

## Hawaii Ocean Time-series HOT-180 General Cruise Plan

Vessel: R/V *Kilo Moana*, University of Hawaii  
Master of the Vessel: Captain Rick Myer  
Chief Scientist: Thomas K. Gregory  
OTG Marine Technicians: Steve Poulos and Gabe Foreman

Loading: March 30, 2006 @ 0900 HST  
Departure: March 31, 2006 @ 0900  
Arrival: April 4, 2006 @ 0800

### 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. Five 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 the first day of the cruise for about 2 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 during the 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> days of the cruise.
- 3) Station 51, is the site of the MOSEAN Mooring, located at 22° 45'N, 158° 6'W will be occupied on the 4<sup>th</sup> day of the cruise for about 30 minutes.
- 4) Station 50 is the site of the WHOTS Mooring, is located at 22° 46.1'N, 157° 53.4'W and will be occupied on the 4<sup>th</sup> day of the cruise for about 30 hours.
- 5) Station 6, referred to as Station Kaena, is located off Kaena Point at 21° 50.8'N, 158° 21.8'W will be occupied on the 4<sup>th</sup> day of the cruise for about 2 hours.

### 1.1 SCIENTIFIC OPERATIONS

<u>Station</u>	<u>Activities</u>
Kahe (sta. 1)	Weight Cast, PRR cast, CTD cast (1000 m)
ALOHA (sta. 2)	Sediment traps, net tows, CTD operations, primary productivity measurements, AC9/FRRf, misc. experiments
MOSEAN mooring station (sta. 51)	CTD cast (200 m)
WHOTS mooring station (sta. 50)	CTD cast (200 m)
Kaena (sta. 6)	CTD cast (2400 m)
Underway/continuous	ADCP, thermosalinograph, fluorometry, meteorology

## 2.0. SCIENCE PERSONNEL

Participant	Affiliation/HOT Group	Title
Mahaffey, Claire	UH/BEACH	Research Specialist
Sadler, Dan	UH/BEACH	Research Associate
Bjorkman, Karin	UH/BEACH	Research Specialist
Curless, Susan	UH/BEACH	Research Associate
Defelice, Suzanne	UH/PO	Research Associate
Doggett, Ken	UH/BEACH	Research Associate
Foreman, Gabe	UH/OTG	Marine Technician
Menviel, Laurie	UH/PO	Graduate Student
Church, Matt	UH/BEACH	Research Oceanographer
Gregory, Thomas	UH/BEACH	Chief Scientist
Harlan, Adriana	UH/BEACH	Research Associate
Lethaby, Paul	UH/PO	Research Associate
Smith, Justin	UH/PO	Volunteer
Poulos, Steve	UH/OTG	Marine Technician
Martiny, Jennifer	Brown/BEACH	Assistant Professor
Lennon, Jay	Brown/BEACH	Postdoctoral Researcher
Santiago - Mandujano, Fernando	UH/PO	Research Associate
Taylor, Mana	UH/BEACH	Graduate Student
Fujieki, Lance	UH/BEACH	Research Associate
Watkins, Blake	UH/BEACH	Marine Engineer

## 3.0. SUMMARY SCHEDULE

.24 March	Pre-cruise meeting
30 March	Ship loading starting at 0900 hrs
31 March	Depart from Snug harbor at 0900 hrs. Science personnel on-board by 0830.
31 March.	Station 1 Kahe Pt. operations
1-3 April	Station ALOHA operations. Station 50 and 51 CTD casts. Station Kaena CTD cast
4 April	Arrive back to Snug harbor. ETA 1000 hrs, full offload

## 4.0. OPERATIONAL PLANS

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

A 400 lb. weight-test cast, one CTD cast to 1000 m, and a PRR cast (Sect. 4.2.7) will be conducted at this location in the afternoon of March 31 The CTD winch and crane will be

required 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, A series of CTD casts will commence.

##### 4.2.2. Sediment trap deployment

At midnight on March 31, the floating sediment traps will be deployed at a location within Station ALOHA which will be determined by local current conditions to be determined enroute to ALOHA. The array will be deployed from the stern using the A-frame and our Seamac winch. Power requirement for the winch is 440 VAC, three phase at 10 amps. After deployment we request that the Bridge verify that the radio transmitters are functioning and directionally correct.

The array will drift for about 52 hours before recovery. The array is equipped with 2 ARGOS satellite transmitters (platform #s 01325 and 01833), 2 strobe lights, and 2 radio transmitters (channel 74, 156.725 MHz). Daily positions of the array shall be transmitted by email directly to the ship; 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.

After deployment of the sediment trap array, the ship shall return to the center of Station ALOHA to deploy the gas array.

