平塚沖波浪観測資料（8）（1988.9～1990.8）

著者	渡部 勲，徳田 正幸，竹田 厚
雑誌名	防災科学技術研究所　研究資料
号	148
ページ	1-104
発行年	1991-03
URL	http://doi.org/10.24732/nied.00001762

551.466/46.06(265.5)

平塚沖波浪観測資料　(8)
(1988.9～1990.8)

渡部　勲*・徳田正幸**・竹田　厚*
防災科学技術研究所

Wind Wave Observation off Hiratsuka (8)
(Sept. 1988～Aug. 1990)

By
Isao Watabe, Masayuki Tokuda and Atsushi Takeda

National Research Institute for Earth Science and Disaster Prevention
Tsukuba, Ibaraki 305, Japan

Summary Note

Wind wave observations at the Hiratsuka Marine Observation Tower have been conducted continuously since 1978, and the data reports have been published in seven back issues of 'Review of Research For Disaster Prevention (Nos. 38, 47, 59, 107, 123, 135 and 142). This current issue contains the data for the period from September 1988 to August 1990.

Descriptions of the tower are presented in Fig. 1 and 2.

An ultrasonic wave gauge has been used for wave measurements. The characteristics of this ultrasonic sensor is almost the same as those of the capacitance-type sensor, except for the higher frequency range where statistic contribution to the significant wave is very small. Wind speed and direction are measured by an Aero-vane type anemometer on a mast at the top of the tower, 22.5m in height above the mean sea surface.

Atmospheric pressure presented here was measured at the base laboratory located on shore before November 29, 1987, and in the hut of the tower since November 30, 1987.

Wave, wind and atmospheric pressure data measured on the tower are transmitted to the base laboratory through a submarine cable and acquired in real time by a computer system (Fig 4) at a rate of one sample every 0.3 seconds for each channel. The one-over-three significant wave heights and periods are calculated from a time period of 20 minutes of wave data at every exact hour.

Analysed results are presented as follows :

(1) Averaged daily data of wave height and wind (Table 1)

①Daily mean value of significant wave height and period.

②The largest wave height of significant wave and period on a given day.

③Standard deviation of significant wave height.

④Daily mean value of maximum wave height and period.

*気圏・水圏地球科学技術研究部　　**元平塚支所沿岸防災第一研究室，現国際航業(株)

⑤The largest value among each maximum wave height and period in a day.
⑥Mean wind speed.
⑦The most frequent wind direction in a day.
⑧Maximum wind velocity and direction.
(2) Hourly change of the significant waves. atmospheric pressures and winds (Fig 5).
A mean wind direction and velocity averaged over 10 minutes are indicated by a vector. at the first exact hour of every three hours.
(3) Distribution of frequency of height and period of signiticant waves for each month (Table 2).

Key words：coastal disaster prevention, wind wave observation
キーワード　：沿岸防災，波浪観測

1.　定時波浪観測の概要

本資料は神奈川県平塚沖約１kmにある波浪等観測塔（図１，２）における波浪の定時観測データを取りまとめたものである。この定時観測は波浪の実況を常時観測することを目的としており，波高，風向，風速，気圧などの計測が行われている。この沿岸波浪のデータは海底ケーブルを通して陸上施設（平塚実験場）にテレメータ伝送され，オンライン・リアルタイムで収録・解析されている。このシステム及びデータ処理・解析の詳細については渡部・徳田（1984）に報告されている。本資料に掲載されている観測データは1988年９月から1990年８月までの２年間のものである。1986年８月以前の観測データについては国立防災科学技術センター防災科学技術資料№38，47，59，107，123，134，142を参照されたい。

2.　計測とデータ処理

１）波高計測

波高計測には，空中設置形の超音波式波高計を用いている。この波高計は超音波の送信・受信部のセンサー部を保護カバーで覆い平均水面から約5.5mの高さの支柱に取り付けたもので，データは信号ケーブルにより室内の信号変換器で電気信号に変換されるものである。

測定原理はセンサー部の送波子から海面に垂直に超音波を発射して受波子で受信し，その音波の往復時間によって海面までの距離を求めるものである。すなわち，検出器から測定面までの路離ｄは

$$d = c \cdot t / 2$$

で表わされる。ここで，cは空気中の音速，tは超音波が検出器と測定面（海面）を往復する時間である。しかしながら，音速は温度により変化するので，そのため誤差0.1℃以内

の温度センサーを用いて温度補正を行い測定精度を高めている。温度センサーは観測塔の観測室の外廊に取り付けてある。 超音波の発射間隔は0.1秒で４㎜の分解能（10Mレンジ使用時）で計測を行う。

このとき誤動作結果を除くため，移動平均を求め平均値と比較して正常なデータだけを出力している。したがって超音波式波高計の特徴は，従来使用していた容量型波高計と異なり海面と非接触であるため，センサーの生物付着や浮遊物による障害もなくメンテナンスをほとんど必要とせず，長期間に亘り安定した波高観測が可能なことである。

２）風向風速計測

観測塔の屋上約2.5m（平均水面から約20m）にプロペラ型風向風速計を設置している。測定範囲は風向について０～540°，風速については０～60m/sであり，それぞれ信号として０～５Ｖの電圧に変換される。

なお，精度は風向に対して±５°以内，風速に対して10m未満の時±0.5m/s以内，10m/s以上の時±５％以内である。

３）気圧計測

気圧計測は，卓上設置型のベローズ差動インダクタンス方式のアネロイド型気圧計発信器を観測塔の室内（水面からの高さ約16m）に設置し，信号をテレメータで伝送する自動計測で行っている。測定範囲は930～1050mbでDC１～５Ｖの電圧値に変換される。精度は±0.5%（0.6mb）Ｆ.Ｓ．以内である。

４）データ伝送システム

観測塔での計測データは，観測塔内に設置されたデータ伝送装置によりA/D変換し，複合海底ケーブルを通じて陸上施設内のデータ受信装置にデジタル伝送される。伝送されたデータ処理装置によって定時観測を行うと共に，台風や強風等の荒天時における連続観測を任意に行うことができる。定時観測のデータは，0.3秒のサンプリング間隔で，波高については，毎正時前後20分間の4096個のデータをゼロアップ・クロス法により波浪統計したものである。図３に示すように，平均水面を横切る点間の時間Ｔ１，Ｔ２，……を個々波の周期とし，個々波の波高は，各周期間の最大値（山）から最小値（谷）までと高さでH1，Ｈ２，……となる。このようにして得られた個々波を波高の高い順に並び換えて大きい方から1/３個の波高平均を，1/３有義波高とする。風向風速は，毎正時前後10分間の平均を計算したものである。

3. 図表の見方

本資料は1988年９月から1990年８月までの２年間の毎時20分間のデータを月毎に図および表にまとめたもので次のような項目で構成される。

１）波と風の日平均月表（表１）

毎時の波浪統計から得られる有義波高，最大波高，風速，風向を日単位にまとめたもので，主な項目順に

①有義波高の日平均波高値と周期

②有義波高について，その日の最大値と周期

③一日における有義波高の標準偏差値

④最大波高の日平均波高値と周期

⑤最大波高について，その日の最大波高値と周期

⑥風速をスカラ量と見なしての日平均値

⑦一日における最多風向(16方位)

⑧最大風速値と風向

２）１ヵ月の毎時の波浪の特性，気圧及び風向風速分布（図５）

波浪の特性は正時前後20分間のデータから求められた1/3有義波高(significant wave height)単位（m）を示す。気圧は正時の瞬間値（mb）示される。風向風速は正時前後10分間の平均値で代表し，３時間毎にベクトル表示した。線分の長さが風速を示し，線分の角度が風向を示す。風速ゼロの長線上にある線分は東風か西風を表わし，長線より上にある線分は北寄りの風，下にある線分は南寄りの風となる。

３）１ヵ月の有義波高と周期の頻度分布（表２）

１/３有義波高とその周期から，波高については30cm，周期は１秒毎に階級分けして，それぞれの頻度を表にしたものである。

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(1990年12月14日原稿受理)

観測塔要目表

波浪等観測塔の設置位置 Tower location	北緯　35° 18' 07" N 東経　139° 20' 56" E
波浪等観測塔の設置水深 Water depth	約20m
観測塔～汀線間のケーブル長 Submarine cable length	約1000m
陸上施設所在地 Station adress	〒254 神奈川県平塚市虹ヶ浜9の2 防災科学技術研究所 平塚実験場 TEL　0463 (32) 7159

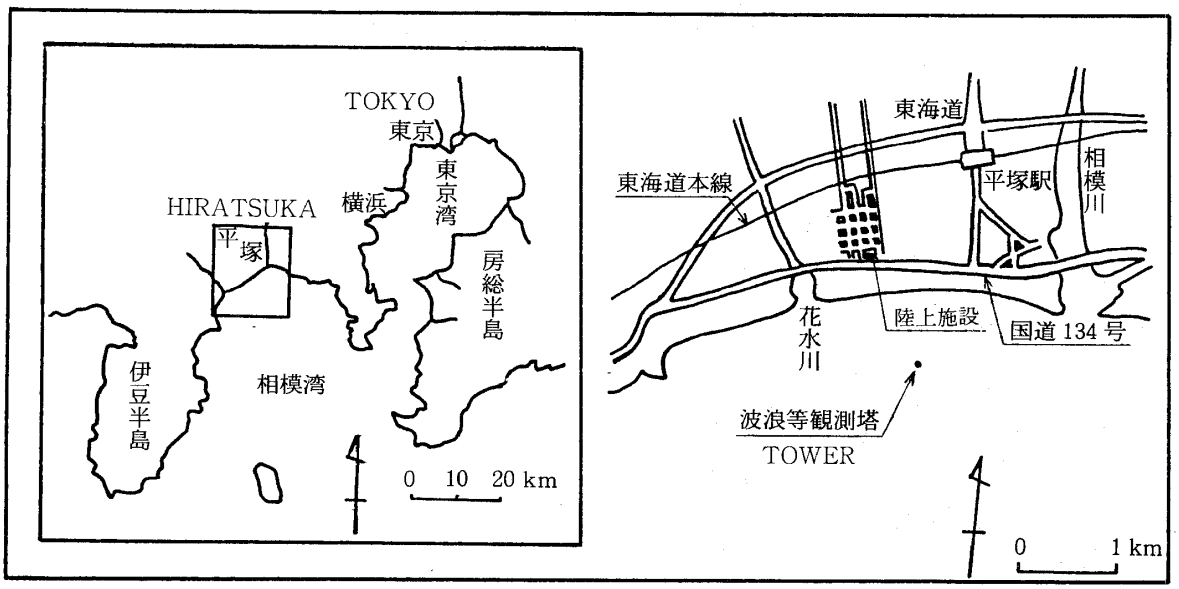
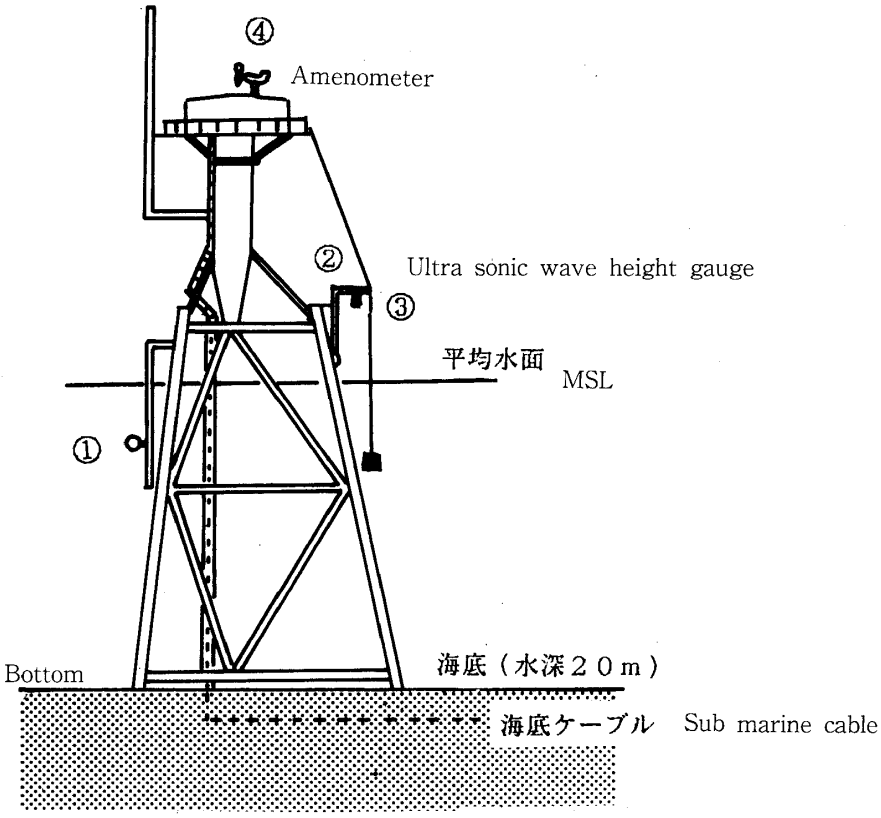
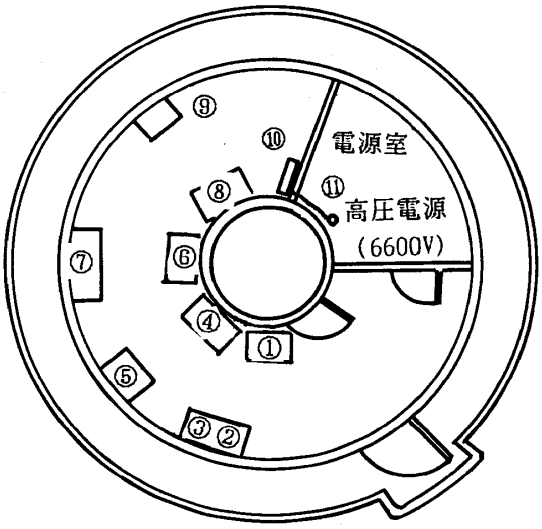


図1.　波浪等観測塔設置位置
Fig.1　Location of the Marine Observation Tower.

（ａ）





Tower labolatory

（ｂ）

(a)　観測器の感部の設置図

(b)　観測室内の計測器の増幅器と関連の装置

①　長周期波計	②　超音波式波高計
③　容量型波高計	④　風向風速計
⑤　無停電電源装置	⑥　気圧計
⑦　空調設備	⑧　テレメータ装置
⑨　遠方制御装置	⑩　保安端子箱
⑪　複合海廃ケーブル	

図2.　波浪等観測塔の概略図
Fig. 2　Structure of the Marine Obesrvation Tower.

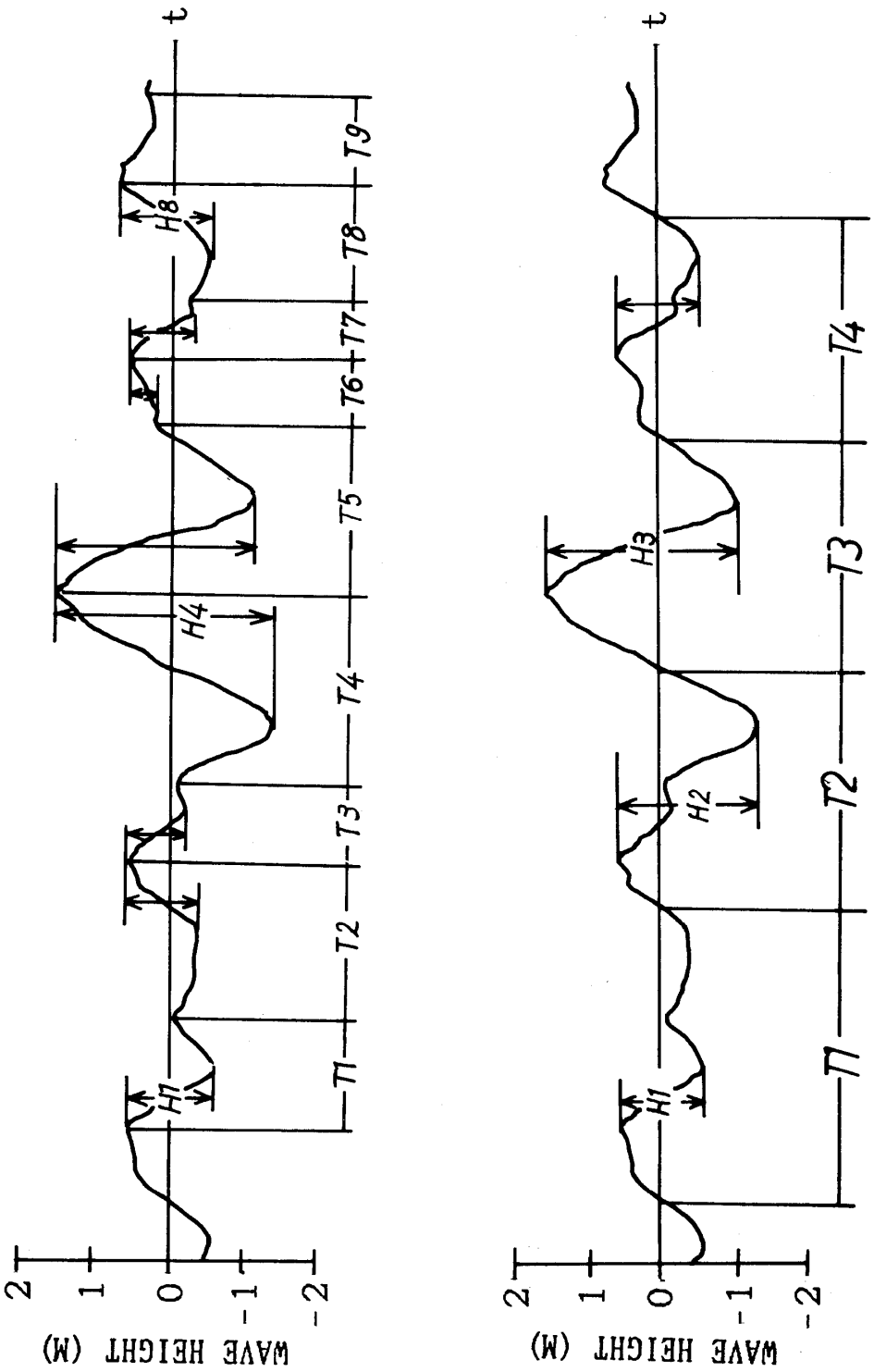


図3. PEAK-TO-PEAK法とZERO-UP-CROSS法
Fig. 3 Peak-to-peak method and Zero-up-cross method.

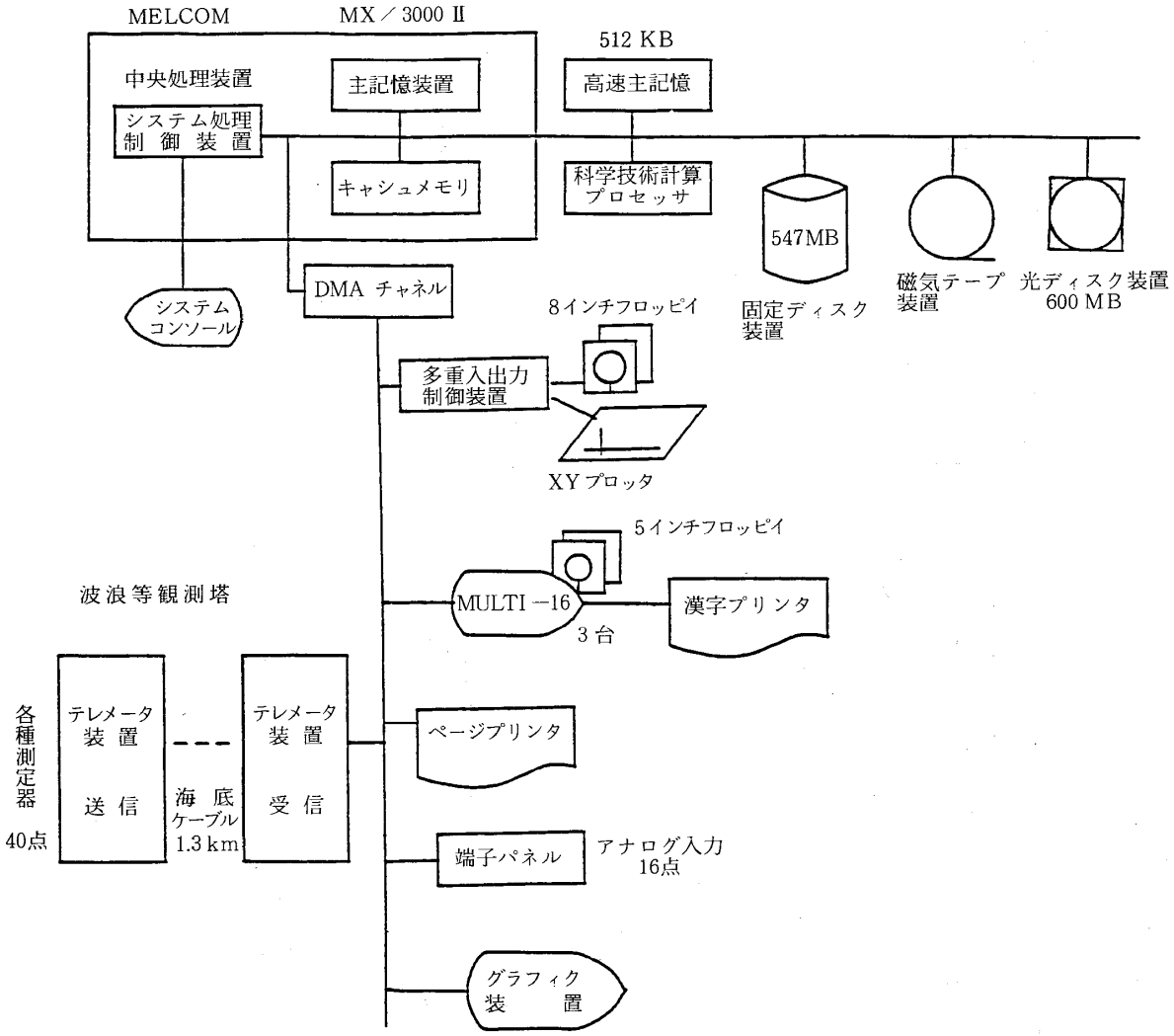


図4.　データ処理システム
Fig. 4　Block diagram of data processing system.

1988年9月～1989年8月

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1988 9

	1／3有義波					最大波							
	平均		最大		標準	平均		最大		平均	最多	最大	
	波高	周期	波高	周期	偏差	波高	周期	波高	周期	風速	風向	風速	風向
日	(CM)	(SEC)	(CM)	(SEC)	(CM)	(CM)	(SEC)	(CM)	(SEC)	(M/S)		(M/S)	
1	35.0	5.4	48.3	4.0	7.1	60.1	6.1	84.5	6.9	4.8	S	6.8	N
2	22.9	4.3	30.6	3.7	3.5	40.3	7.1	50.8	3.0	6.8	N	11.3	N
3	26.4	5.5	34.0	6.8	4.3	50.4	7.7	72.8	9.3	6.9	N	8.3	NNE
4	25.4	4.5	36.7	5.0	4.8	53.5	8.4	83.5	9.0	8.4	N	11.2	N
5	18.5	4.7	24.5	6.7	2.2	35.9	8.0	63.5	8.7	6.4	N	8.4	N
6	22.6	5.7	26.8	7.3	2.5	43.1	7.9	61.0	5.7	6.6	N	11.1	N
7	40.0	6.8	59.7	6.8	12.2	66.5	7.4	101.6	6.3	4.3	N	7.9	NNE
8	52.9	7.4	69.6	7.8	7.4	90.3	7.4	124.0	6.3	3.9	NNE	6.0	NE
9	37.6	6.6	48.2	6.6	4.0	66.9	8.8	87.9	6.0	3.6	S	5.7	N
10	31.6	6.7	40.2	7.1	3.7	52.8	8.5	75.7	8.7	2.3	NE	4.6	NNE
11	44.9	5.4	101.4	4.7	18.7	76.0	7.0	172.4	4.8	3.9	N	9.1	SSW
12	-	-	-	-	-	-	-	-	-	-	-	-	-
13	93.1	10.0	102.1	9.4	6.4	156.2	11.0	185.5	10.5	7.7	NNE	9.7	NE
14	214.9	14.3	314.0	15.1	64.7	339.4	14.1	563.0	13.8	11.3	N	14.0	N
15	248.9	13.6	388.0	14.5	102.8	393.9	14.2	574.2	15.0	15.1	N	18.2	N
16	75.0	9.0	98.9	5.0	10.2	135.8	10.8	188.5	13.2	7.2	N	14.9	NNW
17	72.8	9.5	91.8	7.3	10.7	122.6	11.0	159.7	11.1	5.9	N	7.2	NNE
18	46.4	7.7	88.4	9.2	12.2	78.7	8.2	129.9	9.6	5.9	N	7.7	NNE
19	54.5	6.7	67.1	6.2	8.7	91.5	6.5	121.1	6.0	2.7	N	6.0	N
20	48.4	6.1	67.9	5.2	8.9	81.1	6.5	119.6	5.7	1.7	N	3.3	WSW
21	47.3	7.3	56.5	6.4	5.1	78.7	8.2	100.1	6.3	3.9	NNE	7.3	E
22	40.2	8.0	56.8	8.8	6.2	70.5	8.6	88.9	8.4	6.3	N	9.7	N
23	38.7	7.6	46.4	8.2	3.5	66.5	8.0	76.7	7.8	5.6	N	7.9	N
24	35.9	7.7	47.8	8.7	5.2	62.8	8.5	84.0	9.3	5.6	N	11.3	N
25	92.8	7.6	187.0	5.7	56.4	159.1	7.8	363.3	8.4	5.6	N	13.0	S
26	144.2	9.6	227.7	10.0	40.3	235.8	9.4	393.6	9.3	5.5	N	8.8	NNE
27	59.9	8.1	105.7	8.7	22.1	101.1	8.3	171.4	8.4	7.2	N	8.5	N
28	35.2	7.1	57.7	8.7	8.5	63.8	8.0	89.8	7.5	7.4	N	9.5	N
29	35.7	6.7	47.8	7.6	7.1	67.6	8.2	107.4	8.7	8.8	N	10.3	N
30	32.8	6.7	50.7	8.2	8.6	63.0	7.9	99.6	8.7	6.9	N	9.6	N
平均	60.8	7.4	90.4	7.6	60.8	103.0	8.6	158.4	8.4	6.1	N	18.2	N

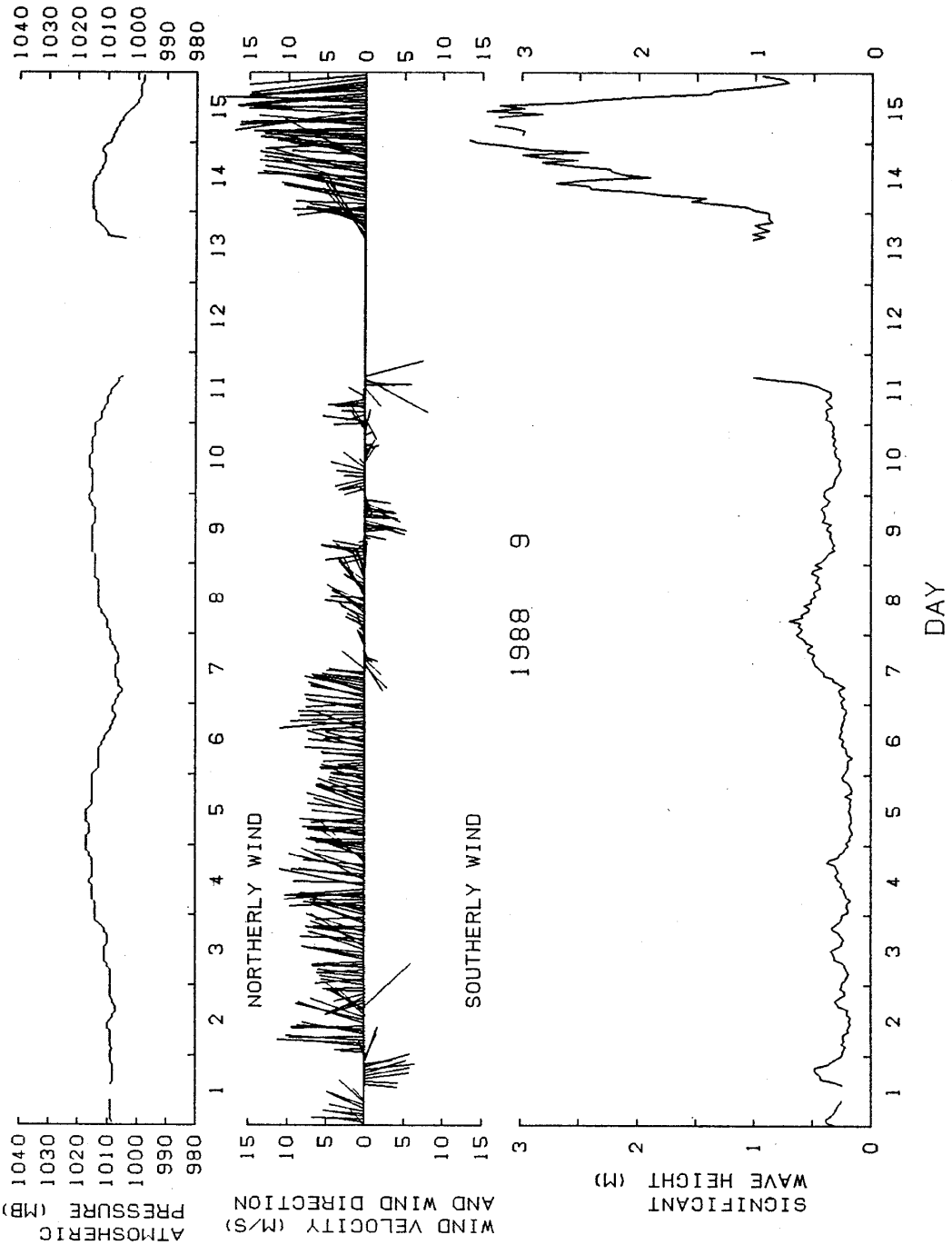


図5.　１ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5　Hourly variation of significant wave height, direction and velocity of wind, and atomospheric pressure.

