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# SENTRY OPERATIONS REPORT FOR THE RR2106 RESING CRUISE

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## **WHOI Sentry Operations Group**

Sean Kelley, Isaac Vandor, Matt Silvia, Victor Naklicki, Tim Joyce

Sentry Expedition Leader: Sean Kelley

*R/V Revelle* — Sep 18th through Nov 6th

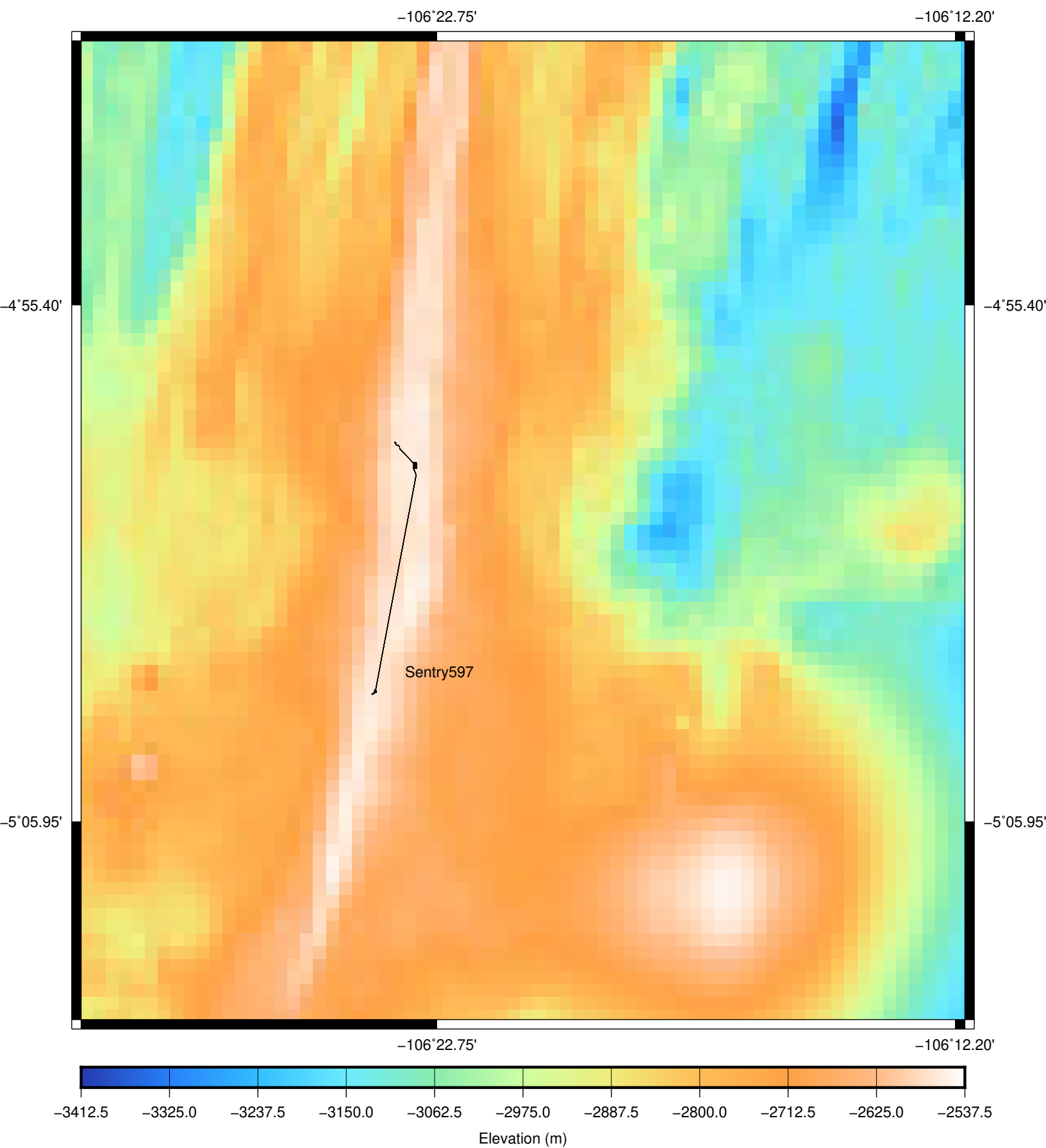
Publication Date: November 2, 2021



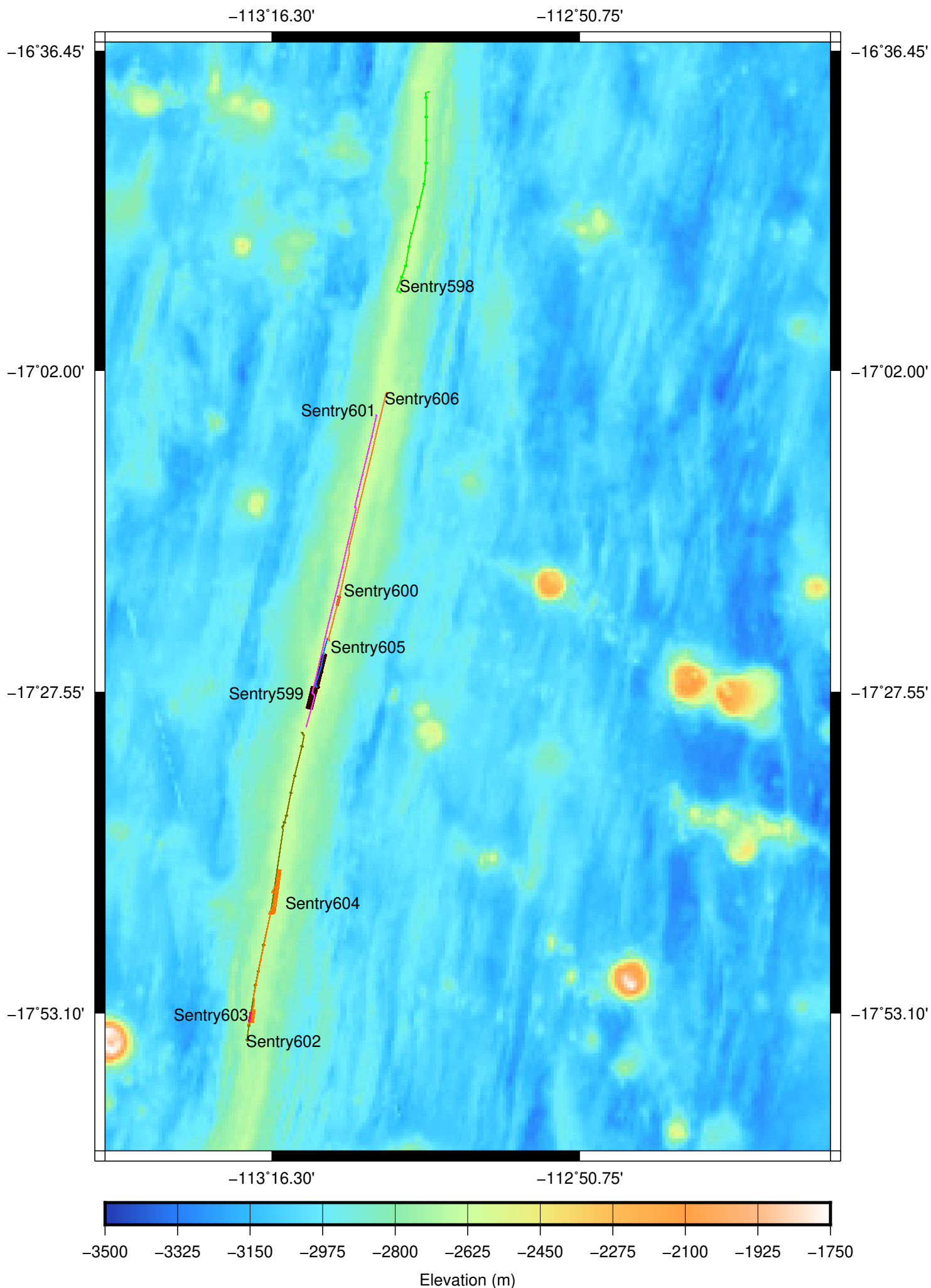
# 1 Summary

This document summarizes operations with the *Sentry* autonomous underwater vehicle (AUV) during the RR2106 Resing 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. The individual dive summaries for Sentry dives 596-606 follow each of these is a free-standing document summarizing the dive.

# Sentry597 at GOFAR fracture zone



2021 Resing cruise map



## 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.

**18 SEP 2021** Departed San Diego for Southern EPR

**19-29 SEP 2021** Transit to GOFAR Fracture zone

**30 SEP 2021** Arrived at GOFAR Fracture Zone

**1 OCT 2021** Deployment of Sentry598 at 15 South GOFAR fracture zone. CTD deployed for tow-yo operations

**2 OCT 2021** Recovery of Sentry598 at 15South, towed along with CTD and captured 20km of trackline on the ridge axis

**3-7 OCT 2021** Transit to 17south work site

**8 OCT 2021** Launched Sentry599 at 17s worksite for a 24 hour dive. CTD ops were conducted 10-15km north of our worksite. Waveglider used during CTD ops.

**9 OCT 2021** Recovered Sentry599 in the morning, a 24 hour dive capturing high level multibeam and three distinct photo surveys. Launch Sentry600 after dinner.

**10 OCT 2021** Recovered Sentry600 in the morning, a 12 hour dive capturing mostly photos at 17s worksite.

**11 OCT 2021** Weather day for Sentry, transited to dive location but weather was not acceptable for a dive.

**12 OCT 2021** Launched Sentry601 for a 12 hour dive. short multibeam survey with roughly 10 hours of camera survey.

**13 OCT 2021** Recovered Sentry601 early morning. Attempted Sentry602 launch but scrubbed due to bad depth sensor.

**14 OCT 2021** Launched Sentry602 in the morning for 24 hour dive, running north to south line.

**15 OCT 2021** Recovered Sentry602.

**16 OCT 2021** Sentry Sentry603, 12 hours of survey capturing multibeam and targeted photo blocks. Recovered late.

**17 OCT 2021** No Sentry Ops

**18 OCT 2021** Deployed Sentry604 for a long duration MB and cam. survey.

**19 OCT 2021** Recovered Sentry605. Attempted Sentry605 launch at midnight but stood down after issues on deck.

**20 OCT 2021** Launch Sentry605 in 2500m of water, short dive to fill gaps in data, recovered afternoon.

**21-23 OCT 2021** CTD ops only due to weather

**24 OCT 2021** Launch Sentry606, along axis 12 hour run filling the gap. Recovered 10pm.

**25 OCT 2021** CTD ops

**26 OCT 2021** Departed station for San Diego started transit

**26 OCT - 6 NOV 2021** Transit to San Diego

## 3 Navigation

All dives were navigated using real time Doppler Velocity Log (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.

### 3.1 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.

### 3.2 USBL Calibration and Performance Notes

A CASIUS calibration of the USBL system **was not** conducted during this cruise.

## 4 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:** Geotraces aframe mounted on the portside of the vessel.
- N.2:** One week isolation before joining the vessel.
- N.3:** Vessel delayed three days due to crew staffing shortages.
- N.4:** Sentry team located in hydrolab.
- N.5:** Jason integrated USBL head used for navigation.
- N.6:** Spare beacon used for CTD casts and should be considered for future cruises.
- N.7:** Waveglider used for tending to Sentry during several dives

## 5 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:** Starboard crane used for Sentry operations
- S.2:** JASON integrated GYRO USBL system used for navigation
- S.3:** Sentry USBL video was fed into ships kvm system such that it could be seen all over the vessel including bridge and CTD station. This was extremely useful.
- S.4:** deck ops on the ship side were marginal. Started with two techs, then switched this up due to a lack of sleep. Vessel tried to accomidate this with marginal success and issues came out of the Sentry605 launch.
- S.5:** Ships crane was greased - with tension removed from wire causing the block to have a slight twist for over half the cruise
- S.6:** Mates were inexperienced with launches and recoveries, requiring the captain to be a part of each launch and recovery.

## 6 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:** Paroscientific depth sensor failed on prediver Sentry602. Depth sensor reported values were jumping all over the place and providing data that was erroneous. Sensor was replaced before going in the water and will be sent back for repair.
- T.2:** 240Khz sidescan showed signs of interference at the outer edges of the data. Unclear what was interfering with the sonar, most likely the 300Khz DVL was causing this issue. Data was not a total loss and this channel was used for atleast half the cruise.
- T.3:** Harmonic servos were swapped out early in the cruise during a weather window. The Harmonic servos required significant attention to make the software integration work. The SAIL servos were installed and used for the remainder of the cruise.
- T.4:** RDF beacon was damaged during the recovery of Sentry600, beyond repair and replaced with spare.
- T.5:** Sentry Main batteries were discharged much to low on Sentry599, we were not able to drive on the surface at the end of the dive. the minimum discharge percentage was changed from 8 to 12 percent.
- T.6:** Joybox for driving Sentry on the surface failed on the launch of Sentry597. Repair included swapping to the spare joybox and moving the position of the antenna. Worked well the remainder of the cruise. This system is end of life and cannot be spared.
- T.7:** micromodem performance was poor throughout the cruise. This was likely due to ship noise and the upgrade to micromodem2 on the vehicle. Additionally we suspect the micromodem ducer on the ship pole is failing and should be replaced.

## 7 Acknowledgments

1. Thank you to NSF for funding this expedition.
2. Thank you to the Captain and crew of the *R/V Revelle* for safe operations and support.

# Sentry 596 Dive Report

## DRAFT



Sean Kelley, Isaac Vandor, Matt Silvia, Victor Naklicki, Tim Joyce

Sentry Expedition Leader: Sean Kelley

## Summary

**Weather:** Deployment: winds light and variable, seas flat  
Recovery: winds light and variable, seas flat

**Reason for end of dive:** Issue with drop weight

## Important Positions

**Dive Origin:** 32 36 -117 -30

**Launch Position:** sentry596 launch position: 32 36.379'N 117 29.505'W

## Narrative

Sentry596 is the first dive of RR2106

This was an engineering dive off the coast of San Diego, using our time waiting on for ships crew members to test Sentry and other systems. After a short two hour transit to 1km of water depth Sentry was launched in the morning. Once on bottom Sentry failed to follow the planned mission and appeared to be stuck on bottom. After troubleshooting through the acoustic comms, Sentry was aborted and brought back up to the surface. Data download and introspection showed the Descent weight failed to release. This dive had no science objectives.

# Special Data Processing Notes

Science data not processed for this dive

## Plots and Images

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

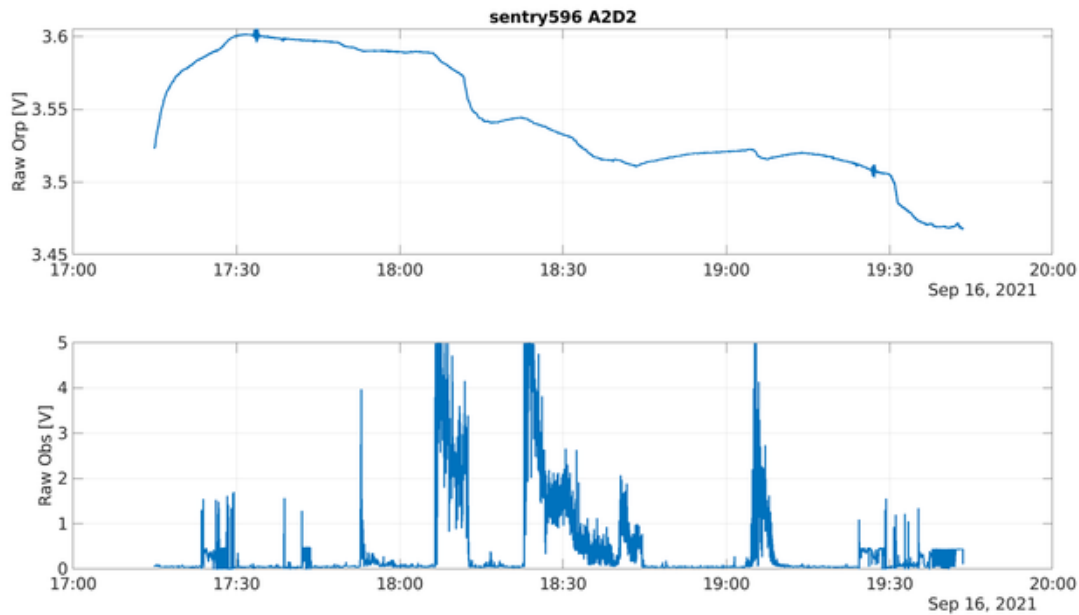


Figure 1: Raw analog Sensor Data

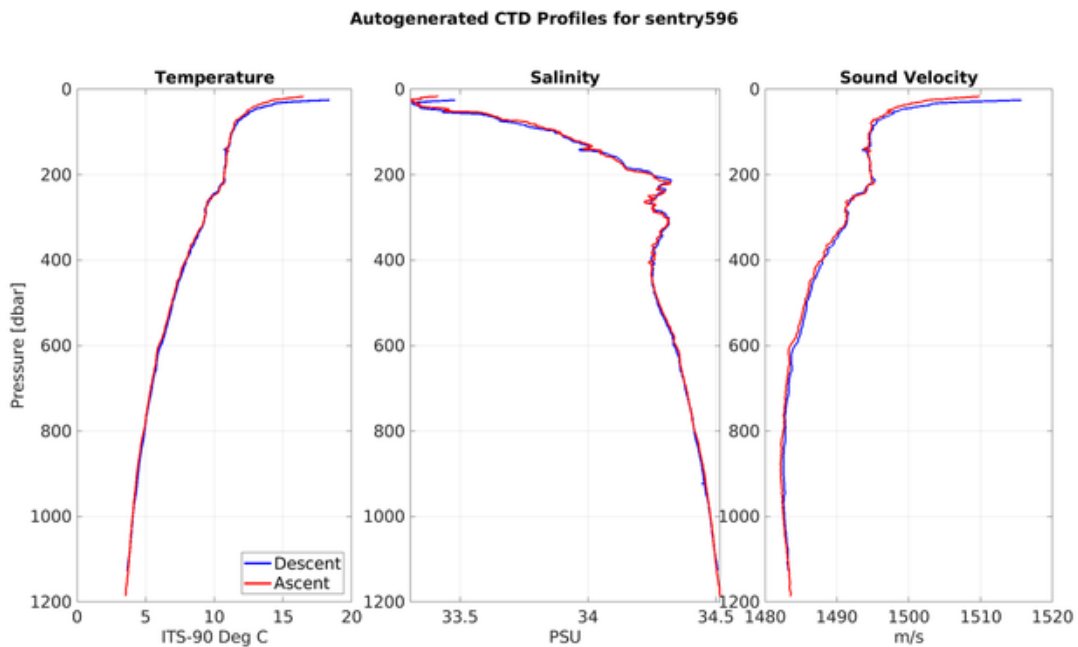
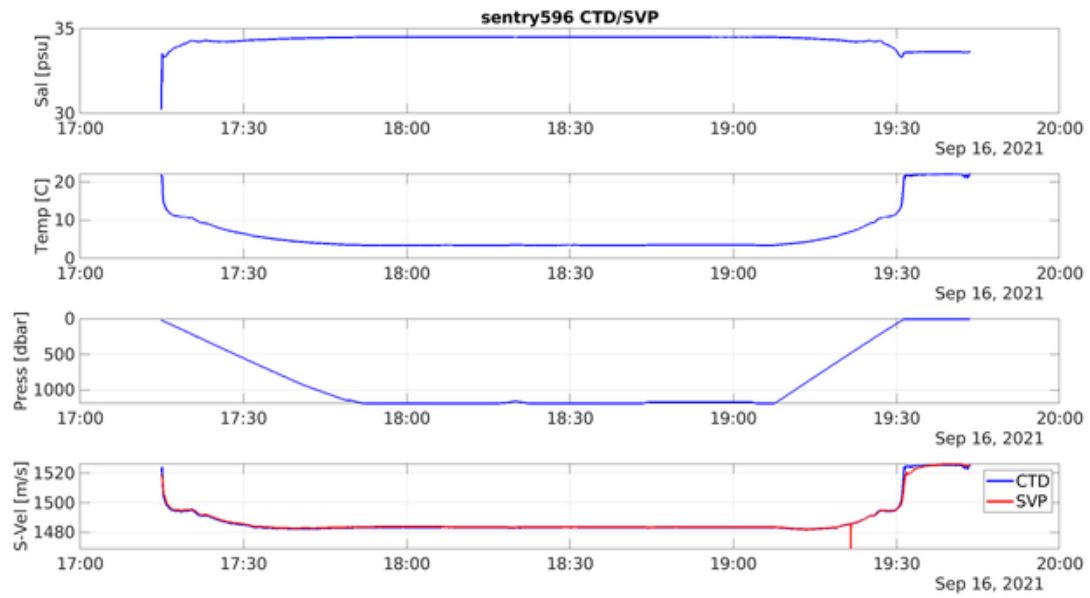
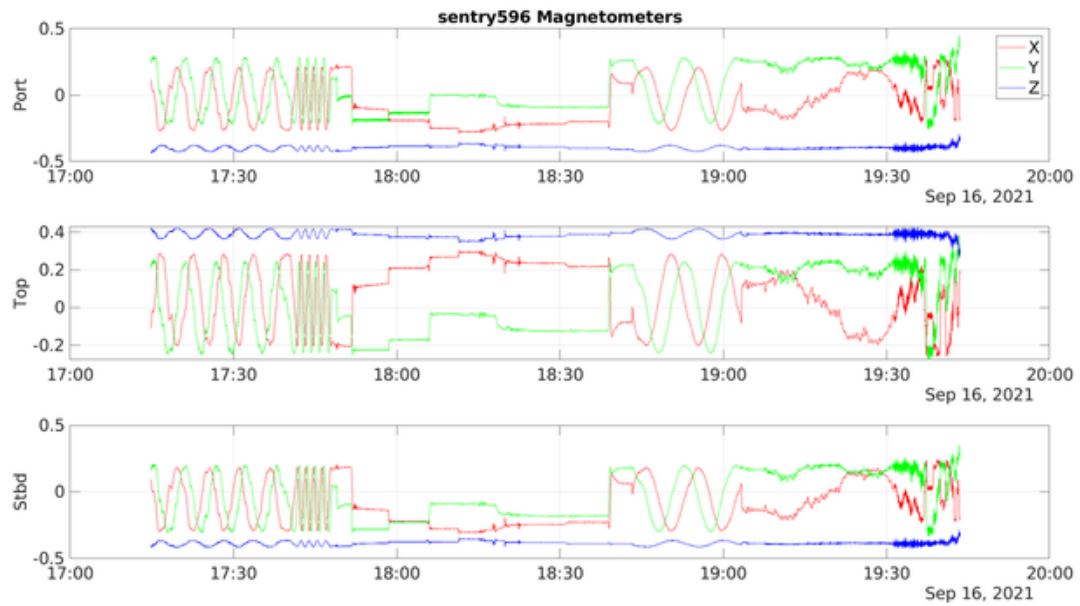


Figure 2: CTD profile sensor data



**Figure 3:** CTD and SVP sensor data



**Figure 4:** Magnetometer data from each of the three magnetometers on Sentry

# Sentry 597 Dive Report

## DRAFT



Sean Kelley, Isaac Vandor, Matt Silvia, Victor Naklicki, Tim Joyce

Sentry Expedition Leader: Sean Kelley

## Summary

**Weather:** Deployment: winds 10 knts, seas confused and 4-5ft  
Recovery: winds 10 knts, seas 4-5 ft

**Reason for end of dive:** End of mission

## Important Positions

**Dive Origin:** -5 -05 -106 -30

**Launch Position:** sentry597 launch position: 05 3.917'S 106 24.485'W

## Narrative

Sentry597 is the second dive of RR2106

Sentry completed roughly 9km of trackline, running south to north along the ridge axis at the GOFAR fracture zone. The beginning of the dive started with the descent processing kicking out of the process before reaching the bottom. This required intervention and commanding Sentry to drive to the bottom from roughly 500m altitude. Once on bottom, Sentry started the mission and ran until the programmed end, with a camera box for a holding station at the end of the mission. The survey line and track proved difficult for the CTD to follow along, requiring the vessel to transit at 1.5 knots towing the CTD, a speed that proved to be too much for the CTD wire. Following the recovery of the CTD, Sentry was recovered soon after.

# Dive Statistics

## 0.1 sentry597 Summary

sentry597 Summary

Origin: -5.083333 -106.500000

Origin: 05 5.000'S 106 30.000'W

Launch: 2021/09/28 17:28:33

Survey start: 2021/09/28 18:37:19

Survey start: Lat:-5.055999 Lon:-106.402434

Survey start: Lat:05 3.360'S Lon:106 24.146'W

Survey end: 2021/09/29 01:52:23

Survey end: Lat:-4.979187 Lon:-106.388421

Survey end: Lat:04 58.751'S Lon:106 23.305'W

Ascent begins: 2021/09/29 01:52:23

On the surface: 2021/09/29 02:44:45

On deck: 2021/09/29 03:18:14

descent rate: 33.1 m/min

ascent rate: 48.7 m/min

survey time: 7.3 hours

deck-to-deck time 9.8 hours

Min survey depth: 2090m

Max survey depth: 2580m

Mean survey depth: 2540m

Mean survey height: 13m

distance travelled: 14.85km

average speed: 0.56m/s

average speed during photo runs: 0.60 m/s over 13.78 km

average speed during multibeam runs: 0.29 m/s over 1.07 km

total vertical during survey: 1566m

Battery energy at launch: 18.0 kwhr

Battery energy at survey start: 17.5 kwhr

Battery energy at survey end: 12.2 kwhr

Battery energy on surface: 12.0 kwhr

Battery energy on deck: 11.6 kwhr

## Sensor Information

### 0.2 sentry597 Devices

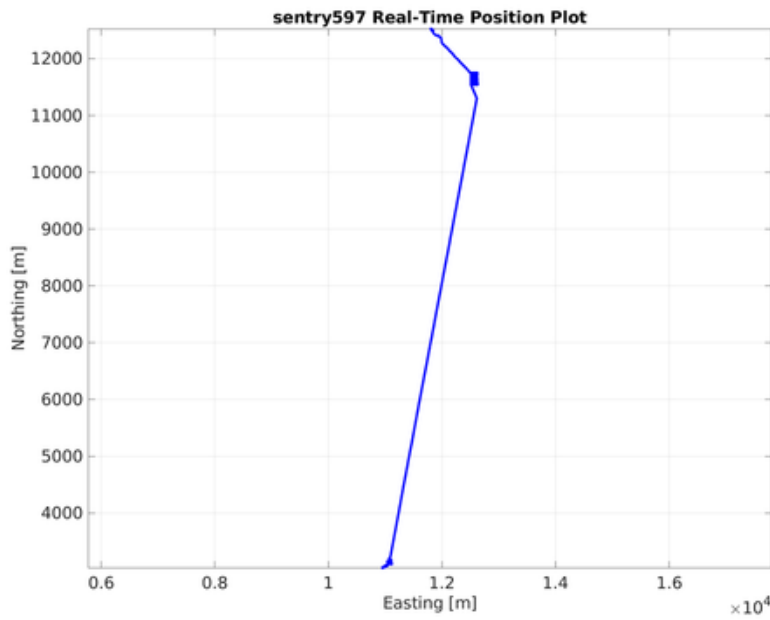
Instrument	Model	Serial Num.	Comments	Config File
USBL	Sonardyne AvTrak2	U00570D		avtrak_20210928_1332.cfg
DVL	RDI Navigator (300kHz)	727-2000-00J	CX: 1, WP: 0	dv1300_20210928_1332.cfg
SAIL	obs A/D	13	A: 5, G: 1.00, O: 0	a2d2-pods_20210928_1332.cfg
	orp A/D	14	A: 3, G: 1.00, O: 0.0024	

## Special Data Processing Notes

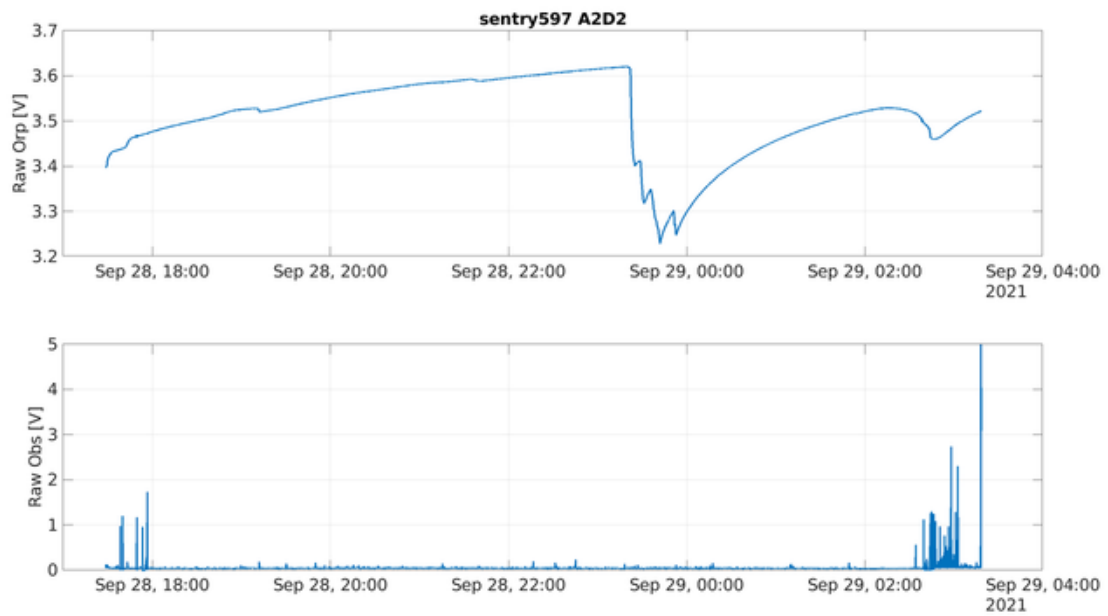
- 400Khz Multibeam collected and processed
- 240Khz and 540Khz sidescan collected and processed

## Plots and Images

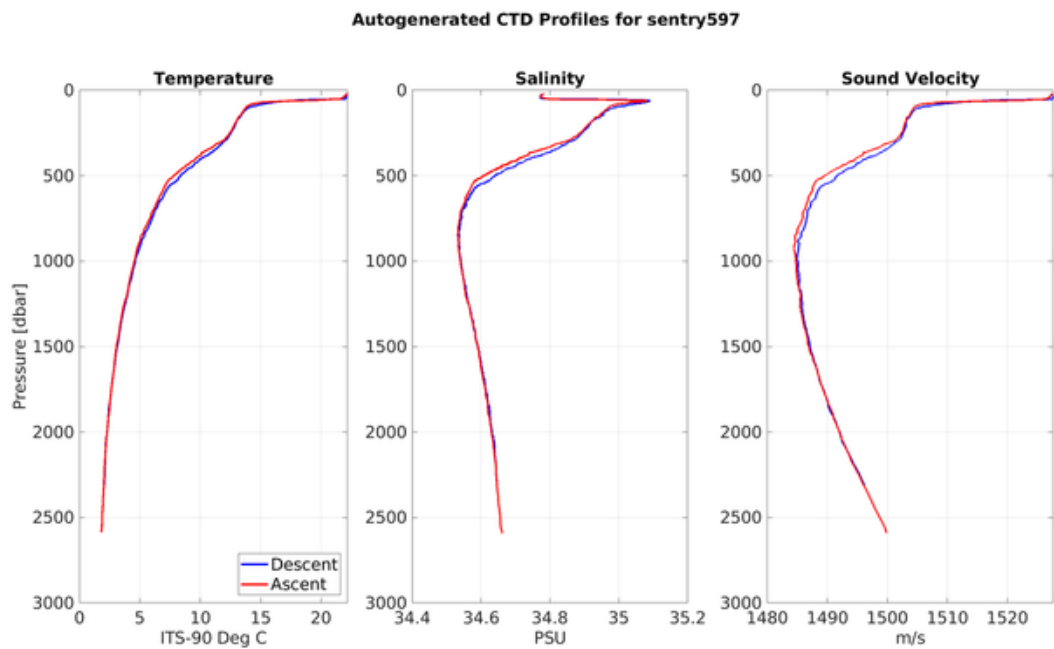
This section contains selected images of data products and plots of vehicle navigation and selected sensors.



