Hawaii Ocean Time-series
HOT-341 Cruise Plan - Operational

Cruise ID: KM 23-04
Vessel: R/V *Kilo Moana*, University of Hawaii
Master of the Vessel: Captain Christopher Amorant
Chief Scientist: Tully Rohrer, University of Hawaii
Marine Technicians: Trevor Young, James Harris

Marine Center phone number: (808) 956-0688
KM phone numbers (in port): 808-587-8566 / 67
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Tully Rohrer Cell Number: (970)708-7601

Pre-Cruise Meeting: March 20th, 2023 at 1300 via Zoom
Start pre-embarkation protocols (masking, social distancing): March 20th
COVID Testing: March 24th
Loading: March 24th at 0900, Pier 35.
Departure: March 27th at 0830 (**Science personnel at UHMC by 0800**).
Arrival: April 1st at 0800
Post-Cruise Meeting: April 3rd at 1330 via Zoom

1.0 SCIENTIFIC OBJECTIVES

The objective of the cruise is to maintain a collection of hydrographic and biogeochemical data at the Hawaii Ocean Time-series (HOT) stations. Four stations will be occupied during the cruise:

1) Station 1, referred to as Station Kahe, is located at 21° 20.6'N, 158° 16.4'W and will be occupied on March 27th for about 3-4 hours.
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. This is the main HOT station and will be occupied March 28th – March 31st.
3) Station 52, the site of WHOTS-18 Mooring (anchor position 22° 40.021'N, 157° 57.078'W) will be occupied for about 3-4 hours on March 31st.
4) Station 6, referred to as Station Kaena, is located off Kaena Point at 21° 50.8'N, 158° 21.8'W and will be occupied on March 31th for about 2 hours.

1.1 SCIENTIFIC OPERATIONS

Station	Activities
Kahe (Sta. 1)	Weight Cast, Hyperpro cast, CTD cast (1000 m), Trace Metal CTD
ALOHA (Sta. 2)	Sediment traps, WireWalker, Primary productivity array, Gas array, Net tows, CTD operations, Trace Metal CTD casts
WHOTS mooring station (Sta. 52)	One CTD cast (yo-yo to 200 m), Hyperpro, Trace Metal CTD cast, surface instrument intercomparisons.
Kaena (Sta. 6)	One near-bottom CTD cast (~ 2400 m)
Underway/continuous	ADCP, thermosalinograph, fluorometry, meteorology, C-Star

2.0. SCIENCE PERSONNEL

Participant	Title	Affiliation	Citizenship
Camille Adkison	Graduate Student	UH	USA
Eleanor Bates	Graduate Student	UH	USA
Karin Björkman	Research Specialist	UH	SWE
Brandon Brenes	Research Associate	UH	USA
Tim Burrell	Research Associate	UH/SCOPE	NZL
Madeline Davis	Graduate Student	UH	USA
Peter Farrell	Graduate Student	NIOZ	NLD
Dan Fitzgerald	Research Associate	UH	USA
Carolina Funkey	Research Associate	UH	USA
Eric Grabowski	Research Associate	UH	USA
James Harris	Marine Technician	UH	USA
Devin Hogate	Undergraduate Student	UH	USA
Andrew Hirzel	Postdoc	UH	USA
Charlotte Kollman	Graduate Student	UGA	USA
Christopher Marsay	Scientist	UGA	GBR
Nicole Mathews	Undergraduate Student	UH	USA
Daniel Ohnemus	Scientist	UGA	USA
Fernando Carvalho Pacheco	Research Associate	UH	BRA
Tully Rohrer	Research Associate	UH/SCOPE	USA
Dan Sadler	Research Associate	UH	USA
Ryan Tabata	Research Associate	UH/SCOPE	USA
Blake Watkins	Marine Engineer	UH	USA
Trevor Young	Marine Technician	OTG	USA

3.0. SUMMARY SCHEDULE

20 March	Pre-cruise planning meeting 1300 hrs, via Zoom.
24 March	Equipment loading at 0900 hrs, Pier 35.
27 March	Depart from Pier 35 at 0830 hrs. **Science personnel to UHMC by 0800.**
27 March	Station 1 Kahe Pt. operations.
28-31 March	Station 2 ALOHA operations, Station 50 CTD yo-yo cast, Station 6 deep cast.
01 April	Arrive back to Pier 35.
03 April	Post-cruise meeting at 1330 hrs via Zoom