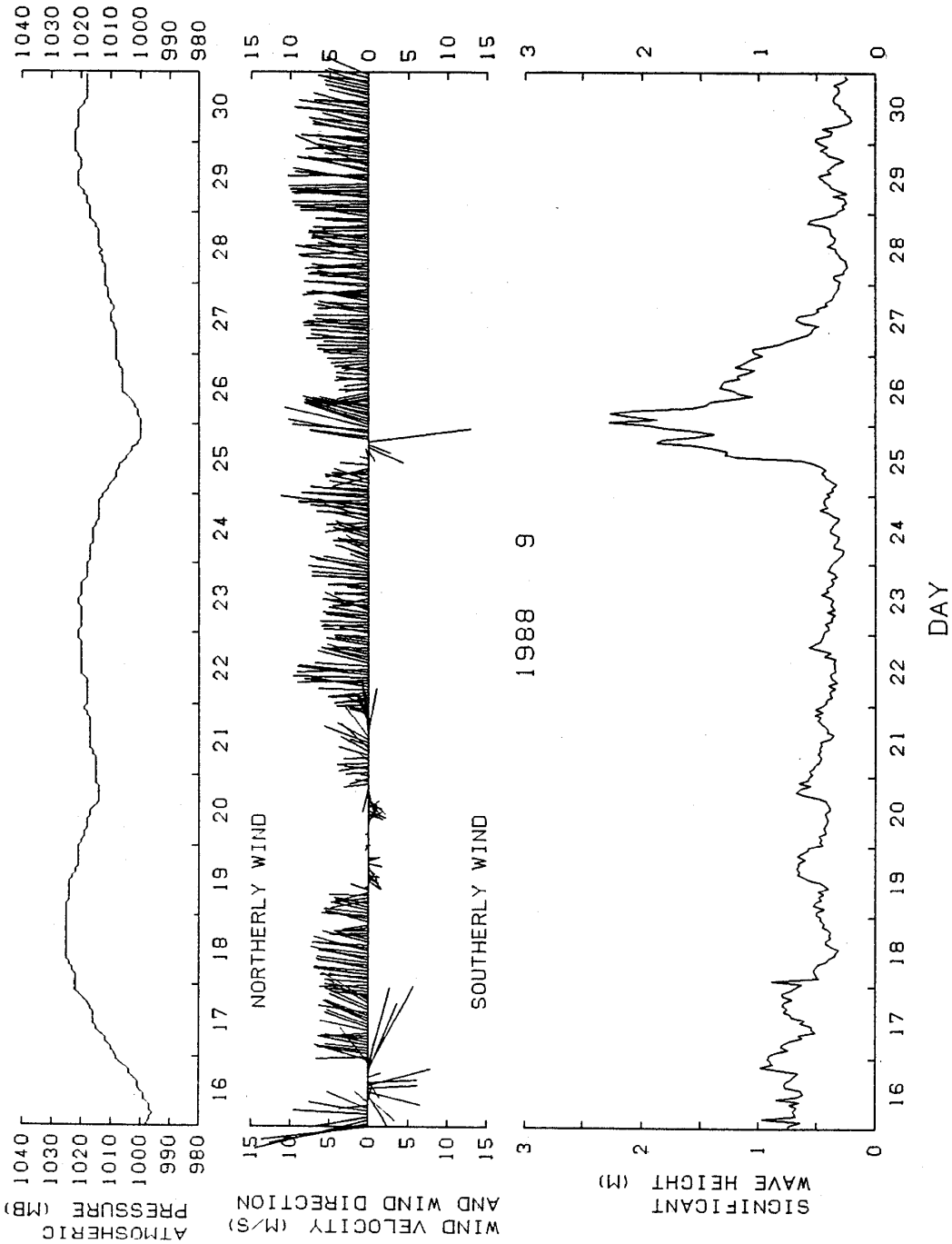

ATMOSPHERIC PRESSURE (MB)
1040
1030
1020
1010
1000
990
980
WIND VELOCITY (M/S) AND WIND DIRECTION
NORTHERLY WIND
SOUTHERLY WIND
15
10
5
0
SIGNIFICANT WAVE HEIGHT (M)
3
2
1
0
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
1988 9
DAY

表2.　1ヵ月の有義波高と周期の頻度分布

Table 2. Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1988　9

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30	3	21	36	53	32	5	2								152	22.7
30 — 60		3	13	25	93	153	56	4							347	51.8
60 — 90			3	5	14	11	9	13	12	5	6				78	11.6
90 — 120			1	1	1	2	8	8	3	3		1			28	4.2
120 — 150				1	2	1		6	2		3	1			16	2.4
150 — 180				1		1	1	1				1	1		6	0.9
180 — 210				1	1		2	1	1			1	1	1	9	1.3
210 — 240								2	1			2	2	1	8	1.2
240 — 270													3	3	6	0.9
270 — 300													6	3	9	1.3
300 — 330													2	3	5	0.7
330 — 360													2	2	4	0.6
360 — 390													1	1	2	0.3
390 — 420															0	0.0
420 —															0	0.0
TOTAL NUMBER	3	24	53	87	143	173	78	35	19	8	9	6	18	14	670	
PERCENT	0.4	3.6	7.9	13.0	21.3	25.8	11.6	5.2	2.8	1.2	1.3	0.9	2.7	2.1		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1988 10

日	1／3有義波 平均 波高 (CM)	平均 周期 (SEC)	最大 波高 (CM)	最大 周期 (SEC)	標準偏差 (CM)	最大波 平均 波高 (CM)	平均 周期 (SEC)	最大 波高 (CM)	最大 周期 (SEC)	平均風速 (M/S)	最多風向	最大風速 (M/S)	最大風向
1	35.0	6.9	49.8	7.3	7.4	62.2	7.1	97.7	6.6	3.4	NNE	6.7	NNE
2	38.7	6.7	49.0	7.8	4.9	64.6	7.3	88.9	7.5	4.3	N	6.7	N
3	37.1	6.6	45.8	6.2	5.0	65.7	7.3	83.0	6.3	5.7	N	8.6	NNE
4	38.7	6.4	55.6	6.0	9.8	66.0	7.1	99.6	6.3	4.3	N	6.4	NNE
5	46.6	6.9	66.2	7.0	7.9	79.7	6.9	109.9	6.3	5.6	N	8.9	N
6	103.8	8.2	147.1	8.8	18.7	163.7	8.2	228.0	9.3	5.0	N	10.0	N
7	95.9	9.1	121.4	8.5	12.8	154.9	9.5	192.4	7.8	2.6	NNE	4.9	N
8	68.3	11.2	104.6	14.4	10.5	124.3	13.8	175.8	15.3	8.5	N	12.3	N
9	67.5	9.7	102.9	11.8	13.0	115.4	10.8	170.4	11.7	5.1	N	11.2	N
10	47.6	7.7	56.2	8.2	5.2	81.3	8.8	100.1	8.7	5.2	NNE	8.3	NNE
11	44.7	6.3	86.0	4.2	19.0	71.0	7.1	140.1	3.9	5.8	N	12.6	SSW
12	101.9	5.1	131.1	6.2	14.7	178.6	5.0	277.3	5.1	8.2	SW	14.9	SW
13	79.2	6.0	126.7	4.9	23.3	137.9	6.3	231.9	4.5	9.0	NNE	17.1	SW
14	49.0	6.4	58.8	7.3	4.8	82.7	7.1	100.6	9.0	3.6	N	6.3	SW
15	50.0	6.0	67.7	4.1	7.4	83.6	6.6	105.5	8.7	3.6	N	9.0	SW
16	31.8	6.6	39.4	6.3	5.5	56.1	7.9	72.8	10.8	4.0	N	7.9	N
17	40.1	7.3	50.1	7.1	6.1	72.3	8.8	95.2	10.8	6.9	N	8.9	N
18	44.2	7.6	54.0	6.9	5.7	73.8	7.8	97.7	6.6	4.4	N	6.2	N
19	30.7	4.2	42.9	3.2	4.7	53.9	4.9	79.6	3.3	7.3	NNE	12.8	NNE
20	28.3	5.8	35.5	5.9	4.1	52.9	7.1	154.8	12.6	3.8	NNW	5.7	N
21	49.3	5.1	91.8	4.0	20.4	85.7	5.6	160.6	3.9	5.5	N	12.7	SW
22	34.1	5.5	53.4	4.9	7.3	59.0	6.8	88.9	4.8	4.7	N	8.4	NNE
23	32.2	7.2	39.0	6.0	5.0	56.6	7.9	78.1	7.2	4.0	N	7.3	N
24	31.4	6.9	43.0	7.5	5.2	54.1	7.3	74.2	7.2	5.0	N	6.6	N
25	41.1	6.5	52.4	6.9	5.9	72.8	6.7	99.1	7.5	6.7	N	10.3	N
26	37.4	6.8	51.4	9.3	6.5	64.8	7.7	89.8	7.5	5.2	NNE	8.7	NNE
27	75.2	8.3	104.5	5.4	20.0	130.4	9.3	182.6	4.5	6.0	N	11.2	SSW
28	67.9	6.9	100.0	5.1	14.0	115.4	8.1	187.5	4.8	5.6	N	9.8	NNE
29	31.1	6.2	40.1	7.9	4.6	56.9	8.8	72.8	10.2	5.5	N	10.0	S
30	40.1	6.7	74.4	5.9	11.8	69.1	7.1	128.4	6.6	3.8	N	7.7	NNE
31	28.0	5.7	37.5	4.2	4.3	49.2	6.1	63.0	6.9	4.5	N	6.5	NNE
平均	50.3	6.9	70.3	6.7	24.3	86.3	7.6	126.7	7.5	5.2	N	17.1	SW

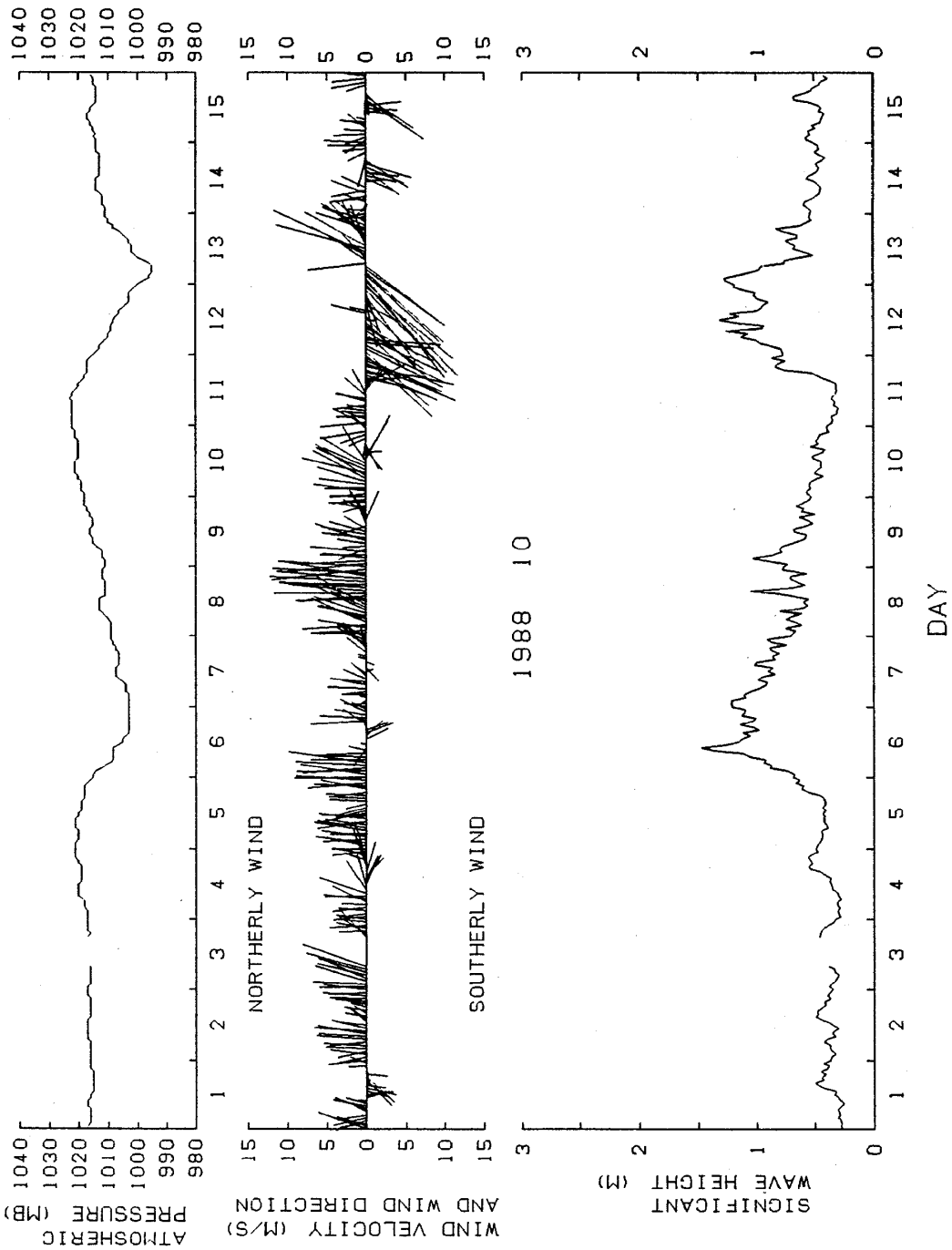


図5. １ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5 Hourly variation of significant wave height, direction and velocity of wind. and atomospheric pressure.

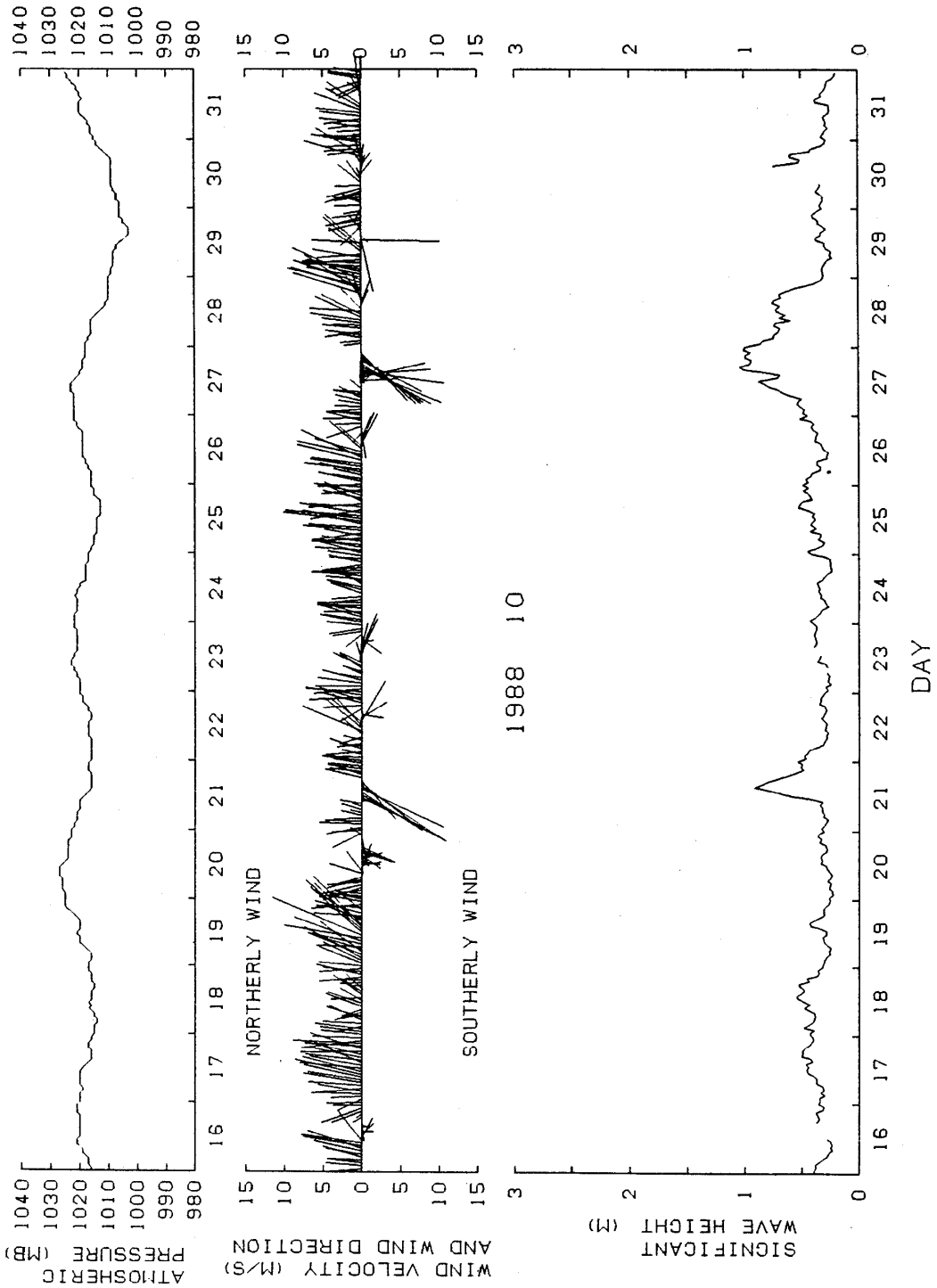

ATMOSPHERIC PRESSURE (MB)
1040
1030
1020
1010
1000
990
980
WIND VELOCITY (M/S) AND WIND DIRECTION
NORTHERLY WIND
SOUTHERLY WIND
SIGNIFICANT WAVE HEIGHT (M)
1988 10
DAY
16
17
18
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表2.　1ヵ月の有義波高と周期の頻度分布
Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1988　10

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30	2	1	15	34	40	19	1								112	15.5
30 — 60	3	12	22	55	165	117	42	12	5	1					434	59.9
60 — 90		7	14	5	16	16	6	9	13	16	4	1			107	14.8
90 — 120			13	18		5	13	8		1	1		1		60	8.3
120 — 150			3	1	1		6								11	1.5
150 — 180															0	0.0
180 — 210															0	0.0
210 — 240															0	0.0
240 — 270															0	0.0
270 — 300															0	0.0
300 — 330															0	0.0
330 — 360															0	0.0
360 — 390															0	0.0
390 — 420															0	0.0
420 —															0	0.0
TOTAL NUMBER	5	20	67	113	222	157	68	29	18	18	5	1	1	0	724	
PERCENT	0.7	2.8	9.3	15.6	30.7	21.7	9.4	4.0	2.5	2.5	0.7	0.1	0.1	0.0		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1988 11

日	1／3有義波 平均 波高 (CM)	平均 周期 (SEC)	最大 波高 (CM)	最大 周期 (SEC)	標準偏差 (CM)	最大波 平均 波高 (CM)	平均 周期 (SEC)	最大 波高 (CM)	最大 周期 (SEC)	平均風速 (M/S)	最多風向	最大風速 (M/S)	最大風向
1	35.5	5.1	71.4	3.6	19.4	64.3	6.2	134.3	3.3	5.2	N	11.3	SW
2	79.6	4.5	122.9	4.6	23.1	141.0	4.6	231.4	4.2	10.2	SW	16.5	SW
3	40.6	5.6	55.8	3.8	6.8	70.3	6.1	105.5	4.5	4.6	NNE	9.1	NNE
4	29.0	6.3	45.3	7.3	5.9	49.4	6.7	71.8	6.6	3.7	NNE	6.6	NNE
5	43.8	6.1	64.2	5.1	10.9	75.4	6.5	110.8	5.4	5.0	N	10.1	N
6	43.9	5.1	74.9	3.6	16.4	78.4	5.6	125.0	3.6	6.1	N	9.9	S
7	40.3	5.7	48.7	5.8	5.3	67.7	6.0	83.0	3.6	3.8	N	8.7	NNE
8	36.7	7.4	52.2	10.0	8.5	63.8	9.2	87.4	11.1	4.5	N	7.9	N
9	66.7	8.8	92.4	6.1	16.1	121.8	11.3	222.7	14.1	5.7	N	10.9	SW
10	111.9	6.4	179.3	5.1	28.7	191.3	7.3	342.3	5.1	8.0	N	19.5	SW
11	77.7	5.1	108.0	4.4	15.5	129.4	4.9	216.8	3.6	4.3	N	11.7	SW
12	61.7	5.4	114.5	4.8	25.0	104.2	5.9	195.8	4.2	6.5	NNW	14.1	SW
13	79.1	5.1	108.8	5.3	17.4	134.0	5.6	191.9	4.2	6.7	W	11.8	SSW
14	70.8	6.1	94.5	7.1	9.5	119.6	6.4	162.1	7.2	5.4	NNE	10.0	N
15	47.4	6.6	64.3	7.6	9.7	81.0	6.8	113.3	7.2	4.4	N	7.6	N
16	65.1	5.4	136.3	4.2	39.5	113.9	5.2	247.1	4.2	7.9	N	21.3	SW
17	56.2	6.3	91.3	5.2	12.5	98.3	6.5	185.5	4.8	6.4	N	8.0	N
18	25.6	4.7	42.8	6.9	6.5	51.4	6.8	84.0	7.2	8.0	N	11.0	N
19	33.2	6.4	57.8	7.3	13.4	61.3	8.0	110.8	7.2	4.4	N	8.0	N
20	27.5	6.2	37.9	7.2	3.1	52.6	8.4	73.7	7.2	6.5	N	8.2	N
21	26.8	7.1	32.6	7.3	3.5	47.2	8.9	59.6	9.0	3.8	N	7.3	N
22	30.4	6.4	45.5	5.0	4.7	54.7	8.7	81.1	10.2	4.6	N	7.3	NNE
23	39.9	5.6	68.4	3.6	11.9	70.4	6.7	122.1	3.6	5.4	N	9.1	SW
24	126.6	6.1	204.6	8.5	54.9	207.9	6.4	321.3	7.2	6.0	N	14.3	SW
25	158.5	5.7	198.9	5.7	26.6	265.3	5.8	374.5	4.5	13.7	WSW	20.5	SW
26	121.9	5.0	154.9	5.0	23.3	213.5	5.3	314.9	5.4	12.1	SW	18.1	SW
27	73.3	6.0	100.7	6.4	10.4	123.1	6.9	180.2	6.6	5.4	NNW	10.0	SW
28	46.2	7.4	63.9	7.2	6.3	81.7	8.0	113.8	7.8	5.8	N	8.4	N
29	29.7	6.8	38.0	7.4	2.6	55.8	8.8	69.8	8.4	5.6	N	12.4	NNE
30	39.7	6.9	58.9	6.0	8.0	70.2	8.0	114.7	6.3	4.1	NNW	5.5	E
平均	59.0	6.0	87.7	5.9	37.9	102.2	6.9	161.6	6.2	6.1	N	21.3	SW

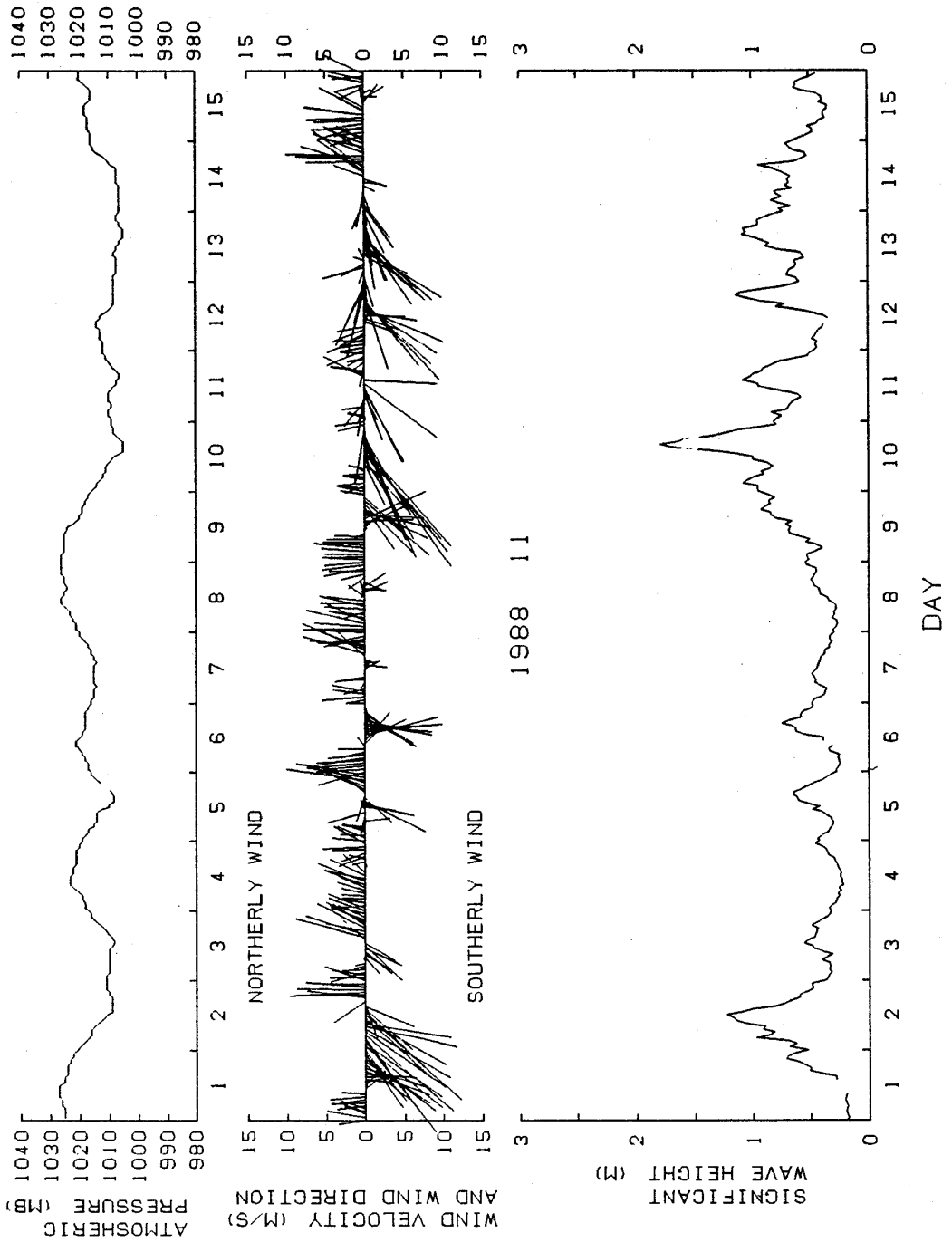


図5. １ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5 Hourly variation of significant wave height, direction and velocity of wind and atomospheric pressure.

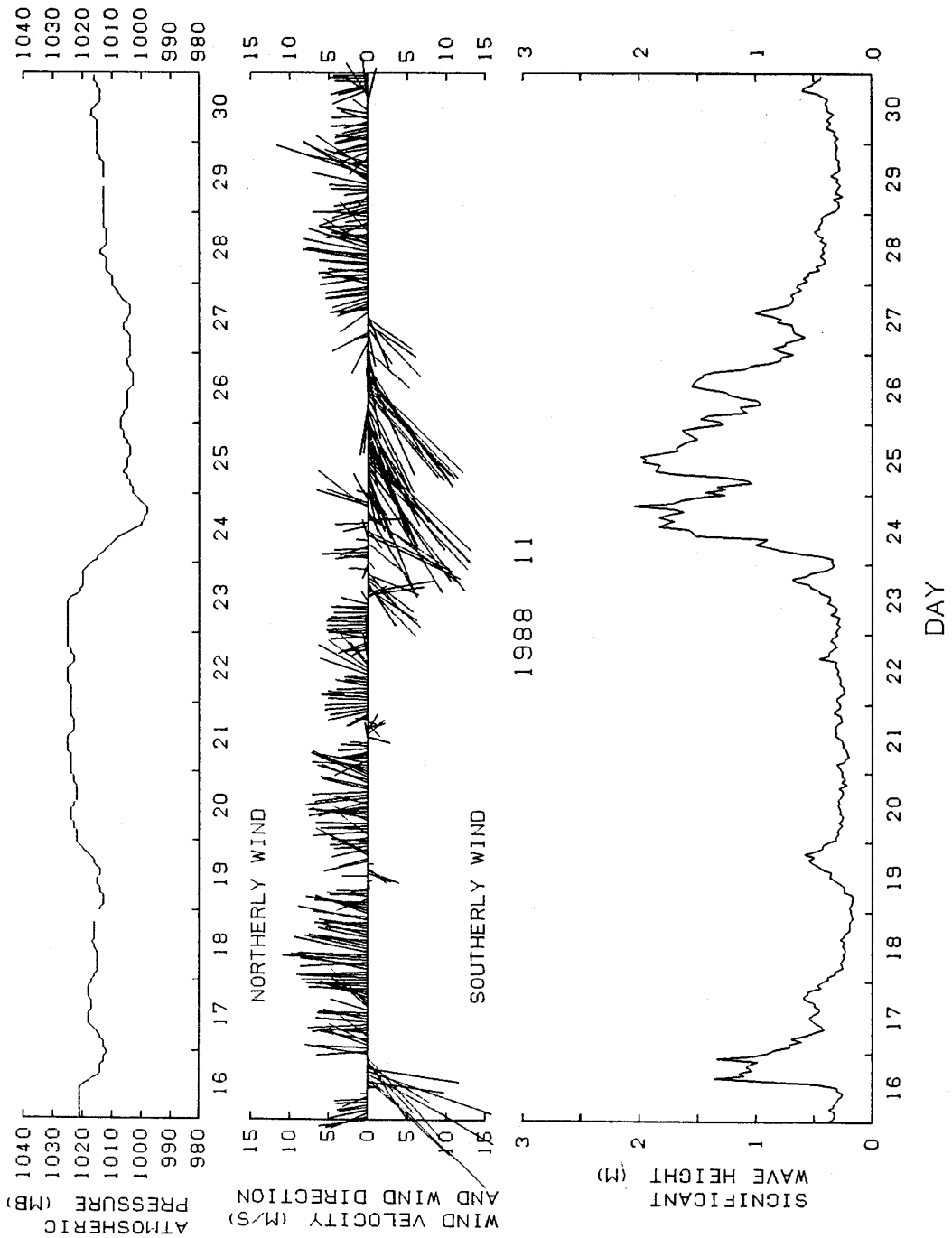

ATMOSHERIC PRESSURE (MB)
WIND VELOCITY (M/S) AND WIND DIRECTION
NORTHERLY WIND
SOUTHERLY WIND
SIGNIFICANT WAVE HEIGHT (M)
1988 11
DAY

表2.　1ヵ月の有義波高と周期の頻度分布
Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1988　11

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30		11	18	34	56	25	4	1							149	20.9
30 — 60		17	22	67	102	76	16	10	3						313	43.8
60 — 90		20	21	47	26	10	1	1	2	2					130	18.2
90 — 120		3	28	21	3	6	2								63	8.8
120 — 150			8	12	1	1	1								23	3.2
150 — 180			1	18	4	1	2								26	3.6
180 — 210				7	1	1	1								10	1.4
210 — 240															0	0.0
240 — 270															0	0.0
270 — 300															0	0.0
300 — 330															0	0.0
330 — 360															0	0.0
360 — 390															0	0.0
390 — 420															0	0.0
420 —															0	0.0
TOTAL NUMBER	0	51	98	206	193	120	27	12	5	2	0	0	0	0	714	
PERCENT	0.0	7.1	13.7	28.9	27.0	16.8	3.8	1.7	0.7	0.3	0.0	0.0	0.0	0.0		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1988 12

	1／3有義波					最大波							
	平均		最大		標準	平均		最大		平均	最多	最大	
日	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	偏差 (CM)	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	風速 (M/S)	風向	風速 (M/S)	風向
1	36.2	6.9	45.8	6.9	4.8	62.4	7.8	86.4	7.2	3.9	N	6.4	N
2	29.3	5.6	33.7	4.9	2.9	49.9	6.0	62.5	6.9	3.6	N	7.3	NNE
3	21.4	4.9	27.8	3.7	2.1	40.3	8.4	51.3	5.7	5.8	N	8.6	NNE
4	22.8	6.3	28.4	5.1	2.9	40.8	7.8	52.2	5.4	3.2	N	5.7	NNW
5	85.6	5.5	149.9	5.3	42.2	146.0	5.8	264.6	5.7	7.5	SW	18.0	SW
6	48.1	6.8	66.4	6.7	14.2	82.4	7.4	126.0	7.8	4.6	N	7.2	N
7	39.1	6.9	47.5	6.8	5.5	66.2	7.7	88.4	8.1	4.0	N	6.4	N
8	32.7	7.2	41.9	7.1	3.6	57.4	8.5	79.6	8.4	3.1	N	5.2	N
9	71.3	5.4	118.5	4.7	32.5	123.0	5.8	236.3	4.5	7.0	SW	15.1	SSW
10	47.2	6.6	64.2	4.9	7.6	81.4	7.5	121.6	7.5	3.9	N	7.6	W
11	53.1	5.8	69.3	6.1	7.5	92.5	6.8	141.6	6.9	4.2	N	9.0	SSW
12	40.8	6.9	64.6	6.3	9.5	67.2	7.5	97.7	7.2	3.5	N	6.2	N
13	26.0	7.0	32.3	7.6	2.5	49.4	8.9	56.6	9.3	5.5	NNE	6.7	N
14	58.4	6.4	110.3	5.0	34.7	98.3	6.9	188.5	4.2	5.6	N	12.6	SW
15	112.2	5.1	146.1	5.9	14.5	190.3	5.2	254.9	5.1	8.8	W	15.4	SW
16	104.6	5.1	123.7	5.2	12.3	176.6	5.2	221.7	4.8	8.2	WSW	14.5	WSW
17	87.8	6.3	108.4	5.6	9.9	148.4	6.9	211.4	6.3	6.0	NE	9.7	SW
18	45.4	6.3	68.1	7.3	10.3	76.4	6.6	133.3	7.8	3.8	N	6.4	SSE
19	36.4	5.7	55.4	5.7	8.1	61.4	5.9	115.2	5.1	2.3	N	5.6	N
20	60.5	5.5	80.7	6.4	10.8	100.8	5.5	138.7	6.9	3.6	N	7.2	SSE
21	47.4	6.3	67.3	7.2	10.1	82.5	6.7	117.7	6.6	4.2	N	7.7	NNE
22	43.7	6.5	56.4	7.2	7.2	74.3	6.5	102.1	6.6	4.1	N	6.4	N
23	35.5	5.4	48.1	3.3	6.9	63.3	6.1	94.7	2.4	5.1	N	8.1	SSW
24	37.4	5.8	61.6	6.4	9.8	64.3	6.5	104.0	7.2	4.2	N	8.1	N
25	55.5	5.7	106.6	5.2	23.4	95.3	6.1	181.6	4.5	5.5	NNE	12.5	SW
26	44.4	7.0	56.9	7.3	6.5	73.5	6.8	103.0	6.9	3.5	N	5.7	N
27	41.1	6.7	46.5	6.0	4.0	68.8	6.8	94.2	6.0	3.5	N	5.9	N
28	36.7	5.9	43.2	6.7	2.7	65.0	6.2	88.9	5.7	5.9	N	10.1	NNE
29	34.9	6.2	43.1	5.3	3.4	61.1	7.0	81.5	7.5	5.0	N	8.2	NNE
30	26.0	6.0	31.6	6.3	3.2	44.8	6.8	60.1	5.4	4.4	N	6.3	N
31	31.0	5.9	44.4	4.1	5.4	53.8	5.9	74.2	5.4	3.2	N	5.9	SSW
平均	47.9	6.1	67.4	5.9	26.3	82.1	6.8	123.6	6.3	4.7	N	18.0	SW