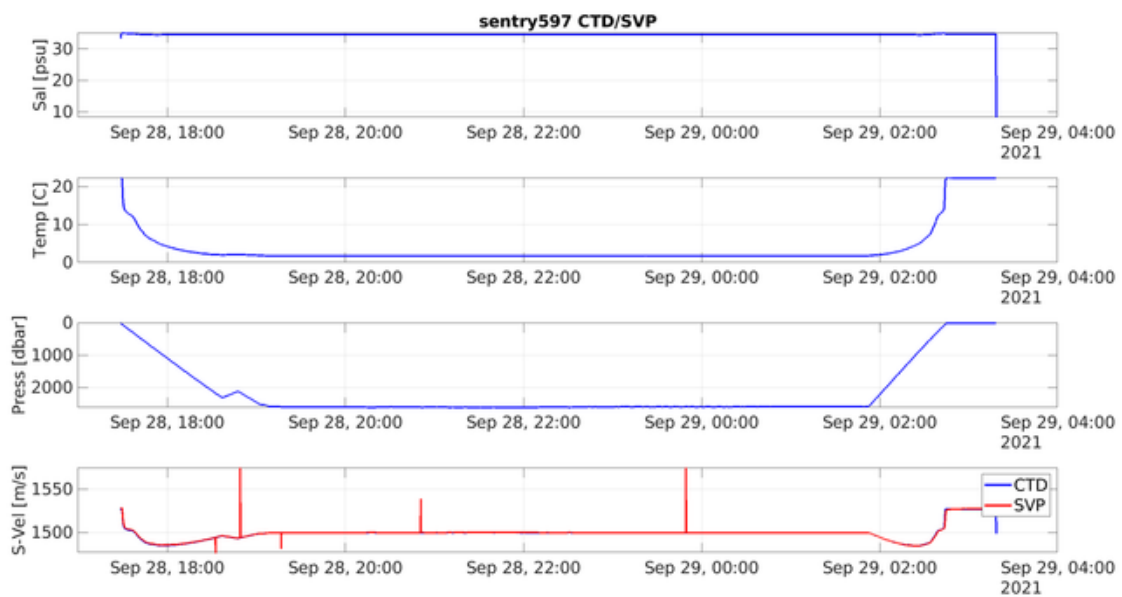
**Figure 5:** Latitude/Longitude plot of Sentry dive 597 based on post-processed navigation



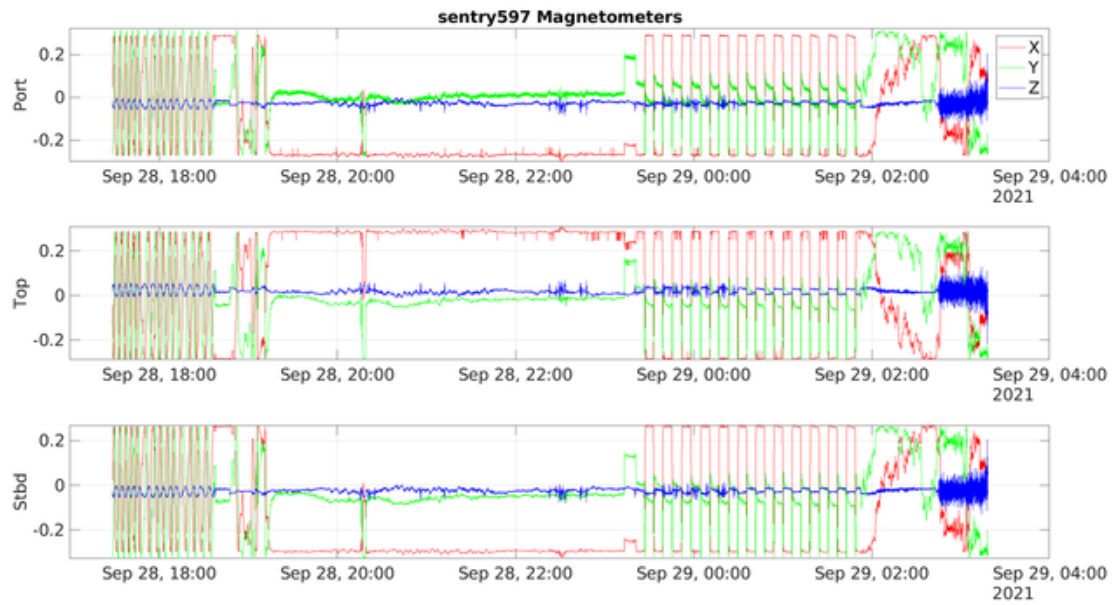
**Figure 6:** Raw analog Sensor Data



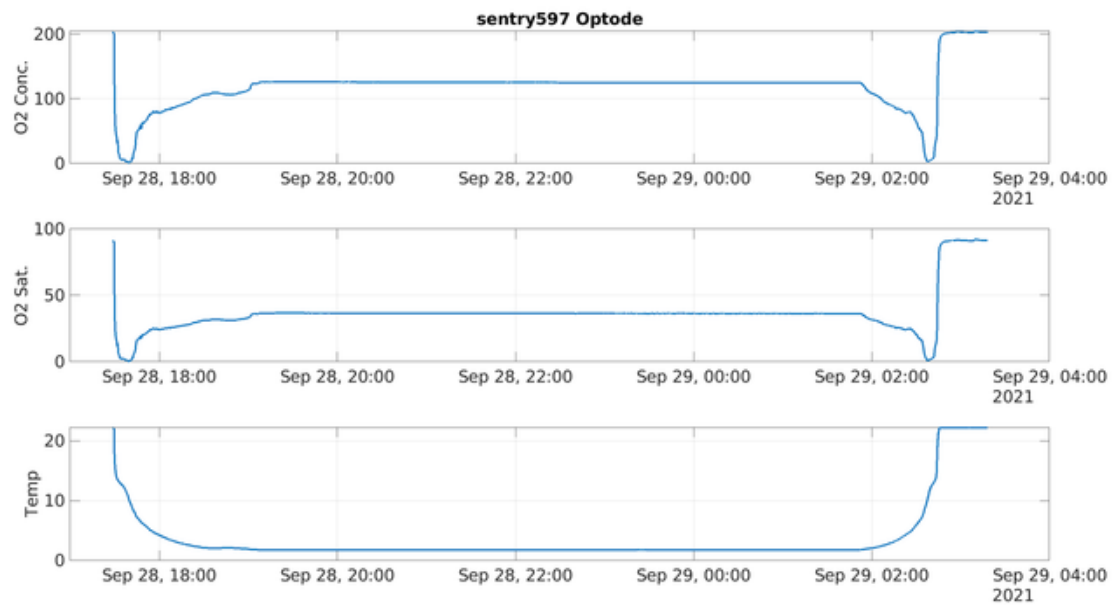
**Figure 7:** CTD profile sensor data



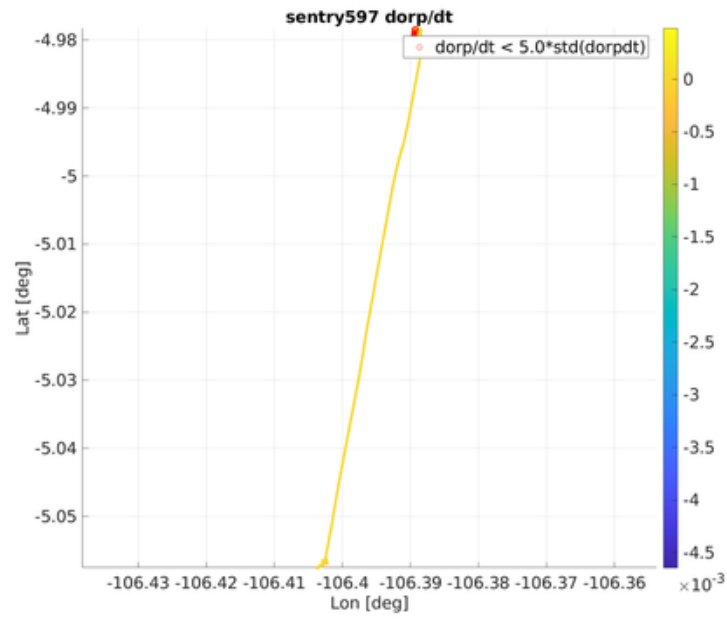
**Figure 8:** CTD and SVP sensor data



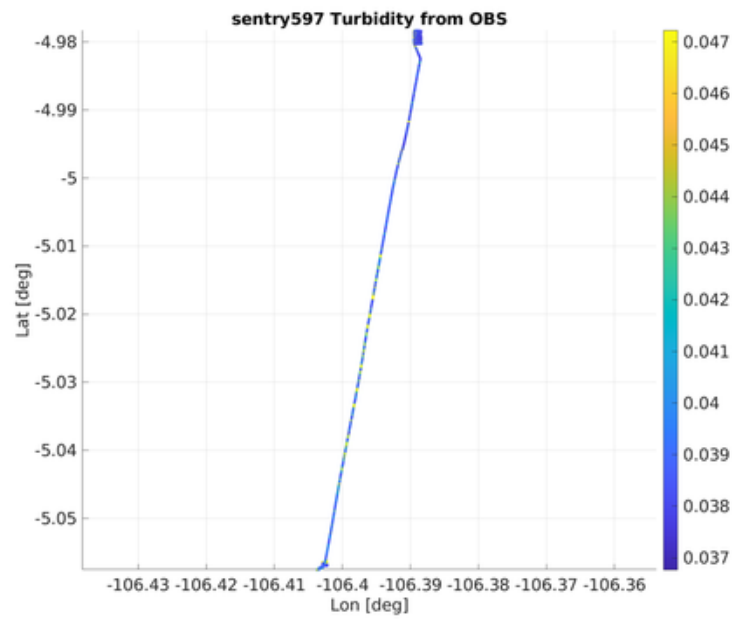
**Figure 9:** Magnetometer data from each of the three magnetometers on Sentry



**Figure 10:** Optode temperature, O2 saturation, and concentration



**Figure 11:** Navigated ORP sensor data.



**Figure 12:** Navigated OBS sensor data.

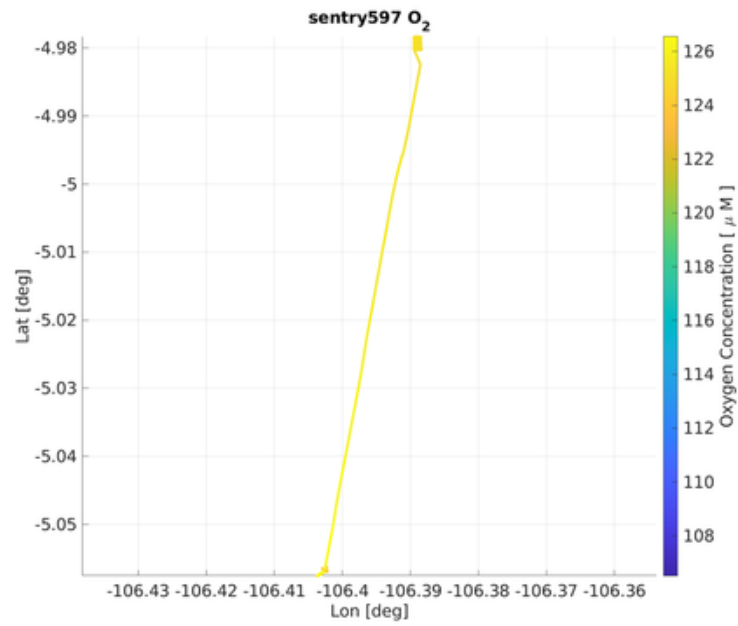


Figure 13: Navigated optode sensor data.

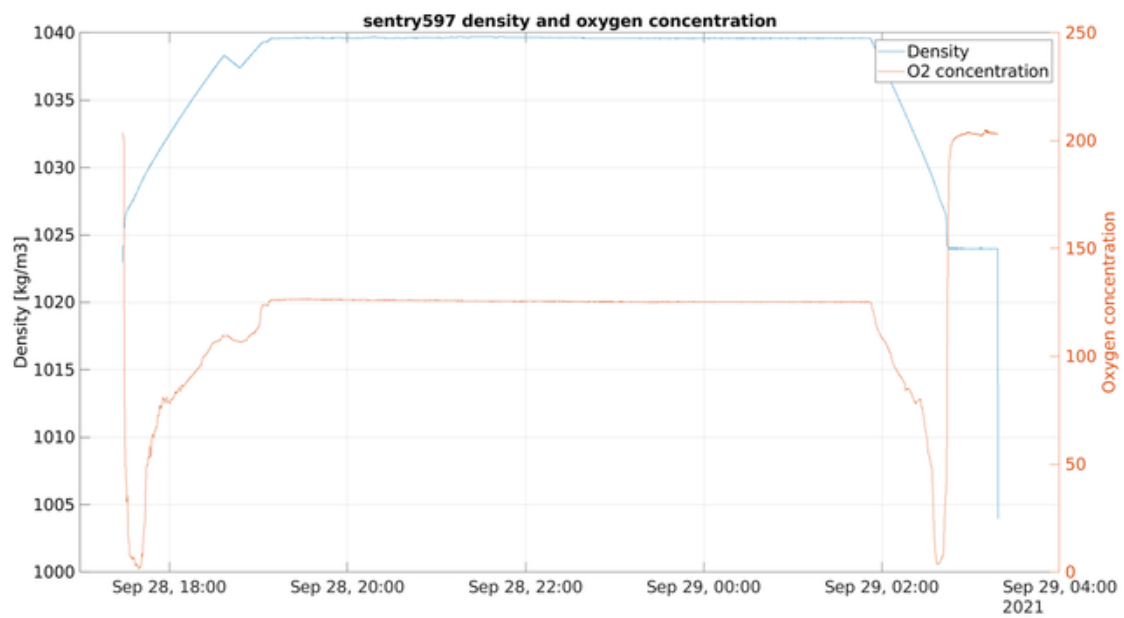


Figure 14: Density and O<sub>2</sub> sensor data.

# Sentry 598 Dive Report

## DRAFT



Sean Kelley, Isaac Vandor, Matt Silvia, Victor Naklicki, Tim Joyce

Sentry Expedition Leader: Sean Kelley

## Summary

**Weather:** Deployment: winds 15 knts, seas confused and 4-6ft  
Recovery: winds 20 knts, seas 5-8 ft

**Reason for end of dive:** Weather

## Important Positions

**Dive Origin:** -16 -58.068 -113 -13.008

**Launch Position:** sentry598 launch position: 16 55.674'S 113 5.696'W

## Narrative

Sentry598 is the third dive of RR2106

Sentry completed roughly 23km of trackline, running south to north along the ridge axis. We were unable to complete the total length of the planned survey (50km) due to deteriorating weather conditions. The survey was planned with 3km segments with a small photo box at the end of each segment. This was to capture images of the seafloor while giving the CTD time to catchup to Sentry. Overall the scheme worked well, the CTD did have some issues keeping up at the 2knot speed when running along axis even with the loop back boxes. The weather was at our limit and made for a difficult recovery. The dive had several ORP indications and a very brief indication of a black smoker plume in one of the photos.

# Dive Statistics

## 0.3 sentry598 Summary

sentry598 Summary

Origin: -16.967800 -113.216800

Origin: 16 58.068'S 113 13.008'W

Launch: 2021/10/03 06:02:53

Survey start: 2021/10/03 07:20:16

Survey start: Lat:-16.926689 Lon:-113.097794

Survey start: Lat:16 55.601'S Lon:113 5.868'W

Survey end: 2021/10/03 22:19:45

Survey end: Lat:-16.664469 Lon:-113.062742

Survey end: Lat:16 39.868'S Lon:113 3.765'W

Ascent begins: 2021/10/03 22:19:45

On the surface: 2021/10/03 23:13:10

On deck: 2021/10/03 23:27:42

descent rate: 32.7 m/min

ascent rate: 49.1 m/min

survey time: 15.0 hours

deck-to-deck time 17.4 hours

Min survey depth: 2532m

Max survey depth: 2649m

Mean survey depth: 2613m

Mean survey height: 14m

distance travelled: 40.42km

average speed: 0.75m/s

average speed during photo runs: 0.50 m/s over 3.64 km

average speed during multibeam runs: 0.78 m/s over 36.78 km

total vertical during survey: 1991m

Battery energy at launch: 18.0 kwhr

Battery energy at survey start: 17.7 kwhr

Battery energy at survey end: 8.9 kwhr

Battery energy on surface: 8.8 kwhr

Battery energy on deck: 8.6 kwhr

## Sensor Information

### 0.4 sentry598 Devices

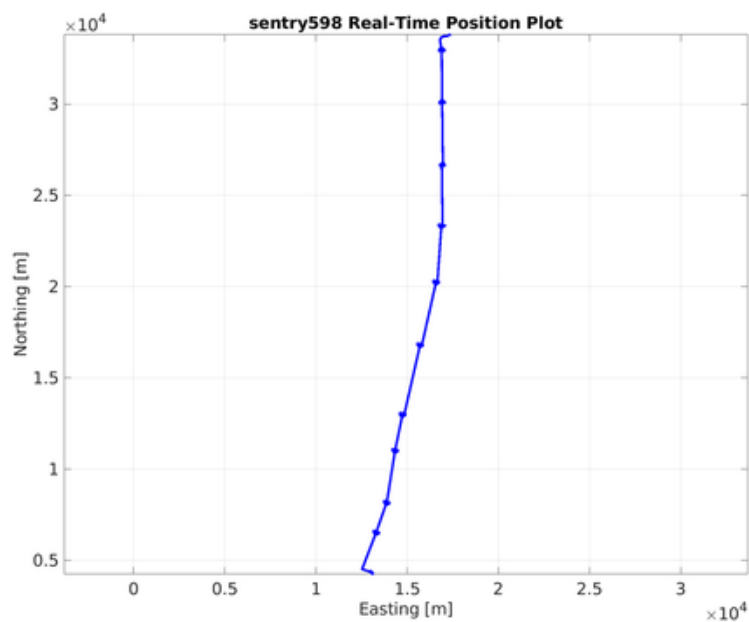
Instrument	Model	Serial Num.	Comments	Config File
USBL	Sonardyne AvTrak2	U00570D		avtrak_20211003.0301.cfg
DVL	RDI Navigator (300kHz)	727-2000-00M	CX: 1, WP: 0	dv1300_20211003.0302.cfg
SAIL	obs A/D	13	A: 5, G: 1.00, O: 0	a2d2-pods_20211003.0302.cfg
	orp A/D	14	A: 3, G: 1.00, O: 0.0024	

## Special Data Processing Notes

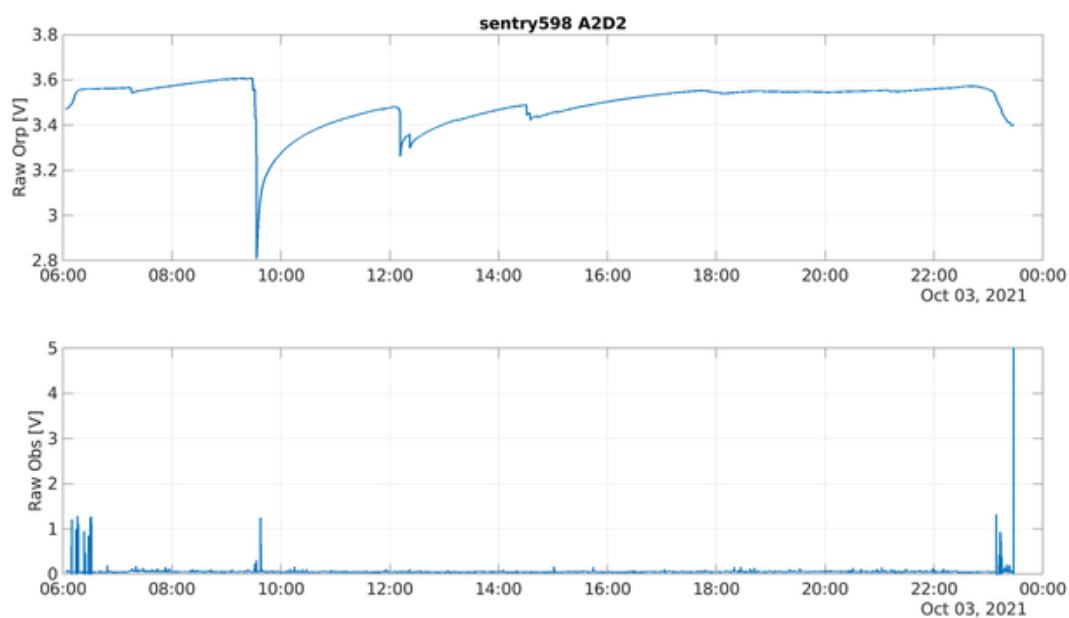
- Multibeam not collected
- 240Khz and 540Khz sidescan collected and processed

## Plots and Images

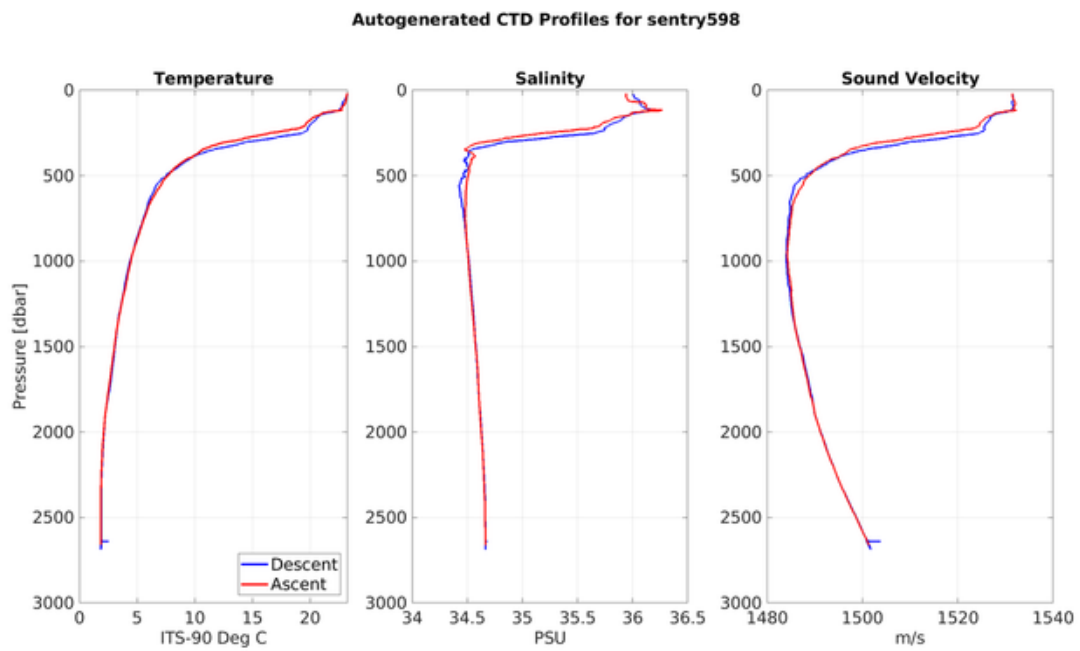
This section contains selected images of data products and plots of vehicle navigation and selected sensors.



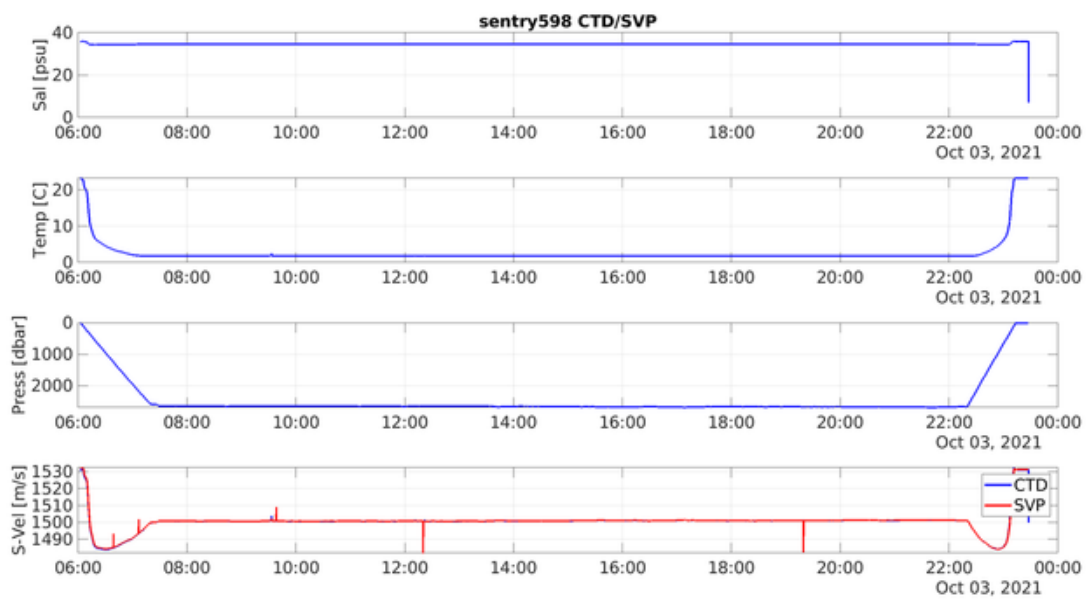
**Figure 15:** Latitude/Longitude plot of Sentry dive 598 based on post-processed navigation



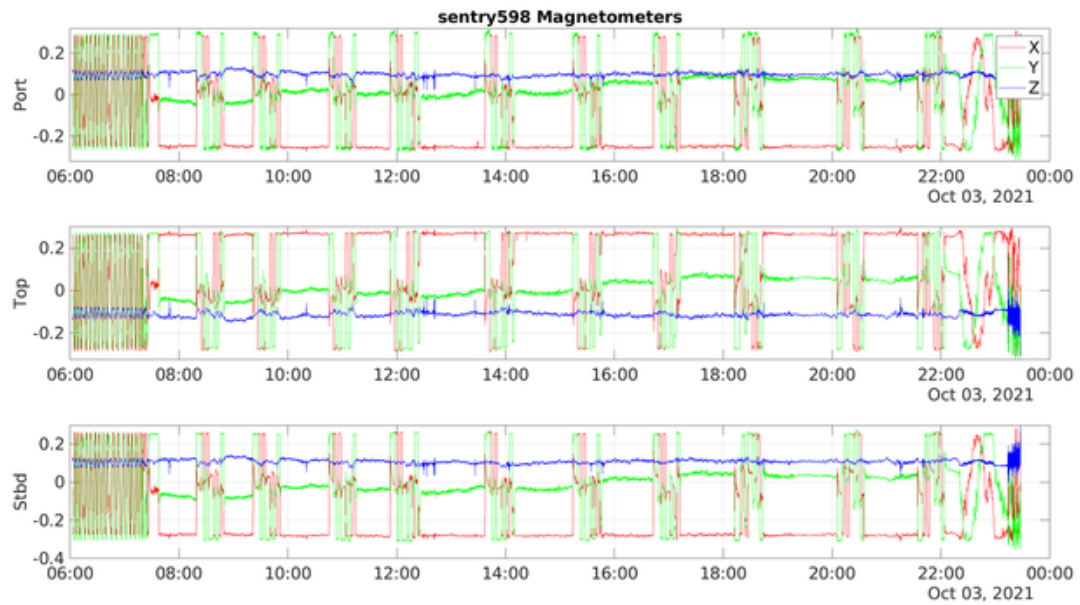
**Figure 16:** Raw analog Sensor Data



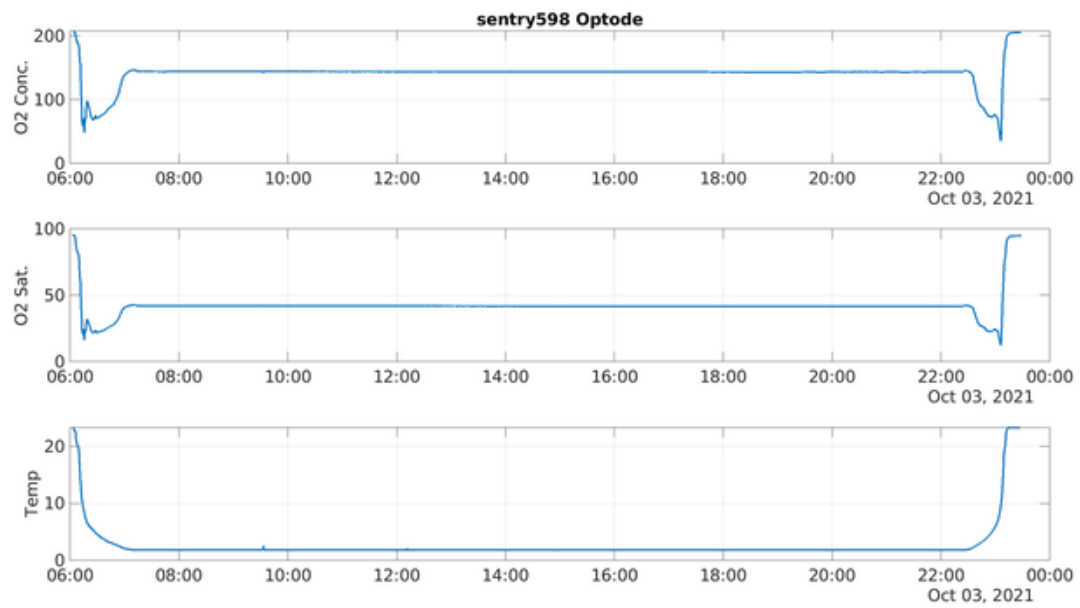
**Figure 17:** CTD profile sensor data



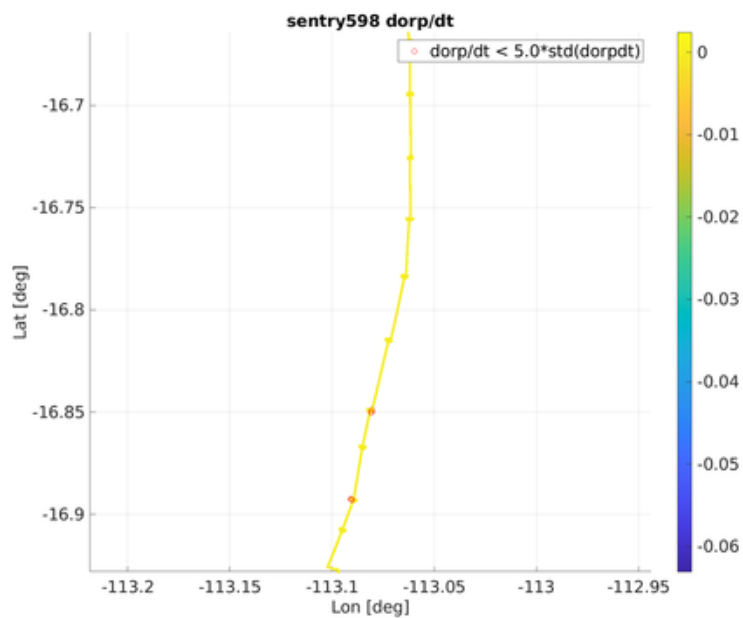
**Figure 18:** CTD and SVP sensor data



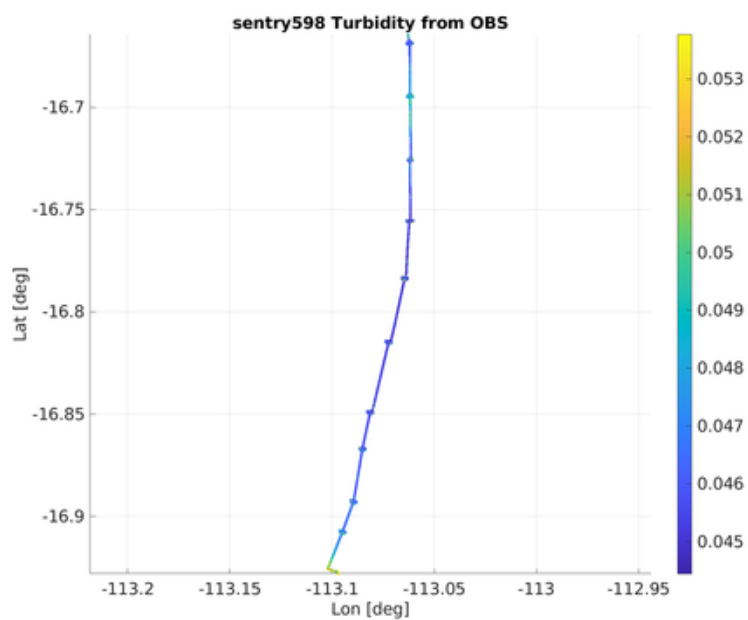
**Figure 19:** Magnetometer data from each of the three magnetometers on Sentry



**Figure 20:** Optode temperature, O2 saturation, and concentration



**Figure 21:** Navigated ORP sensor data.



**Figure 22:** Navigated OBS sensor data.

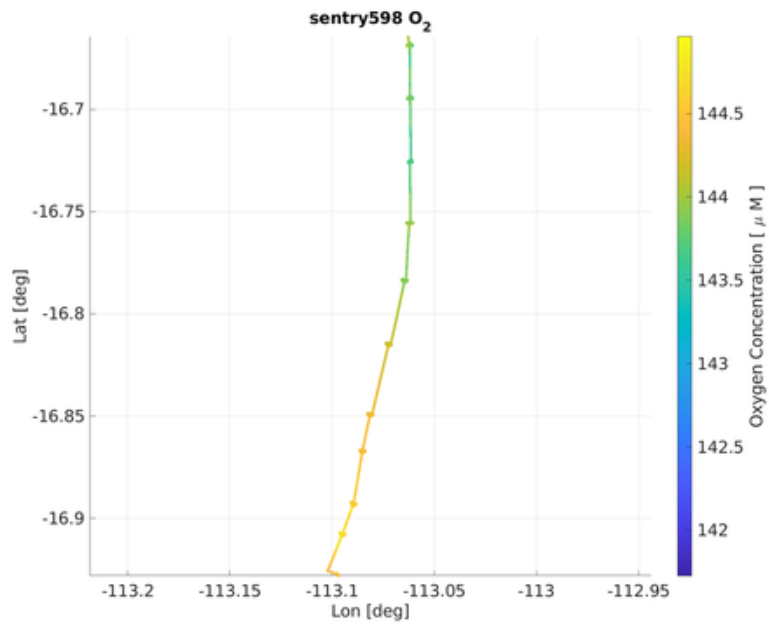


Figure 23: Navigated optode sensor data.

