HOT 331: Chief Scientist Report

Chief Scientist: Dan Sadler
R/V *Kilo Moana*
June 21 – 25, 2020

Cruise ID: KM 21-09
Vessel: R/V *Kilo Moana*, University of Hawaii
Master of the Vessel: Captain Joey Daigle
Chief Scientist: Dan Sadler, University of Hawaii
Marine Technicians: Julianna Diehl, Jeff Koch

1.0 COVID-19 PREVENTION

Due to the current COVID-19 pandemic extra precautions were set in place before and during the cruise to prevent the spread of COVID-19 onboard. UNOLS has provided guidelines which were followed on this cruise. A few of the guidelines are found below. The extensive list can be found in the Pandemic Response Plan.

- All science party was vaccinated.
- All cruise participants self-isolated according to the HOT Risk Mitigation Plan before the cruise (June 8 – June 21).
- All cruise participants were tested twice for COVID

During the cruise all participants:

- wore face masks
- maintained a distance of 6 ft. when possible
- properly disinfected all workspaces often

2.0 SCIENTIFIC OBJECTIVES

The cruise objective was to maintain a collection of hydrographic and biogeochemical data at the Hawaii Ocean Time-series (HOT) stations.

A copy of the detailed cruise plan is available at:

https://hahana.soest.hawaii.edu/hot/crsplan/HOT_331_Operational_Cruise_plan.pdf

Science operations were planned for 7 stations, in the following order:

1) Station 1, referred to as Station Kahe, is located at 21° 20.6'N, 158° 16.4'W.
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.
3) Station 52, the site of WHOTS-16 Mooring (anchor position 22° 40.01'N 157° 56.96'W).
4) PERI-SCOPE Station 1 @ 21° 08.9’ N, 157° 59.9’ W
5) PERI-SCOPE Station 2 @ 21° 09.4’ N, 157° 50.7’ W
6) PERI-SCOPE Station 3 @ 21° 12.0’ N, 157° 50.9’ W
7) PERI-SCOPE Station 4 @ 21° 13.2’ N, 157° 50.7’ W

3.0. SCIENCE PERSONNEL

Participant	Title	Affiliation	Citizenship
James Allen	Scientist	UH	USA
Brandon Brenes	Research Assistant	UH	USA
Tim Burrell	Research Associate	UH/SCOPE	NZL
Julianna Diehl	Marine Technician	OTG	USA
Dan Fitzgerald	Research Associate	UH	USA
Nick Hawco	Scientist	UH	USA
Caroline Jackson	Graduate Student	UH	USA
Jeff Koch	Marine Technician	OTG	USA
Lucie Knor	Graduate Student	UH	DEU
Fernando Pacheco	Research Associate	UH	BRA
Tully Rohrer	Research Associate	UH/SCOPE	USA
Dan Sadler	Research Associate	UH	USA
Fernando Santiago-Mandujano	Research Associate	UH	USA
Eric Shimabukuro	Graduate Student	UH	USA
Ryan Tabata	Research Associate	UH/SCOPE	USA
Blake Watkins	Marine Engineer	UH	USA

4.0. GENERAL SUMMARY

Equipment loading was conducted on June 18th, and the cruise departed on June 21st at 08:53 (HST). At Station Kahe, the Hawboldt LARS system passed the prescribed operational checks and weight cast. After completing operations at Station Kahe the ship proceeded to Station ALOHA.

Upon arrival at Station ALOHA, the sediment traps, and WireWalker were deployed SW of center station, as the currents were expected to carry them towards the SW. A CTD cast was conducted to collect water for the primary productivity array, and the array was deployed 1 nm East of station center. The primary productivity array drifted towards the SW and was recovered after sunset on June 22nd. The gas array experiment was deployed on June 23rd and recovered on schedule on June 24th. The remaining arrays drifted SW and were recovered on June 24th.

At Station ALOHA, two near bottom CTD casts and twelve 1000 m CTD casts were completed. One 5-cycle yoyo CTD cast to 200 m was completed near the WHOTS mooring (Station 52).

Six net tows for the core HOT zooplankton collection were completed: three during the day and three at night.

Hyperpro operations were conducted once at Station Kahe, and twice at Station ALOHA during the primary production experiment. Each operation consisted of 2 deep casts to 185 m, and a 5 cycle Yo-Yo cast to 20 m.

Three trace-metal cast were completed.

Water was collected for the PERI-SCOPE experiment.

The 300 kHz ADCP, underway fluorometer, transmissometer, thermosalinograph and the ship's meteorological suite ran without interruption during the cruise. The 38 kHz ADCP is still not working correctly due a failed cable, but data were collected using three transducers and may still be useful.