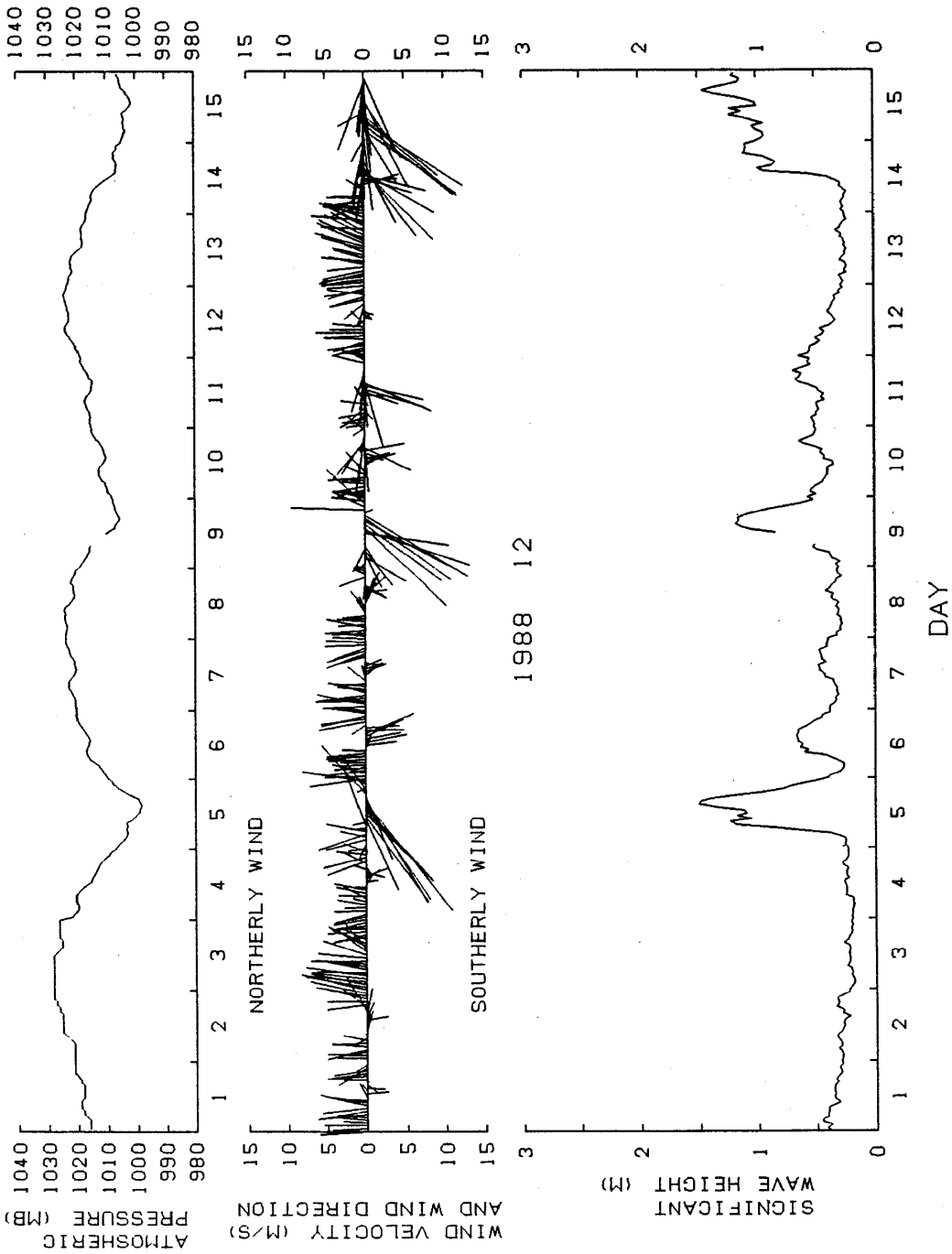
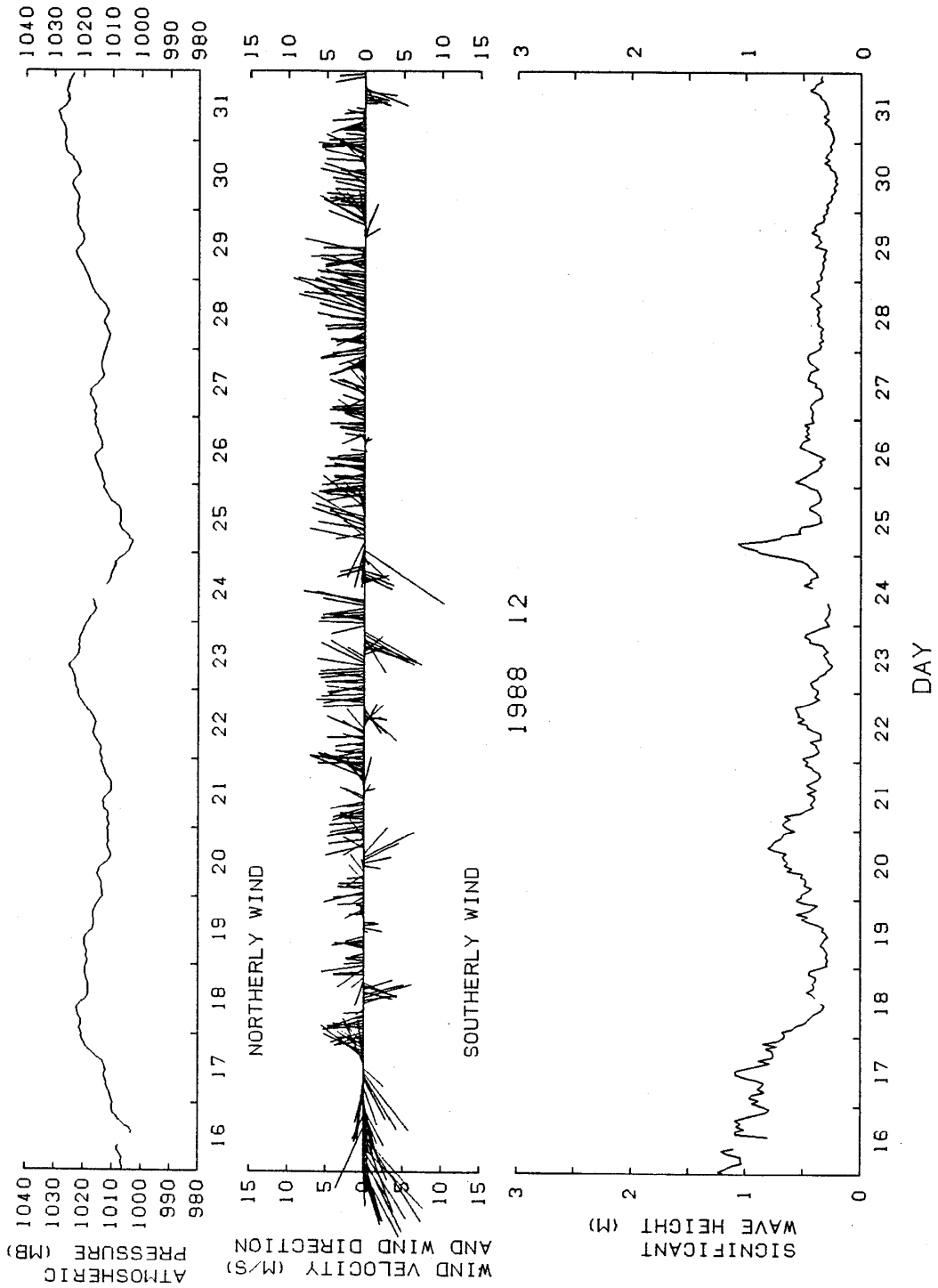


図5.　１ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5　Hourly variation of significant wave height, direction and velocity of wind and atomospheric pressure.


ATMOSHERIC PRESSURE (MB)
1040
1030
1020
1010
1000
990
980
WIND VELOCITY (M/S) AND WIND DIRECTION
NORTHERLY WIND
SOUTHERLY WIND
15
10
5
0
SIGNIFICANT WAVE HEIGHT (M)
3
2
1
0
16
17
18
19
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21
22
23
24
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26
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28
29
30
31
1988 12
DAY

表2.　1ヵ月の有義波高と周期の頻度分布
Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1988　12

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 --- 30		6	19	56	50	34	9								174	23.7
30 — 60		7	27	99	177	94	3								407	55.5
60 --- 90		1	11	22	24	13									71	9.7
90 — 120			29	33	4										66	9.0
120 — 150			3	12											15	2.0
150 — 180															0	0.0
180 — 210															0	0.0
210 — 240															0	0.0
240 — 270															0	0.0
270 — 300															0	0.0
300 — 330															0	0.0
330 — 360															0	0.0
360 — 390															0	0.0
390 — 420															0	0.0
420 ---															0	0.0
TOTAL NUMBER	0	14	89	222	255	141	12	0	0	0	0	0	0	0	733	
PERCENT	0.0	1.9	12.1	30.3	34.8	19.2	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1989 1

日	1／3有義波 平均 波高 (CM)	平均 周期 (SEC)	最大 波高 (CM)	最大 周期 (SEC)	標準偏差 (CM)	最大波 平均 波高 (CM)	平均 周期 (SEC)	最大 波高 (CM)	最大 周期 (SEC)	平均風速 (M/S)	最多風向	最大風速 (M/S)	最大風向
1	42.8	5.2	95.8	3.8	22.9	76.4	5.6	170.9	3.6	5.9	N	14.2	SSW
2	-	-	-	-	-	-	-	-	-	-	-	-	-
3	49.6	6.2	62.4	5.8	5.7	85.9	6.2	110.8	7.8	3.3	NNW	6.2	NNW
4	27.1	5.4	38.9	6.3	4.2	48.9	6.5	64.5	5.1	6.1	N	8.4	N
5	26.6	6.3	32.2	7.0	3.3	47.7	7.6	59.6	7.5	4.4	N	8.1	N
6	35.0	6.7	39.3	7.0	2.1	58.4	7.2	69.3	7.2	3.6	N	5.7	N
7	22.9	6.7	30.8	7.1	3.2	39.9	8.1	47.4	8.7	3.5	N	6.0	N
8	69.2	7.1	159.1	8.5	49.0	112.4	8.3	240.2	8.1	6.8	N	9.3	NNE
9	65.8	7.9	90.6	8.5	10.8	114.2	8.4	174.8	9.0	8.1	N	12.1	N
10	45.0	6.6	69.4	9.4	11.3	83.6	9.1	113.8	8.7	9.3	N	13.4	N
11	56.1	8.1	71.6	8.4	5.8	91.7	8.6	120.1	9.0	3.4	NNE	8.4	NNE
12	44.3	7.0	69.1	9.2	9.4	78.2	9.0	109.9	8.4	7.4	N	11.9	N
13	43.8	8.1	52.3	7.9	4.6	73.1	8.2	90.3	9.3	4.0	N	5.8	N
14	40.2	7.4	56.6	8.2	6.6	70.5	8.2	91.8	8.4	4.5	N	8.1	N
15	39.3	6.2	53.7	7.7	7.5	70.2	8.1	97.2	8.4	7.3	NNE	11.2	N
16	43.4	7.2	65.4	7.6	6.8	76.4	7.6	104.5	8.1	5.2	N	7.7	NNE
17	39.9	7.1	44.8	7.4	3.5	67.2	7.8	86.4	7.8	4.1	N	6.0	NNW
18	30.9	6.6	40.3	6.8	4.4	55.2	8.0	74.7	9.3	5.5	N	8.4	NNE
19	69.0	6.1	138.9	4.5	45.9	124.7	6.4	298.8	5.1	6.2	SSW	15.7	SSW
20	185.6	6.3	224.8	6.9	23.7	312.0	6.1	434.6	5.1	11.0	S	16.3	WSW
21	96.5	7.8	156.4	7.2	29.4	171.0	8.0	354.0	7.5	6.6	NNE	9.6	NNE
22	41.2	6.9	54.4	7.6	7.4	75.1	8.3	100.6	7.2	5.4	N	7.3	N
23	62.7	7.4	116.3	10.5	26.2	113.8	9.3	197.8	10.5	10.9	N	14.7	N
24	106.9	9.1	132.9	8.7	17.1	176.8	9.0	242.7	8.4	5.2	NNE	8.4	NNE
25	56.4	8.5	70.8	9.2	7.8	97.0	9.2	121.6	8.7	5.4	N	8.1	NNE
26	32.9	6.8	41.4	9.0	4.1	58.3	8.3	79.6	8.1	5.2	N	7.7	N
27	101.0	6.3	204.2	5.9	57.5	175.9	6.3	384.8	5.7	9.1	SW	20.9	SW
28	50.7	6.9	72.5	8.0	12.8	93.2	8.2	141.1	7.5	7.1	N	11.7	WNW
29	53.6	6.9	70.9	5.1	9.7	91.7	7.8	129.9	4.2	5.3	N	8.5	SSW
30	42.1	7.0	49.8	7.5	2.9	70.3	7.5	85.9	6.6	3.2	N	5.6	N
31	64.8	5.1	131.8	4.4	36.8	112.3	5.9	284.7	4.8	8.3	N	17.2	SSW
平均	56.5	6.9	84.6	7.4	38.4	98.0	7.8	156.1	7.5	6.1	N	20.9	SW

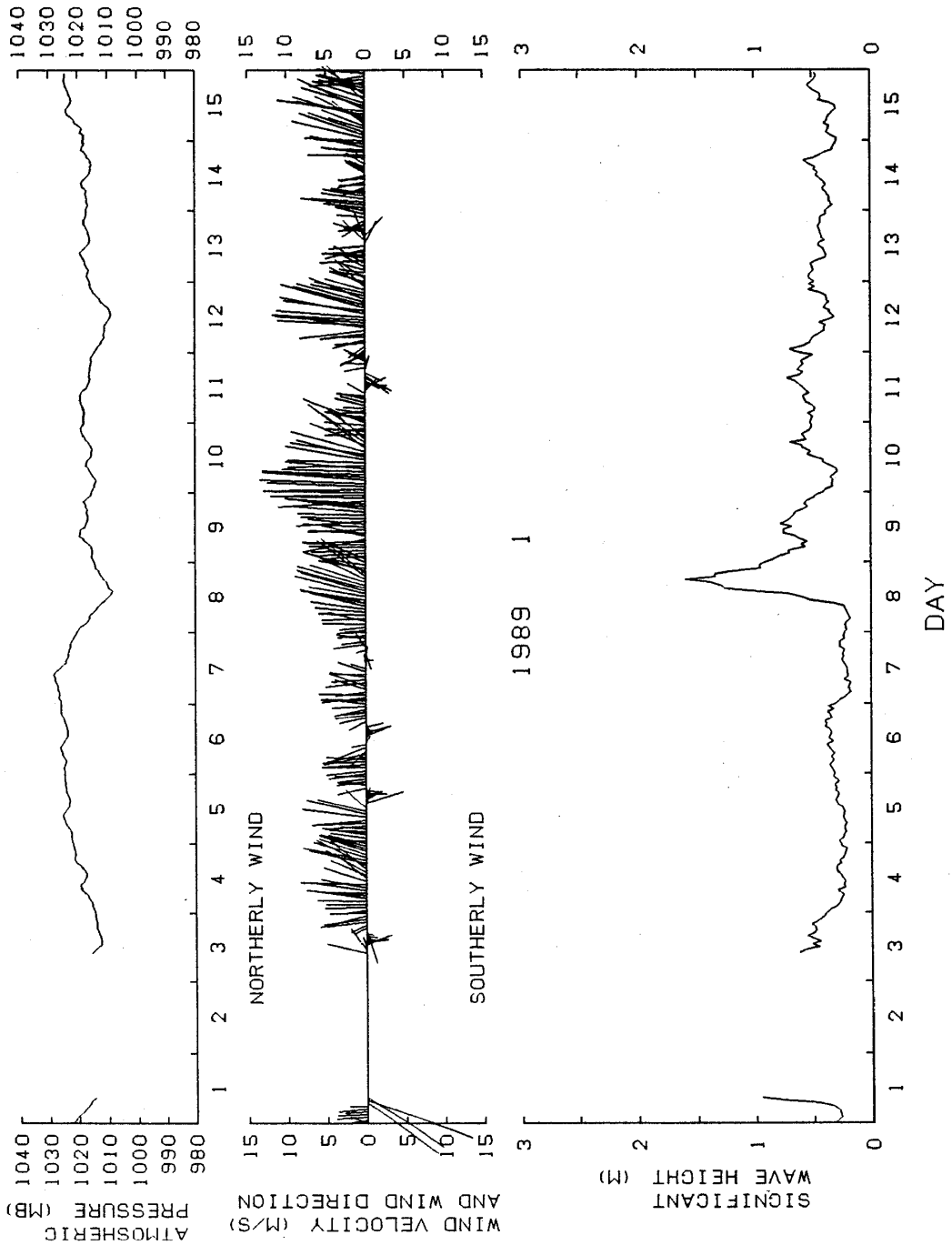


図5. １ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5 Hourly variation of significant wave height, direction and velocity of wind. and atomospheric pressure.

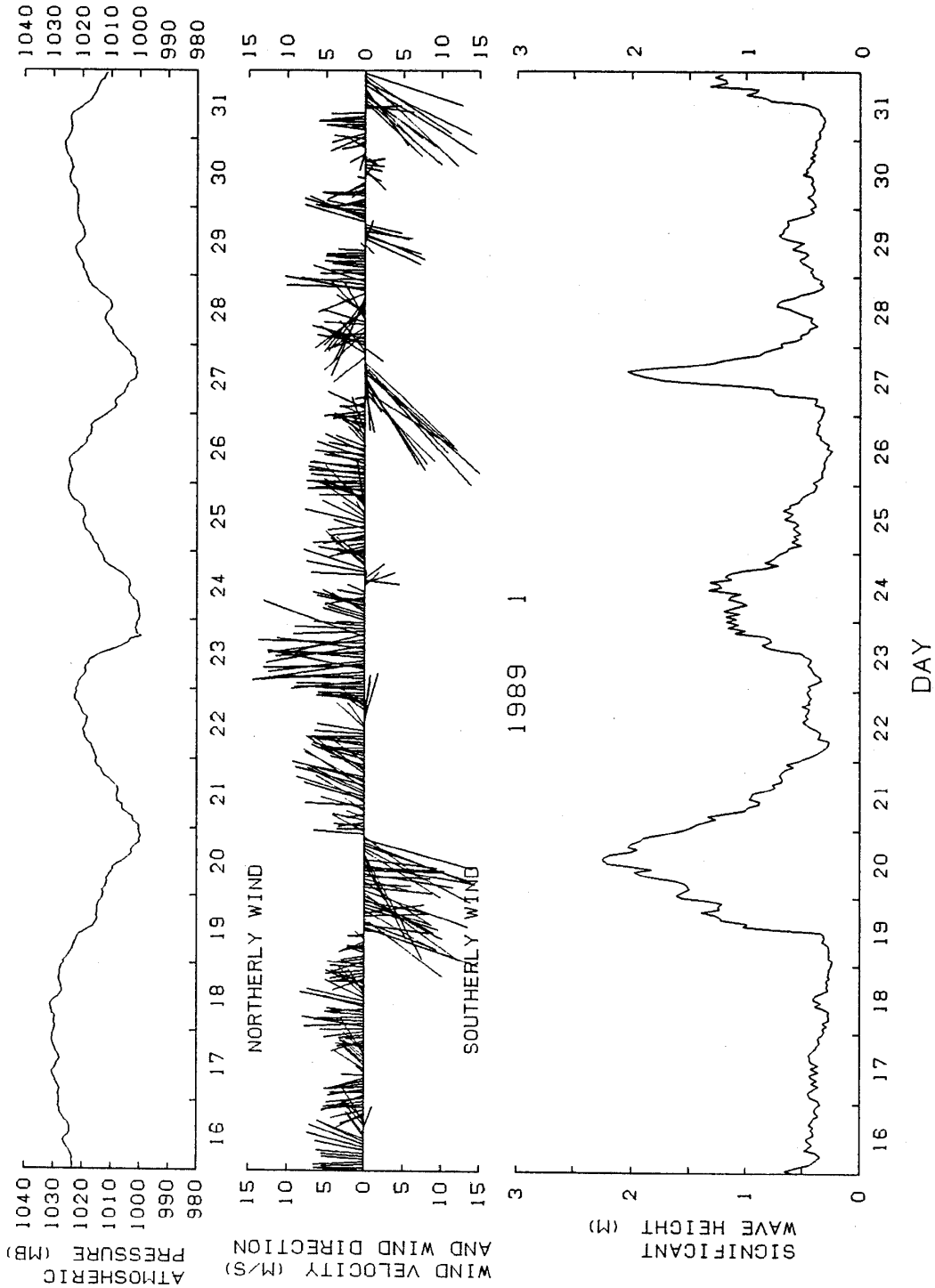

ATMOSPHERIC PRESSURE (MB)
WIND VELOCITY (M/S) AND WIND DIRECTION
NORTHERLY WIND
SOUTHERLY WIND
SIGNIFICANT WAVE HEIGHT (M)
1989 1
DAY

表2.　1ヵ月の有義波高と周期の頻度分布
Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1989　1

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30		1	16	28	39	29									113	16.2
30 — 60		4	9	45	133	130	68	12							401	57.6
60 — 90		6	3	10	5	32	18	9							83	11.9
90 — 120		1	6	2		5	9	11	5						39	5.6
120 — 150			11	4		7	7								29	4.2
150 — 180				7	2	3	1								13	1.9
180 — 210				4	10										14	2.0
210 — 240					4										4	0.6
240 — 270															0	0.0
270 — 300															0	0.0
300 — 330															0	0.0
330 — 360															0	0.0
360 — 390															0	0.0
390 — 420															0	0.0
420 —															0	0.0
TOTAL NUMBER	0	12	45	100	193	206	103	32	5	0	0	0	0	0	696	
PERCENT	0.0	1.7	6.5	14.4	27.7	29.6	14.8	4.6	0.7	0.0	0.0	0.0	0.0	0.0		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1989 2

日	1／3有義波 平均 波高 (CM)	平均 周期 (SEC)	最大 波高 (CM)	最大 周期 (SEC)	標準偏差 (CM)	最大波 平均 波高 (CM)	平均 周期 (SEC)	最大 波高 (CM)	最大 周期 (SEC)	平均風速 (M/S)	最多風向	最大風速 (M/S)	最大風向
1	107.5	6.3	149.0	8.5	23.9	178.3	6.1	266.1	8.1	7.9	NNE	20.3	SW
2	71.3	8.5	122.3	9.4	23.9	117.1	8.6	188.0	9.0	5.3	NNE	9.5	NNE
3	40.7	7.4	51.1	7.1	5.9	69.3	7.8	93.3	7.5	4.2	N	7.6	N
4	41.0	7.1	50.7	6.7	5.4	68.7	7.5	83.0	7.8	4.8	N	6.7	N
5	33.9	5.9	48.9	4.4	6.9	57.5	7.1	83.5	6.3	4.9	N	8.0	NNE
6	28.9	5.6	34.0	5.8	2.7	49.9	6.2	71.3	6.6	4.6	N	8.0	NNE
7	28.0	4.6	40.6	3.8	6.8	48.5	6.1	71.8	6.3	5.3	N	7.3	N
8	41.9	5.4	97.6	5.8	23.1	75.2	6.4	196.3	5.7	3.9	N	6.7	SSW
9	98.3	6.9	127.8	7.6	17.3	166.5	7.2	236.3	7.5	7.0	NE	10.2	SSW
10	61.8	7.5	97.2	7.4	18.8	109.9	7.9	186.5	6.6	6.9	N	9.0	NNE
11	40.5	7.5	50.3	5.8	6.6	74.4	9.2	115.2	8.4	5.6	NNE	9.1	NNE
12	36.9	6.7	47.0	7.6	5.6	64.1	7.4	78.6	7.8	5.1	N	8.6	N
13	25.7	5.1	32.3	5.2	3.2	48.4	7.2	57.6	8.1	6.1	NNE	8.3	N
14	26.1	5.5	41.0	4.2	5.3	46.7	6.4	82.5	6.0	4.2	NNE	6.7	NE
15	60.0	4.8	120.3	4.6	39.2	103.8	5.5	221.2	4.8	7.6	SW	14.0	SW
16	107.1	4.7	157.3	5.9	22.0	182.6	4.4	254.4	4.8	10.7	SW	15.4	SSW
17	147.1	8.0	194.7	6.9	29.9	239.0	8.0	329.6	6.3	9.6	N	14.9	SSW
18	75.9	8.4	98.3	8.9	10.9	133.5	8.7	180.2	8.4	9.4	N	13.0	NNE
19	59.1	8.4	75.1	9.3	8.6	96.9	8.7	118.2	7.8	4.0	NNE	6.7	NNE
20	67.4	6.1	108.8	4.6	23.3	114.1	6.3	201.7	3.6	6.9	N	13.8	SSW
21	84.5	6.9	108.9	7.2	16.9	137.2	7.4	175.8	7.8	5.6	N	9.7	NNE
22	46.2	7.8	63.0	8.6	6.5	82.1	8.7	113.3	8.4	5.6	NNE	8.8	N
23	40.6	6.9	47.0	8.2	3.7	75.4	9.3	87.9	9.6	5.5	NNE	8.8	NNE
24	53.1	7.7	81.7	8.1	13.0	95.8	8.9	145.0	8.4	7.2	NNE	10.6	NNE
25	61.1	8.2	78.1	8.4	8.0	105.0	8.4	128.9	8.7	6.6	N	10.1	N
26	110.4	8.6	197.5	9.2	51.0	183.4	9.1	322.8	9.3	7.6	NNE	12.8	NNE
27	52.3	7.5	76.4	9.4	8.0	93.3	8.4	129.4	9.6	4.4	N	7.4	SSW
28	86.2	6.2	159.0	6.5	42.9	148.3	6.3	306.6	6.3	5.3	N	11.8	SSW
平均	61.4	6.8	91.3	7.0	36.1	105.0	7.5	161.6	7.3	6.1	N	20.3	SW

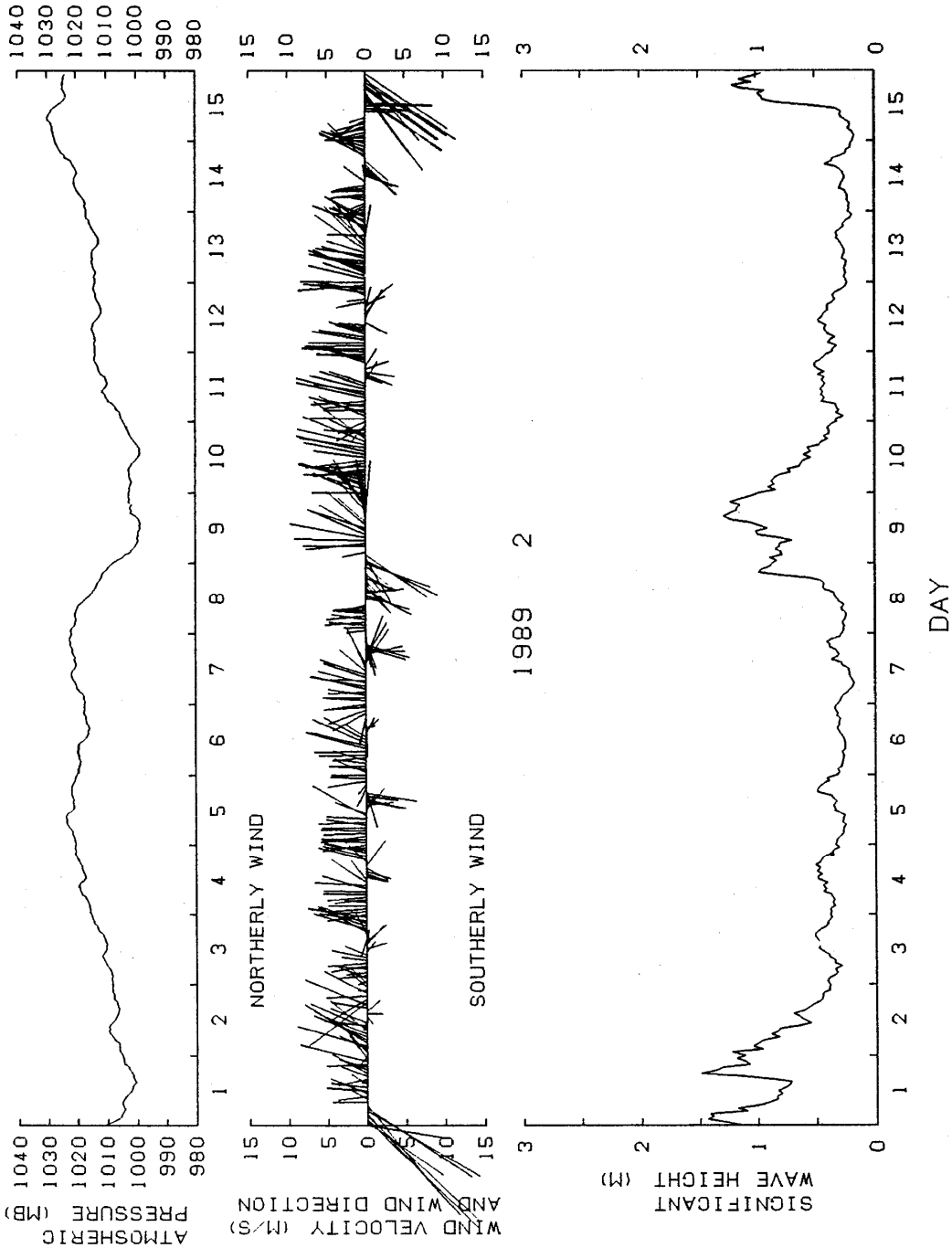


図5. １ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5 Hourly variation of significant wave height, direction and velocity of wind. and atomospheric pressure.

