SEKA
TAŞUCU PAPER PLANT
OCEANOGRAPHIC AND ATMOSPHERIC STUDIES
PHASE A-II FINAL REPORT

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I. INTRODUCTION

1.1. Objectives and Scope of the Study

This continuing study was initiated in 1982 for comprehensive baseline evaluations of the environmental conditions at the Taşucu Paper Mill site with regard to the effects of Paper Mill effluents on the oceanic and atmospheric media. The project is being carried out by the Institute of Marine Science, Middle East Technical University (IMS-METU) for the Mediterranean Establishment of the Turkish Cellulose and Paper Works (SEKA).

The project was separated into three phase. Phase A.I. pre-operational studies covered detailed measurements and reviews of hydrography, chemical properties, currents and circulation, and atmospheric characteristics. The final report for this phase have been proviously completed and submitted to SEKA (IMS-METU, 1984), while phase A.I. studies were done prior to the plant's commencement of production, the phases A.II and A.III are intended for monitoring the environmental conditions and effects of the paper mill in the post-operational period. The mill has been in operation starting with May 1983, that is slightly after the initial production was at a small proportion of the mill capacity, and has since then been gradually increased to fully operational conditions.

The peresent report essentially covers phase A.II studies on the monitoring of hydrographic, hydrochemical and atmospheric chemical parameters at a number of stations on a seasonal basis.

2. DATA COLLECTION TECHNIQUES AND COVERAGE

2.1. Instrumentation and Methods of Analysis

The laboratory and field instruments and methods of Analysis are the same as used in Phase A.I. studies, reported in the final report for this phase (Sections 2.1 and 2.2, IMS-METU, 1984). Since the details can be found in this reference these are not included in the peresent report.

2.2. Data Coverage

2.2.1. Cruises and Stations

Four seasonal oceanographic cruises were planned to be carried out in the Phase A.II studies, during the one year period August 1983-July 1984. Results of a further cruise made in October 1984 as a part of Phase A.III studies are also included in this report for the sake of completeness, and thus five cruises are reported. The actual dates and the research vessels employed in these cruises are shown in Table 1. The oceanographic stations occupied in the cruises are shown in Figure 1. The land-based atmospheric sampling stations are also shown in the same figure and listed in Table 2.

In addition to the 4 oceanographic stations in the outer part of the Göksu river delta (stations 21,22,23,24) and 3 stations in Taşucu Bay (25,26,27) shown in Figure 1, a station at the SEKA disharge point referred to as station DP was also visited after May 1984, when the paper mill started preliminary operations. At the total 8 stations hydrographic (temperature, salinity, density) and chemical (dissolved oxygen, biological oxygen demand, pH, suspended material and humic matter) were measured.

At 5 atmospheric stations shown in Figure 1, atmospheric particulate matter measurements has been done. The collected particulate matter was also analyzed for soluble parts and ash content.

Attempts done for the measurement of sulfonation rate failed since all of the containers (petri dishes) placed at each station were lost. Thus different locations has been proposed and a new support has been desinged for the petri dishes.

2.2.2. Oceanographic Parameters

Hydrographic data collected at stations are listed in Table 3 on a cruise basis. Each station listing of data includes station number, date, time, air temperature (^{o}C), relative humidity (%), barometric pressure (mb), wind speed (knots) and direction, sea state, total depth (m) and Secchi disc depth (m) as heading information. Below this information, record number, depth (m), temperature (^{o}C) conductivity (mmho/cm), salinity (‰),

density (simga-t), saturation dissolved oxygen (mg/l), and difference and ratios of the latter two items are listed. Here, sigma-t is the density unit defined as (1-density) x 1000, sigma-t and saturation dissolved oxygen have been calculated from standart formulas for given salinity and temperature values.

Hydrochemical parameters obtained at each cruise are listed in Table 4 in the order of station number, depth (m), Secchi disc depth at station (m), pH, suspended matter (mg/l), biological oxygen demand (mg/l), dissolved oxygen (mg/l) and humic matter (mg/l).

2.2.3. Atmospheric Parameters

At each station atmospheric dustfall was collected for a known period and analyzed. Table 5 consist the data obtained for such analyses. In the data given in Table 5 insoluble dustfall, soluble dustfall, soluble and insoluble ash are included. These parameters give some information about the character of the dustfall.

3. DISCUSSIONS

3.1. Hydrography

The measurements of hydrographic parameters during the A.II phase mainly had the purpose of monitoring and comparing these measurements with the earlier fields obtained in phase A.I. studies. The full data listing is to be found in Table 3.

A summary of the observed hydrographic features is given through Figures 2,3,4 and 5.

In Figure 2 temperature, salinity and sigma-t profiles at each cruise are presented for two stations: station 26 was selected to be representative of the Taşucu Bay conditions, and station 22 was selected because it was close to the discharge point of the SEKA outfall. It can be seen that significant differences in the profiles at these stations occur in the cruises of 06/09/83, 18/12/83 and 10/05/84 while the profiles are approximately similar for the other two cruises on 25/07/84 and 11/10/84. The differences occur mainly near the surface and salinity and sigma-t values of station 22 are much lower in the corresponding months because of the fresh water influence of the Göksu river discharge. Only in the cruise of 10/05/84, i.e. the spring-time does the salinity profiles of station

26 in Taşucu Bay indicate the fresh water influence to reach the interior of the Bay. This is somewhat consistent with the A.I. phase studies, since the spring floods were indicated as the most influential periods of the Göksu discharge (IMS-METU, 1984). In sigma-t profiles a surface layer of low density is also indicated on 25/07/84 at station 26 but this is mainly due to the surface warming in summer as displayed in Figure 2. In the spring cruise of 10/05/84 the whole salinity values at profiles of both stations 22 and 26 are reduced up to a depth of almost 40 meters, being even more pronounced at station 22, while the salinity variation in the remaining part of the year are relatively small.

In order to display fresh-water effects, the corresponding salinity contorurs of a trensect taken from station 24 to station 21 are plotted in Figure 3 for each cruise. The fresh water influence originating from the Göksu river mouth near station 21 is observed in the first three cruises (September to May). while no effect is seen in the July and October cruises of 1984. In the September 1983 cruise the river influence reaches only up to station 22, but in the December and May cruises this influence is largely felt at the entrance of Taşucu Bay, and a very low salinity layer is detected very close to the surface. In the spring cruise of May 1984 freshwater mainly originating from the river covers the whole area and lowers salinities even in depth. It seems that the river plume is bending in a westerly direction during the latter two cruises and influencing Taşucu Bay.

Surface salinity vaules and Secchi disc depths obtained at

stations are displayed in Figures 4.a-4.e in order to show the domain of influence of the river water and the general distribution of turbidity and salinity. It will be noted that the results are generally similar to those reported in A.I phase studies (IMS-METU, 1984), although the number of stations covered for monitoring is much lower than the earlier phase. There are important differences in same months as compared to the first year cruises, but these differences mainly arise from the year to year changes of the hydrologic regime of the Göksu river.

In fact, the variations in the distribution of water masses resulting from year to year changes of the hydrologic (and climatological) factors are shown more clearly in Figures 5a-c, where temperature, salinity an density ranges obtained in phase A.II are qualitatively compared with those reported earlier for the A.I phase studies. In these figures cruise dates of A.II phase have been arbitrarily superimposed on the first part of the curves corresponding to the same dates of the year 1982, to show annual differences. Station 21 was compared with earlier station 11 near the river mouth (Fig 5.a) and similarly averages of stations 25,26,27 in Taşucu Bay were formed and compared with former station 3 in Fig 5.b. The ranges of parameters observed in the whole region were superimposed on the corresponding figure of the earlier studies in Fig 5.c. All of these figures show that while the general trends are somewhat similar important changes occurred between the actual values of 1982 and 1983/84 (A.II) observations. The salinities were lower in the corresponding summer months, mainly because of possible differences of

climatological factors. Temperatures were higher than at the time of the earlier studies but salinity reductions more than compensated for this effect to reduce the density ranges as compared to 1982.

3.2. Chemical Parameters:

3.2.1. Dissolved Oxygen (DO)

The dissolved oxygen concentration in the marine environment is influenced by complex processes. It is brought into solution in the seawater in two ways, by absorption from the atmosphere and by photosynthesis. Absorption takes place at air-sea interface. The solubility of oxygen dependends on different physical and chemical conditions in the sea, such as, salinity, temperature, diffusion, advection, vertical mixing. Photosynthesis is light dependent and takes place in the upper level of the water column. Under favorable conditions photosynthesis may produce oxygen in the water in amounts which exceed the saturation value. The decomposition processes are oxygen-consuming and take place in all levels of the sea (Ernst FØyn, 1969). The saturated concentration of dissolved oxygen (SDO) is determined by its solubility, in sea-water as a function of salinity and temperature of the medium (Riley and Skirrow, 1975). The measured DO concentrations and SDO concentrations are listed in Table 3 and Table 4 on the cruise basis. The average DO for each cruise is also calculated and is given in Table 4,a. The annual average variation of DO and SDO is plotted in Fig 6. The highest DO was in May, 1984 and the lowest DO was observed in September, 1983 and July, 1984. If we compare DO and SDO (See Fig 6) it is seen that DO concentration is greater than SDO in spring (May, 1984) and

fall (October, 1984) monthes, while in summer and winter months SDO is greater or equals to DO.

It is known that spring and fall bloom of the planktonic organisms occure and thus because of photosynthesis oxygen is produced in the water column. The oversaturated DO in spring and fall monthes could be the result of biological production of oxygen. The degradation of dead organisms or planktonic products during winter and summer months consume oxygen and DO content of water decrease. Beside the degradation and photosynthesis processes, thermo dynamic requirements also influence the DO, SDO concentrations. In July, 1984 and September, 1983 seawater temperature is at its maximum. This requires minimun SDO and as can be seen from Fig 6. SDO is at its minimum and equals to DO. In December, 1983 and May, 1984 temperature is at its minimum value and SDO increases above the DO concentration in December, 1983, Although SDO is at its maximum in May, 1984, because of the reasons mentioned above DO is greater then SDO.

As a result it can be said that the ranges of DO measured during the studied period is above the critical lower limit of 5 mg/l, required to sustain the marine biological activity.

3.2.2. Biochemical Oxygen Demand (BOD_5)

Biochemical oxygen demand is related to the biodegradable load of the water. It measures the oxygen required for biochemical degradation of organic material and the oxygen used to oxidize inorganic material such as sulfides, reduced nitrogen and ferrous iron.

The BOD_5 test results are summarized in Table 4 and the average BOD_5 values of each cruise are given in Table 4.b. The average BOD_5 and the variation with respect to sampling periods is plotted in Fig. 7.

The relatively high BOD_5 which occure in December, 1983 and May, 1984 is a result of biodegradable organic load introduced by the phytoplankton bloom in fall and spring seasons respectively. In summer months the BOD_5 drops and reach to its minimum values during July-October.

3.2.3. Humic Matter. (HM)

Humic matter is the decomposition products of terrestrial and marine biota.

The measured HM values are listed in Table 4 and the average HM values are listed in Table 4.c. The variation of HM with respect to sampling periods is plotted in Fig 8. As can be seen from Fig 8. in December, 1983 (after the fall bloom) HM is relatively high. During May, 1984 it is at its maximum value.

In spring, rain water and the water originated from the melting of snow, wash the terrigeneous HM into the sea. It is clear that in spring months great portion of HM has terrestrial origine and only a small fraction originate from the decomposition of marine biota.

3.2.4. pH

pH is a number that describes the degree of acidiy or basicity of a solution.

The pH values measured in each cruise are listed in Table 4. The average pH for each cruise is plotted in Figure 9. The overall average of measured pH is 8.21 $\pm$ 0.05 which is a normal pH for an oxic coastal region. The observed variation in pH is very small and results from climatological factors.

3.2.5 Particulate Matter (Total Suspended Sediment)

The measured particulate matter is given in Table 4. The frequency distribution of the Average particulate matter with respect to selected intervals is given in Fig. 11. About 90 % of the frequencies fall in the range of 0-7 mg/l. Frequencies which are above these concentrations (0-7 mg/l) corresponds to station 21 which is very close to Göksu river.

The variation in particulate matter content of the studied area is plotted in Fig. 10.

The maximum particulate concentrations reach during winter season. In spring the particulate load is still high and drops down during summer and fall months. During winter season rain water which can reach to the sea wash out terrestrial origine particulate and transport them into the sea. This is indicated by highest particulate load (33.7 mg/l) at the mouth of Göksu river in December, 1985 cruise. In spring in addition to terrestrial origine particulate, load introduced as a result of marine biota can be included. This is also indicated by relatively high suspended load in all stations.

4. ATM STUDIES

4.1. Introduction:

The atmospheric characteristics of the region have been reviewed in Phase A.I. Final Report. (Section 1.3.4). In the present chapter, the results of atmospheric dust settling measurements will be reported.

4.2. Atmospheric Particulate Matter Determinations:

Determinations of atmospheric particulates were done by the techniques given in Phase A.I. studies final report (Section 2.2.). The results obtained at five stations are listed in Table 5.

The percent frequency distribution of total dustfall observed at five stations is shown in Fig. 12. About 96 % of the total dustfall are between the ranges of 10×10^{-3} and 80×10^{-3} mg-cm^{-2}- day^{-1}. Only 4% of the observed dustfall correspond to higher values. The highest total dustfall of 352×10^{-3} mg- day^{-1} -cm^{-1}, has been observed only for a single collection at station five in August-October, 1983 sampling period.

The annual variations of the total dustfall are shown in Fig. 13 It can be seen from Fig. 13 that the highest total dustfall measured during August-December, 1983 period. Due to the inherenet variability in results obtained by the method used for the analysis, it should be better to investigate average

trends of 5 sampling stations. The annual variation of the average total dustfall is plotted in Fig 14. The total dustfall is maximum in the period of August-November, 1984. In the spring and winter months , the total dustfall decreases, due to the washout of atmospheric particulates by rain. The avegarge annual total dustfall irrespective of the sampling area is 44×10^{-3} mg-day^{-1}-cm^{-2} 70% of this load is insoluble fraction and 30% is soluble fraction.

REFERENCES

Taşucu Paper Plant Oceanographic and Atmospheric studies (Pre-operetional phase) Final Report, Prepared by: IMS METU, 1984.

Ernst FØ yn, "Chemical Oceanography" Ed. Rolf Lange, printed in Denmark by P.J. Sehmidt, Vojens, 1969

Riley, J.P.and G. Skirrow, "Chemical Oceanography, Academic Press, 1975.

Abbreviations used in the table and the units used in the tabulated parameters.

REC	: Receiving order
D(M)	: Sampling depth (m)
T(^{o}C)	: Sea water temperature
C(MMHO/CM)	: Conductivity (mmho/cm)
S(‰)	: Salinity (S‰)
SIG.T	: Sigma-t (σ_t)
SDO	: Saturation dissolved oxygen (mg/l)
DO	: Dissolved oxygen (mg/l)

The contents of header information used in Table 3.

Project	: Name of the project
Air temp.	: Air temperature (^{o}C)
X Wind	: Direction from which wind.blow.
XX Sea	: Visual obervation of sea state
Station	: Station number shown in Fig.1
Tot.Dep.	: Total depth of the particular station
Date	: Date at which the station is oceupied.

Baro.Pressure: Atmospheric pressure (mb).

Sec.Disc.Dep.: Secchi disc depth (m).

X E	: East	N.E.	: North East
W	: West	N.W.	: North West
N	: North	S.E.	: South East
S	: South	S.W.	: South West.

XX Sea state codes used in table	Wave height "ft"
0	0
1	0-1
2	1-3
3	3-5
4	5-8
5	8-12
6	12-20
7	20-40
8	40

TABLE I

OCEANOGRAPHIC CRUISES

Cruise No	Date	Rereacrh Vessel
15	6-7, September, 1983	R/V LAMAS
16	18, December, 1983	R/V BİLİM
17	10, May, 1984	R/V LAMAS
18	24-25, July, 1984	R/V LAMAS
19	11-12, October, 1984	R/V ERDEMLİ

TABLE 2

ATMOSPHERIC SAMPLING STATIONS

Station No	Description
1	At shore in the Taşucu Paper Mill area.
2	At the water reservoir of Taşucu Paper Mill.
3	At shore in the Taşucu Harbour area.
4	At Silifke Meteorological station.
5	At the Taşucu Paper Mill water supply dam.

Table 3. Hydrographic data collected at each station.

PROJECT : SEKA
AIR TEMP: 29 C.
WIND : K.B
SEA : 2

STATION : 21
TOT.DEP.: 30 MT.

DATE :06/09/1983 TIME: 14:10
BARO.PRESSURE : 1000 MB.
SEC.DISC.DEP. : 15 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	28.27	61.08	38.23	24.76	6.28	6.30	0.02	1.00
2	7.0	27.90	61.31	38.69	25.23	6.30	0.00	0.00	0.00
3	12.0	27.85	61.31	38.73	25.27	6.30	6.35	0.05	1.01
4	20.0	27.64	61.16	38.80	25.39	6.32	6.35	0.03	1.00

PROJECT : SEKA
AIR TEMP : 29 C.
WIND : K.B
SEA : 2

STATION : 22
TOT.DEP. : 20 MT.

