

# HOT-284: Chief Scientist Report

Chief Scientist: Dan Sadler

**R/V *Oceanus***  
27-3 May, 2016

Cruise ID: OC1605B  
Departed: 27 May at 0800 (HST)  
Returned: 31 May at 0749  
Vessel: R/V *Oceanus*

Master of the Vessel: Captain Bryon Wilson  
OSU Marine Technician: Croy Carlin

## 1. SCIENTIFIC OBJECTIVES

The objective of the cruise was to maintain a collection of hydrographic and biogeochemical data at the Hawaii Ocean Time-series (HOT) stations. Four stations were to be occupied during the cruise, in the following order:

- 1) Station 1, referred to as Station Kahe, is located at 21° 20.6'N, 158° 16.4'W and was to be occupied on May 27<sup>th</sup> for about 2 hours.
- 2) Station 2, referred to as Station ALOHA, is defined as a circle with a 6 nautical mile radius centered at 22° 45'N, 158°W. This is the main HOT station and was to be occupied during May 28<sup>th</sup> to 30<sup>th</sup>.
- 3) Station 52, the site of WHOTS-12 Mooring (anchor position 22° 40.061' N, 157° 56.9654' W) was to be occupied on May 30<sup>th</sup> for about one hour.
- 4) The Deep Trap Deployment Site is located at 22° 51'N, 157° 54'W and will be occupied on May 30<sup>th</sup> for about 6 hours.

Upon arrival to Station Kahe a 1300 lb weight-test cast to 1000 m, one CTD cast to 1000 m, and a Hyperpro cast were to be conducted on the afternoon of May 27<sup>th</sup>. The single CTD cast was to be conducted to collect a continuous profile of various physical and chemical parameters. Water samples were to be collected at discrete depths for biogeochemical measurements. After these operations were satisfactorily completed, the ship was to proceed to Station ALOHA

Upon arrival to Station ALOHA, the free-drifting sediment trap array was to be deployed. The sediment trap array was to stay in the water for about 53 hours. This was to be followed by a 1000 m CTD cast for preparation of the Primary Productivity Array. This cast was to be followed by the deployment of the free-drifting Primary Productivity Array to incubate *in situ* for 12 hours. A full-depth (~4740 m) CTD cast was to be conducted after the deployment of the Primary Production Array, followed by 1000 m CTD casts at strict 3 hour intervals for at least 36 hours for continuous and discrete data collection, ending with another full-depth CTD cast at 2300 on May 29<sup>th</sup>.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on May 29<sup>th</sup>. The Gas Array was to be recovered on May 30<sup>th</sup>.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on May 28<sup>th</sup> and 29<sup>th</sup> at Station ALOHA.

The Hyperpro (a profiling unit with one up-looking and one down-looking hyperspectral radiometer, a WET Labs ECO-BB2F triplet, temperature and conductivity sensors), was to be deployed on May 27<sup>th</sup>, 28<sup>th</sup>, and 30<sup>th</sup>.

After the 36 hour burst period of CTD work at Station ALOHA was accomplished, the ship was to transit to recover the floating Gas Array and the Sediment Trap Array on the morning of May 30<sup>th</sup>.

After recovering the arrays, the ship was to transit to Station ALOHA to Station 52 to conduct a one-hour 200 m CTD yo-yo cast.

Once operations at Station ALOHA were complete, the ship was to transit to the Deep Sediment Trap Deployment Site for deployment of the Deep Sediment Traps. After the deployment the ship was to triangulate the position of the anchor.

The following instruments were to collect data throughout the cruise: shipboard ADCP, thermosalinograph, fluorometer, and the ship's anemometer.

