HAWAII OCEAN TIME-SERIES
HOT- 169 General Cruise Plan

VESSEL: R/V Kilo Moana, University of Hawaii
MASTER OF THE VESSEL: Captain Bryon Wilson
CHIEF SCIENTIST: Thomas K. Gregory, University of Hawaii
Marine Technician: Kuhio Vellalos and Gabe Foreman
Load: May 13, 2005 0900 HST
Depart: May 16, 2005 0700 HST
Return: May 20, 2005 1500 HST

1.0. SCIENTIFIC OBJECTIVES

The objective of HOT 169 is to maintain collection of hydrographic and biogeochemical data at the Hawaii Ocean Time-series (HOT) stations. Three 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 2nd, 3rd and 4th days of the cruise.
3) Station 50, the site of the Ocean Reference Station Mooring, is located at 22° 45'N, 157° 54'W and will be occupied on the 4th day of the cruise for about 30 minutes.

1.1 SCIENTIFIC OPERATIONS

Station	Activities
Kahe (sta. 1)	Weight Cast, PRR cast, CTD cast (1000 m)
ALOHA (sta. 2)	Sediment traps, net tows, CTD op's, PRR casts, primary productivity measurements, AC9/FRRf, misc. experiments
ORS mooring stations (sta. 50, 51)	CTD cast (200 m)
Underway/continuous	ADCP, thermosalinograph, fluorometry, meteorology

2.0. SCIENCE PERSONNEL

Bjorkman, Karin	UH/BEACH	Research Specialist
Clemente, Tara	UH/BEACH	Research Associate
Curless, Susan	UH/BEACH	Research Associate
Guest, Cooper	UH/BEACH	Volunteer
Fujieki, Lance	UH/BEACH	Research Associate
Simmons, Melinda	SIO/BEACH	Graduate Student
Sadler, Dan	UH/BEACH	Graduate Student
Lethaby, Paul	UH/PO	Research Associate
Gregory, Tom	UH/BEACH	Chief Scientist
Santiago - Mandujano, Fernando	UH/PO	Research Associate
Shacat, Joseph	UH/PO	Research Associate
Valenciano, Mark	UH/PO	Electronics Technician
Watkins, Blake	UH/BEACH	Marine Engineer
Church, Matt	UH/BEACH	Research Oceanographer
Mahaffey, Claire	UH/BEACH	Postdoctoral Researcher
Harlan, Adrianna	UH/BEACH	Technician
Rosbrugh, Damion	UH/PO	Volunteer
Chung, Mung Fa	UH/PO	Volunteer

Bullister, John	PMEL/PO	Scientist
Wisegarver, Dave	PMEL/PO	Scientist
De Vargas, Colomban	Rutgers/BEACH	Scientist
Young, Jeremy	NHM/BEACH	Scientist
Meier, Sebastian	NHM/BEACH	Scientist
Drewry, Gray	UHMC	Observer

3.0. SUMMARY SCHEDULE

13 May	Ship loading starting at 0900 hrs
16 May	Depart from Snug harbor at 0700 hrs. Science personnel on-board by 0630.
16 May.	Station 1 Kahe Pt. operations
17 – 19 May	Station ALOHA operations, Stations 50 cast
20 May	Return to Snug harbor. ETA 1500 hrs, full offload

4.0. OPERATIONAL PLANS

4.1. Kahe Point Station (21^{o}20.6'N, 158^{o}16.4'W)

Operations at Kahe station include an initial weight cast to 1000 m, followed by a CTD cast to 1000 m. After all operations have been completed the ship shall proceed to Sta. ALOHA.

4.2. Station ALOHA (22^{o}45'N, 158^{o}W with 6 nmile radius)

Upon arrival at Station ALOHA we will deploy the floating sediment traps followed by a net tow. After the trap deployment CTD operations will begin. Interspersed in this time frame are PRR and optics casts, gas array and primary production array deployment/retrieval, additional plankton net tows, and misc. experiments.

4.2.1. Plankton net tows

We will be conducting several of each of four different types of plankton net tows.

4.2.1.1 CM tows

These tows are hand-deployed off the stern. We request that the ship remain stationary during these tows.

4.2.1.2 CV tows

These tow operations consist of two types of tows. The first is hand-deployed off the stern. The second requires the use of the capstan and A-frame. As with the CM tows, we request that the ship remain stationary during these tows.