DATE : 06/09/1983 TIME : 14:57
BARO.PRESSURE : 1000 MB.
SEC.DISC.DEP. : 7 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	28.08	61.31	38.55	25.06	6.29	0.00	0.00	0.00
2	7.0	27.77	61.31	38.80	25.35	6.31	6.15	-0.16	0.97
3	16.0	27.54	61.31	38.77	25.40	6.34	6.65	0.31	1.05

PROJECT : SEKA
AIR TEMP: 29 C.
WIND : K.B
SEA : 3

STATION : 23
TOT.DEP.: 50 MT.

DATE :07/09/1983 TIME: 10:17
BARO.PRESSURE : 999 MB.
SEC.DISC.DEP. : 21 MT,

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	24.41	60.47	38.50	25.24	6.36	6.45	0.09	1.01
2	7.0	27.53	61.08	38.83	25.46	6.33	0.00	0.00	0.00
3	9.0	27.59	61.08	38.78	25.40	6.33	6.10	-0.23	0.96
4	15.0	27.53	61.08	38.83	25.45	6.33	0.00	0.00	0.00
5	24.0	26.96	60.47	38.86	25.66	6.39	6.25	0.14	0.98
6	38.0	24.13	56.37	38.20	26.05	6.73	0.00	0.00	0.00

PROJECT : SEKA
AIR TEMP : 29 C.
WIND : K.B.
SEA : 3

STATION : 24
TOT.DEP. : 32 MT.

DATE : 06/09/1983 TIME :15:53
BARO.PRESSURE :999 MB.
SEC.DISC.DEP. :16 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	28.29	61.84	38.75	25.14	6.28	6.30	0.04	1.01
2	8.0	27.77	61.31	38.80	25.35	6.31	6.60	0.29	1.05
3	16.0	27.64	61.16	38.80	25.39	6.32	0.00	0.00	0.00
4	26.0	27.54	61.00	38.76	25.40	6.34	6.20	-0.14	0.98

PROJECT : SEKA
AIR TEMP: 29 C.
WIND : K.B
SEA : 3

STATION : 25
TOT.DEP.: 16 MT.

DATE : 06/09/1983 TIME: 16:56
BARO.PRESSURE : 999 MB.
SEC.DISC.DEP. : 9 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	27,95	61,54	38.82	25.31	6,29	6.35	0.06	1.01
2	12,0	27.72	61,23	38,78	25.36	6.32	6,60	0.28	1.04

PROJECT : SEKA
AIR TEMP : 28 C.
WIND : K.B.
SEA : 2

STATION : 26
TOT.DEP. : 40 MT.

DATE : 07/09/1983 TIME : 08:26
BARO.PRESSURE : 999 MB.
SEC.DISC.DEP. : 8 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	27.56	61,08	38.81	25,43	6.33	6.25	-0.08	0.99
2	19.0	27,61	61.16	38,82	25,42	6,33	5.90	-0.43	0.93
3	32,0	27.43	60,93	38.80	25,46	6.35	6.10	-0.25	0.96

PROJECT : SEKA
AIR TEMP: 28 C.
WIND : K.B.
SEA : 3

STATION : 27
TOT.DEP.: 32 MT.

DATE : 06/09/1983 TIME: 17:35
BARO.PRESSURE : 999 MB.
SEC.DISC.DEP. : 9 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	27.93	61.54	38.83	25.33	6.29	6.30	0.01	1.00
2	7.0	27.80	61.38	38.83	25.36	6.31	0.00	0.00	0.00
3	15.0	27.56	61.08	38.81	25.43	6.33	6.15	-0.18	0.97
4	24.0	27.46	61.00	38.83	25.48	6.34	6.40	0.06	1.01

PROJECT : SEKA
AIR TEMP : C
WIND :
SEA :

STATION : 21
TOT.DEP. : 35 MT.

DATE : 18/12/1983 TIME : 15:15
BARO.PRESSURE : MB.
SEC.DISC.DEP. : 0 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	18,28	47,69	36.30	26,22	7,56	8,16	0.60	1,08
2	0.6	18,60	48,70	36,88	26,58	7,49	0,00	0.00	0.00
3	1.0	18,97	50,30	37,90	27,26	7,39	0,00	0.00	0.00
4	1,5	18,98	50,55	38,11	27,42	7,38	0.00	0.00	0.00
5	3.5	19.16	51,45	38,70	27,83	7,33	0.00	0.00	0.00
6	6.4	19.68	52,26	38,90	27,84	7.25	0.00	0.00	0.00
7	8.3	20,02	52,95	38,16	27,95	7,20	0,00	0,00	0.00
8	11.8	20,05	52,92	39.11	27,90	7,19	7,14	-0,05	0.99
9	17,0	20,23	53,28	39,24	27,95	7.17	0.00	0,00	0.00
10	21.4	20.31	53,38	38,24	27,93	7,15	0,00	0,00	0.00
11	25,7	20,31	53,42	38,27	27,96	7,15	0.00	0,00	0,00
12	29,8	20.32	53,45	39,29	27,96	7.15	0,00	0.00	0,00
13	32,5	20.32	53,47	39,30	27,98	7,15	0.00	0.00	0,00

PROJECT : SEKA STATION : 22 DATE : 18/12/1983 TIME: 16:10
AIR TEMP: C. TOT.DEP.: 20 MT. BARO.PRESSURE : MB.
WIND : SEC.DISC.DEP. : 1. MT.
SEA :

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	18.96	51.08	38.58	27.78	7.36	6.79	-0.57	0.92
2	3.9	19.80	52.25	38.78	27.72	7.24	0.00	0.00	0.00
3	5.4	20.18	52.74	38.84	27.66	7.19	0.00	0.00	0.00
4	10.3	20.47	53.64	39.31	27.94	7.13	6.66	-0.47	0.93
5	14.8	20.57	53.87	38.41	27.99	7.11	0.00	0.00	0.00
6	17.6	20.58	53.90	39.42	28.00	7.11	0.00	0.00	0.00

PROJECT : SEKA STATION : 23 DATE : 18/12/1983 TIME : 16:45
AIR TEMP : C. TOT.DEP. : 42 MT. BARO.PRESSURE : MB.
WIND : SEC.DISC.DEP. : 5 MT.
SEA :

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	18.92	51.12	38.65	27.85	7.37	6.73	-0.64	0.91
2	3.0	19.32	51.97	38.99	28.01	7.30	0.00	0.00	0.00
3	4.7	20.24	53.42	39.35	20.03	7.16	0.00	0.00	0.00
4	9.7	20.54	53.86	39.43	28.01	7.12	6.53	-0.59	0.92
5	15.4	20.56	53.88	39.43	28.00	7.11	0.00	0.00	0.00
6	20.4	20.56	53.91	39.45	28.02	7.11	0.00	0.00	0.00
7	30.8	20.56	53.92	39.45	28.02	7.11	0.00	0.00	0.00
8	39.7	20.56	53.94	39.47	28.03	7.11	0.00	0.00	0.00

PROJECT :
AIR TEMP: C.
WIND :
SEA :

STATION : 24
TOT.DEP.: 47 MT.

DATE : 18/12/1983 TIME: 17:15
BARO.PRESSURE : MB.
SEC.DISC.DEP. : 5 MT,

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	18.85	51.05	38.65	27.87	7.38	6.81	-0.57	0.92
2	3.0	19.58	52.01	38.78	27.78	7.27	0.00	0.00	0.00
3	5.4	20.18	53.47	39.45	28.12	7.16	0.00	0.00	0.00
4	9.7	20.38	53.74	39.48	28.09	7.14	6.32	-0.82	0.89
5	15.1	20.51	53.71	39.34	27.96	7.13	0.00	0.00	0.00
6	21.7	20.50	53.82	39.43	28.02	7.12	0.00	0.00	0.00
7	30.6	20.50	53.84	39.43	28.02	7.12	0.00	0.00	0.00
8	40.7	20.52	53.86	39.44	28.02	7.12	0.00	0.00	0.00

PROJECT :
AIR TEMP : C
WIND :
SEA :

STATION : 25
TOT.DEP. : 19 MT.

DATE : 18/12/1983 TIME : 18:20
BARO.PRESSURE : MB.
SEC.DISC.DEP. : 6 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	19.67	52.54	39.15	28.03	7.24	6.90	-0.34	0.95
2	4.7	19.50	52.43	39.12	28.13	7.26	0.00	0.00	0.00
3	10.4	19.27	52.23	39.26	28.22	7.29	7.02	-0.27	0.96
4	16.6	19.14	52.05	39.23	28.23	7.31	0.00	0.00	0.00

PROJECT :
AIR TEMP: C.
WIND :
SEA :

STATION : 26
TOT.DEP.: 37 MT.

DATE : 18/12/1983 TIME:19:00
BARO.PRESSURE : MB
SEC.DISC.DEP. : 6 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	19.77	52.81	39.28	28.11	7.22	6.87	-0.35	0.95
2	5.0	19.82	52.86	39.27	28.09	7.22	0.00	0.00	0.00
3	14.8	19.83	52.88	39.28	28.09	7.22	6.44	-0.78	0.89
4	25.3	19.80	52.87	39.29	28.11	7.22	0.00	0.00	0.00
5	29.2	19.66	52.48	39.09	27.99	7.25	0.00	0.00	0.00
6	34.8	19.10	51.94	39.16	28.20	7.32	0.00	0.00	0.00

PROJECT :
AIR TEMP : C.
WIND :
SEA :

STATION : 27
TOT.DEP. : 30 MT.

DATE : 18/12/1983 TIME : 19:53
BARO.PRESSURE : MB.
SEC.DISC.DEP. : 7 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	19.00	51.80	39.15	28.21	7.33	7.51	0.18	1.02
2	4.7	19.03	51.87	39.18	28.23	7.33	0.00	0.00	0.00
3	11.9	19.03	51.86	39.17	28.22	7.33	7.17	-0.16	0.98
4	20.0	19.04	51.85	39.15	28.20	7.33	0.00	0.00	0.00
5	23.8	18.88	51.67	39.15	28.24	7.35	0.00	0.00	0.00
6	28.0	18.73	51.52	39.16	28.29	7.37	0.00	0.00	0.00

PROJECT : SEKA
AIR TEMP: C.
WIND :
SEA : 1

STATION : 21
TOT.DEP.: 16 MT.

DATE : 10/05/1984 TIME: 12:20
BARO.PRESSURE : 1000 MB.
SEC.DISC.DEP. : 0 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	19.32	37.68	27.20	19.03	7.83	7.85	0.02	1.00
2	5.0	19.83	50.06	36.93	26.29	7.32	7.81	0.00	0.00
3	10.0	19.09	50.44	37.91	27.24	7.38	7.23	-0.15	0.98
4	15.0	19.48	50.14	38.21	27.63	7.45	7.03	0.00	0.00

PROJECT : SEKA
AIR TEMP : C.
WIND :
SEA : 1

STATION : 22
TOT.DEP. : 20 MT.

DATE : 10/05/1984 TIME : 13:10
BARO.PRESSURE : 1007 MB.
SEC.DISC.DEP. : 5 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	20.25	46.87	33.95	23.92	7.39	7.87	0.48	1.06
2	5.0	19.71	49.84	36.85	26.27	7.34	7.87	0.00	0.00
3	10.0	19.64	50.14	37.16	26.52	7.33	7.77	0.44	1.06
4	15.0	19.59	50.14	37.20	26.57	7.34	7.77	0.00	0.00
5	20.0	18.75	50.37	38.16	27.52	7.41	7.73	0.32	1.04

PROJECT : SEKA
AIR TEMP: C.
WIND :
SEA : 1

STATION : 23
TOT.DEP.: 28 MT.

DATE : 10/05/1984 TIME: 15:45
BARO.PRESSURE : 1006 MB.
SEC.DISC.DEP. : 8 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	20.68	48.47	34.90	24.52	7.29	7.36	0.07	1.01
2	5.0	19.98	50.22	36.93	26.25	7.30	7.36	0.00	0.00
3	10.0	19.27	50.44	37.74	27.06	7.36	8.24	0.88	1.12
4	15.0	18.60	50.22	38.17	27.57	7.43	8.28	0.00	0.00
5	24.0	18.48	50.14	38.21	27.63	7.45	8.60	1.15	1.15

PROJECT : SEKA
AIR TEMP : C.
WIND :
SEA : 1

STATION : 24
TOT.DEP. : 41 MT.

DATE : 10/05/1984 TIME : 14:50
BARO.PRESSURE : 1007 MB.
SEC.DISC.DEP. : 10 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	20.63	51.36	37.29	26.36	7.20	8.22	1.02	1.14
2	10.0	18.92	50.67	38.26	27.55	7.38	8.31	0.93	1.13
3	20.0	18.01	49.76	38.32	27.83	7.51	8.43	0.92	1.12
4	30.0	17.82	49.61	38.37	27.91	7.53	8.10	0.57	1.08
	0	17.74	49.53	38.37	27.94	7.54	8.09	0.00	0.00

PROJECT : SEKA
AIR TEMP: C.
WIND :
SEA : 1

STATION : 25
TOT.DEP.: 14 MT.

DATE : 10/05/1984 TIME: 16:25
BARO.PRESSURE : 1006 MB.
SEC.DISC.DEP. : 7 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	20.16	50.60	37.08	26.32	7.27	7.48	0.21	1.03
2	5.0	20.03	50.60	37.20	26.45	7.28	7.48	0.00	0.00
3	10.0	19.37	50.44	37.65	26.97	7.35	7.52	0.17	1.02

PROJECT : SEKA
AIR TEMP : C.
WIND :
SEA : 1

STATION : 26
TOT.DEP. : 38 MT.

DATE : 10/05/1984. TIME : 17:30
BARO.PRESSURE : 1007 MB.
SEC.DISC.DEP. : 8 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	20.16	50.37	36.89	26.18	7.27	7.06	-0.21	0.97
2	5.0	19.96	50.37	37.07	26.37	7.29	7.06	0.00	0.00
3	10.0	19.32	50.06	37.38	26.77	7.37	8.49	1.12	1.15
4	20.0	18.26	49.68	38.02	27.54	7.49	0.00	0.00	0.00
5	30.0	17.99	49.61	38.21	27.75	7.52	0.00	0.00	0.00
6	40.0	17.82	49.53	38.30	27.86	7.54	0.00	0.00	0.00

PROJECT : SEKA STATION : 27 DATE : 10/05/1984 TIME: 18:20
AIR TEMP: C. TOT.DEP.: 25 MT. BARO.PRESSURE : 1007 MB
WIND :
SEA : 1 SEC.DISC.DEP. :6 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	20.35	49.99	36.41	25.77	7.27	7.51	0.24	1.03
2	5.0	20.01	50.29	36.96	26.27	7.29	0.00	0.00	0.00
3	10.0	19.29	50.14	37.47	26.85	7.37	7.28	-0.09	0.99
4	20.0	18.01	49.53	38.13	27.68	7.52	7.10	-0.42	0.94

PROJECT : SEKA STATION : DP DATE : 10/05/1984 TIME :
AIR TEMP : C. TOT.DEP. : 12 MT. BARO.PRESSURE :1007 MB
WIND :
SEA : 1 SEC.DISC.DEP. : 4 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	20.95	46.57	33.15	23.13	7.33	7.80	0.47	1.06
2	5.0	19.64	49.61	36.72	26.18	7.35	7.68	0.33	1.04

PROJECT : SEKA
AIR TEMP: C.
WIND : W
SEA : 2

STATION : 21
TOT.DEP.: 15 MT.

DATE : 24/07/1984 TIME: 12:20
BARO.PRESSURE : 999 MB.
SEC.DISC.DEP. : 7 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	27.38	60.68	38.67	25.38	6.35	6.49	0.14	1.02
2	6.0	27.12	60.37	38.66	25.46	6.38	6.68	0.30	1.05

PROJECT : SEKA
AIR TEMP : C
WIND :
SEA : 2

STATION : 22
TOT.DEP. : 20 MT.

DATE : 24/07/1984 TIME : 13:04
BARO.PRESSURE : 999 MB
SEC.DISC.DEP. : 18 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	27.56	60.90	38.68	25.33	6.34	6.38	0.04	1.01
2	6.0	27.25	60.45	38.61	25.38	6.37	6.38	0.00	0.00
3	12.0	26.91	60.07	38.62	25.50	6.41	6.37	-0.04	0.99

PROJECT : SEKA
AIR TEMP: C
WIND : W
SEA : 3

STATION : 23
TOT.DEP.: 40 MT.

DATE : 24/07/1984 TIME: 14:30
BARO.PRESSURE : 996 MB.
SEC.DISC.DEP. : 19 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	27.98	61.36	38.66	25.18	6.29	6.21	-0.08	0.99
2	6.0	27.07	60.45	38.76	25.55	6.38	6.45	0.00	0.00
3	15.5	26.01	59.08	38.65	25.80	6.50	6.62	-0.05	0.99
4	22.0	24.00	56.50	38.42	26.25	6.73	6.98	0.00	0.00

PROJECT : SEKA
AIR TEMP : C
WIND : W
SEA : 4

STATION : 24
TOT.DEP. : 34 MT.

DATE : 24/07/1984 TIME : 15:18
BARO.PRESSURE : 998 MB.
SEC.DISC.DEP. : 17 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	27.72	61.28	38.82	25.39	6.31	6.41	0.10	1.02
2	6.0	27.30	60.68	38.74	25.46	6.36	6.28	0.00	0.00
3	15.5	26.81	60.07	38.70	25.59	6.41	6.38	-0.13	0.98
4	19.0	26.71	59.99	38.73	25.64	6.42	6.43	0.00	0.00

PROJECT : SEKA
AIR TEMP: C.
WIND : W
SEA : 1

STATION : 25
TOT.DEP.: 14 MT.

