HOT 340: Chief Scientist Report

Chief Scientist: Fernando Santiago-Mandujano
R/V *Kilo Moana*
January 23-26, 2023

Cruise ID: KM 23-04
Vessel: R/V *Kilo Moana*, University of Hawaii
Master of the Vessel: Captain David Martin
Chief Scientist: Fernando Santiago-Mandujano, University of Hawaii
Marine Technicians: Trevor Young (lead), James Harris

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.
- All cruise participants were Antigen tested for COVID.
- All ancillary participants were PCR tested for COVID.

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_340_Cruise_Plan_Operational.pdf

Science operations were planned for 2 stations, in the following order:

1) 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.
2) Deep Moored Sediment Trap Site Deployment - 22° 51'N, 157° 54'W, this operation was going to be conducted if the weather was favorable

3.0. SCIENCE PERSONNEL

Participant	Title	Affiliation	Citizenship
Eleanor Bates	Graduate Student	UH	USA
Karin Björkman	Research Specialist	UH	SWE
Clifton Buck	Scientist	UGA	USA
Andy Burger	Scientist	UH	USA
Benjamin Carpenter	Undergrad Student	UH	USA
Mattia Da Fieno	Undergrad Student	UH	USA
Dan Fitzgerald	Research Associate	UH	USA
Carolina Funkey	Research Associate	UH	USA
Eric Grabowski	Research Associate	UH	USA
James Harris	Marine Technician	OTG	USA
Thomas Kasson	Undergrad Student	UH	USA
Charlotte Kollman	Graduate Student	UGA	USA
Chris Marsay	Scientist	UGA	GBR
Fernando Pacheco	Research Associate	UH	BRA
Tully Rohrer	Research Associate	UH/SCOPE	USA
Fernando Santiago-Mandujano	Research Associate	UH	USA
Eric Shimabukuro	Graduate Student	UH	USA
Blake Watkins	Marine Engineer	UH	USA
Trevor Young	Marine Technician	OTG	USA

4.0. GENERAL SUMMARY

The cruise was originally scheduled to depart on January 22nd at 9:00 to return on January 26th at 8:30 (HST). Equipment loading was conducted on January 21st, when the captain determined that the incoming swell would be too large, and unsafe to sail on January 22nd. The cruise was re-scheduled to depart on January 23rd at 7:00 and potentially return on January 25th, earlier than originally scheduled because another bad weather front was forecasted for that day (with the possibility of returning on January 26th, if a January 25th weather re-assessment indicated better conditions). Consequently, many of the originally planned operations were cancelled to accommodate the reduced schedule shown in the operational cruise plan (one 500-m weight cast, one hyperpro cast and one CTD cast at Kahe Station, the 36-hr burst period of CTD casts, two trace metal casts, three net tows, the gas array deployment, one CTD cast next to the WHOTS-18 buoy, and one Seaglider deployment were cancelled). We sailed directly to Station ALOHA, and only stopped for less than an hour in front of Barbers Pt. to test the LARS system and the CTD wire consistency by deploying a dead weight just below the water surface.

Upon arrival at Station ALOHA, a trace metal cast was conducted. The sediment traps were deployed SW of center station, as the currents were expected to carry them towards the west. Afterwards, a 400-m CTD cast was conducted, followed by a large volume water collection by submersible pump to get a UGA Beryllium-7 profile. A CTD cast was conducted to collect water for the primary productivity array, and the array was deployed south of station center. The primary productivity array did not drift much and was recovered after sunset on January 24th. The sediment traps array drifted SW and was recovered on January 25th. None of the arrays drifted outside the ALOHA circle.

Given the reduced cruise schedule, the 36-hour CTD burst period was not completed. At Station ALOHA, one near bottom CTD casts, six 1000 m CTD casts, one 400 m and one 200 m CTD casts were completed.

On January 25th the weather conditions were favorable (the original January 21st forecast indicated weather conditions to deteriorate on this day), and operations continued with the deep sediment traps mooring deployment. Unfortunately, due to delays in the mooring's anchor position triangulation, and time constraints to return back to port, the UGA McLane pumps cast could not be completed.

Three net tows for the core HOT zooplankton collection were completed: one during the day and two at night.

Hyperpro operations were started at Station ALOHA during the primary production experiment, however due to a ship's power outage this cast could not be completed.

Two trace-metal casts were completed.

