TUNES

SCRIPPS INSTITUTION OF OCEANOGRAPHY
UNIVERSITY OF CALIFORNIA, SAN DIEGO
LA JOLLA, CALIFORNIA 92093

CRUISE PROSPECTUS
R/V *THOMAS WASHINGTON*
MAY 1991 - FEBRUARY 1992

Schedule and Summary

Leg 00
M. Tsuchiya
WOCE Test Trip
San Diego to Port San Luis, California
May 31- June 1, 1991

This leg will serve as a shakedown for the start of WOCE.

Legs 1 & 2
M. Tsuchiya and J. Swift
WOCE Hydrographic Program Section P17 C
Port San Luis to Papeete; Papeete to Papeete
June 2 - July 11; July 16 - August 26, 1991

Hydrographic and CTD data will be collected along 135°W between 35°N and 15°S. Leg 2 will take the ship down to 35°S then up 150°back to Papeete

Leg 3
L. Talley
WOCE Hydrographic Program Section P16C
Papeete to Honolulu
31 August - 1 October 1991

The ship will continue WOCE along 150° from 17°30' S to 19°N.

Leg 4a & 4b
S. Constable and P. Johnson
Tiltmeter and Rock Drill
Honolulu - Kauai Hai - Honolulu
5 October - 16 October, 1991

This short cruise will be working in and out of West Coast of Hawaii conducting Rock Drill and tiltmeter operations.

Leg 5
H. Staudigel
Honolulu to Kwajalein
21 October- 8 November, 1991

JOI/Inc survey and ODF site survey Sea Beam and single channel seismics between Honolulu and Kwajalein.

Leg 6
H. Staudigel
Kwajalein to Guam
10 November - 7 December, 1991

Sea Beam and dredging will be done on 19 different seamounts and guyots.

Leg 7
S. Bloomer
Guam to Guam
11-31 December, 1991

Sea Beam and dredging will be done north of Majuro.

Leg 8
P. Johnson
Guam to Majuro
Magnetometer
4 January - 3 February 1992

The Japanese, Hawaiian, and Phoenix lineations bound the Jurassic Quiet Zone region. A deep-towed magnetometer will survey this region, along with Sea Beam and waterguns.

Leg 9
Transit
Majuro to San Diego
6 February - 22 February, 1992

The ship will transit home.

TUNES Expedition - R/V *Washington*

Underway Geophysical Data Collection

Desig. I.D.	Dates	Days	Chief Scientist(s)	Ports
R/V *Thomas Washington* (1991):				
Leg 1:	31may-11jul (WOCE P17C)	42	Tsuchiya	San Diego - Papeete Sea Beam (transit mode); Gravity (transit mode) Magnetometer (no); Seismic profiler (no)
Leg 2:	16jul-26aug (WOCE P17C) (WOCE P16CS)	42	Swift	Papeete - Papeete Sea Beam (transit mode); Gravity (transit mode) Seismic profiler (no); Magnetometer deployed only on transit between 135W and 150W sections.
Leg 3:	31aug-01oct (WOCE P17) (WOCE P16C)	32	Talley	Papeete - Honolulu Sea Beam (transit mode); Gravity (transit mode) Magnetometer (no); Seismic profiler (no)
Leg 4a: Leg 4b:	05oct-12oct 12oct-16oct	12	Constable/ Johnson	Honolulu - Kauai-Hai - Honolulu Sea Beam (transit mode?); Gravity (transit mode) Magnetometer (yes?) Seismic profiler (no)
Leg 5:	21oct-8 nov	19	Staudigel	Honolulu - Kwajalein Sea Beam (w/SB Proc); Gravity (yes) Magnetometer (yes); Seismic profiler (yes)
Leg 6:	10nov-07dec	28	Staudigel	Majuro - Guam Sea Beam (w/ SB Proc); Gravity (yes) Magnetometer (yes); Seismic profiler (no)
Leg 7:	11dec-31dec	21	Bloomer	Guam - Guam Sea Beam (w/ SB Proc); Gravity (transit mode) Magnetometer (yes); Seismic profiler (no)
Leg 8:	04 jan-03feb92	31	Johnson	Guam - Majuro Sea Beam (w/ SB Proc); Gravity (transit mode) Magnetometer (yes); Seismic profiler (yes)
Leg 9:	06feb-22feb92	17	Transit Leg	Majuro - San Diego

Contact:

