HOT 343: Chief Scientist Report
Chief Scientist: Fernando Santiago-Mandujano
R/V *Kilo Moana*
August 8-14, 2023

Cruise ID: KM 23-11
Vessel: R/V *Kilo Moana*, University of Hawaii
Master of the Vessel: Captain Christopher Amorant
Chief Scientist: Fernando Santiago-Mandujano, University of Hawaii
Marine Technicians: Trevor Young (lead), Benjamin Duncan

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.

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_343_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 50, the site of WHOTS-19 Mooring (anchor position 22° 46.002'N, 157° 53.958'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
Tyra Arends	Undergrad Student	UH	CAN
Eleanor Bates	Graduate Student	UH	USA
Karin Björkman	Research Specialist	UH	SWE
Brandon Brenes	Research Associate	UH	USA
Clifton Buck	Scientist	UGA	USA
Catherine Crowley	Graduate Student	U of Connecticut	USA
Benjamin Duncan	OTG	UH	USA
Dan Fitzgerald	Research Associate	UH	USA
Carolina Funkey	Research Associate	UH	USA
Julie Granger	Scientist	U of Connecticut	CAN
Charlie Kollman	Graduate Student	UGA	USA
Matthew Miller	Undergrad Student	UH	USA
Justine Murray	Undergrad Student	UH	USA
Dan Ohnemus	Scientist	UGA	USA
Sarah Nance	Undergrad Student	UH	USA
Emma Olson	Undergrad Student	UH	USA
Daniel Repeta	Scientist	WHOI	USA
Tully Rohrer	Research Associate	UH	USA
Dan Sadler	Research Associate	UH	USA
Fernando Santiago-Mandujano	Research Associate	UH	USA
Blake Watkins	Marine Engineer	UH	USA
Angelicque White	Scientist	UH	USA
Trevor Young	OTG	UH	USA

4.0. GENERAL SUMMARY

The cruise schedule was delayed one day from the original schedule to resolve some issues with the ship's Harmonic Filter. We departed on August 8th at 0930. Operations at Kahe Station were conducted as scheduled with minor delays. Winds were relatively strong (easterlies about 25-30 kt) due to hurricane Dora, located about 400 nm south of the Big Island. Transit speed to ALOHA was reduced to ~5 kt due to the rough weather (winds reaching 40 kt). Upon arrival to Station ALOHA a 200-m CTD cast was conducted, followed by large volume water collection by submersible pump to get a UGA Beryllium-7 profile, the same pump was used to collect water for D. Repeta. The UGA McLane pumps profile was conducted afterward. The next day (August 10th) the winds decreased to 15-20 kt and operations continued with the deployment of the sediment traps and the primary productivity arrays. The first near-bottom CTD cast was completed and the 36-hr CTD burst period started, one of these CTD casts was cancelled due to delays in the schedule. The burst period ended with a second near-bottom CTD cast. All rosette samples for the core HOT and ancillary projects (J. Granger, A. White, E. Olson, D. Repeta, etc., Sect. 7-8) were collected.

The primary production array was recovered on August 10th about 5 nm SW from the center of ALOHA, and the sediment traps array was recovered on August 12th about 17 nm SW from the center.

The gas array was deployed in the morning of August 11th and recovered on August 12th about 9 nm SW from the center.

A 200-m CTD yo-yo cast was conducted near the WHOTS-19 mooring on August 12th, followed by large volume water pumping from 125 m by D. Repeta. A second UGA McLane pump profile was conducted afterward.

The Seaglider 511, located about 83 nm NW from Station ALOHA was successfully recovered in the morning of August 13th after ~ 8-hour transit. After transiting to Station Kaena, a near-bottom CTD cast was conducted at this Station, after which the ship headed to Pier 35.

Two net tows for the core HOT zooplankton collection were completed during the day and three at night. Two trace metal net tows were conducted by E. Bates.

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

Two trace-metal casts at Station Kahe and 4 at Station ALOHA were completed by E. Bates and D. Repeta.

Three VPR tows were conducted at Station ALOHA.

K. Ackerman obtained 43 low-level (from the ship's 3rd deck wings) sea salt aerosol samples during a diurnal schedule at Station ALOHA, and high-altitude (100 to 500 m) samples with a kite on August 11th and 12th.

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

Winds at the beginning of the cruise were strong easterlies enhanced by hurricane Dora, located about 400 nm south of the Big Island, about 25-30 kt at Kahe Station, and up to 40 kt during transit to Station ALOHA, with seas and swells of 6-10'. Winds decreased to 15-20 kt on August 10th, and down to 10 kt by the end of 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. Captain Amorant 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)

August 8, 2023

0930 - All aboard. Depart from Pier 35
1030 - Safety briefing, Science meeting

1240 - Arrived at Kahe Station
1301-1324 - Weight cast to 500 m
1335-1415 - Hyperpro cast
1426-1551 - S1C1, CTD cast to 1000 m
1608-1619 - Trace metal cast
1729-1746 - Trace metal cast
1815 - Abandon ship and fire drills
1850 - Transit to Station ALOHA

