Hawaii Ocean Time-series
HOT-324 Cruise Plan

Cruise ID: KM 20-13
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: Trevor Young, Jeff Koch

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

Fernando Santiago-Mandujano's Cell Number: (808) 375-5159

Pre-Cruise Meeting: November 5 at 13:30 on Zoom
COVID-19 test 1: October 27 at 08:00 at UH Marine Center, in front of Bay #6.
COVID-19 test 2: November 10 at 08:00 at UH Marine Center, in front of Bay #6. **Bring an ID**.
Loading: November 15 at 09:00, Pier 35. **Bring your UHMC Declaration of Health form**
Departure: November 16, 2020 at 09:00. **Be on board by 08:00**
Arrival: November 21 at 08:00
Post-Cruise Meeting: November 24 at 13:30 on Zoom

1.0 COVID-19 PREVENTION

Due to the current COVID-19 pandemic extra precautions will be set in place before and during the cruise to prevent the spread of COVID-19 onboard. UNOLS has provided guidelines which will be followed on this cruise. A few of the guidelines are found below. The extensive list can be found in the Pandemic Response Plan.

- Sailing with a minimum science party, one scientist per stateroom (11 scientist).
- All cruise participants will self-isolate according to the HOT Risk Mitigation Plan (October 27th – November 15th) before the cruise.
- All cruise participants will be tested for COVID-19 twice before the cruise (October 27th and November 10th).

During the cruise all participants will:

- wear face masks
- maintain a distance of 6 ft. when possible
- properly disinfection of all workspaces often
- remain in their staterooms as much as possible during non-work hours

2.0 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 November 16th for about 2-3 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 November 14th– November 20th.
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 November 20th.
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 November 20th for about 2 hours.

2.1 SCIENTIFIC OPERATIONS

Station	Activities
Kahe (Sta. 1)	Weight Cast, CTD cast (1000 m)
ALOHA (Sta. 2)	Sediment traps, Gas array, Wirewalker, Net tows, CTD operations, Primary productivity measurements, Optics casts, Misc. experiments. Seaglider recovery, Argo float deployment
WHOTS mooring station (Sta. 52)	One CTD cast (yo-yo to 200 m) subsurface instrument intercomparison.
Kaena (Sta. 6)	One near-bottom CTD cast (~ 2400 m)
Underway/continuous	ADCP, thermosalinograph, fluorometry, meteorology, SeaFlow, C-Star, Imaging FlowCytobot (IFCB)

3.0 SCIENCE PERSONNEL

Participant	**Title**	**Affiliation**	**Citizenship**
Eleonor Bates	Graduate Student	UH	USA
Brandon Brenes	Research Assistant	UH	USA
Tim Burrell	Research Associate	UH/SCOPE	NZL
Dan Fitzgerald	Research Associate	UH	USA
Carolina Funkey	Research Associate	UH	USA
Nicholas Hawco	Scientist	UH	USA
Lucie Knor	Research Assistant	UH	GER
Jeff Koch	Marine Technician	OTG	USA
Fernando Pacheco	Research Associate	UH	BRA
Dan Sadler	Research Associate	UH	USA
Fernando Santiago-Mandujano -Chief Scientist	Research Associate	UH	USA
Eric Shimabukuro	Research Assistant	UH	USA
Ryan Tabata	Research Associate	UH/SCOPE	USA
Blake Watkins	Marine Engineer	UH	USA
Tervor Young	Marine Technician	OTG	USA

4.0 SUMMARY SCHEDULE

5 November	Pre-cruise planning meeting 1330 on Zoom
15 November	Loading
16 November	Depart from Pier 35 at 0900 hrs.
16 November	Station 1 Kahe Pt. operations.
17-20 November	Station 2 ALOHA operations, Station 52 CTD yo-yo cast. Station 6 CTD cast.
21 November	Arrive back to Pier 35.
24 November	Post-cruise meeting at 1330 on Zoom

5.0 OPERATIONAL PLANS

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

A 1300 lb. weight-test cast to 500 m, one Hyperpro cast (5.2.9), one CTD cast to 1000 m (5.2.6), and one trace metal cast (5.10) will be conducted at this station on November 16th. After the operations are satisfactorily completed, the ship shall proceed to Station ALOHA.

