HOT 327: Chief Scientist Report

Chief Scientist: Fernando Santiago-Mandujano

R/V *Kilo Moana*

February 15 - 19, 2021

Cruise ID: KM 21-02
Vessel: R/V *Kilo Moana*, University of Hawaii
Master of the Vessel: Captain Joey Daigle
Chief Scientist: Fernando Santiago-Mandujano, University of Hawaii
Marine Technicians: Jeffrey Koch, Julianna Diehl

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 the exception of two people (working on opposite 12-hour watches) sharing one room
- All cruise participants self-isolated according to the HOT Risk Mitigation Plan before the cruise (January 27th – February 14th).
- All cruise participants were tested for COVID-19 twice before the cruise (January 27th and February 10th).

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_327_KM_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
Karin Bjorkman	Scientist	UH	Sweden
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
Lucie Knor	Research Assistant	UH	GER
Jeffrey Koch	Marine Technician	OTG	USA
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 February 12th, and the cruise started on February 15th at 09:00 (HST). After conducting operations at Station Kahe the ship proceeded to Station ALOHA.

Upon arrival at Station ALOHA, the IRSC sediment traps, the floating sediment traps, and WireWalker were deployed just south of the station center. 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 February 17th as scheduled, and recovered on February 18th. All floating arrays were recovered successfully.

At Station ALOHA, two near bottom CTD casts, and fourteen 1000 m CTD casts were completed. One 5-cycle yoyo CTD cast to 200 m was completed near the WHOTS mooring (Station 52). A near-bottom CTD cast was conducted at Station Kaena (Station 6) on February 18th.

All the CTD casts at ALOHA showed an anomalous feature with cold, fresh and relatively low dissolved oxygen located at the near-surface salinity maximum (~ 140 dbar).

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. The W2 winch recently refurbished, worked fine for these deployments/recoveries.

Hyperpro operations were conducted once at Station Kahe and twice at Station ALOHA, on February 16th and 18th. Each operation consisted of 2 deep casts to 185 m, and a 5 cycle Yo-Yo cast to 20 m.

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 February 17th at night and on February 18th during the day.

The weather was smooth at the beginning of the cruise, with 8-11 kt winds, increasing to 20-22 kt from the east on February 18th. A northward current was present near the surface during the cruise and carried the floating arrays up to 18 nm north from the center of ALOHA Station. Swell coming from different directions was present 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.

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)

February 12, 2021

0900 - Began equipment loading
1100 – Safety briefing by the Captain

February 15, 2021

0845 - Depart from Pier 35
0919-0946 - Fire and Abandon ship drills
1137 - Arrived at Kahe Station
1200-1246 - Weight cast to 900 m with 1200 lb weight.
1300-1326 - Hyperpro cast
1341-1436 - S1C1 CTD cast to 1000 m.
1455-1512 - Trace metal cast #1. The trace metal winch W2 which was recently refurbished worked well during deployment/recovery
1530 - Transit to ALOHA Station.
2229 - Arrived at Station ALOHA. Heavy rain before arriving to Station
2306 - IRSC Sediment traps deployed: 22 40.298'N, 158 1.325'W

February 16, 2021

0005 - Sediment traps deployed: 22 41.794'N, 158 1.835'W
0033 - Wirewalker deployed: 22 42.963'N, 158 2.244'W
0154-0246 - S2C1 1000 m CTD cast
0410-0435 - Deployed Primary Productivity array, 22 44.3459'N, 158 1.8045'W
0512 - Begin S2C2 Near bottom cast
0625 - At 6 m off the bottom, 22 45.0394'N, 157 59.9313'W
0659 - Stopped briefly for level wind alarm at 3700 dbar
The transmissometer stopped functioning during the cast
0833 - End of cast
0905-0928 - Trace metal cast #2
1108-1217 - S2C3 1000 m CTD cast
1229-1258 - Net tow
1323-1350 - Hyperpro cast
1408-1452 - S2C4 1000 m CTD cast
1500 - Transit to pump ship's tanks
1547 - Replaced CTD transmissometer SN 1431 with SN 1432
1654-1747 - S2C5 CTD cast to 1000 m
1747 - Calibrated Transmissometer SN 1432:
dark: 0.0647 V
light: 4.8132 V
1800 - Transit to recover PP array
1827-1838 - Recovered PP array 22 48.715'N, 157 59.8594'W
1956-2108 - S2C6 CTD cast to 1000 m
2159-2230 - Plankton Net tow
2235-2258 - Plankton Net tow