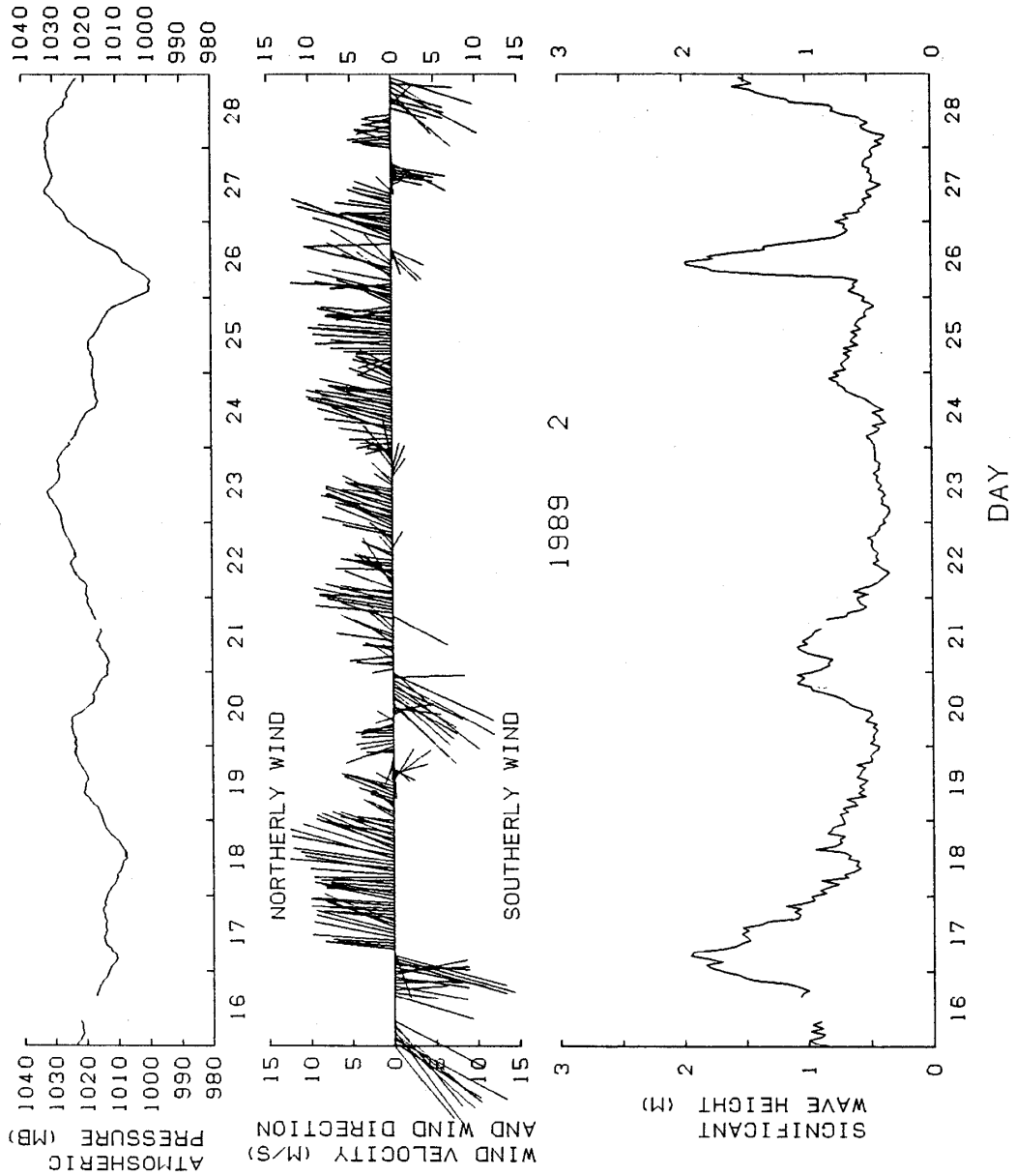

ATMOSPHERIC PRESSURE (MB)
1040
1030
1020
1010
1000
990
980
WIND VELOCITY (M/S) AND WIND DIRECTION
NORTHERLY WIND
SOUTHERLY WIND
15
10
5
0
SIGNIFICANT WAVE HEIGHT (M)
3
2
1
0
1989 2
16
17
18
19
20
21
22
23
24
25
26
27
28
DAY

表2.　1ヵ月の有義波高と周期の頻度分布
Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1989　2

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30		4	24	46	29	3	1								107	16.2
30 — 60		11	20	34	64	108	66	3							306	46.2
60 — 90		3	6	16	13	22	54	9							123	18.6
90 — 120		5	19	10	7	15	11	9							76	11.5
120 — 150			5	1	5	4	8	4							27	4.1
150 — 180				2	5	3	2	4							16	2.4
180 — 210				1	2	1	2	1							7	1.1
210 — 240															0	0.0
240 — 270															0	0.0
270 — 300															0	0.0
300 — 330															0	0.0
330 — 360															0	0.0
360 — 390															0	0.0
390 — 420															0	0.0
420 —															0	0.0
TOTAL NUMBER	0	23	74	110	125	156	144	30	0	0	0	0	0	0	662	
PERCENT	0.0	3.5	11.2	16.6	18.9	23.6	21.8	4.5	0.0	0.0	0.0	0.0	0.0	0.0		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1989 3

	1／3有義波					最大波							
	平均		最大		標準	平均		最大		平均	最多	最大	
日	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	偏差 (CM)	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	風速 (M/S)	風向	風速 (M/S)	風向
1	168.7	7.8	237.4	7.5	41.5	282.7	7.8	442.4	7.2	9.8	SSW	16.6	SSW
2	98.4	9.1	120.9	9.4	10.3	164.4	9.3	212.9	8.4	7.6	NNE	11.3	NNE
3	98.1	9.7	118.2	9.6	11.8	163.9	9.6	225.6	9.3	4.6	N	8.1	N
4	149.0	7.6	221.1	6.2	53.3	255.8	7.7	437.5	6.6	9.4	SSW	19.1	SSW
5	145.1	8.7	196.7	7.5	29.5	232.2	8.7	328.1	7.5	6.9	NNE	9.3	N
6	74.5	8.7	99.5	8.9	12.2	123.9	8.8	178.2	9.3	5.1	N	7.8	NNE
7	51.6	8.5	63.5	9.3	7.8	96.0	9.4	141.1	8.1	7.3	N	9.2	NNE
8	37.8	6.1	46.6	8.6	4.1	72.7	8.8	104.0	9.3	9.1	N	13.0	NNE
9	38.0	7.6	45.8	7.4	3.2	67.7	8.9	98.1	10.2	4.9	N	7.1	NNE
10	35.2	6.4	43.3	3.4	3.5	60.4	7.0	72.8	8.4	4.7	N	7.7	SSW
11	44.3	5.7	63.6	6.1	9.9	73.8	6.0	106.9	6.3	4.8	N	8.9	SW
12	43.4	5.1	78.6	3.8	15.0	77.0	5.0	132.3	2.7	4.6	N	9.4	S
13	42.8	4.7	65.0	4.1	10.5	73.0	5.4	127.4	4.5	4.4	SW	10.5	SSW
14	121.2	8.6	156.7	9.5	26.5	195.9	8.6	259.8	8.4	3.7	N	10.6	N
15	73.1	7.5	122.1	8.9	20.4	124.1	7.7	201.7	9.6	5.5	N	9.7	NNE
16	31.1	6.5	40.8	7.5	4.9	53.7	7.4	70.3	6.6	4.0	N	8.5	N
17	32.2	5.6	43.7	3.9	5.1	60.9	7.3	90.8	7.8	6.9	N	10.1	NE
18	43.6	6.4	62.8	4.4	9.8	73.7	7.1	105.5	3.9	4.1	N	7.3	N
19	31.4	5.8	41.4	4.5	4.8	56.6	7.1	74.7	6.9	5.4	N	8.2	N
20	27.2	5.2	48.5	3.4	7.0	50.3	7.0	85.4	3.0	5.4	N	8.4	N
21	29.1	5.9	51.3	3.4	9.1	52.1	9.1	85.4	3.0	5.0	N	9.7	ENE
22	27.1	6.4	33.5	7.9	4.0	50.3	11.4	73.2	14.1	5.3	N	8.6	N
23	41.2	7.6	51.4	7.7	5.8	71.7	9.3	91.3	6.9	4.1	N	7.3	ESE
24	40.6	6.3	53.5	5.8	5.2	66.1	7.4	85.9	4.8	3.5	NNE	6.0	N
25	129.3	8.4	213.3	8.2	47.4	208.9	8.4	358.9	9.0	6.7	NNE	10.6	N
26	71.3	8.0	111.1	8.9	18.5	118.4	8.3	186.5	8.4	3.7	N	7.4	ESE
27	73.3	7.1	93.6	7.4	10.3	127.0	7.4	169.4	7.5	8.7	N	14.0	N
28	48.5	7.4	70.7	8.2	10.5	86.0	8.6	136.2	9.3	7.0	NNE	16.0	N
29	46.5	6.6	87.3	4.5	19.4	81.0	7.7	142.6	3.6	5.2	N	8.7	SSW
30	49.4	6.3	72.9	3.7	10.3	86.8	7.1	129.4	6.0	5.5	N	8.3	SW
31	92.7	5.1	161.1	5.7	44.8	156.8	5.5	271.0	4.5	7.3	SSW	13.7	SSW
平均	66.3	7.0	94.1	6.6	44.9	112.7	7.9	168.6	7.1	5.8	N	19.1	SSW

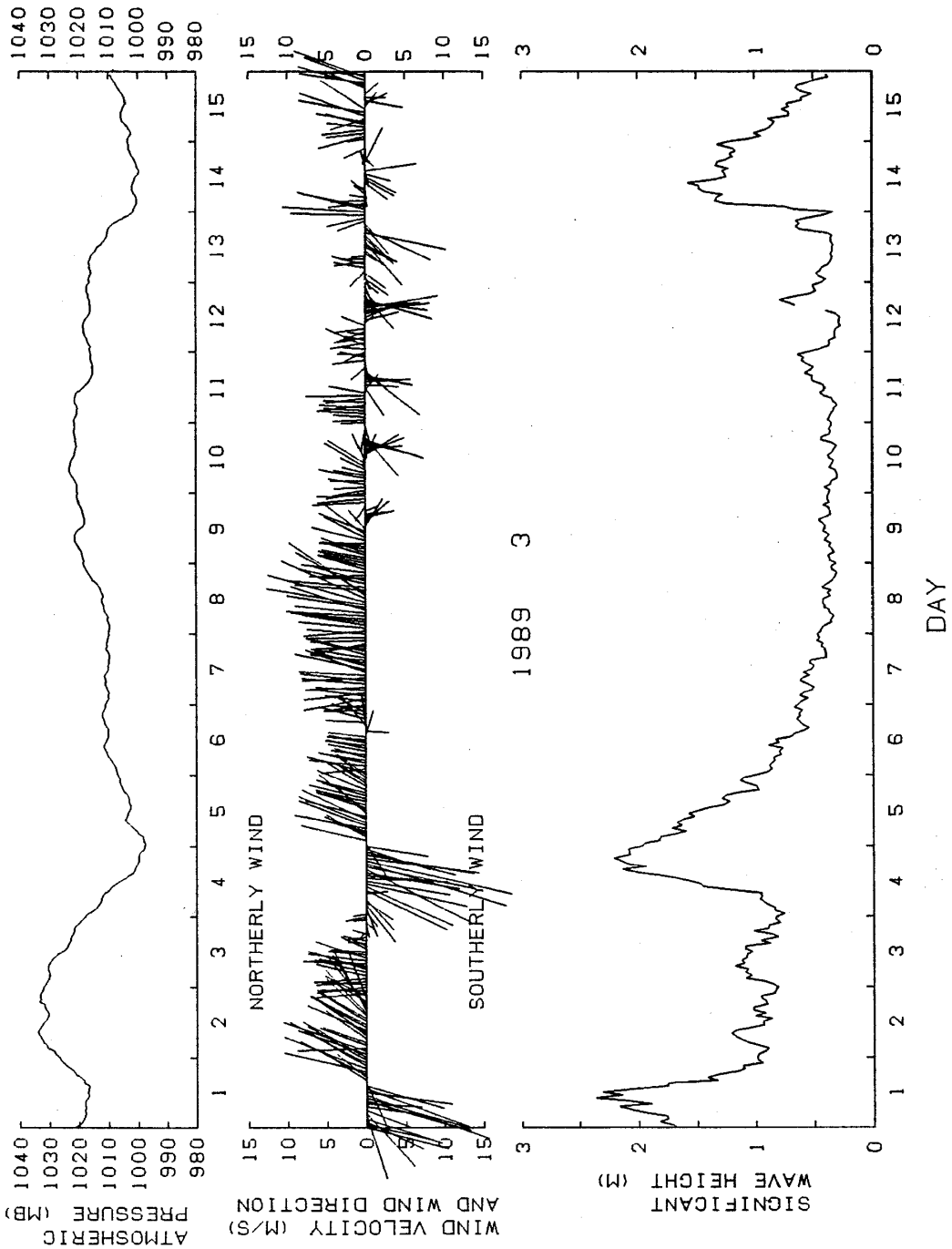


図5. １ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5 Hourly variation of significant wave height, direction and velocity of wind and atomospheric pressure.

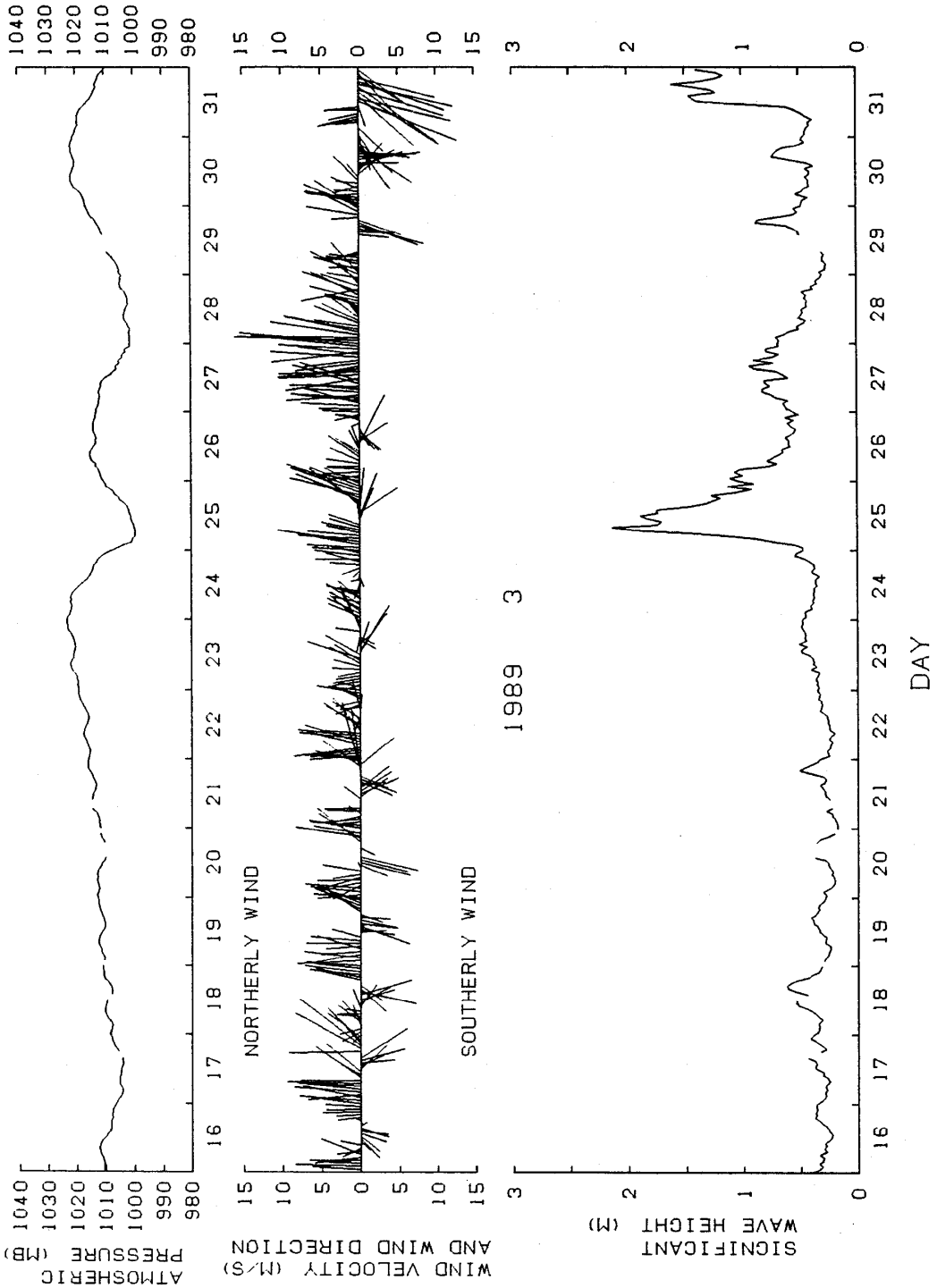

ATMOSPHERIC PRESSURE (MB)
1040
1030
1020
1010
1000
990
980
WIND VELOCITY (M/S) AND WIND DIRECTION
NORTHERLY WIND
SOUTHERLY WIND
15
10
5
0
SIGNIFICANT WAVE HEIGHT (M)
3
2
1
0
1989 3
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
DAY

表2.　1ヵ月の有義波高と周期の頻度分布
Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1989　3

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30		1	10	29	31	12	5								88	12.1
30 — 60		20	47	62	92	87	49	4							361	49.5
60 — 90		8	10	2	18	18	34	22							112	15.4
90 — 120			1	1	1	2	24	43	1						73	10.0
120 — 150			3	7	2	3	10	20							45	6.2
150 — 180				2	5	3	10	3							23	3.2
180 — 210					4	12	1	2							19	2.6
210 — 240					3	4	1								8	1.1
240 — 270															0	0.0
270 — 300															0	0.0
300 — 330															0	0.0
330 — 360															0	0.0
360 — 390															0	0.0
390 — 420															0	0.0
420 —															0	0.0
TOTAL NUMBER	0	29	71	103	156	141	134	94	1	0	0	0	0	0	729	
PERCENT	0.0	4.0	9.7	14.1	21.4	19.3	18.4	12.9	0.1	0.0	0.0	0.0	0.0	0.0		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1989 4

	1／3有義波					最大波							
	平均		最大		標準	平均		最大		平均	最多	最大	
日	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	偏差 (CM)	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	風速 (M/S)	風向	風速 (M/S)	風向
1	113.5	6.4	130.8	5.3	11.5	192.1	7.1	225.6	9.0	7.5	WSW	16.4	SW
2	72.0	6.2	96.9	4.3	13.7	119.0	6.8	164.6	3.6	6.1	NNE	12.3	SSE
3	75.3	6.0	122.1	7.9	19.2	122.0	6.2	222.7	6.6	2.4	SW	5.9	SW
4	108.8	8.0	146.9	9.1	23.5	173.7	8.2	257.8	8.4	3.8	S	6.6	SE
5	64.4	7.0	83.1	6.8	6.9	111.7	7.7	129.9	7.2	8.4	NNE	13.7	NNE
6	59.5	6.7	71.8	6.5	5.8	97.8	7.6	125.0	7.5	4.5	S	7.9	S
7	61.0	7.2	77.6	5.6	9.7	101.7	7.4	134.3	5.4	3.8	N	6.0	SSW
8	94.2	7.1	187.6	6.9	44.5	151.0	7.3	288.6	7.5	6.3	N	9.0	N
9	134.6	8.2	195.6	7.8	33.0	220.9	8.1	401.9	7.5	3.6	SW	5.9	N
10	61.2	7.5	84.4	8.5	10.6	101.8	8.3	140.6	9.0	2.8	SE	6.6	ESE
11	51.6	6.6	91.1	4.3	14.0	86.6	8.3	162.6	3.6	5.6	N	9.7	S
12	47.1	8.1	58.7	6.0	7.0	81.9	10.1	106.9	6.9	4.6	NNE	9.6	SSW
13	58.6	6.8	95.1	4.3	16.6	102.6	7.7	211.9	3.9	4.5	N	9.6	SSW
14	58.1	5.7	89.7	4.0	16.7	100.2	7.4	148.4	3.6	6.1	SW	13.0	SW
15	69.4	4.4	91.3	5.9	9.2	117.7	4.6	149.9	5.7	7.9	SSW	11.9	SSW
16	197.2	6.9	263.6	7.4	51.8	331.6	7.0	464.8	7.8	11.0	S	15.8	SW
17	119.6	6.3	220.3	7.4	50.4	203.6	6.7	377.4	8.1	9.2	SW	14.6	SW
18	55.8	5.5	100.4	4.6	17.3	94.2	5.9	176.3	4.8	3.7	S	7.1	S
19	40.9	5.7	51.7	4.4	4.5	66.9	5.8	93.8	4.2	3.8	SSW	7.1	NNW
20	46.6	5.3	74.4	3.6	12.8	80.7	5.8	127.9	2.7	4.7	SSE	10.4	SSE
21	44.1	5.3	76.9	4.3	13.0	72.8	6.9	123.0	4.2	5.7	N	9.4	NNE
22	59.7	5.3	77.7	4.7	12.8	99.5	5.3	141.6	4.2	4.8	S	9.5	S
23	99.6	7.2	164.6	8.2	26.8	162.5	7.0	263.2	8.1	4.4	SW	14.3	N
24	150.2	10.0	223.4	9.8	30.8	241.9	10.0	377.9	10.2	7.2	N	12.7	NNW
25	83.1	9.5	117.8	11.8	10.1	138.1	10.9	179.7	10.8	5.1	NNE	7.9	NNE
26	60.7	10.0	87.0	11.3	15.1	96.3	10.6	145.0	12.0	3.5	N	7.5	N
27	103.6	6.4	199.6	5.9	46.9	178.6	6.4	387.2	6.0	8.7	SSW	18.1	SSW
28	77.7	5.6	166.9	7.0	47.8	133.7	7.6	281.7	7.8	8.7	N	14.9	NNE
29	43.7	4.9	88.6	3.8	21.8	79.6	6.0	166.0	3.9	5.5	S	10.8	SSW
30	60.7	4.5	111.5	4.6	31.5	104.6	4.9	214.4	4.8	6.5	SW	12.0	SW
平均	79.0	6.7	121.6	6.4	43.8	132.0	7.3	213.0	6.5	5.7	N	18.1	SSW

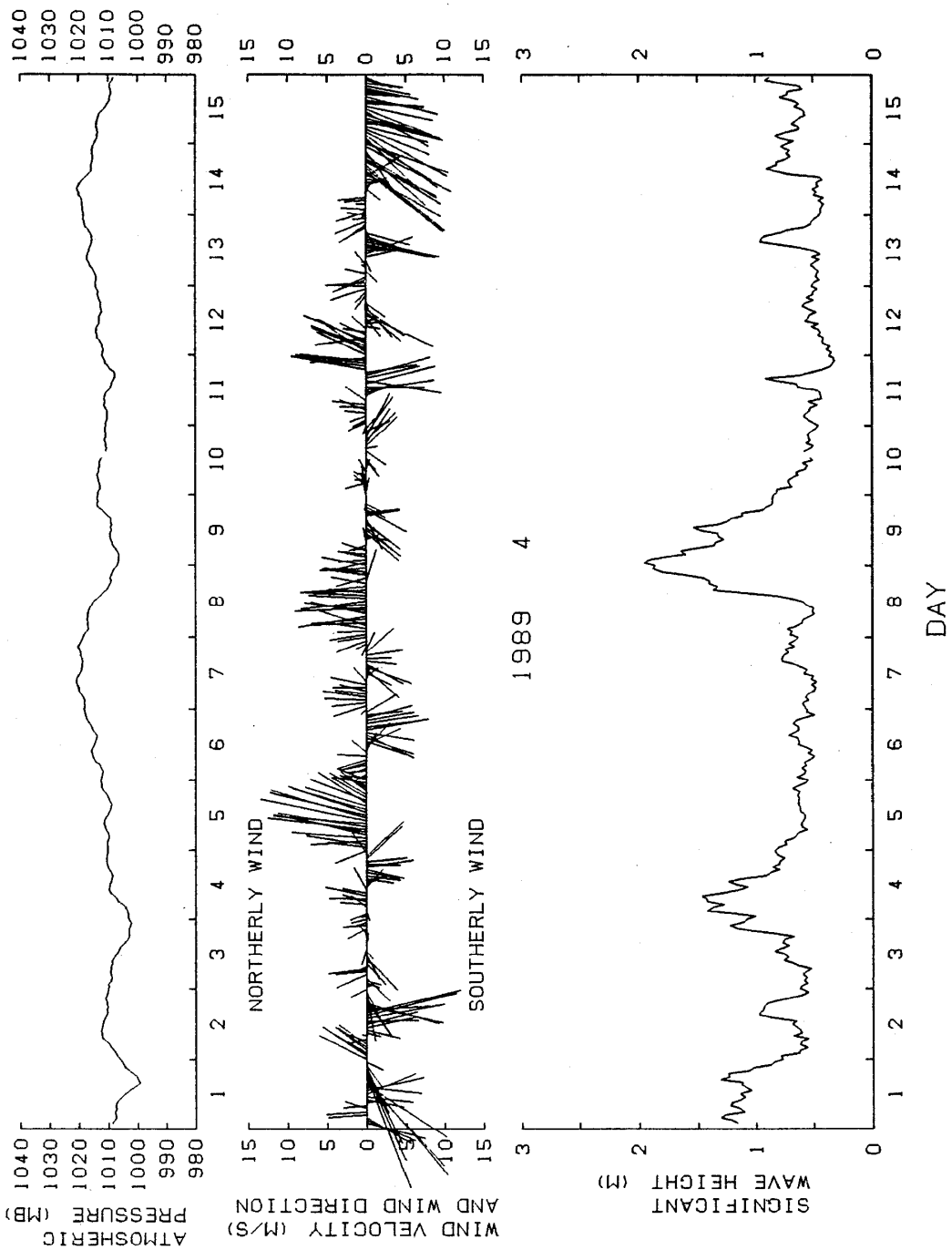


図5. １ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5 Hourly variation of significant wave height, direction and velocity of wind. and atomospheric pressure.

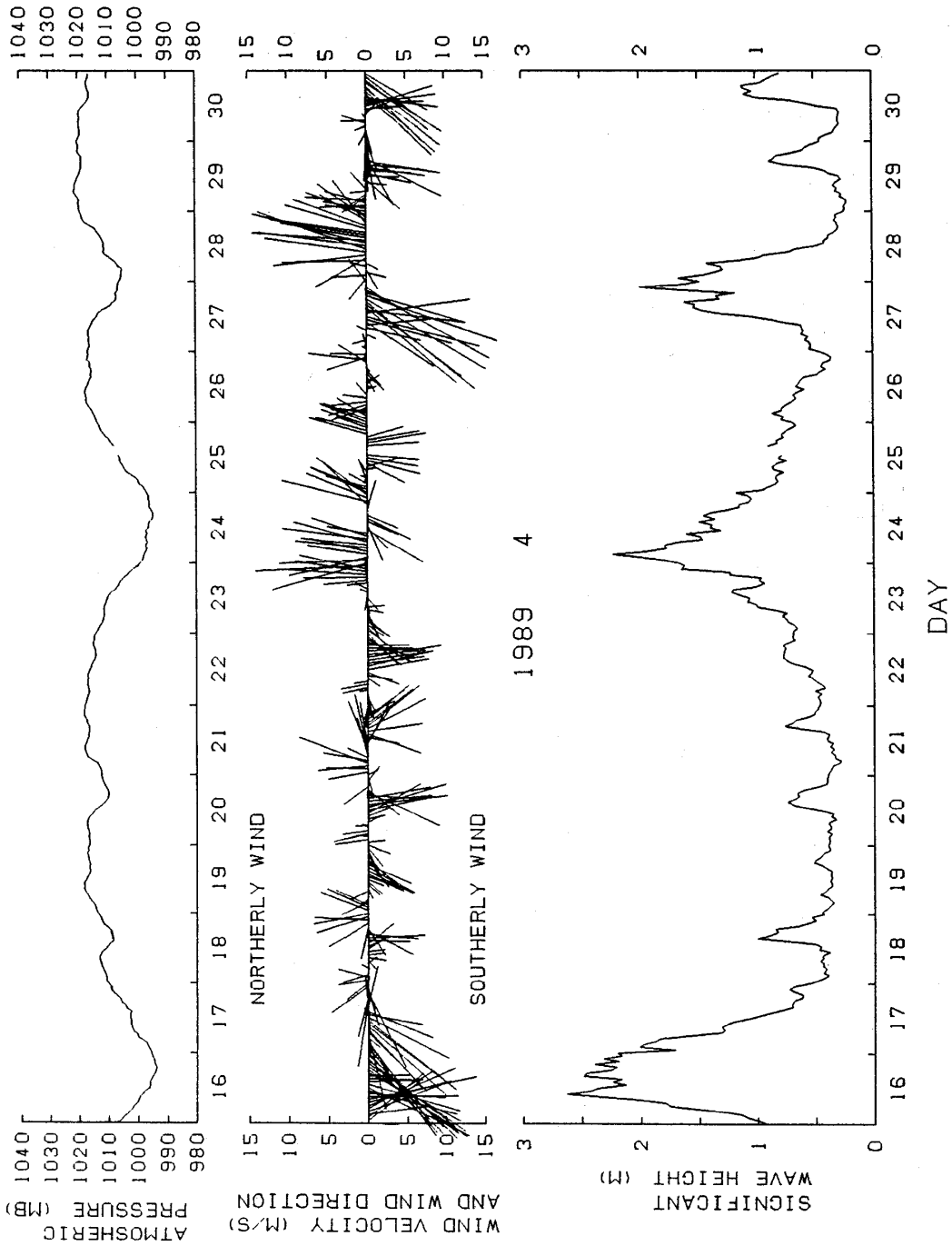

ATMOSPHERIC PRESSURE (MB)
1040
1030
1020
1010
1000
990
980
WIND VELOCITY (M/S) AND WIND DIRECTION
NORTHERLY WIND
SOUTHERLY WIND
15
10
5
0
SIGNIFICANT WAVE HEIGHT (M)
3
2
1
0
1989 4
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
DAY

表2.　1ヵ月の有義波高と周期の頻度分布
Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1989　4

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30			8	11	1										20	2.8
30 — 60	2	12	37	50	70	51	33	18	5						278	38.9
60 — 90		21	61	19	43	42	15	5	14	6					226	31.6
90 — 120			18	12	4	28	5	1	3	4					75	10.5
120 — 150			4	6	12	11	16	9	3						61	8.5
150 — 180			2	2	6	4	8		4						26	3.6
180 — 210				1	4	4	1	2							12	1.7
210 — 240					2	10		1							13	1.8
240 — 270						4									4	0.6
270 — 300															0	0.0
300 — 330															0	0.0
330 — 360															0	0.0
360 — 390															0	0.0
390 — 420															0	0.0
420 —															0	0.0
TOTAL NUMBER	2	33	130	101	142	154	78	36	29	10	0	0	0	0	715	
PERCENT	0.3	4.6	18.2	14.1	19.9	21.5	10.9	5.0	4.1	1.4	0.0	0.0	0.0	0.0		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1989 5

	1／3有義波					最大波							
	平均		最大		標準	平均		最大		平均	最多	最大	
日	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	偏差 (CM)	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	風速 (M/S)	風向	風速 (M/S)	風向
1	76.5	5.5	111.8	6.5	20.8	127.9	5.3	189.9	6.6	4.5	N	11.1	SSW
2	94.2	8.0	127.1	9.1	19.3	154.7	8.6	218.8	9.0	7.9	NNE	11.0	NNE
3	81.6	6.5	143.2	4.8	20.3	137.1	7.3	223.6	5.1	5.4	NNE	14.3	SSW
4	72.3	6.2	98.0	6.4	11.9	125.5	6.4	197.8	7.2	5.6	N	12.2	SW
5	72.5	4.8	90.2	4.3	8.6	125.3	4.9	209.0	4.2	9.1	SSW	11.7	SSW
6	36.3	6.2	56.2	6.2	8.6	63.4	8.0	90.3	4.8	6.2	NNE	11.0	NNE
7	40.8	5.0	61.1	7.0	9.0	78.6	8.3	115.2	8.7	13.1	N	16.2	N
8	42.9	7.1	55.6	6.0	6.1	73.7	8.4	96.7	8.7	5.4	NNE	9.3	N
9	57.2	5.7	94.3	4.2	17.0	98.4	6.4	213.9	4.8	5.0	S	11.3	SSE
10	37.5	7.5	48.8	7.4	4.3	63.7	9.1	78.1	10.8	3.3	N	6.7	NNE
11	32.0	5.3	41.4	9.7	3.2	59.6	9.4	71.8	10.2	10.4	N	15.0	N
12	42.3	6.0	70.0	8.6	9.4	80.2	8.6	118.2	9.0	10.6	N	15.6	N
13	66.2	8.3	85.0	8.2	8.7	109.7	9.1	143.6	8.1	5.5	N	9.8	SW
14	119.6	5.7	175.9	5.4	33.1	202.1	6.1	303.7	4.2	9.5	SSW	21.7	SW
15	106.6	6.8	134.7	8.0	13.1	177.9	6.8	244.1	7.8	3.6	SE	6.6	NNW
16	70.3	6.1	113.0	4.2	20.2	116.6	6.4	185.5	4.5	6.8	NNE	11.9	SSW
17	38.1	5.0	66.5	3.6	10.4	63.5	5.4	116.2	3.0	3.5	SSW	9.4	SSW
18	29.8	5.5	38.6	7.0	5.9	56.4	6.7	73.2	6.6	7.0	NNE	10.8	N
19	38.2	6.5	50.6	6.3	6.2	65.3	6.7	81.1	6.0	3.9	N	8.4	NNE
20	59.3	7.2	79.4	7.3	8.2	99.1	7.3	125.0	7.8	3.9	N	7.8	NNE
21	80.1	6.5	98.0	7.2	7.0	128.9	6.6	160.6	6.3	3.4	NNE	6.3	NNE
22	62.5	6.9	81.8	7.1	9.3	105.5	7.5	130.9	6.3	4.2	SW	10.8	SW
23	48.1	7.0	81.4	4.3	13.3	82.3	8.2	141.1	7.2	3.9	NNE	10.8	SW
24	69.9	6.9	82.7	7.6	7.5	117.6	7.2	147.0	6.9	2.7	S	4.6	S
25	47.7	6.6	62.3	6.9	8.0	81.2	7.3	110.4	6.9	2.6	SSW	5.2	SSW
26	71.2	5.2	110.0	6.9	23.1	119.6	5.0	190.9	7.2	4.9	SSE	9.5	SSE
27	59.3	6.1	79.8	7.1	11.1	100.9	6.6	151.9	7.5	3.7	SW	5.9	SSW
28	40.7	5.0	65.3	4.5	7.9	69.2	5.5	119.1	3.9	3.8	N	11.3	N
29	31.8	5.8	35.8	5.7	2.2	57.0	6.3	73.2	5.7	5.1	N	9.5	N
30	42.3	6.0	72.7	4.9	17.1	70.9	6.7	124.0	6.3	5.1	N	9.2	SSE
31	64.7	6.0	91.6	4.6	18.4	109.8	6.3	168.0	3.9	5.6	S	11.6	SSE
平均	59.1	6.2	84.0	6.4	26.0	100.7	7.0	148.8	6.6	5.6	N	21.7	SW