4.2.1.3 Zoo tows

These are the standard HOT zooplankton tows. We will require the capstan and A-frame for these tows.

4.2.2. Floating Sediment Trap deployment

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 DSE winch. Power requirement for the winch is 440 VAC, three

phase at 10 amps. After deployment we would like to return to the center of Station ALOHA and commence with CTD operations.

The array will drift for approximately 55 hours before recovery. The array is equipped with 2 ARGOS satellite transmitters (platform # 01325 & 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. 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.

4.2.3 Gas Array

Samples for the gas array will be collected from cast 3 and 4. We request the use of the A-frame for this operation and will also use the DSE winch. The array is equipped with a strobe light and a radio transmitter (frequency to be provided). The ship shall keep within sight of the array while performing CTD operations for the approximately 24 hour duration the array will be in the water. CTD operations shall continue after the recovery.

4.2.4. Water column measurements

Vertical profiles of temperature, conductivity and dissolved oxygen will be made with an instrument package consisting of a Seabird CTD attached to a 24-place rosette with 12 liter sampling bottles. The ship’s trawl winch and stern A-frame will be used for this operation. Water samples for biogeochemical measurements will also be collected on each cast. The first cast shall be made to the near bottom (approximately 4800 m). Following this cast, a series of casts shall be made continuously every 3 hours for a 36-hour period, after which a second full-depth cast will be conducted. 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, 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 (cast 9). Just before dawn, a second free drifting array with incubation samples will be deployed from the stern. We request the use of the A-frame for this operation and will also use the DSE winch. The array is equipped with a strobe light and a radio transmitter (channel 72, 156.625 MHz). The ship shall keep within sight 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 around sunset. CTD operations shall continue after the recovery.

4.2.6. Profiling Reflectance Radiometer (PRR)

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

4.2.7. 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 Sea-Bird Seacat with temperature, conductivity, pressure and fluorometer sensors and a Chelsea Fast Repetition Rate Fluorometer (FRRf). The package will be deployed to a depth of 250 m at a steady wire speed of 10 m/s during the downcast and upcast. We request the use of the ship's hydro winch and CTD A-frame for these deployments.

4.3. Floating Arrays

After operations at Sta. ALOHA have been completed we shall proceed for the recovery of the primary production array and sediment trap array. The main crane and the DSE winch will be needed for this operation.

4.4 Ocean Reference Station (ORS) Mooring

One 200 m CTD cast will be conducted near the ORS Mooring (Station 50). The cast should be conducted downwind, downcurrent and at about 200 m from the mooring.

4.5 Thermosalinograph and Fluorometer

The ship's thermosalinograph and fluorometer sampling the uncontaminated seawater supply system will be in operation during the entire cruise. Salinity samples to calibrate the thermosalinograph will be taken from the intake hose at 4 hour intervals by science personnel.

5.0 EQUIPMENT

5.1 The HOT science party shall bring the following:

1. Sea-Bird CTD system, all sensors, deck boxes and computer CTD acquisition systems.
2. 24-place rosette with 12-l water sampling bottles, all spare parts
3. Two laboratory vans with assorted laboratory equipment for radioisotope and sample processing work.
4. All required sampling bottles
5. Type I and Type II water and all required chemicals and isotopes
6. Storage van with assorted equipment.
7. Large vacuum waste container
8. Liquid nitrogen dewars
9. Drifting sediment trap array with strobe lights, satellite and radio transmitters, floats, weights, spar buoy
10. Drifting primary productivity array with strobe light, radio transmitter, floats, weights, polypro. line, spar buoy etc.
11. Plankton nets
12. Dissolved oxygen measurement system
13. Desktop and laptop personal computers
14. PRR, AC-9 & other optical measuring instruments
15. Pertinent MSDS
16. DSE winch

5.2 We will need from the ship the following:

1. A-Frame
2. A-frame block assembly
3. Knuckle crane
4. CTD winch
5. Electric power for winch (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)
6. Radio direction finder
7. Empty freezer and refrigerator in wet lab
9. Hand-held VHF transceivers
10. Precision depth recorder
11. Shackles, hooks and lines
12. Shipboard Acoustic Doppler Current Profiler
13. Underway/on-station data acquisition system for meteorological instruments, ADCP, thermosalinograph, fluorometer
14. Grappling hooks and line
15. Running fresh water and seawater hoses
16. Electronic mail system

