HOT 326: Chief Scientist Report

Chief Scientist: Dan Sadler
R/V *Kilo Moana*
January 11 – 15, 2020

Cruise ID: KM 21-01
Vessel: R/V *Kilo Moana*, University of Hawaii
Master of the Vessel: Captain Joey Daigle
Chief Scientist: Dan Sadler, University of Hawaii
Marine Technicians: Trevor Young, Lance Frymire

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.

- Sailed with a minimum science party, one scientist per stateroom.
- All cruise participants self-isolated according to the HOT Risk Mitigation Plan before the cruise (December 21 – January 11).
- All cruise participants continued their HOT-326 self-isolation so required one COVID-19 test before the cruise (January 6, 2021).

During the cruise all participants:

- wore face masks
- maintained a distance of 6 ft. when possible
- properly disinfected of all workspaces often
- remained in their staterooms as much as possible during non-work hours

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_326_KM_Operational_Cruise_Plan.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-16 Mooring (anchor position 22° 40.01'N 157° 56.96'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
Brandon Brenes	Research Assistant	UH	USA
Tim Burrell	Research Associate	UH/SCOPE	NZL
Dan Fitzgerald	Research Associate	UH	USA
Lance Frymire	Marine Technician	OTG	USA
Lucie Knor	Research Assistant	UH	GER
Fernando Pacheco	Research Associate	UH	BRA
Tully Rohrer	Research Associate	UH	USA
Dan Sadler– Chief Scientist	Research Associate	UH	USA
Eric Shimabukuro	Graduate Student	UH	USA
Ryan Tabata	Research Associate	UH/SCOPE	USA
Blake Watkins	Marine Engineer	UH	USA
Trevor Young	Marine Technician	OTG	USA

4.0. GENERAL SUMMARY

Equipment loading was conducted on January 8th, and the cruise departed on January 11th at 08:34 (HST). After conducting operations at Station Kahe the ship proceeded to Station ALOHA.

Upon arrival at Station ALOHA, the sediment traps, and WireWalker were deployed west of center station, as the currents were expected to move to the south. A CTD cast was conducted to collect water for the primary productivity array, and the array was deployed 1 nm east of center station. The primary productivity array drifted towards the NE and was recovered after sunset on January 12th. The gas array experiment was deployed on January 13th and recovered on schedule on January 14th. The remaining arrays drifted NE and were recovered on January 14th.

At Station ALOHA, two near bottom CTD casts and thirteen 1000 m CTD casts were completed. One 5-cycle yoyo CTD cast to 200 m was completed near the WHOTS mooring (Station 52), as well as the near-bottom CTD cast at Station Kaena (Station 6).

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

Hyperpro operations were conducted once at Station Kahe, and once at Station ALOHA during the primary production experiment. Each operation consisted of 2 deep casts to 185 m, and a 5 cycle Yo-Yo cast to 20 m. A second cast at Station ALOHA was conducted near the WHOTS mooring. It consisted of a 5 cycle Yo-Yo cast to 20 m and a single deep cast to 185m. A second deep cast was not attempted as the wire angle kept changing due to a large swell and current.

The 300 kHz ADCP, underway fluorometer, transmissometer, thermosalinograph and the ship's meteorological suite ran without interruption during the cruise. The 38 kHz ADCP is still not working correctly due a failed cable, but data were collected using three transducers and may still be useful.

The cruise started with light winds out of the SE, gradually shifting clockwise during the cruise as a front approached and passed St. ALOHA. By Thursday, the winds had increased to 20 knots from the east. Several large ground swells kept the Kilo Moana rocking during 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. The LARS system worked well throughout the cruise giving very consistent CTD cast times that allowed us to stick to our schedule. We look forward to full implementation of the docking head which will allow for "hands-free" deployments and recoveries.

Captain Joey Daigle and the ship's crew showed flexibility, concern, and dedication to our scientific mission. Ship handling was very good during all operations.