DATE : 24/07/1984 TIME: 16:10
BARO.PRESSURE : 996 MB.
SEC.DISC.DEP. : MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	28.24	61.59	38.61	25.06	6.27	6.47	0.20	1.03
2	5.5	27.09	60.30	38.64	25.45	6.39	6.66	0.27	1.04

PROJECT : SEKA
AIR TEMP : C.
WIND :
SEA : 1

STATION : 26
TOT.DEP. : 38 MT.

DATE : 25/07/1984 TIME : 07:47
BARO.PRESSURE : 997 MB
SEC.DISC.DEP. : 19 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	28.08	61.44	38.64	25.13	6.28	6.26	-0.02	1.00
2	5.5	27.69	60.90	38.57	25.21	6.33	6.27	0.00	0.00
3	15.0	26.19	59.16	38.55	25.68	6.49	6.45	-0.22	0.97
4	19.0	26.09	59.16	38.64	25.77	6.49	6.51	0.02	1.00

PROJECT : SEKA
AIR TEMP: C.
WIND :
SEA : 1

STATION : 27
TOT.DEP.: 30 MT.

DATE : 25/07/1984 TIME: 07:05
BARO.PRESSURE : 997 MB.
SEC.DISC.DEP. : 19 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	27.74	61.06	38.65	25.25	6.32	6.27	-0.05	0.99
2	5.5	27.61	60.90	38.64	25.28	6.33	6.35	0.00	0.00
3	15.0	26.35	59.39	38.59	25.65	6.47	6.46	-0.01	1.00
4	23.0	25.88	58.93	38.64	25.84	6.52	6.63	0.00	0.00
5	32.0	25.60	58.63	38.66	25.94	6.55	6.64	0.00	0.00

PROJECT : SEKA
AIR TEMP : C.
WIND :
SEA : 0

STATION : 21
TOT.DEP. : 22 MT.

DATE : 11/10/1984 TIME : 12:59
BARO.PRESSURE : 1024 MB.
SEC.DISC.DEP. : 5 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	26.78	60.30	38.90	25.75	6.41	6.87	0.46	1.07
2	6.0	26.71	60.22	38.90	25.77	6.42	6.70	0.00	0.00
3	11.0	26.63	60.07	38.85	25.76	6.43	6.70	0.27	1.04
4	15.0	26.29	59.69	38.86	25.88	6.46	6.65	0.00	0.00

PROJECT : SEKA
AIR TEMP: C.
WIND :
SEA : 1

STATION : 22
TOT.DEP.: 19 MT.

DATE : 11/10/1984 TIME: 13:45
BARO.PRESSURE : 1022 MB.
SEC.DISC.DEP. : 6 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	26.73	60.22	38.88	25.75	6.42	6.89	0.47	1.07
2	6.0	26.55	59.99	38.86	25.80	6.44	6.87	0.00	0.00
3	12.0	26.40	59.76	38.82	25.81	6.45	6.79	0.34	1.05

PROJECT : SEKA
AIR TEMP : C.
WIND :
SEA : 1

STATION : 24
TOT.DEP. : 30 MT.

DATE : 11/10/1984 TIME : 14:54
BARO.PRESSURE : 1021 MB.
SEC.DISC.DEP. : 7 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	26.81	60.30	38.87	25.72	6.41	6.88	0.47	1.07
2	6.0	26.71	60.22	38.90	25.77	6.42	6.87	0.00	0.00
3	12.0	26.66	60.22	38.94	25.82	6.42	6.87	0.45	1.07
4	19.0	26.47	59.92	38.88	25.83	6.44	6.92	0.00	0.00

PROJECT : SEKA
AIR TEMP: C.
WIND :
SEA : 1

STATION : 25
TOT.DEP.: 18 MT.

DATE : 11/10/1984 TIME: 15:52
BARO.PRESSURE : 1021 MB,
SEC.DISC.DEP. : 10 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	26.81	60.37	38.93	25.76	6.41	6.98	0.57	1.09
2	6.0	26.76	60.30	38.91	25.77	6.41	6.97	0.00	0.00
3	11.0	26.71	60.22	38.90	25.77	6.42	6.96	0.50	1.08

PROJECT : SEKA
AIR TEMP : C.
WIND :
SEA : 1

STATION : 26
TOT.DEP. : 38 MT.

DATE : 11/10/1984 TIME : 16:42
BARO.PRESSURE : 1021 MB.
SEC.DISC.DEP. : 15 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	26.86	60.37	38.88	25.71	6.40	6.90	0.50	1.08
2	6.0	26.73	60.30	38.94	25.80	6.41	6.85	0.00	0.00
3	15.0	26.55	59.99	38.86	25.79	6.44	6.86	0.42	1.07
4	23.0	26.53	59.99	38.88	25.81	6.44	6.81	0.00	0.00
5	31.0	26.47	59.99	38.92	25.87	6.44	6.85	0.00	0.00

PROJECT : SEKA
AIR TEMP: C.
WIND :
SEA : 1

STATION : 27
TOT.DEP.: 38 MT.

DATE : 12/10/1984 TIME: 08:52
BARO.PRESSURE : 1021 MB.
SEC.DISC.DEP. : 15 MT.

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD
1	0.0	26.29	59.76	38.92	25.92	6.46	6.19	-0.27	0.96
2	6.0	26.29	59.76	38.92	25.92	6.46	6.17	0.00	0.00
3	12.0	26.29	59.84	38.97	25.96	6.46	6.02	-0.44	0.97
4	15.0	26.29	59.84	38.97	25.96	6.46	6.03	0.00	0.00

PROJECT :
AIR TEMP :
WIND :
SEA :

STATION :
TOT.DEP. :

DATE :
BARO.PRESSURE :
SEC.DISC.DEP. :

TIME :

REC.	D(M)	T(C)	C(MMHO/CM)	S(%0)	SIG.T	SDO	DO	DO-SDO	DD/SDD

TABLE 4. Hydrochemical data collected at each station.

STATION No	DEPTH (M)	S.DISC (M)	PH	PARTICULATE (MG/L)	BOD (MG/L)	D.O. (MG/L)	HUMIC MAT. (MG/L)
21	0	15	8.13	6.72	-	6.30	0.16
	10	-	8.14	5.23	-	6.65	0.57
	25	-	8.13	-	-	6.35	0.11
22	0	7	8.14	6.98	-	-	0.09
	10	-	8.16	4.11	-	6.15	0.29
	20	-	8.18	-	-	6.65	0.42
23	0	21	8.17	5.35	-	6.45	0.01
	10	-	8.17	-	-	6.10	0.10
	30	-	8.18	-	-	6.25	-
24	0	16	8.16	0.72	-	6.30	0.09
	10	-	8.14	3.89	-	6.60	0.10
	33	-	8.16	-	-	6.20	0.10
25	0	9	8.16	4.43	-	6.35	0.60
	10	-	8.14	3.85	-	6.60	-
26	0	8	8.15	3.06	-	6.25	0.08
	10	-	8.14	3.54	-	5.90	0.21
	30	-	8.17	-	-	6.10	0.04
27	0	9	8.16	2.53	-	6.30	0.13
	10	-	8.16	3.84	-	6.15	0.28
	30	-	8.14	-	-	6.40	0.15

- : Not analyzed

Table 4 cont'd

STATION NO	DEPTH (M)	S.DISC (M)	PH	PARTICULATE (MG/L)	BOD (MG/L)	D.O. (MG/L)	HUMIC MAT. (MG/L)
21	.0	0.0	8.27	33.70	1.33	8.16	3.66
	10	-	8.29	7.87	1.05	7.14	1.00
22	0	1	8.23	4.41	1.67	6.79	1.34
	10	-	8.26	2.23	0.61	6.66	0.80
23	0	5	8.22	1.57	1.84	6.73	1.21
	10	-	8.26	1.90	1.33	6.53	0.49
24	0	5	8.27	2.87	1.18	6.81	1.19
	10	-	8.25	1.17	1.46	6.32	1.06
25	0	6	8.27	2.99	0.90	6.90	0.73
	10	-	8.28	2.33	0.57	7.02	0.71
26	0	6	8.26	3.04	0.52	6.87	0.56
	10	-	8.27	4.77	0.38	6.44	0.58
27	0	7	8.27	2.56	0.26	7.51	0.79
	10	-	8.27	3.03	0.76	7.17	0.67

- : Not analyzed

Table 4 cont'd

STATION NO	DEPTH (M)	S.DISC (M)	PH	PARTICULATE (MG/L)	BOD (MG/L)	D.O. (MG/L)	HUMIC MAT. (MG/L)
21	0	0.0	8.29	16.33	1.00	7.85	-
	10	-	8.25	11.81	0.13	7.23	-
22	0	5	8.23	1.76	2.27	7.87	18.5
	10	-	8.24	1.48	0.34	7.77	10.0
	20	-	-	-	0.06	7.73	-
23	0	8	8.23	5.15	1.86	7.36	3.6
	10	-	8.25	2.38	2.40	8.24	2.0
	20	-	-	-	0.0	8.60	-
24	0	10	8.28	1.20	1.54	8.22	5.5
	10	-	8.25	1.77	0.18	8.31	3.0
	20	-	-	-	0.0	8.43	-
	30	-	-	-	0.26	8.10	-
25	0	7	8.28	1.41	0.87	7.48	10
	10	-	8.24	5.01	0.50	7.52	11
26	0	8	8.08	7.33	1.54	7.06	-
	10	-	8.14	1.13	0.13	8.49	-
27	0	6	8.13	9.56	0.97	7.51	-
	10	-	8.15	2.16	0.0	7.28	-
	20	-	-	-	0.0	7.10	-
D.P.	0	4	8.22	-	0.36	7.80	24
	10	-	8.24	-	0.05	7.68	-

-: Not analyzed

Table 4 cont'd

STATION NO	DEPTH (M)	S.DISC (M)	PH	PARTICULATE (MG/L)	BOD (MG/L)	D.O. (MG/L)	HUMIC MAT. (MG/L)
21	0	7	7.94	6.16	0.0	6.49	2.700
	10	-	8.26	11.39	0.15	6.68	-
22	0	18	8.23	3.17	0.55	6.38	1.255
	10	-	8.25	8.75	0.0	6.37	0.770
23	0	9	8.20	1.74	0.20	6.21	1.150
	10	-	8.22	6.89	0.46	6.45	0.555
24	0	17	8.11	6.80	0.22	6.41	1.50
	10	-	8.16	6.18	0.04	6.28	0.850
25	0	-	8.13	5.13	0.0	6.47	0.925
	10	-	8.16	5.68	0.46	6.66	0.560
26	0	19	8.08	4.36	0.07	6.26	1.425
	10	-	8.13	11.64	0.15	6.27	0.350
	30	-	8.07	-	0.0	6.51	-
27	0	19	8.10	6.60	0.45	6.27	0.900
	10	-	8.13	-	0.33	6.46	0.350
D.P.	0	15	8.25	-	0.0	-	1.475
	10	-	8.22	-	0.0	-	0.400

- : Not analyzed

Table 4 cont'd

STATION NO	DEPTH (M)	S.DISC (M)	PH	PARTICULATE (MG/L)	BOD (MG/L)	D.O. (MG/L)	HUMIC MAT. (MG/L)
21	0	5	8.26	5.080	0.0	6.87	0.600
	10	-	8.26	4.510	0.15	6.70	0.175
22	0	6	8.26	3.150	0.0	6.89	0.525
	10	-	8.28	5.170	0.0	6.79	0.275
24	0	7	8.26	1.300	0.18	6.88	0.750
	10	-	8.26	1.490	0.04	6.87	0.400
25	0	10	8.26	1.520	0.0	6.98	0.875
	10	-	8.26	0.629	0.46	6.92	0.275
26	0	15	8.26	2.360	0.07	6.90	1.000
	10	-	8.26	0.489	0.15	6.86	0.457
27	0	4	8.27	4.160	0.45	6.19	0.300
	10	-	8.27	1.280	0.33	6.02	-
D.P.	0	2	8.26	-	0.0	-	1.225
	10	-	8.26	-	0.0	-	0.500

- : Not analyzed

Table 4.a Average DO and SDO concentrations.

Date	DO (mg/l)	SDO (mg/l)
6.9.1983	6.32	6.34
18.12.1983	6.93	7.24
10.5.1984	7.79	7.39
24.7.1984	6.41	6.40
11.10.1984	6.74	6.43

Table 4.b. Average BOD_5

Date	Average BOD_5 (mg/l)
18.12.1983	0.99
10.5.1984	0.85
24.7.1984	0.28
11.10.1984	0.23

Table 4.c

Date	Average HM (mg/l)
6.9.1983	0.23
18.12.1983	1.06
10.5.1984	9.73
24.7.1984	1.01
11.10.1984	0.57

TABLE 5 : Atmospheric Data Collected at Each Station.

Locations of the stations are given in Figure 1

Deseription of the stations are given in Table 2

ATMOSPHERIC PARTICULAR MATTER MEASUREMENTS

($Mg\ cm^{-2}\ day^{-1} x 10^{-3}$)

Collection Date	Station Number	Insoluble Dustfall	Soluble Dustfall	Insoluble Dustfall Ash	Soluble Dustfall Ash	Total Ash	Total Dustfall
July 25,83	1	100	-	-	-	-	>100
to	2	17	-	-	-	-	>17
Aug 31,83	3	38	-	-	-	-	>38
	4	39	-	-	-	-	>39
	5	52	-	-	-	-	>52
Aug 31,83	1	36	6	15	2	17	41
to	2	14	5	5	2	7	18
Oct 17,83	3	49	8	18	4	22	58
	4	49	6	14	3	17	56
	5	342	10	49	4	53	352
Oct 17,83	1	16	10	8	3	11	26
to	2	16	10	7	3	10	26
Nov 22,83	3	179	15	36	4	40	195
	4	63	9	23	3	26	73
	5	21	12	7	4	11	34
Nov 22,83	1	15	8				23
to	2	8	7				15
Dec 23,83	3	35	15				50
	4	18	13				31
	5	50	10				60
Dec 23,83	1	4	10				14
to	2	6	9				15
Jan 25,84	3	11	15				26
	4	13	10				23
	5	10	9				20

ATMOSPHERIC PARTICULAR MATTER MEASUREMENTS

(Mg cm^{-2} day^{-1} $x10^{-3}$)

Collection Date	Station Number	Insoluble Dustfall	Soluble Dustfall	Insoluble Dustfall Ash	Soluble Dustfall Ash	Total Ash	Total Dustfall
Jan 25,84 to Feb 24,84	1	17	13				30
	2	19	14				33
	3	25	22				47
	4	21	13				34
	5	46	11				57
Feb 29,84 to Apr 3,84	1	10	4				14
	2	27	7				34
	3	23	5				28
	4	13	6				19
	5	45	4				48
Apr 3,84 to May 8, 84	1	8	7				15
	2	16	5				21
	3	15	6				21
	4	28	9				37
	5	45	6				51
May 8,84 to July 16,84	1	8	22				30
	2	16	23				39
	3	12	35				47
	4	17	9				26
	5	26	34				60

ATMOSPHERIC PARTICULAR MATTER MEASUREMENTS

($Mg\ cm^{-2}\ day^{-1} x10^{-3}$)

Collection Date	Station Number	Insoluble Dustfall	Soluble Dustfall	Insoluble Dustfall Ash	Soluble Dustfall Ash	Total Ash	Total Dustfall
July 16,84	1	14	16				30
to	2	14	4				18
Oct 11,84	3	21	22				43
	4	3	18				21
	5	30	31				61
Dec 4,84	1	14	20	10	3	13	34
to	2	5	11	4	2	6	16
Jan 8,85	3	20	18	17	5	22	38
	4	9	26	4	4	8	35
	5	12	18	7	3	10	30

FIGURE 1: Atmospheric and Oceanographic Sampling Stations.

