

# HOT-111: Chief Scientist Report

Chief Scientist: D. HEBEL

HOT 111 Cruise Report  
R/V Kaimikai O Kanaloa  
1-4 Feb., 2000  
KOK 20-01

## Personnel List

HOT 111:

### WOCE group:

Fernando Santiago-Mandujano*	Research Associate	UH
Michele Eich	Research Associate	UH
Mark Valenciano	Electronic Technician	UH
Don Wright*	Research Associate	UH

### JGOFS group:

Dale Hebel	Chief Scientist (co-PI JGOFS)	UH
Louie Tupas	Scientist (co-PI JGOFS)	UH
Lance Fujieki	Computer Specialist	UH
Ursula Magaard	Research Associate	UH

### Associated projects:

Colleen Allen (ML lab)	Research Associate	UH
Tom Gregory (CB-N lab)	Research Associate	UH
Jeremiah Johnson (JP lab)	Research Associate	UH

### STAG:

Steve Poulos	Electronic Technician	UH-UMC
Dave Gravatt	Deck Technician	UH-UMC

\* Watch Leader

## Itinerary (approximate HST):

Wednesday, 26 Jan.

1915	Departed Pier 2 aboard R/V Thomas Thompson
0400	On station
0700	On station
0800	Buoy sighted
0840	Buoy captured
1000	Buoy recovery complete
2330	Arrived Pier 2, off-loaded

Thurs 27 Jan

0130 R/V Thomas Thompson departs

Tuesday, 1 Feb.

0900 Departed Snug Harbor  
0935 Fire/abandon ship drill, science meeting  
1135 Arrived Kahe Pt. (Sta. 1)  
1155 Weight cast (1000 m)  
1235 PRR/TSRB casts  
1325 slc1  
1435 Departed Kahe

Wednesday, 2 Feb.

0000 Arrived Sta. Aloha (Sta. 2)  
0015 Net tow  
0045 Net tow  
0200 Completed sediment trap deployment (22° 43.6'N, 157° 58.6'W)  
0300 s2c1(WOCE deep)  
0800 s2c2  
1000 Net tow  
1035 Net tow  
1100 s2c3  
1200 Net tow  
1230 Net tow  
1300 PRR-600/TSRB cast  
1410 s2c4  
1505 in situ pump (in)  
1630 in situ pump (out)  
1700 s2c5  
2000 s2c6  
2200 Net tow  
2230 Net tow  
2300 s2c7

Thursday, 3 Feb.

0035 Net tow  
0105 Net tow  
0200 s2c8  
0300 Go-Flo cast  
0500 s2c9  
0610 Deployed primary productivity array (22° 45.079'N, 157° 59.68'W)  
0805 s2c10  
1000 Net tow  
1030 Net tow  
1100 s2c11  
1200 PRR-600/TSRB cast  
1400 s2c12  
1505 in situ pump (in)  
1625 in situ pump (out)  
1700 s2c13  
1850 Recovered PP array  
2000 s2c14 (second WOCE deep cast)

Friday, 4 Feb.

0035 Transit sediment traps

0225 Arrived sediment traps (22° 28.9'N, 158° 09.6'W)  
0400 Commenced sediment trap recovery  
0410 Spar buoy on board  
0450 Transit Honolulu  
1400 Arrived Snug Harbor

Monday, 7 Feb.

0800 Began offload HOT 111 equipment  
1600 Completed loading HALE ALOHA mooring array recovery equipment  
2100 Departed Snug

Tuesday, 8 Feb.

