

## HOT 342: Chief Scientist Report

Chief Scientist: Carolina Funkey

R/V *Kilo Moana*

May 24-30, 2023

Cruise ID: KM 23-06

Vessel: R/V *Kilo Moana*, University of Hawaii

Master of the Vessel: Captain David Martin

Chief Scientist: Carolina Funkey, University of Hawaii

Marine Technicians: Trevor Young, Benjamin Duncan

### 1.0 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\\_342\\_Draft\\_Cruise\\_plan.pdf](https://hahana.soest.hawaii.edu/hot/crsplan/HOT_342_Draft_Cruise_plan.pdf)

Science operations were planned for 5 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-18 Mooring (anchor position 22° 40.021'N, 157° 57.078'W).
- 4) Station 6, referred to as Station Kaena, is located off Kaena Point at 21° 50.8'N, 158° 21.8'W.
- 5) Deep Moored Sediment Trap Site Recovery at 22° 50.3'N, 157° 52.9'W.

### 3.0. SCIENCE PERSONNEL

<b>Participant</b>	<b>Title</b>	<b>Affiliation</b>	<b>Citizenship</b>
Camille Adkison	Graduate Student	UH	USA
Eleanor Bates	Graduate Student	UH	USA
Karin Björkman	Research Specialist	UH	SWE
Brandon Brenes	Research Associate	UH	USA
Ray Chang	Graduate Student	Stanford	TWN
Benjamin Duncan	OTG	UH	USA
Dan Fitzgerald	Research Associate	UH	USA
Rhea Foreman	Research Associate	UH	USA
Carolina Funkey	Research Associate	UH	USA
Cathy Garcia	Post Doc	UG	USA
Eric Grabowski	Research Associate	UH	USA
Charlie Kollman	Graduate Student	UGA	USA
Adam LARson	Post Doc	Stanford	USA
Lauren Manck	Post Doc	UMT	USA
Christopher Marsay	Scientist	UGA	GBR
Emma Olson	Undergraduate	UH	USA
Fernando Carvalho Pacheco	Research Associate	UH	BRA
Mariah Ricci	Graduate Student	UGA	USA

Tully Rohrer	Research Associate	UH/SCOPE	USA
Dan Sadler	Research Associate	UH	USA
Payton Schwengel	Undergraduate	UH	USA
Miranda Seixas	Post Doc	UMT	USA
Eric Shimabukuro	Research Associate	UH	USA
Ryan Tabata	Research Associate	UH/SCOPE	USA
Blake Watkins	Marine Engineer	UH	USA
Trevor Young	OTG	UH	USA

#### 4.0. GENERAL SUMMARY

The cruise departed from Pier 35 at 0915. We arrived at Kahe at 1150 and completed a weight cast, the hyperpro casts, a CTD cast and two trace metal casts.

We arrived at station ALOHA slightly after midnight on May 24<sup>th</sup>. Once at station a net trap, the sediment traps and the WireWalker were deployed. A CTD cast was done to determine the mixed layer depth, which was proceeded by the University of Georgia (UGA) Be-7 pumping which took 4 hours to complete. Afterwards, both seagliders (513 & 626) were deployed, a high-resolution cast, 2 trace metal casts and a VPR cast were completed. The net trap was recovered successfully on May 25<sup>th</sup>. The UGA group completed their McLane pumping which lasted about 3 hours.

The primary production array was deployed at dawn and drifted West and recovered at dusk of the same day on May 26<sup>th</sup>. The gas array was deployed at dawn on May 27<sup>th</sup> and drifted 8 miles west and was recovered on the next day on May 28<sup>th</sup> at dawn.

One 1000 m CTD cast was completed at Station Kahe. At Station ALOHA, two near bottom CTD casts, thirteen 1000 m CTD casts, and three shallower casts varying from 200–600-meter depths. One 5 cycle yoyo CTD cast to 200 m was completed near the WHOTS mooring (Station 52). A near bottom CTD cast was completed at Station Kaena.

During the deployment of the PCPN cast the wire on the Hawboldt could only payout when the Auto LARS Control System was on, regardless of input from the operator. The control system was switched over to Manual and the PCPN cast was completed successfully. The engineers believed the encoder on the Hawboldt system might have been the cause of the malfunction, so they replaced it. The PPO4 cast started on the Auto LARS Control System and the same issue happened again. The system was switched over to Manual for the following 4 casts. On cast S2C9 OTG discovered that the weight limit setting had changed which caused the issues with Auto with LARS. The weight limit was adjusted, and the rest of the casts were done on the Auto with LARS setting.