4.0. OPERATIONAL PLANS

4.1. Station Kahe (21°20.6'N, 158°16.4'W)

A 1300 lb. weight-test cast to 500 m will be conducted, **including testing of the emergency systems on the docking head of the Hawboldt LARS system.** These tests will include the Manual Anti-2 Block Test, the Auto with LARS Anti 2-block test, and the Auto with LARS switch malfunction test as described in previous cruise plans. A Hyperpro cast (Sect. 4.2.8), one CTD cast to 1000 m (4.2.5), and a Trace Metal CTD cast (4.5) will be conducted at this location. The ship's A-frame, CTD winch, and TM winch will be needed for these operations. After the operations are satisfactorily completed, the ship shall proceed to Station ALOHA.

4.2. Station ALOHA (22°45'N, 158°W with 6 nm radius)

4.2.1. Upon arrival to Station ALOHA, the Sediment Trap Array (Sect 4.2.2) (*****) will be deployed. Then the Wirewalker will be deployed (Sect. 4.2.3).

(*) NOTE: The deployment of all drifting array must be determined by observed local and forecasted currents to avoid possible entanglement with the WHOTS mooring.
Array tracking is facilitated through the SOEST Cruise and Drifter Tracks tool found at
http://hahana.soest.hawaii.edu/nowcast/loctable.html

4.2.2. Sediment trap array deployment

The floating sediment traps will be from the back of the deck through the A-frame and using the SeaMac winch. After deployment we request that the bridge verify that the radio transmitters are functioning and directionally correct. The Sediment Trap array will consist of one cross with 12 particle interceptor traps (PIT) at 150m, and one cross above it with 4 traps. There will be an additional PIT trap at 175 m.

The array will drift for about 70 hours before recovery. The array is equipped with 1 ARGOS satellite transmitter, 1 Novatech Iridium beacon, strobe lights, and a radio transmitter (see section 6.0 for transmitter IDs). Assistance from the bridge is requested in plotting the drift track of the array. We request the use of the ship's radio direction finder for locating the array before recovery. Blake Watkins will direct this deployment.

4.2.3. Wirewalker™ deployment

A Wirewalker (Del Mar Oceanographic) will then be deployed to take hydrographic and optical observations in the upper 400 m of the water column. The instrument is approximately 1.5 m long and 0.6 m wide and weighs approximately 30 kg. The instrument will be deployed on a wire with a 40 kg bottom weight and a surface buoy with strobe light and Pacific Gyre positioning system (See section 6.0 for transmitter IDs).

The Wirewalker will be deployed near to the Sediment Trap array so that the arrays drift in a similar direction. The instrument will stay in the water for approximately 70 hours. Deployment and recovery will be conducted from the back deck through the A-frame and using the SeaMac winch. Two ABs will be required to operate the A-frame and winch, respectively. Blake Watkins will direct this deployment.

After array deployments conclude, the ship shall prepare to deploy the Net Trap Array (4.12).

4.2.4. Primary production experiment

Samples for the primary productivity experiment will be collected from the rosette. Before dawn (Sunrise 0627 hrs on March 29th), a free drifting incubation array will be deployed from the back of the deck thru the A-frame and using the SeaMac winch. The primary production incubation array will be deployed at a location within Station ALOHA to be determined by observed local and forecasted currents to avoid possible entanglement with the WHOTS mooring. Positions of the array will be emailed to argosfix@km.soest.hawaii.edu, password: argosfix. (See section 6.0 for Trasmitter IDs).

The array will be recovered at sunset (1846 hrs). CTD operations shall continue after recovery. All radioactive waste generated by the experiment shall be returned to the University of Hawaii. Only qualified personnel shall handle radioactive material. Blake Watkins will direct this deployment.

After deployment of the Primary Production Array, the ship shall transit to the center of the station circle to conduct a bottom CTD cast, S2C2 (approximately 4740 m).

