HOT 255: Chief Scientist Report

Chief Scientist: Brett Updyke
R/V *Kilo Moana*
September 30 – October 4, 2013

Cruise ID: **KM1317**
Departed: 30 September at 0855 (HST)
Returned: 4 October at 0832 (HST)
Vessel: **R/V *Kilo Moana***
Master of the Vessel: Captain Gray Drewry
OTG Marine Technicians: Trevor Goodman and Daniel Fitzgerald

1. SCIENTIFIC OBJECTIVES

The objective of the cruise was to maintain a collection of hydrographic and biogeochemical data at the Hawaii Ocean Time-series (HOT) stations. Four stations were to 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 was to be occupied on September 30th 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 was to be occupied during October 1st, 2nd, and 3rd.
3) Station 52, the site of WHOTS-10 Mooring (anchor position 22° 40.12'N 157° 57.01'W) was to be occupied on October 3rd for about one hour.
4) Station 6, referred to as Station Kaena, is located off Kaena Point at 21° 50.8'N, 158° 21.8'W and was to be occupied on October 3rd for approximately 2 hours.

Upon arrival to Station Kahe a 1300 lb. weight-test cast to 500 m, one CTD cast to 1000 m, and a Hyperpro cast were to be conducted on the afternoon of September 30th. The single CTD cast was to be conducted to collect continuous profiles of various physical and chemical parameters. Water samples were to be collected at discrete depths for biogeochemical measurements. After these operations were satisfactorily completed, the ship was to proceed to Station ALOHA.

Upon arrival to Station ALOHA, the free-drifting sediment trap array was to be deployed. The sediment trap array was to stay in the water for about 56 hours. This was to be followed by a 1000 m CTD cast for preparation of the Primary Productivity Array. This cast was to be followed by the deployment of the free-drifting Primary Productivity Array to incubate *in situ* for 12 hours. A full-depth (~4740 m) CTD cast was to be conducted after the deployment of the Primary Productivity Array, followed by 1000 m CTD casts at strict 3 hour intervals for at least 36 hours for continuous and discrete data collection, ending with another full-depth CTD cast at 2300 on October 2nd.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on October 2nd. The Gas Array was to be recovered on October 3rd.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on October 1st and 2nd at Station ALOHA.

The Hyperpro was to be deployed for approximately 45 minutes at 1400 hours on September 30th, October 1st, and October 3rd to collect three profiles during each deployment.

A package including a Wet Labs AC9, a Chelsea Fast Repetition Rate Fluorometer (FRRf), a SeaBird Seacat, and a LISST particle size and distribution analyzer was to be used to profile the upper 200 m at Station ALOHA in the early morning and at 1000 hours on October 3rd.

A trace metal free sample was to be collected by the ATE sampler on October 2nd at Station ALOHA.

After the 36 hour burst period of CTD work at Station ALOHA was accomplished, the ship was to transit to recover the floating Gas Array and the Sediment Trap Array on the morning of October 3rd.

After recovering the arrays, the ship was to recover a malfunctioning APEX float before transiting to Station ALOHA to conduct an AC9/FRRf cast. After these operations were complete, the ship was to transit to Station 52 to conduct a one-hour 200 m CTD yo-yo cast and surface instrument intercomparisons. After the yo-yo cast was complete, the ship was to transit to Station ALOHA for a Hyperpro cast at 1400 hours.

Once operations at Station ALOHA were complete, the ship was to transit to Station 6, referred to as Station Kaena where a near-bottom CTD cast (~2500 m) was to be conducted to collect salinity and chlorophyll samples for calibration.

After Station Kaena operations were complete, the ship was to transit back to Snug Harbor.

The following instruments were to collect data throughout the cruise: shipboard ADCP, thermosalinograph, pCO_2 system, underway fluorometer and the meteorological suite.

