Hawaii Ocean Time-series
HOT-333 Cruise Plan - Operational

Cruise ID: KM 21-16
Vessel: R/V *Kilo Moana*, University of Hawaii
Master of the Vessel: Captain Peter Aguinaldo
Chief Scientist: Karin Björkman, University of Hawaii
Marine Technicians: Julianna Diehl, Jeff Koch

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Karin Björkman Cell Number: (808)-738-6421

Pre-Cruise Meeting: Oct 19th, 2021 at 1330 via Zoom
Loading: Oct 27th, 2021 at 0900, Pier 35.
Departure: Oct 27th, 2021 at 1400.
Arrival: Nov 2nd, 2021 at 0800
Post-Cruise Meeting: Nov 3rd, 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 October 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 October 28nd – November 1st.
3) Station 50, the site of WHOTS-17 Mooring (anchor position 22° 46.002'N 157° 53.958'W) will be occupied for about 3-4 hours on October 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 for about 2 hours on November 1st.

1.1 SCIENTIFIC OPERATIONS

Station	Activities
Kahe (Sta. 1)	Weight Cast, Hyperpro cast, CTD cast (1000 m), Trace Metal Go-Flo cast
ALOHA (Sta. 2)	Sediment traps, Primary productivity array, Gas array, Net tows, IRSC traps, CTD operations, Optics casts, Trace Metal Go-Flo casts, VPR, Seaglider Deployment/Recovery
WHOTS mooring station (Sta. 50)	One CTD cast (yo-yo to 200 m), Hyperpro, Trace Metal Go-Flo cast, surface instrument intercomparisons.
Deep Moored Sediment Trap	Recovery of asset – moored location 22˚50.841 N, 157˚54.982

Kaena (Sta. 6)	One near bottom CTD-cast (~2400 m)
Underway/continuous	ADCP, thermosalinograph, fluorometry, meteorology

2.0. SCIENCE PERSONNEL

Participant	Title	Affiliation	Citizenship
Benedetto Barone	Scientist	UH	ITA
Eleanor Bates	Graduate student	UH	USA
Andy Burger	Scientist	UH	USA
Karin Björkman	Scientist	UH	SWE
Kieran Curran	Scientist	UNH	GBR
Julianna Diehl	Marine Technician	OTG	USA
Mattia Da Fieno	Undergraduate student	UH	USA
Dan Fitzgerald	Research Associate	UH	USA
Corinne Hite	Graduate student	UH	USA
Reece James	Graduate student	UH	USA
Fuyan Li	Post-doc	UH	CHI
Jeff Koch	Marine Technician	OTG	USA
Lucie Knor	Graduate student	UH	DEU
Fernando Pacheco	Research Associate	UH	BRA
Tully Rohrer	Research Associate	UH	USA
Dan Sadler	Research Associate	UH	USA
Fernando Santiago-Mandujano	Research Associate	UH	USA
Eric Shimabukuro	Graduate student	UH	USA
Carlo Van Dijken	Undergraduate student	UH	USA
Blake Watkins	Marine Engineer	UH	USA

19 Oct	Pre-cruise planning meeting 1330 hrs, via Zoom.
27 Oct	Equipment loading at 0900 hrs, Pier 35.
27 Oct	Depart from Pier 35 at 0900 hrs. **Science personnel to UHMC by 0800.**
27 Oct	Station 1 Kahe Pt. operations.
28 Oct- Nov 1	Station 2 ALOHA operations, Station 50 CTD yo-yo cast, Deep Trap recovery Sea glider deployments and recoveries, Station 6 deep CTD cast
2 Nov	Arrive back to Pier 35.
3 Nov	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 Go-Flo cast (4.8) will be conducted at this location on Oct 27th. The ship's 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-1 (Sect 4.2.2) (*) will be deployed, followed by the IRSC traps. After these operations are completed, one 500-m cast will be conducted to collect water for

experiments. Then one CTD cast will be performed before moving into the deployment of Seaglider 513 containing the microstructure sensor, followed by the recovery of Seagliders 511 and 626 (Sect 4.2.10). After these operations are completed we will continue with CTD casts and TM-Go-Flo cast and net tows.