##### 4.2.3 Gas Array

Samples for the gas array will be collected from casts 1 and 2. We request the use of the A-frame for this operation and will also use the Seamac winch. The array is equipped with a strobe light and a radio transmitter (frequency to be provided).

##### 4.2.4. 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 need the ship's CTD winch and crane for this operation. Water samples for biogeochemical measurements will also be collected on each 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. 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.

##### 4.2.5. Primary production experiment

Samples for the primary productivity experiment will be collected from the rosette. Just before dawn (sunrise 0623 on April 2), a third free drifting incubation array will be deployed from the stern. We request the use of the A-frame for this operation and will also use the Seamac winch. The array is equipped with strobe lights and a radio transmitter (channel 72, 156.625 MHz). The ship shall keep within site of the array while performing CTD operations

for the approximately 12-hour duration the array will be in the water. The array will be recovered just at sunset (1848). 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.

#### 4.2.6. Plankton net tows

Plankton nets will be deployed from the stern and shall be towed for half-hour periods. Half-hour periods are scheduled at around noon and midnight throughout the cruise. The A-frame and trawl winch will be needed for this operation.

#### 4.2.7. Profiling Reflectance Radiometer (PRR).

Around noon on each day a profiling reflectance radiometer will be deployed from the main deck using the main crane. The instrument is hand-lowered and retrieved with assistance from the Seamac winch.

#### 4.2.8. AC9/FRRf

The Wet Labs AC9 is an optical instrument that measures water column spectral absorption and attenuation at nine wavelengths. The AC9 package also includes a Fast Repetition Rate Fluorometer (FRRf), and a Sea-Bird Seacat with temperature, conductivity, fluorometer, and pressure sensors. The package will be deployed to a target depth of 250 m at a constant speed of 10 m/min during the downcast and upcast. We request the use of the small capstan and A-frame for this operation.

#### 4.3 Floating sediment trap recovery

On April 3, after the morning AC9/FRRf cast has been completed, we shall transit for the recovery of the sediment trap array. The main crane and the Seamac winch will be needed to retrieve the sediment trap array. After the array is recovered, the ship shall transit to Station 51 to conduct one 200 m CTD cast.

#### 4.4 Mooring Operations

##### 4.4.1 WHOTS Mooring (Station 50)

One 200 m cast will be conducted at this mooring as described above for MOSEAN mooring.

##### 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 Feb. 16, after which the ship shall return to Snug harbor.

##### 4.6 Acoustic Doppler Current Profiler

The ship's acoustic Doppler current profiler (ADCP) will be in operation during the duration of the cruise. The OTG electronics technician will be in charge of the ADCP system.

##### 4.7 Thermosalinograph and Fluorometer

The ship's thermosalinograph and fluorometer sampling the uncontaminated seawater supply system will be in operation during the duration of the cruise while the ship is outside of

Snug 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 OTG electronics technician will be in charge of the thermosalinograph operation.

## 5.0 EQUIPMENT

### 5.1 The HOT science party shall be bringing the following

1. Seabird CTD system, all sensors except pinger and altimeter, deck boxes and computer CTD acquisition systems.
3. One laboratory vans with assorted equipment for radioisotope and general use
4. Distilled, deionized water and all required chemicals and isotopes
5. Storage van with assorted equipment
6. Large vacuum waste container
7. Liquid nitrogen dewars
8. Drifting sediment trap array with strobe lights, satellite and radio transmitters, floats, weights
9. Kevlar line, polypropylene line
10. Sediment traps and crosses
11. Drifting primary production array with light and radio transmitter, floats, weights, polypro. Line, spare buoy, etc.
12. PRR, AC-9 and other optical measuring instruments.
13. SEA-MAC winch (440 VAC, 3 phase at 10 amps) and Kevlar line
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. Deck incubation system
20. 400 lb weight.
21. Acoustic transponders for mooring release
22. Pertinent MSDS
23. Small capstan for optics and net tows

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

1. A-frame and trawl winch
2. A-frame block assembly
3. Appleton crane and winch with conducting wire for CTD
4. Electric power for winches (440 VAC three phase at 10 amps) and vans (208 VAC single phase at 30 amps for labvan, 110 VAC 10 amps for equipment van)
5. Radio direction finder
6. Empty freezer and refrigerator in wet lab
7. Space on the main deck for one storage van, SEA-MAC winch
8. Space on the 02 deck for one lab vans
9. Hand-held VHF transceivers
10. Precision depth recorder

11. Shackles, sheaves, hooks and lines
12. Shipboard Acoustic Doppler Current Profiler
13. Thermosalinograph and Fluorometer
14. Copy machine
15. Grappling hooks and line
16. Navlink2 PC or equivalent
17. Running fresh water and seawater, hoses
18. Electronic mail system
19. GPS system
20. Uncontaminated seawater supply
21. Capstan
22. Underway/on-station data acquisition system for meteorological instruments, ADCP, thermosalinograph, fluorometer
23. 24-place rosette with 10-l sampling bottles. SeaPoint Fluorometer, Pinger and Altimeter, spare carousel, spare oxygen sensor.