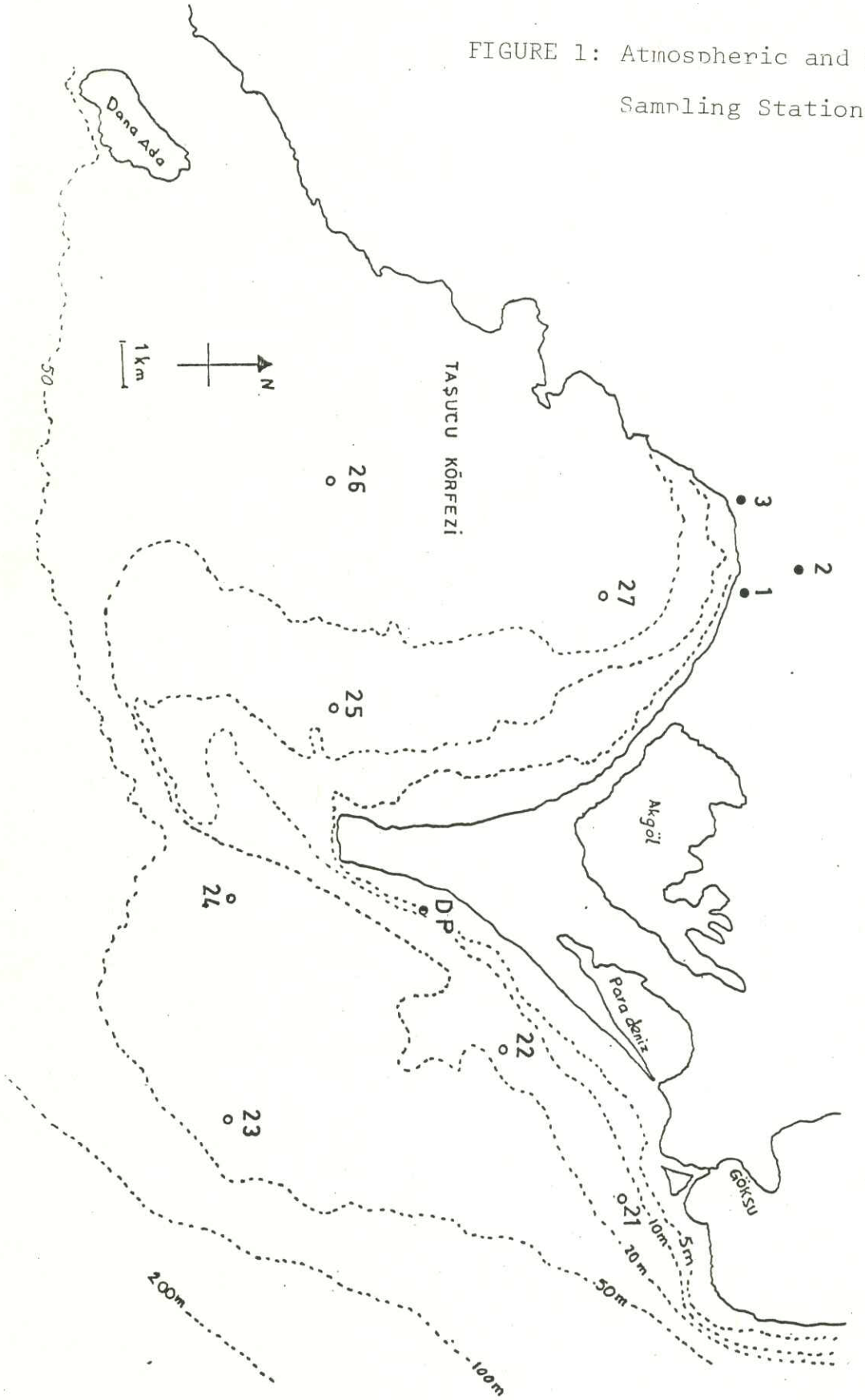
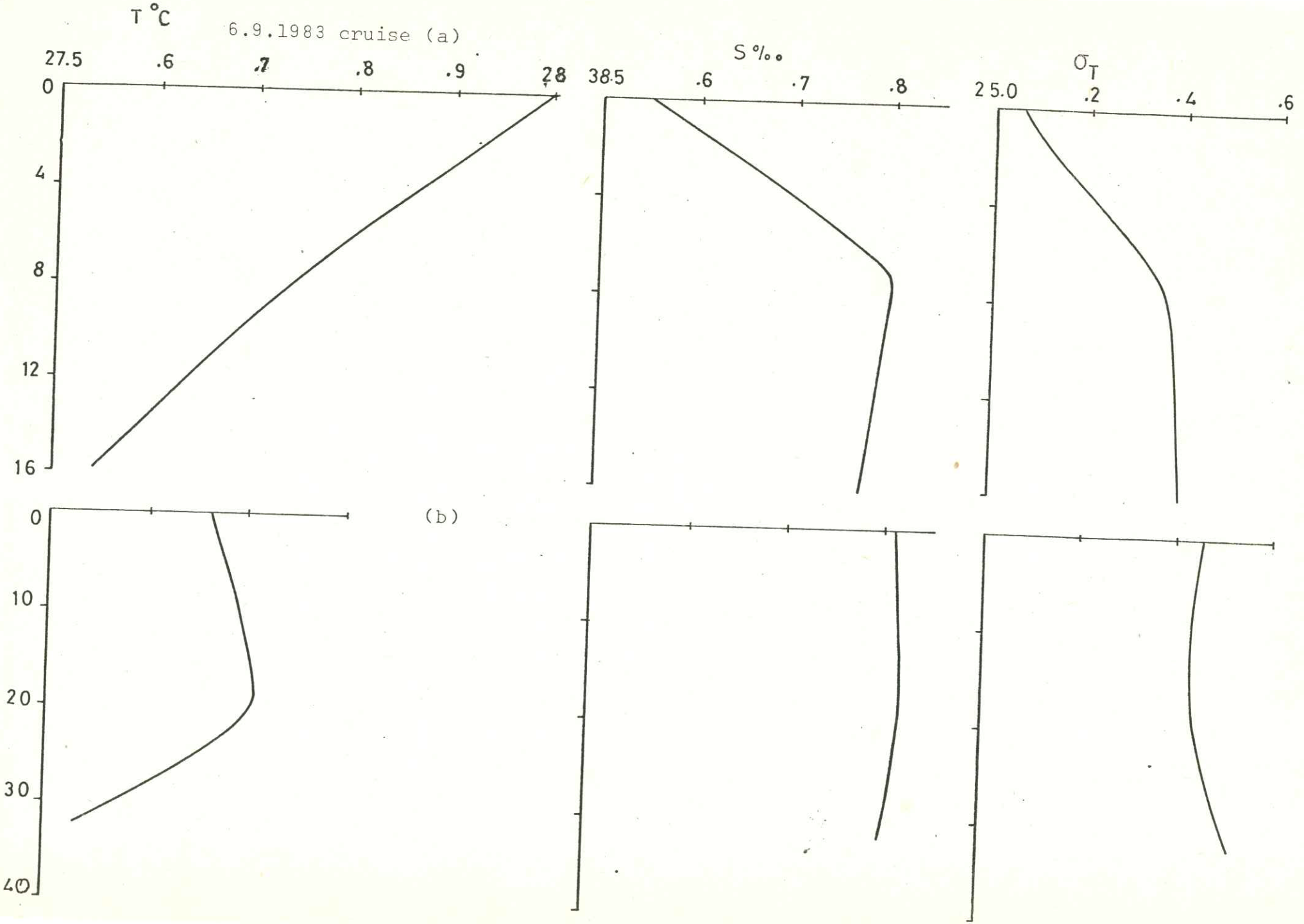
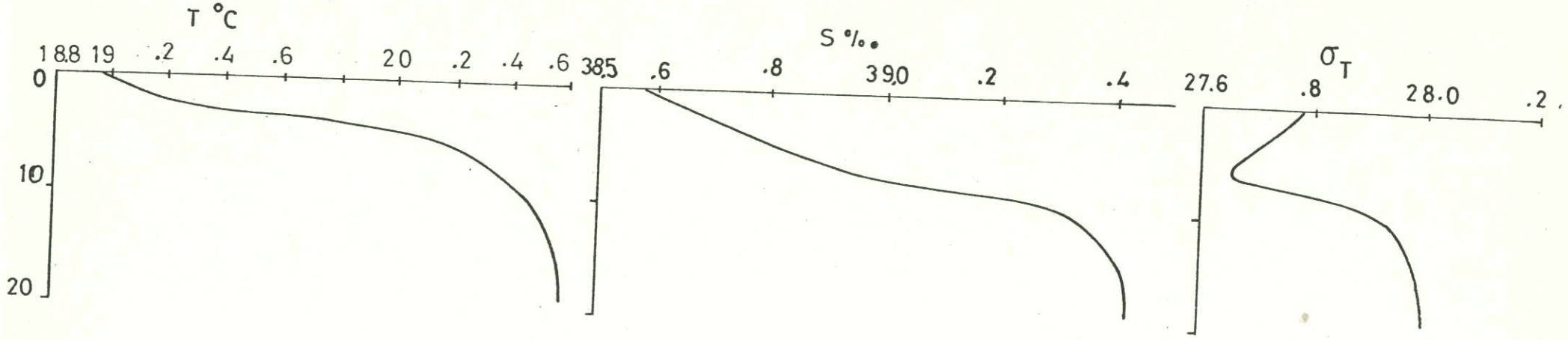


FIGURE 2: Salinity, temperature and Sigma-t profiles for each cruise.

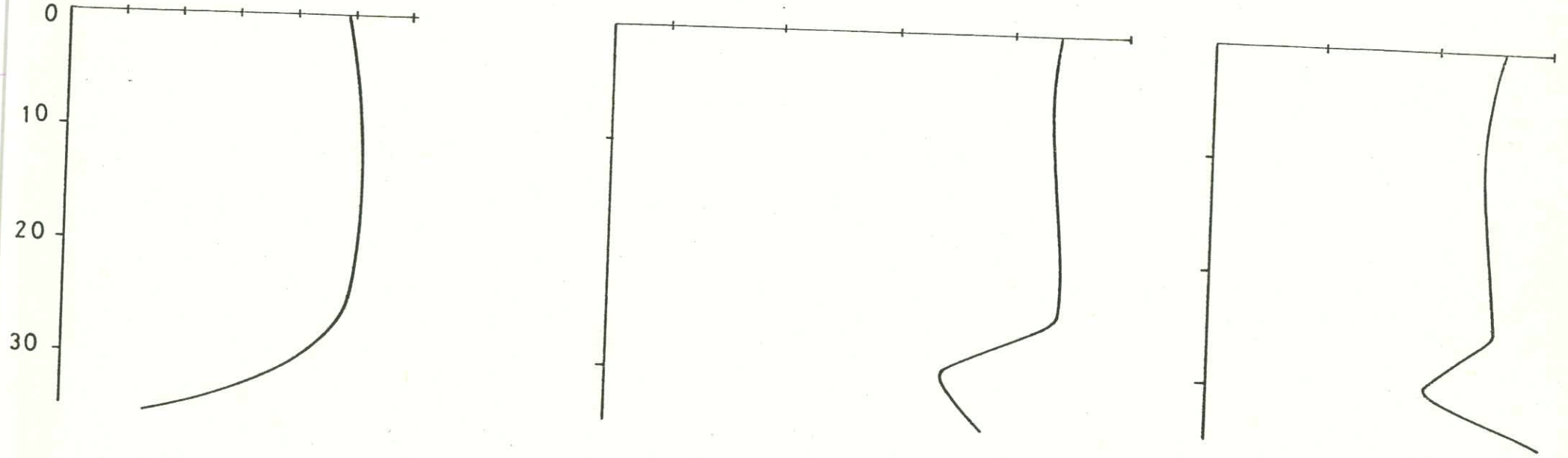
a- Station 22
b- Station 26

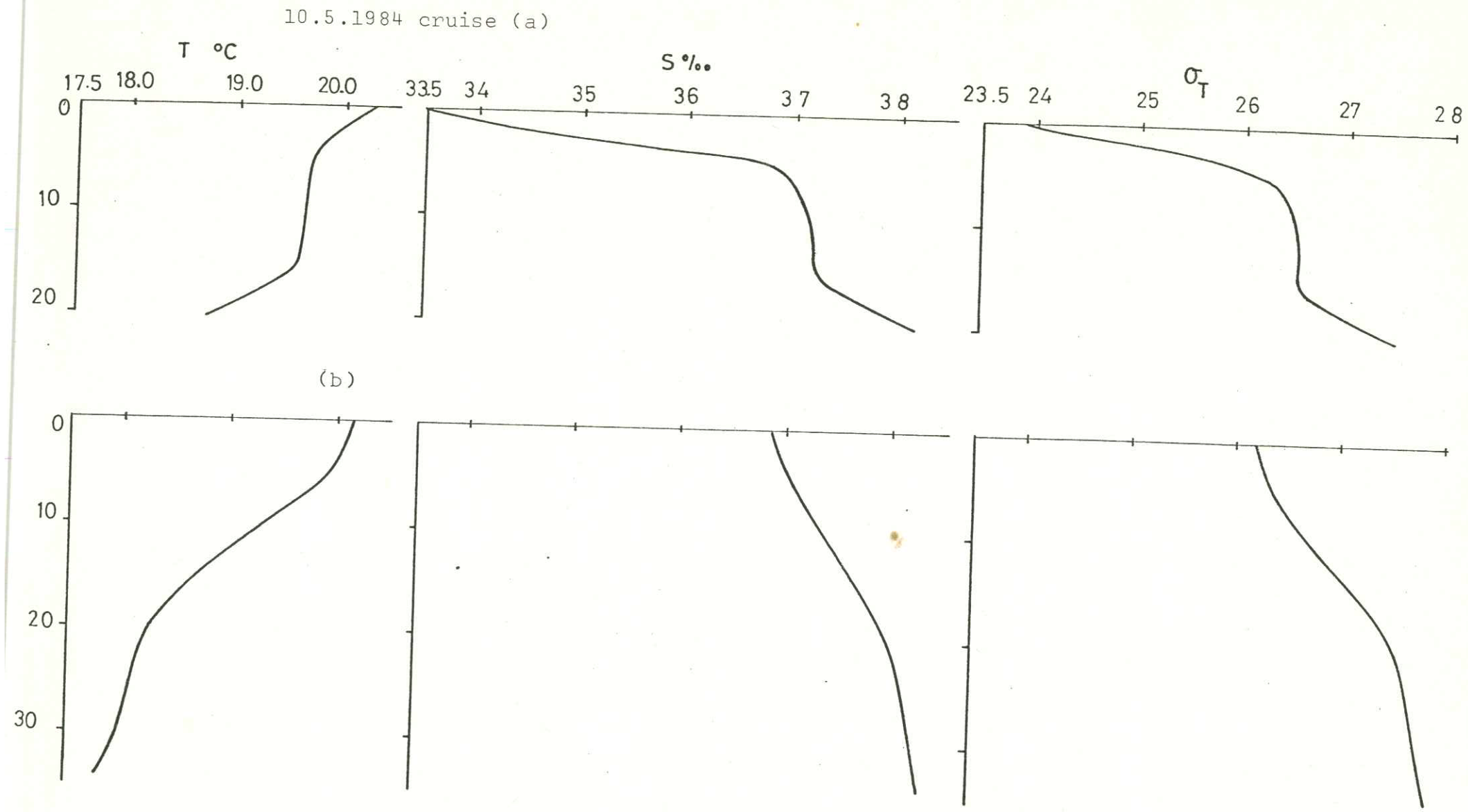

T °C
6.9.1983 cruise (a)
27.5
.6
.7
.8
.9
28
0
4
8
12
16
S ‰
38.5
.6
.7
.8
σT
25.0
.2
.4
.6
(b)
0
10
20
30
40

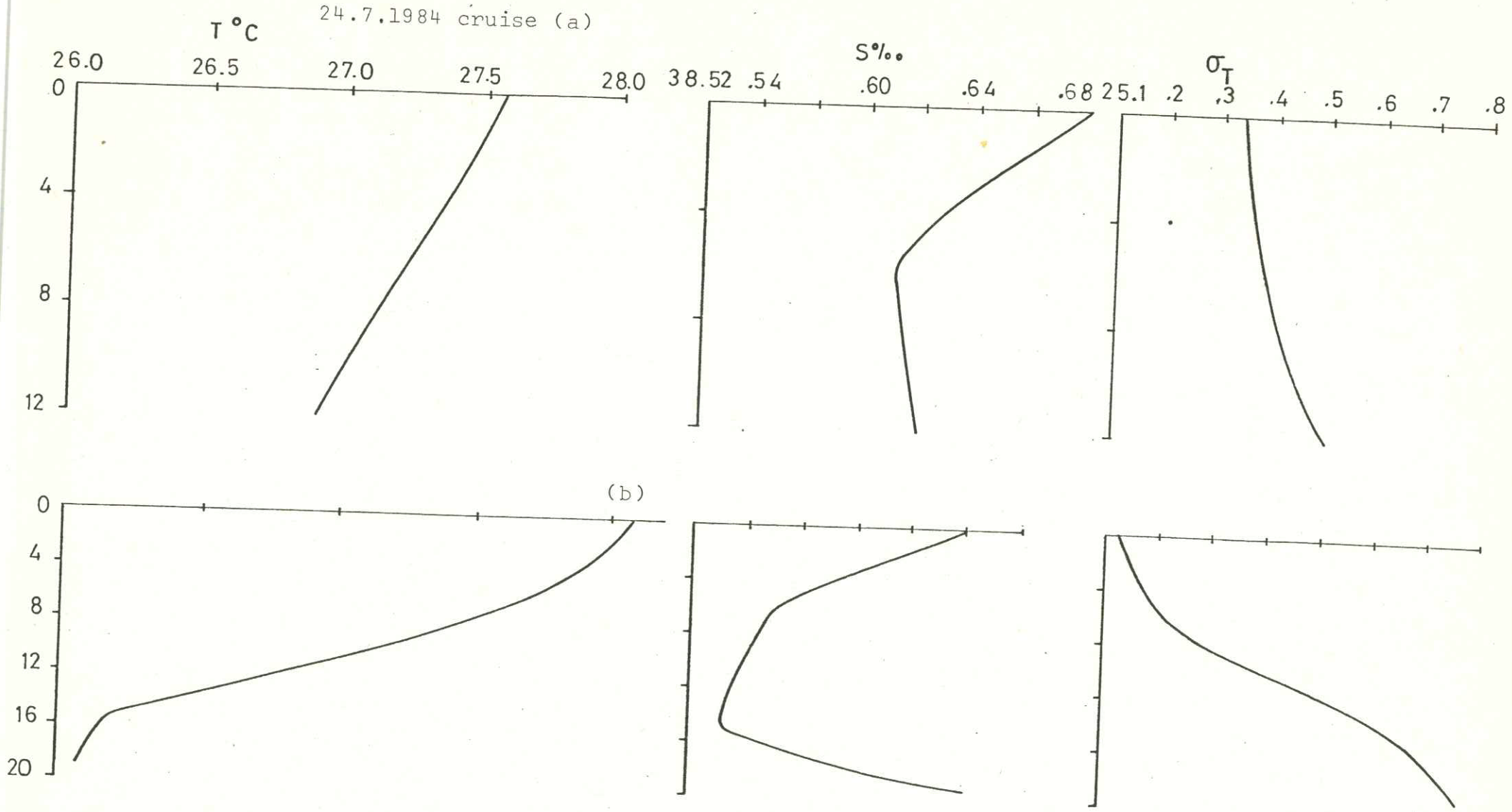
18.12.1983 cruise (a)