On the 29th Sediment Trap Array-2 will be deployed. A cast to 1000 m for the Primary Production array will be conducted at 0200 followed by the Primary Production array deployment (4.2.4). The recovery of the PP-array will be around dusk the same day.

These operations will be followed by a near-bottom CTD cast and a 1000m cast as the start of the 36-hour water column observations at Station ALOHA.

We will perform 1 to 2 High Resolution casts in the vicinity of Seaglider 513 during this cruise, prior to its recovery on Nov 1st, or earlier should weather not permit a longer deployment.

(*) 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 (1 and 2)

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-1 array, to be deployed on the Oct 28th and recovered on Nov 1st, will consist of two crosses, each with 12 particle interceptor traps (PIT) placed at 150 m and 300 m. Sediment Trap-2 array will be deployed on October 29th and recovered on October 31th, will have one cross with 12 PIT and one cross above it with 4 traps.
The IRSC traps are deployed in a similar fashion as the regular sediment traps on Oct 28th.

Each array is equipped with 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.

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 0635 hrs on October 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 monitored (See section 6.0 for Transmitter IDs).

The array will be recovered at sunset (1756 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.

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 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 **(Tully Rohrer and Fernando Pacheco)**.

4.2.6. 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). 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.

4.2.7. 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.

4.2.8. 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.

4.2.9. 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.

4.2.10. Seaglider Recovery & Deployments

Two Seagliders will be recovered, and one Seaglider will be deployed at station ALOHA. The Captain and Chief Scientist will confer with Blake Watkins about the sea state, the best strategy of recovery and

deployment. Recovery is the determining factor for any new deployment, such as Seaglider sg513 with the Microstructure profiler. If the conditions are favorable, Seaglider sg513 will be deployed first. After this operation the other two Seaglider are to be recovered (see schedule). The Seaglider sg513 will be recovered at the end of the cruise (Nov 1st). The Seagliders can be tracked from the standard HOT navigational web site.

4.2.10.1 Seagliders and Weather

Two Seagliders (sg511 and sg626) will be recovered during daytime at Station ALOHA. If it is not feasible to "recover" the Seaglider sg513 later in the cruise, (after the proposed launch) due to weather/sea state or if in the, the Seaglider should not be deployed. This will be a call by B. Watkins. Each recovery could take approximately 60 to 90 minutes and should follow procedure as directed by B. Watkins in concert with the Captain. For the deployment of Seaglider sg513 (also about 60 mins in preparation with B. Barone)

1) The Seaglider 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 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 B. Barone will be communicating via Iridium phone with the Seaglider pilot, Steve Poulos, on land.

S. Poulos office phone: 808 956-6650; cell# 808 226-9543
Additional info -
SG511 Interrogate Freq: 12.5 kHz Reply Frequency 11.5 kHz;
SG626 Interrogate Freq: 14.0 kHz Reply Frequency 10.5 kHz;
SG513 Interrogate Freq: 15.0 kHz Reply Frequency 11.5 kHz Microstructure Profiler

Seaglider Location information (fix) is auto sent to the KM email user: seaglider@km.soest.hawaii.edu

4.3 Gas Array, Sediment Trap Array recovery

In the morning of Oct 31th, 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-2 array. Blake Watkins will be in charge of these operations. After the completion of these operations the ship shall transit to Station 52. On Nov 1st the floating sediment trap array-1 shall be recovered, followed by the recovery of the IRSC traps.

4.4 Station 50 - WHOTS-17 Mooring

The anchor position of the WHOTS-17 mooring is 22° 46.002'N 157° 53.958'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 50 on October 31th, one 200 m CTD yo-yo cast (Sect. 5.4.1), a Hyperpro cast, and ADCP intercomparisons will be conducted.