After all the core HOT work was completed on May 28<sup>th</sup>, we continued with ancillary science work: recovering the second net trap, an additional trace metal cast and the second UGA McLane Pump.

For seaglider 513 recovery on May 29<sup>th</sup>, Captain David backed onto the seaglider perfectly for B. Watkins to hook onto. The recovery happened in record time, less than ten minutes. We headed over to seaglider 511, northeast of ALOHA to check out the Argo antenna. It did not look damaged, so we left it in the water to continue profiling.

For the deep sediment trap recovery, we put the transducer in the water which successfully communicated with the release, and we waited about an hour for the traps to surface and locate. The HOT 342 Chief Scientist report

winds were from the East 15-18 kts and currents to the northwest 0.5 knots during recovery of the deep trap. The deep sediment trap took over an hour from start to finish to recover. Our last activities at station ALOHA were an additional VPR cast and the deployments of 3 Argo floats.

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

Eight trace metal casts were completed.

HyperPro casts were completed at Station Kahe and Station ALOHA.

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

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

The R/V *Kilo Moana* continues to maintain good ship support for our work. The LARS system is working well despite the hiccup with the weight settings limits on the Hawboldt which caused the Auto with LARS setting to not work like it was supposed to for four CTD casts.

Captain David Martin excellent maneuvering skills of the vessel allowed for easy and short recovery times of all the arrays and equipment that were deployed on this cruise. The ship's crew showed flexibility, concern, and dedication to our scientific mission.

Technical support during this cruise was great. OTG personnel were great communicators which helped us stick to schedule. They were available to assist in our work during the cruise.

#### 6.0. DAILY REPORT OF ACTIVITIES (HST)

##### **May 24, 2023**

- 0915: Depart from Pier 35
- 1150: Arrived at Station Kahe
- 1210- 1310: Weight Cast to 500 m
- 1335-1413: Hyperpro (x5 yoyo & x2 deep casts)
- 1423-1534: Kahe Cast
- 1557-1607: Trace Metal Cast #1 E. Olson
- 1640-1655: Trace Metal Cast # 2 E. Bates
- 1703: Transit to Station ALOHA
- 0020: Arrive at Station ALOHA
- 0058-0105: Net Trap Deployment (22° 40.010'N, 158° 00.8500' W)

##### **May 25, 2023**

- 0136-0223: Sediment Trap Deployment 22° (40.785'N, 158° 02.5095' W)
- 0252-0308 WireWalker Deployment (22° 41.4854'N, 158° 02.5104' W)
- 0321-0400: Open Cast (S2C1)
- 0439-0753: UGA Be-7 Pumping
- 0809-0835: Deployment of both Seagliders 626 and 513 (22° 41.6388'N, 158° 01.9794' W)

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- 0848-09 09: Sea glider High Resolution Cast (S2C2)
- 1034-1050: Trace Metal Cast # 3 L. Manck
- 1118-1301: VPR Cast #1 (22° 41.6432'N, 158° 01.8860' W)
- 1318-1336: Trace Metal Cast #4 L. Manck
- 1622-1640: Net Trap Recovery (22° 40.456'N, 158° 05.279' W)
- 1752-2120: UGA McLane Pumps
- 2140-2158: Trace Metal Cast #5 E. Bates

### May 26, 2023

- 0155-0306: Primary Production Cast (S2C3)
- 0420-0446: Primary Production Deployment (22° 41.3618'N, 158° 01.6690' W)
- 0538-0931: PO Deep Cast (S2C4)
- 0950-1013: Trace Metal Cast #6 D.Repeta
- 1042-1202: Shallow Cast (S2C5)
- 1221-1240: Net Tow (22° 45.0267'N, 157° 59.9442' W)
- 1300-1334: Hyperpro (x5 yoyo, x2 deep cast)
- 1350-1545: PC/PN Cast (S2C5)
- 1757-1900: Begin PPO4 Cast (S2C6)
- 1937-1950: Primary Production Recovery (22° 41.998'N, 158° 5.608' W)
- 2032-2155: Beach Cast (S2C8)
- 2215-2245: Net Tow x 1
- 2307-2426: Open Cast (S2C9)

