Hawaii Ocean Time-series
HOT-329 Cruise Plan Operational

Cruise ID: KM 21-04
Vessel: R/V *Kilo Moana*, University of Hawaii
Master of the Vessel: Captain David Martin
Chief Scientist: Tully Rohrer, University of Hawaii
Marine Technicians: Trevor Young, Lance Frymire

Marine Center phone number: (808) 956-0688
KM phone numbers (in port): 808-587-8566 / 67
KM cell phone: 808-864-0065
KM sat phone (voice): 011-870-773-234249
KM sat phone (fax): 011-870-783-207825

Tully Rohrer Cell Number: (970) 708-7601

Pre-Cruise Meeting: April 6th, 2021 at 1330 via Zoom
Loading: April 9th, 2021 at 0900, Pier 35.
Departure: April 12th, 2021 at 0900 (**Science personnel on board by 0800**).
Arrival: April 16th, 2021 at 0800
Post-Cruise Meeting: April 20th, 2021 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, in the following order:

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 22nd 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 23rd – March 25th.
3) Station 52, the site of WHOTS-16 Mooring (anchor position 22° 40.01'N 157° 56.96'W) will be occupied for about 3-4 hours on March 25th.
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 25th for about 2 hours.

1.1 SCIENTIFIC OPERATIONS

Station	Activities
Kahe (Sta. 1)	Weight Cast, Hyperpro cast, CTD cast, Trace Metal CTD (1000 m)
ALOHA (Sta. 2)	Sediment traps, WireWalker, Primary productivity array, Gas array, Net tows, CTD operations, Optics casts, Trace Metal CTD casts, VPR casts, Glider Deployment/Recovery
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, SeaFlow, C-Star

2.0. SCIENCE PERSONNEL

Participant	Title	Affiliation	Citizenship
Benedetto Barone	Scientist	UH	ITA
Eleanor Bates	Graduate Student	UH	USA
Karin Bjorkman	Scientist	UH	SWE
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	Graduate Student	UH	DEU
Fernando Pacheco	Research Associate	UH	BRA
Tully Rohrer	Research Associate	UH/SCOPE	USA
Dan Sadler	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

3.0. SUMMARY SCHEDULE

06 April	Pre-cruise planning meeting 1330 hrs, via Zoom.
09 April	Equipment loading at 0900 hrs, Pier 35.
12 April	Depart from Pier 35 at 0900 hrs. **Science personnel on-board by 0800.**
12 April	Station 1 Kahe Pt. operations.
13-15 April	Station 2 ALOHA operations, Station 52 CTD yo-yo cast. Station 6 CTD cast.
16 April	Arrive back to Pier 35.
20 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.** A Hyperpro cast (Sect. 4.2.9), one CTD cast to 1000 m (4.2.6), and a Trace Metal CTD cast (4.8) will be conducted at this location on March 22nd. The ships A-frame, CTD winch, and SeaMac winch will be needed for these operations. After the operations are satisfactorily completed, the ship shall proceed to Station ALOHA.

Following the incident on HOT-328, this and all future weight casts are to include the following tests of the Hawboldt system:

A. Manual Anti-2 Block Test

This test will verify that the control system will successfully prevent excessive tension spikes in the event that the operator were to accidentally pull the package into the docking head at full speed.

- Start the hydraulics and enable control from the belly pack.
- Position the test weight and the LARS docking head over the main deck, approximately in the landing area normally used for the rosette.
- Position the docking head approximately 10’ from the deck, and manually lower the test weight such that it is barely lifted off the deck
- Ensure the winch is in manual mode

- Ensure all personnel are clear of the area.
- Haul in with the CTD winch at full speed until the test weight compresses the springs completely. The test weight should immediately lower approximately 1.5' and stop as the winch brakes apply.
- The tension can be viewed on the monitor in Lab 1, ensure the spike is below 5,000 lbs.
- Reset all alarms on the Local Console.

B. Auto with LARS Anti-2 Block Test

This test will verify that the control system will successfully prevent excessive tension spikes in the event that the operator were to forget to put the winch into Auto with LARS mode prior to moving the LARS.

- Start the hydraulics and enable control from the belly pack.
- Pick up the test weight with the LARS and position the LARS in the 'Casting' slew position with the knuckle pointing straight down, and the extension boom retracted.
- Ensure all personnel are clear of the area.
- If it isn't already, pull the test weight up into the docking head, just so the springs start to compress.
- Turn the winch to manual mode.
- Knuckle out at full speed. The weight will get pulled into the docking head as the winch will not respond to LARS movement.
- Once the test weight is 2-blocked, the LARS will stop moving and the weight will remain fully 2 blocked.
- The tension can be viewed on the monitor in Lab 1, ensure the spike is below 5,000 lbs.
- Reset all alarms on the Local Console.