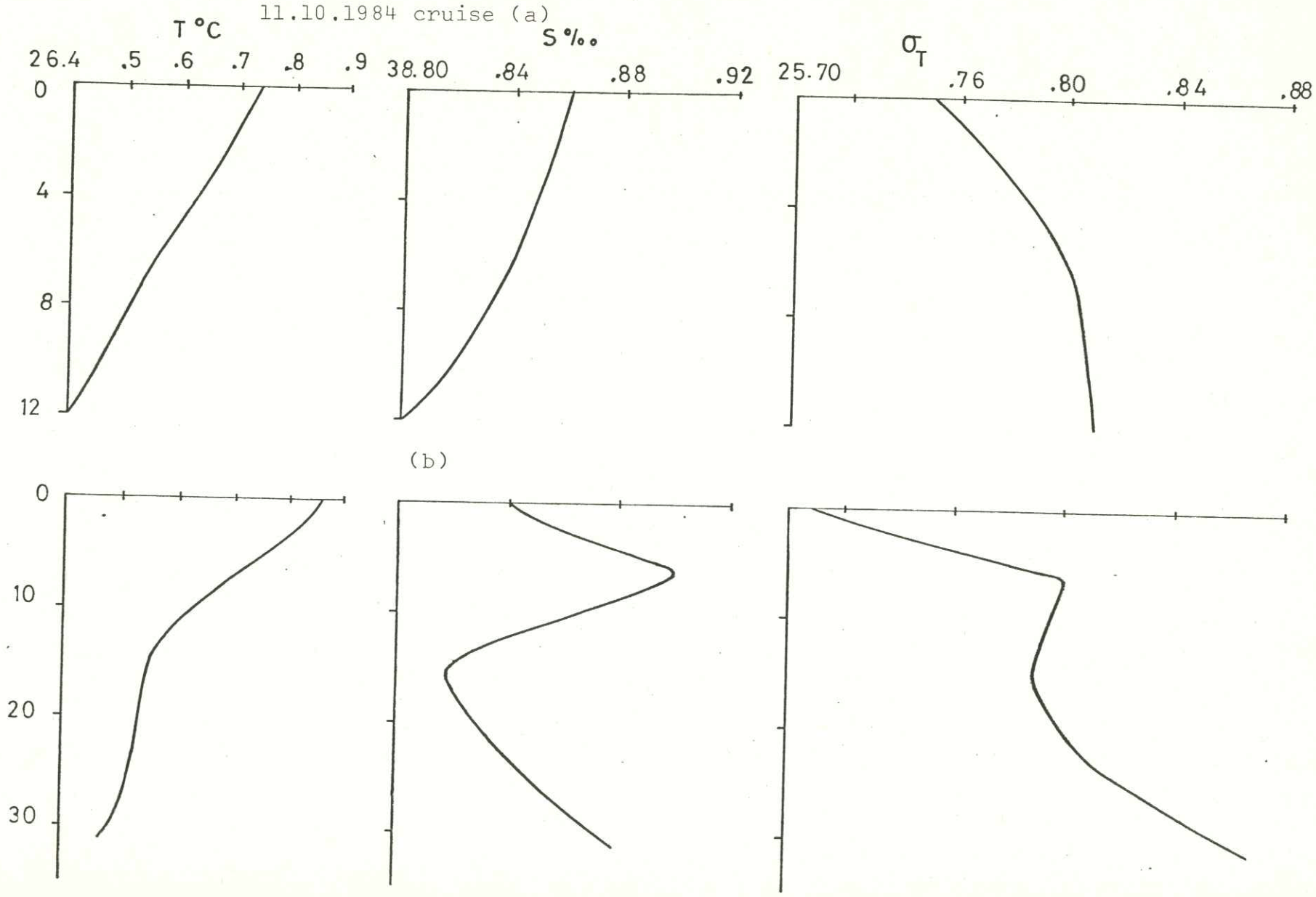


(b)




10.5.1984 cruise (a)
T °C
17.5 18.0 19.0 20.0
S ‰
33.5 34 35 36 37 38
σT
23.5 24 25 26 27 28
0
10
20
(b)
0
10
20
30


24.7.1984 cruise (a)
T °C
26.0
26.5
27.0
27.5
28.0
S‰
38.52
.54
.60
.64
.68
σ_T
25.1
.2
.3
.4
.5
.6
.7
.8
0
4
8
12
(b)
0
4
8
12
16
20


11.10.1984 cruise (a)
T °C
26.4
.5
.6
.7
.8
.9
S ‰
38.80
.84
.88
.92
σT
25.70
.76
.80
.84
.88
0
4
8
12
(b)
0
10
20
30

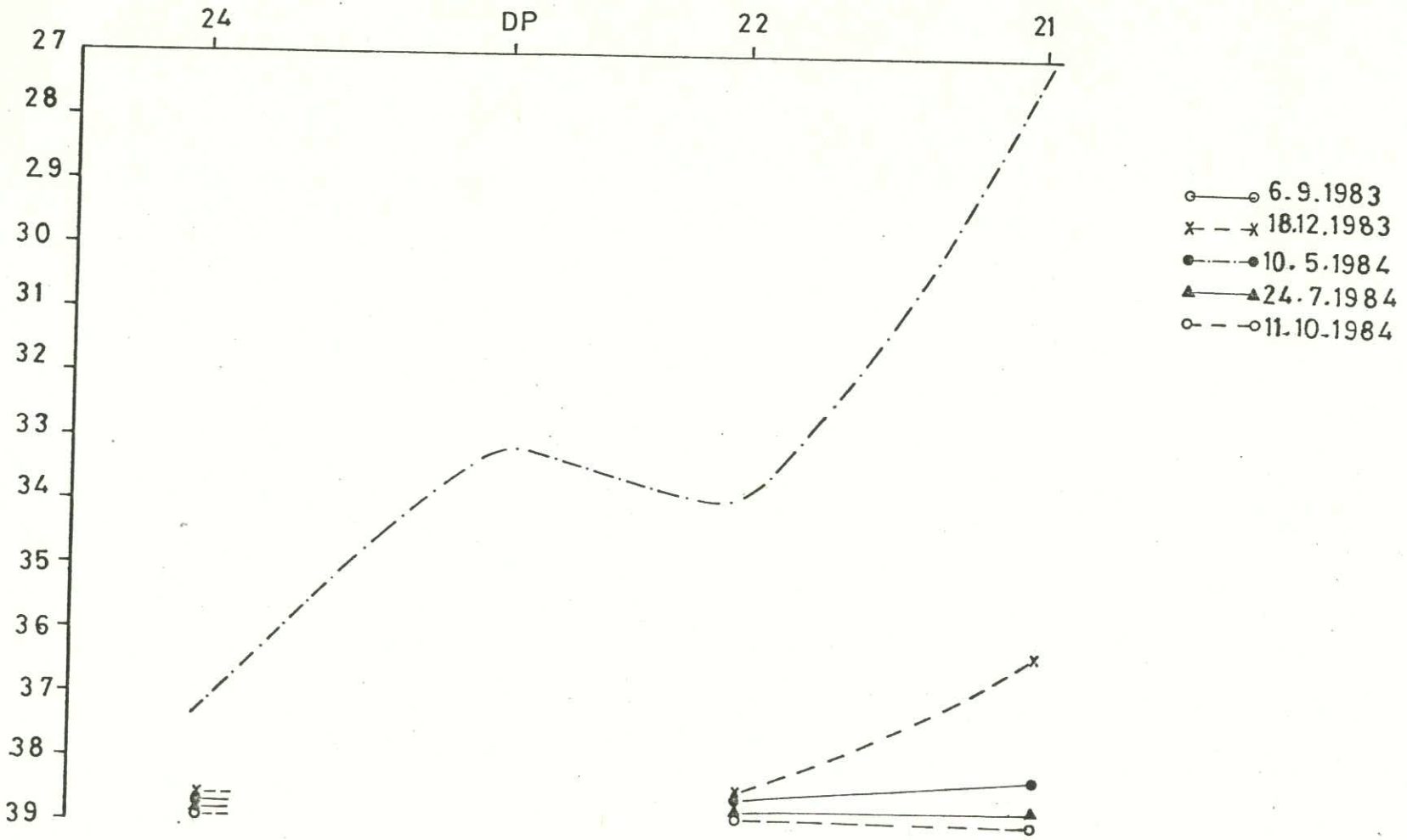


FIGURE 3: Salinity Transect at stations 24-21.

