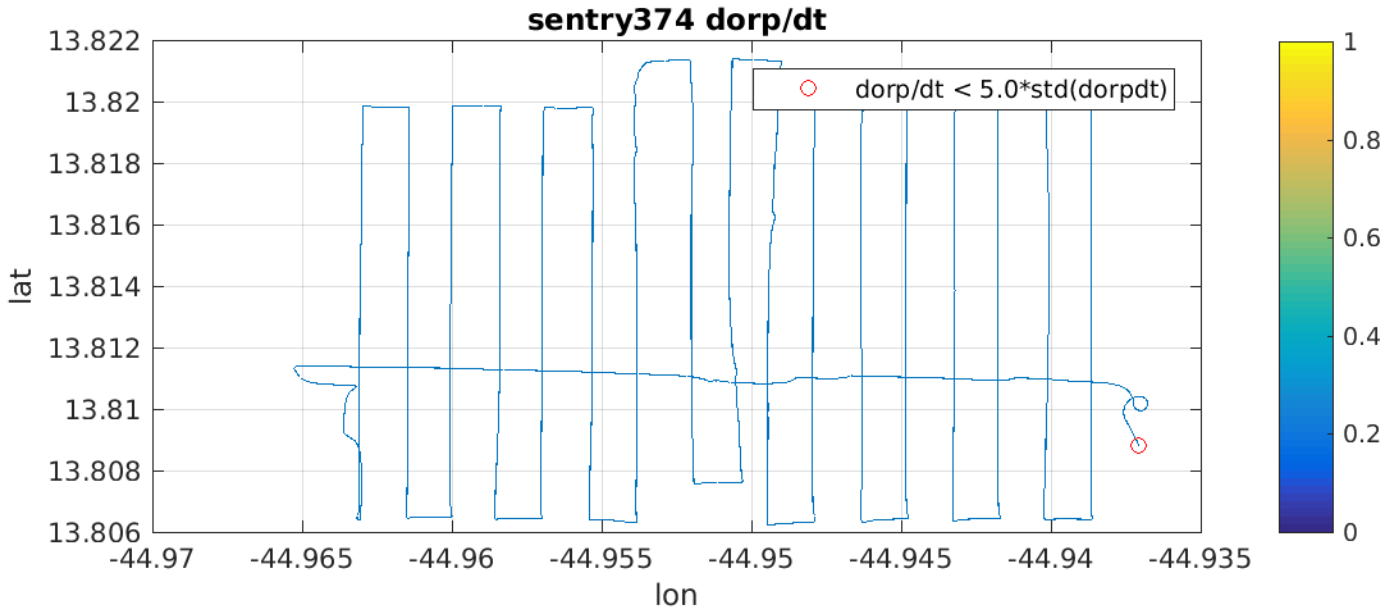


Figure 34: ORP sensor data during dive 374.

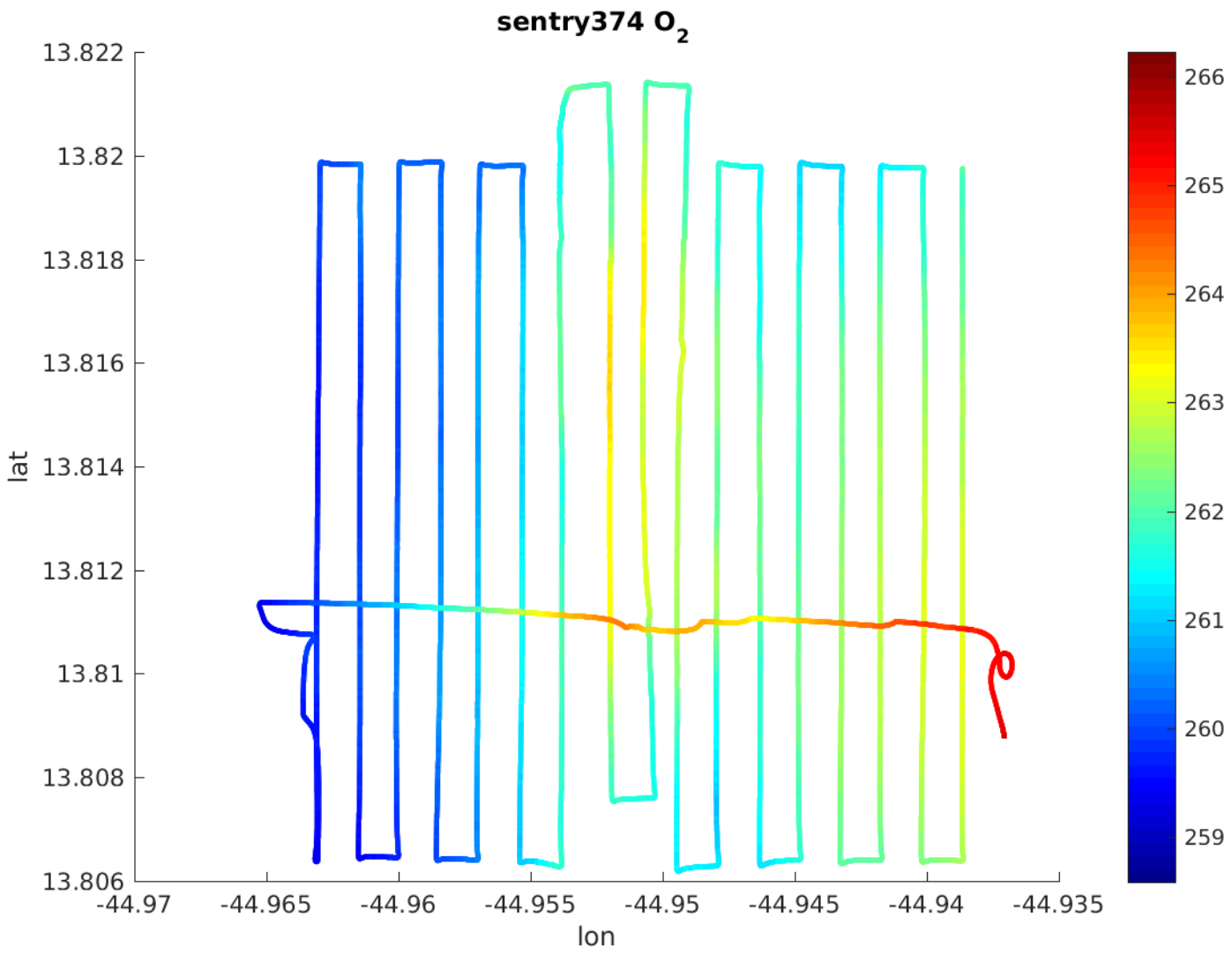


Figure 35: O2 sensor data during dive 374.

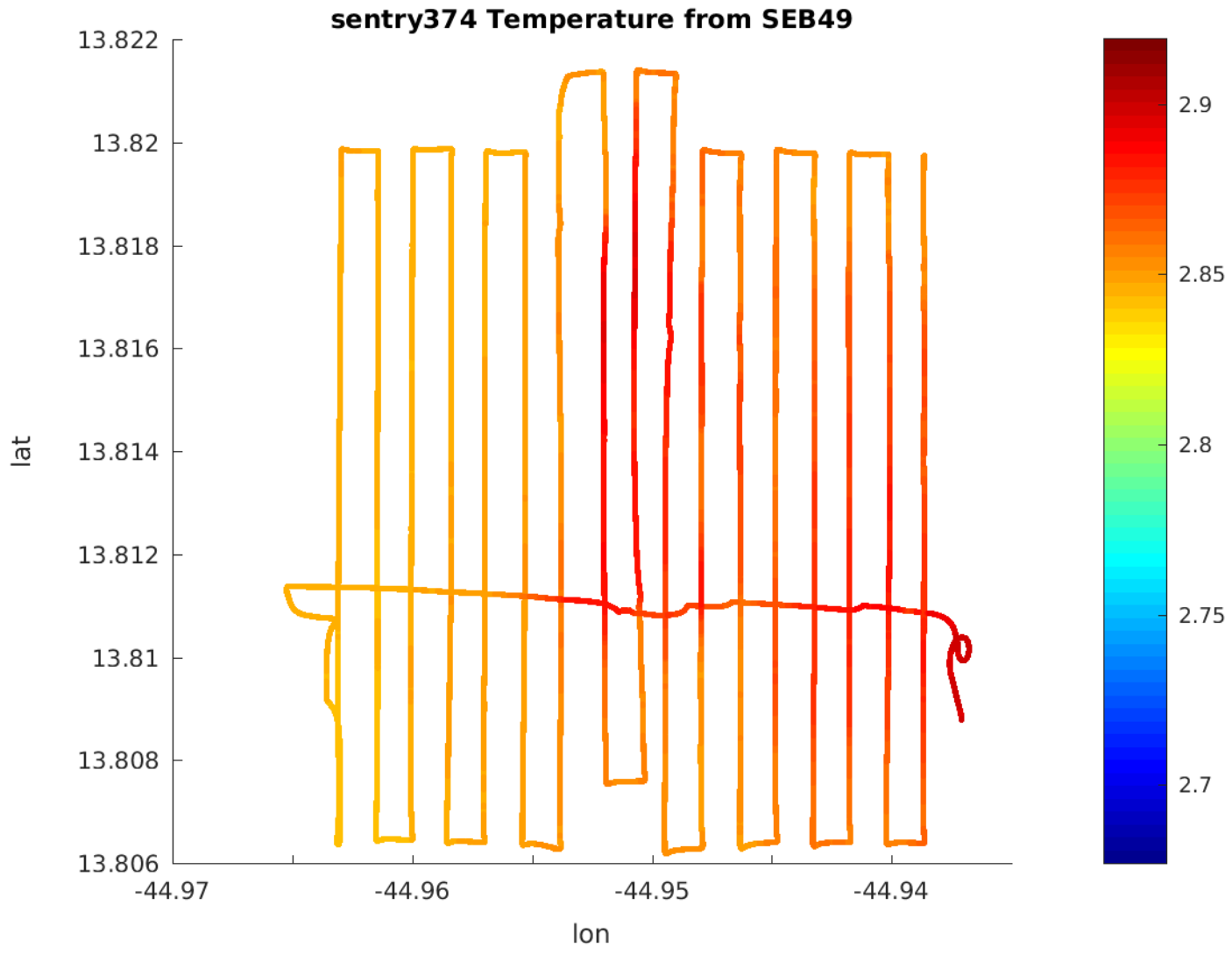


Figure 36: Temperature sensor data during dive 374.

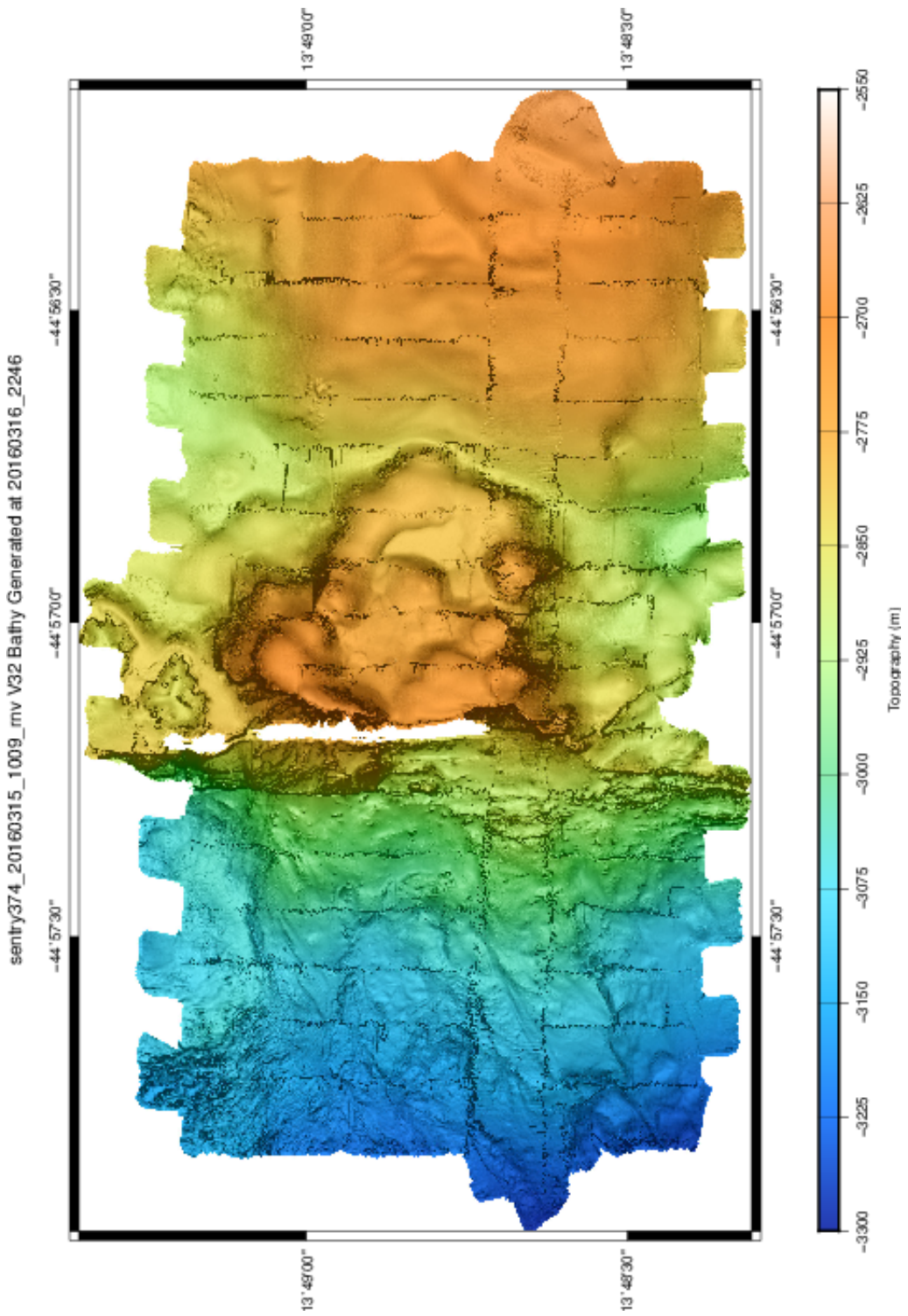


Figure 37: Processed multibeam data from dive 374.

Figure 38: Sidescan mosaic East data from dive 374.

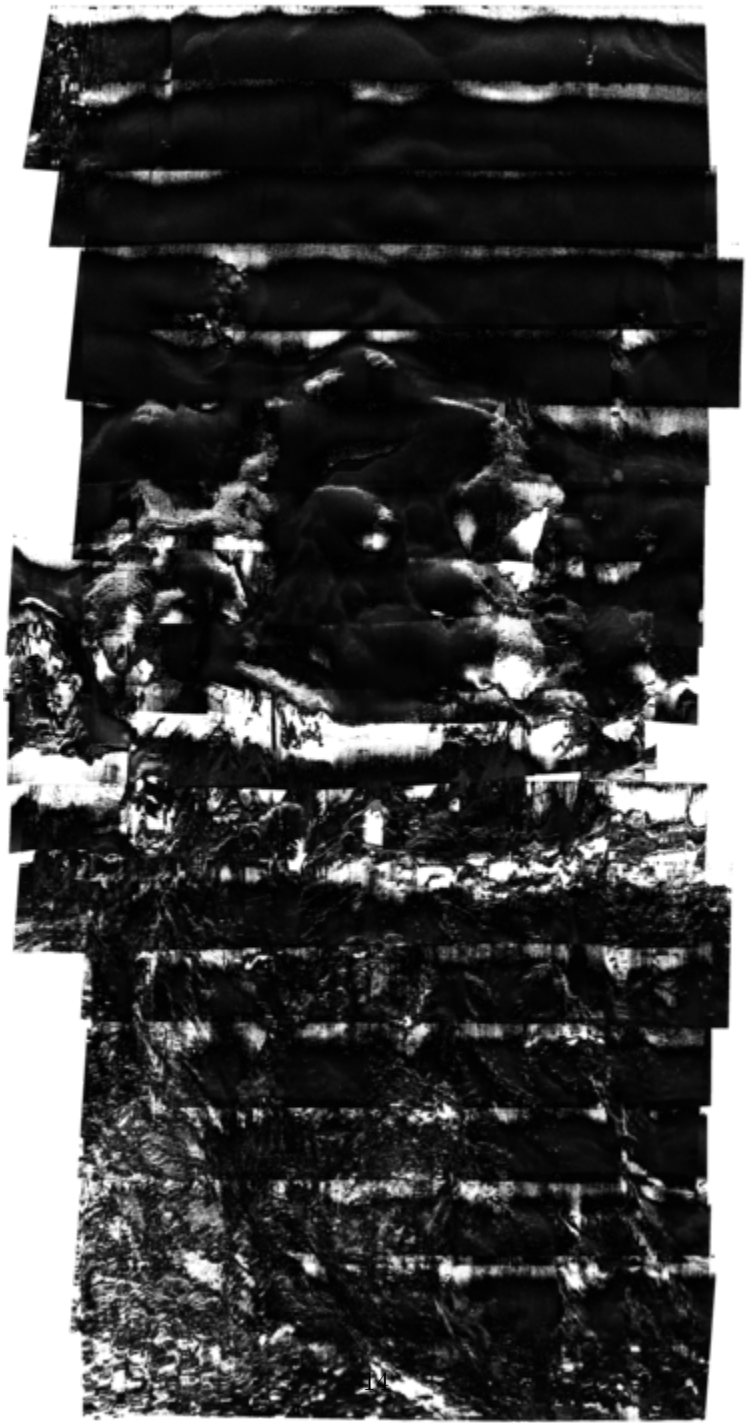


Figure 39: Sidescan mosaic West data from dive 374.

Sentry 375 Dive Report
DRAFT

WHOI Sentry Operations Group
Sean Kelley, Justin Fujii, Stefano Suman, Michael McCarthy, Hayden Radke

Sentry Expedition Leader: Sean Kelley

Chief Scientist: Mark Kurz, WHOI
Co-PI: Eric Mittelstaedt, University of Idaho

Summary

Weather: The seas were appriximately 1-5 ft for both launch and recovery and were not a factor in operations. Wind was 5 to 10 knots.

Reason for end of dive: The dive was ended due to time constraints.

Vehicle Configuration

The science sensing suite for this dive was:

Table 14: Sentry Sensor Configuration

Sensor
APS 1540 Magnetometers (3)
Edgetech 4-24kHz SBP
Reson 7125 Multibeam Sonar
Seabird SBE49 CTD
Seapoint OBS
Anderaa optode model 4330
300kHz RDI DVL
Digital Still Camera
IXEA PHINS
Reson Sound Velocity Probe
NOAA PMEL ORP Sensor

This dive was navigated using the DVL/INS system in real time. USBL provided post-dive corrections.

Important Positions

Dive Origin: 13 43.8 -45 -3

Launch Position: sentry375 launch position: 13 46.077'N 045 0.858'W

Narrative

Multibeam survey over the popping rocks location, filling in gaps from the previous survey caused by the difficult terrain. A camera survey was completed where the popping rocks were first found on top of the mound. Finally a multibeam survey at the end of the dive was completed to fill in the rest of the bathemetry.

1 Issues and Proposed Solutions

NONE None

Chief Scientist Comments

The Chief scientist is requested to include any desired comments.

Dive Statistics

1.1 sentry375 Summary

sentry375 Summary
Origin: 13.730000 -45.050000
Origin: 13 43.800'N 045 3.000'W
Launch: 2016/03/15 21:20:19
Survey start: 2016/03/15 22:58:38
Survey start: Lat:13.765908 Lon:-45.015203
Survey start: Lat:13 45.954'N Lon:045 0.912'W
Survey end: 2016/03/16 08:27:14
Survey end: Lat:13.777180 Lon:-44.996210
Survey end: Lat:13 46.631'N Lon:044 59.773'W
Ascent begins: 2016/03/16 08:27:14
On the surface: 2016/03/16 09:35:26
On deck: 2016/03/16 09:42:60
descent rate: 38.6 m/min
ascent rate: 50.6 m/min
survey time: 9.5 hours
deck-to-deck time 12.4 hours
Mean survey depth: 3668m
Mean survey height: 53m
distance travelled: 24.83km
average speed; 0.72m/s
average speed during photo runs: 0.37 m/s over 2.17 km
average speed during multibeam runs: 0.79 m/s over 22.70 km
total vertical during survey: 7114m
Battery energy at launch: 20.3 kwhr
Battery energy at survey end: 11.7 kwhr
Battery energy on deck: 11.6 kwhr

Sensor Information

This is a recently added section with selected sensor metadata. This section will be expanded in coming months. Additional data is available in the sentryxxx/nav-sci/proc directory within the sentryxxx_config matlab structure as well as in ascii text logs in sentryxxx/metadata. At present metadata is not yet automatically collected on all sensors.

1.2 sentry375 Devices

Instrument	Model	Serial Num.	Comments
USBL	Sonardyne AvTrak2	S/N: 1201	
Magnetometer	APS 1540	APS 0689 Ver: 3.85BD7716F	
	APS 1540	APS 0688 Ver: 3.85BD7716F	
	APS 1540	APS 0690 Ver: 3.85BD7716F	
CTD	SBE 49	S/N: 222	

Plots and Images

This section contains selected images of data products and plots of vehicle navigation and selected sensors.

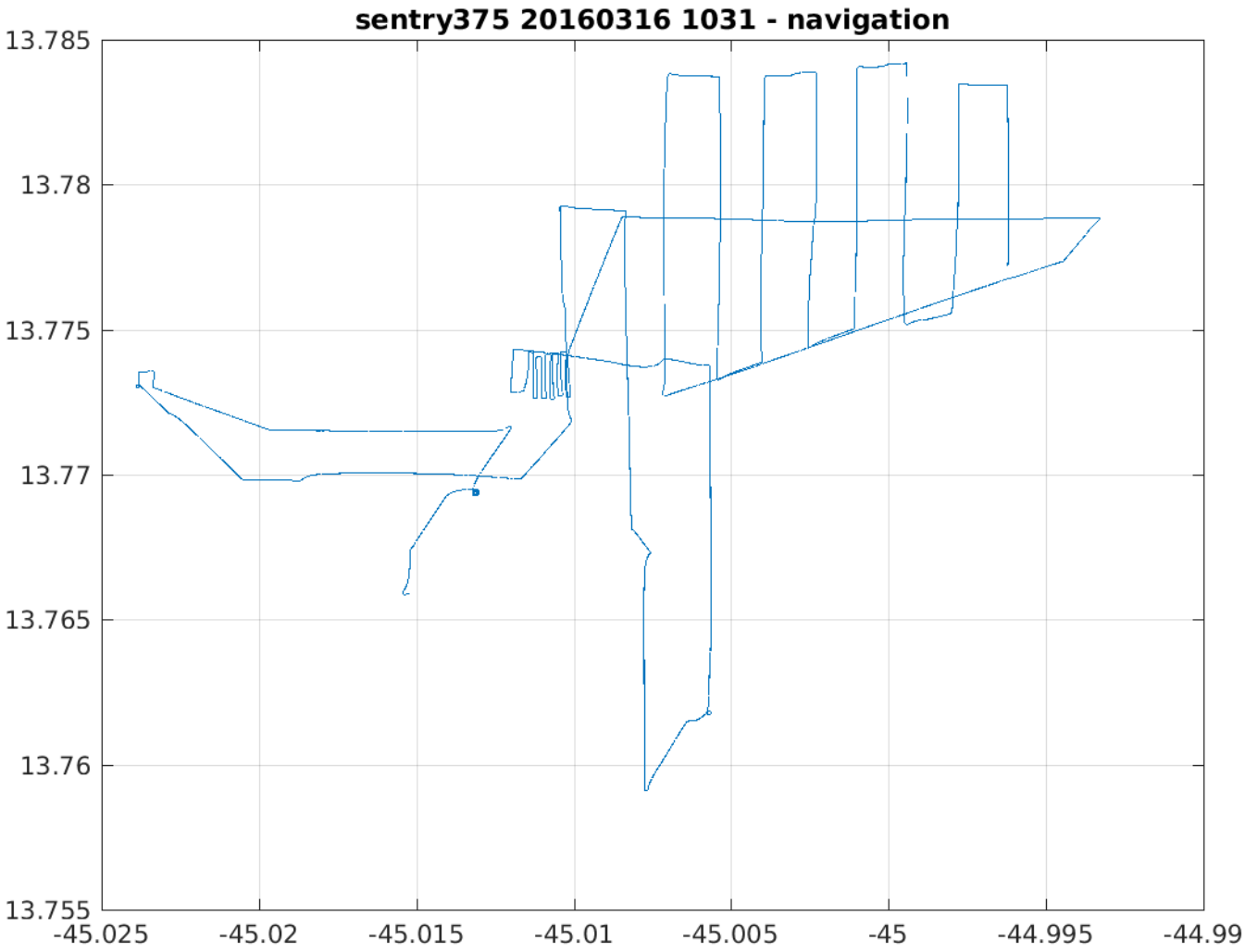


Figure 40: Latitude/Longitude plot of Sentry dive 375 based on post-processed navigation.