Winds during the cruise were 7-10 knots from the NE and bumped up to 10-15 knots on June 24th. An anti-cyclonic eddy to the NW generated a SW current and flow across Station ALOHA.

The HOT CTD/Rosette was lost overboard during deployment on Wednesday, June 23rd at 1106 HST. The location was noted as 22° 42.431' N, 157° 55.642' W. HOT Marine Engineer Dan Fitzgerald observed the operation. His summary of the incident is attached to the end of this report. Thankfully, there were no injuries.

CTD operations resumed at 1700 hours using the OTG CTD/Rosette deployed through the A-frame on the 0.681 wire. Two planned CTD casts were cancelled but the water requirements were shifted to later casts. All water samples were collected but the 36 hour CTD period was interrupted by the incident.

Special thanks to Dan Fitzgerald for working overtime to switch HOT operations over to the OTG rosette.

5.0. R/V *Kilo Moana* OFFICERS AND CREW, TECHNICAL SUPPORT

The R/V *Kilo Moana* continues to maintain very good ship support for our work.

Captain Joey Daigle and the ship's crew showed flexibility, concern, and dedication to our scientific mission. Ship handling was very good during all operations.

The ship's crew was especially helpful in getting us back to work after losing the CTD. Kudos to Chief Mate Luke Barker and the KM deck department for craning the rosette to the Main Deck, rigging the 0.681 wire through the A-frame and preparing the CTD landing pallet used to transfer the rosette between the launch/recovery area and the staging bay for sampling.

Technical support during this cruise was also very good. OTG personnel were available to assist in our work during the cruise. They were flexible and accommodating.

Special thanks to OTG Senior Technician Julianna Diehl for having the OTG rosette in operational condition to serve as a backup. Having a working backup saved us 4-8 hours of science downtime. Julianna also helped terminate the 0.681 wire for an A-frame deployment.

6.0. DAILY REPORT OF ACTIVITIES (HST)

Monday, June 21, 2021

0815 - Everyone on board and ship turned to load Trace Metal Van
0853 - Departed Pier 35
0930 - Safety Briefing
1000 - Fire and Abandon Ship drills
1200 - Arrive Station Kahe
1215 - 1251 - LARS testing and weight cast
1258-1337 - Hyperpro casts, 2 deep and one yoyo
1402-1455 - S1C1 CTD cast to 1000 m
1522-1540 - Trace Metal cast
1558-1635 - Submersible pump testing
1635 - Transit to Station ALOHA

Tuesday, June 22, 2021

0005 - Arrive Station ALOHA
0017-0043 - Sedimentt trap array deployed at 22 41.9340 N, 158 0.0027 W
0106-0119 - Wirewalker deployed at 22 42.8878 N, 157 59.9213 W
0159-0258 - S1C1 1000 m CTD cast for Primary Production
0408-0429 - Primary Production array deployed at 22 44.5728 N, 157 59.9762 W
0512-0834 - S2C2 Near Bottom CTD cast for PO Deep sampling
0912-0940 - Trace Metal cast
1008-1051 - Submersible pump deployed to fill plastic tote
1111-1224 - S2C3 1000 m CTD cast for PO Shallow sampling
1235-1303 - Net tow
1314-1346 - Hyperpro cast, 2 deep and one 20m yoyo
1408-1458 - S2C4 1000m CTD for PC/PN
1509-1516 - Net Trap Deployed at 22 45.0282 N, 157 59.5001 W
1520 - Transit to pump tanks
1703-1806 - S2C5 1000m CTD cast for PPO4
1820 Transit to recover PP array
1918 - PP array recovered at 22 40.1058 N, 158 2.5534 W
2002-2105 - S2C6 1000m CTD cast for BEACH sampling
2200-2306 - 2 net tows completed
2114-0015 - S2C7 1000m CTD cast for SCOPE DNA

Wednesday, June 23, 2021

0156-0256 - S2C8 1000m CTD cast for Gas Array
0436-0459 - Gas Array deployed at 22 44.5707 N, 157 59.8700 W
0522-0615 - S2C9 1000m CTD cast for DNA
0625- Transit to pump tanks and incinerate
0809-0901 - S2C10 1000m CTD cast for PSi
1106 - Wire parted during deployment. Rosette lost overboard at 22 42.431 N, 157 55.642 W

1208-2332 - 2 Net Tows
1303-1325 - Net trap recovered at 22 35.2020 N, 158 02.7914 W
1648-1814 - S2C11 1000m CTD cast for ATP
2004-2119 - S2C12 1000m CTD cast for HPLC
2157-2230 - Net tow
2254-0320 - S2C14 Near Bottom CTD cast, PO Deep 2

