HOT-353: Chief Scientist Report

Chief Scientist: Tully Rohrer
R/V *Kilo Moana*
September 6 – 10, 2024

Cruise ID: KM 24-15
Vessel: R/V *Kilo Moana*, University of Hawaii
Master of the Vessel: Captain Eric Pomeroy
Chief Scientist: Tully Rohrer, University of Hawaii at Manoa
Marine Technicians: Trevor Young (Lead), Ben Duncan

1.0 COVID-19 PREVENTION

Extra precautions were set in place before the cruise to prevent the spread of COVID-19 onboard, as per UNOLS guidelines.

- All of the science party were vaccinated.
- All cruise participants were antigen-tested for COVID-19 on loading day.

2.0 SCIENTIFIC OBJECTIVES

The cruise objective was to maintain a hydrographic and biogeochemical data collection 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_353_Cruise_plan_operational.pdf

Science operations were planned for four stations in the following order:

1) Station 1, referred to as Station Kahe, is at 21° 20.6'N, 158° 16.4'W.
2) Station 2, called Station ALOHA, is a circle with a six 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
Sergei Avetisyan	UNOLS Mate Intern	UNOLS	USA
Karin Björkman	Research Specialist	UH	SWE
Brandon Brenes	Graduate Student	UH	USA
Kellie Cole	Scientist	Maui Strong Fellowship	USA
Mattia Da Fieno	Research Assistant	UH	USA
Paige Dillen	Graduate Student	UH	USA
Jonah Dirks	Graduate Student	UH	USA
Mike Dowd	Graduate Student	UH	USA
Jessica Erwin	Scientist	Maui Strong Fellowship	USA
Zoe Eckardt	Undergraduate Student	UH	USA
Dan Fitzgerald	Research Associate	UH	USA
Fernando Carvalho Pacheco	Research Associate	UH	BRA
Cameron Richardson	Graduate Student	UH	USA
Tully Rohrer	Chief Scientist	UH	USA
Dan Sadler	Research Associate	UH	USA
Blake Watkins	Marine Engineer	UH	USA
Ben Duncan	OTG	UH	USA
Trevor Young	OTG	UH	USA

4.0. GENERAL SUMMARY

Loading took place on Thursday, September 5th and went smoothly. Aloha Tower pushed our departure back from 0900 to 0930, so all science personnel were aboard by 0830 on Friday, September 6th.

Operations at Station Kahe were performed as planned, and included a weight test cast, a Hyperpro deployment, and a CTD cast to 1000m. We began transit to Station ALOHA at 1540. We slowed to 8kts for back-to-back test profiles of the underway CTD from 1600-1645.

Upon reaching Station ALOHA at 1215 on September 7th, we began operations with the deployment of the sediment trap array. We followed that with the Primary Productivity CTD cast and the deployment of the array. Operations continued as planned throughout the day, with the PO Deep Cast, the start of the 36-hour burst CTD sampling, a net tow and a Hyperpro. The Primary Productivity array was recovered at 1901 in glassy conditions just after sunset, about 6 miles south of where it was deployed.

At 1958, during the deployment of the following CTD (S2C6, BEACH cast), a hydraulic hose burst on the Hawboldt's crane. Oil ended up on the 02 deck and the main deck, and the rosette was stuck hanging a few meters above the ocean surface. Engineers fixed the hose by 2027, and the rosette was returned to deck and moved back into the Wet Lab. Ship's crew then cleaned up the oil on deck and the ship transited to another site to avoid sensor contamination in case any oil made it into the ocean. S2C6 was relaunched at 2114, and while two net tows and S2C7 were performed a little later than planned, we were back on schedule by S2C8, the Gas Array cast.

We were able to continue with operations as scheduled for the remainder of the 36-hour burst sampling period, save for one Video Plankton Recorder (VPR) cast that was scheduled after the delayed BEACH cast. After the second PO Deep cast, the Sediment Trap Array was approximately 21 miles from center station, with the Gas Array about 10 miles. We dropped the VPR cast scheduled for after the deep cast in order to make these lengthy transits. The Gas and Sediment Trap arrays were recovered perfectly in glassy conditions.

In all, at Station ALOHA, we performed 13 CTD casts to 1000m, 2 near-bottom deep CTD casts, a Hyperpro deployment, a VPR cast (3 profiles to 400m), six net tows (three daytime, three nighttime), and three array deployments and recoveries.

Near the WHOTS mooring (Station 52), we completed a 5-cycle yoyo CTD cast down to 200 meters, a Hyperpro deployment, and a VPR cast (2 profiles to 400m).

On the transit to Station Kaena, the ship experienced a black out at 1600 that lasted for just a few minutes. Immediately after this, the engineers brought two generators back online. For the following two hours and fifteen minutes, the engineers tried to troubleshoot and figure out what combination of generators would operate the best for the remainder of the cruise. At 1815, we resumed transiting on just two generators as a third could not be brought back online. This limited us to 5-6 kts, and we dropped operations at Station Kaena as this already meant we would miss our 0700 sea buoy appointment. We entered the harbor mouth around 1030 on Tuesday, September 10th, with a tug assist due to a delay in the starboard propulsion that manifested during the cruise as well.