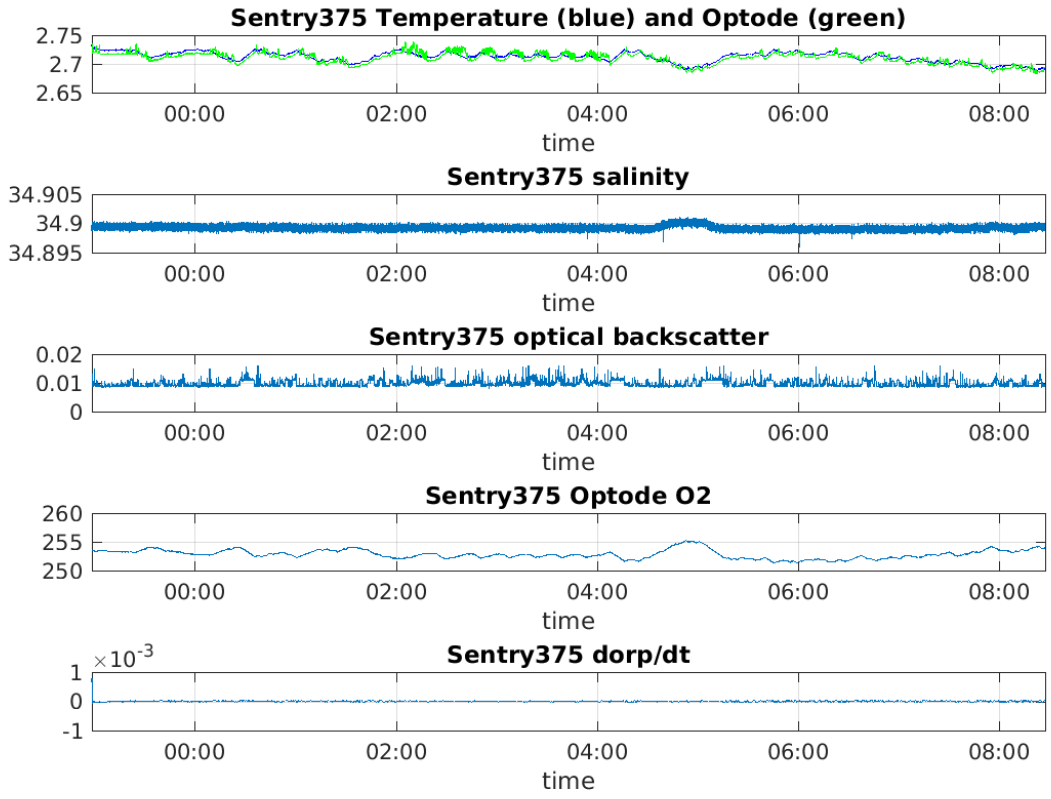


Figure 41: Time series plot of five of the basic sensors on Sentry, from top to bottom, temperature, salinity, optical backscatter, dissolved Oxygen, and ORP.

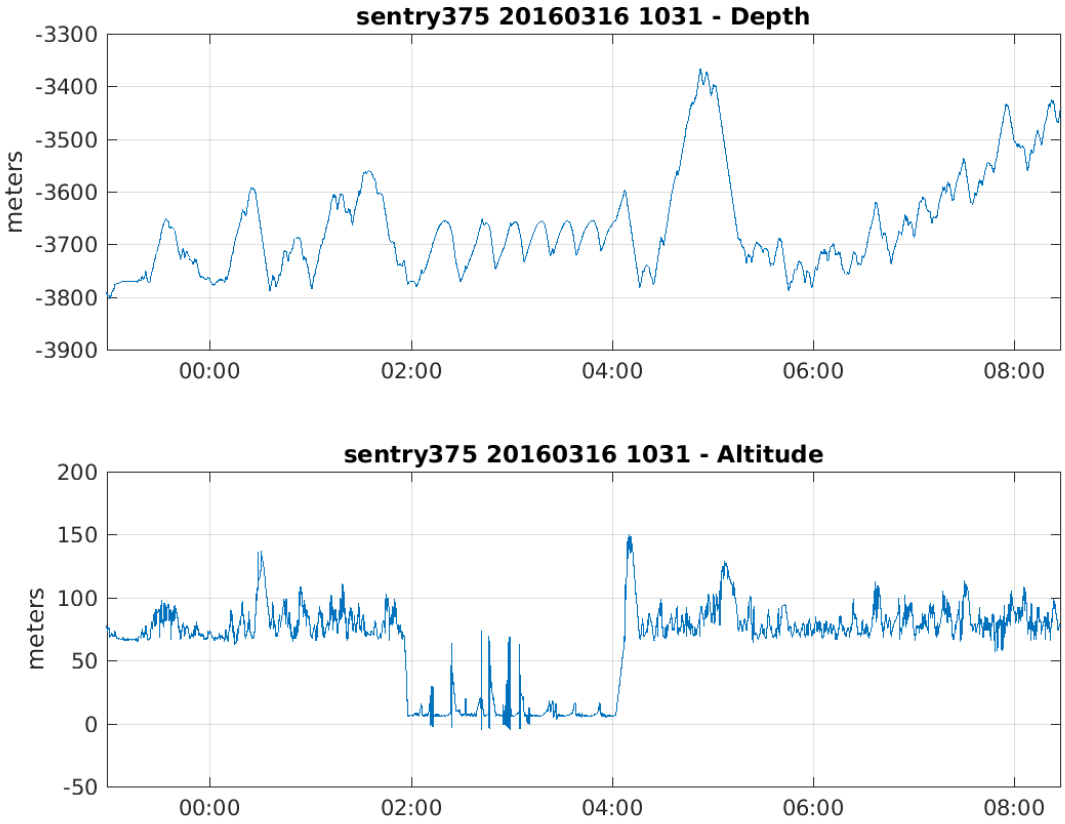


Figure 42: Depth and Altitude of Sentry during dive 375.

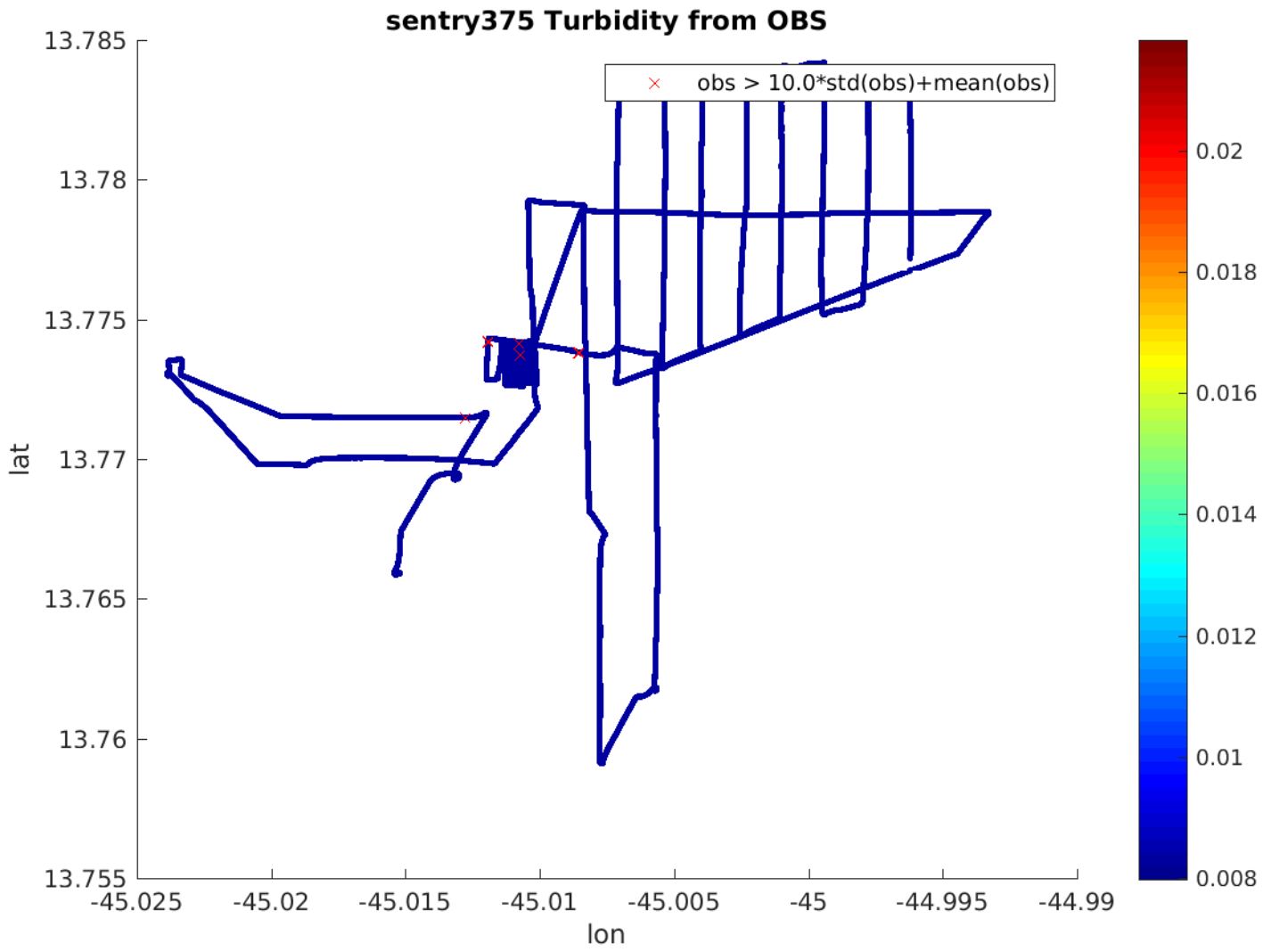


Figure 43: Optical backscatter on dive 375.

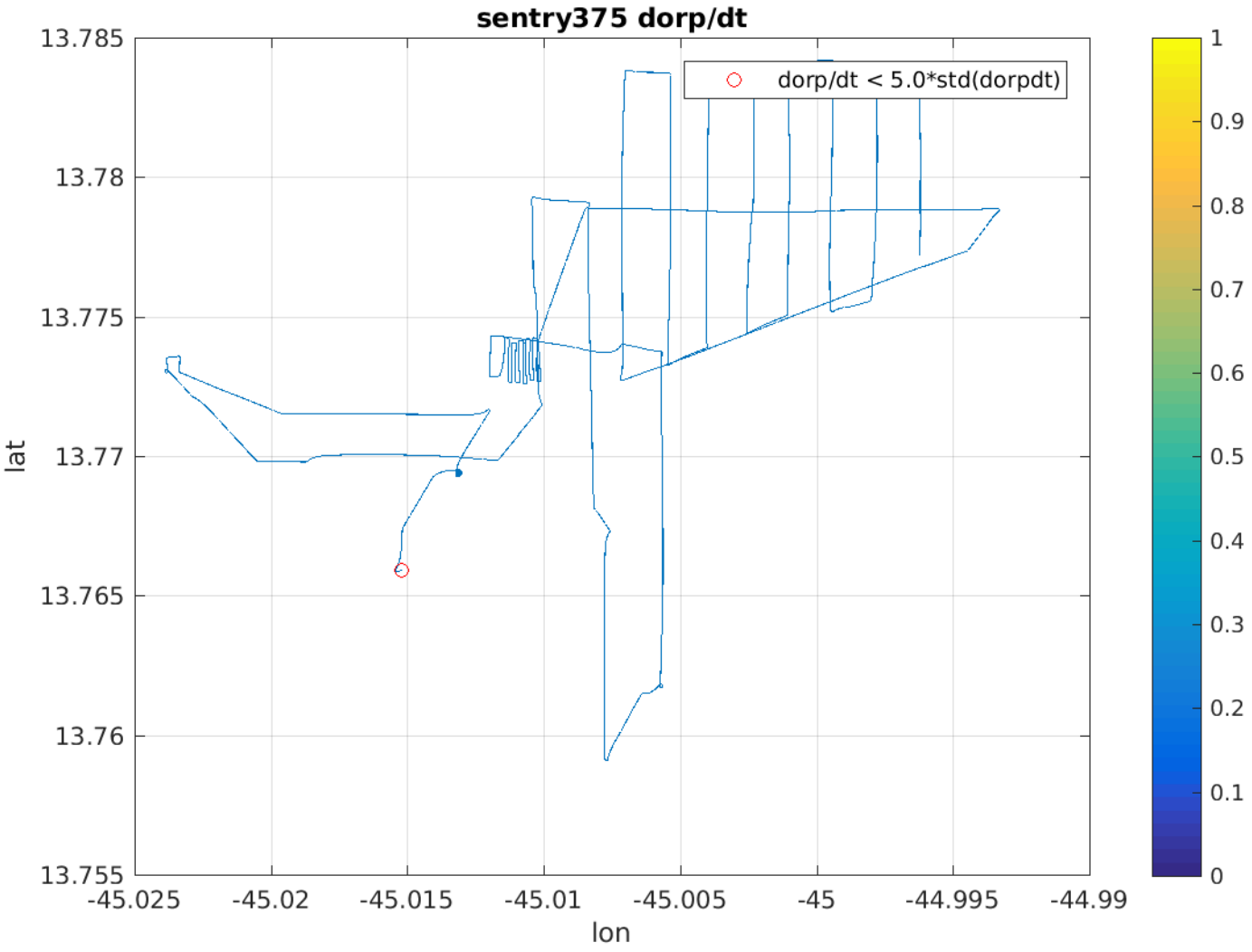


Figure 44: ORP sensor data during dive 375.

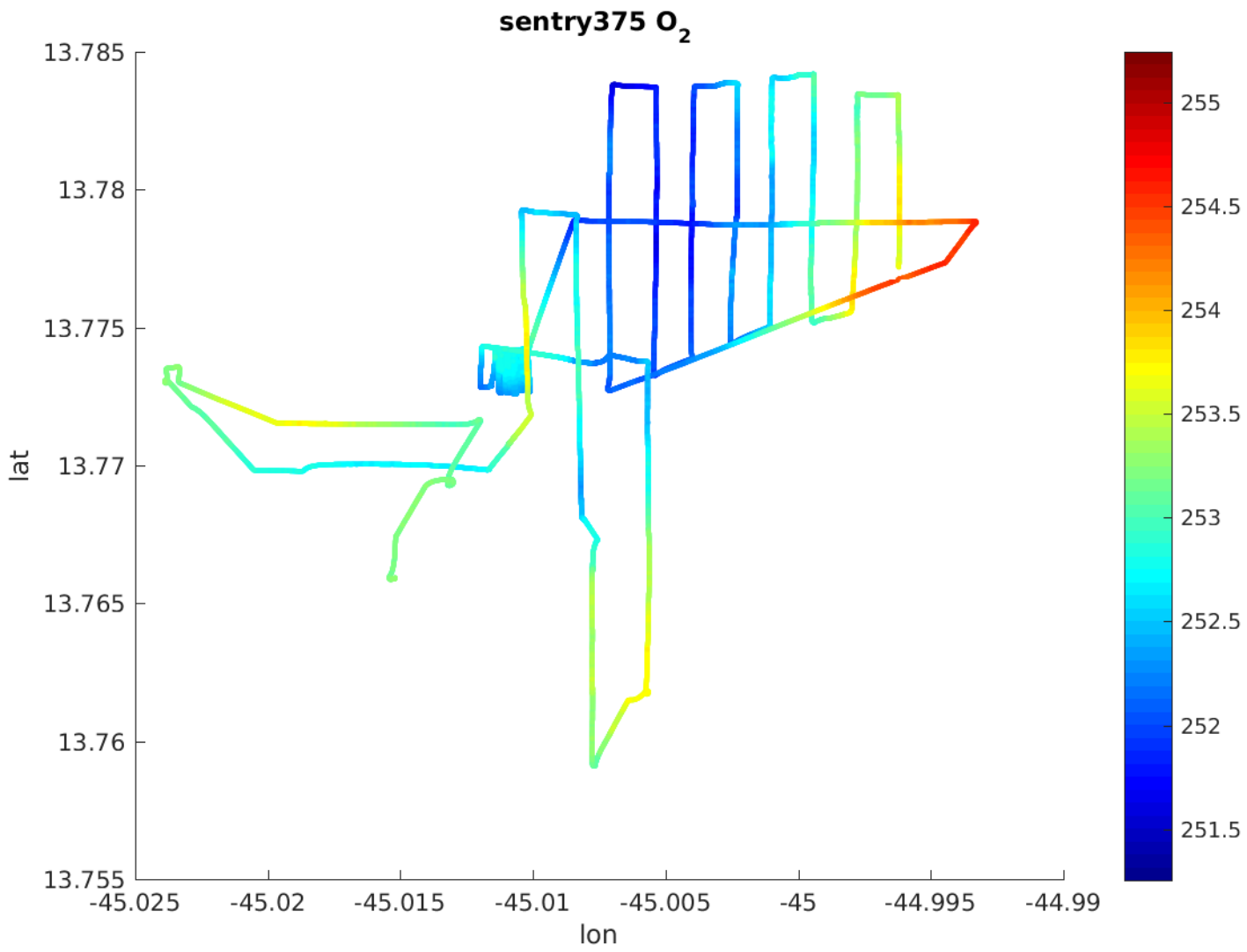


Figure 45: O2 sensor data during dive 375.

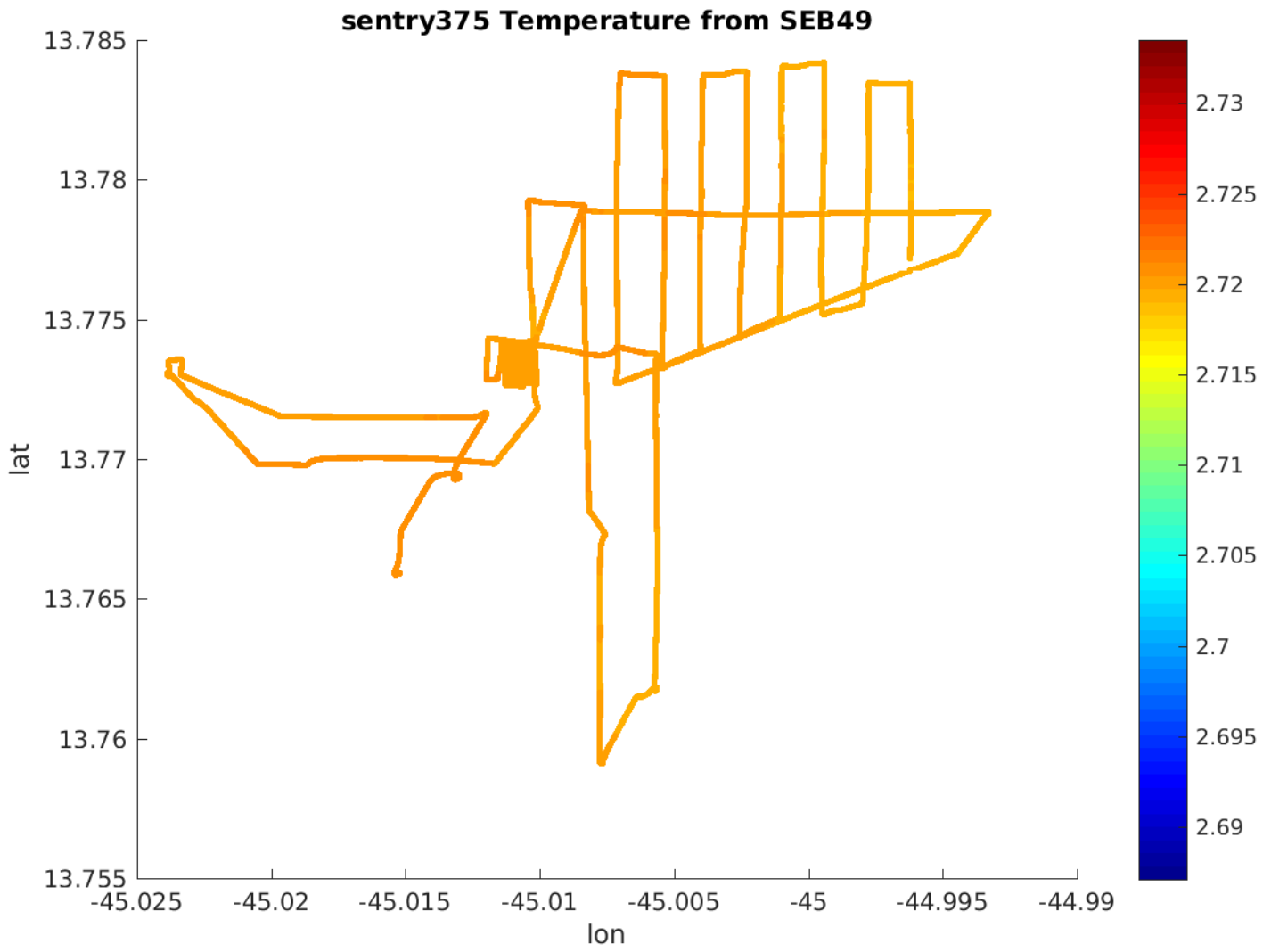


Figure 46: Temperature sensor data during dive 375.