August 9, 2023

0954 - Arrived at Station ALOHA
1026-1118 - S2C1 CTD cast to 200 m
1200 - Start Beryllium-7 water pumping
1315 - Problems with pump, fixed and started pumping water
1500 - Finished collecting Be-7 water. Collected water for D. Repeta with Be-7 pump
1608 - End water pumping
1618-1648 - Trace Metal cast (D. Repeta)
1845 - Start McLane pumps cast
1915 - Pumps deployed, maximum depth 300 m
2223 - End of McLane pumps cast
2242-2257 - Trace metals cast
2318 - Transit to pump ship's tanks

August 10, 2023

0128 - Start sediment traps deployment
0148 - End deployment 22 47.252'N, 158 1.827'W
0217-0310 - S2C2, CTD cast to 1000 m (PP-cast)
0414 - Begin primary productivity array deployment
0445 - PP array deployed: 22 45.8372'N, 158 0.7874'W
0545 - Begin S2C3 near-bottom CTD cast (PO-1 deep)
0737 - At 9 m off the bottom, 22 44.973'N, 158 0.085'W
1008 - End of cast
1136-1322 - S2C4, CTD cast to 1000 m (PO shallow)
1330-1404 - Hyperpro cast
1407 - Transit to pump ship's tanks
1534-1650 - S2C5, CTD cast to 1000 m (PC/PN)
1738-1735 - Trace metals cast
1745 - Transit to recover PP array
1902 - Recovered PP array, 22 42.521'N, 158 4.678'W
1950-2106 - S2C6, CTD cast to 1000 m (BEACH cast)
2205-2235 - Net tow
2240-2305 - Net tow
2317 - Start S2C7, CTD cast to 1000 m (PPO4)

August 11, 2023

0026 - End CTD cast
0040-0126 - VPR tow
0156-0256 - S2C8, CTD cast to 1000 m (Gas array cast)
0410 - Start Gas array deployment
0433 - Deployed Gas array, 22 43.1134'N, 158 3.1439'W
0453-0618 - S2C9, CTD cast to 1000 m
0625 - Transit to pump ship's tanks and incinerate trash
0814 - Start S2C10, CTD cast to 1000 m (PSi cast)
0913 - Kite sampling (aerosols)
0927 - End of CTD cast
1050-1148 - S2C11, CTD cast to 1000 m
1205-1232 - Net tow
1237-1300 - Net tow
1351-1456 - S2C12, CTD cast to 1000 m (ATP cast)
1512-1535 - Trace metal net tow
1537-1605 - Trace metal net tow
1655-1800 - S2C13, CTD cast to 1000 m
1813-1845 - Trace metals cast
1900 - Transit to pump ship's tanks
2013-2113 - S2C14 CTD cast to 1000 m
2202-2233 - Net tow
2300 - Start S2C15 near-bottom CTD cast

August 12, 2023

0046 - CTD at 15 m off the bottom, 22 44.987'N, 157 59.993'W
0225 - End of cast
0241-0336 - VPR tow
0348 - Transit to recover Gas array
0614 - Recovered Gas array, 22 36.2'N, 158 8.7'W
0745 - Recovered sediment traps, 22 31.954'N, 158 17.5607'W
0800 - Transit to WHOTS buoy
1052 - Start S50C1 CTD yo-yo to 200 m. Aborted cast, one modulo error and apparent problems with second Conductivity sensor after the CTD went into the water. Reseated and cleaned connections.
1122-1229 - Re-start S50C1, one modulo error and second C-sensor still showing small values near the surface, normal values below 20 dbar. Continued cast, 5 yo-yo cycles completed.
1237-1318 - Hyperpro cast
1300-1416 - Kite sampling (aerosols)
1346-1446 - VPR tow
1447 - Transit to pump ship's tanks
1601 - Start D. Repeta water pumping from 125 m
2010 - End D. Repeta water pumping
2015-2345 - McLane pumps cast
2352 - Transit to recover Seaglider

August 13, 2023

0728 - Begin Seaglider 511 recovery, 23 39.2167'N, 159 3.6145'W
0744 - Seaglider 511 recovered
0755 - Transit to Station Kaena
1829 - Arrived to Station Kaena
1836-2031 - S6C1, near-bottom CTD cast
2110 - Transit to Pier 35

August 14, 2023

0800 - Arrived at Pier 35, full offload. End of cruise

7.0 HOT program sub-components:

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

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
Dan Repeta	SCOPE: DOM collection	WHOI
Angelicque White	C-STAR, UVP, IFCB, Hyper-BB backscattering sensor.	UH
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 Daniel Ohnemus	Hawaii Aerosol Time-Series: Quantifying marine dust deposition and composition in an oligotrophic gyre	UGA

Charlotte Kollman		
Julie Granger Catherine Crowley	Collaborative Research: Evaluating the contribution of small eukaryotes to nitrate-based new production in the North Pacific Subtropical Gyre	University of Connecticut
Katherine Ackerman Matthew Miller	Study of the diurnal variation of sea salt aerosol production over the open ocean	UH
Kelsey Ann McBeain	Isolation and culturing of heterotrophic eukaryotes	UH
Danielle Hull	Collecting QC water for the S-lab	UH
Emma Olson	Internship from NREM: Measuring the effects of terrestrial water on nitrogen fixation	UH