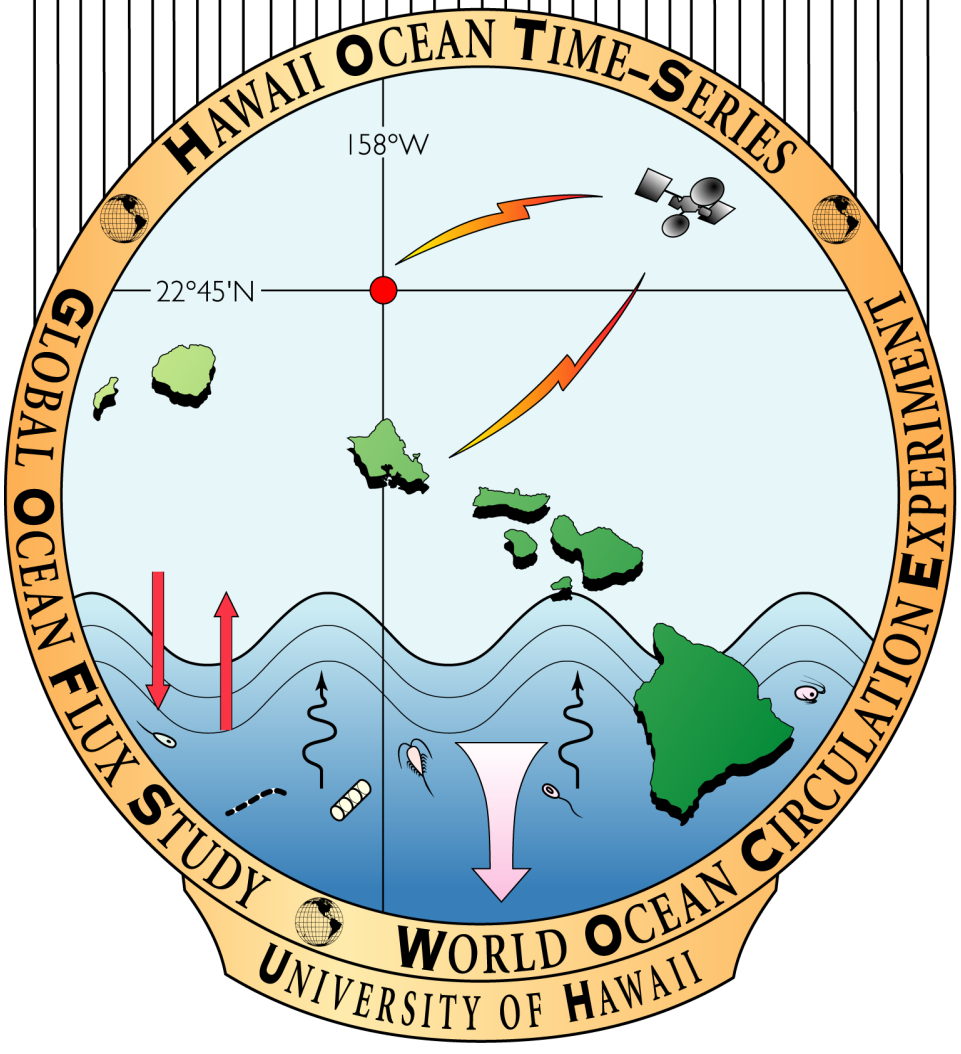
Hawaii Ocean Time-series Program

HOT-21



HAWAII OCEAN TIME-SERIES

NA'INA

HOT-21: 17 - 20 November 1990

Chief Scientist

Dr. Christopher D. Winn

Principal Investigators
Dr. Stephen Chiswell
Dr. Eric Firing
Dr. David Karl
Dr. Roger Lukas
Dr. Christopher Winn

Purpose

These research cruises are to establish and maintain the Hawaii Ocean Time-series (HOT) station north of Oahu. The project has been funded under the World Ocean Circulation Experiment (WOCE) and Global Ocean Flux Study (GOFS) programs. Its aim is to collect monthly observations of the hydrography and biology for five years, with the object of identifying and quantifying the processes controlling biogeochemical cycling in the ocean, as well as physical oceanography of a site representative of the central Pacific Ocean.

