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Tropical Ocean Climate Study (TOCS)

KY9709 Cruise Report

Japan Marine Science and Technology Center

CONTENTS

1. Cruise Summary

Ship	:	R/V KAIYO
Chief Investigator	:	Kunio Yoneyama (Leg−1) Kentaro Ando (Leg−2) (Japan Marine Science and Technology Center)
Cruise Code	:	KY9709
Project Title	:	Tropical Ocean Climate Study
Period	:	August 2, 1997 − August 29, 1997
Ports of call	:	Guam, U.S.A. Truk (Chuuk), Federated States of Micronesia Koror, Republic of Palau
Institutions	:	JAMSTEC MWJ (Marine Works Japan) NME (Nippon Marine Enterprise) PMEL (Pacific Marine Environmental Laboratory) BPPT (Badan Pengkajian dan Penerapan Technologi) GODI (Global Ocean Development Inc.)

Purpose :

The purpose of this cruise is to observe the physical oceanographic and atmospheric conditions in and over the tropical western Pacific for better understanding of the air−sea interaction and its relation to the ENSO(El Nino/Southern Oscillation) and global climate change.

Observation Summary :

The TOCS (Tropical Ocean Climate Study) group in Japan Marine Science and Technology Center (JAMSTEC) and Badan Pengkajian dan Penerapan Technologi (BPPT) of Indonesia conducted 47 CTD/DO (Conductivity, Temperature and Depth/ Desolved Oxygen) casts, current measurement by shipboard ADCP and 77 upper air soudings by radiosonde. The four subsurface ADCP mooring lines at 0N156E, 2S142E, 2.5S142E and 0N138E were recovered and deployed during this cruise. The 7 ADCPs are now being moored in the surveyed area (0N165E, 0N156E, 0N147E, 0N142E, 0N138E, 2S142E, 2.5S142E).

The TAO project group in Pacific Marine Environmental Laboratory (PMEL/NOAA) and the TOCS group in JAMSTEC conducted the 2 repairs, 4 recoveries, 5 deployments of ATLAS buoys along the 156E, 147E and 137E line.

Preliminary Results (by Kentaro Ando) :

According to the TAO data in the end of August, rather large positive SST anomaly is found in the eastern Pacific. This is one of characteristics found during the El Nino phenomena. The westerly wind burst, which is also thought to be associated with the El Nino, has occured from the mid of July in the central Pacific. Associated with this westerly burst, strong northward wind was observed during the first leg (see Section 5). After the mid of August, the wind over the western Pacific has moderated, however, rather anomalous ocean surface layer (lower SST and higher SSS than usual) was observed. The data obtained in this cruise may prevail the condition in the developing stage of this large El Nino phenomena in 1997.

The preliminary data from this cruise shows that the sea surface temperature (SST) along 156E shows 28 29 C, and the SST in the western section (142E and 138E) shows 29 30 C (Section 4). The SST along 156E is lower than usual, showing the warm water was moved to eastward. The warm water more than 29 C in the western sections (138E and 142E) is rather shallow (20 40m), which may be caused by the local shortwave (solar) radiation after the July August westerly wind burst. The surface salinity shows lowest (less than 33.6) at 5N156E, at which latitude (5N 10N) cloud band of ITCZ are found from 130E to 180E from GMS images (see Appendix 2). Along the equator, SSS is low (34.4) in the western sites (138 142E) and high (34.6) in the estern sites (147 156E). However, strong east west SSS front, which is usually found in normal year is, not found from the data, suggesting the lack of rainfall in this year.

During the cruise, the surface current along the equator was weak but eastward except for the current at 0N156E. The current data at 0N156E from shipboard ADCP shows the strong east wouthward surface current during the leg 1 (Section 6), which is caused by the July August westerly wind burst. (As the current data from the moored ADCP at 0N156E does not show this responce, the data need to be checked. (Page 7.11 7.13)) The ocean responce to this westerly wind burst was not apearent at 2S142E and 2.5S142E from both shipboard ADCP and moored ADCP data during the cruise (Section 6). The current data from the moored ADCP was almost westward during the period of the July August westerly wind burst (Section 7). Conversely, during the winter 1997, the eastward surface currents developed at 2S 2.5S 142E, which showed its maximum (approximately 1.5m/s) in March 1997 when the strong westerly wind burst occured. The eastward currents was observed down to 100 m during December 1996 and March 1997.

We could observe the atmospher and ocean in the western Pacific during the developing stage of El Nino 1997. The moored and shipboard ADCP data and the CTD casts during KY9709 and K9702 (January–February 1997) cruises may prevail us variability in the western Pacific during developing the 1997–98 El Nino.

Acknowledgement :

We would like to express our special thanks to Captain Hyodo and his crew members of R/V Kaiyo. In spite of the shortness of this cruise, we could conduct rather large number of CTD casts and all mooring works (ADCP and ATLAS) scheduled from the first time. This cruise will not be success without their help.

The instruments (CTD, ADCP Water Sampler etc.) and mooring cables used during the cruise were set up, operated and sometimes repaired by staffs from Marine Works Japan, Nippon Marine Enterprize and Global Ocean Development Inc. Each section in this report were also written by the staffs (Section 11).

2. List of Instruments

(1) CTD (Conductivity-Temperature-Depth profiler)

·SBE9-11 plus system, Sea Bird Electronics, Inc., USA
CTD Fish for 10,500m (TOCS Group)

		Date of Calibration
Primary:	T-sensor SN1462	(29-Mar-1997)
	C-sensor SN1045	(25-Mar-1997)
Secondary:	T-sensor SN1465	(29-Mar-1997)
	C-sensor SN1174	(25-Mar-1997)
P-sensor	SN41223	(24-Sep-1993)
DO-sensor	SN130311	(03-Sep-1996)

(2) Shipboard ADCP (Acoustic Doppler Current Profiler)
VM-75, RD Instruments, USA
(75kHz, 16m bin length, Normal range 560m starting 30m depth)

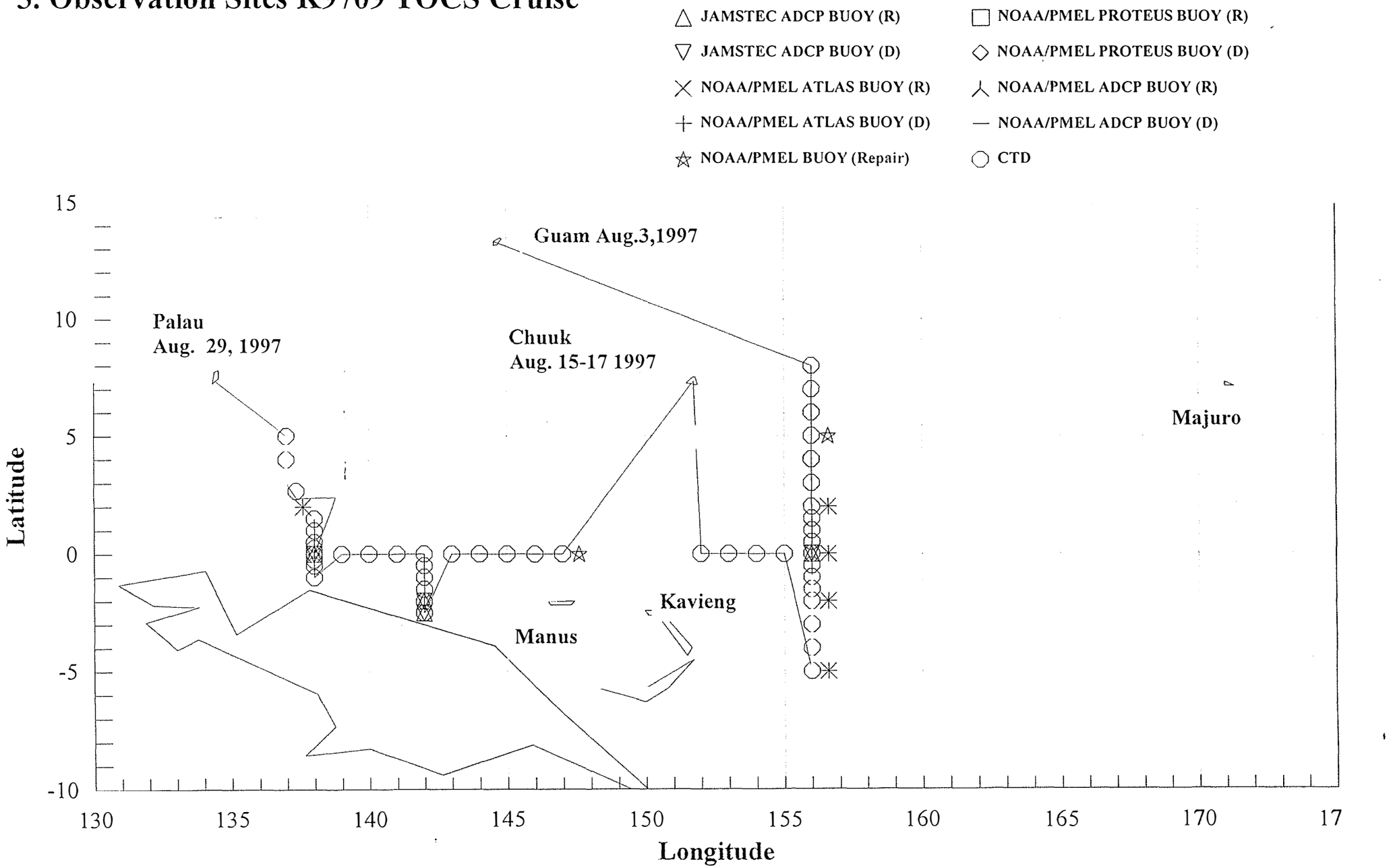
(3) Atmospheric Sounding
·Radio Sonde System, DigiCORA MW11, VAISALA, Finland

(4) Dissolved Oxygen
·TOA Portable Dissolved Oxygen Meter Model DO-25A
·Metrohn Model 726DMS Titrino/ 10ml of titration vessel
·Pt. Electrode/ 6.0401.100
·SBE13, Sea Bird Electoronics, Inc., USA

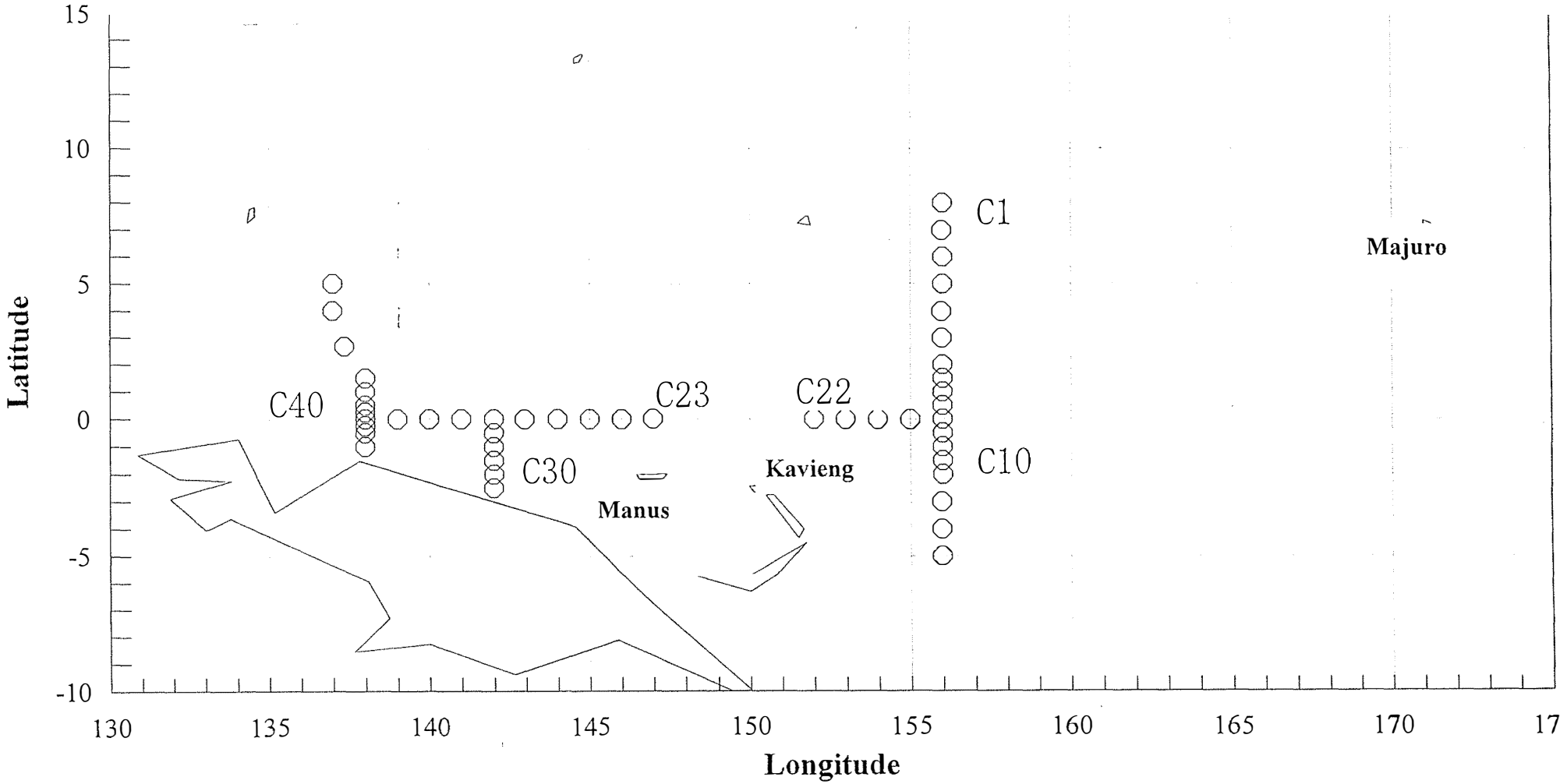
(5) Bottom Salinity
·Guildline Autosal Model8400B

(6) PCO_2 and TCO_2
·The MRI CO_2 Measuring System
·The MRI Coulometric TCO_2 Measuring System

3. Observation Sites K9709 TOCS Cruise



4.1 CTD Sites (K9709)

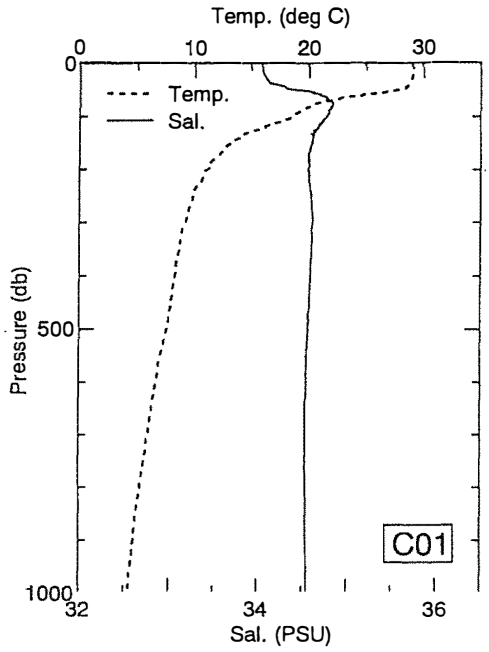


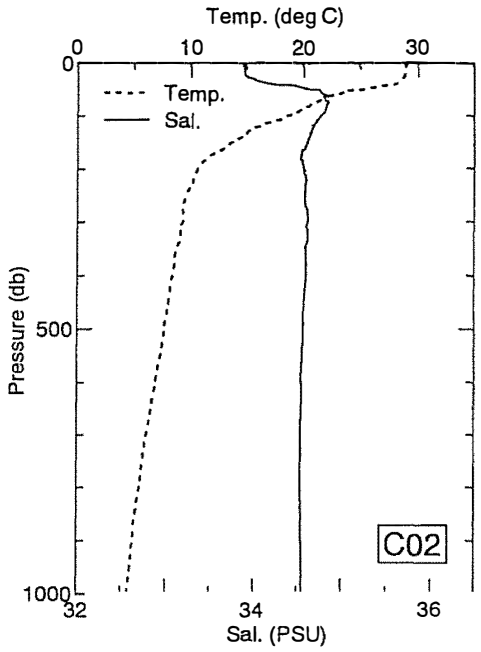
4.2 CTD Cast Table

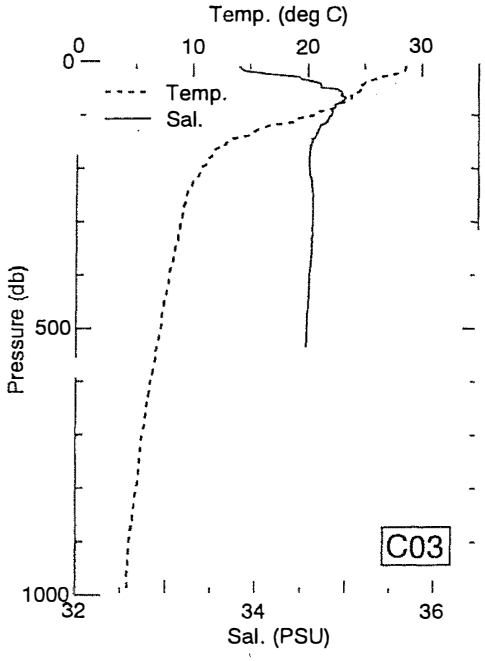
St.	Date	Time(GMT)	Latitude	Longitude
C01	05 Aug.'97	23:25	07° 58.722'N	155° 59.649'E
C02	06 Aug.'97	05:00	07° 00.006'N	156° 00.016'E
C03	06 Aug.'97	10:30	05° 59.839'N	156° 59.897'E
C04	06 Aug.'97	23:43	04° 57.554'N	156° 13.638'E
C05	07 Aug.'97	05:28	03° 59.949'N	156° 00.216'E
C06	07 Aug.'97	11:20	02° 59.960'N	156° 00.127'E
C07	08 Aug.'97	00:51	01° 59.884'N	156° 01.065'E
C08	08 Aug.'97	04:00	01° 30.088'N	155° 59.960'E
C09	08 Aug.'97	07:29	01° 00.065'N	156° 00.000'E
C10	08 Aug.'97	10:48	00° 29.911'N	156° 00.075'E
C11	09 Aug.'97	06:22	00° 01.131'S	155° 59.963'E
C12	09 Aug.'97	09:30	00° 30.017'S	156° 00.038'E
C13	09 Aug.'97	12:42	01° 00.054'S	156° 00.006'E
C14	09 Aug.'97	16:00	01° 29.923'S	156° 00.025'E
C15	10 Aug.'97	04:53	02° 01.191'S	156° 00.387'E
C16	11 Aug.'97	05:53	04° 58.991'S	155° 59.768'E
C17	11 Aug.'97	11:02	03° 59.873'S	156° 00.021'E
C18	11 Aug.'97	16:30	03° 00.067S	156° 00.021'E
C19	12 Aug.'97	09:30	00° 00.154'N	155° 00.049'E
C20	12 Aug.'97	16:05	00° 00.015'S	154° 00.049'E
C21	12 Aug.'97	22:40	00° 00.111'S	152° 59.981'E
C22	13 Aug.'97	05:00	00° 00.119'S	152° 00.008'E
C23	19 Aug.'97	07:23	00° 00.643'S	146° 59.520'E
C24	19 Aug.'97	13:05	00° 00.012'S	145° 59.824'E
C25	19 Aug.'97	18:53	00° 00.003'N	144° 59.975'E
C26	20 Aug.'97	00:25	00° 00.161'S	144° 00.023'E
C27	20 Aug.'97	06:19	00° 00.043'N	142° 59.894'E
C28	21 Aug.'97	02:40	02° 27.000'S	141° 58.648'E
C29	21 Aug.'97	07:52	01° 59.954'S	141° 58.851'E
C30	22 Aug.'97	01:40	01° 29.966'S	142° 00.139'E
C31	22 Aug.'97	04:53	01° 59.960'S	141° 59.930'E
C32	22 Aug.'97	08:08	00° 30.053'S	141° 59.920'E
C33	22 Aug.'97	11:17	00° 00.099'N	142° 00.053'E
C34	22 Aug.'97	16:38	00° 00.070'S	140° 59.883'E
C35	22 Aug.'97	21:51	00° 00.084'S	140° 00.029'E
C36	23 Aug.'97	03:08	00° 00.084'N	138° 59.867'E
C37	23 Aug.'97	10:21	00° 59.932'S	137° 59.838'E
C38	23 Aug.'97	13:36	00° 29.958'S	138° 00.038'E
C39	23 Aug.'97	15:37	00° 14.968'S	137° 59.979'E
C40	23 Aug.'97	17:32	00° 00.062'S	137° 59.909'E
C41	23 Aug.'97	19:28	00° 14.894'N	137° 59.996'E
C42	23 Aug.'97	21:20	00° 29.972'N	137° 59.959'E
C43	24 Aug.'97	00:26	01° 00.052'N	138° 00.742'E
C44	24 Aug.'97	03:27	01° 30.140'N	137° 59.963'E
C45	27 Aug.'97	01:33	02° 26.105'N	137° 24.027'E

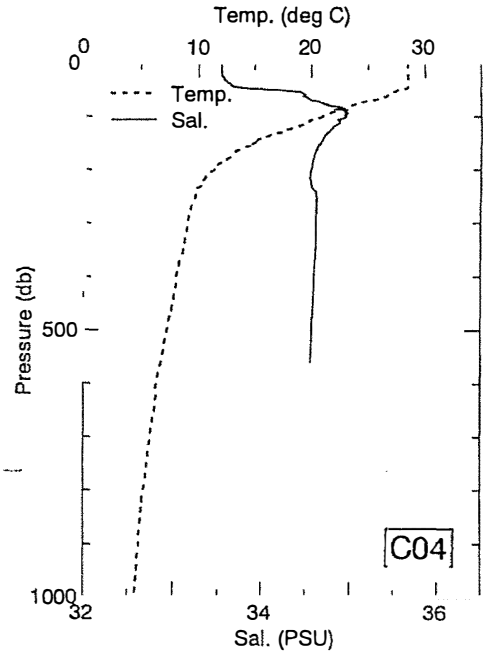
St.	Date	Time(GMT)	Latitude	Longitude
C46	27 Aug.'97	11:10	04° 00.034'N	136° 59.931'E
C47	27 Aug.'97	16:30	05° 00.029'N	137° 00.010'E

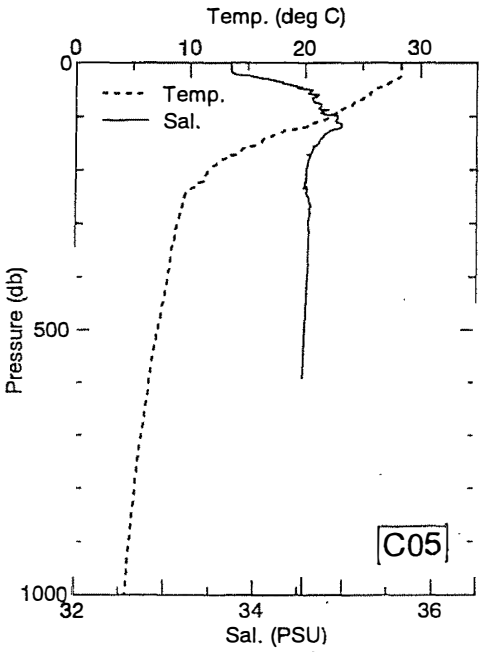
4.3 CTD Profiles







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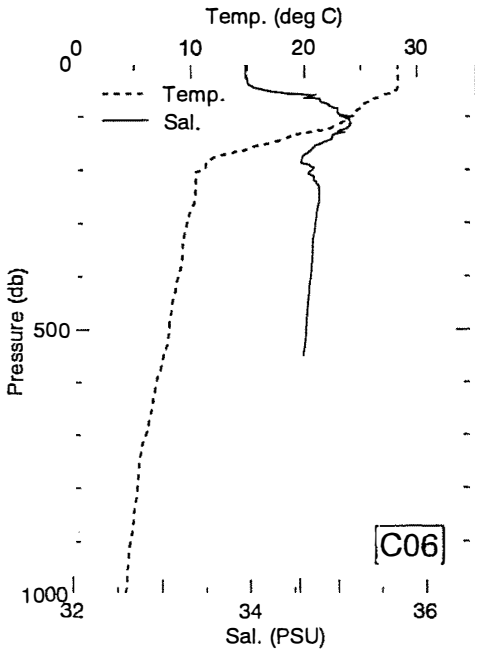
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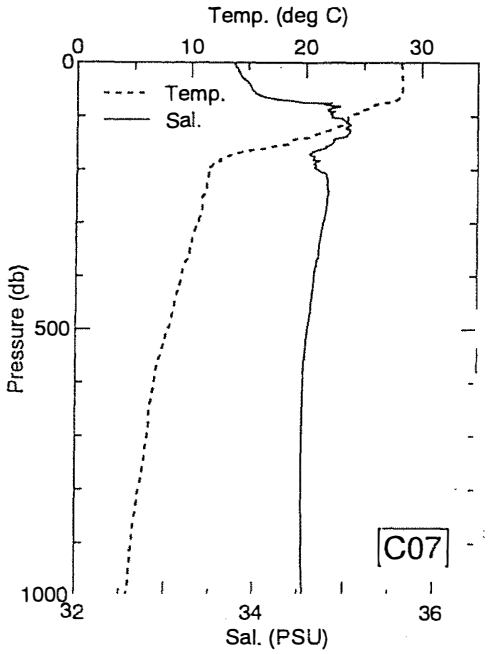
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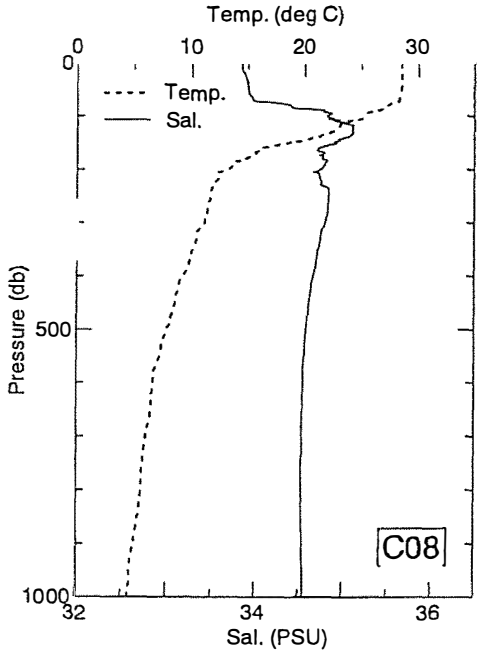
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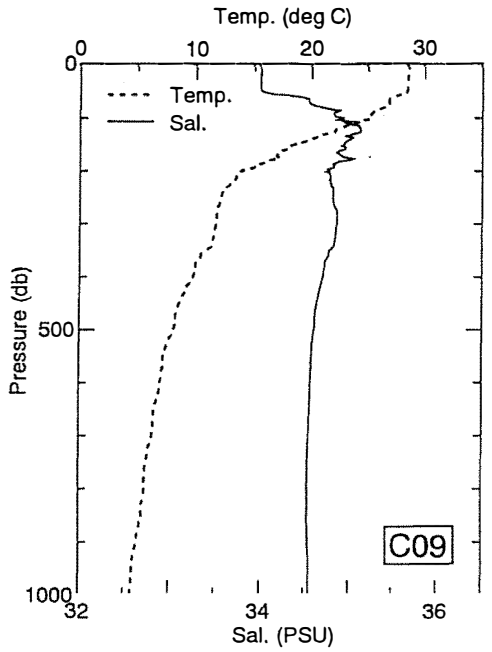
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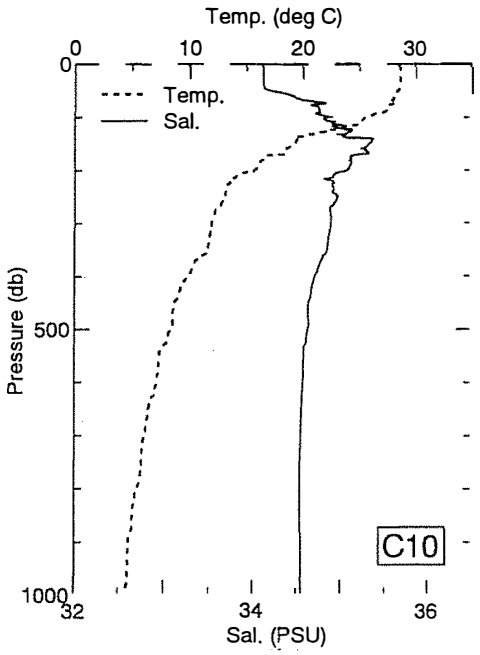
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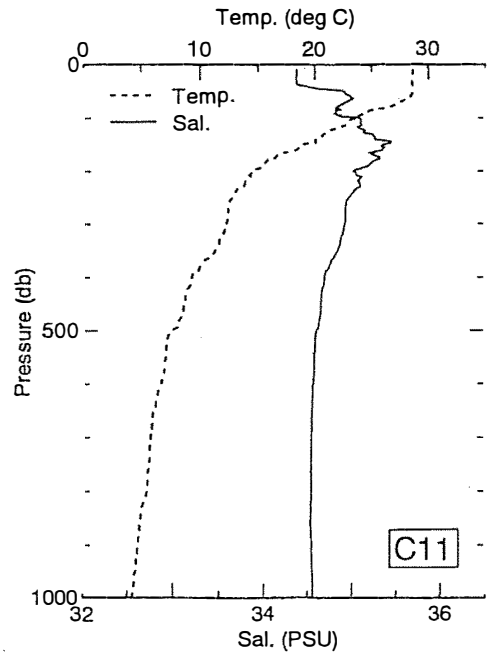
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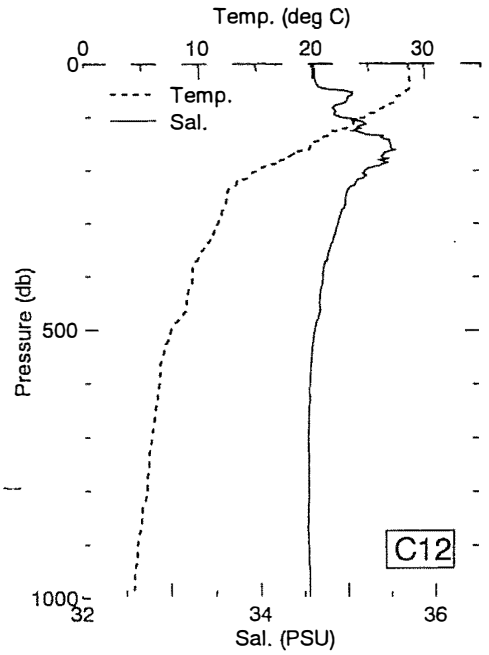
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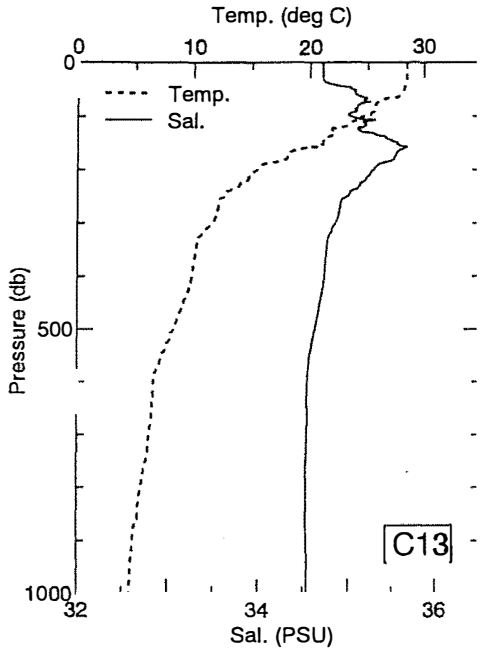
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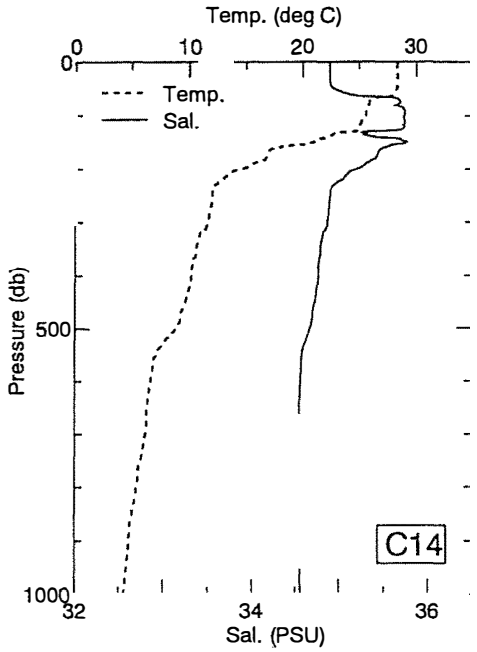
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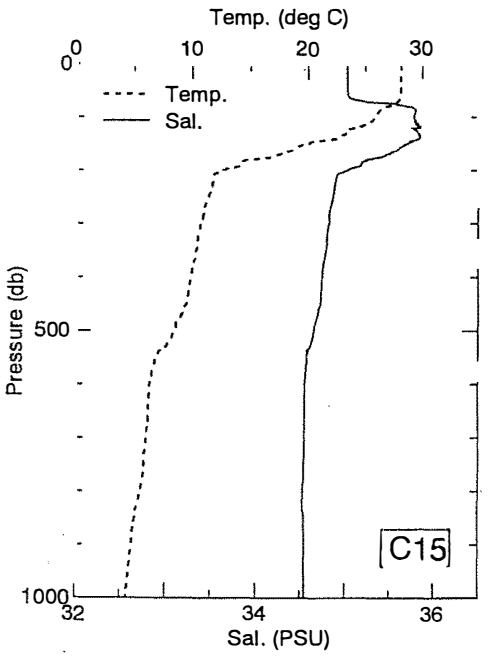
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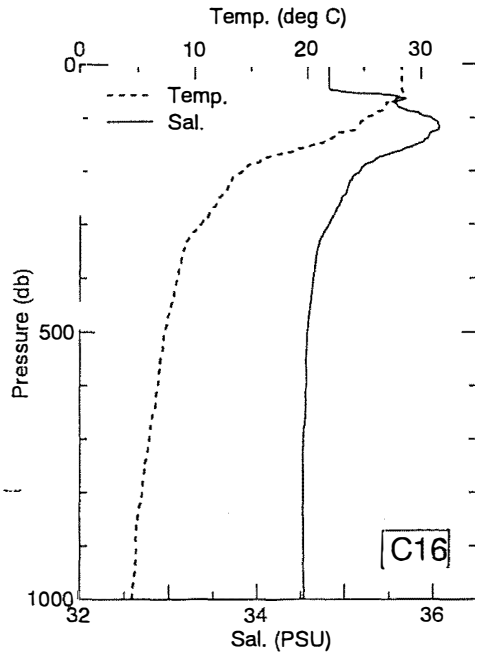
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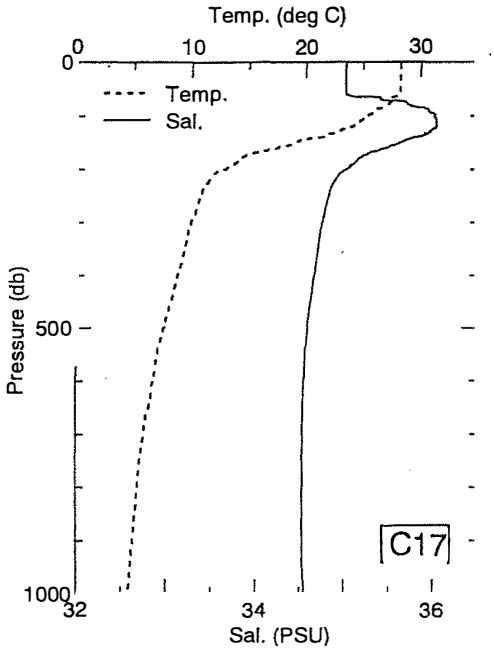
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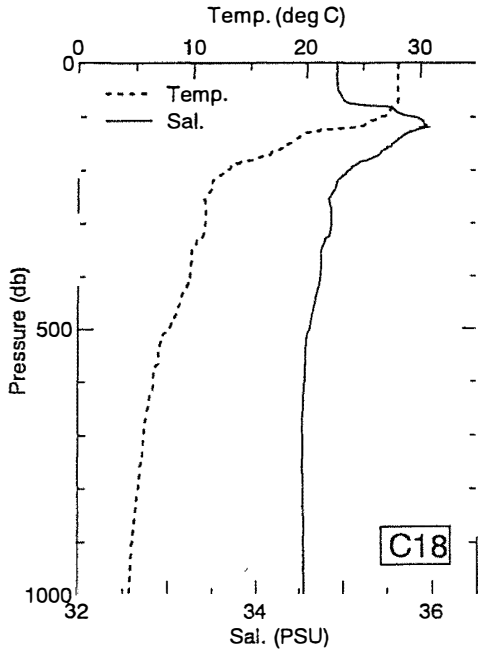
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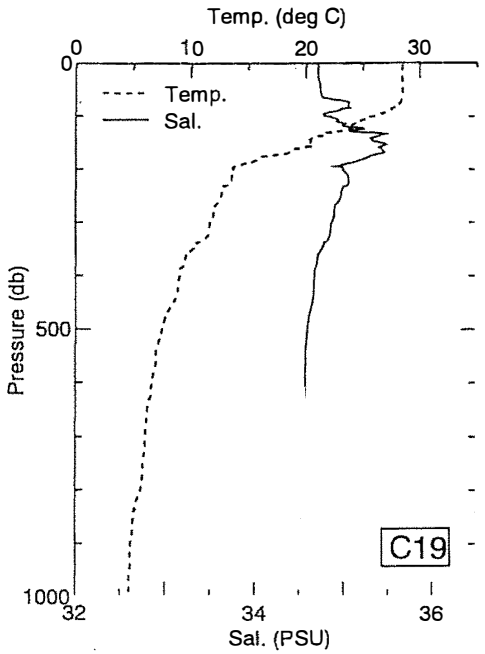
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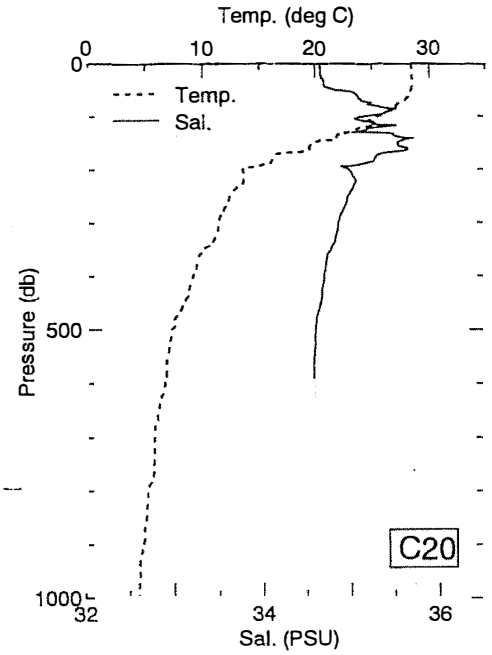
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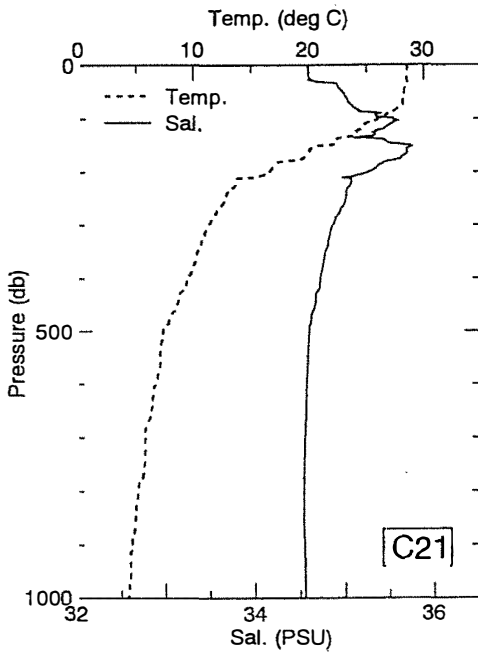
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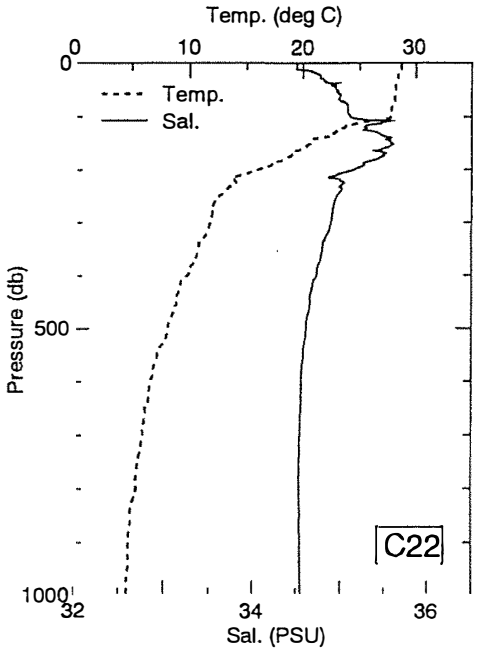
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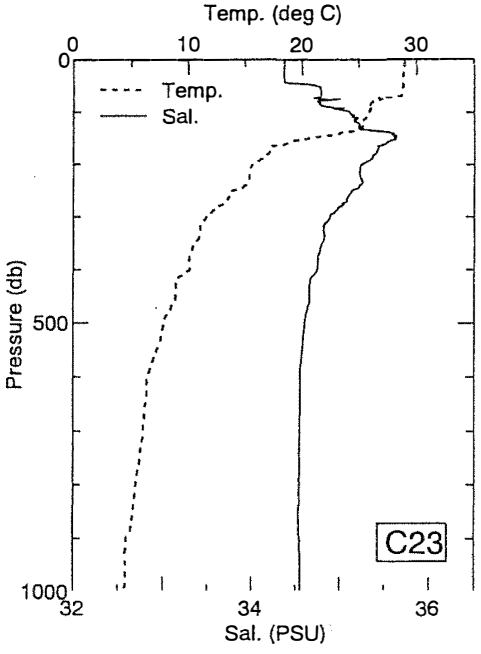
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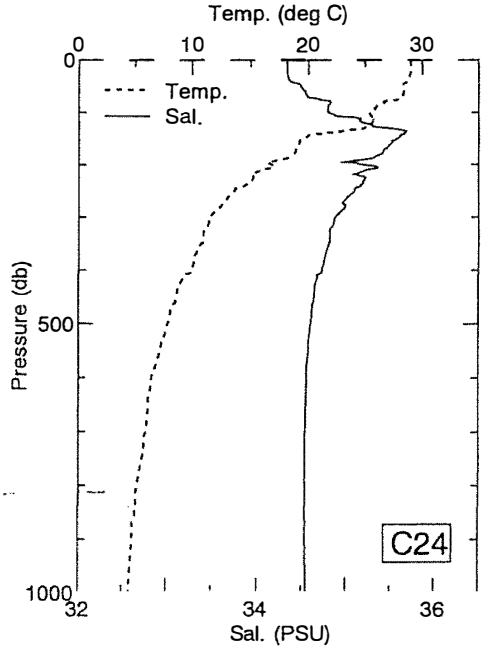
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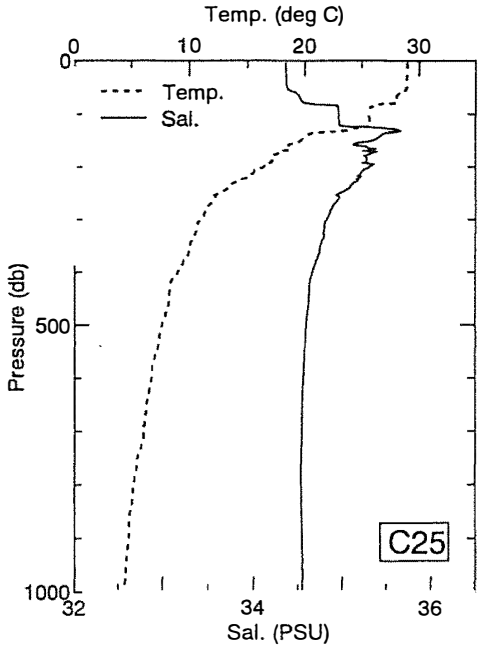
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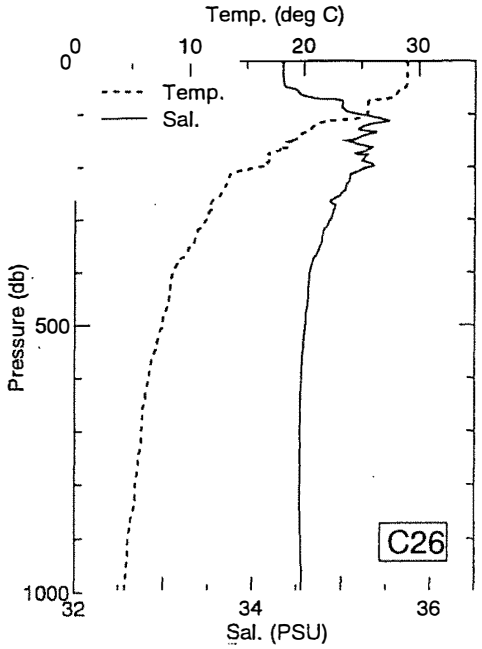
Sal. (PSU)


Temp. (deg C)
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10
20
30
Temp.
Sal.
Pressure (db)
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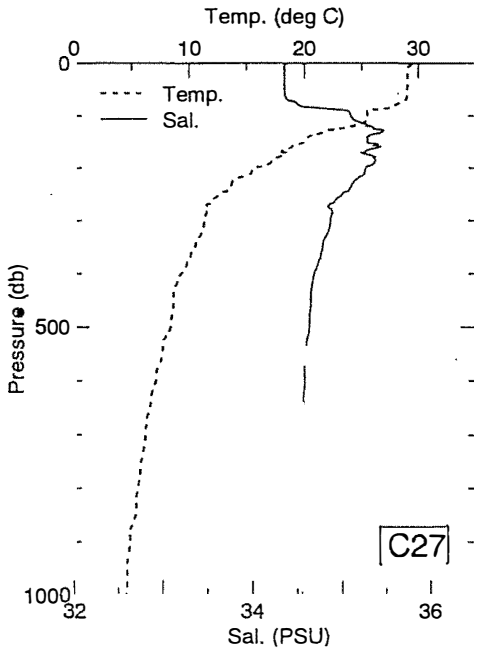
1000
C26
32
34
36
Sal. (PSU)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Temp.
Sal.
Pressure (db)
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1000
C27
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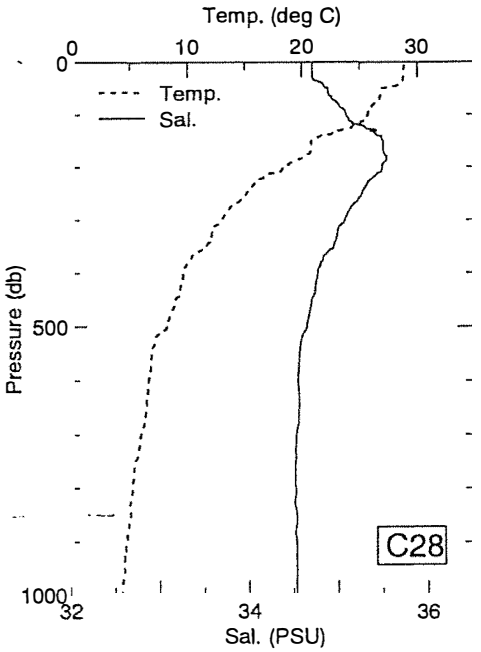
34
36
Sal. (PSU)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30
Temp.
Sal.
Pressure (db)
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1000
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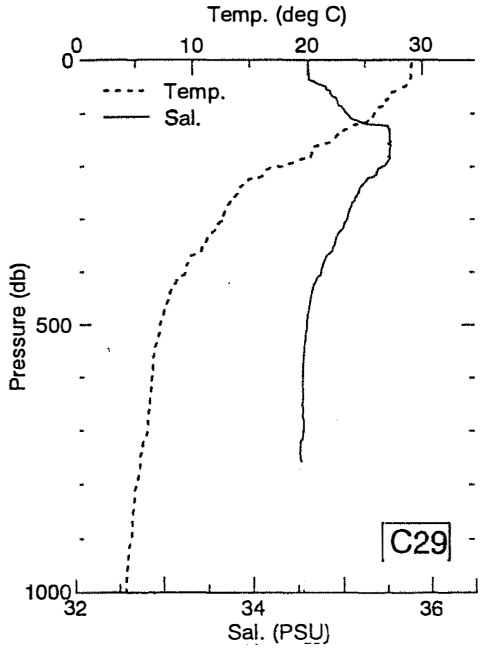
36
Sal. (PSU)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30
Temp.
Sal.
Pressure (db)
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C29
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34
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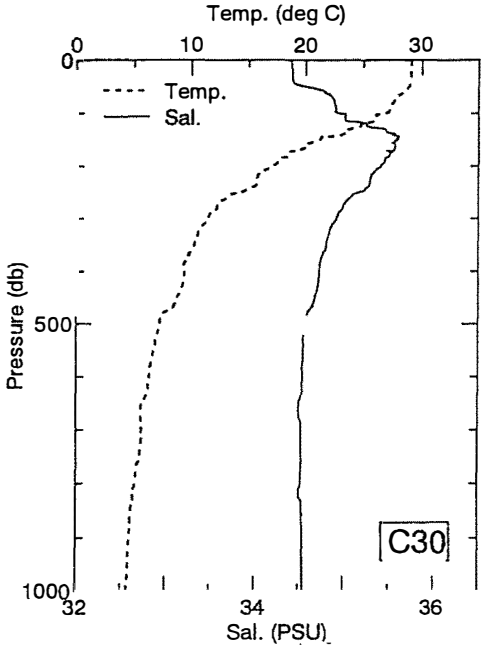
Sal. (PSU)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Temp.
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Pressure (db)
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C30
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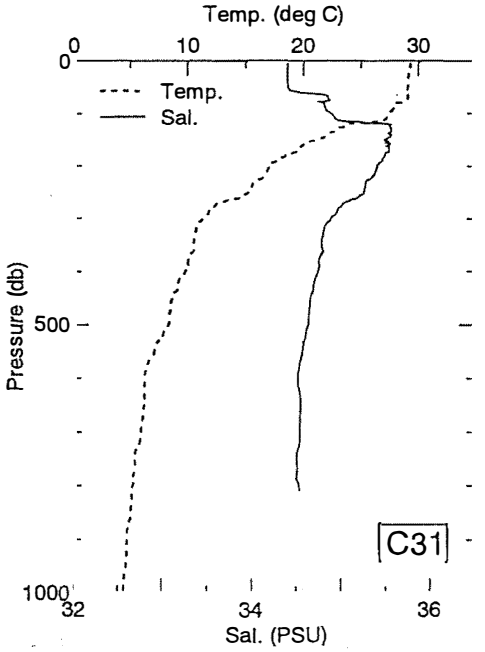
Sal. (PSU)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30
Temp.
Sal.
Pressure (db)
500
1000
C31
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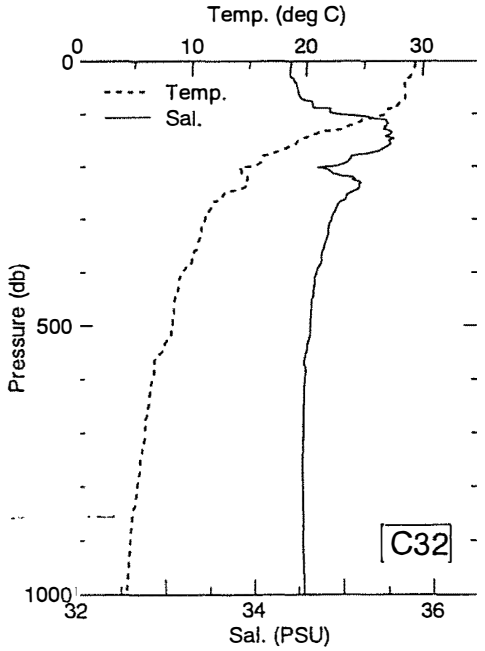
34
36
Sal. (PSU)


Temp. (deg C)
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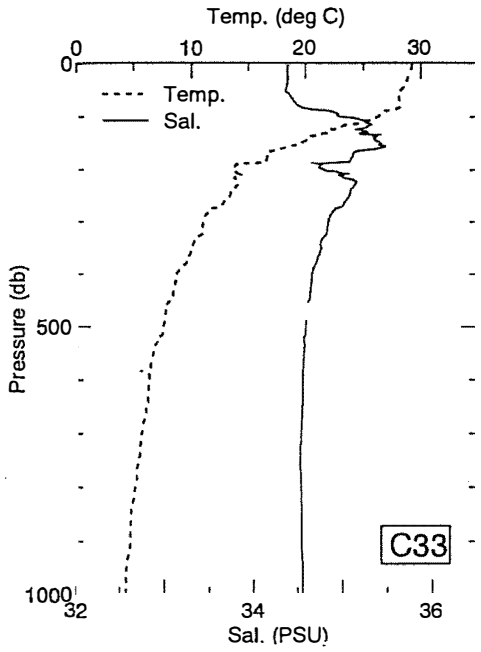
10
20
30
Temp.
Sal.
Pressure (db)
500
1000
C32
32
34
36
Sal. (PSU)


Temp. (deg C)
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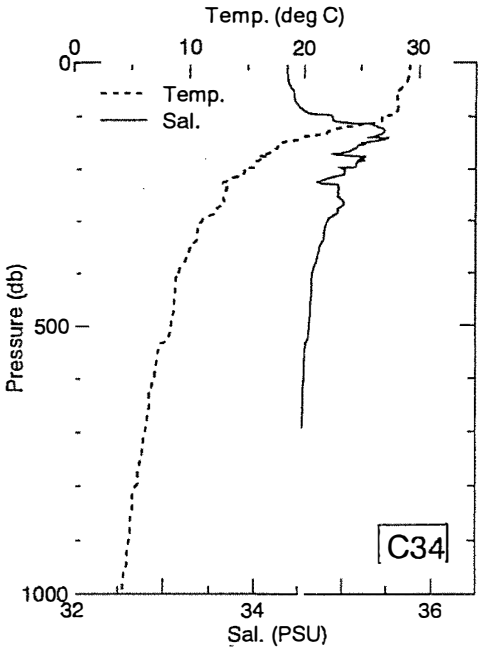
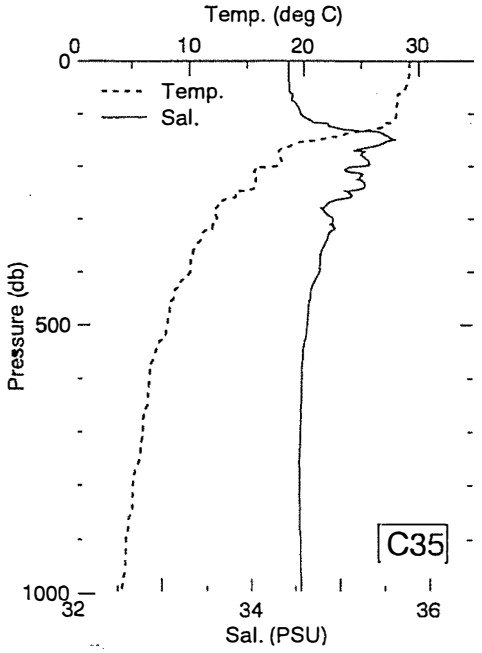
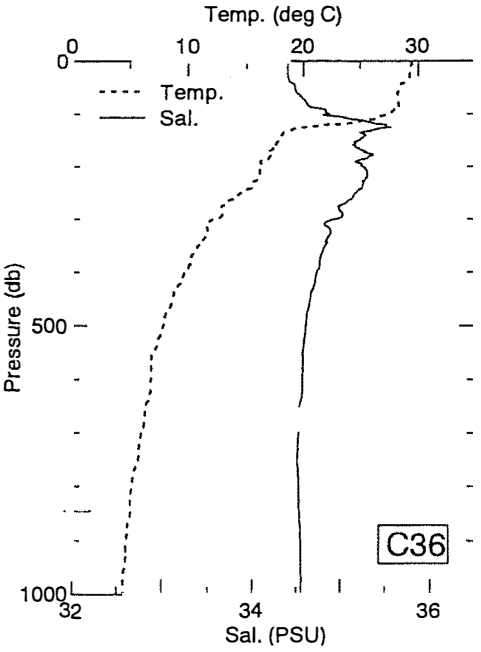
10
20
30
Temp.
Sal.
Pressure (db)
500
1000
C33
32
34
36
Sal. (PSU)


Temp. (deg C)
0
10
20
30
Temp.
Sal.
Pressure (db)
500
1000
C34
32
34
36
Sal. (PSU)


Temp. (deg C)
0
10
20
30
Temp.
Sal.
Pressure (db)
500
1000
C35
32
34
36
Sal. (PSU)


Temp. (deg C)
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10
20
30
Temp.
Sal.
Pressure (db)
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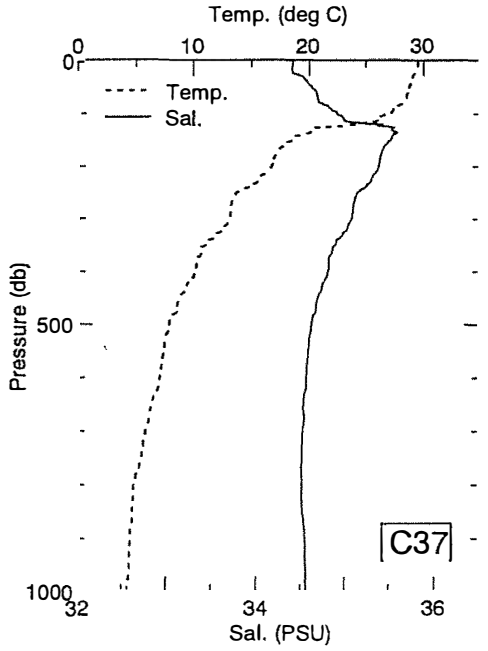
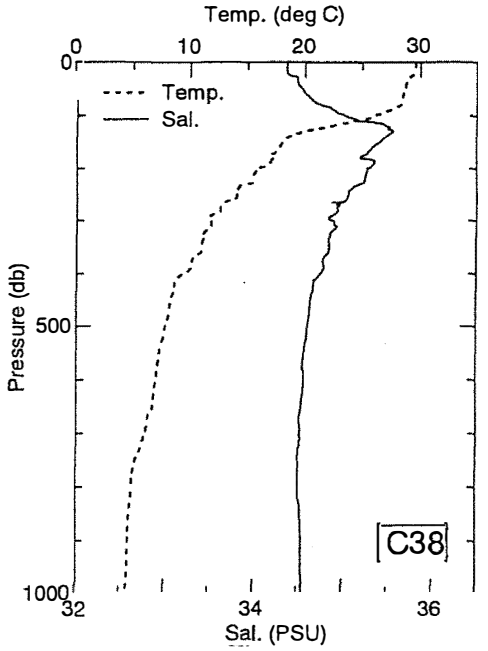
1000
C36
32
34
36
Sal. (PSU)


Temp. (deg C)
0
10
20
30
0
Temp.
Sal.
Pressure (db)
500
1000
C37
32
34
36
Sal. (PSU)


Temp. (deg C)
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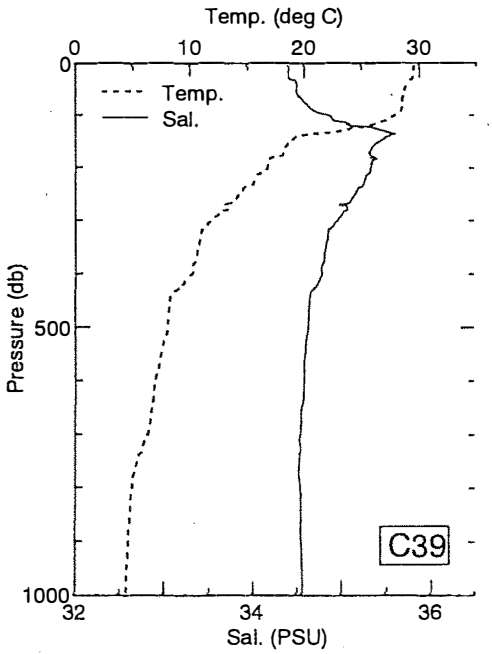
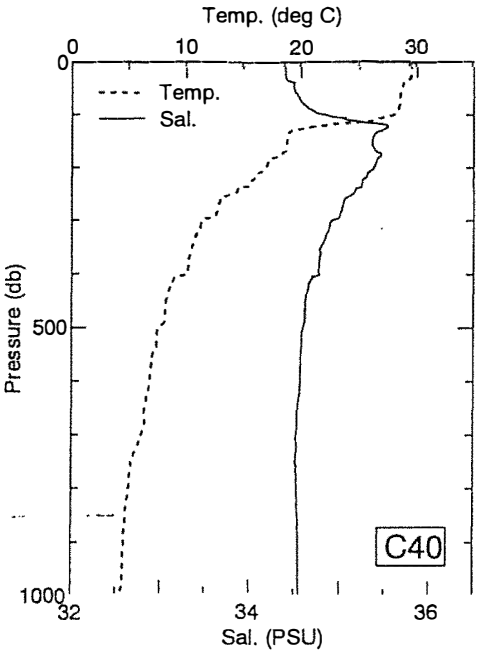
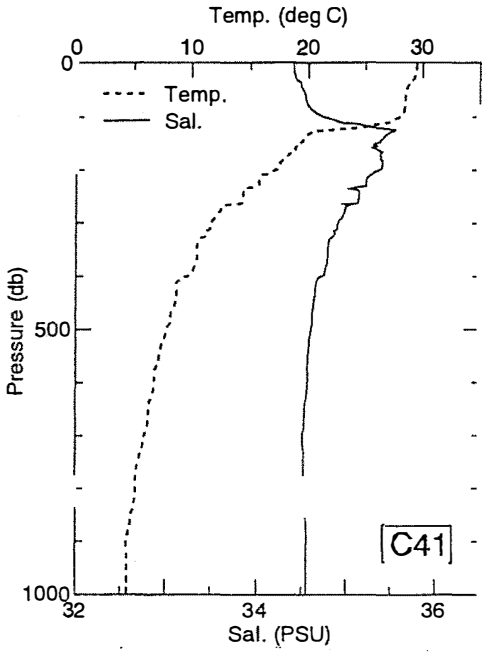
20
30
0
Temp.
Sal.
Pressure (db)
500
1000
C38
32
34
36
Sal. (PSU)


Temp. (deg C)
0
10
20
30
0
Temp.
Sal.
Pressure (db)
500
1000
C39
32
34
36
Sal. (PSU)


Temp. (deg C)
0
10
20
30
0
Temp.
Sal.
Pressure (db)
500
1000
C40
32
34
36
Sal. (PSU)


Temp. (deg C)
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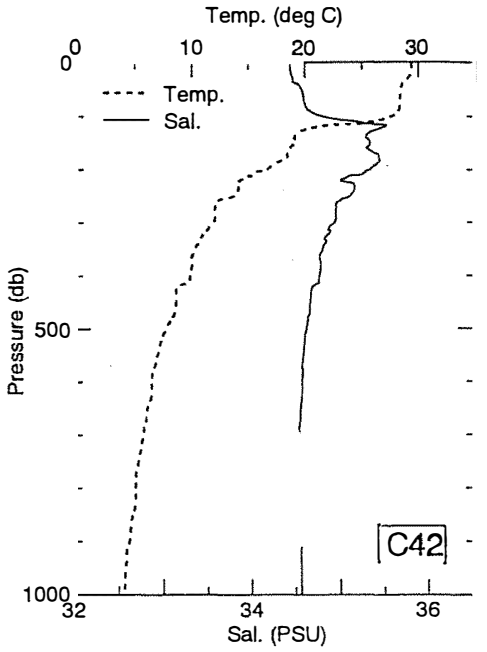
10
20
30
Temp.
Sal.
Pressure (db)
500
1000
C41
32
34
36
Sal. (PSU)


Temp. (deg C)
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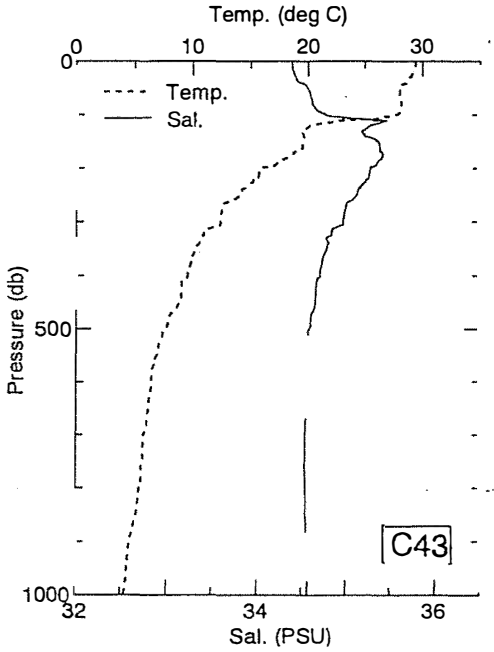
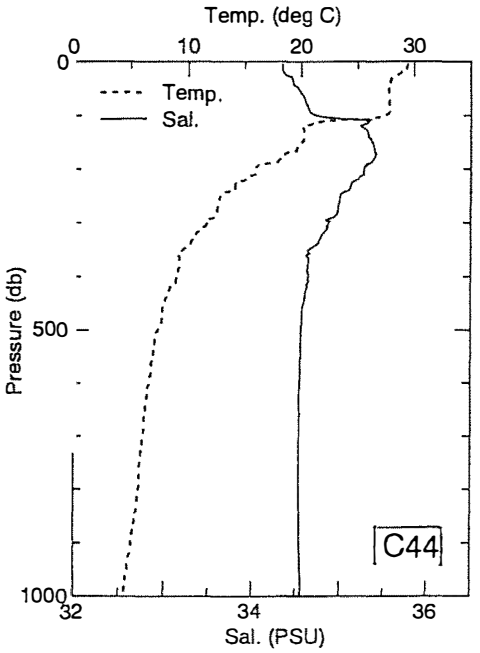
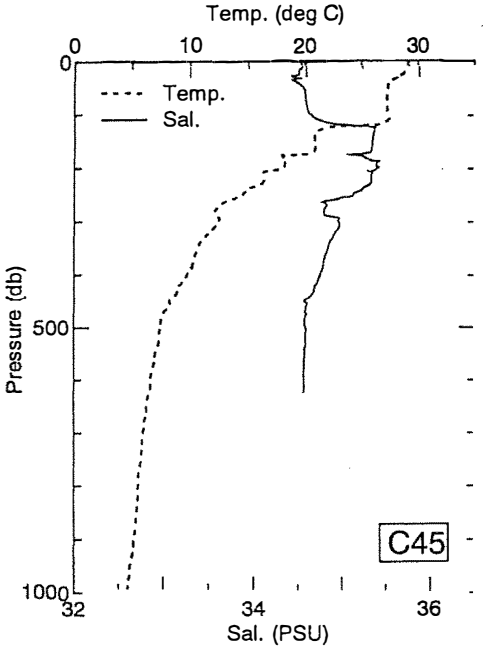
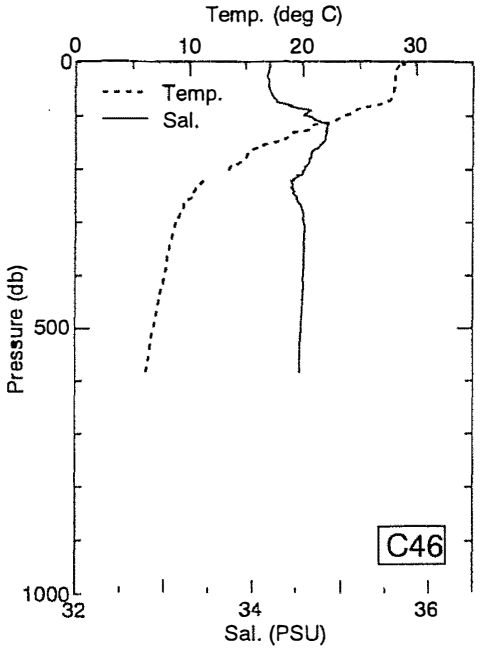
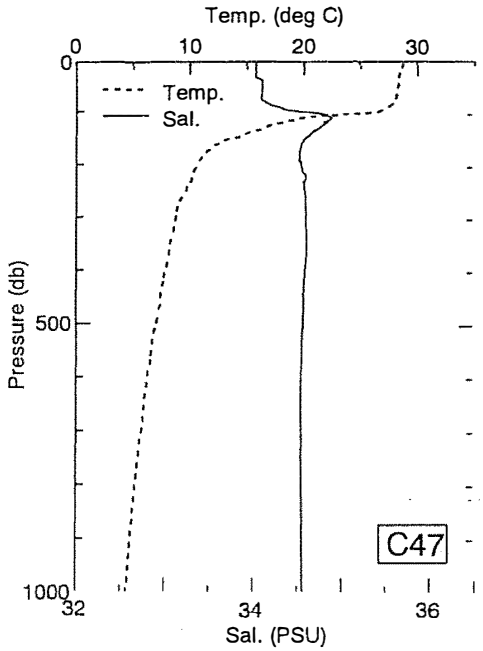
10
20
30
Temp.
Sal.
Pressure (db)
500
1000
C42
32
34
36
Sal. (PSU)


Temp. (deg C)
0
10
20
30
Temp.
Sal.
Pressure (db)
500
1000
C43
32
34
36
Sal. (PSU)

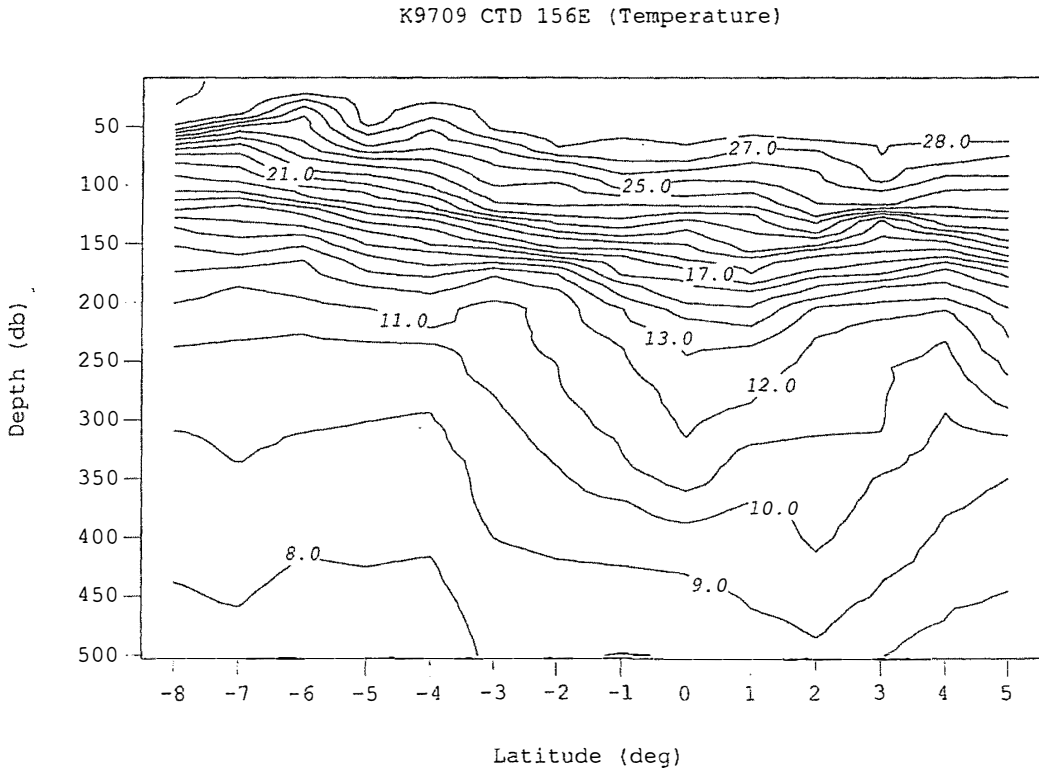

Temp. (deg C)
0
10
20
30
Temp.
Sal.
Pressure (db)
500
1000
C44
32
34
36
Sal. (PSU)

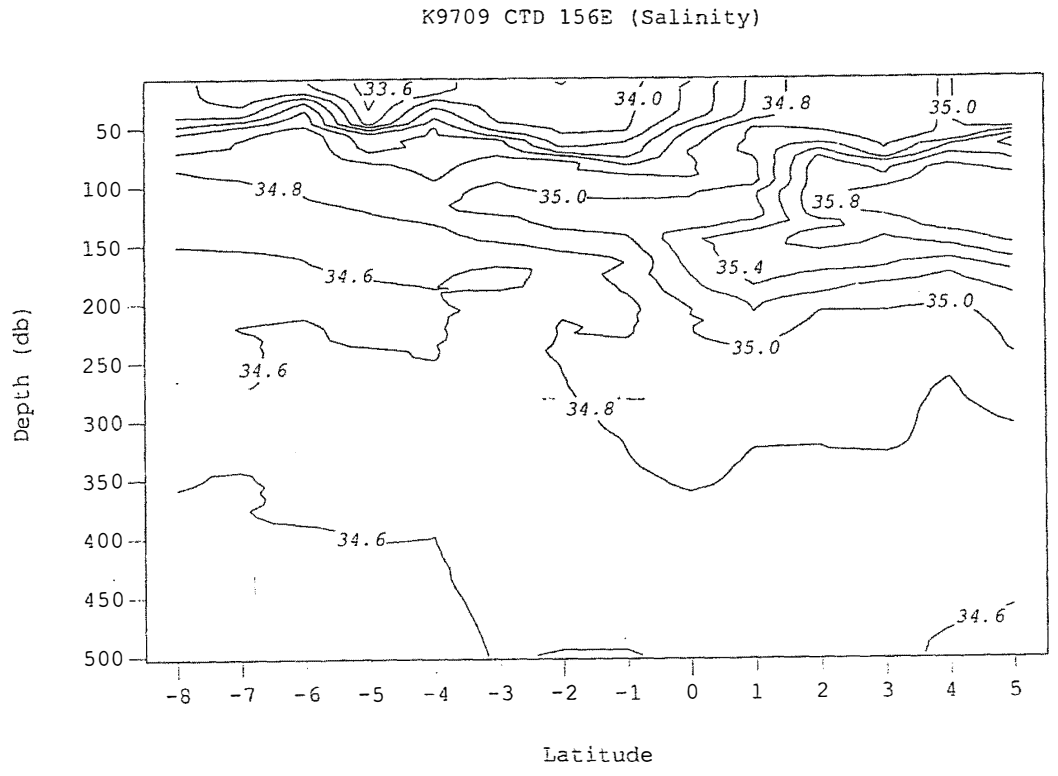

Temp. (deg C)
0
10
20
30
0
Temp.
Sal.
Pressure (db)
500
1000
C45
32
34
36
Sal. (PSU)


Temp. (deg C)
0
10
20
30
0
Temp.
Sal.
Pressure (db)
500
1000
C46
32
34
36
Sal. (PSU)

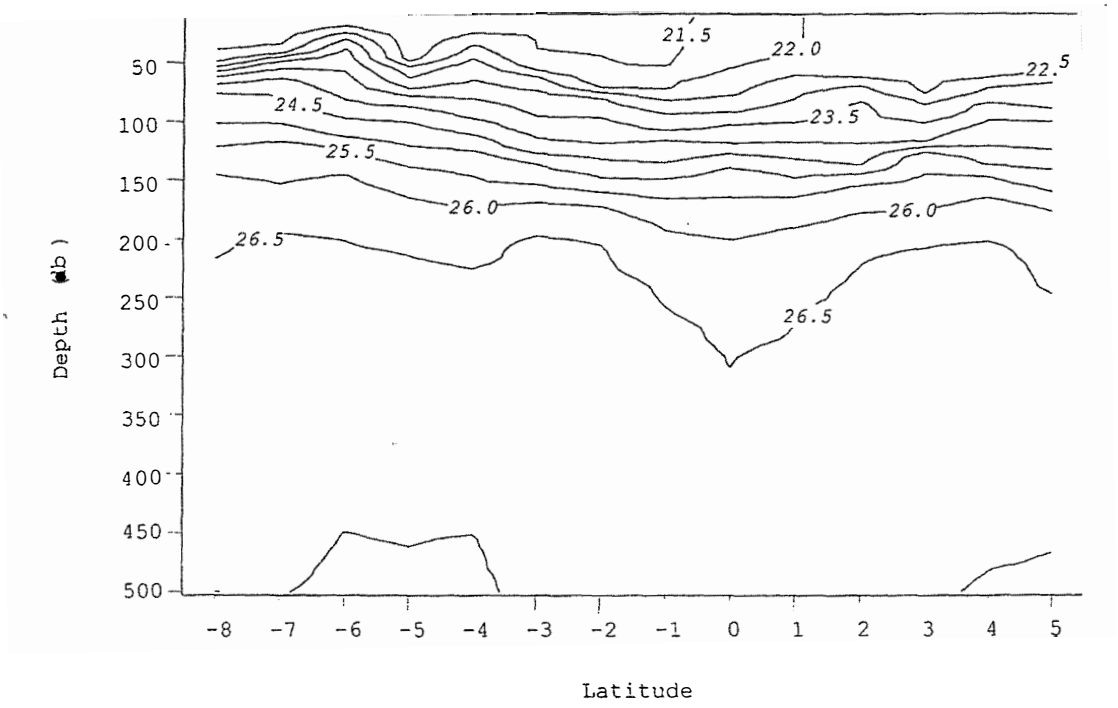

Temp. (deg C)
0
10
20
30
0
Temp.
Sal.
Pressure (db)
500
1000
C47
32
34
36
Sal. (PSU)

4.4 CTD sections

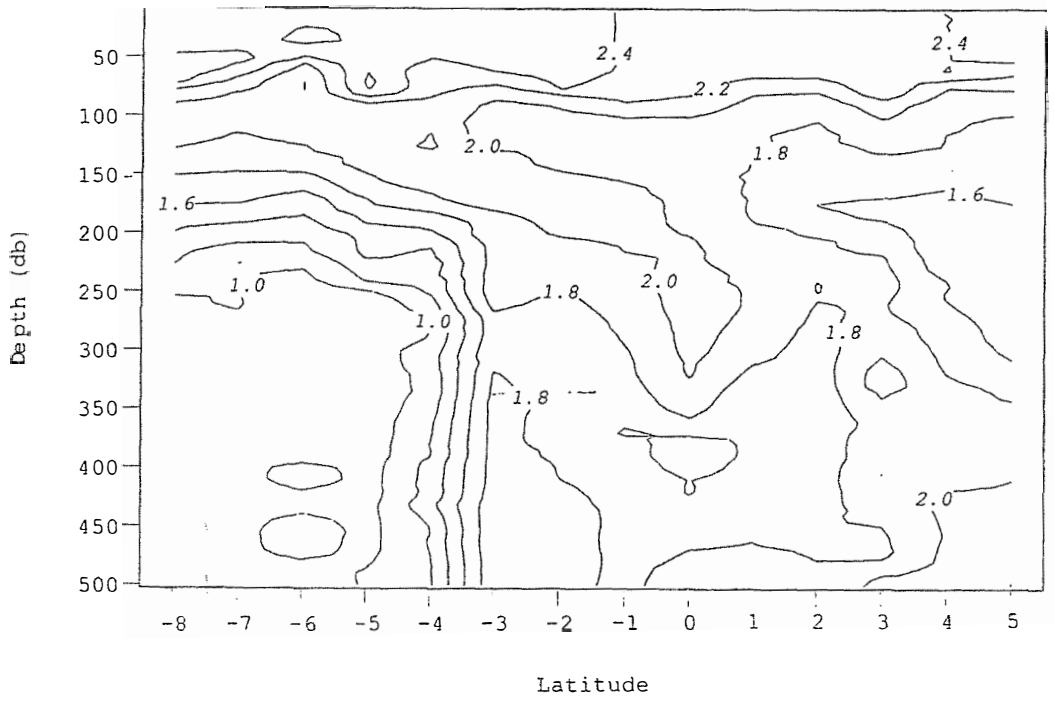




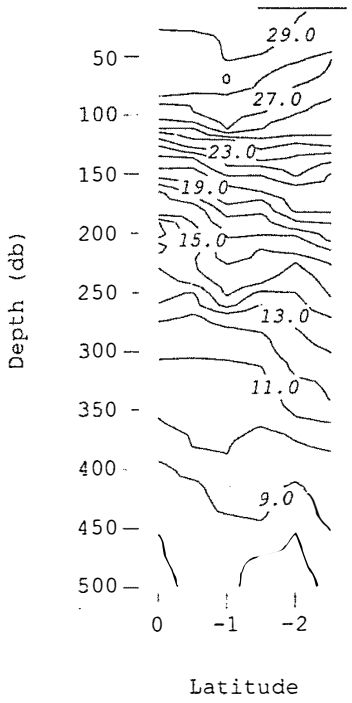
K9709 CTD 156E (Stgma-t)