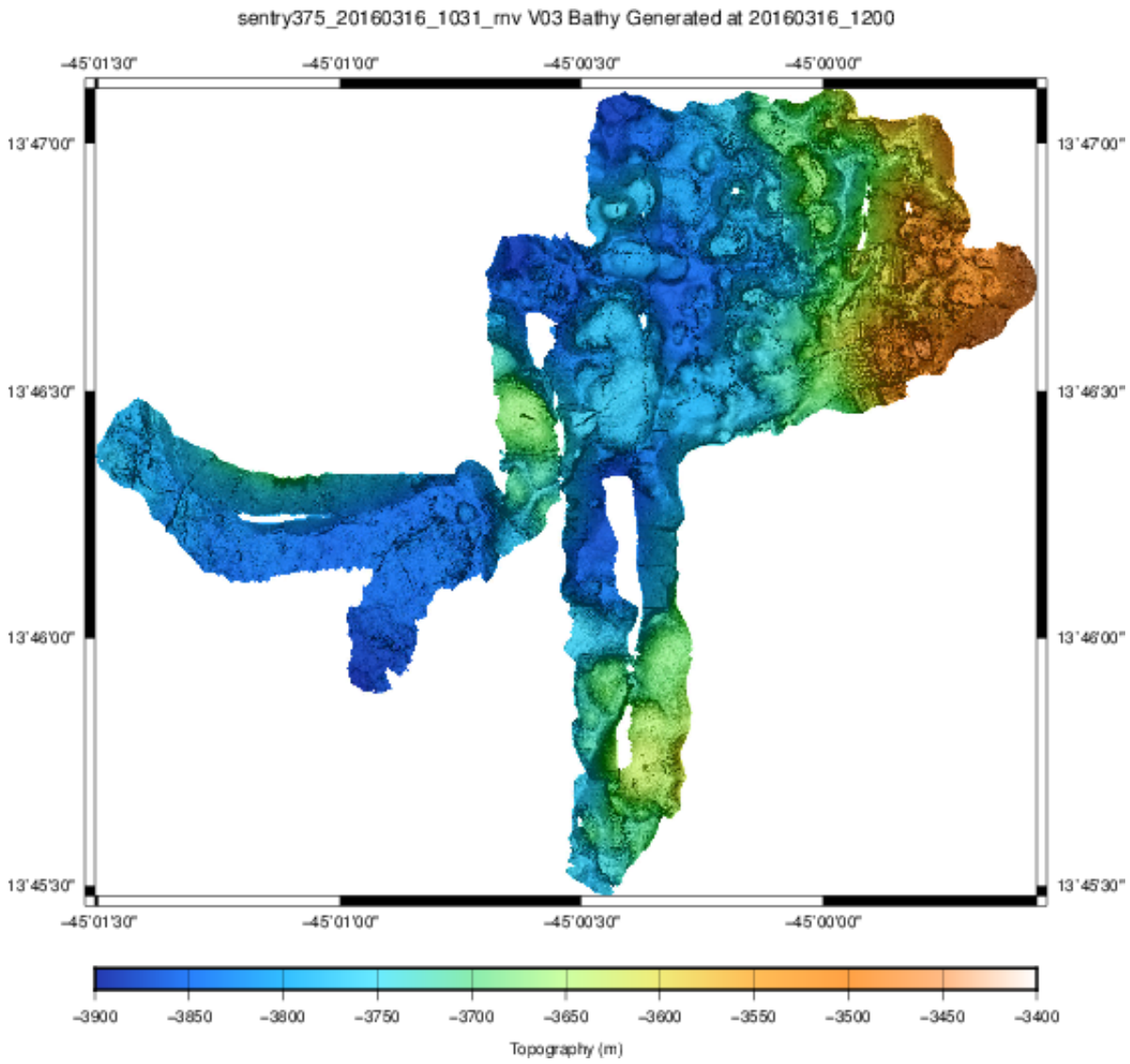


Figure 47: Processed multibeam data from dive 375.

Figure 48: Sidescan mosaic East data from dive 375.

Figure 49: Sidescan mosaic West data from dive 375.

Sentry 376 Dive Report
DRAFT

WHOI Sentry Operations Group
Sean Kelley, Justin Fujii, Stefano Suman, Michael McCarthy, Hayden Radke

Sentry Expedition Leader: Sean Kelley

Chief Scientist: Mark Kurz, WHOI
Co-PI: Eric Mittelstaedt, University of Idaho

Summary

Weather: The seas were appriximately 1-5 ft for both launch and recovery and were not a factor in operations. Wind was 5 to 10 knots.

Reason for end of dive: The dive was ended due to time constraints.

Vehicle Configuration

The science sensing suite for this dive was:

Table 15: Sentry Sensor Configuration

Sensor
APS 1540 Magnetometers (3)
Edgetech 4-24kHz SBP
Reson 7125 Multibeam Sonar
Seabird SBE49 CTD
Seapoint OBS
Anderaa optode model 4330
300kHz RDI DVL
Digital Still Camera
IXEA PHINS
Reson Sound Velocity Probe
NOAA PMEL ORP Sensor

This dive was navigated using the DVL/INS system in real time. USBL provided post-dive corrections.

Important Positions

Dive Origin: 14 2 -45 -3

Launch Position: sentry376 launch position: 14 4.237'N 045 1.813'W

Narrative

Multibeam survey at northern site. The multibeam software that configures the software on the multibeam computer failed to setup the multibeam parameters and start recording data. This caused no multibeam data to be recorded during the dive.

1 Issues and Proposed Solutions

Multibeam Multibeam did not record during the dive. It became apparent that the reson driver that controls the Multibeam was not working. Frequent checks of the software will occur on the way down.

Chief Scientist Comments

The Chief scientist is requested to include any desired comments.

Dive Statistics

1.1 sentry376 Summary

sentry376 Summary
Origin: 14.033333 -45.050000
Origin: 14 2.000'N 045 3.000'W
Launch: 2016/03/16 23:41:23
Survey start: 2016/03/17 00:49:29
Survey start: Lat:14.068238 Lon:-45.029910
Survey start: Lat:14 4.094'N Lon:045 1.795'W
Survey end: 2016/03/17 08:31:55
Survey end: Lat:14.074564 Lon:-45.019438
Survey end: Lat:14 4.474'N Lon:045 1.166'W
Ascent begins: 2016/03/17 08:31:55
On the surface: 2016/03/17 09:30:31
On deck: 2016/03/17 09:40:01
descent rate: 40.8 m/min
ascent rate: 50.2 m/min
survey time: 7.7 hours
deck-to-deck time 10.0 hours
Mean survey depth: 2892m
Mean survey height: 65m
distance travelled: 22.85km
average speed; 0.81m/s
average speed during photo runs: 0.29 m/s over 0.04 km
average speed during multibeam runs: 0.83 m/s over 22.85 km
total vertical during survey: 6044m
Battery energy at launch: 20.0 kwhr
Battery energy at survey end: 13.3 kwhr
Battery energy on deck: 13.0 kwhr

Sensor Information

This is a recently added section with selected sensor metadata. This section will be expanded in coming months. Additional data is available in the sentryxxx/nav-sci/proc directory within the sentryxxx_config matlab structure as well as in ascii text logs in sentryxxx/metadata. At present metadata is not yet automatically collected on all sensors.

1.2 sentry376 Devices

Instrument	Model	Serial Num.	Comments
USBL	Sonardyne AvTrak2	S/N: 1201	
Magnetometer	APS 1540	APS 0689 Ver: 3.85BD7716F	
	APS 1540	APS 0688 Ver: 3.85BD7716F	
	APS 1540	APS 0690 Ver: 3.85BD7716F	
CTD	SBE 49	S/N: 222	

Plots and Images

This section contains selected images of data products and plots of vehicle navigation and selected sensors.

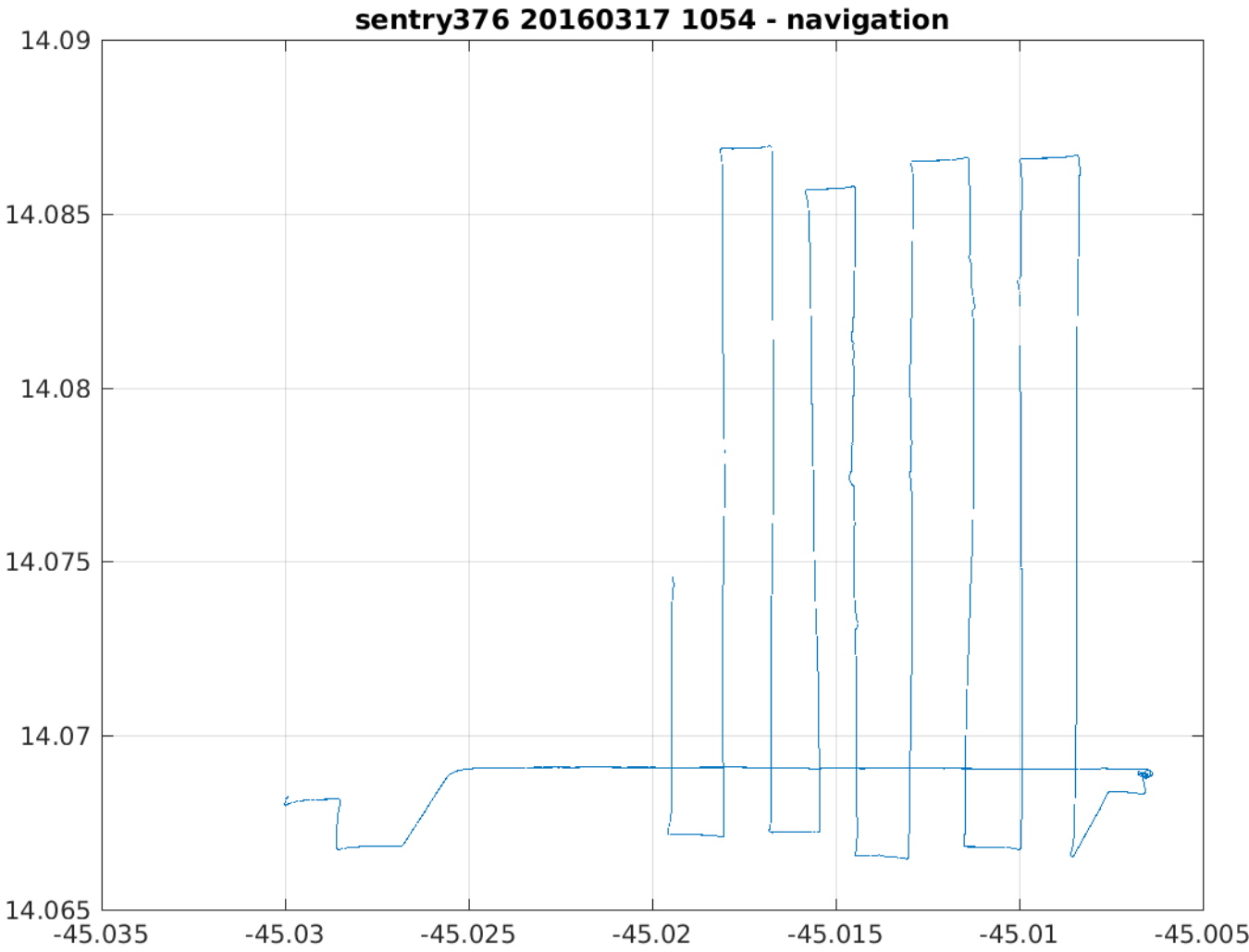


Figure 50: Latitude/Longitude plot of Sentry dive 376 based on post-processed navigation.

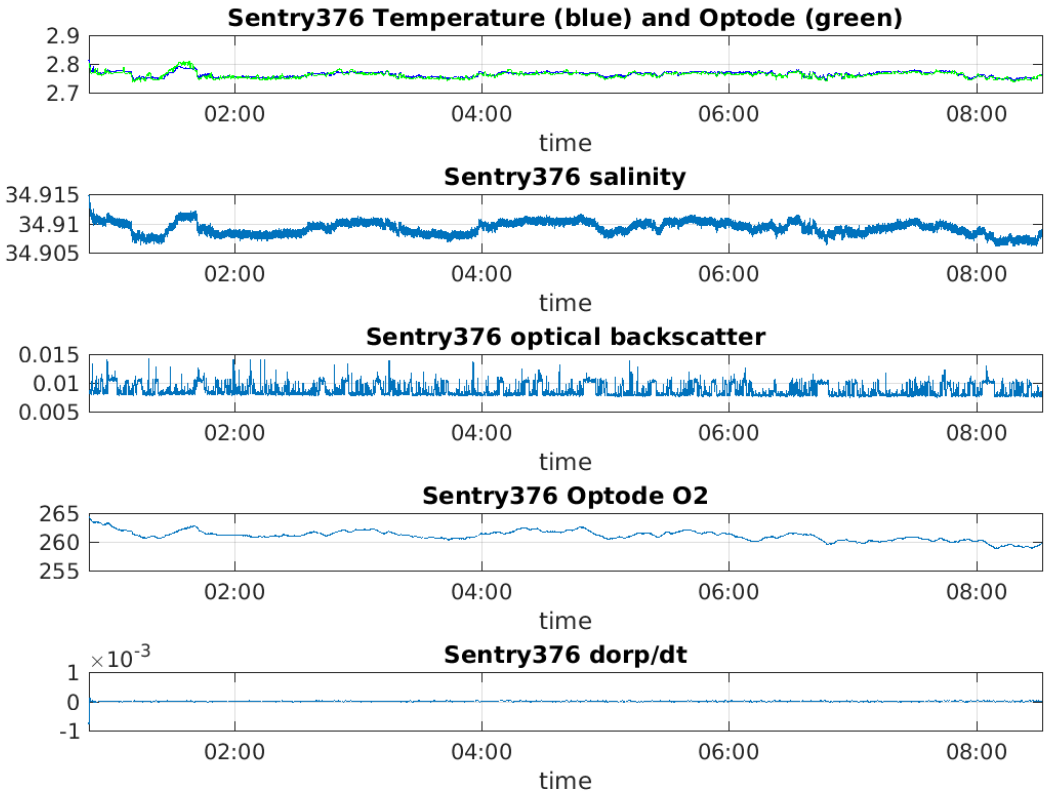


Figure 51: Time series plot of five of the basic sensors on Sentry, from top to bottom, temperature, salinity, optical backscatter, dissolved Oxygen, and ORP.

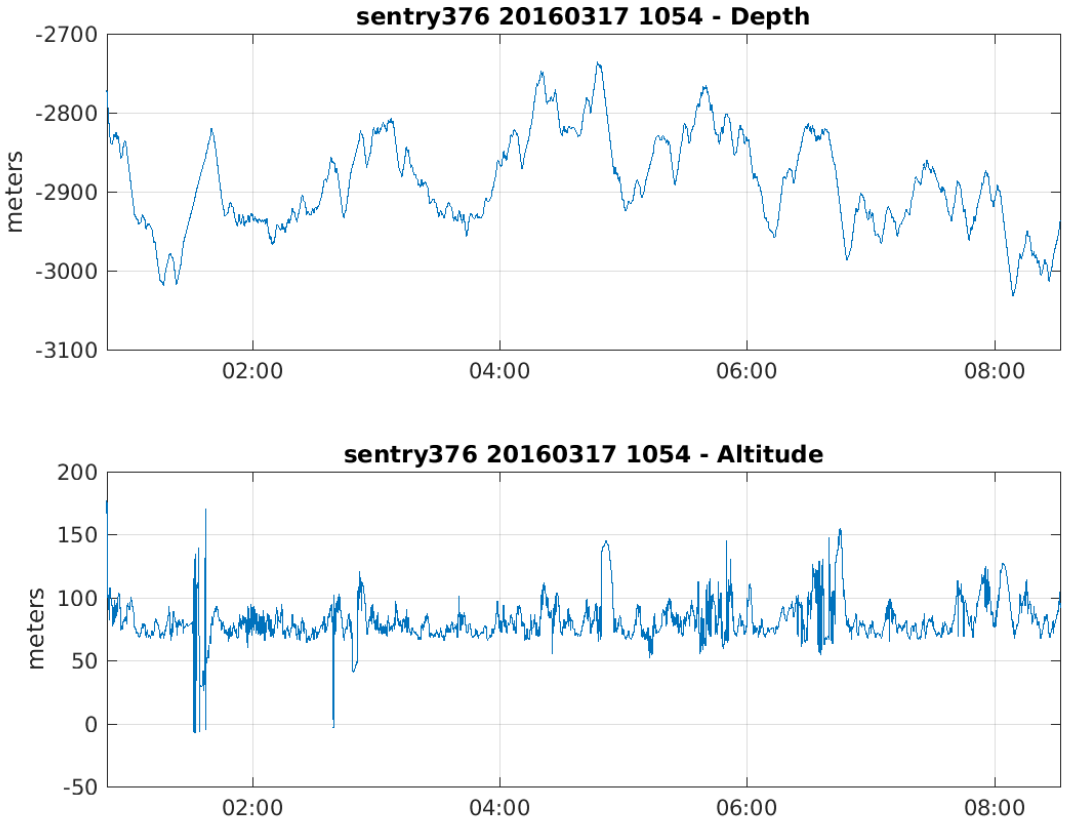


Figure 52: Depth and Altitude of Sentry during dive 376.

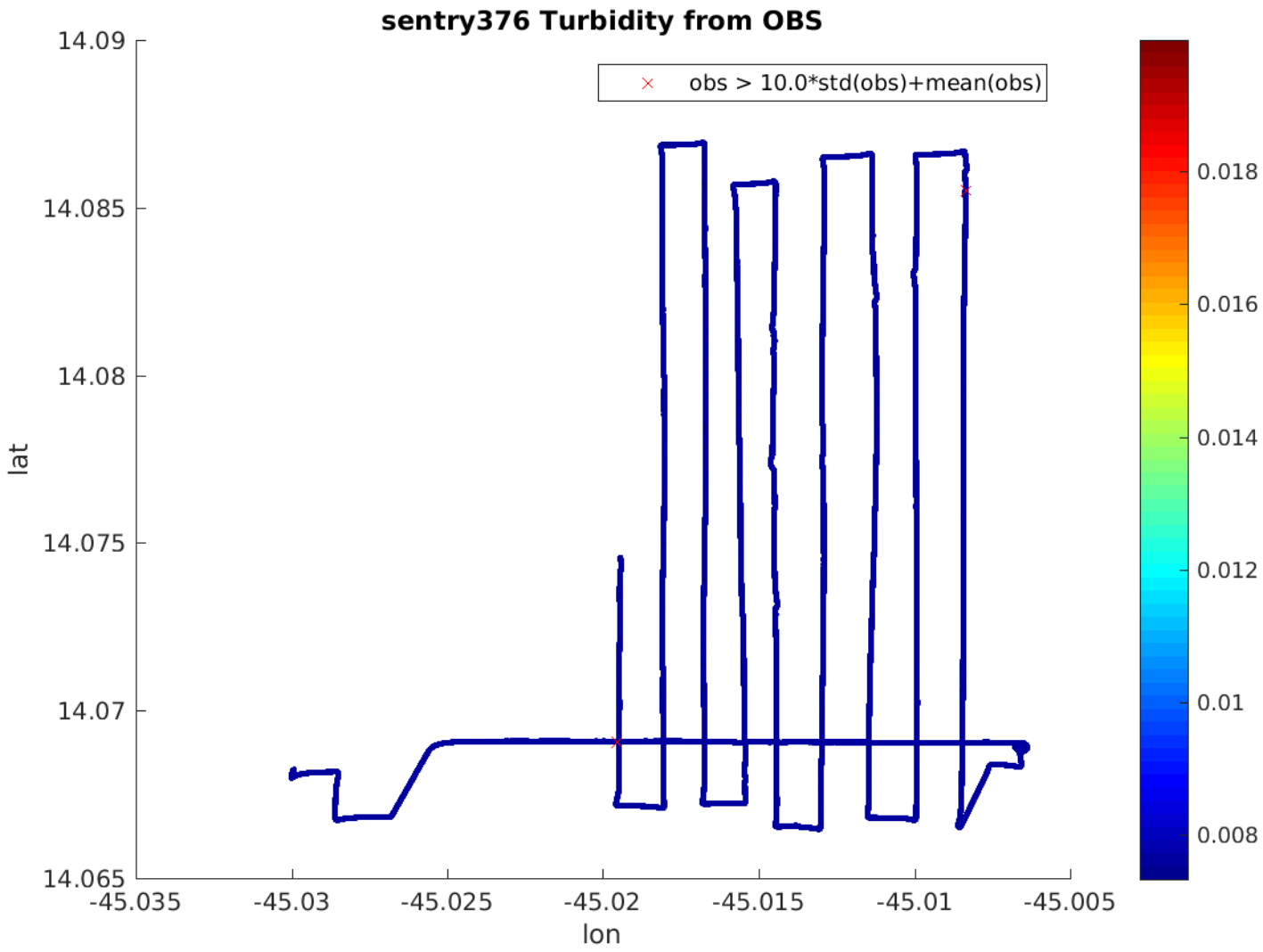


Figure 53: Optical backscatter on dive 376.

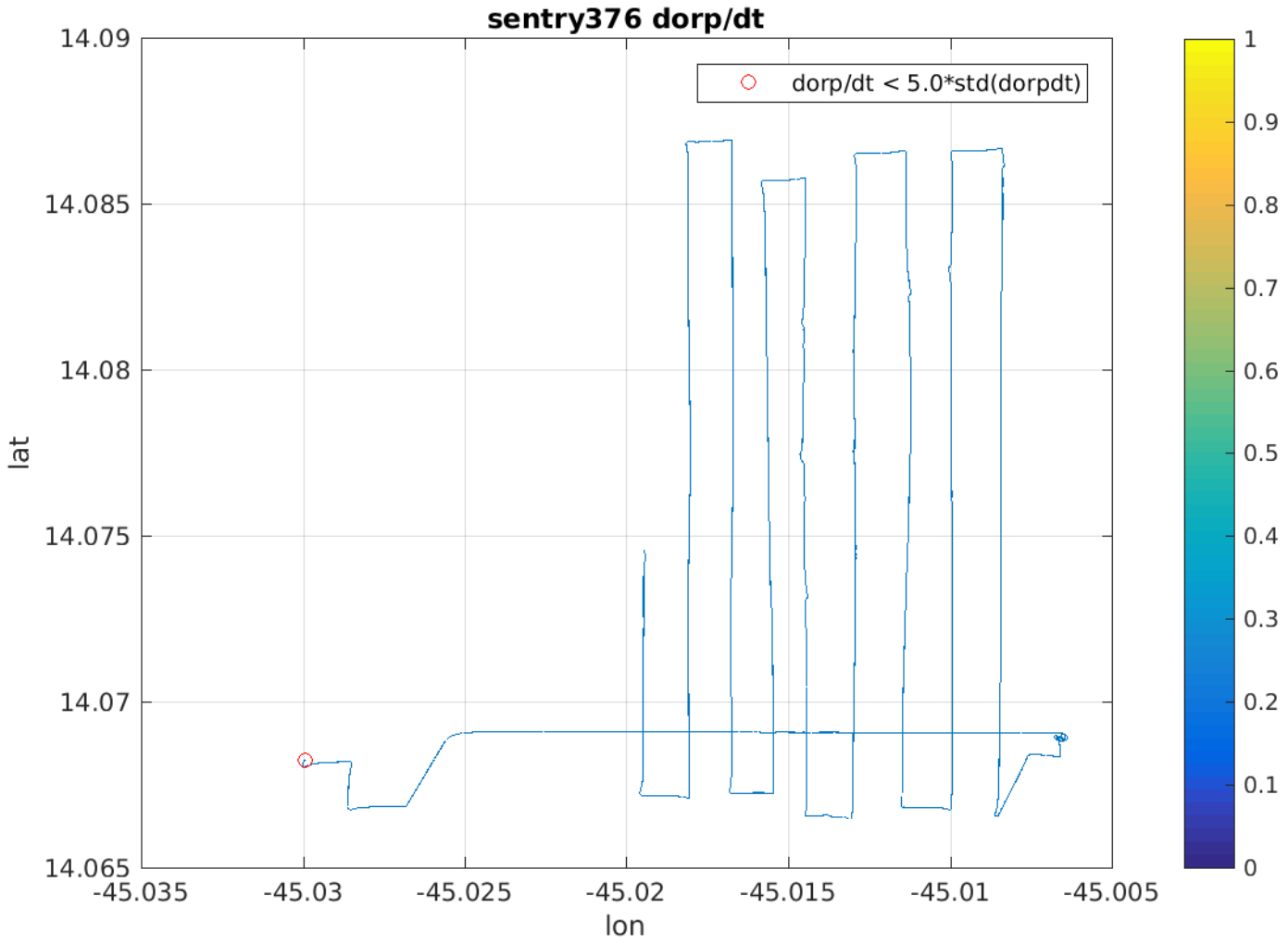


Figure 54: ORP sensor data during dive 376.