## 2. SCIENCE PERSONNEL

<b>Participant</b>	<b>Title</b>	<b>Affiliation</b>
Alex Nelson	Research Associate	UH
Dan Sadler	Research Associate	UH
Brenner Wai	Research Associate	UH
Susan Curless	Research Associate	UH
Blake Watkins	Marine Engineer	UH
Brie Maillot	Technician	UH
Tara Clemente	Research Associate	UH/SCOPE
Greyson Adams	Research Associate	UH/SCOPE
Eric Welsh	Undergraduate	UH
Jefrey Snyder	Marine Technician	UH
Fernando Santiago-Mandujano	Research Associate	UH
Kellen Rosburg	Research Associate	UH
Robert (Walt) Deppe	Research Associate	UH
Croy Carlin	Marine Technician	OSU

## 3. GENERAL SUMMARY

The cruise schedule was modified mid-cruise due to a re-configuration of CTD operations. During the Kahe CTD cast, we found that the stern a-frame did not provide enough clearance to launch and recover the UH CTD. The operation was moved to the side squirt boom. Unfortunately, this arrangement did not allow for deep CTD casts within Appendix A specifications. Instead, the OSU CTD was employed for a deep cast off the stern.

All cruise objectives were completed except:

- No water was collected from the deep cast.
- The second deep cast was cancelled.
- The PUR sampling was cancelled.
- The 36 hour burst sampling was 1 cast short.

Science Van #23 had to be powered using extension cords as the ship did not have 208VAC available. There was no impact on science.

One near bottom CTD cast, one 200 m CTD, and eleven 1000 m CTD casts were conducted at Station ALOHA. One 200 m yo-yo cast was conducted near the WHOTS mooring.

The Floating Sediment Traps, Primary Production Array, and Gas Array were all deployed and recovered successfully.

Six net tows were completed successfully; three during the day, and three during the night.

Three Hyperpro casts (three cycles each) were successfully completed.

Four optics casts were performed on May 30<sup>th</sup>. Two at night and two during the day.

The Deep Moored Sediment Traps were deployed.

The underway thermosalinograph system, the underway fluorometer, and the ADCP functioned correctly during the cruise.

The ship's anemometer ran without interruption during the cruise.

Winds were calm for the most of the cruise with one to two foot seas. On Monday, May 30<sup>th</sup> the wind gradually increased throughout the day, peaking at 15 to 18 knots. Seas increased to 2 – 4 feet.

#### 4. R/V *Oceanus* OFFICERS AND CREW, TECHNICAL SUPPORT

The R/V *Oceanus* delivered excellent support for our work. Captain Bryon Wilson and the ship's crew showed flexibility, enthusiasm, concern, and dedication to our scientific mission. Especially commendable was how the crew was able to re-configure the main deck at-sea to move CTD operations from the stern to the starboard side.

Technical support during this cruise was also excellent. Marine Technician Croy Carlin was available to assist in our work during the cruise. We appreciate his help readying the OSU CTD for a deep cast off the stern.

#### 5. DAILY REPORT OF ACTIVITIES (HST)

27 May 2016

0800 Depart from Snug Harbor  
0900 Science Meeting and Safety Briefing  
1930 Safety Drill  
1100 Arrive Kahe Station  
1105 Deck Ops Training  
1110 Weight cast to 500 m  
1211 Begin Hyperpro cast at 21° 20.606' N, 158° 16.339' W  
1247 Recover Hyperpro  
1305 Start S1C1 CTD cast to 1000 m. Tight clearance between rosette frame and stern. Rosette hit deck during deployment. Landed rosette on deck and repositioned tagline cleats  
1318 Restarted deployment.

1327 Stopped logging due to long wait for deployment. Data will be overwritten.  
1355 Re-start S1C1 CTD cast to 1000 m. Frame bumped stern on deployment.

Meeting to discuss alternative deployment scenarios attended by Captain, Marine Tech, Dan Sadler, Jeffrey Snyder. Will have two people fend off bottom of rosette with boat hooks on recovery. Can also move operations to side A-frame on 0.322 wire. Marine Tech consulted Appendix A and found within specification for side squirt boom capacity (SWL 4000 lbs.) Boom tested in Feb. 2016. Wire tested within 12 months.