4.2.5. Water column measurements

Vertical profiles of temperature, conductivity and dissolved oxygen will be made with an instrument package consisting of a Sea-Bird CTD attached to a 24-place rosette with 12-liter sampling bottles. We will need the ship's CTD winch and crane for these operations. Water samples for biogeochemical measurements will be collected on each cast. The cast after the deployment of the Primary Productivity Array shall be made to the near bottom (approximately 4740 m). Following this cast, a series of 1000-m casts shall be made continuously every three hours for a 36-hour period, ending with a second near-bottom cast. It is highly desired

that this burst sampling be done without interruption, and we request the ship to maintain position within the study area for that period of time, and repositioning to the center of the Station before each cast whenever possible.

Whenever pumping of the ship's tanks is needed, it must be conducted outside the circle that defines station ALOHA (Sect. 1.0). To avoid disruptions in the schedule, this operation should be coordinated with the chief scientist or the watch leaders **(Fernando Carvalho Pacheco and Tully Rohrer)**.

4.2.6. Lowered Acoustic Doppler Current Profiler (LADCP)

Due to the constraints of the OTG rosette, the LADCP will not be deployed on this cruise.

4.2.7. Gas Array deployment

A free drifting incubation array will be deployed the third day of the cruise at Station ALOHA. Samples for the gas array will be collected from Station 2 CTD cast 8. The gas array will be deployed from the back of the deck thru the A-frame and using the SeaMac winch. The gas array will be deployed at a location within Station ALOHA to be determined by observed local and forecasted currents to avoid possible entanglement with the WHOTS mooring. The array is equipped with GPS transmitters, strobe lights and a radio transmitter (See Section 6.0 for transmitter IDs). Positions of the array will be emailed to argosfix@km.soest.hawaii.edu, password: argosfix. The ship will **not** need to keep within sight of the array until the time of the recovery, approximately 25 hours after its deployment. Assistance from the bridge is requested in plotting the drift track of the array. Blake Watkins will oversee this deployment.

4.2.8. Hyperpro

The Hyperpro is a profiling unit with one up-looking and one down-looking hyperspectral radiometer, a WET Labs ECO-BB2F triplet (measuring Chlorophyll-*a* fluorescence and backscattering in the blue and red wavelengths), temperature and conductivity sensors. This instrument also incorporates a ship mounted surface radiometer. Around 1400 on the first, third and fifth days, the Hyperpro will be deployed from the stern through a small block hung from the A-frame. The instrument is lowered and retrieved by hand. Each deployment will consist of two profiles and one yo-yo (5 x 20m) before the instrument is retrieved.

4.2.9. Underwater Vision Profiler (UVP)

The UVP will be installed on the OTG rosette inside the frame using clamps provided by HOT. This instrument will require a modified CTD deployment procedure in which the CTD/rosette is lowered into the water and allowed to soak for one minute before being deployed to 15m as rapidly as is safe for the winch. The instrument will only turn on if the average descent rate is >18 m/min. HOT will be responsible for maintaining this instrument before and after CTD casts.

4.2.10. Zooplankton Net Tows

A plankton net will be deployed from the stern and shall be towed for half-hour periods. Half-hour periods are scheduled around noon and midnight on the second, third, and fourth days (see schedule) for a total of six slots. The A-frame and small capstan will be needed for this operation. Blake Watkins will direct these operations.

4.3 Gas Array, Sediment Trap Array, and WireWalker recovery

In the morning of March 31st, the ship shall transit for the recovery of the Gas Array. The A-frame and the Sea-Mac winch will be needed to retrieve the array. After the Gas Array is recovered, the ship shall transit to recover the floating sediment trap array. On completion of sediment trap array recovery, the ship shall transit to recover the Wirewalker. Blake Watkins will oversee these operations. After the Wirewalker is recovered, the ship shall transit to Station 52.

4.4. Station 52 - WHOTS-18 Mooring

The anchor position of the WHOTS-18 mooring is 22° 40.021'N, 157° 57.078'W. The watch circle of the buoy is about 2 nautical miles. Generally, the buoy stays on the edge of the watch circle. The buoy can be detected via radar in good weather conditions but is harder to detect with larger sea states. Upon arrival at Station 52 on March 30th, one 200 m CTD yo-yo cast (Sect. 5.4.1), a Hyperpro cast, and ADCP intercomparisons will be conducted.