Stuart Smith
Head, SIO Geological Data Center
Scripps Institution of Oceanography
La Jolla, CA 92093-0223
Phone: (619)-534-2752

M. Tsuchiya and J. Swift
WOCE Hydrographic Program Section P17 C
Port San Luis to Papeete; Papeete to Papeete
June 1 - July 11; July 16 - August 26, 1991
Legs 1 & 2

1.1 Overview

We plan to collect hydrographic and CTD data along 135°W between 35°N and 35°S as part of the Pacific World Ocean Circulation Experiment (WOCE) Hydrographic Program (WHP). This work is the subtropical/tropical portion of a complete meridional section (P17) from Alaska to the Antarctic Circumpolar Current recommended in U. S. WOCE Implementation Report, No. 1 (1989). It is the only cross-equatorial WHP transect that is likely to be occupied in the vast region between Tahiti and the Galapagos Islands.

WOCE chose to locate this eastern North Pacific, central South Pacific section at 130°W primarily for mapping purposes. We have chosen to move the section slightly westward to 135°W in order to avoid the coastal environment in the northeast Pacific, to be closer to the division between northward and southward cross-equatorial deep flow suggested by the existing data, and to fill a major data gap in the tropical North Pacific.

1.2 Scientific goals

The general objective of this portion of the 135°W section is the same as for all WHP sections: to be a part of a nearly synoptic picture of the general circulation of the Pacific Ocean. We believe that it is possible, with sufficient station and discrete sample spacings, to obtain reasonable estimates of zonal geostrophic flows at all depths with corroboration from the water properties. We see such data as one of the primary contributions of P17C.

Some specific studies which we intend to pursue with the new section include: (1) study of zonal currents at all depths in the equatorial band, their associated property signals, and relation to cross-equatorial flow, (2) vertical structure of the surface potential vorticity extrema in the subtropical gyre and tropics, (3) vertical and meridional structure of the shallow salinity minima and their relation to the winds and fronts, (4) southern extent of the pool of "oldest" abyssal water in the northeast Pacific, (5) effect of numerous zonal fracture zones on abyssal flows, and (6) pathways of mid-depth and abyssal flow, particularly across the equator, in nearly unobserved region of the North Pacific.

We adhere to the WHP sampling requirements of 36 samples per station for oxygen and nutrients and 30 nm station spacing with closer spacing over steep topography, strong currents, and across the equator. As is planned for P16C along 150°W, we will deviate from the WOCE specifications between 3°N and 3°S, where 10 nm CTD station spacing will be used. These reduced station intervals are to see if the higher resolution significantly increases our ability to observe the equatorial zonal jets, which have been demonstrated to exist to the ocean bottom. Oxygen and nutrient samples will be collected at 20 nm spacing across the equator, so an additional CTD and small rosette for salinity samples will be alternated with the large rosette and principal CTD.

1.3 Parameters, contributing institutions, and personnel

Lynne Talley and Mizuki Tsuchiya are the co-principal investigators of the NSF grant supporting this section. Tsuchiya will serve as chief scientist on the first leg, and Talley has been heavily involved in pre-cruise planning and will participate in post-cruise reporting. Both Talley and Tsuchiya are responsible for overseeing CTD and discrete sample data processing and will work on final data analyses. Jim Swift will be chief scientist on the second leg, which will also make measurements along his funded P16S section.

Measurements which are currently planned on this cruise are listed in Table 1, and the addresses of the principal investigators as of 1/91 are given in Table 2. Only the CTD/O_2 salt/nutrient work is funded at this time. Proposals for CFC, helium, tritium and ADCP work are being considered by NSF. A proposal for large volume sampling is being considered by NOAA. CO_2 measurements are also planned for both legs.

SIO/ODF will carry out CTD and discrete salinity, oxygen, and nutrient measurements. The 36-position 10-liter rosette system of ODF will be the primary water sampler system. We will also require a separate CTD with a smaller rosette for the 18 alternate stations in the equatorial band; no nutrient or oxygen samples will be drawn on these stations.

Large-volume sampling will be accomplished with nine 270-liter Gerard barrels although it is not yet clear whether sampling will be possible from the R/V *T. Washington.*

Sea Beam will be running in the transit mode.