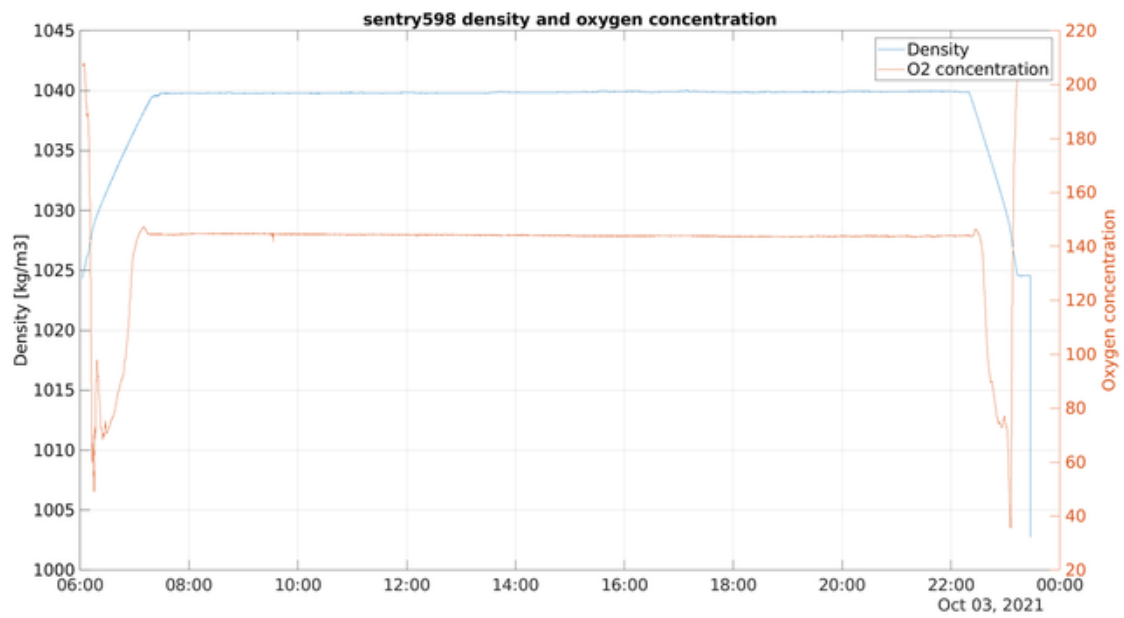


Figure 24: Density and O2 sensor data.

# Sentry 599 Dive Report

## DRAFT



Sean Kelley, Isaac Vandor, Matt Silvia, Victor Naklicki, Tim Joyce

Sentry Expedition Leader: Sean Kelley

## Summary

**Weather:** Deployment: winds 15 knts, seas confused and 3-5ft

Recovery: winds 15 knts, seas 5-8 ft

**Reason for end of dive:** End of mission

## Important Positions

**Dive Origin:** -17 -30 -113 -15

**Launch Position:** sentry599 launch position: 17 24.570'S 113 11.850'W

## Narrative

Sentry599 is the fourth dive of RR2106

Sentry completed both objectives, running for roughly 24 hours on bottom, with three primary survey sites, collecting multibeam over a large area then camera survey in a targeted area. The first survey covered an area of roughly 2km by 0.6km with multibeam, then went for a small 100m x 100m camera box. This survey went well, collecting photos, sidescan and multibeam without any issues. The second box was a 2.9km by 0.6km multibeam survey with another 100m x 100m camera box. Following this survey Sentry went to the third camera box, a final 100m by 100m camera survey before finishing up the dive with a 900m by 3200m multibeam survey. On the surface, we did not have control of the vehicle with the joybox, this is potentially from draining the batteries below their minimum.

# Dive Statistics

## 0.5 sentry599 Summary

sentry599 Summary

Origin: -17.500000 -113.250000

Origin: 17 30.000'S 113 15.000'W

Launch: 2021/10/08 15:11:27

Survey start: 2021/10/08 16:25:37

Survey start: Lat:-17.409089 Lon:-113.198544

Survey start: Lat:17 24.545'S Lon:113 11.913'W

Survey end: 2021/10/09 14:31:28

Survey end: Lat:-17.454392 Lon:-113.208827

Survey end: Lat:17 27.264'S Lon:113 12.530'W

Ascent begins: 2021/10/09 14:31:28

On the surface: 2021/10/09 15:27:17

On deck: 2021/10/09 15:57:43

descent rate: 33.7 m/min

ascent rate: 46.1 m/min

survey time: 22.1 hours

deck-to-deck time 24.8 hours

Min survey depth: 2499m

Max survey depth: 2578m

Mean survey depth: 2532m

Mean survey height: 46m

distance travelled: 63.24km

average speed: 0.79m/s

average speed during photo runs: 0.50 m/s over 11.70 km

average speed during multibeam runs: 0.90 m/s over 51.54 km

total vertical during survey: 3081m

Battery energy at launch: 18.2 kwhr

Battery energy at survey start: 17.7 kwhr

Battery energy at survey end: 1.3 kwhr

Battery energy on surface: 1.0 kwhr

Battery energy on deck: 0.9 kwhr

## Sensor Information

### 0.6 sentry599 Devices

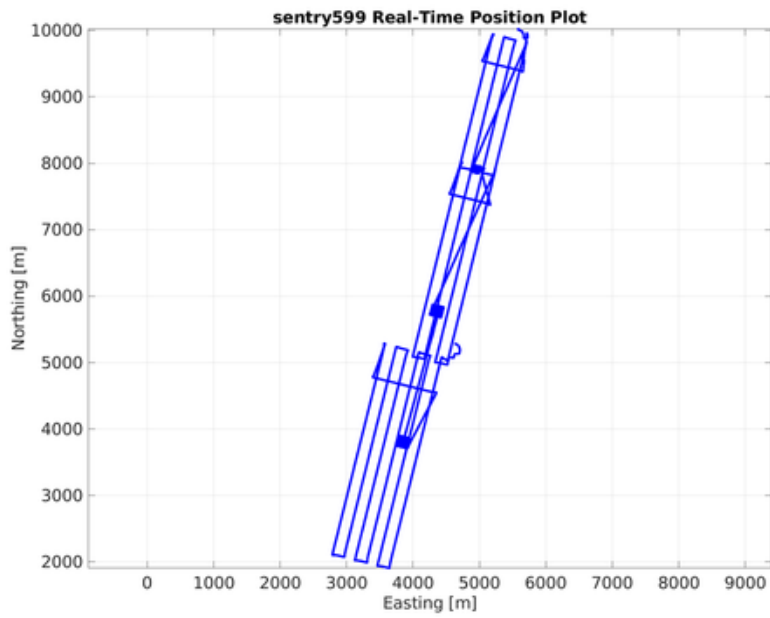
Instrument	Model	Serial Num.	Comments	Config File
USBL	Sonardyne AvTrak2	U00570D		avtrak_20211008.1247.cfg
DVL	RDI Navigator (300kHz)	727-2000-00M	CX: 1, WP: 0	dv1300_20211008.1248.cfg
SAIL	obs A/D	13	A: 5, G: 1.00, O: 0	a2d2-pods_20211008.1248.cfg
	orp A/D	14	A: 3, G: 1.00, O: 0.0024	

## Special Data Processing Notes

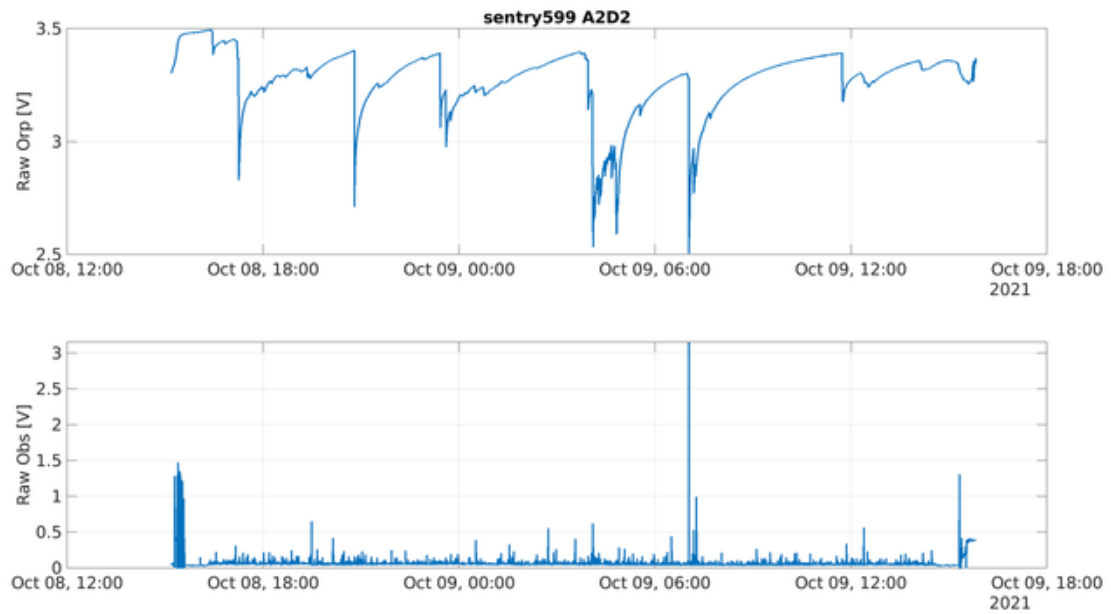
- 400Khz Multibeam collected and processed
- Sidescan 240Khz and 540Khz collected and processed

## Plots and Images

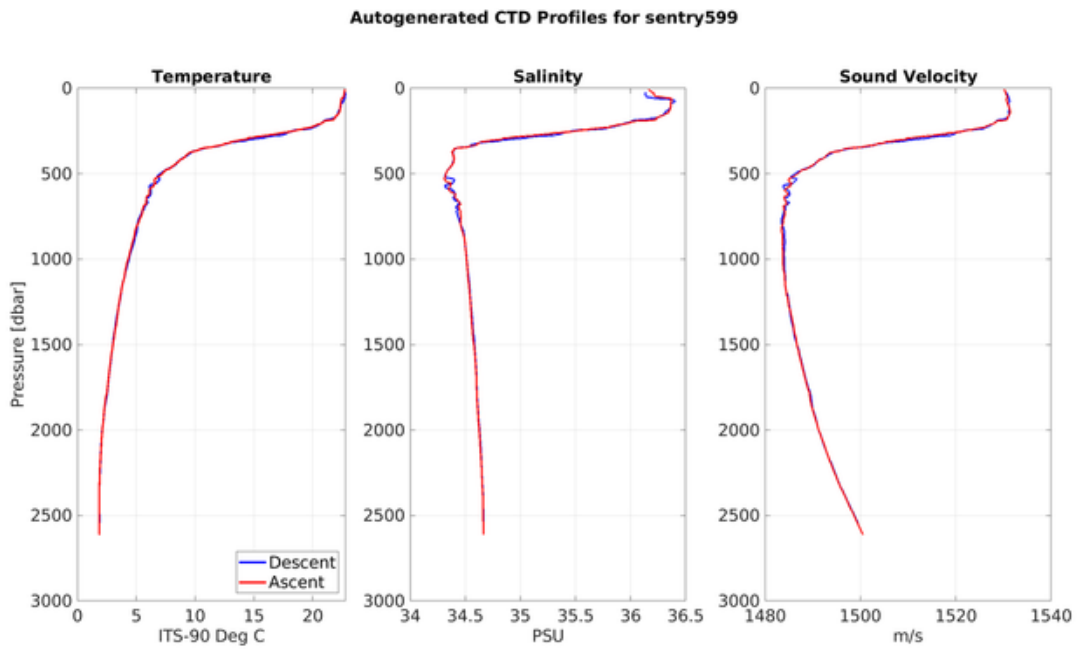
This section contains selected images of data products and plots of vehicle navigation and selected sensors.



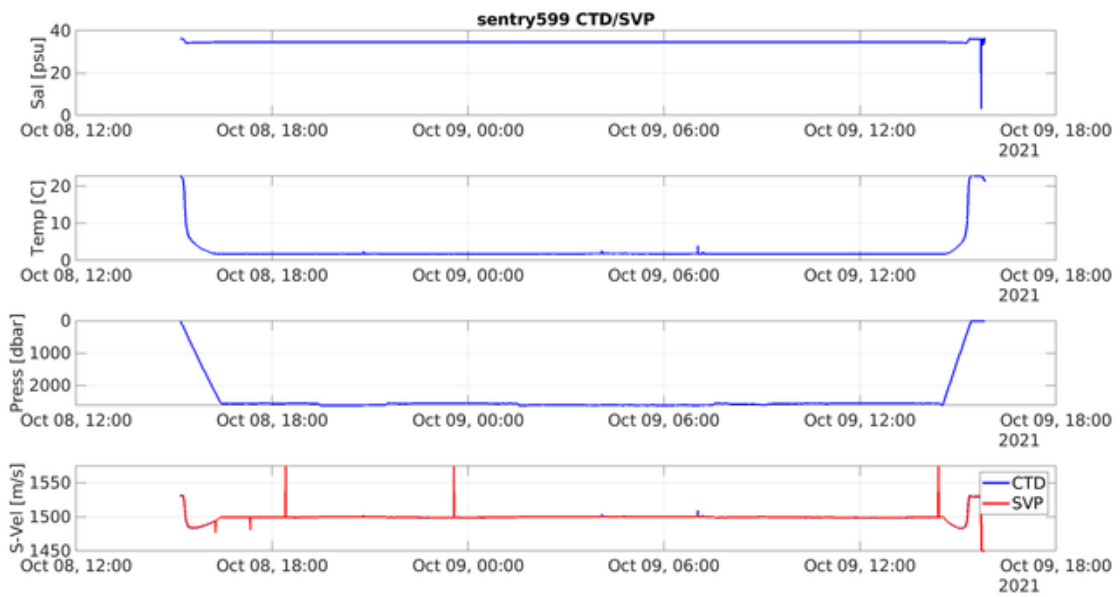
**Figure 25:** Latitude/Longitude plot of Sentry dive 599 based on post-processed navigation



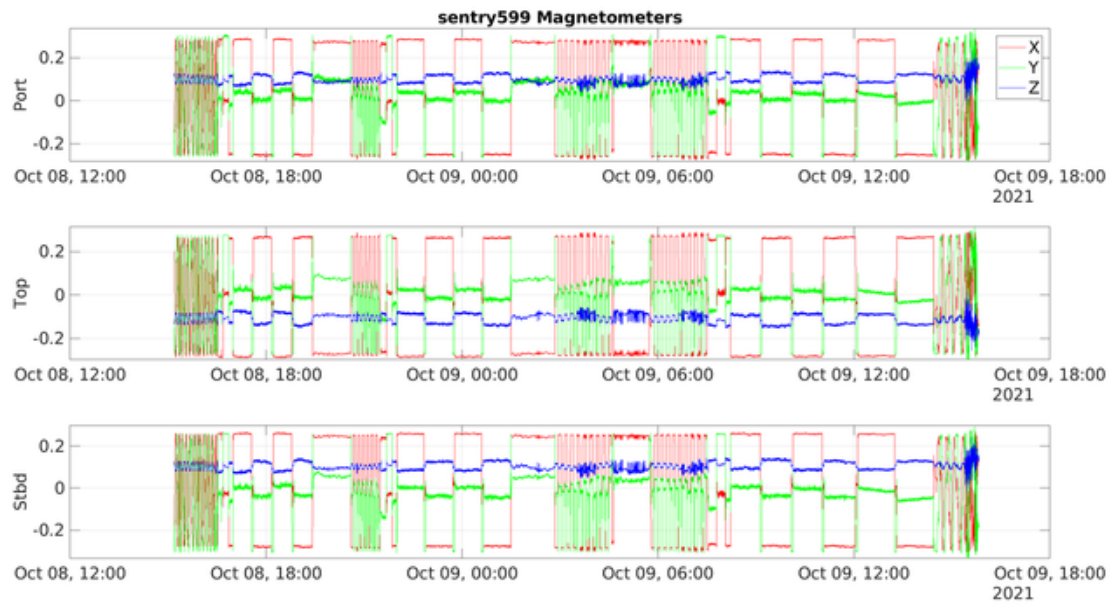
**Figure 26:** Raw analog Sensor Data



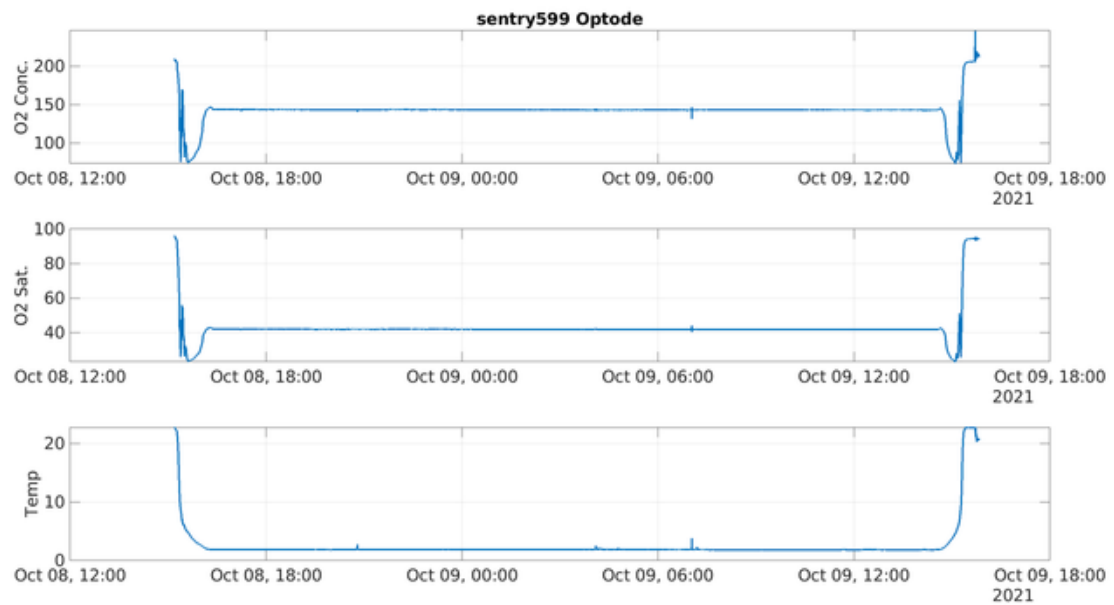
**Figure 27:** CTD profile sensor data



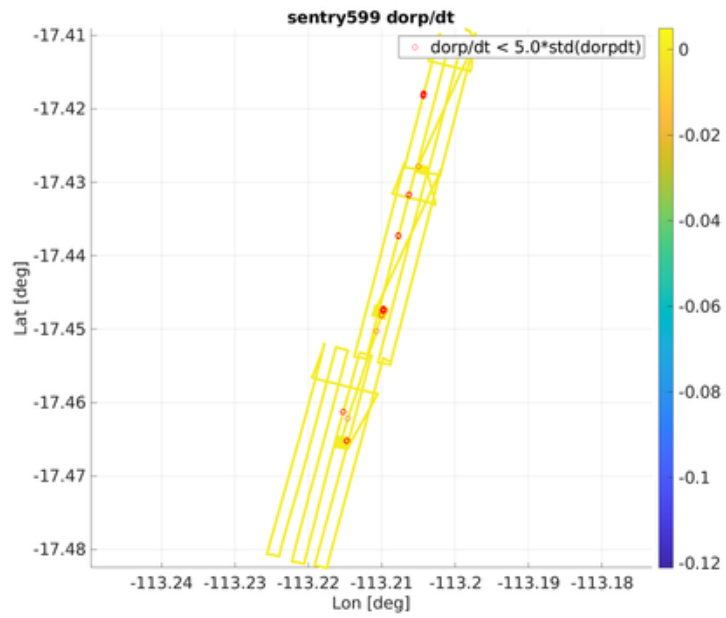
**Figure 28:** CTD and SVP sensor data



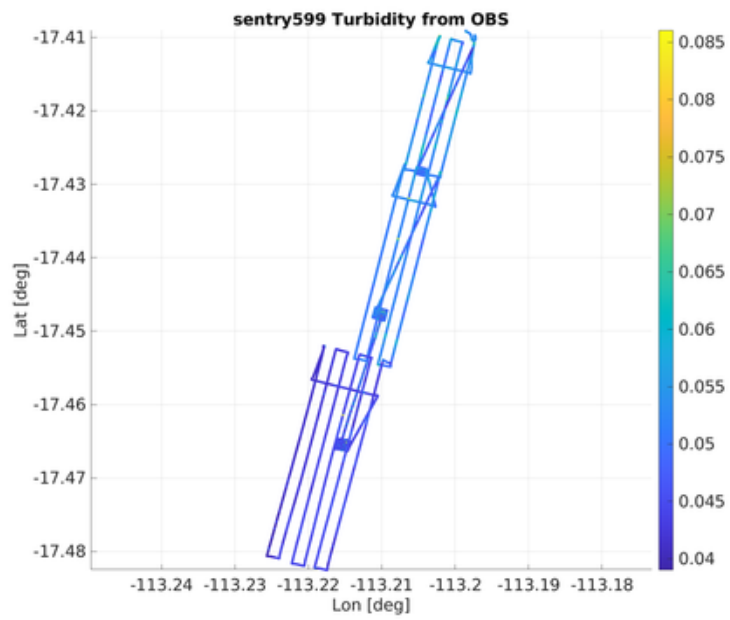
**Figure 29:** Magnetometer data from each of the three magnetometers on Sentry



**Figure 30:** Optode temperature, O2 saturation, and concentration



**Figure 31:** Navigated ORP sensor data.



**Figure 32:** Navigated OBS sensor data.

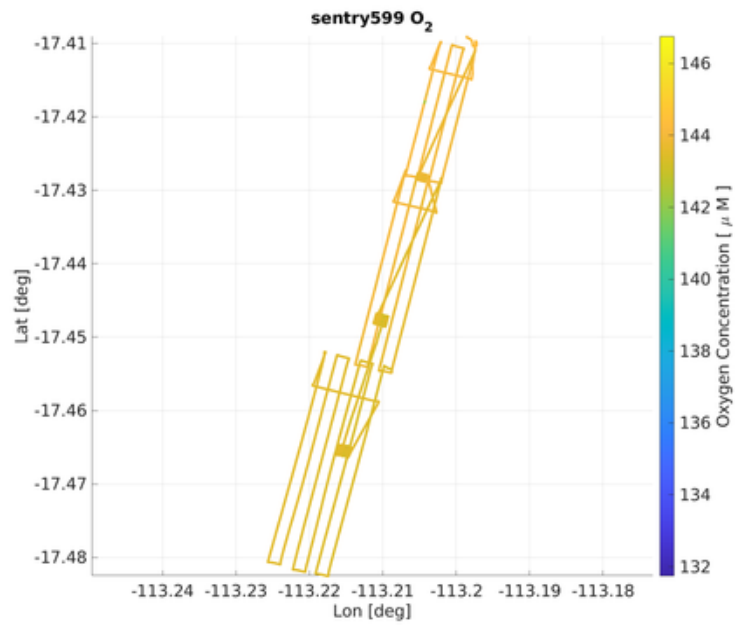


Figure 33: Navigated optode sensor data.

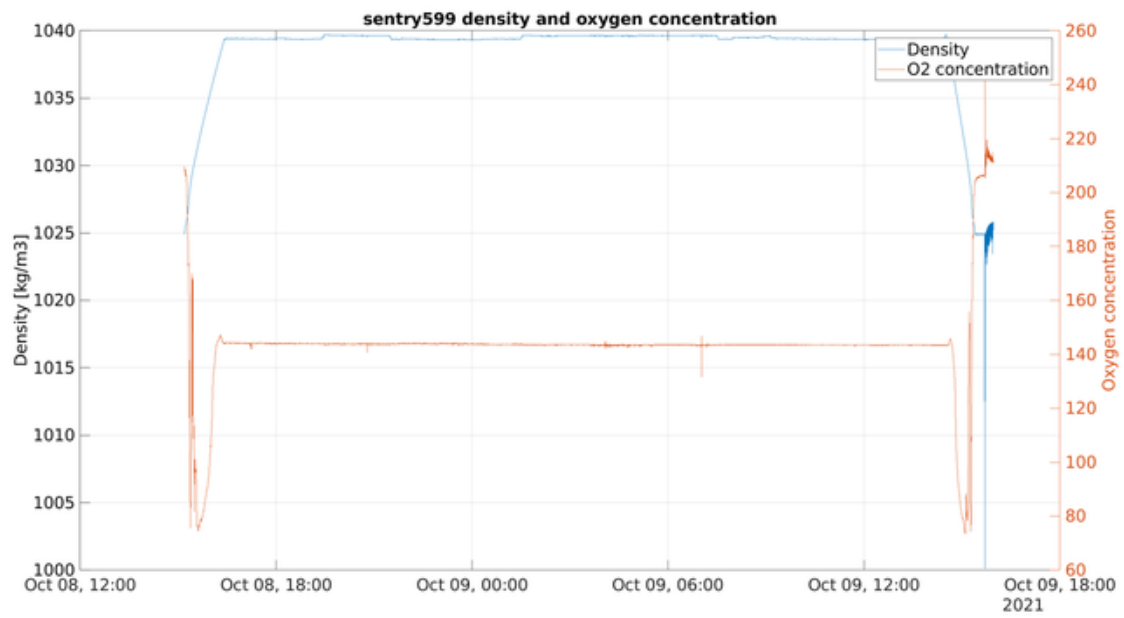


Figure 34: Density and O2 sensor data.

# Sentry 600 Dive Report

## DRAFT



Sean Kelley, Isaac Vandor, Matt Silvia, Victor Naklicki, Tim Joyce

Sentry Expedition Leader: Sean Kelley

## Summary

**Weather:** Deployment: winds 15 knts, seas confused and 3-5ft  
Recovery: winds 15 knts, seas 5-8 ft

**Reason for end of dive:** End of mission plan

## Important Positions

**Dive Origin:** -17 -25 -113 -15

**Launch Position:** sentry600 launch position: 17 19.964'S 113 10.788'W

## Narrative

Sentry600 is the fifth dive of RR2106

Sentry was programmed to complete two multibeam lines over 1km length, then use the remaining time to capture low altitude camera survey. Both items completed without any issues, capturing over 11k photos that showed signs of low temp venting. Vehicle systems worked well. Multibeam and sidescan captured at 65m altitude, sidescan set to 120Khz and 540Khz.