4.5. Trace Metal Clean Rosette

Vertical profiles between 0-600m will be conducted for trace metal analysis using a rosette package with autonomous Auto Fire Module. This mini-CTD rosette consists of a SeaBird CTD attached to a 12-place rosette with 8-liter Niskin sampling bottles. The rosette is approximately 5 ft x 5ft x 4 ft and weighs 355/565 lbs in air empty/full. We will deploy the CTD rosette using the W2 winch, delrin block and 1/4" Amsteel line using trace metal clean procedures from the stern of the vessel using the A-Frame. Eleanor Bates will oversee this operation. **We request the ship's personnel to contact us before doing any trash burning or any cooking that would disseminate smoke to the labs or working area**.

4.5.1. Be-7 Trace Metal Cast

On March 28th a hose will be attached to the Trace Metal Clean CTD and will be held at six depths in the upper 175 m while the deck board pump (120V) fills the tanks (6 x 160-gallon plastic tanks). Each depth will take approximately 30 minutes for a total of 3 hours. The hose reel will need to be set up on deck (43"x43") near the CTD.

4.6. McLane Pumps

After the Be-7 trace metal cast, one in-situ pump cast (which involves deployment, pumping at depth for 2-3hr, and recovery) takes 4-5hr to collect 500-1500L from 4-8 depths in the upper 1000m (with most pumps in the upper 300 m). Dan Ohnemus' pumps have two flow-paths and can collect over multiple filter membranes.

4.7. Station Kaena (21° 50.8'N, 158° 21.8'W)

A near-bottom CTD cast (~2500 m) will be conducted at this location in the evening of March 31st as long as we can arrive to St. Kaena before 10 pm. Once the CTD cast is complete, the ship shall return to Pier 35.

4.8. Acoustic Doppler Current Profiler

The ship's acoustic Doppler current profilers (ADCP) will be in operation during the duration of the cruise. The OTG technicians will oversee the ADCP system.

4.9. Thermosalinograph, Fluorometer and pCO_2

The ship's thermosalinograph, fluorometer and pCO_2 sampling the uncontaminated seawater supply system will be in operation during the duration of the cruise while the ship is outside of Honolulu Harbor. Salinity samples to calibrate the thermosalinograph will be taken from the intake hose at 4-hour intervals throughout the duration of the cruise by the science personnel. The ship's meteorological system shall be in operation throughout the cruise. Access to real-time underway data through the ship's network will be required. The OTG technicians will oversee the thermosalinograph, fluorometer, and meteorological suite operations.

4.9.1. SeaFlow and Inline C-Star Transmissometer

In addition to the continuous thermosalinograph and fluorometer sampling, the SeaFlow and an inline C-Star Transmissometer will sample continuously from the uncontaminated seawater supply system throughout the duration of the cruise while the ship is outside of Honolulu Harbor. Access to real-time underway data through the ship's network is required. The SCOPE Ops technicians and UH personnel will oversee these instruments and operations.

4.10.1 Seaglider 511 Deployment

One Seaglider (SG511) will be deployed during daylight hours at Station ALOHA. The deployment should take about 30 mins. Procedures primarily directed by B. Watkins in concert with SCOPE team and Steve Poulos (pilot-ashore). This glider will not be recovered on HOT-341, but rather on a later HOT cruise.

Procedures generally are as follows:

1) The Seaglider SG511 will be lowered in the water by using the ship's crane or winch combined with the ship's A-frame.
2) Once the glider is in the water, it should be confirmed that the vehicle is floating prior to complete release.
3) After release, the glider will perform a series of test dives, 25mins – 60mins, to make sure that the vehicle is communicating through Iridium Satellite system and that the sensors are working correctly.
4) The vessel can conduct other operations within the area while waiting for this initial feedback. Should the glider malfunction, the vehicle will need to be recovered. During operations, B. Watkins or SCOPE Team will be communicating via Iridium phone with the Seaglider pilot, Steve Poulos. The plan is for this Seaglider to start a 3 month mission. It can be tracked from the standard HOT navigational web site.
5) Other info: SG511 – acoustic pinger interrogate Freq: 12.5 kHz; acoustic pinger reply: 11.5 kHz and its associated backup ARGOS PTT Tag # - 90995