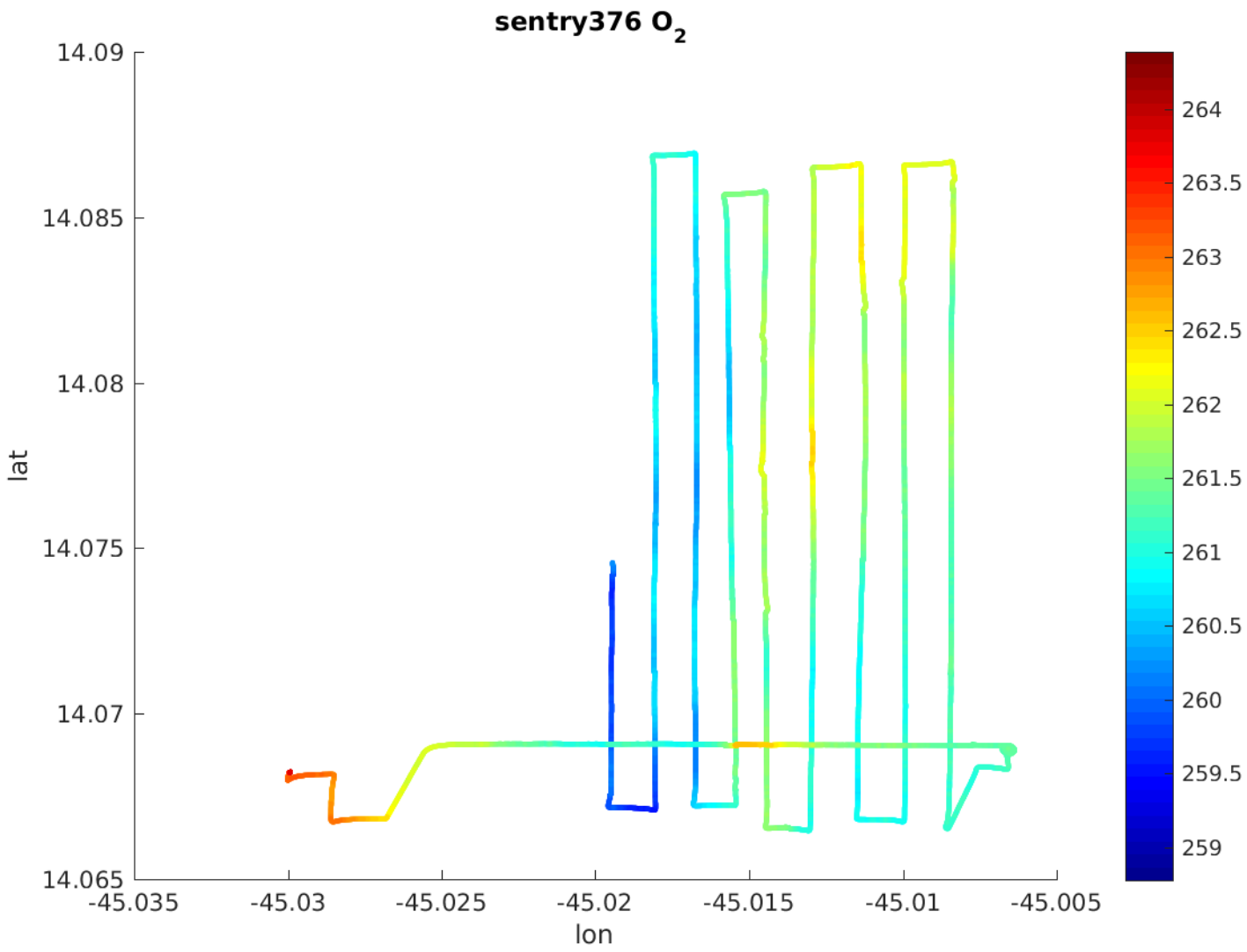


Figure 55: O2 sensor data during dive 376.

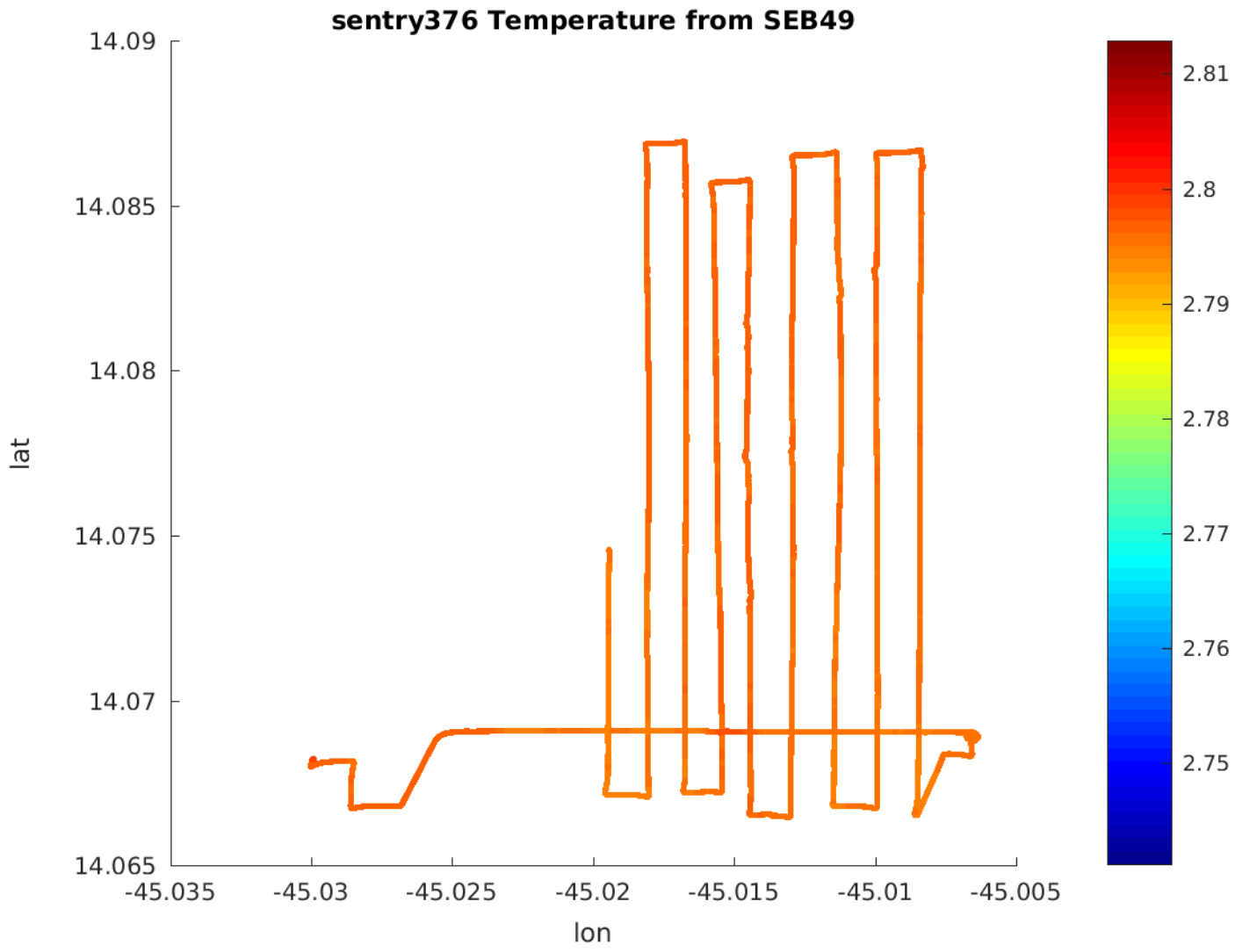


Figure 56: Temperature sensor data during dive 376.

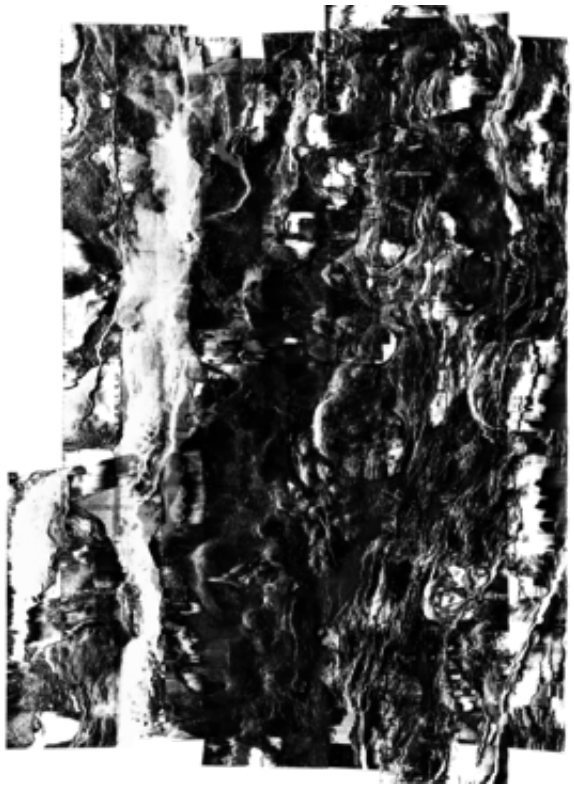


Figure 57: Sidescan mosaic East data from dive 376.

Figure 58: Sidescan mosaic West data from dive 376.

Sentry 377 Dive Report
DRAFT

WHOI Sentry Operations Group
Sean Kelley, Justin Fujii, Stefano Suman, Michael McCarthy, Hayden Radke

Sentry Expedition Leader: Sean Kelley

Chief Scientist: Mark Kurz, WHOI
Co-PI: Eric Mittelstaedt, University of Idaho

Summary

Weather: The seas were appriximately 1-5 ft for both launch and recovery and were not a factor in operations. Wind was 5 to 10 knots.

Reason for end of dive: The dive was ended due to time constraints.

Vehicle Configuration

The science sensing suite for this dive was:

Table 16: Sentry Sensor Configuration

Sensor
APS 1540 Magnetometers (3)
Edgetech 4-24kHz SBP
Reson 7125 Multibeam Sonar
Seabird SBE49 CTD
Seapoint OBS
Anderaa optode model 4330
300kHz RDI DVL
Digital Still Camera
IXEA PHINS
Reson Sound Velocity Probe
NOAA PMEL ORP Sensor

This dive was navigated using the DVL/INS system in real time. USBL provided post-dive corrections.

Important Positions

Dive Origin: 14 2 -45 -3

Launch Position: sentry377 launch position: 14 4.237'N 045 1.813'W

Narrative

Multibeam survey to cover the area of sentry376 which failed to record using the reson mutlibeam.

1 Issues and Proposed Solutions

OBS OBS failed to collect data due to a bad cable whip on the vehicle. Sensor will be moved to another spare cable whip.

Chief Scientist Comments

The Chief scientist is requested to include any desired comments.

Dive Statistics

1.1 sentry377 Summary

sentry377 Summary
Origin: 14.033333 -45.050000
Origin: 14 2.000'N 045 3.000'W
Launch: 2016/03/17 20:33:59
Survey start: 2016/03/17 21:41:47
Survey start: Lat:14.069411 Lon:-45.029819
Survey start: Lat:14 4.165'N Lon:045 1.789'W
Survey end: 2016/03/18 08:24:33
Survey end: Lat:14.076627 Lon:-45.024089
Survey end: Lat:14 4.598'N Lon:045 1.445'W
Ascent begins: 2016/03/18 08:24:33
On the surface: 2016/03/18 09:22:07
On deck: 2016/03/18 09:30:37
descent rate: 42.1 m/min
ascent rate: 49.7 m/min
survey time: 10.7 hours
deck-to-deck time 12.9 hours
Mean survey depth: 2896m
Mean survey height: 65m
distance travelled: 30.09km
average speed; 0.77m/s
average speed during photo runs: 0.10 m/s over 0.01 km
average speed during multibeam runs: 0.78 m/s over 30.09 km
total vertical during survey: 8445m
Battery energy at launch: 20.4 kwhr
Battery energy at survey end: 11.2 kwhr
Battery energy on deck: 11.1 kwhr

Sensor Information

This is a recently added section with selected sensor metadata. This section will be expanded in coming months. Additional data is available in the sentryxxx/nav-sci/proc directory within the sentryxxx_config matlab structure as well as in ascii text logs in sentryxxx/metadata. At present metadata is not yet automatically collected on all sensors.

1.2 sentry377 Devices

Instrument	Model	Serial Num.	Comments
USBL	Sonardyne AvTrak2	S/N: 1201	
Magnetometer	APS 1540	APS 0689 Ver: 3.85BD7716F	
	APS 1540	APS 0688 Ver: 3.85BD7716F	
	APS 1540	APS 0690 Ver: 3.85BD7716F	
CTD	SBE 49	S/N: 222	

Plots and Images

This section contains selected images of data products and plots of vehicle navigation and selected sensors.

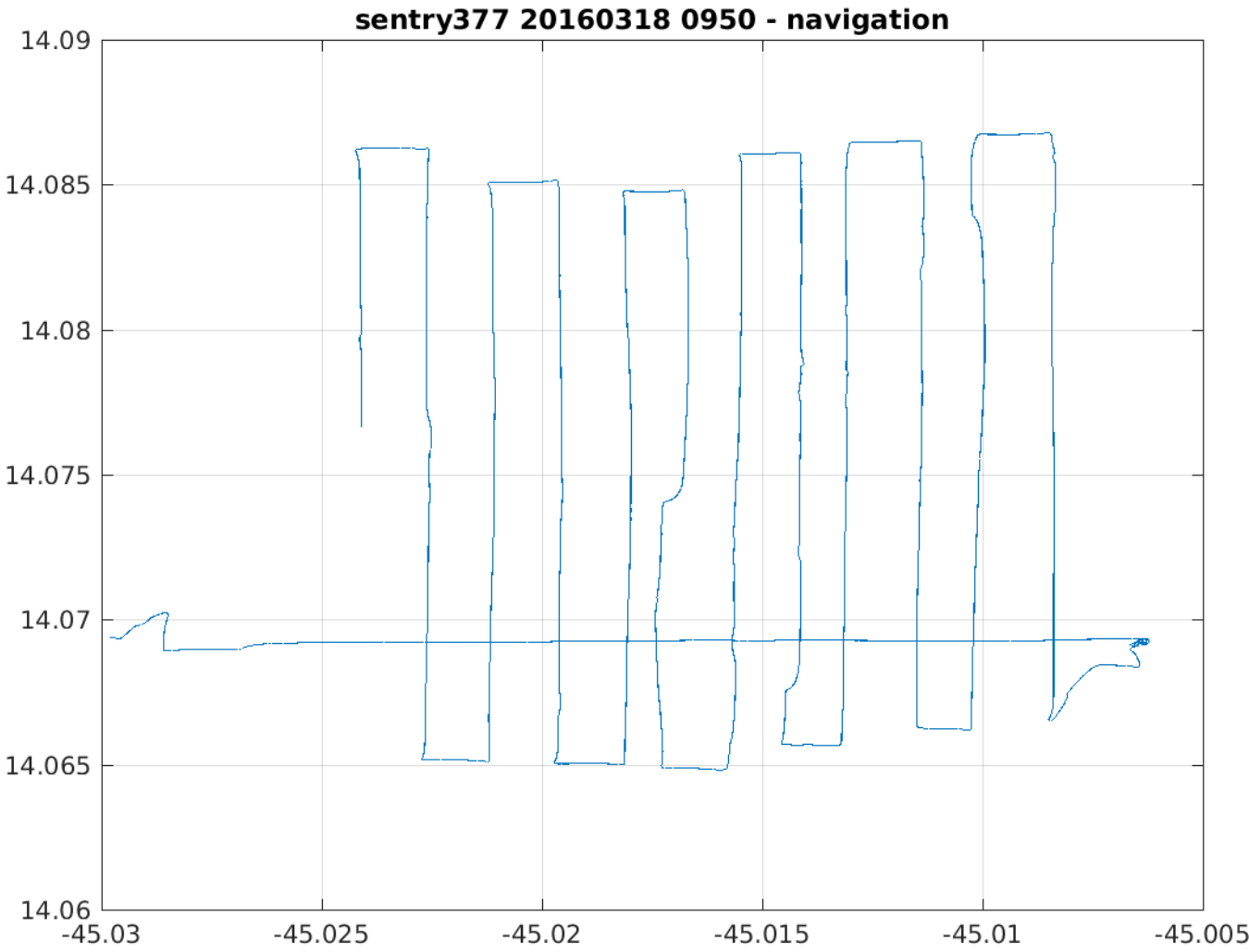


Figure 59: Latitude/Longitude plot of Sentry dive 377 based on post-processed navigation.

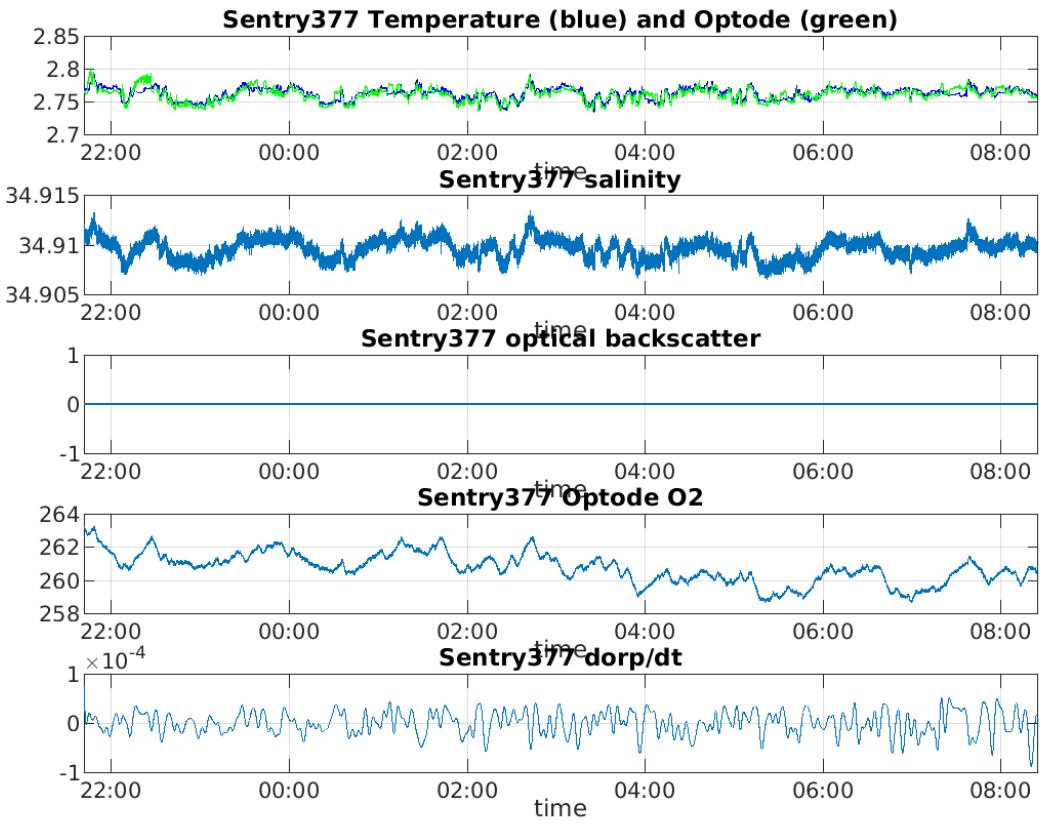


Figure 60: Time series plot of five of the basic sensors on Sentry, from top to bottom, temperature, salinity, optical backscatter, dissolved Oxygen, and ORP.

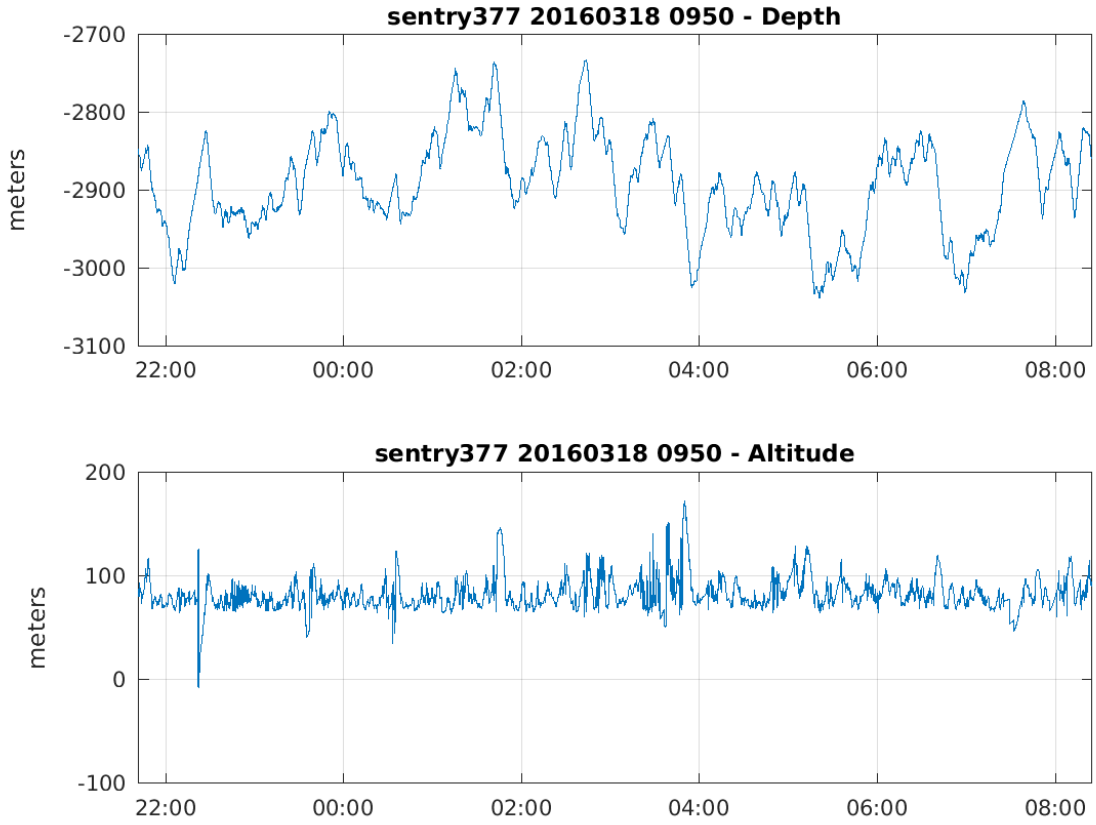


Figure 61: Depth and Altitude of Sentry during dive 377.

