

HOT-251: Chief Scientist Report

Chief Scientist: Susan Curless
R/V Thomas G. Thompson
April 4-8, 2013

Cruise ID: **TN294**

Departed: April 4, 2013 at 0858 (HST)

Returned: April 8, 2013 at 0806 (HST)

Vessel: **R/V Thomas G. Thompson**, University of Washington

Master of the Vessel: Captain Russell DeVaney

Chief Scientist: Susan Curless, University of Hawaii

SSSG Marine Technicians: Brandi Murphy and Tina Thomas

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 April 4th for about 3 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 April 5th, 6th, and 7th.
- 3) Station 50, the site of WHOTS-9 Mooring (anchor position 22° 46.071'N 157° 53.956'W) was to be occupied on April 7th 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 April 7th for approximately 3 hours.

Upon arrival to Station Kahe, a 1300 lb. weight-test cast to 1000 m, one CTD cast to 1000 m, a Hyperpro cast, and a 20 m niskin cast were to be conducted on the afternoon of April 4th. 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 52 hours. This was to be followed by one 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 insitu for 12 hours. A full-depth (~4740 m) CTD cast was to be conducted after the deployment of the Primary Production 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 April 6th.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on April 6th. The Gas Array was to be recovered on April 7th.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on April 5th and 6th at Station ALOHA.

A hand net tow was to be deployed for approximately 15 minutes on the afternoon of April 6th.

The Hyperpro was to be deployed for a half-hour period near noon time on April 4th, 5th and 7th.

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 around noon on April 7th.

A trace metal free sample was to be collected by the ATE sampler in the late morning of April 6th.

After the 36 hour burst period of CTD work at Station ALOHA was accomplished, the ship was to transit to recover the floating Sediment Trap Array and the Gas Array on the morning of April 7th.

After recovering both arrays, the ship was to transit back to Station ALOHA to conduct an ACS/AC9/FRRf/LISST cast, and a Hyperpro cast. Once the optics profiles were complete, the ship was to transit to Station 50 to conduct a one-hour 200 m CTD yo-yo cast.

Once operations at Station 50 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, underway fluorometer and the meteorological package.

2. SCIENCE PERSONNEL

Participant	Title	Affiliation/HOT Group
Susan Curless	Research Associate	UH/BEACH
Dan Sadler	Research Associate	UH/BEACH
Brett Updyke	Research Associate	UH/BEACH
Adriana Harlan	Research Associate	UH/BEACH
Lance Fujieki	Research Associate	UH/BEACH
Donn Viviani	Graduate Student	UH/BEACH
Shimi Rii	Graduate Student	UH/BEACH
Blake Watkins	Marine Engineer	UH/BEACH
Christopher Schvarcz	Graduate Student	UH/CMORE
Benedetto Barone	Postdoctoral Researcher	UH/CMORE
Jefrey Snyder	Marine Technician	UH/PO
Fernando Santiago-Mandujano	Research Associate	UH/PO
Cameron Fumar	Research Associate	UH/PO
Daniel McCoy	Research Associate	UH/PO
Jacquelyn Troller	Volunteer	PO
Carly Goodman	Undergraduate Volunteer	UH/PO
Ken Doggett	Research Associate	UH/CMORE
Ger van den Engh	Scientist	BD Biosciences
Jim Foley	Marine Educator	UH/CMORE
Richard Jones	STARS Participant	UH West Oahu
Steven Soltysik	STARS Participant	Kauai Elem./Bishop Museum
Cristina Veresan	STARS Participant	Star of the Sea School
David Grant	STARS Participant	Brookdale Comm. College
Brandi Murphy	Marine Technician	UW
Tina Thomas	Marine Technician	UW

3. GENERAL SUMMARY

Operations at Station ALOHA were conducted as planned. One 1000 m CTD (S2C4) in the 36-hour burst period was brought back on board with no bottles fired when the conductivity sensor lost signal and the pumps shut off at ~730 dbar on the down cast. The sensor and pumps did regain signal and power on the up cast, and the cable was replaced upon retrieval of the package. Core water needs from Cast 4 (PC/PN) were combined with Cast 5 (PPO4) and ancillary water on cast 4 was rescheduled to later in the cruise.