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

The winds during the cruise were 5 to 10 knots from the SE, switching from the N and increasing to 10-18 knots the last day of the cruise. There was a large groundswell during transit to Station ALOHA on January 23rd and on station on January 25th. There was heavy rain on January 24th.

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

Technical support during this cruise was 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)

January 23, 2023

0720 - All aboard. Depart from UHMC, Pier 35
0738 - Safety briefing, Science meeting
0815 - Fire and Abandon ship drills
0911 - Stopped in front of Barbers point to test the LARS system and the CTD wire with the dead weight
0925 - Weight test just at the sea surface with 1200 lb weight.
0927 - Transit to ALOHA Station
1740 - Arrived at ALOHA Station
1757 - Trace Metal cast - big swell during cast
1811 - End of cast

1907 - Start sediment traps deployment
1951 - End deployment 22 43.1115'N, 158 0.5319'W
2040 - Start 400 m CTD cast (N-cast)
2130 - End cast. Bottles 9, 11, 13 and 20 did not fire. These bottles were at the DCM depth, consequently it was decided not to use any of the bottles for the experiment. Trevor Y. fixed the carousel latches after this cast.
2214 - Start Beryllium-7 cast

January 24, 2023

0215 - End of cast
0233 - Start S2C2, 200-m CTD cast (Primary Productivity cast)
0350 - End of cast.
0445 - Primary Productivity array deployment, 22 42.1532'N, 157 59.8288'W
0513 - End deployment
0515 - Transit to pump ship's tanks
0657 - Start S2C3, full-depth CTD cast, PO-1
1039 - End cast
1116 - Trace metal cast
1148 - End cast
1210 - Start net tow
1237 - End net tow
1251 - Start Hyperpro cast
1303 – 5-min power outage in the middle of the hyperpro cast, engineering restarting ship’s systems. The hyperpro cast couldn’t be completed
1419 - Systems restored, continue operations
1431 - Start S2C4, 1000 m CTD cast, PO shallow
1549 - End CTD cast
1620 - Transit to pump ship's tanks
1805 - Recovering primary productivity array: 22 42.2826'N, 157 59.3427'W
1815 - End recovery
1841 - Start S2c5, 1000 m CTD cast, BEACH cast. Heavy rain
1953 - End CTD cast
2205 - Start net tow
2236 - End net tow
2242 - Start net tow
2307 - End net tow
2319 - Start S2C6, 1000 m CTD cast, HPLC

January 25, 2023

0025 - End CTD cast
0155 - Start S2C7, 1000 m CTD cast, PC/PN
0300 - End CTD cast
0310 - Transit to pump ship's tanks
0507 - Start S2C8, 1000 CTD cast, PPO4
0627 - End CTD cast
0745 - Start S2C9, 1000 CTD cast, ATP/PSi

0900 - End CTD cast
0907 - Transit to recover sediment traps array
0953 - Recovered sediment traps, 22 40.1077'N, 158 1.3797'W
1018 - End recovery
1029 - Transit to deploy deep sediment traps array
1145 - Start mooring deployment
1447 - Anchor dropped 22 50.3009'N, 157 52.8946'W
1450 - Transit to triangulate anchor position
1616 - Problems contacting the acoustic release
1656 - Made contact with acoustic release
1700 - Transit to ALOHA Station
1800 - Start McLane pumps cast
1845 - Decided to cancel cast, not sufficient time for the required 1 ½ hour pumping time because need to return to port at 2000.
1910 - Pumps back on board.
1930 - Transit to Pier 35

January 26, 2023

0750 - Arrived at Pier 35. Starboard side to unload trace metal van
0830 - Turn ship around to port side, full offload. End of cruise

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:

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

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
Clifton Buck Chris Marsay Charlotte Kollman	Hawaii Aerosol Time-Series: Quantifying marine dust deposition and composition in an oligotrophic gyre	UGA
Dave Karl Eric Grabowski	Deep Moored Sediment Traps	UH
Scott Miller	Seawater for growing Station ALOHA diatoms	University of Montana
Britt Henke Jon Zehr	Making culture media for diazotrophs	UCSC
Petra Byl Grieg Steward	Water Collection for Culture Collection Maintenance	UH
Kelsey McBeain Grieg Steward	Isolating heterotrophic eukaryotes for growth on prochlorococcus and pelagibacter	UH