The 300 kHz and 38 kHz Acoustic Doppler Current Profilers (ADCPs), underway fluorometer, transmissometer, thermosalinograph, and the ship's meteorological suite operated continuously throughout the cruise, except for the period during and following the power blackout.

At Station Kahe, wind speeds were 5 knots from the east and currents were 0.9 kts. At Station ALOHA, initial conditions were 15 knots from the east with a 1 kt current to the south, but winds soon dropped to less than 5 kts and the current eased to 0.4-0.6 kts to the south. Swell heights ranged from 3 to 6 feet.

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

The R/V *Kilo Moana* maintained good ship support for our work. Technical support during this cruise was excellent. OTG personnel were available to assist in our work during the cruise and were timely in assisting with any issues. Captain Eric Pomeroy remains excellent to work with, was generous with his time and communication, and we look forward to many more successful HOT cruises in the future.

6.0. DAILY REPORT OF ACTIVITIES (HST)

September 6th, 2024

08:30	All science personnel aboard
09:30	Depart Pier 35
10:10	Safety meeting and drills
12:15	Arrive Station Kahe
12:35-13:16	Weight Cast and Hawboldt safety test
13:23-14:13	Hyperpro casts
14:26-15:31	S1C1, Kahe Cast
15:40	Depart for Station ALOHA
16:00-16:45	Underway CTD Testing (transit speed slowed to 8kts)

September 7th, 2024

00:15	Arrival at ALOHA station, 2 mi west of center
00:27-00:51	Deploy Sediment Trap Array, 22° 44.846'N, 158° 2.053'W
01:56-02:59	S2C1, Primary Productivity Cast
04:21-04:43	Deploy Primary Productivity Array, 22° 44.970'N, 158° 1.231'W
05:17	Begin S2C2, PO Deep Cast
06:58	Reached bottom of cast, 9m from sea floor, 22° 45.002'N, 157° 59.996'W
08:52	End S2C2
11:00-12:21	S2C3, PO Shallow Cast
12:43-13:05	Net Tow (B. Watkins)
13:19-14:01	Hyperpro
14:08-15:09	S2C4, PCPN Cast
15:18	Transit to pump tanks
16:51-17:53	S2C5, PPO4 Cast
18:03	Transit to Primary Productivity Array
18:40-19:01	Recover Primary Productivity Array, 22° 39.514'N, 158° 2.821'W
19:10	Transit 1 mi inside ALOHA circle
19:51	Attempt to begin S2C6
19:58	Hydraulic hose blew on Hawboldt Winch. Cast aborted, repairs commence.
20:27	Hydraulic hose repaired, CTD returned to deck. Cleaning begins, transit to clean site.
21:14-22:30	S2C6, Beach cast
22:50-23:41	Net Tows (2), B. Watkins
23:52	Begin S2C7, Open cast (B. Brenes)

September 8th, 2024

00:54	End S2C7
02:10-03:10	S2C8, Gas Array Cast
03:15	Transit to 2 mi W of Center Circle
04:20-04:41	Gas Array Deployment, 22° 45.034'N, 158° 2.197'W
04:54-05:44	S2C9, Open cast
05:53	Transit to Pump Tanks
07:54-08:50	S2C10, PSi Cast
10:53-11:53	S2C11, Open Cast

12:19-13:08 Net Tows (2) - B.Watkins
13:51-14:55 S2C12, ATP Cast
15:07-16:31 VPR Cast #1 (3 profiles to 400m)
16:49-17:49 S2C13, Open Cast (B.Brenes)
18:00 Transit to pump tanks
19:48-20:55 S2C14, HPLC Cast
22:12-22:31 Net Tow (1) B. Watkins
22:58 Begin S2C15, PO Deep Cast #2

September 9th, 2024

00:37 Reached bottom of cast, 4804 db, 10m from bottom
02:12 End S2C15
02:34 Transit to Gas Array
04:45-05:09 Gas Array recovery, 22° 36.016'N, 158° 4.423'W
05:15 Transit to Sediment Trap Array
06:35-06:58 Sediment Trap Array recovery, 22° 25.281'N, 158° 10.100'W
07:00 Transit to WHOTS Mooring
09:46-10:39 S52C1, WHOTS Yo-yo Cast
11:10-12:05 VPR Cast #2 (2 profiles to 400m)
12:16-12:50 Hyperpro
13:10 Begin Transit to Station Kaena
16:00 Power outage
16:03 Power restored on two generators
16:03-18:15 Generator troubleshooting, no propulsion
18:15 Resume transit to Pier 35 at 5-6kts, Station Kaena cancelled

September 10th, 2024

11:30 Arrive at Pier 35

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

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	UVP, Underway optics	UH
Debbie Lindell	Seasonal Virus Sampling	Technion
Andrew Hirzel	Video Plankton Recorder	UH
Brandon Brenes	Water collection for filtration, FCM analysis	UH
Paige Dillen	A-DOM Samples	UH