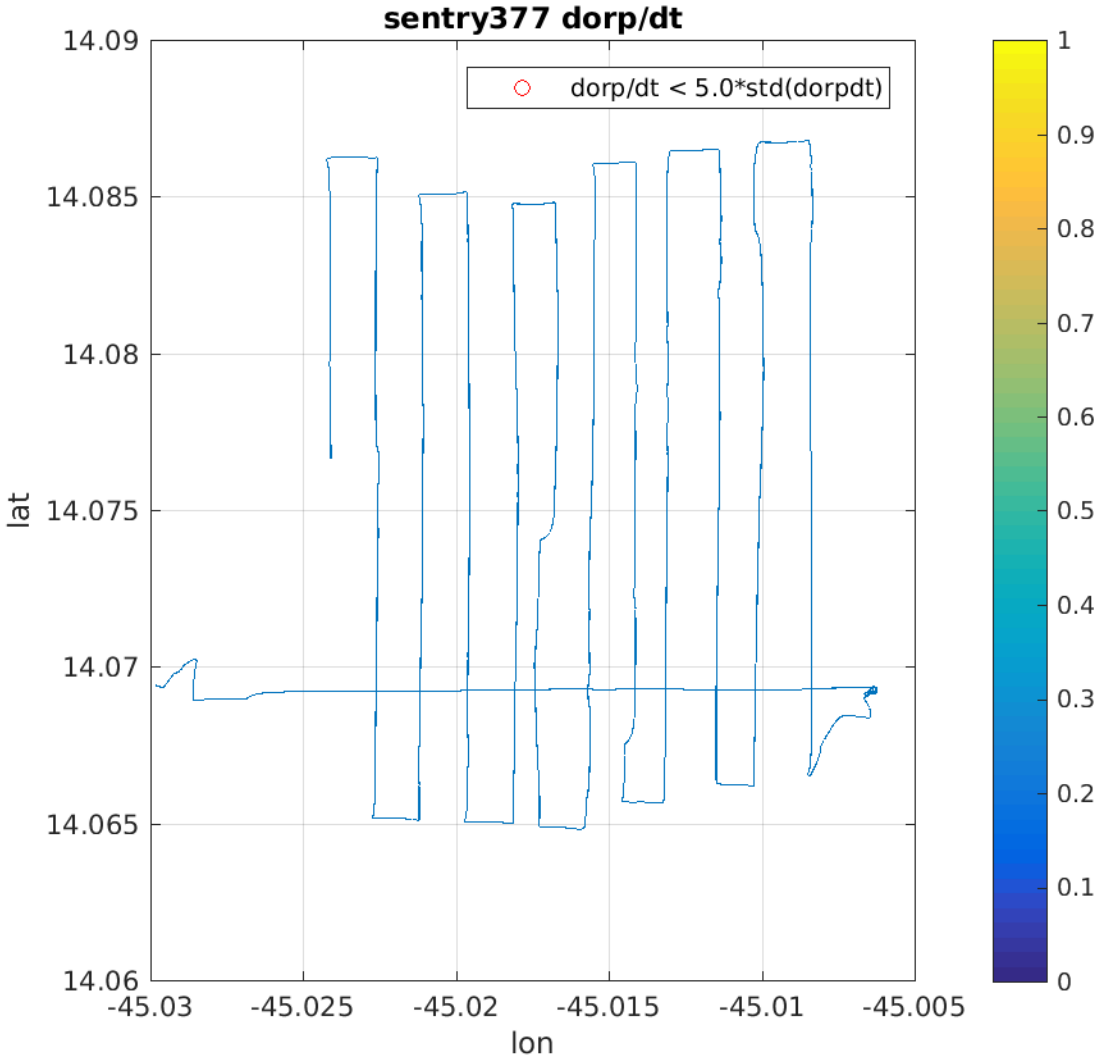


Figure 62: ORP sensor data during dive 377.

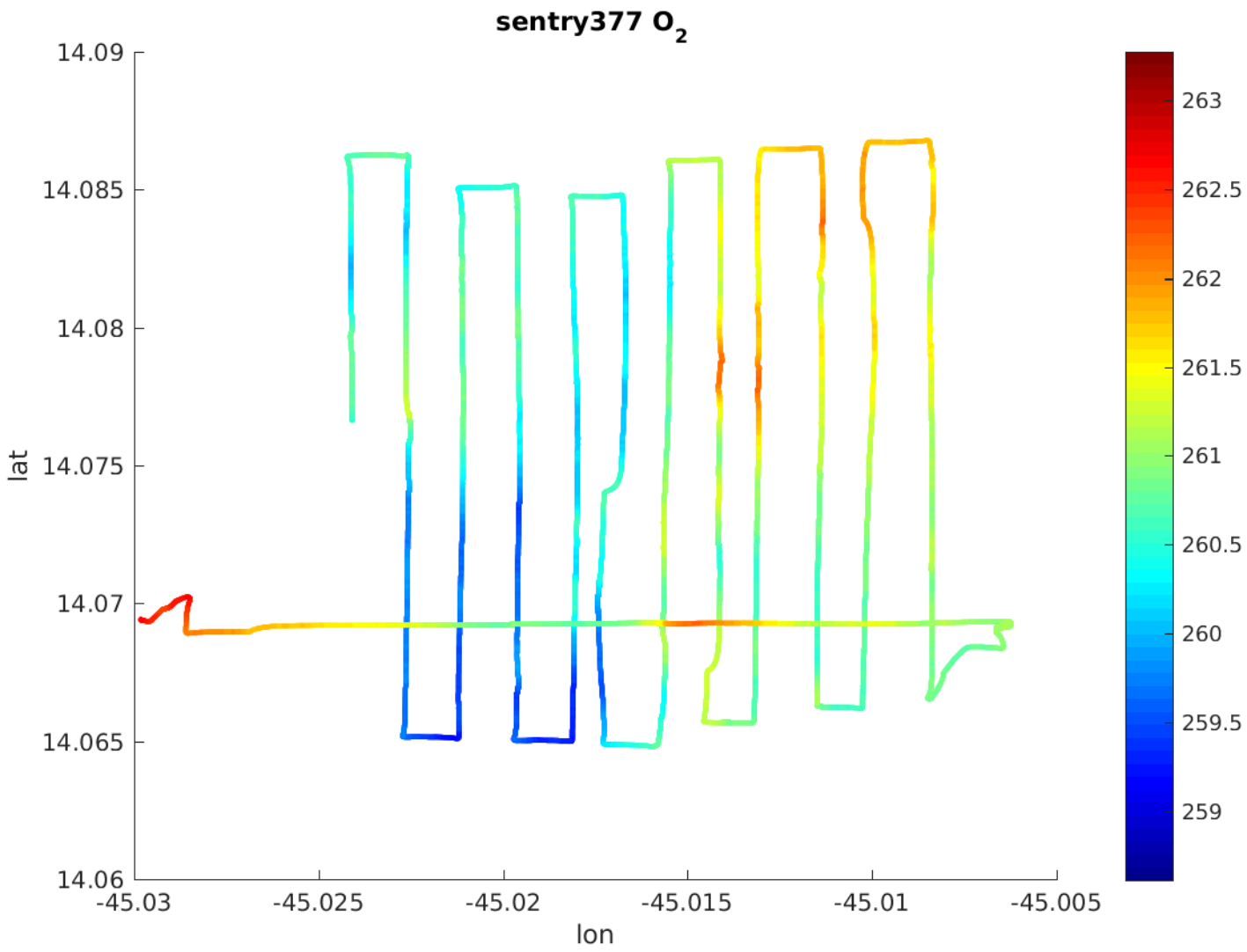


Figure 63: O2 sensor data during dive 377.

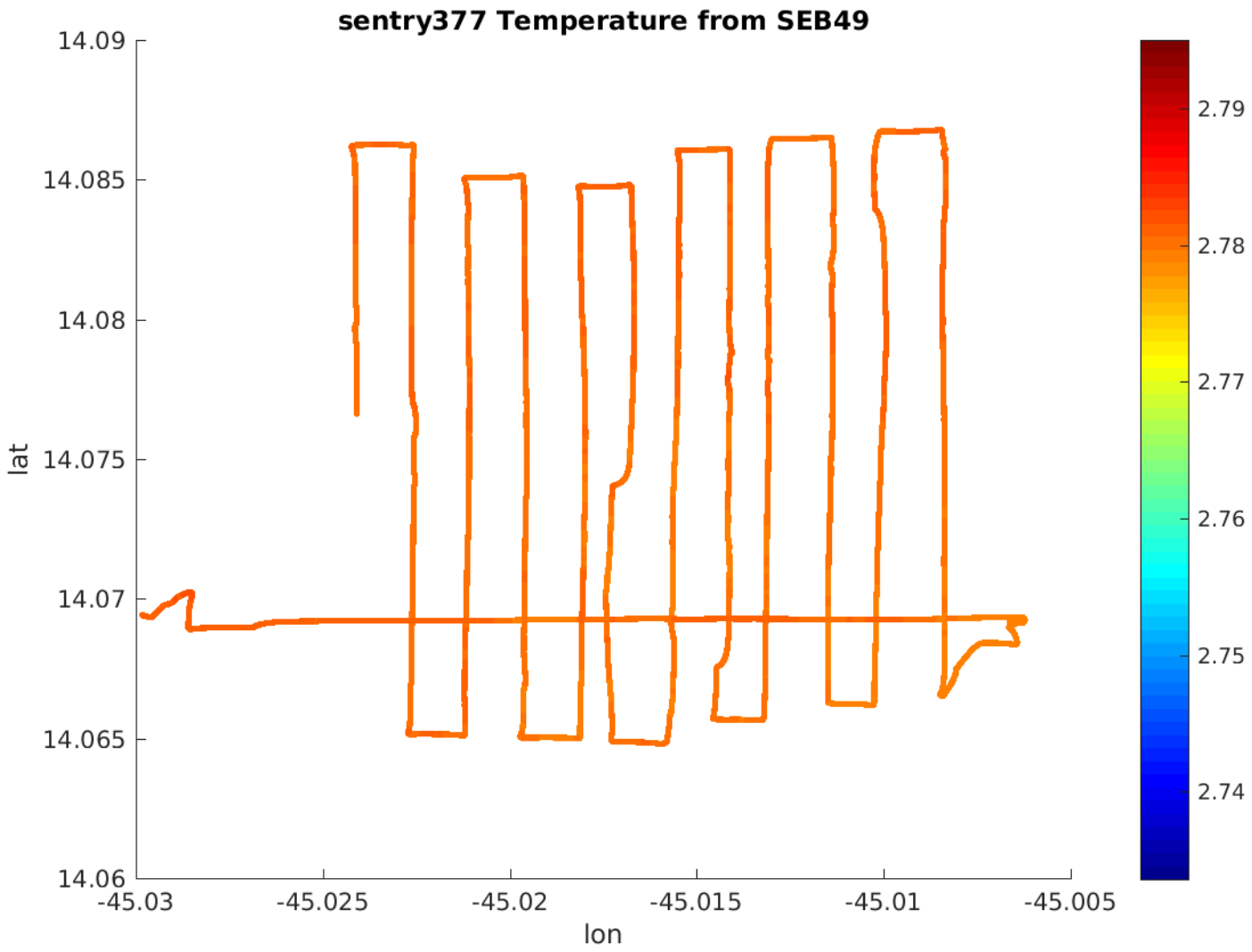


Figure 64: Temperature sensor data during dive 377.

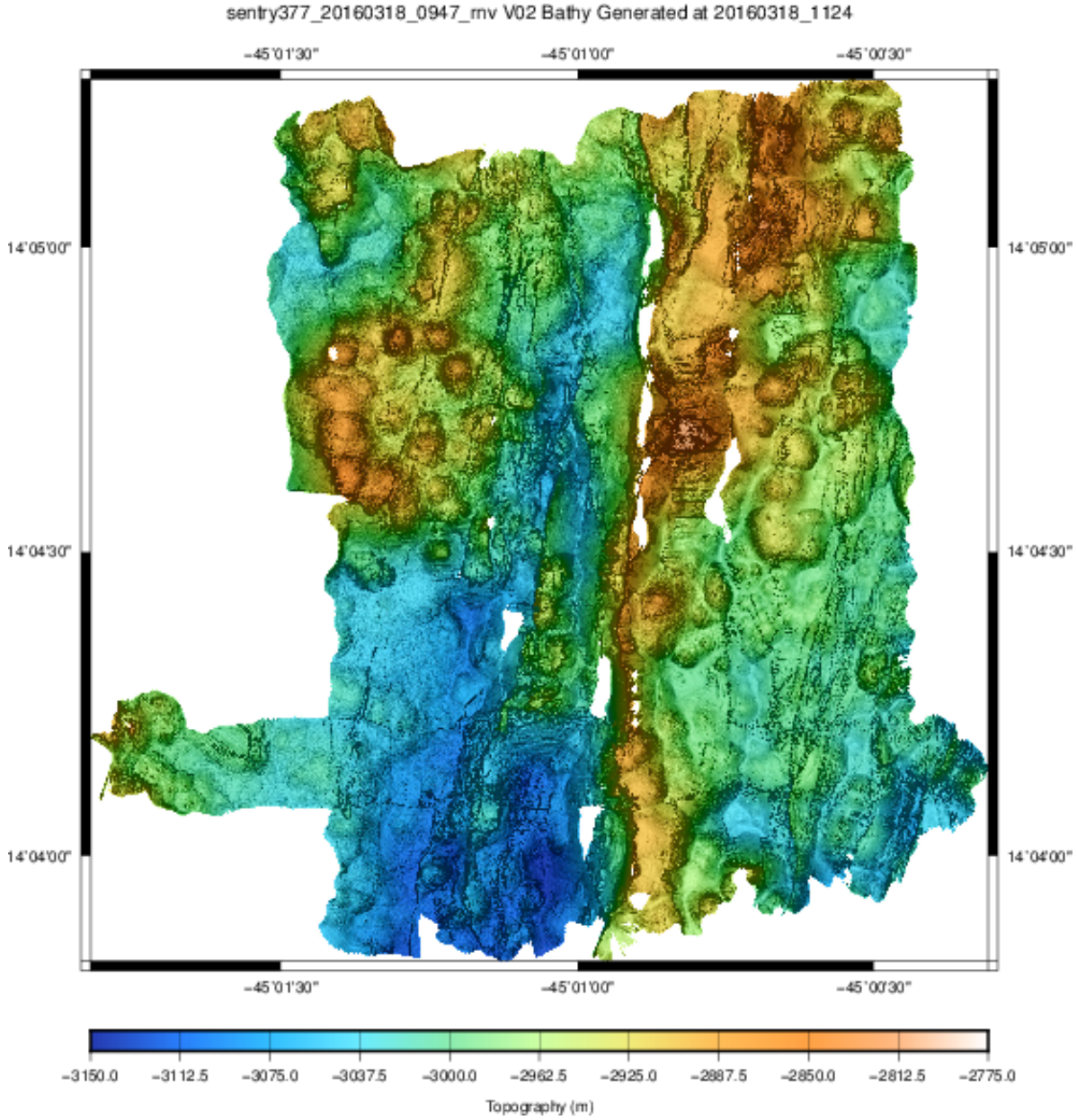


Figure 65: Processed multibeam data from dive 377.

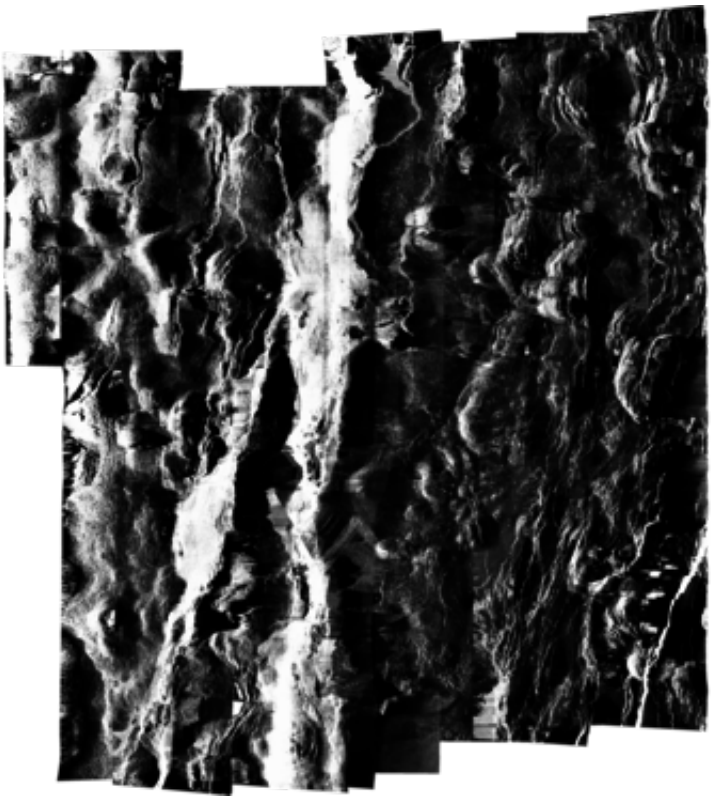


Figure 66: Sidescan mosaic East data from dive 377.

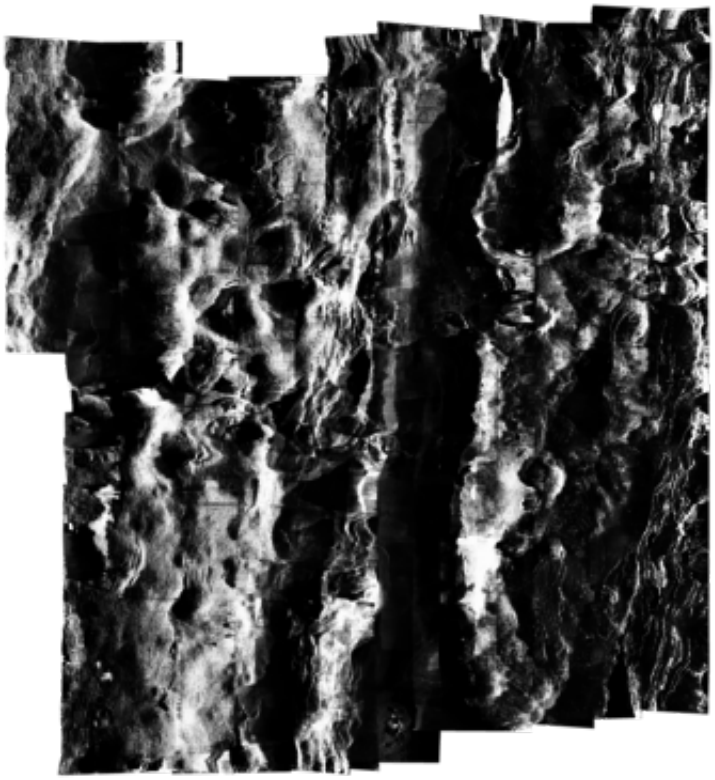


Figure 67: Sidescan mosaic West data from dive 377.

Sentry 378 Dive Report
DRAFT

WHOI Sentry Operations Group
Sean Kelley, Justin Fujii, Stefano Suman, Michael McCarthy, Hayden Radke

Sentry Expedition Leader: Sean Kelley

Chief Scientist: Mark Kurz, WHOI
Co-PI: Eric Mittelstaedt, University of Idaho

Summary

Weather: The seas were appriximately 5-6 ft for both launch and recovery. Wind was 10 to 15 knots.

Reason for end of dive: The dive was ended due to time constraints.

Vehicle Configuration

The science sensing suite for this dive was:

Table 17: Sentry Sensor Configuration

Sensor
APS 1540 Magnetometers (3)
Edgetech 4-24kHz SBP
Reson 7125 Multibeam Sonar
Seabird SBE49 CTD
Seapoint OBS
Anderaa optode model 4330
300kHz RDI DVL
Digital Still Camera
IXEA PHINS
Reson Sound Velocity Probe
NOAA PMEL ORP Sensor

This dive was navigated using the DVL/INS system in real time. USBL provided post-dive corrections.

Important Positions

Dive Origin: 14 2 -45 -5

Launch Position: sentry378 launch position: 14 4.359'N 045 2.695'W

Narrative

A continuation multibeam survey to compliment sentry377. The survey started where sentry377 left off, and moved east to west covering as much area as possible within the time window.

1 Issues and Proposed Solutions

None None

Chief Scientist Comments

The Chief scientist is requested to include any desired comments.

Dive Statistics

1.1 sentry378 Summary

sentry378 Summary
Origin: 14.033333 -45.083333
Origin: 14 2.000'N 045 5.000'W
Launch: 2016/03/18 21:28:24
Survey start: 2016/03/18 22:37:25
Survey start: Lat:14.071711 Lon:-45.044921
Survey start: Lat:14 4.303'N Lon:045 2.695'W
Survey end: 2016/03/19 08:31:30
Survey end: Lat:14.066969 Lon:-45.039952
Survey end: Lat:14 4.018'N Lon:045 2.397'W
Ascent begins: 2016/03/19 08:31:30
On the surface: 2016/03/19 09:28:47
On deck: 2016/03/19 09:38:52
descent rate: 40.8 m/min
ascent rate: 49.6 m/min
survey time: 9.9 hours
deck-to-deck time 12.2 hours
Mean survey depth: 2892m
Mean survey height: 65m
distance travelled: 30.73km
average speed; 0.86m/s

Sensor Information

This is a recently added section with selected sensor metadata. This section will be expanded in coming months. Additional data is available in the sentryxxx/nav-sci/proc directory within the sentryxxx_config matlab structure as well as in ascii text logs in sentryxxx/metadata. At present metadata is not yet automatically collected on all sensors.

1.2 sentry378 Devices

Instrument	Model	Serial Num.	Comments
USBL	Sonardyne AvTrak2	S/N: 1201	
Magnetometer	APS 1540	APS 0689 Ver: 3.85BD7716F	
	APS 1540	APS 0688 Ver: 3.85BD7716F	
	APS 1540	APS 0690 Ver: 3.85BD7716F	
CTD	SBE 49	S/N: 222	

Plots and Images

This section contains selected images of data products and plots of vehicle navigation and selected sensors.

