

HOT 325: Chief Scientist Report

Chief Scientist: Tully Rohrer

R/V *Kilo Moana*

December 17th – 21st, 2020

Cruise ID: KM 20-14

Vessel: R/V *Kilo Moana*, University of Hawaii

Master of the Vessel: Captain Joey Daigle

Chief Scientist: Tully Rohrer, University of Hawaii

Marine Technicians: Trevor Young, Lance Frymire

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.

- Sailed with a minimum science party, one scientist per stateroom (with two exceptions).
- All cruise participants self-isolated according to the HOT Risk Mitigation Plan before the cruise (November 30th – 17th).
- All cruise participants were tested for COVID-19 twice before the cruise (November 30th and December 14th).

During the cruise all participants:

- wore face masks
- maintained a distance of 6 ft. when possible
- properly disinfected of all workspaces often
- remained in their staterooms as much as possible during non-work hours

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_325_KM_Operational_Cruise_Plan.pdf

Science operations were planned for 4 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) Station 6, referred to as Station Kaena, is located off Kaena Point at 21° 50.8'N, 158° 21.8'W.

3.0. SCIENCE PERSONNEL

Participant	Title	Affiliation	Citizenship
Eleanor Bates	Graduate Student	UH	USA
Brandon Brenes	Research Assistant	UH	USA
Tim Burrell	Research Associate	UH/SCOPE	NZL
Dan Fitzgerald	Research Associate	UH	USA
Lance Frymire	Marine Technician	OTG	USA
Nicholas Hawco	Scientist	UH	USA
Lucie Knor	Research Assistant	UH	GER
Fernando Pacheco	Research Associate	UH	BRA
Tully Rohrer – Chief Scientist	Research Associate	UH	USA
Dan Sadler	Research Associate	UH	USA
Andrés Salazar Estrada	Graduate Student	UH	CHL
Eric Shimabukuro	Graduate Student	UH	USA
Ryan Tabata	Research Associate	UH/SCOPE	USA
Blake Watkins	Marine Engineer	UH	USA
Trevor Young	Marine Technician	OTG	USA

4.0. GENERAL SUMMARY

Equipment loading was conducted on December 16th, and the cruise departed on December 17th at 07:35 (HST). After conducting operations at Station Kahe the ship proceeded to Station ALOHA.

Upon arrival at Station ALOHA, the IRSC sediment traps, the sediment traps, and WireWalker were deployed east of center station, as the currents were expected to move to the south. A CTD cast was conducted to collect water for the primary productivity array, and the array was deployed 1 nm east of center station. Despite strong winds, the primary productivity array recovery went smoothly just after sunset on December 18th. The gas array experiment was deployed north of center station on December 19th and recovered on schedule on December 20th. The remaining arrays drifted south and then to the southwest nearly 40 nm from Station ALOHA, so recovery was postponed until after operations concluded at Station 52. They were recovered on the way to Station Kaena and were in the water for approximately 64 hours.

At Station ALOHA, two near bottom CTD casts and thirteen 1000 m CTD casts were completed. The 36-hour CTD burst period was uninterrupted except for a 50 minute delay before S2C12 due to unspooling of slack wire on the winch. The anomalous feature present at Station ALOHA during HOT-324 (a salinity increase (~0.1 g/kg) and oxygen decrease (~0.3 ml/l) in the salinity minimum between 400 and 500 dbar) was present for some of the casts during HOT-325, most notably S2C7, S2C8, and S2C15. One 5-cycle yoyo CTD cast to 200 m was completed near the WHOTS mooring (Station 52), as well as the near-bottom CTD cast at Station Kaena (Station 6).

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

Three casts were conducted with the Trace Metals CTD using the SeaMac winch. The experiments were completed using these casts, so the 4th cast scheduled for December 20th was cancelled.

Four casts were completed with the Scripps Plankton Camera package, also using the SeaMac winch. Two casts were conducted in the daytime, and two at night.

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

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.

The weather was moderate at the beginning of the cruise with 15 knot easterly winds, turning rough starting on December 18th due to the winds increasing to 20-25 knots. Conditions improved overnight on December 19th – 20th, allowing for reasonable array recoveries. A SSWward current of greater than 0.7 knots was present in the upper 80 m during the cruise.

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. The LARS system worked well throughout the cruise giving very consistent CTD cast times that allowed us to stick to our schedule. We look forward to full implementation of the docking head which will allow for “hands-free” deployments and recoveries.

Captain Joey Daigle and the ship's crew showed flexibility, concern, and dedication to our scientific mission. The mates were excellent at foreseeing our needs, especially with regard to positioning the ship to facilitate the next operation, which allowed us to keep to our schedule despite rough seas.

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.