The HOT site ($22^{o}45'N$, $158^{o}W$), also known as station ALOHA, is about 100 km north of Kahuku Point. Free-drifting sediment traps will be deployed for approximately 82 hours near the site to measure sedimentation rates of particulate matter. CTD casts will be made to obtain temperature, salinity and dissolved oxygen profiles. Water samples will be collected simultaneously with the CTD casts to provide measurements of nutrient levels, microbial biomass, dissolved organic nutrient concentrations and primary production. Other research components may be added on future cruises.

A station is also planned near Kahe Point, at approximately $21^{o}20.6'$ N, $158^{o}16.4'$ W. This station will be occupied for about three hours on the way to station ALOHA to test the CTD and other equipment. It will also provide additional time-series data on oxygen and nutrient distributions during the program.

Work Plan

Sediment traps

Sediment-trap arrays will be deployed on arrival at the station. These arrays consist of 12 sediment traps suspended at between 2 and 4 depths from 150 and 500 m from a surface spar-buoy. They will be allowed to drift freely for approximately 82 hours and then recovered on the second leg of HOT 21. The surface buoy is equipped with an ARGOS satellite transmitter, strobe light and radio transmitter to locate the array prior to recovery. Although we will provide ARGOS positions we will require the assistance of the bridge in plotting the drift track of the array. We will use the DSE (GOFS) winch for sediment trap deployment. The GOFS winch requires 460 VAC, three phase at 10 amps. The GOFS winch will need to be placed on the main deck in a position consistent with the deck operation plans of Marc Rosen.

Water column measurements

Vertical profiles of temperature, conductivity and dissolved oxygen will be made with a SeaBird CTD attached to a rosette. Chlorophyll a will be estimated using a fluorometer also attached to the rosette. Light intensity and light transmission will be measured in the upper water column. Water samples will be taken at selected depths with 10 & 12 l Niskin and Go-Flo bottles. We will use a 24-place rosette for the CTD work.

A special primary production cast will also be made using a kevlar line and Go-flo bottles. This cast will be made only once during the cruise. The objective is to collect trace-metal free water samples for primary production measurements. We will be using the GOFS winch and the main deck crane for this deployment.

Physical Measurements

Consecutive hydrographic casts will be made over 24 hours to span the local inertial period and two semi-diurnal tidal cycles. This sampling will provide unaliased estimates of variability having longer time scales than inertial or tidal motions. Casts will be made to at least 1000 decibars, with possibly one deep cast made to within 30 m of the bottom. Nutrient, salinity and dissolved oxygen samples will be taken during the deep cast.

Biological and Chemical Measurements

Biological and chemical conditions within the water column will be measured on water samples collected with the CTD/rosette system. As much as possible, all biological and chemical work will be confined to the portable laboratory. All radioisotope work will be done in the portable laboratory.

In general, water samples will be drawn from the 24-hour rosette casts. In additon, two other types of casts will be conducted.

Approximately eight PNF and one trace metal free primary production cast. The PNF (profiling natural fluorometer), is a manually lowered and retrieved profiler requiring a swing arm and block component. The primary production cast will use the GOFS winch, kevlar line, Go-Flo water bottles, trace metal free block and ship's crane.

Primary production will be measured in situ using a single floating array which will be deployed for 12 hrs.

XBT Profiles

Expendable Bathythermograph (XBT) measurements may also be made during transit to and from the station.

Schedule, HOT-21

0400	17 Nov.	Depart Honolulu
0700		Arrive Kahe Pt site
1000		Depart Kahe Pt
2000	17 Nov.	Arrive HOT-site: deploy sediment traps
2300		Commence CTD sampling
0300	18 Nov.	Primary productivity cast
2400	18 Nov	Cease 24-hour CTD sampling & transit Honolulu
1200	19 Nov.	Arrive Snug Harbor & offload
1200	20 Nov.	Depart Snug Harbor & transit ALOHA
2400	20 Nov.	Arrive ALOHA & locate traps
0800	20 Nov.	Recover traps & transit Honolulu
2400	20 Nov.	Arrive Honolulu