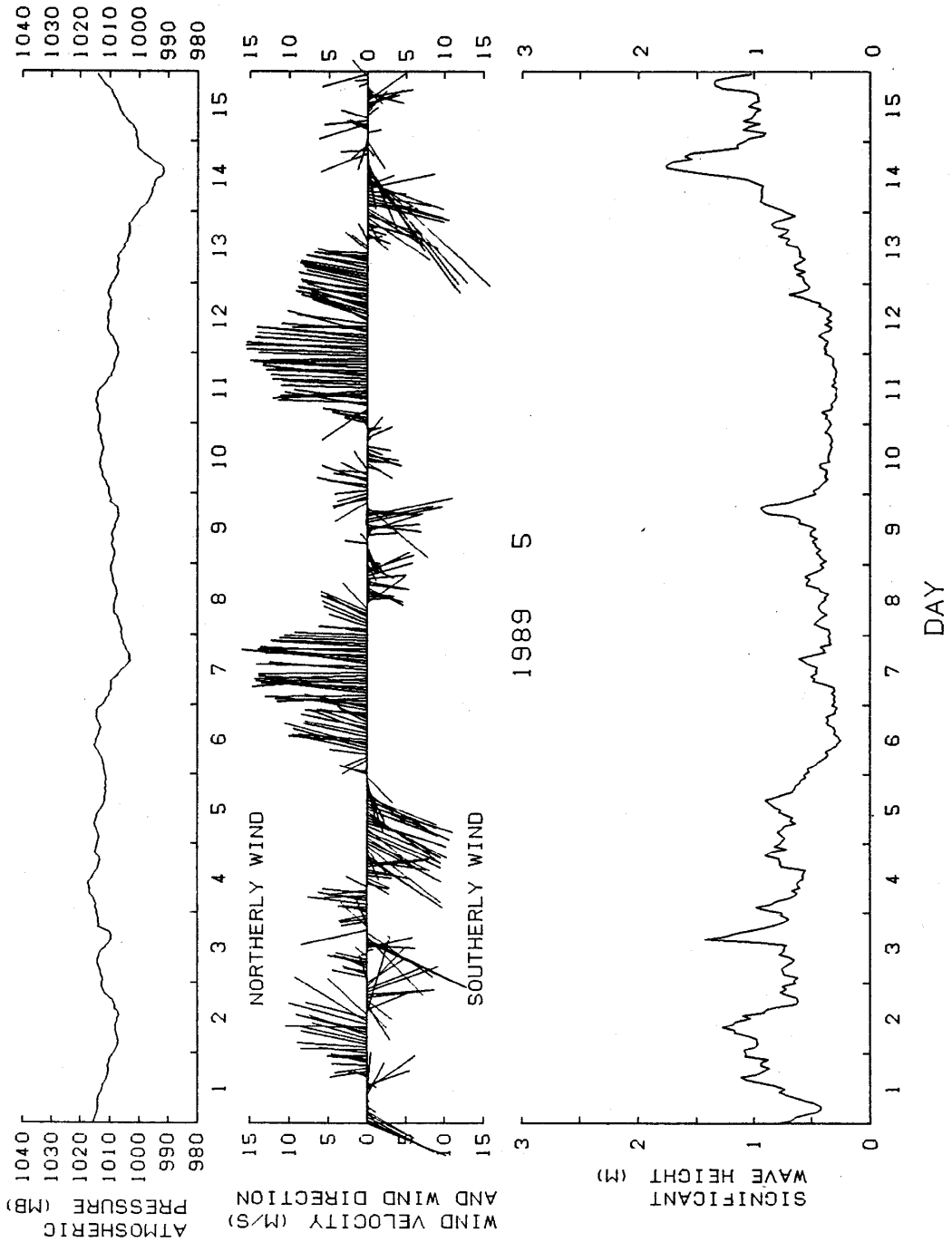
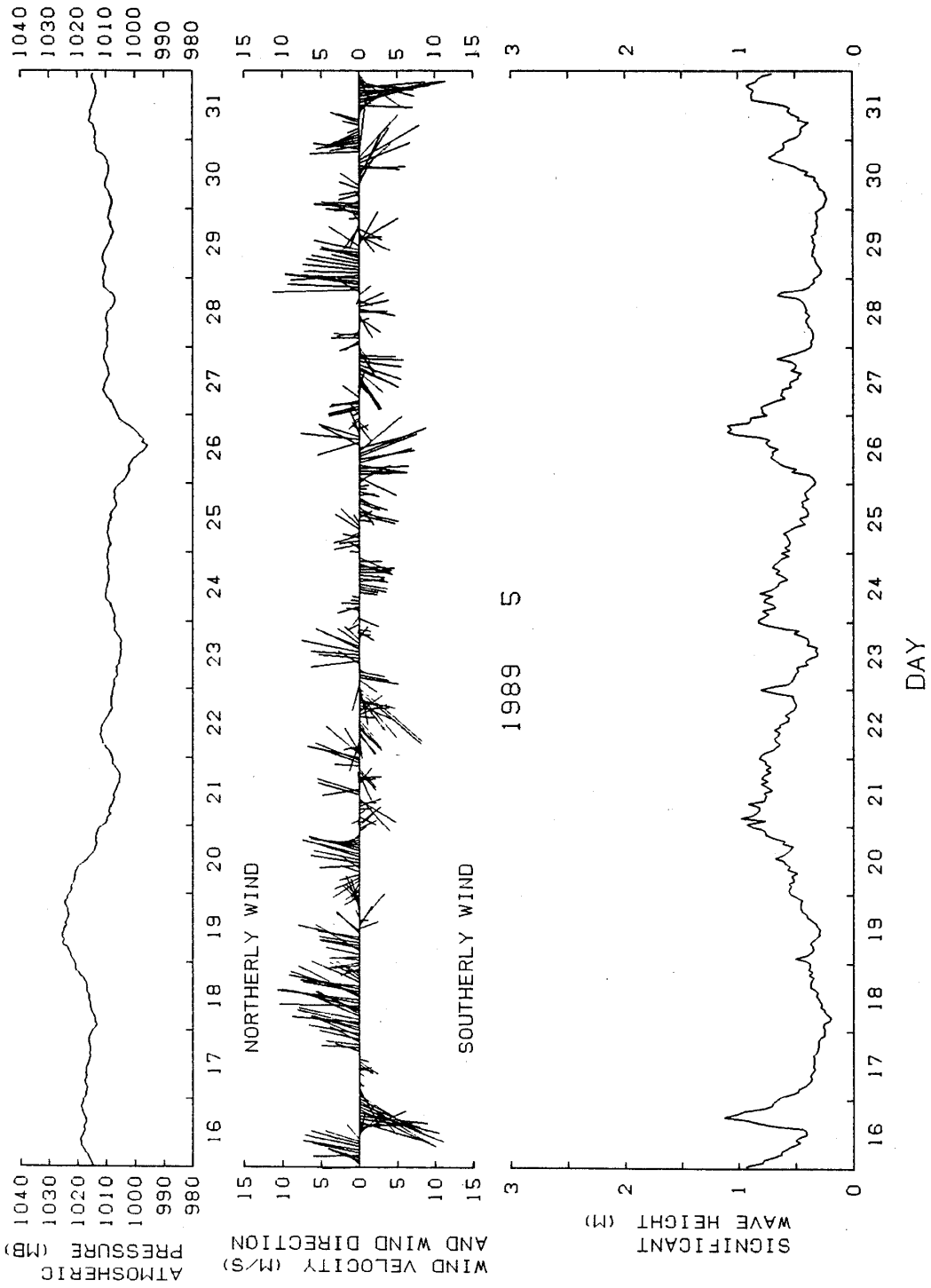


図5. １ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5 Hourly variation of significant wave height, direction and velocity of wind and atomospheric pressure.


ATMOSPHERIC PRESSURE (MB)
1040
1030
1020
1010
1000
990
980
WIND VELOCITY (M/S) AND WIND DIRECTION
NORTHERLY WIND
SOUTHERLY WIND
15
10
5
0
SIGNIFICANT WAVE HEIGHT (M)
3
2
1
0
1989 5
16
17
18
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29
30
31
DAY

表2.　1ヵ月の有義波高と周期の頻度分布
Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1989　5

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30	1	6	11	16	10	4									48	6.5
30 — 60	3	21	43	77	119	81	29	5							378	50.8
60 — 90		17	48	33	48	59	21	1							227	30.5
90 — 120		1	9	15	24	14	4	7							74	9.9
120 — 150			2	2	1	3	1	1							10	1.3
150 — 180				5	2										7	0.9
180 — 210															0	0.0
210 — 240															0	0.0
240 — 270															0	0.0
270 — 300															0	0.0
300 — 330															0	0.0
330 — 360															0	0.0
360 — 390															0	0.0
390 — 420															0	0.0
420 —															0	0.0
TOTAL NUMBER	4	45	113	148	204	161	55	14	0	0	0	0	0	0	744	
PERCENT	0.5	6.0	15.2	19.9	27.4	21.6	7.4	1.9	0.0	0.0	0.0	0.0	0.0	0.0		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1989 6

日	1／3有義波 平均 波高 (CM)	平均 周期 (SEC)	最大 波高 (CM)	最大 周期 (SEC)	標準偏差 (CM)	最大波 平均 波高 (CM)	平均 周期 (SEC)	最大 波高 (CM)	最大 周期 (SEC)	平均風速 (M/S)	最多風向	最大風速 (M/S)	最大風向
1	64.4	5.4	93.2	4.7	13.3	107.7	5.7	170.9	4.5	3.9	SSW	7.8	SSW
2	44.1	4.9	59.2	5.4	6.7	73.3	5.7	108.9	4.8	3.4	SSE	5.8	SSE
3	47.2	6.3	58.4	6.2	5.0	81.6	6.5	105.5	7.2	3.6	SSW	5.6	SSW
4	65.4	5.8	107.5	4.5	16.9	106.9	6.4	185.5	3.9	4.7	S	10.1	S
5	83.9	5.1	110.7	4.6	16.8	138.5	5.4	222.7	3.9	7.7	SSW	13.3	SSW
6	106.5	5.2	131.1	5.3	14.1	185.5	5.7	285.6	4.5	8.2	S	12.5	SW
7	66.3	5.8	91.6	6.8	15.1	113.4	6.3	163.1	6.3	5.0	S	8.3	N
8	44.6	5.3	74.1	4.3	11.0	78.3	5.8	146.5	3.9	5.0	N	8.7	ESE
9	22.9	4.5	26.9	3.8	2.1	44.5	6.5	60.1	6.6	7.8	N	10.0	N
10	23.4	3.6	26.6	5.2	1.7	44.5	7.1	53.2	4.5	8.8	NNE	11.7	N
11	24.9	5.8	29.7	6.0	2.3	46.3	6.8	60.5	6.6	5.3	NNE	7.2	NNE
12	29.8	5.2	46.7	6.2	7.5	51.2	7.2	81.5	6.9	5.5	NNE	8.4	NE
13	48.2	5.7	55.4	3.8	3.8	85.3	6.4	112.3	6.6	4.5	N	6.8	SSE
14	54.0	5.9	64.8	4.7	5.3	90.5	6.6	109.9	5.7	3.5	SSE	7.6	SSE
15	70.7	6.7	83.9	6.5	8.3	117.9	7.0	147.0	7.8	3.0	SE	5.6	SE
16	70.0	7.5	82.5	7.5	5.9	116.2	7.6	147.0	7.5	5.4	N	10.1	NNW
17	92.8	7.1	137.7	7.3	25.2	163.3	7.7	307.6	7.5	5.9	N	11.5	N
18	49.6	6.8	64.3	6.5	6.7	84.8	7.6	115.2	6.3	4.7	NNE	6.8	N
19	32.4	6.6	49.8	7.3	7.3	59.9	7.9	79.1	6.9	7.5	N	9.0	N
20	29.6	5.5	39.9	8.0	5.3	56.6	7.9	87.4	7.8	8.0	NNE	10.4	NNE
21	37.9	6.9	47.6	5.9	4.5	67.4	7.7	91.3	7.5	5.0	NNE	7.9	NNE
22	42.4	7.3	53.9	7.4	6.0	69.9	7.7	89.8	9.6	2.7	N	4.6	NE
23	41.5	6.9	47.2	7.1	5.1	71.4	7.0	91.3	7.2	4.9	N	6.0	NNE
24	59.5	7.3	68.5	7.3	6.4	101.5	7.4	128.4	9.0	4.4	NNE	6.9	N
25	89.3	8.0	121.0	10.4	21.0	149.2	8.8	230.5	11.1	5.2	N	11.2	SW
26	59.6	7.2	78.9	6.8	11.3	96.0	7.4	129.4	5.4	4.0	SSW	6.2	N
27	39.2	6.8	45.5	7.3	3.5	66.7	7.4	87.4	7.5	3.2	SE	6.4	SE
28	36.8	5.5	59.7	6.2	8.4	64.0	6.7	102.1	6.0	4.0	SSE	7.7	SE
29	56.9	6.2	72.2	6.3	7.1	95.6	6.2	119.6	6.9	3.0	SSW	6.0	SSW
30	48.3	5.1	66.0	4.9	7.9	81.6	5.0	106.4	6.6	3.3	S	6.4	S
平均	52.8	6.1	69.8	6.1	23.5	90.5	6.8	130.9	6.5	5.0	N	13.3	SSW

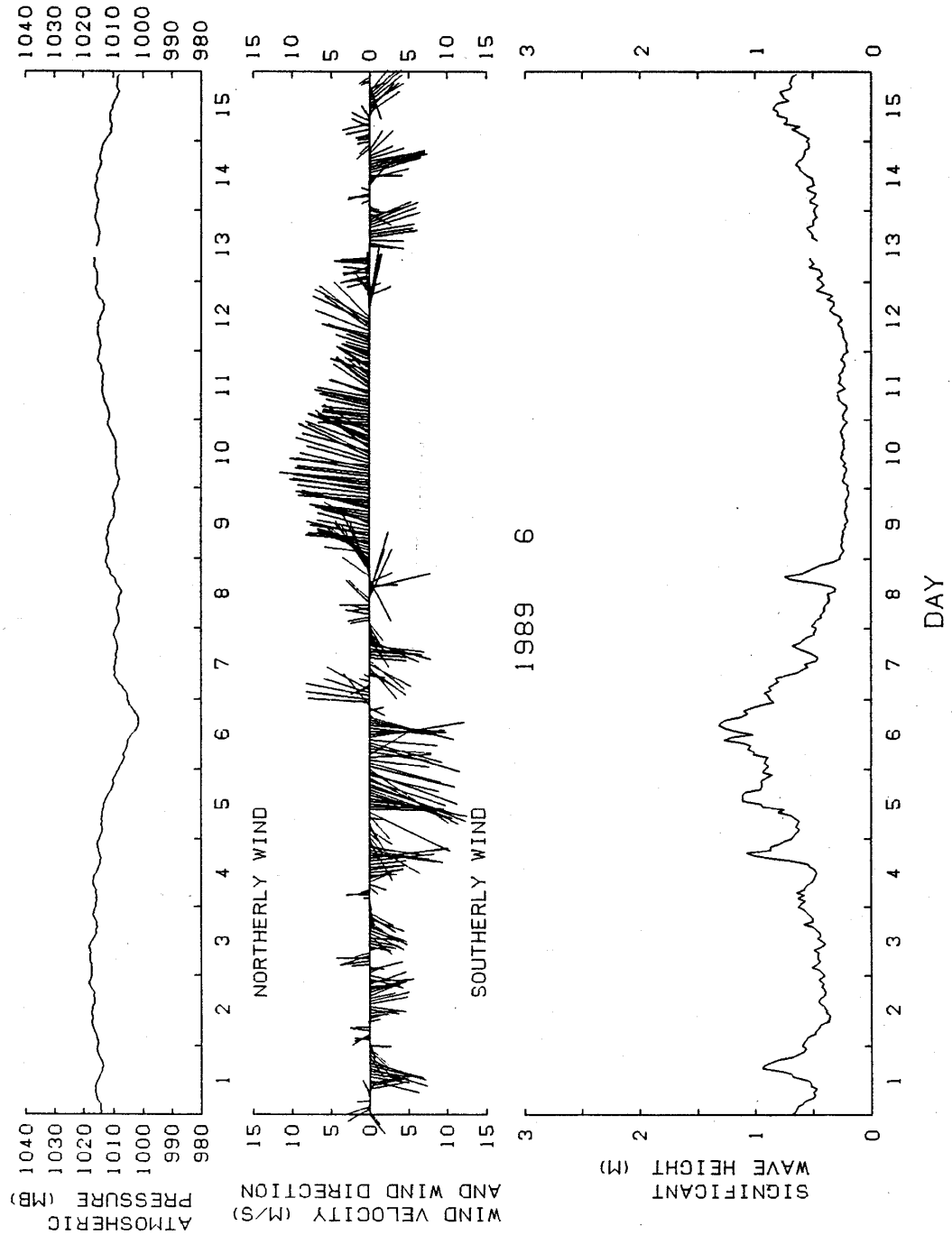

図5. １ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5 Hourly variation of significant wave height, direction and velocity of wind and atomospheric pressure.

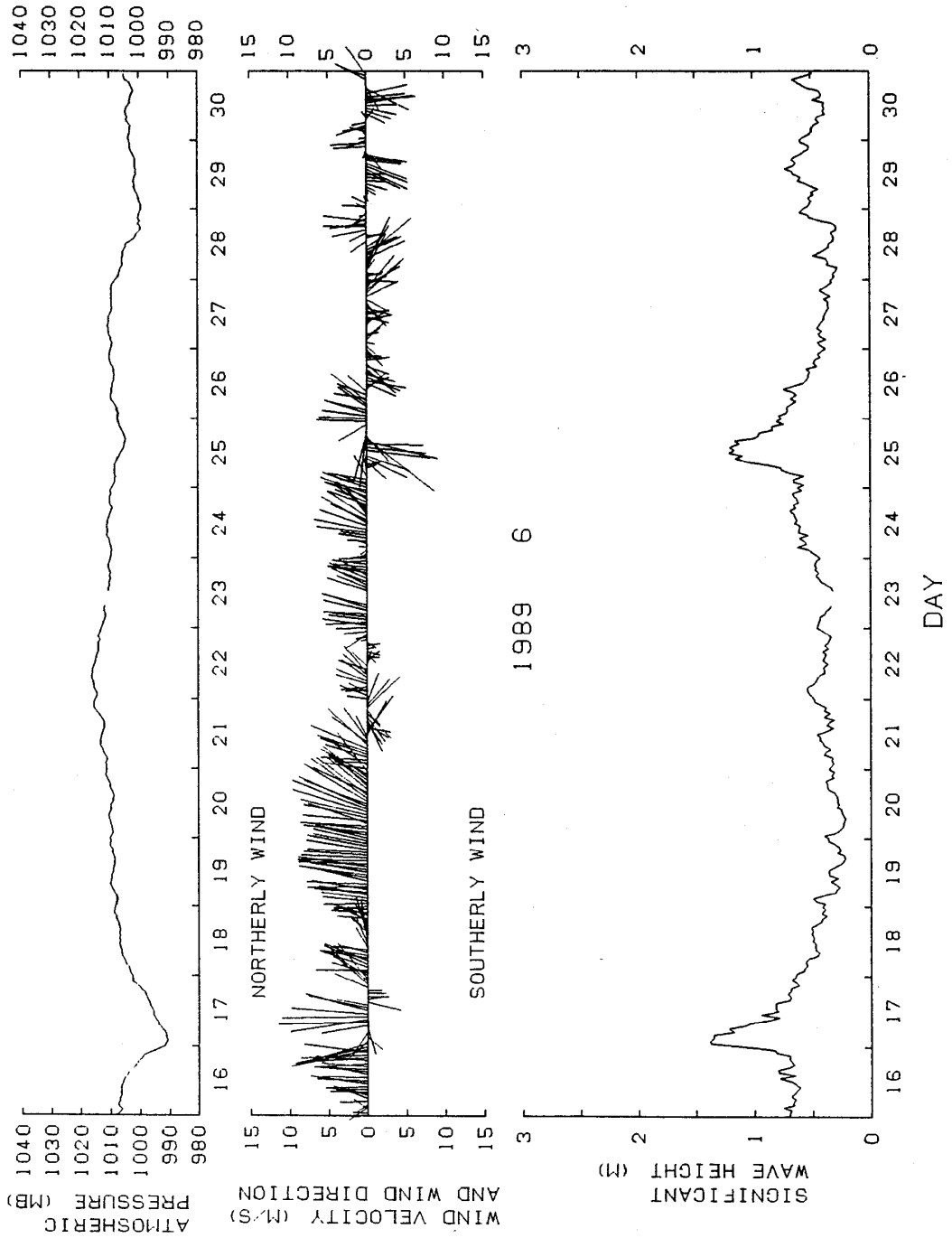
ATMOSPHERIC PRESSURE (MB)
1040
1030
1020
1010
1000
990
980
WIND VELOCITY (M/S) AND WIND DIRECTION
NORTHERLY WIND
SOUTHERLY WIND
15
10
5
0
SIGNIFICANT WAVE HEIGHT (M)
3
2
1
0
1989 6
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表2.　1ヵ月の有義波高と周期の頻度分布
Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1989　6

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30	11	16	26	38	22										113	15.9
30 — 60		16	49	64	145	98	3								375	52.7
60 — 90			27	16	46	69	5	1							164	23.1
90 — 120			23	10	6	4	1		1	2					47	6.6
120 — 150			2	3	1	5			1						12	1.7
150 — 180															0	0.0
180 — 210															0	0.0
210 — 240															0	0.0
240 — 270															0	0.0
270 — 300															0	0.0
300 — 330															0	0.0
330 — 360															0	0.0
360 — 390															0	0.0
390 — 420															0	0.0
420 —															0	0.0
TOTAL NUMBER	11	32	127	131	220	176	9	1	2	2	0	0	0	0	711	
PERCENT	1.5	4.5	17.9	18.4	30.9	24.8	1.3	0.1	0.3	0.3	0.0	0.0	0.0	0.0		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1989 7

	1／3有義波					最大波							
	平均		最大		標準	平均		最大		平均	最多	最大	
日	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	偏差 (CM)	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	風速 (M/S)	風向	風速 (M/S)	風向
1	32.7	4.2	49.0	5.0	6.0	57.3	5.4	78.6	2.4	6.5	NNE	8.7	E
2	33.2	5.9	37.5	6.9	2.5	58.4	6.9	69.3	6.0	5.0	NNE	6.2	NNE
3	25.0	5.4	34.0	6.6	3.2	47.4	7.7	64.0	7.2	8.5	N	11.2	N
4	32.1	6.5	39.6	7.9	4.4	56.2	7.9	75.7	7.8	4.9	N	9.5	NNE
5	33.6	7.1	46.3	8.6	5.6	58.2	9.1	89.8	8.1	3.4	NE	5.2	ENE
6	27.2	4.9	41.0	7.8	6.5	47.0	6.3	71.8	9.0	7.7	NNE	10.3	N
7	28.4	5.9	36.3	3.3	3.0	50.6	6.7	64.0	8.7	5.1	NNE	8.2	NNE
8	36.7	6.8	44.6	7.1	3.5	64.2	7.5	81.1	7.8	4.1	ESE	7.1	NNE
9	84.5	6.0	155.2	4.7	40.2	142.2	6.2	265.1	5.1	5.4	SSW	14.8	SW
10	110.2	5.4	144.0	5.6	21.5	193.2	5.2	280.8	4.8	7.1	SSW	13.4	SSW
11	48.9	6.0	61.0	5.7	6.4	78.7	6.6	114.7	5.7	2.1	SSW	6.9	SW
12	105.1	5.2	133.0	4.9	23.7	172.3	5.3	228.0	3.9	7.1	SW	14.5	SW
13	52.8	7.7	70.3	6.2	7.9	92.6	8.0	132.3	8.4	6.1	NNE	7.8	NNE
14	49.1	8.0	59.5	7.9	5.0	82.3	8.7	109.9	8.1	3.5	NNE	5.6	SSW
15	47.1	8.1	57.7	8.5	3.7	78.9	8.5	105.0	9.0	2.7	SW	5.5	NNE
16	47.8	8.7	63.9	9.8	6.3	78.4	9.4	103.0	9.3	3.2	N	6.5	N
17	53.5	9.5	68.2	9.7	6.5	91.5	9.9	132.3	9.3	5.4	N	6.9	NE
18	82.2	10.8	111.1	11.5	13.8	140.7	11.2	206.5	10.8	5.9	NNE	8.2	NNE
19	70.2	9.9	93.7	11.0	9.8	114.4	10.0	154.8	10.5	3.2	NE	5.5	NE
20	52.9	8.2	77.7	9.3	9.4	91.8	8.6	128.9	9.3	3.0	SSW	4.9	SW
21	44.5	6.0	65.5	8.7	8.4	74.0	7.4	107.9	9.3	2.9	S	5.5	S
22	46.7	4.8	73.2	3.7	11.5	77.8	5.7	120.6	3.9	3.6	S	7.4	S
23	54.4	4.8	93.0	3.7	18.4	93.5	5.9	154.8	3.9	4.8	S	10.5	S
24	61.9	4.1	95.8	3.7	14.9	105.1	4.7	162.6	3.6	5.9	S	10.9	S
25	40.5	4.2	58.1	3.5	6.1	72.3	5.9	99.6	3.3	4.7	S	7.3	SE
26	72.5	6.9	151.3	10.8	31.8	123.5	7.5	225.1	11.1	3.1	N	6.1	WSW
27	175.0	10.6	219.3	11.3	19.8	287.6	10.9	372.1	11.1	4.5	SE	8.0	SE
28	107.3	9.0	139.8	9.7	14.8	175.1	8.7	242.7	9.9	4.5	NNE	7.6	N
29	116.8	7.4	142.3	7.5	10.4	194.4	7.6	271.5	8.1	4.9	NNE	7.8	NE
30	99.3	7.6	130.5	7.5	15.7	162.8	7.4	284.2	8.7	5.9	NNE	10.2	ENE
31	110.5	8.4	143.9	8.3	15.1	187.9	8.4	264.6	8.1	7.3	N	10.4	ENE
平均	64.0	6.9	88.3	7.3	37.2	108.1	7.6	156.8	7.5	4.9	NNE	14.8	SW

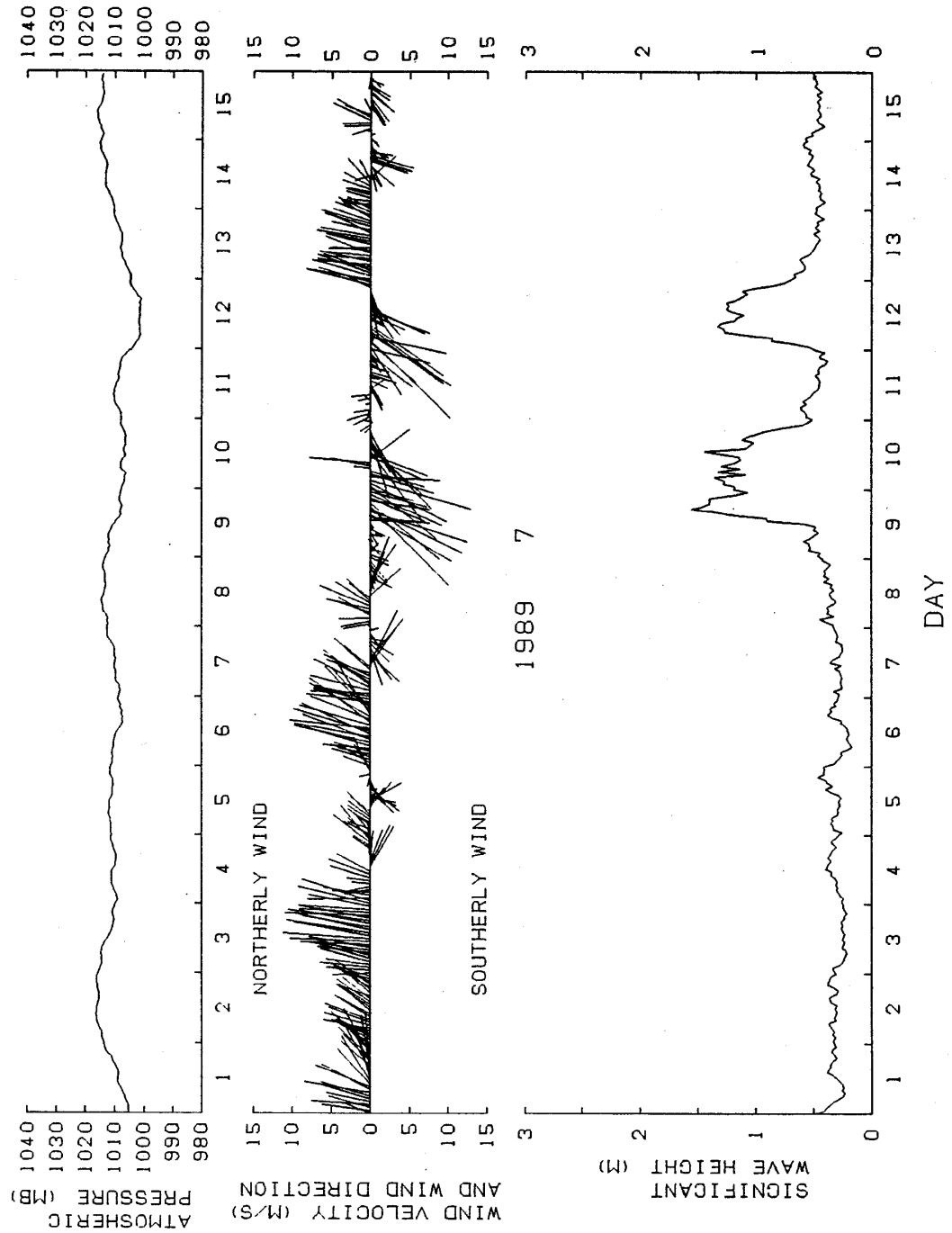
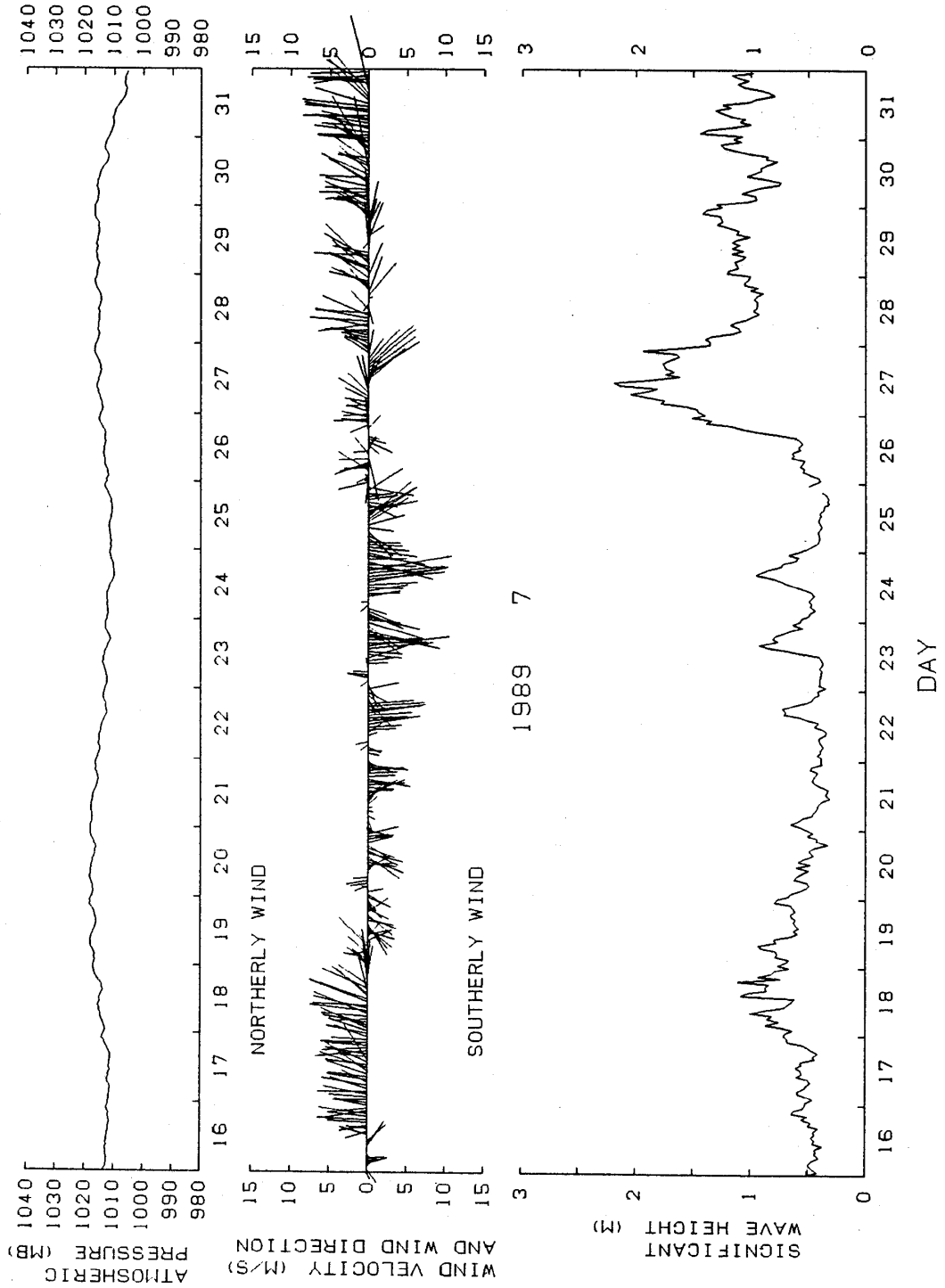


図5. １ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5 Hourly variation of significant wave height, direction and velocity of wind and atomospheric pressure.