2. SCIENCE PERSONNEL

Participant	**Title**	**Affiliation**
Lance Fujieki	Research Associate	UH
Dan Sadler	Research Associate	UH
Blake Watkins	Marine Engineer	UH
Susan Curless	Research Associate	UH
Adriana Harlan	Research Associate	UH
Brett Updyke	Research Associate	UH
Stuart Goldberg	Postdoctoral Researcher	UH
Sara Thomas	Graduate Student	UH
Jefrey Snyder	Marine Technician	UH
Fernando Santiago-Mandujano	Research Associate	UH
Cameron Fumar	Research Associate	UH
Daniel McCoy	Research Associate	UH
Damion Rosbrugh	Undergraduate Student	UH
Ken Doggett	Research Associate	UH
Ger van den Engh	Scientist	B/D Biosciences
Martina Doblin	Senior Research Fellow	Univ. of Tech. Sydney
Agathe Talarmin	Postdoctoral Scholar	UC Irvine
Trevor Goodman	Marine Technician	OTG
Dan Fitzgerald	Marine Technician	OTG

3. GENERAL SUMMARY

Operations at Station ALOHA were conducted as planned. One 1000 m CTD cast was completed at Station Kahe. Two near bottom CTD casts and thirteen 1000 m CTD casts were conducted at Station ALOHA. One 200 m yo-yo CTD cast was completed near the WHOTS mooring (Station 52) with five cycles completed. One near bottom cast was completed at Station Kaena.

The Dynacon trawl winch with the 0.681" wire and the A-frame were used for CTD operations.

The Sediment Traps, Primary Productivity Array and Gas Array were all deployed and recovered successfully. All three arrays drifted NNE of their respective deployment locations.

Six net tows for the core HOT zooplankton collection were completed successfully; three during the day, and three during the night.

Hyperpro casts (3 cycles each) were conducted on September 30th, October 1st, and October 3rd.

The optical package ACS/AC9/FRRf/LISST was deployed twice (2 cycles each) on October 3rd in the early morning and at 1000 hours.

The ATE sampler was deployed and one trace metal free seawater sample was collected.

One APEX profiling drifter was recovered from the stern using a wire rope catchpole on October 3rd at 0830 hours.

The underway thermosalinograph, fluorometer and the ship's meteorological suite ran without interruption during the cruise. The broad band/narrow band Ocean Surveyor ADCP and the Workhorse ADCP were working correctly during the cruise. The underway *p*CO2 system was not operational during the cruise due to a bad solenoid and a bad Valco valve.

Winds were mostly from the east-southeast at 15-20 kts throughout the cruise. Seas were slight to moderate with a 6-8 ft southeasterly swell.

4. R/V *Kilo Moana* OFFICERS AND CREW, TECHNICAL SUPPORT

The R/V *Kilo Moana* continues to maintain very good ship support for our work. Captain Gray Drewry and the ship's crew showed enthusiasm, concern, and dedication to our scientific mission.

Technical support during this cruise was very good. OTG personnel were available to assist in our work during the cruise.

5. DAILY REPORT OF ACTIVITIES (HST)

September 30, 2013
0855 Depart Snug harbor
0945 Safety briefing with Captain
1015 Fire and abandon ship drill
1020 Transit to Station Kahe
1145 Start weight cast to 500m
1215 End weight cast
1303 Start S1C1 CTD cast to 1000m
1430 End S1C1

1445 Start Hyperpro cast
1516 End Hyperpro
1525 Transit to Station ALOHA
2238 Arrive Station ALOHA
2250 Start sediment traps deployment
2309 Sediment traps deployed (22° 45.022'N, 158° 2.007'W)

October 1, 2013
0150 Start S2C1 CTD cast to 1000m
0300 End S2C1
0425 Start primary productivity array deployment
0441 Primary productivity array deployed (22° 45.011'N, 158° 0.955'W)
0445 Transit to center of ALOHA
0457 Start S2C2 CTD cast to near bottom
0659 4810 dbar; 4m off the bottom (22° 44.994'N 158° 0.014'W)
0912 End S2C2
0915 Pump tanks
1010 Start net tow
1050 End net tow; transit to center
1103 Start S2C3 CTD cast to 1000m
1236 End S2C3
1345 Start Hyperpro
1415 End Hyperpro
1427 Start S2C4 CTD cast to 1000m
1550 End S2C4
1554 Transit to pump tanks
1658 Start S2C5 CTD cast to 1000m
1820 End S2C5
1847 Primary Productivity array recovered (22° 48.612'N, 157° 59.473'W)
1949 Start S2C6 CTD cast to 1000m
2105 End S2C6
2156 Start net tow
2225 End net tow
2229 Start net tow
2257 End net tow
2302 Start S2C7 CTD cast to 1000m