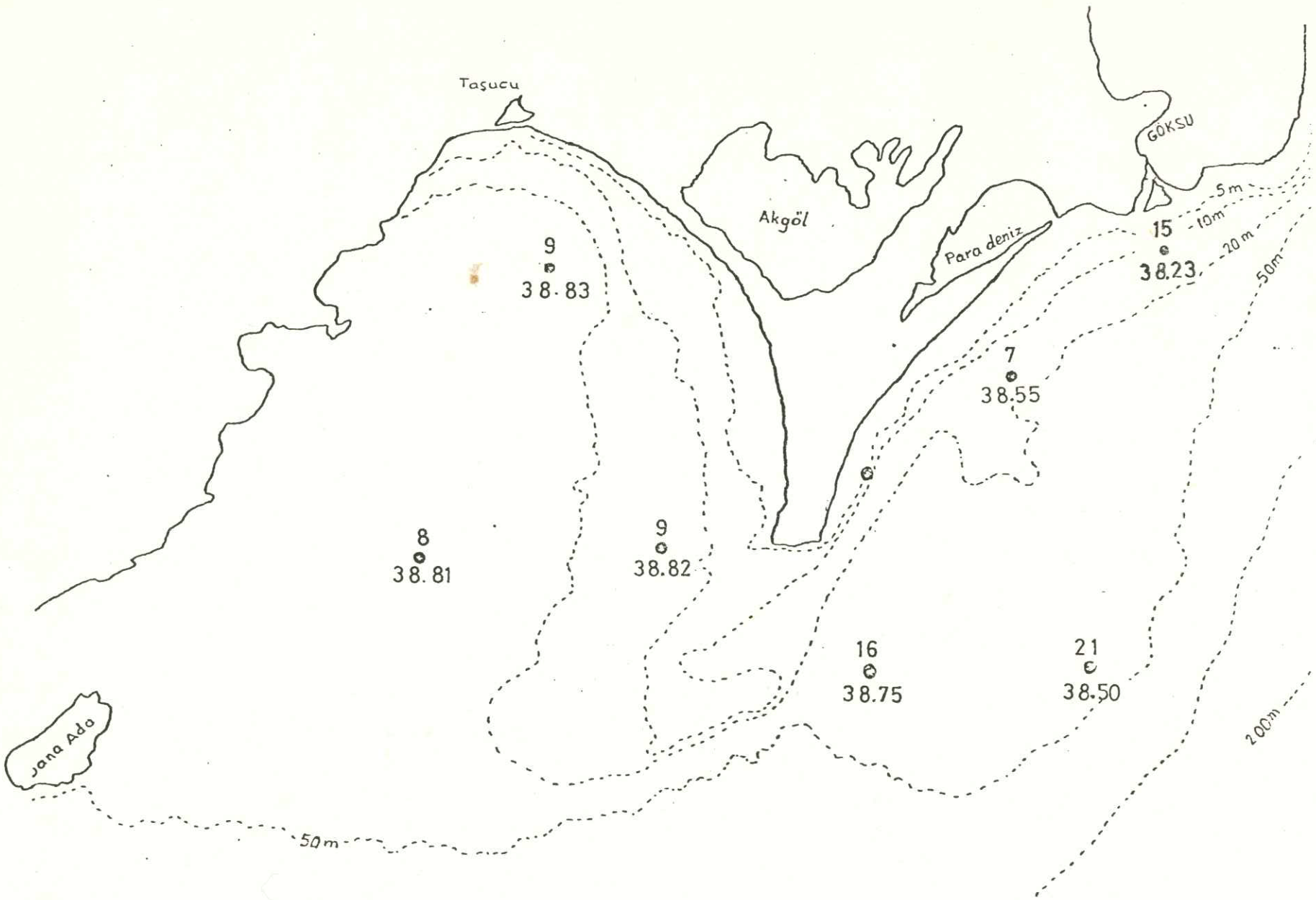


Figure 4.a : Surface salinitiesand secchi disk depths.
6.9.1983 cruise

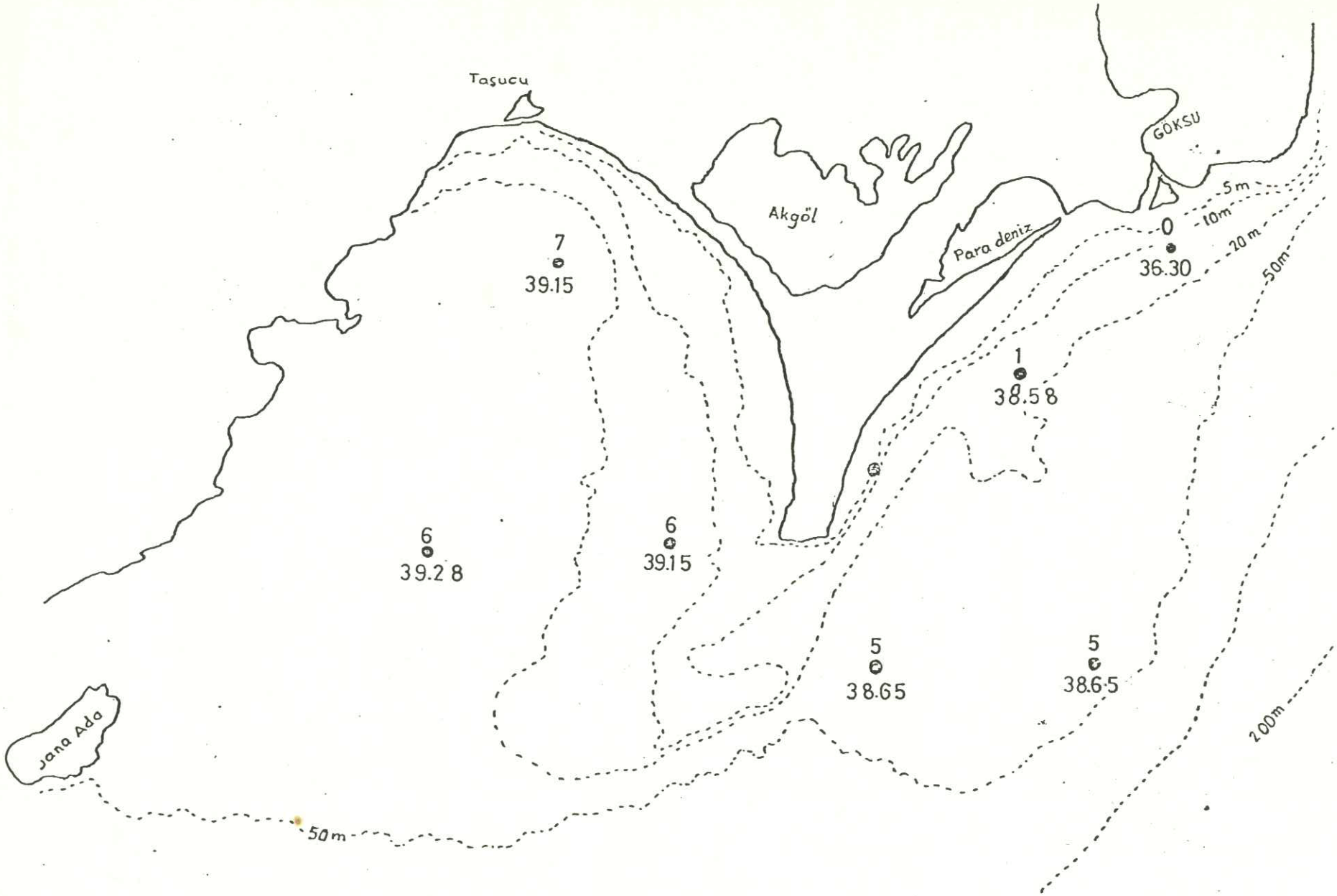


Figure 4.b.
18.12.1983 cruise

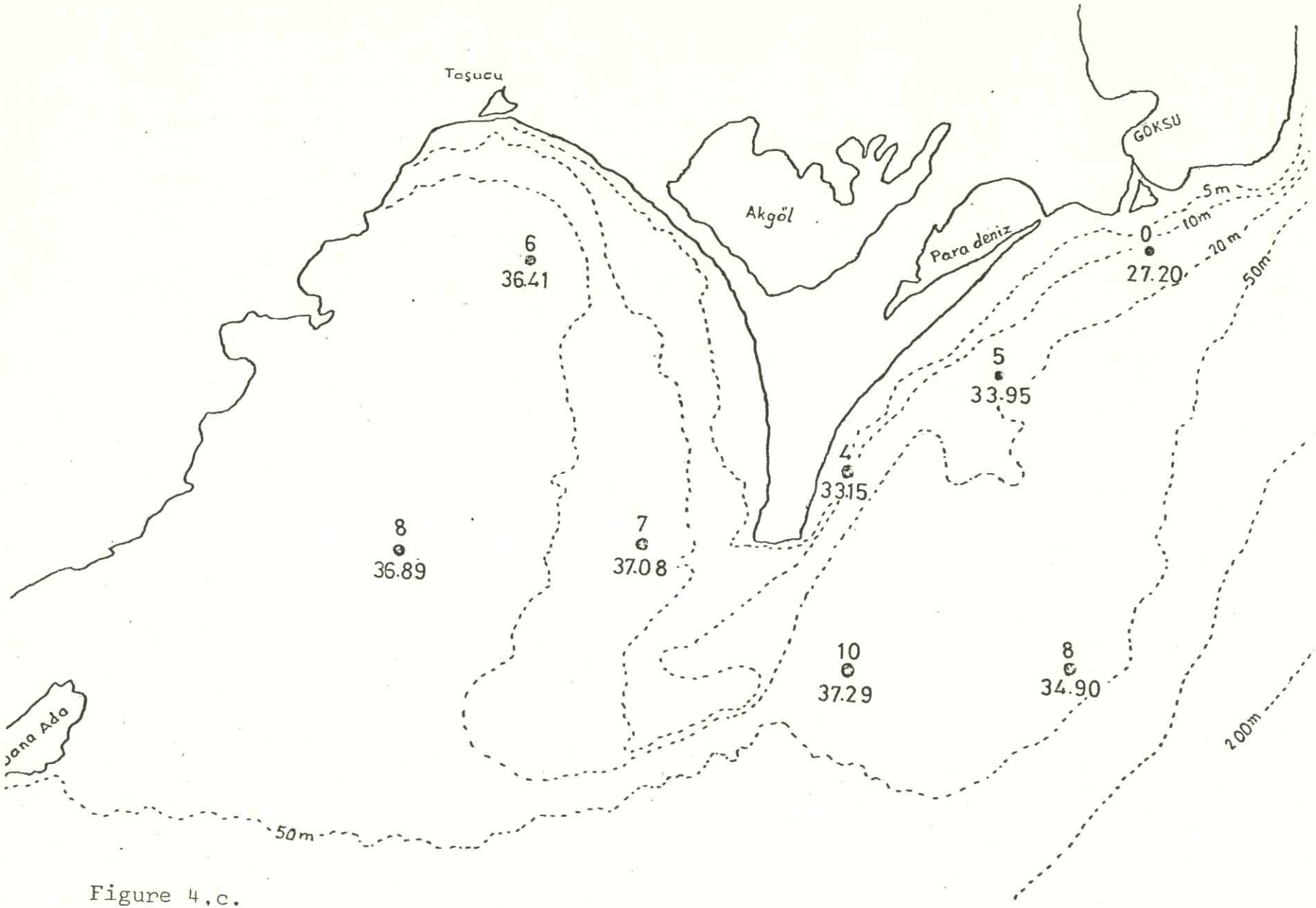


Figure 4.c.
10.5.1984 cruise

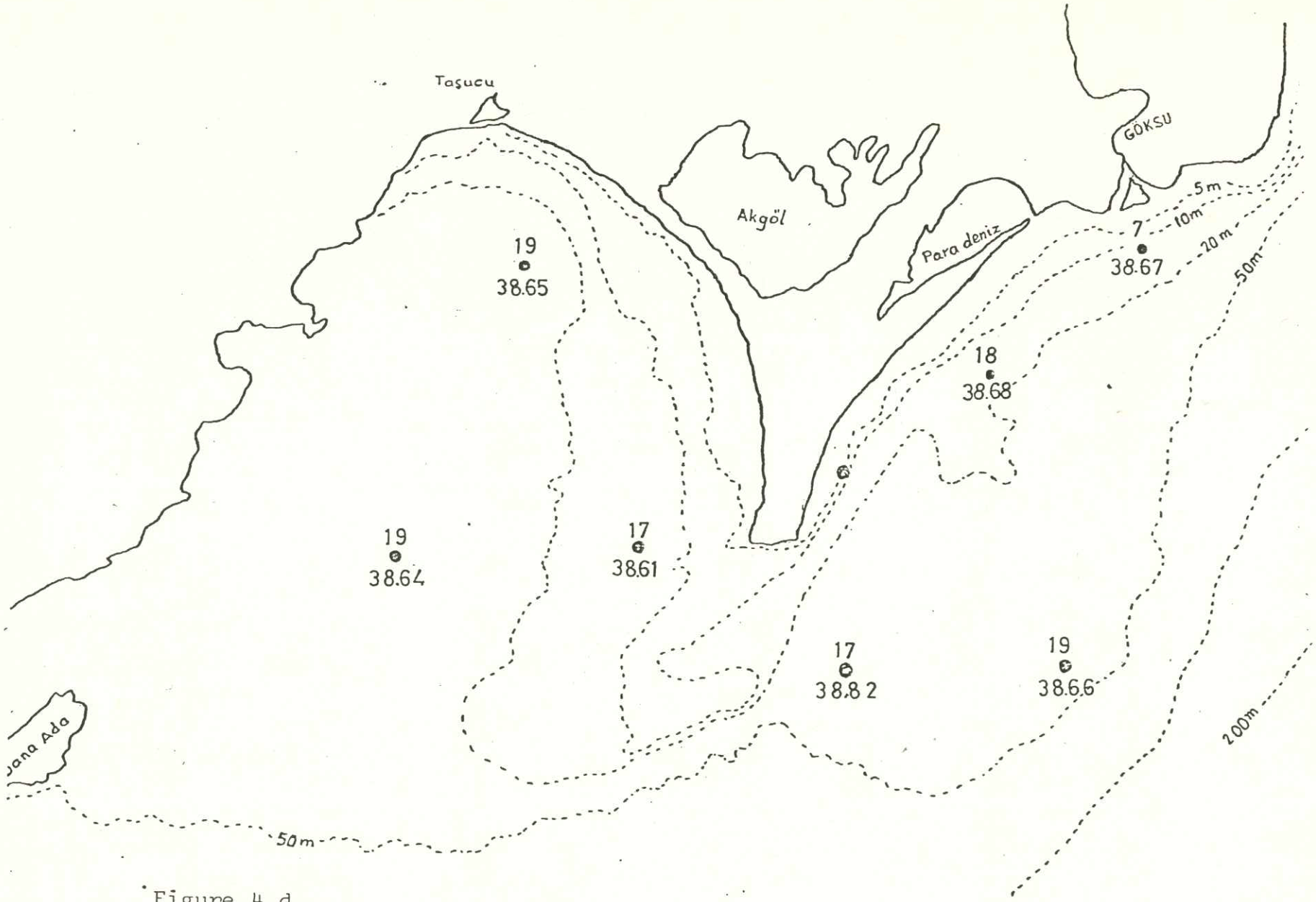


Figure 4.d.
24.7.1984 cruise

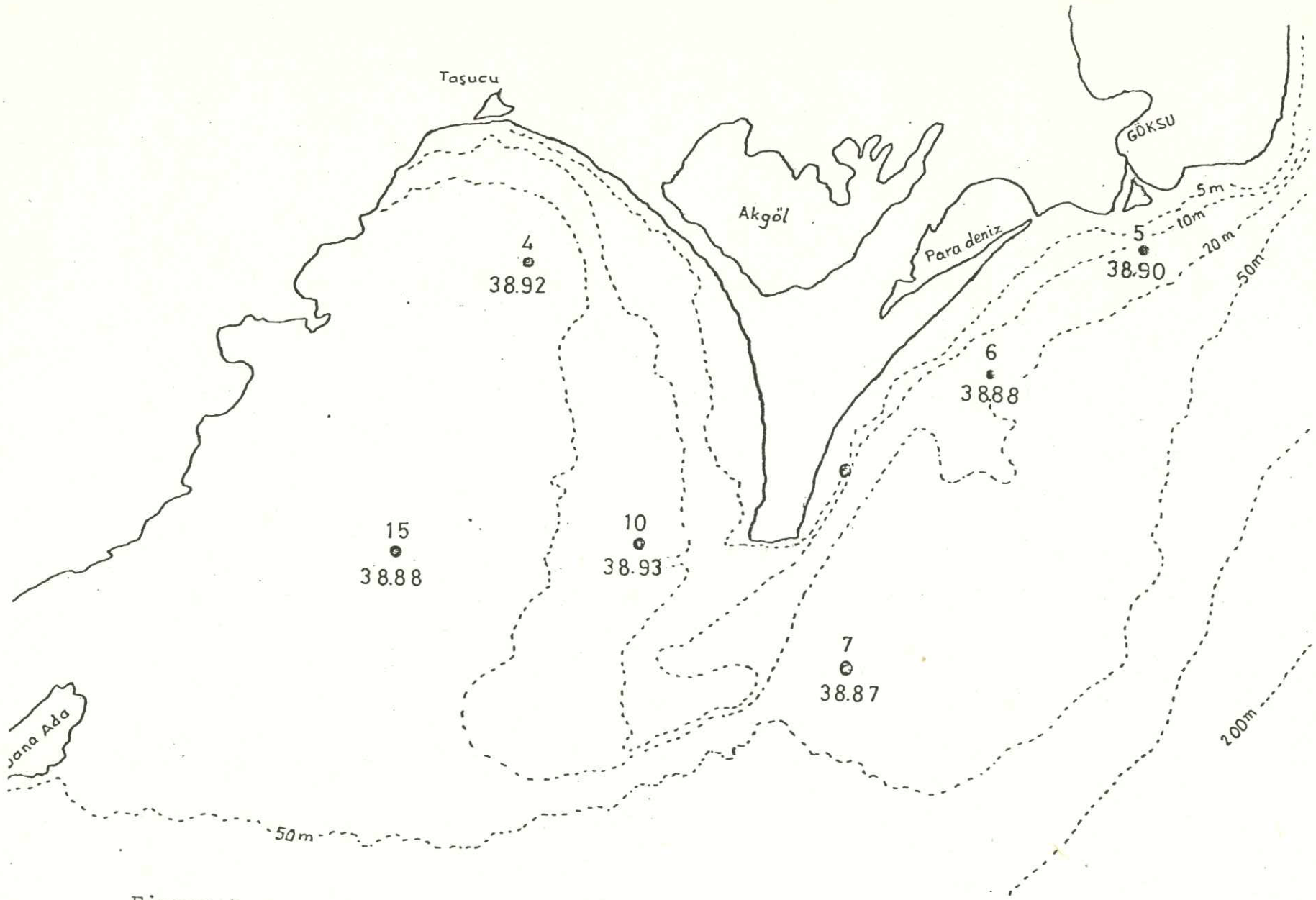


Figure 4.e.
11.10.1984 cruise

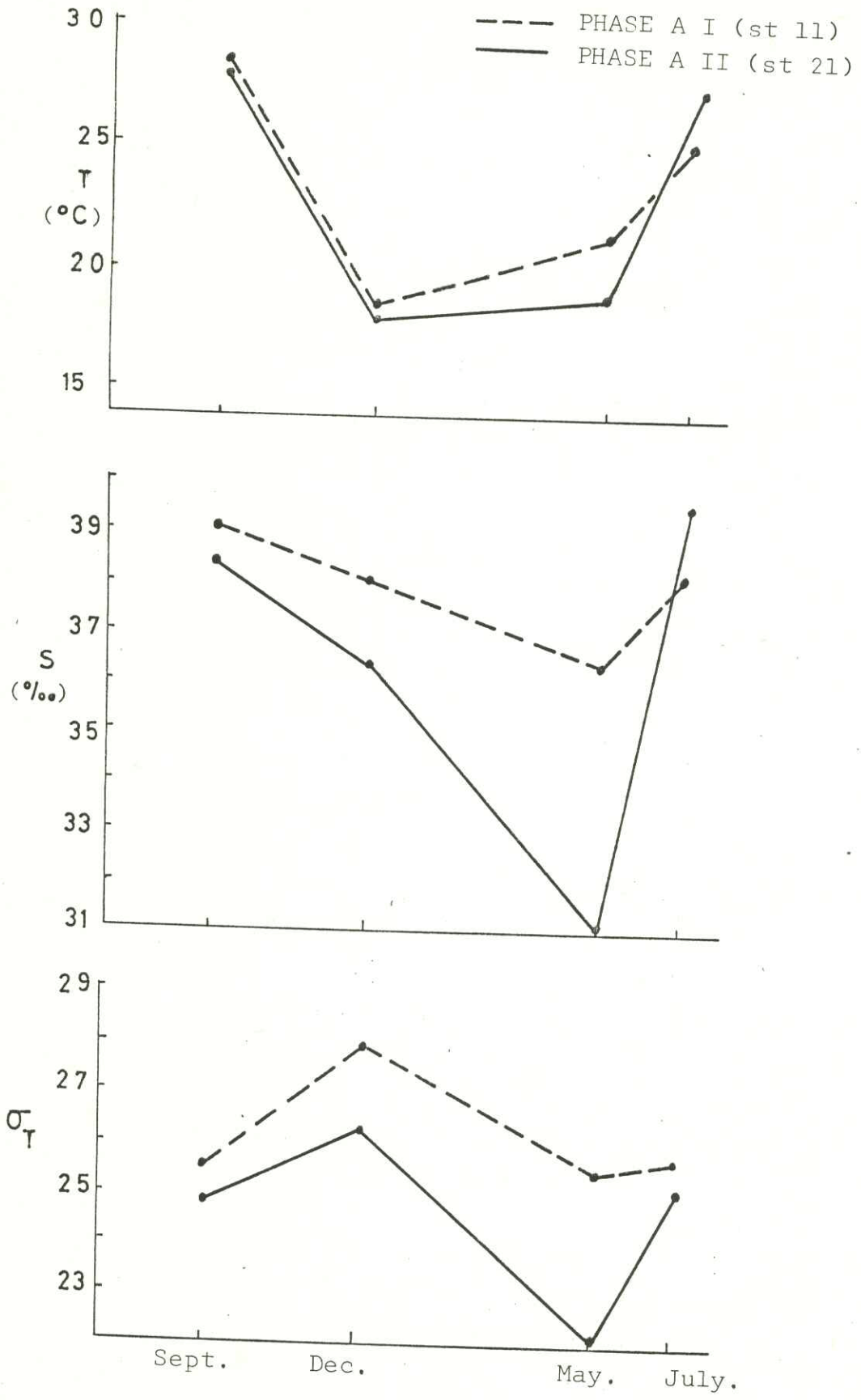


FIGURE 5.a : Annual variation of temperature, salinity and density at Station 11 and station 21

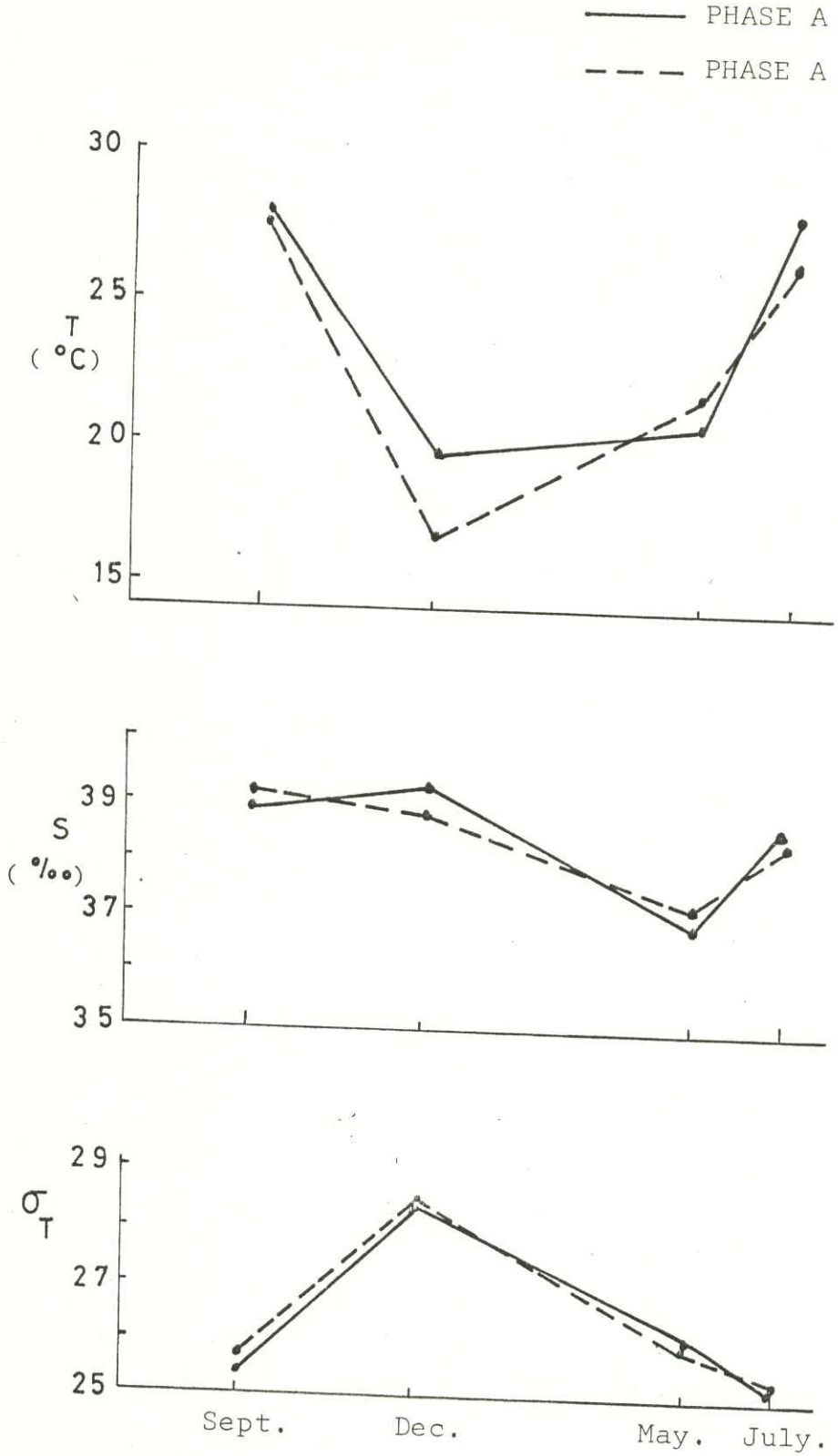


FIGURE 5.b: Annual variation of temperature, salinity and density at station 3 and stations (25,26,27).