ATMOSPHERIC PRESSURE (MB)
1040
1030
1020
1010
1000
990
980
WIND VELOCITY (M/S) AND WIND DIRECTION
NORTHERLY WIND
SOUTHERLY WIND
15
10
5
0
SIGNIFICANT WAVE HEIGHT (M)
3
2
1
0
1989 7
DAY
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31

表2.　1ヵ月の有義波高と周期の頻度分布

Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1989　7

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30	1	9	20	22	17	9	3								81	10.9
30 — 60	2	44	33	64	70	81	66	26	2						388	52.2
60 — 90		23	1	8	5	10	7	24	15	6					99	13.3
90 — 120		3	4	23	4	30	20	14	2	4	1	1			106	14.3
120 — 150			4	16		10	7	5	3	1					46	6.2
150 — 180			1					5	6	3					15	2.0
180 — 210									1	5					6	0.8
210 — 240										2					2	0.3
240 — 270															0	0.0
270 — 300															0	0.0
300 — 330															0	0.0
330 — 360															0	0.0
360 — 390															0	0.0
390 — 420															0	0.0
420 —															0	0.0
TOTAL NUMBER	3	79	63	133	96	140	103	74	29	21	1	1	0	0	743	
PERCENT	0.4	10.6	8.5	17.9	12.9	18.8	13.9	10.0	3.9	2.8	0.1	0.1	0.0	0.0		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1989 8

	1／3有義波					最大波							
	平均		最大		標準	平均		最大		平均	最多	最大	
日	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	偏差 (CM)	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	風速 (M/S)	風向	風速 (M/S)	風向
1	74.0	9.0	109.1	9.1	17.5	119.9	9.0	177.2	9.3	6.2	N	9.0	N
2	85.3	8.3	94.7	9.1	5.3	145.4	8.8	187.5	8.4	3.8	N	6.9	N
3	94.3	10.2	115.5	11.1	10.5	151.7	10.3	209.0	11.7	5.4	NNE	8.7	NE
4	108.9	10.2	143.4	11.1	14.8	188.3	10.2	251.0	9.3	8.0	NNE	10.5	NNE
5	87.0	9.5	127.0	9.6	18.3	148.1	10.1	207.0	9.6	10.8	N	13.1	N
6	101.3	10.3	149.2	13.5	26.7	180.5	11.4	253.4	12.6	11.7	N	15.2	N
7	126.1	5.9	179.3	6.9	21.5	210.2	6.4	288.1	6.3	8.3	S	11.7	SW
8	84.6	5.9	109.0	6.2	10.7	141.8	6.8	189.5	7.5	5.4	SSW	10.0	SW
9	64.5	6.0	77.7	5.1	5.9	107.2	7.0	134.8	8.7	3.4	SSW	6.5	SSW
10	47.5	6.4	57.6	6.3	5.3	79.1	7.3	105.5	9.3	4.3	NNE	8.6	NNE
11	33.4	5.9	40.1	4.9	2.6	59.7	6.7	74.2	6.6	3.6	SSW	5.3	SSW
12	30.7	5.8	44.5	3.7	5.3	52.3	8.6	78.1	2.7	3.6	S	5.5	SSW
13	63.7	4.8	106.5	4.0	27.9	116.0	5.8	229.0	3.3	5.9	S	10.4	S
14	74.1	4.7	93.1	4.0	11.8	125.9	6.2	168.5	3.3	6.8	S	9.8	S
15	68.5	9.4	129.7	13.6	23.1	110.4	10.0	179.7	14.1	3.4	N	6.3	N
16	82.8	9.9	143.2	12.4	22.5	145.5	11.6	237.8	13.5	3.7	SSE	8.5	ENE
17	69.0	9.3	153.7	12.4	27.4	115.4	10.9	256.3	12.0	4.9	N	7.1	WSW
18	40.7	6.2	49.3	5.9	5.7	69.6	8.0	87.4	8.1	2.7	S	5.1	SSW
19	38.0	6.6	51.1	7.8	5.4	65.8	8.1	88.9	7.2	4.0	NNE	6.7	N
20	33.7	6.8	41.3	7.3	4.0	56.9	7.3	70.8	6.0	4.1	NNE	6.4	N
21	39.0	5.8	56.5	3.5	7.6	68.3	6.3	100.1	3.3	3.1	S	6.4	SSW
22	52.0	4.7	89.2	3.9	17.8	92.1	5.2	158.2	4.2	4.9	S	9.8	S
23	67.4	4.9	102.1	4.4	16.5	116.2	5.2	180.2	3.6	5.3	S	10.9	S
24	53.2	5.4	72.1	4.7	8.6	93.0	6.3	127.0	6.6	3.6	S	6.1	SSW
25	32.4	6.2	41.3	5.9	3.2	57.9	6.9	68.8	6.6	7.4	N	9.9	N
26	26.2	5.7	47.3	7.1	7.0	47.1	6.9	80.6	6.9	6.6	N	10.2	N
27	210.8	7.8	424.8	9.0	128.4	339.3	7.7	677.2	9.0	12.0	S	19.5	SSW
28	174.5	8.2	312.4	8.4	70.2	289.4	9.1	537.1	9.9	7.6	SW	18.8	SSW
29	54.0	6.7	96.7	7.3	14.8	88.4	7.3	157.2	6.3	3.4	S	7.1	SSE
30	64.5	5.0	110.2	3.9	26.4	118.9	5.3	219.2	3.6	6.3	S	12.7	SSW
31	112.3	4.5	143.8	4.5	17.7	198.3	4.4	282.2	4.8	9.5	S	12.5	SSW
平均	74.3	7.0	113.3	7.3	50.8	126.2	7.8	195.5	7.6	5.8	S	19.5	SSW

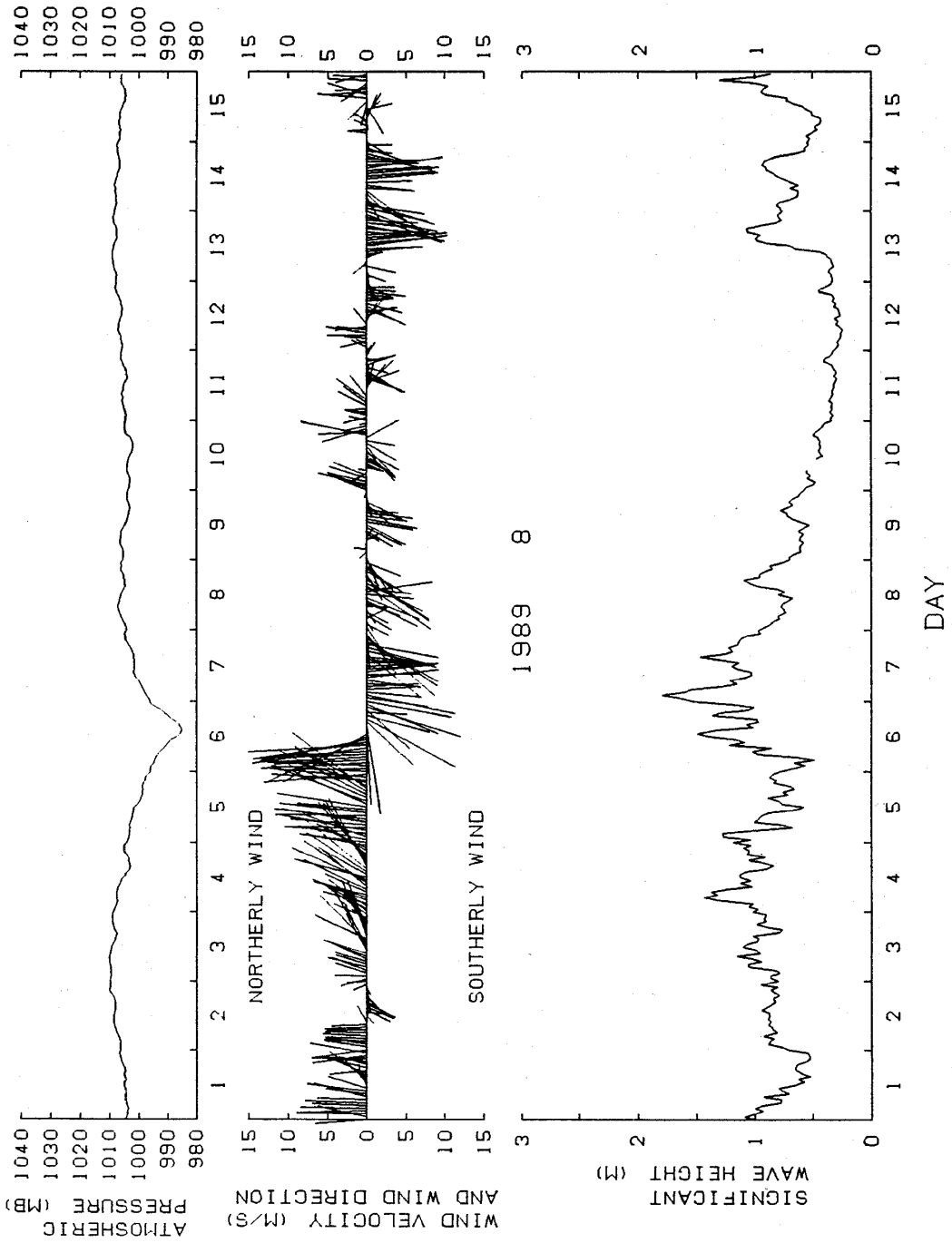
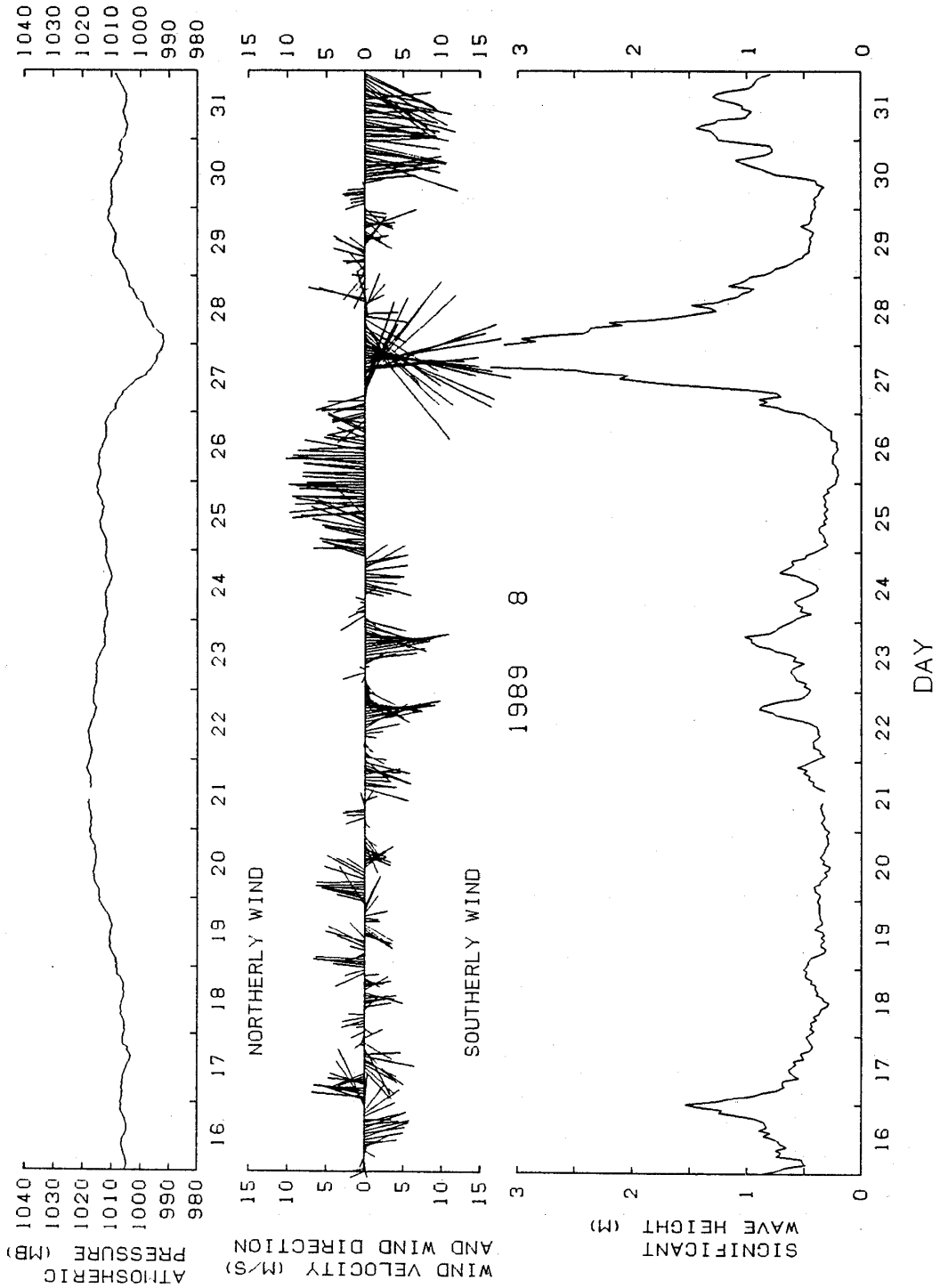


図5. １ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5 Hourly variation of significant wave height, direction and velocity of wind. and atomospheric pressure.


ATMOSHERIC PRESSURE (MB)
1040
1030
1020
1010
1000
990
980
WIND VELOCITY (M/S) AND WIND DIRECTION
NORTHERLY WIND
SOUTHERLY WIND
15
10
5
0
SIGNIFICANT WAVE HEIGHT (M)
3
2
1
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1989 8
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表2.　1ヵ月の有義波高と周期の頻度分布
Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1989　8

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30			3	20	15	8	1								47	6.4
30 — 60		12	43	60	95	62	12	10	1	1	1				297	40.2
60 — 90		16	38	22	11	20	31	31	10	9	1				189	25.6
90 — 120		8	21	17	6	7	12	10	33	12	5				131	17.8
120 — 150		1	10	4	4	6	2	1	2	6	4	3			43	5.8
150 — 180				1	5	1					1				8	1.1
180 — 210				1	1	1	1								4	0.5
210 — 240					2		2	1							5	0.7
240 — 270					1		1								2	0.3
270 — 300						1	2								3	0.4
300 — 330							2								2	0.3
330 — 360							2								2	0.3
360 — 390							2								2	0.3
390 — 420							1	1							2	0.3
420 —								1							1	0.1
TOTAL NUMBER	0	37	115	125	140	106	71	55	46	28	12	3	0	0	738	
PERCENT	0.0	5.0	15.6	16.9	19.0	14.4	9.6	7.5	6.2	3.8	1.6	0.4	0.0	0.0		

1989年9月～1990年8月

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1989 9

	1／3有義波					最大波							
	平均		最大		標準	平均		最大		平均	最多	最大	
日	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	偏差 (CM)	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	風速 (M/S)	風向	風速 (M/S)	風向
1	72.6	4.6	96.6	4.6	13.7	124.8	4.6	184.6	4.8	6.6	S	11.3	SSW
2	95.8	4.1	131.8	4.5	23.5	171.0	4.2	235.8	4.5	9.7	SSW	14.1	SW
3	128.7	4.7	202.3	5.8	41.9	222.5	4.7	389.2	7.5	9.8	S	15.4	SSW
4	143.5	6.4	186.1	6.0	21.7	237.5	6.7	311.5	6.6	7.5	S	13.6	SSW
5	106.7	6.9	127.1	7.0	9.4	176.1	7.0	228.5	6.9	4.6	S	7.8	SSW
6	96.4	5.9	117.4	6.6	8.1	163.6	6.8	200.2	7.2	6.6	S	9.9	SSW
7	97.9	8.3	119.4	7.7	9.2	159.1	8.3	214.4	8.1	2.9	SE	8.6	SE
8	90.0	9.0	105.7	9.0	7.6	143.9	9.0	226.1	9.3	2.4	SSW	4.7	SSW
9	74.8	7.4	94.2	9.7	11.0	129.4	8.6	165.5	9.6	4.7	SSE	9.1	SSE
10	69.0	6.2	92.5	5.1	11.9	124.4	7.8	179.2	4.2	4.5	S	9.3	SSE
11	64.7	7.9	94.2	10.2	14.1	115.2	9.1	217.3	11.1	3.7	S	6.2	SSE
12	117.1	11.5	147.8	11.5	18.3	193.2	12.9	286.6	11.4	2.8	SSW	5.6	S
13	105.2	7.8	131.0	12.1	10.7	181.6	9.7	223.6	14.4	5.4	S	10.9	SSW
14	87.5	5.6	102.8	7.0	6.3	152.0	8.4	188.0	10.8	8.7	SSW	12.2	SSW
15	77.6	6.0	95.5	6.6	6.8	128.7	7.7	165.5	5.4	4.3	S	9.7	SSW
16	50.8	6.9	77.0	8.0	10.6	87.0	7.6	142.6	8.4	5.3	N	7.6	E
17	29.3	6.9	38.0	7.4	3.8	51.4	7.1	68.4	6.6	2.7	NNE	5.1	NNE
18	61.5	4.3	91.9	4.1	22.8	111.7	4.3	176.3	3.6	8.3	SSW	16.1	SSW
19	85.1	4.3	133.4	4.7	18.2	145.3	4.3	245.1	4.2	8.3	S	12.4	SSW
20	149.1	8.4	327.1	11.4	51.8	242.5	8.7	522.5	10.8	5.7	SSW	17.3	N
21	53.1	6.7	93.6	8.2	18.2	89.5	7.2	172.4	7.5	6.5	N	8.8	N
22	34.8	6.0	45.0	6.9	6.0	62.5	6.2	90.8	7.2	5.3	N	10.2	N
23	50.1	4.5	66.5	6.3	6.7	85.4	4.5	111.8	3.6	6.0	N	13.0	ENE
24	31.1	4.7	81.9	7.0	13.9	58.2	6.4	142.1	6.3	9.0	N	13.2	N
25	38.9	5.8	72.3	4.9	19.3	66.1	6.6	127.9	4.8	3.1	N	5.0	S
26	46.7	4.9	65.1	4.9	7.7	79.2	5.0	110.4	4.5	4.5	N	7.9	SE
27	37.6	5.4	51.3	4.2	6.9	70.0	5.7	181.6	4.5	5.0	N	9.5	SSW
28	98.6	4.5	142.8	4.4	24.7	173.6	4.6	251.0	5.4	11.0	SSW	17.4	SW
29	48.7	6.0	81.7	6.6	13.1	79.0	6.1	125.0	5.1	4.8	NNE	8.0	ESE
30	23.5	5.0	34.2	5.9	3.7	42.9	6.6	59.6	5.7	6.7	N	9.9	N
平均	74.9	6.2	108.2	6.9	37.8	127.9	6.9	198.1	7.0	5.9	S	17.4	SW

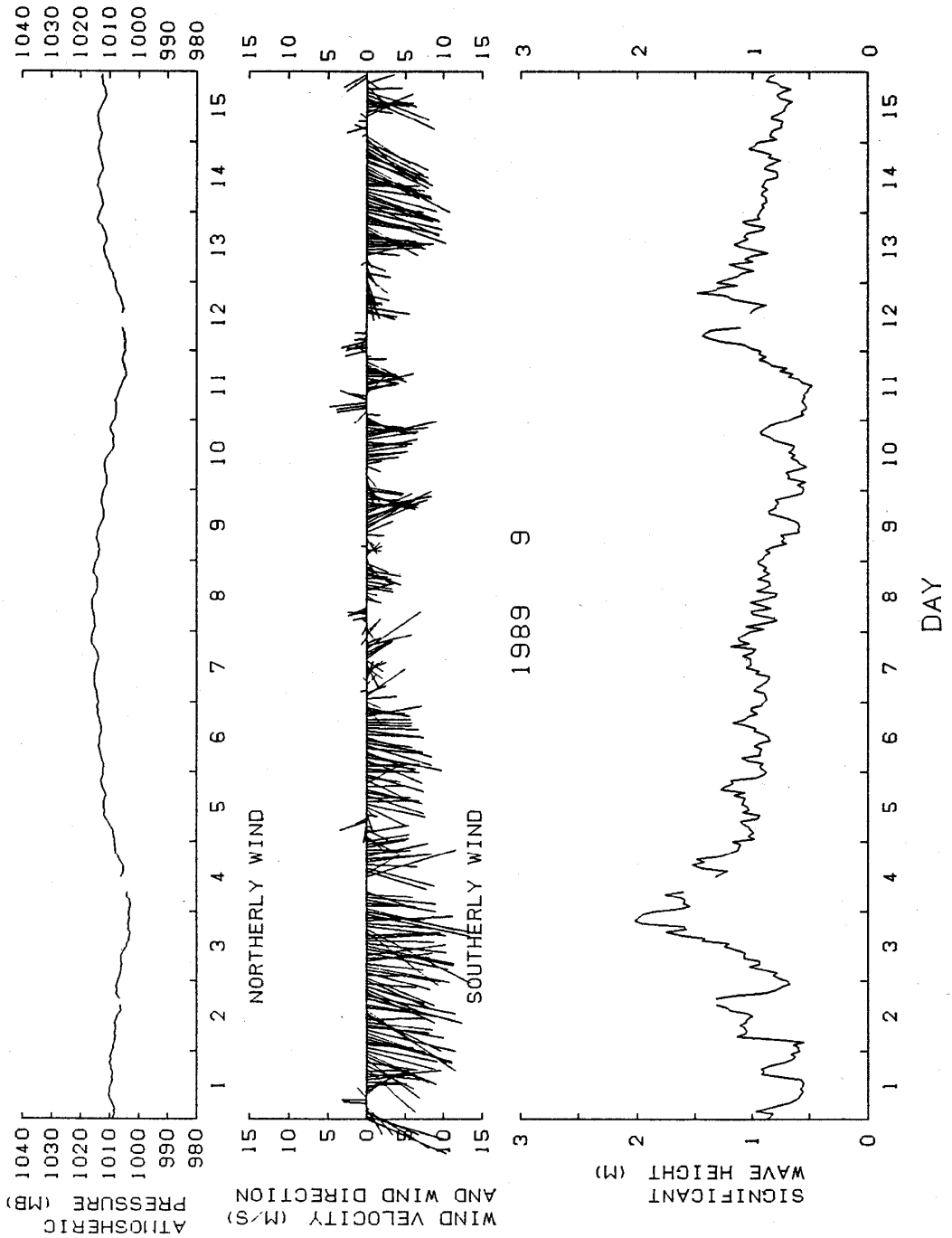

図5. １ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5 Hourly variation of significant wave height, direction and velocity of wind. and atomospheric pressure.

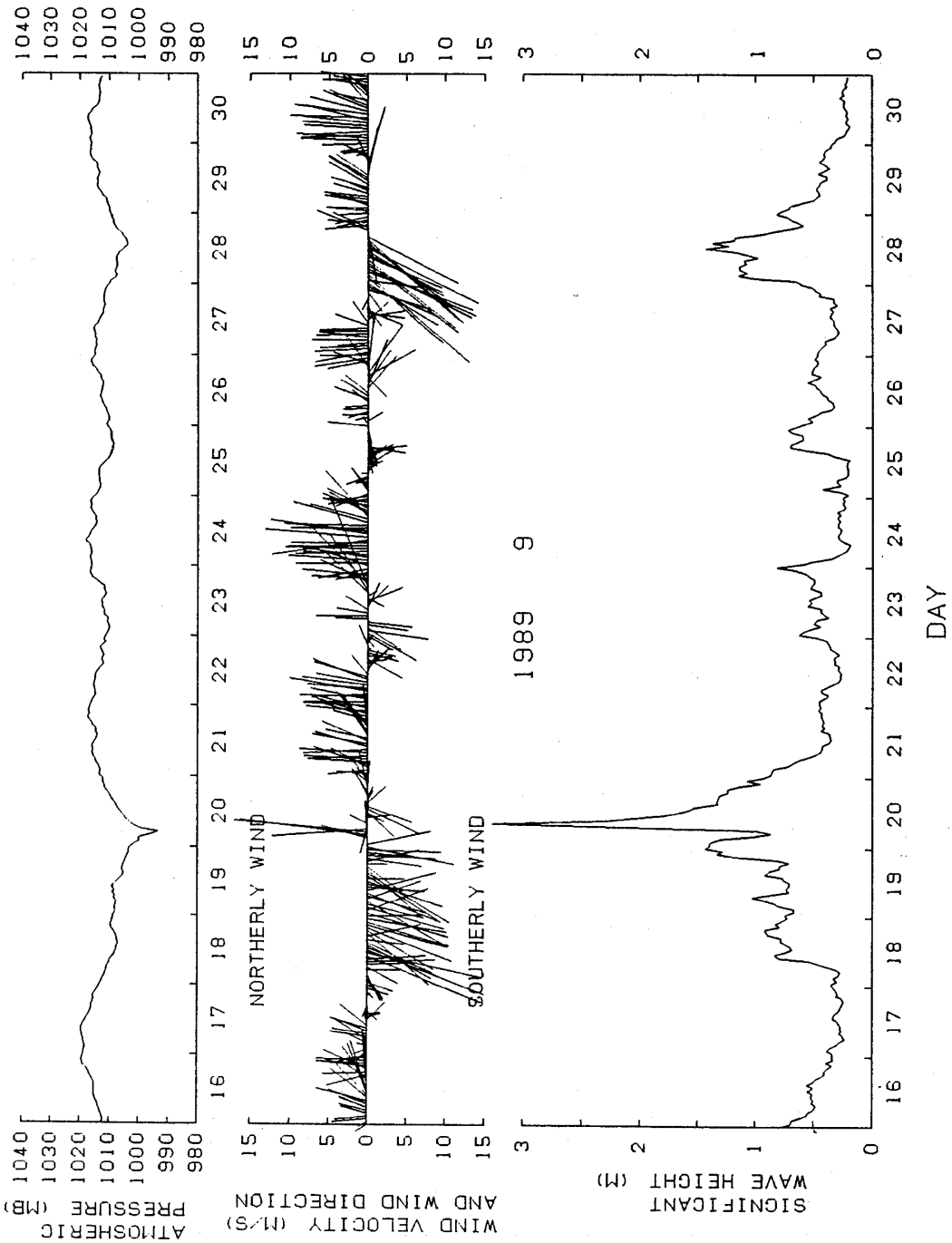
ATMOSPHERIC PRESSURE (MB)
WIND VELOCITY (M/S) AND WIND DIRECTION
SIGNIFICANT WAVE HEIGHT (M)
NORTHERLY WIND
SOUTHERLY WIND
1989 9
DAY

表2.　1ヵ月の有義波高と周期の頻度分布
Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1989　9

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30	4	8	16	21	19	11	1	1							81	11.4
30 — 60	1	20	43	49	55	31	3	1							203	28.6
60 — 90		27	45	39	30	20	18	18	1						198	27.8
90 — 120		7	37	24	20	24	19	15	7	7					160	22.5
120 — 150			12	4	9	1	6	1	2	3	3	3			44	6.2
150 — 180				4	8		2	1							15	2.1
180 — 210				3	2			2							7	1.0
210 — 240									2						2	0.3
240 — 270															0	0.0
270 — 300															0	0.0
300 — 330										1					1	0.1
330 — 360															0	0.0
360 — 390															0	0.0
390 — 420															0	0.0
420 —															0	0.0
TOTAL NUMBER	5	62	153	144	143	87	49	39	12	11	3	3	0	0	711	
PERCENT	0.7	8.7	21.5	20.3	20.1	12.2	6.9	5.5	1.7	1.5	0.4	0.4	0.0	0.0		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1989 10

日	1／3有義波 平均 波高 (CM)	平均 周期 (SEC)	最大 波高 (CM)	最大 周期 (SEC)	標準偏差 (CM)	最大波 平均 波高 (CM)	平均 周期 (SEC)	最大 波高 (CM)	最大 周期 (SEC)	平均風速 (M/S)	最多風向	最大風速 (M/S)	最大風向
1	29.4	5.5	40.5	5.6	5.2	52.4	6.8	74.7	8.7	5.6	NNE	7.2	NNE
2	36.0	6.3	53.0	7.4	7.5	67.5	7.7	94.2	8.1	9.5	N	12.9	NNE
3	34.5	5.9	46.9	7.7	4.3	67.1	7.9	84.0	8.4	10.3	N	13.0	N
4	42.9	7.6	63.9	8.2	6.3	81.3	8.9	118.2	7.5	8.6	N	12.1	N
5	56.0	9.7	83.6	12.1	11.8	95.5	9.9	140.1	11.4	3.5	NNE	6.6	NNE
6	126.0	13.0	165.4	14.5	25.5	198.9	13.0	285.2	14.7	6.5	N	10.2	NNE
7	244.3	14.1	343.4	14.2	49.4	377.9	13.9	489.7	13.8	7.2	N	11.0	NNE
8	200.7	13.6	368.5	15.9	98.8	315.2	13.5	546.4	15.9	6.2	NNE	9.9	N
9	40.5	7.9	52.6	10.9	4.6	72.6	9.3	98.1	11.7	4.2	NNE	8.5	NNE
10	35.9	7.3	45.2	6.9	4.4	60.1	7.5	76.7	7.2	3.8	NNW	6.2	N
11	33.2	5.1	55.9	7.2	8.2	63.2	6.8	101.6	7.5	10.4	N	14.8	N
12	46.0	8.1	60.2	9.4	7.1	82.1	8.6	127.9	9.3	6.8	N	13.5	N
13	46.9	8.1	55.5	7.7	4.3	80.3	8.0	98.1	7.2	2.6	NNE	4.7	NNE
14	47.3	8.9	55.1	9.0	4.3	83.0	9.3	108.4	9.6	4.8	N	8.6	NNE
15	43.4	8.2	49.8	8.6	3.9	80.7	9.0	147.0	13.8	3.5	N	5.3	SW
16	60.1	6.3	109.3	5.0	18.4	105.1	6.9	168.0	7.2	6.6	SW	13.3	SW
17	86.3	6.6	138.8	5.8	26.6	148.5	6.9	252.9	5.4	6.7	NNE	11.6	SSW
18	42.0	6.1	57.6	4.6	7.3	74.3	6.9	98.1	3.9	5.0	NNE	8.4	NNE
19	62.7	7.1	130.1	8.2	34.7	109.5	7.5	258.8	7.8	7.2	N	10.1	N
20	64.8	7.2	109.0	8.4	23.4	111.2	7.6	166.5	8.7	3.9	N	9.3	NNE
21	37.6	6.7	53.3	7.3	10.4	65.6	8.8	90.3	12.3	5.2	N	7.5	N
22	38.7	7.7	44.1	7.6	3.1	69.0	8.2	180.7	8.7	3.4	N	5.8	N
23	40.5	6.6	50.2	6.3	5.1	70.1	6.8	94.2	6.3	5.5	NNE	10.3	NE
24	43.8	6.8	61.9	7.8	8.2	75.4	7.3	138.2	9.3	3.2	N	5.4	NNE
25	38.1	7.0	50.9	7.0	7.9	63.9	6.9	84.5	6.3	3.7	N	6.0	N
26	46.5	6.6	69.3	5.2	11.7	77.4	6.8	116.2	4.8	3.6	N	5.9	SW
27	88.8	10.3	144.3	13.1	28.4	139.7	10.7	213.9	12.9	4.8	NNE	9.2	ENE
28	134.7	12.0	177.0	11.7	21.8	212.0	12.7	301.8	11.4	4.8	N	10.0	NNE
29	104.1	12.4	149.4	12.7	29.7	180.2	13.5	291.0	15.0	7.8	N	12.2	N
30	55.2	8.6	62.5	9.3	4.6	91.0	9.2	106.0	10.8	2.6	N	4.1	SSW
31	77.6	6.4	91.4	7.2	9.5	123.4	6.4	155.8	6.3	4.6	N	6.0	NNW
平均	67.5	8.2	98.0	8.8	55.6	113.2	8.9	171.2	9.4	5.6	N	14.8	N

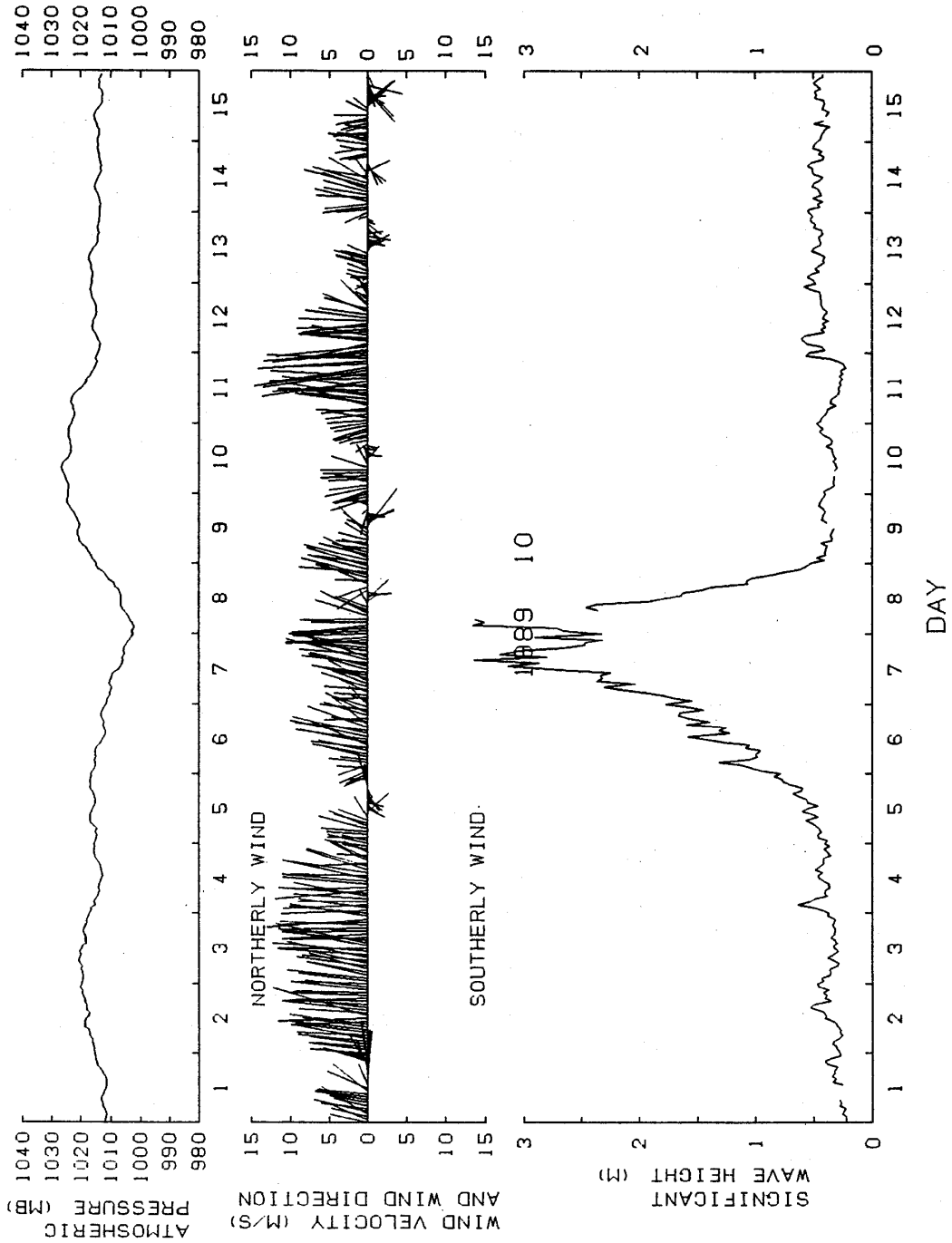

図5. １ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5 Hourly variation of significant wave height, direction and velocity of wind. and atomospheric pressure.