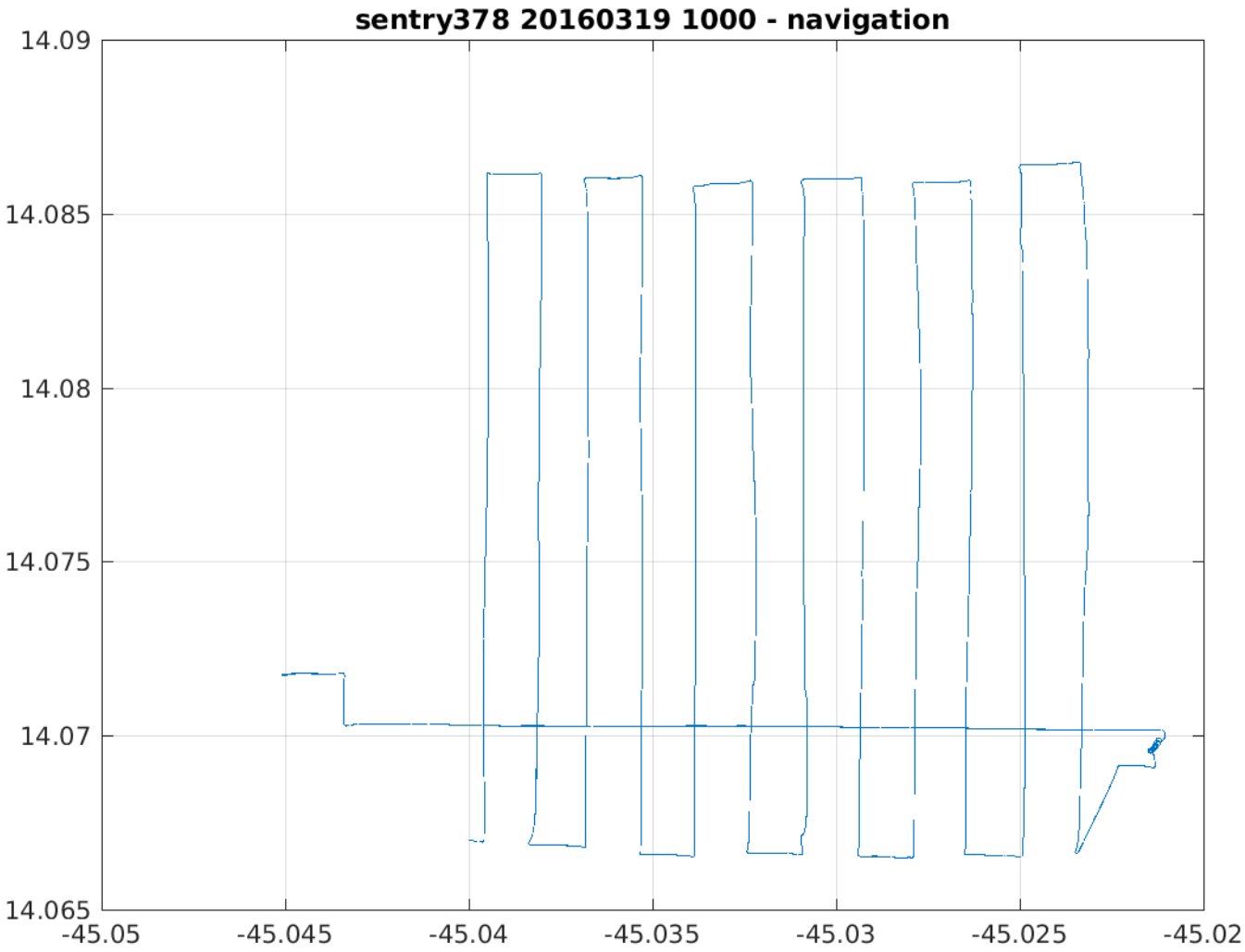


Figure 68: Latitude/Longitude plot of Sentry dive 378 based on post-processed navigation.

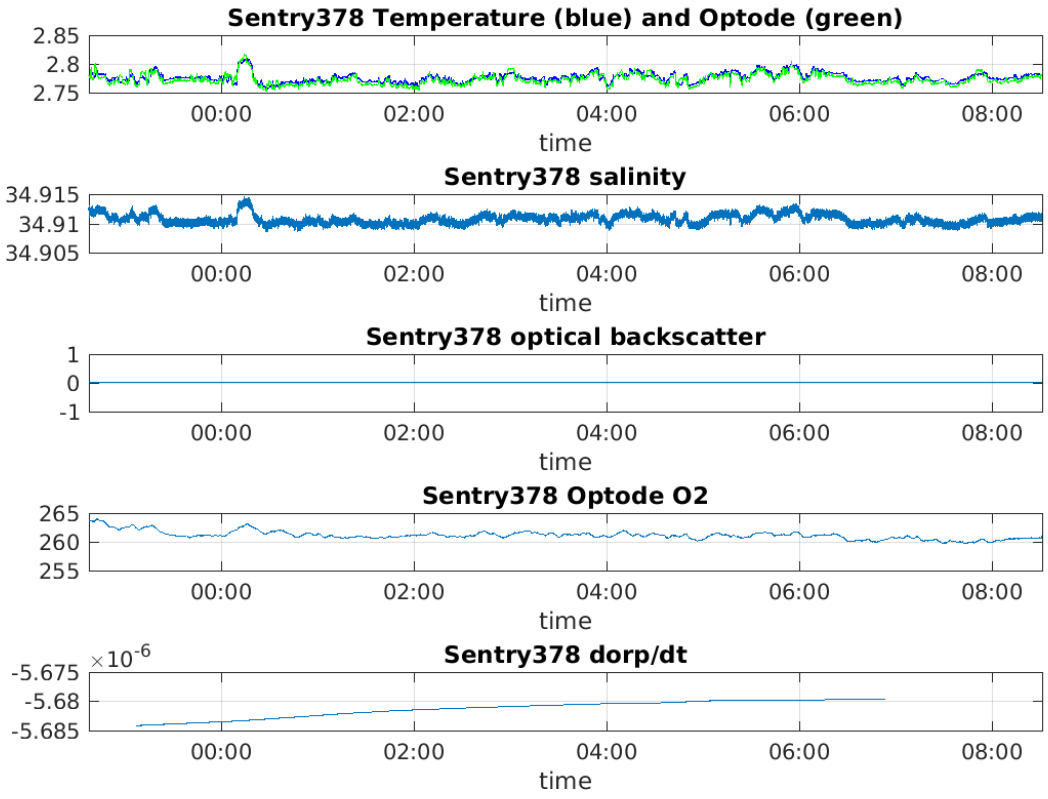


Figure 69: Time series plot of five of the basic sensors on Sentry, from top to bottom, temperature, salinity, optical backscatter, dissolved Oxygen, and ORP.

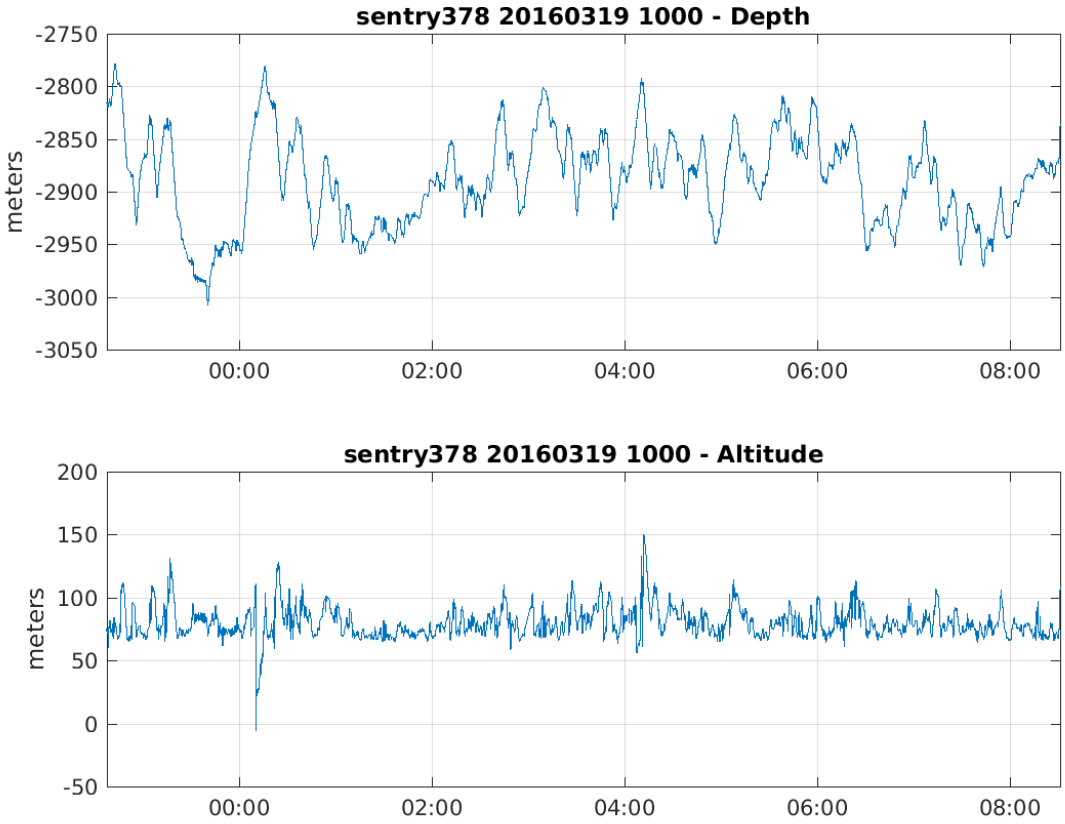


Figure 70: Depth and Altitude of Sentry during dive 378.

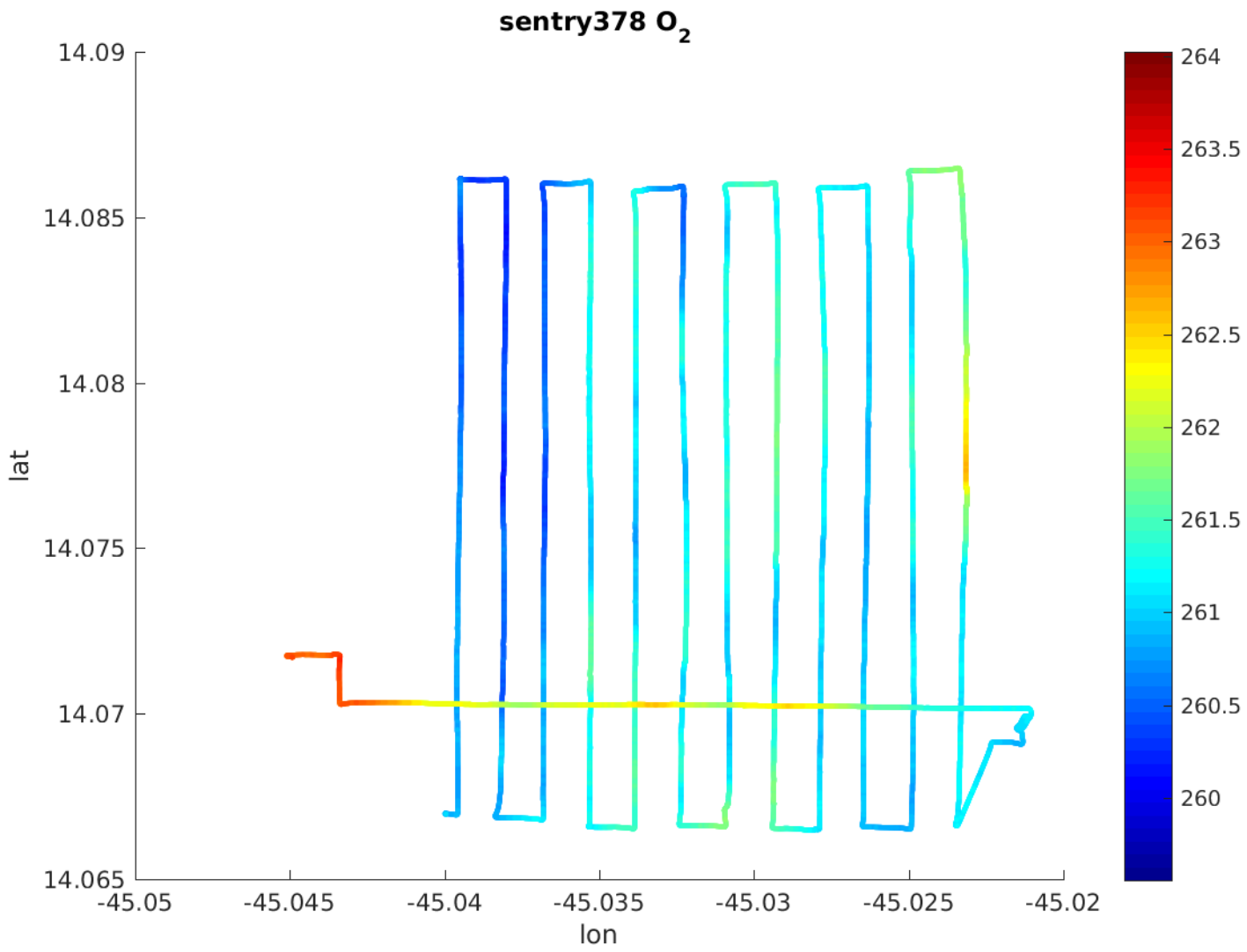


Figure 71: O2 sensor data during dive 378.

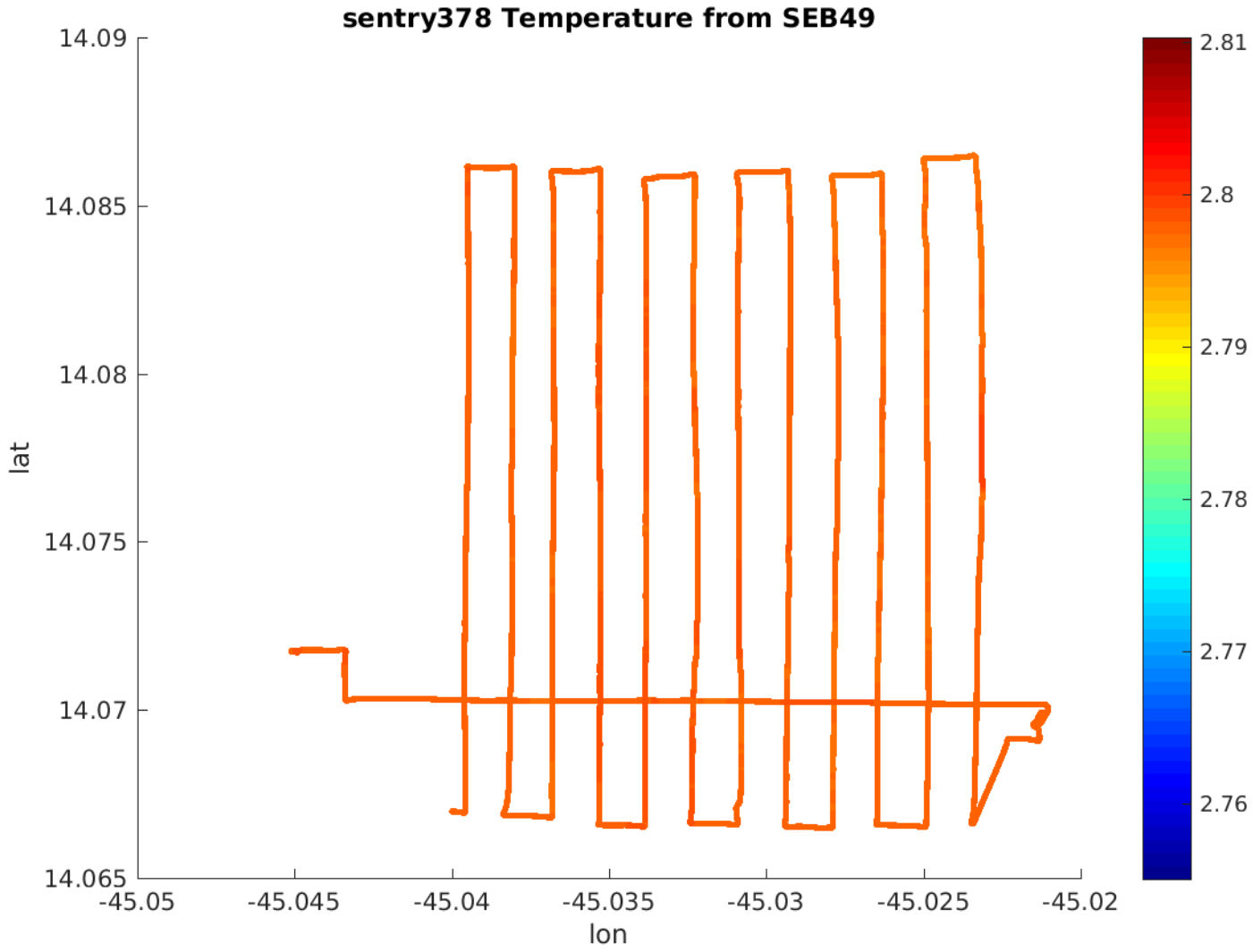


Figure 72: Temperature sensor data during dive 378.

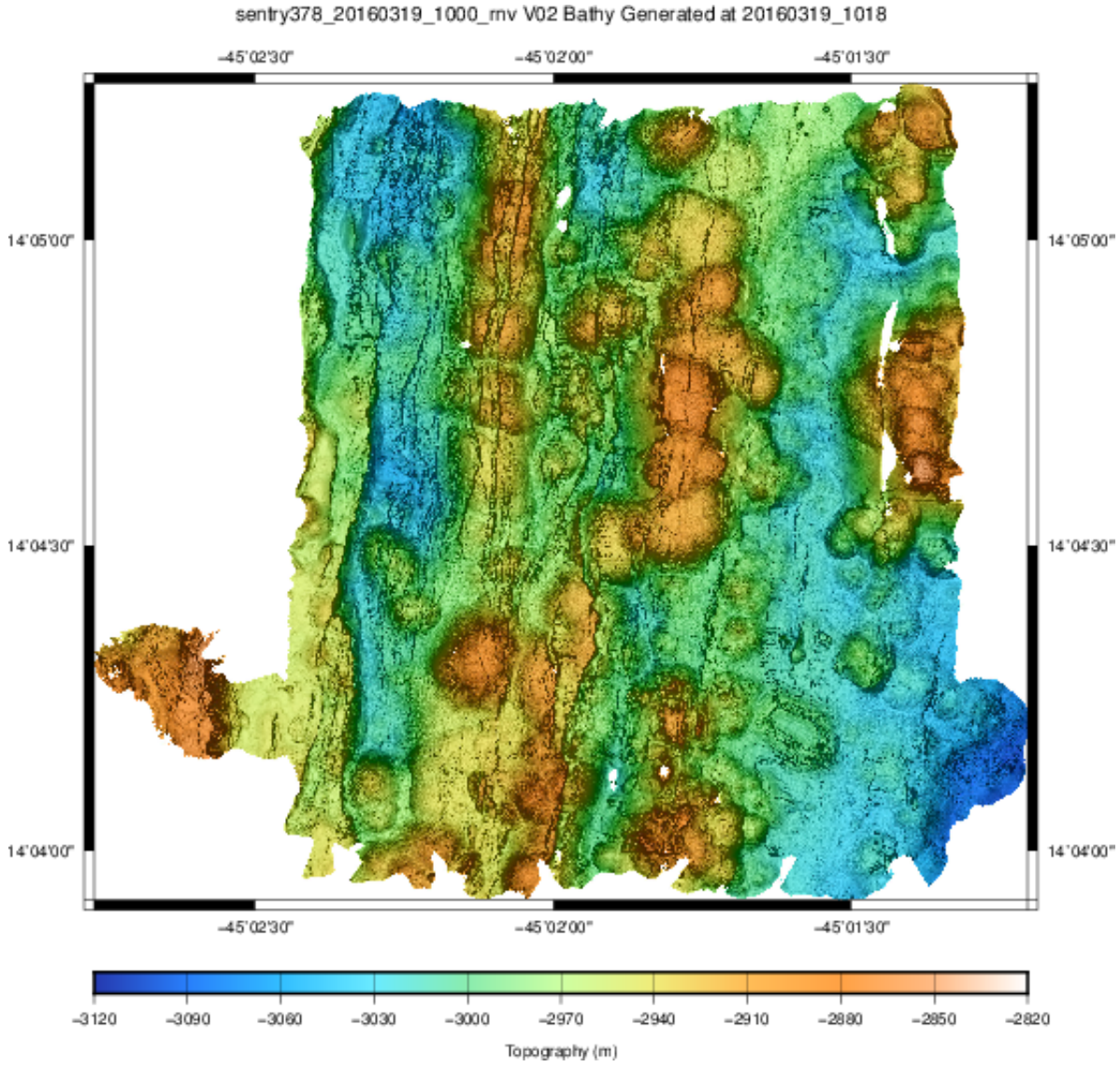


Figure 73: Processed multibeam data from dive 378.

Figure 74: Sidescan mosaic East data from dive 378.

Figure 75: Sidescan mosaic West data from dive 378.

Sentry 379 Dive Report
DRAFT

WHOI Sentry Operations Group
Sean Kelley, Justin Fujii, Stefano Suman, Michael McCarthy, Hayden Radke

Sentry Expedition Leader: Sean Kelley

Chief Scientist: Mark Kurz, WHOI
Co-PI: Eric Mittelstaedt, University of Idaho

Summary

Weather: The seas were appriximately 5-7 ft. Wind was 20 to 25knots.

Reason for end of dive: The dive was ended due to time constraints

Vehicle Configuration

The science sensing suite for this dive was:

Table 18: Sentry Sensor Configuration

Sensor
APS 1540 Magnetometers (3)
Edgetech 4-24kHz SBP
Reson 7125 Multibeam Sonar
Seabird SBE49 CTD
Seapoint OBS
Anderaa optode model 4330
300kHz RDI DVL
Digital Still Camera
IXEA PHINS
Reson Sound Velocity Probe
NOAA PMEL ORP Sensor

This dive was navigated using the DVL/INS system in real time. USBL provided post-dive corrections.

Important Positions

Dive Origin: 14 2 -45 -5

Launch Position: sentry379 launch position: 14 5.269'N 045 1.573'W

Narrative

Final Multibeam survey at the northern site, covering an area from a previous Alvin dive, and continuing the survey from sentry378 from east to west.

1 Issues and Proposed Solutions

Optode Optode failed during the decktest. The sensor was removed. There is currently no spare to replace the sensor.

Chief Scientist Comments

The Chief scientist is requested to include any desired comments.

Dive Statistics

1.1 sentry379 Summary

sentry379 Summary
Origin: 14.033333 -45.083333
Origin: 14 2.000'N 045 5.000'W
Launch: 2016/03/19 21:28:40
Survey start: 2016/03/19 22:39:50
Survey start: Lat:14.085758 Lon:-45.026190
Survey start: Lat:14 5.146'N Lon:045 1.571'W
Survey end: 2016/03/20 08:31:33
Survey end: Lat:14.068151 Lon:-45.049100
Survey end: Lat:14 4.089'N Lon:045 2.946'W
Ascent begins: 2016/03/20 08:31:33
On the surface: 2016/03/20 09:28:33
On deck: 2016/03/20 09:38:00
descent rate: 40.7 m/min
ascent rate: 49.2 m/min
survey time: 9.9 hours
deck-to-deck time 12.2 hours
Mean survey depth: 2814m
Mean survey height: 64m
distance travelled: 28.51km
average speed; 0.80m/s
average speed during photo runs: 0.16 m/s over 0.53 km
average speed during multibeam runs: 0.80 m/s over 28.50 km
total vertical during survey: 7116m
Battery energy at launch: 20.3 kwhr
Battery energy at survey end: 12.0 kwhr
Battery energy on deck: 11.9 kwhr

Sensor Information

This is a recently added section with selected sensor metadata. This section will be expanded in coming months. Additional data is available in the sentryxxx/nav-sci/proc directory within the sentryxxx_config matlab structure as well as in ascii text logs in sentryxxx/metadata. At present metadata is not yet automatically collected on all sensors.