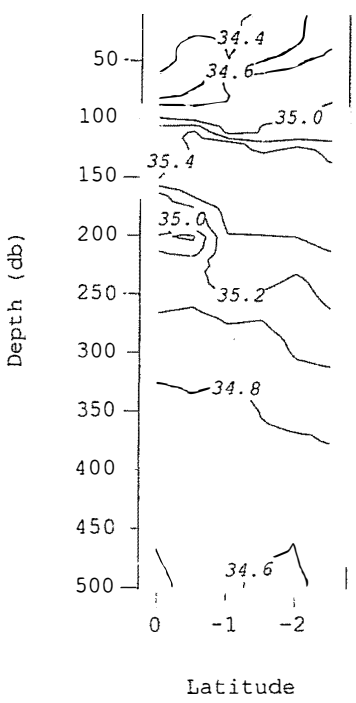
K9709 CTD 156E (Oxygen)



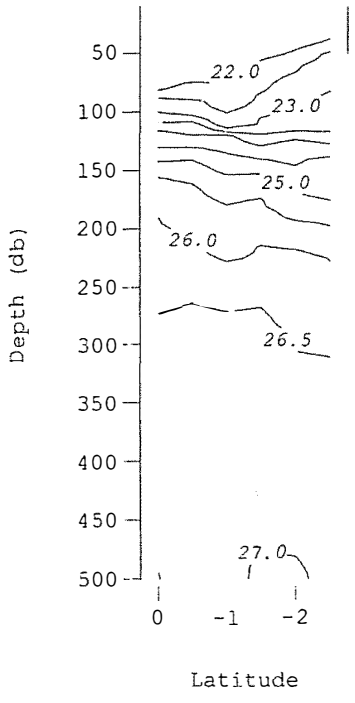
K9709 CTD 142E (Temperature)



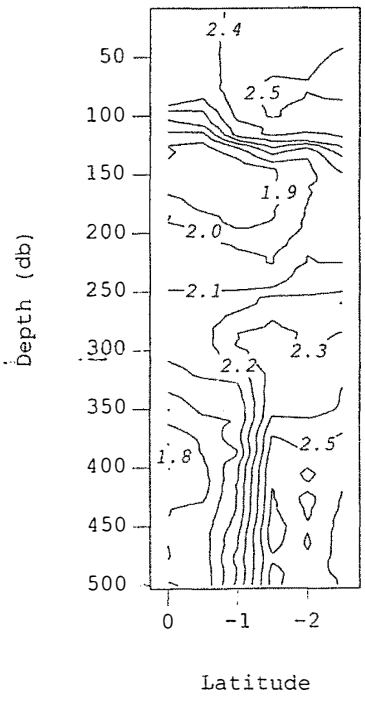
K9709 CTD 142E (Salinity)



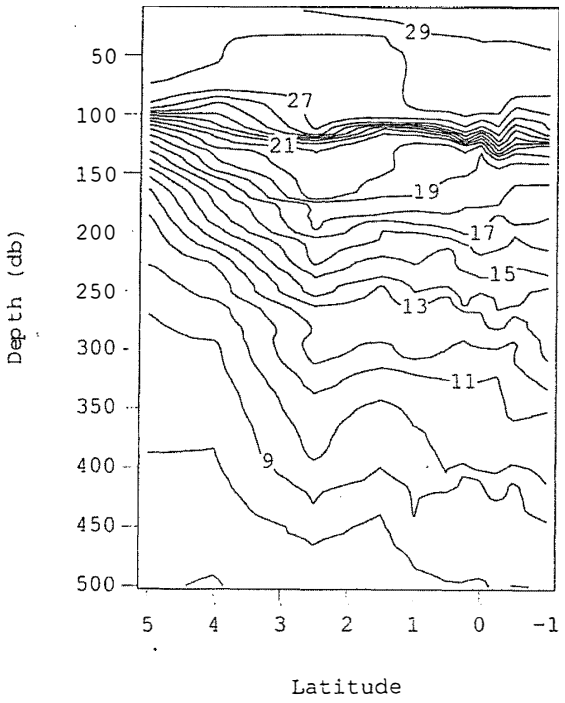
K9709 CTD 142E (Sigma-t)



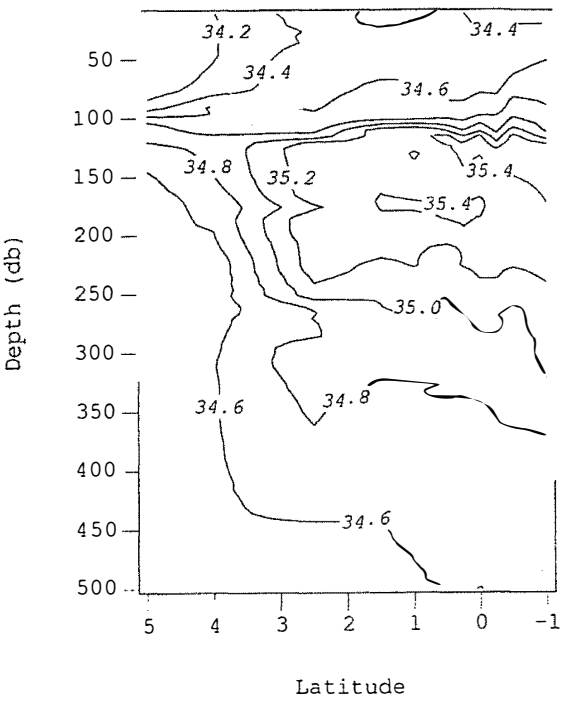
K9709 CTD 142E (Oxygen)



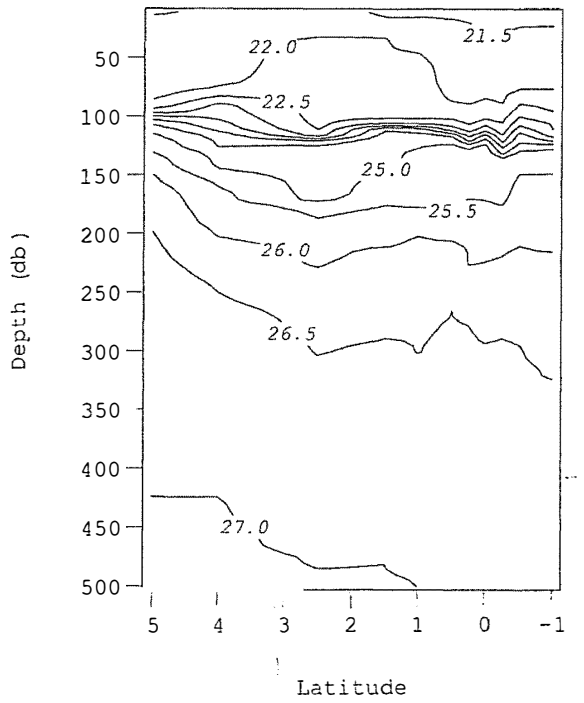
K9709 CTD 138E (Temperature)



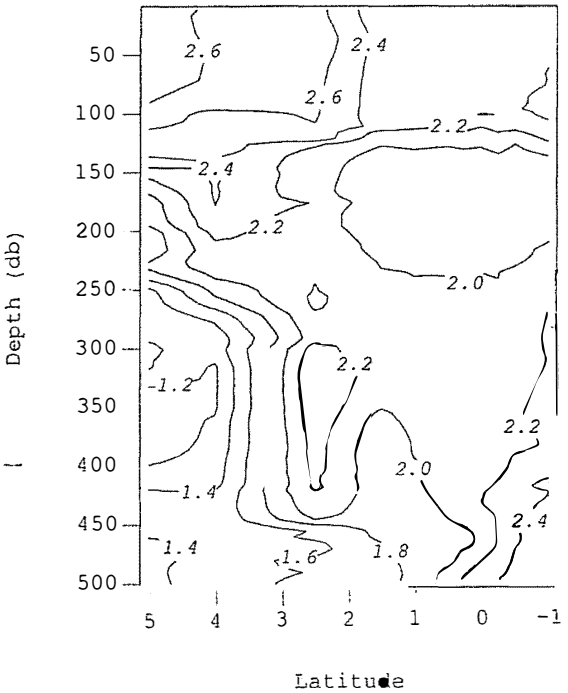
K9709 CTD 138E (Salinity)



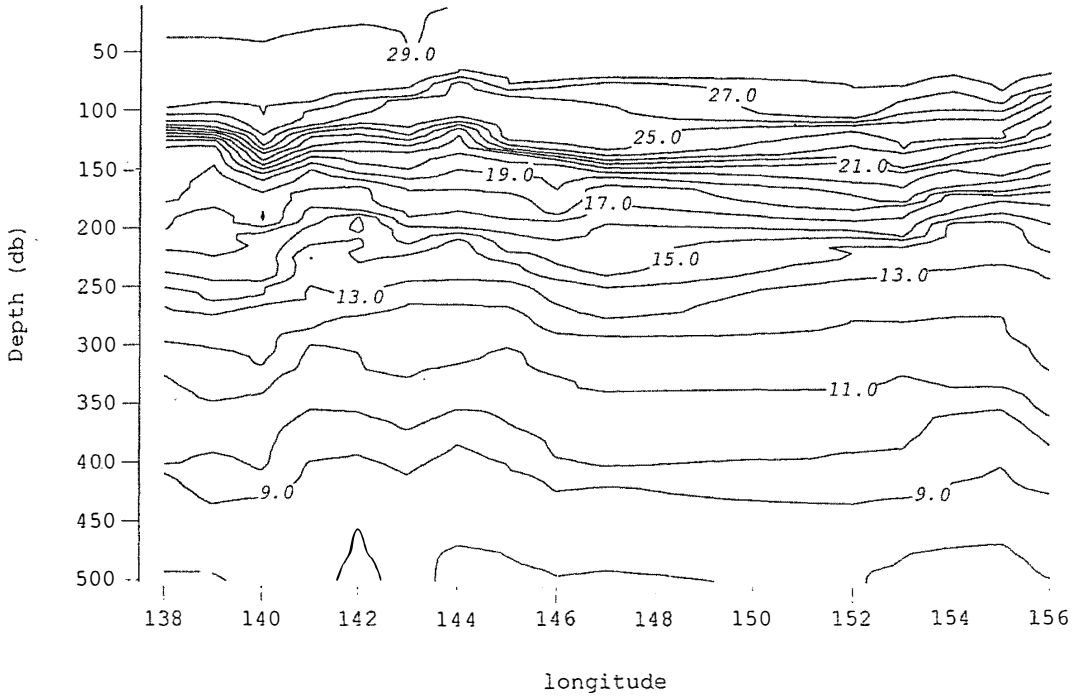
K9709 CTD 138E (Sigma-t)



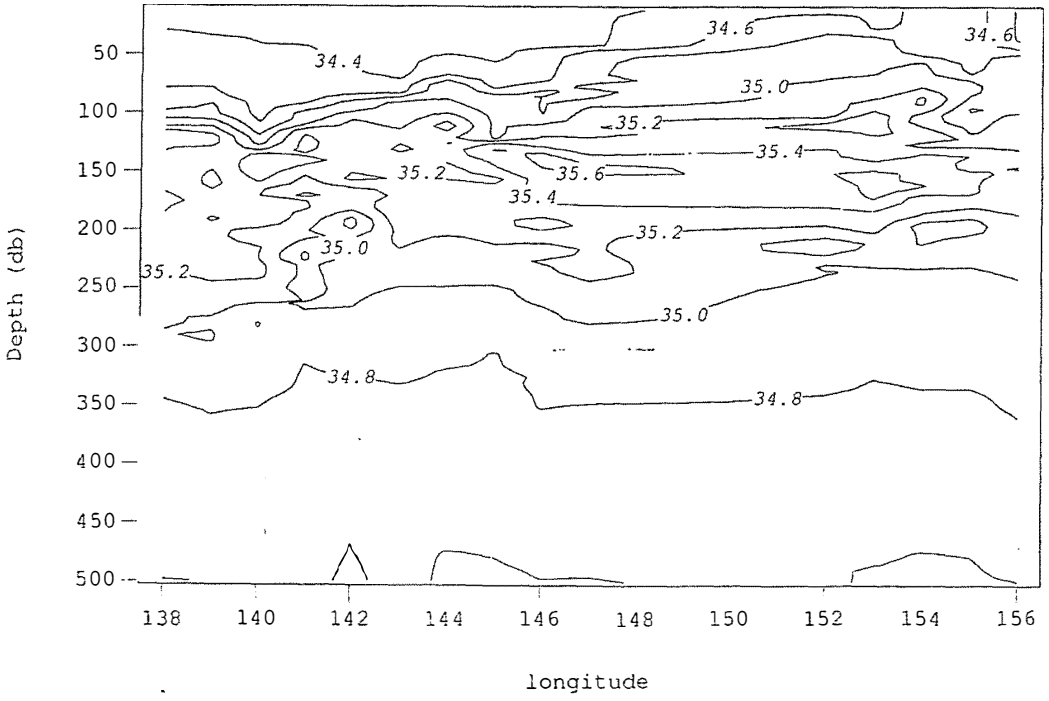
K9709 CTD 138E (Oxygen)



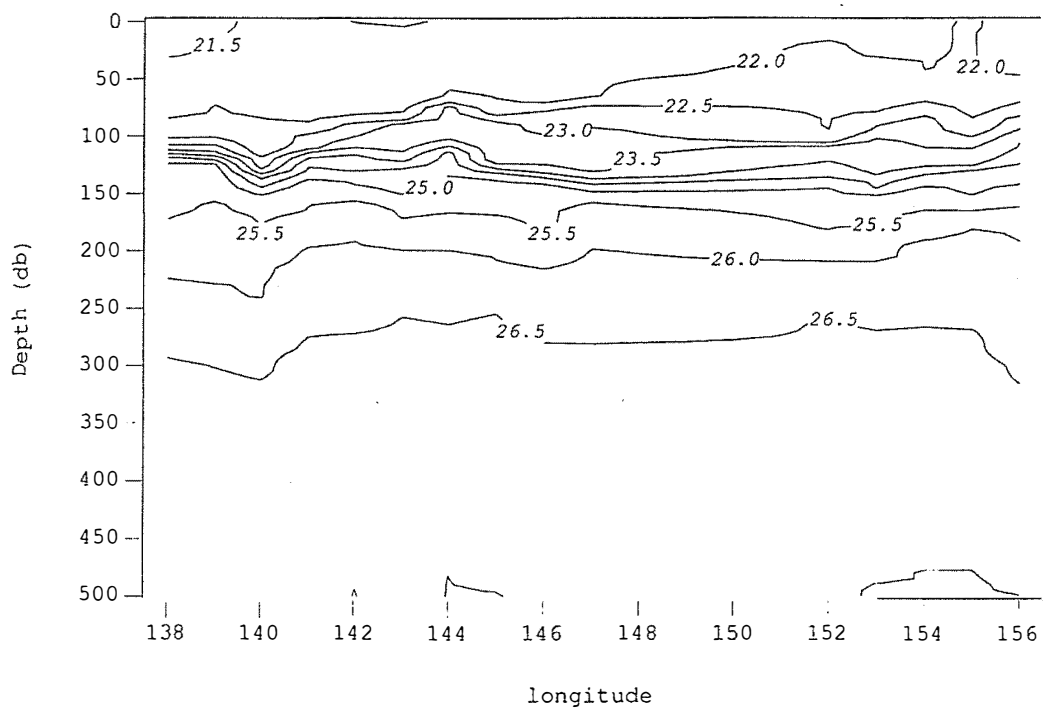
K9709 CTD Equator (Temperature)



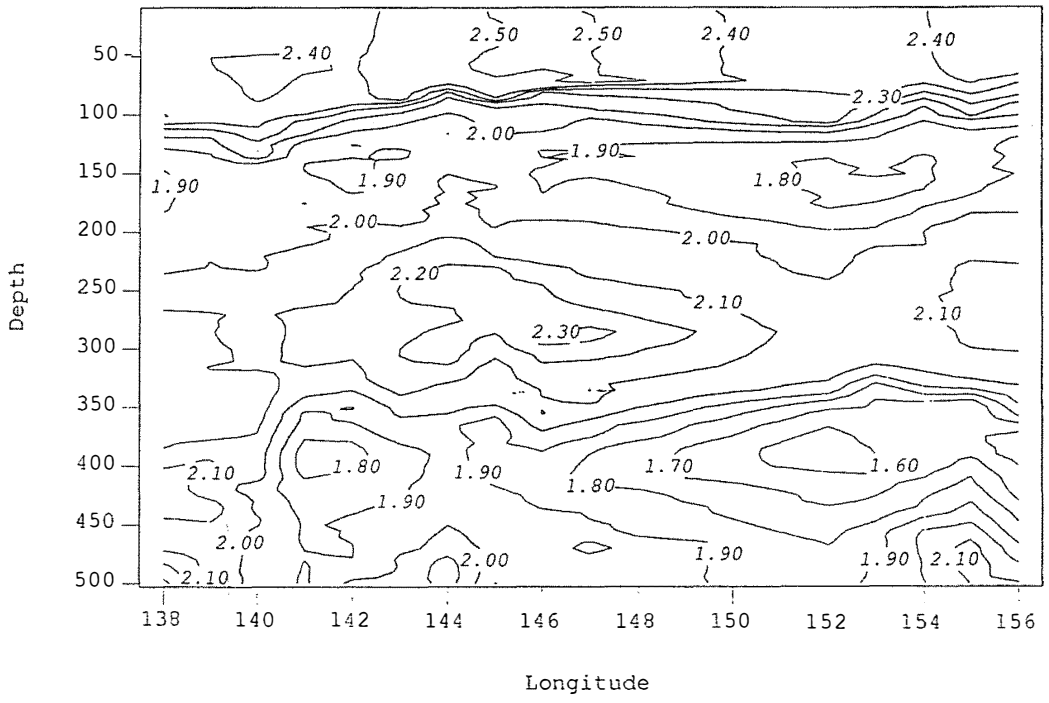
K9709 CTD Equator (Salinity)



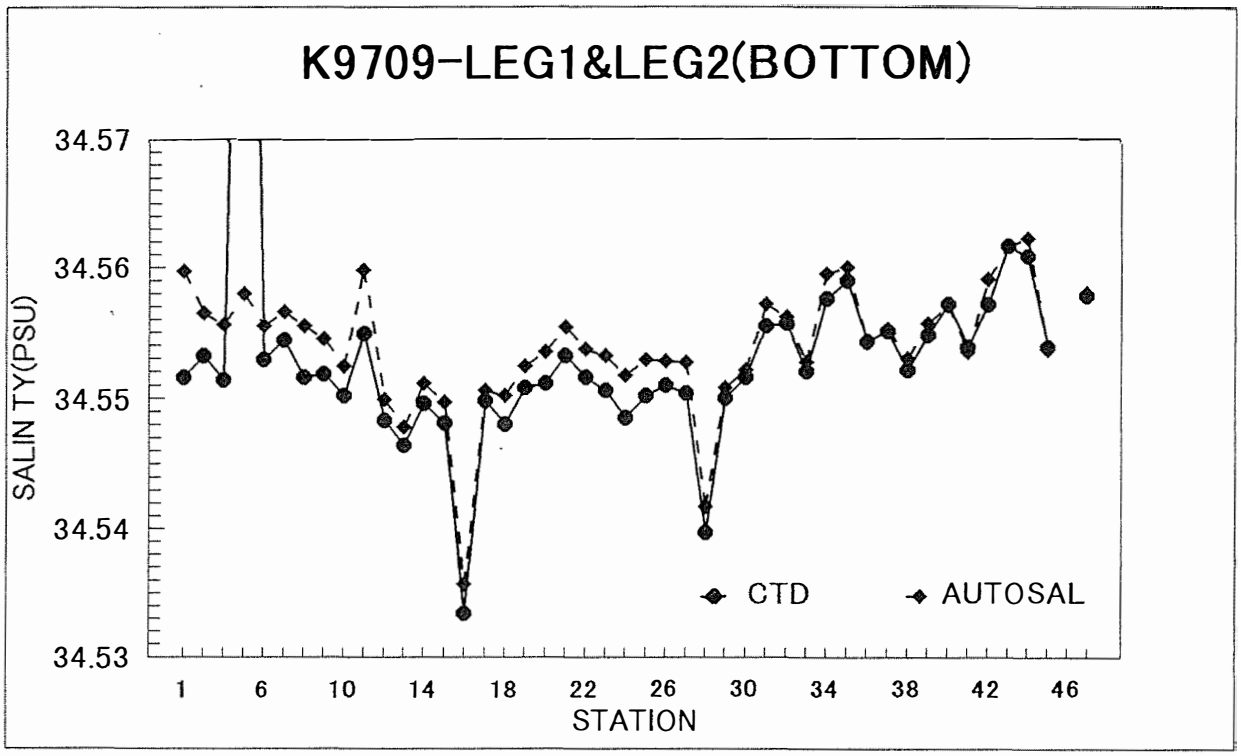
K9709 CTD Equator (Sigma-t)

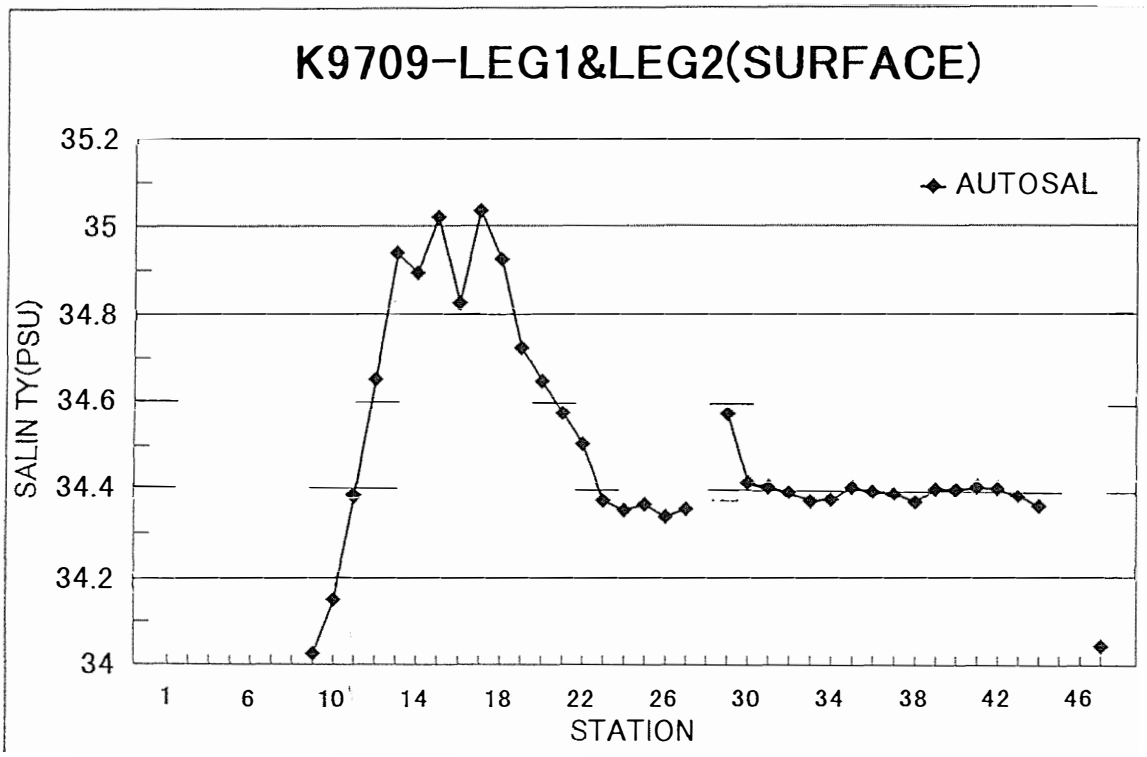


K9709 CTD Equator (Oxygen)



4.5 Bottle Salinity





4.6 Dissolved Oxygen Measurement

T. Shiribiki [1] and K. Komine [2]

[1] :Sanyo Techno Marine, Inc., Japan [2] :Marine Works Japan, LTD.

Objectives:

Measurement of dissolved oxygen (below D.O.) using D.O.meter corrected by the Winkler titration processed to the WHP Operations and Methods(Culberson,1991).

Comparison of D.O.meter data corrected by the Winkler titration with CTD D.O. data.

Instruments:

D.O.meter ; TOA Portable Dissolved Oxygen Meter Model DO-25A
Titrator ; Metrohm Model 716 DMS Totrino/ 10ml of titration vessel
Ditector ; Pt Electrode/ 6.0401.100
Software ; Data acquisition/ Metrohm,METRODATA/ 6.6040.100

Methods :

The 12 piston Niskin water samplers (Go 1015) sampled sea water during CTD upcast.
The water samples for D.O. were sampled from the 5-liter Niskin water samplers into 100ml D.O. glassbottles. In each cast, several water samples for the Winkler titration were also sampled to calibrated BOD flasks (ca, 180 ml) (see Green and Carritt 1966).
During sampling, water corresponded to three times of D.O. bottles was used to flush, then water temperature was measured during sampling.
After the sampling, we analyzed D.O. with salinity correction within 30 minutes.
(Before measurement, the D.O.meter was adjusted to 0-100% (see TOA D.O.meter operation manual)).
The samples for the titration method were analyzed within 2 hours. These samples were analyzed by Metrohm piston buret of 10ml with Pt Erectrode using Whole bottle titration in the laboratory under controlled temperature (ca, 23 ° c)
The standerdizations have been performed every day before the sample titration.

The data from the D.O.meter were corrected with calibration factors. The factors were decided by linear regression based on the Winkler titration value vs D.O.meter Value.

Reproducibility:

(1) D.O.meter Value

104 pairs of samples were analyzed as replicates taken by same Niskin bottle. The avera geand standard deviations (2 sigma) of difference of replicates samples were 0.009 ml/l and 0.016 ml/l (0.34% of D.O.maximum (4.655 ml/l)in this cruise).

(2) Winkler Titration Value

61 pairs of samples were analyzed. The average and std.(2 sigma) of difference was 0.008 ml/l and 0.018 ml/l (0.38% of D.O. maximum (4.692 ml/l) in this cruse).

Results :

(1) Correction of D.O.meter Values

Linear regression line listed below was obtained form 352 pairs of D.O.meter–Winkler data.(Fig.4.6.1)

All D.O.meter data were calibrated by this formula.(corrected D.O. data were Shown in Table 4.6.1)

$$\text{Formula : } Y = 0.1201 + 0.9779 \times X \quad (n = 352)$$
$$R = 0.9983$$

Y : Winkler Value (ml/ l) X : D.O. meter Value (ml/ l)

(2) CTD–D.O. Sensor Value correction

The two kinds of alculated polinominary regression curve for upcast and downcast were obtained from 631 pairs of CTD D.O.Sensor and corrected D.O.data. (Fig.4.6.2)

$$\text{For upcast fomula : } Y = 0.7250 + 0.5217 \times X + 0.3969 \times X^2 \quad (n = 631)$$
$$R = 0.9662$$

Y : Corrected D.O. Value (ml/ l) X : CTD–D.O. Sensor Upcast Value (ml/ l)

$$\text{For downcast fomula : } Y = 0.4680 + 0.6394 \times X + 0.3376 \times X^2 \quad (n = 631)$$
$$R = 0.9144$$

Y : Corrected D.O. Value (ml/ l) X : CTD–D.O. Sensor Downcast Value (ml/ l)

(3) Contour plots

Contour plots in Fig.4.6.3 were made from corrected dissolved oxygen data in Table.4.6.1

156E Line : Stn 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,18,17,16
142E Line : Stn 33,32,31,30,29,28
138E Line : Stn 47,43,42,41,40,39,38,37
Equator Line : Stn 40,36,35,34,33,27,26,25,24,23,22,21,20,19,11

(4) Vertical plofiles

All vertical plofiles in this cruise are showed in Fig.4.6.4. These data were used from corrected D.O. data in Table.4.6.1

(5) Comparison of D.O. Sensor's value and corrected D.O. value

To compare D.O. Sensor's value and corrected D.O. value, we calculated root mean squares (below r.m.s.) are calculated for each depth and stations by this formula.

$$\text{r.m.s.} = \sqrt{\frac{1}{n} \Sigma (X_i - Y_i)^2}$$

X_i : corrected D.O. value Y_i : D.O. Sensor's Value

The upcast and downcast r.m.s. values for each stations and depth are showed in Fig.4.6.4 and Table 4.6.2.

(6) Comments

In all stations, D.O. concentrations is more than 4.00 ml/l above 100m depth. D.O. in the western observations area along equator line is relatively higher than that in the eastern area below 700m depth.

Along 138E and 142E sections, the latitudes of D.O. front around 600db (about 3.00ml/l) are near 1S, and along 156E, that was near 4N. In paticular, the gradients of the D.O. front is very higher in 138E and 142E sections than 156E .

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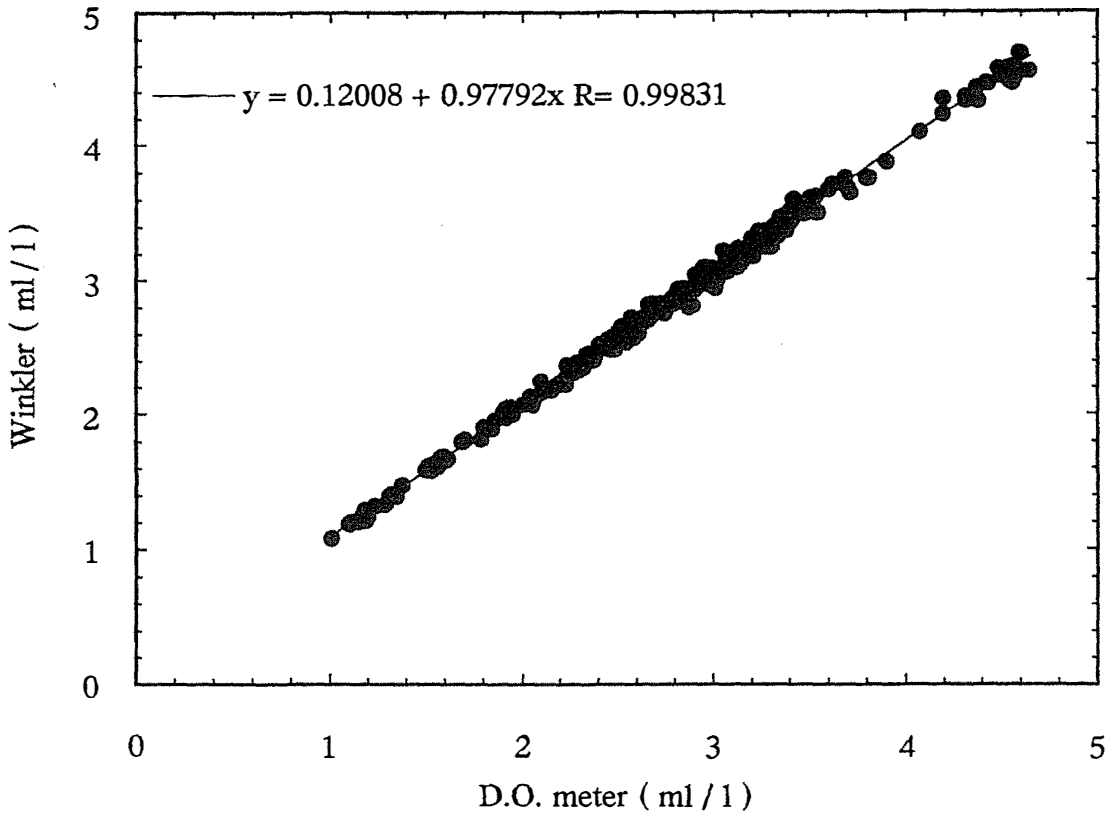


Fig.4.6.1 D.O.meter-Winkler

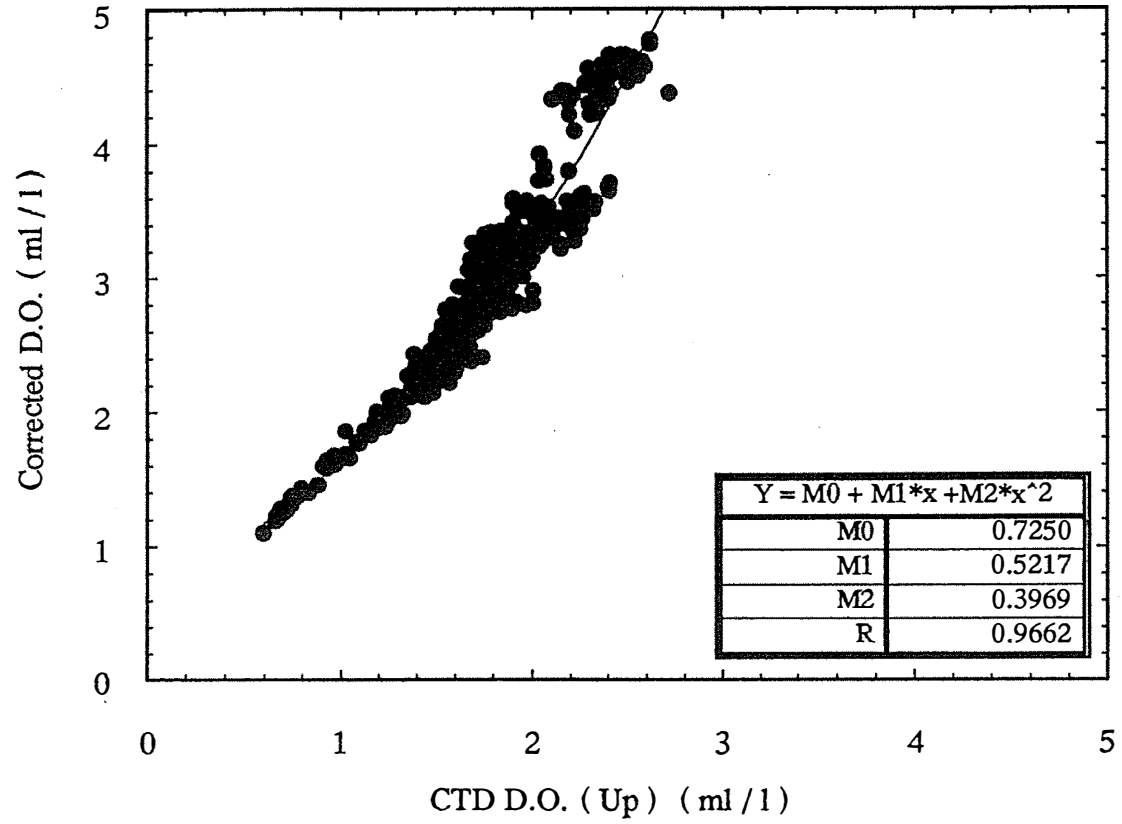


Fig.4.6.2(1) CTD D.O. (Up) - Corrected D.O.

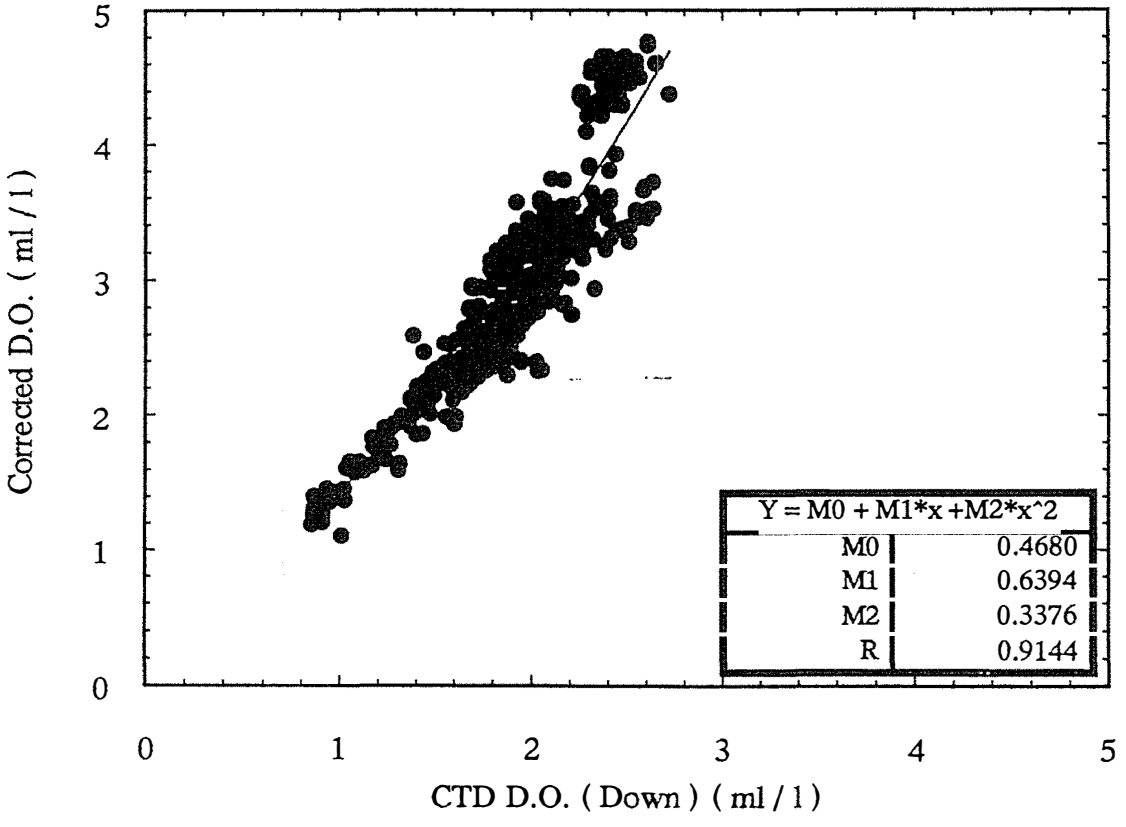


Fig.4.6.2(2) CTD D.O. (Down) - Correced D.O.

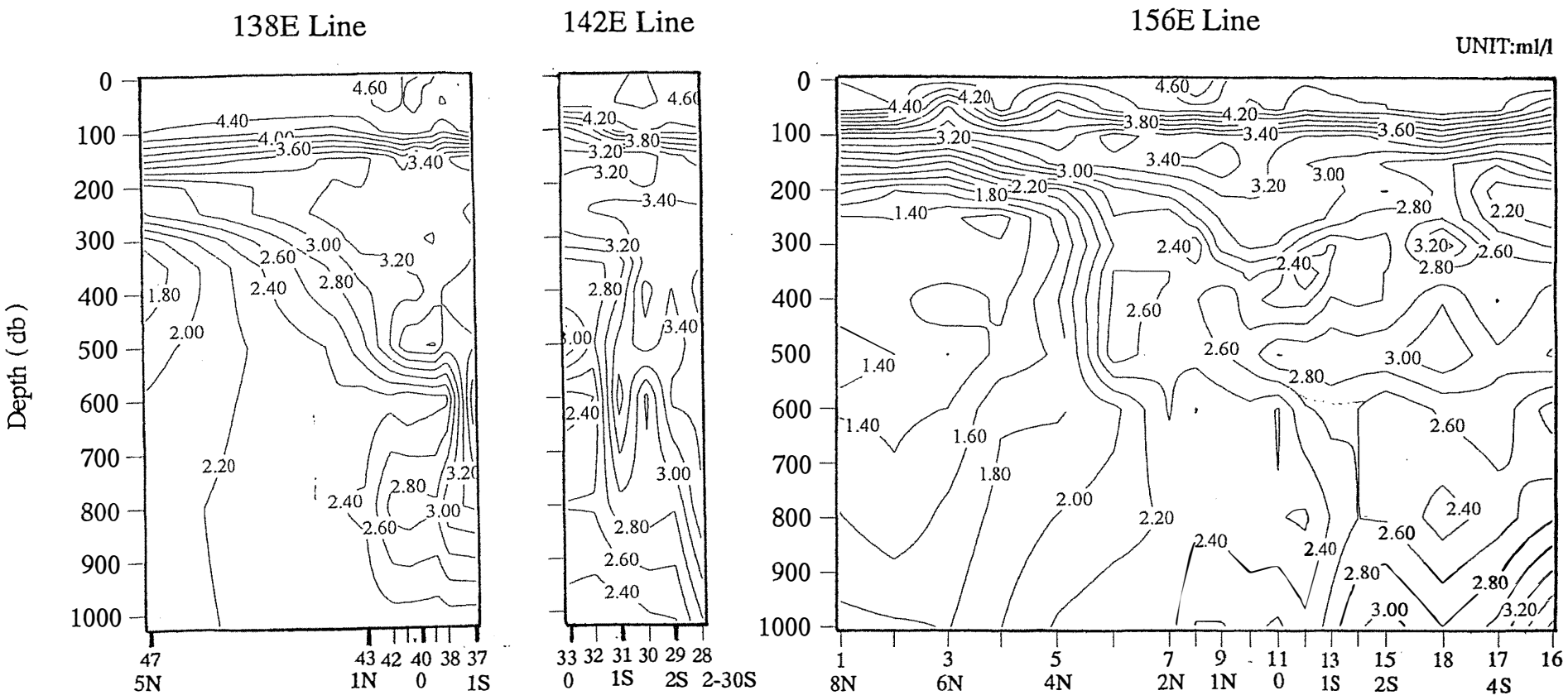


Fig.4.6.3 (1) Dissolved Oxygen Contour

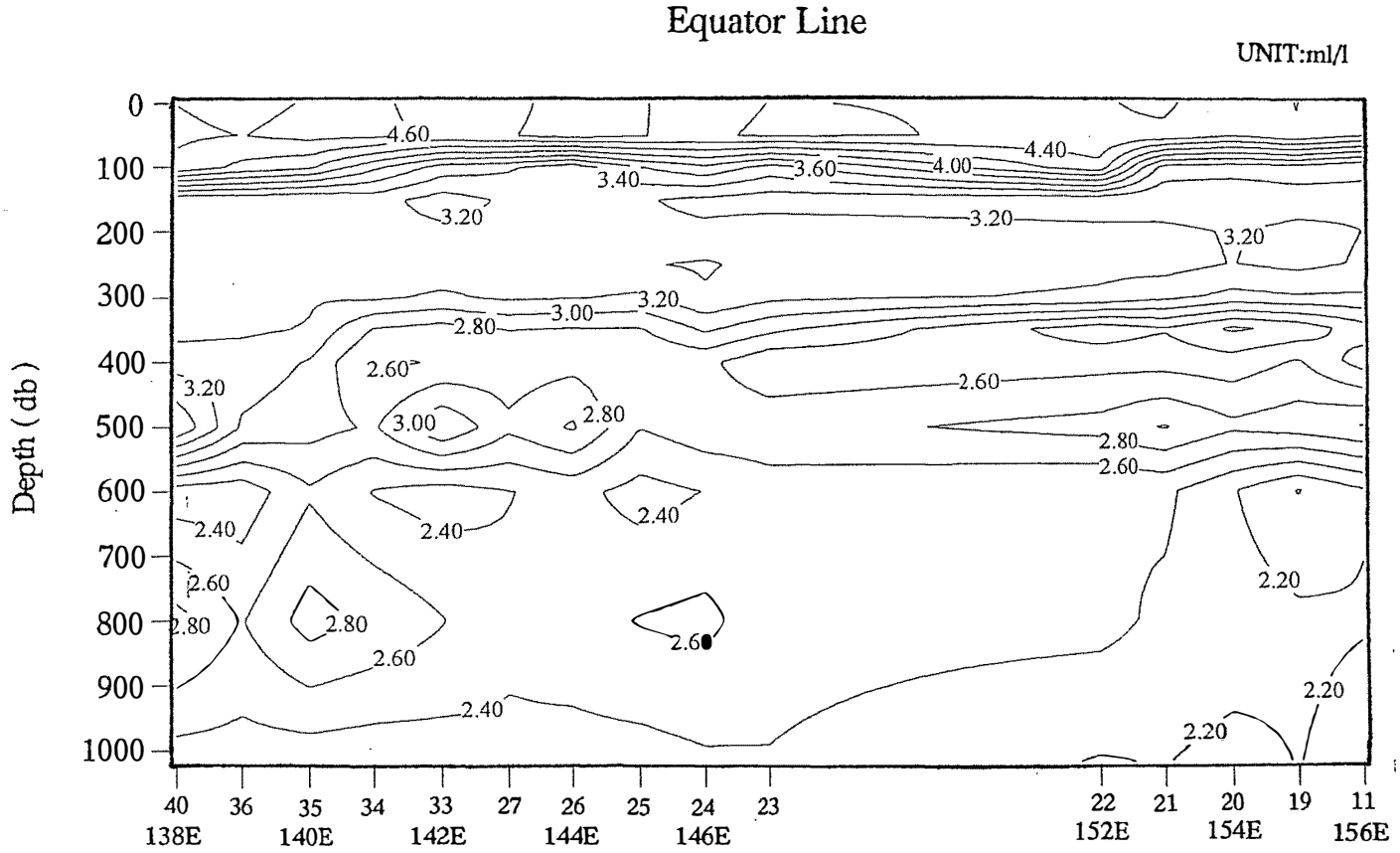


Fig.4.6.3 (2) Dissolved Oxygen Contour

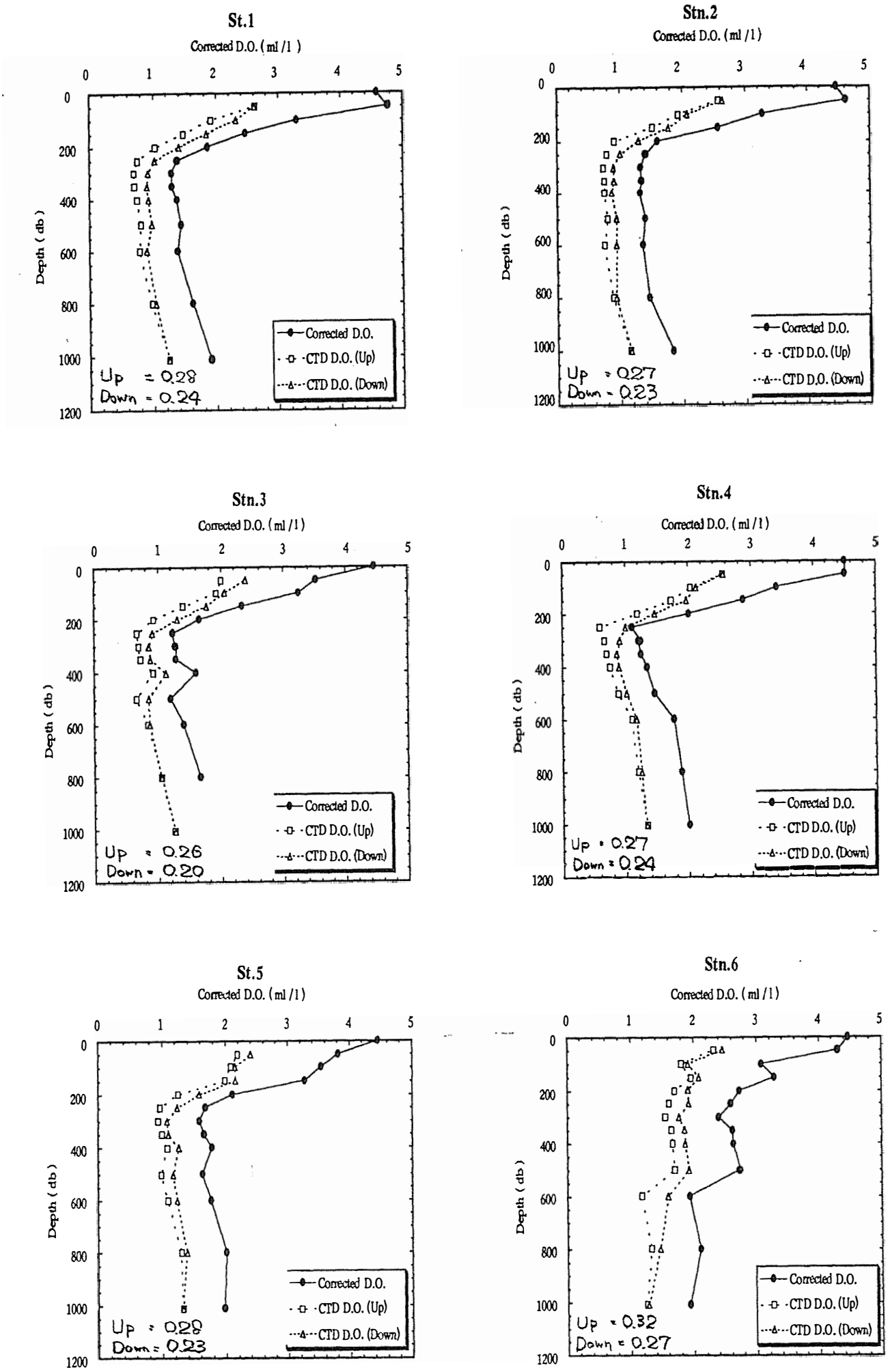


Fig.4.6.4 (1) Vertical plofiles

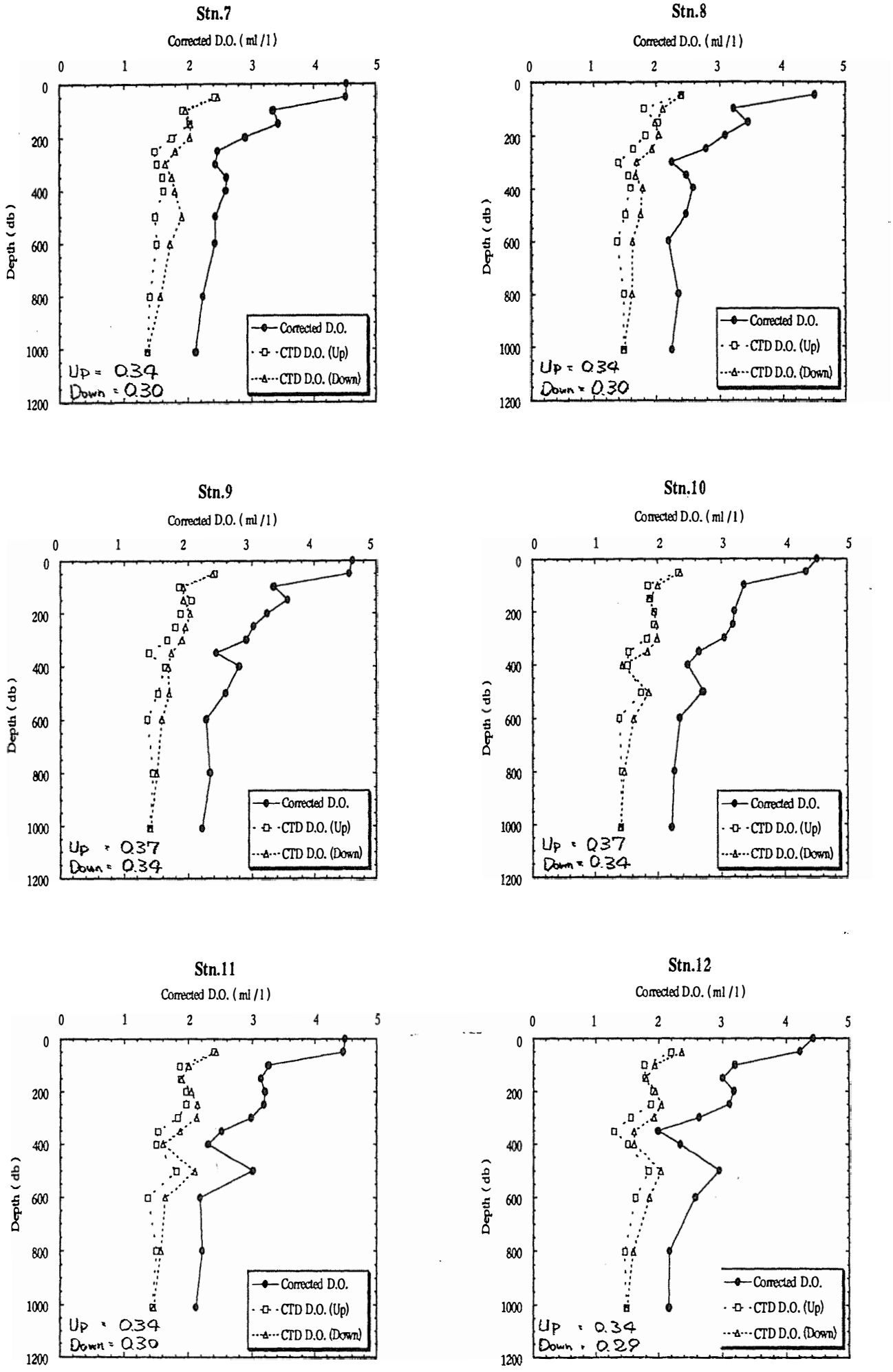


Fig.4.6.4 (2) Vertical plofiles

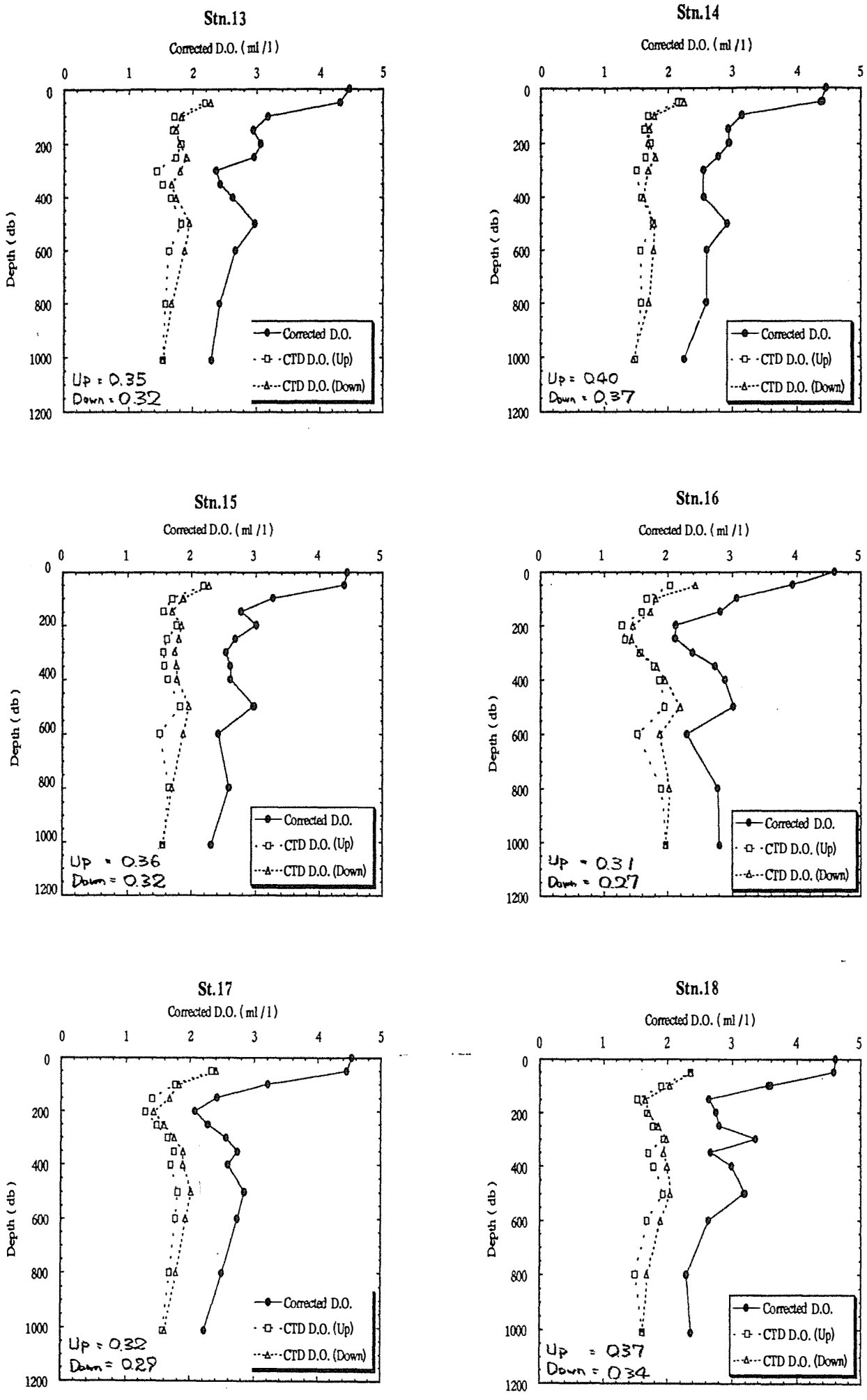


Fig.4.6.4 (3) Vertical plofiles

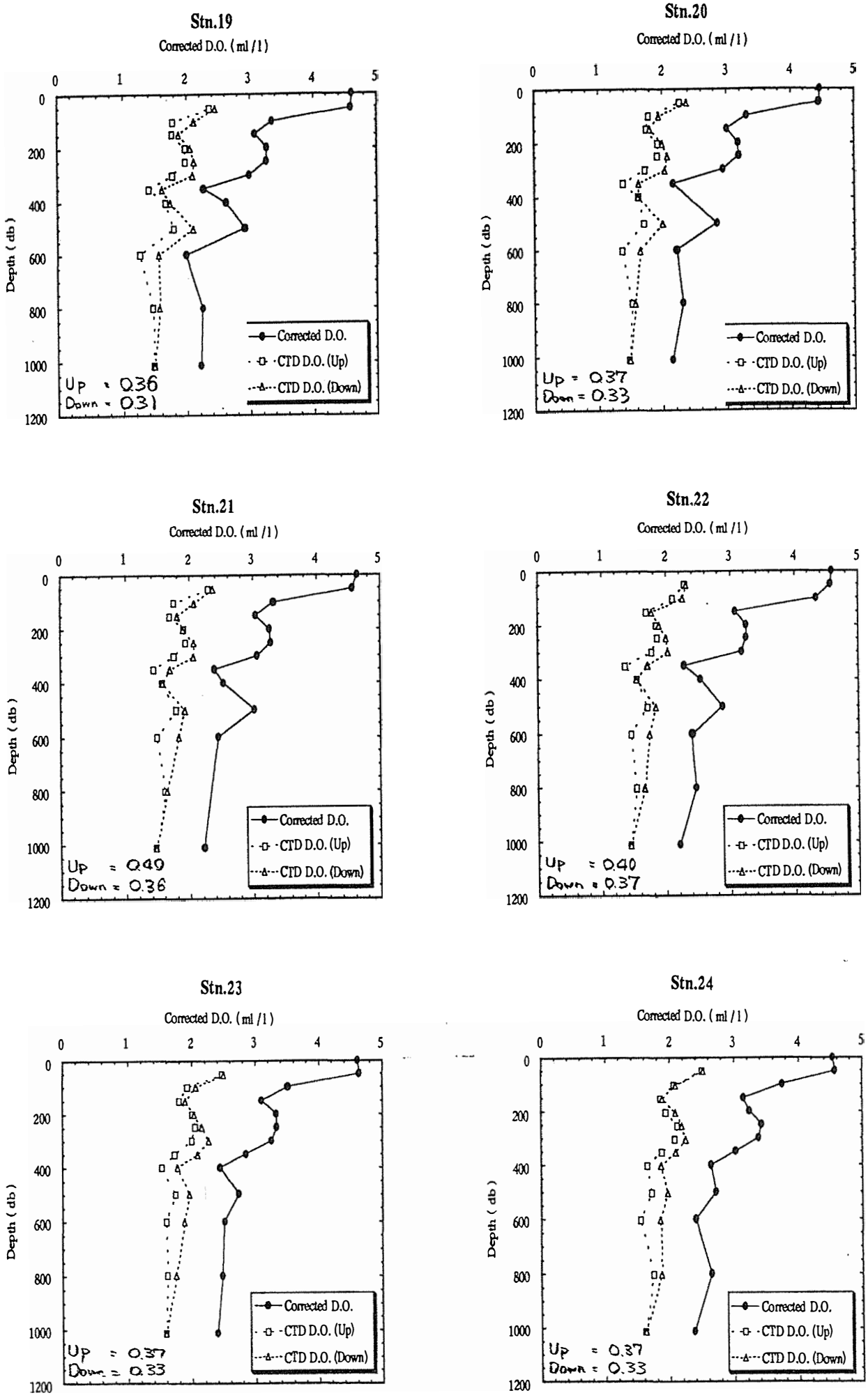


Fig.4.6.4 (4) Vertical plofiles

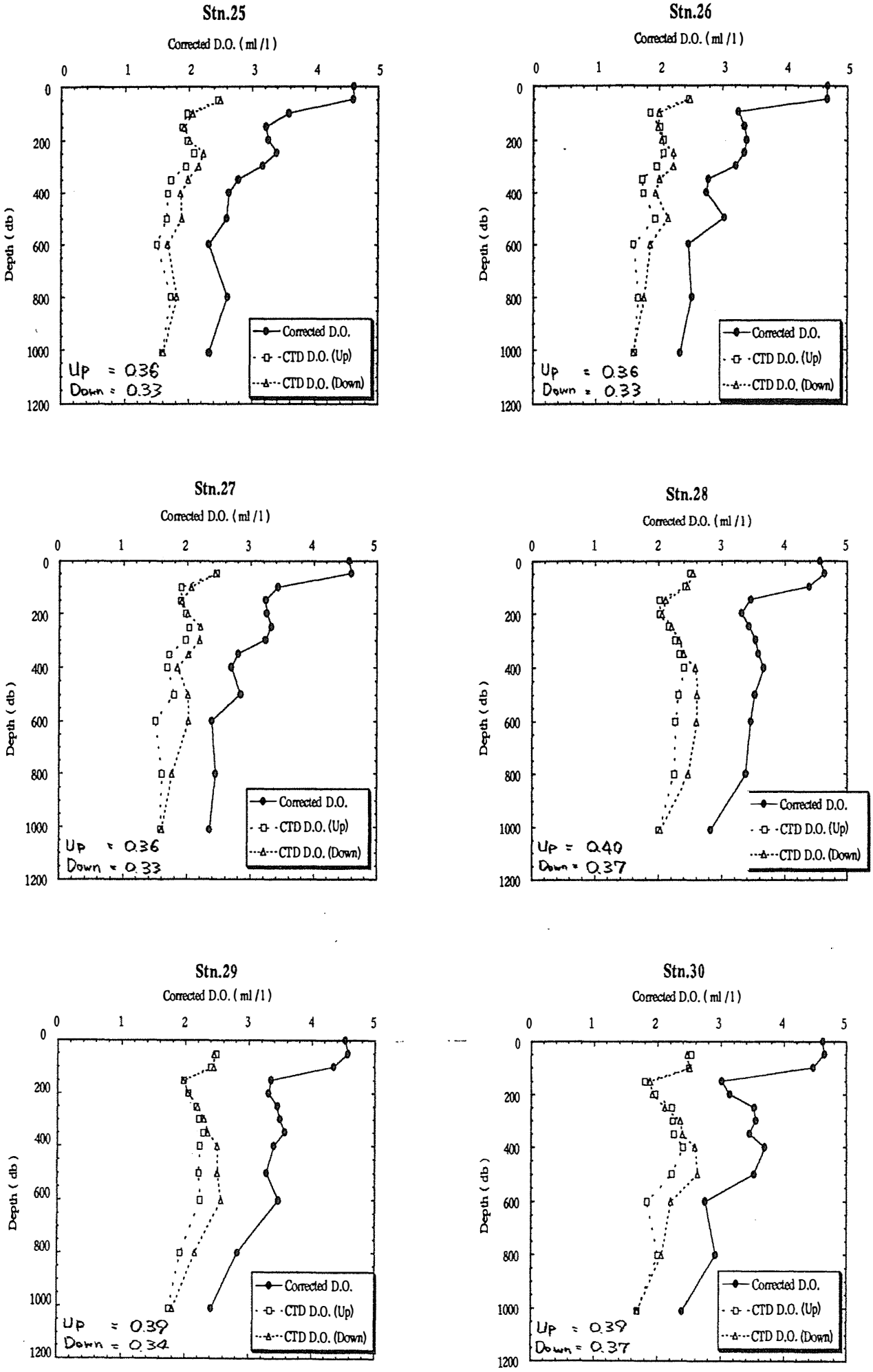


Fig.4.6.4 (5) Vertical plofiles

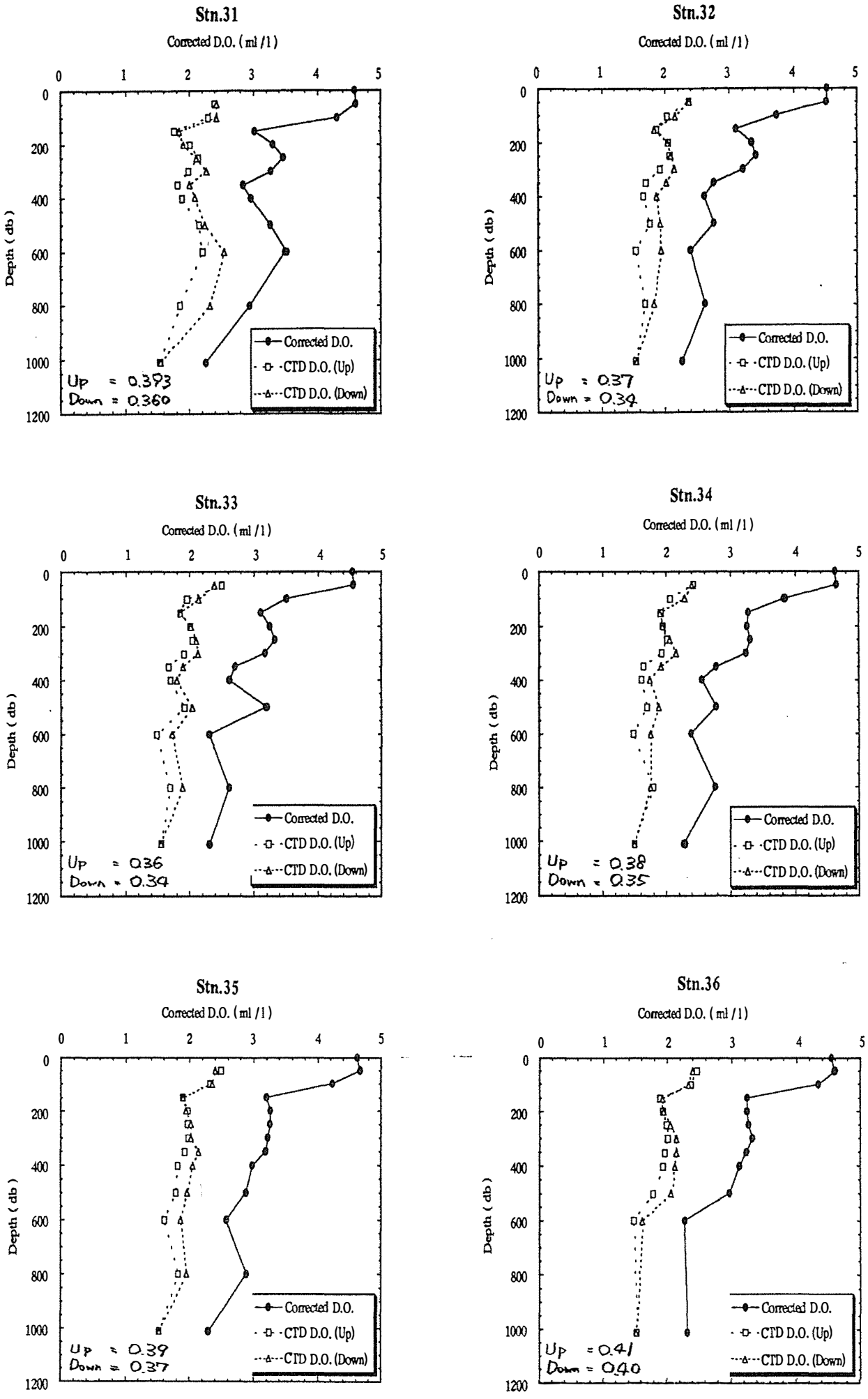


Fig.4.6.4 (6) Vertical plofiles

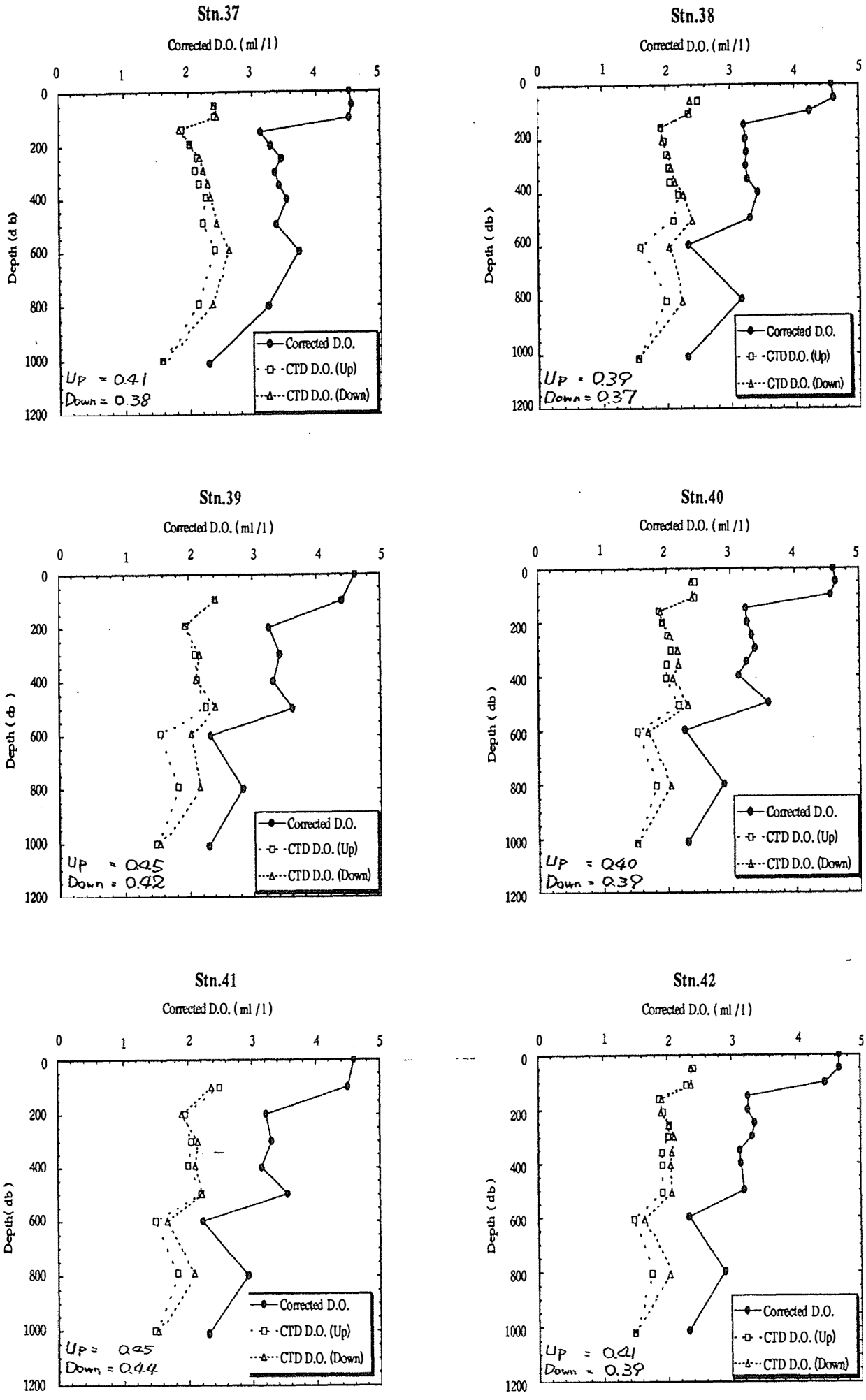
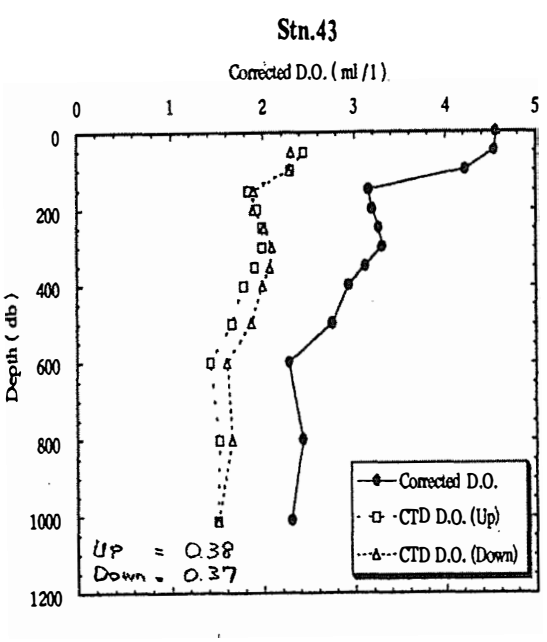
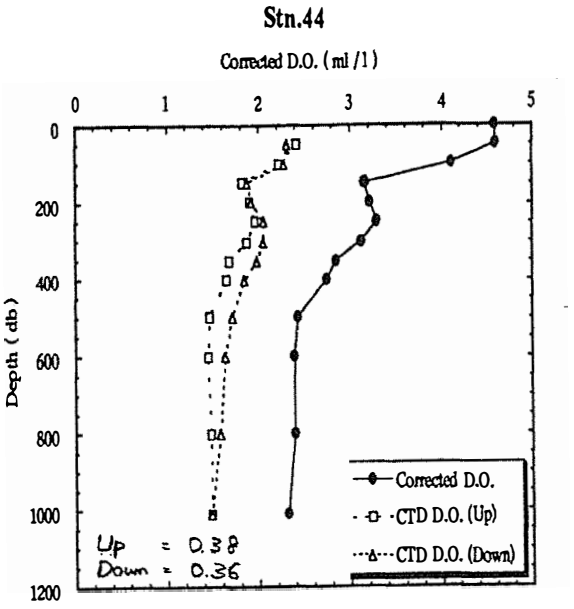


Fig.4.6.4 (7) Vertical plofiles





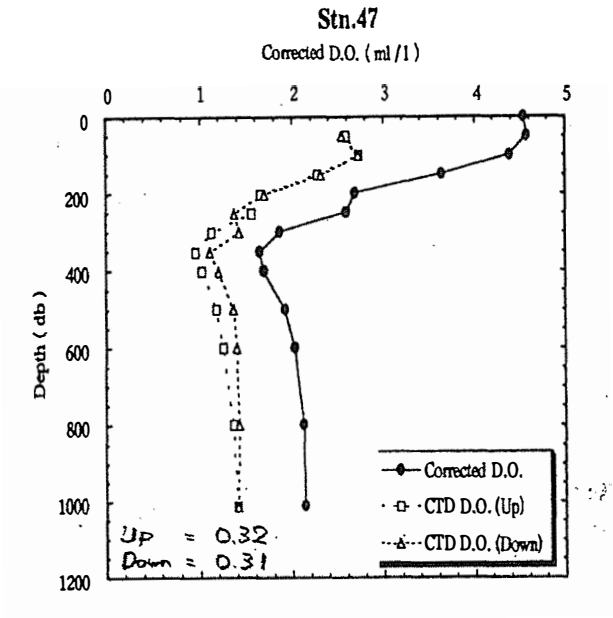


Fig.4.6.4 (8) Vertical plofiles

Table.4.6.1 (1) Corrected D.O. Data

Stn.	1	Stn.	2	Stn.	3	Stn.	4
8N	156E	7N	156E	6N	156E	5N	156E
Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)
0	4.58	0	4.47	0	4.46	0	4.51
49	4.76	50	4.61	50	3.53	49	4.51
100	3.30	100	3.28	100	3.25	99	3.41
148	2.46	149	2.56	150	2.33	149	2.87
199	1.86	199	1.60	199	1.65	199	2.01
250	1.38	249	1.41	250	1.23	250	1.11
299	1.28	300	1.32	300	1.27	300	1.23
349	1.29	350	1.35	349	1.28	350	1.25
401	1.37	399	1.32	400	1.59	400	1.35
499	1.43	499	1.40	499	1.19	499	1.46
599	1.38	600	1.36	598	1.40	598	1.77
799	1.61	799	1.46	799	1.66	799	1.88
1011	1.90	1000	1.83	1005	n.d.	1001	2.00

Stn.	5	Stn.	6	Stn.	7	Stn.	8
4N	156E	3N	156E	2N	156E	1-30N	156E
Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)
0	4.45	0	4.47	0	4.53	0	n.d.
50	3.81	48	4.30	50	4.51	49	4.50
96	3.54	99	3.08	99	3.35	100	3.22
148	3.28	150	3.28	149	3.43	149	3.44
199	2.11	199	2.73	198	2.90	198	3.08
248	1.68	248	2.59	251	2.46	249	2.78
299	1.58	300	2.40	300	2.43	299	2.24
349	1.66	348	2.61	350	2.60	349	2.47
399	1.78	400	2.63	399	2.59	398	2.58
500	1.63	499	2.73	500	2.43	500	2.47
600	1.77	598	1.93	600	2.42	599	2.19
799	2.01	798	2.11	800	2.23	798	2.35
1010	1.98	1007	1.93	1012	2.12	1011	2.24

Stn.	9	Stn.	10	Stn.	11	Stn.	12
1N	156E	0-30N	156E	0	156E	0-30S	156E
Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)
0	4.62	0	4.51	0	4.49	0	4.43
51	4.56	50	4.34	50	4.46	51	4.22
100	3.35	100	3.36	100	3.26	101	3.19
150	3.57	150	n.d.	150	3.13	150	3.00
201	3.24	200	3.21	200	3.20	200	3.17
250	3.02	249	3.18	250	3.18	249	3.10
300	2.91	299	3.04	300	2.98	300	2.63
348	2.43	350	2.65	350	2.52	350	1.99
401	2.79	400	2.47	400	2.30	400	2.34
500	2.58	501	2.71	500	3.01	500	2.95
599	2.28	600	2.35	601	2.18	600	2.57
799	2.34	799	2.26	798	2.21	800	2.17
1010	2.21	1012	2.21	1009	2.12	1010	2.16

Stn.	13	Stn.	14	Stn.	15	Stn.	16
1S	156E	1-30S	156E	2S	156E	5S	156E
Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)
0	4.47	0	4.45	0	4.44	0	4.58
50	4.32	52	4.36	49	4.39	48	3.93
101	3.17	100	4.40	98	3.27	98	3.06
151	2.95	149	3.14	148	2.77	148	2.81
200	3.06	199	2.94	199	3.01	198	2.13
251	2.96	251	2.95	249	2.68	248	2.12
301	2.36	301	2.78	299	2.53	298	2.39
350	2.43	350	2.55	348	2.60	348	2.74
401	2.63	401	2.56	398	2.60	399	2.89
501	2.97	502	2.93	498	2.97	499	3.02
601	2.67	601	2.60	600	2.41	599	2.30
800	2.42	797	2.60	796	2.58	798	2.78
1011	2.29	1009	2.25	1010	2.30	1011	2.80

n.d.=NO DATA

Table.4.6.1 (2) Corrected D.O. Data

Stn.	17	Stn.	18	Stn.	19	Stn.	20
4S	156E	3S	156E	0	155E	0	154E
Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)
0	4.54	0	4.60	0	4.60	0	4.46
50	4.46	49	4.58	52	4.59	49	4.45
100	3.21	99	3.58	101	3.35	99	3.32
150	2.42	150	2.65	147	3.08	148	3.01
201	2.08	199	2.76	198	3.27	200	3.18
251	2.28	250	2.80	250	3.26	248	3.19
300	2.56	299	3.36	301	2.99	298	2.95
352	2.74	349	2.67	351	2.26	348	2.17
400	2.59	399	2.99	401	2.62	398	n.d.
501	2.85	500	3.18	500	2.91	498	2.84
600	2.74	599	2.64	599	1.99	599	2.22
801	2.50	799	2.30	801	2.24	798	2.32
1011	2.22	1010	2.37	1013	2.21	1010	2.15

Stn.	21	Stn.	22	Stn.	23	Stn.	24
0	153E	0	152E	0	147E	0	146E
Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)
0	4.64	0	4.58	0	4.60	0	4.54
51	4.56	49	4.56	49	4.63	49	4.57
102	3.33	100	4.34	98	3.51	100	3.75
150	3.04	150	3.08	150	3.10	151	3.15
200	3.26	199	3.25	199	3.33	200	3.24
251	3.28	246	3.25	249	3.34	250	3.42
300	3.06	298	3.17	299	3.26	300	3.38
350	2.39	350	2.28	349	2.84	349	3.03
400	2.52	400	2.53	398	2.44	400	2.65
500	3.02	501	2.87	496	2.74	500	2.72
599	2.44	600	2.40	599	2.51	600	2.41
800	n.d.	800	2.46	797	2.47	799	2.65
1011	2.21	1011	2.20	1011	2.39	1012	2.38

Stn.	25	Stn.	26	Stn.	27	Stn.	28
0	145E	0	144E	0	143E	2-30S	142E
Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)
0	4.61	0	4.67	0	4.56	0	4.56
49	4.60	49	4.67	48	4.59	48	4.63
99	3.58	98	3.26	101	3.43	99	4.38
149	3.22	150	3.35	150	3.23	148	3.45
198	3.26	200	3.38	199	3.25	200	3.31
248	3.39	248	3.34	251	3.32	248	3.42
298	3.17	299	3.21	298	3.23	298	3.54
349	2.78	348	2.78	350	2.80	350	3.58
400	2.63	399	2.74	399	2.69	400	3.66
500	2.60	500	3.03	500	2.84	499	3.52
598	2.32	600	2.46	599	2.39	599	3.45
798	2.61	800	2.52	801	2.45	799	3.38
1011	2.33	1011	2.33	1010	2.36	1011	2.82

Stn.	29	Stn.	30	Stn.	31	Stn.	32
2S	142E	1-30S	142E	1S	142E	0-30S	142E
Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)
0	4.53	0	4.62	0	4.58	0	4.52
51	4.57	49	4.64	50	4.60	50	4.51
100	4.34	99	4.47	100	4.30	100	3.73
151	3.35	150	3.01	149	3.02	150	3.10
200	3.31	199	3.13	199	3.30	200	3.35
250	3.45	249	3.52	250	3.46	250	3.41
298	3.49	299	3.55	300	3.27	300	3.21
349	3.57	349	3.45	351	2.84	350	2.76
400	3.39	399	3.69	400	2.96	400	2.61
502	3.28	499	3.52	500	3.26	500	2.76
602	3.46	600	2.75	600	3.50	600	2.40
800	2.82	800	2.91	800	2.94	799	2.63
1009	2.41	1010	2.39	1011	2.26	1010	2.26

n.d.=NO DATA

Table.4.6.1 (3) Corrected D.O. Data

Stn.	33	Stn.	34	Stn.	35	Stn.	36
0	142E	0	141E	0	140E	0	139E
Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)
0	4.54	0	4.62	0	4.62	0	4.54
49	4.56	51	4.64	49	4.67	49	4.60
100	3.51	100	3.84	99	4.23	99	4.34
149	3.10	150	3.28	149	3.20	150	3.24
200	3.25	200	3.26	199	3.26	200	3.23
249	3.32	249	3.30	249	3.26	249	3.26
299	3.17	299	3.23	299	3.22	299	3.32
349	2.71	350	2.78	349	3.19	349	3.23
399	2.62	399	2.56	400	2.98	399	3.12
500	3.19	500	2.78	499	2.88	498	2.97
601	2.30	599	2.39	600	2.57	599	2.27
800	2.61	799	2.76	800	2.89	800	n.d.
1012	2.31	1012	2.28	1012	2.30	1012	2.32

Stn.	37	Stn.	38	Stn.	39	Stn.	40
1S	138E	0-30S	138E	0-15S	138E	0	138E
Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)
0	4.52	0	4.58	0		0	4.60
51	4.56	51	4.61	100	4.40	49	4.63
100	4.51	100	4.24	199	3.26	98	4.55
149	3.13	150	3.22	300	3.42	150	3.24
200	3.28	201	3.23	399	3.32	200	3.26
250	3.45	250	3.26	499	3.62	250	3.33
300	3.34	300	3.24	599	2.33	298	3.39
349	3.41	351	3.27	799	2.84	348	3.25
400	3.54	400	3.43	1010	2.29	399	3.12
500	3.36	501	3.31	1010	n.d.	499	3.58
599	3.72	600	2.34	1010	n.d.	598	2.28
800	3.23	800	3.16	1010	n.d.	800	2.88
1012	2.30	1011	2.32	1010	n.d.	1012	2.31

Stn.	41	Stn.	42	Stn.	43	Stn.	44
0-15N	138E	0-30N	138E	1N	138E	1-30N	138E
Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)
0	4.60	0	4.67	0	4.56	0	4.58
100	4.50	48	4.67	49	4.54	49	4.59
200	3.22	100	4.45	99	4.22	100	4.10
300	3.30	150	3.26	150	3.16	149	3.16
399	3.15	200	3.26	200	3.19	200	3.21
498	3.56	248	3.36	249	3.27	250	3.29
599	2.22	298	3.32	299	3.31	302	3.12
799	2.93	348	3.13	349	3.12	352	2.84
1012	2.31	397	3.14	399	2.93	401	2.74
1012	n.d.	499	3.19	499	2.75	499	2.43
1012	n.d.	600	2.33	599	2.28	601	2.39
1012	n.d.	799	2.89	799	2.43	801	2.39
1012	n.d.	1014	2.32	1011	2.30	1011	2.32

Stn.	45	Stn.	46	Stn.	47
2-30N	137-30E	4N	137E	5N	137E
Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)	Depth(db)	D.O.(ml/l)
0	n.d.	0	n.d.	0	4.54
50	n.d.	50	n.d.	50	4.58
100	n.d.	100	n.d.	100	4.38
150	n.d.	150	n.d.	150	3.64
200	n.d.	200	n.d.	200	2.69
250	n.d.	250	n.d.	249	2.59
300	n.d.	300	n.d.	299	1.87
350	n.d.	350	n.d.	350	1.65
400	n.d.	400	n.d.	399	1.69
500	n.d.	500	n.d.	499	1.92
600	n.d.	600	n.d.	599	2.02
800	n.d.	800	n.d.	799	2.12
1000	n.d.	1000	n.d.	1011	2.13

n.d.=NO DATA

Table 4.6.2 Root mean squares for each depth

Niskin No.	Depth (db)	r.m.s (ml/l) CTD (Up)	CTD (Down)
1	1000	0.11	0.11
2	800	0.14	0.11
3	600	0.13	0.10
4	500	0.16	0.13
5	400	0.15	0.13
6	350	0.16	0.13
7	300	0.17	0.15
8	250	0.18	0.17
9	200	0.18	0.17
10	150	0.20	0.19
11	100	0.26	0.25
12	50	0.31	0.30

Corrected D.O. Meter - CTD (upcast & downcast)

5 .Meteorological Measurements

objectives : To promote our understanding about the air sea interaction over the "warm water pool " area.

