HOT 352: Chief Scientist Report

Chief Scientist: Fernando Santiago-Mandujano
R/V *Kilo Moana*
August 16-20, 2024

Cruise ID: KM 24-13
Vessel: R/V *Kilo Moana*, University of Hawaii
Master of the Vessel: Captain Eric Pomeroy
Chief Scientist: Fernando Santiago-Mandujano, University of Hawaii
Marine Technicians: Trevor Young (lead), James Harris

1.0 COVID-19 PREVENTION

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.

- All science party were vaccinated.
- All cruise participants were Antigen 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_352_Cruise_plan_operational.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-20 Mooring (anchor position 22° 40.08'N, 157° 57.01'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
Katherine Ackerman	Graduate Student	UH	USA
Sergei Avetisyan	Marine Technician	UNOLS MATE	USA
Brandon Brenes	Graduate Student	UH	USA
Mattia Da Fieno	Undergrad Student	UH	USA
Paige Dillen	Graduate Student	UH	USA
Michael Dowd	Research Assistant	UH	USA
Dan Fitzgerald	Research Associate	UH	USA
Stephanie Gonzalez Briones	Undergrad Student	UH	USA
Devin Hogate	Undergrad Student	UH	USA
Vivian Hui	Undergrad Student	UH	USA
Emma Layton	Graduate Student	UH	USA
Matthew Miller	Graduate Student	UH	USA
Fernando Carvalho Pacheco	Research Associate	UH	BRA
James Reece	Graduate Student	UH	USA
Dan Sadler	Research Associate	UH	USA
Fernando Santiago-Mandujano	Chief Scientist	UH	USA
Blake Watkins	Marine Engineer	UH	USA
Trevor Young	OTG	UH	USA
James Harris	OTG	UH	USA

4.0. GENERAL SUMMARY

All the science equipment was loaded on August 15th. We departed on August 16th at 0900. Operations at Kahe Station were conducted as scheduled. Upon arrival at Station ALOHA the sediment traps were deployed, followed by a 1000-m CTD cast and the deployment of the primary productivity array. The first near-bottom CTD cast was completed and the 36-hr CTD burst period started. The burst period ended with a second near-bottom CTD cast. Thirteen 1000-m and two near-bottom CTD casts were conducted at Station ALOHA. All rosette samples for the core HOT and ancillary projects (P. Dillen, B. Brenes, Sect. 8) were collected.

The primary production array was recovered on August 17th after drifting about 4 nm SSE, and the sediment traps array was recovered on August 19th after drifting about 17 nm SSE. The gas array was deployed in the morning of August 18th and recovered on August 19th after drifting about 7 nm SSE.

Two 200-m CTD yo-yo casts were conducted near the WHOTS-20 mooring on August 19th, and a near-bottom CTD cast was conducted at Station Kaena.

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

One hyperpro cast was conducted at Station Kahe and three at Station ALOHA.

Three VPR tows were conducted at Station ALOHA.

K. Ackerman, M. Miller, and E. Layton retrieved 12 low-level sea salt aerosol samples and continuous measurements of the atmospheric state variables (temperature, pressure, humidity) from the 01 and 03 port side decks for the cruise duration. Sun photometry measurements were also taken to compare the in-situ aerosol samples to remote-sensing observations at the air-sea interface.

S. Avetisyan (UNOLS MATE intern) was introduced to and involved in our scientific technical procedures by D. Fitzgerald, B. Watkins, OTG technicians and others.

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

Winds were 15-20 kt on August 17th and 18th, and less than 15 kt by the end of the cruise. A strong current (~ 1 kt on 8/19) towards the SSE was present in the upper 60-100 m during the cruise.

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

The R/V *Kilo Moana* continues to maintain excellent ship support for our work. Captain Pomeroy and the ship's crew showed flexibility, enthusiasm, concern, and dedication to our scientific mission.

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

6.0. DAILY REPORT OF ACTIVITIES (HST)

August 16, 2024

0902 - All aboard. Depart from Pier 35
1000 - Safety briefing, Science meeting
1020 - Fire and Abandon ship drills
1150 - Arrived at Kahe Station
1214-1248 - Weight test with 1200 lb weight.
1314-1400 - Hyperpro cast
1412-1518 - S1C1 CTD cast to 1000 m
1530 - Transit to ALOHA Station
2320 - Arrived at ALOHA Station
2350 - Start sediment traps deployment

August 17, 2024

0012 - End sediment traps deployment 22° 45.034'N, 158° 3.431'W
0147-0251 - S2C1 primary productivity CTD cast to 1000 m, fluorometer showing glitches between 200 to 400 dbar downcast, connectors re-seated after cast
0445 - Primary productivity array deployment, 22° 44.998'N, 158° 2.020'W
0507 - Start S2C2, full-depth CTD cast, PO-1
0650 - At 9 m above the bottom
0846 - End cast

