HOT 323: Chief Scientist Report

Chief Scientist: Fernando Santiago-Mandujano

R/V *Kilo Moana*

September 25 - 30, 2020

Cruise ID: KM 20-11
Vessel: R/V *Kilo Moana*, University of Hawaii
Master of the Vessel: Captain David Martin
Chief Scientist: Fernando Santiago-Mandujano, University of Hawaii
Marine Technicians: Julianna Diehl, 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 (September 7th – September 24th).
- All cruise participants were tested for COVID-19 four days before the cruise (September 21st).

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_323_KM_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
Mathieu Caffin	Post-Doc	UH	FRA
Julianna Diehl	Marine Technician	OTG	USA
Dan Fitzgerald	Research Associate	UH	USA
Lance Frymire	Marine Technician	OTG	USA
Carolina Funkey	Research Associate	UH	USA
Fernando Pacheco	Research Associate	UH	BRA
Tully Rohrer	Research Associate	UH/SCOPE	USA
Dan Sadler	Research Associate	UH	USA
Fernando Santiago-Mandujano -Chief Scientist	Research Associate	UH	USA
Ryan Tabata	Research Associate	UH/SCOPE	USA
Blake Watkins	Marine Engineer	UH	USA

4.0. GENERAL SUMMARY

The cruise was delayed two days from its original September 23rd departure date, waiting for the USCG clearance to repairs made to the ship's starboard propulsion drive.

Equipment loading was conducted on September 24th, and the cruise started on September 25th at 13:00 (HST). After conducting operations at Station Kahe the ship proceeded to Station ALOHA.

Upon arrival at Station ALOHA, a CTD cast was conducted to collect water for the primary productivity array. The primary productivity array, floating sediment traps, and WireWalker were deployed just northwest of the station center. They drifted northeastward. The sediment traps and WireWalker were recovered on the last day of the cruise nearly 17 nm northeast of Station ALOHA. A gas array experiment were also completed at Station ALOHA.

At Station ALOHA, two near bottom CTD casts, thirteen 1000 m CTD casts, and one cast to 100 m were completed. One 5 cycle yoyo CTD cast to 200 m was completed near the WHOTS mooring (Station 52), and one near bottom CTD cast was conducted at Station Kaena (Station 6).

Six net tows for the core HOT zooplankton collection were completed successfully; three during the day and three during the night. Additionally, six handheld net tows were completed.

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

The 300 kHz ADCP, underway fluorometer, transmissometer and the ship’s meteorological suite ran without interruption during the cruise. The data from the thermosalinograph had a few issues during the previous HOT-322 cruise due to the pressure flow system causing the data to be segmented. Before

HOT-323, the flow to the thermosalinograph was separated from the other instruments in the IMET lab, and the instrument performed much better.

Weather during the cruise was fair. Winds were easterlies between 6 and 18 knots, with clear skies. A northeastward current of about 0.5 knots in the upper 80 m was present in 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 David Martin and the ship's crew showed flexibility, concern, and dedication to our scientific mission.

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)

September 24, 2020

0800 - Began equipment loading

September 25, 2020

1250 - All aboard. Depart from Pier 35
1320 - Safety briefing. Fire and Abandon ship drills
1526 - Arrived at Kahe Station
1603-1659 - Weight cast to 900 m with 1200 lb weight.
1759-1856 - S1C1 CTD cast to 1000 m.
1900 - Transit to Station ALOHA.

September 26, 2020

0230 - Arrived at Station ALOHA.
0251-0321 - S2C1, 100 m CTD cast
0454-0513 - Deployed Primary Productivity array, 22 45.498'N, 158 2.966'W
0525-0604 - Hand-held net tow
0633-0703 - Sediment traps deployed: 22 46.730'N, 158 1.849'W
0740-0808 - Wirewalker deployed: 22 48.189'N, 158 1.408'W
0850-0922 - Hand-held net tow
1118-1150 - Net tow #1
1155-1229 - Hand-held net tow
1244-1318 - Hyperpro cast
1355-1451 - S2C2, 1000 m CTD cast
1515 - Transit to pump ship's tanks and incinerate trash
1849-1910 - Recovered Primary Productivity array: 22 47.505'N, 158 0.28'W
1939 - Incinerate refuse
2203-2230 - Net tow #2
2236-2307 - Net tow #3
2333-0001 - Hand-held net tow

September 27, 2020

0016-0148 - Optics cast
0200 - Transit to pump ship's tanks
0330-0710 - S2C3 near-bottom CTD cast,
4 m off the bottom, 22 45.0783'N, 157 59.978'W
1100-1230 - S2C4, 1000 m CTD cast
1247-1317 - Net tow #4
1321-1348 - Net tow #5
1355-1502 - S2C5, 1000 m CTD cast
1600-1628 - Hand-held net tow
1708-1805 - S2C6, 1000 m CTD cast
1815 - Transit to pump ship's tanks

2004-2105 - S2C7, 1000 m CTD cast
2306-2359 - S2C8, 1000 m CTD cast

September 28, 2020
0212-0312 - S2C9, 1000 m CTD cast
0415-0433 - Gas array deployed at 22 45.361'N, 157 59.053'W
0505-0606 - S2C10, 1000 m CTD cast
0755-0852 - S2C11, 1000 m CTD cast
0903 - Transit to pump ship's tanks
1053-1148 - S2C12, 1000 m CTD cast
1355-1508 - S2C13, 1000 m CTD cast
1659-1752 - S2C14, 1000 m CTD cast
1800 - Transit to pump ship's tanks. Burning trash
1932-2003 - Hand-held net tow
2007-2112 - S2C15, 1000 m CTD cast
2208-2240 - Net tow #6
2303 - Start S2C16, near-bottom CTD cast

September 29, 2020

0050 - At 8 m off the bottom. 22 45.031'N, 158 0.0302'W
0225 - End of CTD cast
0359-0423 - Gas array recovery, 22 48.563'N, 157 52.527'W
0513-0538 - Sediment traps array recovery, 22 53.404'N, 157 45.844'W
0600-0616 - Wirewalker recovery, 22 54.724'N, 157 45.541'W
1150-1248 - S52C1, 200 m CTD yo-yo cast, 5 cycles
1327-1403 - Hyperpro cast
1405 - Transit to Station Kaena

September 30, 2020

0728 - Arrive Pier 35, Unloaded Ship

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

Ancillary programs:

Virginia Ambrust	SCOPE: Seaflow	UW
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, IFCB, UVP, IRS Traps	UH
John Zehr	Samples for unicellular cyanobacterium	UCSC
Matthieu Caffin	N2 fixation at sea based on Ar induced H2 production	UH
Sonya Dyhrman	Physiological ecology of diatom diazotroph associations using metatranscriptome samples.	LDEO
Petra Byl Grieg Steward	Maintenance of algal and viral stocks, for full genome sequencing	UH