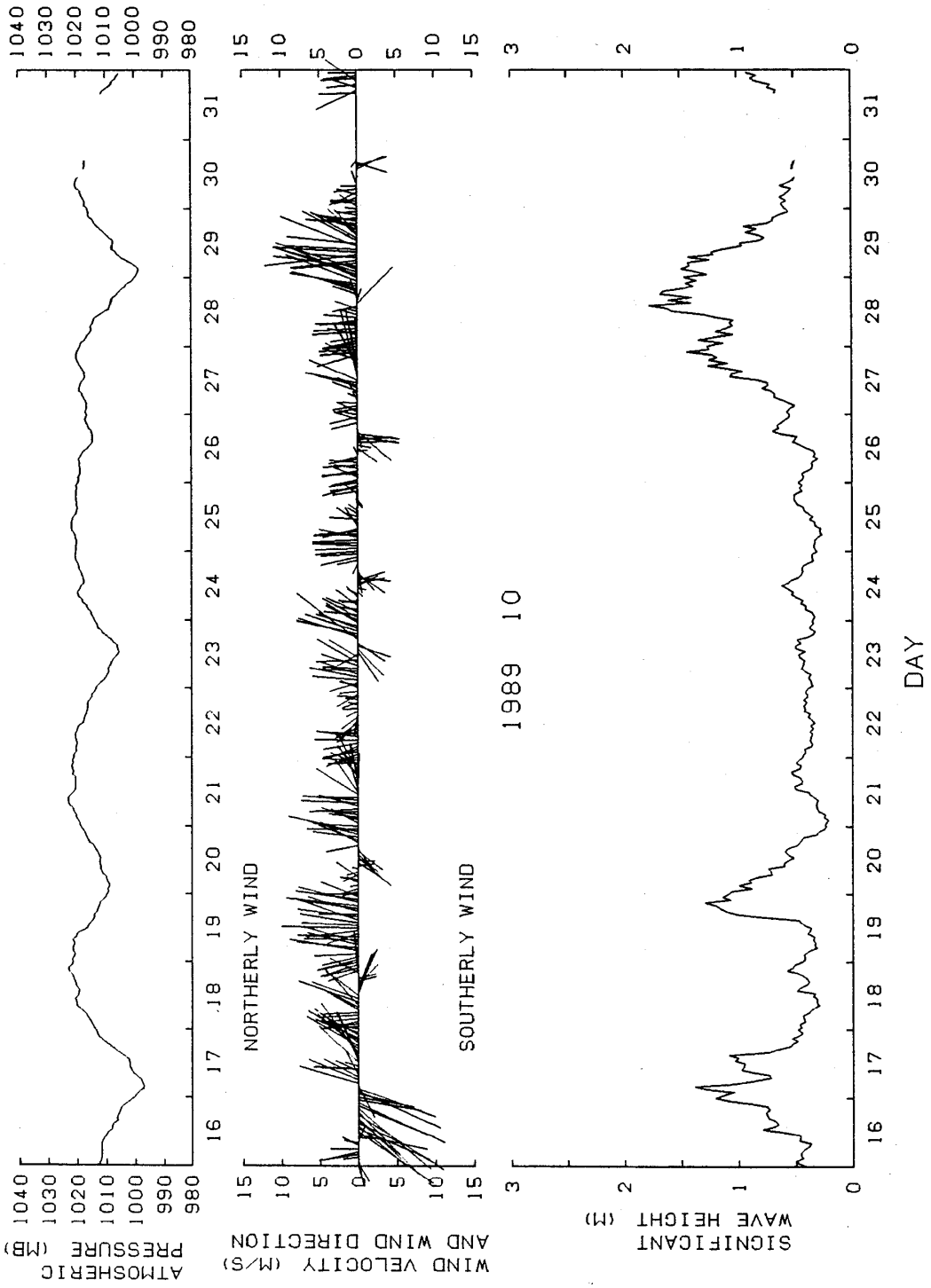
ATMOSPHERIC PRESSURE (MB)
WIND VELOCITY (M/S) AND WIND DIRECTION
SIGNIFICANT WAVE HEIGHT (M)
NORTHERLY WIND
SOUTHERLY WIND
1989 10
DAY

表2.　1ヵ月の有義波高と周期の頻度分布
Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1989　10

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30	2	5	11	11	15	3									47	6.6
30 — 60		5	8	43	127	138	94	35	5						455	63.8
60 — 90		2	6	5	13	7	3	6	15	9	2				68	9.5
90 — 120			1	3	3	8	7		3	10	12	5			52	7.3
120 — 150				3			1		2	5	14	13	2		40	5.6
150 — 180										3	4	5	7		19	2.7
180 — 210												1		2	3	0.4
210 — 240												3	5	2	10	1.4
240 — 270												3	3		6	0.8
270 — 300												3	1		4	0.6
300 — 330												2	1		3	0.4
330 — 360													1	3	4	0.6
360 — 390														2	2	0.3
390 — 420															0	0.0
420 —															0	0.0
TOTAL NUMBER	2	12	26	65	158	156	105	41	25	27	32	35	20	9	713	
PERCENT	0.3	1.7	3.6	9.1	22.2	21.9	14.7	5.8	3.5	3.8	4.5	4.9	2.8	1.3		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1989 11

	1／3有義波					最大波							
	平均		最大		標準	平均		最大		平均	最多	最大	
日	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	偏差 (CM)	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	風速 (M/S)	風向	風速 (M/S)	風向
1	137.2	7.1	171.1	6.2	21.4	221.5	7.1	295.9	6.9	7.7	WSW	15.9	SW
2	63.7	6.8	111.3	7.3	27.6	106.8	7.4	171.4	6.6	5.8	NNE	9.6	NNE
3	34.5	6.6	40.3	5.3	3.9	59.0	8.2	84.0	6.9	4.1	N	7.4	N
4	31.3	7.1	40.7	7.8	3.4	54.4	8.1	68.8	7.5	3.3	N	5.3	N
5	32.9	7.1	41.6	6.9	4.0	59.1	8.4	122.6	14.1	2.6	N	4.6	N
6	33.6	6.3	40.8	6.0	4.7	57.3	7.0	80.6	7.5	3.3	N	6.0	SSE
7	59.1	6.0	84.5	6.4	14.3	99.9	6.0	159.2	6.3	2.8	SSW	7.4	SSW
8	53.4	6.9	65.2	7.0	4.2	91.9	6.8	125.5	6.9	3.2	N	5.6	N
9	87.4	6.1	131.1	5.3	24.0	143.6	6.6	212.4	4.5	6.3	SSW	11.6	SSW
10	52.2	7.6	86.7	7.5	11.2	89.3	8.3	137.7	7.5	6.3	N	9.8	NNE
11	43.8	7.4	55.9	8.0	6.1	78.1	8.5	102.5	8.1	5.3	N	8.7	N
12	44.8	7.6	62.4	6.5	7.9	74.1	8.3	104.5	9.6	3.2	N	5.2	N
13	66.4	7.0	85.2	6.1	9.9	110.0	7.3	173.3	8.1	3.1	N	7.2	N
14	68.0	7.9	96.7	7.4	13.9	116.6	9.0	153.8	7.8	6.7	NNE	9.7	NNE
15	57.1	8.3	84.6	9.9	11.4	105.0	9.7	134.8	8.7	8.4	N	10.1	N
16	61.0	8.8	76.7	9.2	8.6	109.8	9.2	138.2	10.5	8.1	N	10.7	N
17	69.0	9.3	90.8	10.2	13.1	121.4	9.8	164.6	9.6	8.4	N	10.1	N
18	71.3	9.6	88.8	10.1	13.3	121.7	10.1	165.0	11.4	4.4	NNE	9.1	NNE
19	104.1	6.2	132.4	5.4	15.8	170.7	7.2	223.6	6.9	8.6	WSW	15.7	SW
20	50.2	7.3	69.5	7.5	7.8	82.9	7.6	141.1	6.3	3.5	N	6.7	NW
21	36.0	7.1	46.1	7.2	4.3	60.5	9.1	75.7	7.5	3.4	N	6.2	SSE
22	40.5	6.1	70.6	4.5	15.2	71.7	7.4	138.2	4.2	4.8	N	10.1	SW
23	29.5	6.6	44.9	5.6	5.2	52.5	9.0	74.2	6.9	3.7	N	6.5	NNE
24	33.0	7.4	47.6	8.3	7.4	58.5	9.5	78.6	10.2	4.3	N	7.7	N
25	30.8	7.2	45.0	8.1	4.8	58.2	9.7	77.6	9.3	6.0	N	9.1	NNE
26	36.4	7.3	53.9	7.6	8.6	67.7	8.6	103.0	7.8	5.2	NNE	7.9	NNE
27	59.7	8.4	93.8	8.5	14.5	102.7	8.4	155.3	9.3	3.4	N	5.4	NNW
28	82.4	5.7	104.4	4.8	16.7	138.2	6.4	196.8	3.3	8.9	SW	15.7	SW
29	107.6	5.4	158.3	5.4	27.0	184.2	5.6	297.4	4.5	8.1	WSW	17.2	WSW
30	74.9	5.7	103.0	5.4	14.1	124.4	6.0	169.4	4.5	4.9	W	9.1	W
平均	58.6	7.1	80.8	7.0	28.9	100.1	8.0	144.2	7.6	5.3	N	17.2	WSW

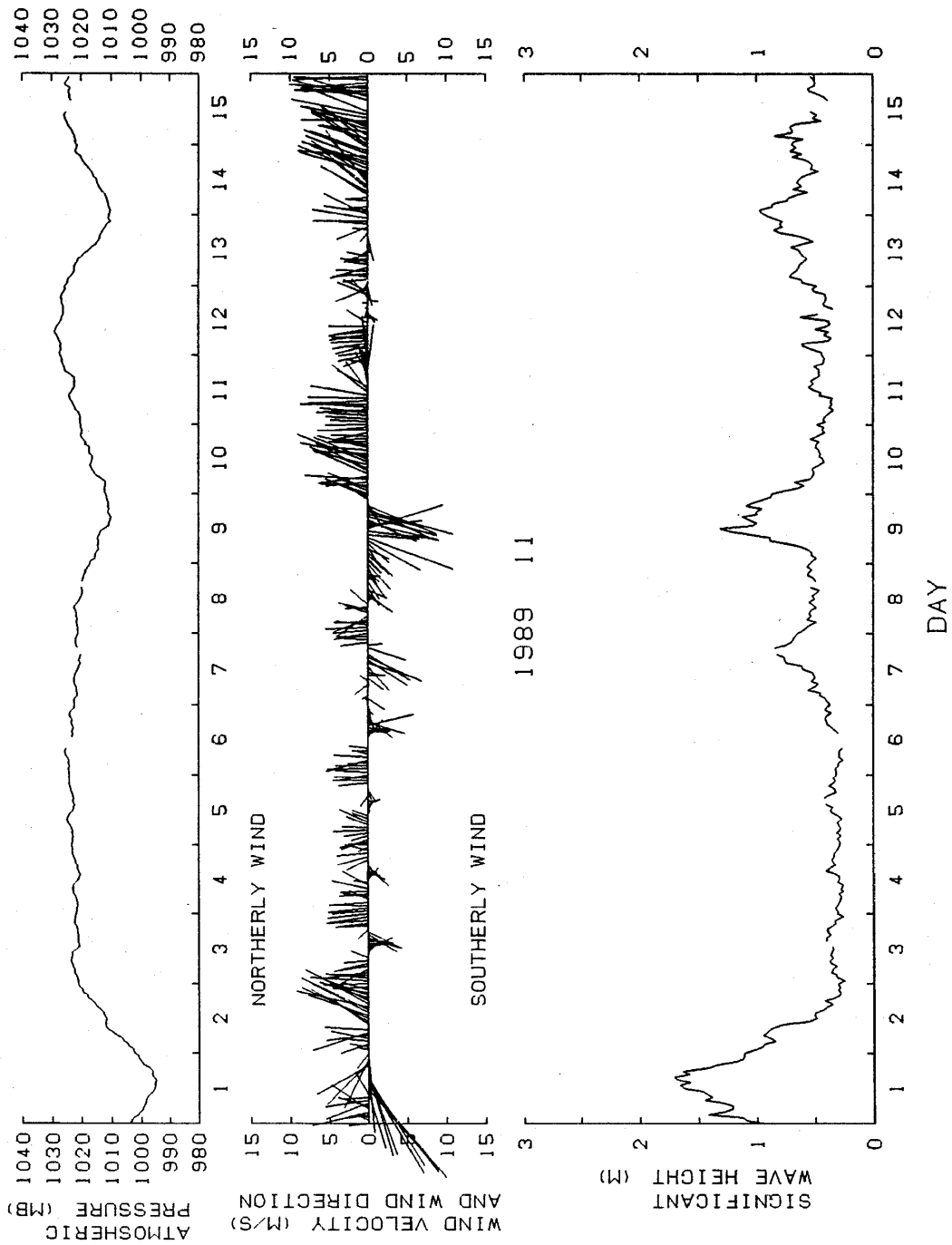

図5.　１ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5　Hourly variation of significant wave height, direction and velocity of wind and atomospheric pressure.

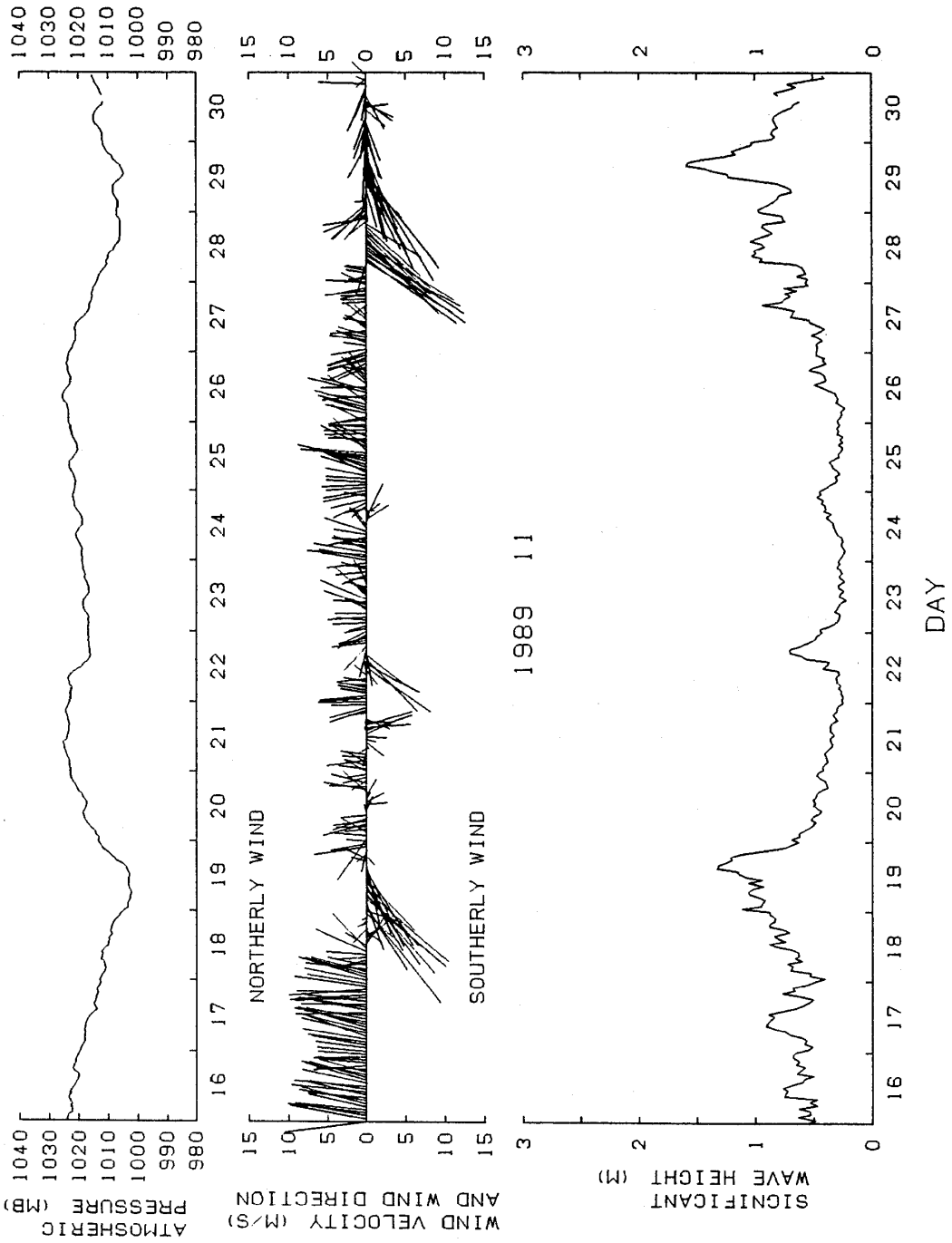
ATMOSPHERIC PRESSURE (MB)
1040
1030
1020
1010
1000
990
980
WIND VELOCITY (M/S) AND WIND DIRECTION
NORTHERLY WIND
SOUTHERLY WIND
15
10
5
0
SIGNIFICANT WAVE HEIGHT (M)
3
2
1
0
1989 11
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
DAY

表2.　1ヵ月の有義波高と周期の頻度分布
Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1989　11

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30			1	16	27	31	12								87	12.3
30 — 60		3	7	39	81	141	72	11							354	50.1
60 — 90			7	27	34	20	29	41	8						166	23.5
90 — 120			11	28	14	9	2		2						66	9.3
120 — 150			3	8	7	3	4								25	3.5
150 — 180			1	2	6										9	1.3
180 — 210															0	0.0
210 — 240															0	0.0
240 — 270															0	0.0
270 — 300															0	0.0
300 — 330															0	0.0
330 — 360															0	0.0
360 — 390															0	0.0
390 — 420															0	0.0
420 —															0	0.0
TOTAL NUMBER	0	3	30	120	169	204	119	52	10	0	0	0	0	0	707	
PERCENT	0.0	0.4	4.2	17.0	23.9	28.9	16.8	7.4	1.4	0.0	0.0	0.0	0.0	0.0		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1989 12

日	1／3有義波 平均 波高 (CM)	平均 周期 (SEC)	最大 波高 (CM)	最大 周期 (SEC)	標準偏差 (CM)	最大波 平均 波高 (CM)	平均 周期 (SEC)	最大 波高 (CM)	最大 周期 (SEC)	平均風速 (M/S)	最多風向	最大風速 (M/S)	最大風向
1	42.3	6.2	55.2	6.6	5.8	71.2	6.7	91.8	7.2	3.1	N	6.0	N
2	54.4	5.2	122.3	4.9	36.0	95.9	6.1	232.4	4.8	6.1	N	16.2	SW
3	43.3	6.2	59.6	5.0	8.4	74.0	6.1	105.5	5.1	3.5	N	5.9	N
4	79.7	4.9	120.4	5.0	28.1	132.8	4.9	210.0	5.1	7.5	N	16.1	SW
5	56.3	9.8	70.0	7.0	7.3	96.2	11.7	132.8	6.3	3.2	NNW	6.2	NNW
6	44.7	8.7	59.5	11.3	5.5	77.0	10.3	106.4	10.2	4.1	N	7.7	N
7	40.3	7.3	54.6	4.9	7.5	72.1	8.0	99.1	3.6	5.0	N	7.6	N
8	57.9	5.1	110.2	4.3	21.5	101.2	5.4	196.3	4.5	7.6	NNE	12.1	W
9	69.1	6.4	90.4	5.1	13.1	117.2	6.6	148.9	5.1	4.6	N	10.4	NNE
10	41.8	6.6	65.7	7.1	11.7	69.0	6.5	110.4	6.6	3.8	N	6.0	N
11	28.3	5.9	63.6	6.5	10.2	47.7	6.5	95.2	6.9	3.6	N	5.9	NNW
12	37.7	5.3	62.9	6.8	13.5	64.0	6.1	94.7	7.5	5.1	NNE	8.7	NNE
13	30.8	5.7	40.6	6.3	6.0	53.8	6.4	71.3	6.0	5.1	NNE	8.9	NNE
14	35.0	5.8	71.8	6.8	11.8	62.1	7.1	112.3	8.4	6.3	N	9.9	N
15	67.2	6.7	91.0	6.6	13.9	109.8	6.9	160.2	6.9	4.3	N	7.2	WSW
16	41.2	6.2	55.6	7.5	7.4	73.2	7.0	98.6	7.2	4.5	N	6.9	NNE
17	27.8	6.0	35.2	6.9	3.1	51.0	7.0	87.9	3.3	3.8	N	7.0	NNE
18	32.7	5.5	41.5	6.2	3.1	57.0	6.8	83.5	5.1	6.8	NNE	9.8	NNE
19	30.7	5.4	46.0	7.5	7.5	55.7	8.1	82.5	8.4	7.8	N	9.6	N
20	42.7	7.3	50.8	6.7	4.1	71.7	7.8	92.3	6.6	4.7	N	7.1	N
21	31.6	5.7	51.1	6.8	7.3	58.0	6.7	93.8	6.9	4.7	N	8.1	NNE
22	22.9	5.3	26.6	5.4	1.4	40.9	5.8	60.1	3.9	3.7	NNE	6.1	NNW
23	31.4	5.5	56.3	7.2	14.1	59.2	7.9	104.5	8.1	5.8	NNE	8.7	NNE
24	43.5	5.9	61.6	7.4	12.6	76.4	7.1	109.4	7.8	8.5	N	12.7	N
25	41.1	6.4	54.7	7.1	7.2	81.5	8.3	104.0	8.7	9.2	N	12.1	N
26	38.7	7.6	45.3	8.2	4.5	70.3	7.9	86.4	7.2	6.1	N	8.0	N
27	54.7	9.0	70.3	9.4	9.6	92.5	9.8	125.5	9.0	4.3	N	9.7	NNE
28	56.8	8.5	68.4	10.3	4.3	99.1	9.5	126.0	10.8	4.3	NNE	7.0	NNE
29	49.6	6.5	62.5	7.0	9.2	84.0	6.4	119.1	7.2	3.4	N	6.0	N
30	45.6	6.7	87.0	7.4	18.0	75.7	7.6	133.8	8.1	4.4	N	8.6	N
31	79.4	6.7	100.6	6.8	13.5	133.5	7.1	186.5	7.8	6.9	WNW	11.3	WNW
平均	45.4	6.5	66.2	6.8	19.4	78.6	7.3	118.1	6.8	5.2	N	16.2	SW

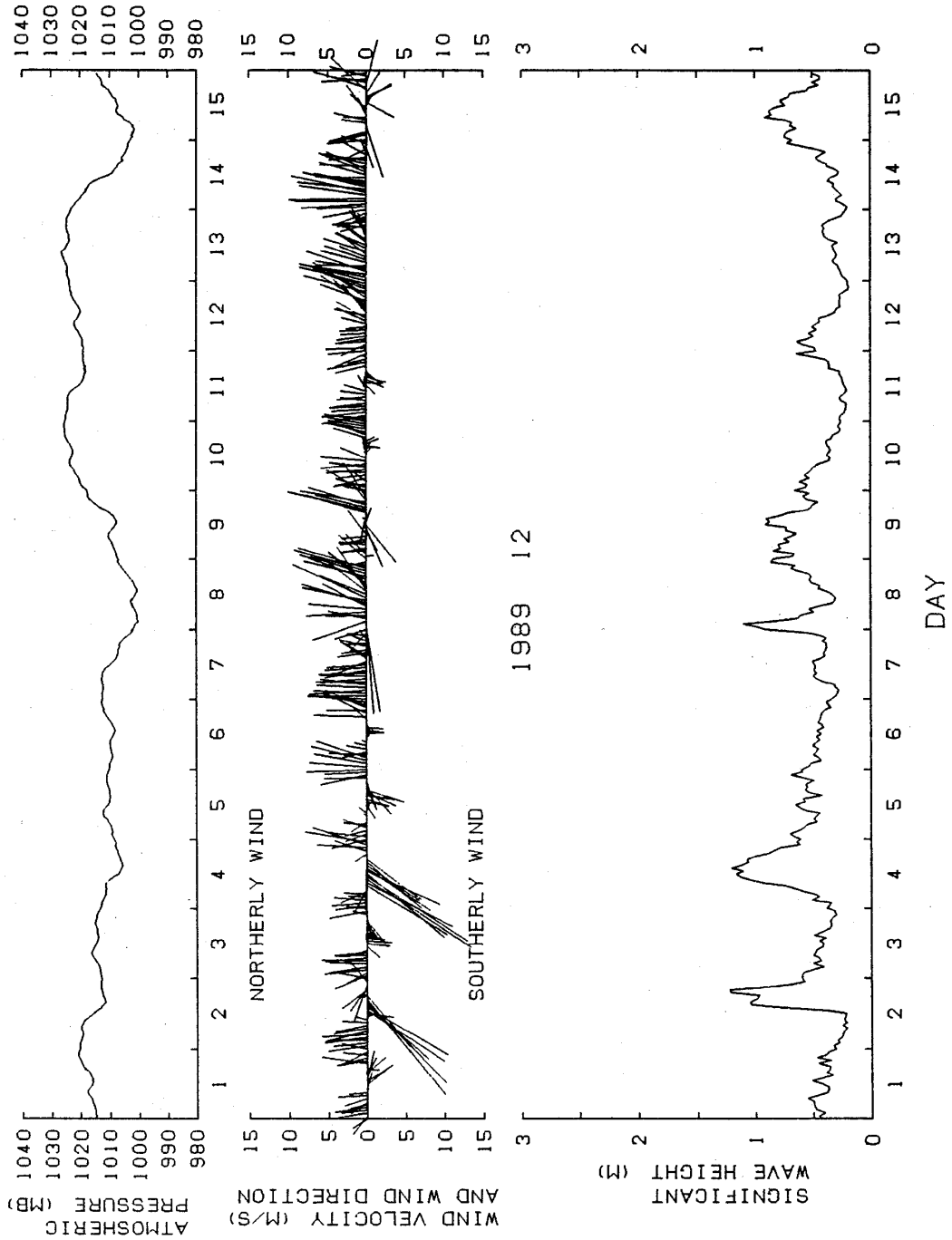

図5. 1ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5 Hourly variation of significant wave height, direction and velocity of wind and atomospheric pressure.