Thursday, June 24, 2021

0335-0511 - Optics cast, 3 cycles
0512 - Transit to Gas Array
0623-0639 - Gas Array recovered at 22 33.7233 N, 158 02.7045 W
0747-0805 - Sediment Traps recovered at 22 20.1896 N,158 11.9339 W
0824-0833 - Wirewalker recovered at 22 29.929 N, 158 11.4276 W
1113-1216 S52C1 200m yoyo cast, 5 cycles
1232-1303 - Hyperpro cast at 22 38.0474 N, 157 58.2329 W
1305 - Transit to PERI-SCOPE sampling area
2216 - PERI-SCOPE Station 1 Bucket sample @ 21 08.9 N, 157 59.9 W
2330-0027 - PERI-SCOPE Station 2 Bucket sample and submersible pump @ 1 21 09.4 N, 157 50.7 W

Friday, June 25, 2021

0116 - PERI-SCOPE Station 3 Bucket sample @ 21 12.0 N, 157 50.9 W
0155 - PERI-SCOPE Station 4 Bucket sample @ 21 13.2 N, 157 50.7 W
0746 – All fast Pier 35

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HOT program sub-components:

Investigator	**Project**	**Institution**
Angelicque White	Core Biogeochemistry	UH
Dave Karl	SCOPE-biogeochemistry	UH
John Dore	Biogeochemistry QA/QC	MSU
James Potemra	Hydrography	UH
Mike Landry	Zooplankton dynamics	SIO
Ricardo Letelier	Optical measurements	OSU

Ancillary programs:

Matt Church	Diversity and activities of nitrogen-fixing microorganisms	UM/FLBS
Ed DeLong	SCOPE: DNA and Viral DNA collection	UH
Andrew Dickson	CO_2 dynamics and intercalibration	SIO
Paul Quay	$DI^{13}C$	UW
Dan Repeta	SCOPE: DOM collection	WHOI
Angelicque White	SCOPE: C-STAR, UVP, IFCB	UH
Nicholas Hawco Eleanor Bates	Quantifying Iron Turnover in the Upper Ocean via Time-series Measurements at Station ALOHA	UH
Sonya Dyhrman	Physiological ecology of diatom diazotroph associations using metatranscriptome samples.	LDEO
Debbie Lindell	Seasonal Virus Sampling	Technion
Emily Seelen Emily Townsend Seth John Lab	PERI-SCOPE: Iron incubation experiment (PERI-FIX)	USC

6/24/2021

Summary of HOT yellow Rosette and CTD during HOT-331 (KM2109)
by D. Fitzgerald, HOT Marine Electronics Engineer/Technician

The loss of the HOT yellow rosette package -- outfitted with a SBE 9plus CTD, dual temperature, conductivity and dissolved oxygen sensors, plus a Seapoint chlorophyll fluorometer and C-Star transmissometer, and atwenty-four place carousel/pylon with twenty-four 12L bottles -- occurred during the deployment of the 11th CTD cast at Station ALOHA, S2C11, scheduled to begin at 1100 HST on June 23, 2021 using the Hawboldt CTD LARS.

The OTG tech and I were on the fantail aft of the wet lab, while two ABs and the chief engineer were on the 01-deckat the Hawboldt winch controls. When the lab and bridge were ready, deployment procedures began with one of the ABs using the belly pack controls to maneuver the package into deployment position. The package was successfully lifted off the deck into the docking head. and then the operator slewed the crane aft, moving the package outboard of the rail, and engaged the locking pin.

At that point it was noted by the OTG tech that the Hawboldt system had alarms present, indicated by the red light at the base of the crane, and the tech told an AB to clear the alarms. There was no mention of what type of alarms were active.

At that point, the AB on the belly pack was instructed to knuckle out and boom down while in "Auto with LARS" mode, but the AB said that he no longer had any control of the winch or crane from the belly pack. The belly pack was turned off and on several times to reestablish connection -- it seemed like it had partial connection, because at one point it sounded like the winch was powered on (could hear the electric motor fan noise), but the AB could not control the crane from the belly pack. Then the OTG tech told the AB to turn off the belly pack and to use the manual hydraulic levers to move the crane into full deployment position. The AB was instructed to knuckle out and boom down, the crane responded, but the winch did not pay out or render, and within a few seconds the package was pulled further into the docking head, reached maximum compression, and then the wire parted at the termination and the yellow rosette fell into the ocean.

Fortunately no one was injured.