0500 Arrived HALE ALOHA station  
0515 Triangulation operations  
0730 Hard hats released  
0810 Hard hats on surface  
0920 Hooked floats  
1010 Recovery completed, transit Honolulu (A/A full on bow thruster SCR & SCR #3)  
1820 Arrived Snug Harbor  
2000 Deck equipment off-load completed

Narrative:

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HOT 111 was conducted aboard the R/V Kaimikai O Kanaloa (KOK), 1-4 February 2000. Captain Hayes was the master of the vessel and Dale Hebel chief scientist. Initially there was a total of 14 participants in the scientific party composed of 4 WOCE, 6 JGOFS, 2 Ancillary and 2 STAG. However, due to the postponement of the cruise (initially Jan. 24-28) one of the JGOFS participants was unavailable. The delay in departure was due to problems with the newly installed SCR engine controllers and their synchronization. This problem was especially frustrating since our HALE ALOHA mooring had separated from its bottom anchor and was floating free and we had planned on combining the HOT cruise with the buoy recovery. The drifting buoy was noticed on the 21 Jan. (loading day), and it appeared that the buoy had been adrift since about the 16th Jan. Due to the constant delays, the cruise was rescheduled for the following week and a recovery effort was instituted (26-27 Jan.) aboard the R/V Thomas Thompson which, fortuitously, was in the area. Following the rescheduled HOT cruise another recovery cruise was instituted aboard the KOK (7-8 Feb.), to retrieve the remaining line, hard-hats and acoustic releases from the mooring site.

Since HALE ALOHA was no longer at its mooring site, station 8 activities were deleted from the schedule. This and an early morning sediment trap recovery allowed us to return Friday afternoon instead of Saturday morning. We departed Snug on 1 February occupying stations at, Kahe Pt. (sta. 1), and Station ALOHA (sta. 2). All scheduled work was completed and all samples collected, however, a number of samples from the JGOFS-2 cast were compromised when they were discovered (7 Feb.) at room temperature still in the collection box. CTD operations were conducted at stations 1&2. One CTD cast was conducted at station 1, 14 CTD casts at Station ALOHA with 2 deep casts. The HPLC cast (s2c14) was incorporated into the second WOCE deep cast. Other over-the-side operations included 3 light casts, 12 net tows, 2 in situ pumping operations, 1

Go-Flo cast, floating sediment traps and productivity operations. All operations were routine with the exception of additional net tows for C. B. Nelson, a rosette Go-Flo primary productivity experiment comparison, and collection of atmospheric particulate material.

The underway/continuous thermosalinograph and ADCP were operable and functioned properly. No continuous pCO<sub>2</sub> or fluorometry were measured on HOT 111 as well as limited meteorological instrumentation.

The weather was variable with higher winds, seas and mostly sunny skies at the beginning of the cruise with light winds, seas and mostly cloudy skies at the end of the cruise.

#### Daily Activities (HST)

Tuesday 18 Jan., 2000

HOT 111 pre-cruise meeting, MSB 306 at 1030 hrs.

Friday 21 Jan., 2000

Ship loading day.

Monday 24 Jan., 2000

All personnel are on standby due to SCR controller problems. Cruise postponed until Tuesday.

Tuesday 25 Jan., 2000

Problems still persist, cruise postponed until Wednesday.

Wednesday 26 Jan., 2000

Problem continues and there is no strong indication that it will be solved the next day, therefore, the cruise was rescheduled for the following week. In the interim we have learned that the R/V Thomas Thompson just left Honolulu Harbor and were fortunate to arrange her return to recover our drifting HALE ALOHA buoy. We departed (Scientific Party: Terry Houlihan, Lance Fujieki, Dale Hebel, Mark Valenciano, Don Wright and Dave Gravat) pier 2 at 1915 hrs.

Thursday 27 Jan., 2000

Steamed to what we decided was a safe distance to hold-off until light due to the uncertainty in the amount of line that may be drifting on the surface. There was about 1500 m of neutral buoyancy 3/4" nylon line and the same length of positive buoyancy 3/4' polypropylene. At 0715 we headed towards the search area and at 0810 spotted the buoy. The winds were trades at 20-30 kts, seas rough, swell 8-10 ft, under mostly cloudy skies.