HOT-21 Personnel

1	Stephen Chiswell	WOCE
2	John Dore	GOFS
3	Dale Hebel	GOFS
4	Ricardo Letelier	GOFS
5	Stewart Reid	WOCE
6	Marc Rosen	WOCE/GOFS
7	Jeff Snyder	WOCE
8	Chuck Stump	UW
9	Chris Winn	GOFS

11/17/90 HOT-21

Personnel
C.S. C. Winn
D Hebel
M. Rosen
C. Stump
R. Lefelier
J. Dore

Had some problems with electrical connections to vans
also Dale's computer failed and Ursula's computer was gotten from UH

Departed Snug @ 1030 on 11/17/90

Arrived Kahe Point 13:50
did PNF profile
XBT #1 21°16.9', 158° 16.38' 14:09
file # 71A
This first XBT profile did not work (no data recorded)
We tried a second XBT
XBT #2 21°16.9', 158° 16.38' SST = 26.1 °C
file 72A data was recorded

departed Kahe ~ 1430 hrs

~1700 XBT #3 21° 42' 158 19.07 SST 25.94

1822 XBT #4,5 & 6 21°49' 158°, 14' SST 25.53
#4 & 5 wrong orientation in gun - no data
#6 File is 74aa

1908 XBT #7 (File 75aa?) 21 56 SST 25.4
158 15

2002 XBT #8 (File 78aa) 22 2.87 SST 25.3
158 13.10

HOT-21 Cruise Report

C.D. Winn Chief Scientist

The Na'Ina, a small 110 ft vessel, was chartered for HOT-21. The ships hydraulic system was modified to operate the HOT hydrowinch without the powerpack, and some electrical modifications were made to power the vans and the GOFS winch. After a test cruise on 11/16/90, it was decided that the ship was not capable of safely supporting CTD operations. Although several small problems contributed to this situation, the primary factor limiting the use of the Na'Ina for CTD deployments was the length of the ship's crane. The boom was too long to allow deployment and recovery of the package without an unacceptably long whip. As a result, CTD operations were canceled for HOT-21 and we intended to conduct the cruise using the GOFS winch alone. Our objective was to collect water samples form the upper 200m, and make our standard primary production and sediment trap measurements.

We departed Snug Harbor on 11/17/90 at 10:30 after solving some last minute electrical problems. We dropped an XBT and collected optical data at Kahe Point in the early afternoon. The standard WOCE XBT profiling was conducted enroute to station. We arrived on station at approximately 02:30. Conditions on station were rough with approximately 30 knot winds and 10-12 foot seas. After having the ship attempt to hold station, I decided to cancel the primary production cast planned for that morning and wait until dawn for a decision on continuing operations. At dawn, conditions were essentially unchanged, and the morning forecast called for increasing seas with gale force winds. I consequently decided to return to Snug Harbor. We arrived at approximately 22:00 that evening after a slow transit due to high seas.

S.Chiswell
E.Firing
R.Lukas
D.Karl
C.Winn ✓

HOT 21
Nav Inv
NOV 17-21

TIME	Wed 14	Thur 15	Fri 16	Sat 17	Sun 18	Mon 19	Tues 20	Wed 21	Thur 22
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0200									
0300									
0400				Depart Survey 0400					
0500									
0600									
0700				Arrive Kahe					
0800									
0900				Kahe					
1000									
1100									
1200							Depart Survey 1200		
1300									
1400									
1500									
1600									
1700									
1800									
1900					Recover 1° Pod				
2000									
2100				Deploy Traps					
2200									
2300				Position					
2400									

HOT 21
Nav Inva
NOV 17-21

Wed Thur Fri Sat Sun Mon Tues Wed Thur

TIME	14	15	16	17	18	19	20	21	22
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Date: 11/9/90