October 2, 2013
0015 End S2C7
0019 Transit to pump tanks
0148 Start S2C8 CTD cast to 1000m
0253 End S2C8
0400 Start Gas array deployment
0415 Gas array deployed (22° 45.047'N, 158° 1.057'W)
0420 Transit to center of ALOHA
0451 Start S2C9 CTD cast to 1000m
0601 End S2C9
0605 Transit to pump tanks
0753 Start S2C10 CTD cast to 1000m
0905 End S2C10
1000 Start net tow
1035 End net tow
1040 Start ATE
1105 End ATE
1110 Start S2C11 CTD cast to 1000m
1233 End S2C11

1241 Start net tow
1310 End net tow
1348 Start S2C12 CTD cast to 1000m
1513 End S2C12
1517 Transit to pump tanks
1653 Start S2C13 CTD cast to 1000m
1812 End S2C13
1952 Start S2C14 CTD cast to 1000m
2100 End S2C14
2105 Transit to pump tanks
2201 Start net tow
2234 End net tow
2305 Start S2C15 CTD cast to near bottom

October 3, 2013
0057 7m off the bottom (22° 44.983'N, 158° 00.025'W)
0236 End S2C15
0300 Start AC9/FRRf
0445 End AC9/FRRf
0450 Transit to Gas array
0600 Start Gas array recovery (22° 52.34'N, 157° 58.02'W)
0630 Gas array recovered
0635 Transit to Sediment Traps
0700 Start Sediment Traps recovery (22° 55.452'N, 157° 57.923'W)
0730 Sediment Traps recovered
0735 Transit to APEX float
0830 Start APEX float recovery (22° 48.758'N, 157° 56.479'W)
0840 APEX float recovered
0845 Transit to Station 52
1000 Start AC9
1146 End AC9
1153 Start S52C1 200m yo-yo cast
1317 End S52C1
1400 Start Hyperpro
1445 End Hyperpro
1455 Transit to Station Kaena
2002 Arrive Station Kaena
2004 Start S6C1 CTD cast to near bottom
2209 End S6C1
2214 Transit to Snug Harbor

October 4, 2013
0706 Arrive H buoy
0754 Arrive Snug Harbor starboard side to, offload OTG van
0832 All fast port side to, full offload

6. HOT program sub-components:

Investigator	**Project**	**Institution**
Matt Church	Core biogeochemistry	UH
Dave Karl		
Bob Bidigare		
John Dore	Biogeochemistry QA/QC	MSU
Roger Lukas	Hydrography	UH
Mike Landry	Zooplankton dynamics	SIO

Ricardo Letelier	Optical measurements	OSU
Ancillary programs:		
Andrew Dickson	CO_2 dynamics and intercalibration	SIO
Paul Quay	$DI^{13}C$	UW
Matt Church & Ricardo Letelier	Diversity and activities of nitrogen-fixing microorganisms	UH
Sam Wilson	Reduced gases in the upper ocean: The cycling of methane, sulfide and nitrous oxide	UH
Erica Goetze	Temporal stability of copepod populations at Station ALOHA	UH
Sara Thomas	Chemolithoautotroph experiment	UH
Ken Doggett, Ger van den Engh, Martina Doblin	Pigment analysis by flow cytometry	UH, B/D Biosciences, UTS
Agathe Talarmin	Stoichiometry of picophytoplankton and biological controls of ocean C:N:P ratios	UCI
Ken Johnson, Steve Riser	Development of an integrated IFET pH sensor for high pressure applications in the deep sea	MBARI, UW
Anela Choy	Diet analysis of top predatory pelagic fishes in the central NPSG	UH
Becky Briggs	Quality control sample collection for organic and inorganic nutrient analyses at SOEST S-LAB	UH