4.5. Deep Trap Recovery

In the afternoon of October 31st, the ship shall transit of the deep sediment trap anchor at moored location 22˚50.841 N, 157˚54.982 W. Recovery of the sediment trap is expected to take approximately 3 hours, with return to the surface expected to take an hour. The array is equipped with a radio transmitter for location (channel 72: 156.625MHz), XEOS ID # 30930_151. Blake Watkins will be in charge of this operation with 2 or 3 members of the science party. Two ABs will be required to operate the A-frame and winch respectively.

4.6. 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 1st. Once the CTD cast is complete, the ship shall return to Pier 35.

4.7. 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.

4.8. 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.

4.9. Trace Metal Clean Rosette THIS WILL BE CONDUCTED USING GO-FLO BOTTLES

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**.

4.10 Video Plankton Recorder Cast

A digital autonomous Video Plankton Recorder (VPR) from Tracy Villareal (The University of Texas at Austin) will be deployed three times 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.

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 (#24).
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 IRSC Sediment Trap array with surface buoy, strobe lights, satellite transmitters, floats, weights, line, and instrument cage.
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. Video Plankton Recorder (VPR)
17. Incubator, blue, stored on 02 Deck
18. Seaglider with microstructure profiler (sg 513)
19. Deep Moored Sediment Trap recovery supplies: McLane Sediment traps, glass floats (~4 wire baskets)
20. Net Trap Array supplies: nets, frames, and lines

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. Plus additional space for 4-5 baskets (deep moored trap 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, 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 primary**)

32. OTG's CTD (back-up to HOT's)
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. Trace metal free block
38. 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 1 (ST-1)	08	266		156.475 MHz
Sediment Trap 2 (ST-2)	05	267		156.675 MHz
Primary Production (PP)	02&03			156.425 MHz
Gas Array (GA)	02&03			156.425 MHz
IRSC traps (IRSC)	06	268		156.475 MHz
Deep moored traps		151		156.625 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 333 CTD CASTS** **Date: Oct 27-Nov 2, 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	500 m	**KC** (3@5,125)	7
s2c2	1000 m	SCOPE DNA (1@200,225,250,275) **KC**(1@5,50,75,100,125,150,250,350)	14
s2c3	1000 m	**DK** (High-res cast-1, 5m spacing centered DCM), Nuts, TDN/TDP	24
s2c4	1000 m	Primary Production (3@ 5, 25, 45, 75, 100, 125, 150, 175) Chl a, FCM, DIC, Salts	24
s2c5	4740 m (PO-1)	O_2, Temp, DOC, DIC/Alk, pH, Ref Si, Nuts, Salts	24
s2c6	1000 m (PO-2)	O_2, Temp, DOC, DIC/Alk, pH, Nuts, Ref Si, Salts	24
s2c7	1000 m	PC/PN, **DL**(pb@5,25,45,75,100,125,150,175), Salts	23
s2c8	1000 m	PPO4, salts, **KC**(pb2L@5,50,75,100,125,150,250,350) SCOPE DNA (1@5,25,45,75)	19
s2c9	1000 m (BEACH)	O_2, Temp, DIC/Alk, pH, Nuts, LLN, LLP, DOC, Keeling, Quay, salts	23
s2c10	1000 m	SCOPE DNA(1@ 100,125,150,175), **CF** PSi (3@5,100,175) Salts	15
s2c11	1000 m	Gas Array(3@5,25,45,75,100,125), Salts	20
s2c12	1000 m	**MC** (1@5, 25, 45, 75, 100, 125, 150, 175), Salts	10
s2c13	1000 m	**Open, DK** (High-res cast-2, 5m spacing centered on 150 m)	24
s2c14	1000 m	PSi, Salts, **KC**(pb@5,50,75,100,125,150,250,350) **RF**(1@5,25,45, 75,100, DCM)	19
s2c15	1000 m	ATP, SCOPE DNA(1@300,400,500,770), Salts	15
s2c16	1000 m	**Open: CS** (4@ML)	6
s2c17	1000 m	HPLC, Chl a, Salts, **KC**(pb@5,50,75,100,125,150,250,350)	17
s2c18	4740 m (PO-3)	Oxygen, SCOPE DNA(1@ 1000,2000,3000,4000), Salts	12
s2c19	1000 m	**KC**(1@5,50,75,100,125,150,250,350), **RF**(1@5,25,45, 75,100, DCM)	16
WHOTS Mooring			
s50c1	200 m yo-yo	DIC/TA(1@5)	9