1053-1140 - S2C3, 1012 m CTD cast (PO-2). Conductivity glitches in the primary C-sensor
1300-1323 - Net tow
1336-1432 - Hyperpro cast
1439-1547 - S2C4, 1000 m CTD cast (PC/PN). Primary conductivity sensor cable replaced before the cast
1600 - Transit to pump ship's tanks
1700-1806 - S2C5, 1000 m CTD cast (PPO4)
1810 - Transit to primary productivity array
1907 - Start PP array recovery, 22° 41.09'N, 158° 1.017'W
1928 - End recovery
1947-2111 - S2C6, 1000 m CTD cast (BEACH)
2205-2227 - Net tow
2234-2254 - Net tow
2303 - Start S2C7, 1000 m CTD cast (Open cast)

August 18, 2024

0006 - End CTD cast
0024 - Start VPR cast, 22° 41.979'N, 157° 59.36'W
0111 - End VPR cast, 22° 42.2729'N, 157° 58.7109'W
0148 - Start S2C8, 1000 m CTD cast (Gas array cast)
0252 - End of S2C8
0425 - Start gas array deployment
0448 - Gas array deployed - 22° 42.2969'N, 158° 2.9288'W
0459-0554 - S2C9 1000 m CTD cast. (Open cast)
0605 - Transit to pump ship's tanks
0800-0859 - S2C10 1000 m CTD cast (Psi)
1052-1151 – S2C11 1000 m CTD cast (Open cast)
1205-1230 - Net tow
1234-1257 - Net tow
1306-1329 - Hyperpro cast
1348-1447 - S2C12 1000 m CTD cast (ATP)
1458 - Transit to pump ship's tanks
1647-1746 - S2C13 1000 m CTD cast (Open cast)
1807 - Start VPR cast 22° 44.3172'N, 157° 59.3958'W
1924 - End VPR cast - 22° 45.1409'N, 157° 56.738'W
1940-2057 - S2C14 1000 m CTD cast (HPLC)
2200-2231 - Net tow
2255 - Start S2C15, near-bottom CTD cast (PO3)

August 19, 2024

0039 - Continued with S2C15 deep CTD cast. CTD at 7 m above the bottom
0214 - End of CTD cast
0220 - Transit to recover gas array
0436 - Start gas array recovery - 22° 35.0866'N, 158° 0.9668'W
0507 - End gas array recovery
0517 - Transit to recover sediment traps

0558 - Start sediment traps recovery - 22° 28.5498'N, 158° 0.7516'W
0645 - End sediment traps array recovery
0650 - Transit to Station 52 (WHOTS-20)
0858-0945 - S52C1, 200 m CTD yo-yo cast near the WHOTS-20 buoy
0949-1036 - S52C2, 200 m CTD yo-yo cast, second cast because the previous one broke the surface and the CTD pumps turned off after the second yo-yo cycle. A large wave reached the CTD when it was near the surface, causing the winch operator to inadvertently raise the CTD above the surface.
11036 - Start VPR cast - 22° 39.3917'N, 157° 58.0599'W
1206 - End VPR cast - 22° 40.1182'N, 157° 58.9206'W
1220-1257 - Hyperpro cast
1350 - Transit to Station Kaena
1815 - Arrived to Station Kaena
1825-2027 - S6C1, near-bottom CTD cast
2049 - Transit to Pier 35

August 20, 2024

0807 - Arrived at Pier 35. End of cruise

7.0 HOT program sub-components:

Investigator	**Project**	**Institution**
Angelicque White	Core Biogeochemistry	UH
Dave Karl	Biogeochemistry	UH
John Dore	Biogeochemistry QA/QC	MSU
James Potemra	Hydrography	UH
Mike Landry	Zooplankton dynamics	SIO
Ricardo Letelier	Optical measurements	OSU
Al Plueddemann/James Potemra	WHOTS mooring	UH/WHOI

8.0 Ancillary programs:

Matt Church	Diversity and activities of nitrogen-fixing microorganisms	UM/FLBS
Andrew Dickson	CO_2 dynamics and intercalibration	SIO
Paul Quay	$DI^{13}C$	UW
Angelicque White	C-STAR, UVP, IFCB, Hyper-BB backscattering sensor.	UH

Debbie Lindell	Seasonal Virus Sampling	Technion
Andrew Hirzel	Video Plankton Recorder	UH
Brandon Brenes	CNP stoichiometry of picoeukaryotes	UH
Paige Dillen Fernanda H.Freitas Angelicque White	Leveraging the Hawaii Ocean Time-series program for validation of the PACE Mission in oligotrophic waters	UH
Katherine Ackerman Matthew Miller Emma Layton	Study of the diurnal variation of sea salt aerosol production over the open ocean	UH
Sergei Avetisyan Maria Osiadacz	UNOLS MATE Internship program	UNOLS