HOT 329: Chief Scientist Report
Chief Scientist: Tully Rohrer
R/V *Kilo Moana*
April 12 - 16, 2021

Cruise ID: KM 21-04
Vessel: R/V *Kilo Moana*, University of Hawaii
Master of the Vessel: Captain David Martin
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.

- All participants have been vaccinated for COVID-19, and departure was greater than two weeks from the administration of the final dose for every person.
- Sailed with a minimum science party, one scientist per stateroom, with the exception of two staterooms housing two individuals each.
- Cruise participants that did not participate in the previous cruise (HOT-328, March 22nd – March 26th) self-isolated according to the HOT Risk Mitigation Plan before the cruise (March 24th – April 11th), and were tested for COVID-19 twice before the cruise (March 24th and April 9th).
- All cruise participants that were on the previous cruise (HOT-328, March 22nd – 26th) were tested twice for COVID-19 twice before that cruise, and once before HOT-329 (April 7th).

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_329_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
Benedetto Barone	Scientist	UH	ITA
Eleanor Bates	Graduate Student	UH	USA
Karin Bjorkman	Scientist	UH	SWE
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
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
Trevor Young	Marine Technician	OTG	USA

4.0. GENERAL SUMMARY

Following the incident on HOT-328 that resulted in the Hawboldt winch system two-blocking the HOT rosette in the docking head and parting the termination, testing of the system's newly installed failsafe mechanisms was completed on loading day and then again at Station Kahe.

The cruise began April 12th at 09:00 (HST). At Station Kahe, in addition to the weight cast, Hyperpro cast, and the 1000 m CTD cast, Eleanor Bates also performed a Trace Metal CTD cast to soak the Niskin bottles. After conducting operations at Station Kahe the ship proceeded to Station ALOHA.

Upon arrival at Station ALOHA, the floating sediment trap and WireWalker arrays were deployed west of the center station. A CTD cast was conducted to collect water for the primary productivity array, and subsequently the primary productivity array was deployed. The gas array experiment was deployed on April 14th as scheduled, and recovered on April 15th. All floating arrays were recovered successfully, except for the loss of one PIT trap upon recovery when the trap made contact with the transom.

In addition to the typical array deployments, Benedetto Barone deployed Seaglider 513 with the newly acquired microstructure sensors on April 13th with Steve Poulos piloting the glider from shore. Deployment and recovery went smoothly from the A-frame, with the latter operation performed by backing the ship up to the glider and bringing it aboard via the lasso method and the SeaMac winch.

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

backup altimeter was not functional, so near-bottom casts were stopped shallower than typical cruises (primary altimeter and 12 khz pinger were damaged in HOT-328 incident).

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

Three total casts were conducted with the Trace Metals CTD using the W2 winch.

Hyperpro operations were conducted once at Station Kahe and twice at Station ALOHA, on April 13th and 15th respectively.

The 300 kHz and the 38 kHz ADCPs, underway fluorometer, transmissometer, thermosalinograph and the ship's meteorological suite ran without interruption during the cruise.

The VPR (Video Plankton Recorder from Tracy Villareal) was deployed twice, on April 14th at night and April 15th during the day.

The weather was favorable during the cruise, with 8-15 kt winds and flat seas. The arrays did not drift significantly, venturing just south of the ALOHA circle before recovery on April 15th.

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, with the implementation of the docking head allowed for "hands-free" deployments and recoveries.

Captain David Martin and the ship's crew showed flexibility, concern, and dedication to our scientific mission.