4.10.2 Seaglider 513 Deployment and Recovery

Seaglider 513 will be deployed and recovered on HOT-341, weather-permitting. This glider has extremely sensitive and delicate microstructure profiling instruments on the top, so good weather conditions for deployment and recovery are a necessity. B. Watkins will be in charge of these operations and making the call whether the weather is favorable for deployment. SG513 Interrogate Freq: 15.0 kHz Reply Frequency 11.5 kHz and its associated backup ARGOS PTT tag # - 90996. Seaglider Location information (fix) is auto sent to the KM email user: seaglider@km.soest.hawaii.edu

4.11 Video Plankton Recorder (VPR) Cast

A digital autonomous Video Plankton Recorder (VPR) will be deployed multiple times during the cruise. Tow speed 1.5 knots, payout/recovery speed 30 meters per minute using the SeaMac winch. The system should be continuously oscillated between the surface and the maximum line out depth. The orange synthetic Dyneema line shall be used for this deployment. Deployments should be at least 45 minutes in the water.

4.12 Net Trap Array

Following the deployments of the sediment trap array and WireWalker, the Net Trap array will be deployed. A free floating net trap (similar to a plankton net, with a frame) will be deployed in a vertical orientation at a depth of 175m for about 14hrs before recovery. The array will be deployed from A-frame using the SeaMac winch. The trap diameter is 1 m with a mesh size for the net of 55 um (and the cod-end is 55 um). The array is equipped with GPS transmitters, strobe lights and a radio transmitter (See Section 6.0 for transmitter IDs). Prior to recovery, a pinger is hung over the side of the ship to communicate and close the trap. Once the trap is closed it can then be recovered. Daily positions of the array shall be transmitted by email directly to the ship (argosfix@km.soest.hawaii.edu, password: argosfix), therefore the ship will not need to keep within site of the array until the time of the recovery. Assistance from the bridge is requested in plotting the drift track of the array. We request the use of the ship's radio direction finder for locating the array before recovery.

5.0 EQUIPMENT

5.1. The HOT science party shall be bringing the following

1. Seabird CTD system, all sensors, deck boxes and computer CTD acquisition systems

2. One 20 ft. laboratory van (#23) with assorted equipment for radioisotope and general use, one 10x8 ft. equipment van (PO) for equipment and spare storage, and one trace metal 20 ft van (#581).
3. Distilled, deionized water and all required chemicals and isotopes
4. Large vacuum waste containers
5. Liquid nitrogen dewars
6. Drifting sediment trap array with strobe lights, satellite and radio transmitters, floats, weights, line, sediment traps and crosses.
7. Drifting primary production array with strobe lights, satellite and radio transmitters, floats, weights, line primary production bottles and spreader bars.
8. Drifting gas array with strobe lights, satellite and radio transmitters, floats, weights, line, 4 L bottles and short mounting bars.
9. Drifting Wirewalker™ array with surface buoy, strobe lights, satellite transmitters, floats, weights, 400m and cable.
10. Oxygen titration system
11. Plankton nets and towing lines
12. Desktop and laptop personal computers
13. Assorted tools
14. All required sampling bottles
15. Pertinent MSDS
16. Wirewalker™
17. SeaFlow
18. Inline C-Star Transmissometer
19. Trace metal clean rosette with 8L Niskin bottles and programmable CTD
20. Underwater Vision Profiler (UVP)
21. One incubator, baby blue, stored on 02 Deck
22. Hose Reel (43” x 43”)
23. 6 x 160-gallon plastic tanks (3’ diameter)
24. 4 McLane Pumps (32” x15” footprint, total13 sq feet)

5.2. We will need the use of the following ship's equipment:

1. A-frame
2. A-frame block assembly
3. CTD winch
4. Electric power
   -440/480 VAC, 3 phase 60Hz, 60amp for winches
   -208 VAC single phase at 60 amps for lab vans
5. Space on upper 01 deck port side for one 10 ft van **(Equipment van)**
6. Space on upper 01 deck port side for one 20 ft van **(#23)**
7. Space on upper 01 deck starboard side for trace metal 20 ft van (**#581**)
8. Space on 02 deck for one incubator
9. Space on deck for ~4 deck baskets of array gear
10. Space on deck to secure 6x160-gallon plastic tanks
11. Small capstan (~ 10 m/min)
12. SeaMac Winch
13. W2 winch
14. Radio direction finder
15. Hand-held VHF transceivers
16. Shackles, sheaves, hooks and lines
17. Precision depth recorder
18. Shipboard Acoustic Doppler Current Profiler