During the recovery the PVC ring was damaged and at least one anemometer was lost along with possible other instrument damage. Once the buoy was hooked and secured the buoy was towed upwind to limit the possibility of entangling the mooring line in the props. Once in position the buoy was recovered with considerable effort since the bottom metal stand had separated from the float and when the buoy was lifted it slid off the donut-shaped float although the chain, which secured the down-line array, was still attached passing through the float's center hole. The float, which had fallen back into the water, was finally hooked and lifted onto the deck, followed by instrument array. About

1500 m of 5/16" plastic jacketed cable and about 500 m of 3/4" nylon line were recovered. Following is a slightly edited copy of events by Terry Houlihan who directed our recovery team:

Due to the uncertainty of the availability of the K-O-K we were able to charter the R/V Thomas Thompson which had recently ended a science cruise from San Diego to Honolulu. The charter was on very short notice, the Thompson was four hours into her return to Seattle when we were made aware of her location and the appropriate phone calls and arrangements were made so that the ship could return to Hawaii and help us in our buoy rescue. Thanks to the UH Marine Center, the UW Marine Center, the NSF and the captain and crew of the Thompson for the quick response to our request. The approval was granted in a matter of a few hours, pretty amazing for us here in Hawaii.

The Thompson left Pier 2 at approximately 2000 on 26 January with 6 scientists from Hawaii on board. Equipment was also trucked from the Marine Center to the pier to aid in the recovery. We transitted overnight and arrived at an intercept point south of the projected drift track at 0600. The flashing navigation light was not visible so we decided to stand off until daybreak to ensure that we did not foul any of the buoy line that might have been on the surface. Captain Gray plotted out a dead reckoning projected location of the buoy from the Argos drift track and at about 0800 the buoy was sighted right where predicted. Coincidentally the buoy was recovered in Station Aloha after an interesting trip, the track is plotted on the HALE ALOHA homepage:

<http://hahana.soest.hawaii.edu/hot/hale-aloha/positions.html>.

Some of the instruments faired very well, many were lost. One UW Seacat/GTD was totally lost, one was recovered in somewhat damaged condition. One MBARI Nitrate sensor was totally lost, one sustained considerable damage. Although the OSU optical instrument hard had was recovered, the sensor was missing and the glass sphere was shattered. Both MIT trace metal samplers looked in good condition although a few of the individual samplers were damaged. The UH/Karl Seacats were recovered with the external sensors gone. All the UH/Karl thermistors and UH/Lucas Seacats were recovered and looked like they may have sustained some superficial external damage, more will be know as the instruments are inspected closely. The meteorological sensors were a near total loss as was the surface buoy and tower. We are fairly confident that the flotation hardhats and dual releases are in recoverable condition and will be retrieved at an appropriate time. We returned to Pier 2 at 2330 on 27 January where the buoy, gear and scientists were offloaded and trucked home. The Thompson was finally on her way home by 0130.

The line parted at the termination between the top two 500m nylon sections. The thimble was missing from the upper section and it looked like it was not due to splicing but to some abrasion. It appeared that the damage to the instruments was due to the failure of the stainless bolts that held the base on to the buoy. The buoy had a metal frame made from angle iron that was used to stand the buoy upright while it was on land. This frame was missing upon recovery and it is guessed that as this frame fell through the water column it damaged the instruments and possibly caused the abrasion at the point where the line parted.

Tuesday 1 Feb., 2000

Departed Snug Harbor 0900 hrs. After departure and past the entrance buoy we had the routine fire/abandon ship drill followed by a short science meeting to review the schedule and safety concerns. Arrived Kahe 1135 hrs and conducted a 1000 m weight cast, PRR/TSRB casts, and final 1020 db CTD cast. All equipment functioned properly and all samples were collected. Departed Kahe 1435 hrs.

Skies were mostly sunny with 3-4' seas, 3-6 swell and 18-22 kt winds.

Wednesday, 2 Feb., 2000

Arrived Station ALOHA ~0000 hrs. Completed all scheduled operations through s2c7. This included 8 net tows, 7 hydrocasts, 1 light cast, 1 in situ pump operation, and deployment of floating sediment trap array.

Skies were mostly clear with 7-17 kt winds and 2-3 seas with 4-5 NNW swell.