### May 27, 2023

- 0153-0302: Gas Array Cast (S2C10)
- 0407-0436: Gas Array Deployment (22° 42.6522'N, 158° 03.8443' W)
- 0455-0604: Open Cast (S2C11)
- 0835-1025: PSi Cast (S2C12)
- 1055-1119: Trace Metal Cast #7 E. Bates
- 1128-1240: Open Cast (S2C13)
- 1257- 1400: Net Tow x2 (22° 41.9552'N, 158° 04.2609' W)
- 1401-1503: ATP Cast (S2C14)
- 1614-1620: Net Trap Deployment # 2 (22° 42.0166'N, 158° 02.2467' W)
- 1703-1819: High Resolution Cast #3 (S2C15)
- 2008-2120: HPLC Cast (S2C16)
- 2201-2300: Net Tow x2
- 2332-0246: PO Deep #2 (S2C17)

### May 28, 2023

- 0300-0412: VPR Cast #3
- 0603-0619: Gas Array Recovery (22° 43.8469'N, 158° 09.5947' W)
- 0752-0825: Sediment Trap Recovery (22° 45.7360'N, 158° 19.7342' W)
- 0845-0902: WireWalker Recovery (22° 45.8643'N, 158° 20.6900' W)
- 1103-1120: Trace Metal Net Tow #1
- 1156-1229: Hyperpro (x5 yoyo, x2 deep cast)
- 1233-1336: High Resolution Cast #3 (S2C18)

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- 13:40: Transit to WHOTS
- 14:00: WHOTS ADCP comparison
- 1643-1652: Net Trap Recovery #2
- 1840-1941: Trace Metal Cast #8 E. Bates
- 1947-0055: UGA Deep McLane Pump

### May 29, 2023

- 0152-0213: Trace Metal Net Tow #2
- 0255-0407: WHOTS Cast (S52C1)
- 0429-0540: VPR Cast #3 (22° 40.7595'N, 157° 58.6414' W)
- 0635-0644: Seaglider 513 Recovery (22°40.7390'N, 157°57.3697'W)
- 0826: Inspecting Seaglider 511(22°55.7217'N, 157°50.7623'W)
- 0925: Arrived at Deep Sediment Trap Location (22°50.1976'N, 157°52.911'W)
- 0930: Transducer in the water
- 0940: Successful communication with the release
- 1118-1236: Deep Sediment Trap Recovery (22°50.1286'N, 157°53.0731'W)
- 0204-0306: VPR Cast #4. (22° 45.0246'N, 158° 00.0037' W)
- 0317-0322: Apex Float Deployments x 3 (22°44.7035'N, 157°58.7659'W)
- 0323: Transit to Kaena
- 2053-2246: Kaena Cast (S6C1)
- 2351: Transit to Pier 35

### May 30, 202

- 0819: Arrive at Pier 35

### HOT program sub-components:

Investigator	Project	Institution
Angelicque White	Core Biogeochemistry	UH
Dave Karl	SCOPE-biogeochemistry and particle flux	UH
John Dore	Biogeochemistry QA/QC	MSU
James Potemra	Hydrography	UH
Mike Landry	Zooplankton dynamics	SIO
Ricardo Letelier	Optical measurements	OSU
<b>Ancillary programs:</b>		
Ed DeLong	SCOPE: DNA and Viral DNA collection	UH
Andrew Dickson	CO <sub>2</sub> dynamics and intercalibration	SIO
Paul Quay	DI <sup>13</sup> C	UW

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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
Dan Ohnemus Chris Marsay Charlotte Kollman	Hawaii Aerosol Time-Series: Quantifying marine dust deposition and composition in an oligotrophic gyre	UGA
Dave Karl Eric Grabowski Cathy Garcia Rhea Foreman Karin Björkman	High Resolution CTD cast, Net Trap Array Seagliders, Rice Husk Incubations, Nitrite Analysis linked to Nitrifier DNA Samples	UH
Kelsey McBeain	Isolating heterotrophic eukaryotes for growth on prochlorococcus and pelagibacter	UH
Lauren Manck Miranda Seixas	Heterotrophic Bacterial Incubations	UMT
Adam Larson Ray Chang	Vertical Tracking of <i>Pyrocystis noctiluca</i>	Stanford
Dana Swift	Deploy three Biogeochemical Argo Floats	UW
Angelicque White	C-Stat, UVP, VPR	UH