19. Thermosalinograph, pCO_2 system, and Fluorometer
20. Meteorological suite
21. Grappling hooks and line
22. Navlink2 PC or equivalent
23. Running fresh water and seawater, hoses
24. Uncontaminated seawater supply
25. Source of compressed air for Trace Metal pump
26. -80°C Freezer
27. 4°C Refrigerator and -20°C Freezer
28. Distilled, deionized water system
29. Email system
30. GPS system
31. Underway/on-station data acquisition system for meteorological instruments, ADCP, thermosalinograph, fluorometer, SeaFlow, and inline C-Star transmissometer and access to real-time data through the network.
32. OTG's 24-place rosette, and 24 12-l water sampling bottles (**to be used as primary system**)
33. ~1300 lb weight
34. Remote CTD dbar pressure display in the winch operator area.
35. Monitor in CTD Lab displaying ship coordinates, bottom depth and GMT.
36. OTG's transmissometer
37. OTG's altimeter
38. Trace metal free block
39. Amsteel Line (1/4") for trace metal clean work

6.0 Satellite Position Transmitters Summary

Array Name	RockBlock ID	XEOS ID	Argos ID	Radio Frequency
Sediment Trap (ST)	06	268		CH.68 (156.425 MHz)
WireWalker (WW)		77 and 80		
Primary Production (PP)	05	267		CH.74 (156.725 MHz)
Gas Array (GA)	05	267		CH.74 (156.725 MHz)
Net Trap Array (NT)		83 and 85		CH.74 (156.725 MHz)

NOTE: Array tracking is facilitated through the SOEST Cruise and Drifter Tracks tool found at http://hahana.soest.hawaii.edu/nowcast/loctable.html

Ship: R/V *Kilo Moana* **HOT 341 CTD CASTS** **Date: March 27-31, 2023**

Cast		Samples	#Bottles
Kahe Pt.			
s1c1	1000 m	O_2, Temp, DIC/Alk, pH, Nuts, LLN, LLP, Chl a, Salts	15
Station ALOHA			
s2c1	200m	UGA – Mixed Layer Depth check	0
s2c2	1000m (N-cast)	**EG** (high vertical resolution centered on deep Chl max)	24
s2c3	1000 m	Primary Production (3@ 5, 25, 45, 75, 100, 125, 150, 175) Chl a, FCM, Salts	24
s2c4	4740 m (PO-1)	O_2, Temp, DOC, DIC/Alk, pH, Ref Si, Nuts, Salts **MD** pb (all bottles, 40ml per niskin)	24
s2c5	1000 m (PO-2)	O_2, Temp, DOC, DIC/Alk, pH, Nuts, Ref Si, Salts **MD** pb (all bottles, 40 ml per niskin)	22
s2c6	1000 m	PC/PN, **DL** (pb@5,25,45,75,100,125,150,175), Salts	19
s2c7	1000 m	PPO4, SCOPE DNA (1@100,125,150,175) Salts	18
s2c8	1000 m (BEACH)	O_2, Temp, DIC/Alk, pH, Nuts, LLN, LLP, DOC, Keeling, Quay, Salts	23
s2c9	1000 m	Open, **EG,** Salts	24
s2c10	1000 m	Gas Array (3@5,25,45,75,100,125), Salts	20
s2c11	1000 m	SCOPE DNA (1@5,25,45,75), **CF** (1@250), Salts **MC** (1@5, 25, 45, 75, 100, 125, 150, 175), **RF (**pb all MC bottles)	15
s2c12	1000 m	PSi, Salts	10
s2c13	1000 m	SCOPE DNA (1@300,400,500,770), **EG,** Salts	24
s2c14	1000 m	ATP, **SD** (6@20-25(Mixed Layer), Salts	17
s2c15	1000 m	Open, Salts	2
s2c16	1000 m	HPLC, SCOPE DNA (1@200,225,250,275), Chl a, Salts	18
s2c17	4740 m (PO-3)	Oxygen, SCOPE DNA(1@1000,2000,3000,4000) **CF** (1 @ 4000), **ML** (2 @ 3500)	15
WHOTS Mooring			
s52c1	200 m yo-yo	DIC/TA(1@5), **KM** (1@ 5, Mixed Layer Depth, DCM)	4
Kaena			
s6c1	2400 m	Chl a, Salts	13