Thursday 3 Feb. 2000

Conducted 7 CTD casts including second WOCE deep cast, 4 net tows, 1 PRR/TSRB cast, 1 in situ pump operation, 1 Go-Flo cast and deployment/recovery of primary productivity array.

The winds have decreased to 7-12 kts, seas have decreased to 2' with a 2-4' swells. Skies are mostly cloudy.

Friday 4 Feb. 2000

Since we combined the HPLC cast with second WOCE deep cast we departed Sta. ALOHA earlier than scheduled to intercept the floating sediment traps. The trap array was spotted in the very early morning and we stood-off until R. Barnes took the bridge shortly before 0400 hrs. By ~0500 hrs the traps and array was on board and we departed for Honolulu. We arrived Snug Harbor 1400 hrs. and conducted a partial off loading.

Winds continue to be light, with 2-3 seas and 2-3swell. Skies were mostly cloudy.

Monday 7 Feb. 2000

Completed off-loading of HOT 111 equipment and on-loading of HALE ALOHA subsurface array recovery equipment. Departed Snug Harbor 2100 hrs (science party: Terry Houlihan, Lance Fujieki, Dale Hebel and Dave Gravat). We arrive at the mooring site shortly before 0500 and began triangulation operations. The acoustic releases were released at ~0730 and spotted on the surface some 4 (?) km away. The recovery went without incident and was completed shortly after 1000 hrs. Two of the 37 hard hats had imploded. We recovered ~1000 m of  $\frac{3}{4}$  nylon, ~1500 m  $\frac{3}{4}$  polypro, 37 hard hats, and the two acoustic releases. There was evidence that the buoy stand continued down the line, past the break point, for some (at present) indeterminable distance.

The recovery was conducted in light winds, seas and swells. We departed the mooring site ~1000 hrs and arrived at Snug Harbor ~1830 hrs. The recovery and retrieved equipment was off-loaded that night to facilitate the MOBY cruise loading the following morning.

# Meterological Data

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HOT 111:

Below is listed the cruise bridge log meterological descriptions. The various values represent the range for that day. Under wind, sea, and swell there will be two designations, the first is the direction (in degrees), the second for wind is in kts, sea in Beauford force, and swell in feet, barometer in inches of Hg, temp °C (dry bulb) and clouds in tenths.

Day Date	Wind	Sea	Swell	Barometer	Temp	Clouds
Thurs 27 Jan.	060-090,22-30	060-090,RGH	030-070,8-12	22.5-24.9	70-75	4-8
Tues 1 Feb.	070-120,18-22	070-120,3-4	090-340,3-6	29.98-30.02	72-81	2
Wed 2 Feb.	120-240,7-17	120-240,2-3	340,4-5	29.85-29.97	71-78	1-3
Thur 3 Feb.	070-270,7-12	000-260,2	090-340,2-4	29.84-29.89	72-78	2-9
Fri 4 Feb*	185-230,6-8	185-230,1-2	290,2-3	29.85-29.89	72-74	3-8
Mon 7 Feb.**	012-9	012-2		29.96	70	3
Tues 8 Feb***	100,7-10	100,2	340,3-4	29.93-30.02	72-76	2-6

\*Three entries (0200, 0600 & 1000 hrs)

\*\*One entry (2200 hrs)

\*\*\*Two entries (0600 & 1000 hrs)

## Equipment and methods:

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All standard equipment functioned properly

## Sub component programs:

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### Investigator:

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Karl/Winn (UH)

Bob Bidigare (UH)

Michael Landry (UH)

### Project:

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DIC, Alk.,/UH

HPLC pigments/UH

zooplankton dynamics/UH

### Ancillary programs:

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### Investigator:

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Charles Keeling (SIO)

Paul Quay (UW)

Ed Boyle

John Porter

Abbott/Letelier

Claudia B-Nelson

### Project:

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CO2 dynamics and intercalibration/SIO

DIC and 13C/UW

trace metals/MIT

aerosols/UH

optical measurements/OSU

Radiogenic phosphorus

### Students:

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Others:

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Karl/Hebel/Tupas

EOC, 1° prod. comparison/UH