HOT 350: Chief Scientist Report

Chief Scientist: Dan Sadler
R/V *Kilo Moana*
April 27 – May 1, 2024

Cruise ID: KM 24-05
Vessel: R/V *Kilo Moana*, University of Hawaii
Master of the Vessel: Captain Eric Pomeroy
Chief Scientist: Dan Sadler, University of Hawaii
Marine Technicians: Lance Frymire, 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 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-350_Operational_Cruise_Plan.pdf

Science operations were planned for 3 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).

3.0. SCIENCE PERSONNEL

Participant	Title	Affiliation	Citizenship
Dan Sadler	Chief Scientist	UH	USA
Paige Dillen	Graduate Student	UH	USA
Robert Clegg	Graduate Student	UH	USA
Caroline Anderson	Graduate Student	UNH	USA
James Lin	Graduate Student	UNH	USA
Alexandrya Robinson	Undergraduate Student	UH	USA
Mattia Da Fieno	Undergraduate Student	UH	USA
Catherine Crowley	Graduate Student	UCONN	USA
Raquel Flynn	Scientist	UNCCH	ZAF
Meredith Meyer	Graduate Student	UNCCH	USA
Eleanor Bates	Graduate Student	UH	USA
Angelicque White	Scientist	UH	USA
Karin Björkman	Research Specialist	UH	SWE
Brandon Brenes	Graduate Student	UH	USA
Fernando Carvalho Pacheco	Research Associate	UH	BRA
Dan Fitzgerald	Research Associate	UH	USA
Merritt Shepherd	Graduate Student	UH	USA
Tully Rohrer	Research Associate	UH	USA
Blake Watkins	Marine Engineer	UH	USA
Jomphol Lamoonkit	Graduate Student	UH	THA
Carla Baizeau	Graduate Student	UH	FRA
Lance Frymire	OTG	UH	USA
James Harris	OTG	UH	USA

4.0. GENERAL SUMMARY

Equipment loading was conducted on April 26th, and the cruise departed on April 27th at 0801 (HST). At Station Kahe, the Hawboldt LARS system passed the prescribed operational checks and weight cast. A Hyperpro cast, near bottom CTD cast and Trace Metal rosette cast were completed before proceeding to Station ALOHA.

On arrival at Station ALOHA, the sediment traps were deployed 2 nm W of station center, as the currents were expected to carry them towards the N. Afterwards, a 200m CTD cast was performed to collect water for an ancillary science experiment followed by a 1000 CTD cast to collect water for the Primary Production array. The PP array was deployed 1nm W of station center. The deep cast was interrupted on the way to the surface by a Hawboldt issue. The package stalled at 1600m while the Hawboldt technician, OTG, Deck and Engineering diagnosed and came up with a fix to recover in manual mode. The 0.681 wire through the A-frame was offered as a backup, but proved unnecessary when the Hawboldt system was repaired. One CTD cast was missed during this time, but we were able to collect all the missed samples on later casts.

A Hawboldt engineer was aboard to evaluate/repair mechanical vibrations evident during operation of the CTD winch/crane deployment system. During the several system issues/stoppages during the cruise, he was able to get the system back up and running. Without his presence, CTD operations most

likely would have been cancelled or moved to the 0.681/A-frame. After completing operations at St. ALOHA, a ship fabricated coupler was installed and tested during a weight cast so as not to risk the HOT CTD/Rosette. The coupler reduced the vibration. A commercial coupler and spares have been ordered.

The floating arrays were recovered about 10 miles N of Station ALOHA.

At Station ALOHA, two near bottom CTD casts, twelve 1000 m CTD casts, one 200 m CTD casts, one 350 m CTD cast were completed. AYo-Yo CTD cast, comprising five cycles down to 200 dbar was completed near the WHOTS mooring (Station 50).

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

Hyperpro operations were conducted at Station ALOHA during the primary production experiment and next to the WHOTS mooring. Each operation consisted of 2 deep casts to 185 m, and a 5 cycle Yo-Yo cast to 20 m.

Four trace-metal cast were completed.

Two Video Plankton Recorder casts were completed.

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

Winds during the cruise were 10-15 knots from the east with local seas of 4-8 feet.