1.6 Personnel

TUNES LEG 01

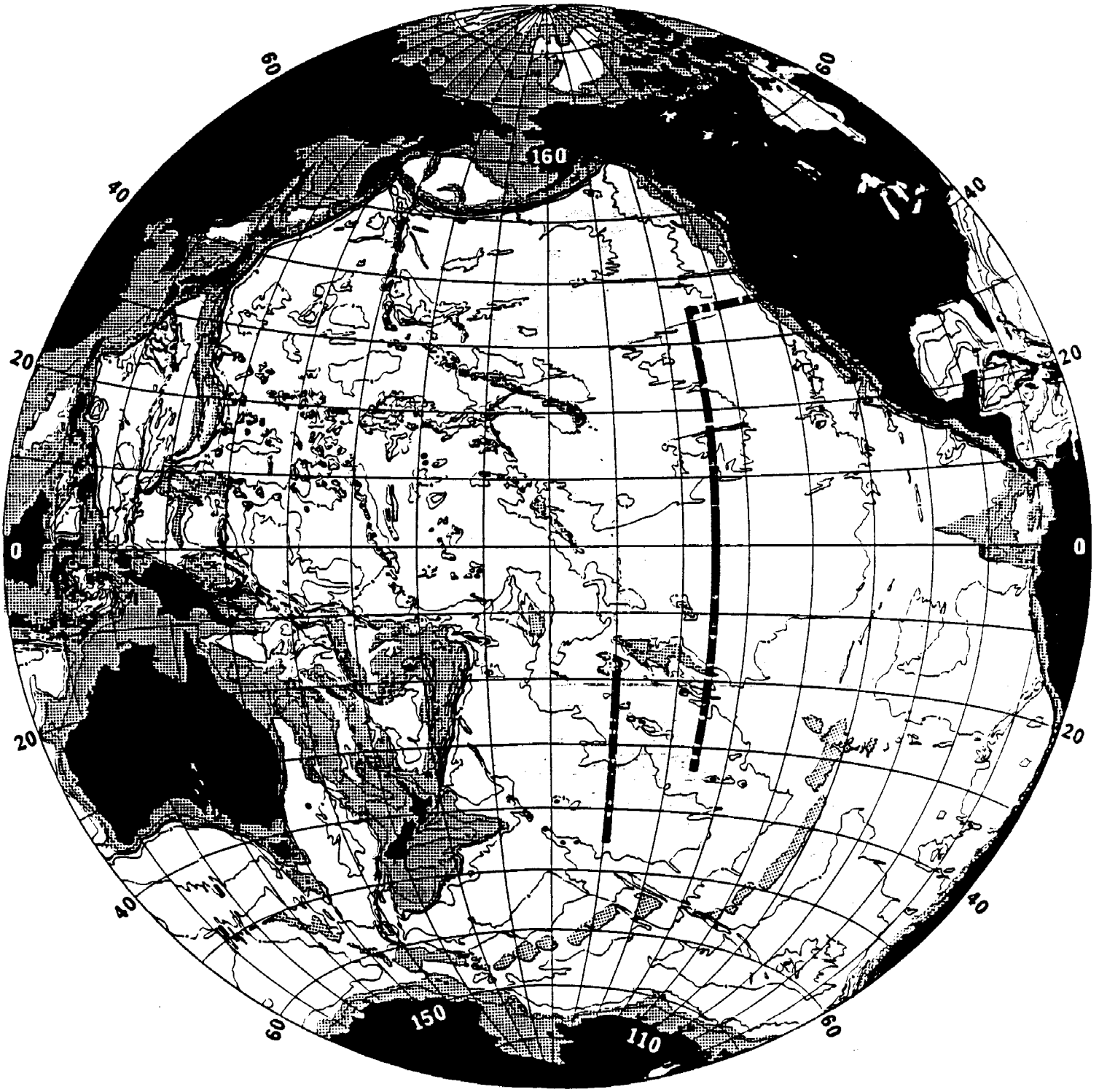
1. Mr. David Bos, UCSD/SIO/STS/ODF, SRA
2. Ms. Dee Breger, Lamont-Doherty Geological Observatory
3. Mr. Kenneth S. Casey, RSMAS, U. of Miami, Student Assistant
4. Mr. Ronald L. Comer, UCSD/SIO/STS/RT, Resident Marine Technician
5. Mr. James Costello, UCSD/SIO/STS/ODF, SRA
6. Ms. Martha Denham, UCSD/SIO/PORD, SRA
7. Dr. Eric Firing, University of Hawaii, Researcher
8. Ms. Sally D. Hacker, Woods Hole Oce. Inst. , Research Assistant
9. Mr. John Jain, UCSD/SIO/ODF, ET
10. Dr. Bill Jenkins, WHOI, Researcher
11. Ms. Mary C. Johnson, UCSD/SIO/STS/ODF, SRA
12. Dr. Robert Key, Princeton, Researcher
13. Mr. Leonard Lopez, UCSD/SIO/STS/ODF, SRA
14. Mr. Carl Mattson, UCSD/SIO/STS/ODF, SRA
15. Mr. J. Michael Moore, UCSD/SIO/STS/SCG, Computer Technician
16. Mr. David Muus, UCSD/SIO/STS/ODF, Marine Technician
17. Mr. Andrew Ross, Oregon State Univ., Research Assistant
18. Mr. Kevin Sullivan, RSMAS, Mar. Tech. Specialist
19. Ms. Kathy Tedesco, UCSB, Research Assistant
20. Dr. Mizuki Tsuchiya, UCSD/MRD, Chief Scientist
21. Mr. James Wells, UCSD/SIO/STS/ODF, Marine Technician