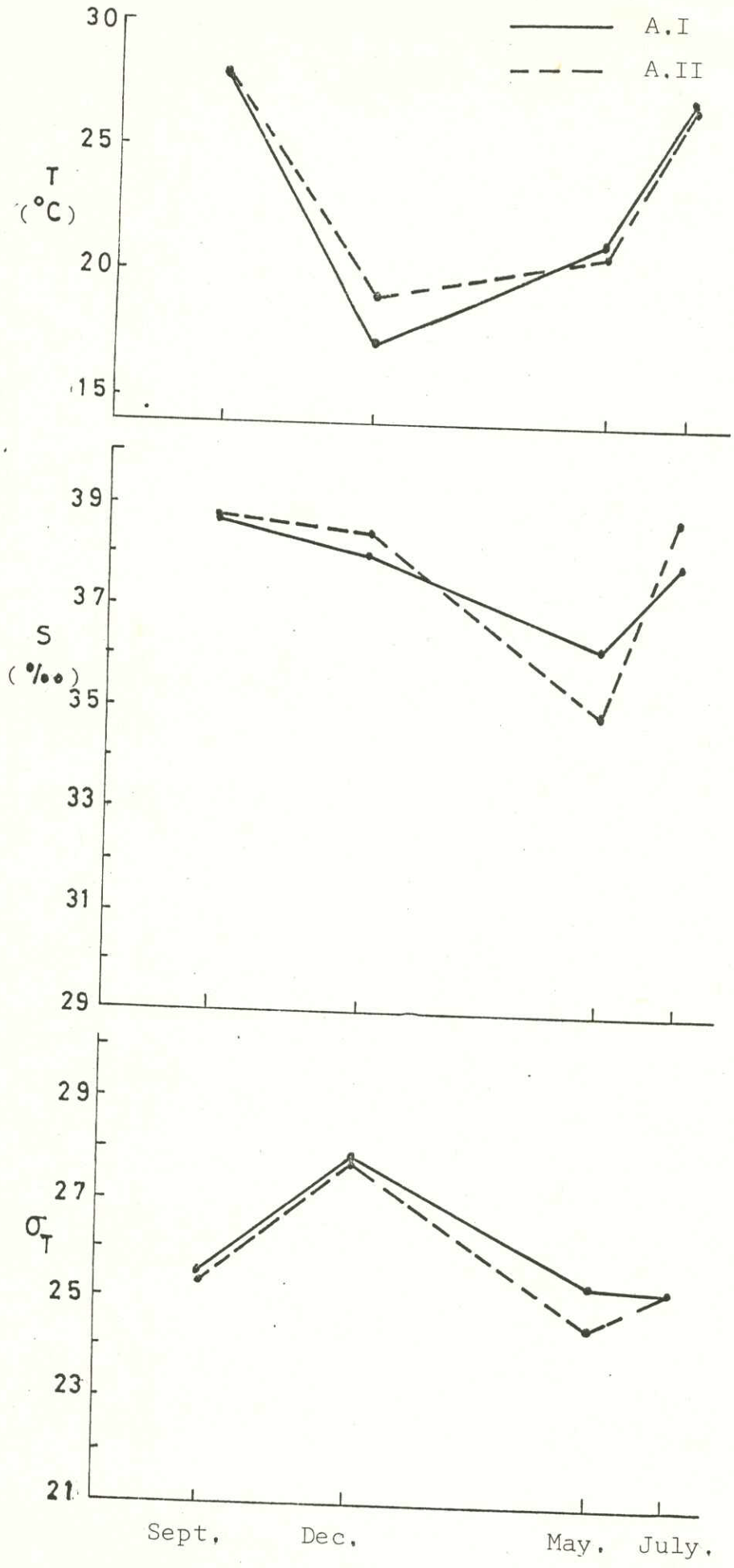


FIGURE 5.c : The annual variation of average temperature, salinity and density observed in the Taşucu/Göksu region during Phases A.I and A. II.

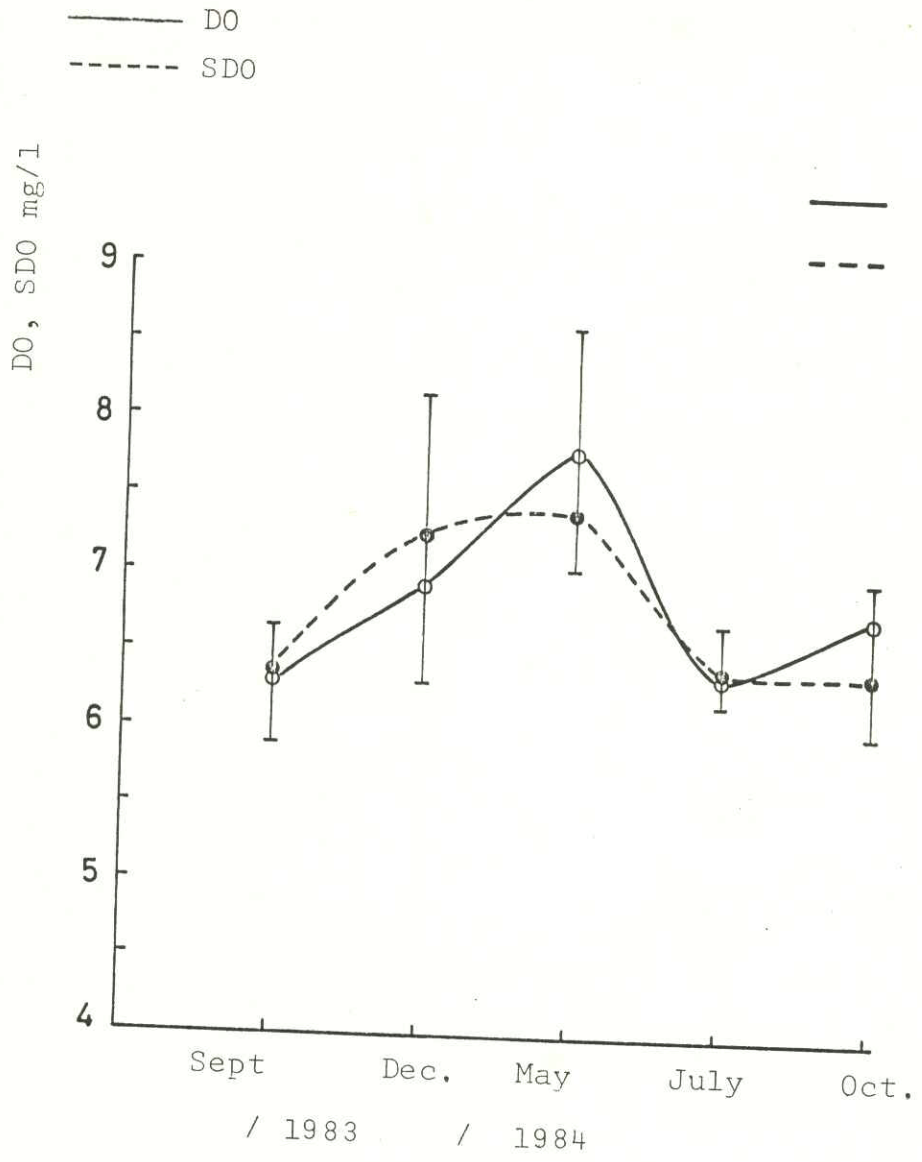


Figure 6: Annual variation of average DO and SDO

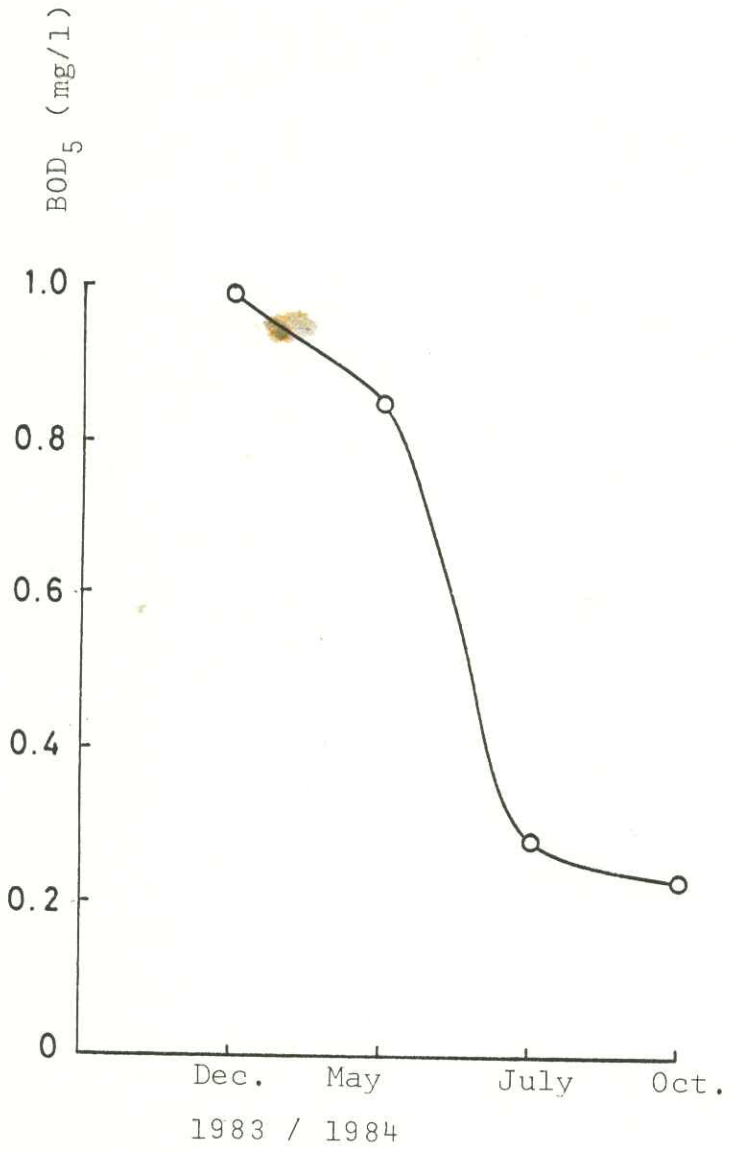


Figure 7: Annual variation of average BOD_5.

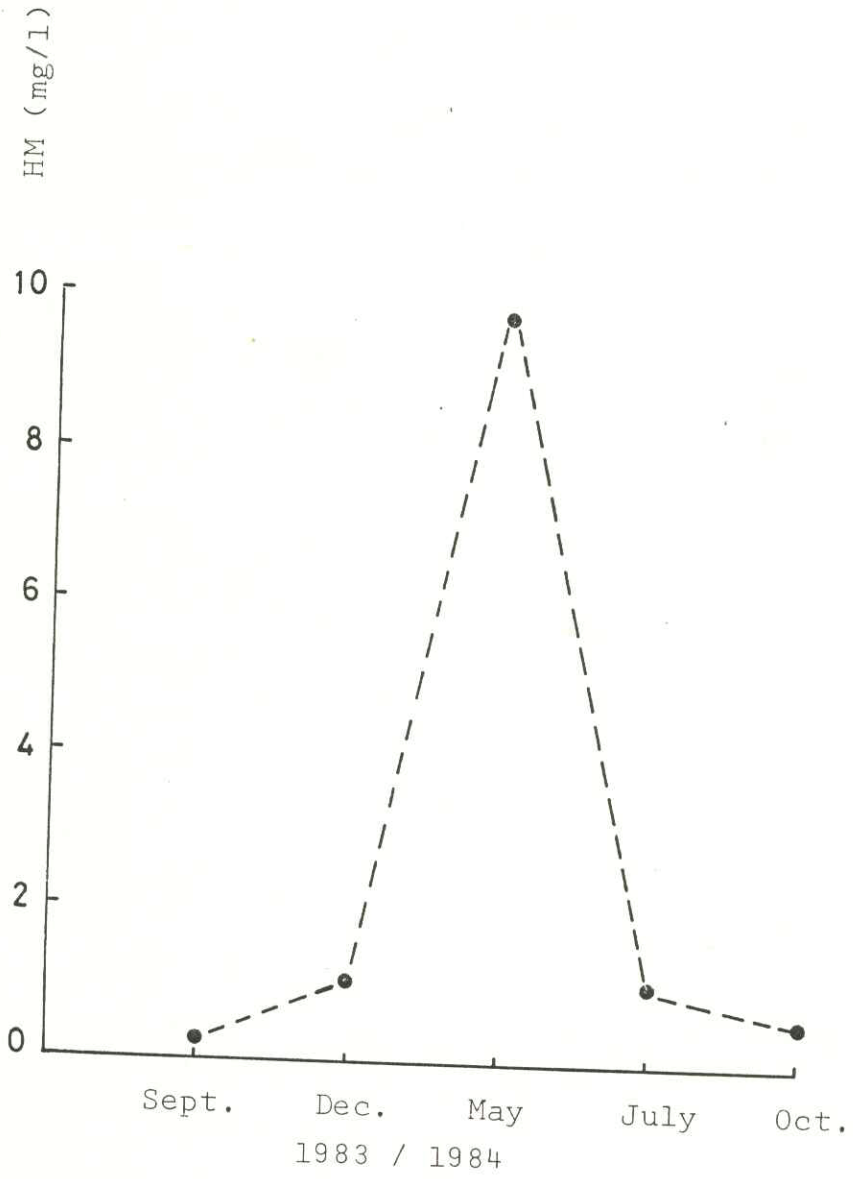


Figure 8: Annual variation of average HM.

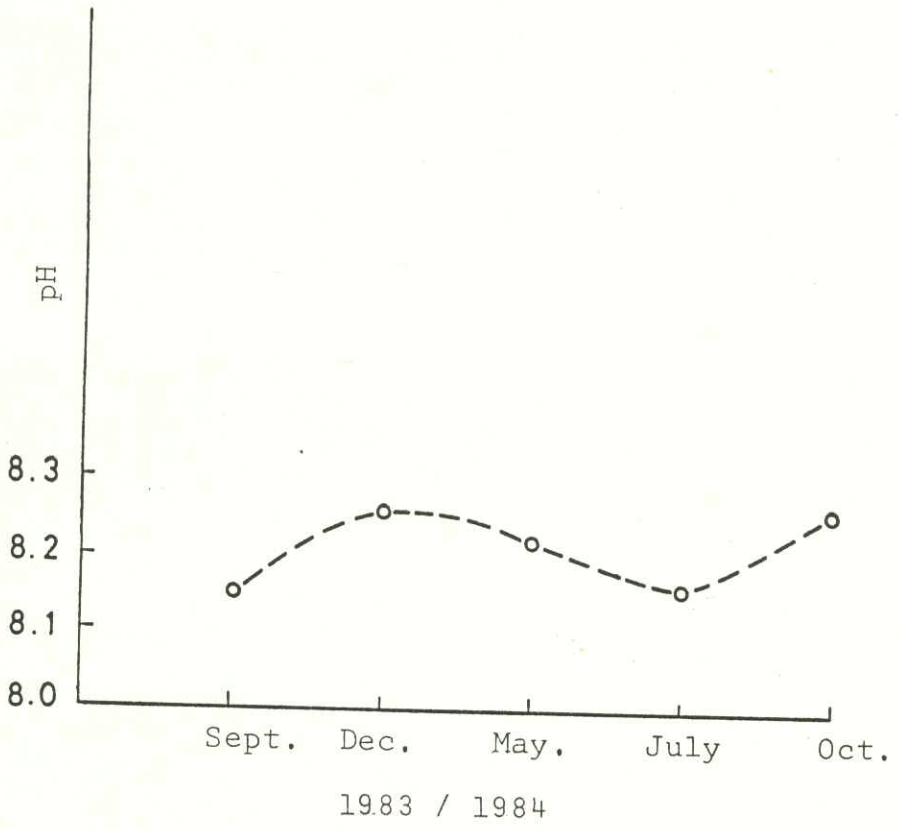


Figure 9: Annual variation of average pH.