# Dive Statistics

## 0.7 sentry600 Summary

sentry600 Summary

Origin: -17.416667 -113.250000

Origin: 17 25.000'S 113 15.000'W

Launch: 2021/10/10 02:25:56

Survey start: 2021/10/10 03:40:32

Survey start: Lat:-17.331818 Lon:-113.180773

Survey start: Lat:17 19.909'S Lon:113 10.846'W

Survey end: 2021/10/10 14:55:47

Survey end: Lat:-17.333591 Lon:-113.178003

Survey end: Lat:17 20.015'S Lon:113 10.680'W

Ascent begins: 2021/10/10 14:55:47

On the surface: 2021/10/10 15:50:46

On deck: 2021/10/10 16:06:60

descent rate: 33.9 m/min

ascent rate: 47.2 m/min

survey time: 11.3 hours

deck-to-deck time 13.7 hours

Min survey depth: 2524m

Max survey depth: 2603m

Mean survey depth: 2589m

Mean survey height: 13m

distance travelled: 22.01km

average speed: 0.54m/s

average speed during photo runs: 0.50 m/s over 18.43 km

average speed during multibeam runs: 0.96 m/s over 3.59 km

total vertical during survey: 1988m

Battery energy at launch: 14.0 kwhr

Battery energy at survey start: 13.5 kwhr

Battery energy at survey end: 6.1 kwhr

Battery energy on surface: 5.9 kwhr

Battery energy on deck: 5.8 kwhr

## Sensor Information

### 0.8 sentry600 Devices

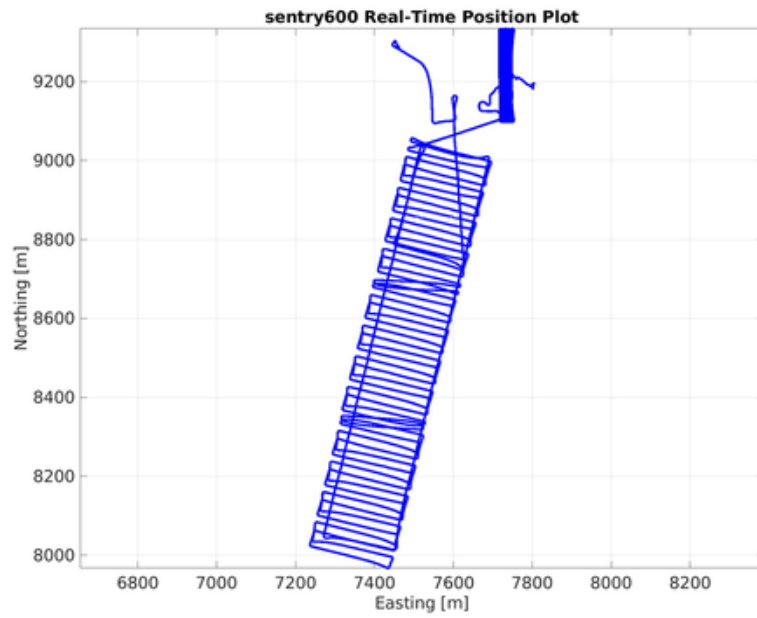
Instrument	Model	Serial Num.	Comments	Config File
USBL	Sonardyne AvTrak2	U00570D		avtrak_20211010.0037.cfg
DVL	RDI Navigator (300kHz)	727-2000-00M	CX: 1, WP: 0	dv1300_20211010.0038.cfg
SAIL	obs A/D	13	A: 5, G: 1.00, O: 0	a2d2-pods_20211010-0038.cfg
	orp A/D	14	A: 3, G: 1.00, O: 0.0024	

## Special Data Processing Notes

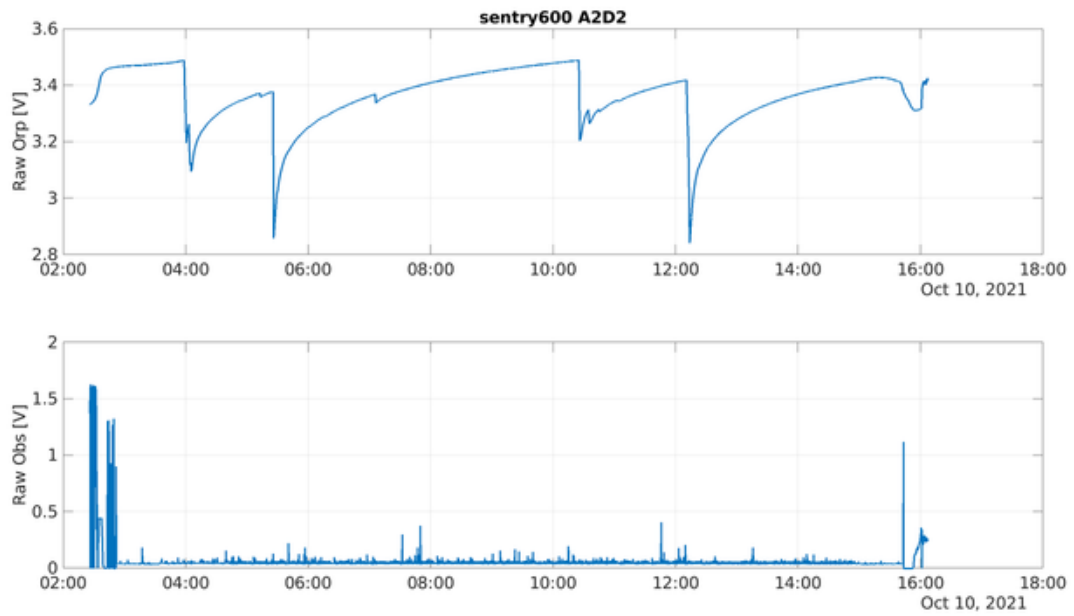
- 400Khz Multibeam collected and processed
- 120Khz and 540Khz sidescan collected and processed

## Plots and Images

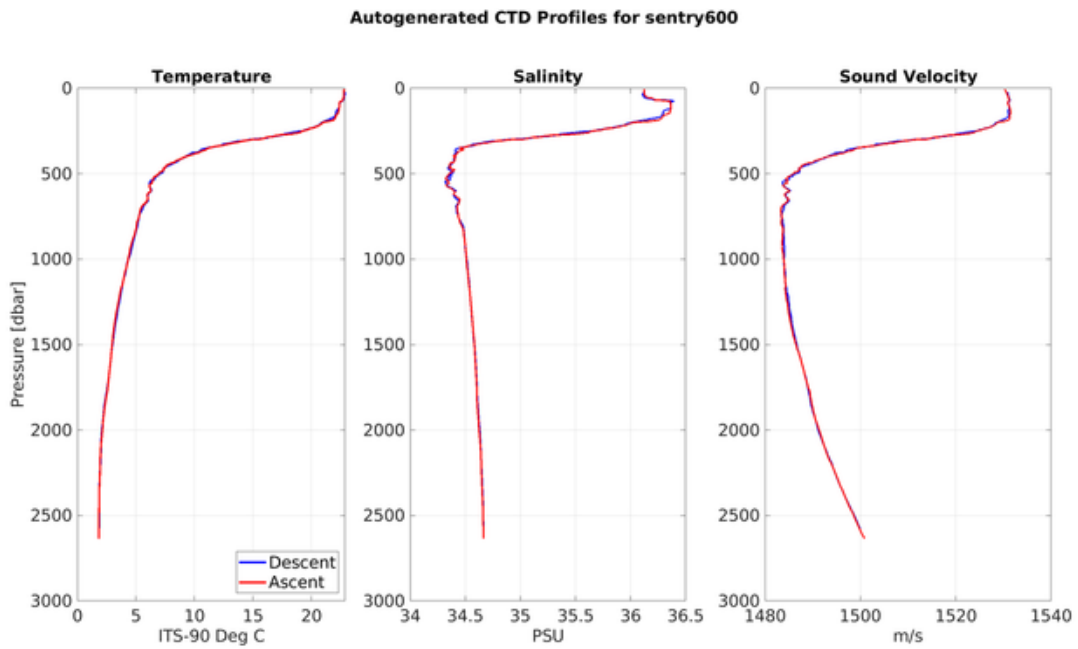
This section contains selected images of data products and plots of vehicle navigation and selected sensors.



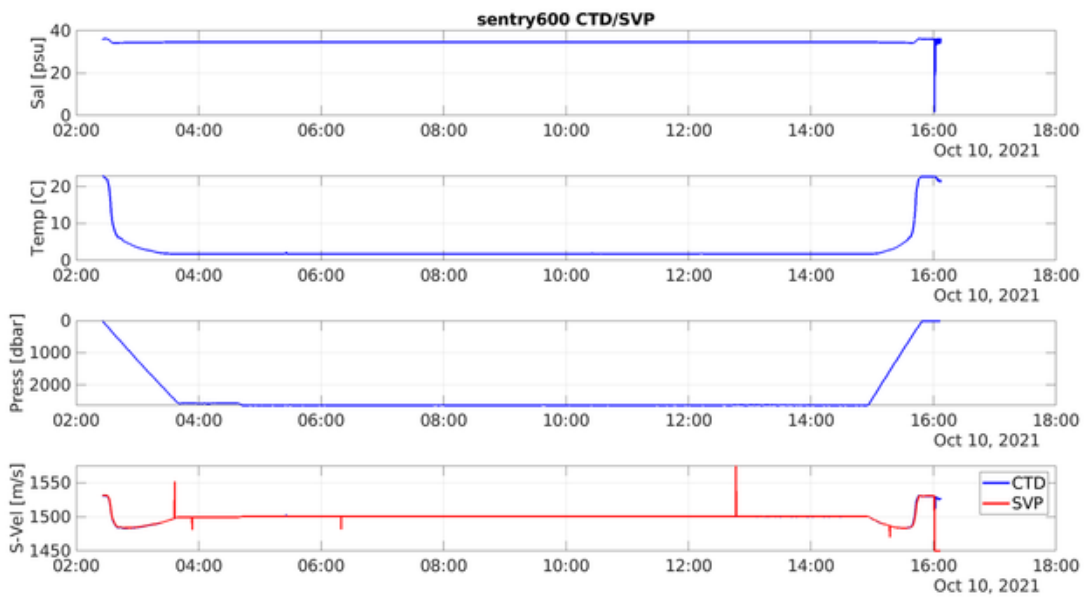
**Figure 35:** Latitude/Longitude plot of Sentry dive 600 based on post-processed navigation



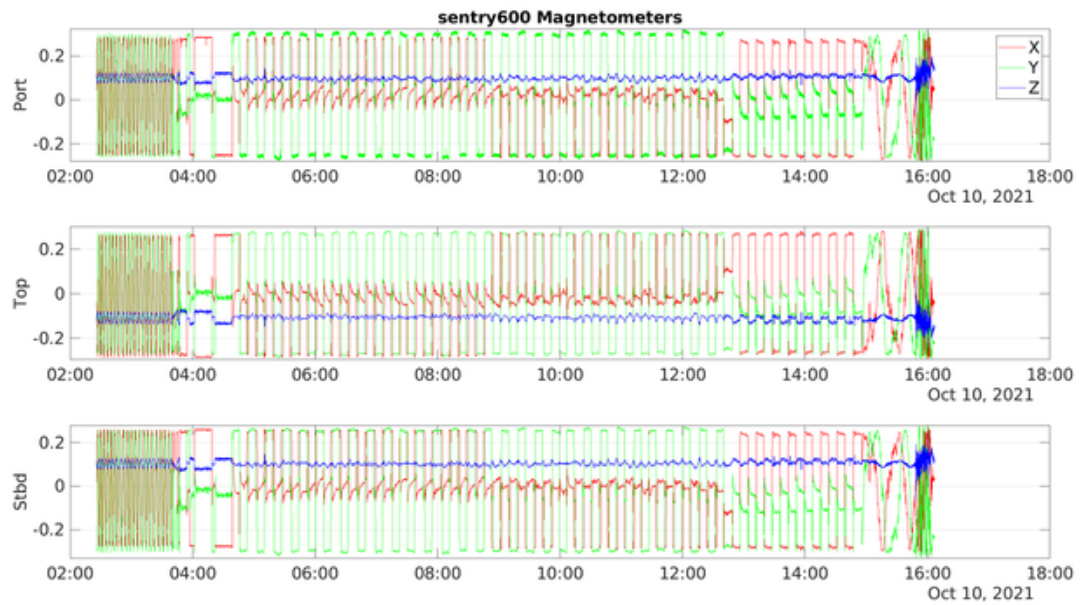
**Figure 36:** Raw analog Sensor Data



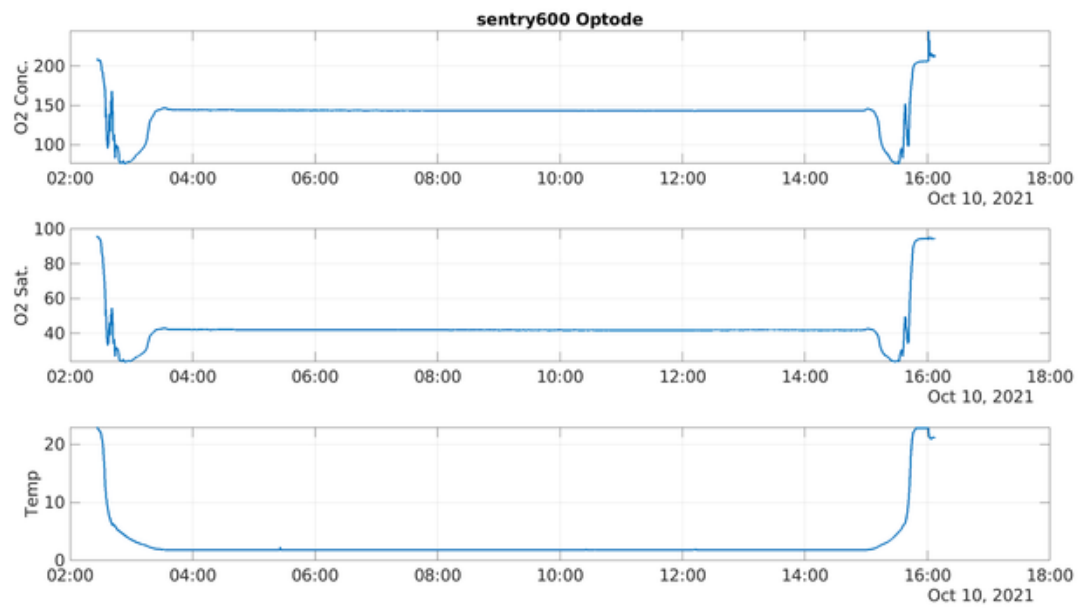
**Figure 37:** CTD profile sensor data



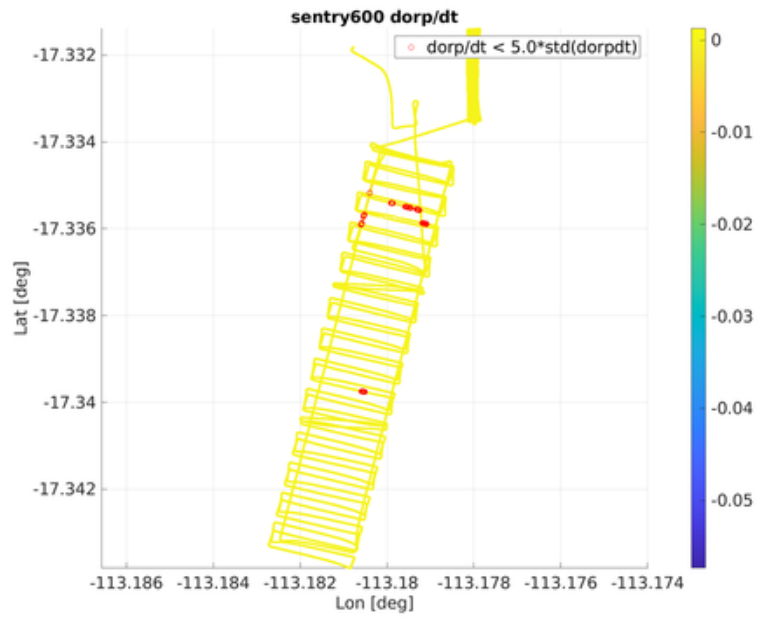
**Figure 38:** CTD and SVP sensor data



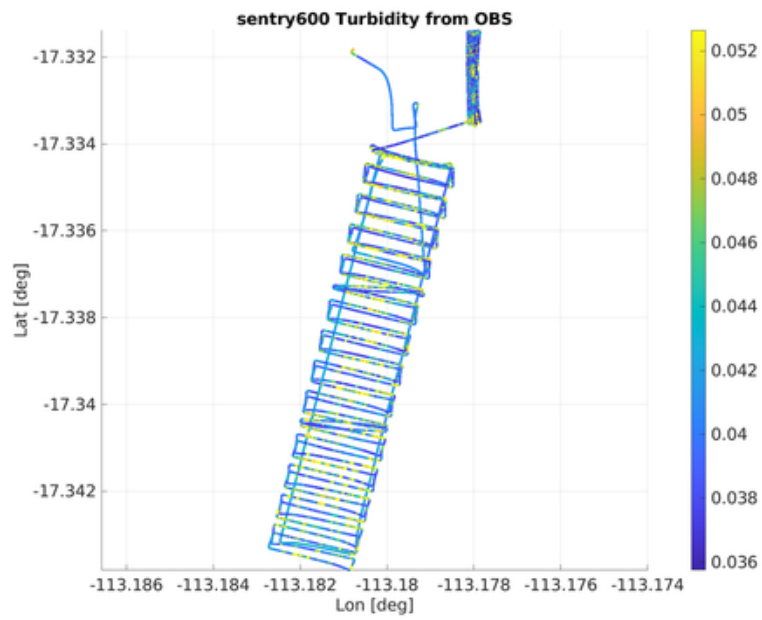
**Figure 39:** Magnetometer data from each of the three magnetometers on Sentry



**Figure 40:** Optode temperature, O2 saturation, and concentration



**Figure 41:** Navigated ORP sensor data.



**Figure 42:** Navigated OBS sensor data.

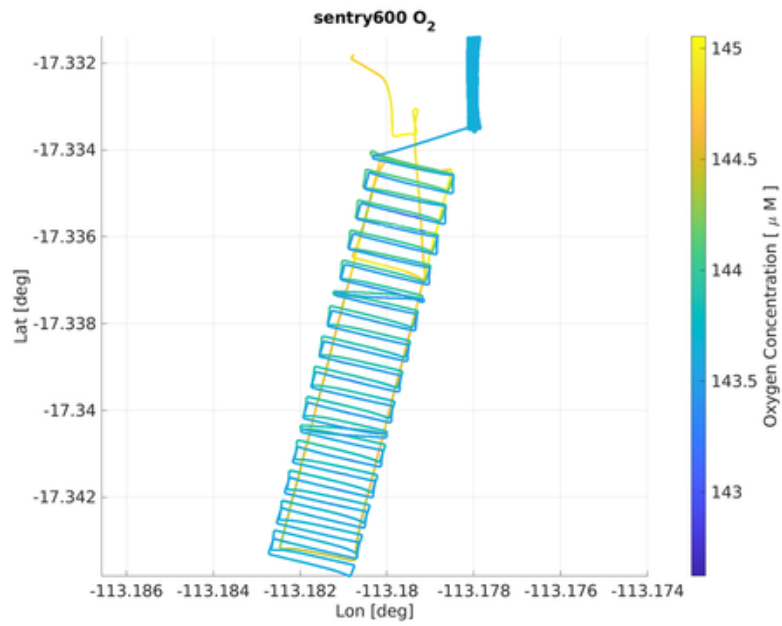


Figure 43: Navigated optode sensor data.

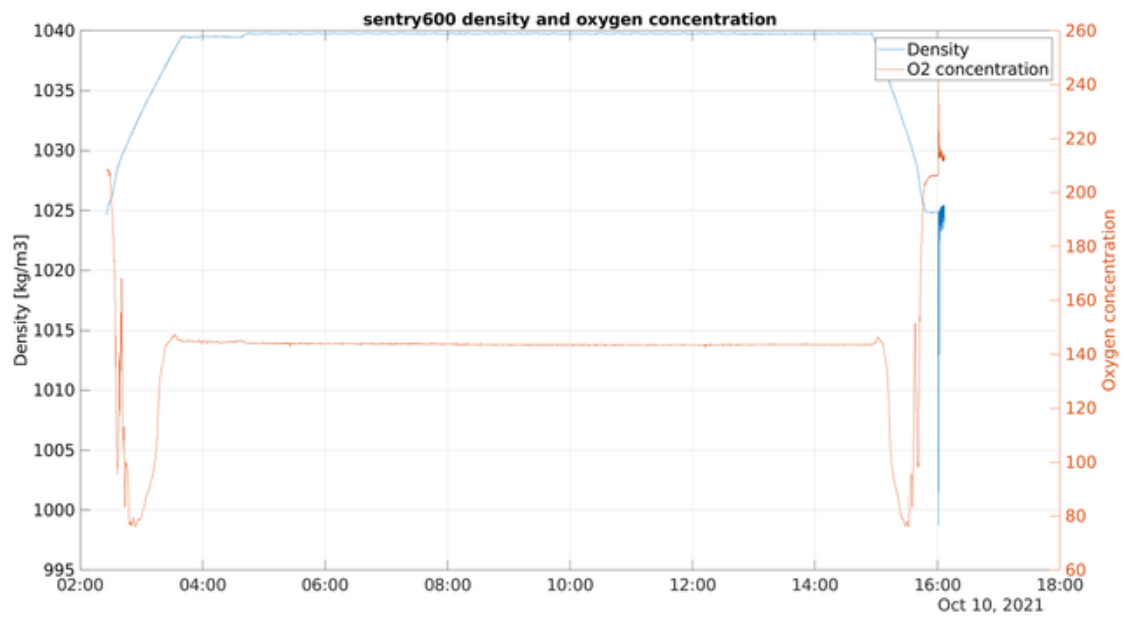


Figure 44: Density and O2 sensor data.

# Sentry 601 Dive Report

## DRAFT



Sean Kelley, Isaac Vandor, Matt Silvia, Victor Naklicki, Tim Joyce

Sentry Expedition Leader: Sean Kelley

## Summary

**Weather:** Deployment: winds 15 to 20 knts, seas confused and 6-8ft  
Recovery: winds 15 to 20 knts, seas 5-8 ft

**Reason for end of dive:** End of mission plan

## Important Positions

**Dive Origin:** -17 -30 -113 -15

**Launch Position:** sentry601 launch position: 17 5.603'S 113 7.373'W

## Narrative

Sentry601 is the sixth dive of RR2106

This dive was programmed to run along axis north to south, covering roughly 45km of trackline. The dive consisted of a north to south line running Sentry at 15mab, collecting ORP and sidescan data. Additionally there were occasional stops to take photos at 8mab for a roughly 75m backline. The waveglider was used to assist the mission as the ship departed our survey after we were on bottom to perform CTD casts. Several CTDs were located in the middle of the survey allowing for a check-in of Sentry. This was critical as the waveglider was not able to make enough forward speed to keep up with Sentry. For the majority of the mission Sentry was driving at 0.65meters per second, while the waveglider was only making 0.4meters per second. Ultimately we lost comms with the waveglider around 6km horizontal distance. Once Sentry passed the ship at the halfway point, contact with Sentry was lost for several hours until it was picked up again near the end of the mission. Overall the dive went well completing the entire trackline, collecting just over 1000 photos, and sidescan throughout the dive. The waveglider performance had an impact on our ability to track Sentry during the dive. This was largely due to the waveglider loosing the aft skeg.

# Dive Statistics

## 0.9 sentry601 Summary

sentry601 Summary

Origin: -17.500000 -113.250000

Origin: 17 30.000'S 113 15.000'W

Launch: 2021/10/12 15:33:01

Survey start: 2021/10/12 16:48:00

Survey start: Lat:-17.092049 Lon:-113.127642

Survey start: Lat:17 5.523'S Lon:113 7.659'W

Survey end: 2021/10/13 16:06:19

Survey end: Lat:-17.505280 Lon:-113.223333

Survey end: Lat:17 30.317'S Lon:113 13.400'W

Ascent begins: 2021/10/13 16:06:19

On the surface: 2021/10/13 17:08:47

On deck: 2021/10/13 17:17:60

descent rate: 33.7 m/min

ascent rate: 41.3 m/min

survey time: 23.3 hours

deck-to-deck time 25.7 hours

Min survey depth: 2523m

Max survey depth: 2623m

Mean survey depth: 2585m

Mean survey height: 15m

distance travelled: 51.62km

average speed: 0.61m/s

average speed during photo runs: 0.50 m/s over 1.87 km

average speed during multibeam runs: 0.62 m/s over 49.76 km

total vertical during survey: 2983m

Battery energy at launch: 18.5 kwhr

Battery energy at survey start: 18.2 kwhr

Battery energy at survey end: 8.9 kwhr

Battery energy on surface: 8.7 kwhr

Battery energy on deck: 8.7 kwhr

## Sensor Information

### 0.10 sentry601 Devices

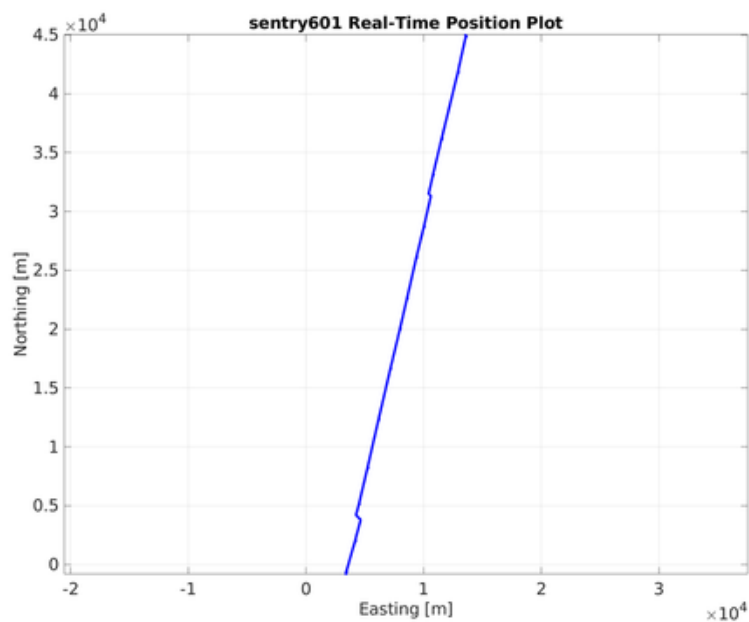
Instrument	Model	Serial Num.	Comments	Config File
USBL	Sonardyne AvTrak2	U00570D		avtrak_20211012_1241.cfg
DVL	RDI Navigator (300kHz)	727-2000-00M	CX: 1, WP: 0	dv1300_20211012_1241.cfg
SAIL	obs A/D	13	A: 5, G: 1.00, O: 0	a2d2-pods_20211012_1241.cfg
	orp A/D	14	A: 3, G: 1.00, O: 0.0024	

## Special Data Processing Notes

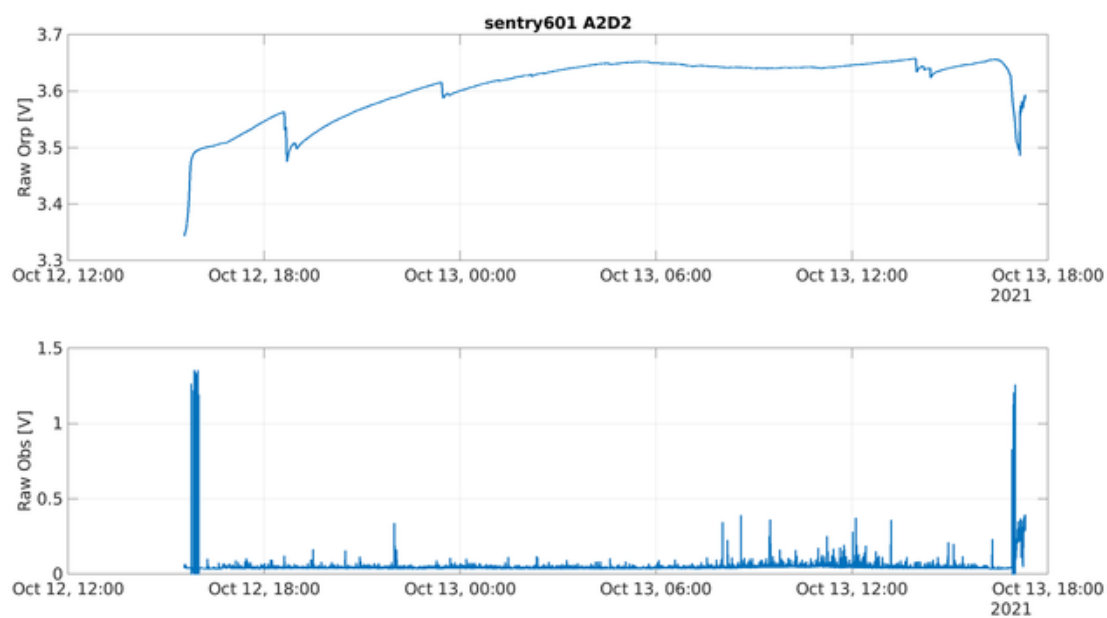
- Multibeam not collected
- Sidescan 240Khz and 540Khz collected and processed
- renav required a second revision due to large doppler drift during the dive and the renav software throwing out good USBL fixes. This caused a large artificial shift in the final renavigated data that required a second revision including the good USBL data.

## Plots and Images

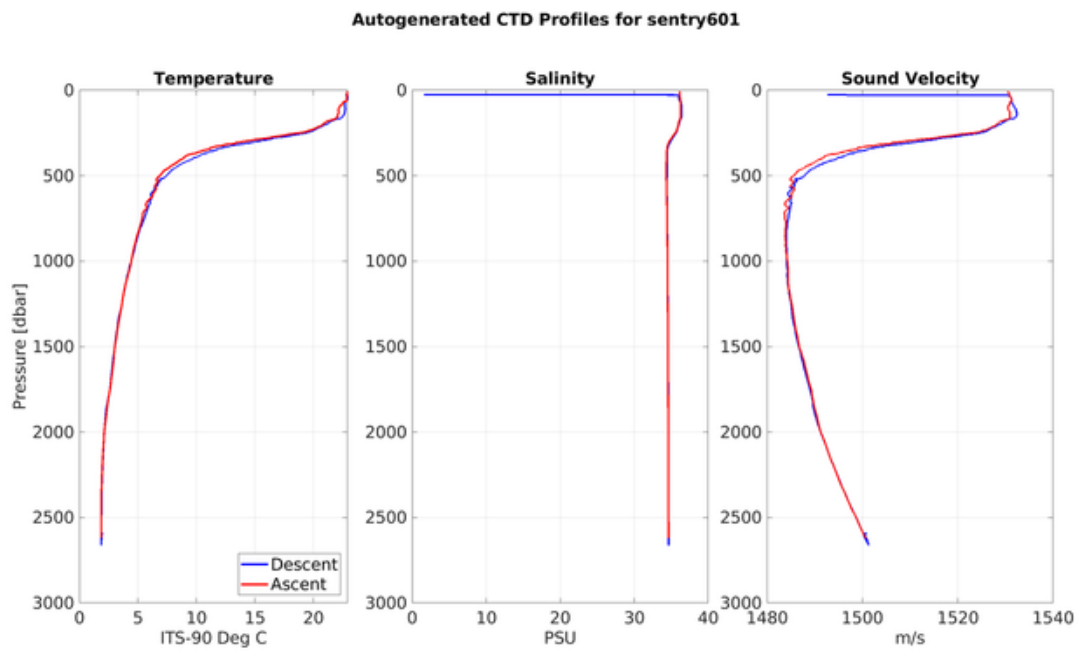
This section contains selected images of data products and plots of vehicle navigation and selected sensors.



