WFP Ref. No: PR01/P02
Last Updated: February 9, 1996

A. Cruise Narrative

A.1 Highlights

A.1.a WOCE designation: PR01
PR02

A.1.b EXPOCODE: 49RY9201_2
49RY9201_1

A.1.c Chief Scientist: Michio Hirota,
Japan Meteorological Agency,
1-3-4, Otemachi, Chiyoda-ku,
Tokyo 100, Japan

A.1.d Ship: R/V Ryofu Maru

A.1.e Ports of call: Leg 1: Tokyo, Japan to Marakal, Parau
Leg 2: Marakal, Parau to Naha, Japan

A.1.f Cruise dates: Leg 1: January 18, 1992 to February 5, 1992
Leg 2: February 10, 1992 to February 19, 1992

A.2 Cruise Summary Information

A.2.a Geographic boundaries

A.2.b Stations occupied

Observations of PR2 were carried out as part of the R/V Ryofu Maru cruise RY9201 Leg 1, and those of PR1 were Leg 2.

Number of Stations

A total of 33 CTD/rosette stations for PR2 and 17 stations for PR1 was occupied using a General Oceanics 12 bottle rosette equipped with 12 1.7-liter Niskin water sample bottles, and an NBIS MK III B CTD. No additional sensors were used with the CTD system.

Sampling

The following water sample measurements were made:
salinity, oxygen, nitrate, nitrite and phosphate on all stations.
The depths sampled were: 10, 25, 50, 75, 100, 125, 150, 175, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1250, 1500, 2000, 2500, 3000, 4000 in meters on PR2. The samples were taken at shallower depths than 1250m on PR1 except station RY8135. Surface water samples were collected by a bucket at every station.

A.2.c Floats and drifters deployed

A.2.d Moorings deployed or recovered

A.3 List of Principal Investigators

The principal investigators responsible for each parameter measured on the cruise are listed in Table 1. (All the

correspondence on these data should be addressed to the Director of the Oceanographical Division, Marine Department, Japan Meteorological Agency.)

Table 1. Principal Investigators for all measurements.

Name	Responsibility	Affiliation
H. Minami	CTD, S	JMA/MD
K. Fushimi	O2, Nutrients	JMA/MD

JMA/MD Marine Department, Japan Meteorological Agency

2. Measurement Techniques and Calibrations

2.1 CTD

The CTD is NBIS Mark III B. An HP9000 Series 300 model 330 (Hewlette Packard) with 4 MByte of memory was used as the primary data collection device and all FSK signals of CTD data were backed up using the digital audio tape (DAT). The original sampling rate is 31.25 samples per second, however, our software gets around 20 samples per second and compress these into one tenth of collected data.

The temperature and pressure sensor were calibrated at the calibration facility of SEA Co., Ltd. before the cruise. The results are shown in Table 2.

Table 2. CTD Calibration contents at laboratory

	Temperature; linear fit		
	Time	Bias	Slope
Pre-Cruise	(1 January 1992)	+0.2265	0.999888

	Pressure(increase); linear fit		
	Time	Bias	Slope
Pre-Cruise	(6 January 1992)	-1.7815	1.000931

The conductivity sensor was calibrated at sea using data from the measurements of salinity collected at 15 stations on PR2 and 5 stations on PR1. The salinometer is Guildline Portasal model 8410 for the measurements of salinity of the water samples. We used the batch P110 and P111 of IAPSO as standard sea water to calibrate the salinometer. The calibration factor of conductivity sensor was heavily depending on the pressure, we used the third-ordered polynomial as function of pressure to correction as follows for PR2 and station RY8135 on PR1. The calibration function is determined assuming that the bias zero. The results are shown in Table 3. We lost the calibration value for RY8086-8118, so the table is left as the blank.

$$C(\text{correction}) = Cf(P) \times C(\text{CTD}) \quad (1)$$

where

$$Cf(P) = A + B \times P + C \times P^2 + D \times P^3 \quad (2)$$

	A	B (x10^-6)	C (x10^-9)	D (x10^-13)
RY8086-8118				

RY8119-8134	0.99969	0.0	0.0	0.0
RY8135	0.9994691	0.2852447	-.1210456	0.1114588

Table 3. The conductivity scaling factor

The temperature in "-.SEA" and "-.CTD" files are described with the international temperature scale of 1990 (ITS-90).

2.2 Oxygen Measurements

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

Because no temperature data when samples were taken from bottles are recorded, it was assumed that the density of samples is 1022.156 kg/m3 (which assume the temperature for 28 degree C and salinity for 34.68) and use this value to convert from umol/l to umol/kg.

2.3 Nutrients Analyses

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

Because no temperature data while analyses are recorded, it was assumed that the density of samples is 1022.156 kg/m3 (which assume the temperature for 28 degree C and salinity for 34.68) and use this value to convert from umol/l to umol/kg.

2.4 Noted for the -.SUM, -.SEA and -.CTD files

2.4.1 -.SUM

The positions of observation stations were recorded at the beginning and end of the observation and these values were only recorded in minutes, we describe the averaged position as the bottom (BO).

Since the surface water samples were taken by a stainless steel water bucket, "Number of bottle" includes this bucket sampling.

2.4.2 -.SEA

Our following parameters have the less precision than the required, we describe the last digit of data as blank to meet the data format: CTD temperature, CTD salinity, salinity, oxygen and nitrates.

2.4.4 -.CTD

CTD temperature and salinity data have the less precision than the required, we describe the last digit of data as blank to

meet the data format.

The number of samples averaged at the pressure level was not available because our software was not recording the number of data during data processing.

3. References

Japan Meteorological Agency, 1970: Kaiyo Kansoku Shishin (Manual on Oceanographic Observation). (in Japanese)