1.2 sentry379 Devices

Instrument	Model	Serial Num.	Comments
USBL	Sonardyne AvTrak2	S/N: 1201	
Magnetometer	APS 1540	APS 0689 Ver: 3.85BD7716F	
	APS 1540	APS 0688 Ver: 3.85BD7716F	
	APS 1540	APS 0690 Ver: 3.85BD7716F	
CTD	SBE 49	S/N: 222	

Plots and Images

This section contains selected images of data products and plots of vehicle navigation and selected sensors.

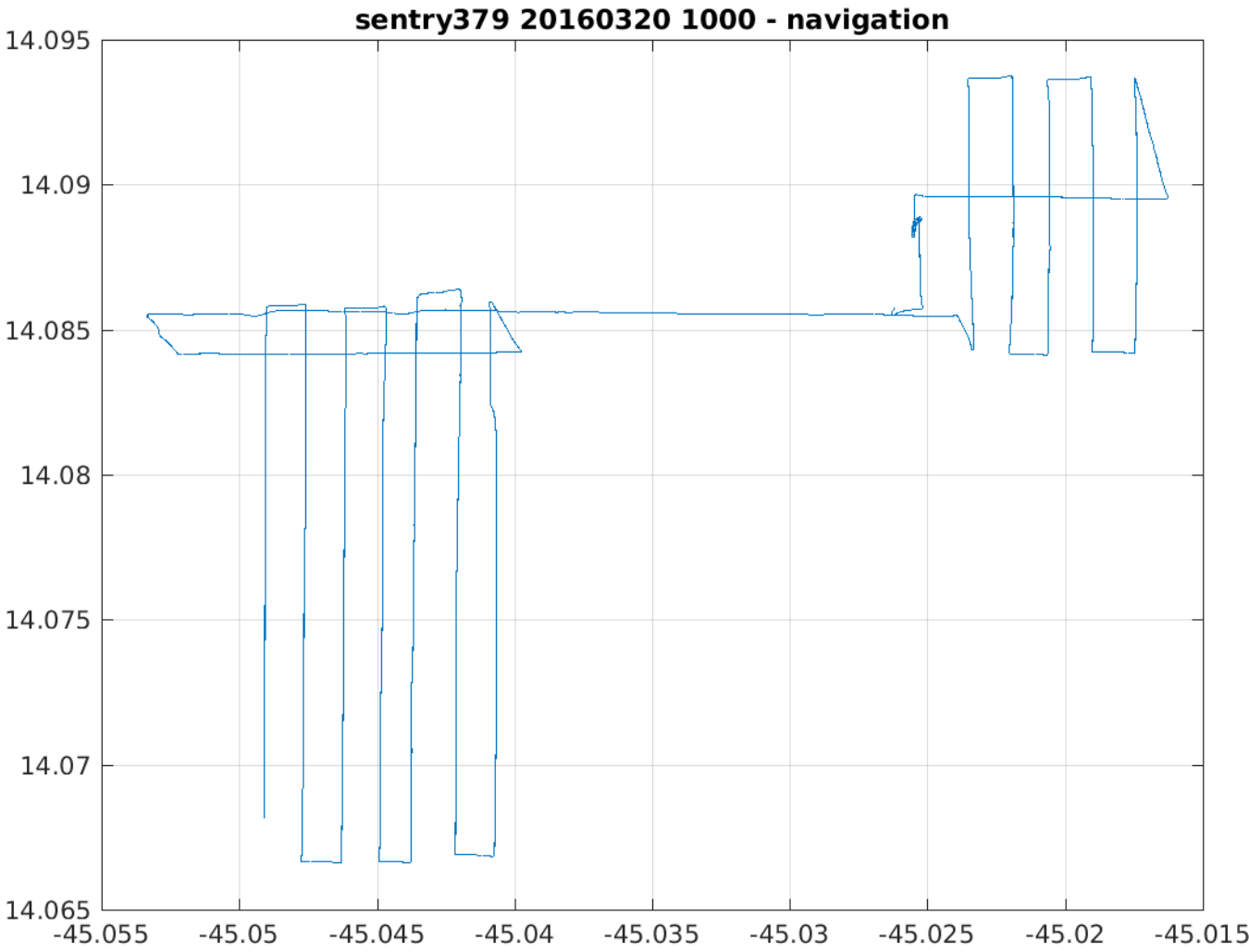


Figure 76: Latitude/Longitude plot of Sentry dive 379 based on post-processed navigation.

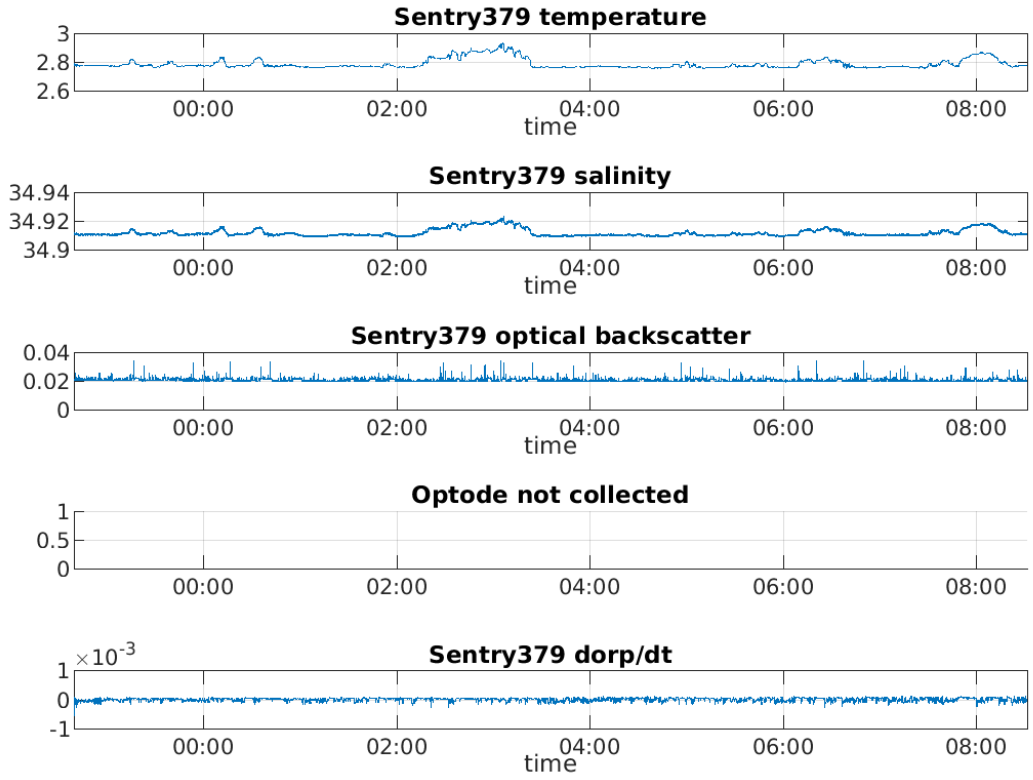


Figure 77: Time series plot of five of the basic sensors on Sentry, from top to bottom, temperature, salinity, optical backscatter, dissolved Oxygen, and ORP.

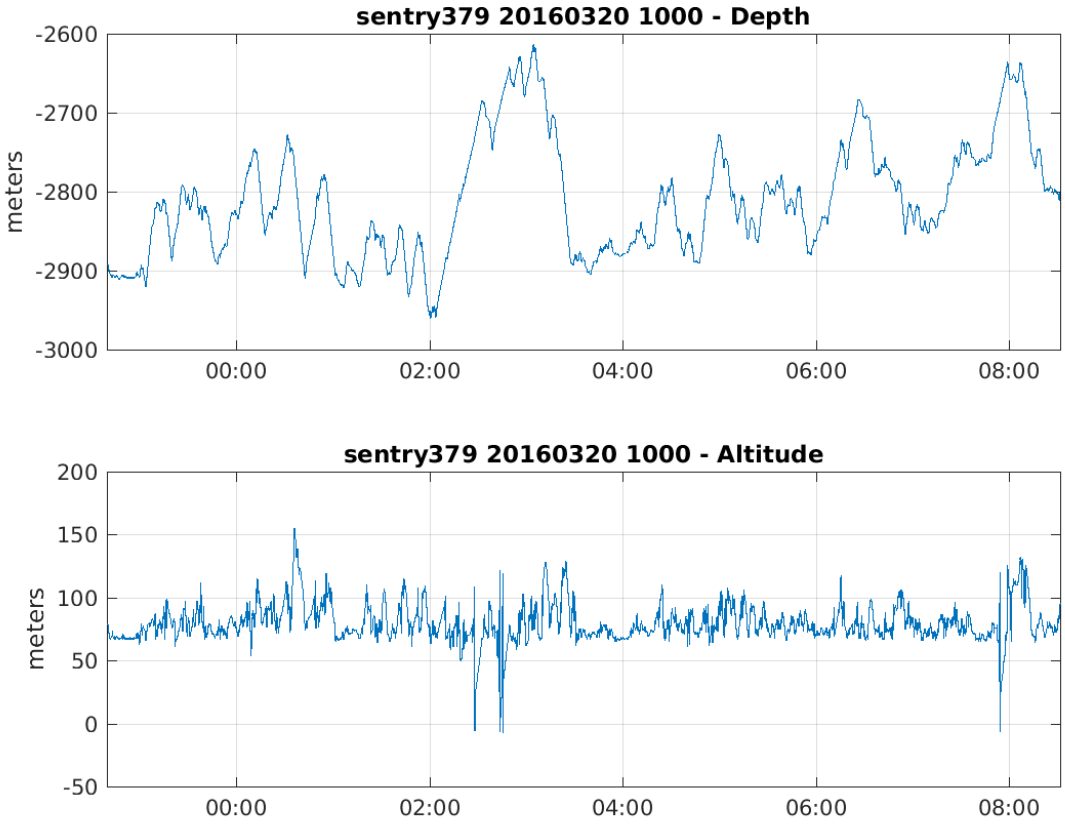


Figure 78: Depth and Altitude of Sentry during dive 379.

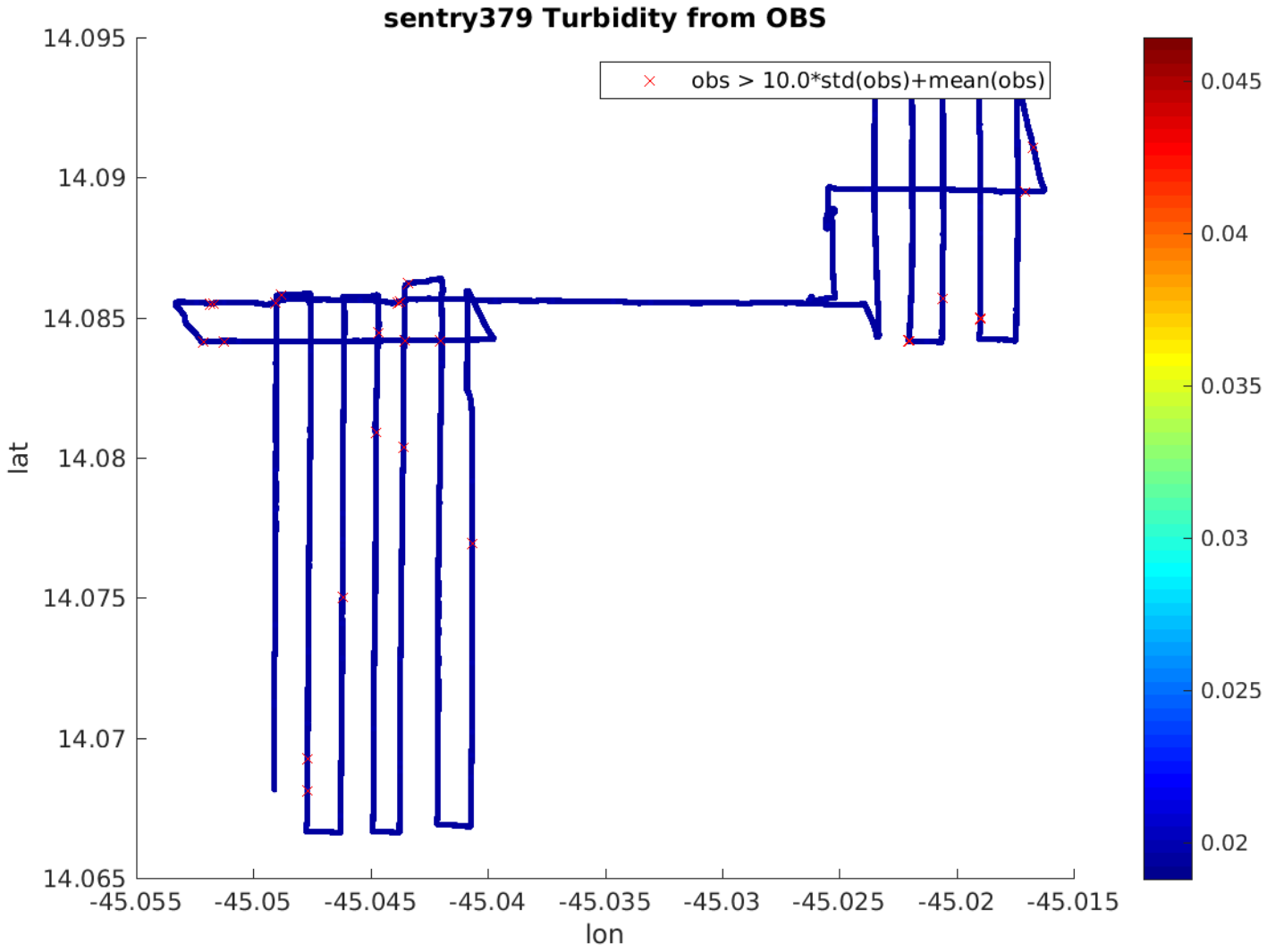


Figure 79: Optical backscatter on dive 379.

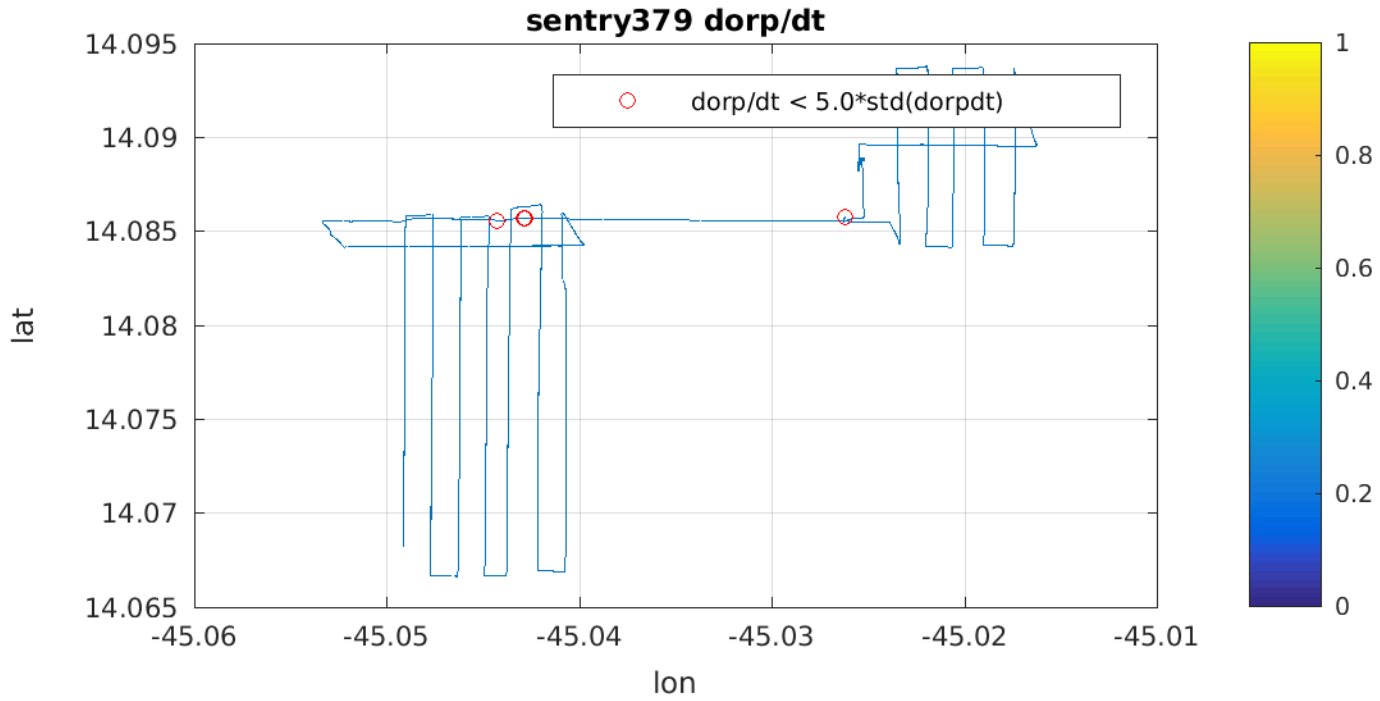


Figure 80: ORP sensor data during dive 379.

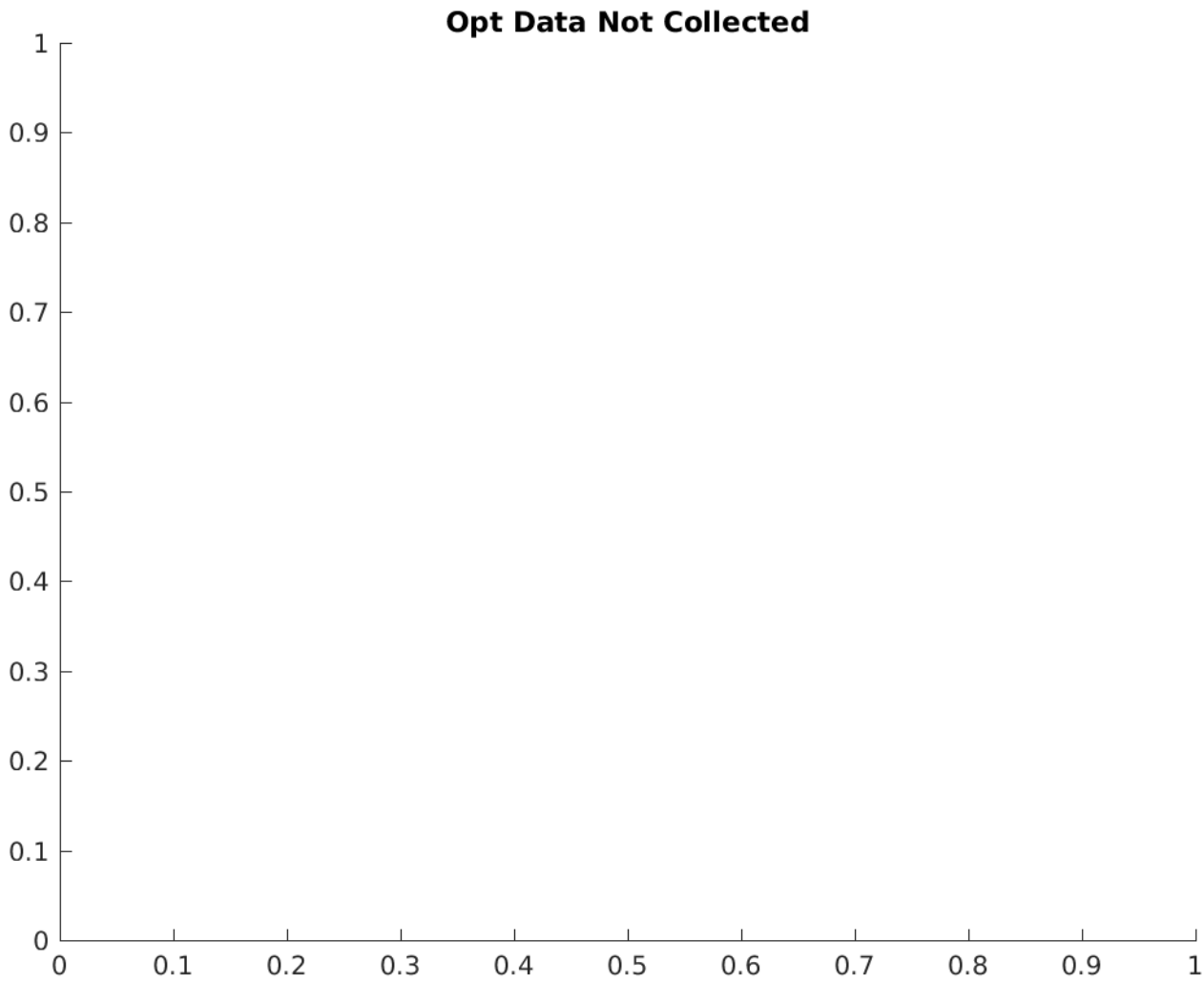


Figure 81: O2 sensor data during dive 379.

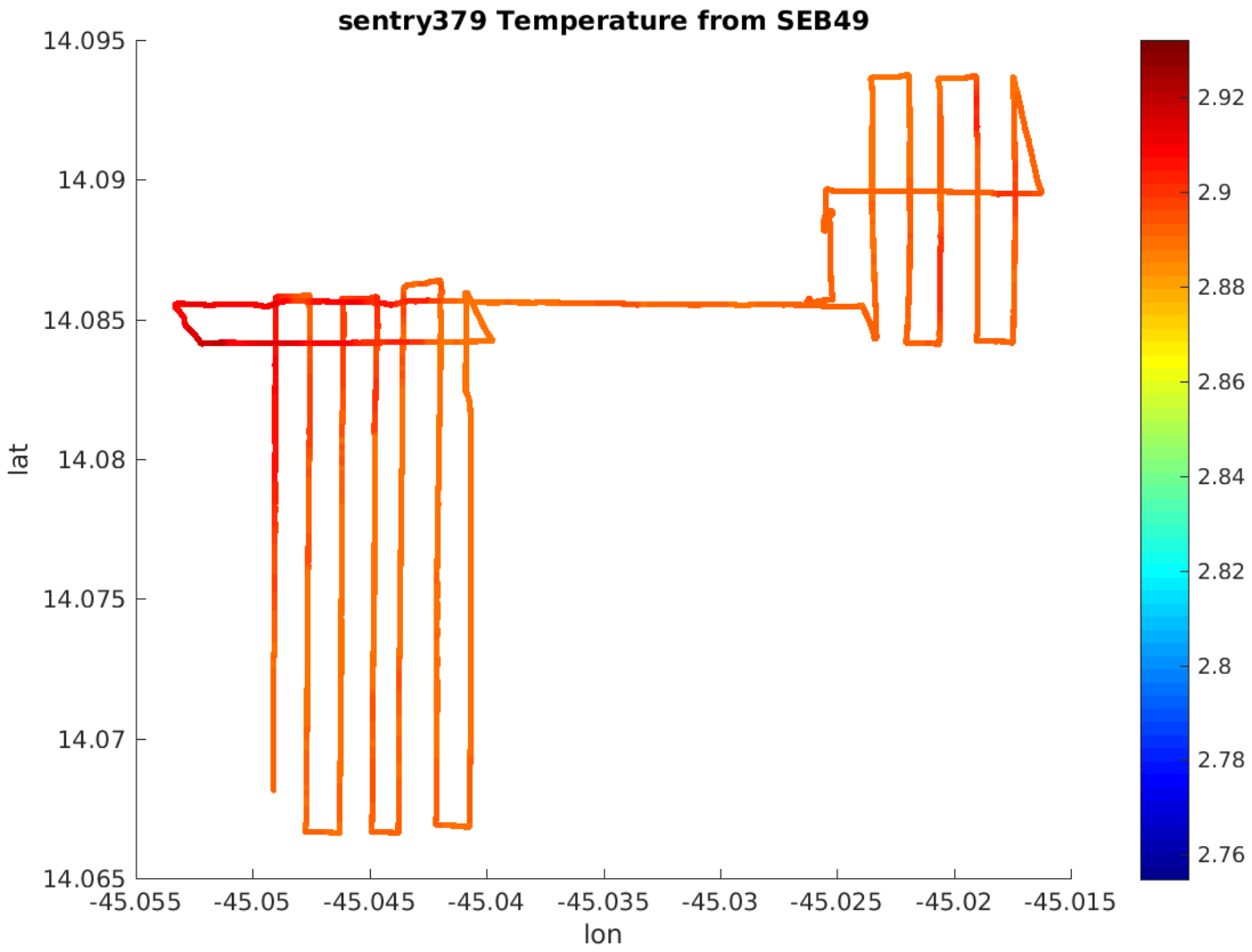


Figure 82: Temperature sensor data during dive 379.