6.0. DAILY REPORT OF ACTIVITIES (HST)

December 16, 2020

0900 – Began equipment loading
1100 – Safety briefing

December 17, 2020

0730 – All aboard
0735 – Depart from Pier 35
0820 – Fire and Abandon ship drills
0830 – Fast Rescue Boat deployment (KM operation for Coast Guard regulations)
1050 – Arrived at Kahe Station
1058-1145 – Weight cast to 900 m with 1200 lb weight
1202-1238 – Hyperpro cast
1248-1353 – S1C1 CTD cast to 1000 m
1415-1430 – Trace metal cast
1445 – Transit to Station ALOHA
2245 – Arrived at Station ALOHA
2331 – Deployed IRSC Trap array, 22 44.8803'N, 158 04.5419'W

December 18, 2020

0021 – Deployed Sediment Trap array, 22 44.9540'N, 158 03.3779'W
0048 – Deployed WireWalker, 22 44.9862'N, 158 02.1918'W
0210-0258 – S2C1, 1000 m CTD cast
0436 – Deployed Primary Productivity array, 22 44.7178'N, 158 0.7672'W
0456 – S2C2, near-bottom CTD cast
0639 – 7m off bottom, 22 45.0514'N, 157 59.9826'W
0839 – End of cast
0904-0916 – Trace Metal cast #2
1010-1046 – Scripps Plankton Camera profile
1155-1217 – S2C3, 1000 m CTD cast
1235-1305 – Net Tow
1336-1405 – Hyperpro profiles and yo-yo
1410-1516 – S2C4, 1000 m CTD cast
1520 – Transit to pump tanks
1652-1746 – S2C5, 1000 m CTD cast
1746 – Transit to Primary Production array, 4 mi S of ALOHA circle
1856-1913 – Primary Production array recovery, 22 35.1235'N, 158 02.9645'W
1945 – Back inside ALOHA circle
2016-2117 – S2C6, 1000 m CTD cast
2140-2222 – Scripps Plankton Camera cast #2
2228-2259 – Net Tow
2320-0002 – S2C7, 1000 m CTD cast

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December 19, 2020

0012 – Transit to pump tanks
 0211-0300 – S2C8, 1000 m CTD cast
 0424-0440 – Gas Array deployment, 22 48.1274'N, 158 00.0210'W
 0450-0602 – S2C9, 1000 m CTD cast
 0756-0905 – S2C10, 1000 m CTD cast
 0927-0944 – Trace Metal cast #3
 1051-1152 – S2C11, 1000 m CTD cast
 1204-1308 – Net Tows (2)
 1450-1540 – S2C12, 1000 m CTD cast
 1545-1642 – Scripps Plankton Camera cast #3
 1705-1753 – S2C13, 1000 m CTD cast (PO salinometer secondary standard collected)
 1800 – Transit to pump tanks
 1956-2048 – S2C14, 1000 m CTD cast
 2106-2139 – Scripps Plankton Camera cast #4
 2201-2300 – Net Tows (2)
 2322 – Begin S2C15, near bottom CTD cast (end 36 hour burst sampling)

December 20, 2020

0100 – 14m off bottom, 22 44.9890'N, 158 00.0292'W
 0230 – End of CTD cast
 0244-0419 – Optics cast
 0425 – Transit to Gas Array
 0605 – Recovery of Gas Array, 22 31.9110'N, 158 07.2482'W
 0610 – Transit to Station 52, WHOTS Mooring
 0730-0800 – ADCP Intercomparison
 0826-0944 – S52C1, 200m cast (5 yo-yos)
 1007-1047 – Hyperpro cast
 1106 – Transit to WireWalker
 1352 – Recovery of WireWalker, 22 22.9427'N, 158 26.6939'W
 1354 – Transit to Sediment Trap Array
 1453 – Recovery of Sediment Trap Array, 22 24.7655'N, 158 30.9998'W
 1458 – Transit to IRSC Traps
 1556 – Recovery of IRSC Traps, 22 31.2570'N, 158 38.2645'W
 1605 – Transit to Station Kaena
 2026 – Begin S6C1, near-bottom CTD cast
 2115 – 13m off bottom, 21 50.8110'N, 158 21.8381'W
 2211 – End CTD cast
 2220 – Transit to Pier 35

December 21, 2020

0855 – Arrive Pier 35, first line. Partial ship unloading.

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HOT program sub-components:

Investigator	Project	Institution
Angelique 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
Angelique White	SCOPE: C-STAR, UVP, IRS Traps, IFCB	UH
Sonya Dyhrman	Physiological ecology of diatom diazotroph associations using metatranscriptome samples.	LDEO
Nicholas Hawco Eleanor Bates	Quantifying Iron Turnover in the Upper Ocean via Time-series Measurements at Station ALOHA	UH
Keri Opalk	Collection of TDN reference water for Carlson DOM lab	UCSB
Chris Schvarcz	Collection of seawater for maintaining phytoplankton cultures for Steward lab	UH
Robert Letscher	Transparent exopolymer and phytoplankton vertical migration as sources for preformed nitrate anomalies in the subtropical N. Pacific Ocean	UNH