17. GPS system
18. Navlink2 PC or equivalent
19. Uncontaminated seawater supply

SHIP R/V Kilo Moana HOT 169 DATE 16 – 20 May. 2005

TIME	Mon. 5/16	Tues. 5/17	Wed 5/18	Thurs. 5/19	Fri. 5/20
0000			CV tow	CV tow	
0100			Zoo tow	Zoo tow	S50C1 Transit Snug
0200			S2C6 PPO4	S2C14 PP	
0300					
0400			AC9/FRRF	S2C15 open	
0500		Arrive ALOHA, Deploy sed traps	S2C7 PC/PN	Deploy PP array	
0600		CM tow S2C1 PO-1	CM tow	CM tow	
0700	Depart Snug		S2C8 Open		
0800			AC9/FRRF	S2C16 PSi	
0900			AC9/FRRF		
1000			Zoo tow	Zoo tow	
1100			S2C9 MIT	S2C17 PO-3 (end 36 hours)	
1200		S2C2 PO-2	PRR		
1300		Zoo tow PRR	Zoo tow		
1400		AC9/FRRF	S2C10 ATP		
1500	Depart Pearl	S2C3 O2	CV tow		Arrive Snug offload
1600		CV tow			
1700		S2C4 N2	S2C11 PE		
1800	Arrive Kahe Wt. cast				
1900	S1C1		Recover gas array	Recover PP array	
2000	Transit ALOHA	Deploy gas array	S2C12 HPLC	Transit sed traps	
2100					
2200		Zoo tow	Zoo tow	Recover sed traps	
2300		S2C5 BEACH (Begin 36 hour)	S2C13 Open	Transit St 50	

Sunrise 0550 Sunset 1907 May 18, 2005

16 – 20 May, 2005 **HOT 169**
Ship: R/V Kilo Moana **CTD CASTS**

Cast		Samples	#Bottles
Kahe Pt.			
s1c1	1000 m	O_2, Temp, DIC/Alk, Nuts, Chl a, LLN, $LLPO_4$, DOC, FCM, Salts,	24
Station ALOHA			
s2c1	4800 m (PO-1)	O_2, Temp, DOC, DIC/Alk, Nuts, Salts, JB	24
s2c2	1000 m (PO-2)	O_2, Temp, Nuts, DIC/Alk, Quay, DOC, Salts, JB	24
s2c3	200 m	O_2 Array (3@5, 25, 45, 75, 100, 125) MC 1@150, 175	20
s2c4	200m	N_2 Array (4@5, 25, 45, 75, 100, 125), Salts	24
s2c5	1000 m(BEACH)	O_2, Temp, DIC/Alk, Nuts, LLN, LLP, DOC, Keeling, Quay, Salts	20
s2c6	1000 m	PPO4, Salts, CV 10 tbd	24
s2c7	1000 m	PC/PN, Salts, JB 1 @ 5, 200, 400, 600, 800, 1000	20
s2c8	1000 m	Salts, CV 12 tbd	14
s2c9	1000 m	MIT, Salts, MC 5, 45, 75, 120	18
s2c10	1000 m	ATP, Salts, MC 100, 125, 150, 175	19
s2c11	1000 m	PE, Salts, MC 5, 25, 45, 75, JB 5, 200, 400, 600, 800,1000	20
s2c12	1000 m	HPLC, Chl a, Slides, Salts	22
s2c13	1000 m	Salts, CV 12 tbd	14
s2c14	1000 m	Primary Productivity, Chl a, FCM, Salts	22
s2c15	1000 m	Salts, CM 12 @ 5	16
s2c16	1000 m	PSi, Salts, MC 1@5, 25, 45, 75, 100, 125, 150, 175	18
s2c17	4800 m(PO-3)	O_2, Temp, Salts, CV 12 tbd, JB 1000, 2000, 3000, 4800	24
Ocean Reference Station Mooring			
s50c1	200 m	Salts	3

HOT-169 Watch Schedule

0300-1500
F. Santiago-Mandujano - Watch Leader
M. Valenciano
D. Rosbrugh
S. Curless
L. Fujieki
T. Gregory
A. Harlan

1500-0300
D. Sadler - Watch Leader
P. Lethaby
J. Shacat
T. Clemente
B. Watkins
M. F. Chung
C. Guest
K. Bjorkman

At-large
M. Simmons
G. Drewry
J. Bullister
D. Wisegarver
C. de Vargas
J. Young
S. Meier
C. Mahaffey
M. Church