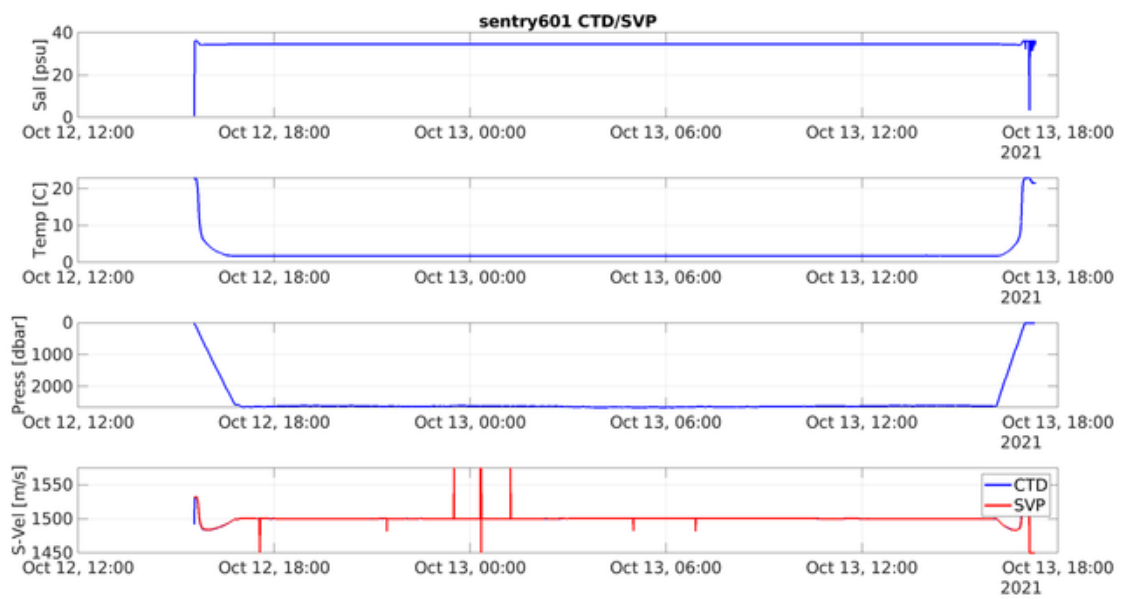
**Figure 45:** Latitude/Longitude plot of Sentry dive 601 based on post-processed navigation



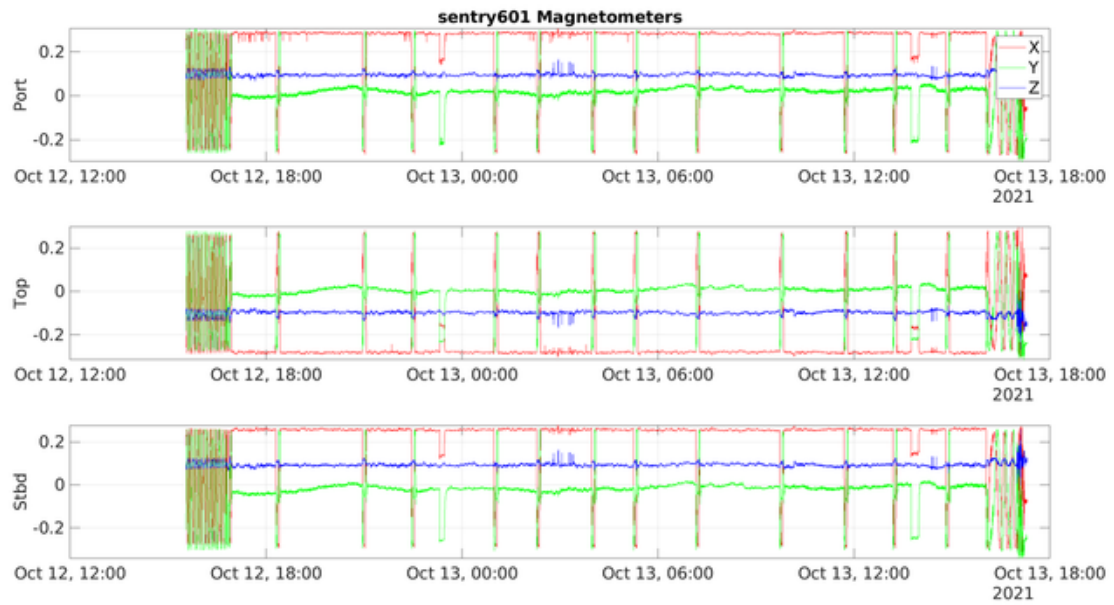
**Figure 46:** Raw analog Sensor Data



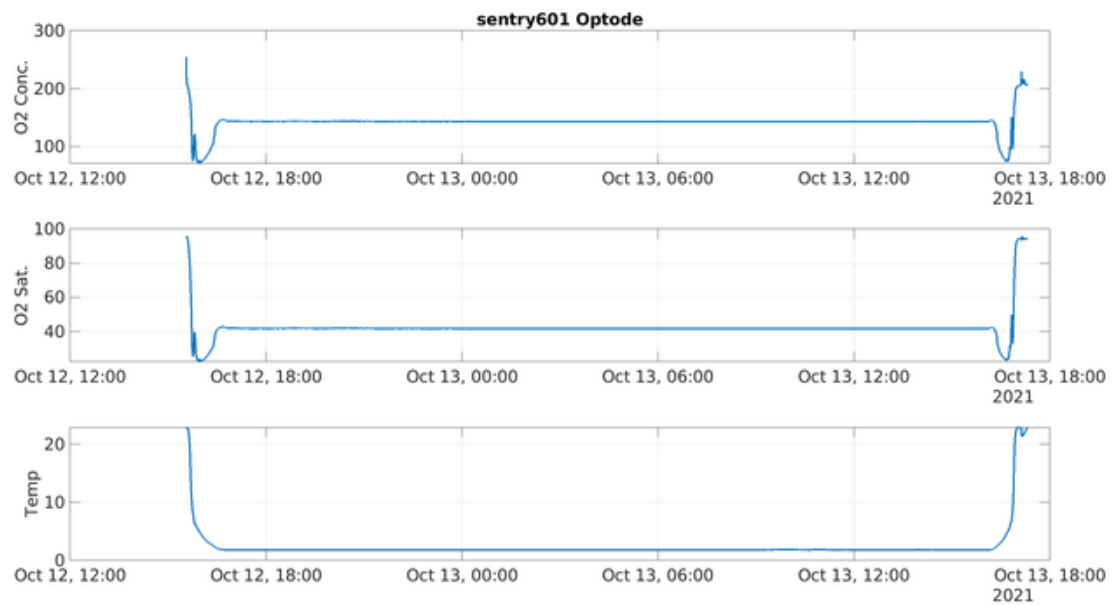
**Figure 47:** CTD profile sensor data



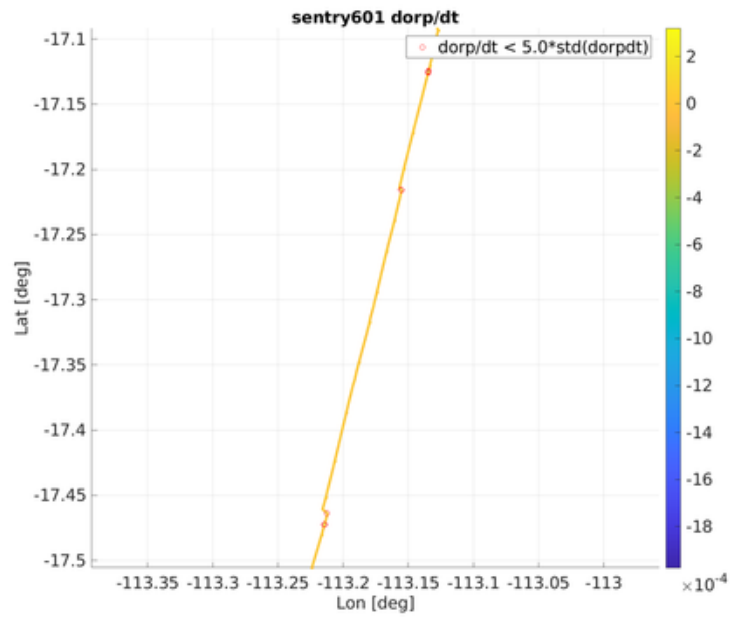
**Figure 48:** CTD and SVP sensor data



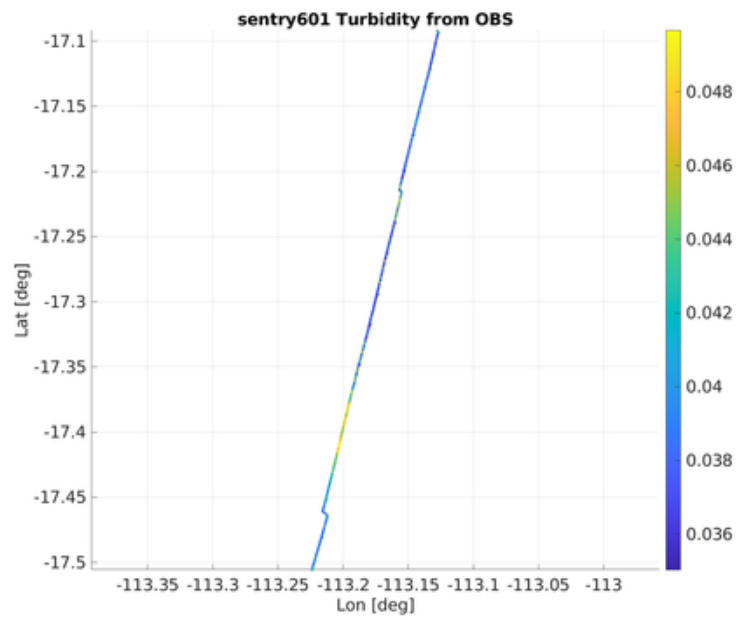
**Figure 49:** Magnetometer data from each of the three magnetometers on Sentry



**Figure 50:** Optode temperature, O2 saturation, and concentration



**Figure 51:** Navigated ORP sensor data.



**Figure 52:** Navigated OBS sensor data.

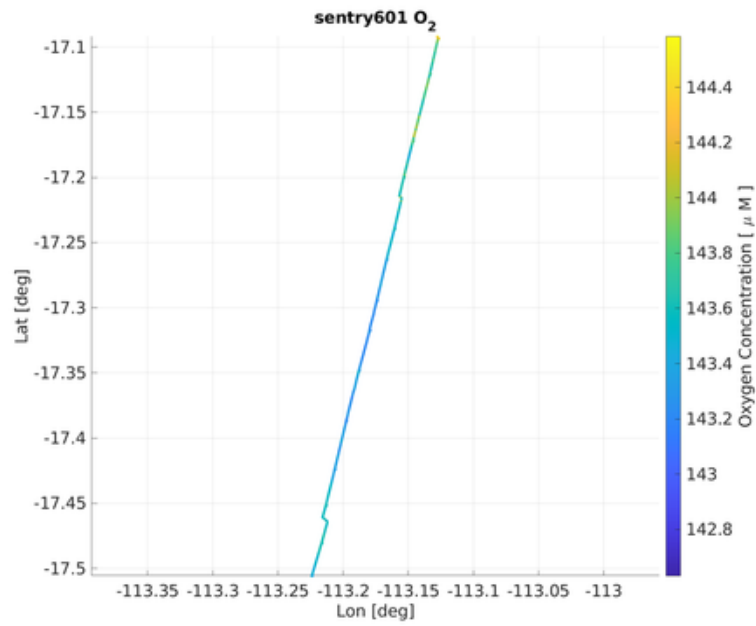


Figure 53: Navigated optode sensor data.

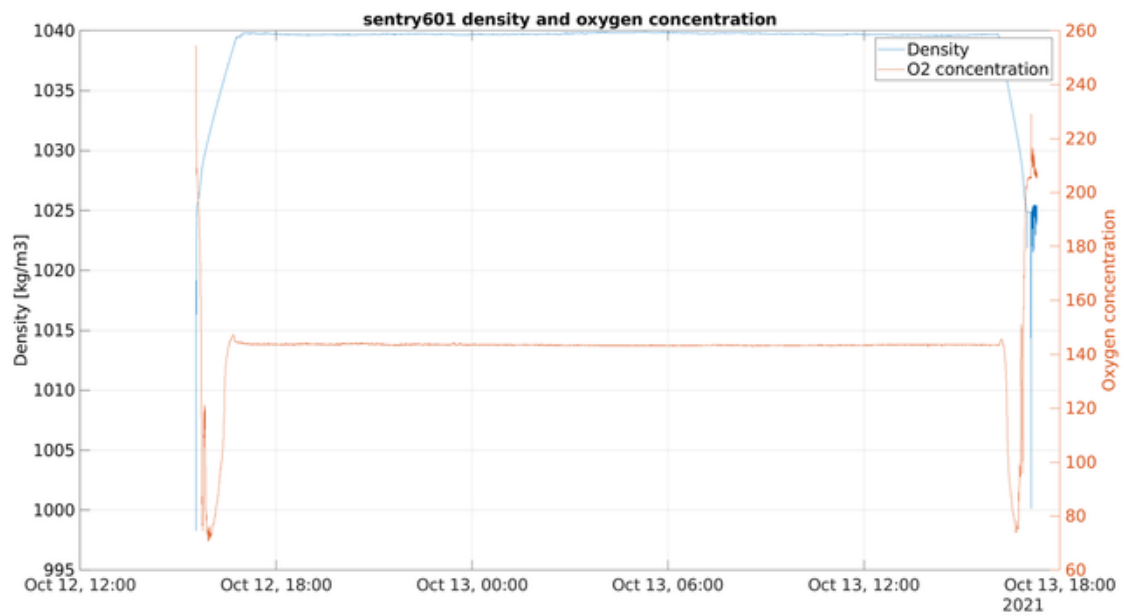


Figure 54: Density and O2 sensor data.

# Sentry 602 Dive Report

## DRAFT



Sean Kelley, Isaac Vandor, Matt Silvia, Victor Naklicki, Tim Joyce

Sentry Expedition Leader: Sean Kelley

## Summary

**Weather:** Deployment: winds 15 to 20 knts, seas confused and 6-8ft

Recovery: winds 15 to 20 knts, seas 5-8 ft

**Reason for end of dive:** End of mission plan

## Important Positions

**Dive Origin:** -17 -56 -113 -19

**Launch Position:** sentry602 launch position: 17 55.184'S 113 18.406'W

## Narrative

Sentry602 is the seventh dive of RR2106

This dive was a long transect running south to north with short u-turn camera surveys every 3-4km. Additionally the CTD was to be towed along axis behind Sentry. In total Sentry ran through the length of the programmed 45km of trackline with eleven camera boxes throughout the survey. Three of the camera boxes were targeted to areas of potential known venting sites. Overall the dive went well, collecting photos, sidescan and ORP data. The dance between CTD, Ship, and Sentry was a delicate balance of vessel speed vs Sentry speed, sending the command to speed Sentry up towards the end of the mission. This was necessary to ensure Sentry finished with enough time for the CTD near the end of the trackline and start coming up.

A new depth sensor was installed for this dive, worked well without any issues.

# Dive Statistics

## 0.11 sentry602 Summary

sentry602 Summary

Origin: -17.933333 -113.316667

Origin: 17 56.000'S 113 19.000'W

Launch: 2021/10/14 21:28:26

Survey start: 2021/10/14 22:46:17

Survey start: Lat:-17.919281 Lon:-113.308469

Survey start: Lat:17 55.157'S Lon:113 18.508'W

Survey end: 2021/10/15 23:31:52

Survey end: Lat:-17.514759 Lon:-113.230218

Survey end: Lat:17 30.886'S Lon:113 13.813'W

Ascent begins: 2021/10/15 23:31:52

On the surface: 2021/10/16 00:24:35

On deck: 2021/10/16 00:36:41

descent rate: 33.1 m/min

ascent rate: 49.1 m/min

survey time: 24.8 hours

deck-to-deck time 27.1 hours

Min survey depth: 2569m

Max survey depth: 2672m

Mean survey depth: 2610m

Mean survey height: 14m

distance travelled: 60.26km

average speed: 0.67m/s

average speed during photo runs: 0.55 m/s over 11.21 km

average speed during multibeam runs: 0.70 m/s over 49.05 km

total vertical during survey: 4098m

Battery energy at launch: 17.9 kwhr

Battery energy at survey start: 17.6 kwhr

Battery energy at survey end: 5.0 kwhr

Battery energy on surface: 4.9 kwhr

Battery energy on deck: 4.8 kwhr

## Sensor Information

### 0.12 sentry602 Devices

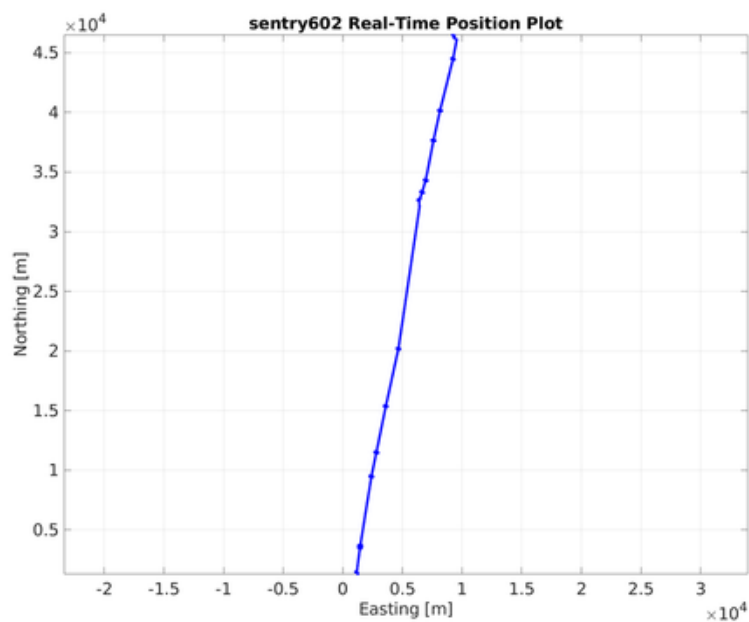
Instrument	Model	Serial Num.	Comments	Config File
USBL	Sonardyne AvTrak2	U00570D		avtrak_20211014_1809.cfg
DVL	RDI Navigator (300kHz)	727-2000-00M	CX: 1, WP: 0	dv1300_20211014_1809.cfg
SAIL	obs A/D	13	A: 5, G: 1.00, O: 0	a2d2-pods_20211014_1809.cfg
	orp A/D	14	A: 3, G: 1.00, O: 0.0024	

## Special Data Processing Notes

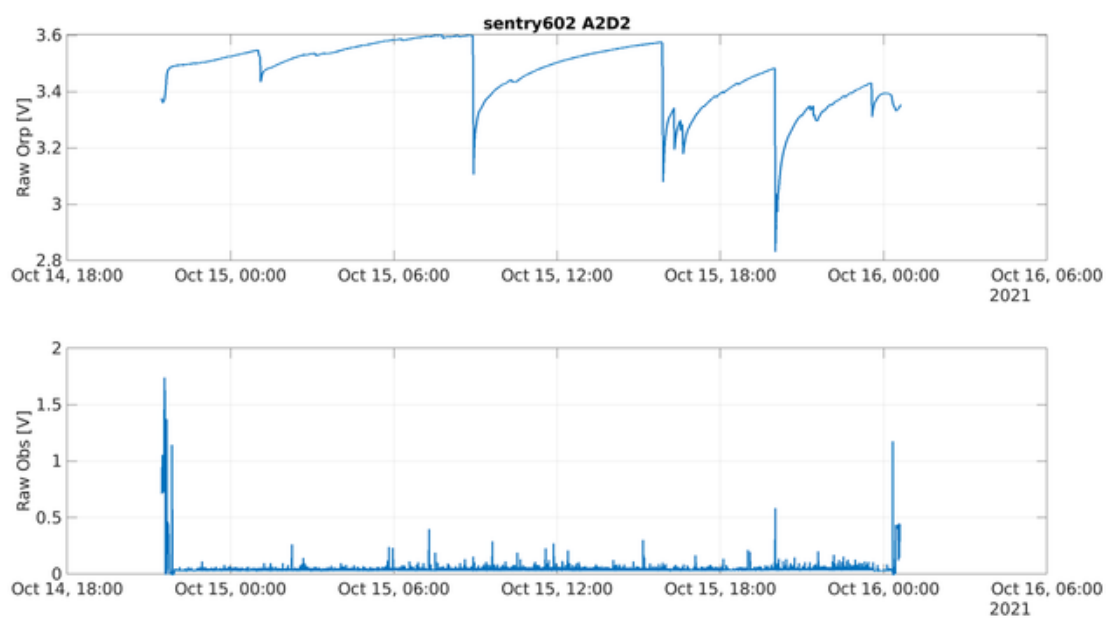
- Multibeam not collected
- 240Khz and 540Khz sidescan collected and processed

## Plots and Images

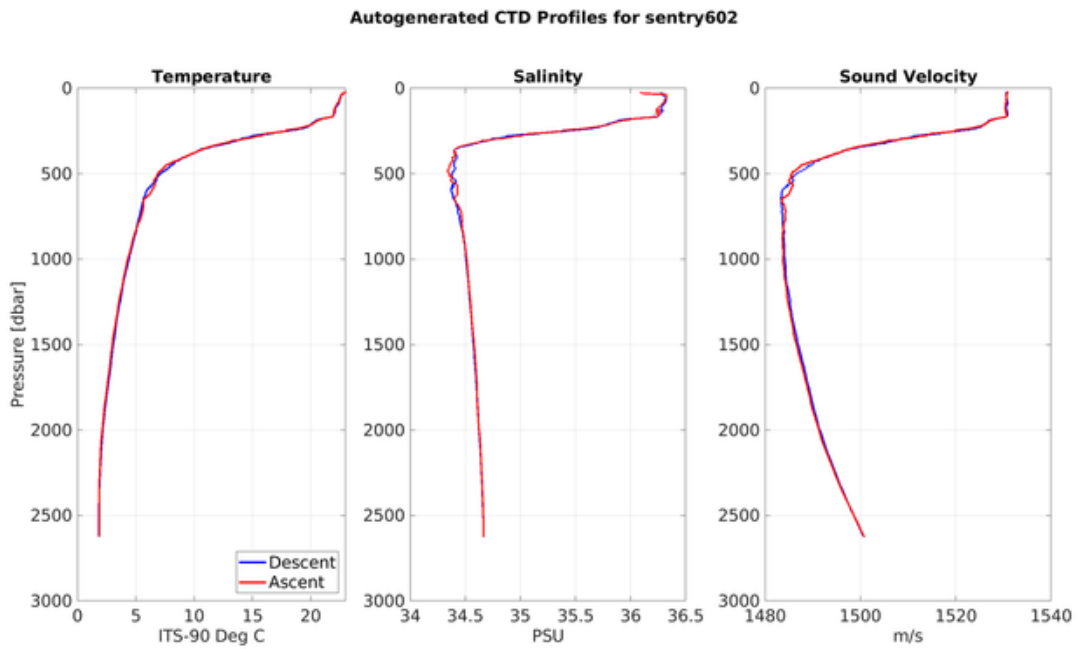
This section contains selected images of data products and plots of vehicle navigation and selected sensors.



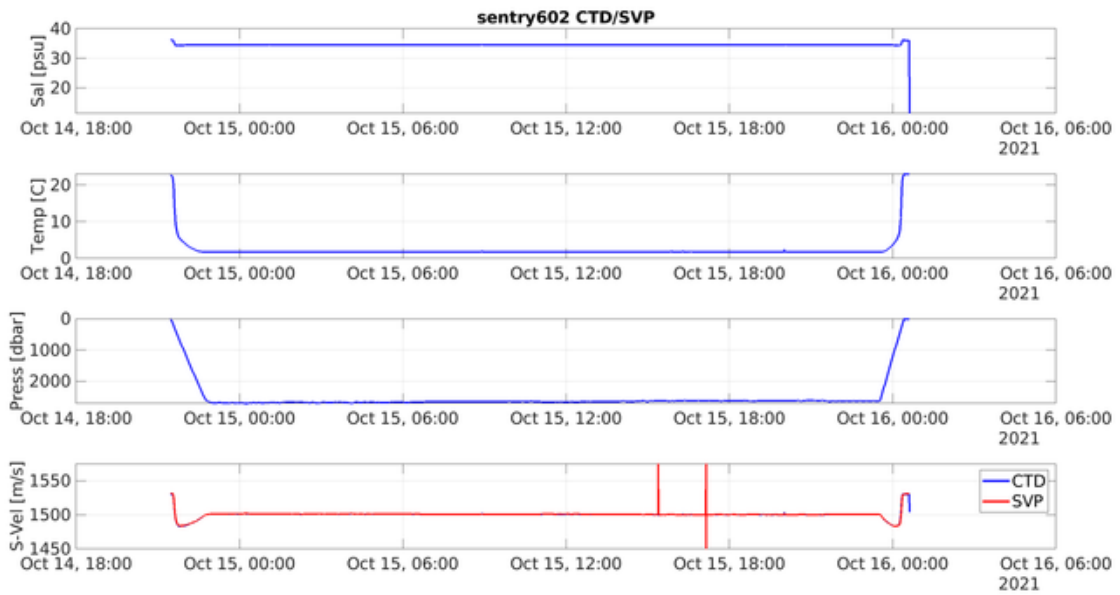
**Figure 55:** Latitude/Longitude plot of Sentry dive 602 based on post-processed navigation



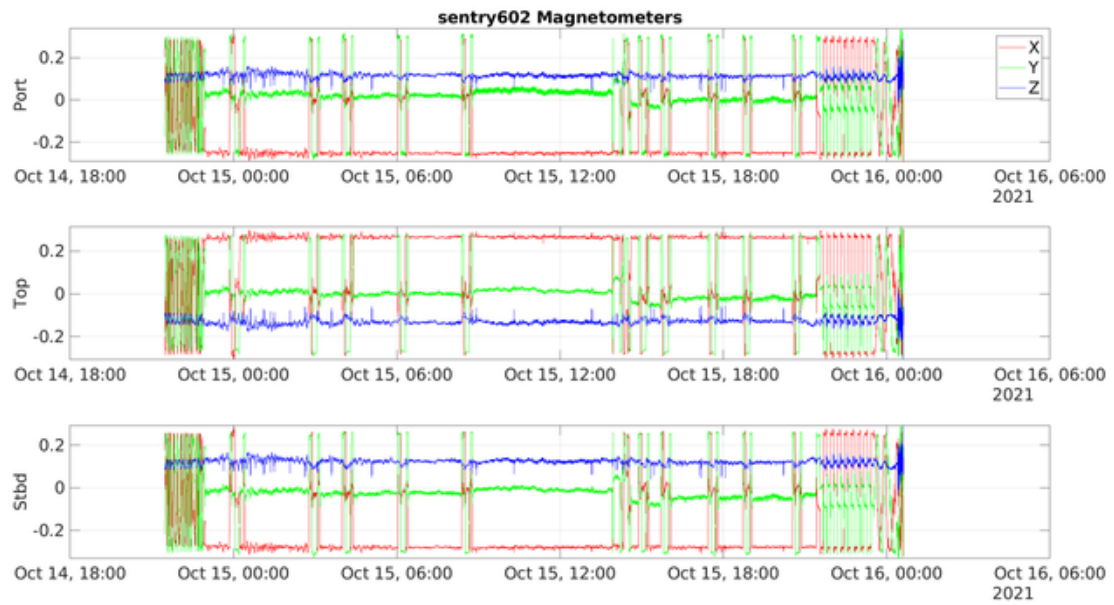
**Figure 56:** Raw analog Sensor Data



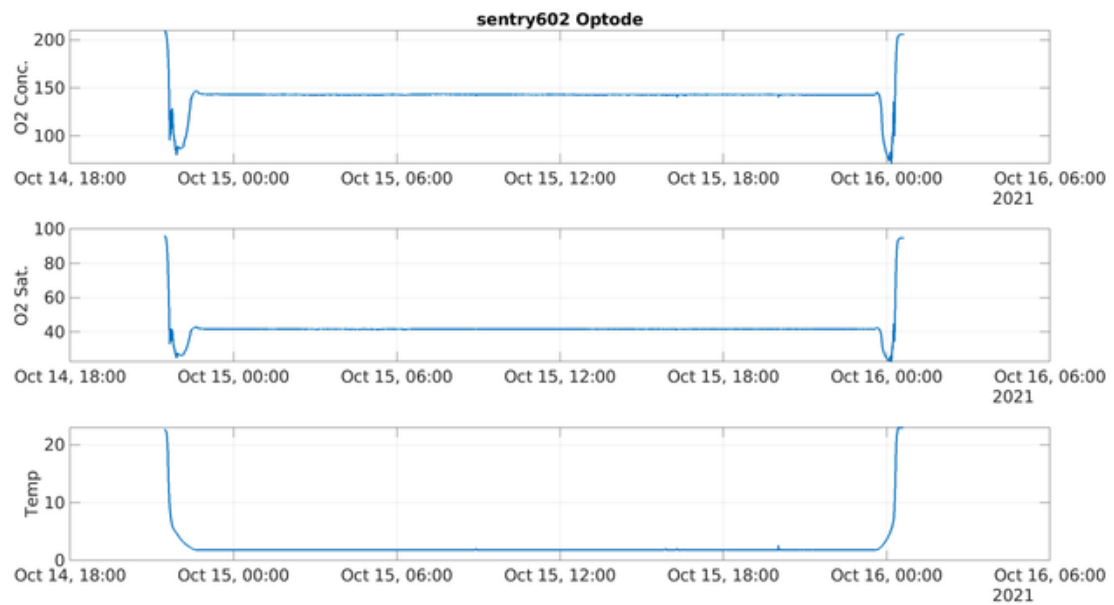
**Figure 57:** CTD profile sensor data



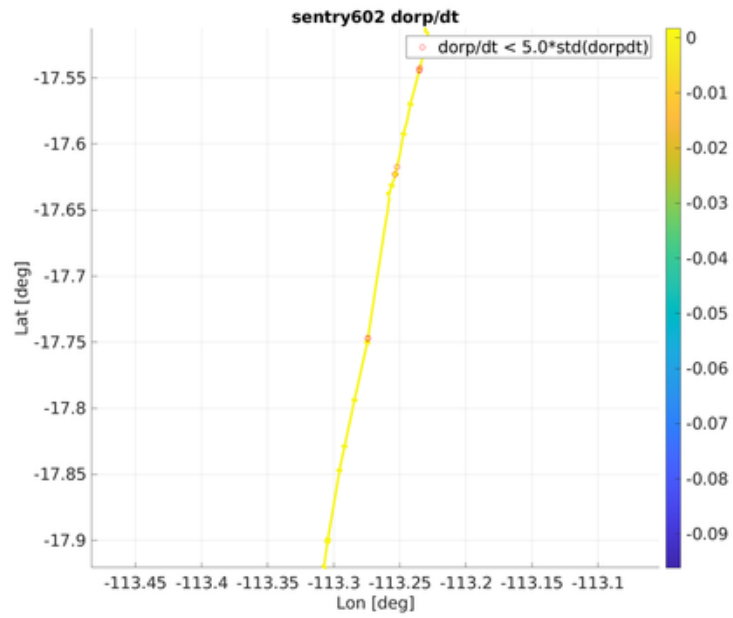
**Figure 58:** CTD and SVP sensor data



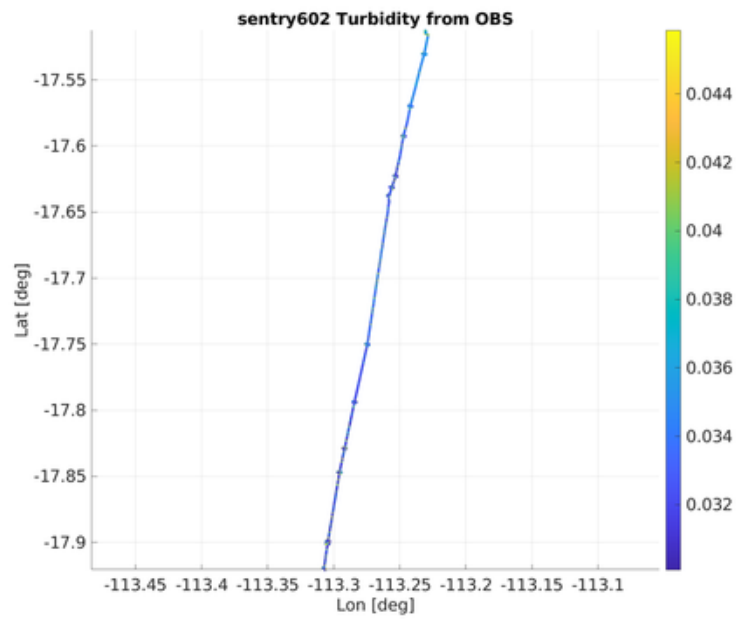
**Figure 59:** Magnetometer data from each of the three magnetometers on Sentry



**Figure 60:** Optode temperature, O2 saturation, and concentration



**Figure 61:** Navigated ORP sensor data.



**Figure 62:** Navigated OBS sensor data.

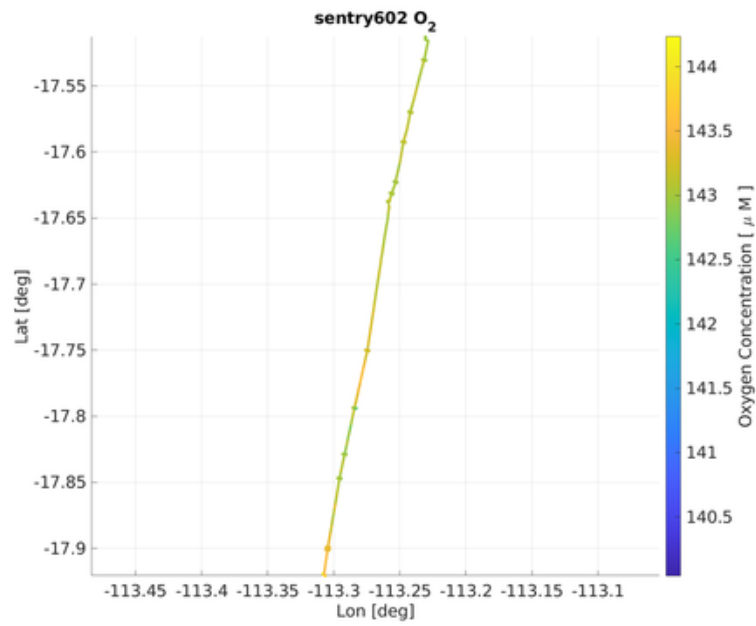


Figure 63: Navigated optode sensor data.