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

The R/V *Kilo Moana* continues to be our favorite ship for HOT cruises. The efforts by the UH Marine Center to staff and retain an experienced crew continue made it possible to complete our ambitious science schedule. Deck, Engineering and OTG all worked together to keep the Hawboldt CTD deployment system up and running through several mechanical challenges.

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 27, 2024

0745	Departed Pier 35
0835	Safety briefing and drills
1100	Arrive Station Kahe
1105-1141	Weight cast
1150	Hyperpro cast
1236-1347	S1C1 CTD cast

1400-1427 Trace Metal cast
1438 Transit to St. ALOHA
2215 Arrive at southern edge of Station ALOHA
2238 Arrive at sediment trap deployment site, 2 nm west of center
2243 Begin sediment trap deployment
2313 Sediment trap array released at 22 43.986 N, 158 3.161 W
2320 Transit 1 nm ENE
2354 Begin S2C1 CTD cast to 200m

April 28, 2024

0018 End S2C1
0152-0245 S2C2 CTD cast to 200m for PP array
0409 Start PP array deployment
0429 PP array released at 22 44.2186 N, 158 02.1204 W
0506 Start S2C3 near bottom CTD cast. Multiple winch alarms and stops during cast.
1018 S2C3 recovered using tag lines. Hawboldt rep and OTG began the repair effort.
1209-1232 Net tow
1240-1315 Hyperpro cast
1330 Trace metal cast
1401-1519 S2C4 CTD cast to 1000
1525 Transit to pump tanks
1530 Transit to pump tanks
1654-1754 S2C5 1000m CTD cast
1806 Transit to PP array
1900-1917 PP array recovered at 22 49.432 N, 158 0.690 W
1959-2105 S2C6 CTD cast to 1000m. 25 min delay during recovery due to belly pack issue.
2205-2258 Completed 2 night net tows
2300 Begin S2C7 CTD cast to 1000m

April 29, 2024

0007 End S2C7
0024-0144 VPR cast #1
0159-0254 S2C8 CTD cast to 1000m
0417-0440 Gas Array deployed at 22 47.6310 N, 157 59.1403 W
0452-0550 S2C9 CTD cast to 1000m
0557 Transit to pump tanks
0759-0906 S2C10 CTD cast to 1000m
0936-1010 Trace Metal cast
1055-1157 S2C11 CTD cast to 1000m
1217-1306 2 day net tows
1343-1451 S2C12 CTD cast to 1000m
1518-1552 Trace Metal cast
1701-1756 S2C13 CTD cast to 1000m

1805	Transit to pump tanks
2002-2102	S2C14 CTD cast to 1000m
2204-2228	Night net tow
2256	Begin S2C15 near bottom CTD cast

April 30, 2024

0231	End S2C15
0325-0400	S2C16 CTD cast to 350m
0405	Transit to Gas Array
0534	Gas array recovered at 22 55.2272 N, 157 53.9978 W
0553	Transit to sediment trap array
0702	Sediment trap array recovered at 23 02.5478 N, 158 01.4786 W
1000-1217	S50C1 yo-yo ctd cast to 200m, 5 cycles. Problems with winch delayed recovery.
1226	Hyperpro cast
1321-1609	VPR cast
1620	Begin Hawboldt troubleshooting cast using weight
1800	Transit to Pier 35

May 1, 2024

0800	Arrive Pier 35

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
Andrew Dickson	CO_2 dynamics and intercalibration	SIO
Paul Quay	$DI^{13}C$	UW
Angelicque White	SCOPE: C-STAR, UVP, IFCB	UH
Nicholas Hawco	Quantifying Iron Turnover in the Upper Ocean via Time-series Measurements at Station ALOHA	UH
Debbie Lindell	Seasonal Virus Sampling	Technion
Andrew Hirzel	Video Plankton Recorder	UH
Julie Granger Adrian Marchetti	Evaluating the contribution of small eukaryotes to nitrate-based new production in the NPSG	UCONN UNCCH
Robert Letscher	Transparent exopolymer and phytoplankton vertical migration as sources for preformed nitrate anomalies in the subtropical N. Pacific Ocean	UNH