One 1000 m CTD cast and one 20 m niskin cast were completed at Station Kahe. Two near bottom CTD casts and twelve 1000 m CTD casts were conducted at Station ALOHA. One 200 m yo-yo CTD cast was completed near the WHOTS mooring (Station 50) with five cycles completed. One near bottom cast was completed at Station Kaena.

The Sediment Traps, Primary Production Array, and Gas Array were all deployed and recovered successfully. All arrays drifted to the southeast of the center of Station ALOHA.

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

One hand net tow was deployed and recovered successfully.

During cruise preparations the ATE instrument failed to communicate, so the operation was cancelled and a trace metal sample was not collected.

The Hyperpro was deployed and recovered successfully three times near noon.

The optical package ACS/AC9/FRRf/LISST was deployed two times during the cruise, once around noon and once in the early morning.

The fluorometer, ADCP, thermosalinograph, and the ship's meteorological suite ran without interruption during the cruise.

Winds were from the east at ~15-20 kts throughout the cruise. Seas were slight ~1-2 ft with a 6-8 ft northwest swell. The prevailing currents were ~1.0 kt to the south upon arrival to Station ALOHA but within 24 hours of our arrival shifted to due east and then south east for the remainder of the cruise.

4. R/V *Thomas G. Thompson* OFFICERS AND CREW, TECHNICAL SUPPORT

The R/V *Thomas G. Thompson* provided excellent ship support for our work. Captain DeVaney and the ship's crew showed not only a positive attitude, but enthusiasm, concern, and dedication to our scientific mission.

Technical support during this cruise was also excellent. The SSSG personnel were available at any time to assist in our work during the cruise.

5. DAILY REPORT OF ACTIVITIES (HST)

April 4, 2013

0858- Depart Snug Harbor

1000- Science Party Briefing with Captain, Chief Mate, Third Mate, and Lead Technician.

1025- Fire and Abandon Ship Drill

1034- Secure from all drills

1145- Arrive Station Kahe, Weight Cast to 1000 m

1215- End of Weight Cast

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1230- Hyperpro
1315- End of Hyperpro
1320- S1C1 1000 m CTD
1430- End of cast
1438- Niskin cast to 20 m
1445- End of cast
1450- Transit Station ALOHA
2139- Arrive Station ALOHA
2159- Deployment of Sediment Traps
2224- Array Released 22° 45.03'N 158° 02.65'W

April 5, 2013

0144- S2C1 1000 m CTD
0309- End of cast
0415- Primary Production Array Deployment begins
0500- PP Array Released 22° 41.878'N 157° 59.43'W
0515- Transit to the center of ALOHA; check ST position on way by array to double check argosfix.
0600- S2C2 near bottom CTD cast
0750- At 5 m off the bottom 22° 45.046'N 157° 59.97'W
1015- End of cast
1030- Net Tow
1145- End of cast
1158- S2C3 1000 m CTD
1300- End of cast
1310- Hyperpro
1400- End Hyperpro
1430- S2C4 1000 m CTD - all stop at ~730dbar, spike in primary oxygen and conductivity sensors, primary conductivity sensor signal showing 99, pump status off
1505- Primary conductivity sensor and pumps back on
1510- End of cast
1530- Replaced primary conductivity cable (and oxygen cable again)
1600- Transit to pump ship's tanks
1656- S2C5 1000 m CTD
1805- End of cast
1811- Transit to PP array
1900- Recovery of the PP array 22° 38.72'N 157° 56.15'W
1930- End of recovery, transit ALOHA
2002- S2C6 1000 m CTD
2111- End of cast
2200- Net Tow
2230- Begin second net tow
2304- End of net tows
2314- S2C7 1000 m CTD