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)

Monday, January 11, 2021

0834 - Departed Pier 35
0909 - Safety drills - Messrs. Fitzgerald, Young and Sadler demonstrated proper immersion suit technique
1111 - Arrived at Station Kahe
1123-1211 Weight Cast
1226-1302 Hyperpro Cast - 5x20 m yoyo followed by 2 deep casts
1318-1408 S1C1 CTD cast to 1000 m
1415- Underway to Station ALOHA
2157-2218 - Sediment Traps deployed at 22 45.0802 N,158 03.1750 W
2241-2258 - WireWalker deployed at 22 45.0843 N, 158 02.2302 W

Tuesday, January 12, 2021

0152-0249 - 1000 m CTD cast for Primary Production
0413-0430 - Primary Production Array deployed at 22 45.1055 N, 158 00.6757 W
0505-0847 - S2C2 Near bottom CTD cast for PO Deep sampling
1111-1214- S2C3 1000 m CTD cast for PO Shallow sampling
1228-1255 - Net Tow
1339-1407 - Hyperpro cast, 5x20m yoyo and 2 deep casts
1421-1512 - S2C4 1000 m CTD cast for PC/PN and DNA
1520 - Transit to pump tanks
1642-1646 - S2C5 CTD cast to 1000 m for PPO4
1751 - Transit to recover PP array
1822-1839 - PP array recovered at 22 46.5024 N, 157 57.0712 W
1954-2106 - S2C6 CTD cast to 1000 m for BEACH sampling
2155-2300 - Completed 2 net tows
2305- 0002 - S2C7 CTD cast to 1000 m

Wednesday, January 13, 2021

0007 - Transit to pump tanks
0156-0255 - S2C8 CTD cast to 1000 m for Gas Array
0406 - Rain on station, deployment delayed
0418-0436 - Gas array deployed at 22 45.6210 N, 157 59.6521 W
0507-0558 - S2C9 CTD cast to 1000 m for DNA sampling
0802-0859 - S2C10 CTD cast to 1000 m for PSi
1103-1152 - S2C11 CTD cast to 1000 m for Robert Letscher sampling
1204-1305 - completed 2 net tows
1339 - Raining on station
1357-1448 - S2C12 CTD cast to 1000 m for ATP
1651-1742- S2C13 CTD cast to 1000 m Open Cast
2016-2120- S2C14 CTD cast to 1000 m for HPLC
2157-2226 - Net tow completed
2254-0201 - S2C15 near bottom CTD cast - 2nd PO Deep

Thursday, January 14, 2021

0228-0409 - Optics Cage - 3 cycles to 200 m
0413 - Transit to Gas Array
0624-0638 - Gas Array recovered at 22 51.3764 N, 157 49.7800 W
0724-0738- WireWalker recovered at 22 56.3282 N, 157 46.6791 W
0746-0800- Sediment Traps recovered at 22 56.2879 N, 157 46.6763 W
1219-1327- S52C1 CTD cast, 5 cycles to 200 m
1349-1403 - Hyperpro cast. 5 x 20m and one deep cast.
1413 - Begin transit to Station Kahe
1912-2119 – S6C1 near bottom CTD cast (St. Kaena)

Friday, January 15, 2021

0811 – Arrive Pier 35

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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
Ed DeLong	SCOPE: DNA and Viral DNA collection	UH
Andrew Dickson	CO_2 dynamics and intercalibration	SIO

Paul Quay	$DI^{13}C$	UW
Dan Repeta	SCOPE: DOM collection	WHOI
Angelicque White	SCOPE: C-STAR, UVP, IFCB	UH
Sonya Dyhrman	Physiological ecology of diatom diazotroph associations using metatranscriptome samples.	LDEO
Robert Letscher	Transparent exopolymer and phytoplankton vertical migration as sources for preformed nitrate anomalies in the subtropical N. Pacific Ocean	UNH
Debbie Lindell	Seasonal Virus Sampling	Technion