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

5.2.1. Upon arrival to Station ALOHA, the Wirewalker will be deployed (Sect. 5.2.2), followed by the Sediment Traps deployment (Sect. 5.2.3a), and the IRSC Sediment Traps deployment (Sect. 5.2.3b). After the arrays are deployed, one 1000-m CTD cast will be conducted to collect water for the Primary Production Array. Following this, the Primary Production array will be deployed (5.2.4) (*). After these operations are completed, a Seaglider will be recovered (5.11), net tows (5.2.11) will be conducted, followed by a Hyperpro cast (5.2.9) and a 1000-m CTD profile, and the recovery of the Primary Production array. An optics cast (5.2.5) will be conducted in the morning of November 18th, followed by a near-bottom CTD cast, and the beginning of the 36-hour water column observations at Station ALOHA (5.2.6).

(*) 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

5.2.2. Wirewalker™ deployment

A Wirewalker (Del Mar Oceanographic) will 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 a satellite position transmitter. (See section 7.0 for transmitter ID #'s).

The Wirewalker 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 instrument will stay in the water for approximately 72 hours. Deployment and recovery will be conducted from the back deck through the A-frame and using the SeaMac winch, each operation will take 30 to 60 min. Two ABs will be required to operate the A-frame and winch respectively. B. Watkins will be in charge of this deployment.

After deployment of the Wirewalker, the ship shall prepare to deploy the sediment trap array.

5.2.3a. Sediment trap array deployment

The floating sediment traps will be deployed in close proximity to the Wirewalker, so the two arrays drift in a similar direction. The array will be deployed from the back of the deck thru 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 two crosses with 12 particle interceptor traps (PIT) at 150m.

The array will drift for about 72 hours before recovery. The array is equipped with a satellite position transmitter, strobe lights, and a radio transmitter (See section 7.0 for transmitter ID #'s). 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. B. Watkins will be in charge of this deployment.

5.2.3b. IRSC Sediment trap array deployment

The IRSC sediment traps will be deployed in close proximity to the Sediment Trap, so the two arrays drift in a similar direction. The array will be deployed from the back of the deck thru 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 IRSC array will consist of three indented rotating sphere traps on a custom frame at 150 m with a single cross of standard HOT PIT Sediment Traps above.

The array will drift for about 72 hours before recovery. The array is equipped with a satellite position transmitter, strobe lights, and a radio transmitter (See section 7.0 for transmitter ID #'s). 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. B. Watkins will be in charge of this deployment

5.2.4. Primary production experiment

After the Wirewalker and sediment traps are deployed at Station ALOHA, one 1000-m CTD cast will be conducted, and samples for the primary productivity experiment will be collected from the rosette. Before dawn (Sunrise 0646 hrs on November 17th), 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. The array is equipped with a satellite position transmitter, strobe lights, and a radio transmitter (See section 7.0 for transmitter ID #'s). The **ship shall keep within site of the array** while performing CTD operations for the last 6 hours of the approximately12-hour time the array will be in the water unless the array drifts outside of the ALOHA circle. If the array drifts out of the circle, the ship should return inside the circle to conduct CTD casts, and the monitoring of the array will be coordinated with the watch leader. The array will be recovered just at sunset (1747 hrs). All radioactive waste generated by the experiment shall be returned to the University of Hawaii. Only qualified personnel shall handle radioactive material. B. Watkins will be in charge of this deployment.

After deployment of the Primary Production Array, the ship shall prepare to recover a Seaglider (Sect. 5.11).

5.2.5. Optics

An optical package including a SeaBird Seacat with temperature, conductivity, and pressure sensors, a Wetlabs ECO triplet measuring g 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.

After deployment of the optical package, the ship shall transit to the center of the station circle to conduct a near-bottom CTD cast, S2C3 (approximately 4740 m).

5.2.6. 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. On November 18th the first near-bottom cast (approximately 4740 m) shall be made. Following this cast, a series of 1000-m casts shall be made continuously every 3 hours for a 36-hour period, ending with a second near-bottom cast. A Lowered Acoustic Doppler Current Profiler (LADCP, Sect. 5.2.7) is mounted on the internal rosette frame to collect current velocity profiles. An underwater vision profiler (UVP, Sect. 5.2.8) is also mounted on the internal rosette frame for imaging of particle concentration and size.