April 6, 2013

0008- End of cast
0040- Transit of pump tanks
0150- S2C8 1000 m CTD
0101- End of cast
0400- Gas Array Deployment 22° 43.01'N 158° 00.0'W
0445- End of deployment
0450- Re-position within ALOHA for CTD
0459- S2C9 1000 m CTD
0556- End of cast
0600- Transit to Pump Ship's tanks
0800- S2C10 1000 m CTD

0900- End of cast
1000- Net Tow
1035- End of net tow
1055- S2C11 1000 m CTD
1205- End of cast
1215- Net tow
1250- End of net tow
1400- S2C12 1000 m CTD
1501- End of cast
1516- Hand Net Tow
1659- S2C13 1000 m CTD
1811- End of Cast
1815- Transit to pump ship's tanks
1920- Transit Station ALOHA
1957- S2C14 1000 m CTD
2055- End of cast
2130- Net Tow
2215- End of net tow
2259- S2C15 near bottom CTD

April 7, 2013

0046- At 9 m off the bottom 22° 44.99'N 158° 00.03'W
0219- End of cast
0315- AC9/FRRf
0450- End of AC9/FRRf
0500- Transit to Gas Array
0630- Gas Array Recovery begins 22° 41.28'N 157° 46.02'N
0700- Recovery complete, transit to Sediment Traps
0745- Sediment Trap Recovery begins 22° 34.27'N 157° 45.40'W
0815- Recovery complete, transit to Station ALOHA
1000- AC9/FRRf
1200- End of AC9
1215- Hyperpro
1300- End of Hyperpro
1325- S50C1 200 m yo-yo CTD
1526- Transit Station Kaena
2009- Arrive Station Kaena
2015- S6C1 near bottom CTD
2206- End of cast
2212- Transit Snug Harbor

April 8, 2013

0806- Arrive Snug Harbor for full off-load.

HOT program sub-components:

Investigator	Project	Institution
Matt Church	Core Biogeochemistry	UH
Dave Karl		
Bob Bidigare		
Roger Lukas	Hydrography	UH
Mike Landry	Zooplankton dynamics	SIO
Ricardo Letelier	Optical measurements	OSU

Ancillary programs:

Charles Keeling	CO ₂ dynamics and intercalibration	SIO
Paul Quay	DI ¹³ C	SIO
Matt Church	Diversity and activities of nitrogen-fixing microorganisms	UH

Additional programs:

Dave Karl (via Sam Wilson)	Reduced gases in the upper ocean: The cycling of methane, sulfide and nitrous oxide	UH/Moore
Matt Church (via Donn Viviani)	Bacterial production and EOC at Station ALOHA	UH
Matt Church (via Shimi Rii)	Investigation of temporal changes in picoeukaryote diversity at Station ALOHA	UH
Adina Paytan	O ¹⁸ natural abundance	UCSC
Grieg Steward (via Christopher Schvarcz)	Viral Dynamics at Station ALOHA and surface water collection for virus and phytoplankton culturing	UH
Erica Goetze	Temporal stability of copepod populations at Station ALOHA	UH
John Zehr (via Brandon Carter)	UCYN-A2/3 variant search	UCSC
Scott Turn	Evaluation of second generation biofuels	HNEI/ONR/UH
Stuart Donachie	Thraustochytrids in the Hawaiian Archipelago	UH
Rebecca Briggs	Low Nutrient Seawater Collection	S-LAB/UH
Jörg Bollmann	Lower photic zone coccolithophore taxa at the Station ALOHA	University of Toronto
Nicholas Fisher (via Daniel Madigan and Brian Popp)	Tracking transport of Fukushima-derived radionuclides by pelagic species	Stanford/UH
Dave Karl (via Jim Foley)	STARS (Science Teachers Aboard Research Ships)	CMORE/UH
Dave Karl (via Ken Doggett and Ger van den Engh)	Development of underway sampler for Influx flow cytometer	BD Biosciences/UH
Matt Church (via Shimi Rii and Donn Viviani)	Water collection for nutrient addition experiment	UH