1457 End S1C1. 24 marks OK.

Problems recovering rosette. Two additional people (besides two taggers and an a-frame operator) were pushing the rosette with poles to prevent hitting the stern. No visible damage to package. The rosette does not have sufficient clearance when deployed from stern. The A-frame does not extend far enough out board.

1625 1200 lb. weight cast from side squirt boom on 0.322 wire.  
1705 End weight cast. Max. tension: 1650 lbs. Wire out: 1000 m. Moving our rosette to starboard side to prepare for CTD cast. Ship's rosette (12 place), moved to stern.

Began transit to St. ALOHA

2111 Start test CTD cast (S20C1) to evaluate starboard CTD wire/boom. Tension in air 1250-1300 lb. Spiked at 1700 during deployment

- 0-500 m max tension 1250-1300 lb. Spike of 1700 during deployment.
- 500-400 m at 55 m/min, max tension 1200 lb.
- 400-750 m, 50 m/min, max. tension 1260 lb.
- 750-650 m at 55 m/min, max tension 1300 lb.
- 650-1020 m at 50 m/min, max. tension 1400 lb.
- Closed all 24 bottles at 1020m
- 1020-25 m at 55 m/min, max tension 1400 lb.
- Max tension in air 2100 lb.

2230 End of cast. Bottles fired without mark. Bottles not sampled. No pressure readout available during cast.

2240 Depart to St. ALOHA

28 May 2016

0310 Arrive St. ALOHA  
0322 S2C2 CTD cast to 200 m.  
0355 End of cast  
0500 Begin PP array deployment at 22° 44.09'N, 158° 00.193'W  
1517 PP array released at 22° 44.108'N, 158° 00.073'W  
1540 Begin sediment trap deployment at 22° 45.019'N, 157° 59.976'W  
1558 Sediment traps released.  
1251 Net tow at 22° 43.777'N, 157° 58.528'W  
1323 End of net tow  
1337 Begin Hyperpro at 22° 44.347'N, 157° 58.112'W  
1415 Hyperpro recovered  
1420 Start S2C2 CTD cast to 1000 m

Cast had secondary fluorescence “bump” between 180m and 240m. PC/PN 200 m filter had lots of orange/brown waxy substance.

1533 End of Cast. Max tension 1770 lb. 18 marks ok.  
1701 Start S2C3 CTD cast to 1000 m. Secondary Fluorescence max at about 210m  
1807 End of cast. Max tension 1710 lb. 16 marks OK.  
1908 Recovered PP array at 22° 42.95'N 158° 0.20'W  
1958 Start S2C4 CTD cast to 1000 m. Secondary florescence max with large spike at 250 dbar  
2104 End of cast, 24 marks OK  
2200 Start net tow  
2230 End net tow  
2239 Start net tow  
2309 End net tow  
2306 Errors in CTD deck box on board before starting CTD cast. Jeffrey troubleshooting. Errors stopped after wiggling termination but no problem found in termination.

29 May 2016

0048 Start S2C5 CTD cast to 1000 m.  
0150 End of cast. Max tension 1970 lb. 24 marks OK.  
0253 Start S2C6 CTD cast to 1000 m. Winch passed 125 dbar and went to 111 dbar. Sent back to 125 dbar to fire bottles.  
0402 End of cast. 22 marks OK.  
0451 Begin Gas Array deployment at 22° 45.362'N, 157° 57.569'W  
0515 Gas Array released at 22° 45.376'N, 157° 57.237'W  
0531 Start S2C7 CTD cast to 1000 m.  
0635 End of Cast. Max tension 1468 lb.  
0758 Start S2C8 CTD cast to 1000 m.  
0859 End of cast. 18 marks OK.  
1010 Start net tow at 22° 44.679'N 157° 58.721'W  
1039 End of net tow  
1057 Start S2C9 CTD cast to 1000 m.  
1158 End of cast. 9 marks OK.  
1250 Start net tow at 22° 45.84'N 157° 57.16'W  
1321 End of net tow  
1402 Start of S2C10 CTD cast to 1000 m  
1501 End of cast. Max tension 2020 lb.  
1650 Raining on station  
1656 Start S2C11 CTD cast to 1000 m.  
1801 End of cast. Max tension 1820 lb. 15 marks OK.  
1956 Start S2C12 CTD cast to 1000 m.  
2103 End of cast. 24 marks OK, max tension 1396 lb.  
2215 Start net tow  
2245 End net tow  
2300 Near bottom CTD cast on OSU rosette from stern on 0.680 wire. Late start due to problems with termination. Had to recover and troubleshoot. Termination needed more slack in electrical connection.