5.1 Atmospheric Sounding

Method:

We observed vertical profiles of pressure, temperature, relative humidity, and wind speed/direction by using VAISALA DigiCORA MW 11 semi Automatic Radiosonde System. The system consists of Main processor (MW11), Local VLF Antenna (CAS11B/CAA21), UHF Telemetry Antenna (RB21), Microdisk Recorder (MF12), Ground Check Set (GC22), Printer (EPSON LX 1050), Balloon Launcher (ASAP JAMSTEC), and Radiosonde (RS80). The range and accuracy of parameters measured by the radiosonde are follows ;

Parameter	Range	Accuracy
Pressure	1060 — 3 hPa	0.5 hPa
Temperature	90 +60 deg C	0.2 deg C
Relative humidity	0 — 100 %	3 %
Wind speed	0 — 180 m/s	0.5 m/s

The surface data were measured by using handy humidity and temperature meter (YOKOGAWA2451 01), shipboard Aneroid barometer (YANAGI type 8A) and wind speed/direction meter (OGASAWARA).

We launched the radiosonde with balloon every 6 hours at 00Z, 06Z, 12Z, 18Z from 5th AUG '97 to 14thAUG '97 and from 18th AUG '97 to 28thAUG '97. So we obtained sounding data. Table 5-1 shows radosonde launch Log.

Preliminary Result :

Fig.5—1 shows the EMAGRAM and wind profiles with sounding time (YYMMDDTT UTC) and position.

In the earlier days of this cruise (~Aug.8), convectively active area existed in160° E Dateline and within 10° from the equator. One outstanding phenomena was that the tropical depression developed around (10° N, 160° E) on Aug.8. It grew and moved west-northwestward, and clear eye of typhoon could be found at (18° N, 147° E) at 00Z of Aug. 12 (see Appendix A 2, GMS IR Image).

Atmospheric sounding by radiosonde shows that westerly wind burst (WWB) occurred

in the lower troposphere(~5km) on and north of the equator during Aug.7−18. The vertical profile shows easterly wind prevailed above 5km whose maximum speed reached over 25m/s at about 10km. Southerly wind was also dominant south of the equator during Aug.10−12. Although relatively moist conditions were dominant in this whole cruise period, some extremely dry layers could be found at 700 800hPa level while WWB occurred.

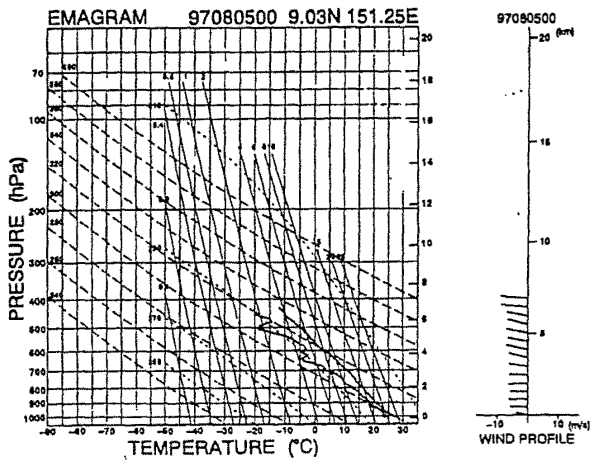
Table5—1
Radiosonde launch Log Sites

Surface

No.	Time(UTC)	Position		Press.	Temp.	RH	W.D.	W.S.	Max Altitude		Cloud	
	YY MM DD TT	Lat..	Log.	(hPa)	(DEG-C)	(%)	(deg)	(m/s)	(hPa)	(m)	Amount	Type
1	97 08 05 00	09 18N	151 15E	1011.4	28.3	77	79	3.5	426.5	7135	8	Cb,Cu
2	97 08 05 06	08 59N	152 24E	1009.1	27.8	86	180	4.3	646.1	3823	3	Cb,Cu
3	97 08 05 12	08 38N	153 39E	1011.7	27.7	78	142	4.5	43.0	21665	1	N/A
4	97 08 05 18	08 19N	154 52E	1008.0	25.7	83	158	3.5	28.7	24178	8	Cb,Cu
5	07 08 06 00	07 59N	156 00E	1008.4	26.7	72	238	8.5	41.7	22082	8	Cu,Cb,Ac,Ci,Cs
6	97 08 06 06	06 59N	156 00E	1006.8	28.0	77	270	9.0	42.3	21695	9	Cu,Sc,Ac
7	97 08 06 12	05 59N	156 00E	1010.1	26.7	86	299	8.6	42.3	21750	10	N/A
8	97 08 06 18	05 03N	156 12E	1008.2	26.1	87	225	5.0	543.0	5193	10	Cb,Ns
9	97 08 07 00	04 58N	156 14E	1008.8	28.2	77	214	7.1	18.7	26938	10	Ns,As,Sc
10	97 08 07 06	04 00N	156 00E	1005.8	27.2	77	203	10.0	48.6	20843	7	As.Sc,Cu,Cb
11	97 08 07 12	03 00N	156 00E	1008.8	26.7	82	221	10.5	60.1	19511	1	As
12	97 08 07 18	02 04N	155 59E	1008.7	27.3	78	180	8.0	34.8	22956	10	N/A
13	97 08 08 00	02 00N	156 00E	1012.0	24.0	92	266	9.2	62.2	19421	10	Ns,St
14	97 08 08 06	01 26N	156 00E	1007.7	29.1	70	180	8.0	46.0	21208	5	Cb,Cu,As
15	97 08 08 12	00 29N	156 00E	1011.4	27.1	75	181	10.5	29.9	23924	9	Cs
16	97 08 08 18	00 00N	156 25E	1009.2	27.0	75	176	10.0	22.8	25632	10	Ac,As
17	97 08 09 00	00 01N	156 14E	1011.5	29.1	68	191	8.0	21.1	26116	2	Cu
18	97 08 09 06	00 00S	156 00E	1008.7	27 9	79	180	10.0	621.5	10876	5	Cu,Cc
19	97 08 09 12	00 43S	156 00E	1011.5	27.3	75	185	10.5	35.9	22761	1	As,Cu
20	97 08 09 18	01 36S	156 00E	1009.7	27.5	70	180	11.0	35.7	22770	8	Cu,Cs,As
21	97 08 10 00	02 00S	156 04E	1011.9	28.6	68	204	14.8	20.4	26283	2	Ci,Cu,Cs
22	97 08 10 06	02 01S	156 00E	1009.5	27.4	74	203	12.0	29.8	23898	9	Cu,As,Ns
23	97 08 10 12	03 07S	156 00E	1012.6	24.7	87	137	8.5	536 9	5317	10	Cb
24	97 08 10 18	04 24S	156 00E	1010.2	27.1	77	223	11.0	29.1	24075	4	Ac,As,Cc
25	97 08 11 00	05 00S	156 00E	1012.3	28.4	68	175	11.0	42.6	21669	4	Ac,Ci,Cu
26	97 08 11 06	05 00S	156 00E	1009.8	27.7	69	158	7.0	150.3	14218	9	As,Cs,Cc,Cu
27	97 08 11 12	04 00S	156 00E	1009.7	26.7	81	151	17.5	45.8	21244	9	Ac,Cs,Cc
28	97 08 11 18	03 00S	156 00E	1008.8	27.3	73	158	10.5	30.1	23856	9	Cs,As
29	97 08 12 00	01 53S	155 38E	1011.3	27.6	78	191	10.5	24.5	25147	3	Cu,Ac,Cc
30	97 08 12 06	00 41S	155 13E	1007.9	28.3	75	203	10.5	34.4	23033	9	Ac,Cu,Cc
31	97 08 12 12	00 00S	154 50E	1011.7	26.9	82	186	10.5	26.0	24795	7	As,Cb,Cu,Cs
32	97 08 12 18	00 00N	153 55E	1009.6	27.0	74	180	9.0	42.4	21720	0	
33	97 08 13 00	00 00N	153 00E	1010.3	28.5	70	175	11.5	28.0	24272	2	Cu
34	97 08 13 06	00 00S	152 00E	1006.7	26 9	75	170	8.0	26.2	24710	1	Ac
35	97 08 13 12	01 00N	152 00E	1010.8	25.1	81	118	3.0	30.5	23784	10	Cc
36	97 08 13 18	02 11N	152 00E	1008.7	26.2	78	158	5.6	32.8	23304	10	As,AC,Cs
37	97 08 14 00	03 22N	152 00E	1010.3	29.1	67	144	6.5	33.5	23153	1	Ci,Cc,Cs
38	97 08 18 00	03 59N	150 36E	1008.0	30.0	68	208	10.5	27.1	24496	7	Ci,Cu,Ac
39	97 08 18 06	03 16N	149 57E	1005.8	28.9	72	194	8.0	26.4	24661	8	Ci,Cc,Cu
40	97 08 18 12	02 30N	149 15E	1008.2	27.4	76	160	7.5	34.8	22947	2	Cu
41	97 08 19 06	00 00N	147 00E	1005.7	28.6	69	145	7.0	37.8	22414	2	Cu
42	97 08 19 12	00 00N	146 21E	1007.9	27.2	77	147	6.5	34.2	23054	2	Cu
43	97 08 19 18	00 00N	145 18E	1006.6	26.4	90	142	7.0	27.9	24300	3	Cu
44	97 08 20 00	00 00S	144 13E	1009.1	29.1	89	136	6.0	36.6	22597	5	Cu,Cb
45	97 08 20 06	00 00N	143 11E	1005.7	29.4	72	145	5.5	37.3	22496	4	Cu
46	97 08 20 12	00 49S	142 40E	1007.7	27.7	83	117	7.5	30.4	23758	0+	Ac
47	97 08 20 18	01 57S	142 10E	1007.4	25.7	90	94	5.3	29.3	24004	4	Ac,Cb
48	97 08 21 00	02 29S	141 56E	1009.7	28.0	88	130	5 2	30.0	23866	3	Cc,Cs,Cb,Cu
49	97 08 21 06	02 03S	141 59E	1006.4	27.9	73	92	5.0	42.0	21737	7	Cu,Sc
50	97 08 21 12	02 01S	141 59E	1008.4	27.2	83	103	5.5	31.4	23577	2	Cu
51	97 08 21 18	01 58S	142 01E	1007.3	27.0	84	83	3.0	30.3	23785	5	Cs,Cu
52	97 08 22 00	02 00S	142 00E	1010.3	28.7	73	104	5.3	21.6	25963	8	Cb,Cu
53	97 08 22 06	01 00S	142 00E	1006.7	31.5	57	118	8.5	27.4	24418	1	Cu,Cb

Table5－1
Radiosonde launch Log Sites

54	97 08 22 12	00 00S	142 00E	1008.7	28.5	77	98	7.5	29.6	23974	0	
55	97 08 22 18	00 00S	141 00E	1008.2	26.3	82	90	5.0	33.0	23268	1	Cu
56	97 08 23 00	00 00S	139 52E	1010.5	29.2	74	101	4.6	40.6	21962	2	Cu
57	97 08 23 06	00 14S	138 47E	1006.9	30.0	70	131	6.1	30.6	23722	1	Cu
58	97 08 23 12	00 58S	138 00E	1009.0	28.3	78	49	8.2	37.1	22536	0+	Cb
59	97 08 23 18	00 04S	138 00E	1007.8	27.0	84	24	6.0	37.4	22465	1	Cu,Ac
60	97 08 24 00	00 44S	138 00E	1010.1	29 2	73	100	2.0	27.3	24435	2	Cu,Ac,Ci
61	97 09 24 06	01 17N	138 00E	1006.2	30.3	65	130	5.0	27.7	24339	5	Cu
62	97 08 24 12	00 07N	138 05E	1009.2	28.3	76	79	5.0	30.8	23713		
63	97 08 24 18	00 03S	138 00E	1008.8	27.1	80	100	3.0	29.2	24002	1	Cu,Cb
64	97 08 25 00	00 01S	137 59E	1010.9	29.0	71	119	5.0	26.7	24595	0+	Cs,Cu
65	97 08 25 06	00 41N	138 16E	1008.3	32.0	59	55	2.0	30.4	23747	4	Ci,Cu
66	97 08 25 12	01 41N	138 36E	1011.7	28.1	74	78	2.0	39.5	22137	0	
67	97 08 25 18	02 17N	138 52E	1008.8	28.7	75	138	3.0	34.9	22879	4	Cs,Cu
68	97 08 26 00	02 20N	138 49E	1010.8	29.7	68	175	3.0	47.7	20965	3	Cs,Ci,Cu,Cb
69	97 08 26 06	02 12N	138 06E	1007.8	30.2	69	122	2.5	34.8	22197	9	Ci,Cc,Cu
70	97 08 26 12	02 00N	137 10E	1010.0	28.3	77	112	4.5	49.4	20767	3	Cu
71	97 08 26 18	02 00N	136 59E	1009 2	28.0	78	131	2.5	34.8	22931	8	As
72	97 08 27 00	02 24N	137 25E	1010.4	29.0	70	240	1.0	33.7	23139	2	Cu,As
73	97 08 27 06	02 50N	137 07E	1007.5	30.9	68	290	2.5	32.1	23412	2	Cu
74	97 08 27 12	04 00N	137 00E	1009.7	27.6	75	275	1.5	31.6	23553		
75	97 08 27 18	05 00N	137 00E	1007.8	27.6	77	247	6.0	39.0	22200	0+	Cs
76	97 08 28 00	05 40N	136 03E	1009.4	27.9	75	247	8.0	28.6	24126	1	Cu
77	97 08 28 06	06 19N	135 02E	1006.7	31.6	60	253	5.5	32.0	23415	4	Ac,Cu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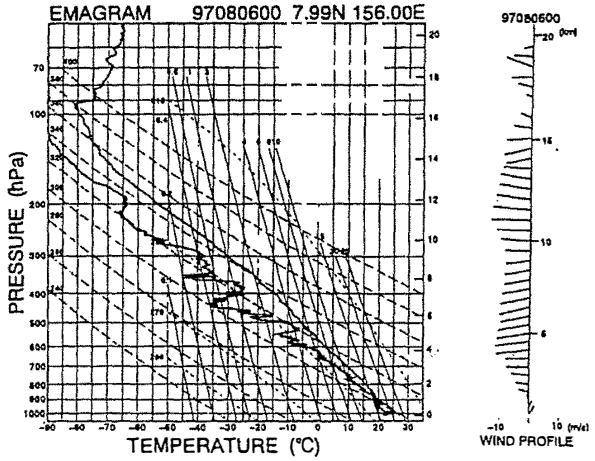
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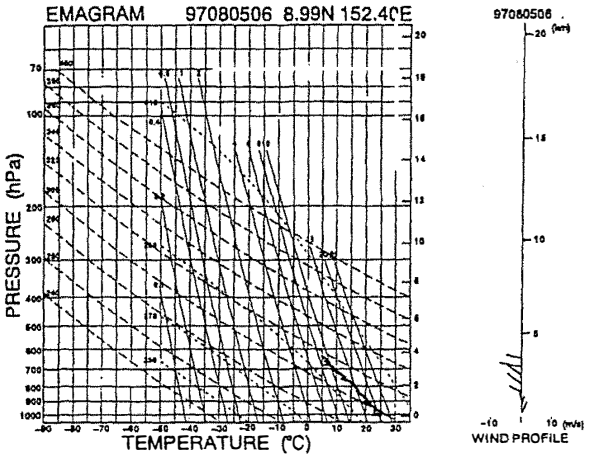
WIND PROFILE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TEMPERATURE (°C)
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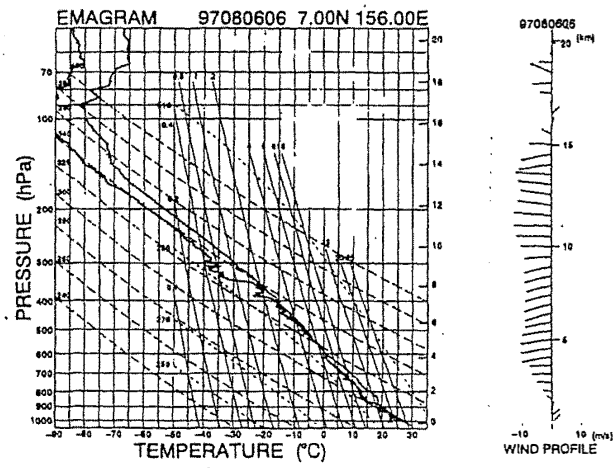
WIND PROFILE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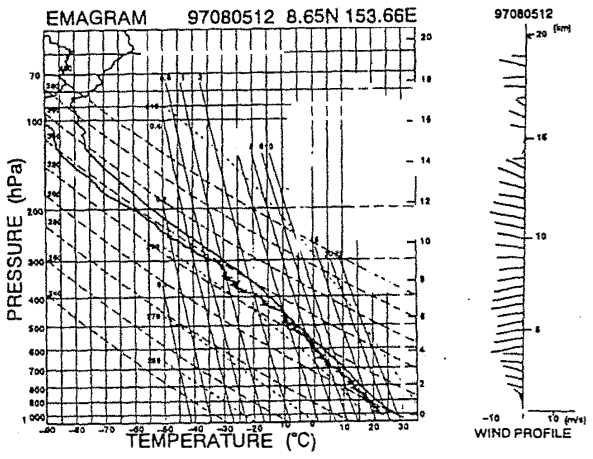
WIND PROFILE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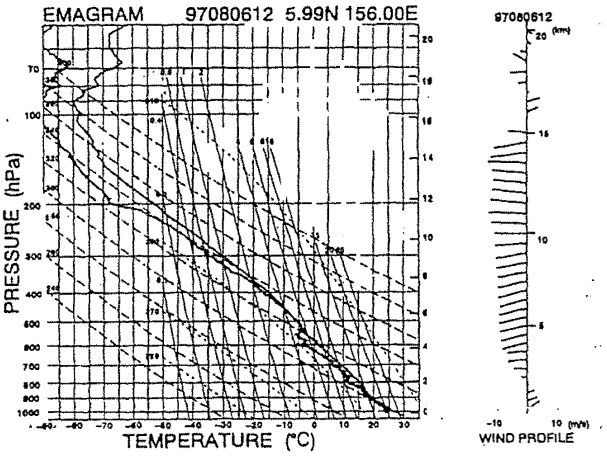
WIND PROFILE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TEMPERATURE (°C)
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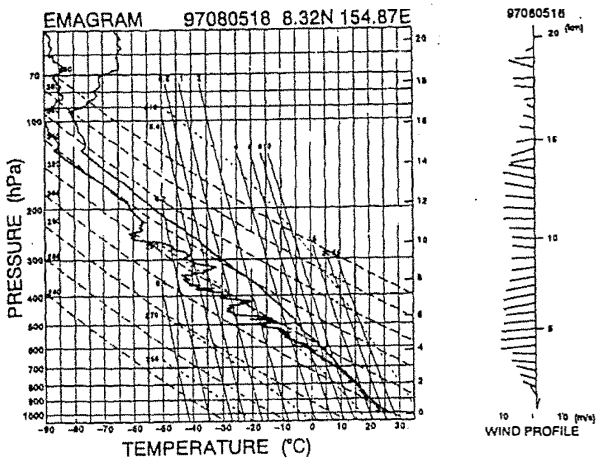
WIND PROFILE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TEMPERATURE (°C)
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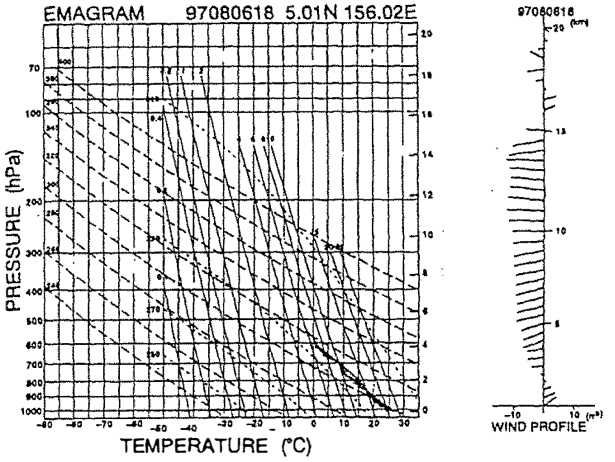
WIND PROFILE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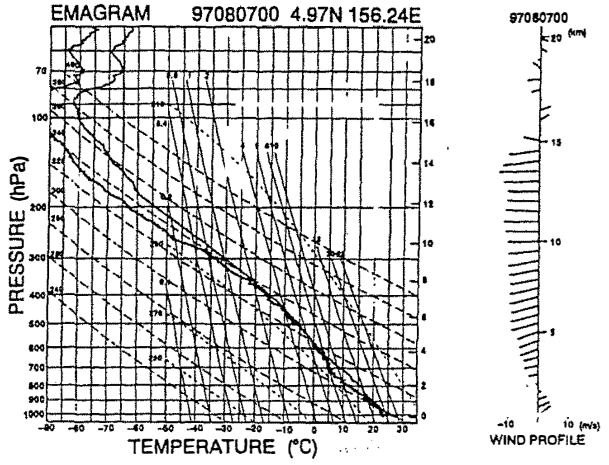
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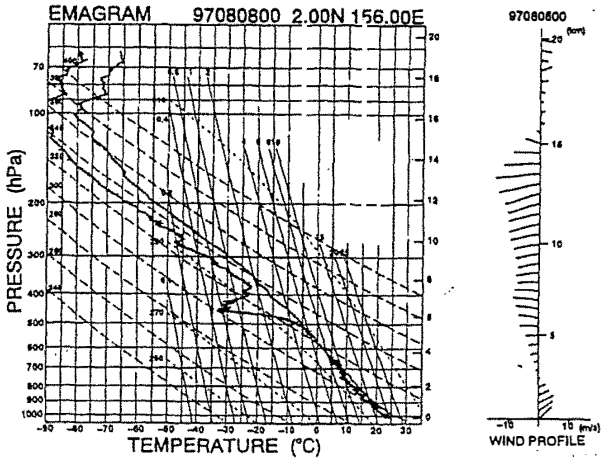
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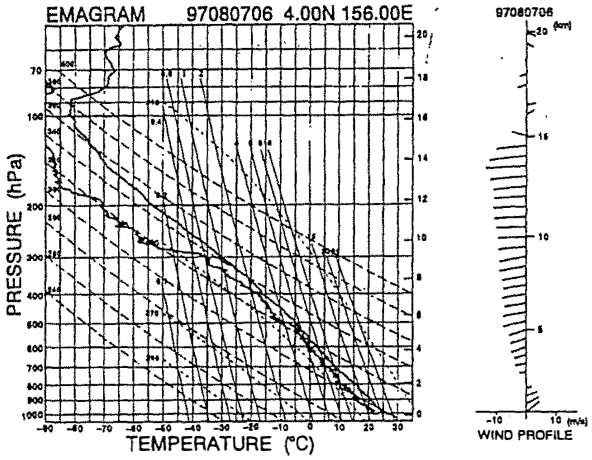
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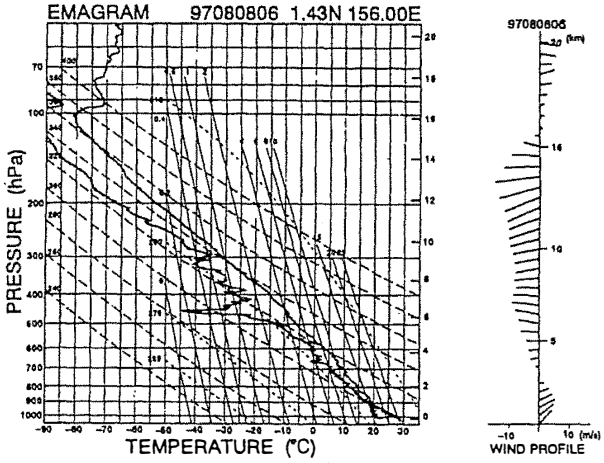
WIND PROFILE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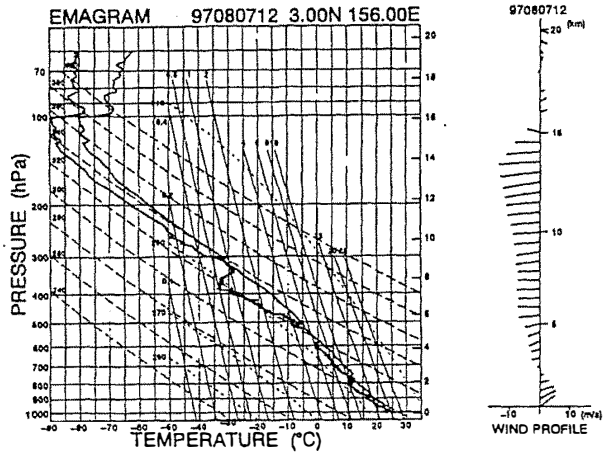
WIND PROFILE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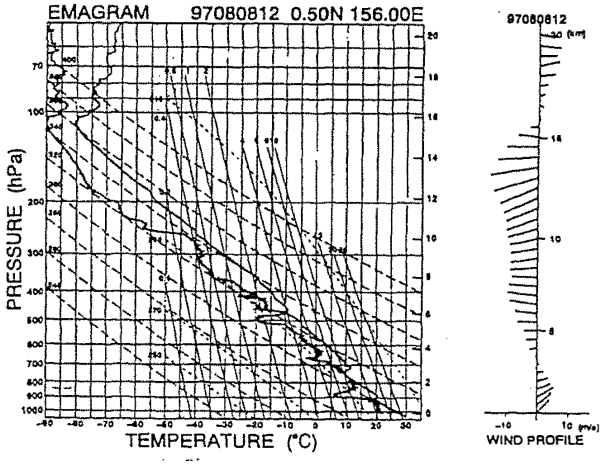
TEMPERATURE (°C)
97080712
WIND PROFILE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TEMPERATURE (°C)
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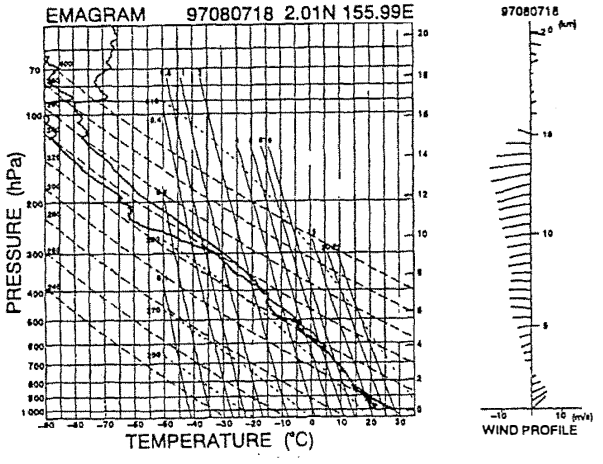
WIND PROFILE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TEMPERATURE (°C)
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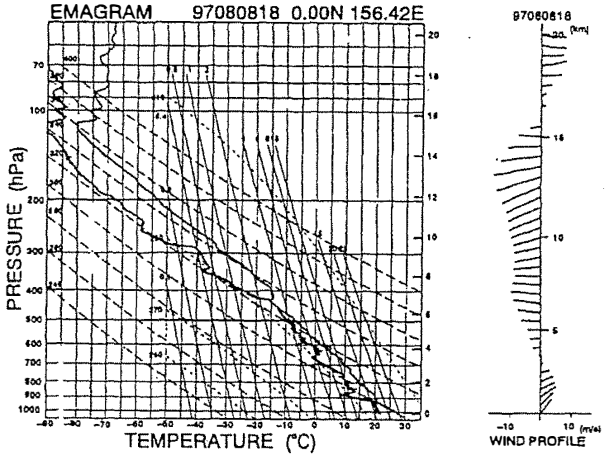
WIND PROFILE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TEMPERATURE (°C)
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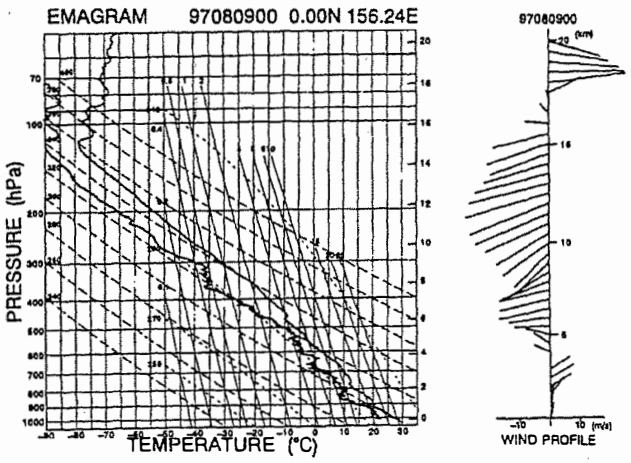
WIND PROFILE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TEMPERATURE (°C)
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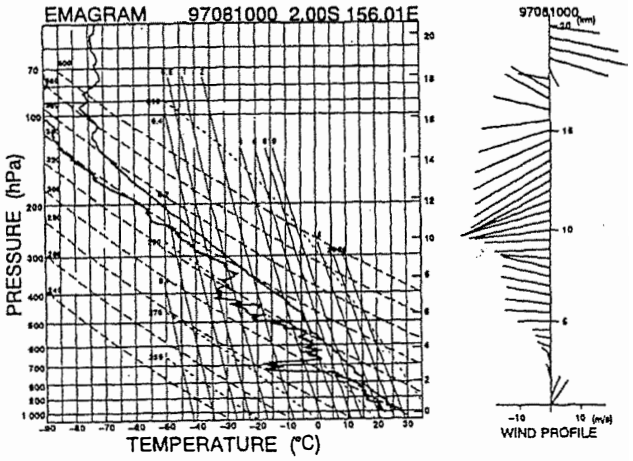
WIND PROFILE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PRESSURE (hPa)
TEMPERATURE (°C)
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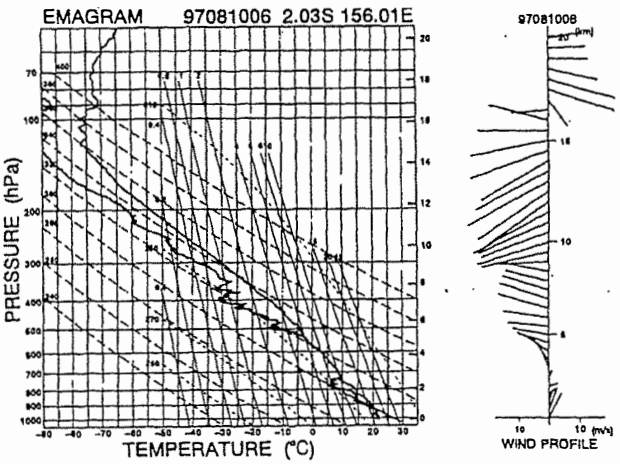
WIND PROFILE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TEMPERATURE (°C)
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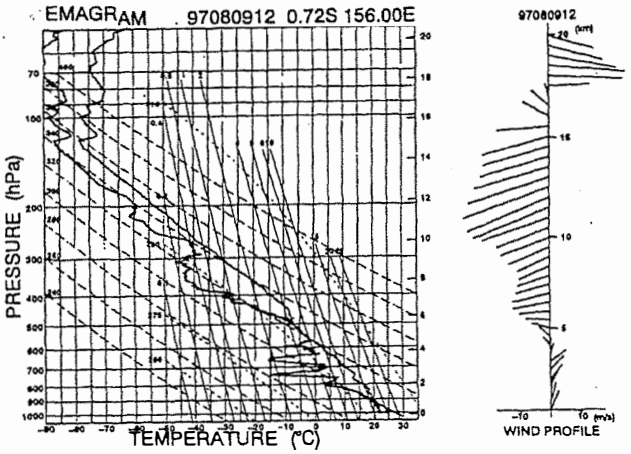
WIND PROFILE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TEMPERATURE (°C)
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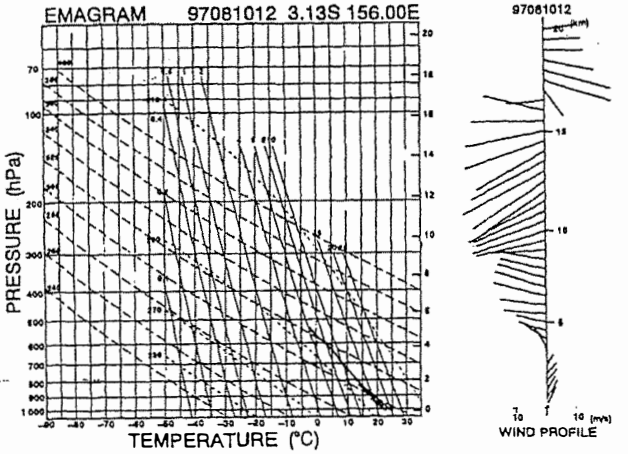
WIND PROFILE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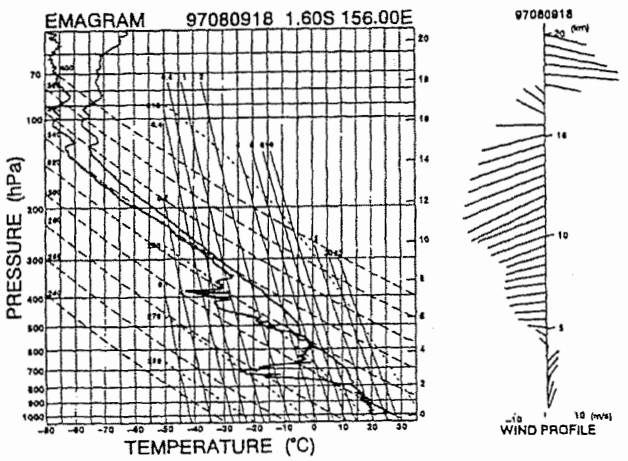
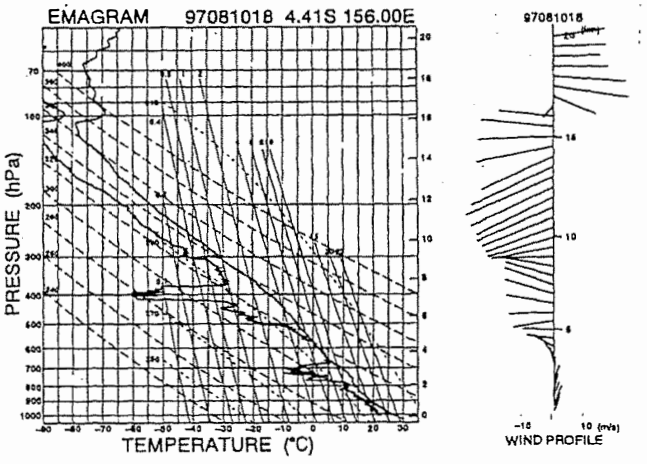
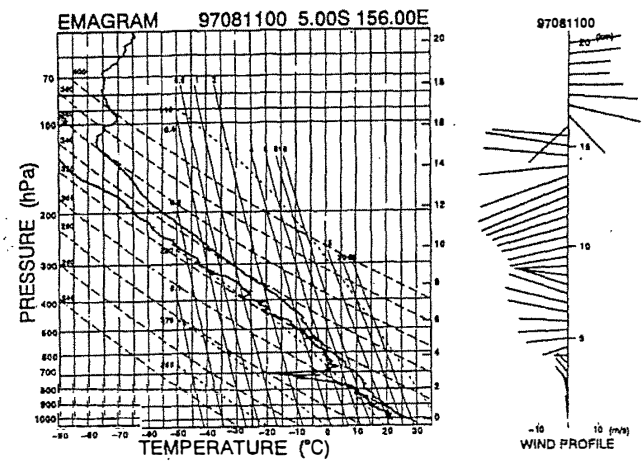
WIND PROFILE


EMAGRAM 97080918 1.60S 156.00E
PRESSURE (hPa)
TEMPERATURE (°C)
97080918
WIND PROFILE


EMAGRAM 97081018 4.41S 156.00E
PRESSURE (hPa)
TEMPERATURE (°C)
97081018
WIND PROFILE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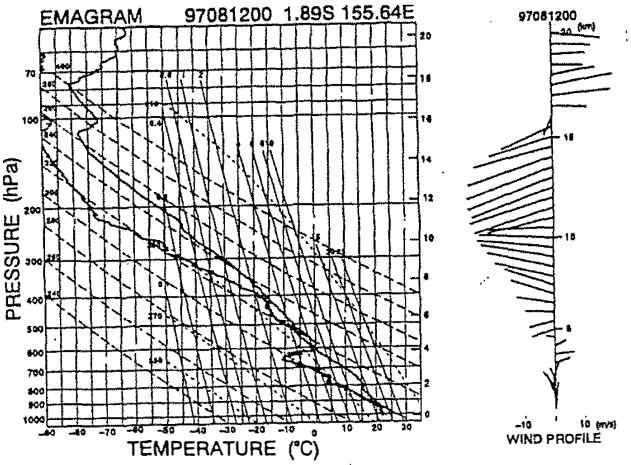
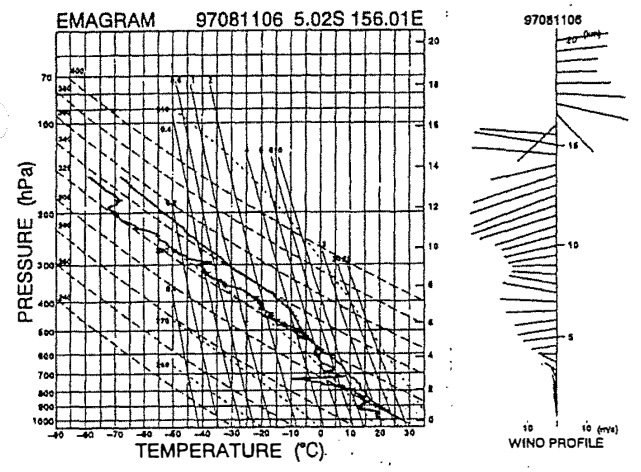
PRESSURE (hPa)
TEMPERATURE (°C)
97081100
WIND PROFILE


EMAGRAM 97081200 1.89S 155.64E
PRESSURE (hPa)
TEMPERATURE (°C)
97081200
WIND PROFILE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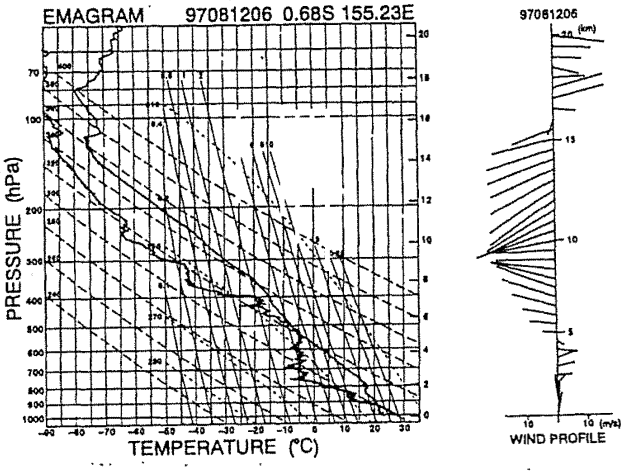
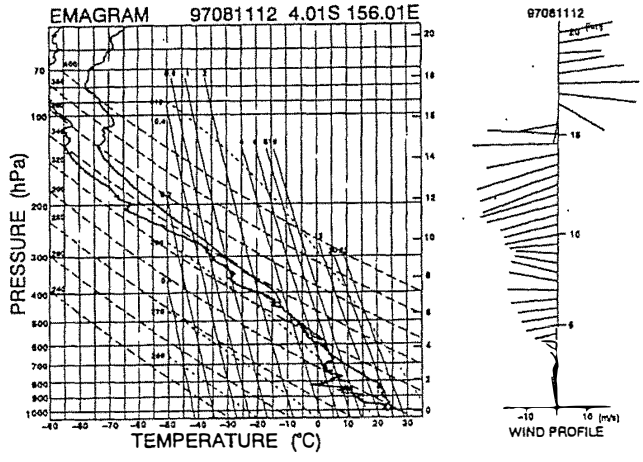
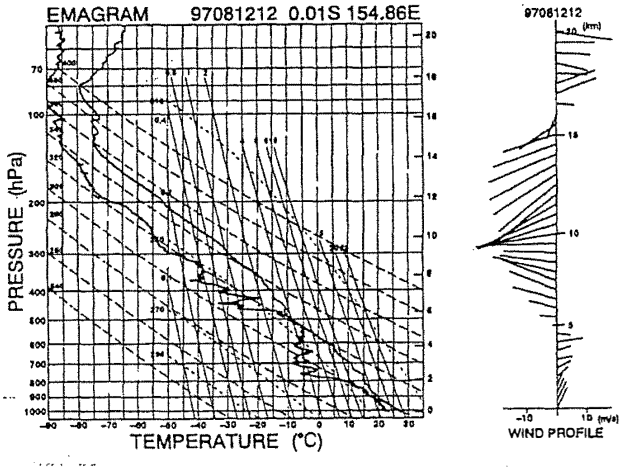
PRESSURE (hPa)
TEMPERATURE (°C)
97081106
WIND PROFILE


EMAGRAM 97081206 0.68S 155.23E
PRESSURE (hPa)
TEMPERATURE (°C)
97081206
WIND PROFILE


EMAGRAM 97081112 4.01S 156.01E
PRESSURE (hPa)
TEMPERATURE (°C)
97081112
WIND PROFILE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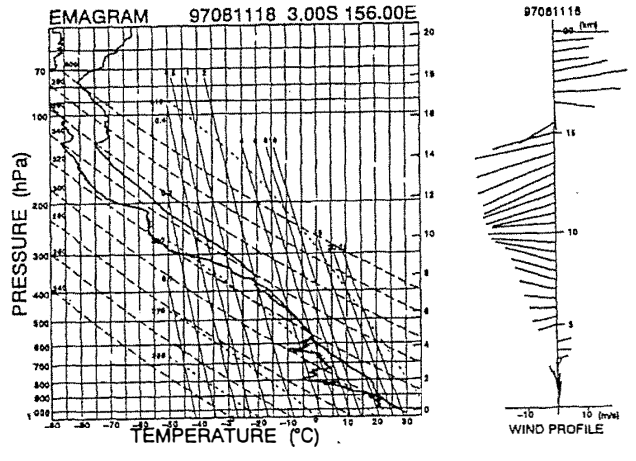
PRESSURE (hPa)
TEMPERATURE (°C)
97081212
WIND PROFILE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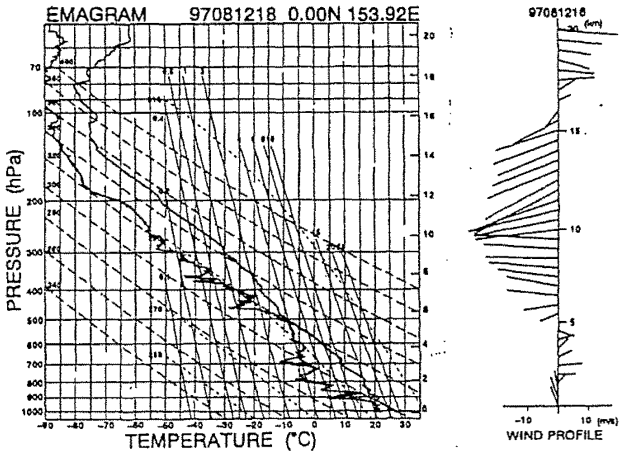
PRESSURE (hPa)
TEMPERATURE (°C)
97081118
WIND PROFILE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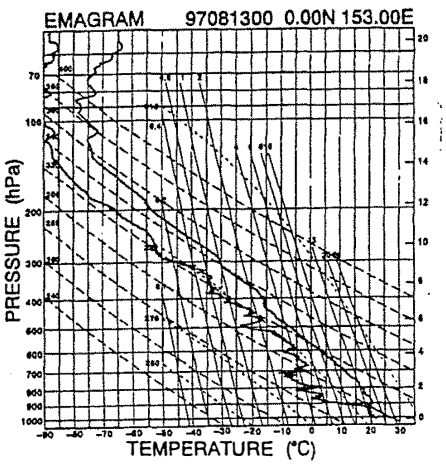
PRESSURE (hPa)
TEMPERATURE (°C)
97081218
WIND PROFILE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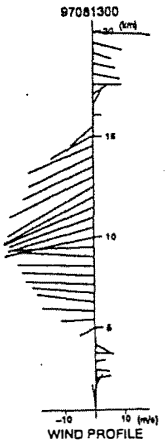
PRESSURE (hPa)
TEMPERATURE (°C)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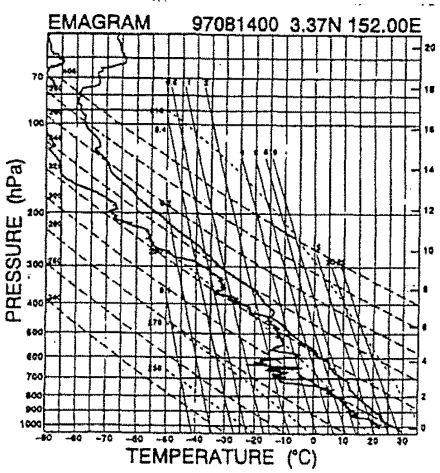
WIND PROFILE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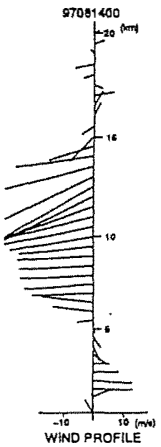
PRESSURE (hPa)
TEMPERATURE (°C)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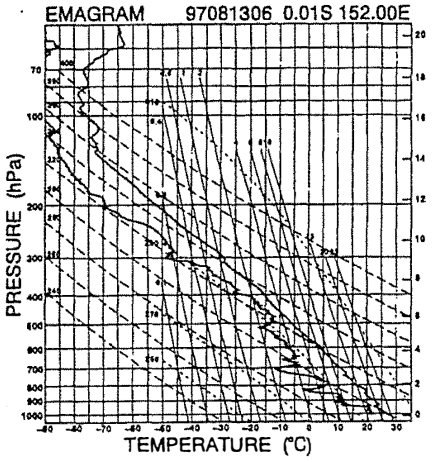
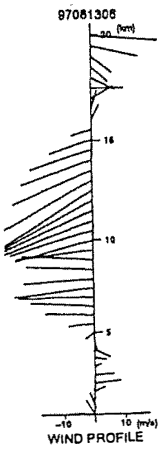
WIND PROFILE


EMAGRAM 97081306 0.01S 152.00E
PRESSURE (hPa)
TEMPERATURE (°C)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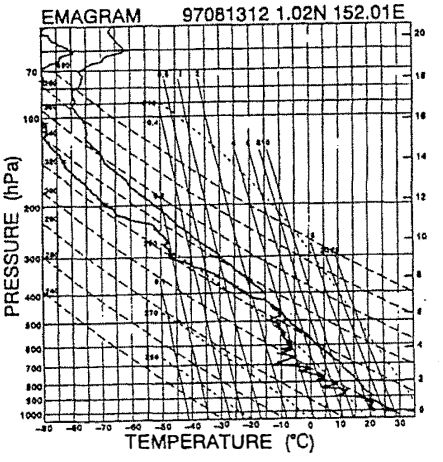
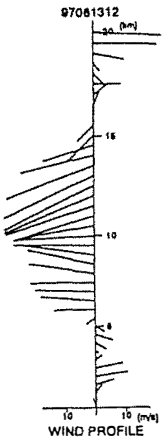
WIND PROFILE


EMAGRAM 97081312 1.02N 152.01E
PRESSURE (hPa)
TEMPERATURE (°C)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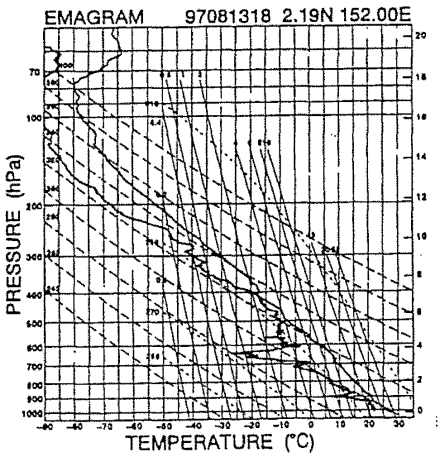
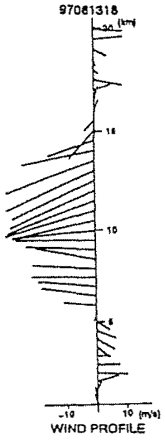
WIND PROFILE


EMAGRAM 97081318 2.19N 152.00E
PRESSURE (hPa)
TEMPERATURE (°C)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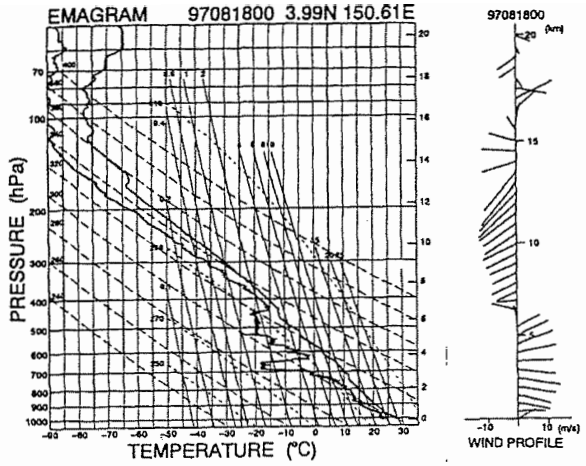
WIND PROFILE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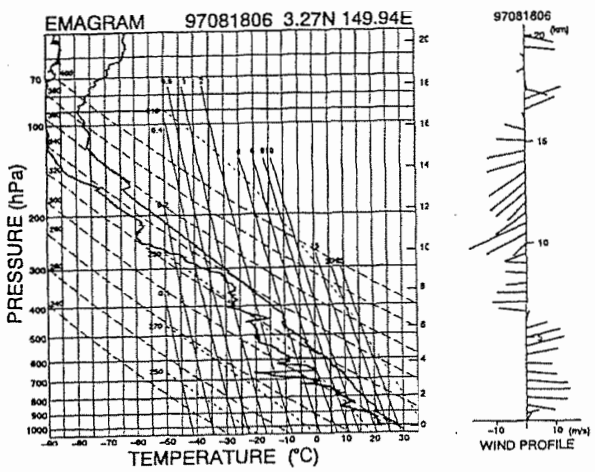
PRESSURE (hPa)
TEMPERATURE (°C)
97081800
WIND PROFILE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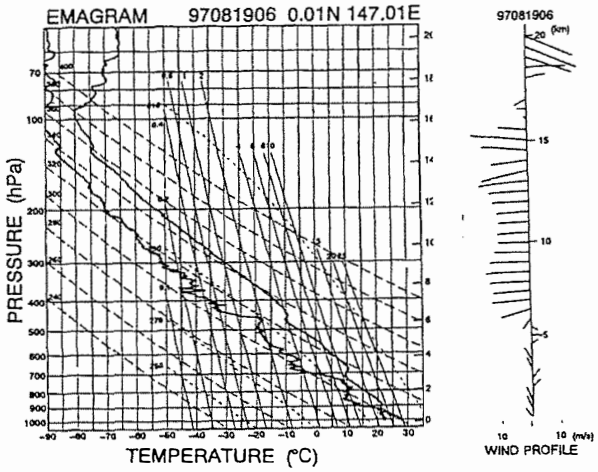
PRESSURE (hPa)
TEMPERATURE (°C)
97081806
WIND PROFILE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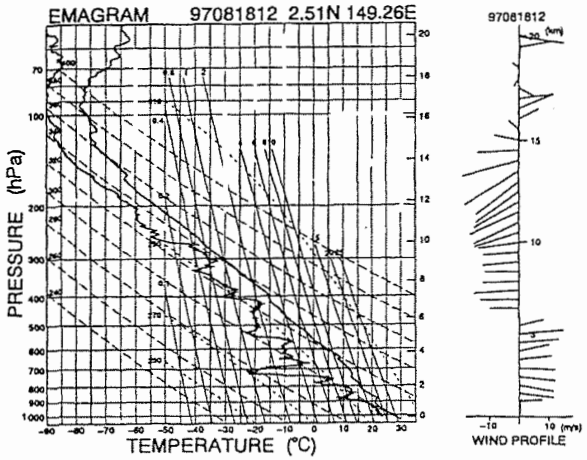
PRESSURE (hPa)
TEMPERATURE (°C)
97081906
WIND PROFILE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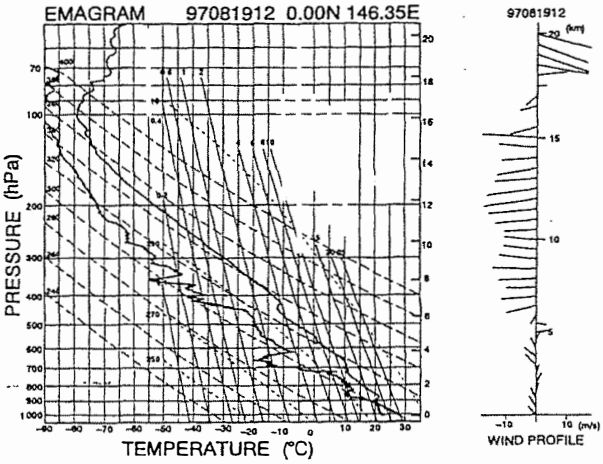
PRESSURE (hPa)
TEMPERATURE (°C)
97081812
WIND PROFILE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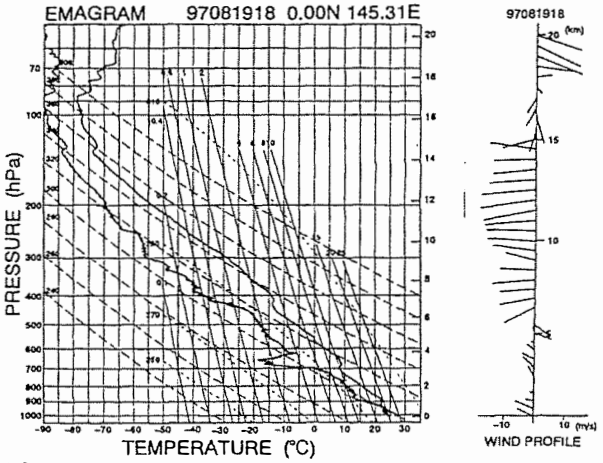
PRESSURE (hPa)
TEMPERATURE (°C)
97081912
WIND PROFILE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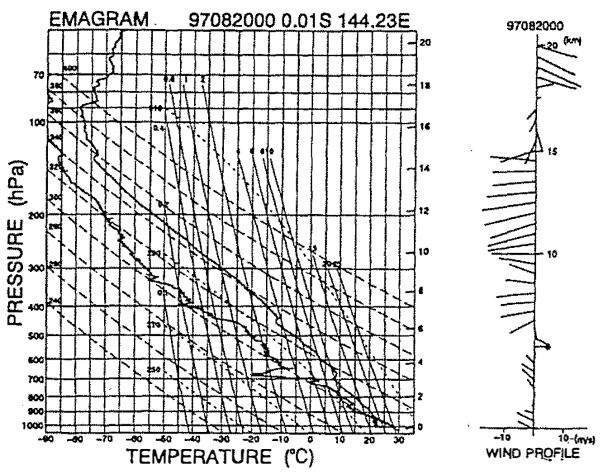
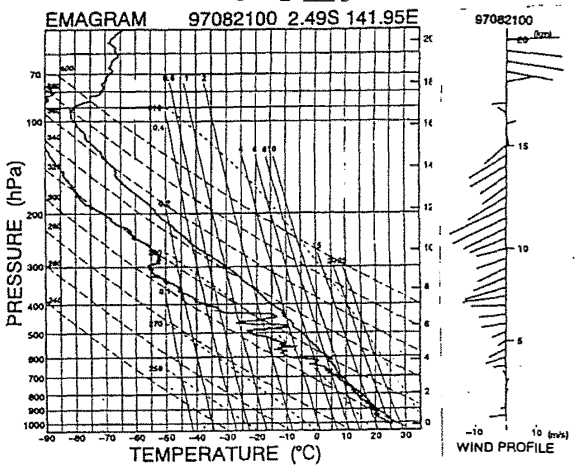
PRESSURE (hPa)
TEMPERATURE (°C)
97081918
WIND PROFILE


EMAGRAM 97082000 0.01S 144.23E
PRESSURE (hPa)
TEMPERATURE (°C)
97082000
WIND PROFILE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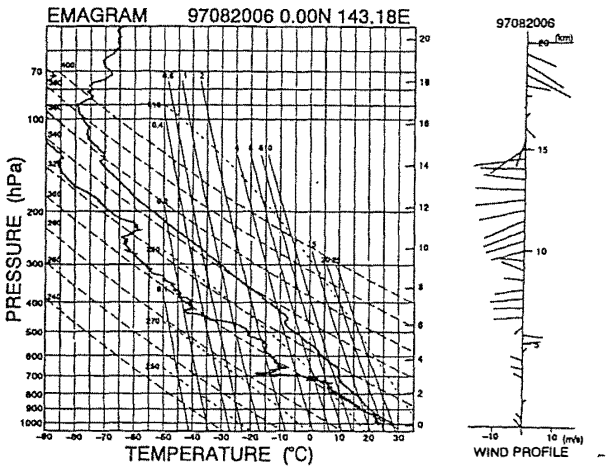
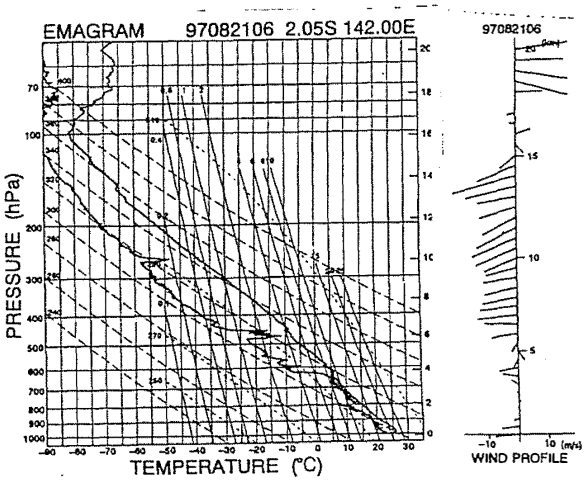
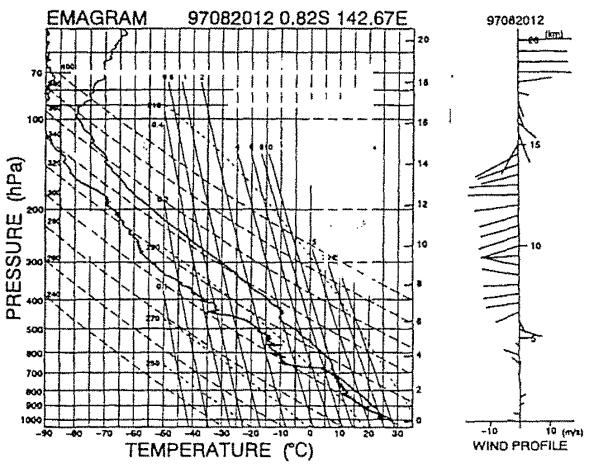
PRESSURE (hPa)
TEMPERATURE (°C)
97082100
WIND PROFILE


EMAGRAM 97082006 0.00N 143.18E
PRESSURE (hPa)
TEMPERATURE (°C)
97082006
WIND PROFILE


EMAGRAM 97082106 2.05S 142.00E
PRESSURE (hPa)
TEMPERATURE (°C)
97082106
WIND PROFILE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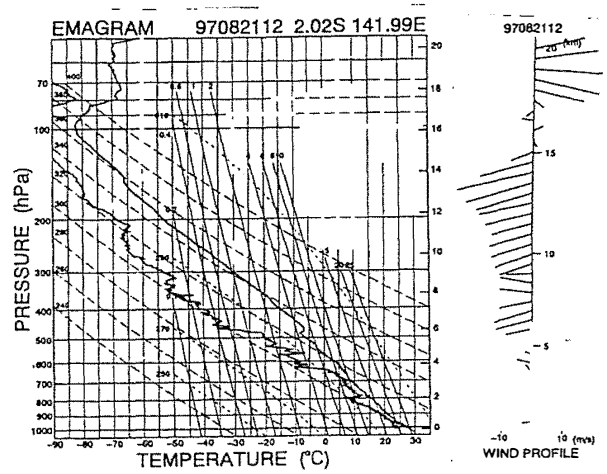
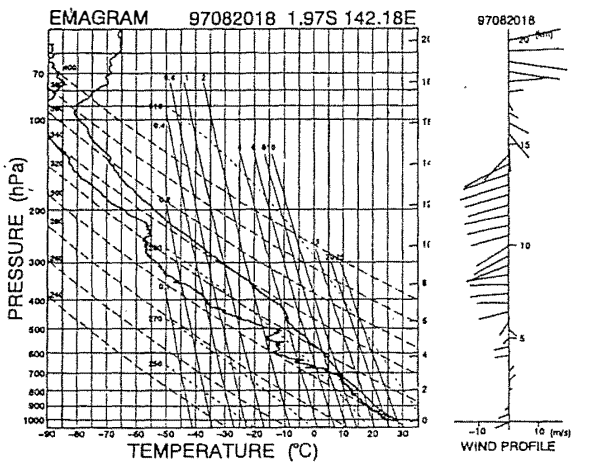
PRESSURE (hPa)
TEMPERATURE (°C)
97082012
WIND PROFILE


EMAGRAM 97082112 2.02S 141.99E
PRESSURE (hPa)
TEMPERATURE (°C)
97082112
WIND PROFILE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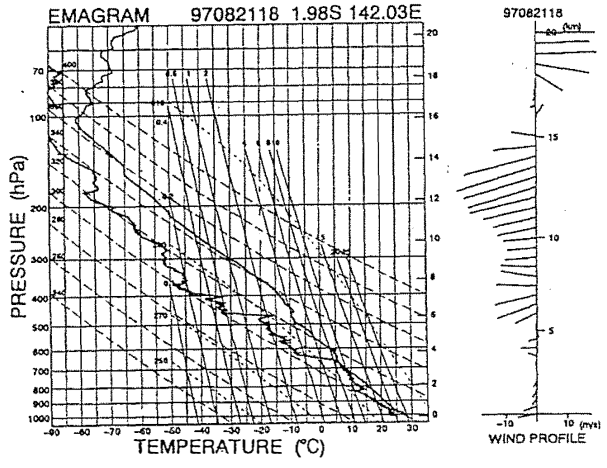
PRESSURE (hPa)
TEMPERATURE (°C)
97082018
WIND PROFILE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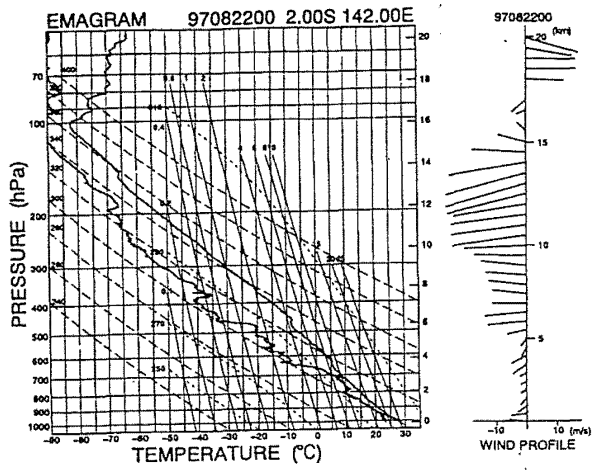
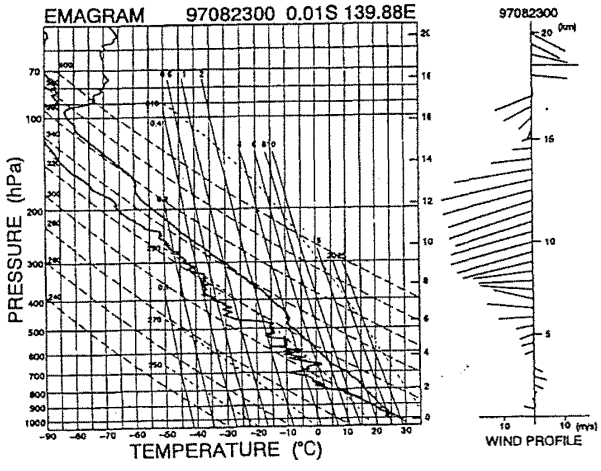
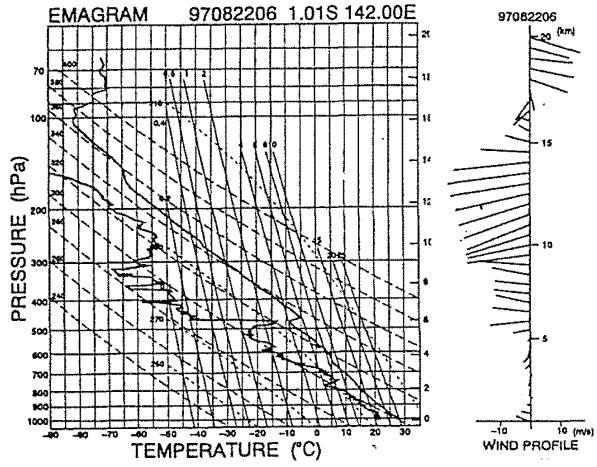
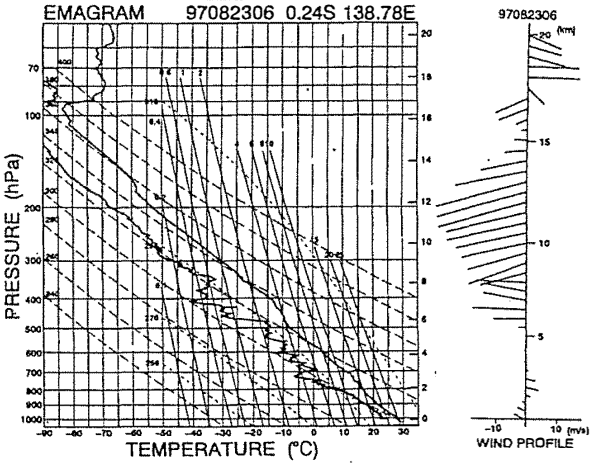
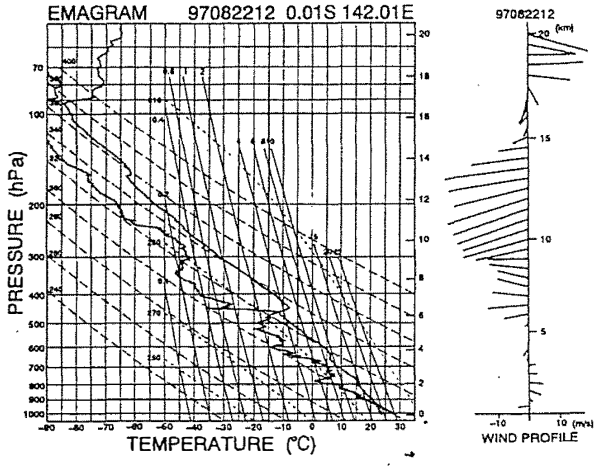
PRESSURE (hPa)
TEMPERATURE (°C)
97082118
WIND PROFILE