2304 - Start S2C7 CTD cast to 1000 m
2326-2333 - Stopped CTD at 869 dbar downcast due to winch level winding problems

February 17, 2021

0000 - End of cast
0016 - Start VPR deployment: 22 44.273'N, 158 0.145'W
0152 - End deployment: 22 42.9124'N, 158 2.0334'W
0159-0248 - S2C8 CTD cast to 1000 m
0400-0428 - Gas array deployment: 22 43.2020'N, 158 1.8906'W
0431 - Raining on station
0503-0555 - S2C9 CTD cast to 1000 m
0600 - Transit to pump ship's tanks and incinerator
0804-0852 - S2C10 CTD cast to 1000 m
0908-0923 - Trace metal cast #3
1106-1149 - S2C11 CTD cast to 1000 m
1201-1231 - Plankton Net tow
1234-1303 - Plankton Net tow
1406-1448 - S2C12 CTD cast to 1000 m
1655-1737 - S2C13 CTD cast to 1000 m
1954- Start S2C14 CTD cast to 1000 m
2045-2057 - Paused due to level winding issues
2112 - End of cast
2200-2228 - Plankton net tow
2254 - Start S2C15 near bottom CTD cast
2339 - Secondary oxygen sensor SN 43262 showing noisy data below 2500 dbar downcast, sensor may be failing

February 18, 2021

0011 - CTD at 8 m off the bottom: 22 45.120'N, 158 0.084'W
0125 - End of cast
0256-0431 - Optics cast
0500 - Transit to recover gas array
0604-0618 - Recovered gas array 22 49.7651'N, 157 59.8627'W
0620 - Transit to recover sediment traps
0708-0725 - Recovered sediment traps: 22 54.8863'N, 157 55.3033'W
0726 - Transit to recover Wirewalker
0746-0756 - Recovered Wirewalker: 22 55.7516'N, 157 56.9156'W
0757 - Transit to recover IRSC traps
0846-0858 - Recovered IRSC traps: 23 2.8598'N, 157 57.4484'W
0902 - Transit back to Station ALOHA, pumping ship's tanks
1225-1303 - S52C1 200 m CTD yo-yo cast near the WHOTS buoy
1318-1345 - Hyperpro cast
1356 - Start VPR deployment: 22 40.7937'N, 157 57.5116'W
1538 - End deployment: 22 42.2916'N, 157 55.7776'W
1545 – Transit to Kaena Station
2050 – Start S6C1 near bottom CTD cast

2135 – 10 m off the bottom, 21 50.733'N, 158 21.837'W
2245 – End of cast
2300 – Transit to Pier 35

February 19, 2021

0800 - Arrive Pier 35, starboard side to unload trace metal van.
0845 – Turn ship around to port side. 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, UVP, IRS Traps, AA3	UH
John Zehr	Samples for unicellular cyanobacterium	UCSC
Sonya Dyhrman	Physiological ecology of diatom diazotroph	LDEO

	associations using metatranscriptome samples.	
Nicholas Hawco Eleanor Bates	Quantifying Iron Turnover in the Upper Ocean via Time-series Measurements at Station ALOHA	UH
Andres Salazar Sara Ferron	Water Collection for Mass Spectrometer Standard	UH
Britt Henke Jon Zehr	Making culture media for diazotrophs	UC Santa Cruz
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