Subject: HOT 21 personnel

Name	SS#	Person to notify
Christian, James	999-99-1939	John & Marguerite Christian, parents 8166 13th Ave Burnably, B.C.
Chiswell, Stephen M	123-62-6722	Douglas Chiswell, father Rodney, New Zealand (64) 84620-759
Dore, John	545-19-1685	Sheree Tribble, sister 23048 Fall River Rd Moreno Valley, CA 92387 (714) 247-1939
Hebel, Dale	565-68-1064	Susan Hebel, wife 944 Garen Incline Village, NV 89451 (702) 831-0724
Letelier, Ricardo	575-43-8551	Ina Hecker, wife 1518 Evelyn Ln. Honolulu, Hi 96822 (808) 941-5725
Reid, Stewart	546-06-3875	Holli Hanalei, wife Kaneohe, Hi (808) 239-8114
Rosen, Marc	551-76-2770	Teresa Rosen, wife Kailua, Hi (808) 531-3511 x891 (w) (808) 254-1934
Snyder, Jefrey	477-80-8066	Meri Snyder, sister White Bear Lake, MN (612) 429-8205
Stump, Chuck	271-40-3352	Jeanette Stump, wife 634 Elmdale Rd. Toledo, Ohio 43609 (419) 385-2047
Winn, Chistopher	569-74-0367	Linda Winn, wife 3081 D Paty Dr. Honolulu, Hi 96822 (808) 988-4594

checklist.xls

HOT 21

Water Column	Analysis	Spread Sheet	Plots	Raw Data	Checked
Primary Prod.					
Chla & Phaeo					
Pigments(HPLC)					
Light (PNF)					
Light (Licor)					
ATP					
LPS					
Bacteria Counts					
DIC (Coulometer)					
P.PO4					
POC					
PON					
Low level PO4					
DOC					
DON					
PO4					
NO3 & NO2					
NO2					
NH4					
SI					
DOP					
DO					
Salts					
Traps					
POC					
PON					
P.PO4					
Mass Flux					

HOT 21

NAINA 17-21 Nov.

14 Nov '90 — NAINA moved to Snug For CTD winch installation.

15 Nov '90 — Sea trials (CTD operation) delayed due to winch installation problems. Sea trials initiated in late afternoon. Serious prob's w/ CTD operation & WOCE group decides to abandon efforts on HOT 21. CORFS group decides to go & do Sed. Traps. 1° Prod & limited Keular work. Bottle casts.

16 Nov. '90 — Loaded Ship. Weather has been overcast & raining most of week including today. Rain prevented completion of electrical work (Dave's van).

17 Nov '90 — Continued working on electrical connections & found prob. w/ elect. supply. Electrician called. IBM PS70 would NOT work. Picked up PS 50 From UH. Finally underway ~ 1030 hrs. This will be a short cruise from the standpoint that we will only be on Sta. 24-30 hrs. Then return to Honn. offload, & return to pick up traps on 21 Nov.

1350 hrs. Arrived Hale. Conducted PNF cast & 2 XBT's, 1st one did not work (See cruise log).

~1430 Departed Hale. Will drop XBT's every 7 min's starting at 21° 42'

11/18/90

~1700 Dropped XBT's en route to Sea North. Boat Needed to Slow Down During each cast due to rough seas. Conditions deteriorated & by the time we reached North Dhos decided to wait until morning to assess conditions. By morning Gale Force winds were predicted & the sea state continued to deteriorate. Many items broke free of their restraints & periodic expeditions to rescue items were necessary. The decision was made to return to Honolulu. @ ~ 0700 today. No work other than XBT's were accomplished. We are now off the Windward & a cursory inspection indicates a tumultuous journey. The middle van (DK) appears to have shifted & both D.K. & COFS vans have taken water. In the COFS van

—the air conditioner is out although the contractor seem to have fixed pretty good. D.R's room has moved, however, everything inside appears O.K. except the GOES computer keyboard which was covered with seawater (may have entered around AC?). I hope the monitor & hard drive are O.K.

PNF-300 DATA SHEET

Cruise H21 Station Kahe

Time (local) 1335 Date 17 Nov '90

Position 21 16.9 N 157. 16.37 W (Loran 12497.1 ; 37202.2)

Operator Dore & Hebert File Name P1117O AA downcast
AB upcast

Weather conditions:
overcast ; light rain
2-3' Swell w/ light - mod. winds 10-15 mph?

Notes:

Completed cast 1843 hrs.