TUNES LEG 02

1. Dr. Jim Swift, UCSD/SIO/PORD, Chief Scientist
2. Dr. Ray Peterson, UCSD/SIO/PORD, Researcher
3. Mr. Alex Orsi , U. Hawaii
4. Ms. Diana Lewis , UCSD/SIO/PORD, Graduate Student
5. Mr. Frank Delahoyde, UCSD/SIO/STS/ODF, Programmer/Analyst
6. Mr. Jim Schmitt , UCSD/SIO/STS/ODF, ET
7. Mr. Ron Patrick , UCSD/SIO/STS/ODF, SRA
8. Mr. Bob Williams, UCSD/SIO/STS/ODF, Programmer/Analyst
9. Ms. Nadia Williams, UCSD/SIO/STS/ODF, SRA
10. TBD, UCSD/SIO/ODF, Marine Technician
11. Mr. George Bouchard, UCSD/SIO/STS/ODF, Programmer/Analyst
12. Mr. Doug Masten, UCSD/SIO/STS/ODF, Marine Technician
13. Mr. Dennis Guffy, TAMU, Marine Technician
14. Dr. Richard Rotter, Princeton University, Researcher
15. Mr. Kevin Maillet, RSMAS
16. Mr. Guy Mattheui, RSMAS, Sr. Staff Associate
17. Ms. Kathy Tedesco, UCSB, Research Assistant
18. Mr. Scott Birdwhistle, WHOI
19. Mr. John Goddard, LDGO
20. Mr. Stephany Rubin, LDGO
21. Mr. Robert Wilson, UCSD/SIO/STS/RT, Resident Marine Technician
22. Mr. James Charters, UCSD/SIO/STS/SCG, Computer Technician

1.4 Cruise track and stations

A cruise track is shown, and the sampling plan and timing requirements.



Measurement	Stations	Samples per station	Responsible PI	Measurement Group if applicable
CTD/O_2 (WOCE)	90		Talley	WHOI CTD (Toole)
CTD (WOCE)	18		Talley	WHIO CTD (Toole)
Salinity (WOCE)	90/18	36/24	Talley	WHOI (Toole)
Oxygen (WOCE)	90	36	Talley	WHOI (Toole)
Nutrients (SiO_3,PO_4, NO_2,NO_3)	90	36	Talley	OSU (Gordon) SIO ODF (Swift)
CFC (WOCE)	90	20	Bullister	
CFC (WOCE)	Underway-air		Bullister	
Tritium (WOCE)	20	?	Jenkins	
Helium-3 (WOCE)	20	?	Jenkins	
Helium-3 (WOCE)	20	15	Craig	
CO_2 (JGOFS)	20	40	Keeling	SIO ODF (Swift)
Transmissometer	90		Gardner	
C14 (WOCE)	8	9	Quay	SIO ODF (Swift)
Kr (WOCE)	3	9	Quay	SIO ODF (Swift)
Argon (WOCE)	1	10	Quay	SIO ODF (Swift)
ADCP (WOCE)	Underway		Firing/Hacker	
ADCP (wire-mounted)	?		Firing/Hacker	
ALACE Floats (WOCE)	20		Davis	
Pigments, primary productivity (JGOFS)	28		Marra	

CO_2: 40 samples every 2°

He/trit (Jenkins): 240nm > 10°, 120nm 4°-10°, 60nm 1°-4°, 30nm 0-1° from equator.

He (Craig): 60nm, 16 samples/station