Whenever pumping of the ship's tanks or trash burning is needed, it must be conducted outside the circle that defines station ALOHA (Sect. 2.0). To avoid disruptions in the schedule, this operation should be coordinated with the chief scientist or the watch leaders **(Fernando Pacheco and Carolina Funkey)**.

5.2.7. Lowered Acoustic Doppler Current Profiler

The HOT rosette configuration includes a Teledyne Workhorse Mariner Model 600 kHz lowered-ADCP (LADCP) for current measurements on down- and up-cast. The LADCP, operating in single ping mode, will record measurements internally at a rate of 4 Hz. These measurements will then be downloaded after each cast via an RS232-to-ethernet connection. This will require direct connection to the ADCP after each cast, with data download before the next cast.

5.2.8. Underwater Vision Profiler

The HOT rosette configuration includes an Underwater Vision Profiler (UVP), for imaging of particle concentration and size. The instrument is not integrated with the CTD, it is self-powered with internal logging.

5.2.9. Gas Array deployment

A free drifting incubation array will be deployed the fourth day of the cruise at Station ALOHA. Samples for the gas array will be collected from Station 2 CTD cast 9. The gas array will be deployed from the back of the deck thru the A-frame and using the SeaMac winch. The gas array 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 a satellite position transmitter, strobe lights, and a radio transmitter (See section 7.0 for transmitter ID #'s). 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. B. Watkins will be in charge of this deployment.

5.2.10. 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 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.

5.2.11. 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. B. Watkins will be in charge of these operations.

5.3. Gas Array, Sediment Trap, and WireWalker recovery

In the morning of November 20th, the ship shall transit for the recovery of the Gas Array, the Sediment Traps, and the WireWalker. The A-frame and the Sea-Mac winch will be needed to retrieve these arrays. B. Watkins will be in charge of these operations. After all the arrays are recovered, the ship shall transit to Station 52.

5.4. 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 November 20th one 200 m CTD yo-yo cast (Sect. 5.4.1), a HyperPro cast, and ADCP inter comparisons will be conducted. After these operations are completed, an Argo float will be deployed from the stern (Sect. 5.12) before the ship proceeds to Station Kaena (Sect. 5.6)

5.5. CTD yo-yo cast (subsurface instrument intercomparison)

One 200-m CTD yo-yo cast with at least 5 full cycles will be conducted near the WHOTS buoy on November 20th for subsurface instrument intercomparison. **This cast should be conducted downwind, down current, and about 200 m from the mooring.**

5.6. 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 November 20th. Once the CTD cast is complete, the ship shall return to Pier 35.

5.7. 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.

5.8. 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.

5.9. SeaFlow, Inline C-Star Transmissometer and Imaging FlowCytobot (IFCB)

In addition to the continuous thermosalinograph and fluorometer sampling, the SeaFlow, an inline C-Star Transmissometer, and the IFCB 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 ships network is required. The SCOPEOps technicians and UH personnel will be in charge of these instruments and operations.

5.10. Trace Metal Clean Rosette

Vertical profiles between 0-600 m 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 blue winch which will be wrapped in package wrap to prevent the Amsteel Line coming into contact with metal, delrin block and 1/4" Amsteel line using trace metal clean procedures from the stern of the vessel using the A-Frame. N. Hawco and E. Bates will be in charge of this operation.

5.11 Seaglider Operations

The Seaglider sg148 will be recovered at Stn. ALOHA in the morning of November 17th. This recovery could be conducted later during the cruise depending on weather conditions. In order to assist the pilot (Steve Poulos- poulos@soest.hawaii.edu), it is requested that the ship set up the standard broadcast of its fix position once/hour to 'sdrifter@aloha.soest.hawaii.edu '.

The Seaglider sg148's position can be found on the asset tracker web page: http://hahana.soest.hawaii.edu/seagliders/history148.html, or http://hahana.soest.hawaii.edu/hot/trackmap/TrackMap.html, as well as its position will be sent to the ship at 'seaglider@km.soest.hawaii.edu' . B. Watkins will be in charge of this operation.

5.12. Argo float deployment

An Argo float from the University of Washington (A. R. Rupan) will be deployed from the stern the last day of the cruise, before departing from Station ALOHA. The deployment will be conducted by hand by B. Watkins. A UW technician (Andrew Meyer) will arrive to the UHMC to check the float on November 10th.