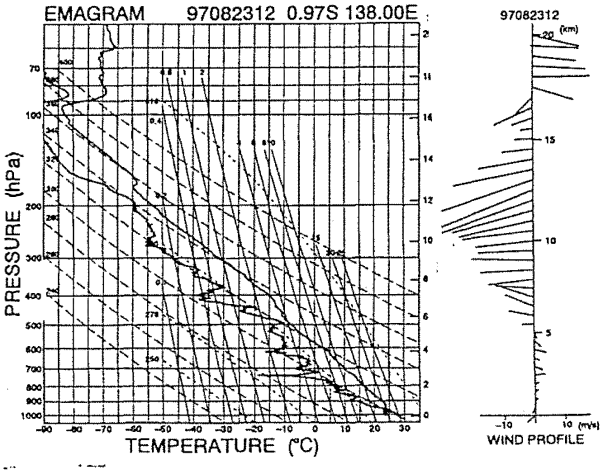

EMAGRAM 97082200 2.00S 142.00E
PRESSURE (hPa)
TEMPERATURE (°C)
97082200
WIND PROFILE

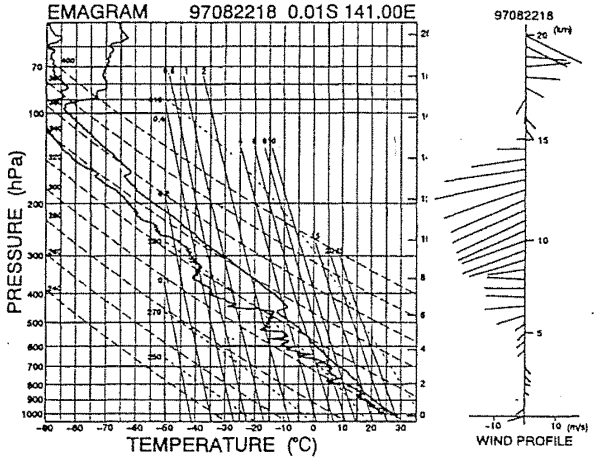

EMAGRAM 97082300 0.01S 139.88E
PRESSURE (hPa)
TEMPERATURE (°C)
97082300
WIND PROFILE

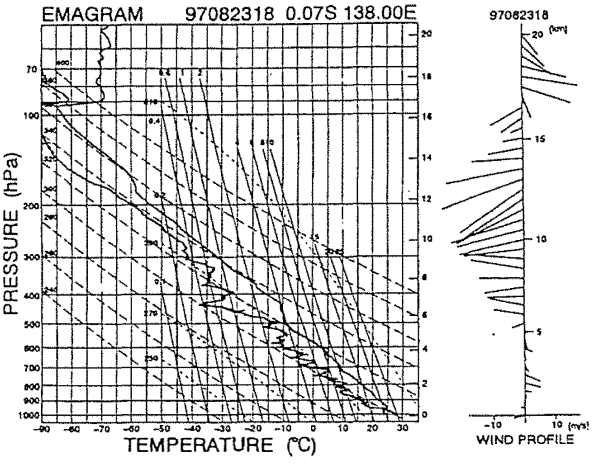

EMAGRAM 97082206 1.01S 142.00E
PRESSURE (hPa)
TEMPERATURE (°C)
97082206
WIND PROFILE

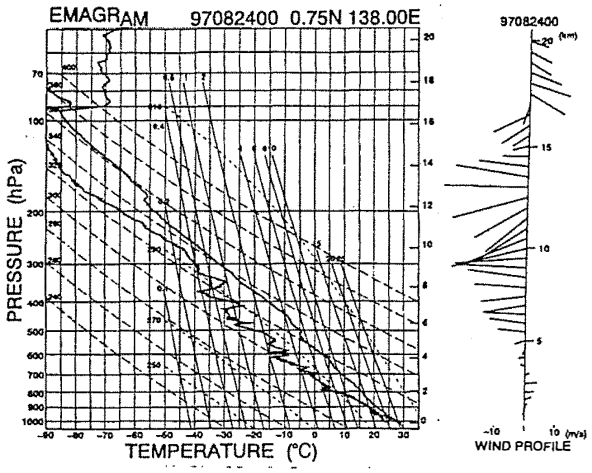

EMAGRAM 97082306 0.24S 138.78E
PRESSURE (hPa)
TEMPERATURE (°C)
97082306
WIND PROFILE

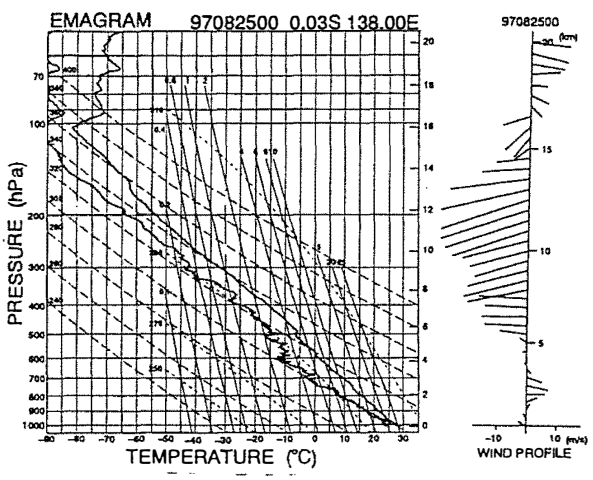

EMAGRAM 97082212 0.01S 142.01E
PRESSURE (hPa)
TEMPERATURE (°C)
97082212
WIND PROFILE

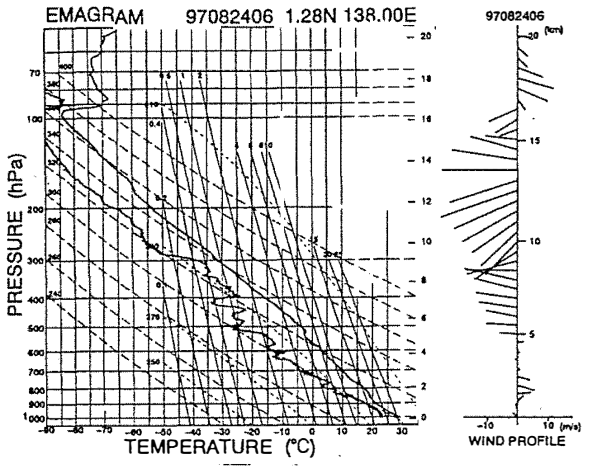

EMAGRAM 97082312 0.97S 138.00E
PRESSURE (hPa)
TEMPERATURE (°C)
97082312
WIND PROFILE

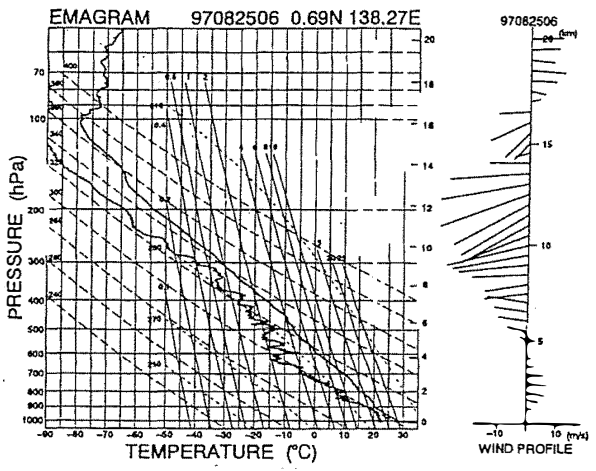

EMAGRAM 97082218 0.01S 141.00E
PRESSURE (hPa)
TEMPERATURE (°C)
97082218
WIND PROFILE

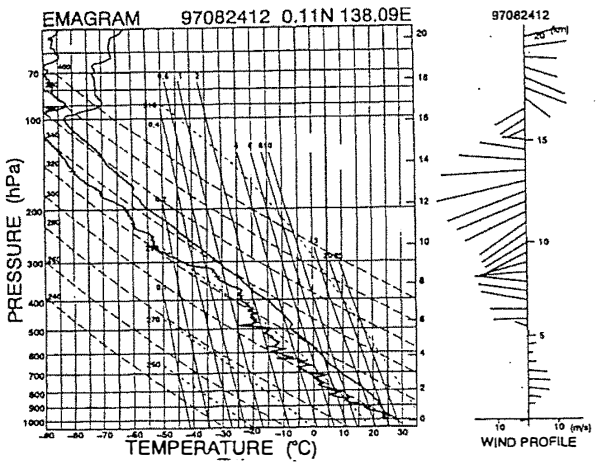

EMAGRAM 97082318 0.07S 138.00E
PRESSURE (hPa)
TEMPERATURE (°C)
97082318
WIND PROFILE

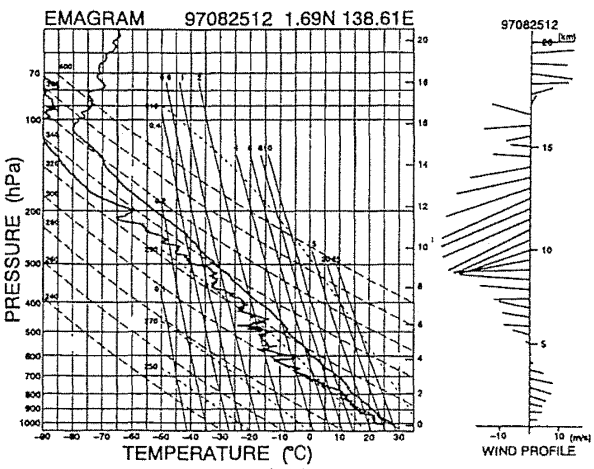

EMAGRAM 97082400 0.75N 138.00E
97082400
PRESSURE (hPa)
TEMPERATURE (°C)
WIND PROFILE

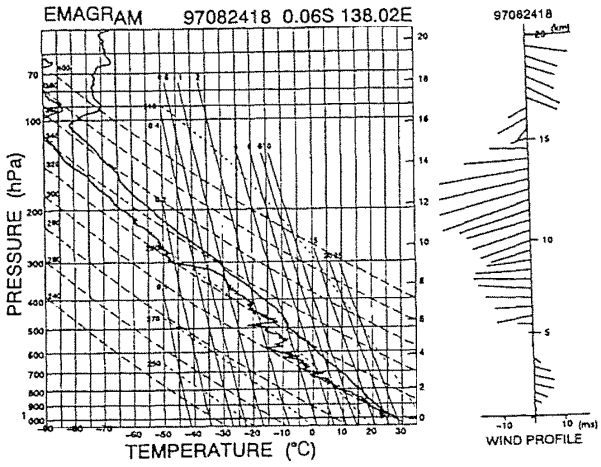

EMAGRAM 97082500 0.03S 138.00E
97082500
PRESSURE (hPa)
TEMPERATURE (°C)
WIND PROFILE

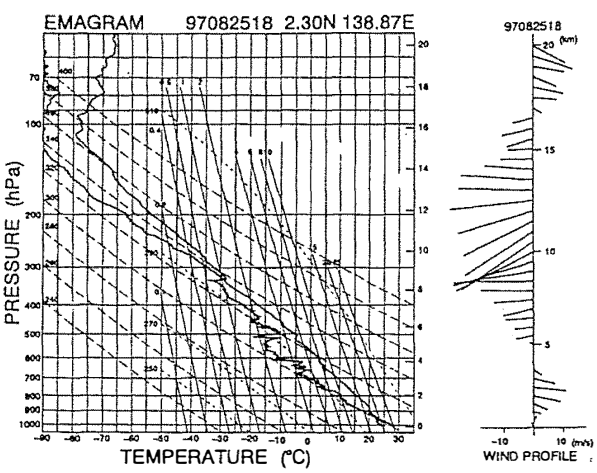

EMAGRAM 97082406 1.28N 138.00E
97082406
PRESSURE (hPa)
TEMPERATURE (°C)
WIND PROFILE

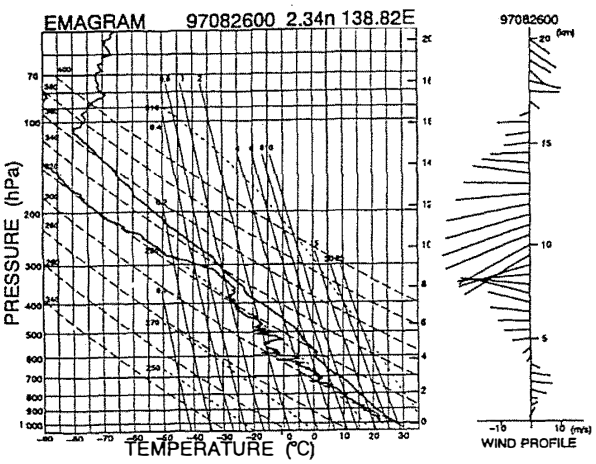

EMAGRAM 97082506 0.69N 138.27E
97082506
PRESSURE (hPa)
TEMPERATURE (°C)
WIND PROFILE

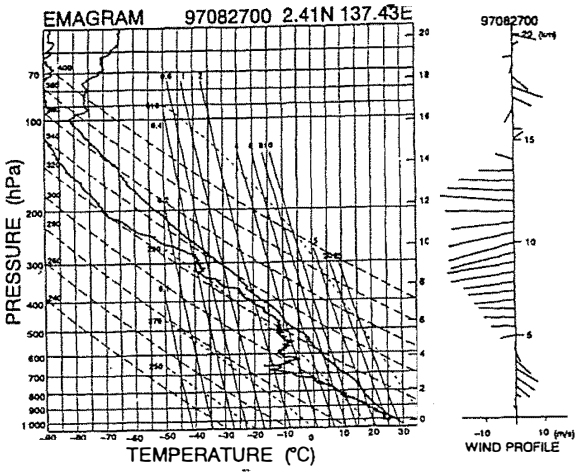

EMAGRAM 97082412 0.11N 138.09E
97082412
PRESSURE (hPa)
TEMPERATURE (°C)
WIND PROFILE

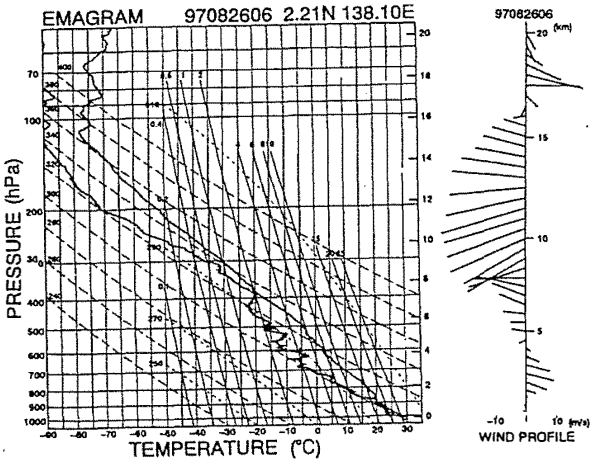

EMAGRAM 97082512 1.69N 138.61E
97082512
PRESSURE (hPa)
TEMPERATURE (°C)
WIND PROFILE

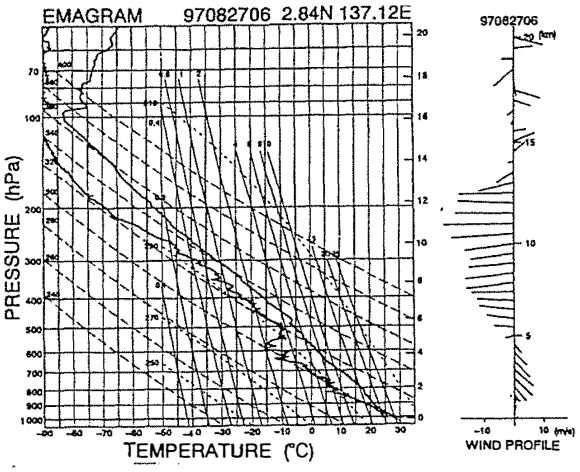

EMAGRAM 97082418 0.06S 138.02E
97082418
PRESSURE (hPa)
TEMPERATURE (°C)
WIND PROFILE

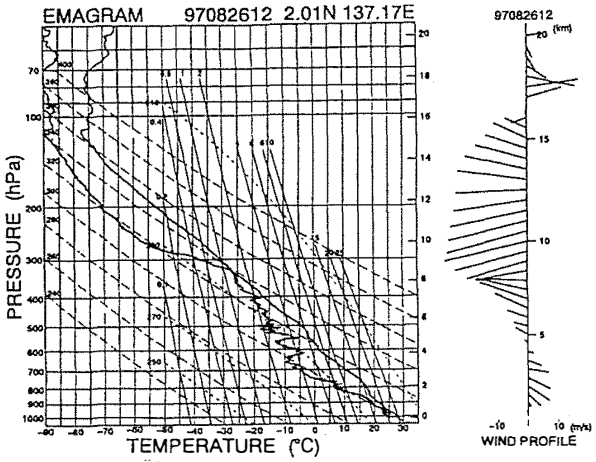

EMAGRAM 97082518 2.30N 138.87E
97082518
PRESSURE (hPa)
TEMPERATURE (°C)
WIND PROFILE

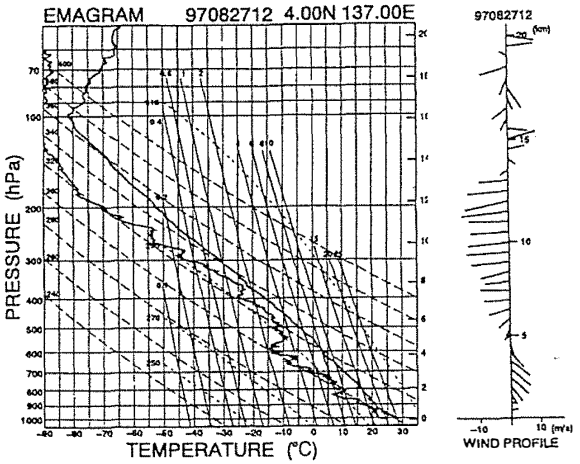

EMAGRAM 97082600 2.34n 138.82E
PRESSURE (hPa)
TEMPERATURE (°C)
97082600
WIND PROFILE

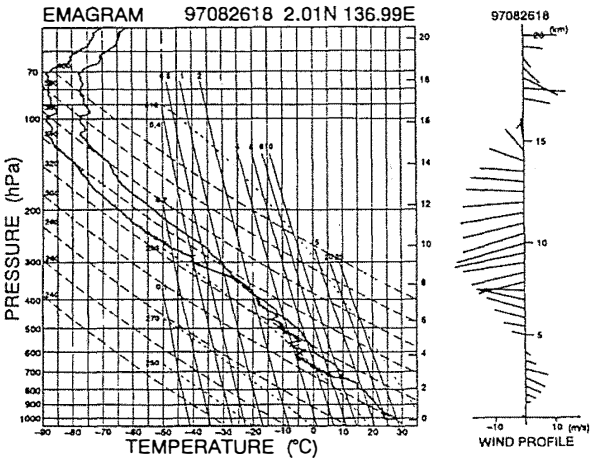

EMAGRAM 97082700 2.41N 137.43E
PRESSURE (hPa)
TEMPERATURE (°C)
97082700
WIND PROFILE

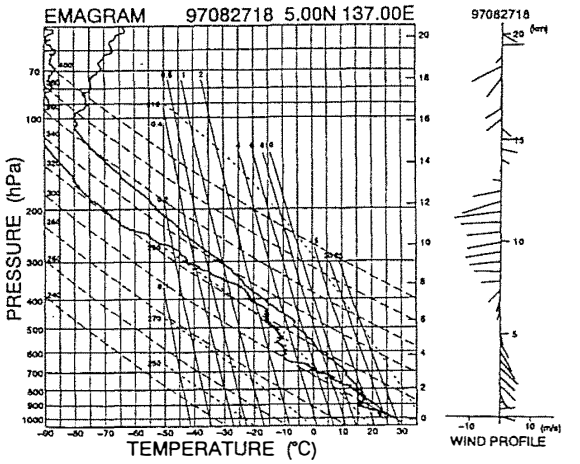

EMAGRAM 97082606 2.21N 138.10E
PRESSURE (hPa)
TEMPERATURE (°C)
97082606
WIND PROFILE

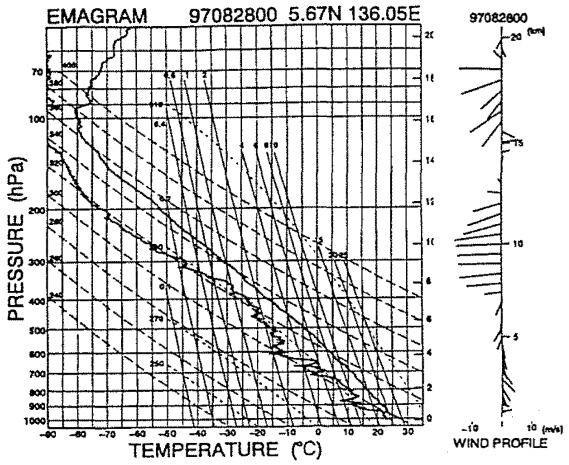

EMAGRAM 97082706 2.84N 137.12E
PRESSURE (hPa)
TEMPERATURE (°C)
97082706
WIND PROFILE

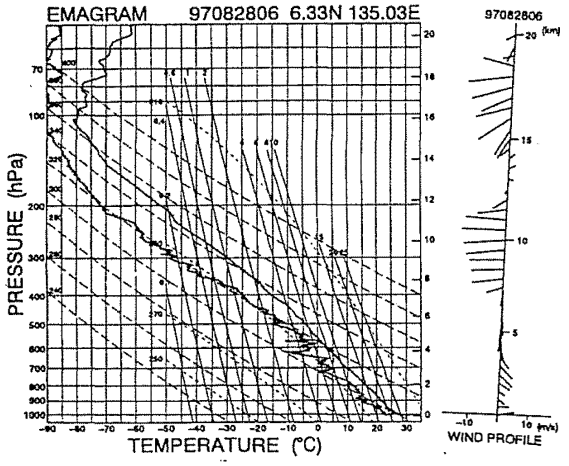

EMAGRAM 97082612 2.01N 137.17E
PRESSURE (hPa)
TEMPERATURE (°C)
97082612
WIND PROFILE


EMAGRAM 97082712 4.00N 137.00E
PRESSURE (hPa)
TEMPERATURE (°C)
97082712
WIND PROFILE


EMAGRAM 97082618 2.01N 136.99E
PRESSURE (hPa)
TEMPERATURE (°C)
97082618
WIND PROFILE


EMAGRAM 97082718 5.00N 137.00E
PRESSURE (hPa)
TEMPERATURE (°C)
97082718
WIND PROFILE


EMAGRAM 97082800 5.67N 136.05E
97082800
PRESSURE (hPa)
TEMPERATURE (°C)
WIND PROFILE


EMAGRAM 97082806 6.33N 135.03E
97082806
PRESSURE (hPa)
TEMPERATURE (°C)
WIND PROFILE

5.2 Surface Meteorological Measurements

We observed some surface meteorological parameters (pressure, dry air temperature, wet air temperature, dew point temperature, sea temperature, wind speed/direction, cloud amount and weather) every 3 hours from Guam to Chuuk and Chuuk to Palau. The parameters were recorded by officer and crew of R/V KAIYO according to the Ship's Weather Observation Reports.

Table 5−2 ,Fig.5 2,3 and Fig.5−4 show results of observation.

Table 5－2 Surface Meteorological Mesurements

Time UTC	Ship's time	Position Lat.	Log.	W.D. (16deg)	W.S. (m／s)	Weather	Press. (hPa)	Dry Temp (DEG－C)	Sea W.T. (DEG－C)	Wet Temp (DEG－C)	Dew P.T. (DEG－C)	Cloud Amount
Aug 04 12	Aug 04 22	10 10.3N	149 14.3E	E	4.0	bc	1011.1	29.0	29	25.5	24.3	1
15	05 01	09 50.5N	149 32.1E	ESE	4.0	bc	1010.5	28.2	29	25.8	25.1	2
18	4	09 36.1N	150 14.4E	SSE	4.5	bc	1009.6	27.5	29	25.0	25.6	2
21	7	09 26.9N	150 48.8E	ESE	2.8	c	1010.5	28.2	29	25.8	24.9	8
05 00	10	09 16.6N	151 22.9E	E	3.5	c	1011.4	29.8	29	28.0	27.5	6
3	13	09 06.1N	152 00.5E	ESE	4.2	bc	1009.8	29.6	29	26.8	26.0	4
6	16	08 56.7N	152 34.1E	SSE	6.5	bc	1009.2	29.8	29	26.6	25.5	5
9	19	08 47.6N	153 10.3E	ESE	4.9	c	1010.1	28.2	29	25.4	24.5	6
12	22	08 36.6N	153 47.6E	SE	4.5	b	1011.7	28.0	29	25.5	24.6	1
15	06 01	08 26.8N	154 25.1E	SSE	3.2	bc	1010.0	27.8	29	25.6	24.8	2
18	4	08 15.7N	155 03.3E	SW	6.1	q	1009.2	27.4	29	25.6	24.8	5
21	7	08 05.8N	155 38.7E	SSW	5.4	c	1010.3	28.2	28	25.6	24.7	8
06 00	10	07 58.7N	155 59.5E	SW	8.5	c	1011.0	30.3	28	26.4	25.1	8
3	13	07 22.6N	156 00.3E	WSW	5.5	o	1009.3	28.2	28	25.4	24.4	6
6	16	06 55.9N	156 00.1E	W	7.5	o	1008.2	28.4	28	25.8	25.1	8
9	19	06 17.6N	156 00.0E	SW	5.7	c	1009.6	27.8	28	25.4	24.5	8
12	22	05 50.0N	156 02.4E	SSW	8.4	c	1011.1	27.1	28	25.1	24.4	6
15	07 01	05 14.1N	156 10.3E	SW	5.5	bc	1009.0	26.0	28	24.6	24.0	5
18	4	05 04.2N	156 10.7E	SSE	2.5	r	1009.0	24.6	28	24.0	23.8	8
21	7	04 00.0N	156 13.6E	SSW	8.1	r	1010.2	25.5	28	25.1	24.9	10
07 00	10	04 57.7N	156 13.6E	SSW	5.0	o	1010.3	27.0	28	25.0	24.3	8
3	13	04 25.6N	156 06.4E	S	12.0	o	1007.9	27.4	28	25.6	24.8	6
6	16	03 59.9N	156 00.1E	SSW	12.3	o	1007.0	27.6	28	25.4	24.6	8
9	19	03 24.7N	156 00.1E	WSW	12.4	c	1009.1	27.8	28	24.4	23.1	4
12	22	02 59.9N	156 00.3E	SSW	11.4	bc	1010.6	27.0	28	24.9	24.2	3
15	08 01	02 27.5N	155 59.9E	SSE	10.7	o	1009.6	26.8	28	24.8	24.3	8
18	4	02 04.5N	155 59.9E	S	8.0	o	1010.0	28.0	28	25.2	23.9	8
21	7	01 59.9N	155 59.9E	W	11.3	r	1012.1	23.4	28	23.2	23.1	10
08 00	10	02 00.1N	156 00.1E	W	9.2	r	1013.4	23.8	27	23.8	23.8	N/A
3	13	01 41.3N	156 00.5E	SE	9.5	o	1010.4	28.0	28	25 2	23.9	6
6	16	01 16.7N	156 00.3E	S	11.0	bc	1009.0	28.5	28	24.8	23.7	6
9	19	00 49.4N	156 00.1E	S	11.2	c	1011.5	27.8	28	23.8	22.2	4
12	22	00 25.5N	156 03.8E	S	11.0	bc	1012.6	28.0	28	24.5	23.2	2
15	09 01	00 00.6N	156 26.2E	S	7.5	o	1011.3	27.8	28	24.8	23.9	6
18	4	00 00.5N	156 25.4E	SSE	10.0	o	1011.0	27.8	28	25.0	24.0	7
21	7	00 01.7S	156 27.7E	S	7.8	c	1012.1	28.3	28	24.9	23.6	8
09 00	10	00 00.0N	156 10.0E	S	6.2	bc	1012.9	28.3	28	25 2	24.0	2
3	13	00 00.0N	156 00.8E	S	9.0	bc	1011.8	28.0	28	25.1	23.9	3
6	16	00 00.1N	155 59.9E	S	10.0	bc	1010.2	28.0	28	24.8	23.9	3
9	19	00 26.5S	155 59.9E	S	11.4	bc	1011.6	28.0	28	23.9	25.0	3
12	22	00 53.1S	156 00.0E	S	11.1	bc	1012.8	28.0	28	24.8	23.6	1
15	10 01	01 19.1S	155 59.8E	S	11.0	bc	1011.9	27.6	28	25.0	24.1	3
18	4	01 44.2S	155 59.8E	S	11.0	bc	1011.0	27.6	28	24.2	22.9	2
21	7	01 59.0S	156 00.4E	SSW	15.3	bc	1012.5	27.4	27	24.0	22.9	3
10 00	10	01 59.6S	156 04.0E	SSW	14.8	bc	1012.7	29.0	27	24.5	22.8	3
3	13	02 00.3S	156 00.3E	SW	13.0	c	1011.6	28.0	27	N/A	N/A	4
6	16	02 04.1S	156 00.2E	SSW	13.0	o	1011.0	27.4	27	24.6	23.4	8
9	19	02 40.8S	155 59.7E	SSW	11.7	o	1012.3	27.4	27	24.8	24.0	N/A
12	22	03 16.5S	155 59.7E	SE	8.5	r	1014.0	25.2	27	24.0	23.5	8
15	11 01	03 51.3S	155 58.8E	SW	11.0	r	1012.3	25.2	27	24.2	23.6	8
18	4	N/A	N/A	S	11.0	c	1011.5	27.4	27	24.0	22.7	6
21	7	N/A	N/A	S	15.0	c	1012.4	27.3	27	24.0	22.8	7
11 00	10	04 59.3S	156 00.2E	S	12.0	o	1012.6	29.6	28	25.5	24.1	8
3	13	05 00.1S	155 59.4E	S	11.0	c	1011.6	27.3	28	24.3	22.3	7

Table 5—2 Surface Meteorological Mesurements

6	16	04 58.9S	155 59.7E	SSE	10.0	c	1011.1	27.0	28	24.4	23.6	7
9	19	04 24.8S	156 00.0E	SSE	12.9	c	1012.1	27.1	28	24.7	23.8	8
12	22	03 54.7S	156 00.3E	SSE	15.0	c	1011.9	28.0	27	24.9	23.5	8
15	12 01	03 14.9S	155 59.5E	SSE	10.0	o	1010.8	27.6	27	25.4	24.8	8
18	4	N/A	N/A	SSE	10.5	c	1010.5	27.8	27	24.6	23.4	6
21	7	02 17.1S	155 45.5E	SSE	9.8	c	1012.0	27.8	27	25.2	24.3	5
12 00	10	01 43.6S	155 34.7E	SSW	12.8	bc	1012.6	27.7	27	25.0	24.0	4
3	13	01 09.5S	155 23.4E	S	11.0	c	1010.2	28.2	27	25.6	24.6	6
6	16	00 36.3S	155 11.7E	SSW	10.5	c	1009.3	28.0	27	25.4	24.6	6
9	19	00 04.6S	155 01.5E	SSW	8.2	c	1010.4	27 9	28	25.4	24.5	7
12	22	00 00.1S	154 41.0E	S	11.7	c	1012.6	28.1	28	25.0	23 9	6
15	13 01	00 00.2S	154 09.5E	S	2.7	c	1012.0	27.6	28	24.4	23.4	6
18	4	N/A	N/A	S	9.0	bc	1011.0	27.4	28	24.0	22.7	2
21	7	00 00.3S	153 16.6E	S	12.8	bc	1010.8	27.4	28	24.1	22.9	3
13 00	10	00 00.4S	152 53.2E	S	13.7	bc	1011.4	28.0	28	24.8	23.5	2
3	13	00 00.2S	152 21.3E	SSE	7.5	bc	1009.4	27.6	28	24.6	23.4	2
6	16	00 00.8N	151 59.9E	SSE	8.5	bc	1008.0	27.8	28	24.2	22.7	2
9	19	00 35.2N	151 59.9E	SE	5.6	bc	1010.1	27.4	28	24.5	23.4	1
12	22	01 11.2N	152 00.1E	ESE	3 9	c	1012.1	27.7	28	24.4	23.2	7
15	14 01	01 46.5N	152 00.5E	SE	4.2	c	1010.9	27.6	28	24 2	22.7	7
18	4	02 20.9N	152 00.3E	SSE	5.0	o	1010.0	27.6	28	24.6	23.4	8
21	7	02 56.2N	152 00.4E	SSE	5.2	bc	1010.6	28.4	28	25.4	24.3	3
14 00	10	03 31.6N	152 00.1E	SSE	7.0	bc	1011.7	29.8	28	25.4	23.8	2
3	13	04 04.8N	152 00.0E	SSE	5.7	bc	1010.0	30.0	28	24.8	23.9	2
6	16	04 38.5N	152 00.0E	S	3.6	bc	1009.1	30.2	28	25.8	24.4	2
9	19	05 13.5N	152 00.0E	SW	4.6	bc	1010.1	28.0	28	25.6	24.7	2
12	22	05 48.9N	151 59.6E	S	4.1	c	1011.5	28.0	28	25.1	24.0	6
15	15 01	06 25.0N	152 01.8E	SSW	5.5	o	1009.8	27.8	28	25.4	24.6	7
18	4	07 00.0N	152 04.0E	SSW	5.0	bc	1008.6	27.8	27	25.6	25.0	6
21	7		Chuuk									
15 00	10											
3	13											
6	16											
9	19											
12	22											
15	16 01											
18	4											
21	7											
16 00	10											
3	13											
6	16											
9	19											
12	22											
15	17 01											
18	4											
21	7											
17 00	17 10											
3	13											
6	16											
9	19											
12	22	05 51.3N	151 44.4E	WSW	9.5	r	1009.2	27.2	27	26.5	26.3	8
15	18 01	05 15.8N	151 34.2E	W	9.6	o	1007.9	27.3	27	25.7	25.1	8
18	4	04 45 9N	151 17.0E	WNW	11.3	r	1007.8	26.0	28	24.9	24.6	8
21	7	04 20.0N	150 54.0E	SSW	7.7	q	1008.4	26.6	28	24.6	23.9	7
18 00	10	03 55.9N	150 33.0E	SSW	10.5	c	1009.5	29.0	28	26.2	25.2	5
3	13	03 33.2N	150 12.1E	SSW	10.0	bc	1008.6	28.9	28	26.0	25.0	4

Table 5－2 Surface Meteorological Mesurements

6	16	03 11.0N 149 51.7E	SSW	8.0	bc	1006.6	28.8	28	25.0	23.5	4
9	19	02 47.5N 149 30.5E	S	7.2	bc	1008.4	28.2	28	25.0	23.8	4
12	22	02 24.4N 149 09.8E	SSE	7.5	bc	1009.8	28.0	28	26.2	25.6	4
15	19 01	02 00.8N 148 48.5E	SSE	8.5	bc	1009.1	28.0	28	24.5	23.2	3
18	4	01 36.5N 148 26.9E	SSE	7.0	bc	1008.5	27.5	28	24.5	23.4	2
21	7	01 10.7N 148 03.7E	SSE	5.1	c	1009.1	27.8	28	24.8	23.7	5
19 00	10	00 45.4N 147 40.8E	SE	6.0	bc	1010.6	28.5	28	24.9	23.6	2
3	13	00 19.8N 147 17.1E	SSE	6.0	bc	1008.8	28.5	28	25.5	24.4	2
6	16	00 00.4N 146 59.6E	SSE	5.5	bc	1007.4	28.0	28	24.9	23.9	2
9	19	00 00.6N 146 47.7E	SSE	5.7	bc	1007.8	28.2	28	25.4	24.4	2
12	22	00 00.0N 146 11.2E	SE	6.5	bc	1009.5	27.8	28	25.6	24.8	2
15	20 01	00 00.1S 145 47.3E	SE	8.5	bc	1008.9	28.5	28	25.5	24.4	2
18	4	00 00.0N 145 08.0E	SE	7.0	bc	1008.6	28.0	28	25.3	24.6	2
21	7	00 00.2N 144 40.6E	SE	7.2	bc	1009.1	28.2	28	25.4	24.3	3
20 00	10	00 00.0N 144 03.2E	SE	6.0	bc	1010.5	29.6	28	25.0	23.4	3
3	13	00 00.0N 143 37.3E	SE	7.5	bc	1008.8	28.6	28	25.0	23.7	2
6	16	00 00.0N 143 01.1E	SE	5.5	bc	1007 2	28.8	29	25.0	23.6	3
9	19	00 23.3N 142 50.4E	SE	6.7	bc	1007.0	28.6	N/A	25.4	24.2	2
12	22	00 57.1S 142 35.5E	ESE	7.5	b	1009.5	28.5	28	25.4	24.5	1
15	21 01	01 28.0S 142 22.5E	ESE	5.0	bc	1009.7	28.1	28	25.1	23.9	2
18	4	02 05.5S 142 06.9E	E	5.3	bc	1008.6	27.9	28	25.0	23.9	2
21	7										
21 00	10	02 28.0S 141 55.6E	SE	5.5	bc	1011.0	28.4	28	26.2	25.4	3
3	13	02 26.9S 141 58.6E	SE	6.0	c	1009.2	29.5	28	25.5	24.1	6
6	16	02 00.1S 141 59.0E	SE	5.0	bc	1008.1	27.0	29	25.0	24.3	3
9	19	02 00.0S 142 00.0E	SE	5.1	bc	1008.6	27.8	28	25.4	24.5	3
12	22	02 00.9S 141 58.0E	ESE	6.5	b	1010.0	27.8	28	25.8	25.1	N/A
15	22 01	02 02.3S 141 56.1E	ENE	7.0	bc	1009.6	28.2	28	25.0	23.9	4
18	4	01 58.3S 142 01.5E	E	5.5	bc	1008.5	27.8	28	25.0	24.0	2
21	7	02 00.0S 141 57.7E	E	8.7	bc	1010.1	28.2	28	24.6	23.4	2
22 00	10	01 48.7E 141 59.9E	E	5.5	c	1011.3	30.4	28	25.3	23.5	7
3	13	01 21.5S 142 00.0E	ESE	5.5	bc	1009.6	31.0	28	25.5	23.5	6
6	16	00 55.0S 142 00.0E	ESE	8.5	bc	1007.9	28.5	29	25.5	24.4	3
9	19	00 28.1S 142 00.0E	E	8.5	bc	1009.1	28.6	29	25.6	24.5	2
12	22	00 00.3N 141 58.8E	E	7.5	b	1010.6	28.2	29	26.0	25.2	1
15	23 01	00 00.3N 141 19.5E	ESE	4.0	c	1010.1	29 2	28	25.3	23.9	5
18	4	00 00.0S 140 49.1E	E	4.0	bc	1009.7	28.3	28	25.2	23.9	2
21	7	00 00.3S 140 05.4E	ESE	5.1	bc	1010.4	28.2	28	25.4	24.2	2
23 00	10	00 00.4N 139 40.9E	ESE	4.5	bc	1011.5	29.0	28	26.0	25.0	3
3	13	00 00.0S 139 00.0E	ESE	4.0	bc	1010.4	29.2	29	25.5	24.3	3
6	16	00 20.9S 138 39.1E	SE	6.1	bc	1008.2	28.5	29	25 2	23.8	2
9	19	00 49.6S 138 11.1E	E	5 9	bc	1008.6	28.6	29	25.2	23.9	1
12	22	00 47.7S 138 00.0E	NE	6.5	b	1010.2	28.0	29	26 2	25.6	1
15	23 01	00 20.5S 138 00.0E	NE	4.5	bc	1010.7	28.1	29	25.5	23.9	2
18	4	00 00.0S 138 00.0E	E	5.5	bc	1009.7	28.0	29	25.4	24.6	2
21	7	00 30.0N 137 59.9E	E	3.6	bc	1010.3	28.4	29	25.2	24.0	2
24 00	10	00 55.9N 138 00.0E	E	2.0	bc	1011.5	30.2	29	25.6	24.0	2
3	13	01 26.2N 138 00.0E	ENE	2.0	bc	1010.3	29.5	29	26.0	24.8	4
6	16	01 09.2N 138 00.0E	SE	5.0	bc	1007.7	29.0	29	25.3	24.3	2
9	19	00 30.5N 137 59.7E	SE	5.1	bc	1008.5	28.8	29	25.6	24.5	2
12	22	00 01.0S 138 05.0E	ENE	3.5	bc	1010.8	28.2	29	26.2	25.5	
15	24 01	00 02.3S 138 01.9E	E	4.0	bc	1011.2	28.5	29	25.2	23.8	2
18	4	00 02.8S 138 00.6E	E	3.0	bc	1010.7	27.8	29	25.0	24.0	2
21	7										
25 00	10	00 01.2S 138 01.7E	SE	4.5	bc	1012.0	30.2	29	25.4	23.7	N/A
3	13	00 19.2N 138 08.6E	ESE	2.5	bc	1011.4	30.8	29	26.0	24.3	2

Table 5－2 Surface Meteorological Mesurements

6	16	00 49.8N	138 18.3E	NE	2.0	bc	1009.9	29.0	29	25.2	23.6	2
9	19	01 19.8N	138 28.8E	NNE	5.0	bc	1010.7	29.0	29	25.6	23.8	2
12	22	01 50.8N	138 41.0E	NNE	2.5	b	1012.8	28.0	29	26.4	25.9	1
15	26 01	02 15.6N	138 48.7E	ESE	3.0	bc	1011.8	28.4	29	24.8	23.6	2
18	4	02 18.1N	138 52.3E	SE	3.0	bc	1010.4	28 2	29	25.0	23.9	2
21	7	01 21.7N	138 48.6E	S	4.0	bc	1011.4	28.4	28	25.2	24.0	4
26 00	10	02 20.5N	138 48.9E	SSE	2.8	bc	1012.3	30.2	29	25.6	24.0	2
3	13	02 16.1N	138 24.2E	SSE	2.0	bc	1011.1	30.5	29	25.4	23.7	3
6	16	02 10.5N	137 57.2E	SE	2.5	bc	1009.4	29.5	29	25.8	24.3	4
9	19	02 05.5N	137 29.2E	ESE	3.6	bc	1009.6	29.0	29	26.0	25.0	4
12	22	01 58.3N	137 02.9E	ESE	4.5	b	1011.4	28.8	29	26.0	25.0	1
15	27 01	01 59.6N	136 58.1E	E	3.5	b	1011.3	28.8	29	25.4	24.3	1
18	4	02 00.0N	136 58.4E	SE	1.5	bc	1010.6	28.5	28	25.2	23.8	2
21	7	02 00.1N	137 01.2E	NW	5.1	c	1010.6	29.0	28	25.6	24.4	5
27 00	10	02 26.3N	137 26.9E	S	0.5	bc	1011.8	29.4	28	25.4	24.0	3
3	13	02 29.7N	137 22.1E	SSW	2.5	bc	1010.6	31.8	28	25.5	23.1	4
6	16	02 53.0N	137 05.1E	WNW	2.5	bc	1008.7	29.8	28	25.6	24.0	3
9	19	03 35.1N	137 00.8E	WNW	3.1	bc	1009.6	N/A	N/A	N/A	N/A	N/A
12	22	04 04.9N	136 59.9E	W	1.5	b	1011.4	28.0	28	25.4	24.5	1
15	28 01	04 43.4N	137 00.1E	WSW	5.0	bc	1011.1	28.0	28	24.8	23.9	3
18	4	05 05.1N	136 57.5E	WSW	6.5	bc	1009.5	28.0	28	24.5	23.2	2
21	7	05 25.8N	136 23.6E	WSW	5.1	bc	1009.7	28.6	28	24.8	23.4	1
28 00	10	05 46.1N	135 55.0E	WSW	7.5	bc	1011.1	27.8	28	24.8	23.7	4
3	13	06 06.8N	135 25.3E	W	5.0	bc	1010.6	28.5	28	25.2	27.8	3
6	16	06 24.9N	134 57.5E	WSW	5.5	bc	1008.8	28.5	28	26.0	25.1	2
9	19	06 42.0N	134 18.8E	WSW	7.7	bc	1008.1	28.8	28	25.2	23.9	3
12	22	07 08.9N	134 04.9E	SW	5.0	b	1010.3	27.5	27	25.8	25.2	1

＊ weathe bc : Fine but cloudy (cloud 3 to 7)
c : Cloudy (cloud 8 to 10)
o : Overcast (cloud10)
r : rain
q : Squalls

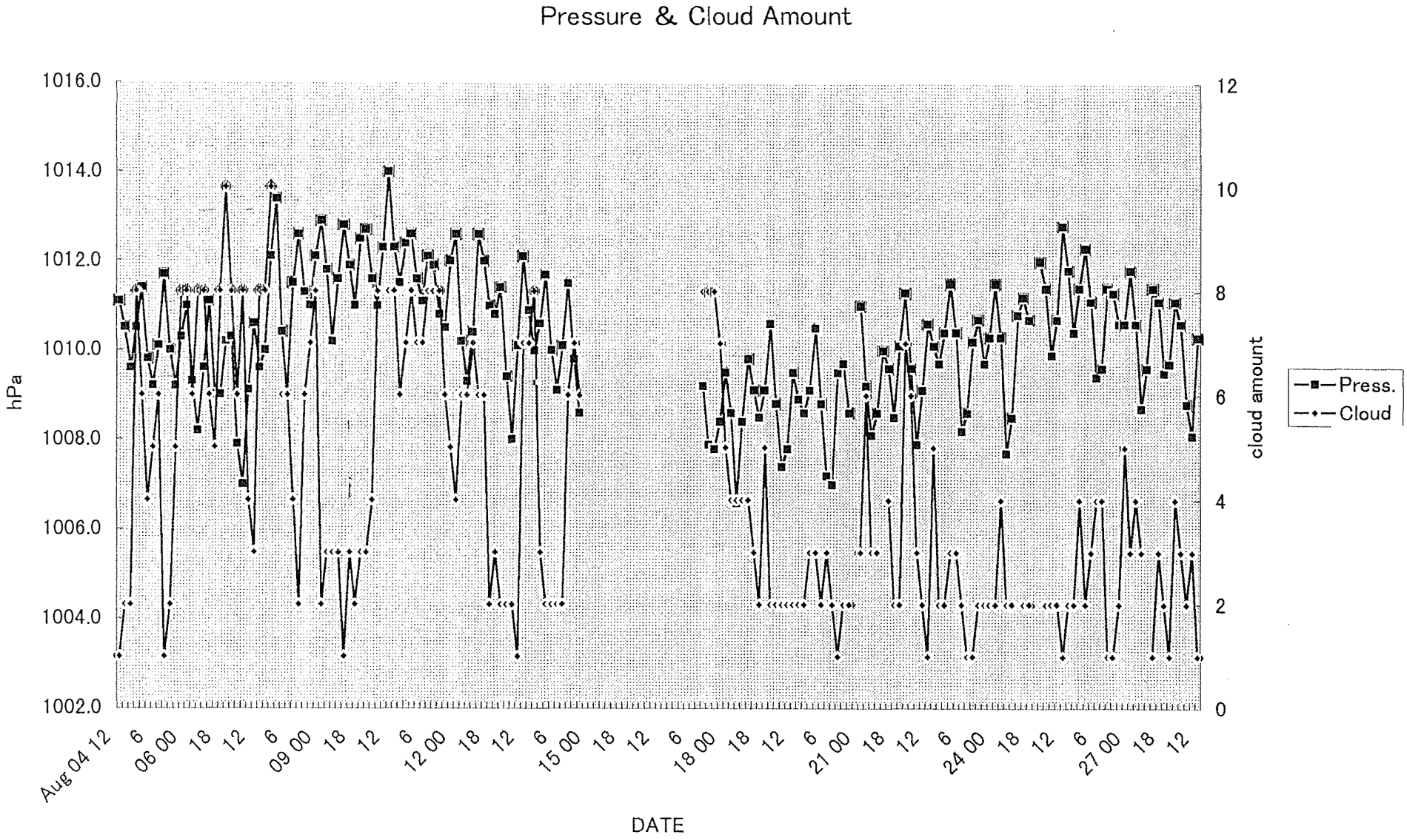

Pressure & Cloud Amount
1016.0
1014.0
1012.0
1010.0
1008.0
1006.0
1004.0
1002.0
hPa
12
10
8
6
4
2
0
cloud amount
Press.
Cloud
Aug 04 12
6
06 00
18
12
6
09 00
18
12
6
12 00
18
12
6
15 00
18
12
6
18 00
18
12
6
21 00
18
12
6
24 00
18
12
6
27 00
18
12
DATE

Fig.5—2

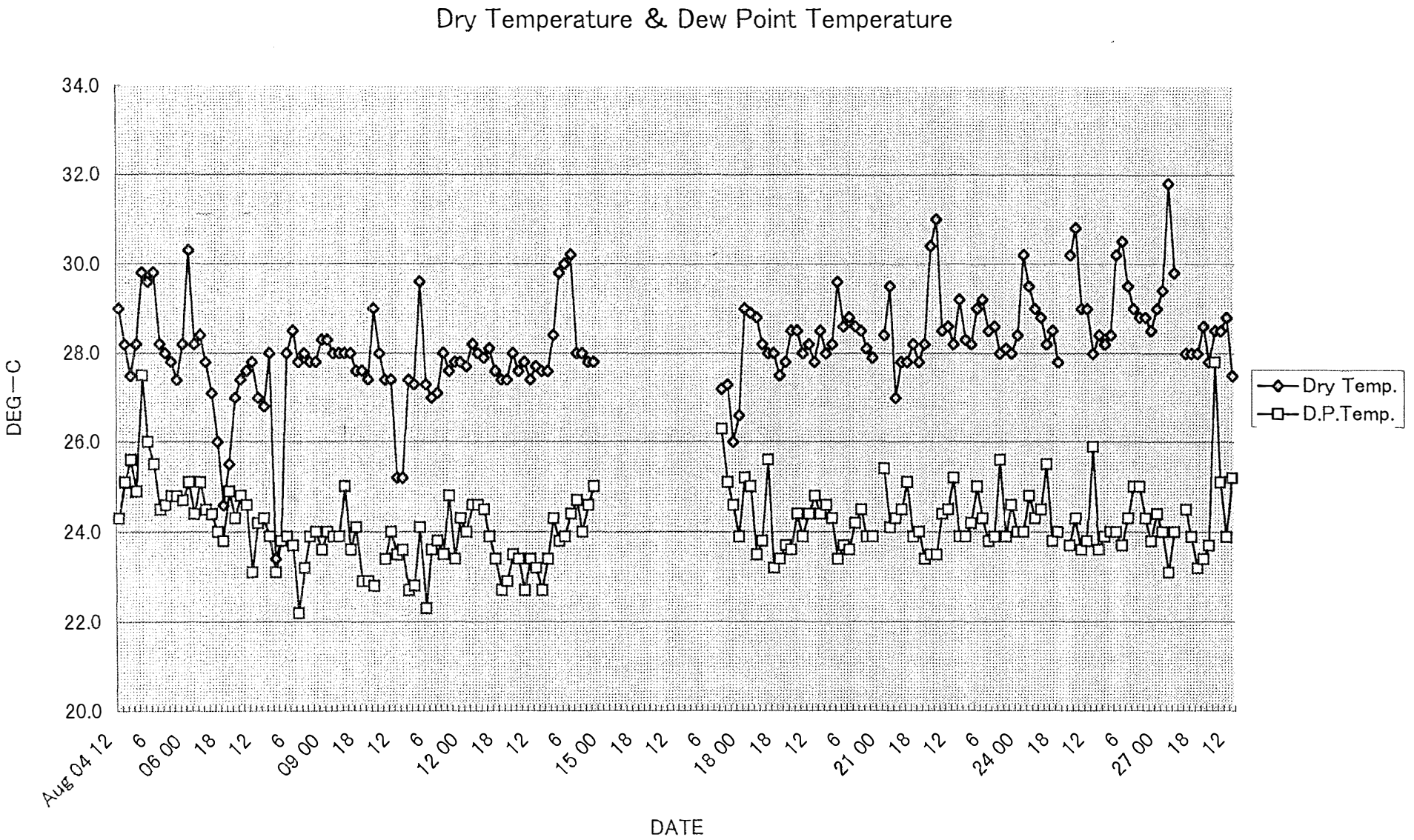

Dry Temperature & Dew Point Temperature
34.0
32.0
30.0
28.0
26.0
24.0
22.0
20.0
DEG—C
Aug 04 12
6
06 00
18
12
6
09 00
18
12
6
12 00
18
12
6
15 00
18
12
6
18 00
18
12
6
21 00
18
12
6
24 00
18
12
6
27 00
18
12
DATE
Dry Temp.
D.P.Temp.

Fig.5—3

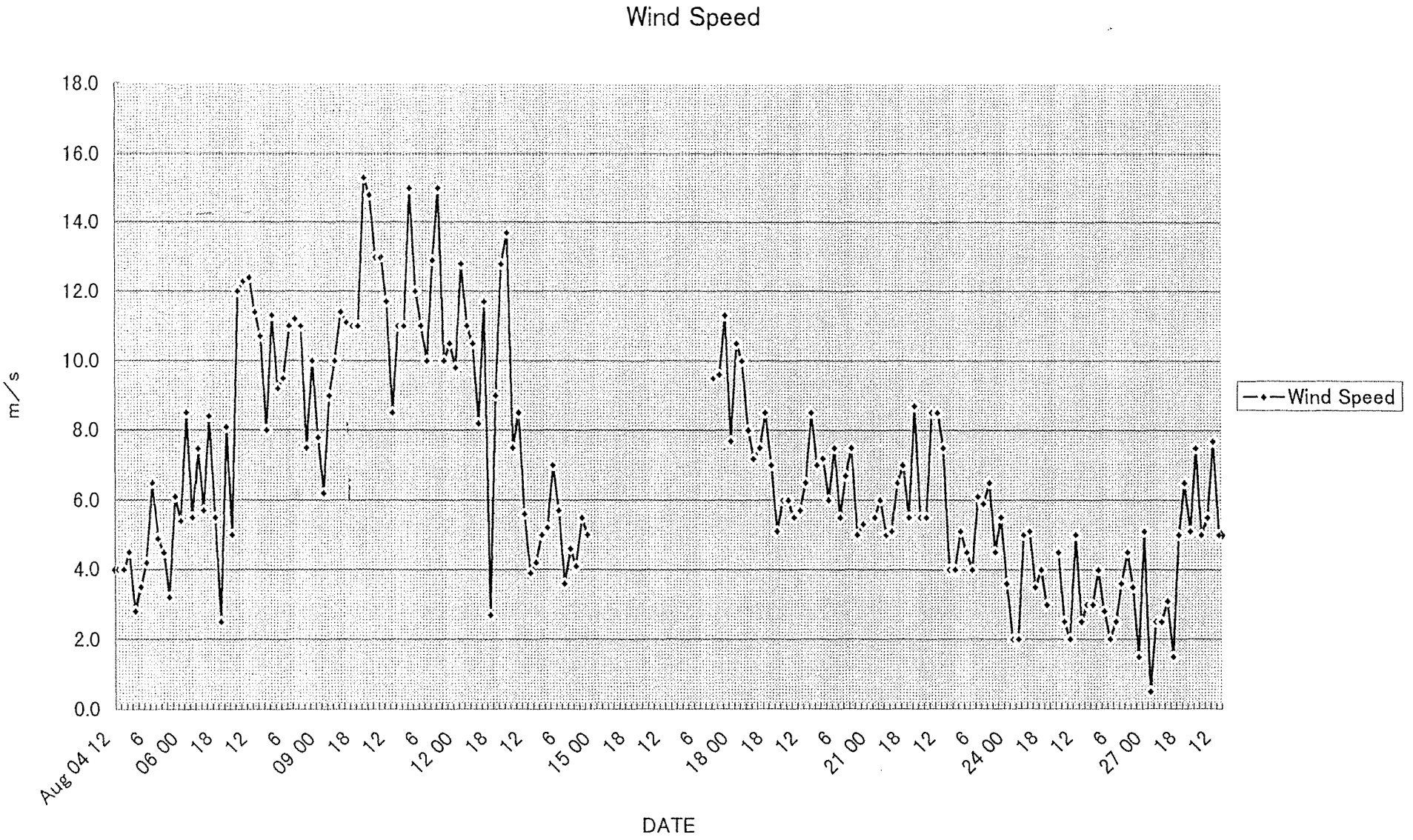

Wind Speed
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
m/s
Aug 04 12
6
06 00
18
12
6
09 00
18
12
6
12 00
18
12
6
15 00
18
12
6
18 00
18
12
6
21 00
18
12
6
24 00
18
12
6
27 00
18
12
DATE
—•—Wind Speed

Fig.5—4

5.3 Precipitation measurement

Rain guage (RM. Young, Model 50202) was set on the compass deck and data are taken every minutes. Data were stored onto PC (NEC, PC9801LV) through the data logger (Eikoseiki, SOLAC Ⅲ, MP−090). Time series of rainfall rate is shown in Fig.5−5,6,7 and Fig.5−8.

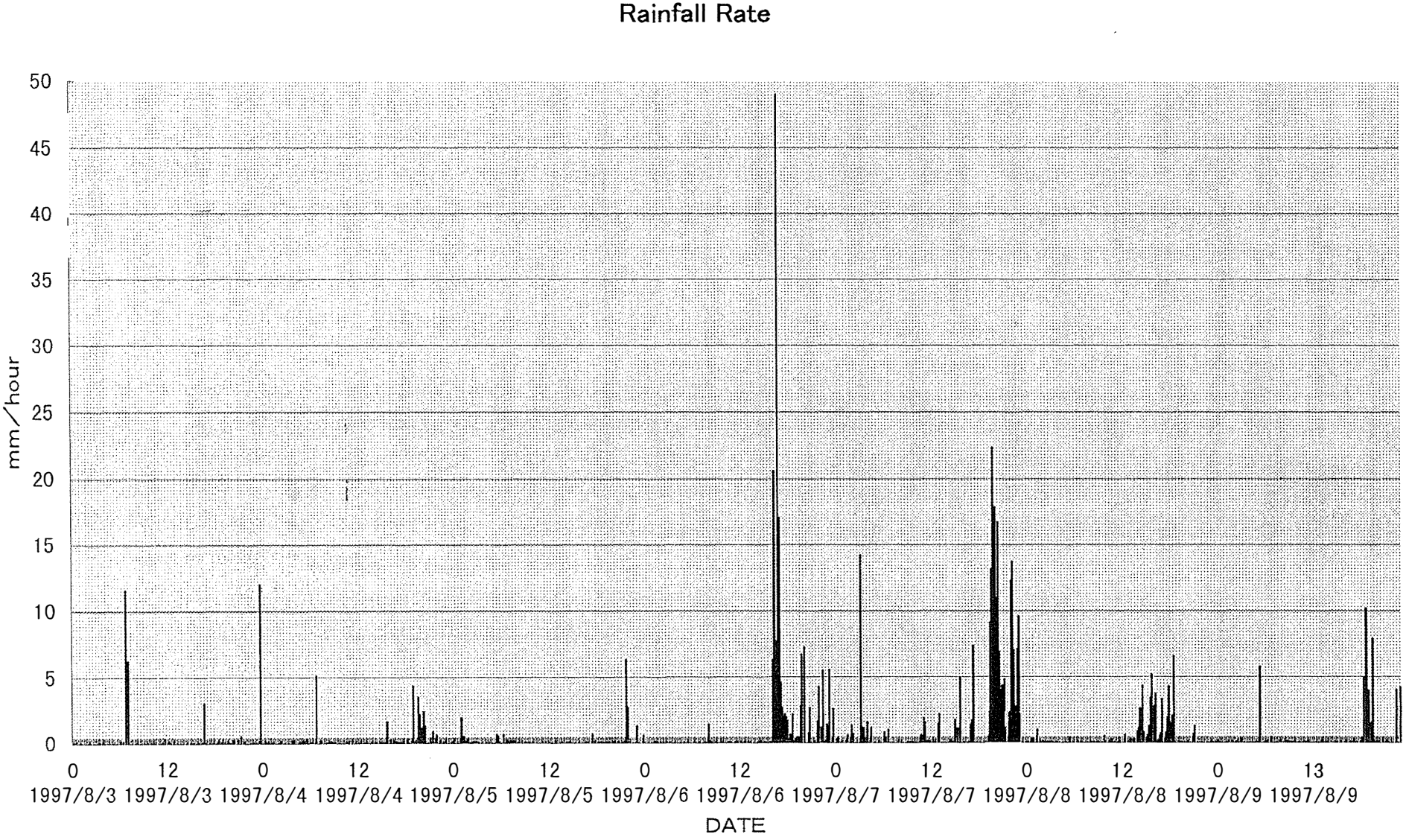

Rainfall Rate
50
45
40
35
30
25
20
15
10
5
0
mm/hour
0
12
0
12
0
12
0
12
0
12
0
12
0
13
1997/8/3
1997/8/3
1997/8/4
1997/8/4
1997/8/5
1997/8/5
1997/8/6
1997/8/6
1997/8/7
1997/8/7
1997/8/8
1997/8/8
1997/8/9
1997/8/9
DATE

Fig.5－5

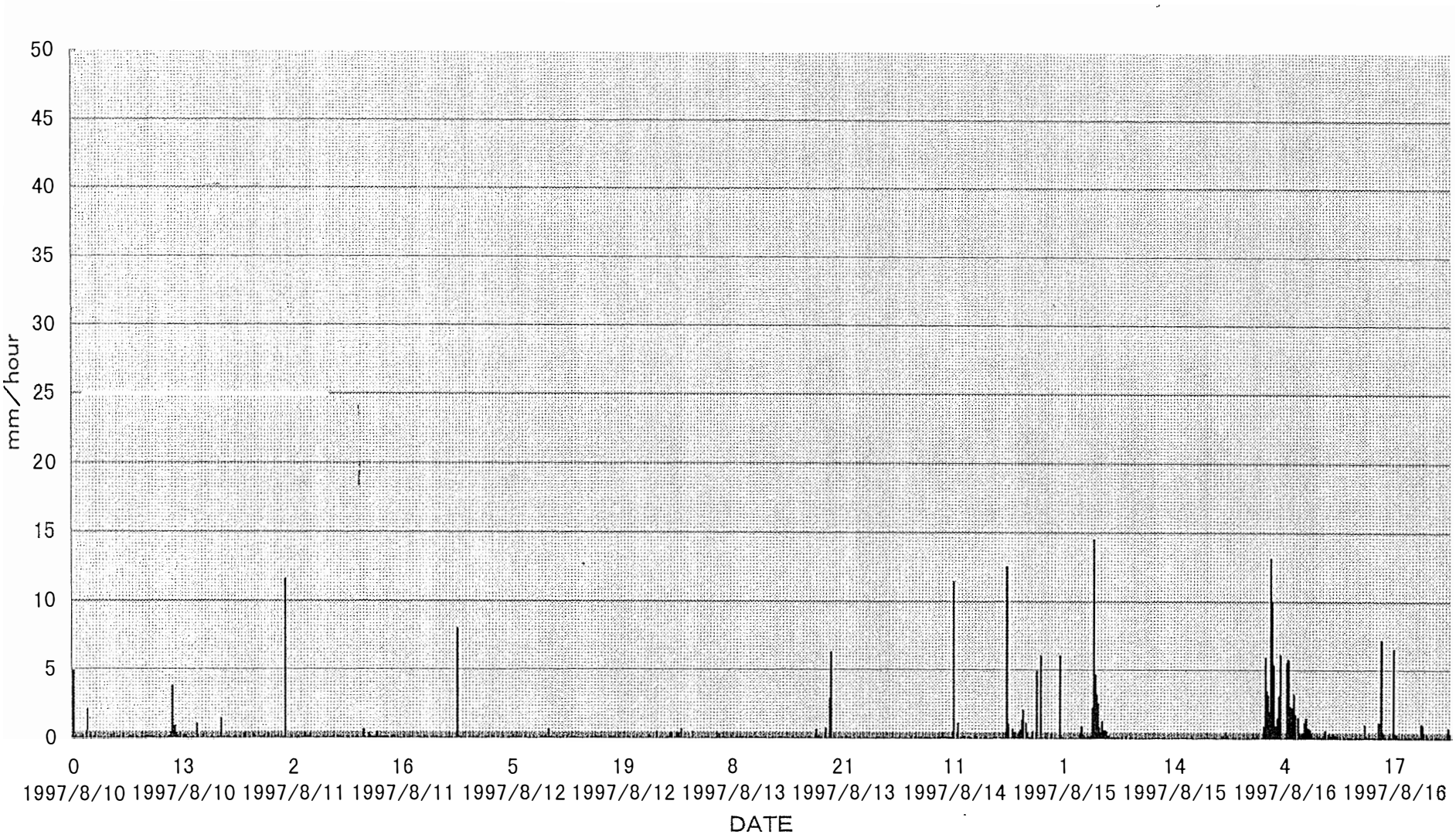

Rainfall Rate
mm/hour
50
45
40
35
30
25
20
15
10
5
0
0
13
2
16
5
19
8
21
11
1
14
4
17
1997/8/10
1997/8/10
1997/8/11
1997/8/11
1997/8/12
1997/8/12
1997/8/13
1997/8/13
1997/8/14
1997/8/15
1997/8/15
1997/8/16
1997/8/16
DATE

Fig.5－6

Rainfall Rate

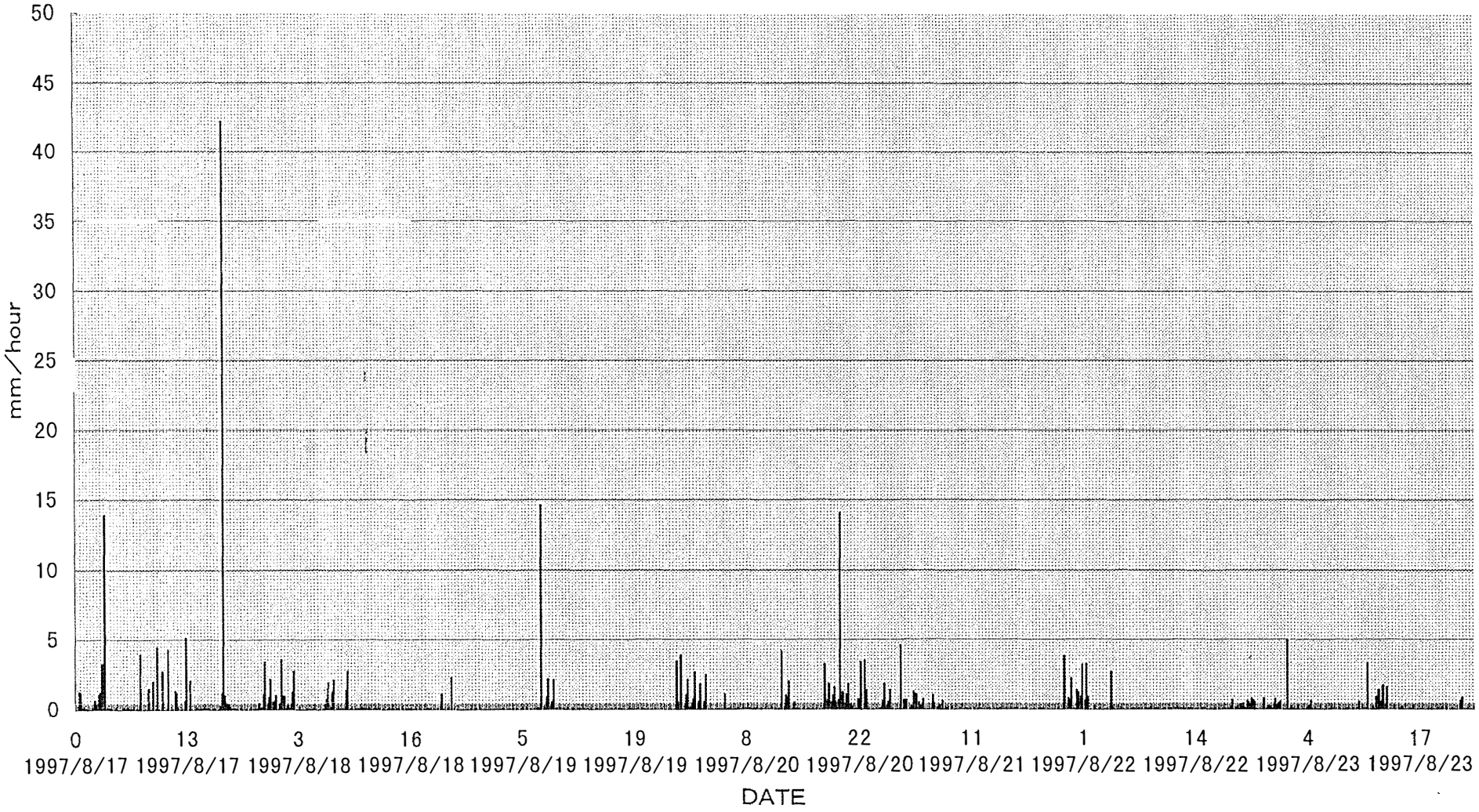


Fig.5－7

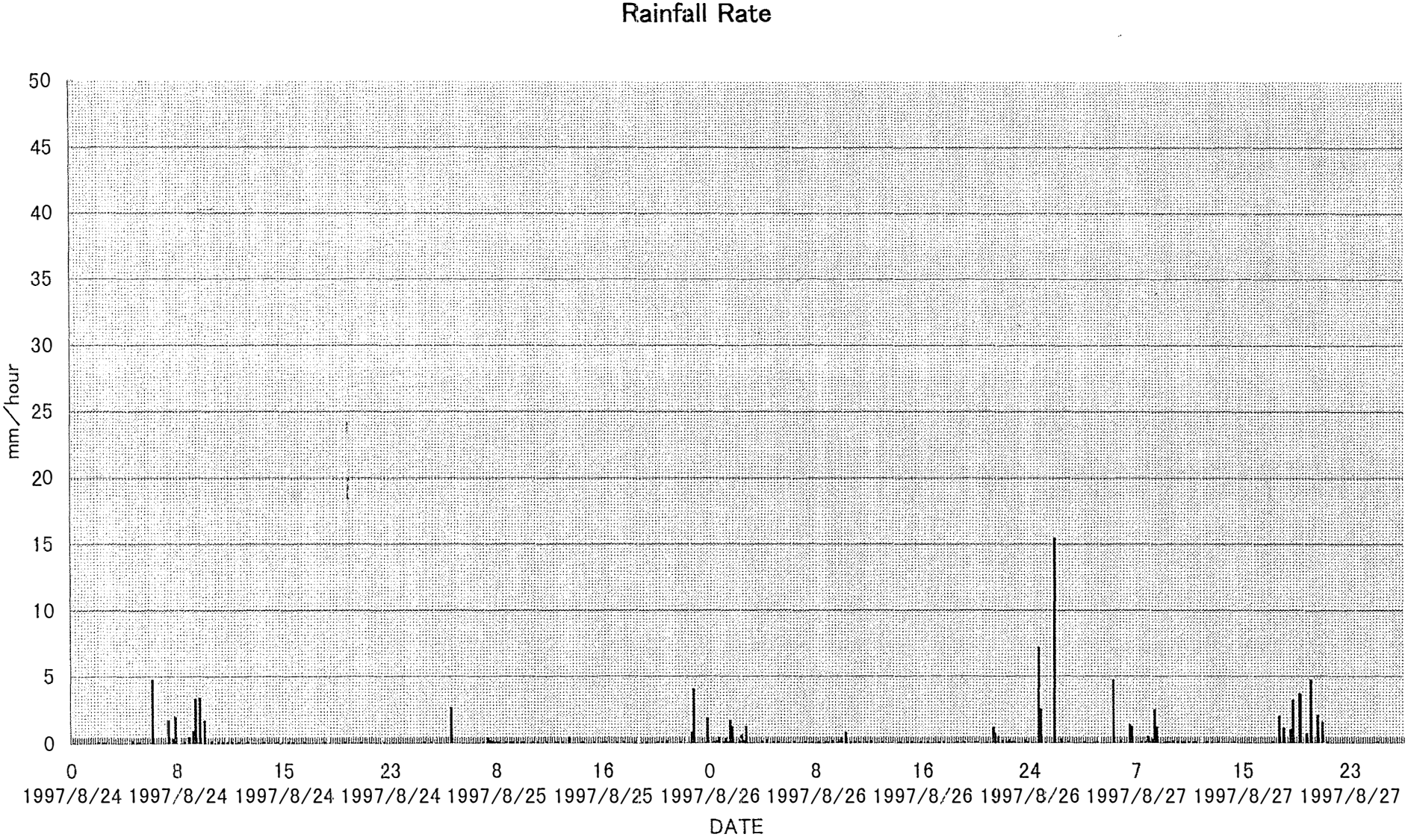

Rainfall Rate
50
45
40
35
30
25
20
15
10
5
0
mm/hour
0
8
15
23
8
16
0
8
16
24
7
15
23
1997/8/24
1997/8/24
1997/8/24
1997/8/24
1997/8/25
1997/8/25
1997/8/26
1997/8/26
1997/8/26
1997/8/26
1997/8/27
1997/8/27
1997/8/27
DATE

Fig.5－8

6. Shipboard ADCP

R/V Kaiyo mounts the VM-ADCP(Vessel-Mounted Acoustic Doppler Current Profiler) . The ADCP measures the speed and direction of the current profiles using the Doppler effect.

Instrument

Type *RD Instruments VM-NB(Narrow Band)ADCP 77kHz*

Data description

The current profiles obtained by ADCP on the equator from 137E to 156E show that the Equatorial Undercurrent is found about 200m depth. The Southern Equatorial Current is week or disappeared during this cruse. A strong vertical velocity shear is seen in Fig.1 at subsurface layer from 150m to 300m depth.

Configuration file (for KY9709)

-COMMUNICATIONS-

ADCP	GPIB				
Data out	COM2	4800	None	8	1
Navigation	COM1	9600	None	8	1
Ref.out	COM4	9600	None	8	1

-ADCP CONFIG.-

	CFG file	ADCP
Serial number	595	595
Firmwave	1710	1710
Beam angle	30	30
Frequency	77	77
System	BEAM	EARTH
Range switch	HIGH	HIGH
Orientation	DOWN	DOWN
Pattern	CONCAVE	CONCAVE

-RECORDING-

Raw ADCP Data	YES
Averaged Data	YES
Navigation Data	YES

-ADCP SETUP-

Depth cell Length	16m
Number of depth cells	64
Pings per ensemble	28pings
Time between pings	01.10sec
Transmit pulse length	16m
Blank after transmit	8.0m

-PROCESSING PARAMETERS-

ADCP depth	6.0m
Head offset/Mag. var.	224.0° /0.00°
Xducer misalignment	0.00°
Sound absorption	0.025dB/cts
Intensity scale factor	0.43dB/cts
Speed of sound used	Func.(t,s,d)
Salinity	34.5ppt
Tilt misalignment	0.00°
Pitch/Roll offset	0.00° /0.00°
Top/Btm Q method	CONSTANT/POWER
Power curve exponent	0.01667

(file name : kytm9706.cfg)

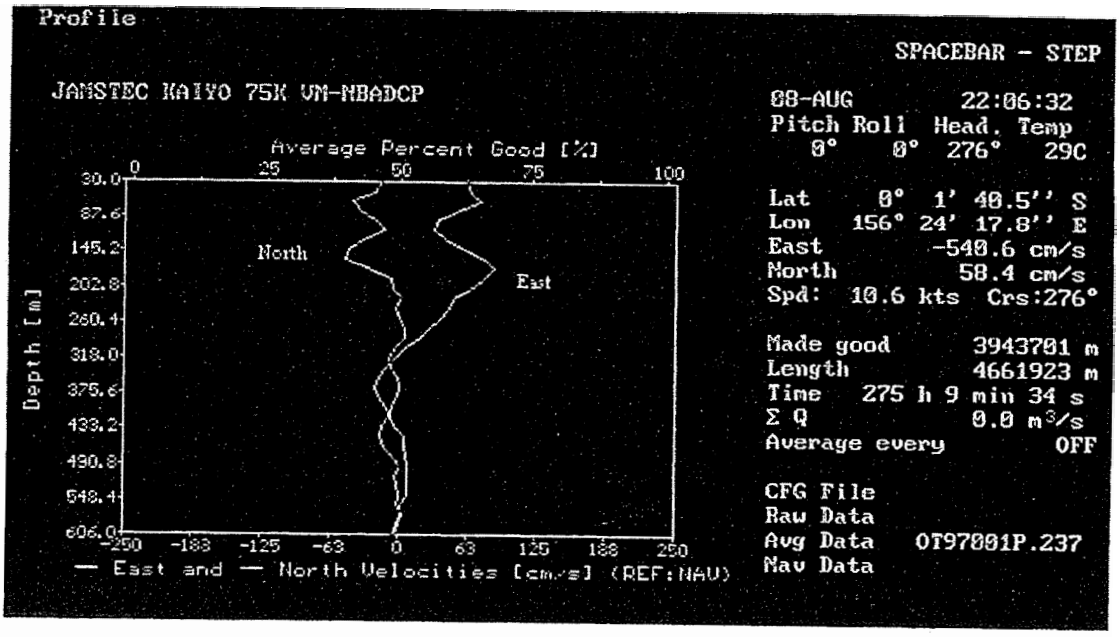


Fig.6-1 Zonal and meridional velocity profiles and percent good near Eq.,156E.

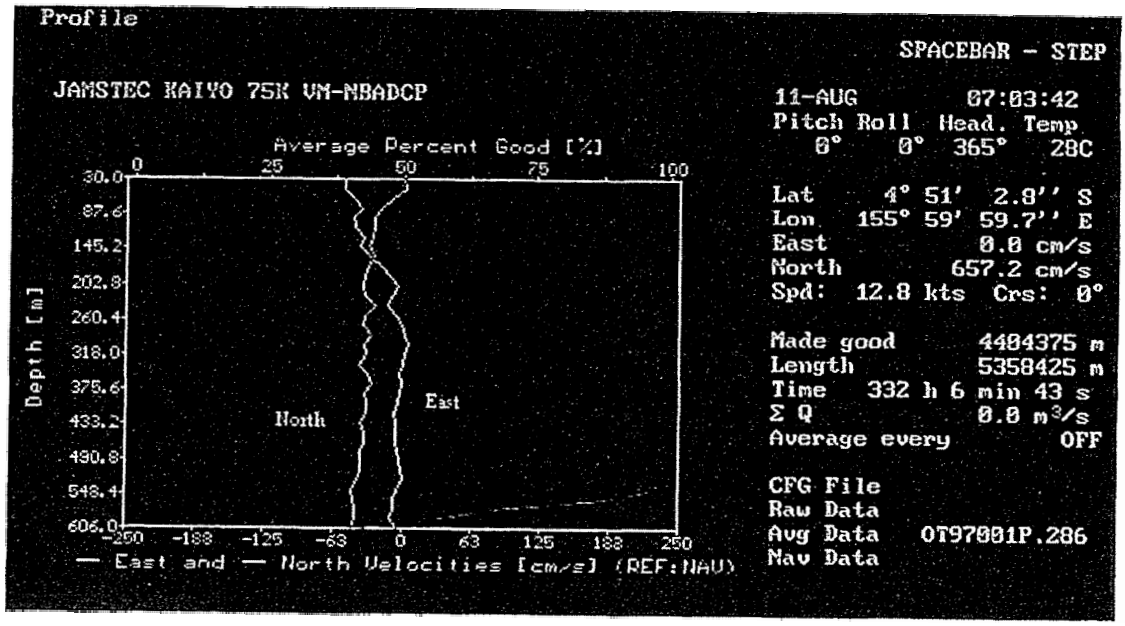


Fig.6-2 Zonal and meridional velocity profiles and percent good near 5S,156E.

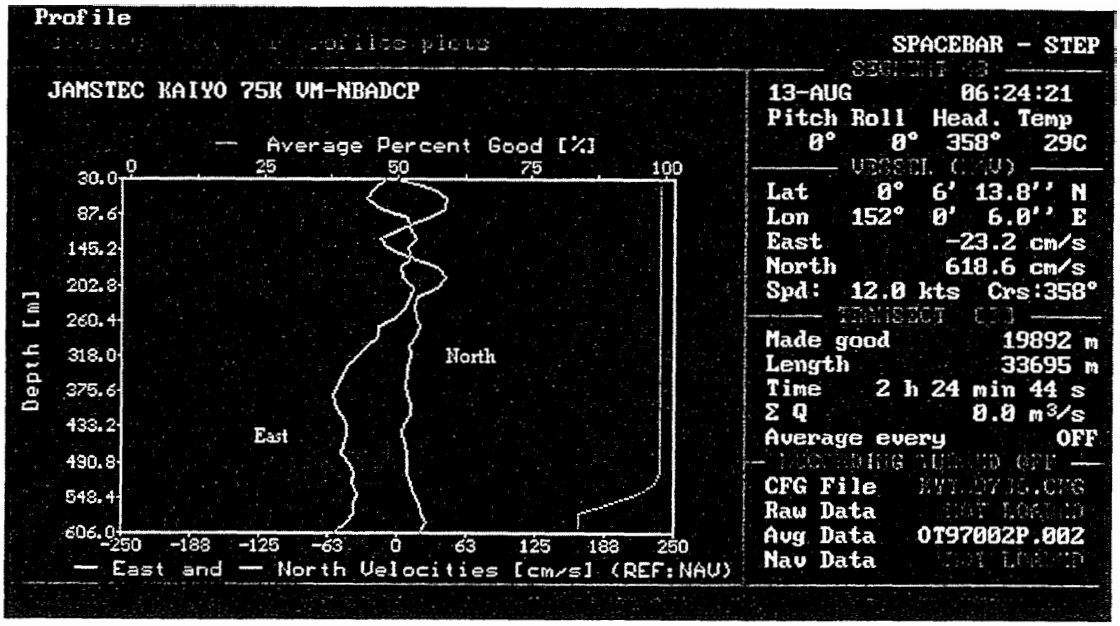


Fig.6-3 Zonal and meridional velocity profiles and percent good near Eq.,152E.

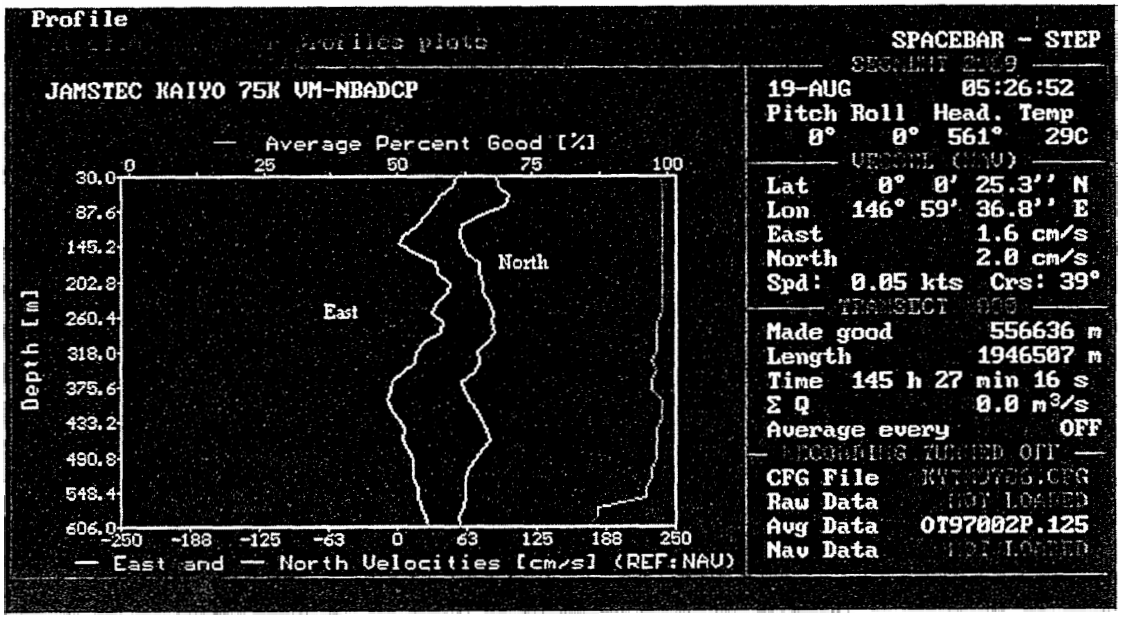


Fig.6-4 Zonal and meridional velocity profiles and percent good near Eq.,147E.

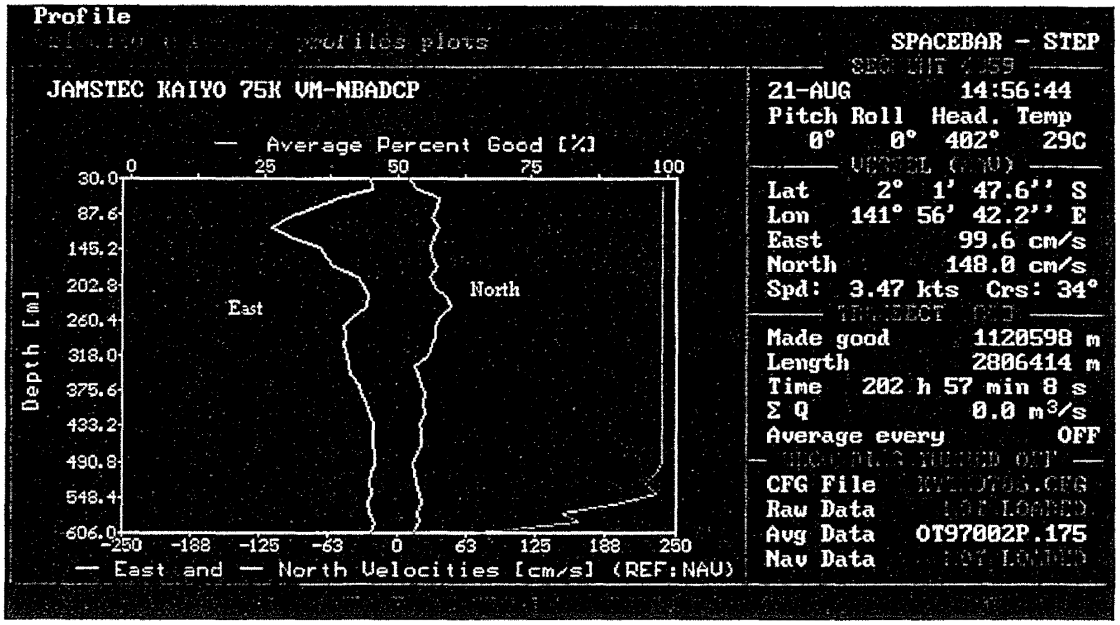


Fig.6-5 Zonal and meridional velocity profiles and percent good near 2S,142E.

7. ADCP MOORING

To get the knowledge of physical process in the western equatorial pacific. In this cruise (K97-09), we recovered four subsurface ADCP moorings at(00-156E),(2.5S-142E),(2S-142E),and (00-138),and deployed four ADCP mooring at the same place.

Instrument:

1) ADCP

Distance to first bin : 8m
Pings per ensemble : 16
Time per ping : 2.00s
Bin length : 8.00m
Sampling Interval : 3600s

Recoreved ADCP

- Serial Number : 1151 (Mooring No.960729-00156E)
- Serial Number : 1152 (Mooring No.960713-25S142E)
- Serial Number : 1153 (Mooring No.960713-2S142E)
- Serial Number : 1221 (Mooring No.960711-00138E)

Deployed ADCP

- Serial Number : 1223 (Mooring No.970809-00156E)
- Serial Number : 1225 (Mooring No.970821-25S142E)
- Serial Number : 1220 (Mooring No.970821-2S142E)
- Serial Number : 1222 (Mooring No.970824-00138E)

2) CTD

SBE-16
Sampling Interval : 1800s

Recoreved CTD

- Serial Number : 1286 (Mooring No.960729-00156E)
- Serial Number : 1284 (Mooring No.960713-25S142E)
- Serial Number : 1285 (Mooring No.960713-2S142E)
- Serial Number : 1279 (Mooring No.960711-00138E)

Deployed CTD

- Serial Number : 1278 (Mooring No.970809-00156E)
- Serial Number : 1280 (Mooring No.970821-25S142E)
- Serial Number : 1282 (Mooring No.970821-2S142E)
- Serial Number : 1223 (Mooring No.970824-00138E)

Deployment :

Four ADCP mooring were deployed at (00-156E), (2.5S- 142E), (2S-142E), and (00-138E) . The moorings were planed to make the ADCP buoy placed at about 270m.

After we dropped the anchor, we monitored depth of the acoustic releaser (Fig.7-1～7-4). The descending rate was about 2.7m/sec. Each position of the mooring were showed below.

