preliminary data report
may 18, 1995

A. Cruise Narrative

A.1 Highlights

A.1.a WOCE designation PR17
A.1.b EXPOCODE 49SU9101/2
A.1.c Chief Scientist Nobuo SATO
Kobe Marine Observatory(KMO)

A.1.d Ship: R/V Shumpu Maru
A.1.e Port of Call Hososima to Kochi
A.1.f Cruise Dates February 24 to February 28,1991

A.2 Cruise Summary

A.2.a Geographic boundaries

A.2.b Total number of stations occupied

A.2.c Floats and drifters deployed

A.2.d Moorings deployed or recovered

A.3 List of Principal Investigators

Table 1: Principal Investigators for All Measurements

Name	Responsibility	Affiliation
Nobuo SATO	Oxygen, Nutrients	KMO
Ryohei OKADA	CTD, S	KMO

A.4 Scientific Programme and Methods

The ship departed Hososima on February 24,1991, and made 6 CTD/rosette stations of a section PR17. 4 XBT stations were made between CTD/rosette stations. To first CTD/rosette station the ship reached at 1905 UTC on February 24, from last station departed at 2030 UTC on February 25.

The CTD is EG&G NBIS Mark III B(6500 db type, no oxygen sensor). Water samples were collected from 1.7 liter Niskin bottles mounted on the General Oceanics Rosette multisampler. However, surface water samples were collected by a bucket.

A.5 Major Problems and Goals Not Achieved

A.6 Other incidents of Note

A.7 List of Cruise Participants

Table 2: Cruise Participants for leg 3

Name	Responsibility	Affiliation
Nobuo SATO	Chief Scientist Oxygen, Nutrients	KMO
Ryohei OKADA	CTD Hardware	KMO
Toshihiko YANO	Oxygen, Nutrients	KMO
Syunta NAITOO	CTD Software	KMO
Akiyoshi AWANO	Oxygen, Nutrients	KMO

Keiichi SATO	Watch Stander	KMO
Masayoshi ISHII	Watch Stander	KMO
Satoru YAMAGUCHI	Watch Stander	KMO
Hiroki SUZUKI	Oxygen, Nutrients	KMO

B. Underway Measurements

B.1 Navigation and bathymetry
B.2 Acoustic Doppler Current Profiler (ADCP)
B.3 Thermosalinograph and underway dissolved oxygen, fluorometer, etc
B.4 XBT and XCTD
B.5 Meteorological observations
B.6 Atmospheric chemistry

C. Hydrographic Measurements

CTD

The CTD is EG&G NBIS Mark III B(6500 db type, no oxygen sensor). A HP 9000 Series 300 model 330(Hewlett Packard) with a 4 MByte of memory was used as the primary data collection device.

The temperature and pressure sensor were calibrated at the calibration facility of HAKUTO CO., LTD before the cruise. The results are shown in Table 3. However, no correction with these results has been made because the correction method are not established.

Table 3: The temperature and pressure sensor calibration constants

Temperature		
Time	Bias	Slope
January 28(pre-cruise)	-0.0101126	0.9998815
Pressure (increasing)		
Time	Bias	Slope
February 4(pre-cruise)	-6.0676	1.000512
Pressure (decreasing)		
Time	Bias	Slope
February 4(pre-cruise)	-10.0073	1.001266

The conductivity sensor were calibrated at sea using data from the analyses of salinity collected at 3 stations of before leg. The salinometer is AUTOLAB model 1601 for the analyses of salinity of the water samples. The calibration constant is determined assuming that the bias 0. The results are shown in Table 4.

Table 4: The conductivity sensor calibration constants

Bias	Slope
0	0.99999

Oxygen Measurements

The determination of dissolved oxygen was done by the modified version of the Winkler method described in "Kaiyo Kansoku Shishin (Manual of Oceanographic Observation)" published by the Oceanographical Society of Japan(1970). The reagent blank was not subtracted. No estimation of accuracy and precision has been done.

Nutrients Analyses

The nutrients analyses were done by the Technicon Auto Analyzer II described in "Kaiyo Kansoku Shishin (Manual of Oceanographic Observation)" published by the Oceanographical Society of Japan(1970). No estimation of accuracy and precision has been done.

D. Acknowledgments
E. References

Unesco, 1983. International Oceanographic tables. Unesco Technical Papers in Marine Science, No. 44.

Unesco, 1991. Processing of Oceanographic Station Data, 1991. By JPOTS editorial panel.

F. WHPO Summary

Several data files are associated with this report. They are the su9102.sum, su9102.hyd, su9102.csl and *.wct files. The su9102.sum file contains a summary of the location, time, type of parameters sampled, and other pertient information regarding each hydrographic station. The su9102.hyd file contains the bottle data. The *.wct files are the ctd data for each station. The *.wct files are zipped into one file called su9102wct.zip. The su9102.csl file is a listing of ctd and calculated values at standard levels.

The following is a description of how the standard levels and calculated values were derived for the su9102.csl file:

Salinity, Temperature and Pressure: These three values were smoothed from the individual CTD files over the N uniformly increasing pressure levels. using the following binomial filter-

$$t(j) = 0.25ti(j-1) + 0.5ti(j) + 0.25ti(j+1) \quad j=2....N-1$$

When a pressure level is represented in the *.csl file that is not contained within the ctd values, the value was linearly interpolated to the desired level after applying the binomial filtering.

Sigma-theta(SIG-TH:KG/M3), Sigma-2 (SIG-2: KG/M3), and Sigma-4(SIG-4: KG/M3): These values are calculated using the practical salinity scale (PSS-78) and the international equation of state for seawater (EOS-80) as described in the Unesco publication 44 at reference pressures of the surface for SIG-TH; 2000 dbars for Sigma-2; and 4000 dbars for Sigma-4.

Gradient Potential Temperature (GRD-PT: C/DB 10-3) is calculated as the least squares slope between two levels, where the standard level is the center of the interval. The interval being the smallest of the two differences between the standard level and the two closest values. The slope is first determined using CTD temperature and then the adiabatic lapse rate is subtracted to obtain the gradient potential temperature. Equations and Fortran routines are described in Unesco publication 44.

Gradient Salinity (GRD-S: 1/DB 10-3) is calculated as the least squares slope between two levels, where the standard level is the center of the standard level and the two closes values. Equations and Fortran routines are described in Unesco publication 44.

Potential Vorticity (POT-V: 1/ms 10-11) is calculated as the vertical component ignoring contributions due to relative vorticity, i.e.

pv=fN2/g, where f is the coriolius parameter, N is the bouyancy frequency (data expressed as radius/sec), and g is the local acceleration of gravity.

Bouyancy Frequency (B-V: cph) is calculated using the adiabatic leveling method, Fofonoff (1985) and Millard, Owens and Fofonoff (1990). Equations and Fortran routines are described in Unesco publication 44.

Potential Energy (PE: J/M2: 10-5) and Dynamic Height (DYN-HT: M) are calculated by integrating from 0 to the level of interest. Equations and Fortran routines are described in Unesco publication, Processing of Oceanographic station data.

Neutral Density (GAMMA-N: KG/M3) is calculated with the program GAMMA-N (Jackett and McDougall) version 1.3 Nov. 94.

G. Data Quality Evaulation