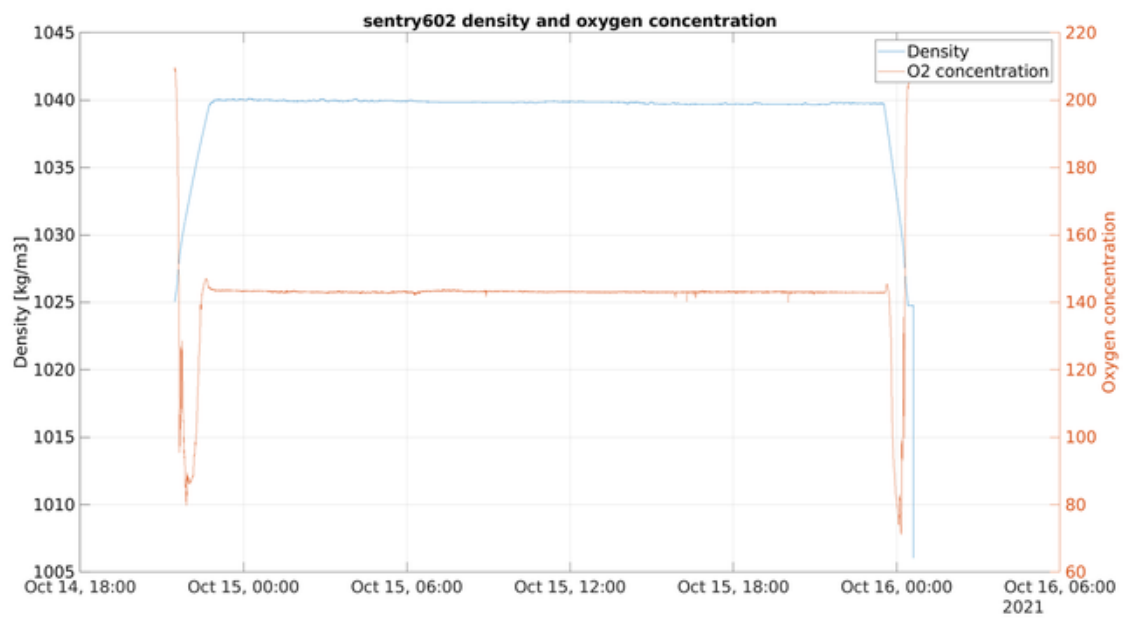


Figure 64: Density and O<sub>2</sub> sensor data.

# Sentry 603 Dive Report

## DRAFT



Sean Kelley, Isaac Vandor, Matt Silvia, Victor Naklicki, Tim Joyce

Sentry Expedition Leader: Sean Kelley

## Summary

**Weather:** Deployment: winds 15 to 20 knts, seas confused and 6-8ft  
Recovery: winds 15 to 20 knts, seas 5-8 ft

**Reason for end of dive:** End of mission plan

## Important Positions

**Dive Origin:** -17 -56 -113 -19

**Launch Position:** sentry603 launch position: 17 53.652'S 113 18.218'W

## Narrative

Sentry603 is the eighth dive of RR2106

This dive was scheduled to run a short multibeam survey followed by targeted photo surveys over areas of suspected venting. The multibeam survey was 1km length lines, running along axis north to south, with three lines spaced 175m apart. While Sentry ran these lines, multibeam was not collected due to operator error and a misunderstanding during the pre-dive. The four photo surveys were 100m square boxes with 10m spaced lines east to west, then north to south. These were programmed at 7m altitude, primarily collecting photos, ORP, and high frequency sidescan. Following Sentry's bottom approach and mission survey start, the vessel transited roughly 30km away and conducted two CTDs while Sentry was running the mission on bottom. Following the second CTD, the vessel returned to the Sentry survey and waited roughly an hour until the final camera block was completed before recovery. The waveglider was tending to Sentry throughout the dive. The waveglider was recovered before this dive in order to move it closer to the next dive site. Performance from the waveglider was poor which ended up being due to the loss of the rear skeg.

# Dive Statistics

## 0.13 sentry603 Summary

sentry603 Summary

Origin: -17.933333 -113.316667

Origin: 17 56.000'S 113 19.000'W

Launch: 2021/10/16 16:23:36

Survey start: 2021/10/16 17:42:42

Survey start: Lat:-17.892674 Lon:-113.305384

Survey start: Lat:17 53.560'S Lon:113 18.323'W

Survey end: 2021/10/17 04:48:00

Survey end: Lat:-17.886861 Lon:-113.302641

Survey end: Lat:17 53.212'S Lon:113 18.158'W

Ascent begins: 2021/10/17 04:48:00

On the surface: 2021/10/17 05:42:12

On deck: 2021/10/17 05:49:38

descent rate: 32.7 m/min

ascent rate: 48.9 m/min

survey time: 11.1 hours

deck-to-deck time 13.4 hours

Min survey depth: 2575m

Max survey depth: 2670m

Mean survey depth: 2642m

Mean survey height: 17m

distance travelled: 24.56km

average speed: 0.61m/s

average speed during photo runs: 0.55 m/s over 18.66 km

average speed during multibeam runs: 0.97 m/s over 5.91 km

total vertical during survey: 2649m

Battery energy at launch: 17.1 kwhr

Battery energy at survey start: 16.8 kwhr

Battery energy at survey end: 10.0 kwhr

Battery energy on surface: 9.9 kwhr

Battery energy on deck: 9.8 kwhr

## Sensor Information

### 0.14 sentry603 Devices

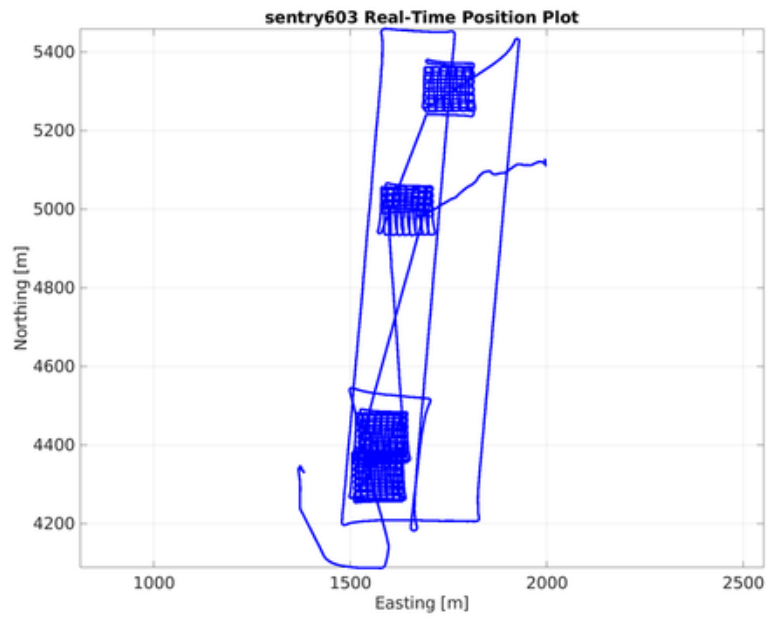
Instrument	Model	Serial Num.	Comments	Config File
USBL	Sonardyne AvTrak2	U00570D		avtrak_20211016_1447.cfg
DVL	RDI Navigator (300kHz)	727-2000-00M	CX: 1, WP: 0	dv1300_20211016_1447.cfg
SAIL	obs A/D	13	A: 5, G: 1.00, O: 0	a2d2-pods_20211016_1447.cfg
	orp A/D	14	A: 3, G: 1.00, O: 0.0024	

## Special Data Processing Notes

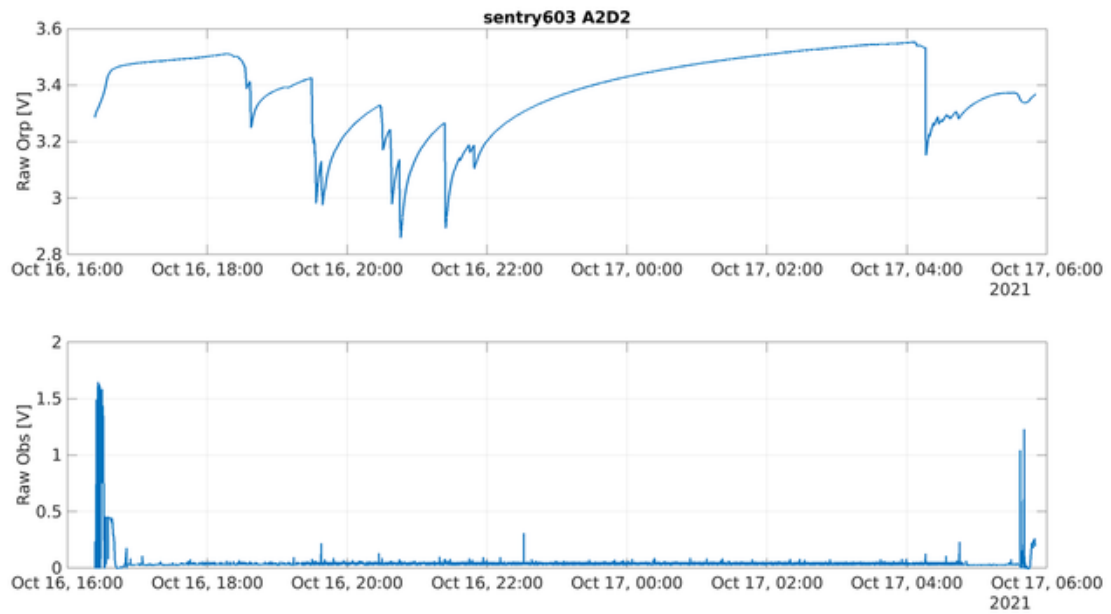
- Multibeam not collected
- 120Khz and 540Khz sidescan collected and processed

## Plots and Images

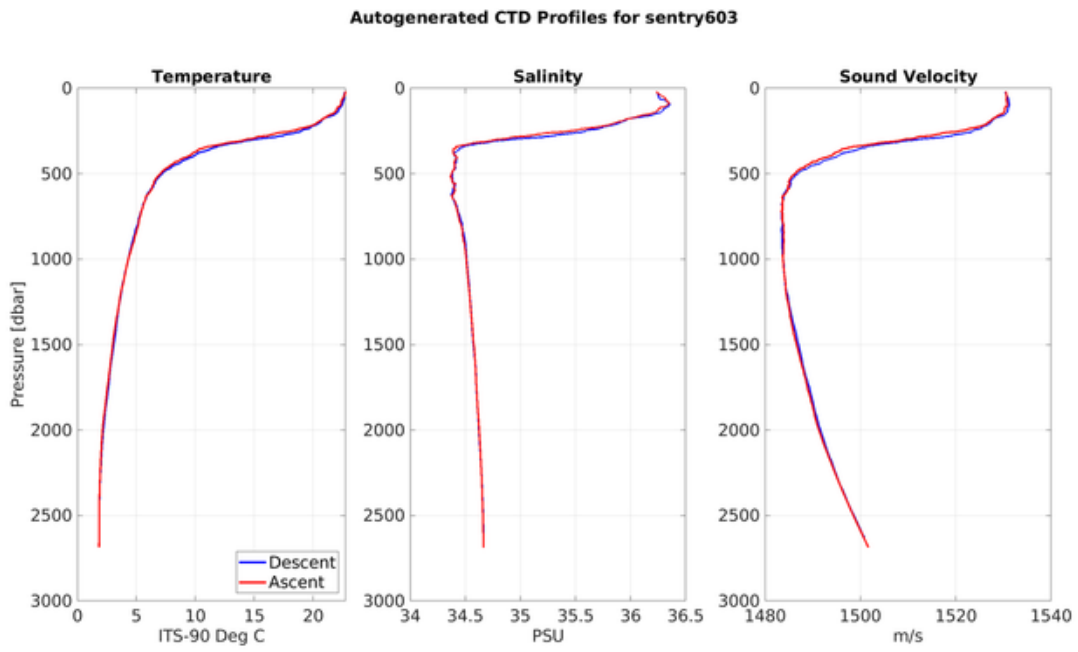
This section contains selected images of data products and plots of vehicle navigation and selected sensors.



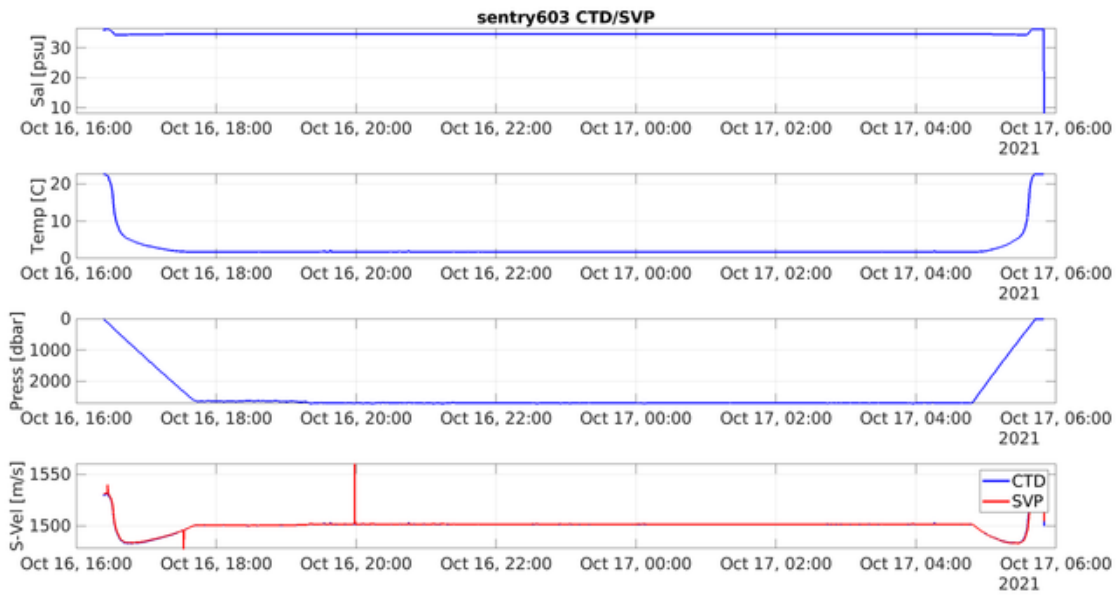
**Figure 65:** Latitude/Longitude plot of Sentry dive 603 based on post-processed navigation



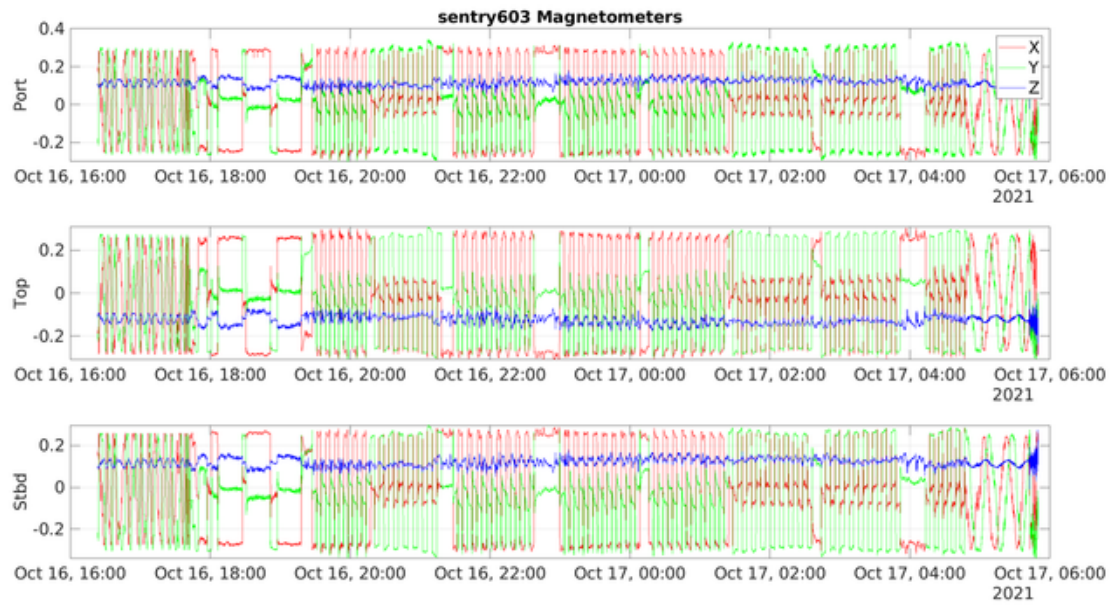
**Figure 66:** Raw analog Sensor Data



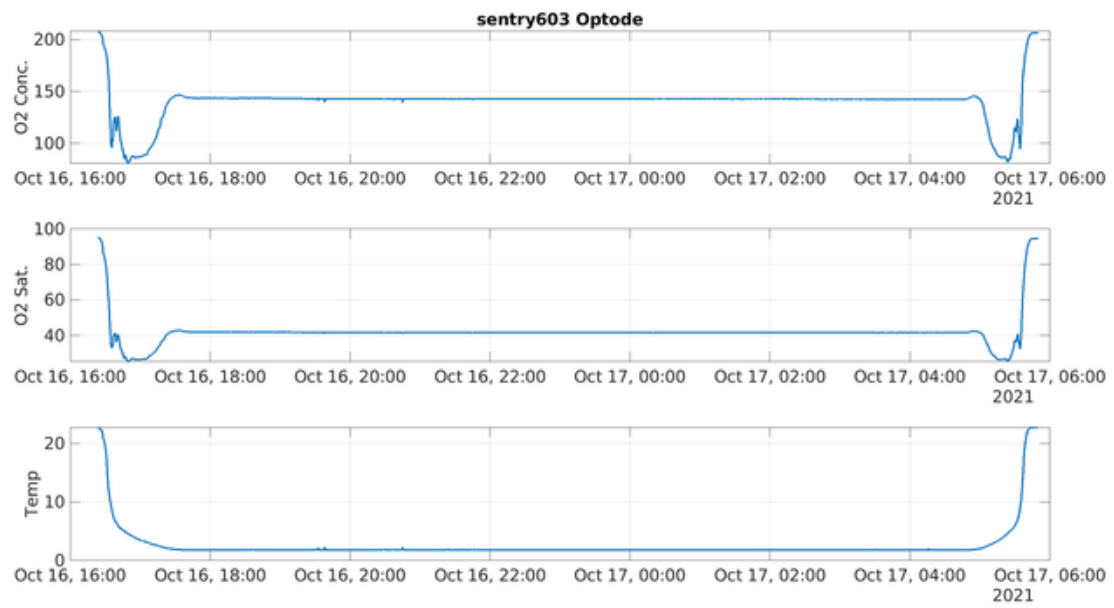
**Figure 67:** CTD profile sensor data



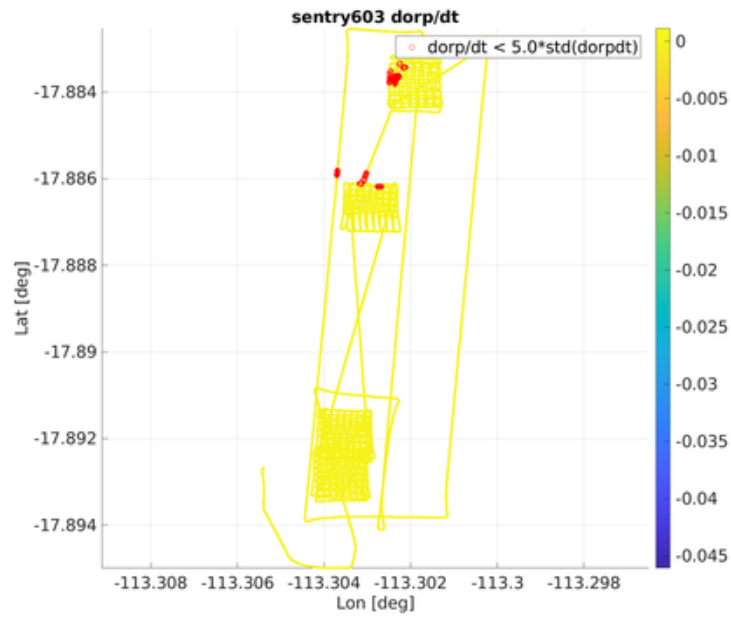
**Figure 68:** CTD and SVP sensor data



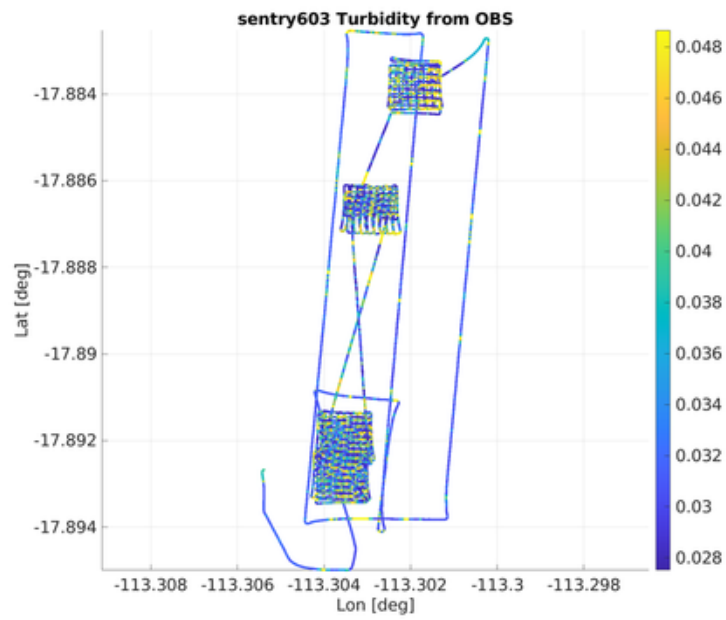
**Figure 69:** Magnetometer data from each of the three magnetometers on Sentry



**Figure 70:** Optode temperature, O2 saturation, and concentration



**Figure 71:** Navigated ORP sensor data.



**Figure 72:** Navigated OBS sensor data.

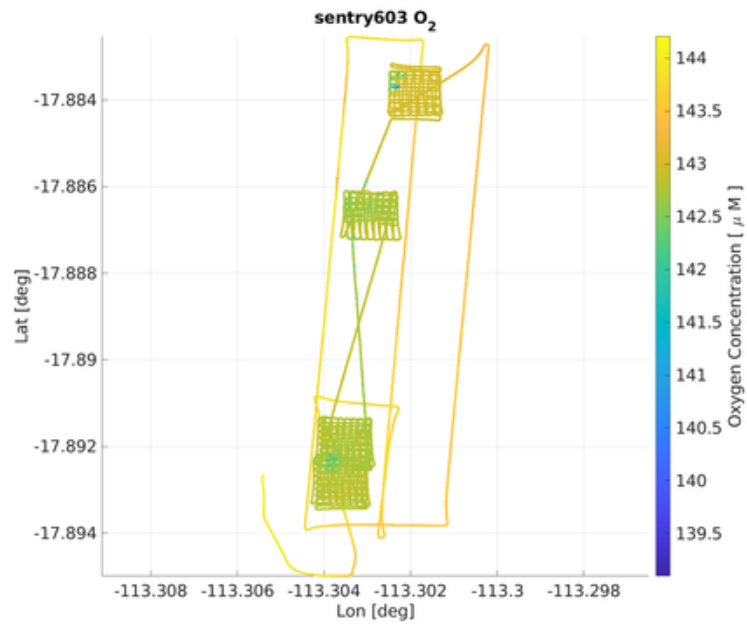


Figure 73: Navigated optode sensor data.

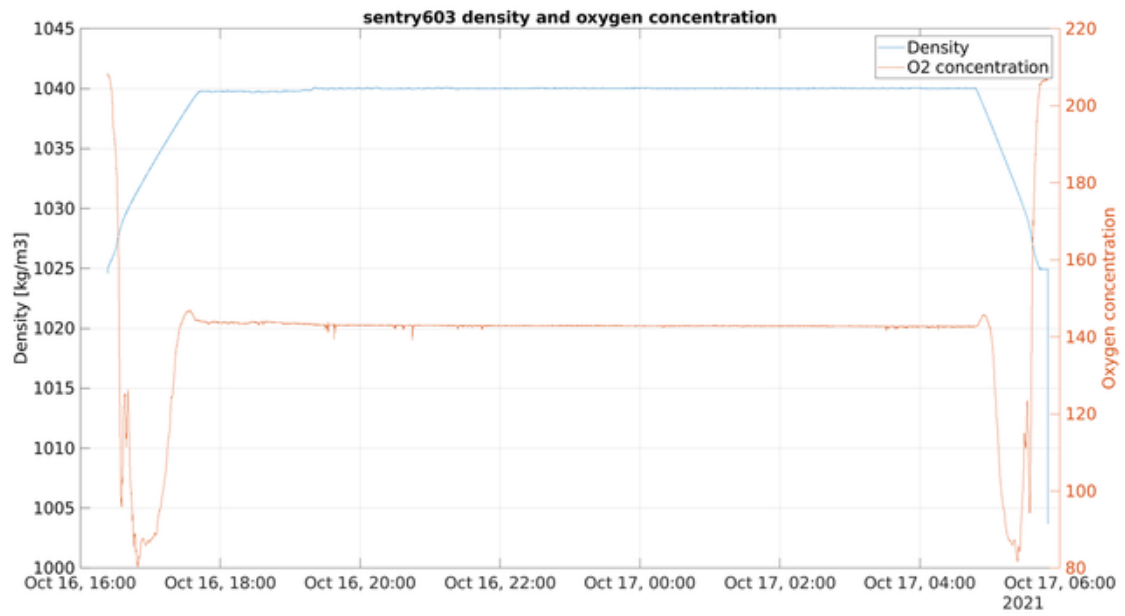


Figure 74: Density and O<sub>2</sub> sensor data.

# Sentry 604 Dive Report

## DRAFT



Sean Kelley, Isaac Vandor, Matt Silvia, Victor Naklicki, Tim Joyce

Sentry Expedition Leader: Sean Kelley

## Summary

**Weather:** Deployment: winds 15 to 20 knts, seas confused and 5-6ft  
Recovery: winds 15 to 20 knts, seas 5-6 ft

**Reason for end of dive:** End of mission plan

## Important Positions

**Dive Origin:** -17 -56 -113 -19

**Launch Position:** sentry604 launch position: 17 44.820'S 113 16.355'W

## Narrative

Sentry604 is the ninth dive of RR2106

This dive was scheduled to run a mixed bag of surveys, trying to capture multibeam and sidescan coverage as well as targeted photo runs. Sentry started the mission with a 100m photo box in an area of suspected venting. Once Sentry finished the photo block a large multibeam block was started and ran for roughly 5 hours. During the multibeam block a CTD was conducted in the area of the first photo block. The waveglider was tending to Sentry during the multibeam block. Following the end of the MB block, the survey finished at the north end of this block and came down to photo survey height. Sentry then worked its way south, hitting targeted photo lines. Once these photo lines were completed in the northern section, Sentry came back up to multibeam height and started a transit line to the south. This transit allowed for multibeam collection in the area of Sentry603. Sentry completed the transit with a small photo survey box in the middle, and finished the dive. A short ballast test was conducted at the end of the dive to test currents. No noticeable current was apparent.

# Dive Statistics

## 0.15 sentry604 Summary

sentry604 Summary

Origin: -17.933333 -113.316667

Origin: 17 56.000'S 113 19.000'W

Launch: 2021/10/18 19:25:58

Survey start: 2021/10/18 20:41:18

Survey start: Lat:-17.746413 Lon:-113.274591

Survey start: Lat:17 44.785'S Lon:113 16.475'W

Survey end: 2021/10/19 17:45:58

Survey end: Lat:-17.898742 Lon:-113.306427

Survey end: Lat:17 53.925'S Lon:113 18.386'W

Ascent begins: 2021/10/19 17:45:58

On the surface: 2021/10/19 18:40:08

On deck: 2021/10/19 18:47:24

descent rate: 33.7 m/min

ascent rate: 49.1 m/min

survey time: 21.1 hours

deck-to-deck time 23.4 hours

Min survey depth: 2536m

Max survey depth: 2667m

Mean survey depth: 2591m

Mean survey height: 43m

distance travelled: 60.04km

average speed: 0.79m/s

average speed during photo runs: 0.55 m/s over 15.35 km

average speed during multibeam runs: 0.93 m/s over 44.69 km

total vertical during survey: 4050m

Battery energy at launch: 18.3 kwhr

Battery energy at survey start: 17.9 kwhr

Battery energy at survey end: 2.2 kwhr

Battery energy on surface: 2.0 kwhr

Battery energy on deck: 1.9 kwhr

## Sensor Information

### 0.16 sentry604 Devices

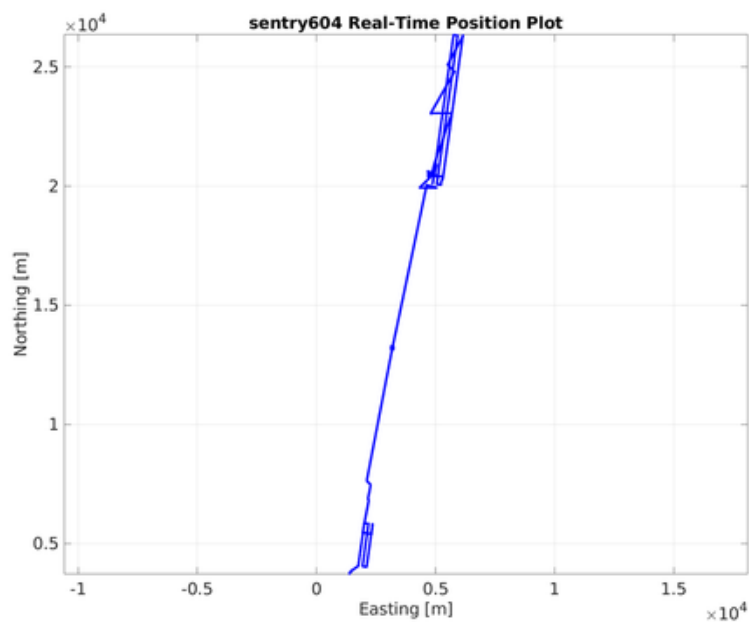
Instrument	Model	Serial Num.	Comments	Config File
USBL	Sonardyne AvTrak2	U00570D		avtrak_20211018_1650.cfg
DVL	RDI Navigator (300kHz)	727-2000-00M	CX: 1, WP: 0	dv1300_20211018_1651.cfg
SAIL	obs A/D	13	A: 5, G: 1.00, O: 0	a2d2-pods_20211018_1651.cfg
	orp A/D	14	A: 3, G: 1.00, O: 0.0024	

## Special Data Processing Notes

- 400Khz Multibeam collected and processed
- Sidescan 120Khz and 540Khz collected and processed

## Plots and Images

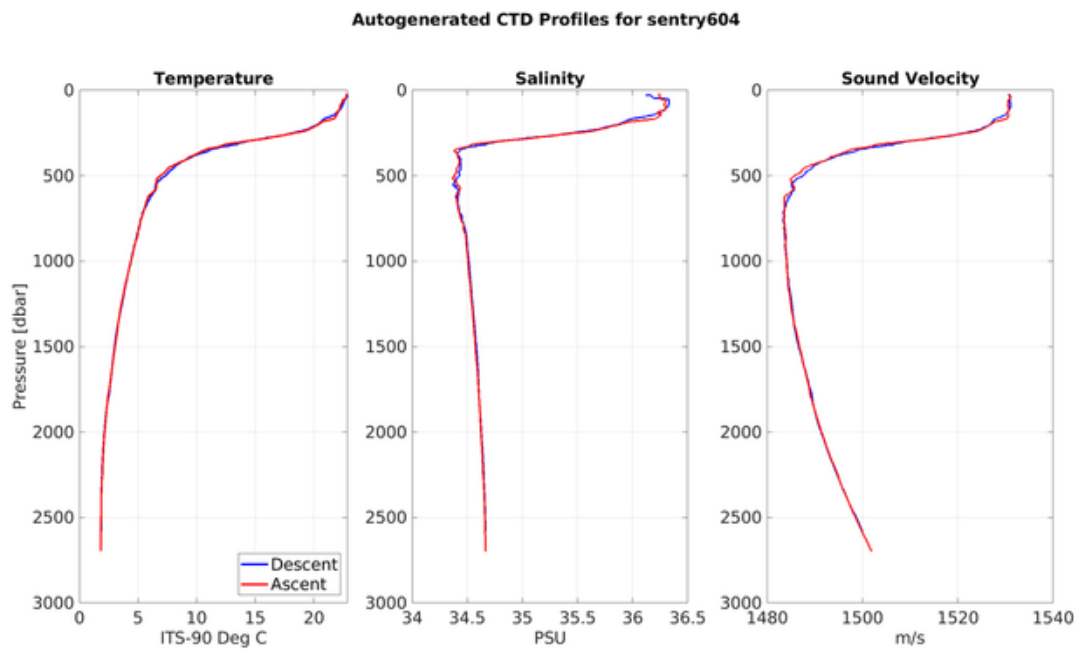
This section contains selected images of data products and plots of vehicle navigation and selected sensors.