Results of calibration

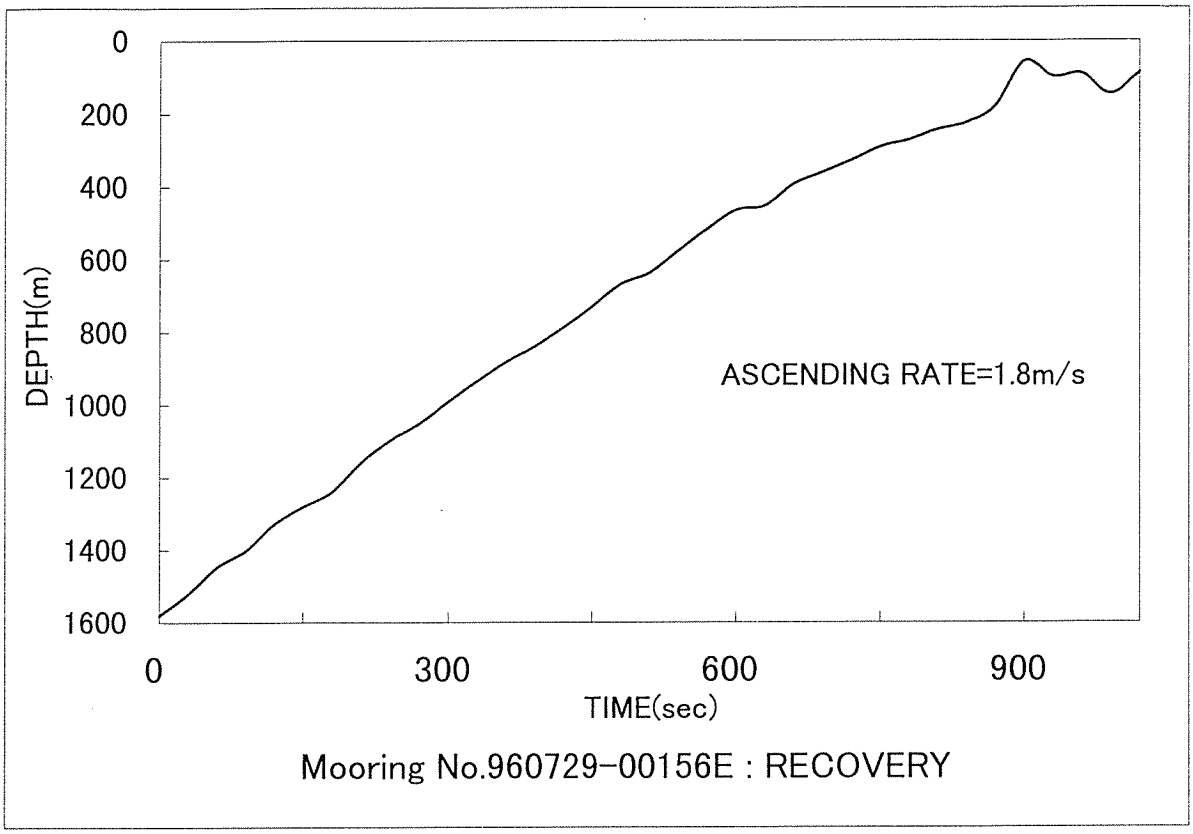
- Mooring No.970809-00156E
  Lat: 0° 00.031N Long: 156° 00.036E
- Mooring No.970821-25S142E
  Lat: 2° 47.953S Long: 141° 58.633E
- Mooring No.970821-2S142E
  Lat: 2° 00.023S Long: 142° 00.013E
- Mooring No.970824-00138E
  Lat: 0° 01.247S Long: 138° 01.799E

Recovery

We recovered four ADCP moorings which were deployed on Jul.1996 (K96-06).

We monitored depth of acoustic releaser after we released the anchor(Fig.7-1～7-4).

After the recovery, we uploaded ADCP and CTD data into a computer, then raw data were converted into ASCII code. Results were shown in the figures on following pages. Fig.7-5～7-8 shows CTD depth, temperature and salinity data . Fig.7-9～7-20 shows the velocity data (eastward and northward component) at 50m(16bins for 00-156E ADCP,25bins for 2.5S-142E, 28bins for 2S-142E, 21bins for 00-138E), 100m(10bins for 00-156E ADCP,19bins for 2.5S-142E, 21bins for 2S-142E, 15bins for 00-138E) and 150m(4bins for 00-156E ADCP,12bins for 2.5S-142E, 15bins for 2S-142E, 9bins for 00-138E) depth.



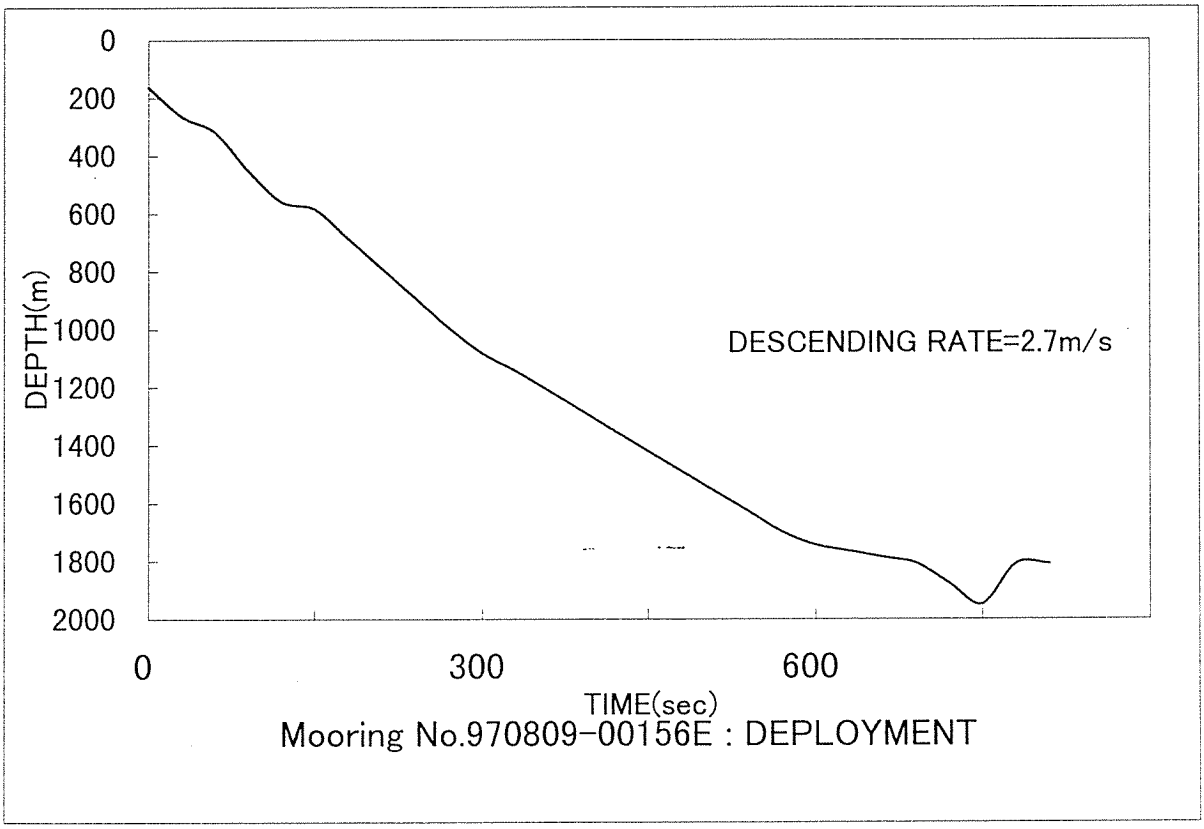
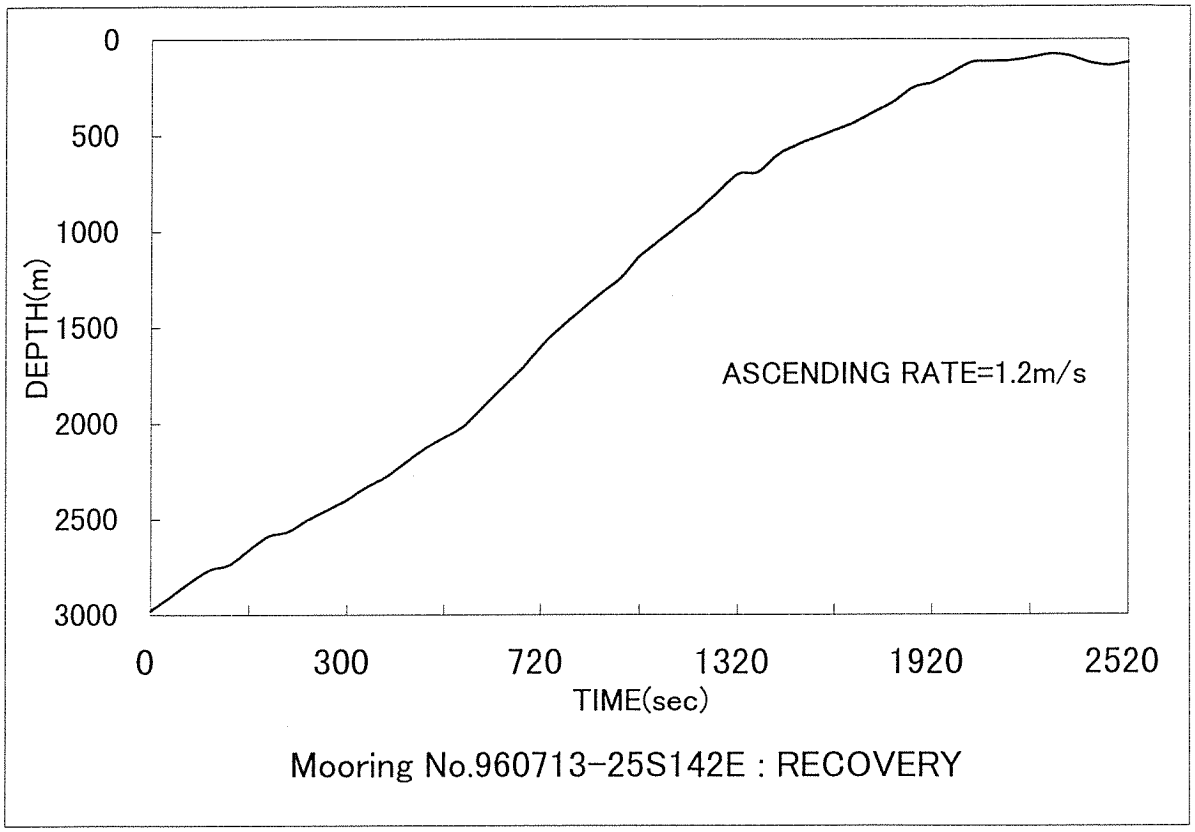


Fig. 7-1 Depth Monitor of Acoustic Releaser



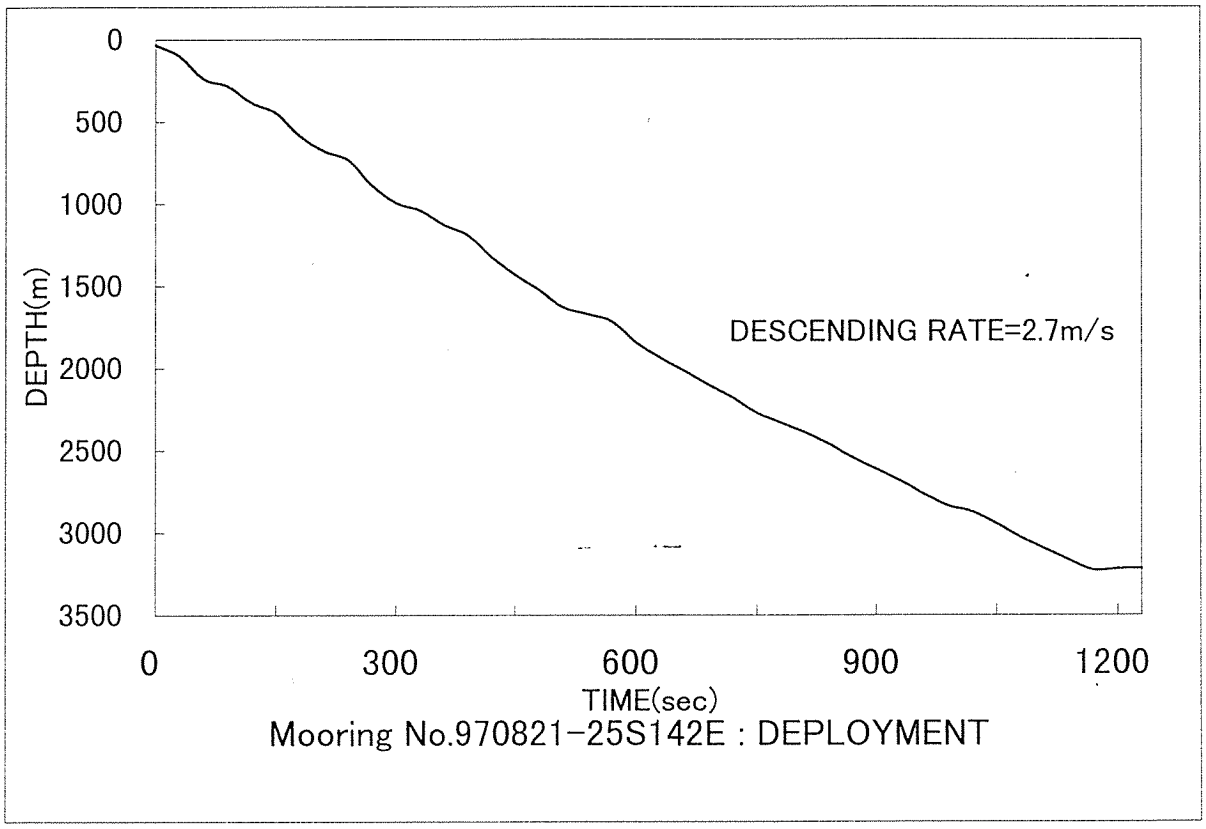
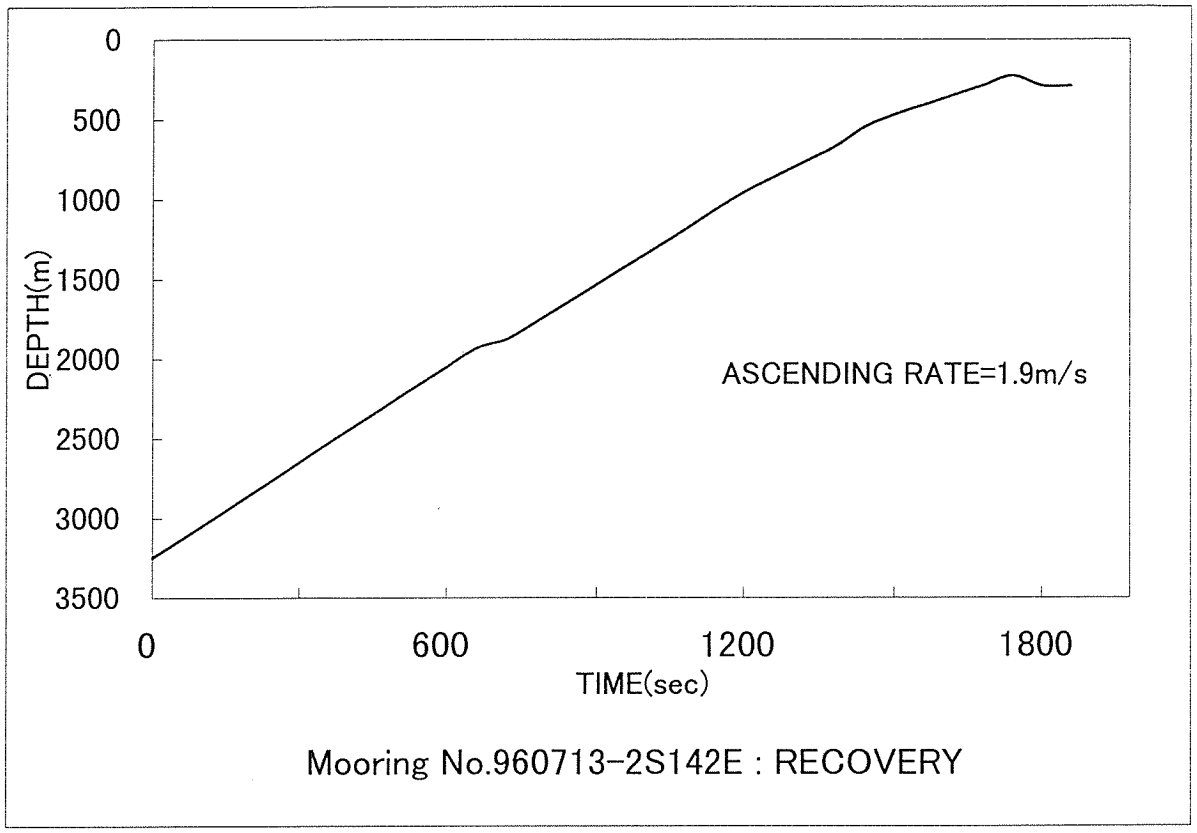


Fig. 7-2 Depth Monitor of Acoustic Releaser



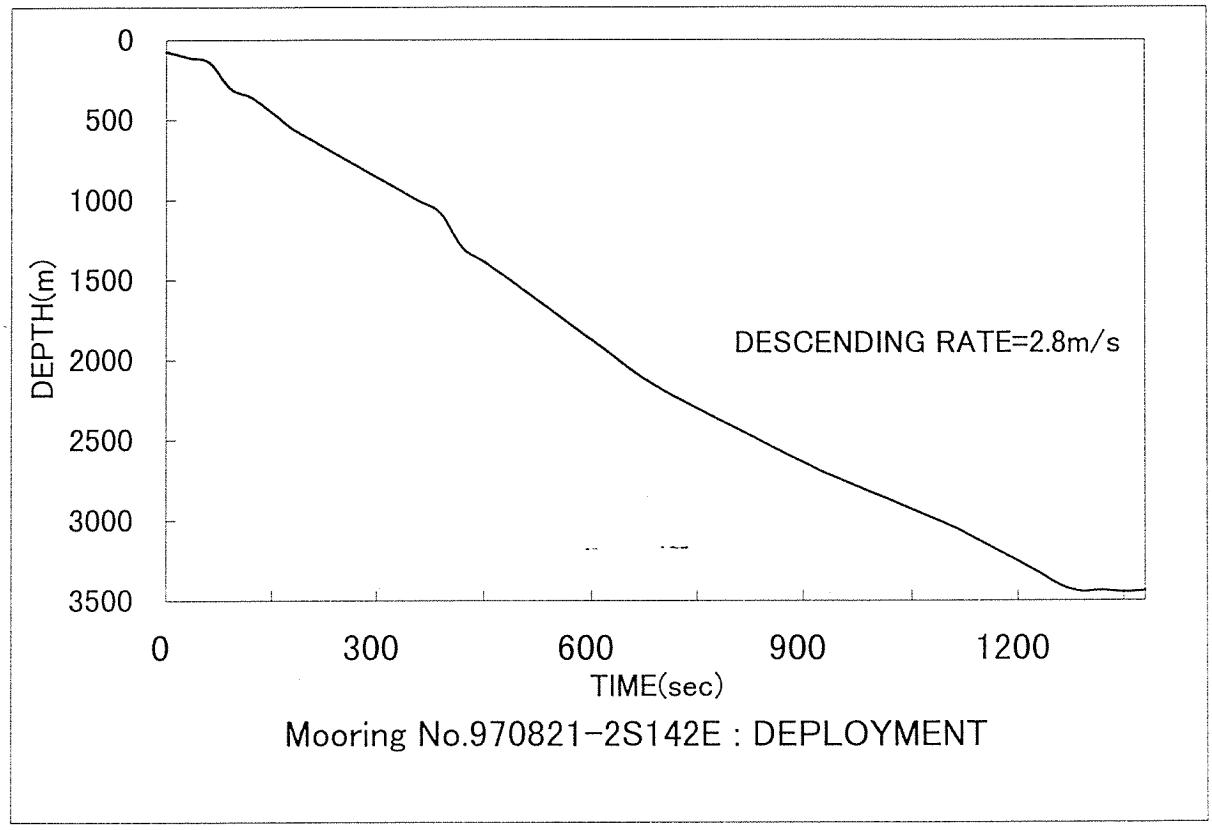
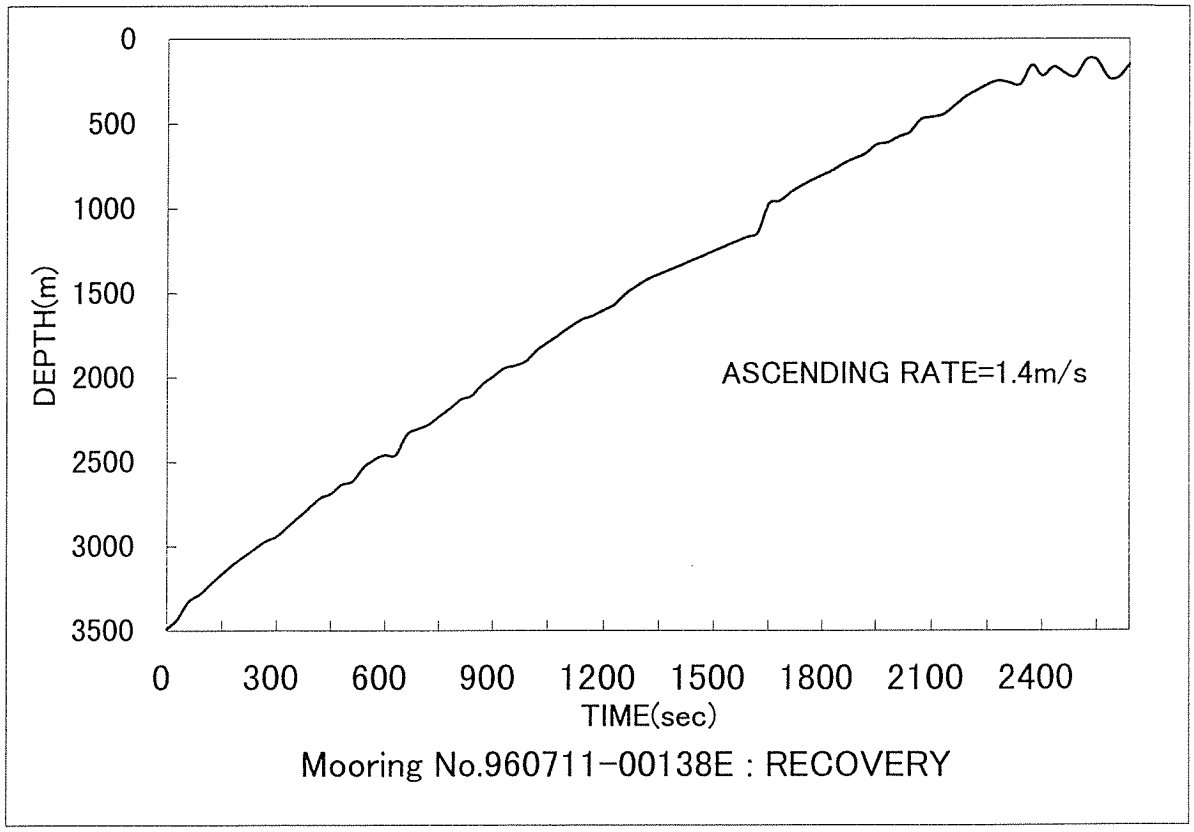


Fig. 7-3 Depth Monitor of Acoustic Releaser



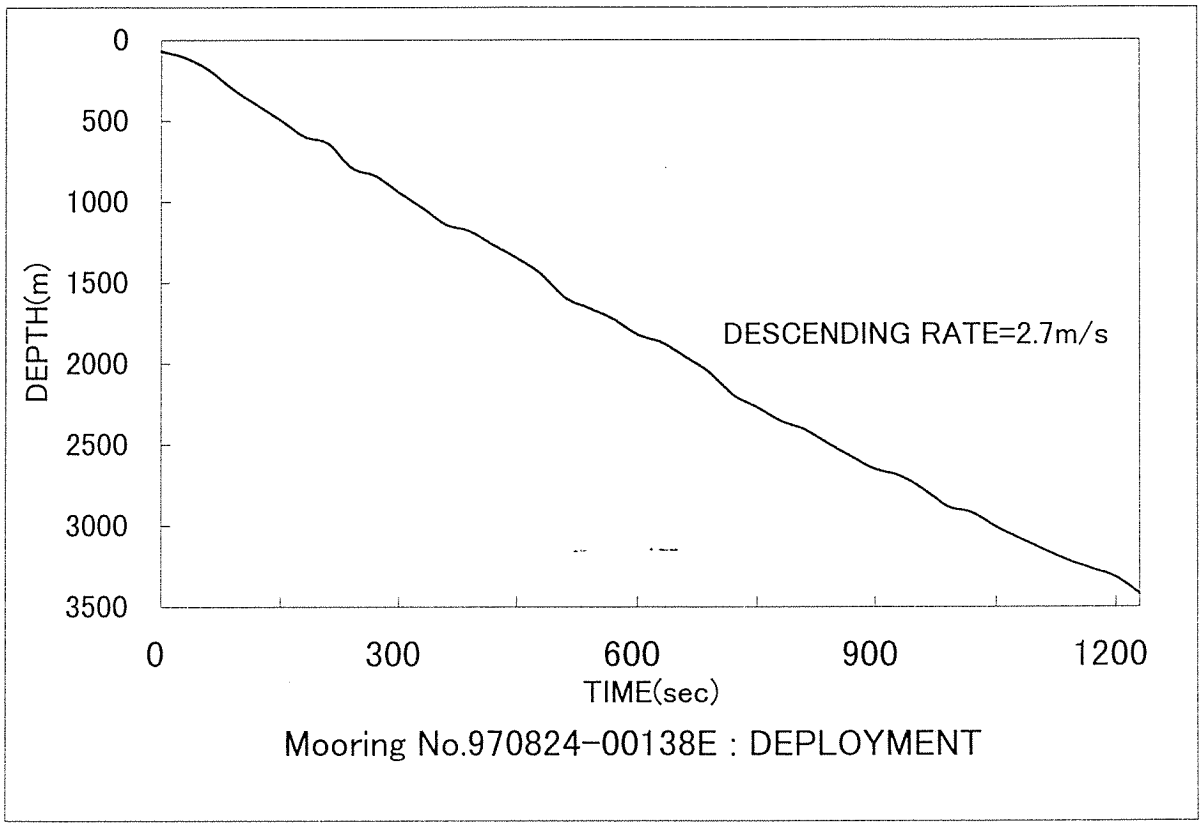
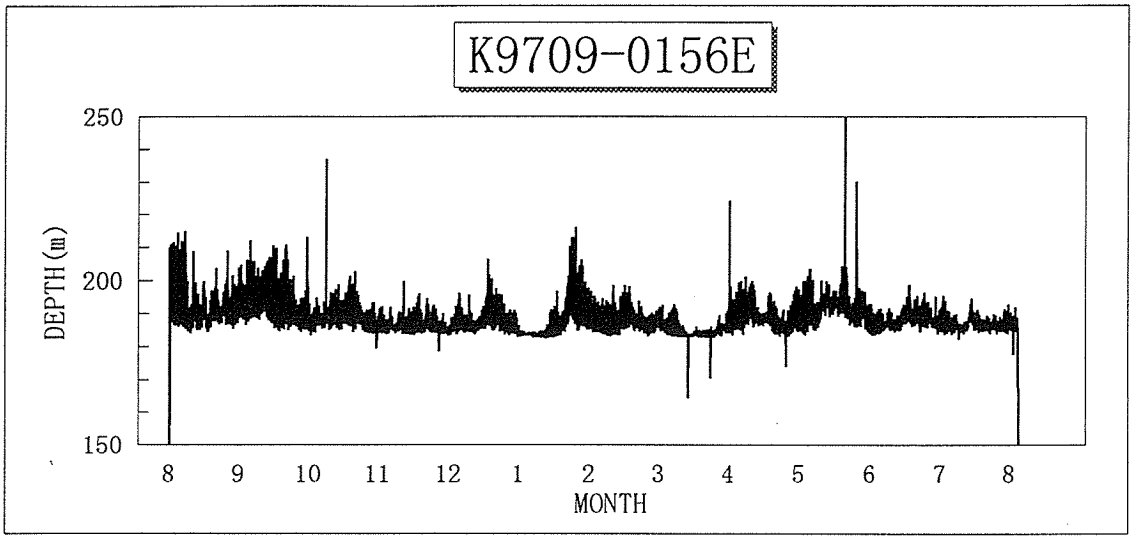
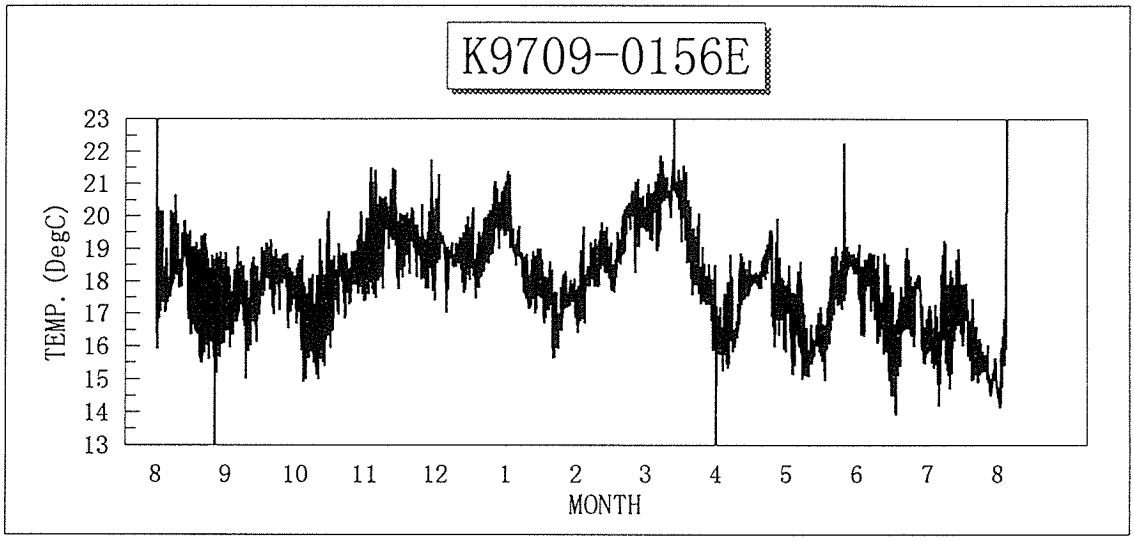


Fig. 7-4 Depth Monitor of Acoustic Releaser





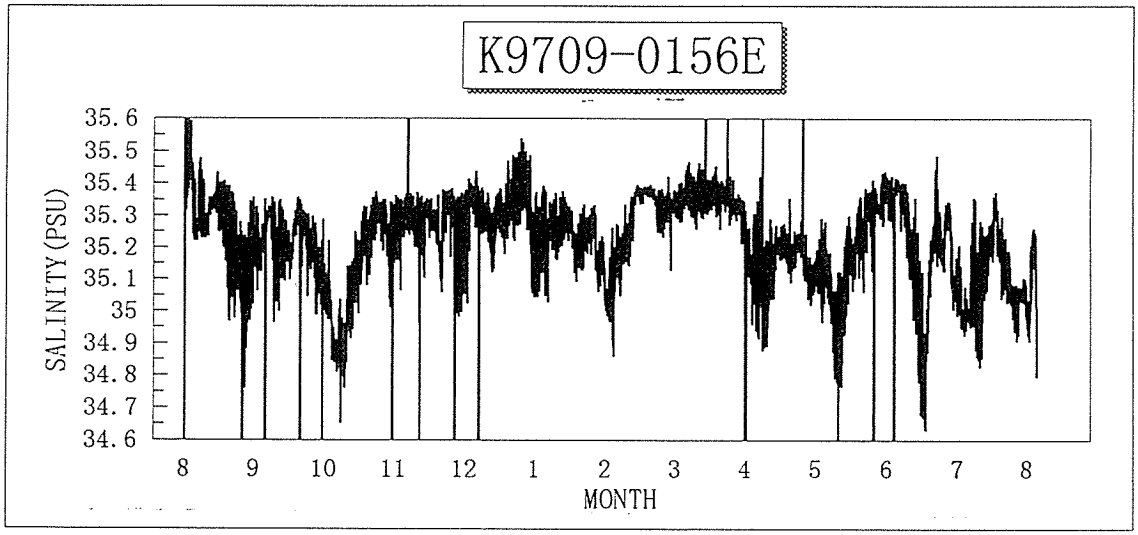
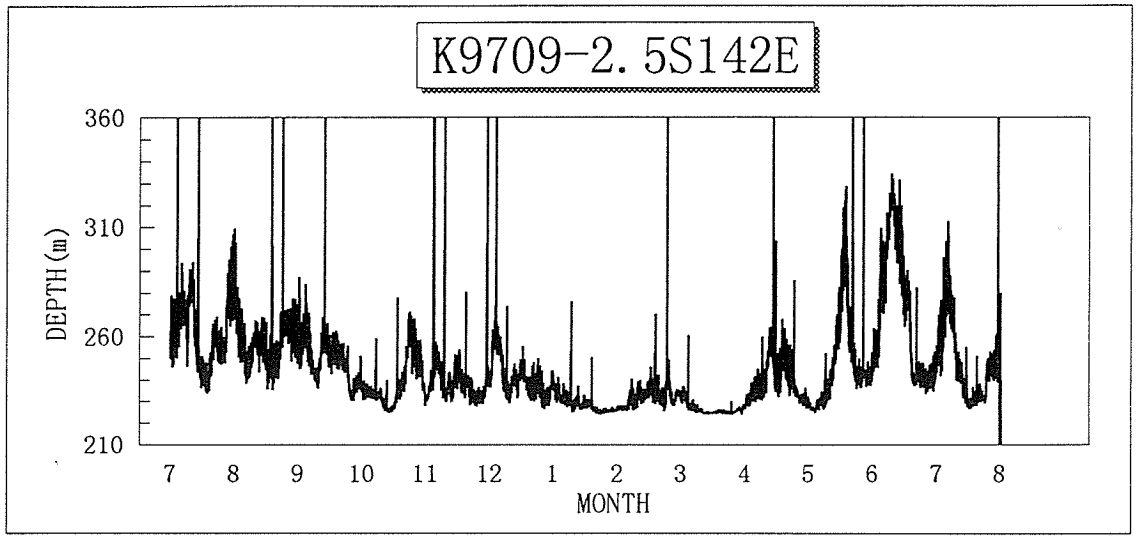
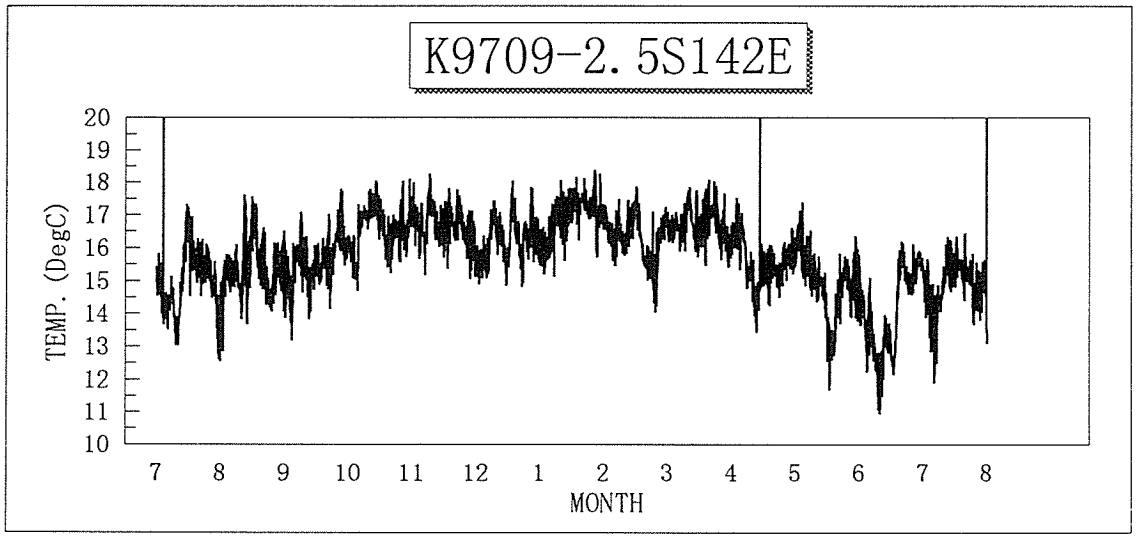


Fig. 7-5 Time Series of Depth, Temperature and Salinity





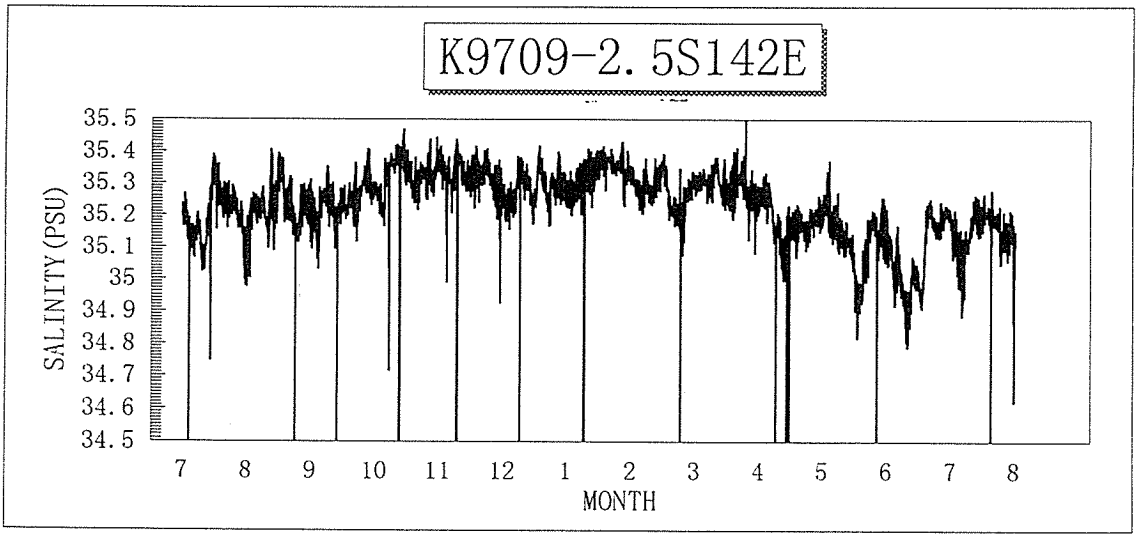
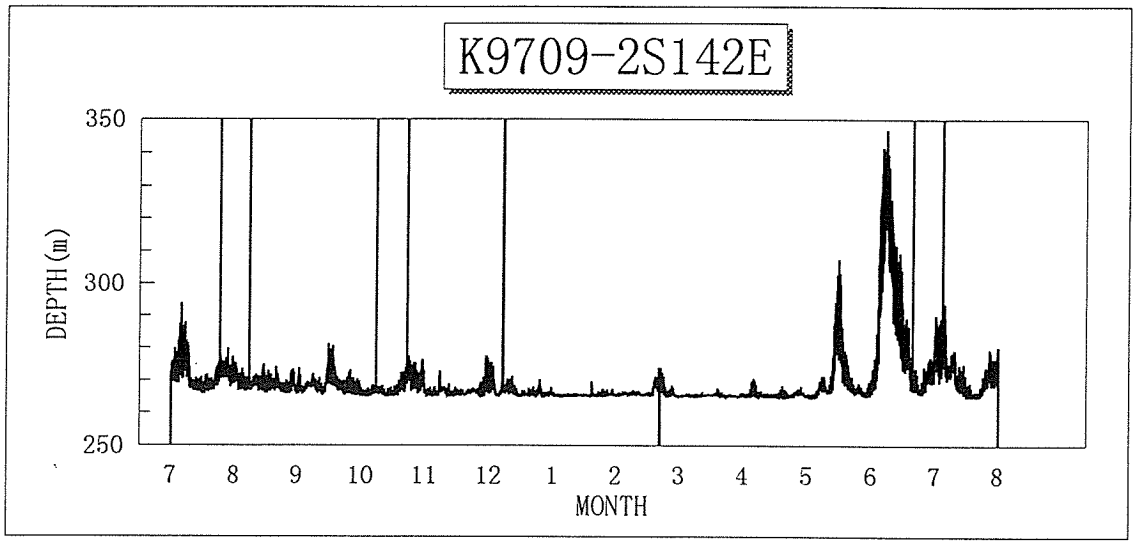
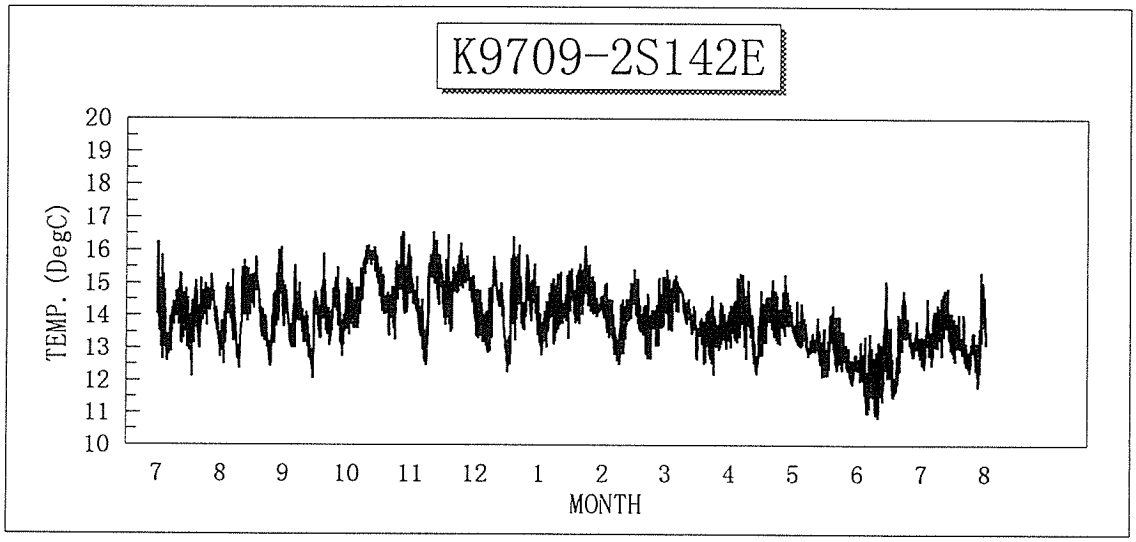


Fig. 7-6 Time Series of Depth, Temperature and Salinity





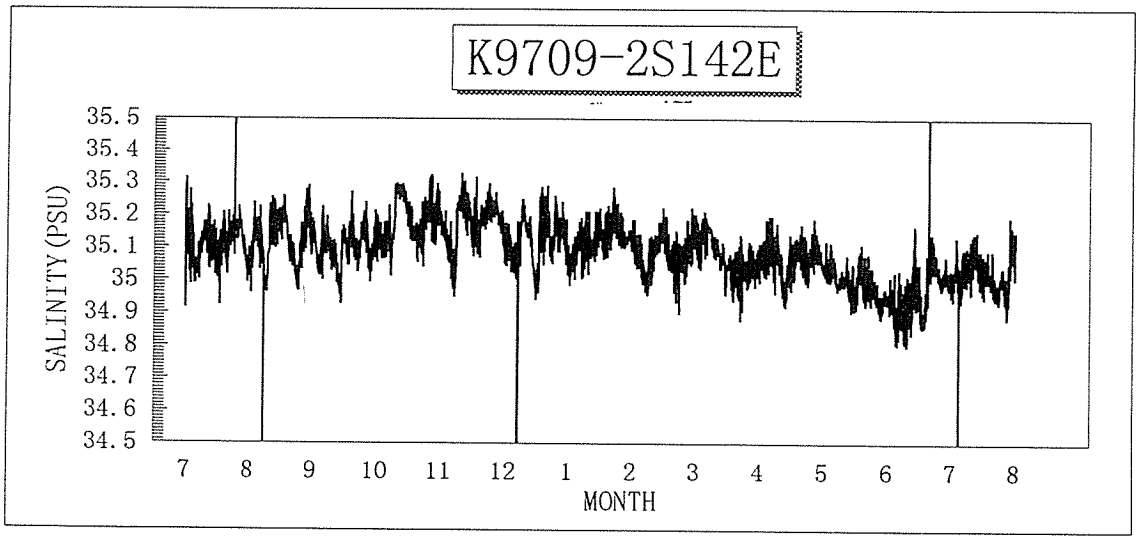
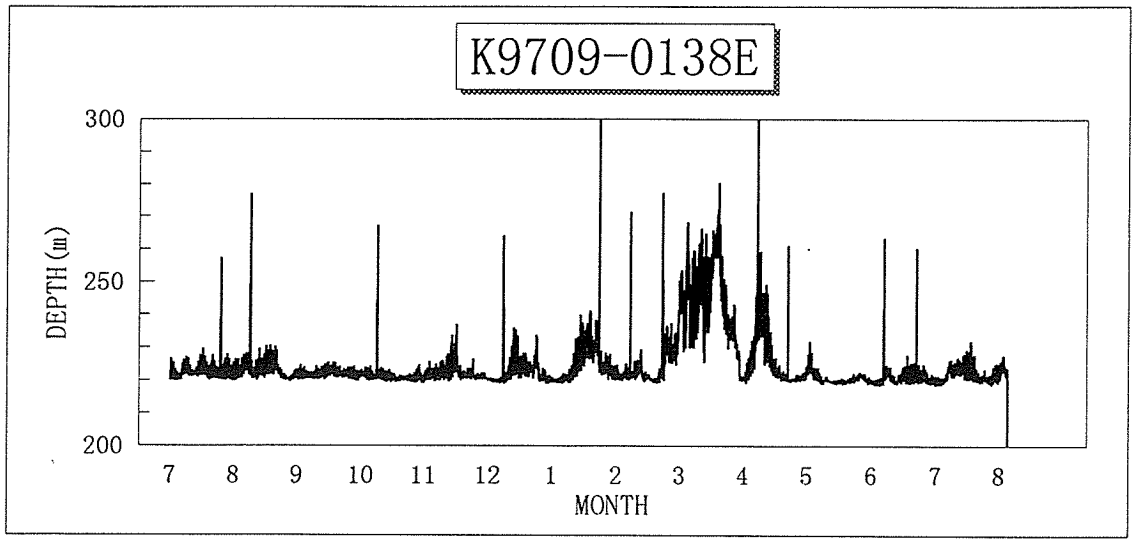
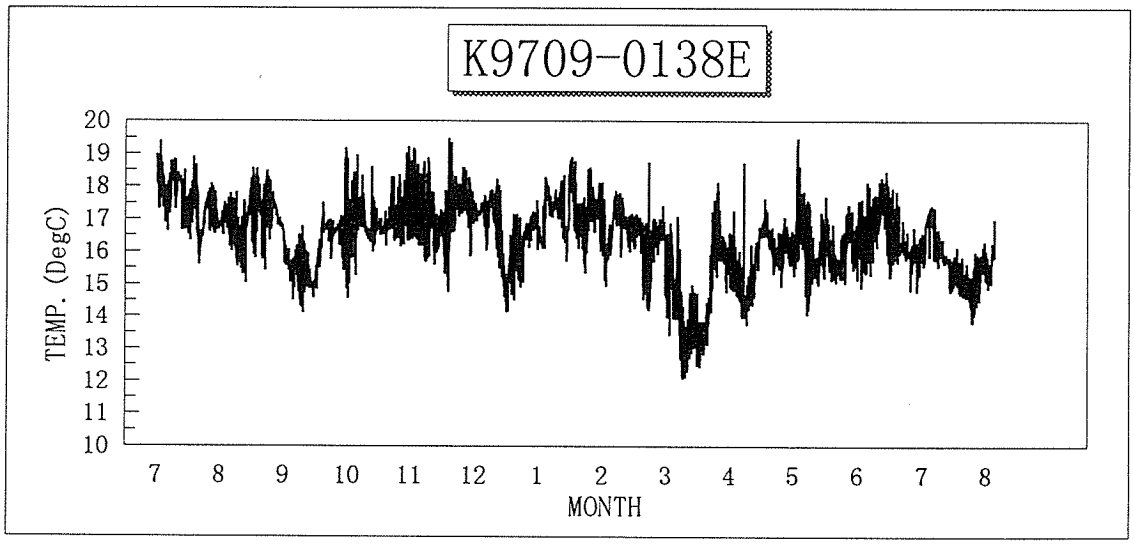


Fig. 7-7 Time Series of Depth, Temperature and Salinity





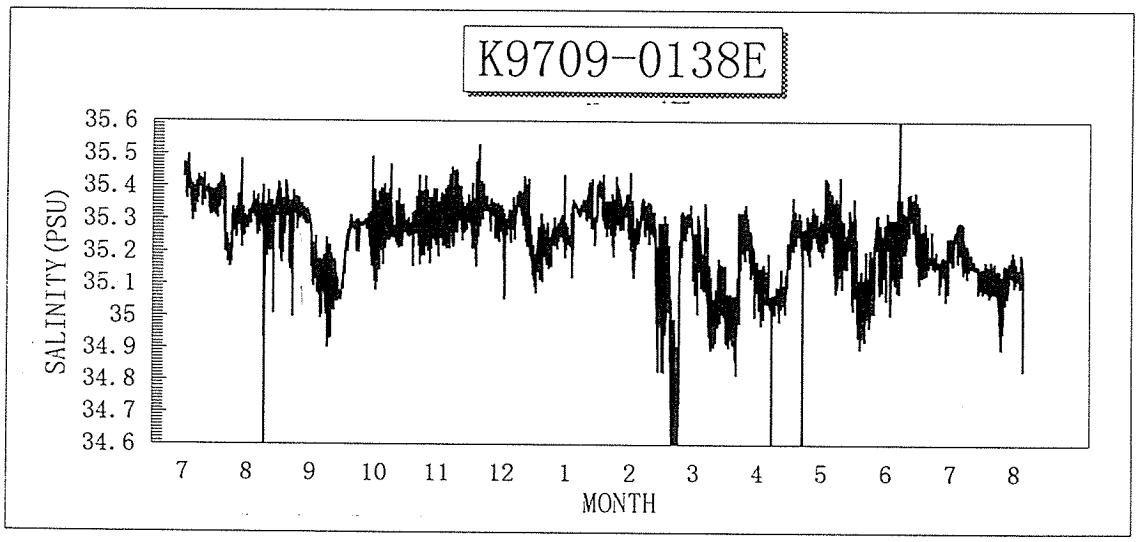
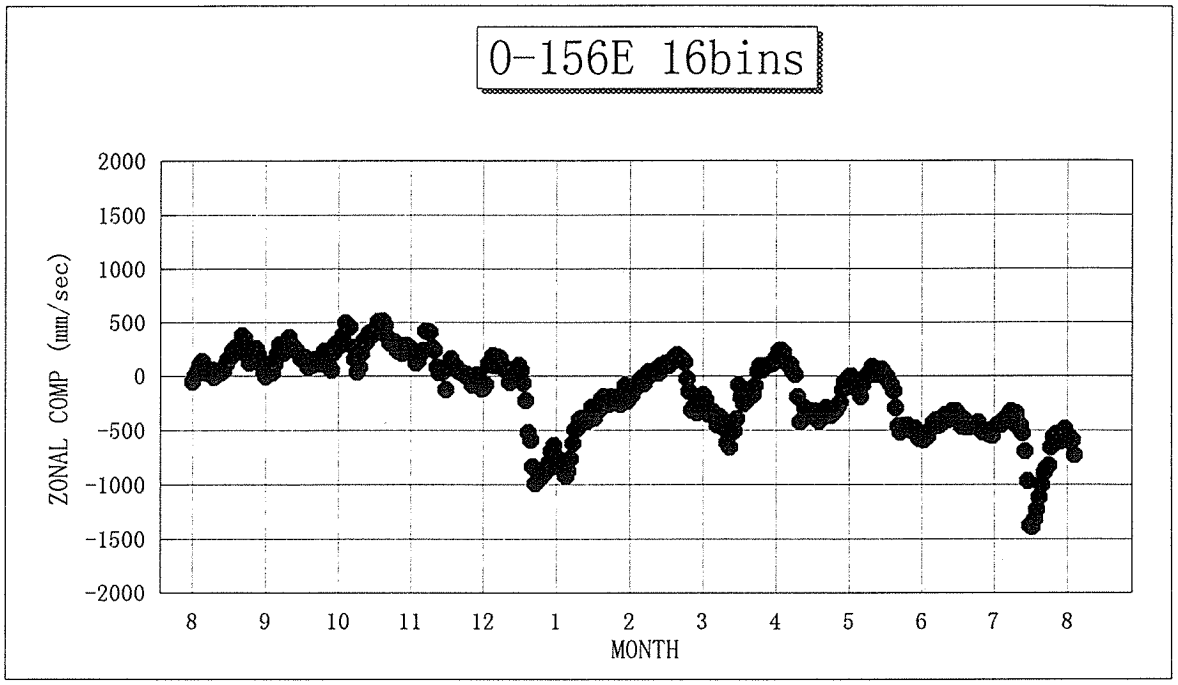


Fig. 7-8 Time Series of Depth, Temperature and Salinity



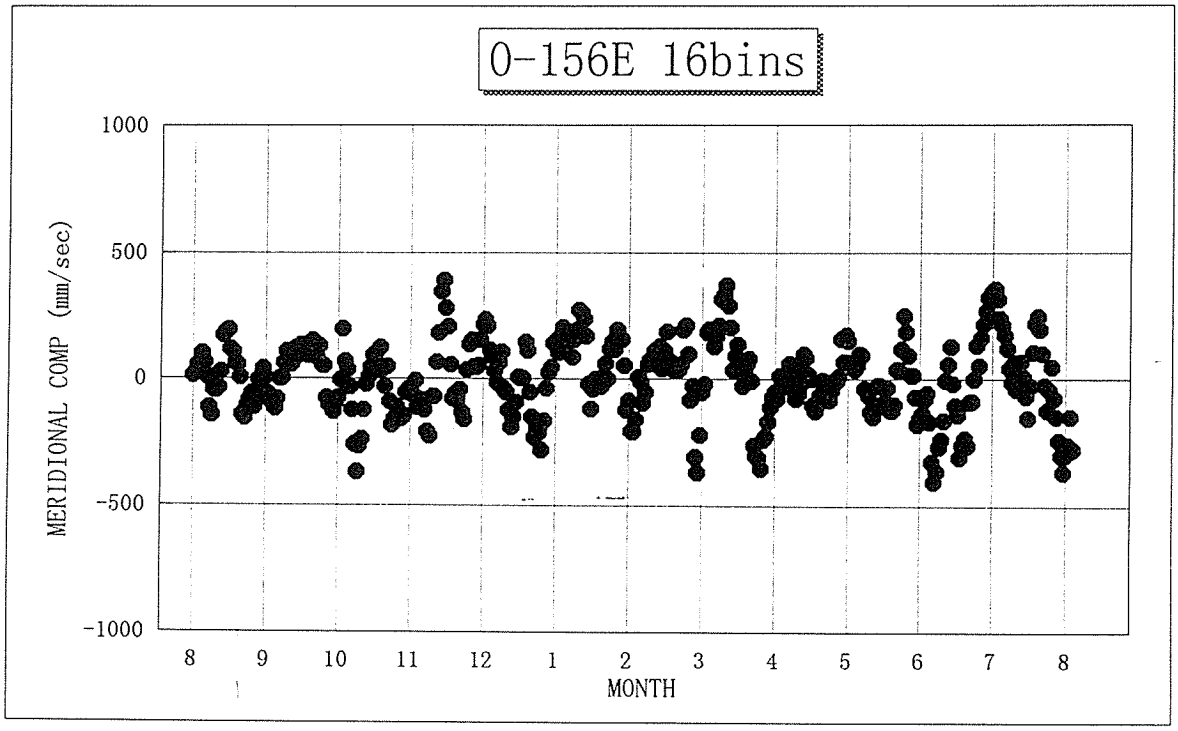
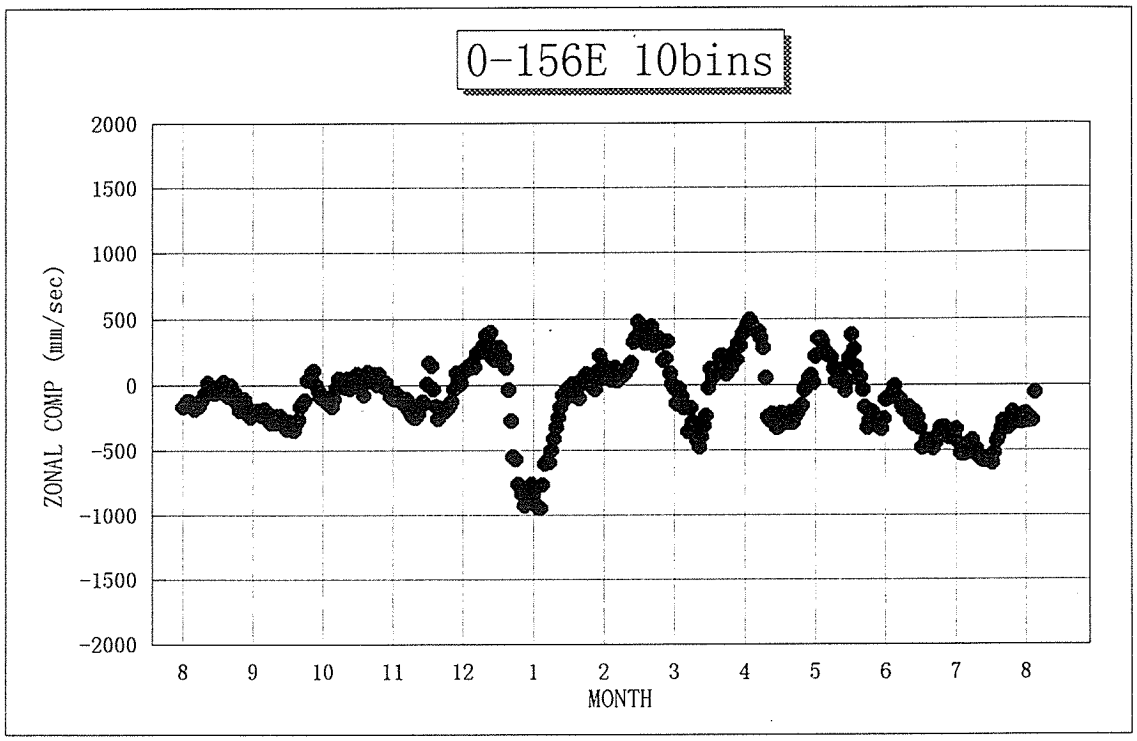


Fig. 7-9 Time Series of Velocity (50m)



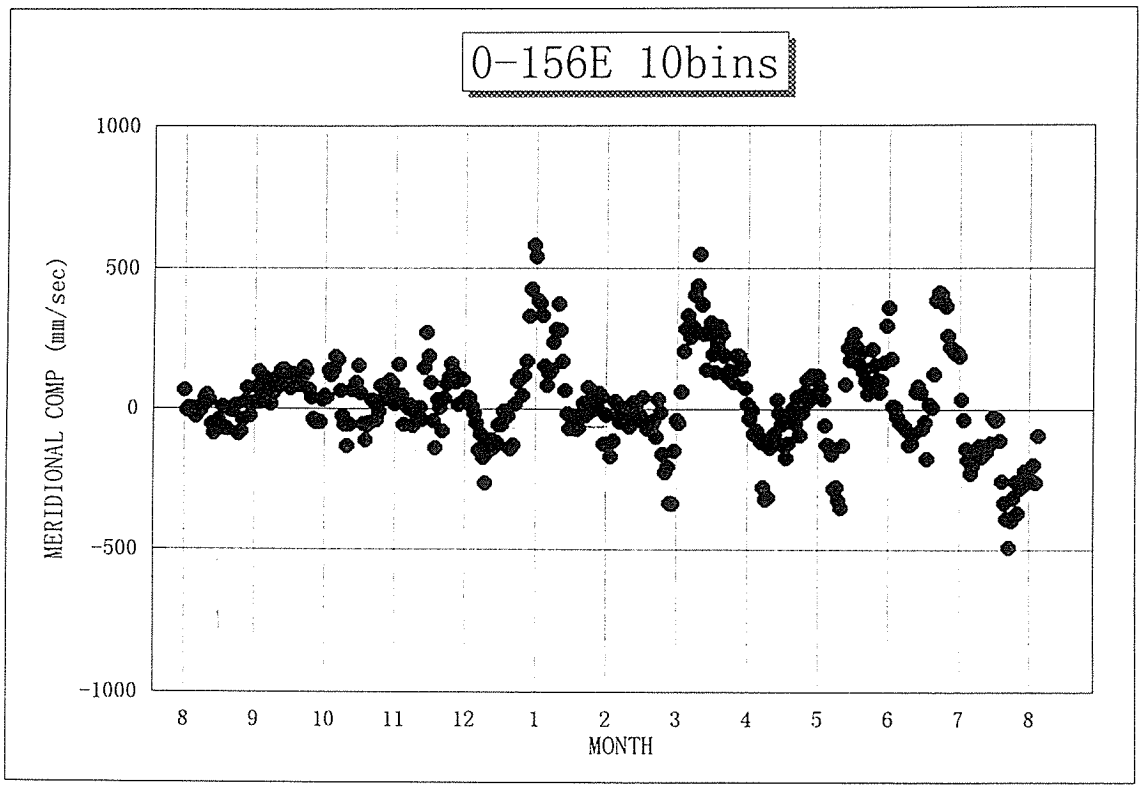
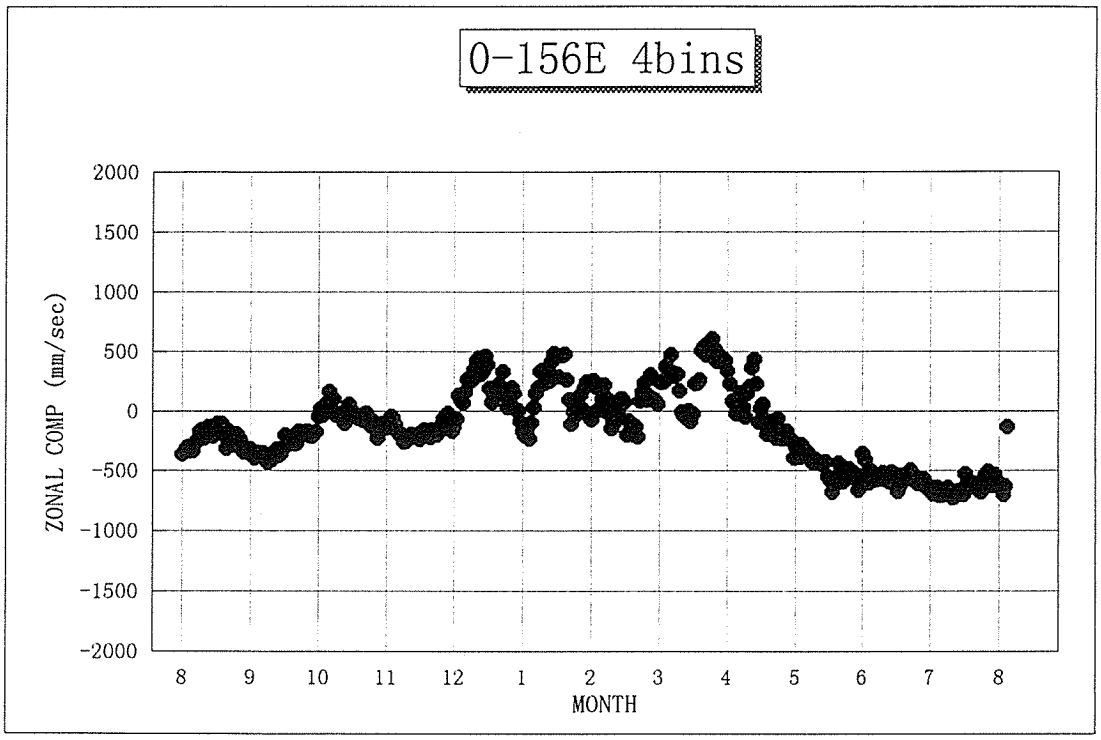


Fig. 7-10 Time Series of Velocity (100m)



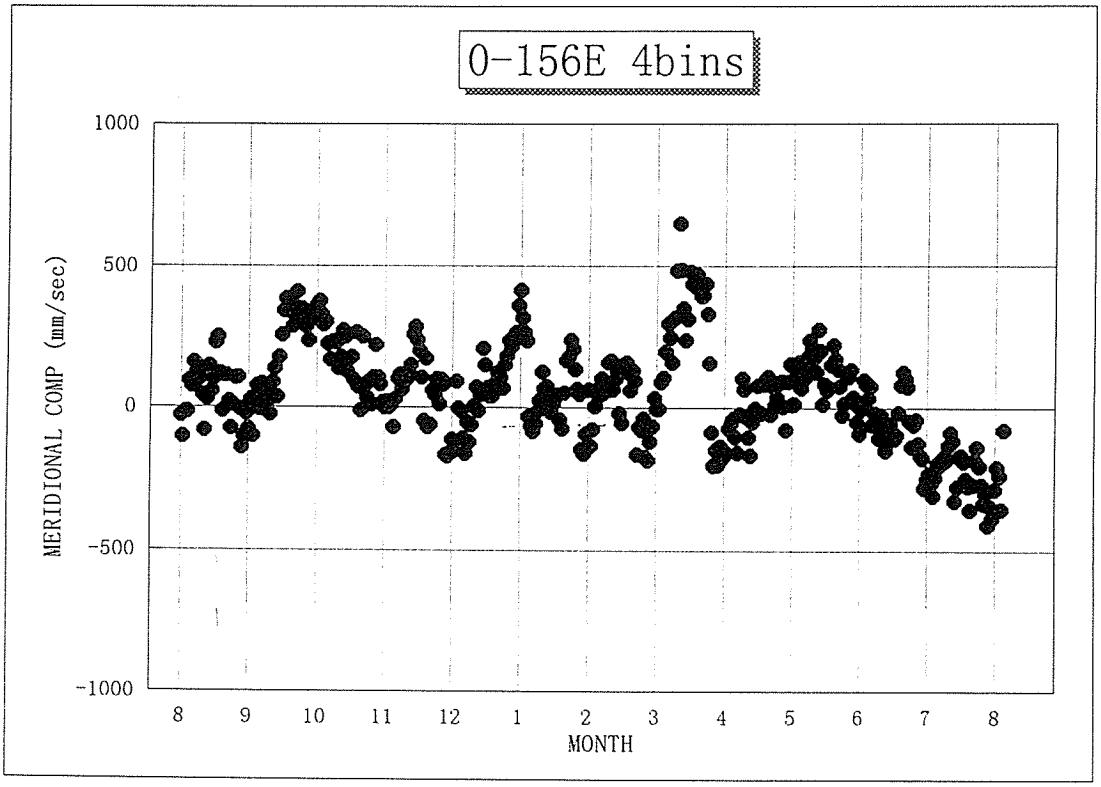
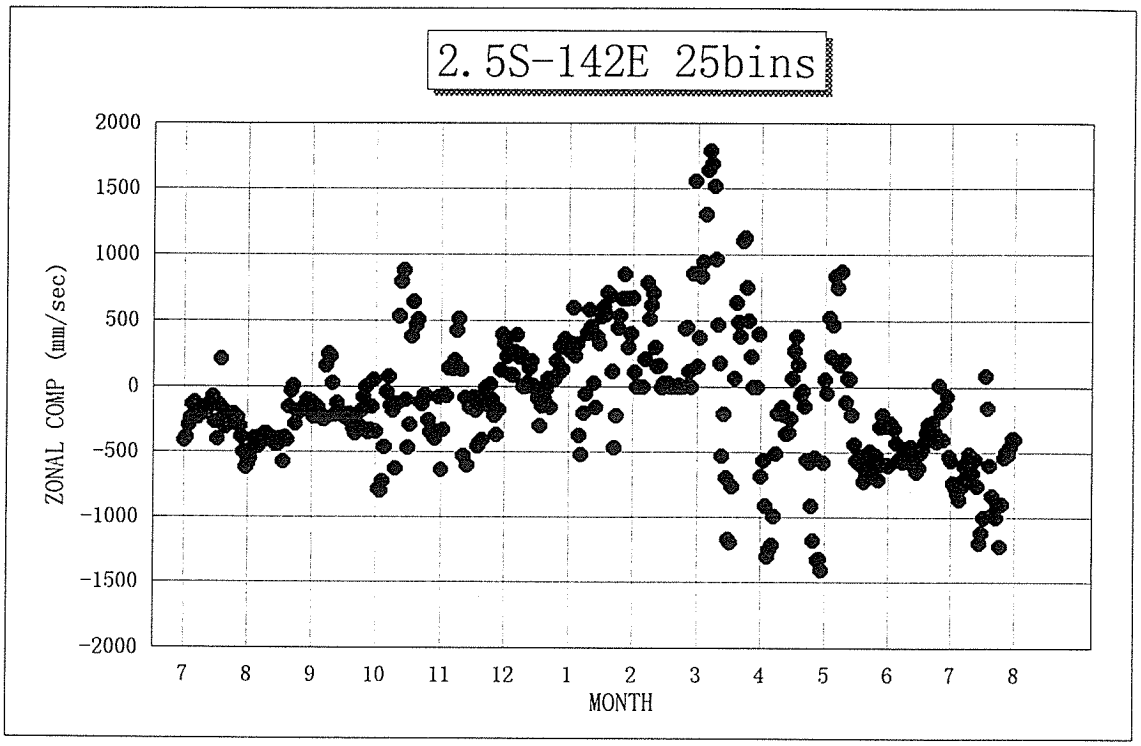


Fig. 7-11 Time Series of Velocity (150m)



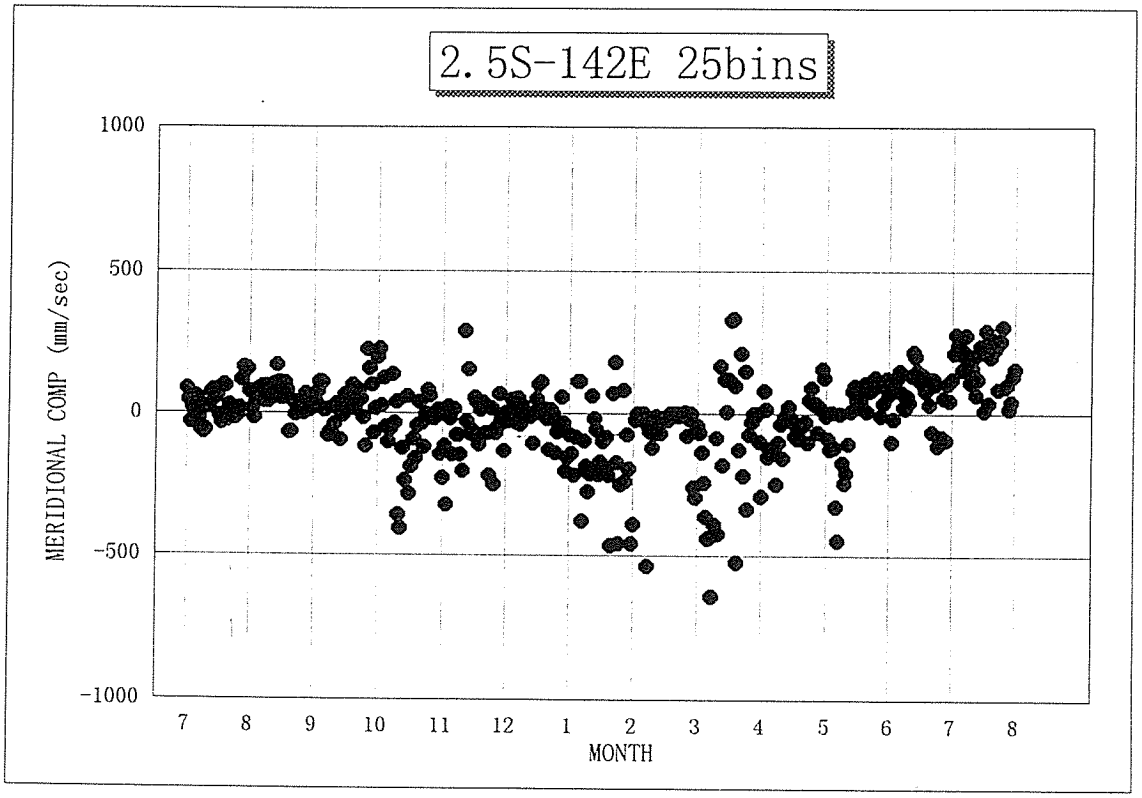
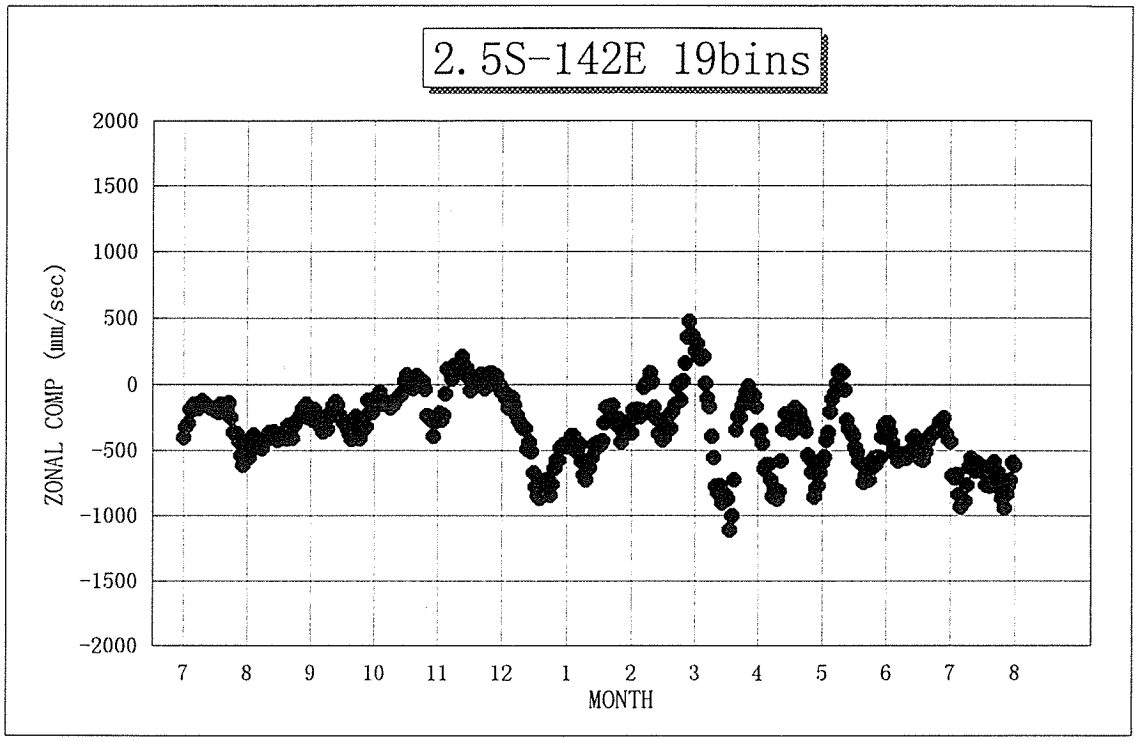


Fig. 7-12 Time Series of Velocity (50m)



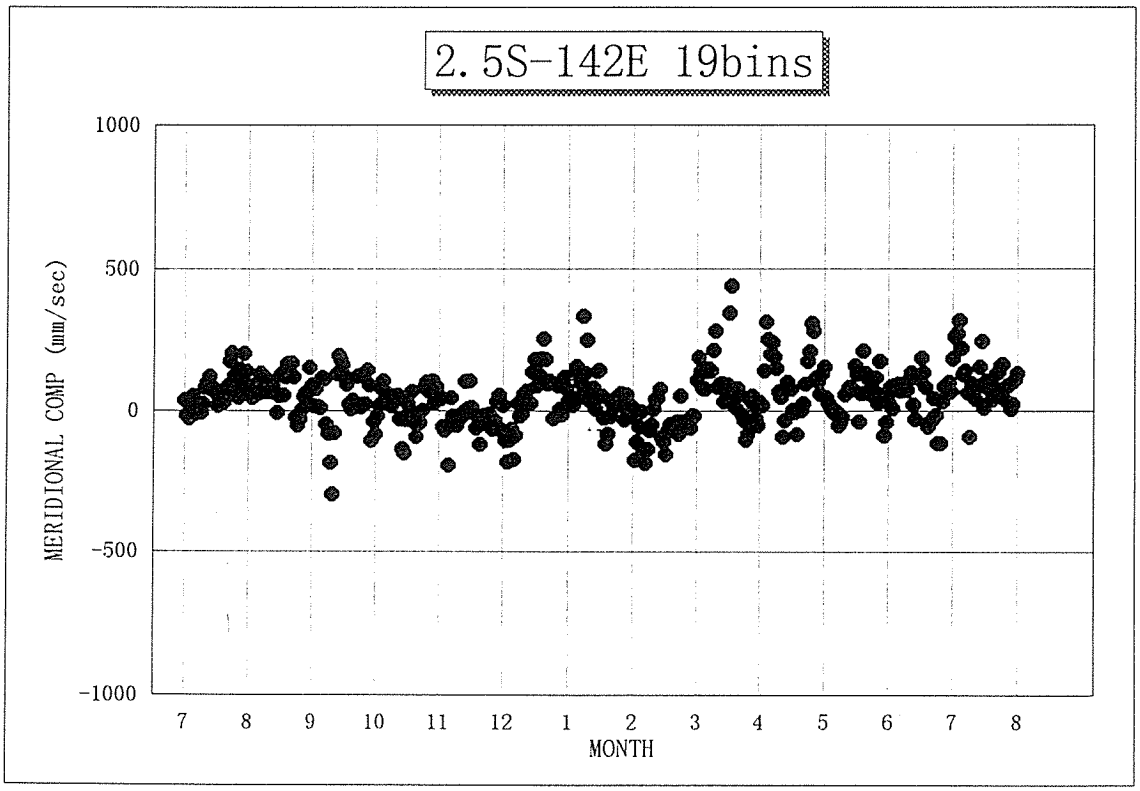
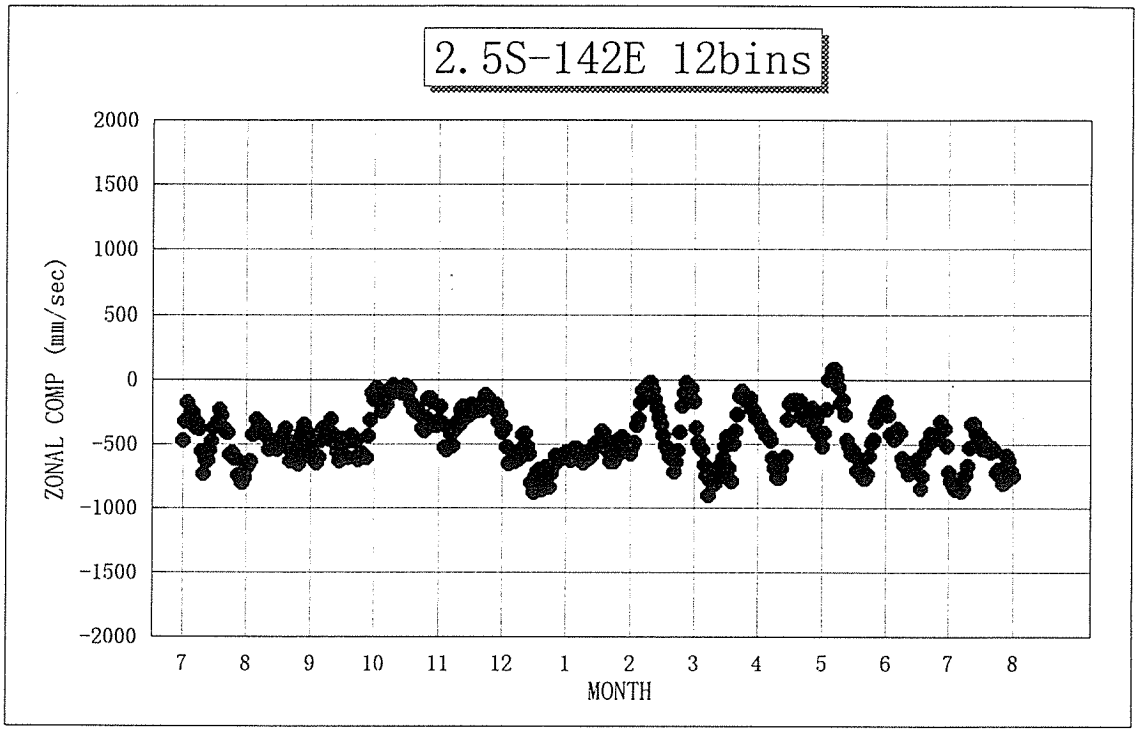


Fig. 7-13 Time Series of Velocity(100m)