C. Auto with LARS Switch Malfunction Test

This test will verify that the control system will successfully prevent excessive tension spikes in the event that the docking head anti-2 block sensor malfunctions during a deployment or recovery.

- Start the hydraulics and enable control from the belly pack.
- Pick up the test weight with the LARS and position the LARS in the 'Casting' slew position with the knuckle pointing straight down, and the extension boom retracted.
- Ensure all personnel are clear of the area.
- If it isn't already, pull the test weight up into the docking head, just so the springs start to compress.
- Turn the winch to Auto with LARS mode
- Knuckle out at a reduced speed.
- As the LARS is moving, temporarily remove fuse F10161 from the Local Console.
- The LARS and winch will immediately stop, the winch will lower the weight about 1.5' and then apply its brake.
- Once this behavior is confirmed, the test is considered successful.
- Reset all alarms on the Local Console

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). After these operations are completed, one 1000-m cast will be conducted to collect water for the Primary Production Array. Following this, the Primary Production array will be deployed (4.2.4). These operations will be followed by a near-bottom CTD cast and the start of the 36-hour water column observations at Station ALOHA.

(*) 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, one cross above that with 12 traps for Eric Grabowski, and one cross above it with 4 traps for Eleanor Bates.

The array will drift for about 56 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 56 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, one 1000 m CTD cast shall be conducted. Following these operations, the ship shall prepare to deploy the Primary Productivity Array.

4.2.4. Primary production experiment

Samples for the primary productivity experiment will be collected from the rosette. Before dawn (Sunrise 0606 hrs on April 13th), 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 (1854 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 Bullister sampling bottles. We will need the ship's CTD winch and A-frame 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 **(Dan Fitzgerald and Fernando Pacheco)**.

4.2.6. Lowered Acoustic Doppler Current Profiler (LADCP)

Due to the constraints of the older HOT rosette, the LADCP will not be deployed on HOT-329.

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 be in charge of 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, second and fourth 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. Optics

An optical package including a SeaBird Seacat with temperature, conductivity, and pressure sensors, a Wetlabs ECO triplet measuring backscatter, chlorophyll fluorescence, and CDOM fluorescence, and a LISST particle size and distribution analyzer will be deployed during the cruise. Each deployment will consist of three up and two down profiles to a target depth of 200 m at a constant speed of 10 m/min during both the downcast and upcast. An instrument soaking period at just below the surface will be required between the two profiles. The A-frame and capstan will be needed for this operation.

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 April 15th, after the optics cast has been completed, 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 be in charge of these operations. After the Wirewalker is recovered, the ship shall transit to Station 52.

4.4 Station 52 - WHOTS-16 Mooring

The anchor position of the WHOTS-16 mooring is 22° 40.01'N 157° 56.96'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 April 15th, one 200 m CTD yo-yo cast (Sect. 5.4.1), a Hyperpro cast, and ADCP intercomparisons will be conducted. Following a Trace Metal CTD cast, the ship will transit to Station Kaena.

4.5. 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 April 15th. Once the CTD cast is complete, the ship shall return to Pier 35.

4.6. 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 be in charge of the ADCP system.

4.7. 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 be in charge of the thermosalinograph, fluorometer, and meteorological suite operations.

4.7.1. 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 be in charge of these instruments and operations. The Imaging Flow CytoBot (IFCB) is being calibrated at the manufacturer and will not be utilized on this cruise.

4.8. 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 be in charge of 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**.

4.9. Scripps Plankton Camera Cast

A digital autonomous Video Plankton Recorder (daVPR) from Tracy Villareal (The University of Texas at Austin) will be deployed twice during the cruise. Tow speed 1.5 knots, payout/recovery speed 30 meters per minute. 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. The batteries when fully charged are good for 4.5 hours, so a maximum time of 4 hours is reasonable.

4.10. Glider Deployment and Recovery

Weather permitting, one Seaglider (sg513, Hydroid) will be deployed during daytime near the time of arrival at Station ALOHA. The vehicle will be later recovered during daytime, near the end of the cruise. The Seaglider will be diving and profiling in the proximity of Station ALOHA, at a safe distance from ship operations. The objective of this deployment is to test a new microstructure sensor (MicroPod, Rockland Scientific) mounted on the autonomous vehicle after refurbishment. The MicroPod measures shear and temperature changes on a very fine scale that are used to estimate turbulent mixing. The probes mounted on the microstructure sensor are very delicate and require careful operations during both deployment and recovery. The preferred method of deployment and recovery is from the small boat, where the relatively low height from the sea surface ensures weaker impact on the sensors.

