Hawaii Ocean Time-series
HOT-154 General Cruise Plan

Vessel: R/V *Kilo Moana*, University of Hawaii
Master of the Vessel: Captain Grey Drewry
Chief Scientist: Fernando Santiago-Mandujano, University of Hawaii
STAG Electronics Technician: Steve Poulos
STAG Deck Technician: Kuhio Vellalos

Loading: December 18, 2003 @ 0900
Departure: December 18, 2003 @ 1300
Arrival: December 22, 2003 @ 1300

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. Three stations will be occupied during the cruise, in the following order:

1) Station 1, referred to as Station Kahe, is located at 21º 20.6'N, 158º 16.4'W and will be occupied on the first day of the cruise for about 3 hours.
2) Station ALOHA is defined as a circle with a 6 nautical mile radius centered at 22º 45'N, 158ºW. This is the main HOT station and will be occupied during the 2nd, 3rd, and 4th days of the cruise.
3) Station 6, referred to as Station Kaena, is located off Kaena Point at 21º 50.8'N, 158º 21.8'W will be occupied on the 5th day of the cruise.

1.1 SCIENTIFIC OPERATIONS

Station	Activities
Kahe (sta. 1)	Weight Cast, TSRB, PRR cast, CTD cast (1000 m)
ALOHA (sta. 2)	Sediment traps, net tows, CTD operations, TSRB, PRR casts, primary productivity measurements, AC9/FRRf, RAS testing, misc. experiments
Kaena Pt. (sta. 6)	CTD operations (2500 m)
Underway/continuous	ADCP, thermosalinograph, fluorometry, meteorology

2.0. SCIENCE PERSONNEL

Santiago Andrioni	Undergrad. Student	HPU/PO
Amanda Ashe	Research Assistant	OSU/JGOFS
Karin Bjorkman	Research Specialist	UH/JGOFS
Tara Clemente	Research Associate	UH/JGOFS
Daniel Fitzgerald	Research Associate	UH/ PO
Lance Fujieki	Computer Specialist	UH/JGOFS

Eric Grabowski	Research Associate	UH/JGOFS
Nina Hamacher	Undergrad. Student	HPU/PO
Maya Iriondo	Graduate Student	UH/ PO
Sam Laney	Graduate Student	OSU/JGOFS
Steve Poulos	Marine Technician	UHMC/STAG
Dan Sadler	Research Associate	UH/JGOFS
Fernando Santiago-Mandujano	Research Associate	UH/ PO
Cecelia Sheridan	Graduate Student	UH/JGOFS
Mark Valenciano	Electronics Technician	UH/ PO
Kuhio Vellalos	Marine Technician	UHMC/STAG
Kuulei Vickery	Undergrad. Student	UH/JGOFS
Blake Watkins	Research Associate	UH/JGOFS

3.0. SUMMARY SCHEDULE

11 December	Pre-cruise meeting
18 December	Ship loading starting at 0900 hrs
18 December	Depart from Snug harbor at 1300 hrs. Science personnel on-board by 1230.
18 December	Station 1 Kahe Pt. operations
19-20 December	Station ALOHA operations
21 December	RAS operations. Light casts. Sediment trap array retrieval.
22 December.	Station 6 CTD ops. Arrive back to Snug harbor. ETA 1300 hrs, full offload

4.0. OPERATIONAL PLANS

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

A 400 lb. weight-test cast, and a CTD cast to 1000 m will be conducted at this location in the evening of December 18. The CTD winch will be required for these operations. After the operations are satisfactorily completed, the ship shall proceed to Station ALOHA.

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

4.2.1. Sediment trap deployment

Upon arrival to Station ALOHA, the sediment trap array will be deployed. The array will be deployed from the A-frame and the JGOFS DSE 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. After deployment the ship shall return to the center of Station ALOHA and commence with the work outlined below.

The array will drift for about 62 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. 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.

4.2.2. 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 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 1000-m casts shall be made continuously every 3 hours for a 36-hour period, the last cast during this period will be a second full-depth 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.

4.2.3. Primary production experiment

Samples for the primary productivity experiment will be collected from the rosette. Just before dawn (sunrise 0707 hrs on December 20), a free drifting incubation array will be deployed from the port side. We request the use of the port crane for this operation. 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 (1751 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.

4.2.4. Plankton net tows

Plankton net will be deployed from the stern and shall be towed for two half-hour periods. One-hour periods are scheduled at around noon and midnight on December 19 and 20 (see schedule) with a total of eight available slots to accommodate cancellations due to sea state or other unforeseen problems. The A-frame and capstan will be needed for this operation.

4.2.5. Profiling Reflectance Radiometer (PRR) and Hyperspectral Tethered Spectral Radiometric Buoy (HTSRB).

Around noon on each day the hyperspectral tethered spectral radiometric buoy will be deployed by hand from the stern. Immediately after, a profiling reflectance radiometer will be deployed from the main deck using the A-frame.

4.2.6. AC9/FRRf/ISUS

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, and pressure sensors. A Satlantic ISUS sensor will be added to this package to measure the vertical distribution of nitrate. The package will be deployed to a target depth of 300 m at a constant speed of 10 m/min using the capstan and the A-frame.

4.2.7. Remote Automatic Sampler (RAS)

The RAS is an autonomous instrument that takes water samples at pre-set time intervals. The RAS will be deployed to a target depth of 4500 m at a lowering speed of 60 m/min using the hydrowire, and will be raised to selected depths at pre-determined time intervals to conduct the sampling. The RAS shall be deployed after the second deep cast at ALOHA. The total time from deployment until recovery shall take about 8 hrs. We need the ship's CTD winch and crane for this operation.