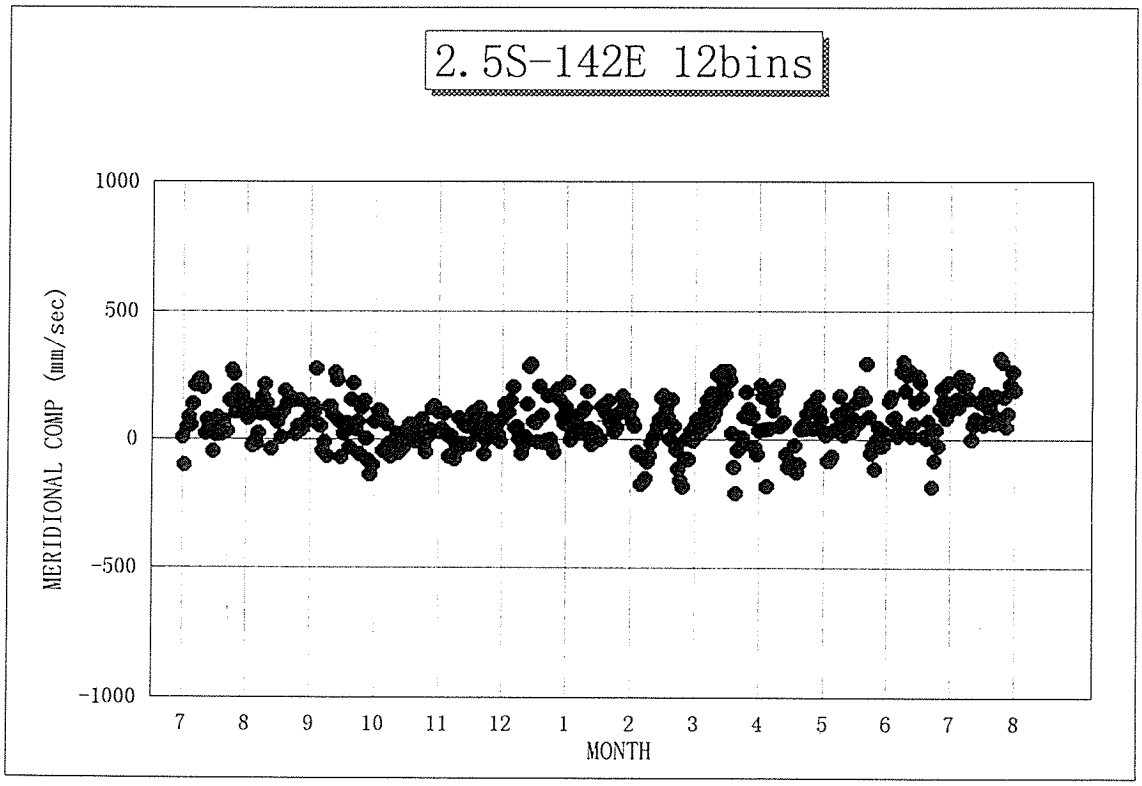
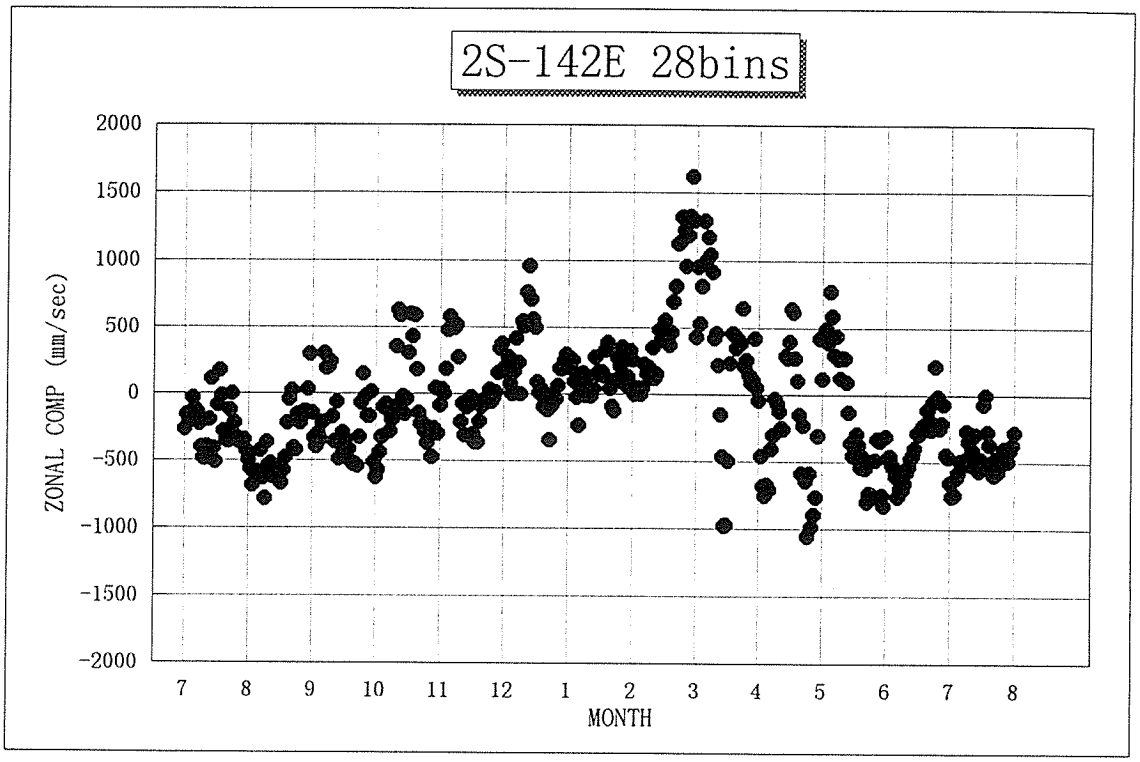


Fig. 7-14 Time Series of Velocity (150m)



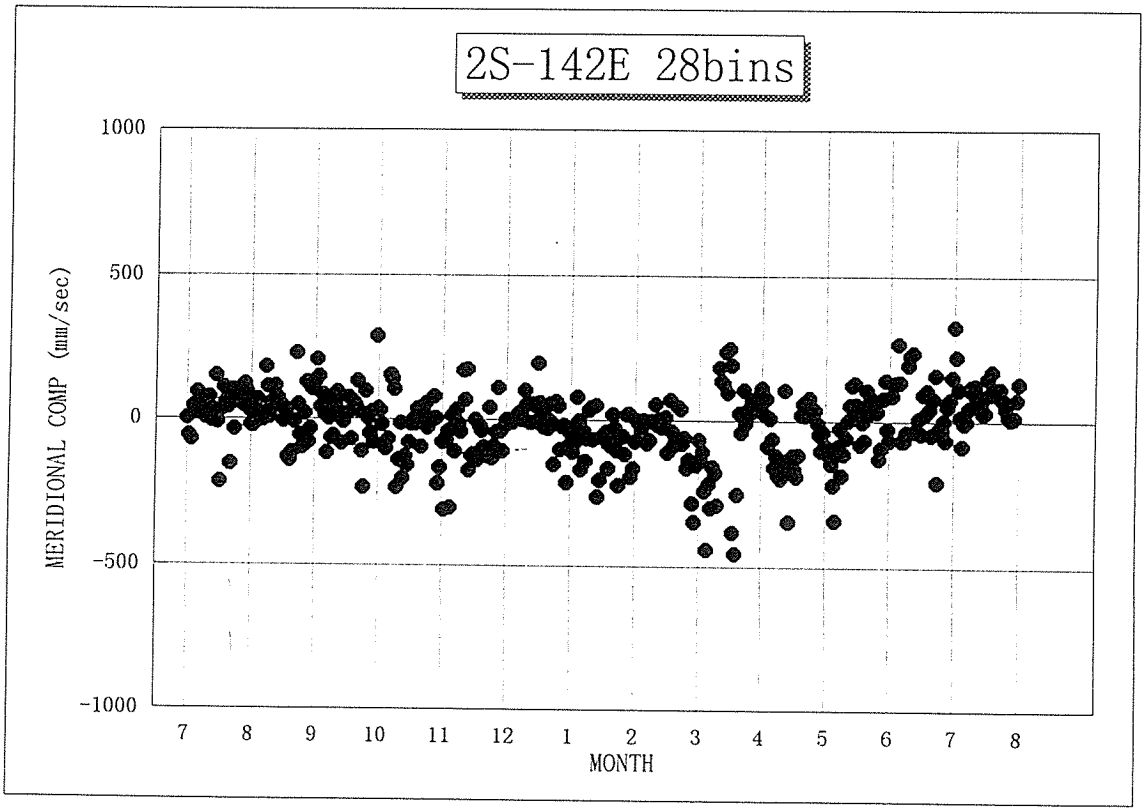
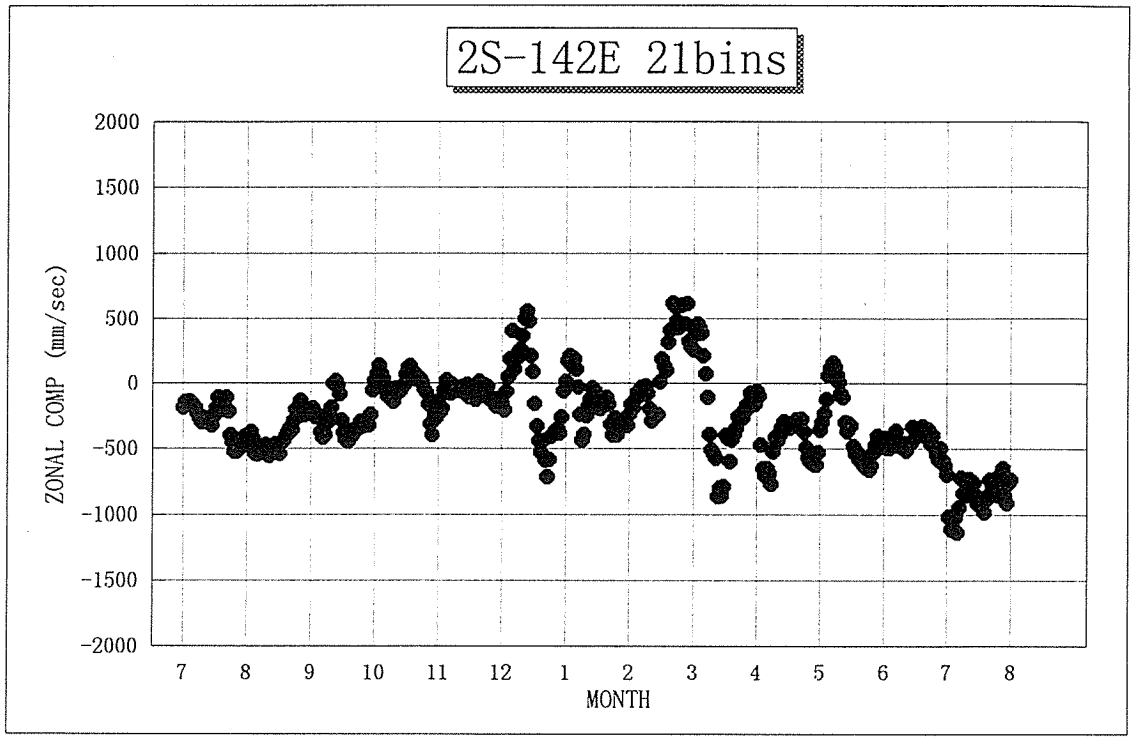


Fig. 7-15 Time Series of Velocity (50m)



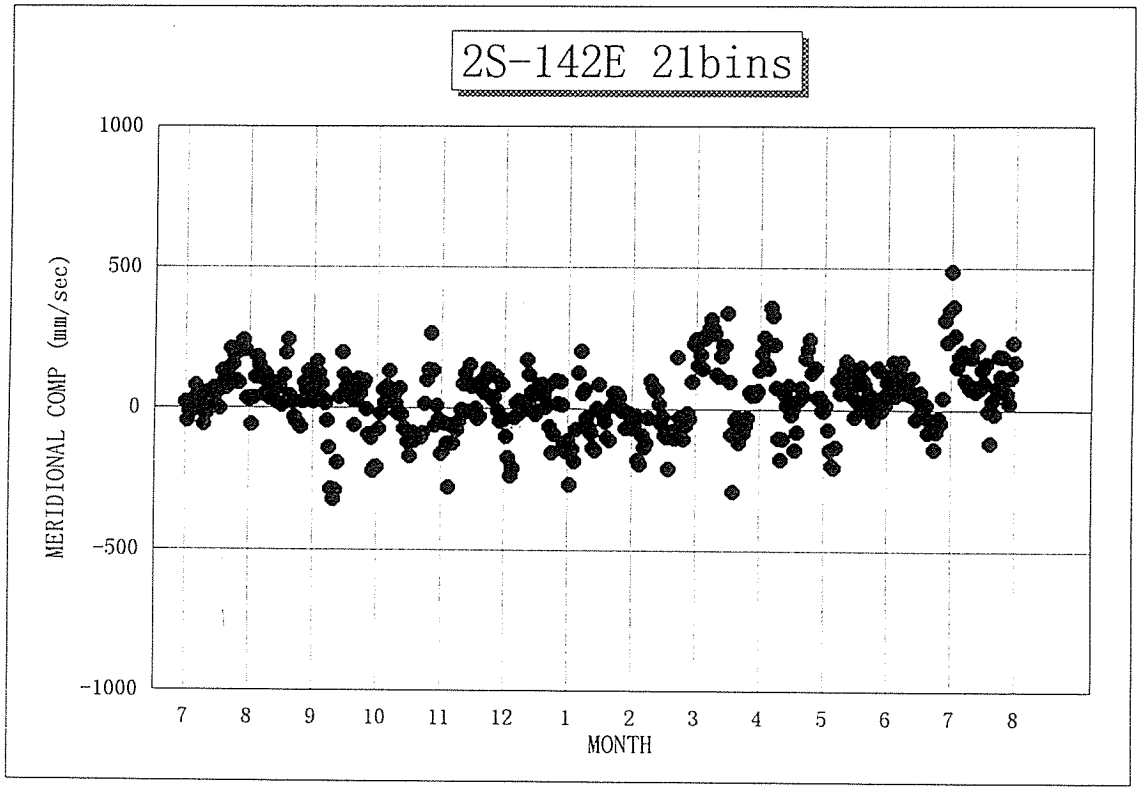
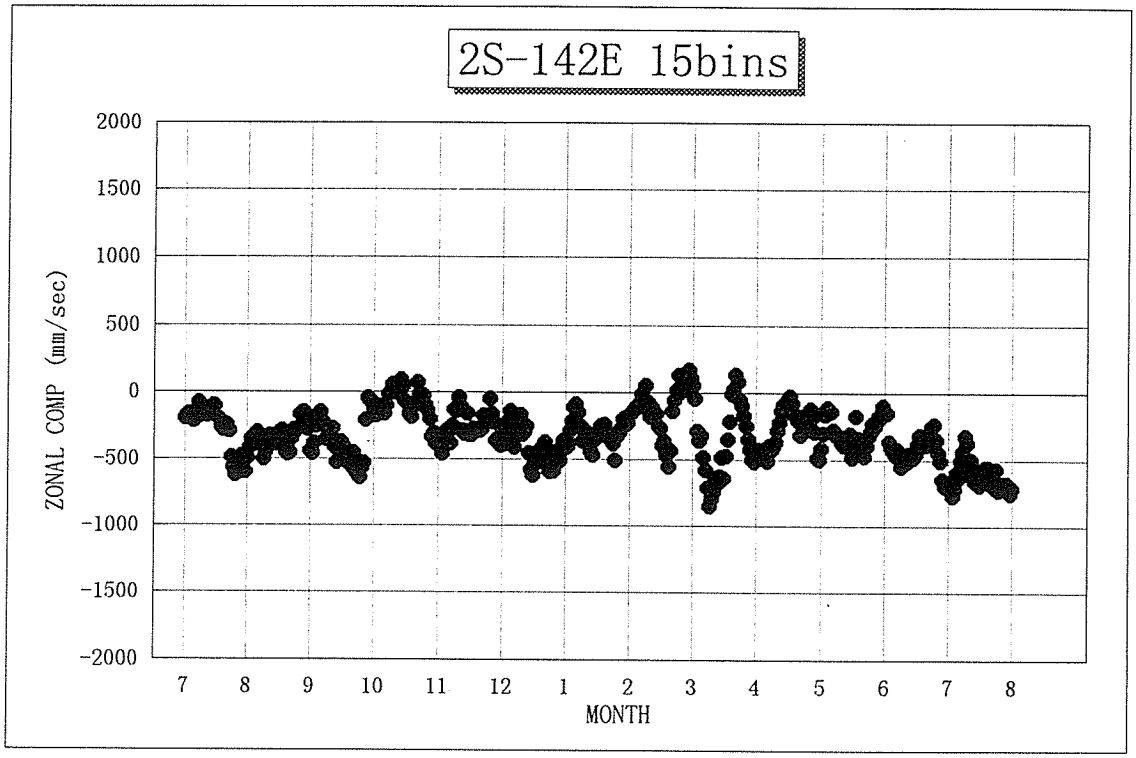


Fig. 7-16 Time Series of Velocity (100m)



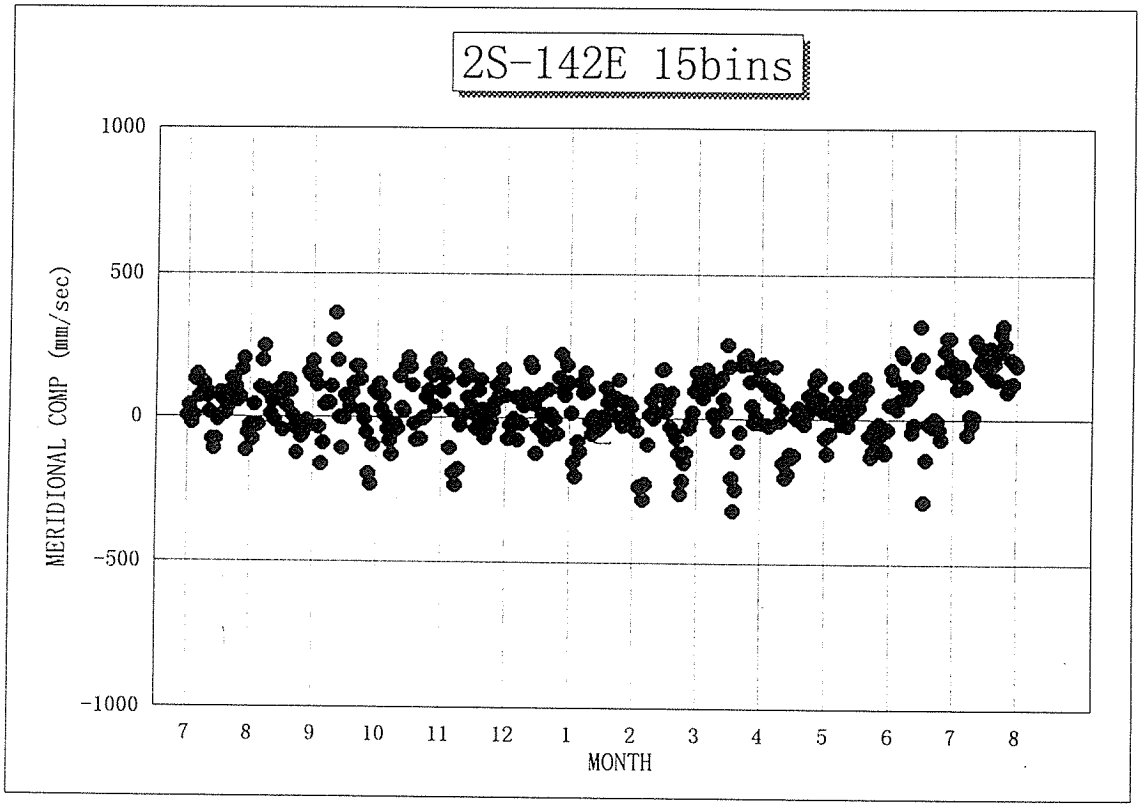
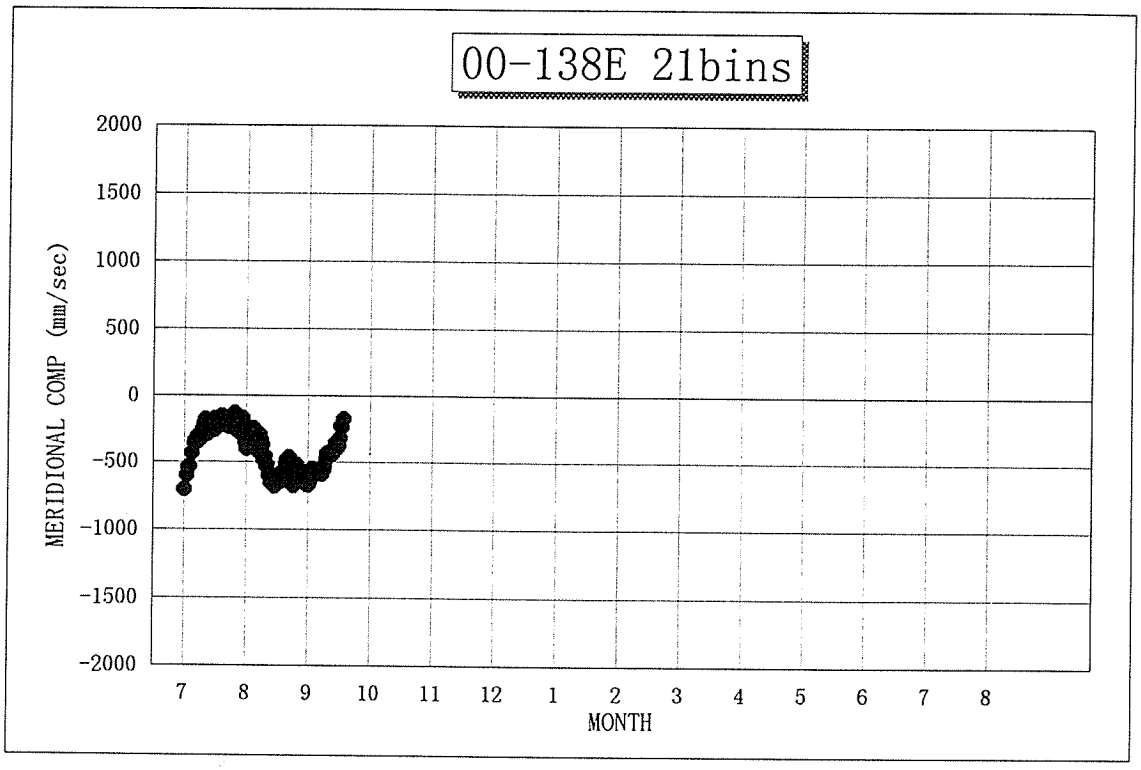


Fig. 7-17 Time Series of Velocity (150m)



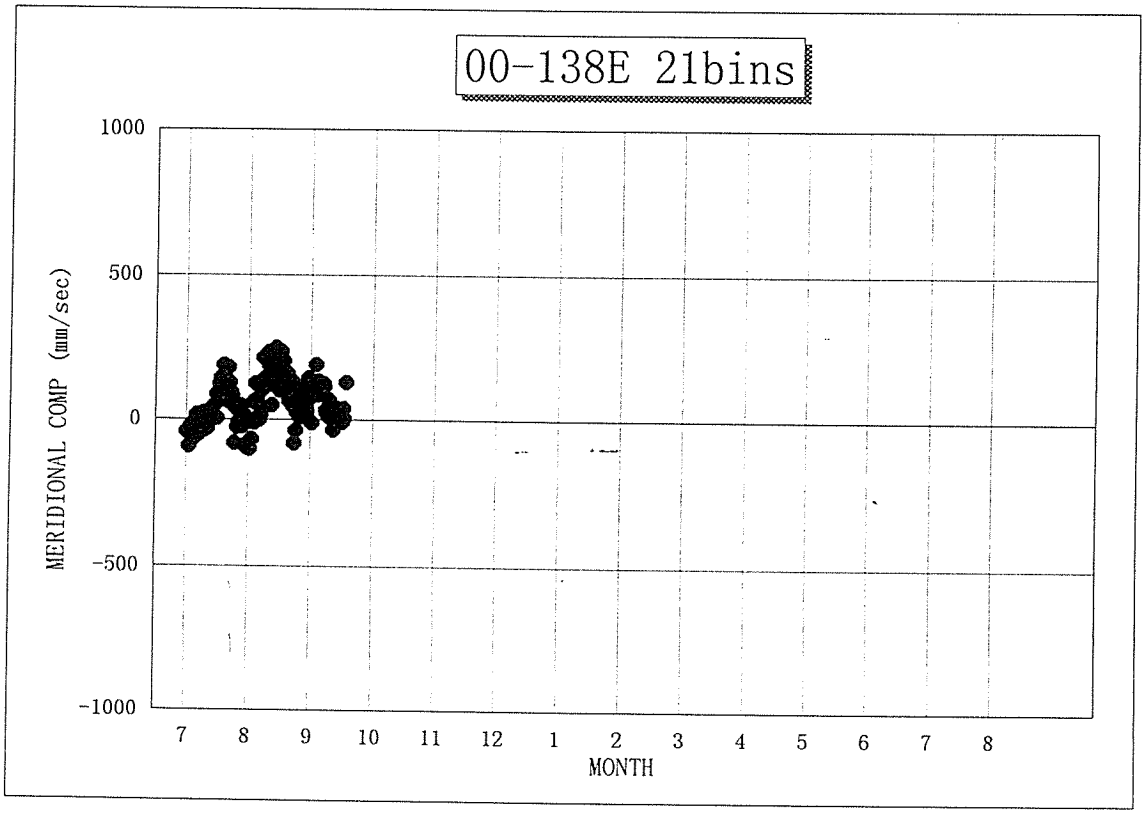
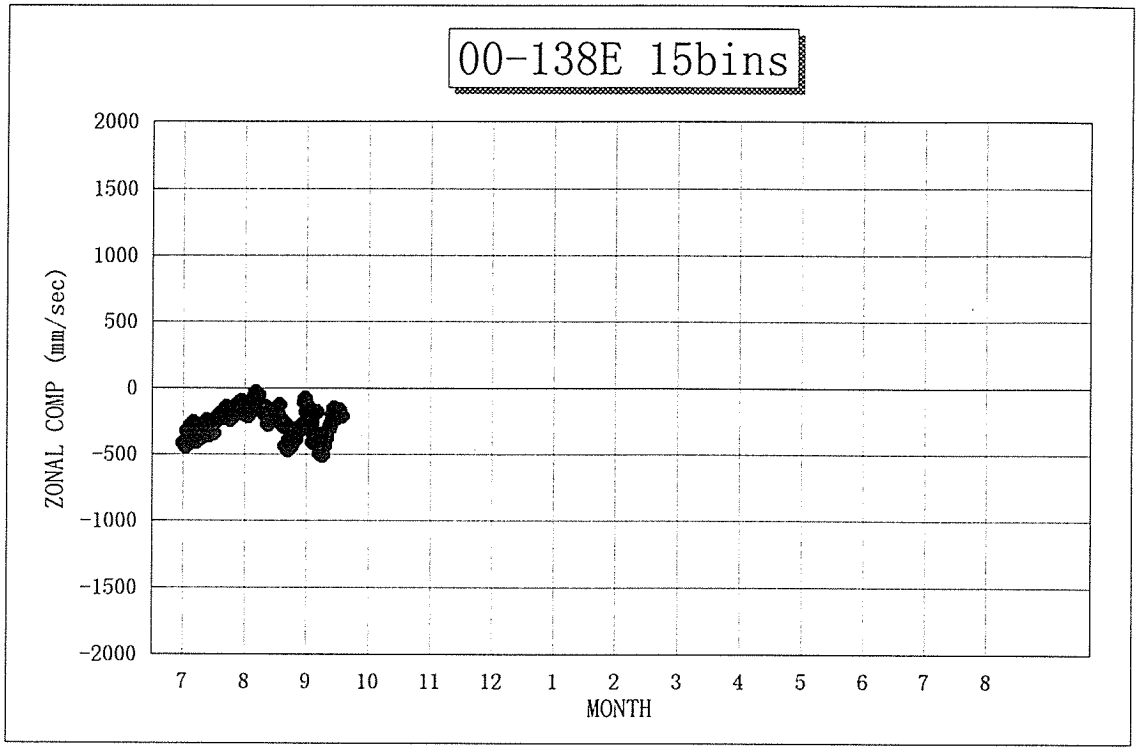


Fig. 7-18 Time Series of Velocity (50m)



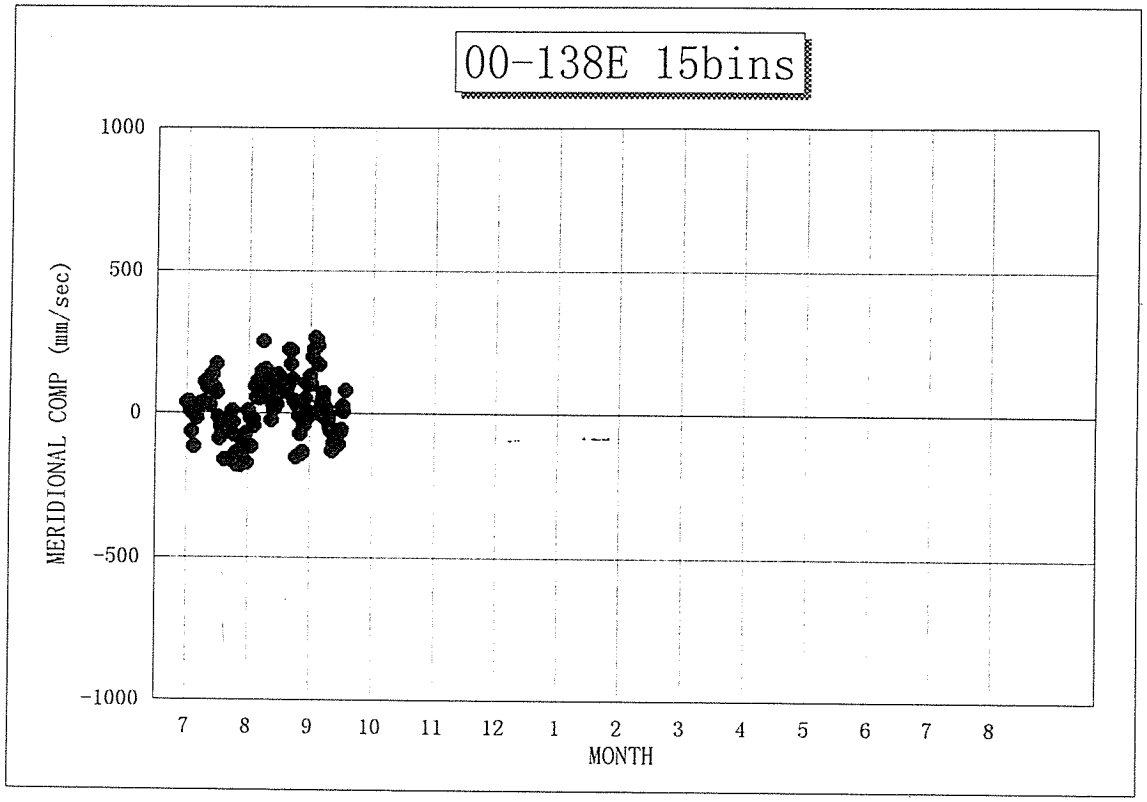
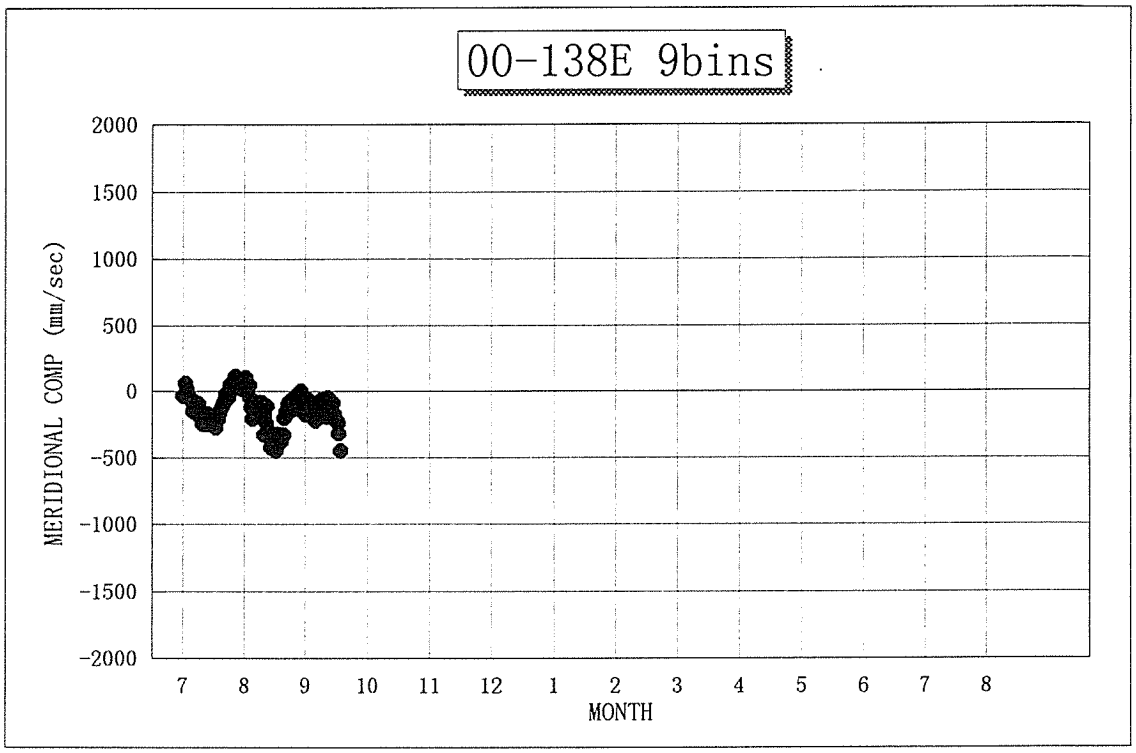


Fig. 7-19 Time Series of Velocity (100m)



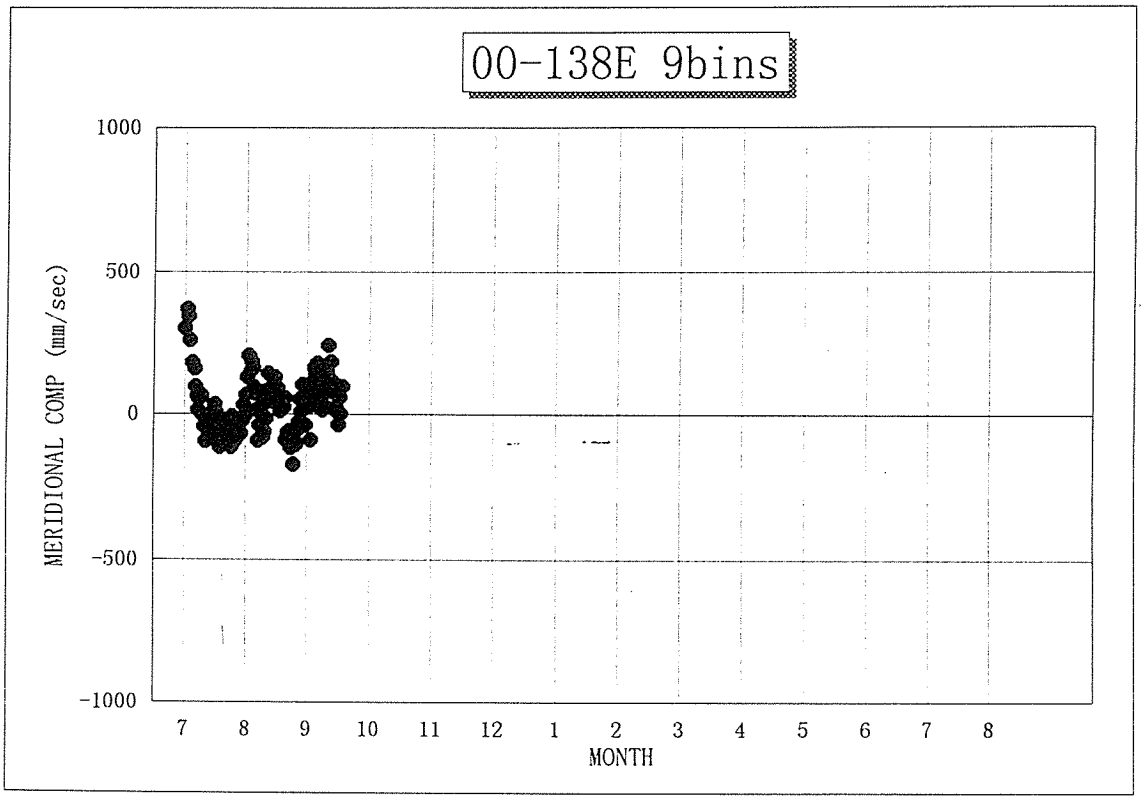


Fig. 7-20 Time Series of Velocity (150m)

Command File of ADCP

WP00016
WD111110000
WN040
WS0800
WF0800
WM4
TP00:02.00
WV480
BP000
BM3
BX1200
TE01:00:00.00
ET1000
ES35
ED3000
EZ1111111
EX11111
CF11101
WW12
TF970807000000

DEPLOYMENT & RECOVERY

MOORING No. 960729-00156E

PROJECT	TOCS	TIME	
AREA	Western Pacific	RECORDER (D)	T. Katayama
POSITION	0°N, 156°E	(R)	R. Kaneko
DEPTH	1957 m		
PERIOD	29 July 1996 ~	NAVIGATION SYSTEM :	WGS 84
No.of DAYS			
LENGTH :	1667 m	DEPTH of BUOY : 269 m	BUOYANCY : kg

ACOUSTIC RELEASER

TYPE	Benthos (Upper)	TYPE	Benthos (Lower)
S/N	716	S/N	666
RECEIVE F.	13.0 kHz	RECEIVE F.	13.0 kHz
TRANSMIT F.	13.5 kHz	TRANSMIT F.	14.5 kHz
ENABLE C.	C	ENABLE C.	F
RELEASE C.	B	RELEASE C.	E
BATTERY	2 years	BATTERY	2 years
TEST on DECK	OK	TEST on DECK	OK

DEPLOYMENT

DATE '96 Jul 28 (U.T) SHIP KAIYO CRUSE No. K96-06

WEATHER C CONDITIONS 8/8 0.6m DIR. of WIND 220° VEL. of WIND 3.5 m

DEPTH 1,700 m DEPTH of A.R. 1,582 m DESCEND. RATE m/s BUOY :

POS. of STRT 00°00.061S 156°03.649E 2216 HOR.RANGE m

POS. of DEP. 00°00.095S 156°05.348E 2302 SINKER 23 :02 DISAPPEAR. 23 :09

POS. of MOORING 00°00.027S 156°05.414E LANDING 23 : 30

NOTE

ワイヤー：端末のシャックル部分が割りピンのみの固定であったため、回収した、ユーワイヤーからボルトナットを持ち上し、流用。

リリーサー：Upper, Lower 共に眠り石を投入、直後、船上局から信号を送りおこす 両方

シンカー投入後の直上水深は 1,958 m

SSBL

TIME	S/R	DEPTH

RECOVERY

DATE '97 Aug 9 SHIP KAIYO CRUSE No. K97-09

WEATHER bc CONDITIONS 7sec 1.6m DIR. of WIND 175° VEL. of WIND 9 m/s

START of RELEASE 2:48 FINISH of RELEASE 2:48 1.8

POS. of DISCOVERY ° ° ASCENDING RATE ~~1.67~~ m/s

DIRECTION ° DISTANCE m

NOTE

SSBL

TIME	S/R	DEPTH
2:52	290° 050m	1300m
2:53	288°	1100m
2:57		700m
3:01		300m
3:05		ガラスブイ 海上

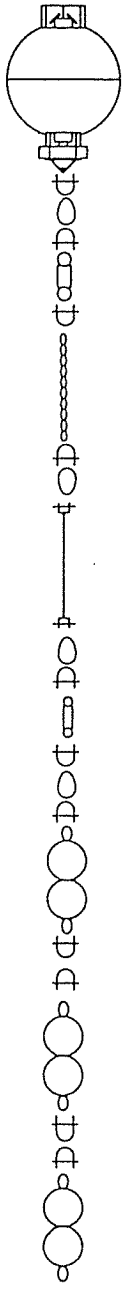
TIME RECORD

MOORING No. 960729-00156E

		DEPLOYMENT		RECOVERY (Date: '97 Aug 9)	
		Start: 22:12 Finish: 23:01		Start: 3:18 Finish: 4:07	
ITEM	S/N etc.	TIME	MEMO	TIME	MEMO
ADCP	1151	22:16	CTD 6 1281	3:26	
WIRE	50m	22:12~22:18		3:29~3:32	
ABS BUOY	2	22:18		3:33	
〃	2	22:18		3:33	
〃	2	22:19		3:33	
WIRE	200m	22:19~22:24		3:35~3:41	
〃	200m	22:24~22:29		3:41~3:45	
KEVLER	716m	22:29~22:41	1994.10.12-716M No.147-A2 (赤)	3:45~3:58	
〃	262m	22:41~22:46	1994-10.12-262M No.147-A1 (赤)	3:58~4:04	
〃	101m	22:46~22:52	New (緑)	4:04~4:06	
GLASS BALL	10	22:52		4:08	
A.R.	716	22:52	13.5 C.B	4:08	
〃	666	22:53	14.5 F.E	4:07	
NYLON ROPE	106m	22:53~23:01			
ANCHOR		23:01			

リリーサー Upper. Lower 共に眠らせたまま投入してしまったので
投入直後. Upper. Lower 共におこす

3:11 ロープをつなぐ



ADCP
S/N 1220

CTD SBE16
S/N 1282

SHACKLE 26mm
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 16mm

CHAIN
13mm x 3.0m

SHACKLE 16mm
RING 19mm

WIRE
10mm x 50m

RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 26mm

ABS BUOY
CT608B

NYLON 2.2m

SHACKLE 26mm

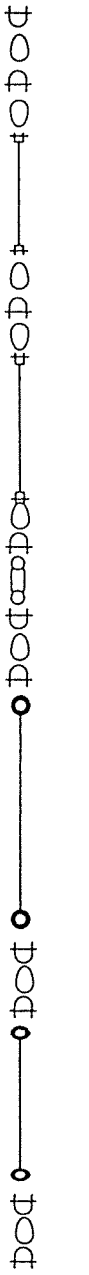
SHACKLE 26mm

ABS BUOY
CT608B

NYLON 2.2m
SHACKLE 26mm
SHACKLE 26mm

ABS BUOY
CT608B

NYLON 2.2m



SHACKLE 26mm
RING 19mm
SHACKLE 18mm
RING 19mm

WIRE
11mm x 200m

RING 19mm
SHACKLE 18mm
RING 19mm

WIRE
11mm x 200m

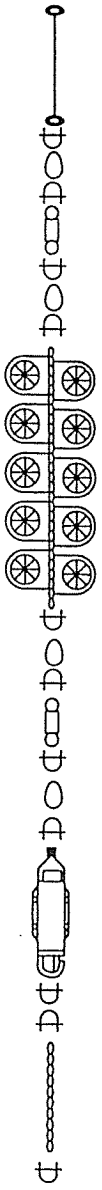
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm

KEVLER(USED)
12mm x 716m

SHACKLE 16mm
RING 19mm
SHACKLE 16mm

KEVLER(USED)
12mm x 262m

SHACKLE 16mm
RING 19mm
SHACKLE 16mm



KEVLER(NEW)
12mm x 101m

SHACKLE 16mm
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm

BENTHOS
GLASS BALL
2040-17V x 10ps.

CHAIN
13mm x 8m

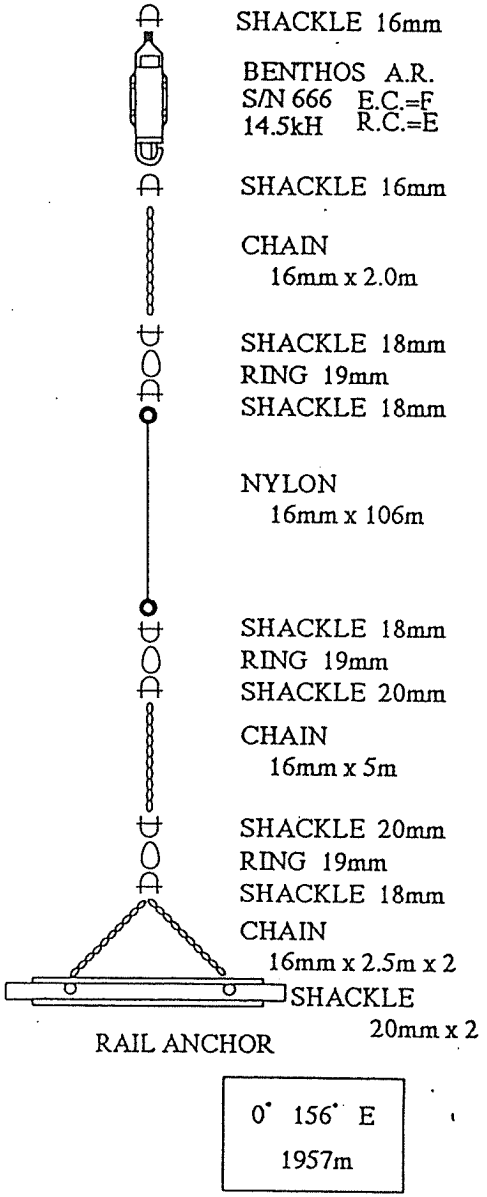
SHACKLE 16mm
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm

BENTHOS A.R.
S/N 716 E.C.=C
13.5kH R.C.=B

SHACKLE 16mm
SHACKLE 16mm

CHAIN
16mm x 5m

SHACKLE 16mm



SHACKLE 16mm

BENTHOS A.R.
S/N 666 E.C.=F
14.5kH R.C.=E

SHACKLE 16mm

CHAIN
16mm x 2.0m

SHACKLE 18mm
RING 19mm
SHACKLE 18mm

NYLON
16mm x 106m

SHACKLE 18mm
RING 19mm
SHACKLE 20mm

CHAIN
16mm x 5m

SHACKLE 20mm
RING 19mm
SHACKLE 18mm

CHAIN
16mm x 2.5m x 2

SHACKLE
20mm x 2

RAIL ANCHOR

0° 156° E
1957m

DEPLOYMENT & RECOVERY

MOORING No. 970809-00156E

PROJECT	TOCS	TIME	
AREA	Western Pacific	RECORDER (D)	R. Kaneko
POSITION	0°N, 156° E	(R)	
DEPTH	1957m		
PERIOD	9 August 1997~	NAVIGATION SYSTEM :	WGS 84
No.of DAYS			
LENGTH :	m	DEPTH of BUOY : m	BUOYANCY : kg

ACOUSTIC RELEASER

TYPE	Benthos (Upper)		TYPE	Benthos (Lower)	
S/N	667		S/N	664	
RECEIVE F.	13.0	kHz	RECEIVE F.	13.0	kHz
TRANSMIT F.	14.5	kHz	TRANSMIT F.	14.0	kHz
ENABLE C.	G		ENABLE C.	D	
RELEASE C.	F		RELEASE C.	C	
BATTERY	2 year		BATTERY	2 year	
TEST on DECK	OK		TEST on DECK	OK	

DEPLOYMENT

DATE	'97 Aug 9		SHIP	KAIYO	CRUSE No. K97-09
WEATHER	BC	CONDITIONS 7.2S, 1.4m	DIR. of WIND	175°	VEL. of WIND 10 m/S
DEPTH	1956 m	DEPTH of A.R. 1812 m	DESCEND. RATE	~~2.17~~ 2.7 m/s	BUOY 4:55
POS. of STRT	00°00.023N 156°00.878E		HOR.RANGE		m
POS. of DEP.	00°00.026N 156°00.051E		SINKER	5:39	DISAPPEAR. 5:50
POS. of MOORING	00°00.031N 156°00.036E				LANDING 5:52

NOTE

シンカー投入後の直上水深は 1956m
着底 5:52 (GMT)
ガラス玉 新しくした(チェーン, シャックル)

	TIME	S / R	DEPTH
SSBL	05:40		163
	05:41		451
	05:44		995
	05:48		1489
	05:51		1808

RECOVERY

DATE		SHIP	CRUSE No.
WEATHER	CONDITIONS	DIR. of WIND	VEL. of WIND
START of RELEASE	:	FINISH of RELEASE	:
POS. of DISCOVERY	°	°	ASCENDING RATE m/s
DIRECTION	°	DISTANCE	m

NOTE

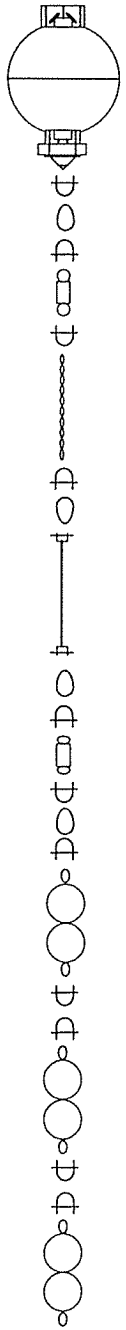
	TIME	S / R	DEPTH
SSBL			

TIME RECORD

MOORING NO. 970809-00156E

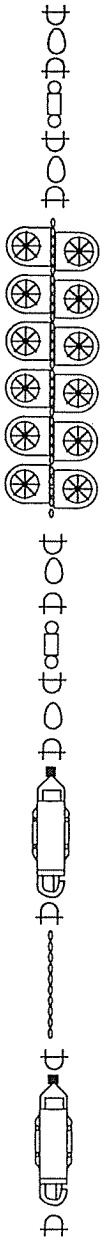
		DEPLOYMENT		RECOVERY (Date:)	
		START : 4:48 FINISH : 5:39		START : FINISH :	
ITEM	S/N etc.	TIME	MEMO	TIME	MEMO
ADCP	ADCP 1223 CTD 1278	4:55			
WIRE	50m	4:55			
ABS BUOY	2	4:57			
〃	2	4:57			
〃	2	4:57			
WIRE	200m	4:57 ~ 5:02			
KEVLER	988m	5:05 ~ 5:17	K10-06		
〃	202m	5:18 ~ 5:21	K2-05		
〃	101m	5:22 ~ 5:24	K1-01		
GLASS BALL	12	5:31			
A.R.	667	5:31	14.5 kHz G F		
A.R.	664	5:31	14.0 kHz D C		
NYLON	93m	5:31 ~ 5:34			
ANCHOR	1.7t	5:39	1.7t		
着底 5:52					

00-156 (moored) '97

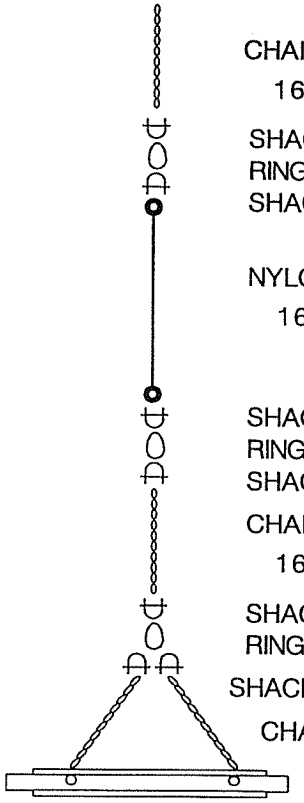


ADCP
S/N 1223
CTD SBE16
S/N 1278
SHACKLE 22mm
RING 19mm
SHACKLE 22mm
SWIVEL AB103
SHACKLE 18mm
CHAIN
13m x 3.0m
SHACKLE 16mm
RING 19mm
WIRE
10mm x 50m
RING 19mm
SHACKLE 18mm
SWIVEL AB102
SHACKLE 18mm
RING 19mm
SHACKLE 26mm
ABS BUOY
CT608B
NYLON 2.2m
SHACKLE 26mm
SHACKLE 26mm
ABS BUOY
CT608B
NYLON 2.2m
SHACKLE 26mm
SHACKLE 26mm
ABS BUOY
CT608B
NYLON 2.2m

SHACKLE 26mm
RING 19mm
SHACKLE 18mm
RING 19mm
WIRE
10mm x 200m
RING 19mm
SHACKLE 18mm
SWIVEL AB102
SHACKLE 18mm
RING 19mm
SHACKLE 16mm
KEVLER(K10-06)
12mm x 988m
SHACKLE 16mm
RING 19mm
SHACKLE 16mm
KEVLER(K2-05)
12mm x 202m
SHACKLE 16mm
RING 19mm
SHACKLE 16mm
KEVLER(K1-01)
12mm x 101m



SHACKLE 16mm
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm
BENTHOS
GLASS BALL
2040-17V x 12ps.
CHAIN
13mm x 8m
SHACKLE 16mm
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm
BENTHOS A.R.
S/N 667 E.C.=G
14.5kH R.C.=F
SHACKLE 16mm
CHAIN
16mm x 5m
SHACKLE 16mm
BENTHOS A.R.
S/N 664 E.C.=D
14.0kH R.C.=C
SHACKLE 16mm



CHAIN
16mm x 2.0m
SHACKLE 18mm
RING 19mm
SHACKLE 18mm
NYLON
16mm x 93m
SHACKLE 18mm
RING 19mm
SHACKLE 20mm
CHAIN
16mm x 5m
SHACKLE 18mm
RING 19mm
SHACKLE 16mmx 2
CHAIN 16mm
x 2.5m x 2
SHACKLE 20mm x 2
RAIL ANCHOR

0° 156° E
1956m

DEPLOYMENT & RECOVERY

MOORING No. 960713 - 2.5S 142E

PROJECT	TOCS	TIME	
AREA		RECORDER (D)	M. FUJISAKI
POSITION	02°-30 S 142° E	(R)	R. KANEKO
DEPTH	3438		
PERIOD	13 July 1996 ~	NAVIGATION SYSTEM :	
No.of DAYS			
LENGTH :	m	DEPTH of BUOY : m	BUOYANCY : kg

ACOUSTIC RELEASER

TYPE	BENTHOS A.R. UPPER	TYPE	BENTHOS A.R. Bottom
S/N	712	S/N	633
RECEIVE F.	13.0 kHz	RECEIVE F.	12.0 kHz
TRANSMIT F.	13.5 kHz	TRANSMIT F.	14.0 kHz
ENABLE C.	B	ENABLE C.	E
RELEASE C.	A	RELEASE C.	D
BATTERY	2 YEARS	BATTERY	2 YEARS
TEST on DECK	OK	TEST on DECK	OK

DEPLOYMENT

DATE 13 July 1996 SHIP KAIYO CRUSE No. K96-06

WEATHER bc CONDITIONS WAVE 0.4m 8.0sec DIR. of WIND 095 VEL. of WIND 5.0m

DEPTH 3336 m DEPTH of A.R. 3021 m DESCEND. RATE 2.4 m/s BUOY :

POS. of STRT 02° 27.644S 141° 55.762E HOR.RANGE m

POS. of DEP. 02° 28.235S 141° 57.303E SINKER 01 : 42 DISAPPEAR. 01 : 55

POS. of MOORING 02° 28.114S 141° 57.242E LANDING 02 : 05

NOTE

ABSブイ
6個 → 7個

GLASS BALL
10個 → 12個 (138Eで回収分 + New 2個)

ケイロン
180m → 100m

	TIME	S/R	DEPTH
S	01:43		52.3
S	01:50		1831.8
B	01:55		2063.3
L	02:00		2800.3
	02:05		3103.2

RECOVERY

DATE 20 Aug 1997 SHIP KAIYO CRUSE No. K97-09

WEATHER C CONDITIONS 7sec 0.5m DIR. of WIND 090 VEL. of WIND 5.1 m/s

START of RELEASE 21 : 31 FINISH of RELEASE 21 : 36

POS. of DISCOVERY ASCENDING RATE 1.2 m/s

DIRECTION DISTANCE m

NOTE

21:40 ADCPブイ浮上

回収時計測 3317m at 係留点

ケブラーのよりがすごくて巻きとりが大変だった。

ADCPフロートのCTD取り付け台がちょっと溶けてた。

	TIME	S/R	DEPTH
S	21:36		3159
S	21:41		2590
B	21:47		2011
L	21:57		1006
	22:05		471
	22:29		70

ガラスブイ浮上

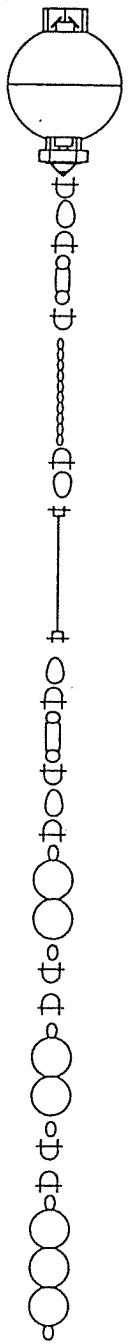
TIME RECORD

MOORING NO. 960713-2.5S142E

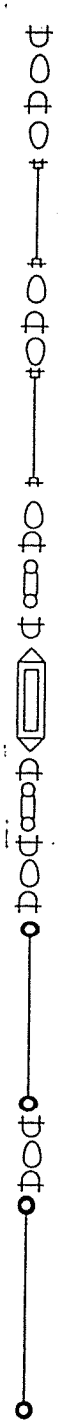
	~~DEPLOYMENT~~	~~RECOVERY~~ (Date: 20 Aug 97)
	START : 00:40 FINISH : 01:43	START : 22:18 FINISH : 23:33

ITEM	S/N etc.	TIME	MEMO	TIME	MEMO
ADCP & CTD	ADCP 1152 CTD 1284	00:43		22:27	
WIRE	50m	00:40~00:41	ワイヤーから入れはじめた.	22:27~22:30	
ABS BUOY	2	00:47		22:34	
〃	2	00:47		22:34	
〃	3	00:48	2連から3連に変更	22:34	
WIRE	200m	00:48~00:52		22:35~22:39	
〃	200m	00:54~00:58		22:40~22:43	
SACM		01:03		22:43	
KEVLER	984m	01:04~01:10	USED 9410 147-C	22:45~23:03	
〃	984m	01:12~01:20	USED 9410 142-B	23:03~23:22	
	500m	01:22~01:26	NEW 9506	23:22~23:32	
GLASS BALL	12	01:33	0°138°E 回収分プラス 2個(NEW)	23:33~23:34	
A.R.	712	01:33		23:34	
A.R.	633	01:34		23:33	
NYLON	100m	01:34~01:36			
ANCHOR		01:43			

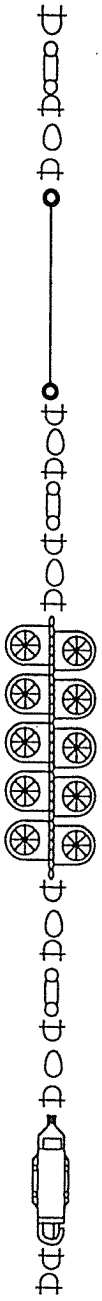
ナイロン
180m(予定) → 100m
ABS ブイ
6個(予定) → 7個
ガラス玉、
10個(予定) → 12個



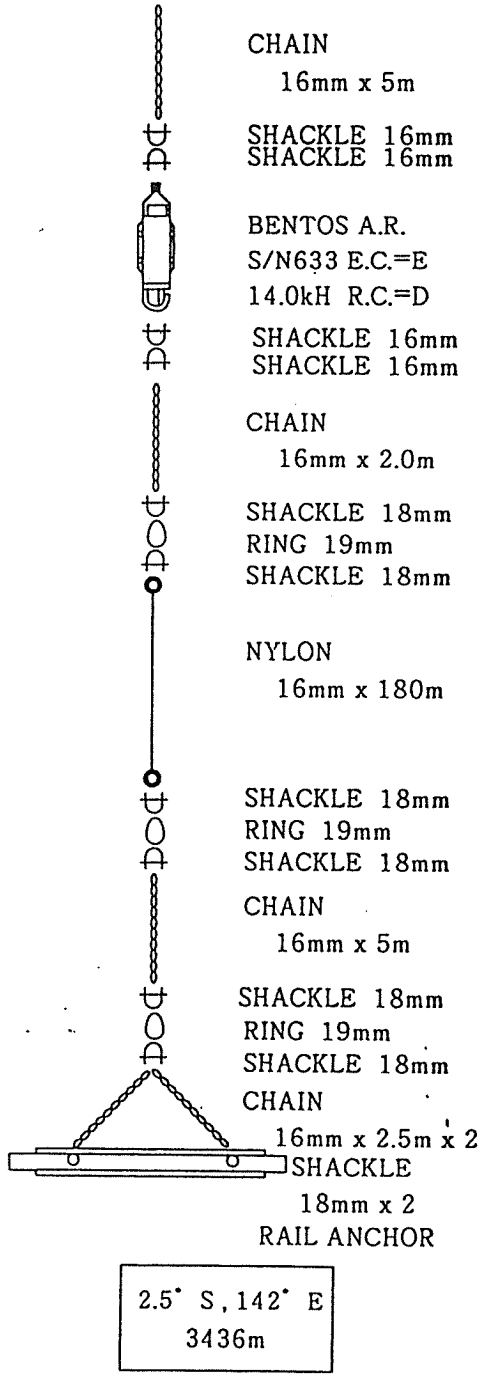
ADCP
S/N1152
CTD SBE16
S/N 1284
SHACKLE 18mm
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 16mm
CHAIN
13mm x 3.0m
SHACKLE 16mm
RING 19mm
WIRE
11mm x 50m
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 26mm
ABS BUOY
CT608B
NYLON 2.2m
SHACKLE 26mm
SHACKLE 26mm
ABS BUOY
CT608B
NYLON 2.2m
SHACKLE 26mm
SHACKLE 26mm
ABS BUOY
CT608B
NYLON 3.3m



SHACKLE 26mm
RING 19mm
SHACKLE 18mm
RING 19mm
WIRE
11mm x 200m
RING 19mm
SHACKLE 18mm
RING 19mm
WIRE
11mm x 200m
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
SACM
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm
KEVLER(USED)
12mm x 984m
SHACKLE 16mm
RING 19mm
SHACKLE 16mm
KEVLER(USED)
12mm x 984m



SHACKLE 16mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm
KEVLER(NEW)
12mm x 505m
SHACKLE 16mm
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm
BENTHOS
GLASS BALL
2040-17V x 12ps.
CHAIN
13mm x 8m
SHACKLE 16mm
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm
BENTOS A.R.
S/N712E.C.=B
13.5kHz R.C.=A
SHACKLE 16mm



CHAIN
16mm x 5m
SHACKLE 16mm
SHACKLE 16mm
BENTOS A.R.
S/N633 E.C.=E
14.0kH R.C.=D
SHACKLE 16mm
SHACKLE 16mm
CHAIN
16mm x 2.0m
SHACKLE 18mm
RING 19mm
SHACKLE 18mm
NYLON
16mm x 180m
SHACKLE 18mm
RING 19mm
SHACKLE 18mm
CHAIN
16mm x 5m
SHACKLE 18mm
RING 19mm
SHACKLE 18mm
CHAIN
16mm x 2.5m x 2
SHACKLE
18mm x 2
RAIL ANCHOR

2.5° S, 142° E
3436m

DEPLOYMENT & RECOVERY

MOORING No. 970821-2S142E

PROJECT	TOCS	TIME	
AREA		RECORDER (D)	
POSITION	02°-30.S 142°E	(R)	
DEPTH			
PERIOD	20 Aug 1997~	NAVIGATION SYSTEM :	
No.of DAYS			
LENGTH :	m	DEPTH of BUOY : m	BUOYANCY : kg

ACOUSTIC RELEASER

TYPE	BENTHOS A.R(UPPER)		TYPE	BENTHOS A.R. (Lower)	
S/N	691		S/N	630	
RECEIVE F.	13.0	kHz	RECEIVE F.	13.0	kHz
TRANSMIT F.	14.0	kHz	TRANSMIT F.	13.5	kHz
ENABLE C.	D		ENABLE C.	B	
RELEASE C.	C		RELEASE C.	A	
BATTERY	2 Years		BATTERY	2 Years	
TEST on DECK	OK		TEST on DECK	OK	

DEPLOYMENT

DATE	21 Aug 1997	SHIP	KAIYO	CRUSE No.	K97-09
WEATHER	C	CONDITIONS	6sec/0.8m	DIR. of WIND	130
VEL. of WIND	6.0 m/sec				
DEPTH	3441 m	DEPTH of A.R.	3240 m	DESCEND. RATE	2.7 m/s
BUOY	0:30				
POS. of STRT	02°28.038S	141°56.043E	HOR.RANGE	m	
POS. of DEP.	02°28.059S	141°58.678E	SINKER	1:49	DISAPPEAR. :
POS. of MOORING	02°27.953S	141°58.633E			LANDING 2:10

NOTE

3440m 141°58.56E 2°28.1S らへんをねらう

CTDの取り付け台がアルミの為、ステンレスと接触しない様にナイロンのワッシャーを入れた。
(2S142Eと0138Eも)

	TIME	S / R	DEPTH
SSBL	11:50		33.3
	11:53		589.9
	11:56		1129.2
	12:01		2015.6
	12:08		3028.3

RECOVERY

DATE		SHIP	CRUSE No.
WEATHER	CONDITIONS	DIR. of WIND	VEL. of WIND
START of RELEASE	:	FINISH of RELEASE	:
POS. of DISCOVERY	°	°	ASCENDING RATE m/s
DIRECTION	°	DISTANCE m	

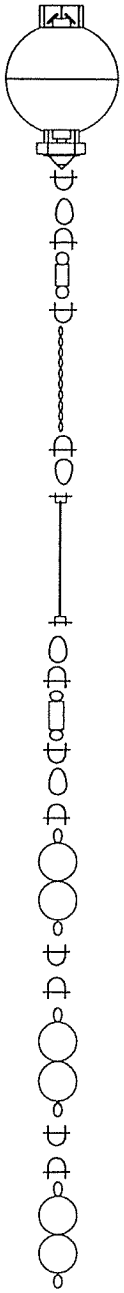
NOTE

	TIME	S / R	DEPTH
SSBL			

TIME RECORD

MOORING NO. 970821 - 25S 142E

		DEPLOYMENT		RECOVERY (Date:)	
		START : 0:25 FINISH : 1:49		START : FINISH :	
ITEM	S/N etc.	TIME	MEMO	TIME	MEMO
ADCP	ADCP 1225 CTD 1280	0:30			
WiRE	50m	0:27~0:29			
ABS BUOY	2	0:32			
〃	2	0:33			
〃	2	0:33			
WiRE	150m	0:33~0:36	内側につなげる ヤリなおし		
〃	100m	0:38(44)~0:46			
KEVLER	988m	0:50~1:02	K10-04		
〃	988m	1:04~1:14	K10-05		
〃	488m	1:16~1:20	K5-01		
〃	202m	1:22~1:25	K2-08		
GLASS BALL	12	1:42			
A.R.	691	1:42	14.0 kHz DC		
A.R.	630	1:43	13.5 kHz BA		
NYLON	138m	1:43~1:45			
ANCHOR	1.7t	1:49			



ADCP
S/N1225
CTD SBE16
S/N 1280
SHACKLE 22mm
RING 19mm
SHACKLE 22mm
SWIVEL AB103
SHACKLE 18mm

CHAIN
13mm x 3.0m
SHACKLE 16mm
RING 19mm

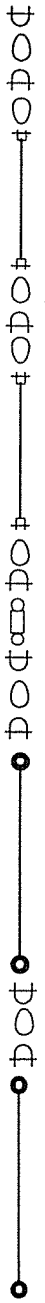
WIRE
10mm x 50m

RING 19mm
SHACKLE 18mm
SWIVEL AB103
SHACKLE 18mm
RING 19mm
SHACKLE 26mm

ABS BUOY
CT608B
NYLON 2.2m
SHACKLE 26mm
SHACKLE 26mm

ABS BUOY
CT608B
NYLON 2.2m
SHACKLE 26mm
SHACKLE 26mm

ABS BUOY
CT608B
NYLON 2.2m



SHACKLE 26mm
RING 19mm
SHACKLE 18mm
RING 19mm

WIRE
10mm x 150m

RING 19mm
SHACKLE 18mm
RING 19mm

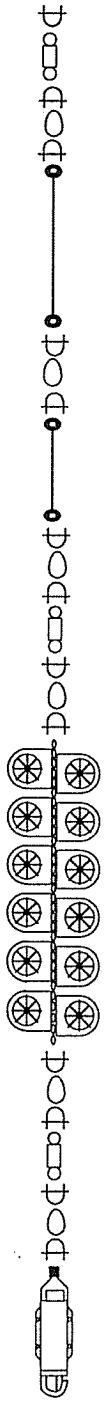
WIRE
10mm x 100m

RING 19mm
SHACKLE 18mm
SWIVEL AB102
SHACKLE 18mm
RING 19mm
SHACKLE 16mm

KEVLER(K10-04)
12mm x 988m

SHACKLE 16mm
RING 19mm
SHACKLE 16mm

KEVLER(K10-05)
12mm x 988m



SHACKLE 16mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm

KEVLER(K5-01)
12mm x 488m

SHACKLE 16mm
RING 19mm
SHACKLE 16mm

KEVLER (K2-08)
12mm x 202m

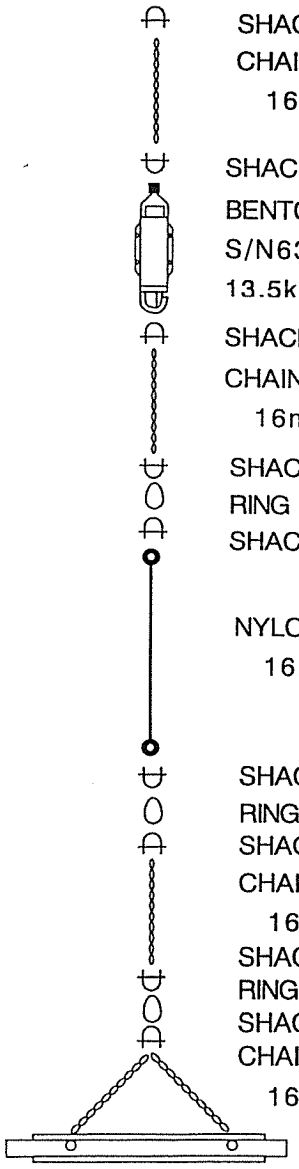
SHACKLE 16mm
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm

BENTHOS
GLASS BALL
2040-17V x 12ps.

CHAIN
13mm x 8m

SHACKLE 16mm
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm

BENTOS A.R.
S/N691 E.C.=D
14.0kH R.C.=C



SHACKLE 16mm
CHAIN
16mm x 5m

SHACKLE 16mm
BENTOS A.R.
S/N630 E.C.=B
13.5kH R.C.=A

SHACKLE 16mm
CHAIN
16mm x 2.0m

SHACKLE 18mm
RING 19mm
SHACKLE 18mm

NYLON
16mm x 138m

SHACKLE 18mm
RING 19mm
SHACKLE 18mm
CHAIN
16mm x 5m
SHACKLE 18mm
RING 19mm
SHACKLE 20mm
CHAIN
16mm x 2.5m x 2
SHACKLE
18mm x 2
RAIL ANCHOR

2.5° S, 142° E
3441m

DEPLOYMENT & RECOVERY

MOORING No. 960713-2S 142E

PROJECT	TOCS	TIME	
AREA		RECORDER (D)	Fujisaki
POSITION	2S 142E	(R)	Kaneko
DEPTH	3609		
PERIOD	13 July '96 ～	NAVIGATION SYSTEM :	
No.of DAYS			
LENGTH :	m	DEPTH of BUOY : m	BUOYANCY : kg

ACOUSTIC RELEASER

TYPE	BENTHOS A.R. (UPPER)	TYPE	BENTHOS A.R (BOTTOM)
S/N	717	S/N	635
RECEIVE F.	13.0 kHz	RECEIVE F.	13.0 kHz
TRANSMIT F.	14.0 kHz	TRANSMIT F.	14.5 kHz
ENABLE C.	D	ENABLE C.	G
RELEASE C.	C	RELEASE C.	F
BATTERY	2 Years.	BATTERY	2 Years
TEST on DECK	OK	TEST on DECK	OK

DEPLOYMENT

DATE 13 July 1996 SHIP KAIYO CRUSE No. K9606

WEATHER bc CONDITIONS 0.4m 8s DIR. of WIND 080° VEL. of WIND 5 m/s

DEPTH 3606 m DEPTH of A.R. m DESCEND. RATE 2.5 m/s BUOY :

POS. of STRT 01° 59.845S 141° 57.985E HOR.RANGE m

POS. of DEP. 02° 00.045S 141° 59.780E SINKER 22:05 DISAPPEAR. 22:19

POS. of MOORING 01° 59.908S 141° 59.704E LANDING 22:30

NOTE

21:00 ADCP作動確認後、作業開始.

ABS ブイ 61個 → 71個

GLASS BALL 10個 → 121個

ナイロンロープ 105m → 100m

	TIME	S/R	DEPTH
SSBL	22:05		50.4
	22:12		1156.9
	22:18		2169.3
	22:22		2802.3
	22:27		3388.3
	22:30		3398.1

RECOVERY

DATE 21 Aug 1997 SHIP KAIYO CRUSE No. K9709

WEATHER bc CONDITIONS 0.8m 9s DIR. of WIND 110° VEL. of WIND 6 m/s

START of RELEASE 5:29 FINISH of RELEASE 5:34

POS. of DISCOVERY ° ° ASCENDING RATE 1.9 m/s

DIRECTION ° DISTANCE m

NOTE

5:36 ADCP確認.

ABSブイがからまってあがってきた。

CTD取り付け台のナットが溶けてた。

(304) ボルト (316) だった。

	TIME	S/R.	DEPTH
SSBL	05:35		3552.4
	05:39		3008
	05:47		2048
	05:56		1067
	06:02		467
	06:06		225

TIME RECORD

MOORING No. 960713 - 2S142E

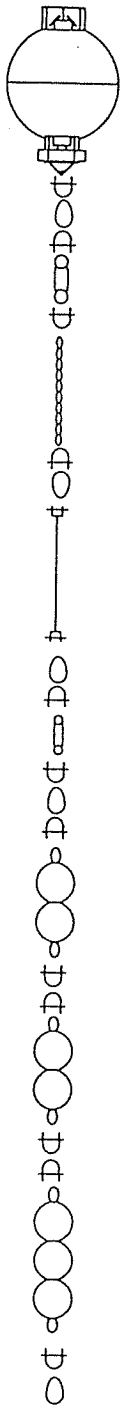
		DEPLOYMENT		RECOVERY (DATE : 21 Aug 97)	
		START : 21:01 FINISH : 22:05		START : 5:53 FINISH :	
ITEM	S/N etc.	TIME	MEMO	TIME	MEMO
ADCP & CTD	ADCP 1153 CTD 1285	21:05		06:10	
WIRE	50m	~~21:01~~ 21:01 ~ 21:02		06:12 ~ 06:22	
ABS BUOY	2	21:06		06:22	からまってた
〃	2	21:07		06:22	
〃	3	21:07		06:22	
WIRE	200m	21:08 ~ 21:12		06:24 ~ 6:29	
〃	〃	21:14 ~ 21:18		06:30 ~ 06:35	
KEVLER	1010m	21:20 ~ 21:27	NEW 9410	06:35 ~ 06:54	よりがバラバラできもいがたいへん
〃	〃	21:29 ~ 21:37	NEW	06:54 ~ 07:13	
〃	505m	21:38 ~ 21:42	NEW 9506	07:13 ~ 07:23	
〃	202m	21:45 ~ 21:47	NEW	07:23 ~ 07:28	
GLASS BALL	12	21:54	2S5 142E 回収分 プラス ニ NEW 2コ	07:29 ~ 07:30	
A.R.	717	21:54		07:30	
〃	635	21:55		07:29	
NYLON	100m	21:55 ~ 21:56			
ANCHOR		22:05			

21:00 ADCP作動確認後 設置作業開始

ABSブイ 6個 を 7個に.

GLASS BALL 10個 を 12個に.