The deployment will take approximately 30-60 minutes and it could follow two procedures: 1) The Seaglider will be lowered in the water by hand from the small boat, which would need to be deployed from the ship; 2) The Seaglider will be lowered in the water by using the ship's crane or winch combined with the ship's A-frame. Once the glider is in the water, it should be confirmed that the vehicle is floating prior to complete release. After release, the glider will perform a series of test dives to make sure that the vehicle is communicating through Iridium and that the sensors are working correctly. 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 deployment, Blake Watkins or Benedetto Barone will be communicating via Iridium phone with the Seaglider pilot, Steve Poulos, on land.

The recovery of the Seaglider will take approximately 30-60 minutes either from the small boat or from the ship deck by using a wire noose and by lifting it through the A-frame. To track the Seaglider position, its coordinates will be emailed automatically from "sdrifter@soest.hawaii.edu" to "seaglider@km.soest.hawaii.edu", or can be found on the Seaglider website: http://hahana.soest.hawaii.edu/hot/trackmap/TrackMap.html

The Captain and Chief Scientist will confer with Blake Watkins about the sea state, the best strategy of deployment and recovery, as well as a possible cancellation of the Seaglider mission. OTG will set up the Ship's GPS to broadcast every 60 mins by email to sdrifter@soest.hawaii.edu and during deployment. This broadcast interval will be decreased to 10 mins during 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. Rosette and 24 12L Bullister sampling bottles, and all associated spare parts
3. 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 (#24).
4. Distilled, deionized water and all required chemicals and isotopes
5. Large vacuum waste containers
6. Liquid nitrogen dewars
7. Drifting sediment trap array with strobe lights, satellite and radio transmitters, floats, weights, line, sediment traps and crosses.
8. Drifting primary production array with strobe lights, satellite and radio transmitters, floats, weights, line primary production bottles and spreader bars.
9. Drifting gas array with strobe lights, satellite and radio transmitters, floats, weights, line, 4 L bottles and short mounting bars.
10. Drifting Wirewalker™ array with surface buoy, strobe lights, satellite transmitters, floats, weights, 400m and cable.
11. Drifting IRSC Sediment Trap array with surface buoy, strobe lights, satellite transmitters, floats, weights, line, and instrument cage.
12. Oxygen titration system
13. Plankton nets and towing lines
14. Desktop and laptop personal computers
15. Assorted tools
16. All required sampling bottles
17. Pertinent MSDS
18. Wirewalker™
19. SeaFlow
20. Inline C-Star Transmissometer
21. Trace metal clean rosette with 8L Niskin bottles and programmable CTD
22. Video Plankton Recorder
23. Incubator, blue, stored on 02 Deck
24. Slocum glider with microstructure profiler

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 (**#24**)
8. Space on 02 deck for one incubator
9. Space on deck for ~4 deck baskets of array gear
10. Small capstan (~ 10 m/min)
11. SeaMac Winch
12. W2 winch

13. Radio direction finder
14. Hand-held VHF transceivers
15. Shackles, sheaves, hooks and lines
16. Precision depth recorder
17. Shipboard Acoustic Doppler Current Profiler
18. Thermosalinograph, pCO_2 system, and Fluorometer
19. Meteorological suite
20. Grappling hooks and line
21. Navlink2 PC or equivalent
22. Running fresh water and seawater, hoses
23. Uncontaminated seawater supply
24. Source of compressed air for Trace Metal pump
25. -80°C Freezer
26. 4°C Refrigerator and -20°C Freezer
27. Distilled, deionized water system
28. Electronic mail system
29. GPS system
30. 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.
31. OTG's 24-place rosette, and 24 12-l water sampling bottles (to be used as spare)
32. ~1300 lb weight
33. Remote CTD dbar pressure display in the winch operator area.
34. Monitor in CTD Lab displaying ship coordinates, bottom depth and GMT.
35. OTG's transmissometer (preferably SN 1366)
36. Trace metal free block
37. 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 and 78		CH.69 (156.475 MHz)
WireWalker (WW)		77 and 80		
Primary Production (PP)	05	267 and 79		CH.73 (156.675 MHz)
Gas Array (GA)	05	267 and 79		CH.73 (156.675 MHz)
Seaglider (SG)				

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 329 CTD CASTS** **Date: April 12-16, 2021**