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)

April 9th, 2021

0900 – Began equipment loading
1045 – Safety briefing by the Captain

April 12th, 2021

0842 – Depart from Pier 35
0915-0930 – Fire and Abandon ship drills
1142 – Arrived at Kahe Station
1149-1234 – Weight cast to 900 m with 1200 lb weight
1250-1323 – Hyperpro cast
1349-1506 – S1C1 CTD cast
1611-1639 – Trace metal cast
1645 – Transit to ALOHA Station
2350 – Arrive WireWalker deployment site
2358 – Begin WireWalker deployment, 22° 44.99′ N, 158° 05.09′ W

April 13th, 2021

0010 – End WireWalker deployment
0033-0104 – Sediment Trap array deployment, 22° 44.97′ N, 158° 03.90′ W
0151-0257 – S2C1, PP Cast
0412-0428 – Primary Production array deployment, 22° 45.00′ N, 158° 01.77′ W
0519 – Begin S2C1, PO Deep Cast
0601 – Rain on station
0656 – Deepest point of PO Deep cast, 4801 db, 22° 44.98′ N, 158° 00.01′ W
0841 – End PO Deep Cast
0914 – Seaglider with Microstructure Sensors deployed
0945-2022 – Trace Metal cast #2
1109-1216 – S2C3, PO Shallow Cast
1228-1257 – Net Tow
1318-1354 – Hyperpro casts (2 profiles, 1 yo-yo)
1409-1509 – S2C4, PCPN Cast
1515 – Transit to Pump Tanks
1708-1807 – S2C5, PPO4 Cast
1810 – Transit to PP array
1903-1918 – Recover Primary Production array, 22° 43.37′ N, 158° 00.36′ W
1958-2108 – S2C6, BEACH cast
2157-2305 – Net Tows (2)
2312 – Begin S2C7, Open cast (Microstructure High Resolution Nutrients)

April 14th, 2021

0028 – End S2C7

0044-0152 – T. Villareal VPR Deployment (2 yo-yo profiles), 22° 46.56′ N, 158° 00.48′ W
0158-0301 – S2C8, Gas Array Cast
0418- 0438 – Gas array deployment, 22° 43.70′ N, 158° 04.30′ W
0531-0631 – S2C9, Open Cast, SCOPE DNA sampling (start delayed due to issue on the bridge)
0635 – Transit to pump tanks and incinerate
0814-0902 – S2C10, PSi Cast
1107-1201 – S2C11, Open Cast, R. Letscher sampling, PO Salinity Secondary Standard collected
1218-1317 – Net Tows (2)
1412-1503 – S2C12, ATP Cast
1505 – Transit to pump tanks
1651-1806 – S2C13 (Open Cast, Water Sampling for A. Burger/E. DeLong)
1817-1841 – Trace Metal Cast 3
1951-2105 – S2C14, HPLC Cast
2154-2225 – Net Tow (1)
2252 – Begin S2C15, PO Deep Cast #2

April 15th, 2021

0032 – Reached bottom of cast, 4791 db
0204 – End S2C15
0227-0406 – Optics Cast
0407 – Transit to Gas Array
0607-0623 – Gas Array recovered, 22° 41.68′ N, 158° 02.02′ W
0707-0713 – WireWalker recovered, 22° 38.54′ N, 158° 00.01′ W
0742-0800 – Sediment Trap Array recovered, 22° 39.39′ N, 157° 58.17′ W
0805 – Transit to Seaglider
0904-0915 – Seaglider recovered, 22° 44.03′ N, 158° 02.44′ W
0920 – Transit to WHOTS mooring, Station 52
1208-1246 – Hyperpro
1330-1423 – S52C1, WHOTS yo-yo cast (5 profiles)
1431 – Transit South while prepping for VPR cast
1453-1635 – VPR Cast, 22° 35.55′ N, 157° 57.26′ W
2115-2314 – S6C1, Kaena Cast

April 16th, 2021

0730 - Arrive Pier 35, first line. Partial equipment unloading

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	UH
John Zehr	Samples for unicellular cyanobacterium	UCSC
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
Robert Letscher	Transparent exopolymer and phytoplankton vertical migration as sources for preformed nitrate anomalies in the subtropical N. Pacific Ocean (UNH)	UNH
Debbie Lindell	Seasonal Virus Sampling	Technion
Tracy Villareal	Transparent exopolymer and phytoplankton vertical migration as sources for preformed nitrate anomalies in the subtropical N. Pacific Ocean	U of Texas at Austin
Andrew Burger Ed DeLong	Water Collection for Viral Analysis	UH
Anamica Bedi de Silva	Edwards Lab – seawater collection for lab-based culturing	UH