Fujisaki



ADCP
S/N 1153
CTD SBE16
S/N 1285
SHACKLE 26mm
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 16mm

CHAIN
13mm x 3.0m
SHACKLE 16mm
RING 19mm

WIRE
11mm x 50m

RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 26mm
ABS BUOY
CT608B
NYLON 2.2m
SHACKLE 26mm
SHACKLE 26mm
ABS BUOY
CT608B
NYLON 2.2m
SHACKLE 26mm
SHACKLE 26mm
ABS BUOY
CT608B
NYLON 3.3m

SHACKLE 26mm
RING 19mm

SHACKLE 18mm
RING 19mm
WIRE
11mm x 200m

RING 19mm
SHACKLE 18mm
RING 19mm
WIRE
11mm x 200m

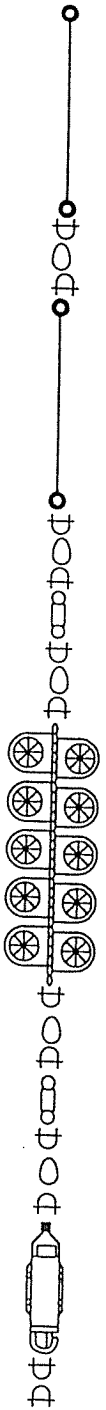
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm

KEVLER(NEW)
12mm x 1010m

SHACKLE 16mm
RING 19mm
SHACKLE 16mm

KEVLER(NEW)
12mm x 1010m

SHACKLE 16mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm



KEVLER(NEW)
12mm x 505m

SHACKLE 16mm
RING 19mm
SHACKLE 16mm

KEVLER(NEW)
12mm x 202m

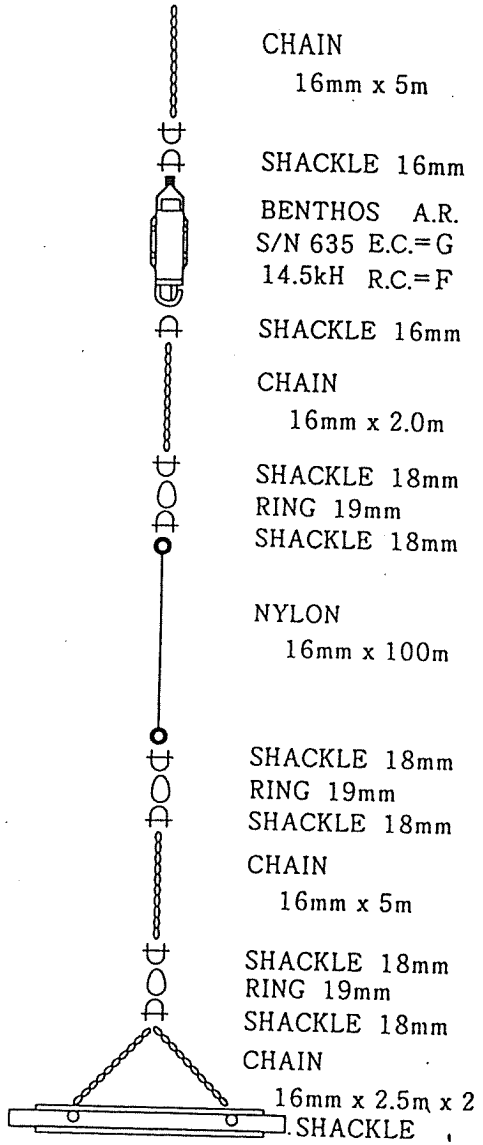
SHACKLE 16mm
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm

BENTHOS
GLASS BALL
2040-17V x 12ps.
CHAIN
13mm x 8m

SHACKLE 16mm
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm

BENTHOS A.R.
S/N 717 E.C.=D
14.0kH R.C.=C

SHACKLE 16mm
SHACKLE 16mm



CHAIN
16mm x 5m

SHACKLE 16mm

BENTHOS A.R.
S/N 635 E.C.=G
14.5kH R.C.=F

SHACKLE 16mm

CHAIN
16mm x 2.0m

SHACKLE 18mm
RING 19mm
SHACKLE 18mm

NYLON
16mm x 100m

SHACKLE 18mm
RING 19mm
SHACKLE 18mm

CHAIN
16mm x 5m

SHACKLE 18mm
RING 19mm
SHACKLE 18mm

CHAIN
16mm x 2.5m x 2
SHACKLE
18mm x 2
RAIL ANCHOR

2° S 142° E
3609m

DEPLOYMENT & RECOVERY

MOORING No. 970821-2S142E

PROJECT	TOCS	TIME	
AREA	Western Pacific	RECORDER (D)	Kaneko
POSITION	2°S 142°E	(R)	
DEPTH			
PERIOD	21 Aug 1997~	NAVIGATION SYSTEM :	WGS 84
No.of DAYS			
LENGTH :	m	DEPTH of BUOY : m	BUOYANCY : kg

ACOUSTIC RELEASER

TYPE	BENTHOS A.R.(UPPER)	TYPE	BENTHOS A.R.(Lower)
S/N	693	S/N	632
RECEIVE F.	13.0 kHz	RECEIVE F.	13.0 kHz
TRANSMIT F.	14.5 kHz	TRANSMIT F.	14.0 kHz
ENABLE C.	F	ENABLE C.	D
RELEASE C.	E	RELEASE C.	C
BATTERY	2years	BATTERY	2 years
TEST on DECK	OK	TEST on DECK	OK

DEPLOYMENT

DATE 21 Aug '97 SHIP KAIYO CRUSE No. K9709

WEATHER bc CONDITIONS 3sec/0.5m DIR. of WIND 079 VEL. of WIND 8.7 m/s

DEPTH 3607 m DEPTH of A.R. 3440 m DESCEND. RATE 2.8 m/s BUOY 21 : 22

POS. of STRT 01°59.970S 141°58.291E HOR.RANGE m

POS. of DEP. 01°59.995S 142°00.113E SINKER 22:22 DISAPPEAR. :

POS. of MOORING 02°00.023S 142°00.013E LANDING 22:44

NOTE
- ガラスブイのチェーンとシャックルを新しくした。
- CTD取り付け台(アルミ)とボルト(ステンレス)とが接触しない様にナイロンのワッシャーを入れた。

	TIME	S / R	DEPTH
S	22:23		109.4
S	22:28		1052.7
B	22:34		2069.6
L	22:42		3100
	22:44		3400

RECOVERY

DATE		SHIP	CRUSE No.
WEATHER	CONDITIONS	DIR. of WIND	VEL. of WIND
START of RELEASE	:	FINISH of RELEASE	:
POS. of DISCOVERY	°	°	ASCENDING RATE m/s
DIRECTION	°	DISTANCE m	

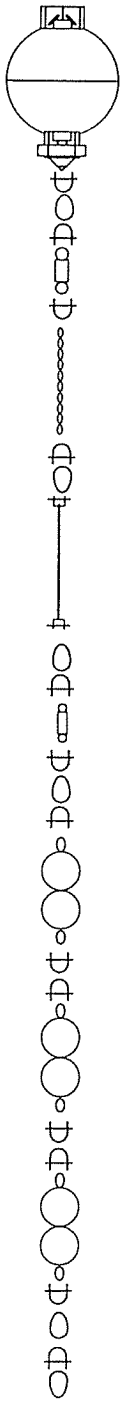
NOTE

	TIME	S / R	DEPTH
S			
S			
B			
L			

TIME RECORD

MOORING NO. 970821-2S142E

		DEPLOYMENT		RECOVERY (Date:)	
		START : 21:19 FINISH : 22:22		START : FINISH :	
ITEM	S/N etc.	TIME	MEMO	TIME	MEMO
ADCP & CTD	ADCP 1220 CTD 1282	21:22			
WIRE	50m	21:19 ~ 21:20			
ABS BUOY	2	21:24			
〃	2	21:25			
〃	2	21:25			
WIRE	150m	21:25 ~ 21:28			
〃	100m	21:29 ~ 21:31			
KEVLER	1010m	21:34 ~ 21:46	K10-08		
〃	987m	21:48 ~ 21:56	K10-07		
〃	488m	21:59 ~ 22:03	K5-02		
〃	202m	22:06 ~ 22:07	K2-06		
〃	202m	22:09 ~ 22:11	K2-07		
GLASS BALL	12	22:16			
A.R.	693	22:16			
〃	632	22:16			
NYLON	95m	22:16 ~ 22:18			
ANCHOR		22:22	-		



ADCP
S/N 1220

CTD SBE16
S/N 1282

SHACKLE 22mm
RING 19mm
SHACKLE 22mm
SWIVEL AB103
SHACKLE 18mm

CHAIN
13mm x 3.0m

SHACKLE 16mm
RING 19mm

WIRE
10mm x 50m

RING 19mm
SHACKLE 18mm
SWIVEL AB103
SHACKLE 18mm
RING 19mm
SHACKLE 26mm

ABS BUOY
CT608B

NYLON 2.2m
SHACKLE 26mm
SHACKLE 26mm

ABS BUOY
CT608B

NYLON 2.2m
SHACKLE 26mm
SHACKLE 26mm

ABS BUOY
CT608B

NYLON 2.2m
SHACKLE 26mm
RING 19mm
SHACKLE 18mm
RING 19mm

WIRE
10mm x 150m

RING 19mm
SHACKLE 18mm
RING 19mm

WIRE
10mm x 100m

RING 19mm
SHACKLE 16mm

KEVLER(K10-08)
12mm x 1010m

SHACKLE 16mm
RING 19mm
SHACKLE 16mm

KEVLER(K10-07)
12mm x 987m

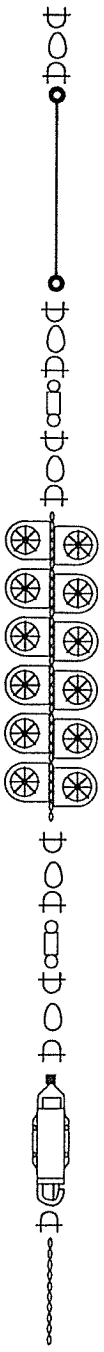
SHACKLE 16mm
RING 19mm
SHACKLE 16mm

SWIVEL AB102
SHACKLE 18mm
RING 19mm
SHACKLE 16mm

KEVLER(K5-02)
12mm x 488m

SHACKLE 16mm
RING 19mm
SHACKLE 16mm

KEVLER(K2-06)
12mm x 202m



SHACKLE 16mm
RING 19mm
SHACKLE 16mm

KEVLER(K2-07)
12mm x 202m

SHACKLE 16mm
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm

BENTHOS
GLASS BALL
2040-17V x 12ps.

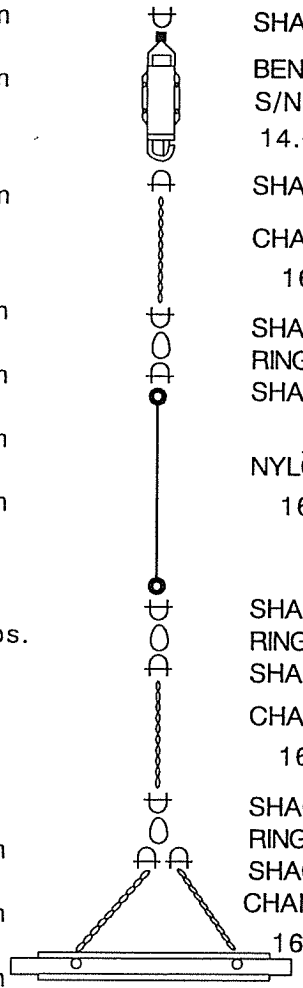
CHAIN
13mm x 8m

SHACKLE 16mm
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm

BENTHOS A.R.
S/N 693 E.C.=F
14.5kH R.C.=E

SHACKLE 16mm

CHAIN
16mm x 5m



SHACKLE 16mm

BENTHOS A.R.
S/N 632 E.C.=D
14.0kH R.C.=C

SHACKLE 16mm

CHAIN
16mm x 2.0m

SHACKLE 18mm
RING 19mm
SHACKLE 18mm

NYLON
16mm x 95m

SHACKLE 18mm
RING 19mm
SHACKLE 18mm

CHAIN
16mm x 5m

SHACKLE 18mm
RING 19mm
SHACKLE 16mmx 2

CHAIN
16mm x 2.5m x 2

SHACKLE 18mm x 2

RAIL ANCHOR

2° S142° E
3607m

DEPLOYMENT & RECOVERY

MOORING No. 960711-00138E

PROJECT	TOCS	TIME	
AREA		RECORDER (D)	M. Fujisaki
POSITION	0° 138°E	(R)	
DEPTH	≒ 910		
PERIOD	11 July 1996 ~	NAVIGATION SYSTEM :	
No.of DAYS			
LENGTH :	m DEPTH of BUOY :	m BUOYANCY :	kg

ACOUSTIC RELEASER

TYPE	BENTHOS (upper)	TYPE	BENTHOS (bottom)
S/N	719	S/N	631
RECEIVE F.	13.0 kHz	RECEIVE F.	13.0 kHz
TRANSMIT F.	14.0 kHz	TRANSMIT F.	13.5 kHz
ENABLE C.	E	ENABLE C.	C
RELEASE C.	D	RELEASE C.	B
BATTERY	2 Years	BATTERY	2 Years
TEST on DECK	ok	TEST on DECK	ok

DEPLOYMENT

DATE 11 July 1996 SHIP KAIYO CRUSE No. K9606

WEATHER Cloud CONDITIONS wave 0.2m 7kt/s DIR. of WIND 042 VEL. of WIND 5.2 m/s

DEPTH 3904 m DEPTH of A.R. 3729 m DESCEND. RATE 2.2 m/s BUOY 00:16

POS. of STRT 0° 01.422S 137° 59.769E HOR.RANGE m

POS. of DEP. 0° 01.320S 138° 01.837E SINKER 01:41 DISAPPEAR. 01:52

POS. of MOORING 00° 01.236S 138° 01.795E LANDING 02:09

NOTE

・ガラス玉
設置前に回収したものを再使用の予定であったが、回収時、海面まで浮上しなかったため、新しいガラス玉を使用。

・ワイヤー
端末加工に不安があった。(ボルト、ナット、割りピンで固定するのではなく、割りピンのみで固定する仕様)ため、回収したワイヤーの端末を流用した。

	TIME	S/R	DEPTH
SSBL	01:41		56.7
	01:45		624.3
	01:49		1337.4
	01:54		2105.8
	02:00		2997.9
	02:07		3579.1

RECOVERY

DATE 24 Aug '97 SHIP KAIYO CRUSE No. K9709

WEATHER bc CONDITIONS 0.3m, 2S DIR. of WIND 125 VEL. of WIND 2.7 m/s

START of RELEASE 20:54 FINISH of RELEASE 20:59

POS. of DISCOVERY ° ° ASCENDING RATE 1.4 m/s

DIRECTION 130° DISTANCE 950. m

NOTE

21:01 ADCPブイ確認
ABS BUOYがからまってあがってきた。

	TIME	S/R	DEPTH
SSBL	20:59		3530.5
	21:04		3063
	21:15		2041
	21:28		974
	21:39		550
	21:44		154

TIME RECORD

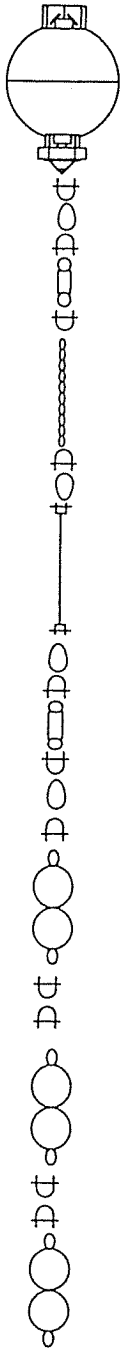
MOORING NO. 960711 - 00138E

		DEPLOYMENT		RECOVERY (Date: 24 Aug '97)	
		START : 00:13 FINISH : 01:41		START : 21:31 FINISH : 22:40	
ITEM	S/N etc.	TIME	MEMO	TIME	MEMO
ADCP & CTD	ADCP: 1221 CTD: 1279	00:16	ADCPわくに CTD取り付け.	21:35	
WIRE	11mm x 50m	00:16 ~ 00:18		21:41 ~ 21:43	
ABS BUOY	CT608B 2連	00:20		21:44	かしまっる あがってきた。
〃	〃	00:20		21:44	
〃	〃	00:20		21:44	
WIRE	11mm x 200 m	00:20 ~ 00:28		21:46 ~ 21:50	
〃	〃	00:28 ~ 00:32		21:50 ~ 21:53	
KEVLER	12 mm x 984m (USED)	00:32 ~ 00:51	水色 941013 147-B	21:54 ~ 22:07	
〃	〃	00:51 ~ 01:03	みどり 941012 142-A	22:08 ~ 22:22	
KEVLER	12mm x 505m (NEW)	01:05 ~ 01:10	青 9506	22:22 ~ 22:30	
KEVLER	12mm x 484m (USED)	01:12 ~ 01:17	黄 941012 147-D	22:30 ~ 22:38	
GLASS BALL	10ps.	01:27	NEW	22:40	
A. R.	719	01:27		22:40	
〃	631	01:28		22:40	
NYLON	16mm x 175	01:28 ~ 01:32			
RAIL ANCHOR	1.8ton	01:41			

・ワイヤーの端末は、回収したものを流用.
・ガラス玉は新しいものを使用.
・ナイロン 173 → 175m

記録：Fujisaki

21:44 ガラスブイ浮上



ADCP
S/N 1221

CTD SBE16
S/N 1279

SHACKLE 26mm
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 16mm

CHAIN
13mm x 3.0m

SHACKLE 16mm
RING 19mm

WIRE
11mm x 50m

RING 19mm
SHACKLE 18mm
SWIVEL BS103

SHACKLE 18mm
RING 19mm
SHACKLE 26mm

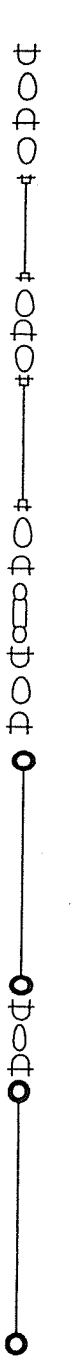
ABS BUOY
CT608B
NYLON 2.2m

SHACKLE 26mm
SHACKLE 26mm

ABS BUOY
CT608B
NYLON 2.2m

SHACKLE 26mm
SHACKLE 26mm

ABS BUOY
CT608B
NYLON 2.2m



SHACKLE 26mm
RING 19mm
SHACKLE 18mm
RING 19mm

WIRE
11mm x 200m

RING 19mm
SHACKLE 18mm
RING 19mm

WIRE
11mm x 200m

RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm

KEVLER (USED)
12mm x 984m

SHACKLE 16mm
RING 19mm
SHACKLE 16mm

KEVLER (USED)
12mm x 984m

SHACKLE 16mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm

KEVLER (NEW)
12mm x 505m

SHACKLE 16mm
RING 19mm
SHACKLE 16mm

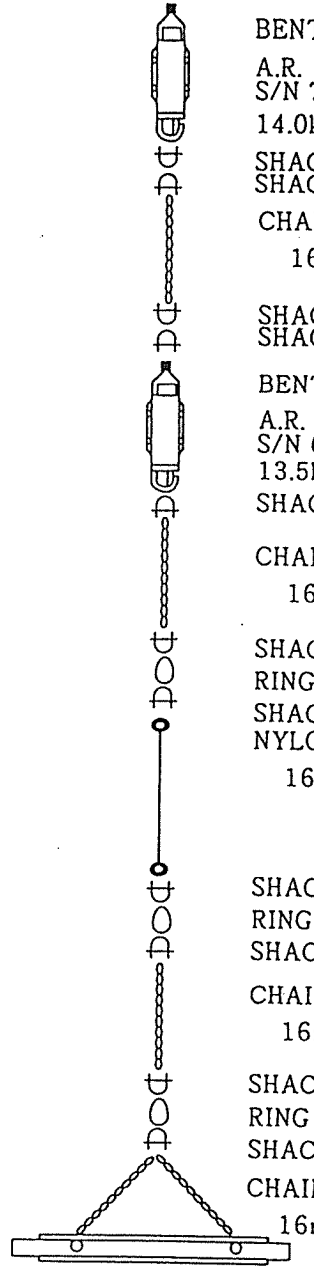
KEVLER (USED)
12mm x 484m

SHACKLE 16mm
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm

BENTHOS
GLASS BALL
2040-17V x 10ps.

CHAIN
13mm x 8m

SHACKLE 16mm
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm



BENTHOS
A.R.
S/N 719 E.C.=E
14.0kH R.C.=D

SHACKLE 16mm
SHACKLE 16mm

CHAIN
16mm x 5m

SHACKLE 16mm
SHACKLE 16mm

BENTHOS
A.R.
S/N 631 E.C.=C
13.5kH R.C.=B

SHACKLE 16mm

CHAIN
16mm x 2.0m

SHACKLE 18mm
RING 19mm
SHACKLE 18mm

NYLON
16mm x 175m

SHACKLE 18mm
RING 19mm
SHACKLE 18mm

CHAIN
16mm x 5m

SHACKLE 18mm
RING 19mm
SHACKLE 18mm

CHAIN
16mm x 2.5m x 2

SHACKLE 18mm x 2
RAIL ANCHOR

0° 138° E
3910m

DEPLOYMENT & RECOVERY

MOORING No. 970824-00138E

PROJECT	TOCS	TIME	
AREA	Western Pacific	RECORDER (D)	R.Kaneko
POSITION	0°N 138°E	(R)	
DEPTH			
PERIOD	24 Aug '97 ~	NAVIGATION SYSTEM :	WGS 84
No.of DAYS			
LENGTH :	m	DEPTH of BUOY : m	BUOYANCY : kg

ACOUSTIC RELEASER

TYPE	Benthos (Upper)	TYPE	Benthos (Lower)
S/N	689	S/N	665
RECEIVE F.	13.0 kHz	RECEIVE F.	13.0 kHz
TRANSMIT F.	13.5 kHz	TRANSMIT F.	14.0 kHz
ENABLE C.	B	ENABLE C.	F
RELEASE C.	A	RELEASE C.	D
BATTERY	2 years	BATTERY	2 years
TEST on DECK	OK	TEST on DECK	OK

DEPLOYMENT

DATE 24 Aug '97 SHIP KAIYO CRUSE No. K9709

WEATHER bc CONDITIONS 0.3m,2S DIR. of WIND 134° VEL. of WIND 4.6 m/s

DEPTH 3907 m DEPTH of A.R. 3735 m DESCEND. RATE 2.7 m/s BUOY 23:32

POS. of STRT 00°01.246S 137°59.537E HOR.RANGE m

POS. of DEP. 00°01.216S 138°01.875E SINKER 0:22 DISAPPEAR. :

POS. of MOORING 00°01.247S 138°01.799E LANDING 0:46

NOTE

ワイヤー100mをケブラー100mに変えスイベルを1つ追加した。

トップブーア 120m → 110m にした。

	TIME	S / R	DEPTH
S	00:25		496.4
S	00:28		1035
B	00:34		2055
L	00:40		3008
	00:44		3505
	00:48		3719

RECOVERY

DATE		SHIP	CRUSE No.
WEATHER	CONDITIONS	DIR. of WIND	VEL. of WIND
START of RELEASE	:	FINISH of RELEASE	:
POS. of DISCOVERY	°	°	ASCENDING RATE m/s
DIRECTION	°	DISTANCE m	

NOTE

	TIME	S / R	DEPTH
S			
S			
B			
L			

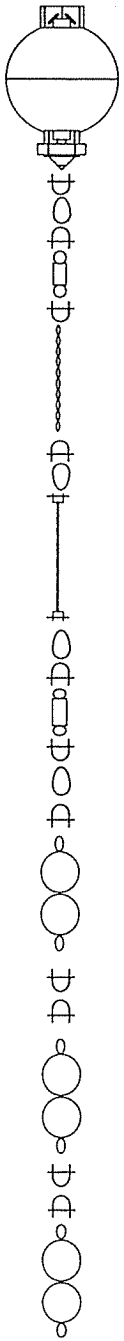
TIME RECORD

MOORING NO. 970824 - 00138E

		DEPLOYMENT		RECOVERY (Date:)	
		START : 23:27 (24 Aug) FINISH : 0:22 (25 Aug)		START : FINISH :	
ITEM	S/N etc.	TIME	MEMO	TIME	MEMO
ADCP CTD	ADCP 1222 CTD 1283	23:30			
WIRE	50m	23:27 ~ 23:30			
ABS BUOY	2	23:32			
〃	2	23:32			
〃	2	23:32			
WIRE	150m	23:32 ~ 23:36			
KEVLER	100m	23:36 ~ 23:38	k1-02		
〃	988m	23:47 ~ 23:50	k10-01		
〃	988m	23:51 ~ 23:59	k10-02		
〃	988m	0:01 ~ 0:07	k10-03		
〃	200m	0:09 ~ 0:10	k2-04		
GLASS BALL	12	0:15			
A.R.	S/N 689	0:15			
A.R.	S/N 665	0:16			
NYLON	110m	0:16 ~ 0:18			
ANCHOR	1.7t	0:22			

WIRE 100m → ケブラー 100m に変えた.
NYLON ロープ 120m → 110m に変えた.

00-138 (moored) '97



ADCP
S/N 1222

CTD SBE16
S/N 1283

SHACKLE 22mm
RING 19mm
SHACKLE 22mm
SWIVEL AB103
SHACKLE 18mm

CHAIN
13mm x 3.0m

SHACKLE 16mm
RING 19mm

WIRE
10mm x 50m

RING 19mm
SHACKLE 18mm
SWIVEL AB103
SHACKLE 18mm
RING 19mm
SHACKLE 26mm

ABS BUOY
CT608B

NYLON 2.2m

SHACKLE 26mm
SHACKLE 26mm

ABS BUOY
CT608B

NYLON 2.2m

SHACKLE 26mm
SHACKLE 26mm

ABS BUOY
CT608B

NYLON 2.2m

SHACKLE 26mm
RING 19mm
SHACKLE 18mm
RING 19mm

WIRE
10mm x 150m

RING 19mm
SHACKLE 16mm

KEVLER (K1-02)
12mm x 100m

SHACKLE 16mm
RING 19mm
SHACKLE 16mm
SWIVEL AB102
SHACKLE 16mm

KEVLER (K10-01)
12mm x 988m

SHACKLE 16mm
RING 19mm
SHACKLE 16mm

KEVLER (K10-02)
12mm x 988m

SHACKLE 16mm
RING 19mm
SHACKLE 18mm
SWIVEL AB102
SHACKLE 16mm

KEVLER (K10-03)
12mm x 988m

SHACKLE 16mm
RING 19mm
SHACKLE 16mm

KEVLER (K2-04)
12mm x 202m

SHACKLE 16mm
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm

BENTHOS
GLASS BALL
2040-17V x 12ps.

CHAIN
13mm x 8m

SHACKLE 16mm
RING 19mm
SHACKLE 18mm
SWIVEL BS103
SHACKLE 18mm
RING 19mm
SHACKLE 16mm

0° 138° E
3907m

BENTHOS
A.R.
S/N 689 E.C.=B
13.5kH R.C.=A
SHACKLE 16mm

CHAIN
16mm x 5m

SHACKLE 16mm
BENTHOS
A.R.
S/N 665 E.C.=F
14.0kH R.C.=D
SHACKLE 16mm

CHAIN
16mm x 2.0m

SHACKLE 18mm
RING 19mm
SHACKLE 18mm

NYLON
16mm x 110m

SHACKLE 18mm
RING 19mm
SHACKLE 20mm

CHAIN
16mm x 5m

SHACKLE 18mm
RING 19mm
SHACKLE 20mm
CHAIN
16mm x 2.5m x 2'

SHACKLE 18mm x 2
RAIL ANCHOR

8. TAO (Tropical Atmosphere-Ocean) Moorings

Linda Stratton, Timothy Nesseth
NOAA/PMEL
(National Oceanic and Atmospheric Administration, Pacific Marine Environmental Laboratory, Seattle, Washington, USA)

Overview:

The TAO (Tropical Atmosphere-Ocean) array is a network of moored buoys which span the Pacific Ocean consisting of approximately 70 buoys. Standard ATLAS (Automated Temperature-Line Acquisition System) buoys measure surface wind speed and direction, air temperature, relative humidity, sea surface temperature, and 10 discrete subsurface temperatures to 500m depth. Additionally, some ATLAS moorings measure conductivity at selected depths, rainfall, and radiation. The TAO array also contains 4 subsurface ADCP (Acoustic Doppler Current Profiler) moorings and 3 surface current meter moorings with in-line mechanical current meters in the central and eastern Pacific Ocean. All surface moorings transmit data in near real-time via the Argos satellite system. The buoys are an integral component of the ocean observing system, and are used primarily for the prediction of El Nino and other climatic phenomena, and for validation of Ocean General Circulation Models.

The *KAIYO* visited 8 mooring sites on KY-97-9 along the 156E, 147E, and 137E meridians. 4 moorings were recovered, 5 moorings were deployed, and 3 were repaired on this cruise. Work performed was done through joint cooperation between PMEL and JAMSTEC. The ship departed Guam, USA on 3 Aug 1997, and arrived Republic of Palau on 29 August 1997 with a mid-cruise stop in Chuuk, Federated States of Micronesia from 15-17 Aug, 1997.

Summary of Cruise Work:

The *KAIYO* proceeded directly to the 8N 156E site upon leaving Guam, USA, and serviced every buoy along the 156E meridian as she made her way southward. Mooring work done along 156E included 4 buoy deployments, 3 recoveries, and 2 repairs. An optical rain gauge and radiometer were deployed at 0N, 156E in addition to the standard ATLAS instrumentation. Seacat conductivity/temperature recorders were put out at all sites deployed along 156E. Data from these moorings transmitted to PMEL in real-time indicate that all instruments are working properly. Maintenance of buoys along this meridian was especially timely as a significant El Nino is underway, and all of the moorings along 156E required some upkeep.

After the *KAIYO* finished work along 156E, the ship returned to the equator to continue JAMSTEC CTD measurements in a westward track to 152E. The ship then transitted to Chuuk, Federated States of Micronesia for a mid-cruise stop involving the exchange of scientific personnel and fueling.

The ship departed Chuuk on August 17. The scheduled trackline was changed to accommodate the recovery and deployment of a TAO mooring that had recently gone adrift. The *KAIYO* therefore bypassed the 5N 147E site (which had been scheduled for deployment, but will be serviced in Sept 1997 by the Taiwanese research vessel *FISHERY RESEARCHER),* and transitted directly to 0N, 147E to repair the wind and air/relative humidity sensors. Unfortunately, the compass within the ATLAS data-logger tube was faulty, and exchange of anemometers (involving 3 small boat rides to the buoy) did not fix the wind direction. The air temperature/relative humidity sensor was successfully repaired.

The *KAIYO* continued JAMSTEC ADCP and CTD work, then proceeded to 2-21.06N, 138-48.74E to recover the mooring that was previously deployed at approximately 2-26N 137-26E and had gone adrift on 29 July 1997. This was an unscheduled operation, as the mooring was not adrift when the cruise schedule was initially determined. The flexibility of JAMSTEC scientists and cooperation of the *KAIYO* allowed this change to mooring work. The mooring had moved approximately 84 nm, and was found anchored. It was missing wind and air/relative humidity sensors, and the tower of the buoy was badly damaged. The mooring was successfully recovered, and the *KAIYO* then proceeded to the 2N 137E site to deploy the final ATLAS buoy of the cruise.

See Table 1 for a complete summary of TAO mooring operations.

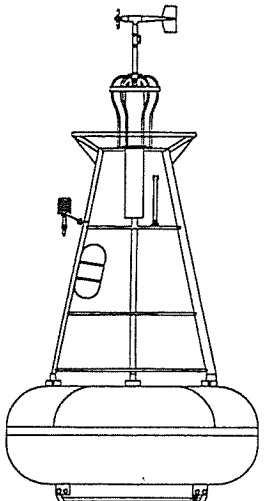
Acknowledgments:

We gratefully thank Captain Hyodo, the crew of the *KAIYO,* and JAMSTEC scientific personnel for the skillful and cooperative effort involved with the TAO moorings on this cruise. A special thanks goes to chief scientist(s) Dr. Kunio Yoneyama and Dr. Kentaro Ando for working with PMEL personnel to insure that all mooring work was successfully completed.

Table 1 - SUMMARY OF TAO MOORING OPERATIONS, TOCS K-97-09

SITE	DATE	BUOY#	LAT	LONG	TYPE	OPERATION
8N 156E	6 AUG 97	ET-435	07-59.71N	155-59.61E	STD ATLAS	REPAIR Wind Sensor
5N 156E	7 AUG 97	ET-405	04-58.89N	156-13.45E	STD ATLAS	REPAIR Tube Swap
2N 156E	8 AUG 97	ET-452	01-59.95N	156-00.85E	STD ATLAS *with seacat (1m)*	DEPLOY
ON 156E	9 AUG 97	ET-402	00-01.20S	156-27.00E	STD ATLAS	RECOVER
ON 156E	9 AUG 97	ET-454	00-00.31N	156-00.04E	STD ATLAS *with rain gauge, radiometer, seacat (1m)*	DEPLOY
2S 156E	10 AUG 97	ET-400	02-00.30S	155-59.58E	STD ATLAS	RECOVER
2S 156E	10 AUG 97	ET-456	02-00.16S	156-03.40E	STD ATLAS *with seacat (1m)*	DEPLOY
5S 156E	11 AUG 97	ET-399	04-59.22S	155-59.88E	REVERSE CATENARY	RECOVER
5S 156E	11 AUG 97	ET-457	04-59.82S	155-59.65E	REVERSE CATENARY *with seacat (1m)*	DEPLOY
0N 147E	19 AUG 97	ET-438	00-00.32N	146-59.53E	STD ATLAS	REPAIR Wind /Air Sensors
2N 137E	26 AUG 97	ET-439	02-21.06N	138-48.74E	STD ATLAS	RECOVER Moved, anchored
2N 137E	27 AUG 97	ET-462	02-25.96N	137-25.82E	STD ATLAS	DEPLOY

STANDARD ATLAS



1 M SST

1" SAS
3/4" SAS
BAILEY BRACKET
3/4" SAS
1.2 M 1/2" CHAIN
3/4" SAS

Beginning of 525 M piece of wire rope

25 M TEMPERATURE SENSOR

50 M TEMPERATURE SENSOR

75 M TEMPERATURE SENSOR

100 M TEMPERATURE SENSOR

125 M TEMPERATURE SENSOR

150 M TEMPERATURE SENSOR

200 M TEMPERATURE SENSOR

250 M TEMPERATURE SENSOR

300 M TEMPERATURE SENSOR W/ PRESSURE

500 M TEMPERATURE SENSOR W/ PRESSURE

5/8" SAS
5 TON MILLER SWIVEL
5/8" SAS

.5 M 1/2" CHAIN

5/8" SAS

175 M WIRE

5/8" SAS

.5 M 1/2" CHAIN

5/8" SAS

(A)

LENGTH DETERMINED BY BOTTOM DEPTH

NYLON

(A)

5/8" SAS

1 M 1/2" CHAIN

5/8" SAS
3 TON MILLER SWIVEL
5/8" SAS

EG&G RELEASE

5/8" SAS

1 M 1/2" CHAIN

5/8" SAS

50 M 3/4" NYLON

5/8" SAS

.5 M 1/2" CHAIN

5/8" SAS

4 M 1/2" CHAIN

5/8" SAS

ANCHOR WEIGHT 4020#

Fist Grip Spacing

Spacing	Depth
1.5 M	0 - 50 M
2.5 M	50 - 175 M
5 M	175 - 300 M
10 M	300 - 500 M

SURFACE INSTRUMENTS	
INST	SER#
TUBE	
RMYOUNG	
ROTRONICS	
EPPLEY	
SST	

MOORING REQUIREMENTS

.985 SCOPE

TOTAL LENGTH OF WIRE, HARDWARE, INCLUDING 50M PIECE OF NYLON =

762 M

KEY

(A) NYLON TERMINATION 2, 5/8" SAS W/DELRIN BUSHINGS

NOAA-PMEL-TAO
7600 SAND POINT WAY NE
SEATTLE, WA 98115
(206) 526-6178

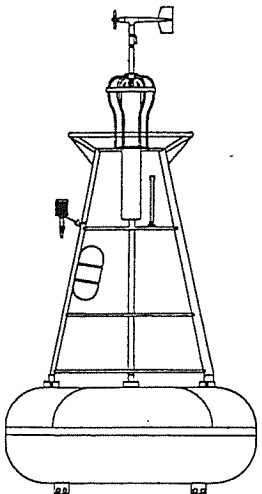
MOORING: STANDARD ATLAS, WESTERN PACIFIC

LOCATION:

DRAWN BY: A. S. DATE: 7/16/97

APPROVED BY: DATE:

REVERSE CATENARY ATLAS



1 M — SST

1" SAS
3/4" SAS
BAILEY BRACKET
3/4" SAS
1.2 M 1/2" CHAIN
3/4" SAS

Beginning of 525 M piece of wire rope

25 M — TEMPERATURE SENSOR

50 M — TEMPERATURE SENSOR

75 M — TEMPERATURE SENSOR

100 M — TEMPERATURE SENSOR

125 M — TEMPERATURE SENSOR

150 M — TEMPERATURE SENSOR

200 M — TEMPERATURE SENSOR

250 M — TEMPERATURE SENSOR

300 M — TEMPERATURE SENSOR W/ PRESSURE

500 M — TEMPERATURE SENSOR W/ PRESSURE

5/8" SAS
1 M 1/2" CHAIN

5/8" SAS
6 TON MILLER SWIVEL
3/4" SAS
1" SAS

4.5M 1 3/8"STUD LINK CHAIN

1" SAS
3/4" SAS

100 METERS OF NILSPIN

Ⓐ

The nylon to polyolifin splice is done without a shackle. The thimbles of the two pieces are joined together and then spliced.

10 M NYLON STIFFENER

Nylon

Polyolifin to Nylon Splice***

600 M Polyolifin (APPROX)

3/4" SAS

4 17" GLASS BALLS

5/8" SAS

2 M 1/2" CHAIN

5/8" SAS
3 TON MILLER SWIVEL
5/8" SAS
5/8" SAS

EG&G RELEASE

5/8" SAS

1 M 1/2" CHAIN

5/8" SAS

50 M 3/4" NYLON

5/8" SAS

.5 M 1/2" CHAIN

5/8" SAS

4 M 1/2" CHAIN

5/8" SAS

ANCHOR
WEIGHT
4200 lbs.

1.35 SCOPE

TOTAL LENGTH OF WIRE and HARDWARE, INCLUDING the 50M PIECE OF NYLON =

696 METERS

This does not include the polyolifin or nylon lengths. The Polyolifin lengths are approximate on this drawing. Please check the shipping inventories for the correct lengths.

SURFACE INSTRUMENTS	
INST	SER#
TUBE	
RMYOUNG	
ROTRONICS	
EPPLEY	
SST	

Fist Grip Spacing, Western Pacific

SPACING	DEPTH
1.5 M	1-50 M
2.5 M	50-175 M
5.0 M	175- 300 M
10 M	300-500 M*

* PANDUITS USED BETWEEN FIST GRIPS

KEY

Ⓐ NYLON TERMINATION 2, 5/8" SAS W/DELRIN BUSHINGS

NOAA-PMEL-TAO
7600 SAND POINT WAY NE
SEATTLE, WA 98115
(206) 526-6178

MOORING: Reverse Catenary ATLAS Western PACIFIC VERSION E1

LOCATION: 5 S, 156 E

DRAWN BY: A.S. DATE: 7/1697

9. Total inorganic carbon in the ocean

(1) Tittle

Spatial variation of the total inorganic carbon in the equatorial Pacific during 3rd.August - 28th August, 1997.

(2) Scientists

M. Ishii[1)], H. Yoshikawa[1)] and T. Harimoto[2)]

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[2)]Ocean Environment Survey Department
Kansai Environmental Engineering Center Co.LTD. (KEEC)
2-3-39, Nakazakinishi, Kitaku, Osaka, 530 JAPAN

(3) Objective

It is expected that total inorganic carbon (TCO_2; the sum of the concentrations of hydrate carbon dioxide, carbonic acid, bicarbonate, and carbonate) in the surface seawater in the equatorial Pacific exhibits pronounced spatial and temporal variabilities as a result of the strong upwelling, biological activities, air-sea CO_2 exchange, etc. Coupling with pCO2(sea) data, we are aiming at describing the carbonate system in this region and clarify the factors those are responsible for its variation.

(4) Method

Surface seawater was pumped up continuously from the bottom of the ship and the portion of it was introduced (1L/min) into the MRI coulometric TCO_2 measuring system at the 2nd laboratory. TCO_2 and seawater temperature were automatically measured once every an hour.

TCO_2 in the standard seawater and CO_2 content in the standard gas (1%CO_2 in air ; Nippon Sanso,CO.) were also determined occasionally to calibrate system.

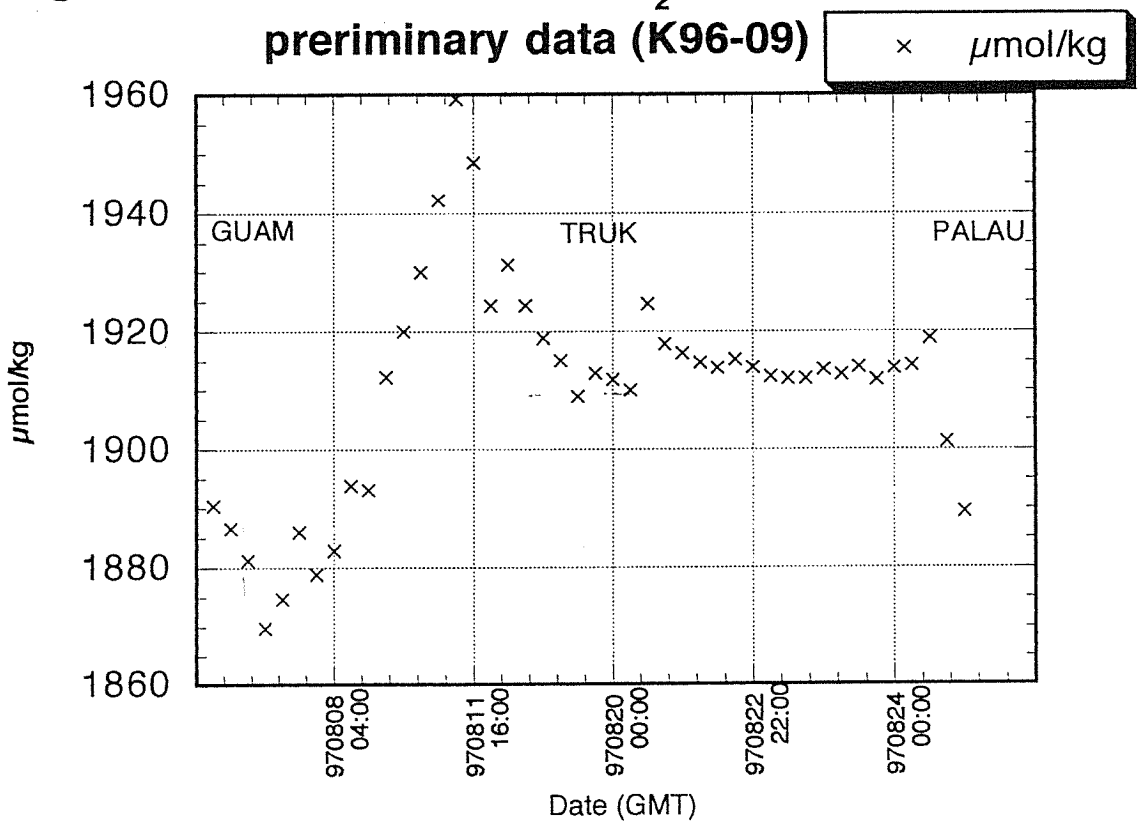
(5) Equipment

For the determination of the CO_2 amount, we used CO_2 coulometer (Model 5013 UIC Inc., USA). CO_2 extraction from the seawater and determination of its amount were automatically operated.

(6) Result

Data analysis including background correction, efficiency change correction, and seawater density calculation have not been made completely during this cruise. Figure 1 shows tentative TCO_2 measurements in the surface seawater at each CTD stations from Guam to Truk and from Truk to Palau.

Figure 1 Distribution of TCO_2 in surface seawater preriminary data (K96-09)



10. SUMMARY REPORT

Bambang Winarno & Udrekh
Agency for The Assessment and Application of Technology
(BPPT)

Purpose

The purpose of this cruise was to observe physical oceanographic condition in western tropical Pacific, to achieve better understanding of ocean atmosphere interaction and its effect to ENSO Phenomena (ELNINO / Southern Oscillation) and climate change.

Time duration & Field

TOCS cruise was carried out on August 3th, 1997 to August 29th, 1997. The area consist of Pacific Ocean & Indonesia n EEZ in Northern Irian.

Survey Activity

This cruise activity contains as follow:

1. CTD (Conductivity, Temperature and Depth) Observation.
   It has been done 47 Ctd stations including getting water sampler in depth: 50, 100, 150, 200, 250, 300, 350, 400, 500, 600, 800 & 1000 m.

2. Subsurface ADCP mooring (Acoustic Doppler Current Profiler)
   This equipment was used to obtain variability of current. We have deployed 4 subsurface mooring at (0N156E), (2S,142E), (2.5S142E) & (0N,138E).

3. ATLAS mooring
   This equipment was used to obtain surface meteorological data and subsurface water temperature. We have 2 repair, 5 deployments and 5 recoveries ATLAS buoys along 156E, 147E NS 137E line.

4. Atmospheric Sonde
   This equipment is designed to measure upper air temperature, wind speed & direction, humidity and pressure of air. This equipment was launched to air with balloon that contain helium gas. The data transmitted in real time to receiver at the container on board. It was done every 6 hours.

5. Dissolved Oxygen Measurement/

   Measurement of Dissolved Oxygen was done on All CTD stations with direct measurement by sensor that attached on CTD system and water sampler.

CONCLUSION

All activity above have been done successfully. We would like to thank JAMSTEC for invited us and all expenses, our Deputy of Natural Resources Development Dr. Ir. Indroyono Soesilo,MSc, APU. Chief scientist Kentaro Ando, Technical staff, Captain & crew members of Research Vessel Kaiyo.
We would like to apologize to all people who participate in TOCS cruise if we have ever made a mistake.

11. Participants List

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Hiroshi Matsuura	JAMSTEC
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Atsuo Ito	MWJ
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Hideki Yamamoto	MWJ
Reiko Kaneko	MWJ
Hiroshi Asari	MWJ
Haruki Naitou	MWJ
Syunzou Higuchi	MWJ
Ichirou Yamazaki	MWJ
Yasuo Kobayashi	MWJ
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Udrekh	BPPT
Asser Lolotan	Indonesia Navy / Hydrography JI. Pantai Kuta V / l Jakarta Indonesia Phone:+62-21-684810 Linda Stratton Pacific Marine Enviromental Laboratry(PMEL) 7600 Sand Point Way Northeast Seatle, Washinton 98115, USA Phone +1-206-526-6728
Timothy Nesseth	PMEL

R/V Kaiyo Crew Members

Captain	Hiroshi Hyodo
Cheif Officer	Toshinobu Miyata
Second Officer	Kazunori Fujiwara
Second Officer	Yoshiyuki Mizui
Third Officer	Rikita Yoshida
Jr.Third Officer	Hiroki Maruyama
Cheif Engineer	Tatsuo Jidozono
First Engineer	Morito Takahama
Second Engineer	Kazuma Koto
Third Engineer	Makoto Kotani
Chief Radio Officer	Masahiro Aimono
Second Radio Officer	Katsutoshi Kitamura
Boatswain	Yoshiaki Shirai
Able Seaman	Yoshimasa Azechi
Able Seaman	Akio Hama
Able Seaman	Tsugio Kashiwaya
Able Seaman	Yasuyoshi Kyuki
Able Seaman	Shuji Takuno
Able Seaman	Shigekazu Konno
No.1 Oiler	Masayuki Masunaga
Oiler	Chikara Inoue
Oiler	Kiyoshi Yawata
Oiler	Seiichi Matsuda
Oiler	Hiroyuki Oishi
Oiler	Takashi Suda
Cheif Steward	Yoichi Suzuki
Steward	Yoshitaro Tamiya
Steward	Takeshi Miyauchi
Steward	Tadayuki Takatu
Steward	Kazunori Nagano

Appendices

A1 . Time Table

A2 . GMS Images

A3 . Report of CTD troubles

(in Japanese)

Time Table of TOCS KY9709 Cruise

```
Aug.02 (Sat)  Shower / Cloudy
13:00－15:00  Load PMEL's gear

Aug.03 (Sun)  Cloudy
16:00         Depart Guam

Aug.04 (Mon)  Fine ¦ Shower
09:00－09:30  Guidance for Safety Life
09:30－10:10  Fire Drill
10:15－11:20  Meeting for the first leg
13:00－14:30  ATLAS buoys assembly
13:00－15:30  Preparation of CTD and Radiosonde Observation
16:45         Kompira-san
22:00         Start Surface Meteorological measurement every 3 hours

Aug.05 (Tue)  Fine ¦ Shower
09:00－11:00  Preparation for ATLAS and sub-surface buoy deployment
09:43－11:00  RS-01  (09-18N, 151-15E)   --- Radiosonde launching
13:24－13:41  RS-02  (08-59N, 152-24E)
21:35－23:25  RS-03  (08-38N, 153-39E)

Aug.06 (Wed)  Fine ¦ Shower
03:27－05:07  RS-04  (08-19N, 154-52E)
08:50－09:00  ATLAS Repair         (07-59.708N, 155-59.605E)
09:25－10:02  CTD-01 (07-59N, 156-00E)
09:29－11:18  RS-05  (07-59N, 156-00E)
14:55－15:35  CTD-02 (07-00N, 156-00E)
15:30－17:20  RS-06  (06-59N, 156-00E)
20:26－21:02  CTD-03 (06-00N, 156-00E)
21:26－23:16  RS-07  (05-59N, 156-00E)

Aug.07 (Thu)  Fine ¦ Rain
03:39－04:01  RS-08  (05-03N, 156-12E)
07:58－08:45  ATLAS Repair         (04-58.888N, 156-13.451E)
09:26－11:16  RS-09  (04-58N, 156-14E)
09:39－10:19  CTD-04 (04-58N, 156-14E)
15:24－16:00  CTD-05 (04-00N, 156-00E)
15:34－17:11  RS-10  (04-00N, 156-00E)
21:15－21:52  CTD-06 (03-00N, 156-00E)
21:25－23:15  RS-11  (03-00N, 156-00E)

Aug.08 (Fri)  Rain / Fine
03:26－05:10  RS-12  (02-04N, 155-59E)
07:56－09:43  ATLAS Deployment     (01-59.950N, 156-00.850E), 2594m
09:22－11:12  RS-13  (02-00N, 156-00E)
10:46－11:26  CTD-07 (01-59N, 156-01E)
14:04－14:45  CTD-08 (01-30N, 156-00E)
15:26－17:16  RS-14  (01-26N, 156-00E)
17:27－18:00  CTD-09 (01-00N, 156-00E)
20:44－21:20  CTD-10 (00-30N, 156-00E)
21:25－23:15  RS-15  (00-29N, 156-00E)
```

Aug.09 (Sat) Cloudy / Fine
03:27－05:14 RS-16 (00-00, 156-25E)
05:23－07:45 ATLAS Recovery
09:21－11:04 RS-17 (00-01N, 156-14E)
09:35－10:55 ATLAS Deployment (00-00.18OS, 156-09.85OE), 1973m
12:38－14:08 ADCP-buoy Recovery
14:50－15:52 ADCP-buoy Deployment (00-00.031N, 156-00.036E), 1962m
15:34－15:52 RS-18 (00-00, 156-00E)
16:18－16:55 CTD-11 (00-01S, 156-00E)
19:28－20:03 CTD-12 (00-30S, 156-00E)
21:25－23:09 RS-19 (00-43S, 156-00E)
22:38－23:18 CTD-13 (01-00S, 156-00E)

Aug.10 (Sun) Fine(Windy)
01:58－02:36 CTD-14 (01-30S, 156-00E)
03:26－05:09 RS-20 (01-36S, 156-00E)
09:58－11:35 RS-21 (02-00S, 156-04E)
10:04－11:08 ATLAS Deployment (02-00.16OS, 156-03.40OE), 1765m
12:41－14:22 ATLAS Recovery
14:49－15:33 CTD-15 (02-01S, 156-00E)
15:25－17:08 RS-22 (02-01S, 156-00E)
21:40－22:07 RS-23 (03-07S, 156-00E)

Aug.11 (Mon) Fine / Cloudy
04:02－05:48 RS-24 (04-24S, 156-00E)
08:24－11:04 ATLAS Recovery
09:22－11:11 RS-25 (05-00S, 156-00E)
13:03－15:03 ATLAS Deployment (04-59.82OS, 155-59.65OE), 1531m
15:25－17:15 RS-26 (05-00S, 156-00E)
15:50－16:24 CTD-16 (04-59S, 156-00E)
20:58－21:33 CTD-17 (04-00S, 156-00E)
21:24－23:14 RS-27 (04-00S, 156-00E)

Aug.12 (Tue) Fine(Windy)
02:32－03:07 CTD-18 (03-00S, 156-00E)
03:23－05:11 RS-28 (03-00S, 156-00E)
09:25－11:15 RS-29 (01-53S, 155-38E)
15:43－17:25 RS-30 (00-41S, 155-13E)
19:26－20:05 CTD-19 (00-00, 155-00E)
21:24－23:14 RS-31 (00-00, 154-50E)

Aug.13 (Wed) Fine
02:02－02:35 CTD-20 (00-00, 154-00E)
03:33－05:06 RS-32 (00-00, 153-55E)
08:34－09:12 CTD-21 (00-00, 153-00E)
09:20－11:10 RS-33 (00-00, 153-00E)
14:58－15:35 CTD-22 (00-00, 152-00E)
15:25－17:05 RS-34 (00-00, 152-00E)
21:24－23:13 RS-35 (01-00N, 152-00E)

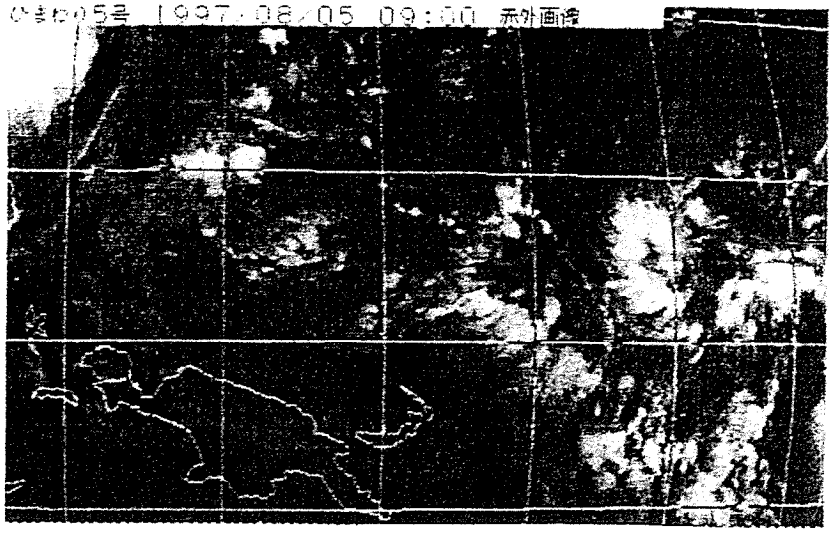
Aug.14 (Thu) Fine
03:29－05:15 RS-36 (02-11N, 152-00E)
09:21－10:59 RS-37 (03-22N, 152-00E)

Aug.15 (Fri)	Cloudy ¦ Rain
	Arrive Chuuk
	Fueling
Aug.16 (Sat)	Rain
	Anchor at off-shore
Aug.17 (Sun)	Cloudy ¦ Rain
12:00	Deaprt from Chuuk
15:00	Guidance for life on Kaiyo
Aug.18 (Mon)	Cloudy
	Cruising to ON147E
09:00	Boat & Fire Drill
09:30	Meeting for Leg-2
09:30-09:50	RS38 (03-57N,150-34E)
10:30	Seminar for CTD system and ADCP mooring system
15:37	RS39 (03-13N,149-53E)
21:37	RS40 (02-27N,149-12E)
Aug.19 (Tue)	Fine
10:00	Instruction for operation of CTD system
15:15-15:24	RS41 (00-01N,147-00E)
15:15-17:08	Repaire ATLAS at ON147E
17:20-17:55	CTD23 (ON,147E)
20:34	RS42 (00-00N,146-16E)
23:04-23:39	CTD24 (ON,146E)
Aug.20 (Wed)	Fine
03:26	RS43 (00-00N,145-15E)
04:49-05:25	CTD25 (ON,145E)
09:26	RS44 (00-00N,144-10E)
10:23-10:58	CTD26 (ON,144E)
15:33	RS45 (00-00N,143-07E)
16:17-16:53	CTD27 (ON,143E)
21:33	RS46 (00-52S,142-38E)
Aug.21 (Thu)	Fine
03:26	RS47 (01-00S,142-09E)
06:00-06:40	Seabeam (2-28S,142-00E -> 2-28S,141-56E)
07:30-09:34	Recovery ADCP mooring at (2-30S,142E)
09:24	RS48 (02-29S,141-57E)
10:26-12:10	Deployment of ADCP mooring at (2-30S,142E)
12:35-13:12	CTD28 (02-30S,142E)
15:25	RS49 (02-00S,142-00E)
15:29-17:30	Recovery ADCP mooring at (2S,142E)
17:48-18:25	CTD29 (2S,142E)
21:36	RS50 (02-01S,141-58E)
Aug.22 (Fri)	
03:25	RS51 (01-58S,142-01E)
07:20-09:00	Deployment of ADCP mooring at (2S,142E)
09:25	RS52 (01-56S,142-00E)
11:36-12:11	CTD30 (01-29S,142-00E)
14:50-15:26	CTD31 (00-59S,142-00E)
14:29	RS53 (01-00S,142-00E)
18:05-18:39	CTD32 (00-30S,142-00E)

21:12-21:46	CTD33 (00-00N,142-00E)
21:29	RS54 (00-00N,142-00E)
Aug.23 (Sat)	Fine
02:34-03:10	CTD34 (00-00N,141-00E)
03:25	RS55 (00-00N,140-58E)
07:48-08:24	CTD35 (00-00N,140-00E)
09:25	RS56 (00-01N,139-49E)
13:07-13:42	CTD36 (00-00N,139-00E)
13:45	RS57 (00-16S,138-44E)
20:19-20:52	CTD37 (01-00S,138-00E)
20:29	RS58 (00-54S,138-00E)
23:32-24:06	CTD38 (00-29.972S)
Aug.24 (Sun)	Fine
01:35-02:07	CTD39 (00-15S,138-00E)
03:25	RS59 (00-00S,138-00E)
03:30-04:04	CTD40 (00-00S,138-00E)
05:25-05:58	CTD41 (00-15N,138-00E)
07:19-07:54	CTD42 (00-30N,138-00E)
09:25	RS60 (00-48N,138-00E)
10:23-10:57	CTD43 (01-00N,138-00E)
13:22-14:00	CTD44 (01-30N,138-00E)
15:30	RS61 (01-14N,138-00E)
21:30	RS62 (00-03S,138-06E)
Aug.25 (Mon)	Fine
03:25	RS63 (00-03S,138-01E)
09:25	RS64 (00-01S,138-00E)
06:54-08:40	Recovery the 0N138E ADCP mooring
09:27-11:03	Deployment the 0N138E ADCP mooring
15:36	RS65 (00-46N,138-17E)
21:30	RS66 (01-45N,138-37E)
Aug.26 (Tue)	Fine
03:26	RS67 (02-18N,138-52E)
08:03-10:03	Recovery Drifted ATLAS (2-21.060N,138-48.740E,D=4,365m)
15:34	RS68 (02-12N,138-02E)
21:32	RS69 (01-59N,137-07E)
Aug.27 (Wed)	Fine
03:25	RS70 (02-00N,136-58E)
09:25	RS71 (02-27N,137-27E)
09:27-12:24	ATLAS Deployment (02-25.960N,137-25.820E,D=4465m)
11:31-12:00	CTD45 (02-26N,137-24E)
15:27	RS72 (02-53N,137-05E)
21:06-21:28	CTD46 (04-00N,137-00E)
21:26	RS73 (04-00N,137-00E)
Aug.28 (Thu)	Fine
02:28-03:10	CTD47 (05-00N,137-00E)
03:26	RS74 (05-01N,136-58E)
09:27	RS75 (05-42N,136-00E)
15:30	RS76 (06-22N,134-57E)
Aug.29 (Fri)	Fine
08:00	Palau (Pilot Station)

A−2 GMS Images

Aug. 05, 1997 00Z



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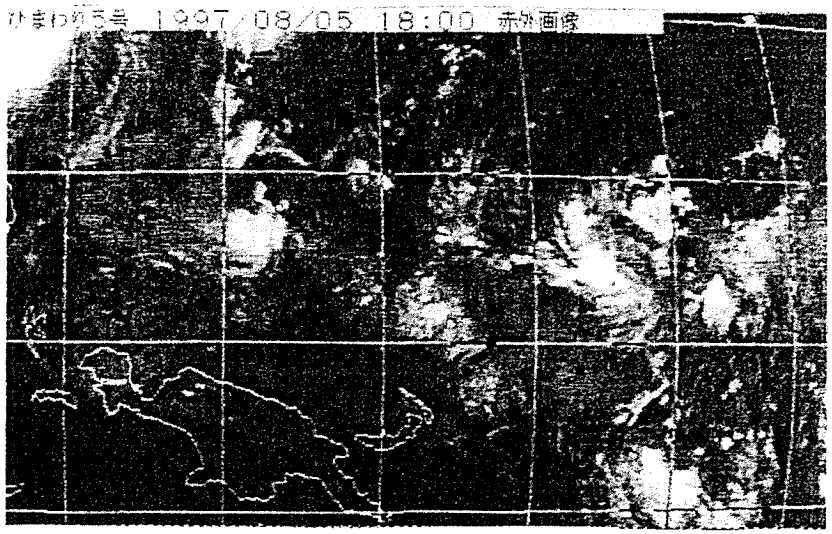

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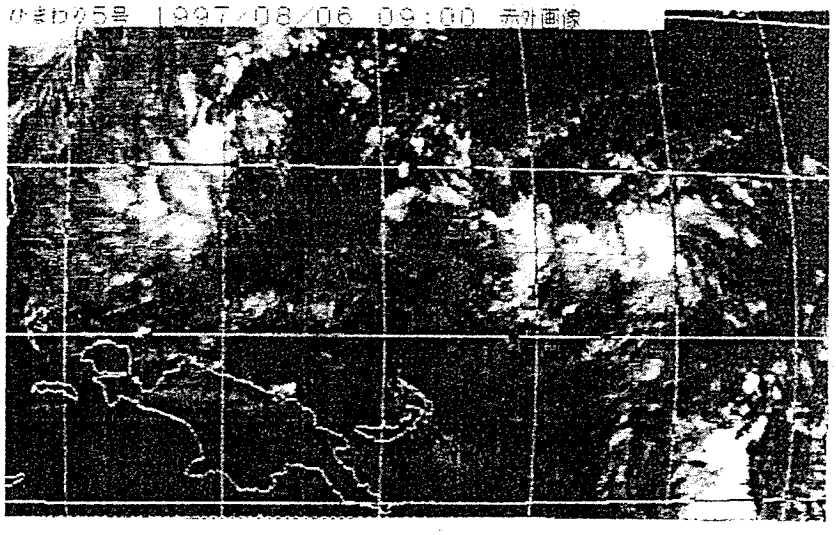

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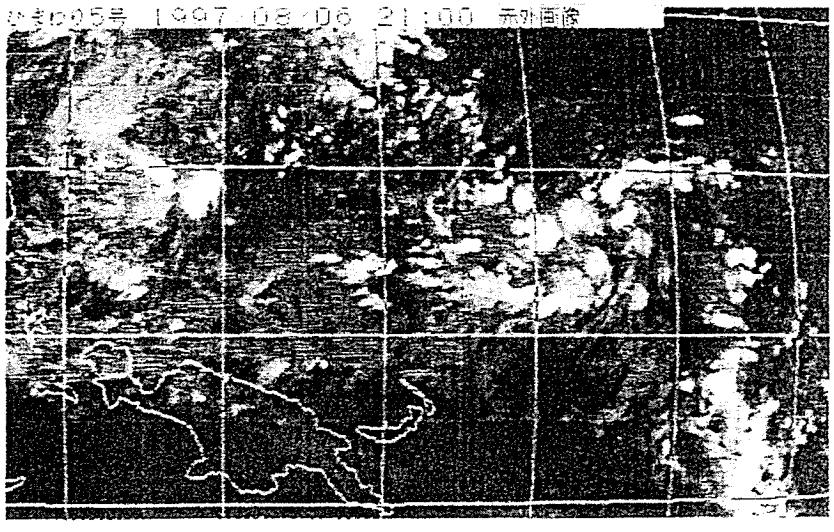

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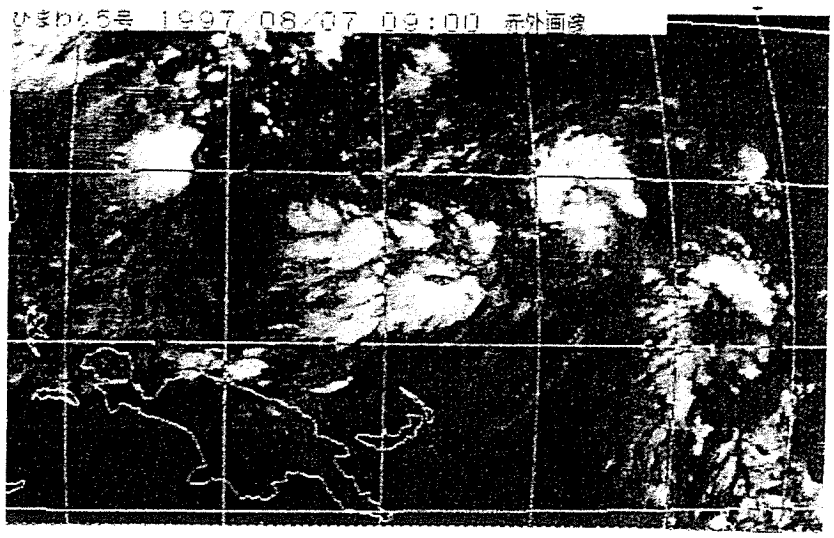

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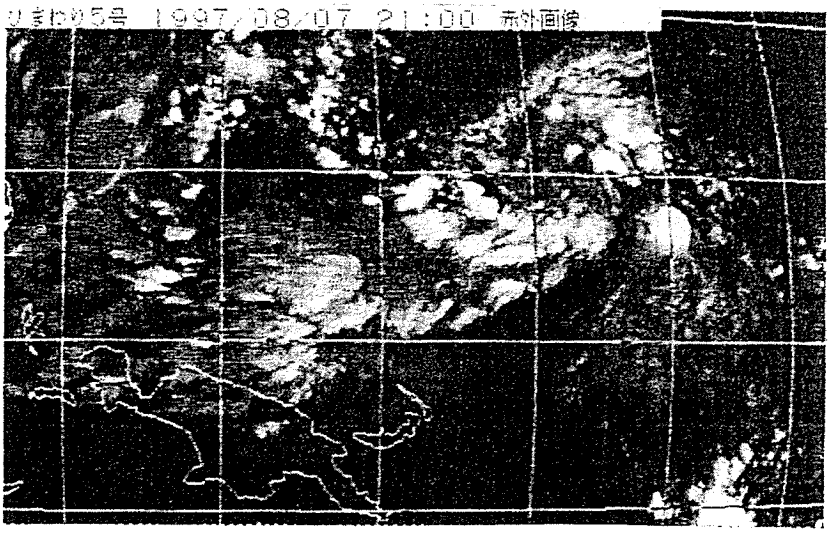

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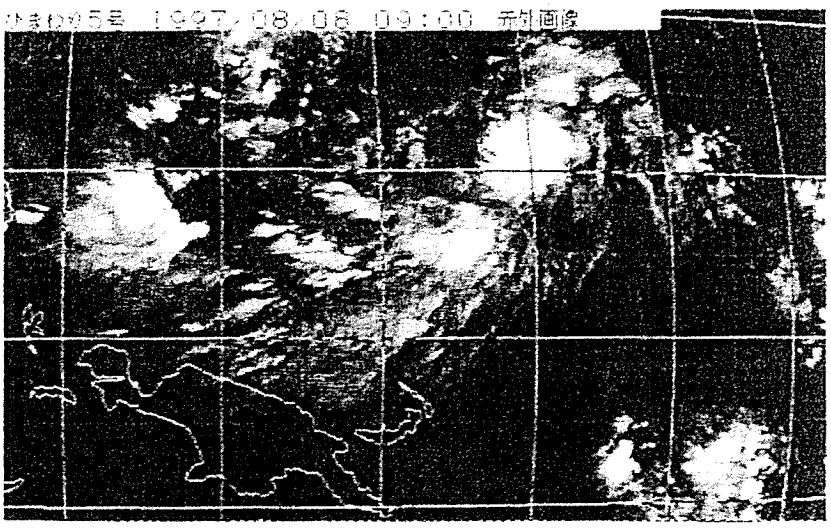

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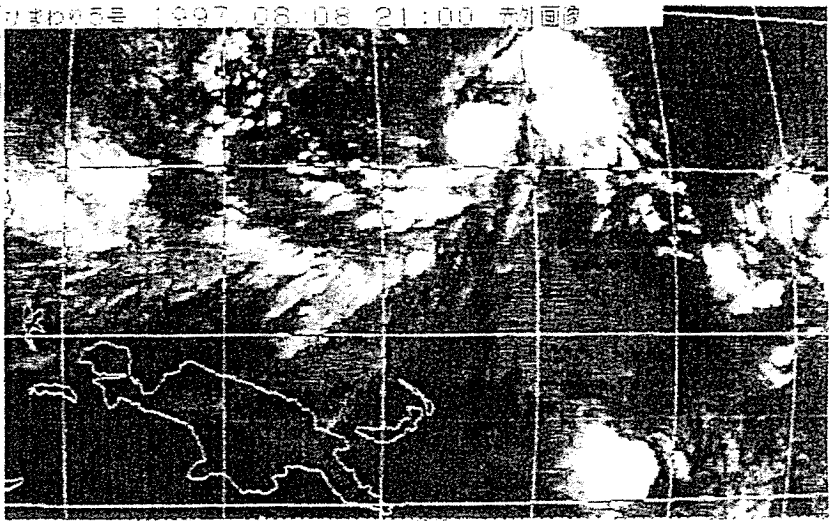

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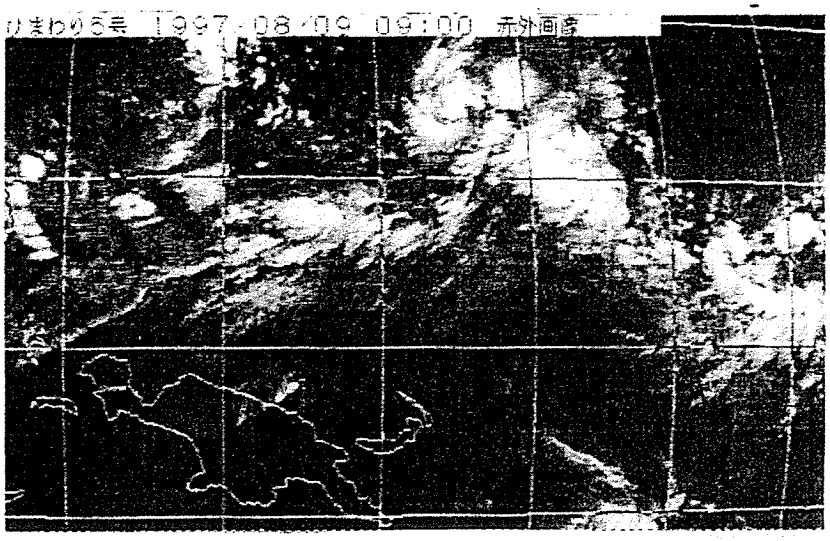

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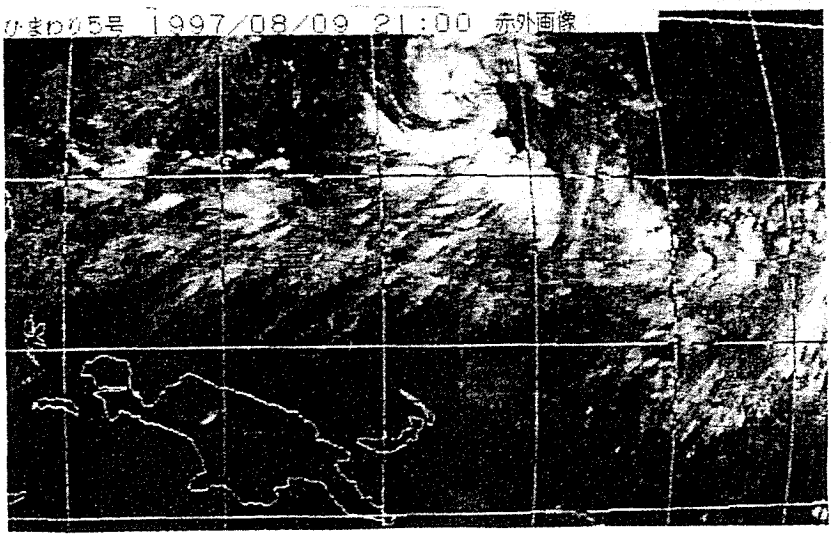

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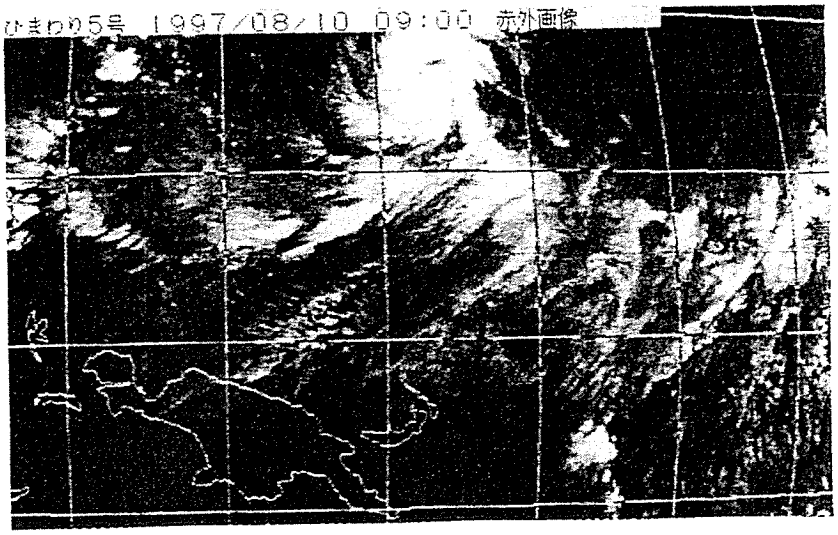

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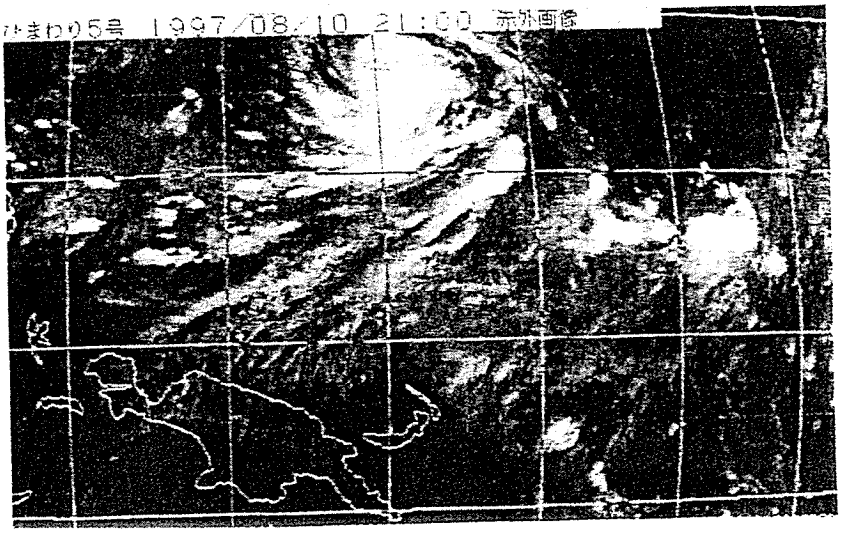

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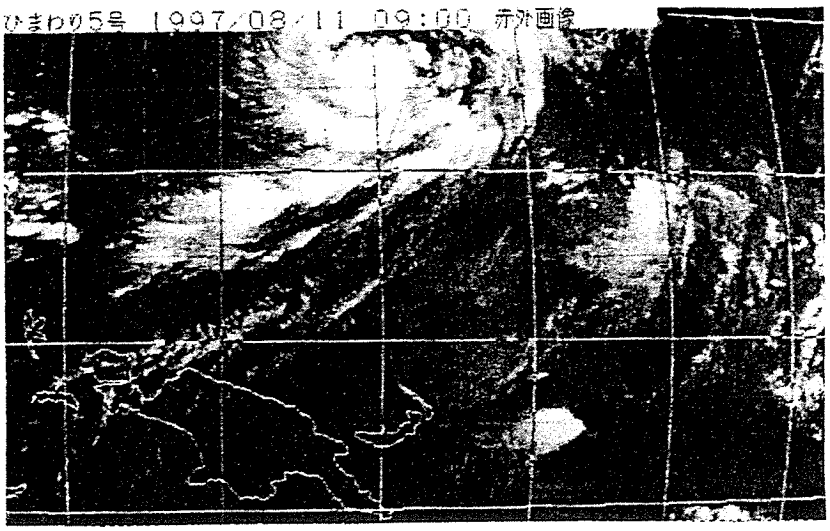

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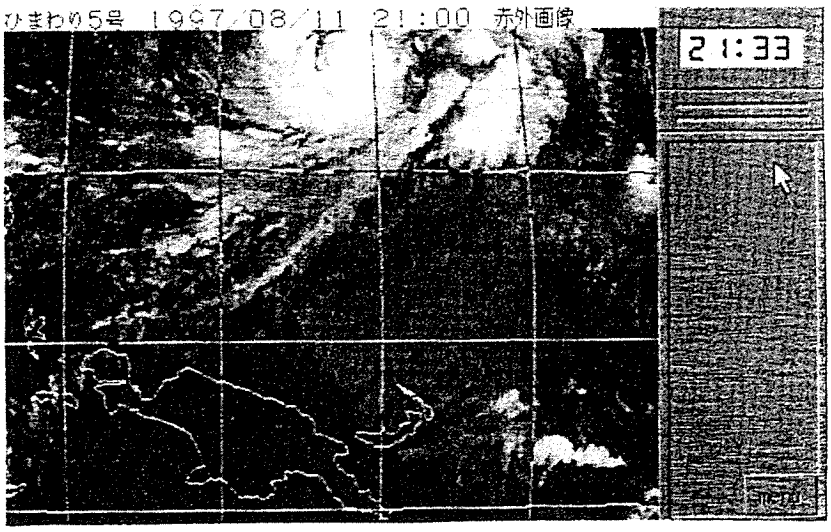

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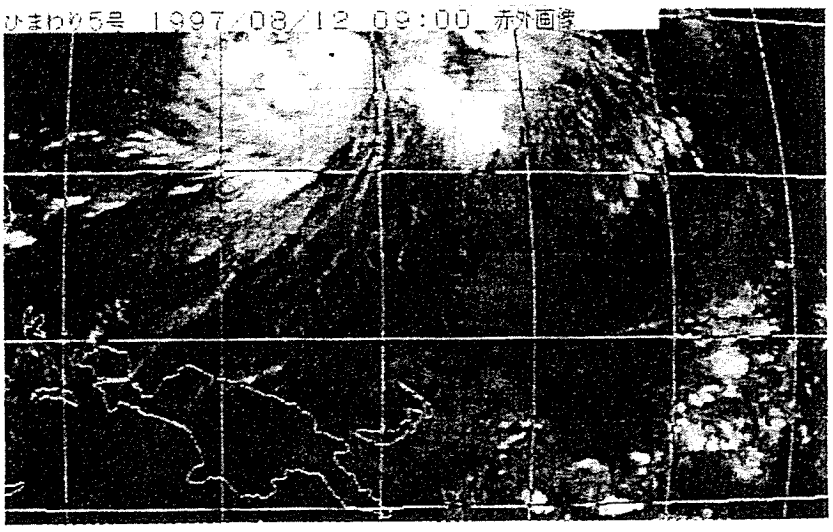

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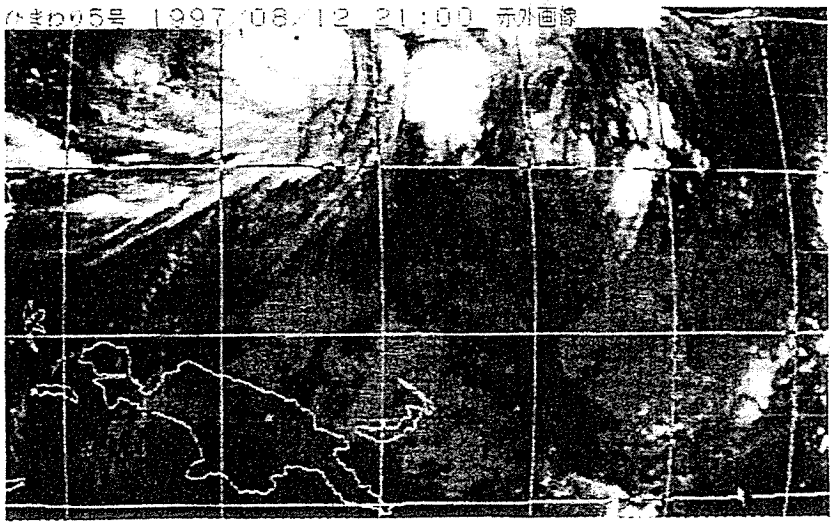

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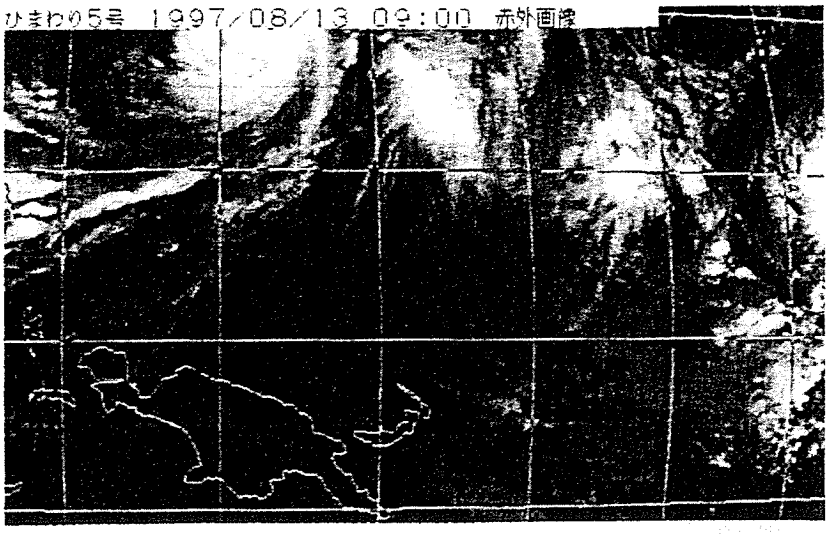

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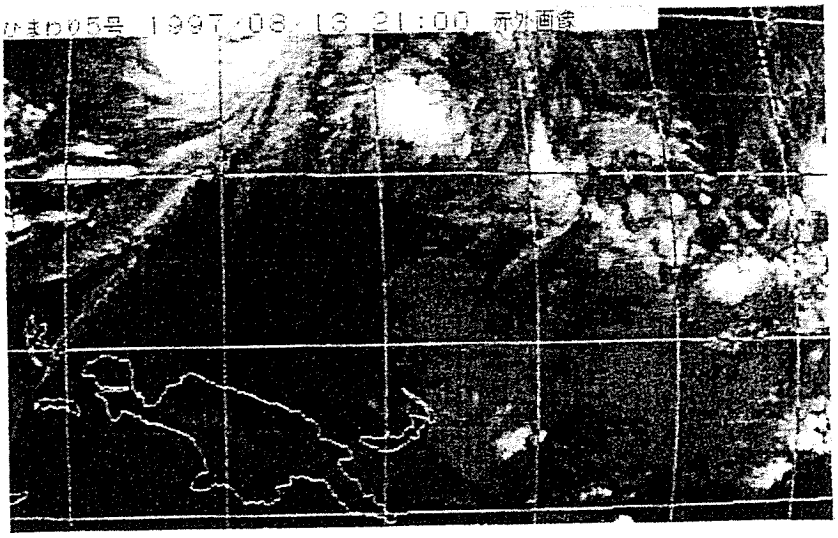

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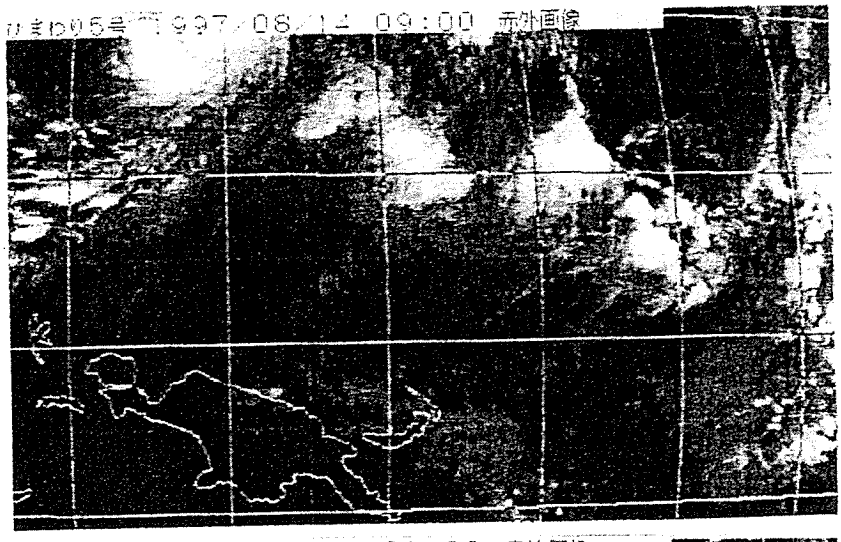