6.0 EQUIPMENT

6.1. 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. Lowered Acoustic Doppler Current Profiler (LADCP)
4. One 20 ft. laboratory van (#23) with assorted equipment for radioisotope and general use
5. One 10x8 ft. equipment van (PO) for equipment and spare storage.
6. One 20 ft. laboratory van (#24) for trace metal work
7. Distilled, deionized water and all required chemicals and isotopes
8. Large vacuum waste containers
9. Liquid nitrogen dewars
10. Drifting sediment trap array with strobe lights, satellite and radio transmitters, floats, weights, line, sediment traps and crosses.
11. Drifting primary production array with strobe lights, satellite and radio transmitters, floats, weights, line primary production bottles and spreader bars.
12. Drifting gas array with strobe lights, satellite and radio transmitters, floats, weights, line, 4 L bottles and short mounting bars.
13. Drifting Wirewalker™ array with surface buoy, strobe lights, satellite transmitters, floats, weights, 400m and cable.
14. Oxygen titration system
15. Plankton nets and towing lines
16. Desktop and laptop personal computers
17. Assorted tools
18. All required sampling bottles
19. Pertinent MSDS
20. SeaFlow
21. Inline C-Star Transmissometer
22. Imaging FlowCytobot (IFCB)
23. McLane Pump x2
24. Deck Incubator
25. An underwater vision profiler (UVP)
26. Trace metal clean rosette with 8L Niskin bottles and programmable CTD
27. Argo float from UW
28. Seagoing Nutrient Auto Analyzer

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

1. A-frame
2. A-frame block assembly
3. CTD winch (LARS system)
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 McLane Pump
9. Space on deck for ~4 deck baskets of array gear
10. Small capstan (~ 10 m/min)
11. SeaMac Winch
12. Radio direction finder
13. Hand-held VHF transceivers
14. Shackles, sheaves, hooks and lines
15. Precision depth recorder
16. Shipboard Acoustic Doppler Current Profiler
17. Thermosalinograph, pCO_2 system, and Fluorometer
18. Meteorological suite
19. Grappling hooks and line
20. Navlink2 PC or equivalent
21. Running fresh water and seawater, hoses
22. Uncontaminated seawater supply
23. Source of compressed air for Trace Metal pump
24. -80°C Freezer
25. 4°C Refrigerator and -20°C Freezer
26. Distilled, deionized water system
27. Electronic mail system
28. GPS system
29. Underway/on-station data acquisition system for meteorological instruments, ADCP, thermosalinograph, fluorometer, SeaFlow, inline C-Star transmissometer and IFCB and access to real-time data through the network.
30. OTG's 24-place rosette, and 24 12-l water sampling bottles (to be used as spare)
31. ~1300 lb weight
32. Remote CTD dbar pressure display in the winch operator area.
33. Monitor in CTD Lab displaying ship coordinates, bottom depth and GMT.
34. OTG's transmissometer (preferably SN 1366)
35. Trace metal free block (black)
36. Trace metal winch (winch 2) with 1000 m dyneema Amsteel Line (1/4") for trace metal clean work

7.0 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		
IRSC Traps (IRSC)	03	266 and 81		CH.74 (156.725 MHz)
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 148			90996	

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 324 CTD CASTS** **Date: November 16 – 21, 2020**