MC=Matt Church**, SD** = Sonya Dyhrman, **EG**= Eric Grabowski, **DL** = Debbie Lindell, **MD** = Madeline Davis, **CF** = Carolina Funkey, **ML** = Moritz Lehmann, **KM** = Kelsey McBeain, **RF** = Rhea Foreman

Ship: R/V *Kilo Moana* HOT 341 Date: March 27 – April 1, 2023

TIME	Monday 3/27	Tuesday 3/28	Wednesday 3/29	Thursday 3/30
0000		Deploy WireWalker	Transit to Pump Tanks	
0100		Deploy Sed Traps		
0200		Deploy Net Trap	S2C3 PP	S2C10 Gas Array
0300		S2C1 UGA MLD		
0400		UGA– Be-7 Pumping	Deploy PP Array	Deploy Gas Array
0500			S2C4 PO-1 (Deep)	S2C11 Open
0600				Transit to pump tanks Incinerator
0700				
0800	All Sci. Aboard	Seaglider Deployment Seaglider Deployment		S2C12 PSi
0900	Depart Pier 35		Trace Metal Cast 2	Trace Metal Cast 3
1000		VPR Cast		
1100			S2C5 PO-2 (Begin 36 hr)	S2C13 Open
1200	Arrive Kahe Weight Cast	Transit to Pump Tanks	Net Tow	Net Tow Net Tow
1300	Hyperpro	UGA– McLane Pumps	Hyperpro	
1400	S1C1 Kahe		S2C6 PC/PN	S2C14 ATP
1500	Trace Metal Cast 1		Transit to Pump Tanks	VPR Cast
1600	Transit to ALOHA			
1700			S2C7 PPO4	S2C15 Open
1800		Recover Net Trap	Transit to PP array	Pump Tanks
1900		S2C2 High Res Cast	Recover PP array	Trace Metal Cast 4
2000			S2C8 BEACH	S2C16 HPLC
2100		Transit to WHOTS Anchor Site		
2200	Pump Tanks	WHOTS Bathymetry survey (2 hrs)	Net Tow Net Tow	Net Tow
2300	Arrive ALOHA		S2C9 Open	S2C17 PO-3 (Deep) (end 36 hours)

March 29th: Sunrise 0627, Sunset 1846

TIME	Friday 3/31	Saturday 4/1
0000		
0100		
0200		
0300	VPR Cast	
0400		
0500	Transit Gas Array	
0600	Recover Gas Array Transit Sed Traps	
0700	Recover Sed Traps	
0800	Transit WireWalker	Arrive Pier 35
0900	Recover WireWalker Transit Seaglider	
1000	Recover Seaglider	
1100	Transit Station 52 S52C1 WHOTS	
1200	Hyperpro	
1300	Incinerator Pump Tanks	
1400	Transit to St. Kaena	
1500		
1600		
1700		
1800		
1900		
2000	S6C1 Kaena	
2100		
2200		
2300	Transit to Pier 35	

6.0 HOT-336 Watch Schedule

0300-1500

Dan Fitzgerald
Carolina Funkey
Devin Hogate
Fernando Carvalho Pacheco – Console, Watch Leader
Dan Sadler – Water Boss
Ryan Tabata

1500-0300

Camille Adkison
Karin Björkman – Water Boss
Brandon Brenes
Tim Burrell
Peter Farrell
Nicole Mathews
Tully Rohrer – Console, Chief Scientist, Watch Leader

At Large

Eleanor Bates
Madeline Davis
Eric Grabowski
Andrew Hirzel
Charlie Kollman
Chris Marsay
Dan Ohnemus
Blake Watkins

OTG

James Harris
Trevor Young (lead)