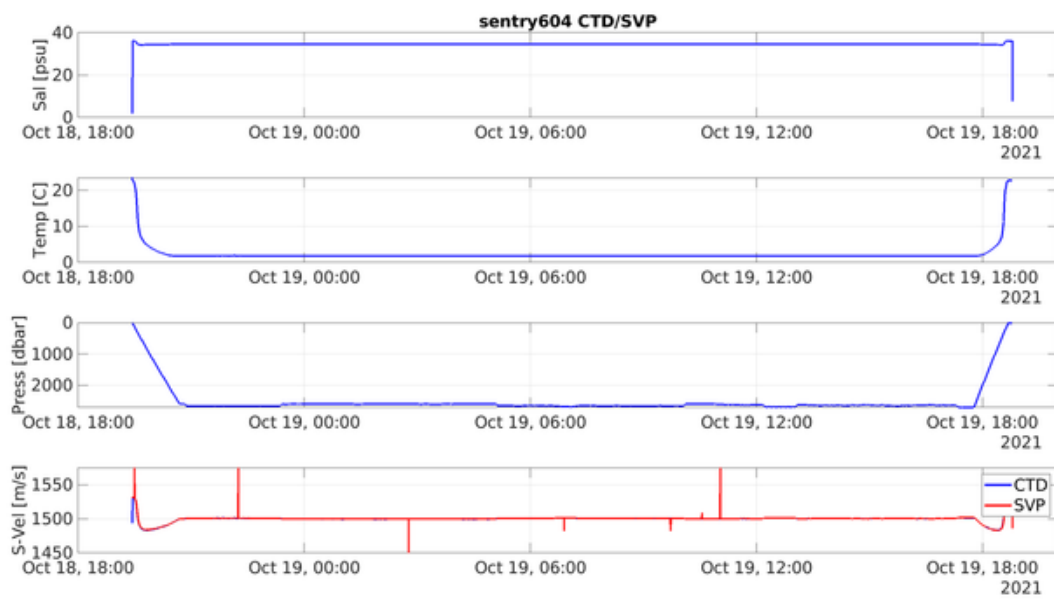
**Figure 75:** Latitude/Longitude plot of Sentry dive 604 based on post-processed navigation



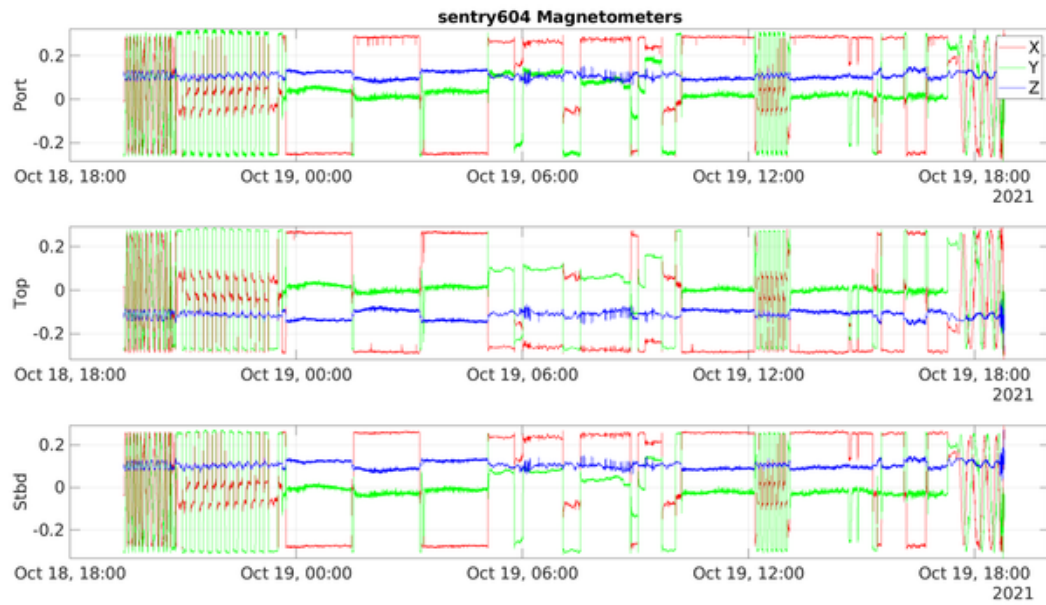
**Figure 76:** Raw analog Sensor Data



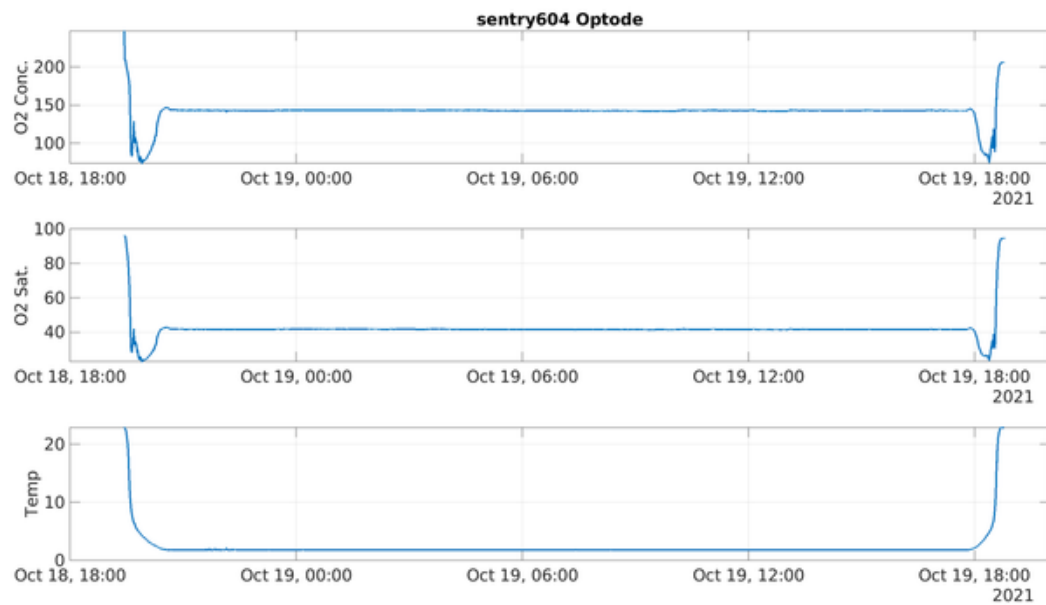
**Figure 77:** CTD profile sensor data



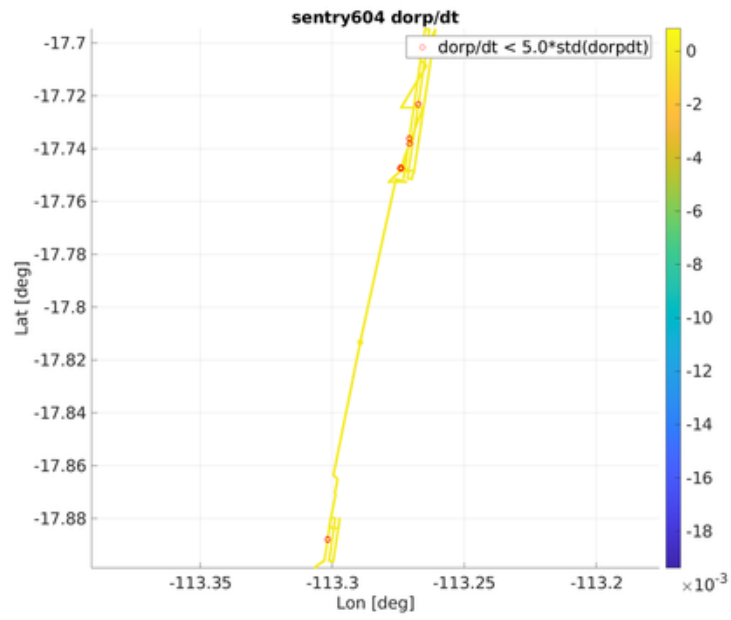
**Figure 78:** CTD and SVP sensor data



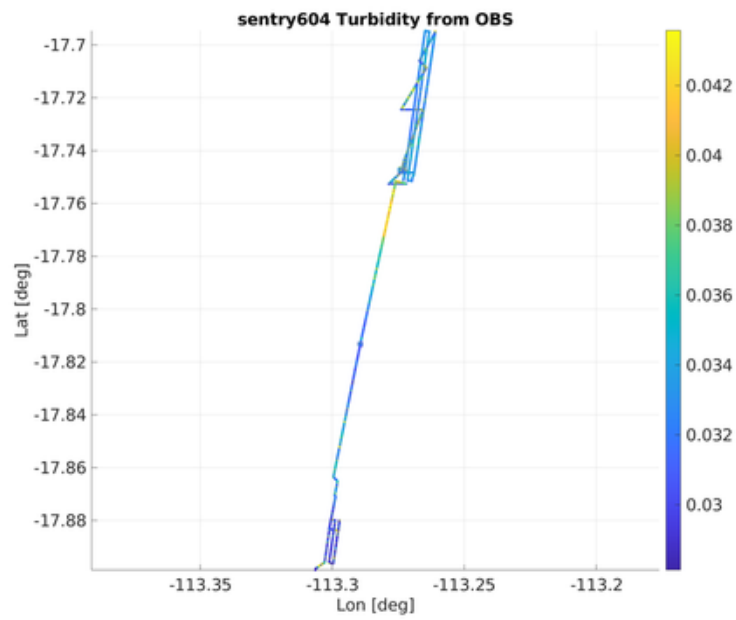
**Figure 79:** Magnetometer data from each of the three magnetometers on Sentry



**Figure 80:** Optode temperature, O2 saturation, and concentration



**Figure 81:** Navigated ORP sensor data.



**Figure 82:** Navigated OBS sensor data.

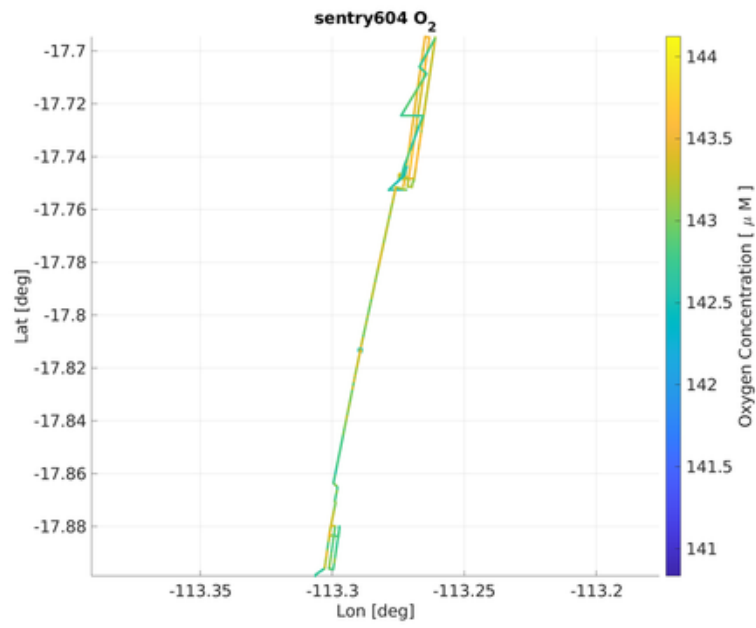


Figure 83: Navigated optode sensor data.

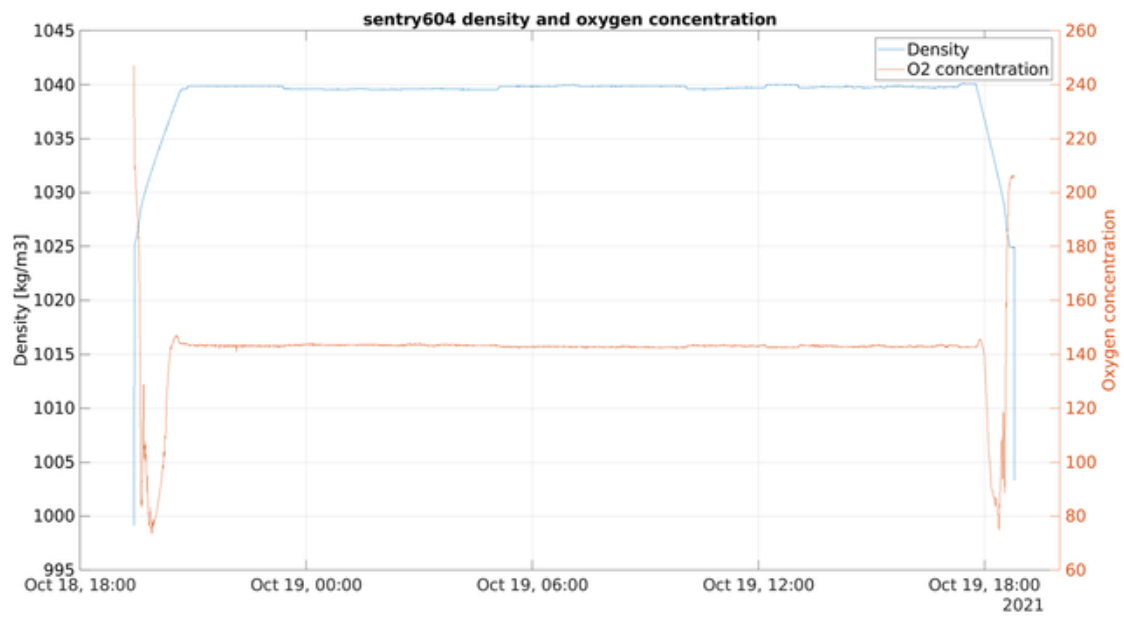


Figure 84: Density and O<sub>2</sub> sensor data.

# Sentry 605 Dive Report

## DRAFT



Sean Kelley, Isaac Vandor, Matt Silvia, Victor Naklicki, Tim Joyce

Sentry Expedition Leader: Sean Kelley

## Summary

**Weather:** Deployment: winds 18 to 20 knts, seas confused and 6-8ft

Recovery: winds 18 to 22 knts, seas 7-8 ft

**Reason for end of dive:** Weather

## Important Positions

**Dive Origin:** -17 -30 -113 -15

**Launch Position:** sentry605 launch position: 17 27.078'S 113 12.605'W

## Narrative

Sentry605 is the tenth dive of RR2106

This dive was scheduled to run for 24km on bottom, filling in a line of missed ORP data from a previous dive. This dive was scheduled to launch the night before, but due to issues with crew on deck and confusion from the captain the dive was scrubbed for the morning. The weather window was short due to deteriorating conditions with very little time for the dive to complete. Overall the dive went well running for 7km south to north before calling the dive due to weather. The initial portion of the survey was run at 15mab to avoid collapse pits and then back down to 10mab. During the 10m meter survey Sentry was manually commanded to 15m altitude to allow for a speed increase and more coverage. Multibeam, Sidescan, and photos were collected along with the normal sensor suite.

# Dive Statistics

## 0.17 sentry605 Summary

sentry605 Summary

Origin: -17.500000 -113.250000

Origin: 17 30.000'S 113 15.000'W

Launch: 2021/10/20 14:12:43

Survey start: 2021/10/20 15:29:53

Survey start: Lat:-17.450438 Lon:-113.210372

Survey start: Lat:17 27.026'S Lon:113 12.622'W

Survey end: 2021/10/20 18:34:21

Survey end: Lat:-17.388001 Lon:-113.194284

Survey end: Lat:17 23.280'S Lon:113 11.657'W

Ascent begins: 2021/10/20 18:34:21

On the surface: 2021/10/20 19:27:02

On deck: 2021/10/20 19:34:15

descent rate: 32.2 m/min

ascent rate: 48.9 m/min

survey time: 3.1 hours

deck-to-deck time 5.4 hours

Min survey depth: 2479m

Max survey depth: 2587m

Mean survey depth: 2561m

Mean survey height: 19m

distance travelled: 7.98km

average speed: 0.72m/s

average speed during photo runs: 0.56 m/s over 0.12 km

average speed during multibeam runs: 0.72 m/s over 7.86 km

total vertical during survey: 428m

Battery energy at launch: 16.8 kwhr

Battery energy at survey start: 16.3 kwhr

Battery energy at survey end: 13.8 kwhr

Battery energy on surface: 13.6 kwhr

Battery energy on deck: 13.5 kwhr

## Sensor Information

### 0.18 sentry605 Devices

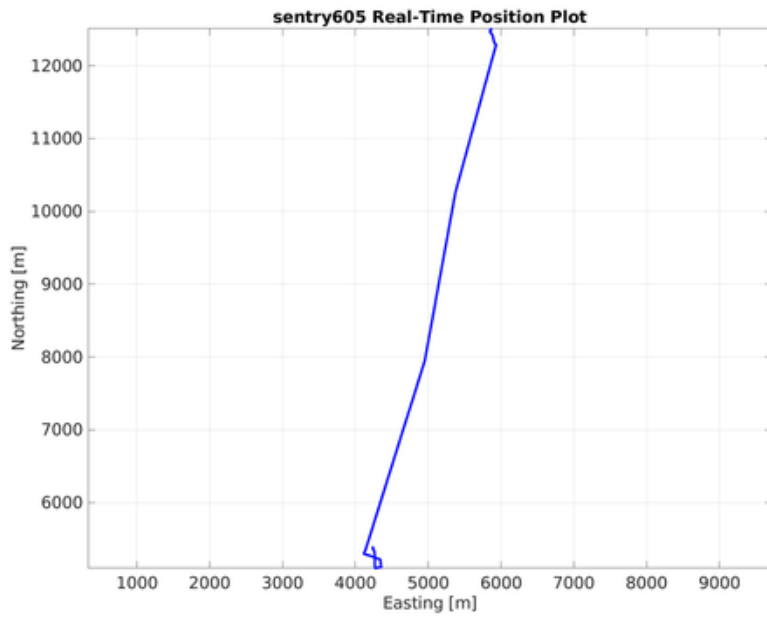
Instrument	Model	Serial Num.	Comments	Config File
USBL	Sonardyne AvTrak2	U00570D		avtrak_20211020_1251.cfg
DVL	RDI Navigator (300kHz)	727-2000-00M	CX: 1, WP: 0	dv1300_20211020_1251.cfg
SAIL	obs A/D	13	A: 5, G: 1.00, O: 0	a2d2-pods_20211020_1251.cfg
	orp A/D	14	A: 3, G: 1.00, O: 0.0024	

## Special Data Processing Notes

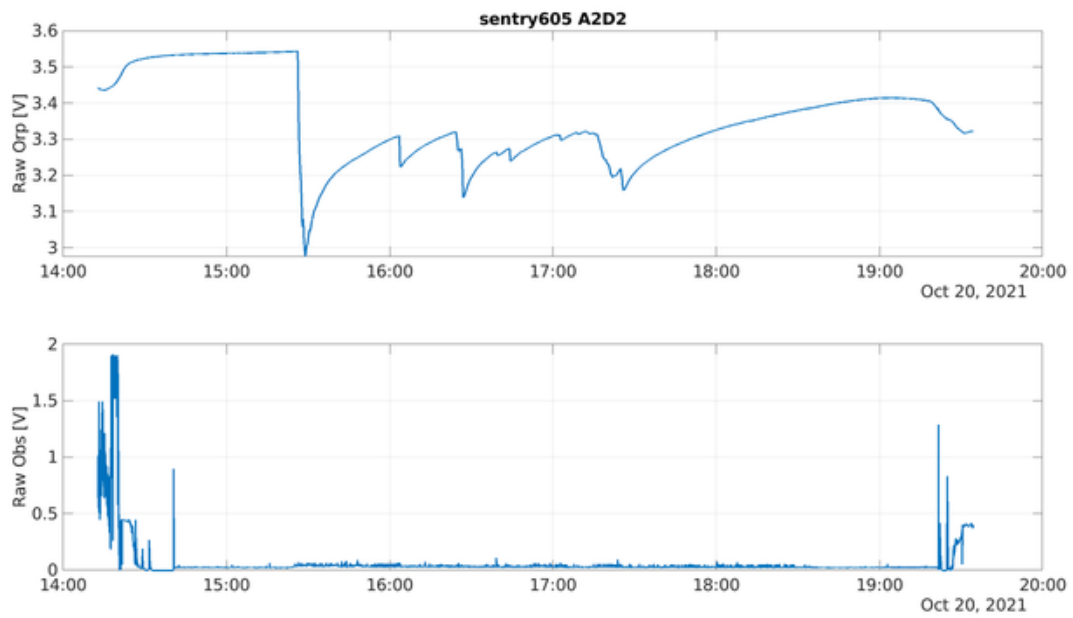
- 400Khz Multibeam collected at low altitude and processed
- 120Khz and 540Khz sidescan collected and processed

## Plots and Images

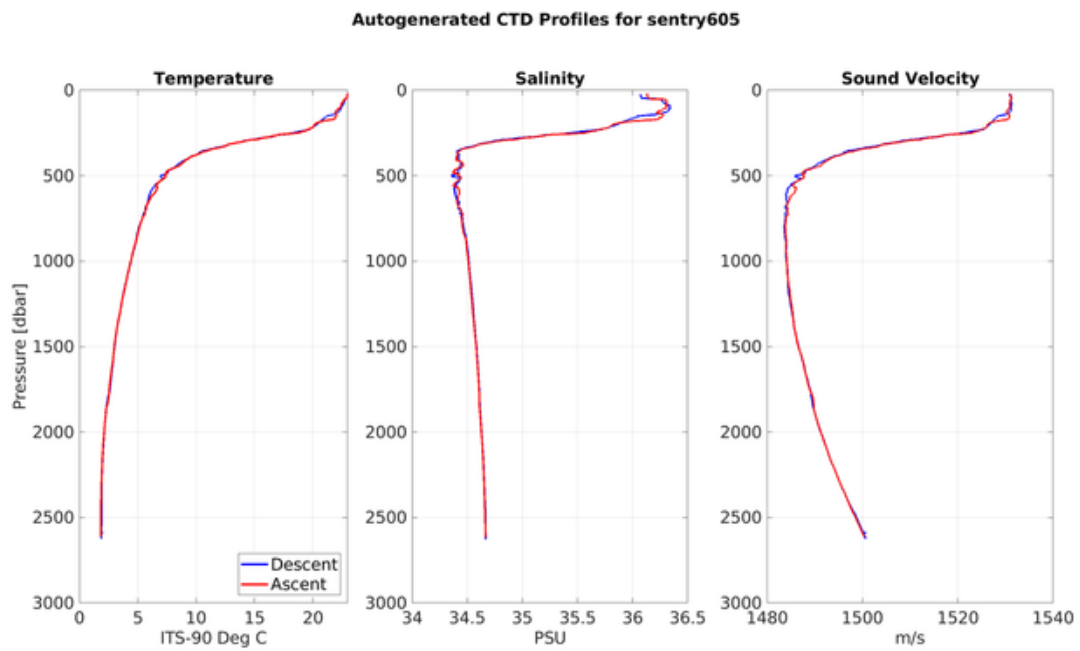
This section contains selected images of data products and plots of vehicle navigation and selected sensors.



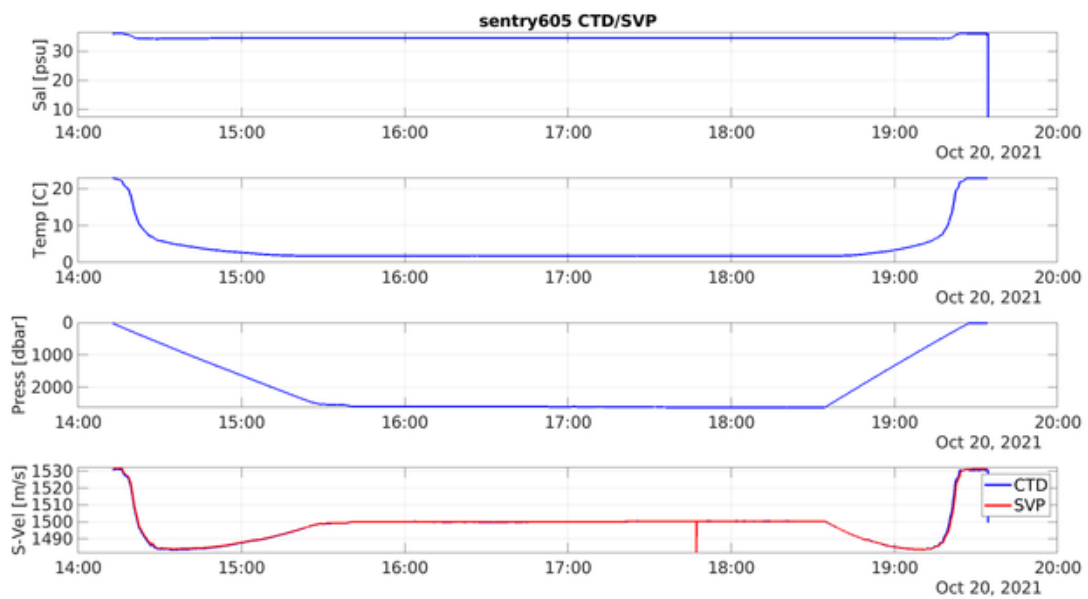
**Figure 85:** Latitude/Longitude plot of Sentry dive 605 based on post-processed navigation



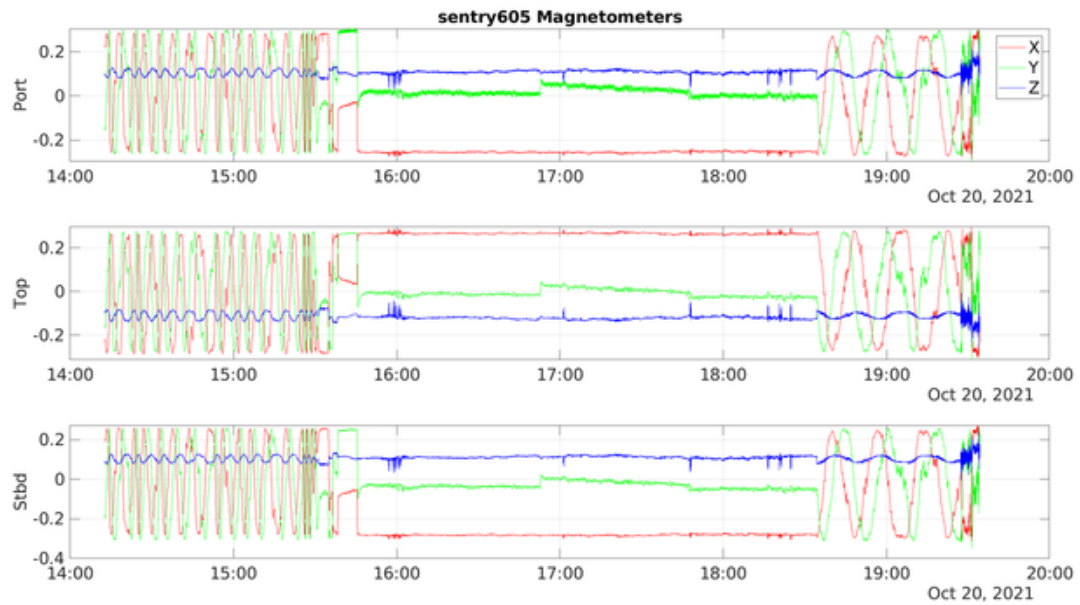
**Figure 86:** Raw analog Sensor Data



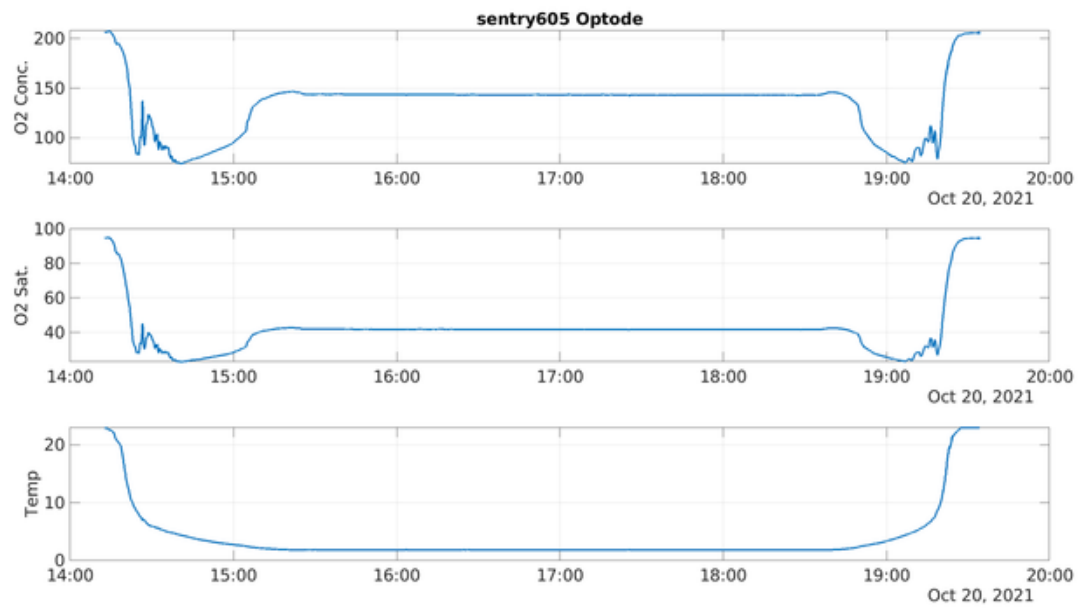
**Figure 87:** CTD profile sensor data



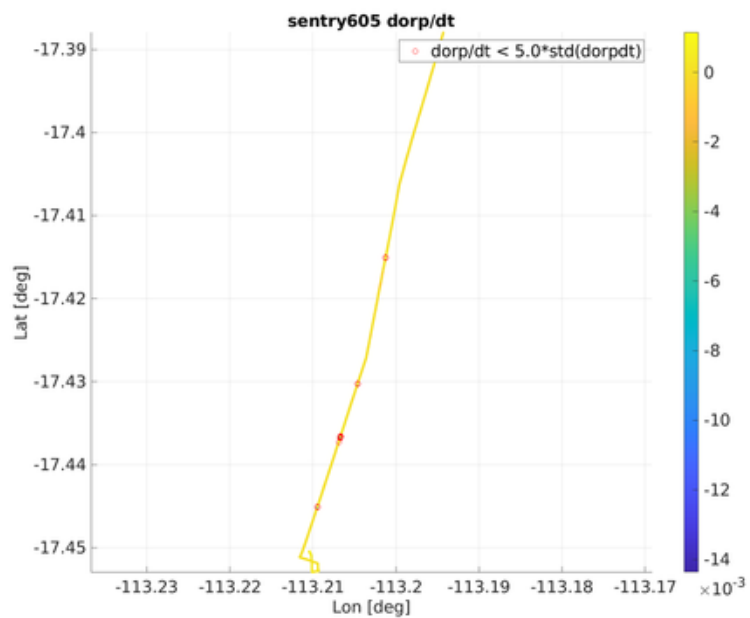
**Figure 88:** CTD and SVP sensor data



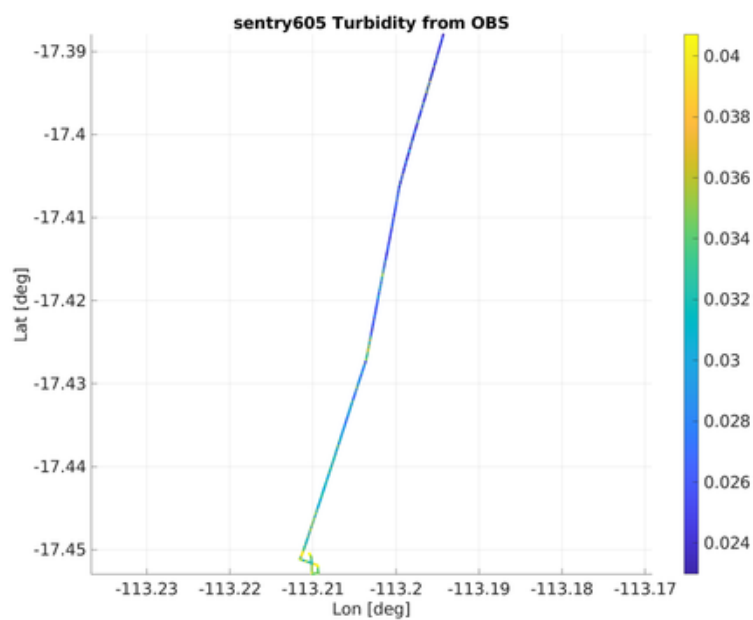
**Figure 89:** Magnetometer data from each of the three magnetometers on Sentry



**Figure 90:** Optode temperature, O2 saturation, and concentration



**Figure 91:** Navigated ORP sensor data.



**Figure 92:** Navigated OBS sensor data.

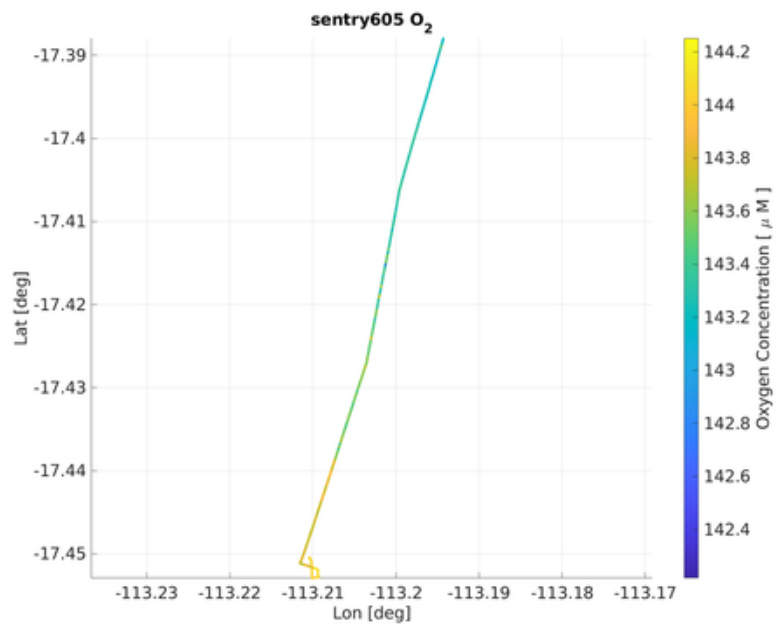


Figure 93: Navigated optode sensor data.