30 May 2016

0024 Start S2C13 CTD cast to near bottom. No pressure display for winch operator.  
0208 Unable to fire bottles on up cast. Ended cast at bottom 4801 dbar. 12 m off bottom.

22° 44.968'N, 157° 59.924'W

0213 Tried to start new cast S2C14 but software unable to recognize water sampler. Disabled water sampler and restarted s2C14.

0349 End of cast. No marks.

0405 Deployed optics cage at 22° 45.013'N, 158° 00.000'W

0457 Optics recovered and re-deployed.

0534 Optics recovered at 22° 45.009'N, 157° 59.485'W. After first light.

0550 Transit to gas array

0639 Begin gas array recovery at 22° 44.834'N, 157° 53.425'W

0652 Gas array recovered

0655 Transit to sediment traps

0735 Begin sediment trap recovery at 22° 40.731'N, 157° 56.49'W

0800 End sediment trap recovery.

0802 Transit to WHOTS mooring

1005 Deploy optics at 22° 40.731'N, 157° 57.294'W

2050 Optics recovered and re-deployed

1138 Optics recovered at 22° 40.711'N, 157° 57.285'W

1145 Transit to WHOTS mooring

1209 Start S52C1 CTD yoyo cast to 200 m. 4 cycles, last one to 250 m to collect water from 2<sup>nd</sup> chlorophyll peak.

1312 End of cast. 14 marks OK

1314 Transit to ALOHA

1339 Start Hyperpro cast at 22° 40.406'N, 157° 57.374'W

1421 Hyperpro recovered

1425 Transit North of ALOHA to deploy deep moored sediment traps.

1638 Start deep moored trap deployment. First float deployed at 22° 48.71'N, 157° 55.18'W

1819 Anchor over stern at 22° 50.65'N, 157° 54.929'W

1915 Began triangulating anchor position

2200 Finished triangulating anchor position

2210 Transit to Honolulu

31 May 2016

0749 Arrive Snug Harbor

## 6. HOT program sub-components:

Investigator	Project	Institution
Matt Church	Core Biogeochemistry	UH
Dave Karl		
Bob Bidigare		
John Dore	Biogeochemistry QA/QC	MSU
Roger Lukas	Hydrography	UH
Mike Landry	Zooplankton dynamics	SIO
HOT-284 Chief Scientist Report		

Ricardo Letelier	Optical measurements	OSU
<b>Ancillary programs:</b>		
Andrew Dickson	CO <sub>2</sub> dynamics and inter-calibration	SIO
Paul Quay	DI <sup>13</sup> C	SIO
Matt Church	SCOPE: Diversity and activities of nitrogen-fixing microorganisms	UH
Sam Wilson	SCOPE: Reduced gases in the upper ocean: The cycling of methane, sulfide and nitrous oxide	UH
Sara Ferron-Smith	SCOPE: Determination of net community production from the diurnal variability of O <sub>2</sub> /Argon ratios	UH
Ed DeLong	SCOPE: DNA collection	UH
Angel White	SCOPE: Diazotroph microscopy sampling	OSU
Kyle Edwards	Surface seawater for culturing	UH