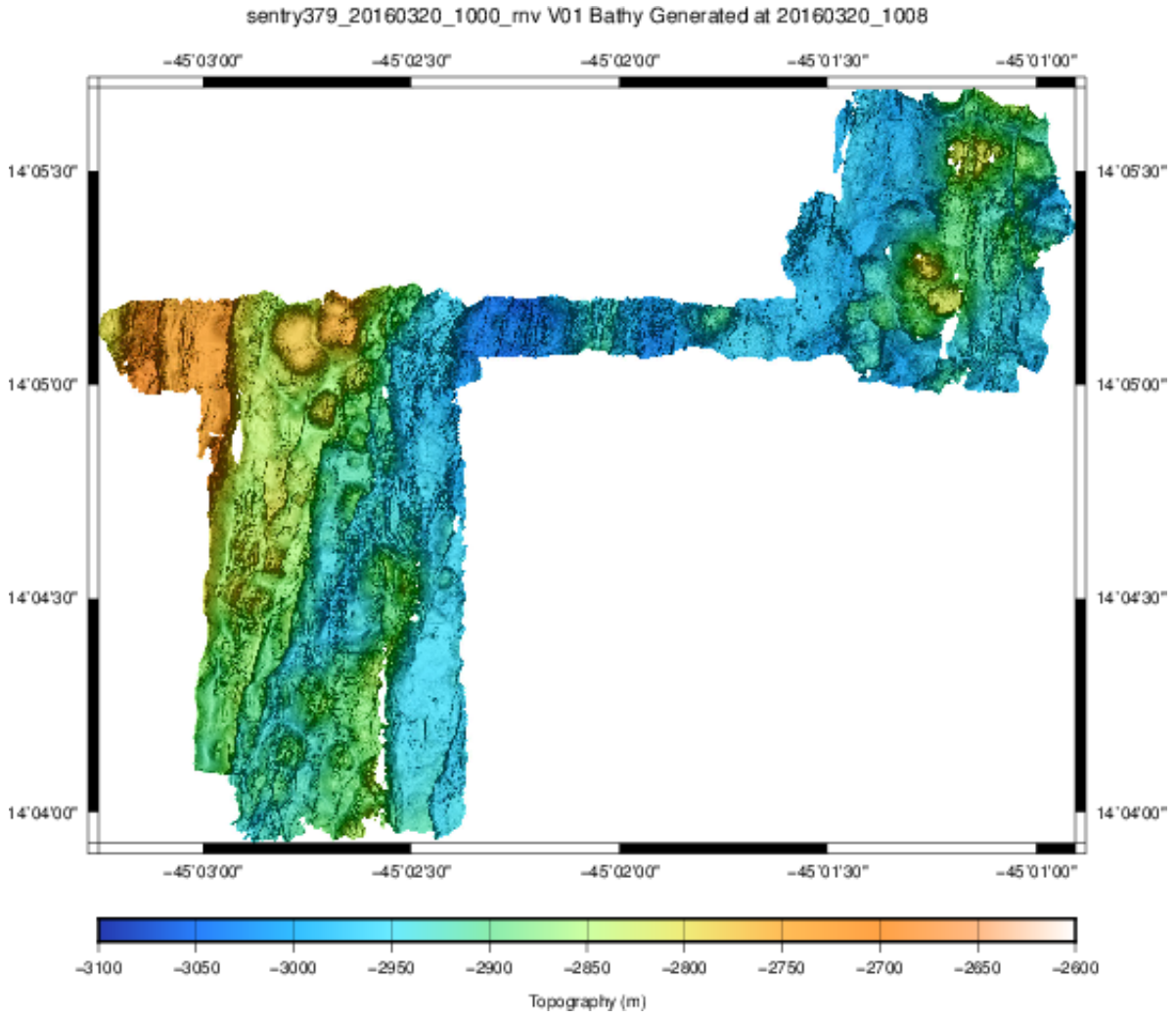


Figure 83: Processed multibeam data from dive 379.

Figure 84: Sidescan mosaic East data from dive 379.

Figure 85: Sidescan mosaic West data from dive 379.

CASIUS Calibration Report

Sonardyne SOUND IN DEPTH

Vessel: **Device No:** **Date/Time:** Monday, March 07, 2016 21:30:55

Settings:

Initial Estimates for BoxIn	
Transceiver depth offset	4.760m
Transceiver depth	4.760m
Antenna starboard offset	-3.410m
Antenna forward offset	-10.140m
Antenna height offset	27.470m

Error Estimates for BoxIn	
DGPS lags USBL	0.00s
Range measurement	0.2m
Range gate	1.0m
DGPS position	2.0m
Beacon position	30.0m
Beacon depth	5.0m
Sound velocity	15.0m/s
Transceiver depth	0.5m
Transceiver offset	1.0m

Transceiver & Beacon	
Transceiver Index	11
Beacon Name	AvT-813
Turn Around Time	320.0ms

Depth Aiding	
Boresight Angle Limit	22.0º
Depth Difference Limit	1.0m

Transceiver Attitude Calculation Inputs	
Angle Gate	2.0º
Known Heading Correction	n/a

Values Used During Data Collection	
Transceiver Pitch Correction	0.00º
Transceiver Roll Correction	0.00º
Transceiver Heading Correction	0.00º
Sound Velocity	1500.9m/s

Results:

Beacon BoxIn	Beacon Eastings	Beacon Northings	Beacon Depth	Sound Velocity	Transceiver Starboard Offset	Transceiver Forward Offset
Before	284636.70m	1435684.70m	1542.00m	1500.88m/s	-2.31m	-5.92m
Calculated	284637.24m	1435683.68m	1541.12m	1498.77m/s	-2.35m	-5.78m
Calculated Accuracy	0.03m	0.03m	0.14m	0.08m/s	0.03m	0.03m

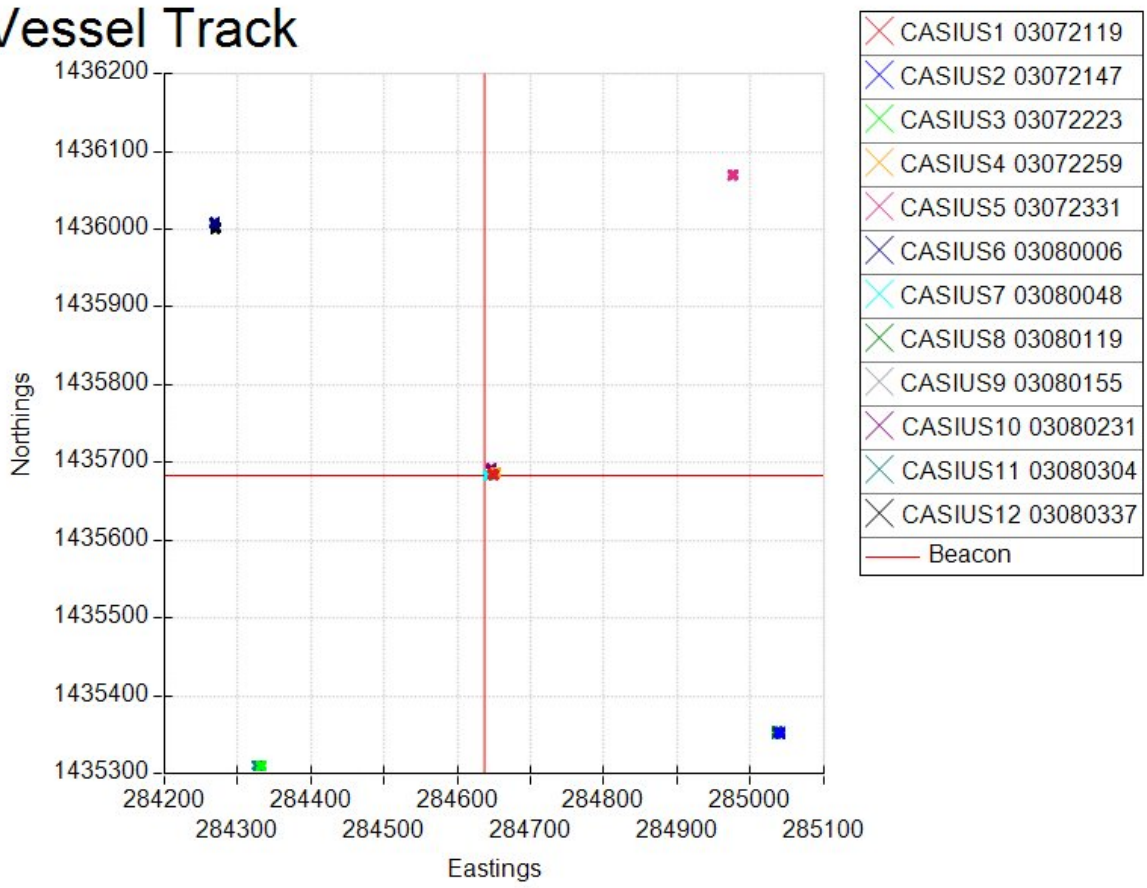
Transceiver Attitude	Pitch Correction	Roll Correction	Heading Correction
Before	0.00º	0.00º	0.00º
Calculated	**0.24º**	**0.05º**	**2.08º**
Calculated Accuracy	0.01º	0.01º	0.02º

Statistics:

	Before CASIUS (distance)	After CASIUS (distance)	Before CASIUS (% depth)	After CASIUS (% depth)
39.4% Beacon Positions (1 sigma)	14.8m	7.9m	0.96	0.51
50.0% Beacon Positions (CEP)	17.8m	9.4m	1.16	0.61
63.2% Beacon Positions (1 Drms)	21.3m	11.2m	1.38	0.73
86.5% Beacon Positions (2 sigma)	27.6m	15.9m	1.79	1.03
98.2% Beacon Positions (2 Drms)	36.0m	23.6m	2.33	1.53

General:

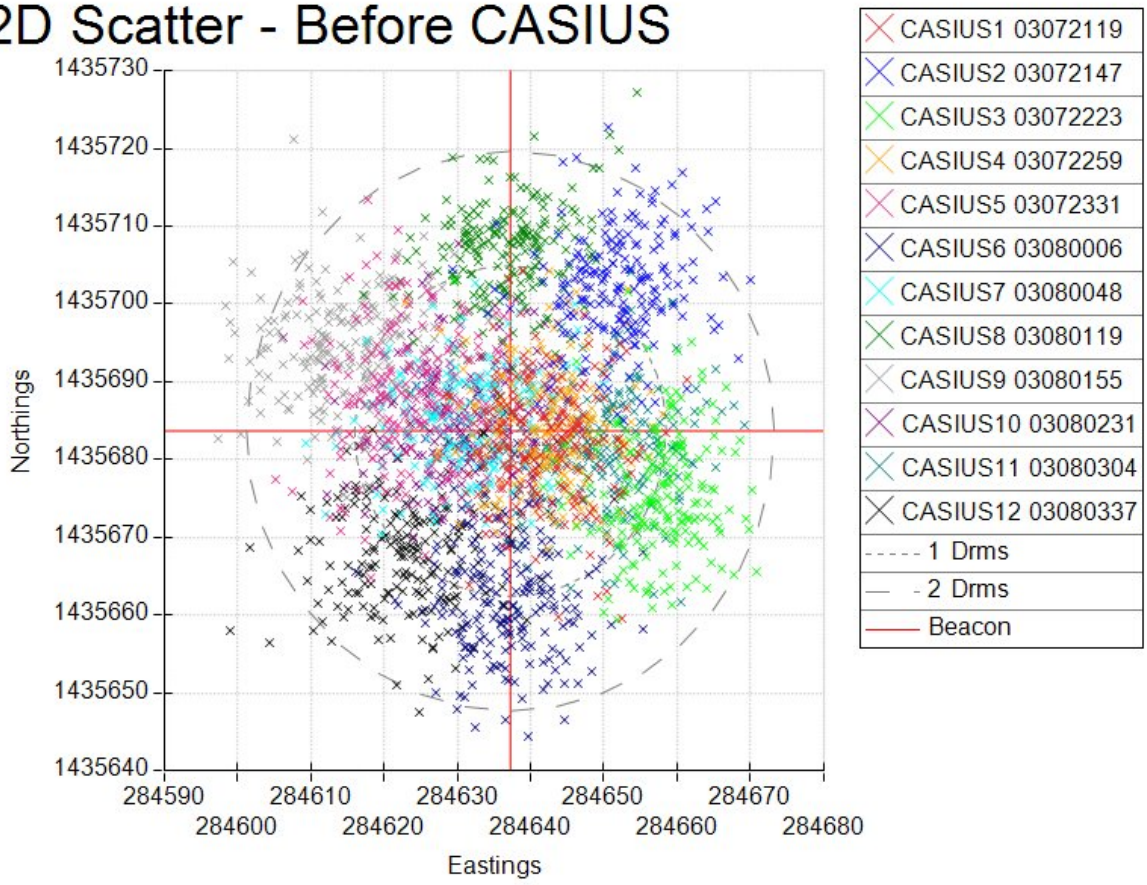
	Beacon BoxIn	Transceiver Attitude
Number of Iterations	3	3
Number of Fixes Used	2401	2401
Number Depth Aided		0
Average weighted residuals	0.005	1.587



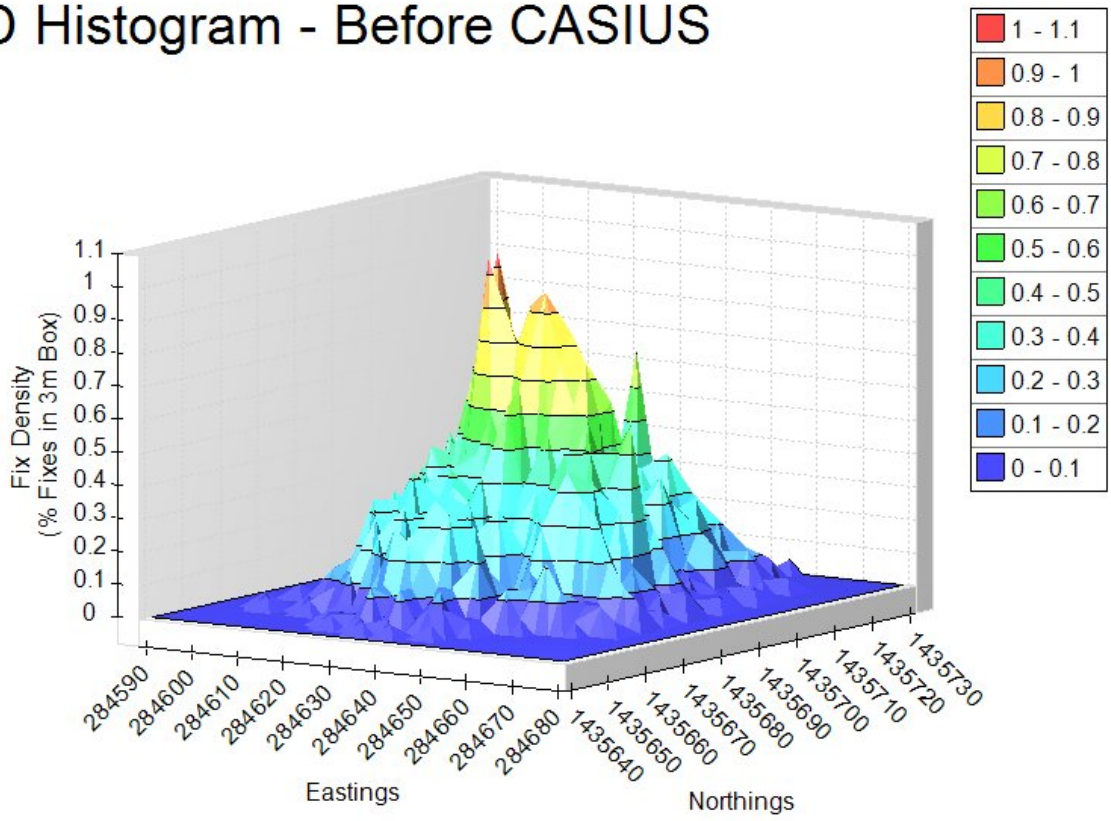
Data used:

Name	Filename	Start	End	#Acoustic	#Position
CASIUS1 03072119	C:\Ranger Files\CASIUS\2016Kurz\CASIUS1 03072119.csv	3/7/2016 21:30:55	3/7/2016 21:47:50	203	1139
CASIUS2 03072147	C:\Ranger Files\CASIUS\2016Kurz\CASIUS2 03072147.csv	3/7/2016 22:06:20	3/7/2016 22:22:56	200	1084
CASIUS3 03072223	C:\Ranger Files\CASIUS\2016Kurz\CASIUS3 03072223.csv	3/7/2016 22:42:26	3/7/2016 22:59:11	201	1084
CASIUS4 03072259	C:\Ranger Files\CASIUS\2016Kurz\CASIUS4 03072259.csv	3/7/2016 23:14:35	3/7/2016 23:31:22	202	1104
CASIUS5 03072331	C:\Ranger Files\CASIUS\2016Kurz\CASIUS5 03072331.csv	3/7/2016 23:49:32	3/8/2016 00:06:13	201	1088
CASIUS6 03080006	C:\Ranger Files\CASIUS\2016Kurz\CASIUS6 03080006.csv	3/8/2016 00:32:10	3/8/2016 00:48:46	200	1057
CASIUS7 03080048	C:\Ranger Files\CASIUS\2016Kurz\CASIUS7 03080048.csv	3/8/2016 01:02:55	3/8/2016 01:19:30	200	1032
CASIUS8 03080119	C:\Ranger Files\CASIUS\2016Kurz\CASIUS8 03080119.csv	3/8/2016 01:38:15	3/8/2016 01:55:04	202	1090
CASIUS9 03080155	C:\Ranger Files\CASIUS\2016Kurz\CASIUS9 03080155.csv	3/8/2016 02:14:55	3/8/2016 02:31:42	202	1101
CASIUS10 03080231	C:\Ranger Files\CASIUS\2016Kurz\CASIUS10 03080231.csv	3/8/2016 02:47:36	3/8/2016 03:04:22	202	1102
CASIUS11 03080304	C:\Ranger Files\CASIUS\2016Kurz\CASIUS11 03080304.csv	3/8/2016 03:20:36	3/8/2016 03:37:13	200	1113
CASIUS12 03080337	C:\Ranger Files\CASIUS\2016Kurz\CASIUS12 03080337.csv	3/8/2016 03:55:08	3/8/2016 04:11:39	199	1074

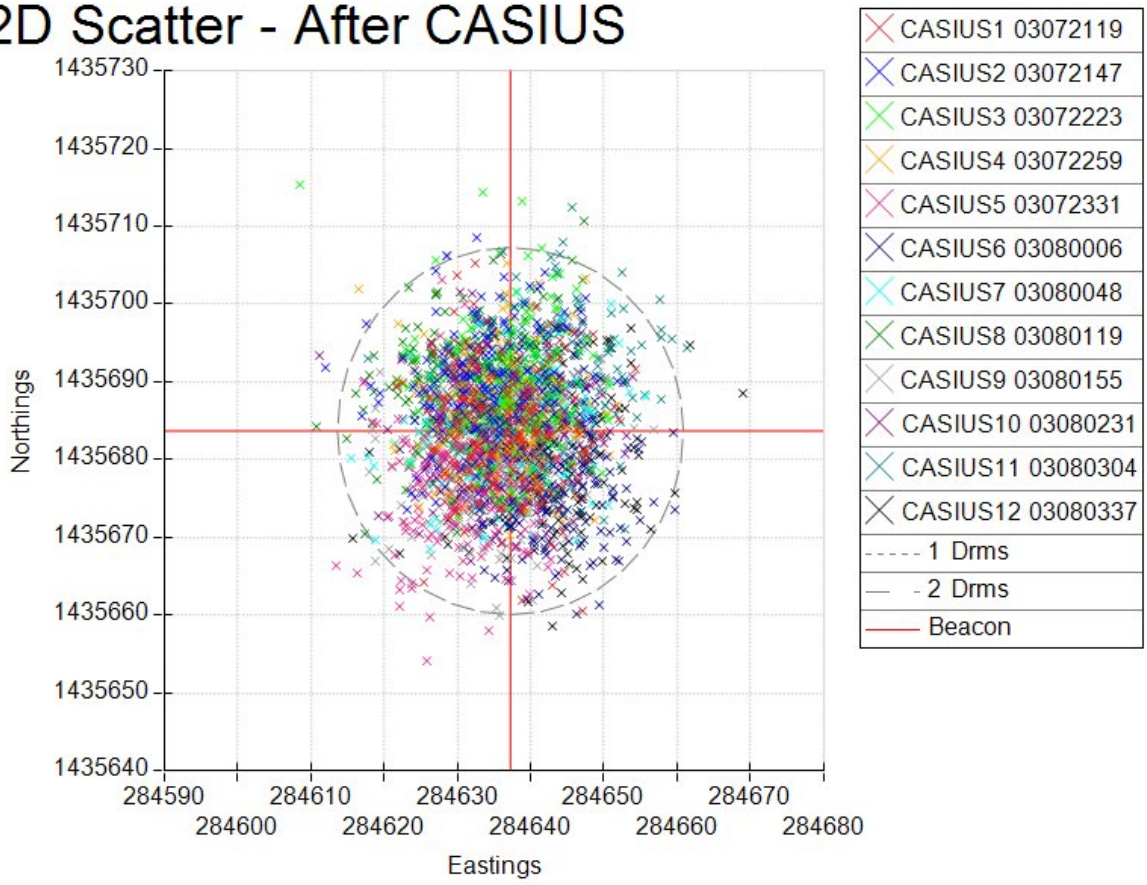
2D Scatter - Before CASIUS



3D Histogram - Before CASIUS



2D Scatter - After CASIUS



3D Histogram - After CASIUS