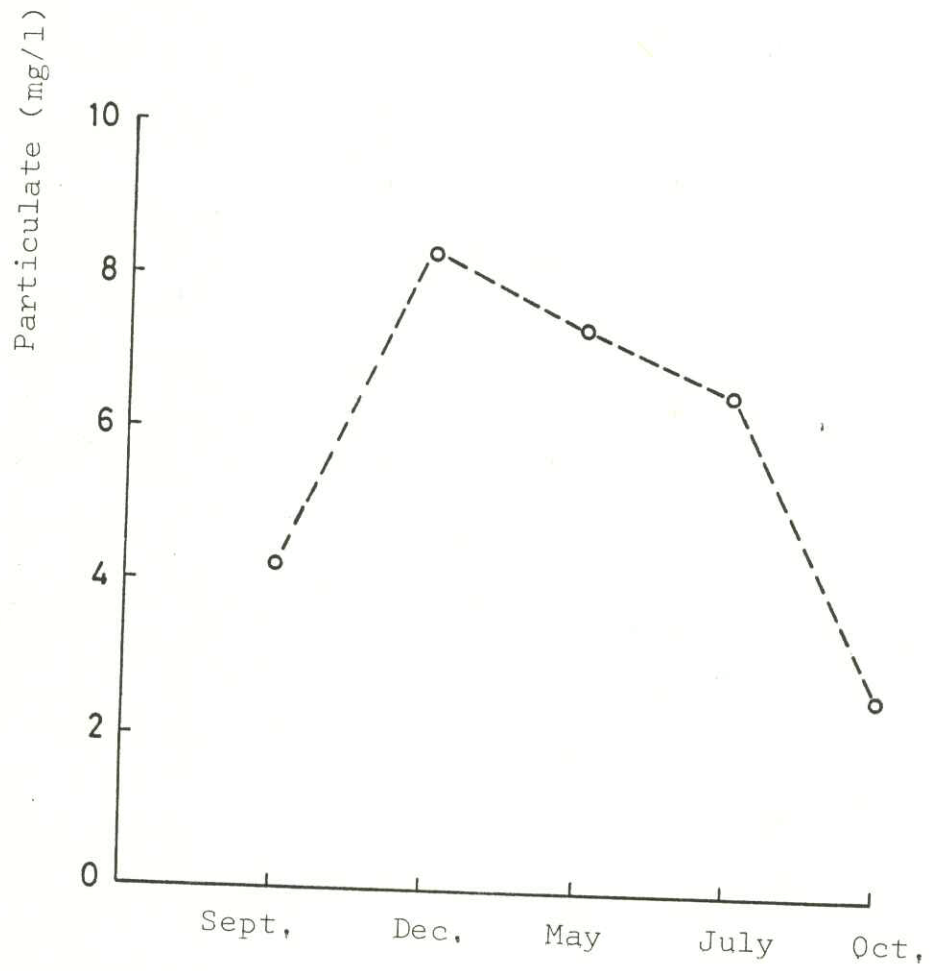


Figure 10: Annual variation of average particulate.

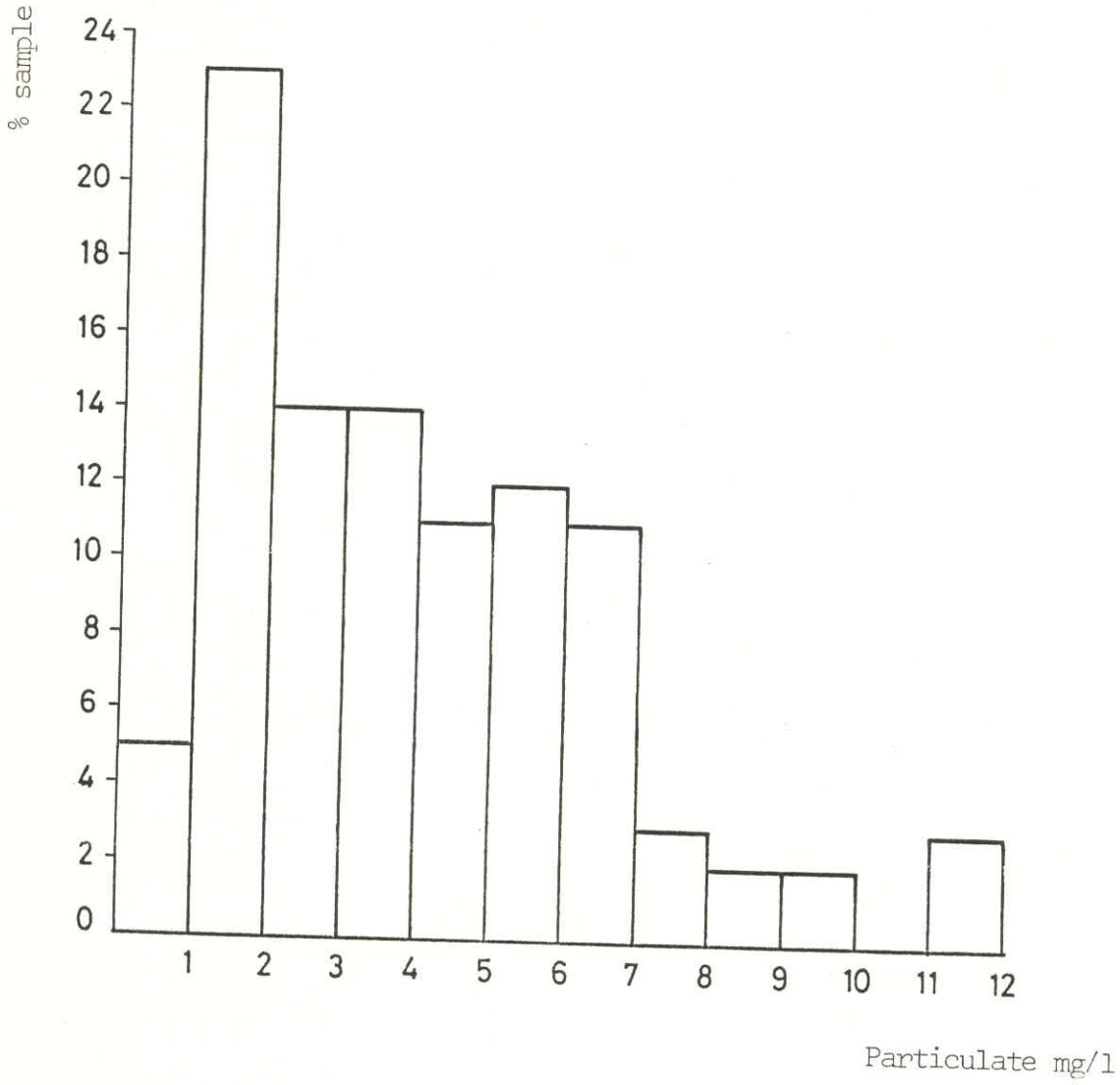


Figure 11: Percent frequency distribution of particulate.

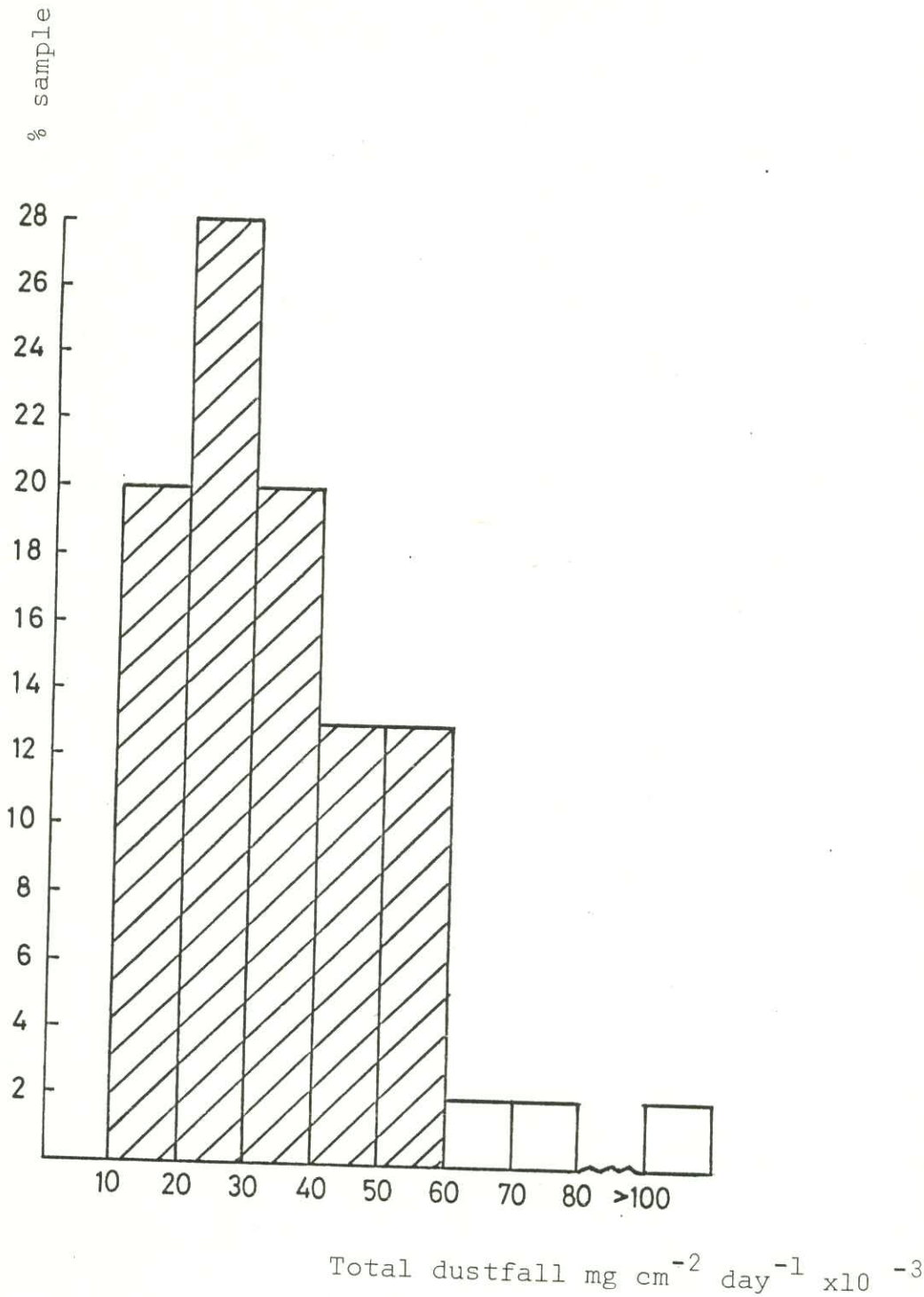


Figure 12: The annual average percent frequecy distribution of total dustfall.

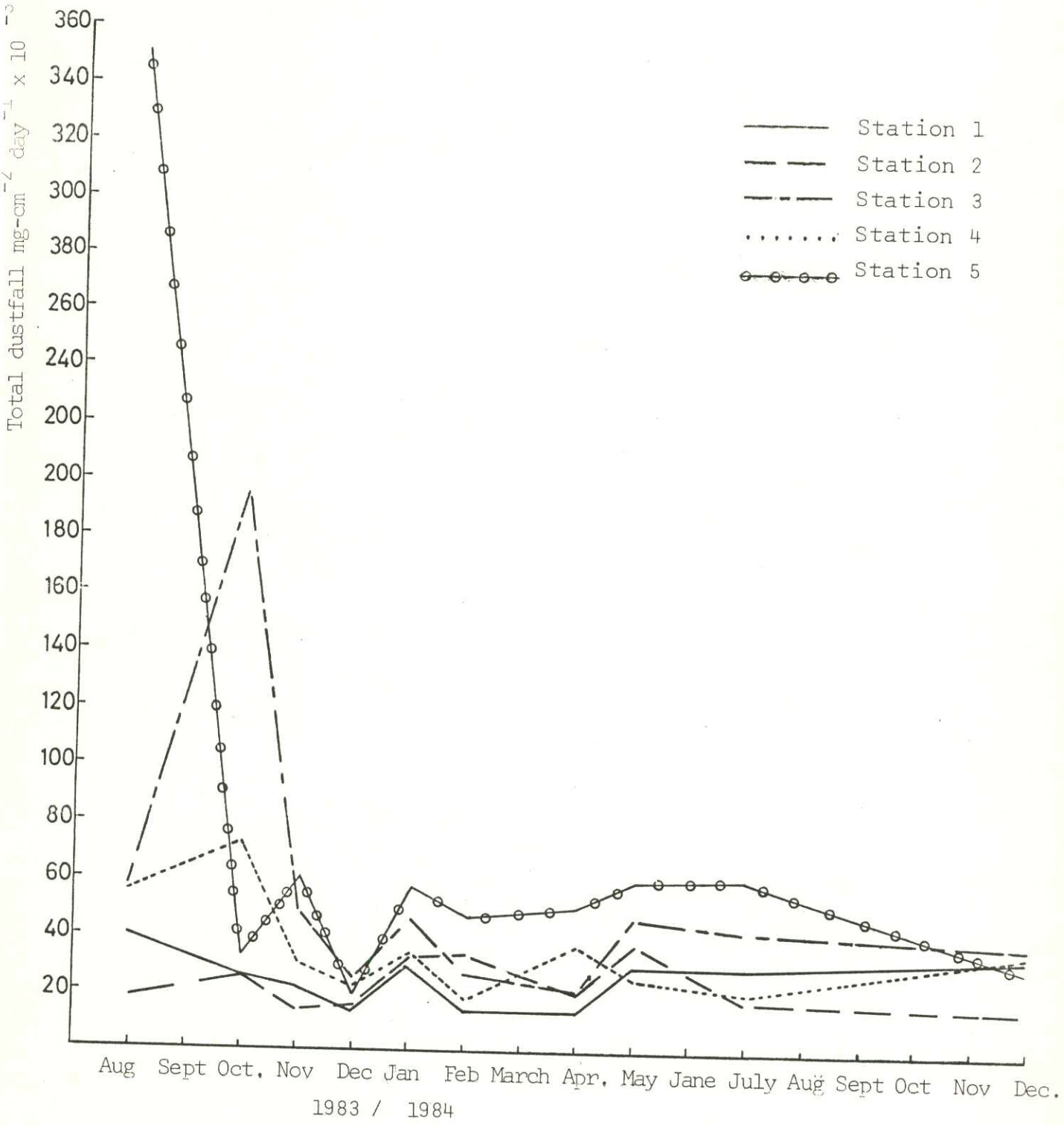


Figure 13: The annual variations of the total dustfall.

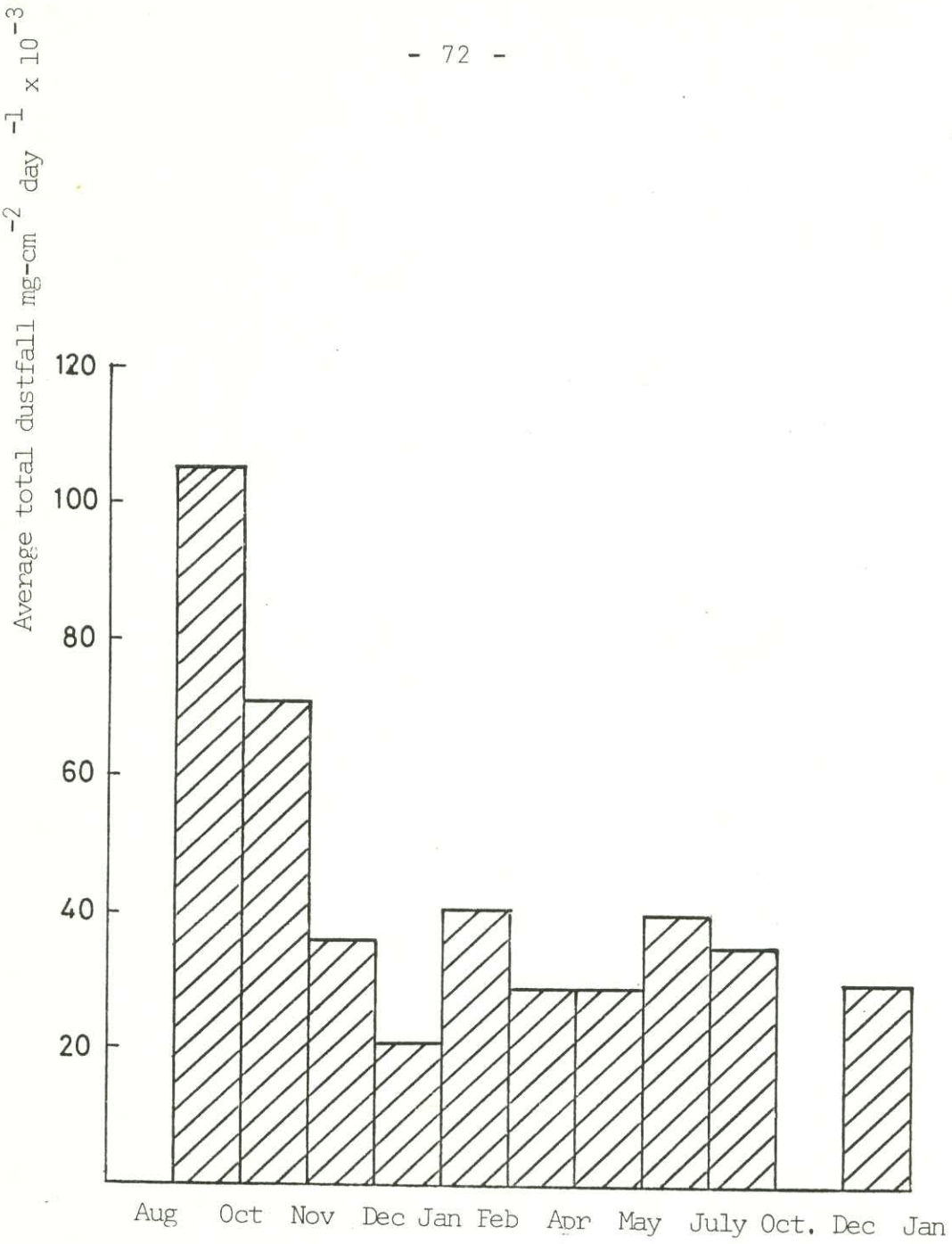


Figure 14: Annual variation of the average total dustfall.