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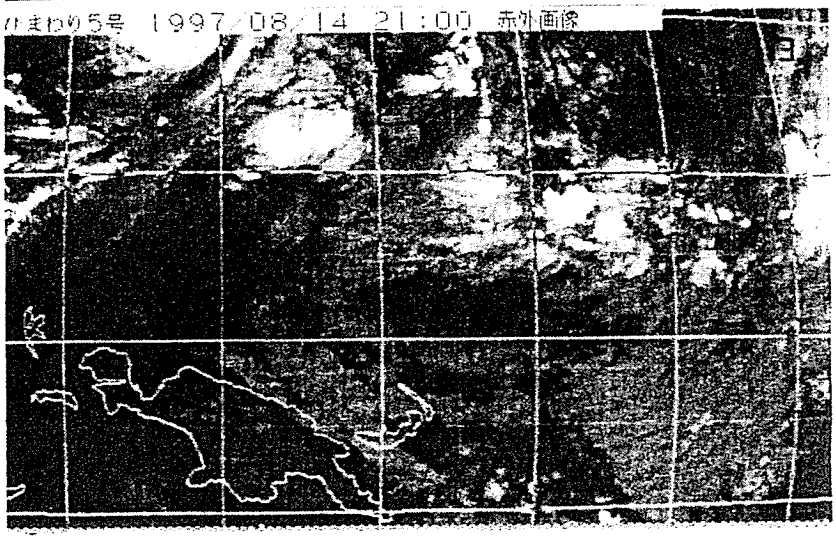

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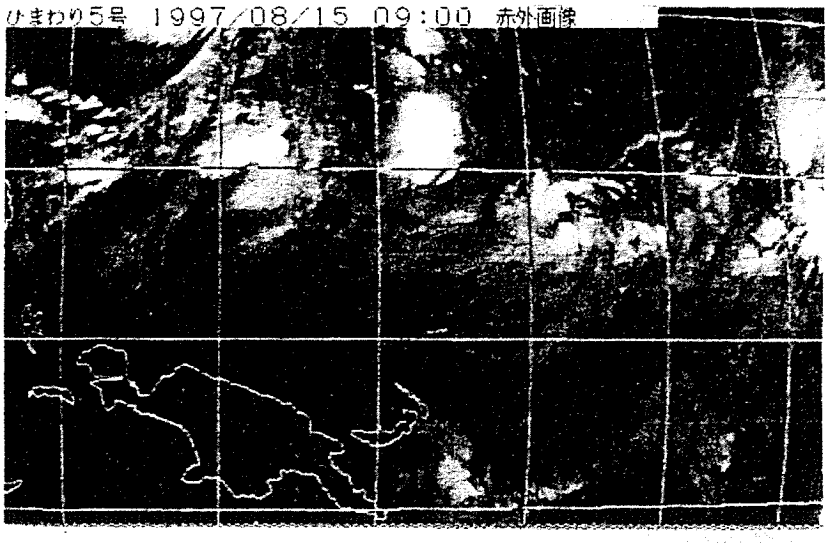

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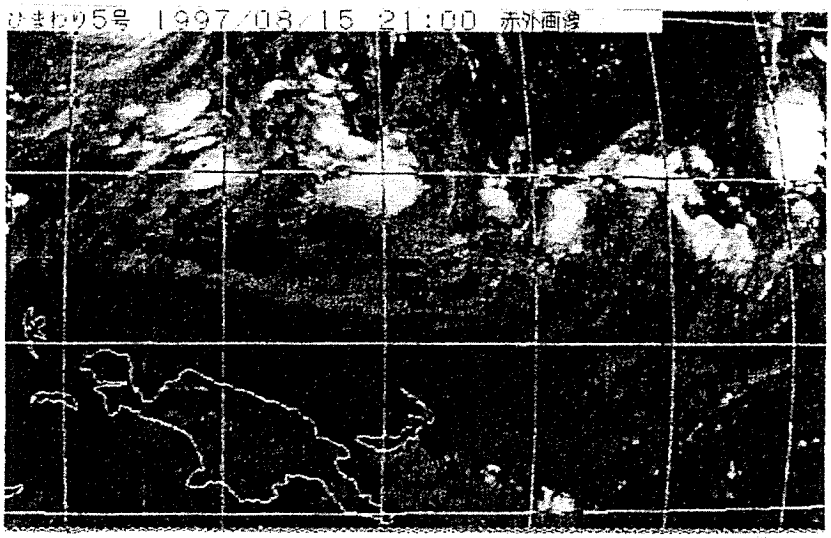

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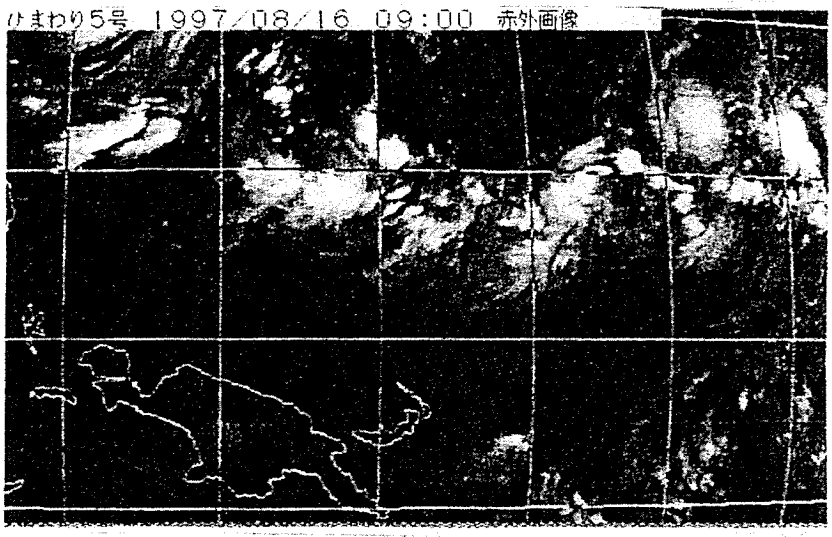

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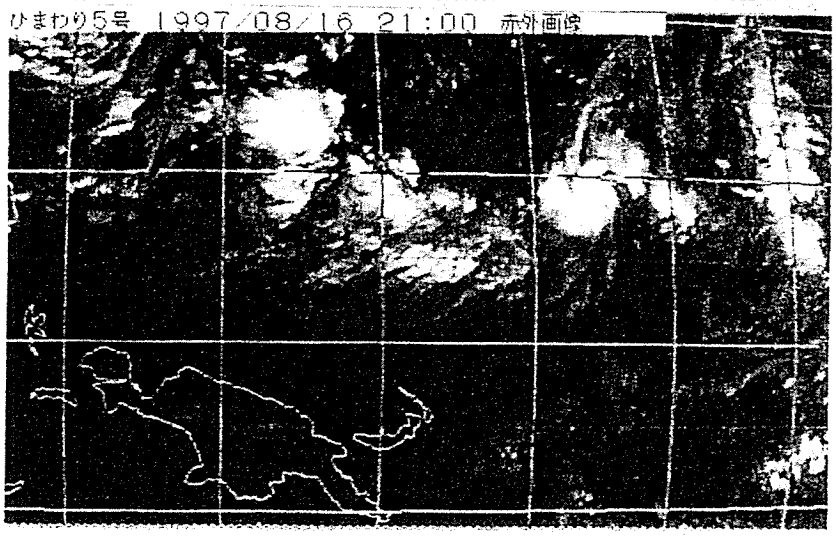

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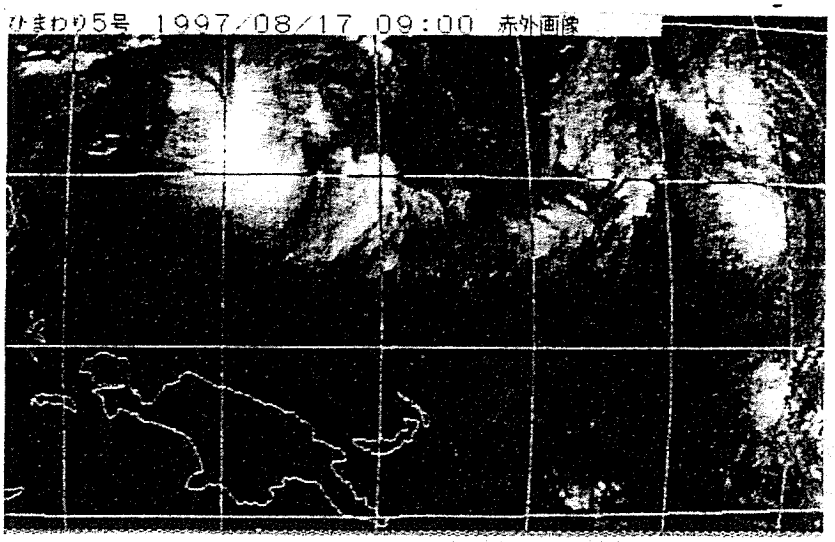

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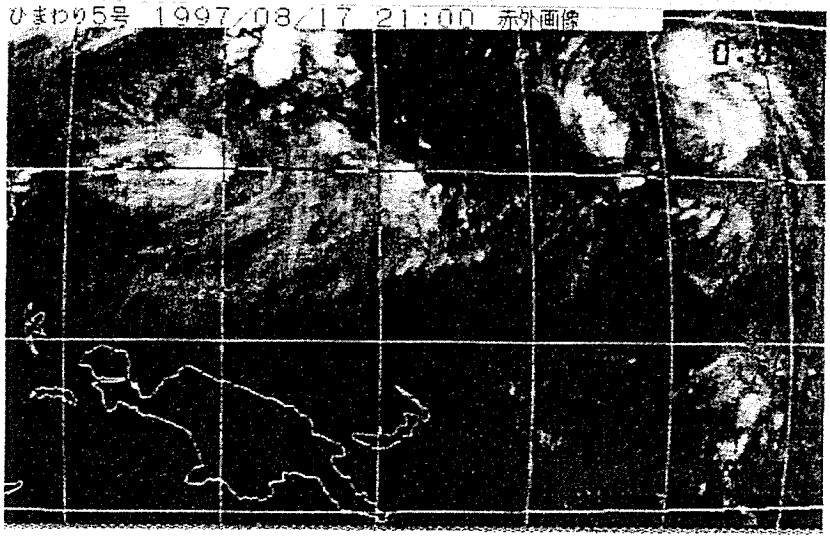

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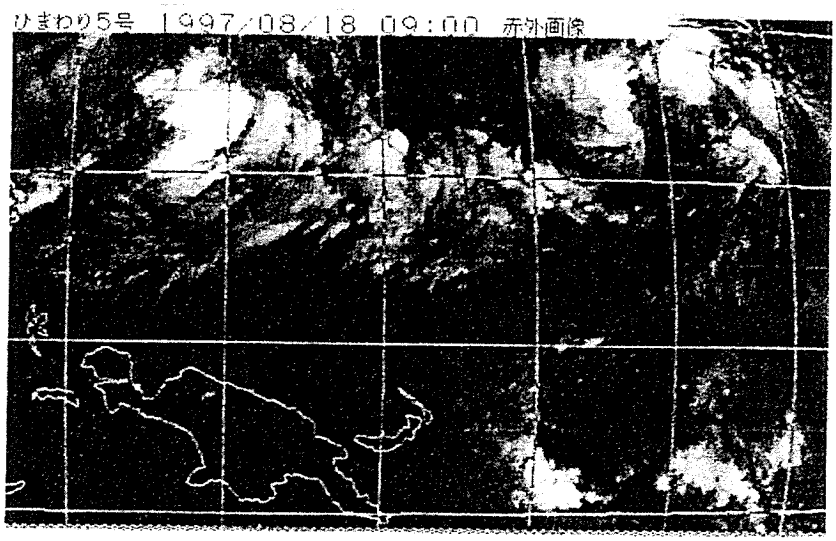

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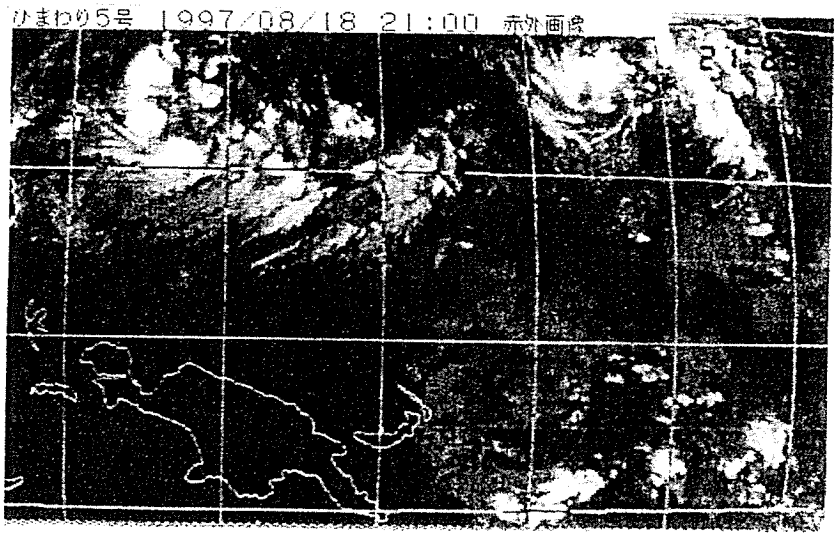

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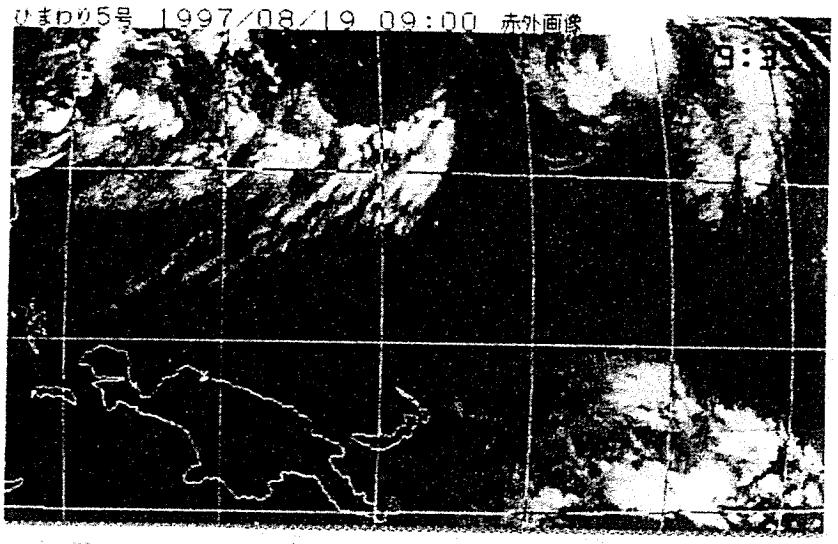

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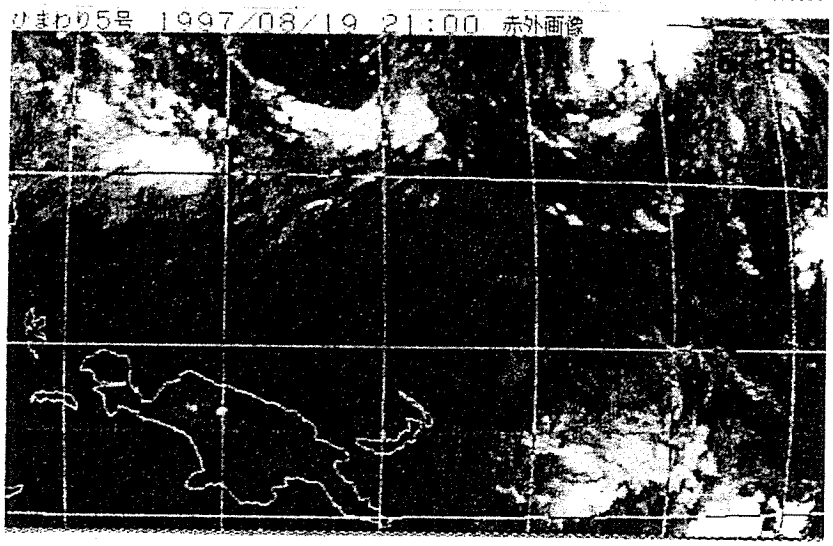

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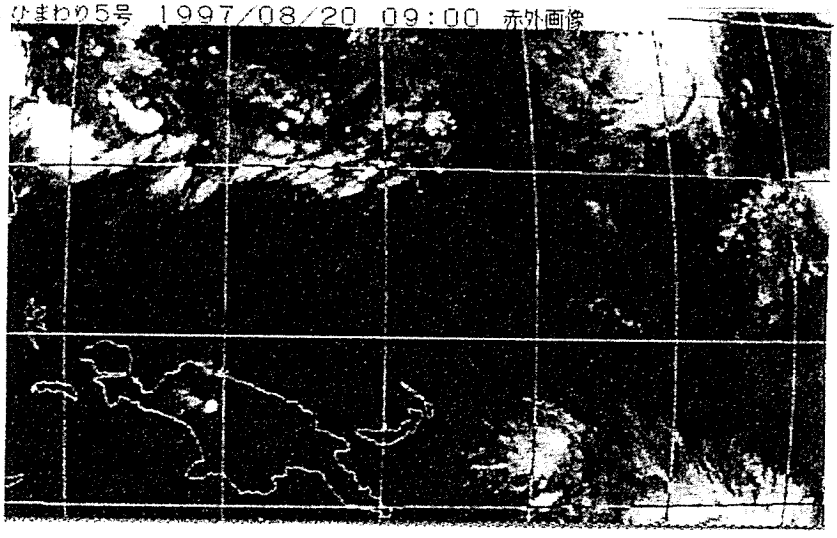

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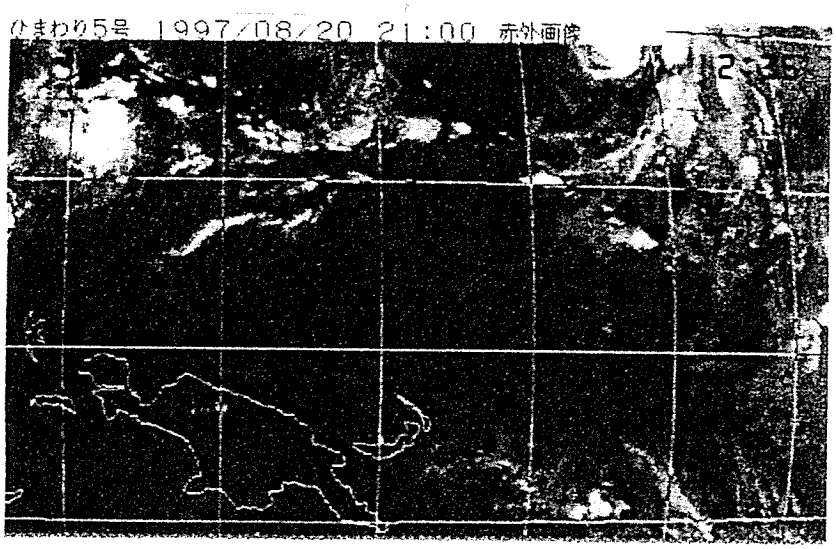

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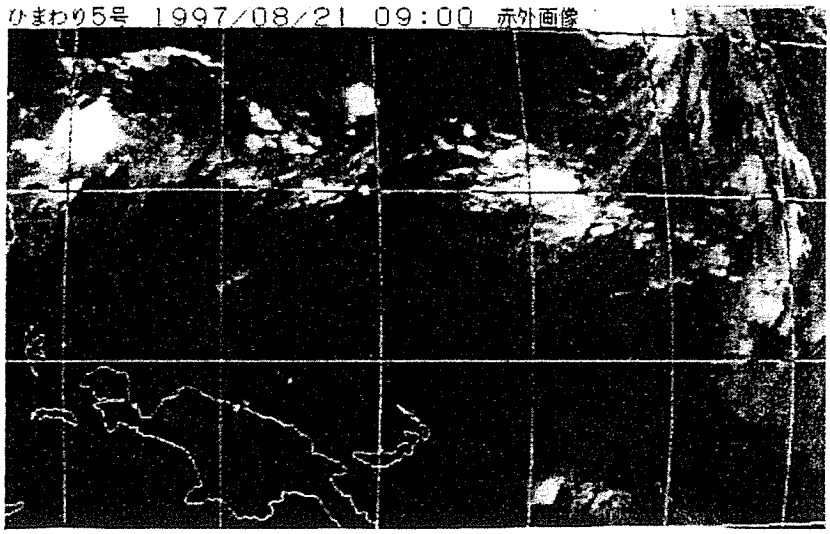

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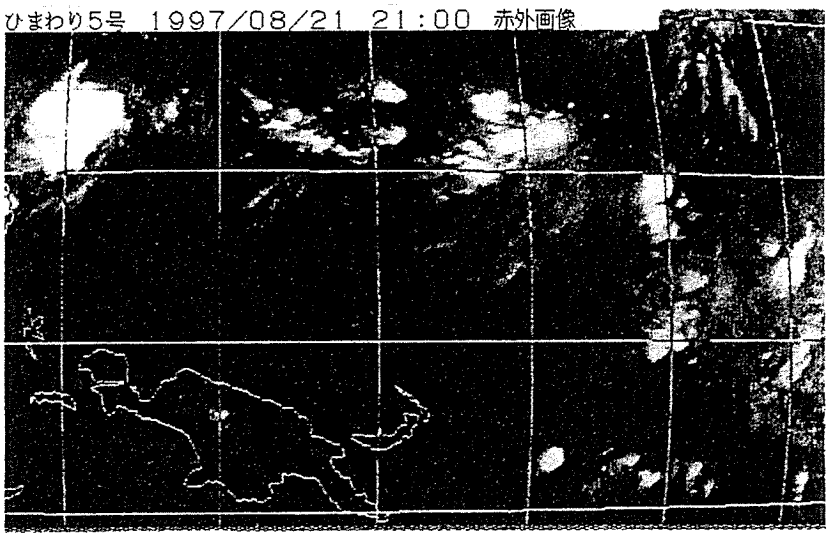

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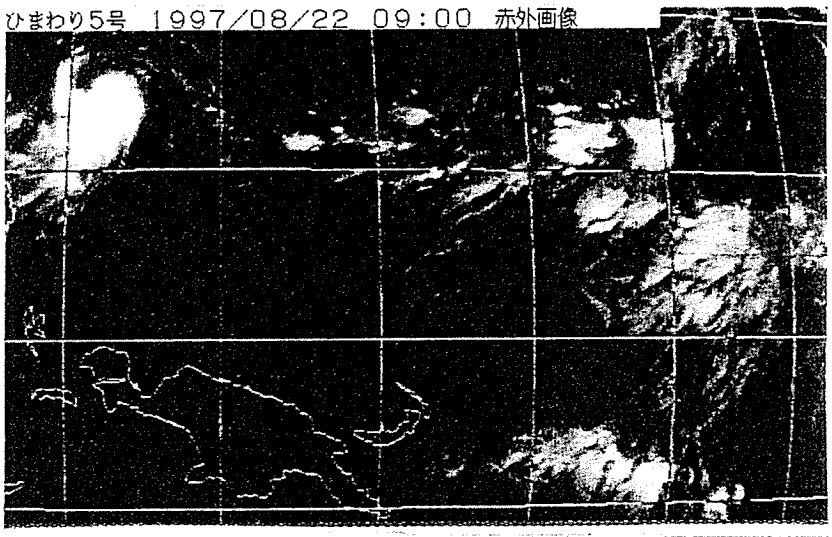

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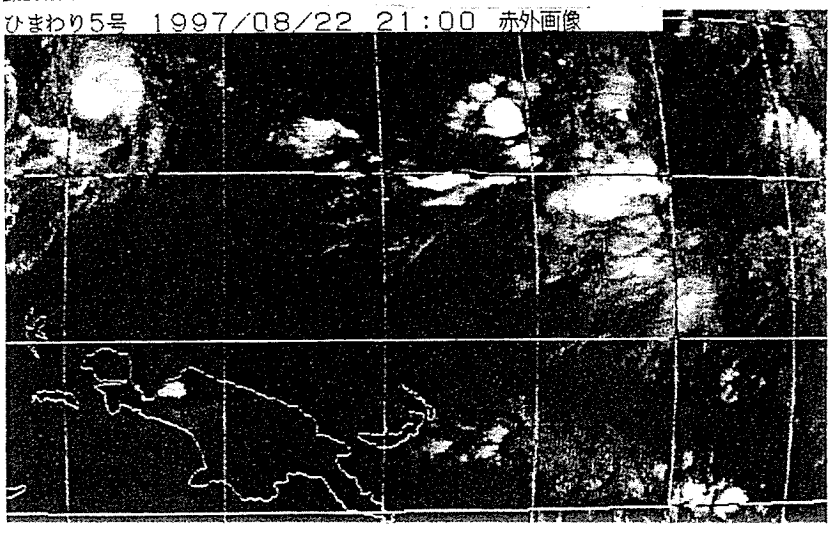

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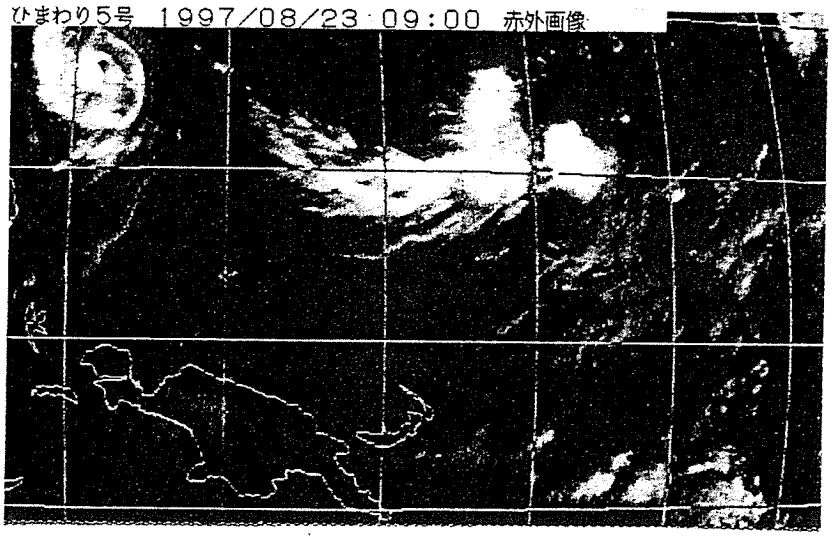

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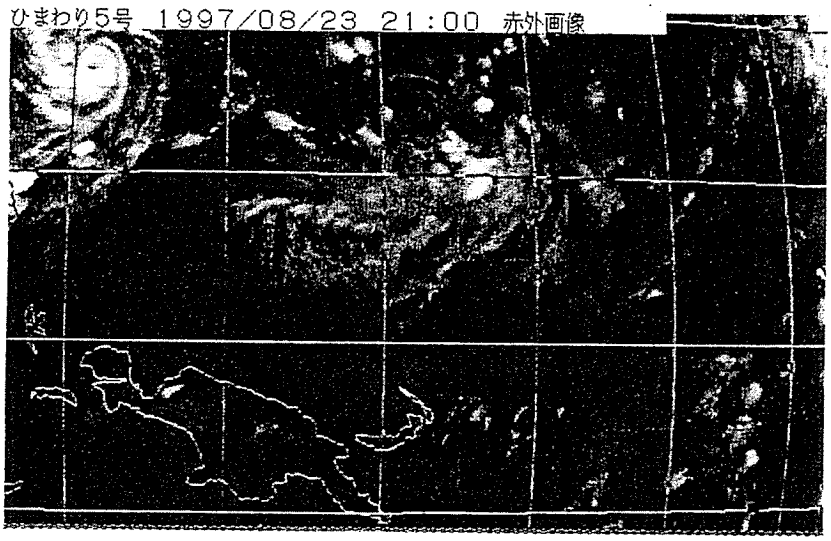

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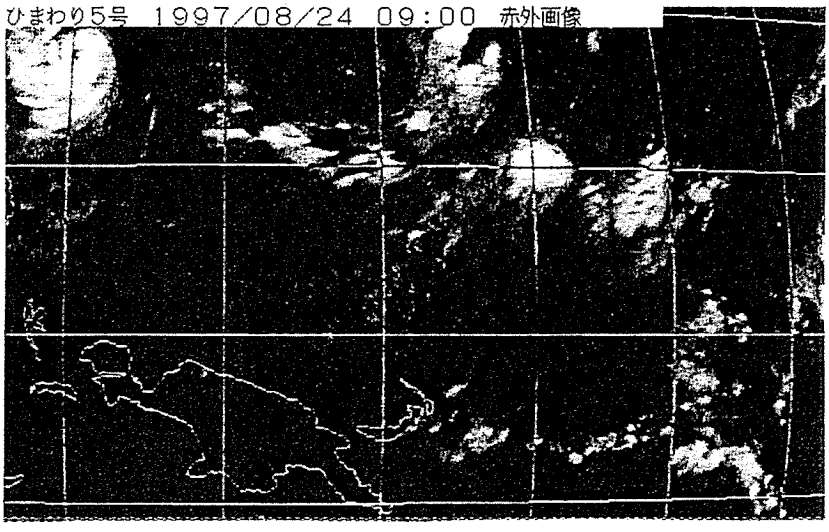

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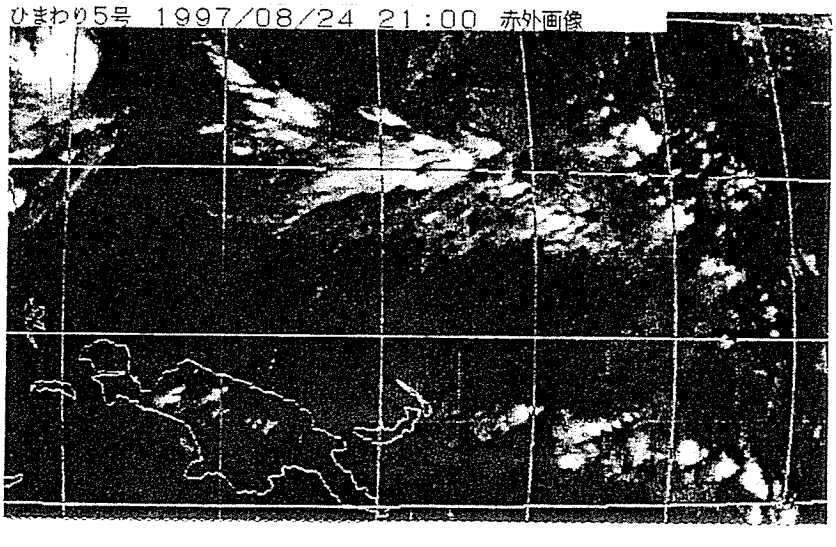

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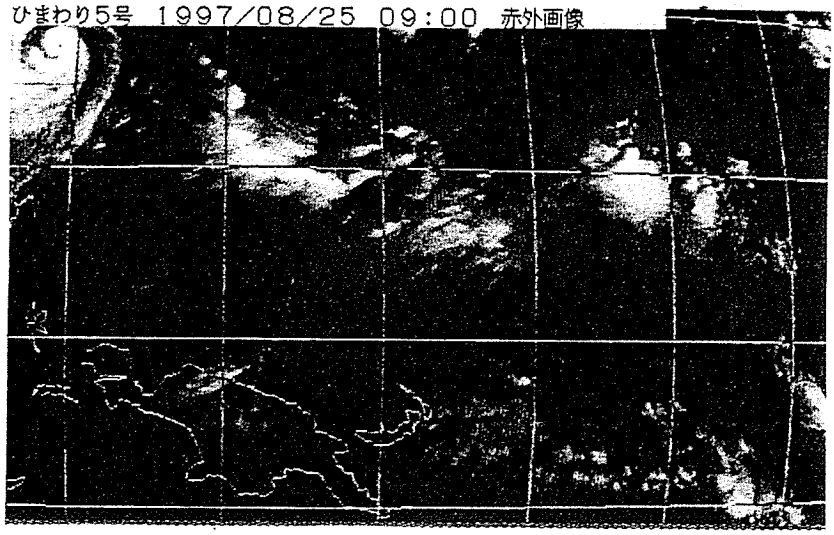

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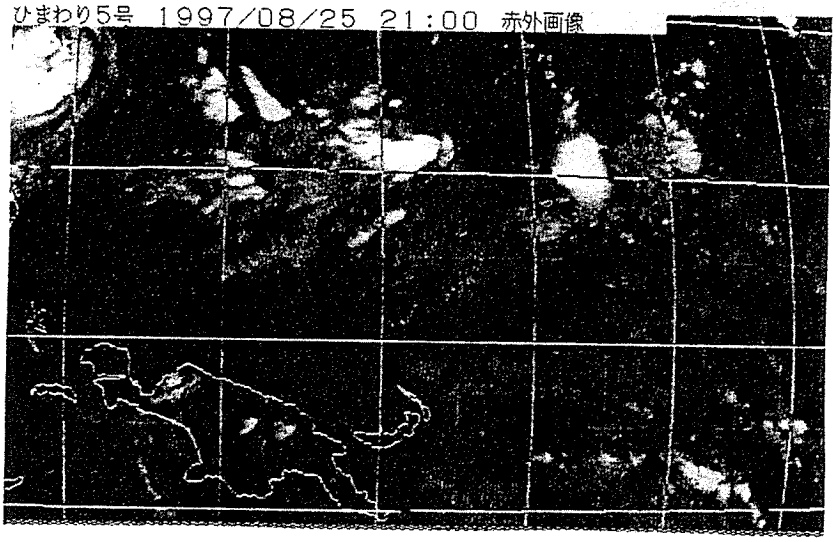

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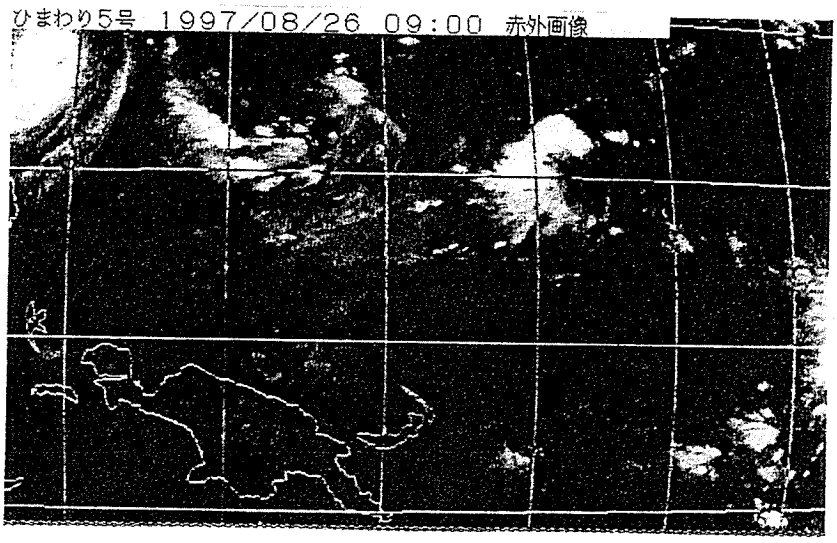

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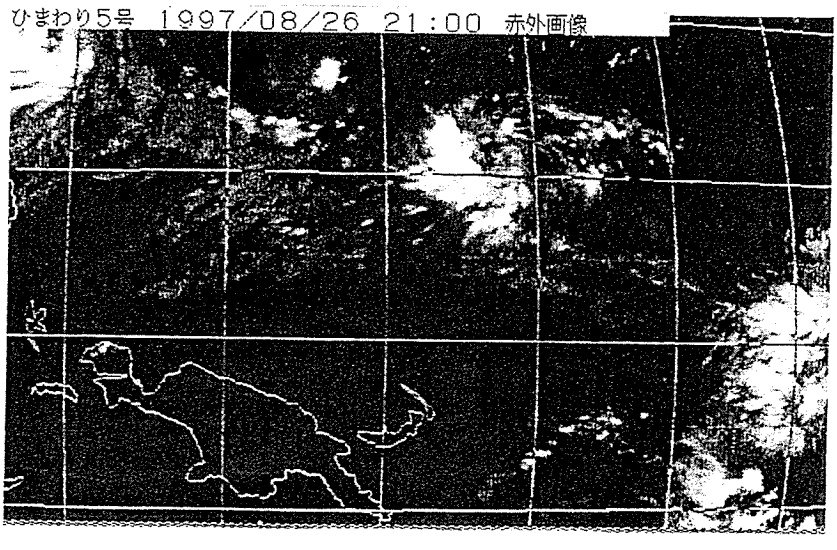

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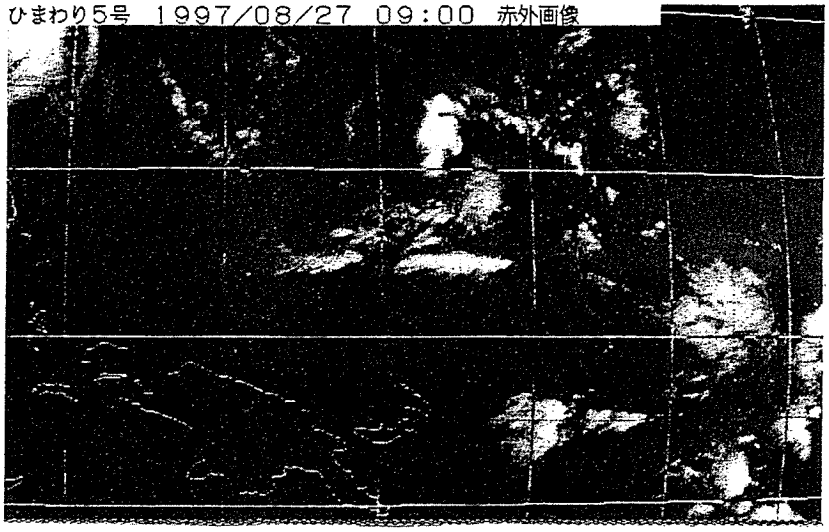

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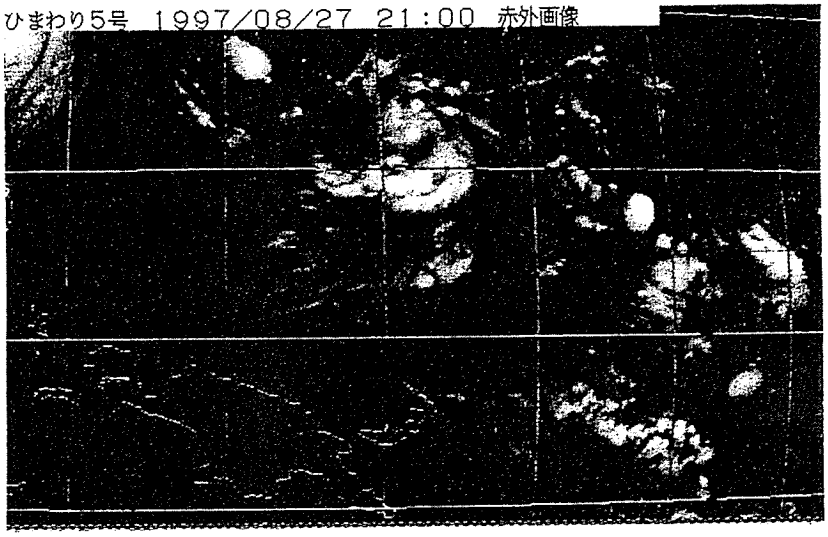
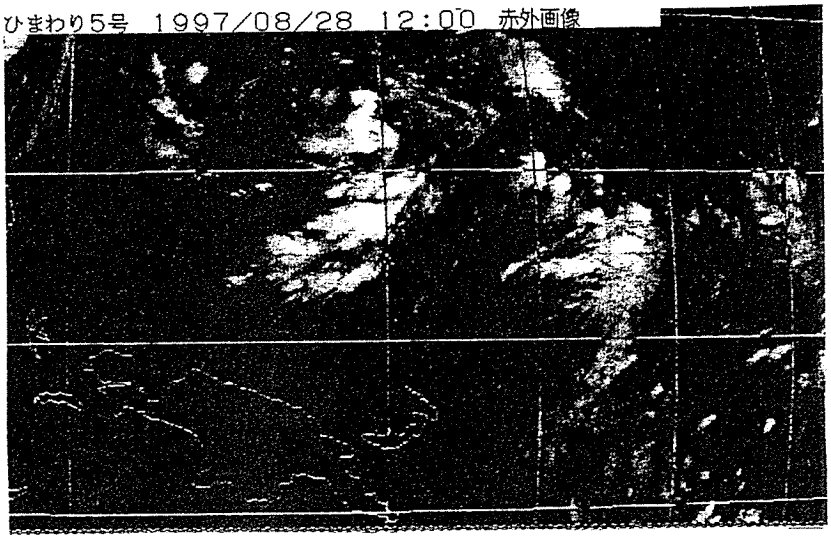
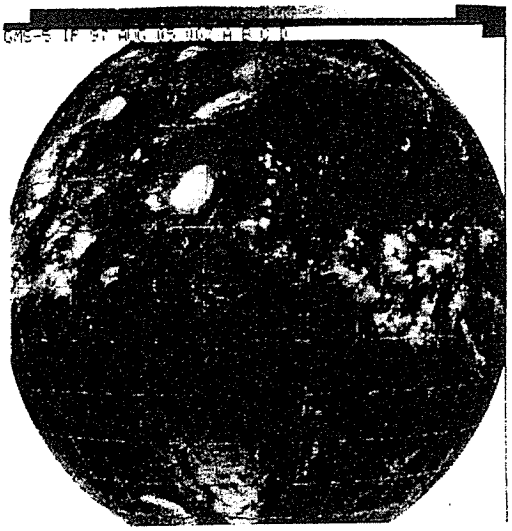
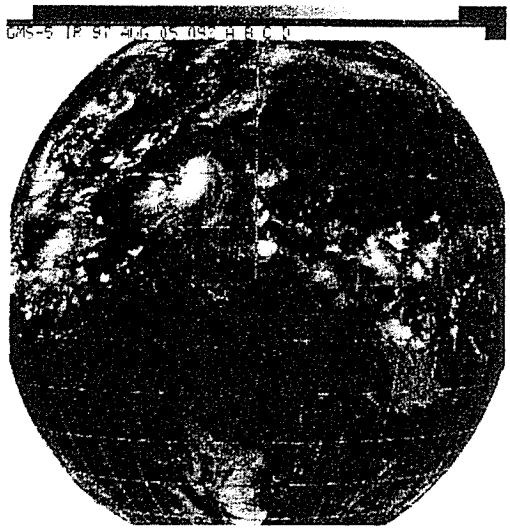
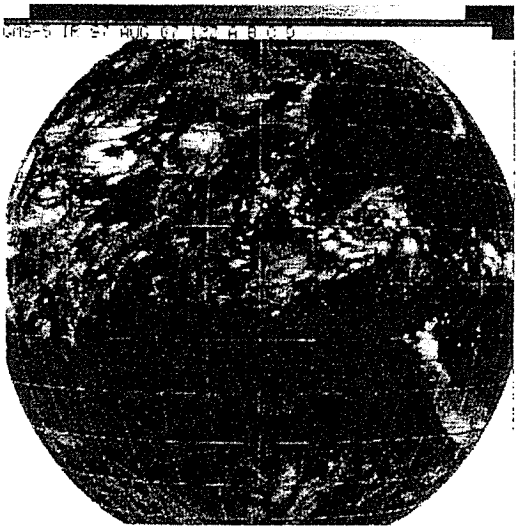


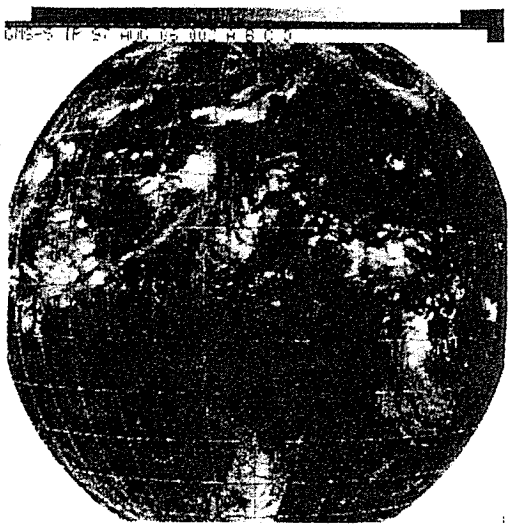
Aug. 28, 1997 03Z

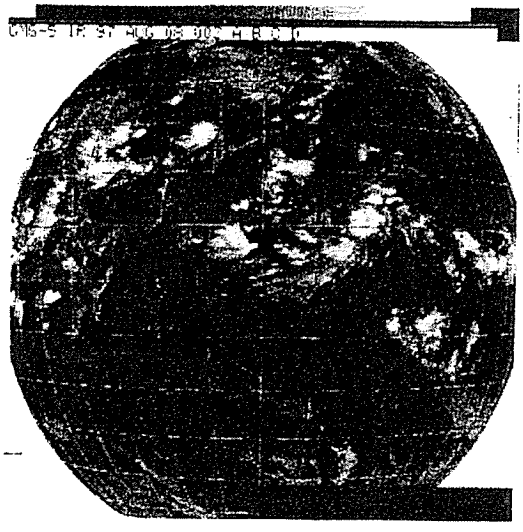


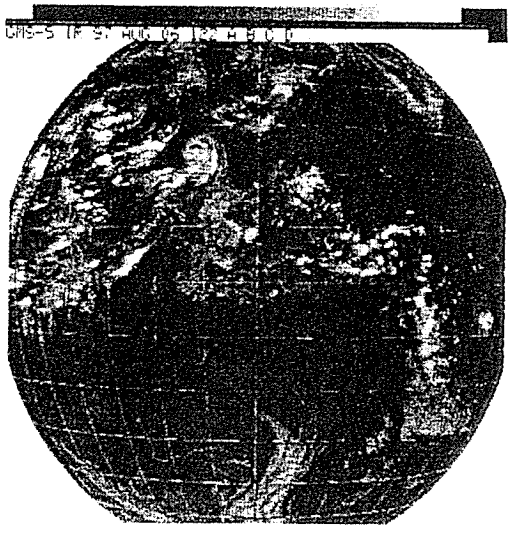


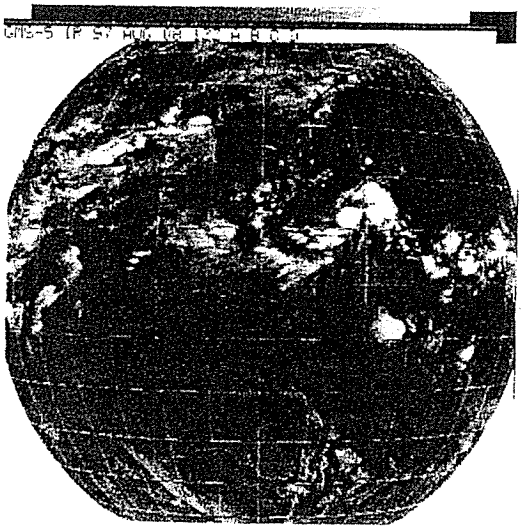


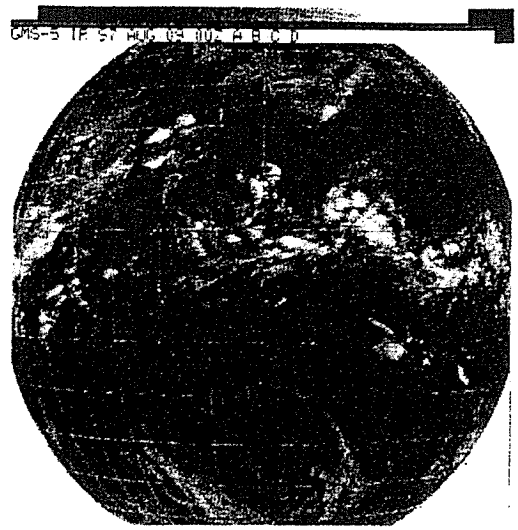


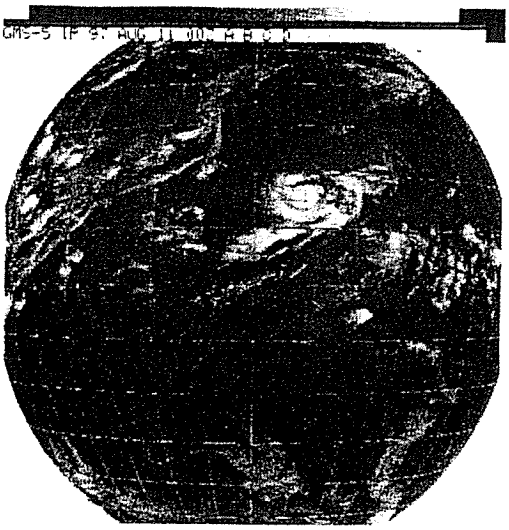


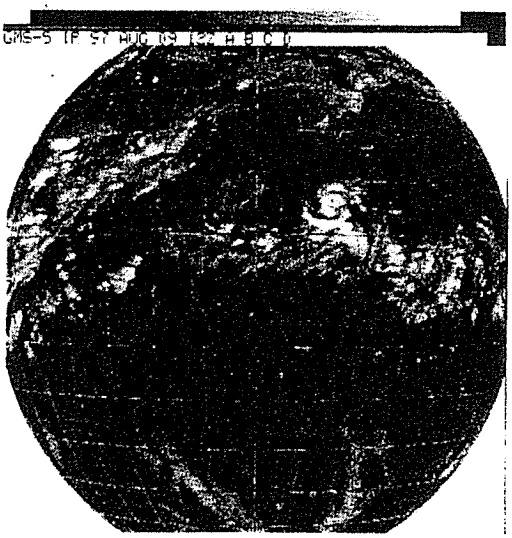


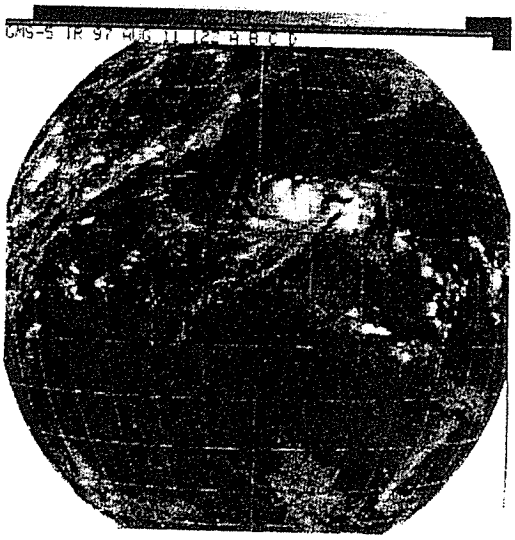


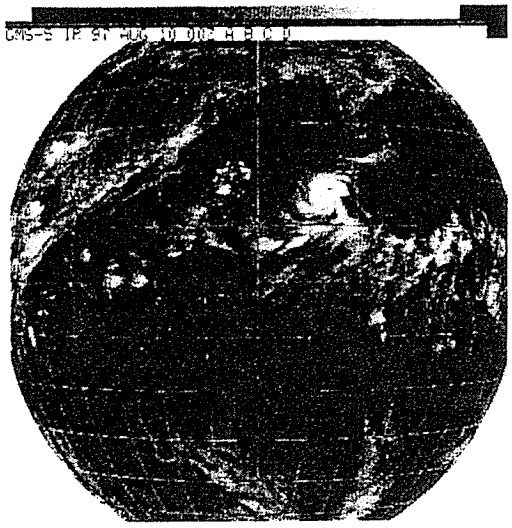


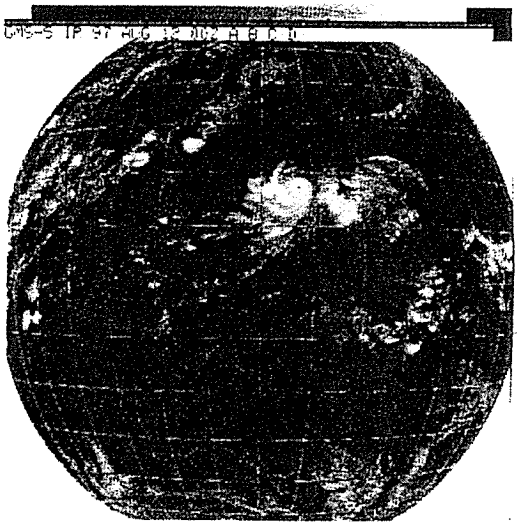


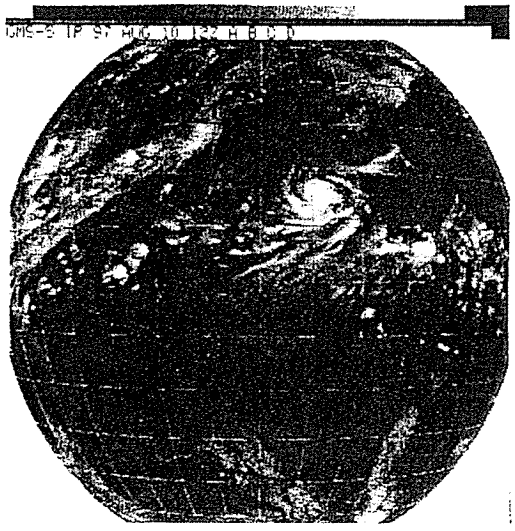


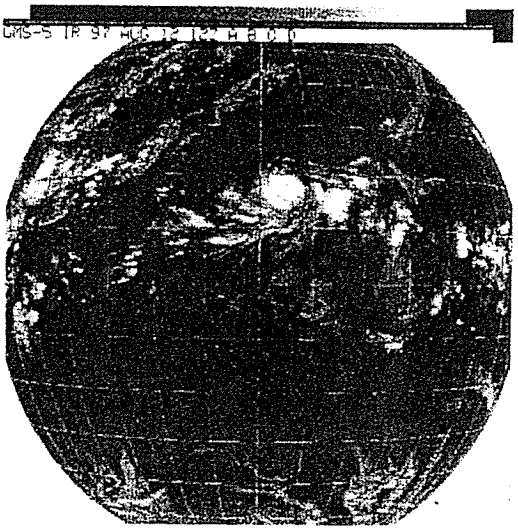


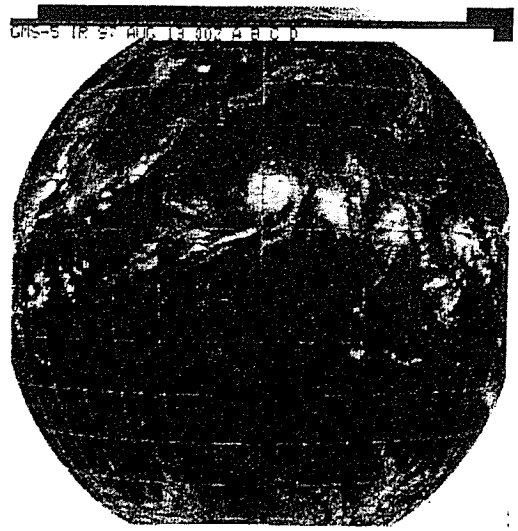
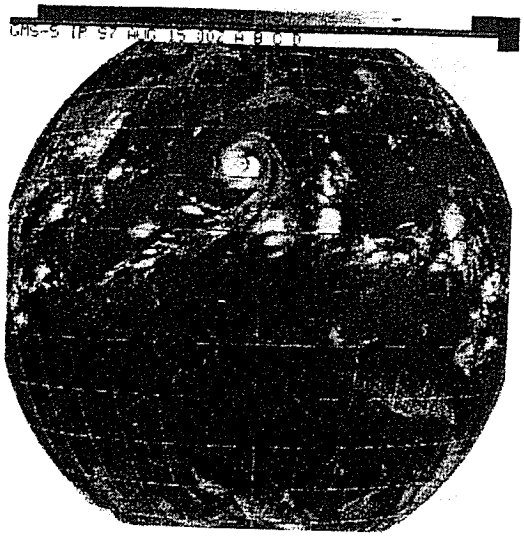
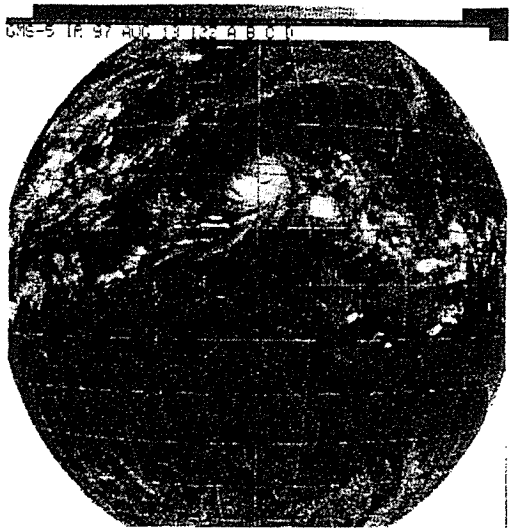


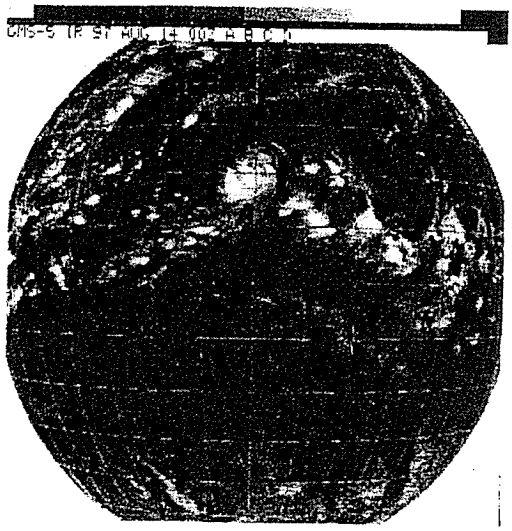
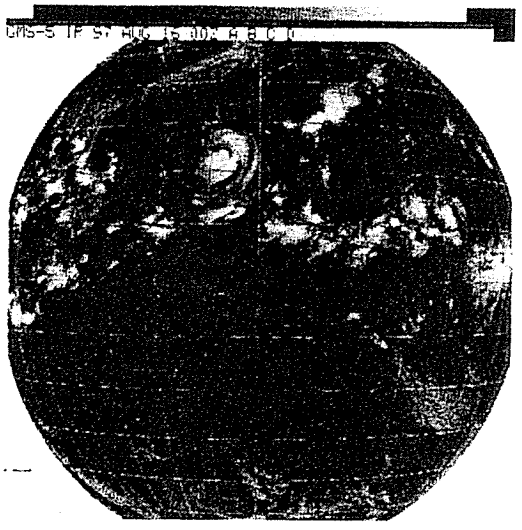
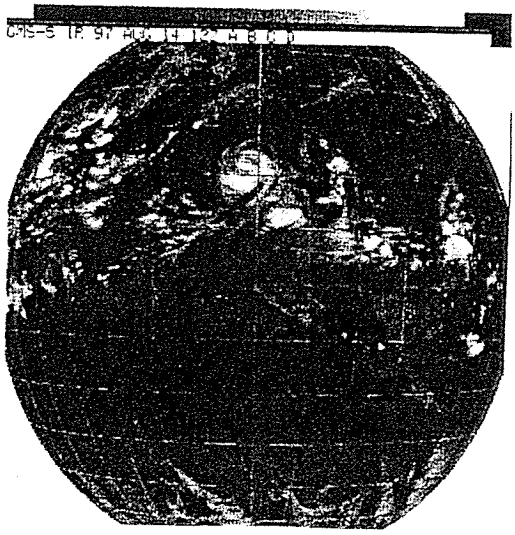
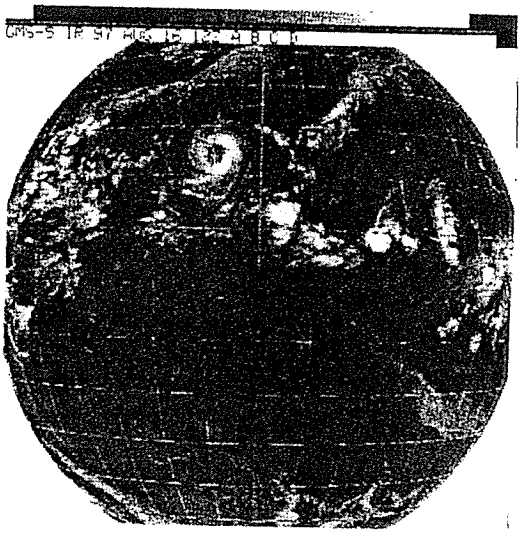


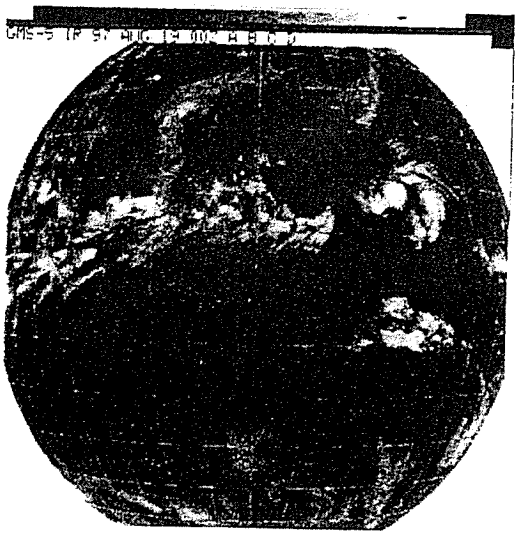


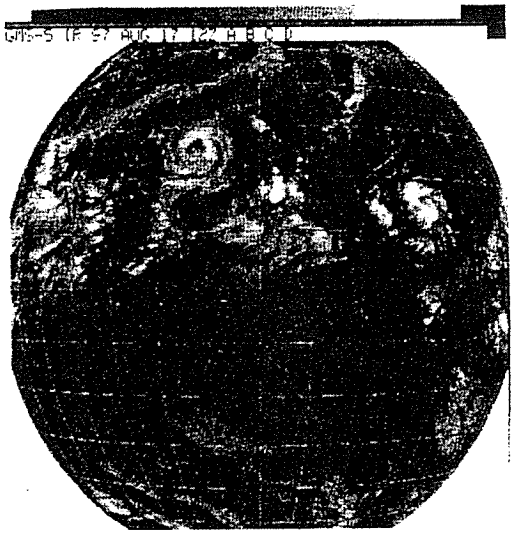


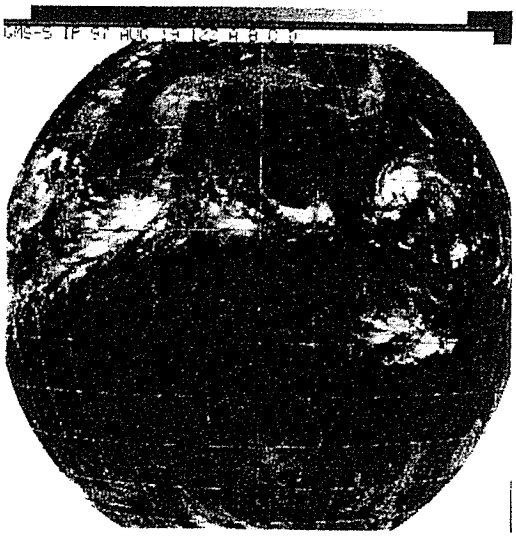


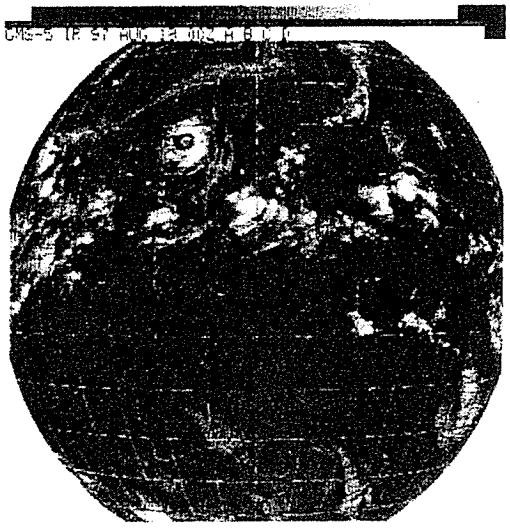




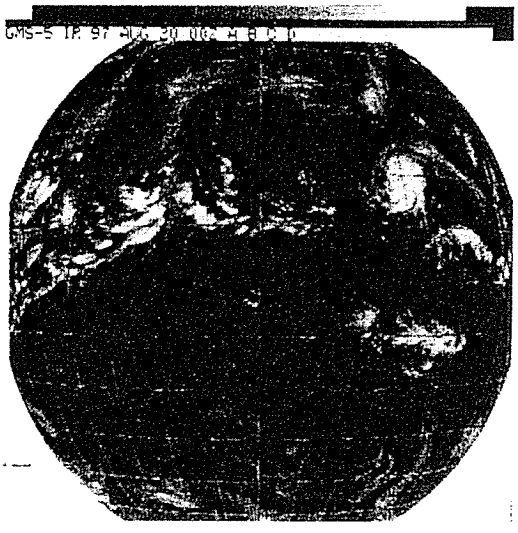





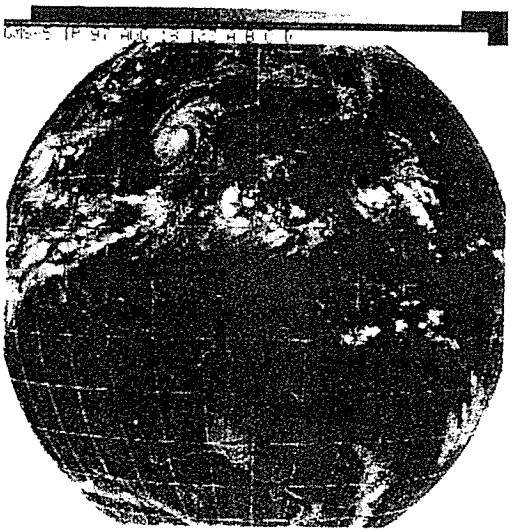


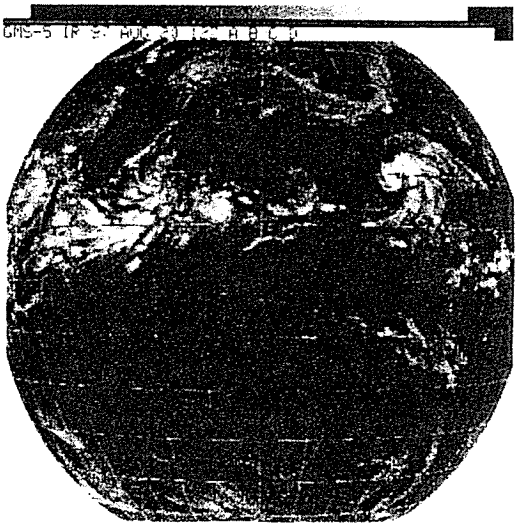


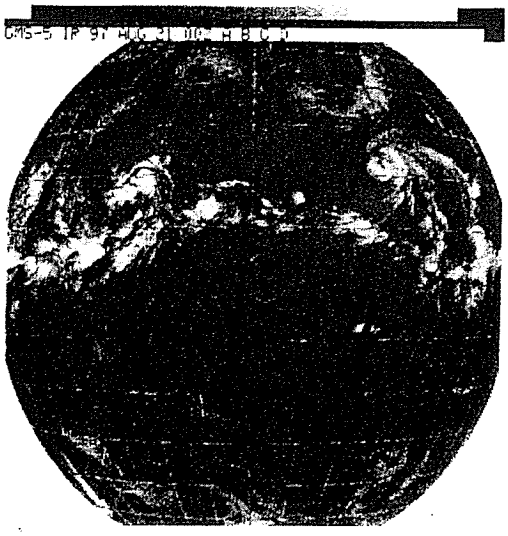


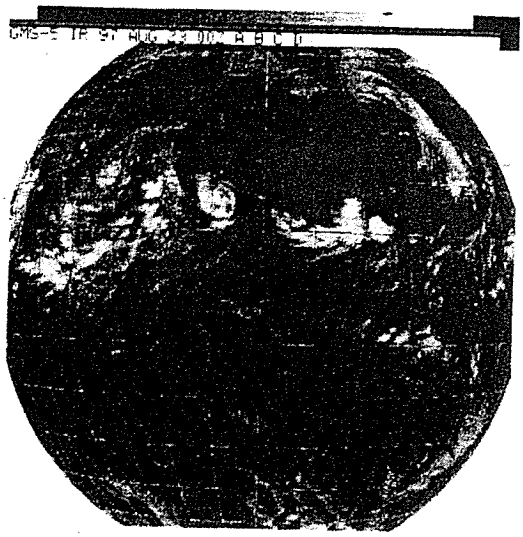


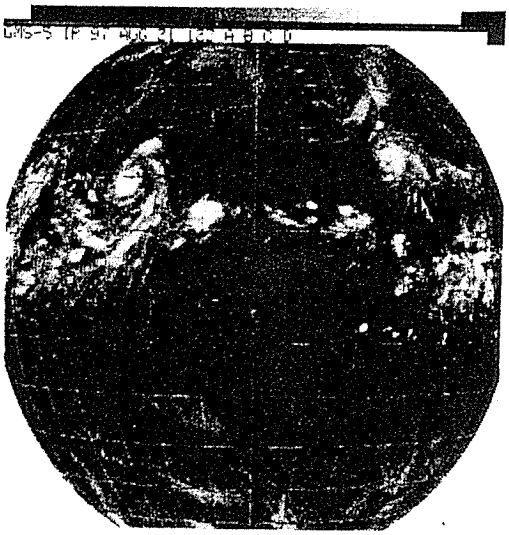


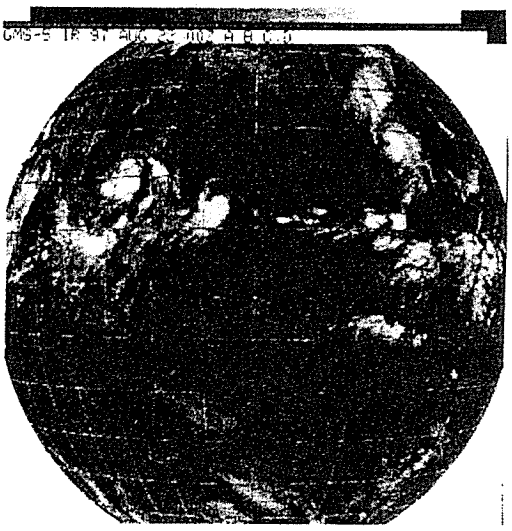


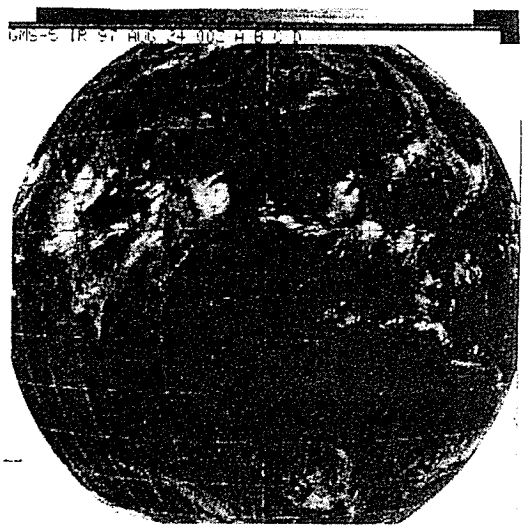


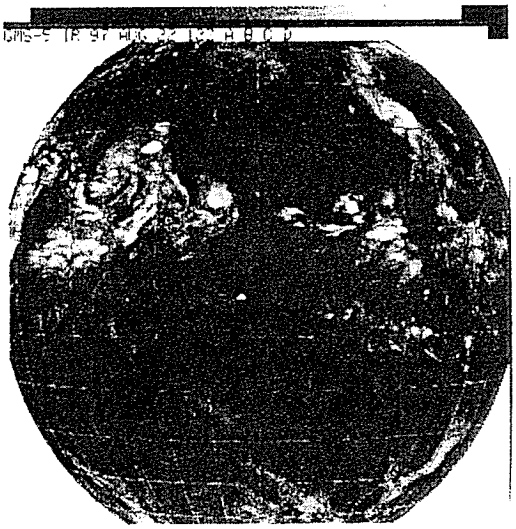


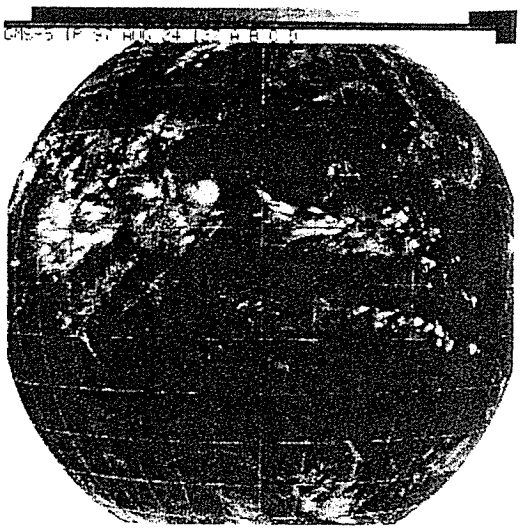










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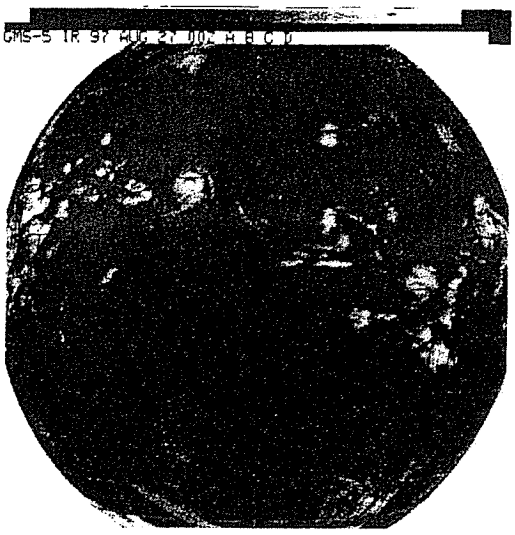
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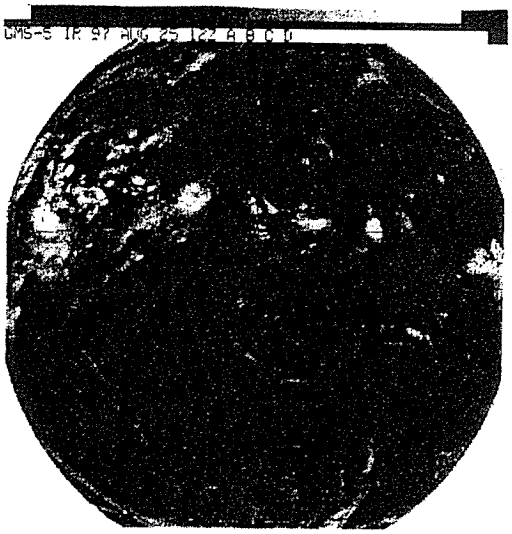
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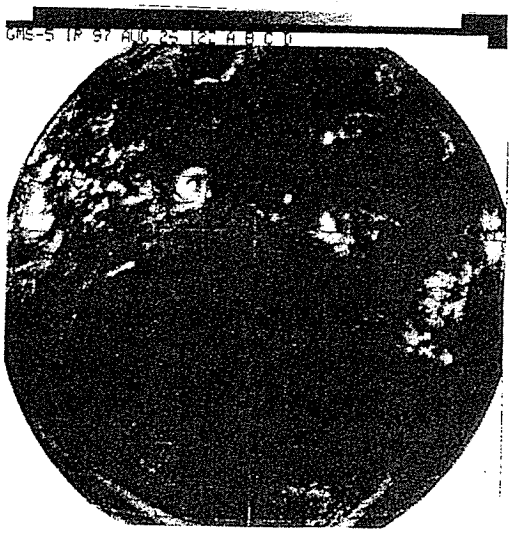
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Appendix　3.　ＣＴＤ観測中のトラブルおよび修理記録

概要

8月27日（水）のＣＴＤ観測中（st.C45，11:44頃，深度1010m，停止中）にアーマードケーブル（以下「ワイヤ」）とシーケーブルの接合部で断続的な絶縁不良が生じ、本体を揚収して修理を行った（以下「トラブル１」とする）。修理直後の観測中（st.C46，21:20頃，深度746m，1.2m/sで繰り出し中）に修理箇所に再び絶縁不良が生じ（以下「トラブル２」とする）、本体を揚収後、修理を行った。

再修理後の観測は正常に行われた。

１．原因

「トラブル１」、「トラブル２」とも、ワイヤのＣＴＤ側端末処理の不具合による絶縁不良。

２．「トラブル１」の原因の特定

始めに船上局のヒューズをチェックし、切れていたため交換した。交換後再びヒューズが切れたため、絶縁不良は瞬間的なものではないと判断した。観測を中断し、本体の揚収後に各部の抵抗値を実測して不良個所を特定した。

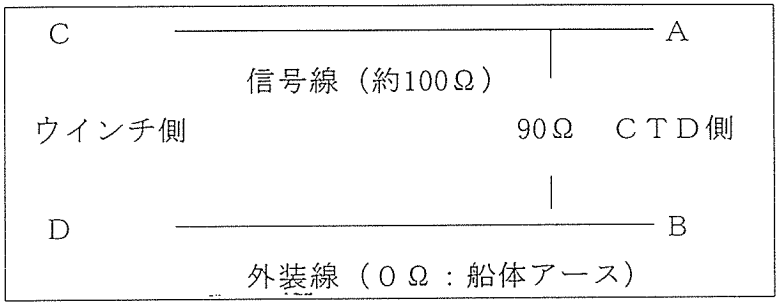
本航海で使用したウインチの「信号線抵抗値（ワイヤ長8000m）」は約100Ωであることを既知データとして用いた。以下に各部の抵抗の実測値と過程を示した。

絶縁不良箇所は一箇所であると仮定した。

各実測抵抗値

① Ａ－Ｃ：　87Ω
② Ｂ－Ｄ：　 0Ω
③ Ａ－Ｂ：　90Ω
④ Ａ－Ｄ：　90～130Ω
⑤ Ｂ－Ｃ：170～220Ω

（Ａ－Ｃはワイヤの信号線ケーブル、Ｂ－Ｄは外装線）



①、②で既知データの確認を行った。

③、④は「絶縁不良箇所の抵抗値」と「Ａから絶縁不良箇所までの信号線の抵抗値」の和を示す。

⑤は「絶縁不良箇所の抵抗値」と、「Ｃからその箇所までの信号線の抵抗値」の和を示す。①から⑤の計測を行って、「⑤-④」の値と③の90Ω値とがほぼ同じ値であったため、絶縁不良個所を「ワイヤのＣＴＤ側先端部」と特定した。

3．修理－「トラブル２」の後のワイヤとシーケーブルの接合方法－

1）信号線ケーブルを約8cm出し、ワイヤの素線を１本だけ残して切断した。
2）信号線のみを先にハンダ付けし、さらに圧着端子で加工した。
3）接合部に生ゴムおよび自己融着テープ（以下「融着テープ」とする）を十分に巻いた。融着テープは引き延ばしながら幅の約1/3程度を重ねて巻き、ワイヤの素線に掛からぬようにした。（この時点で、目的深度の水圧に対して海水との絶縁を得なければならならない。）
4）外装線を圧着端子を用いて加工し、接合部を信号線同様に生ゴムと融着テープで巻いた。
5）信号線と外装線の両方を併せて融着テープで数層巻いた。
6）2本のインシュロック（W:13.0mm, T:2.0mm）で補強しさらに融着テープを数層巻いた。
7）擦れ防止としてビニールテープで接合部全体を数層巻き修理を終えた。

4．今後の対策

今回のトラブルでは、絶縁不良箇所の抵抗値は30～180Ωまで時間の経過とともに変化し、そのために不良箇所の特定に時間を要した。したがって今後は必要な既知データをもとに、短時間のうちに各部の絶縁試験を行うべきであると考える。本航海で使用したウインチ（ワイヤ全長8000m, S/N:04506）の「信号線の抵抗値」は90Ωであった。

接合部の加工には、接合部の浸水防止のためシリコン樹脂の注入を行いビニールホースを補強材とする方法（気象庁の方法）もある。

「トラブル１」の後、修理に曲がり防止のためにステンレス製パイプ（L:140mm, I.D. 17mm)を用いたが、再び絶縁不良を生じた（「トラブル２」）。この原因は加工に用いたパイプの内径は狭く、接合部の生ゴムおよび融着テープの量が制限されたためと推定された。事実、再修理のために接合部をあけたとき接合部は浸水していた。このことから今後、接合部に巻く生ゴムおよび自己融着テープの量は相当量必要なことがわかった。