4.3 Floating sediment trap recovery

On December 21, after the mid-day AC-9/FRRf casts has been completed, we shall transit for the recovery of the sediment trap array. The ship's A-frame will be needed to retrieve the sediment trap array. After the array is recovered, the ship shall transit to Station 6.

4.4 Station Kaena (21^{o} 50.8'N, 158^{o} 21.8'W)

A near-bottom CTD cast (~2500 m) will be conducted at this location in the morning of December 22, after which the ship shall return to Snug harbor.

4.5 Acoustic Doppler Current Profiler

The ship's acoustic Doppler current profiler (ADCP) will be in operation during the duration of the cruise. The ADCP should be set to work in bottom track mode when within range. It is requested to the Bridge officers to maintain the ship in a trajectory where the bottom depth is between 50 to 400 m when in transit between Snug harbor and Kahe Pt. (both directions) when possible. The STAG electronics technician will be in charge of the ADCP system.

4.6 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 STAG electronics technician will be in charge of the thermosalinograph operation. Additional optical instruments provided by the science personnel will be sampling the uncontaminated seawater supply system.

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. 24-place rosette with 12-l water sampling bottles, all spare parts
3. One laboratory van (01 deck) with assorted equipment for radioisotope and general use
4. Distilled, deionized water and all required chemicals and isotopes
5. Storage van with assorted equipment (main deck)
6. Large vacuum waste container
7. Liquid nitrogen dewers
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
12. PRR, HTSRB, AC-9/FRRf and other optical measuring instruments (fluorometers, transmissometer, volume scattering meter, etc.)
13. DSE 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. Small capstan
21. Pertinent MSDS

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

1. Port side crane
2. A-frame block assembly
3. Crane and winch with conducting wire for CTD
4. Electric power for winches and vans
5. Radio direction finder
6. Empty freezer and refrigerator in science storage room
7. Space on the main deck for storage van, DSE winch
8. Space on the upper 01 deck for 1 lab van
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

18-22 December 2003 **HOT 154**
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	4730 m (PO-1)	O_2, Temp, DOC, DIC/Alk, Nuts, Salts	24
s2c2	1000 m (PO -2)	O_2, Temp, Nuts, DIC/Alk, Quay, DOC, Salts	24
s2c3	1000 m	PPO_4, Salts	14
s2c4	1000 m	PC/PN, Salts	14
s2c5	1000 m	PE, Salts	14
s2c6	1000 m (JGOFS-2)	O_2, Temp, DIC/Alk, Nuts, LLN, LLP, DOC, Keeling, Quay, Salts	19
s2c7	1000 m	Primary Productivity, Chl a, FCM, Salts	22
s2c8	1000 m	Salts	4
s2c9	1000 m	PSi, Salts	12
s2c10	1000 m	MIT, Salts	14
s2c11	1000 m	ATP, Salts	11
s2c12	1000 m	Salts	4
s2c13	1000 m	HPLC, Chl a, Salts, C. Sheridan (10)	24
s2c14	4730 m (PO -3)	O_2, Temp, Salts, RAS comparison	24
Kaena Point			
Sta 6	2500 m	Chl a, Salts	13

SHIP R/V *Kilo Moana* HOT 154 DATE 18-22 December, 2003

TIME	Thu. 12/18	Fri. 12/19	Sat. 12/20	Sun. 12/21	Mon. 12/22
0000					
0100			Net tow	Net tow	S6C1 (Kaena)
0200			S2C7 PP		
0300		Arrive ALOHA Deploy sed. traps		AC-9/FRRf	Transit Snug
0400				RAS Deployment	
0500		S2C1 PO-1	S2C8 Open		
0600			Deploy PP array		
0700			Log PRR Light		
0800			S2C9 PSi		
0900	Loading				
1000		Net tow	Net tow		
1100		S2C2 PO-2 (start 36 hrs)	S2C10 MIT	RAS on board	
1200	On Board	Net tow TSRB	Net tow TSRB	TSRB PRR	
1300	Depart Snug Log Licor light	PRR	PRR AC-9/FRRf	AC-9/FRRf	Arrive Snug
1400		S2C3 P.PO4	S2C11 ATP	AC-9/FRRf	
1500	Arrive Kahe			Transit sed traps	
1600	Weight cast		S2C12 Open		
1700	S1C1 (Kahe)	S2C4 PC/PN	Recover PP array	Recover sed traps	
1800	Transit ALOHA		End PRR Light		
1900				Transit sta. 6	
2000		S2C5 PE	S2C13 HPLC		
2100					
2200		Net tow	Net tow		
2300		S2C6 JGOFS-2	S2C14 PO-3 (end 36 hrs)		

December 20: Sunrise 0707 Sunset 1751

6.0 HOT-154 Watch Schedule

0300-1500

Dan Sadler - Watch Leader
Lance Fujieki
Blake Watkins
Mark Valenciano
Santiago Andrioni
Fernando S-Mandujano

1500-0300

Daniel Fitzgerald - Watch Leader
Maya Iriondo
Nina Hamacher
Eric Grabowski
Tara Clemente
Karin Bjorkman
Kuulei Vickery

At Large

Cecelia Sheridan
Amanda Ashe
Sam Laney

STAG

Steve Poulos
Kuhio Vellalos