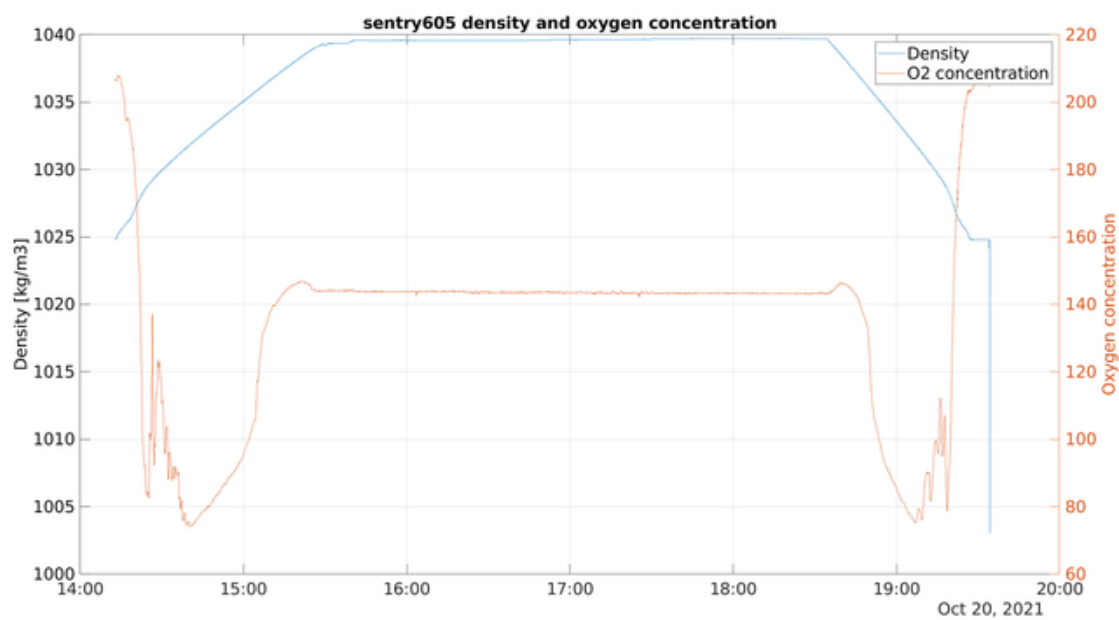


Figure 94: Density and O<sub>2</sub> sensor data.

# Sentry 606 Dive Report

## DRAFT



Sean Kelley, Isaac Vandor, Matt Silvia, Victor Naklicki, Tim Joyce

Sentry Expedition Leader: Sean Kelley

## Summary

**Weather:** Deployment: winds 15 knts, seas confused and 4-6ft  
Recovery: winds 15 knts, seas 2-5 ft

**Reason for end of dive:** End of mission

## Important Positions

**Dive Origin:** -17 -30 -113 -15

**Launch Position:** sentry606 launch position: 17 23.352'S 113 11.585'W

## Narrative

Sentry606 is the eleventh dive of RR2106

This dive was scheduled to run for 12 hours on bottom, collecting sidescan and ORP anomalies along the ridge axis. This survey planned to capture the gap that existing in the data between Sentry598 and Sentry601, collecting ORP and sidescan along axis. Sentry was programmed to run at 15m altitude for the duration of the dive. Overall the dive went well, collecting several ORP anomalies and completing the expected mission. The co-exploration software was tested during this dive, sending science data through the acoustic modem to the vessel.

# Dive Statistics

## 0.19 sentry606 Summary

sentry606 Summary

Origin: -17.500000 -113.250000

Origin: 17 30.000'S 113 15.000'W

Launch: 2021/10/24 13:54:19

Survey start: 2021/10/24 15:10:05

Survey start: Lat:-17.388473 Lon:-113.194438

Survey start: Lat:17 23.308'S Lon:113 11.666'W

Survey end: 2021/10/25 03:31:44

Survey end: Lat:-17.061914 Lon:-113.112550

Survey end: Lat:17 3.715'S Lon:113 6.753'W

Ascent begins: 2021/10/25 03:31:44

On the surface: 2021/10/25 04:24:39

On deck: 2021/10/25 04:30:21

descent rate: 33.1 m/min

ascent rate: 49.3 m/min

survey time: 12.4 hours

deck-to-deck time 14.6 hours

Min survey depth: 2505m

Max survey depth: 2609m

Mean survey depth: 2577m

Mean survey height: 16m

distance travelled: 40.17km

average speed: 0.90m/s

average speed during photo runs: NaN m/s over 0.00 km

average speed during multibeam runs: 0.90 m/s over 40.17 km

total vertical during survey: 1382m

Battery energy at launch: 18.1 kwhr

Battery energy at survey start: 17.7 kwhr

Battery energy at survey end: 5.5 kwhr

Battery energy on surface: 5.3 kwhr

Battery energy on deck: 5.2 kwhr

## Sensor Information

### 0.20 sentry606 Devices

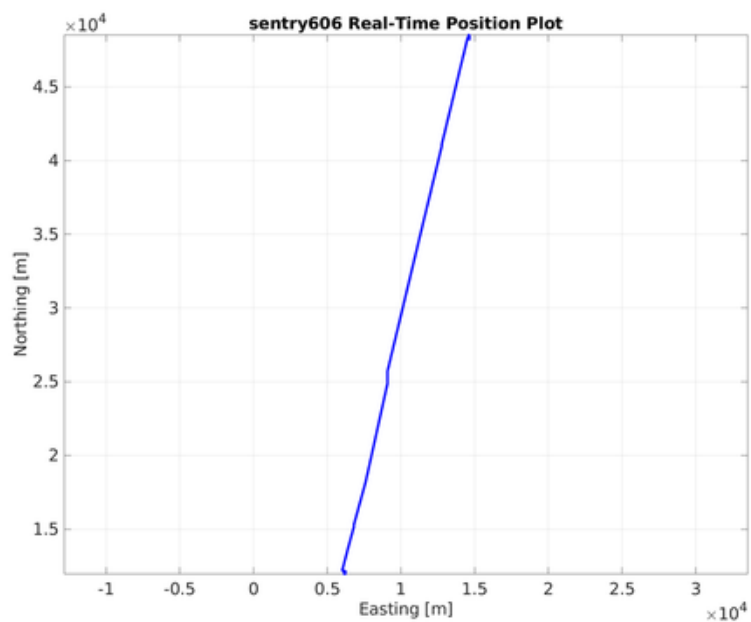
Instrument	Model	Serial Num.	Comments	Config File
USBL	Sonardyne AvTrak2	U00570D		avtrak_20211024_1214.cfg
DVL	RDI Navigator (300kHz)	727-2000-00M	CX: 1, WP: 0	dv1300_20211024_1214.cfg
SAIL	obs A/D	13	A: 5, G: 1.00, O: 0	a2d2-pods_20211024_1214.cfg
	orp A/D	14	A: 3, G: 1.00, O: 0.0024	

## Special Data Processing Notes

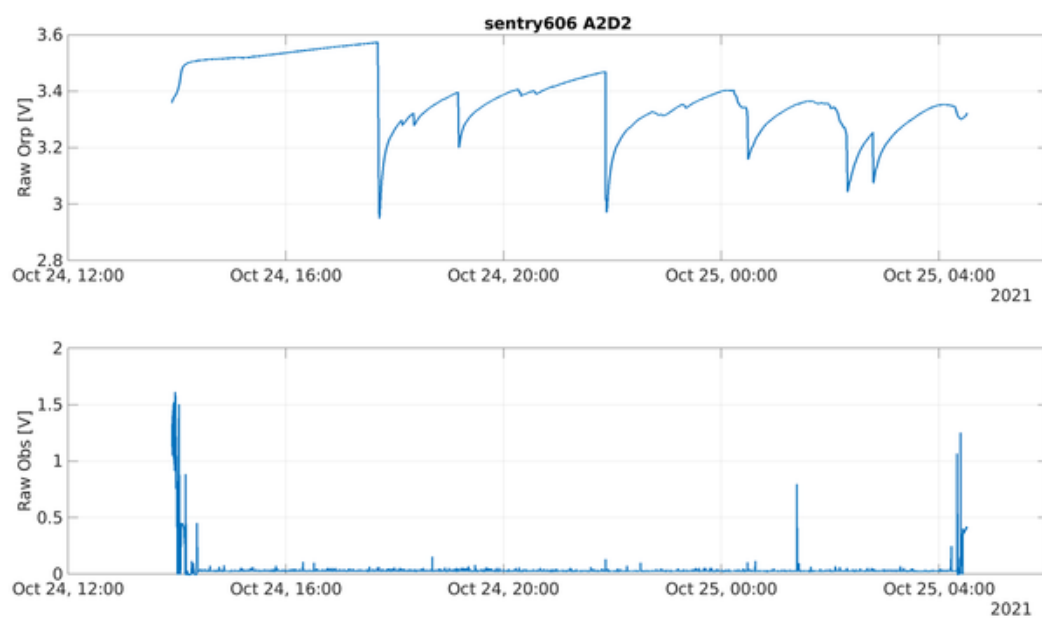
- 400Khz Multibeam was collected at low altitude and processed
- 120Khz and 540Khz Sidescan collected and processed

## Plots and Images

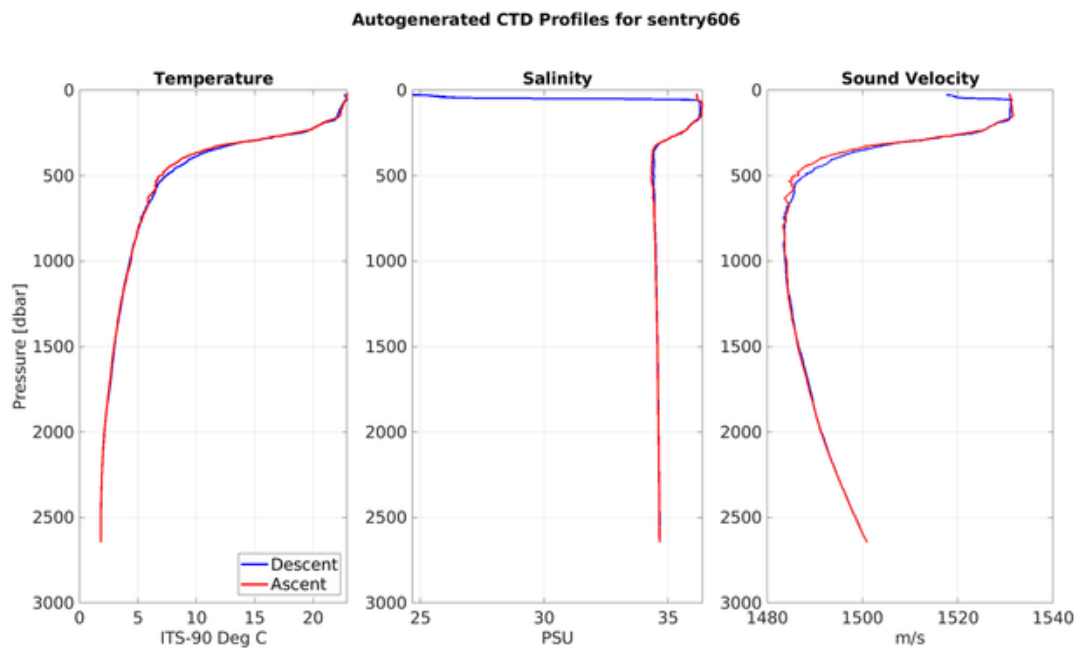
This section contains selected images of data products and plots of vehicle navigation and selected sensors.



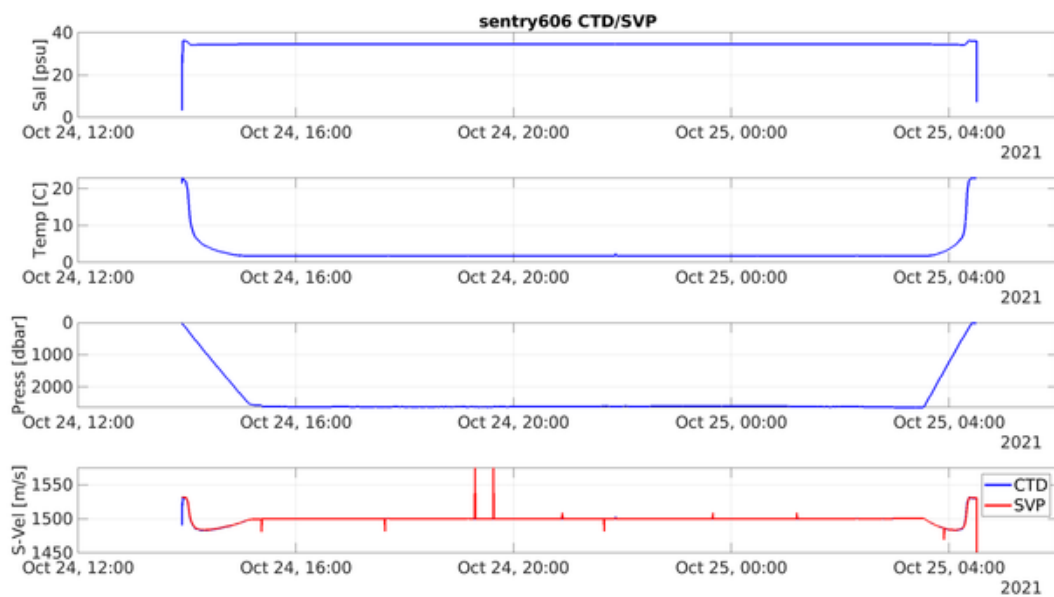
**Figure 95:** Latitude/Longitude plot of Sentry dive 606 based on post-processed navigation



**Figure 96:** Raw analog Sensor Data



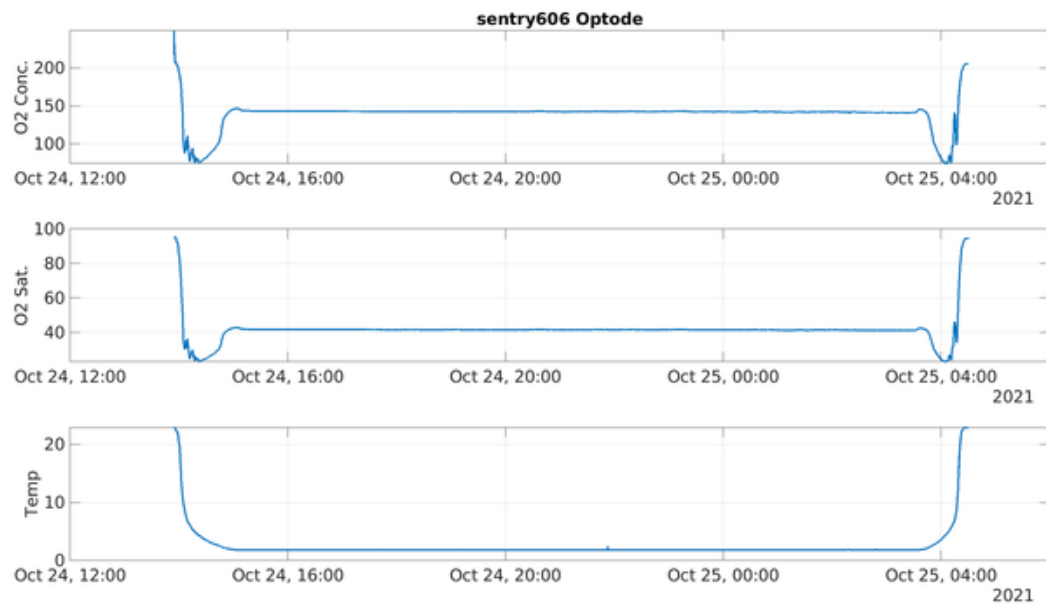
**Figure 97:** CTD profile sensor data



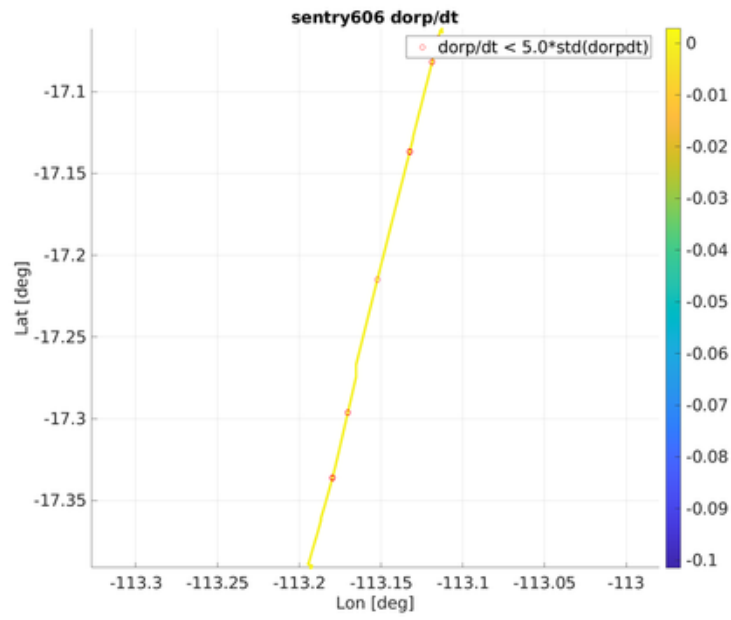
**Figure 98:** CTD and SVP sensor data



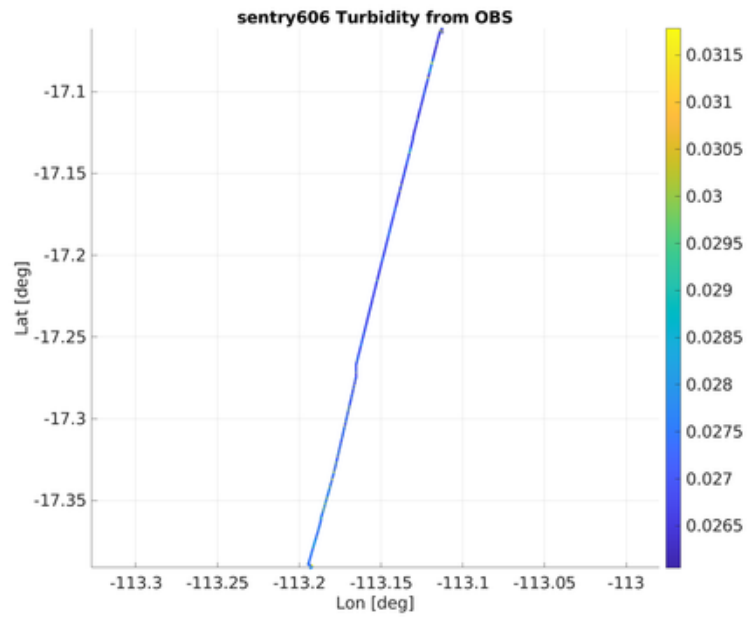
**Figure 99:** Magnetometer data from each of the three magnetometers on Sentry



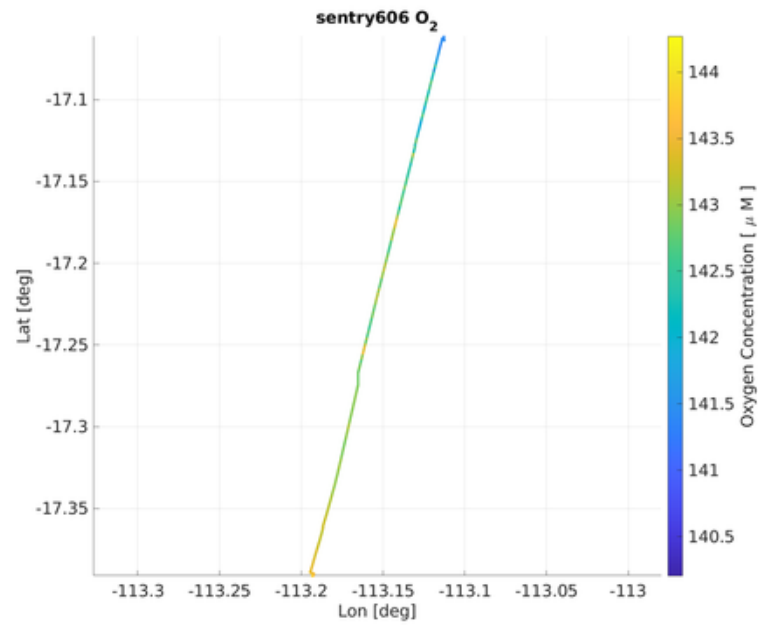
**Figure 100:** Optode temperature, O2 saturation, and concentration



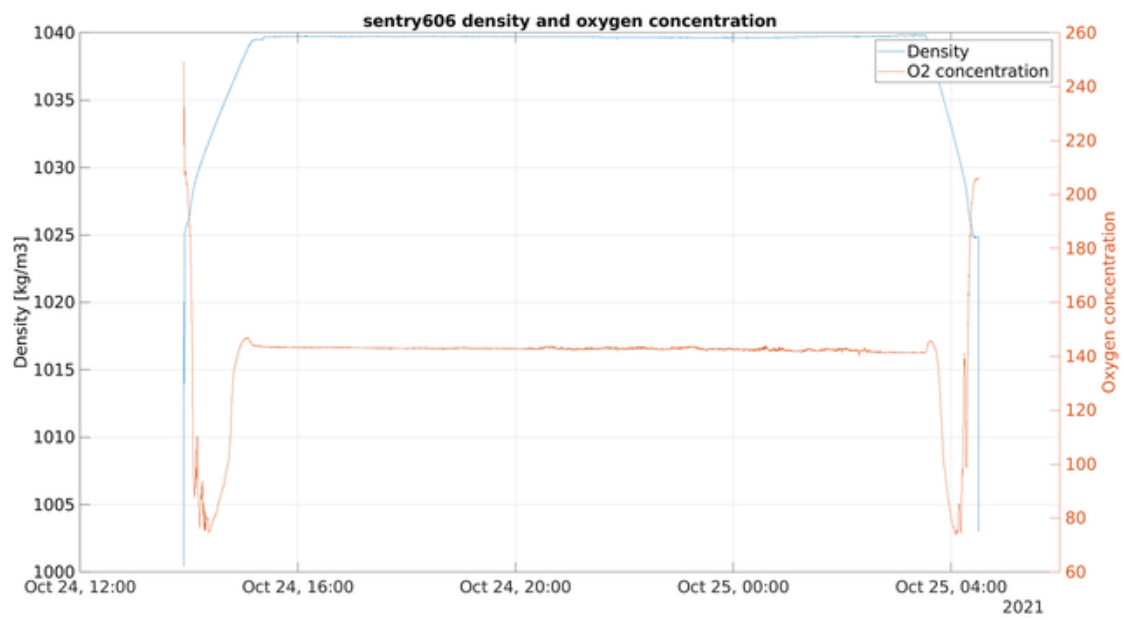
**Figure 101:** Navigated ORP sensor data.



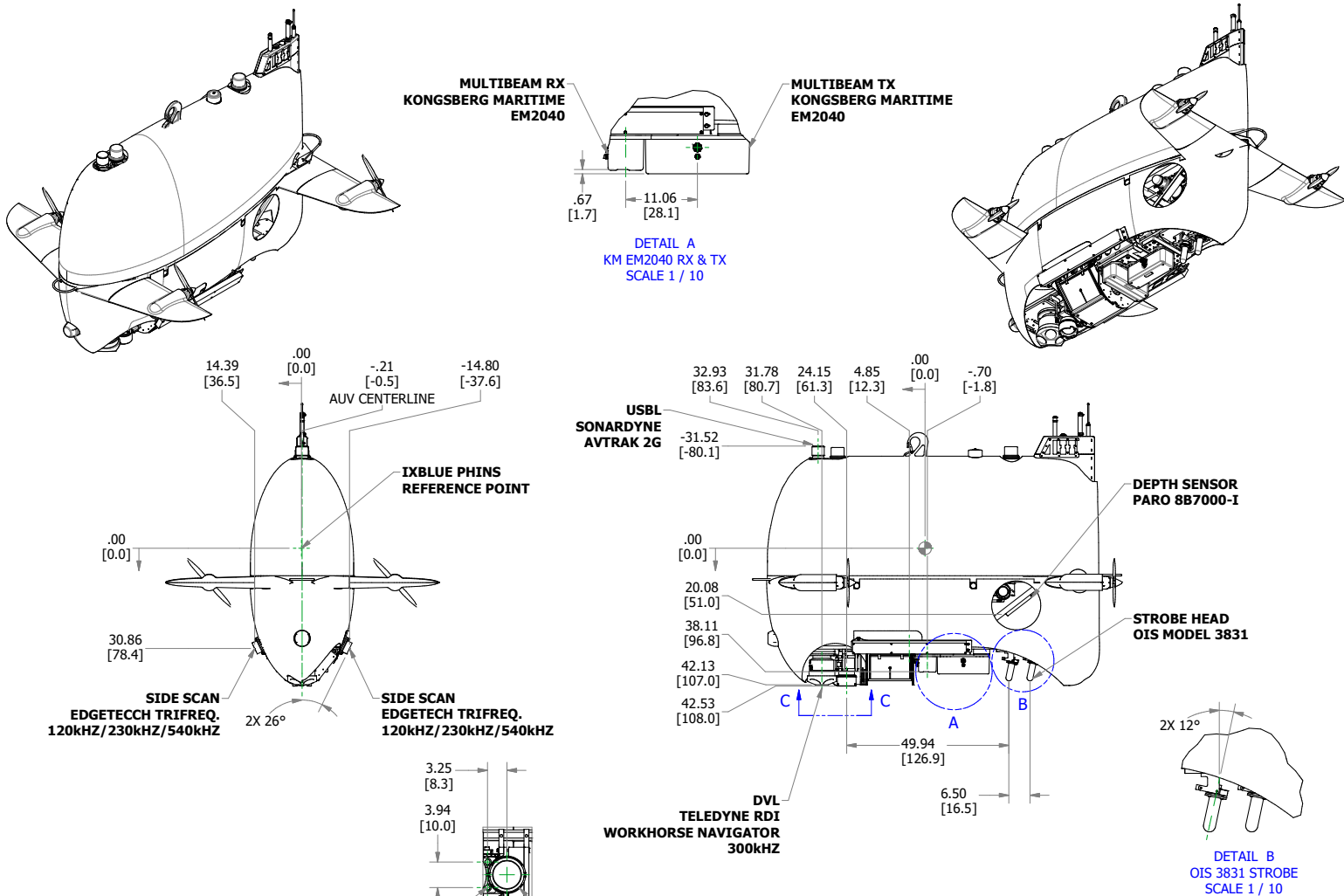
**Figure 102:** Navigated OBS sensor data.



**Figure 103:** Navigated optode sensor data.





**Figure 104:** Density and O2 sensor data.



#### NOTES:

1. PRIMARY DIMENSIONS INCHES, IN
2. ALTERNATE DIMENSIONS CENTIMETERS, [CM]
3. MEASUREMENTS ONLY FOR 2021-RESING CRUISE
4. DO NOT SCALE MEASUREMENTS OFF DRAWING
5. ALL DIMENSIONS  $\pm 0.75$  [1.9]

UNLESS OTHERWISE NOTED: DIMENSIONS ARE IN INCHES RESING ALL DIMENSIONS & SHARP EDGES BREAK ALL SHARP EDGES 90.02 MIN			DRAFTER: M.SILVIA 9/26/2021		 WOODS HOLE OCEANOGRAPHIC INSTITUTION NATIONAL DEEP SUBMERGENCE FACILITY SENTRY ENGINEERING	 SENTRY GENERAL INFO GENERAL ARRANGEMENTS & SCHEMATICS OFFSET MEASUREMENTS 2021-RESING	SIZE: C DRAWING NUMBER: S0001-2103M SCALE: 1/20 SHEET 1 OF 1	REV: A
TOLERANCES			ENGINEER: M.SILVIA 9/22/2021					
MATERIAL			CHECKED BY: S.KELLEY 9/26/2021					
			APPROVED BY: S.KELLEY 9/26/2021					