Ship: R/V KILO MOANA **HOT 180 CTD CASTS** 31 March – 4 April, 2006

Cast	Samples	#Bottles
<b><u>Kahe Pt.</u></b>		
s1c1 1000 m	O <sub>2</sub> , Temp, DIC/Alk, Nuts, Chl a, LLN, LLPO <sub>4</sub> , DOC, FCM, Salts	24
<b><u>Station ALOHA</u></b>		
s2c1 200 m	Gas Array (7@5, 25, 45), Salts,	21
s2c2 200 m	Gas Array (7@75, 100, 125), Salts,	21
s2c3 4740 m (PO-1)	O <sub>2</sub> , Temp, DOC, DIC/Alk, Nuts, Salts	24
s2c4 1000 m (PO-2)	O <sub>2</sub> , Temp, Nuts, DIC/Alk, Quay, DOC, Salts	24
s2c5 1000 m	ATP, Salts, MC (175,150,125,100)	16
s2c6 1000 m	PE, Salts, MC(5,25,45,75,100,125,150,175)	17
s2c7 1000 m	HPLC, Chl a, Slides, Salts, MC (PB 5,25,45,75)	22
s2c8 1000 m(BEACH)	O <sub>2</sub> , Temp, DIC/Alk, Nuts, LLN, LLP, DOC, Keeling, Quay, Salts	20
s2c9 1000 m	Primary Production, Salts	22
s2c10 1000 m	Open	3
s2c11 1000 m	MC(5,25,45,75,100,125,150,175)	10
s2c12 1000 m	MIT	14
s2c13 1000 m	PC/PN, Salts, CM (8@30)	22
s2c14 1000 m	PPO <sub>4</sub> , Salts,	14
s2c15 1000 m	Open	3
s2c16 4740 m (PO-3)	Oxygen, Salts, MC(1@1000,2000,3000,4000), PUR )	24
s2c17 200 m	PSi, ZJ	24
<b><u>MOSEAN Mooring</u></b>		
s51c1 200 m	Salts	3
<b><u>WHOTS Mooring</u></b>		
S50c1 200 m	Salts	3
<b><u>Kaena Point</u></b>		
s6c1 2500 m	Open, Chl a, Salts	13

SHIP R/V KILO MOANA HOT 180 DATE 31 March – 4 April, 2006

TIME	Fri. 3/31	Sat. 4/1	Sun. 4/2	Mon. 4/3	Tues. 4/4
0000		S2C1 Gas 1			
0100		S2C2 Gas 2	Net Tow		
0200			S2C9 PP	Net Tow	
0300				AC9/FRRF	
0400			S2C10 Open	Transit sed traps	
0500		Deploy gas array	Deploy PP array	Recover traps	
0600		S2C3 PO-1	Transit gas array	Transit St. 51	
0700			Recover gas array		
0800			S2C11 Open	S51C1 MOSEAN	Arrive Snug offload
0900	Depart Snug			Transit ALOHA	
1000		Net Tow	Net Tow		
1100		S2C4 PO-2 (Begin 36 hr)	S2C12 MIT	S2C17 Psi/ZJ	
1200	Arrive Kahe Weight cast		PRR AC9/FRRF	PRR AC9/FRRF	
1300	PRR S1C1	Net Tow	Net Tow	AC9/FRRF	
1400	Transit ALOHA	S2C5 ATP	S2C13 PC/PN	Transit St. 50	
1500				S50C1	
1600					
1700		S2C6 PE	S2C14 PPO4	Transit St. Kaena	
1800			Recover PP array		
1900					
2000		S2C7 HPLC	S2C15 Open		
2100				S6C1	
2200		Net Tow	Net Tow		
2300	Arrive ALOHA Deploy sed traps	S2C8 BEACH	S2C16 PO-3 (end 36 hours)	Transit Snug	

April 2: Sunrise 0623 Sunset 1848



## 6.0 HOT-178 Watch Schedule/ Bunk assignment

### **0300-1500**

Susan Curless - Watch Leader  
Tom Gregory – Chief Scientist  
Lance Fujieki  
Adriana Harlan  
Fernando S-Mandujano  
Laurie Menviel

### **1500-0300**

Paul Lethaby - Watch Leader  
Karin Bjorkman  
Suzanne Defelice  
Ken Doggett  
Dan Sadler

### **At Large**

Claire Mahaffey  
Blake Watkins  
Mana Taylor  
Jennifer Martiny  
Jay Lennon  
Matt Church  
Justin Smith

### **OTG**

Steve Poulos  
Gabe Foreman