

1. Cruise Narrative

1.1 Highlights

Expedition Designation(EXPOCODE): 49RY9111/1

Chief Scientist: Akihiro Kikuchi,
Japan Meteorological Agency,
1-3-4, Otemachi, Chiyoda-ku,
Tokyo 100, Japan

Ship: R/V Ryofu Maru

Ports of Call:
Leg 1: Tokyo, Japan to Shimizu, Japan

Cruise Dates:
Leg 1: November 15, 1991 to December 1, 1991

1.2 Cruise Summary

Cruise Track

The cruise track and station locations are shown in Figure 1. Observations of PR3 were carried out as part of the R/V Ryofu Maru cruise RY9111 Leg 1.

Number of Stations

A total of 13 CTD/rosette stations 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, 250, 300, 400, 500, 600, 700, 800, 900, 1000, 1250, 1500, 2000, 2500, 3000, 4000 in meters. Surface water samples were collected by a bucket at every station.

1.3 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.)

Name	Responsibility	Affiliation
H. Minami	CTD, S	JMA/MD
K. Fushimi	O ₂ , Nutrients	JMA/MD

JMA/MD Marine Department, Japan Meteorological Agency

Table 1. Principal Investigators for all measurements.

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 HAKUTO Co., Ltd. before the cruise. The results are shown in Table 2.

Temperature; linear fit		
Time	Bias	Slope
Pre-Cruise (12 January 1991)	+0.1246	0.999874

Pressure(increase); linear fit		
Time	Bias	Slope
Pre-Cruise (16 January 1991)	-0.8331	1.000787

Table 2. CTD Calibration contents at laboratory

The conductivity sensor was calibrated at sea using data from the measurements of salinity collected at 4 stations. The salinometer is Guildline Portasal model 8410 for the measurements of salinity of the water samples. We used the batch P112 of IAPSO as standard sea water to calibrate the salinometer. The results are shown in Table 3. The calibration constant is determined assuming that the bias zero.

	Bias	Slope
RY8061-8073	0.0	0.99930

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 of Oceanographic Observation). (in Japanese)