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, and O2(1@15), Salts	24
s2c2	1000 m	SCOPE DNA (1@200,225,250,275), **ASE** (4@25)	8
s2c3	4740 m (PO-1)	O_2, Temp, DOC, DIC/Alk, pH, Ref Si, Nuts, Salts	24
s2c4	1000 m (PO-2)	O_2, Temp, DOC, DIC/Alk, pH, Ref Si, Nuts, Salts	24
s2c5	1000 m	PC/PN, SCOPE DNA (1@5,25,45,75), Salts SCOPE, **SD** (6@20-25(Mixed Layer))	24
s2c6	1000 m	PPO4, O2(1@15), Salts	17
s2c7	1000 m (BEACH)	O_2, Temp, DIC/Alk, pH, Nuts, LLN, LLP, DOC, Keeling, Quay, Salts	24
s2c8	1000 m	SCOPE DNA (1@,100,125,150,175), Salts	9
s2c9	1000 m	Gas Array (3@5,25,45,75,100,125), Salts	20
s2c10	1000 m	**MC** DNA (1@5, 25, 45, 75, 100, 125, 150, 175), O2(1@15), Salts	11
s2c11	1000 m	PSi, Salts	12
s2c12	1000 m	**RL** (1@5,45,75,100,125,150,200, 250), Salts	10
s2c13	1000 m	ATP, SCOPE DNA(1@300,400,500,770), Salts	17
s2c14	1000 m	O2(1@15), Salts	3
s2c15	1000 m	HPLC, Chl a, Salts	18
s2c16	4740 m (PO-3)	Oxygen, SCOPE DNA(1@1000,2000,3000,4000), **AP**(1@5,100,200,300,400, 500,1000,1500,2000,3000,4000, near bottom), Salts	24
WHOTS Mooring			
s52c1	200 m yo-yo	DIC/TA(1@5), SCOPE Zher (1@ 25)	2
Kaena			
s6c1	2400 m	Chl, Salts	13

MC=Matt Church, **SD** = Sonya Dyhrman, **ASE** = Andres Salazar Estrada, **RL** = Rob Letsher, **AP** = Alex Philips

Ship: R/V *Kilo Moana* HOT 324 Date: November 16 – 21, 2020

TIME	November 16	November 17	November 18	November 19	November 20
0000		Arrive to ALOHA Deploy WireWalker	Optics		
0100		Deploy Sed Traps			
0200		S2C1 PP	Transit to pump tanks. Incinerator	S2C9 Gas Array	Transit to recover arrays
0300			S2C3 PO-1(Deep)		Pump Tanks Incinerator
0400		Deploy PP Array		Deploy Gas Array	Recover Gas Array
0500				S2C10 Open	
0600				Transit to pump tanks. Incinerator	Recover Sediment Traps
0700					
0800	All Sci. Aboard	Recover Seaglider		S2C11 PSi	Recover Wirewalker
0900	Depart Pier 35				
1000		Transit to pump tanks. Incinerator			
1100	Arrive Kahe(11:30) Weight Cast	Net Tow	S2C4 PO-2 (Begin 36 hr)	S2C12 Open	Trace Metal Cast 5
1200	HyperPro	HyperPro	Net Tow	Net Tow	S52C1 WHOTS
1300					HyperPro
1400	S1C1 Kahe	S2C2 Open	S2C5 PC/PN	S2C13 ATP	Deploy Argo float
1500	Trace Metal Cast 1		Transit to pump tanks Incinerator	Trace Metal Cast 4	Transit To St. Kaena
1600	Transit to Aloha	Transit to PP array			
1700		Recover PP array	S2C6 PPO4	S2C14 Open	Pump Tanks Incinerator
1800			Trace Metal Cast 3	Transit to pump tanks Incinerator	
1900		Trace Metal Cast 2			
2000		Transit to pump tanks. Incinerator	S2C7 BEACH	S2C15 HPLC	S6C1 St Kaena
2100					
2200		Net Tow Net Tow	Net Tow		
2300			S2C8 Open	S2C16 PO-3 (Deep) (end 36 hr)	Transit to Honolulu

November 17th: Sunrise 0646, Sunset 1747

Ship: R/V *Kilo Moana* HOT 324 Date: November 16 – 21, 2020

TIME	November 21				
0000					
0100					
0200					
0300					
0400					
0500					
0600					
0700					
0800	Arrive Pier 35				
0900					
1000					
1100					
1200					
1300					
1400					
1500					
1600					
1700					
1800					
1900					
2000					
2100					
2200					
2300					

8.0 HOT-324 Watch Schedule

0300-1500

Dan Fitzgerald – Tag
Carolina Funkey – Watch Leader, Water Boss, Alt Tag
Ryan Tabata - Tag
Lucie Knor - Console

1500-0300

Dan Sadler – Water Boss, Alt Tag
Eric Shimabukuro - Tag
Fernando Pacheco, Watch Leader - Tag
Fernando Santiago-Mandujano – Chief Scientist, Console

At Large

Tim Burrell- Alt Tag
Blake Watkins
Brandon Brenes- Alt Tag
Eleonor Bates
Nicholas Hawco

OTG

Trevor Young (lead)
Jeff Koch