Cast		Samples	#Bottles
Kahe Pt.			
s1c1	1000 m	O_2, Temp, DIC/Alk, pH, Nuts, LLN, LLP, Chl a, Salts	15
Station ALOHA			
s2c1	1000 m	Primary Production (3@ 5, 25, 45, 75, 100, 125, 150, 2@ 175) Chl a, FCM, Salts	24
s2c2	4740 m (PO-1)	O_2, Temp, DOC, DIC/Alk, pH, Ref Si, Nuts, Salts	24
s2c3	1000 m (PO-2)	O_2, Temp, DOC, DIC/Alk, pH, Nuts, Ref Si, Salts	24
s2c4	1000 m	PC/PN, SCOPE DNA (1@5,25,45,75), Salts **DL**(pb@5,25,45,75,100,125,150,175)	18
s2c5	1000 m	PPO4, Salts **SD** (6@20-25(Mixed Layer))	20
s2c6	1000 m (BEACH)	O_2, Temp, DIC/Alk, pH, Nuts, LLN, LLP, DOC, Keeling, Quay, Salts	23
s2c7	1000 m	SCOPE DNA(1@ 100,125,150,175, **BB**(15 TBD), Salts	21
s2c8	1000 m	Gas Array(3@5,25,45,75,100,125), Salts	20
s2c9	1000 m	SCOPE DNA(1@200,225,250,275), **MC** (1@5, 25, 45, 75, 100, 125, 150, 175), Salts	14
s2c10	1000 m	PSi, Salts	10
s2c11	1000 m	**RL**(1 @ 5, 50, 75, 100, 125, 150, 250, 350), **PO** (6@1000), Salts	16
s2c12	1000 m	ATP, SCOPE DNA(1@300,400,500,770), Salts	15
s2c13	1000 m	**AB**(18@75), Salts	18
s2c14	1000 m	HPLC, Chl a, Salts	14
s2c15	4740 m (PO-3)	Oxygen, SCOPE DNA(1@ 1000,2000,3000,4000), Salts	12
WHOTS Mooring			
s52c1	200 m yo-yo	DIC/TA(1@5), **AB**(23@75)	24
Kaena			
s6c1	2400 m	Chl a, Salts	13

Underway
ABdS (5 x 20L)

MC=Matt Church**, SD** = Sonya Dyhrman, **RL**=Robert Letscher, **DL** = Debbie Lindell, **BB** = Benedetto Barone, **AB** = Andrew Burger, **PO** = Physical Oceanography Group, **ABdS** = Anamica Bedi de Silva

Ship: R/V *Kilo Moana* HOT 329 Date: April 12 – 16, 2021

TIME	Monday 4/12	Tuesday 4/13	Wednesday 4/14	Thursday 4/15	Friday 4/16
0000		Deploy WireWalker	VPR cast		
0100					
0200		S2C1 PP	S2C8 Gas Array		
0300				Optics	
0400		Deploy PP Array	Deploy Gas Array		
0500		S2C2 PO-1(Deep)	S2C9 Open	Transit Gas Array	
0600			Transit to pump tanks Incinerator	Recover Gas Array Transit Sed Traps	
0700				Recover Sed Traps	
0800	All Sci. Aboard		S2C10 PSi	Transit WireWalker Recover WireWalker	Arrive Pier 35
0900	Depart Pier 35	Seaglider Deployment Trace Metal Cast 2		Transit Seaglider Recover Seaglider	
1000				Transit Station 52 VPR cast	
1100	Arrive Kahe(11:30) Weight Cast	S2C3 PO-2 (Begin 36 hr)	S2C11 Open		
1200	Hyperpro	Net Tow	Net Tow Net Tow	HyperPro	
1300	S1C1 Kahe	HyperPro		S52C1 WHOTS	
1400		S2C4 PC/PN	S2C12 ATP	Transit to Kaena Incinerator	
1500	Trace Metal Cast 1 Transit to ALOHA	Transit to pump tanks	Transit to pump tanks		
1600					
1700		S2C5 PPO4	S2C13 Open		
1800		Transit to PP array Recover PP array	Trace Metal Cast 3		
1900					
2000		S2C6 BEACH	S2C14 HPLC	S6C1 Kaena	
2100					
2200		Net Tow Net Tow	Net Tow	Transit to Pier 35	
2300	Arrive ALOHA Deploy Sed Traps	S2C7 Open	S2C15 PO-3 (Deep) (end 36 hours)		

April 13th: Sunrise 0606, Sunset 1854

6.0 HOT-329 Watch Schedule

0300-1500

Dan Fitzgerald – Alt Tag, Watch Leader
Lucie Knor – Console
Dan Sadler – Water Boss
Ryan Tabata
Brandon Brenes –Alt Tag

1500-0300

Karin Bjorkman – Water Boss
Fernando Pacheco – Console, Watch Leader
Tully Rohrer – Chief Scientist, Alt Tag
Eric Shimabukuro – Alt Tag
Tim Burrell

At Large

Benedetto Barone
Eleanor Bates
Blake Watkins

OTG

Trevor Young (lead)
Lance Frymire