Station Kaena

s6c1	2400 m	Chl a, salts	13

Underway

MC=Matt Church**, DL**=Debbie Lindell, **KC=**Kieran Curran, **CS**=Carole Sakamoto, **RF**=Rachel Foster
DK=Dave Karl, **CF**=Carolina Funkey, **DF**=Da Fitzgerald

Ship: R/V *Kilo Moana* HOT 333 Date: Oct 26 - Nov 2, 2021

TIME	Wednesday 10/27	Thursday 10/28	Friday 10/29	Saturday 10/30	Sunday 10/31
0000			Deploy Sed Traps-2		
0100					
0200			S2C4 - PP	S2C11 Gas Array	
0300		Arrive at Stn ALOHA			Optics
0400		Deploy Sed Traps-1	Deploy PP array	Deploy Gas Array	
0500		Deploy IRSC	S2C5 PO-1 (Deep)	S2C12 Open	Transit Gas Array
0600		S2C1		Transit to pump tanks, Incinerator	Recover Gas Array Transit Sed Trap-2
0700		Deploy seaglider 513			Recover ST-2
0800				S2C13 HR-2	
0900	Loading	Recover seaglider 511	TM Go-Flo cast 3	TM Go-Flo cast 5	(Recover sg 513)
1000		Transit to sg 626			Transit Station 50
1100			S2C6 PO-2 (begin 36 hours)	S2C14 PSi	S50C1 WHOTS
1200		Recover seaglider 626	Net tow	Net Tow Net Tow	HyperPro
1300			HyperPro	(Recover sg 513)	VPR
1400	Depart Pier 35	S2C2	S2C7 PC/PN	S2C15 ATP	Transit to Deep moored trap
1500		TM Go-Flo 2	Transit to pump tanks	Transit to pump tanks	Recover Deep moored traps
1600		Transit to pump tanks	S2C8 PPO4		
1700	Arrive Kahe Weight Cast		Transit to PP-array	S2C16 Open	
1800	TM Go-Flo cast 1		Recover PP-array	TM Go-Flo 6	
1900	S1C1 Kahe	S2C3 (HR-1)	TM Go-Flo 4		
2000	Transit to ALOHA		S2C9 BEACH	S2C17 HPLC	TM Go-Flo 7
2100					
2200		Net Tow Net Tow	Net Tow Net Tow	Net Tow	
2300			S2C10	S2C18 PO-3 (Deep end 36 h)	

October 29th: Sunrise 0635, Sunset 1756

Ship: R/V *Kilo Moana* HOT 333 Date: Oct 27-Nov 2, 2021

TIME	Monday 11/1	Tuesday 11/2
0000		
0100		
0200	S2C19	
0300	Optics	
0400	VPR	
0500	Test CTD/fish (DF)	
0600		
0700	Transit to sed traps	
0800	Recover ST-2	Arrive at Pier 35
0900		
1000	Recover IRSC	
1100		
1200	TM Go-Flo cast 8	
1300	VPR	
1400	Transit to Stn 6	
1500		
1600		
1700		
1800		
1900		
2000	S6C1	
2100		
2200		
2300		

6.0 HOT-331 Watch Schedule

0300-1500

Dan Fitzgerald
Lucie Knor– Console
Dan Sadler – Water Boss
Tully Rohrer - Watch Leader
Mattia De Fieno
Reece James

1500-0300

Karin Björkman – Water Boss – Chief Scientist
Fernando Santiago-Mandujano – Console
Fernando Pacheco –Watch Leader
Eric Shimabukuro
Carlo van Dijken

0900 – 2100

Corinne Hite

At Large

Eleanor Bates
Benedetto Barone
Andrew Burger
Kieran Curran
Fuyan Li
Blake Watkins

OTG

Julianna Diehl (lead)
Jeff Koch