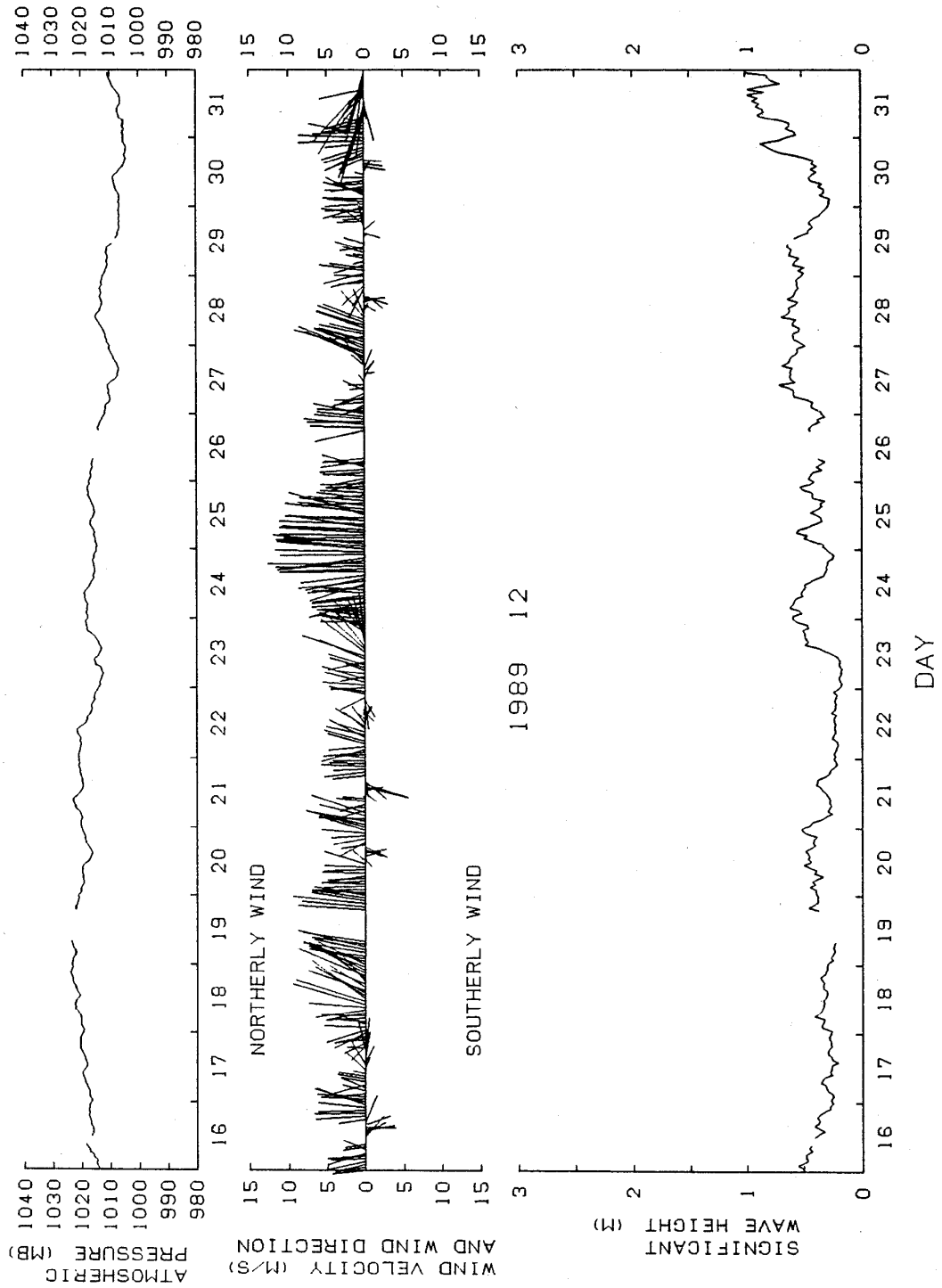
ATMOSPHERIC PRESSURE (MB)
1040
1030
1020
1010
1000
990
980
WIND VELOCITY (M/S) AND WIND DIRECTION
NORTHERLY WIND
SOUTHERLY WIND
15
10
5
0
SIGNIFICANT WAVE HEIGHT (M)
3
2
1
0
1989 12
DAY
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31

表2.　1ヵ月の有義波高と周期の頻度分布
Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1989　12

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30	2	15	36	61	43	6									163	22.6
30 — 60	1	4	31	72	154	101	37	21	5	3	1	2			432	59.8
60 — 90		2	10	12	41	18	5	7	2		1	1	1		100	13.9
90 — 120		5	10	3	6										24	3.3
120 — 150			2	1											3	0.4
150 — 180															0	0.0
180 — 210															0	0.0
210 — 240															0	0.0
240 — 270															0	0.0
270 — 300															0	0.0
300 — 330															0	0.0
330 — 360															0	0.0
360 — 390															0	0.0
390 — 420															0	0.0
420 —															0	0.0
TOTAL NUMBER	3	26	89	149	244	125	42	28	7	3	2	3	1	0	722	
PERCENT	0.4	3.6	12.3	20.6	33.8	17.3	5.8	3.9	1.0	0.4	0.3	0.4	0.1	0.0		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1990 1

	1／3有義波					最大波							
	平均		最大		標準	平均		最大		平均	最多	最大	
	波高	周期	波高	周期	偏差	波高	周期	波高	周期	風速	風向	風速	風向
日	(CM)	(SEC)	(CM)	(SEC)	(CM)	(CM)	(SEC)	(CM)	(SEC)	(M/S)		(M/S)	
1	61.4	6.1	81.0	6.1	8.3	107.6	6.1	161.6	6.3	3.6	N	6.0	SSW
2	66.0	5.6	81.2	6.0	7.4	109.0	5.6	133.3	5.4	3.4	NNW	5.9	N
3	-	-	-	-	-	-	-	-	-	-	-	-	-
4	31.8	6.5	37.9	6.2	2.8	53.7	7.7	61.5	6.3	4.0	N	6.3	ENE
5	40.5	6.9	48.5	8.3	5.5	70.2	7.9	89.8	7.2	4.7	N	7.4	SSW
6	92.9	5.2	134.6	4.7	28.4	154.4	5.6	224.6	4.5	8.7	SW	16.5	WSW
7	54.6	7.0	72.7	7.1	8.8	94.1	7.1	123.0	6.6	6.1	N	8.4	NE
8	29.0	6.2	35.8	6.9	3.3	51.9	7.0	64.9	6.9	4.4	N	6.0	N
9	34.0	5.6	62.1	5.7	14.2	60.1	6.4	112.3	5.7	4.1	N	8.1	SW
10	87.8	6.8	258.7	8.1	75.4	149.4	6.8	460.9	7.8	5.3	N	12.5	SW
11	110.8	8.8	167.1	7.3	31.1	185.5	8.9	299.3	6.0	6.6	NNE	10.8	N
12	72.4	7.8	96.6	5.2	12.7	122.8	8.0	169.4	6.9	5.9	N	11.8	SSW
13	65.7	6.9	102.3	5.6	16.6	114.2	7.8	165.5	6.6	6.3	N	9.6	NE
14	51.7	7.8	78.0	5.9	8.5	88.8	8.5	126.0	6.9	3.7	N	7.1	N
15	53.3	6.5	78.6	6.0	11.2	88.2	8.0	140.1	6.6	4.5	N	6.4	N
16	27.6	4.6	32.1	5.0	2.1	56.1	9.9	70.8	10.5	9.7	N	12.5	N
17	56.7	8.8	78.1	10.5	12.5	98.0	9.8	136.7	9.6	5.0	NE	9.6	N
18	104.3	5.9	167.8	5.2	43.9	190.5	6.1	365.7	4.8	11.9	SW	22.0	SW
19	117.6	6.4	157.5	7.6	19.1	202.3	6.4	255.9	4.2	11.2	N	19.3	SW
20	62.0	6.9	109.2	8.6	25.9	113.5	7.8	193.4	8.4	8.0	NNE	11.8	NNE
21	38.9	7.2	49.9	7.9	5.8	66.4	7.5	78.6	7.2	4.5	N	7.0	N
22	92.4	6.2	169.9	5.4	38.9	165.3	5.9	468.3	4.8	8.7	N	17.8	SW
23	65.7	5.7	137.1	5.4	39.3	112.8	7.2	250.5	5.1	8.2	N	14.6	WSW
24	79.8	6.0	159.3	5.2	46.0	139.4	6.6	365.7	4.8	7.9	N	16.5	SW
25	85.8	6.0	111.2	4.9	8.8	142.5	6.6	178.7	6.0	6.3	N	11.8	W
26	58.3	6.4	74.0	6.0	10.4	99.3	6.5	131.8	6.9	4.7	N	8.8	N
27	36.7	5.9	40.2	5.6	2.2	64.3	6.4	80.1	6.9	4.9	N	7.6	N
28	35.3	6.2	42.7	6.4	3.9	58.9	6.1	71.3	6.0	3.2	NNE	5.5	NNW
29	68.5	5.4	159.8	7.2	46.2	116.8	6.2	289.6	7.5	7.1	N	13.0	SW
30	89.4	7.7	142.8	7.2	20.6	149.9	7.9	246.1	6.9	5.8	N	8.3	NE
31	35.6	6.4	59.2	7.0	7.9	65.7	8.4	103.5	6.9	7.4	NNE	9.8	N
平均	64.1	6.5	100.9	6.5	36.1	110.8	7.3	187.3	6.5	6.3	N	22.0	SW

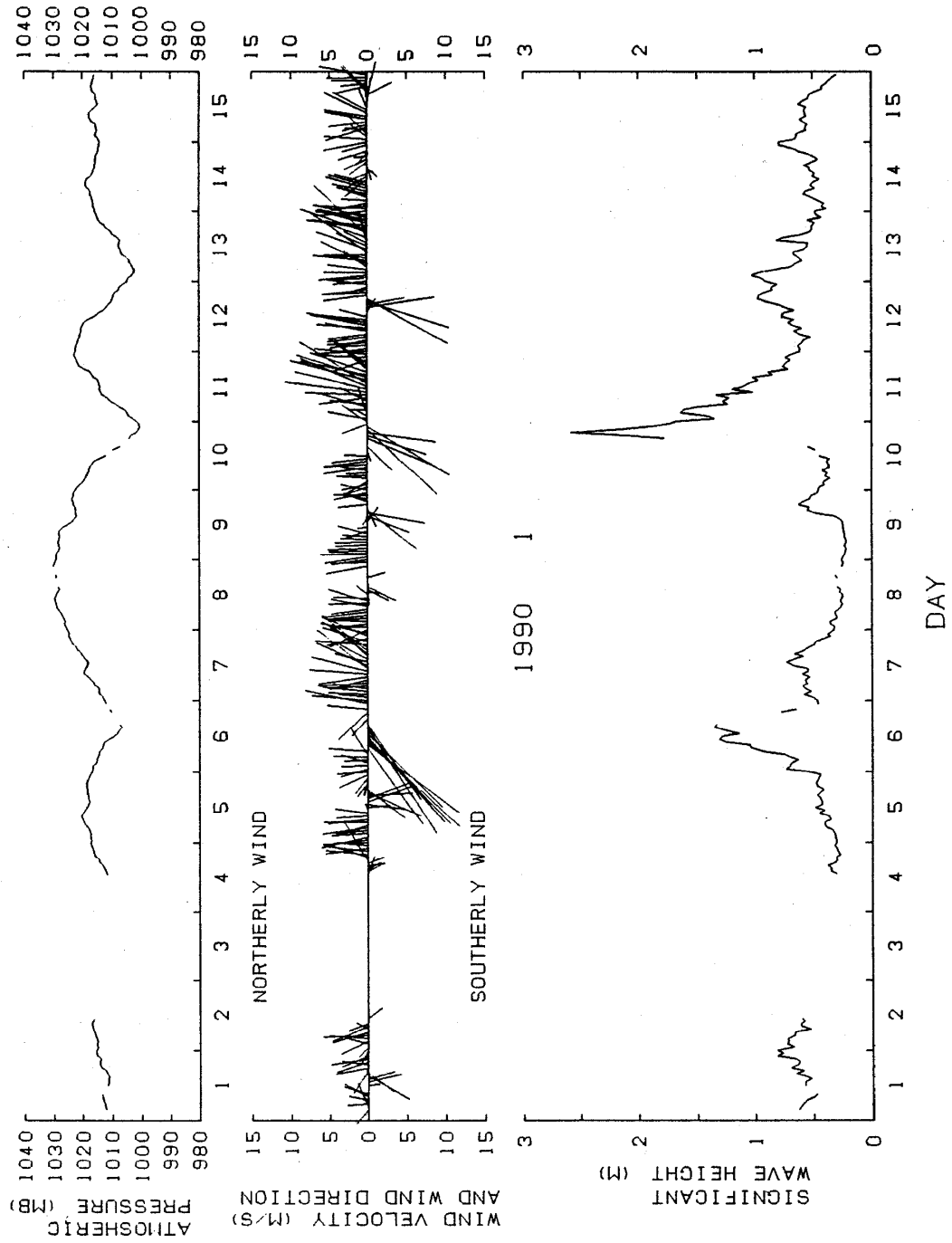

図5. １ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5 Hourly variation of significant wave height, direction and velocity of wind. and atomospheric pressure.

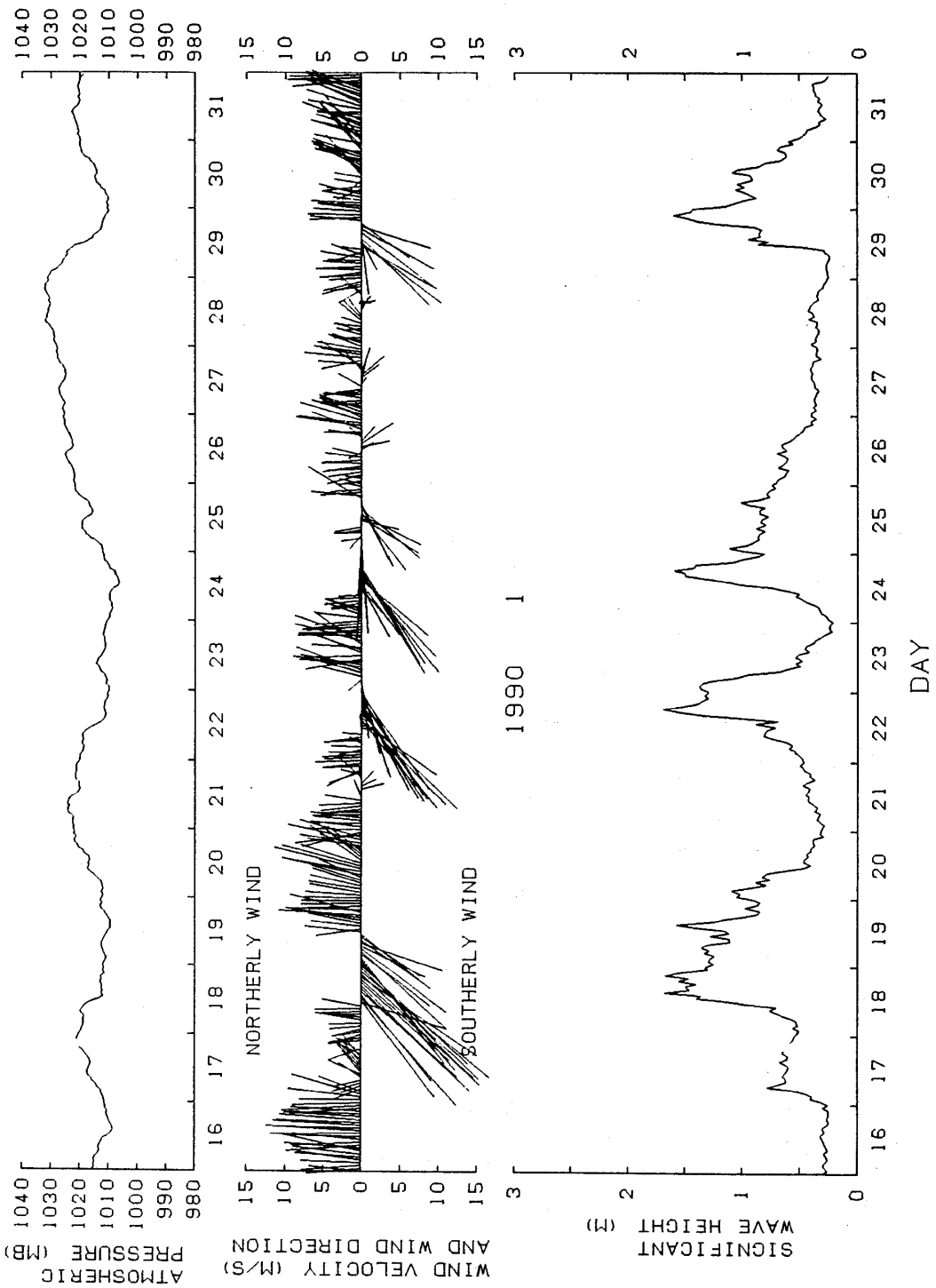
ATMOSPHERIC PRESSURE (MB)
1040
1030
1020
1010
1000
990
980
WIND VELOCITY (M/S) AND WIND DIRECTION
NORTHERLY WIND
SOUTHERLY WIND
SIGNIFICANT WAVE HEIGHT (M)
1990 1
DAY
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

表2.　1ヵ月の有義波高と周期の頻度分布

Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　1990　1

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30		8	10	33	27	4									82	12.1
30 — 60		4	6	56	130	78	26	3	1						304	44.9
60 — 90		2	8	38	48	31	21	12	2						162	23.9
90 — 120		1	11	17	2	5	20	2							58	8.6
120 — 150			21	17	3	6	3	2							52	7.7
150 — 180			3	5		5	1	1							15	2.2
180 — 210						1									1	0.1
210 — 240						2									2	0.3
240 — 270							1								1	0.1
270 — 300															0	0.0
300 — 330															0	0.0
330 — 360															0	0.0
360 — 390															0	0.0
390 — 420															0	0.0
420 —															0	0.0
TOTAL NUMBER	0	15	59	166	210	132	72	20	3	0	0	0	0	0	677	
PERCENT	0.0	2.2	8.7	24.5	31.0	19.5	10.6	3.0	0.4	0.0	0.0	0.0	0.0	0.0		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1990 2

	1／3有義波					最大波							
	平均		最大		標準	平均		最大		平均	最多	最大	
日	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	偏差 (CM)	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	風速 (M/S)	風向	風速 (M/S)	風向
1	31.7	5.6	39.1	7.3	4.4	59.5	8.9	74.7	8.4	9.5	N	12.4	N
2	27.3	6.6	33.4	6.8	2.9	51.0	8.6	73.2	9.0	4.9	NNE	6.9	NNE
3	30.8	6.7	34.6	7.2	2.6	53.4	8.0	70.3	6.6	4.6	N	7.9	N
4	29.0	5.9	47.7	7.3	7.5	55.2	8.5	82.5	7.5	7.5	N	9.5	NNE
5	26.5	5.5	32.1	8.3	3.0	51.9	8.9	65.4	10.2	7.7	N	11.5	N
6	29.4	7.0	33.8	7.0	2.6	54.2	8.2	66.4	8.4	5.4	N	7.5	N
7	29.5	7.1	36.7	8.9	3.2	54.6	8.8	75.2	9.6	5.8	NNE	7.5	N
8	49.5	7.5	79.9	7.4	14.7	84.5	7.9	144.0	7.8	4.9	NNE	8.3	NNE
9	33.1	6.2	42.7	6.8	4.6	59.7	7.8	76.7	6.9	6.6	N	9.4	N
10	42.3	8.3	51.6	9.4	3.9	68.7	9.1	89.4	13.5	3.2	N	6.2	N
11	189.5	7.3	302.2	7.3	92.9	309.6	7.0	547.4	7.2	9.5	SSW	20.2	SSW
12	133.8	8.8	193.8	9.5	28.6	214.3	8.7	300.3	9.6	5.5	N	9.8	SW
13	50.3	7.1	73.7	7.9	10.4	86.4	7.2	125.5	8.1	5.0	NNE	8.2	NNE
14	28.6	5.0	31.9	6.2	1.8	54.7	8.4	64.0	8.4	8.3	N	11.5	N
15	29.3	3.3	32.8	3.9	2.5	54.8	7.7	67.9	9.6	12.5	N	14.7	N
16	28.2	6.0	33.2	5.5	2.3	59.8	10.2	69.3	9.9	8.1	N	11.4	N
17	33.2	7.7	42.9	6.6	4.0	58.1	8.9	71.8	6.9	3.6	N	6.0	N
18	38.8	7.2	50.9	8.3	6.9	70.3	8.3	101.6	10.2	3.9	N	6.1	NNE
19	33.3	6.2	41.3	7.7	3.3	61.9	8.0	74.7	9.6	7.7	N	9.4	N
20	186.5	7.8	341.2	8.2	103.4	308.3	7.5	628.9	8.4	7.1	N	16.2	SSE
21	95.7	8.4	151.5	9.0	28.8	155.1	8.5	237.3	9.9	3.5	N	7.1	N
22	49.0	7.6	58.0	5.1	4.0	82.7	8.4	99.1	10.5	3.4	N	4.9	NNW
23	40.0	8.1	45.7	7.8	2.7	70.3	8.4	79.1	8.7	5.2	N	7.1	N
24	99.8	7.4	158.1	7.0	37.3	161.3	7.4	278.3	7.5	4.9	N	10.8	N
25	65.5	7.8	92.4	8.2	16.3	110.1	8.1	189.9	8.1	4.5	N	7.2	NNW
26	40.7	7.6	50.1	8.6	5.6	72.6	10.1	90.8	9.0	6.9	N	10.4	N
27	28.7	6.2	31.0	7.5	1.4	57.5	10.4	68.4	11.1	7.4	N	10.1	N
28	34.0	5.5	51.2	4.2	8.0	59.3	8.2	90.3	6.0	6.2	NNE	8.4	ENE
平均	54.9	6.8	79.1	7.3	53.2	94.4	8.4	142.9	8.8	6.2	N	20.2	SSW

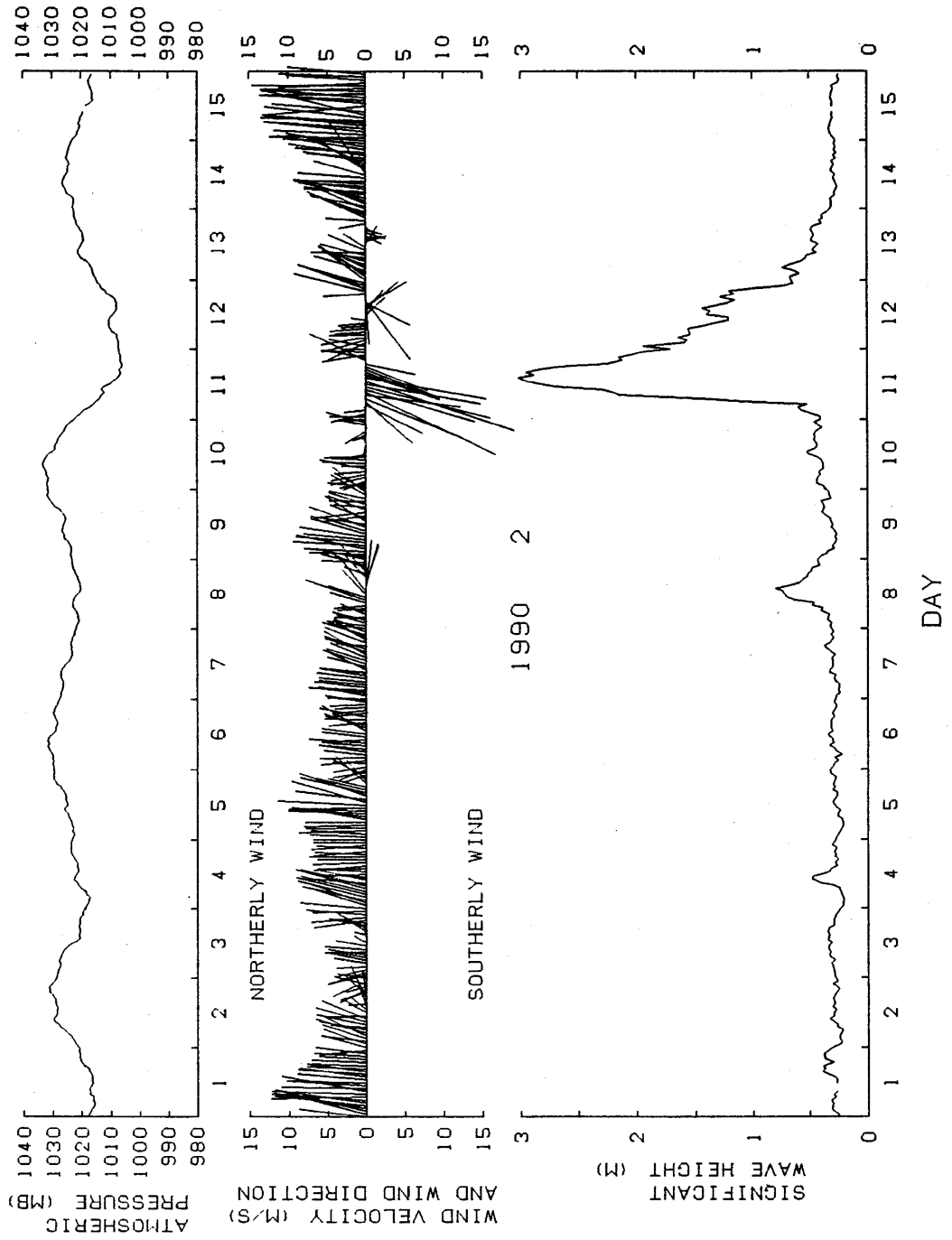

図5. １ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5 Hourly variation of significant wave height, direction and velocity of wind and atomospheric pressure.

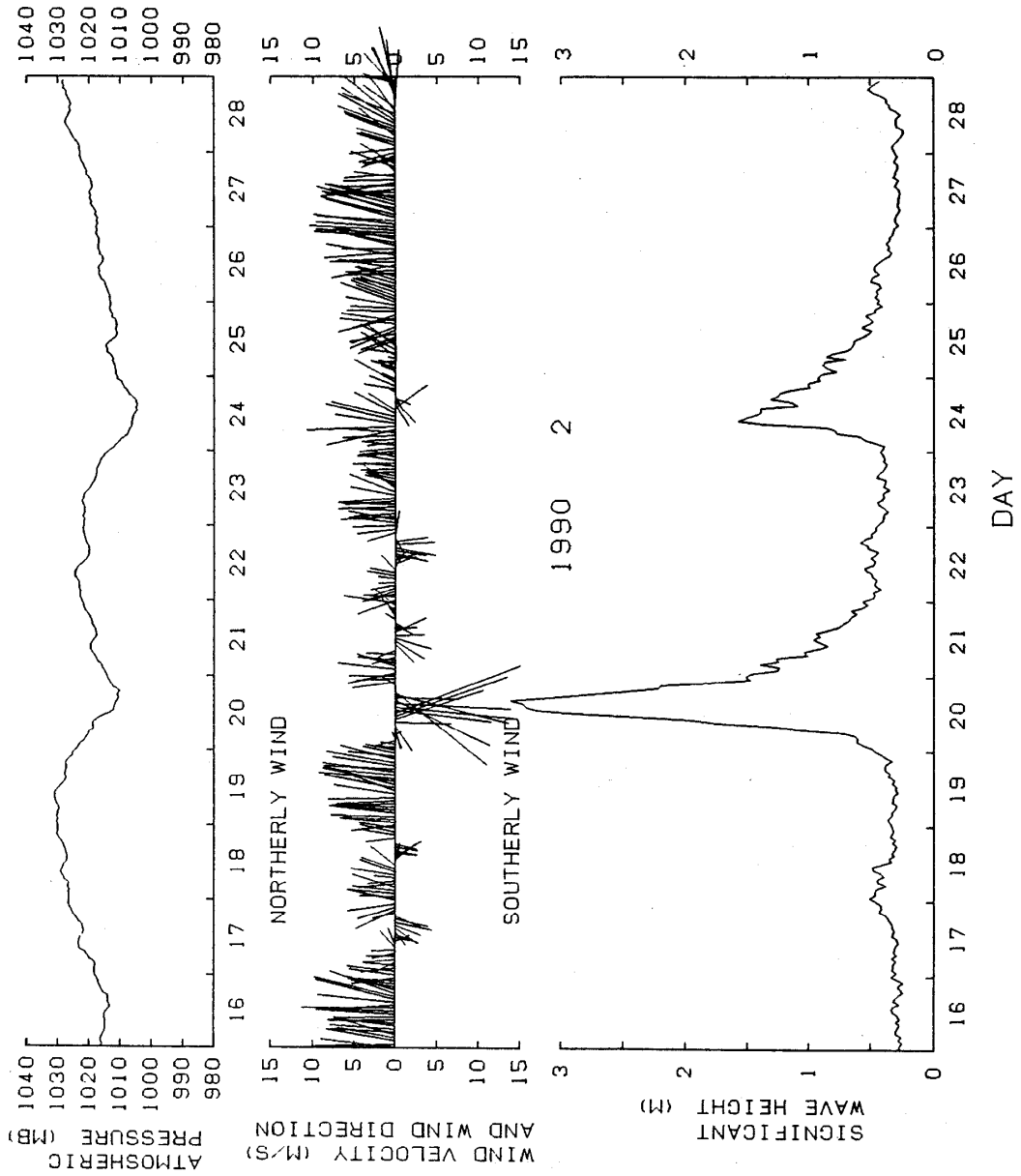
ATMOSPHERIC PRESSURE (MB)
1040
1030
1020
1010
1000
990
980
WIND VELOCITY (M/S) AND WIND DIRECTION
NORTHERLY WIND
SOUTHERLY WIND
SIGNIFICANT WAVE HEIGHT (M)
1990 2
DAY
16 17 18 19 20 21 22 23 24 25 26 27 28

表2.　1ヵ月の有義波高と周期の頻度分布

Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1990　2

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30	3	21	44	45	56	20	10								199	29.7
30 — 60	3	12	10	30	77	124	78	9							343	51.3
60 — 90					5	28	6								39	5.8
90 — 120				1		7	12								20	3.0
120 — 150				1	2	9	6	9							27	4.0
150 — 180					2	1		8							11	1.6
180 — 210					1		2	2							5	0.7
210 — 240				1	2	1	5								9	1.3
240 — 270							2								2	0.3
270 — 300					1	4	2	1							8	1.2
300 — 330						3	1								4	0.6
330 — 360						1	1								2	0.3
360 — 390															0	0.0
390 — 420															0	0.0
420 —															0	0.0
TOTAL NUMBER	6	33	54	78	146	198	125	29	0	0	0	0	0	0	669	
PERCENT	0.9	4.9	8.1	11.7	21.8	29.6	18.7	4.3	0.0	0.0	0.0	0.0	0.0	0.0		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1990 3

	1／3有義波					最大波							
	平均		最大		標準	平均		最大		平均	最多	最大	
	波高	周期	波高	周期	偏差	波高	周期	波高	周期	風速	風向	風速	風向
日	(CM)	(SEC)	(CM)	(SEC)	(CM)	(CM)	(SEC)	(CM)	(SEC)	(M/S)		(M/S)	
1	33.2	5.9	49.8	6.7	6.6	62.8	8.2	94.7	8.1	8.5	N	11.5	N
2	43.5	6.3	59.6	8.2	7.4	88.0	8.6	126.5	8.7	10.5	N	12.8	N
3	37.0	6.4	53.8	8.7	8.6	75.3	8.8	123.5	9.0	8.7	N	10.4	N
4	34.8	6.2	45.1	7.8	7.0	65.5	8.6	83.0	10.2	6.0	NNE	10.5	NNE
5	41.6	7.1	54.1	7.9	5.2	73.1	7.7	96.2	6.9	4.6	NNE	6.0	NNE
6	29.2	5.6	37.0	7.1	3.3	53.4	6.8	72.8	7.5	5.2	NNE	9.5	N
7	74.0	5.5	147.6	4.6	36.9	126.9	5.5	274.9	3.9	7.7	SW	18.0	SW
8	65.9	7.0	105.2	8.2	18.2	116.6	7.7	169.9	8.4	6.0	NNE	9.9	NNE
9	54.7	6.4	92.3	8.4	13.6	93.2	7.0	166.0	8.7	3.8	N	5.8	N
10	34.7	5.2	55.1	3.9	8.8	60.0	5.9	86.9	3.6	5.0	NNE	11.6	N
11	44.2	5.0	88.9	3.8	18.7	75.2	5.3	172.9	3.9	7.0	N	13.2	SSW
12	217.4	7.3	317.4	7.7	59.0	362.0	7.4	553.7	7.8	13.1	SSW	20.4	SW
13	118.9	8.7	180.2	9.6	28.3	202.2	8.6	323.2	10.2	4.5	N	7.5	NE
14	49.8	5.7	77.7	4.1	13.7	86.5	6.0	137.2	3.6	4.5	N	10.1	SSW
15	146.6	6.3	212.6	8.4	47.5	250.4	6.3	449.7	6.0	8.8	SSW	15.7	SW
16	89.4	7.8	162.4	9.5	33.2	147.7	8.4	281.3	9.0	4.7	NNE	9.1	NNE
17	41.3	5.2	75.1	5.2	17.1	80.8	6.8	210.0	14.7	5.7	S	9.1	N
18	31.2	6.0	37.2	6.3	3.9	60.2	8.3	81.5	9.0	6.6	N	10.9	N
19	52.6	6.3	104.9	4.4	23.1	92.9	6.9	185.1	4.2	4.6	S	8.3	S
20	67.2	6.8	83.8	6.6	9.3	111.9	6.6	164.1	6.6	4.5	N	9.3	NNE
21	36.5	6.6	50.3	7.3	5.7	65.3	7.1	102.5	7.8	4.3	N	8.0	NNE
22	43.6	5.4	85.6	4.1	18.4	75.9	6.0	161.1	3.9	5.3	N	10.6	SSE
23	35.0	5.3	45.1	4.1	3.8	60.3	6.1	79.6	7.8	3.5	N	5.5	NNW
24	101.4	5.6	160.0	4.9	49.3	173.1	5.7	314.9	5.1	9.4	SSW	19.0	SW
25	48.1	5.2	86.1	6.7	16.3	86.8	7.6	140.6	6.9	10.4	NNE	16.3	NNE
26	40.7	6.3	52.9	5.7	5.1	69.8	7.7	83.0	8.1	5.9	NNE	9.4	NNE
27	45.9	5.9	77.9	3.9	15.3	78.6	6.7	138.2	4.2	4.5	S	8.0	S
28	38.3	6.1	53.2	5.3	6.8	64.8	7.1	87.9	6.0	4.9	N	7.9	SW
29	40.4	6.5	66.4	9.2	13.6	71.9	8.1	124.5	9.0	7.5	N	11.8	N
30	57.1	8.0	81.8	8.4	9.8	98.4	8.3	142.6	8.7	5.9	NNE	8.0	N
31	85.8	7.8	161.7	8.5	42.7	146.1	7.9	278.3	9.3	8.8	N	12.5	N
平均	60.8	6.3	95.5	6.6	45.9	106.0	7.2	177.6	7.3	6.5	N	20.4	SW

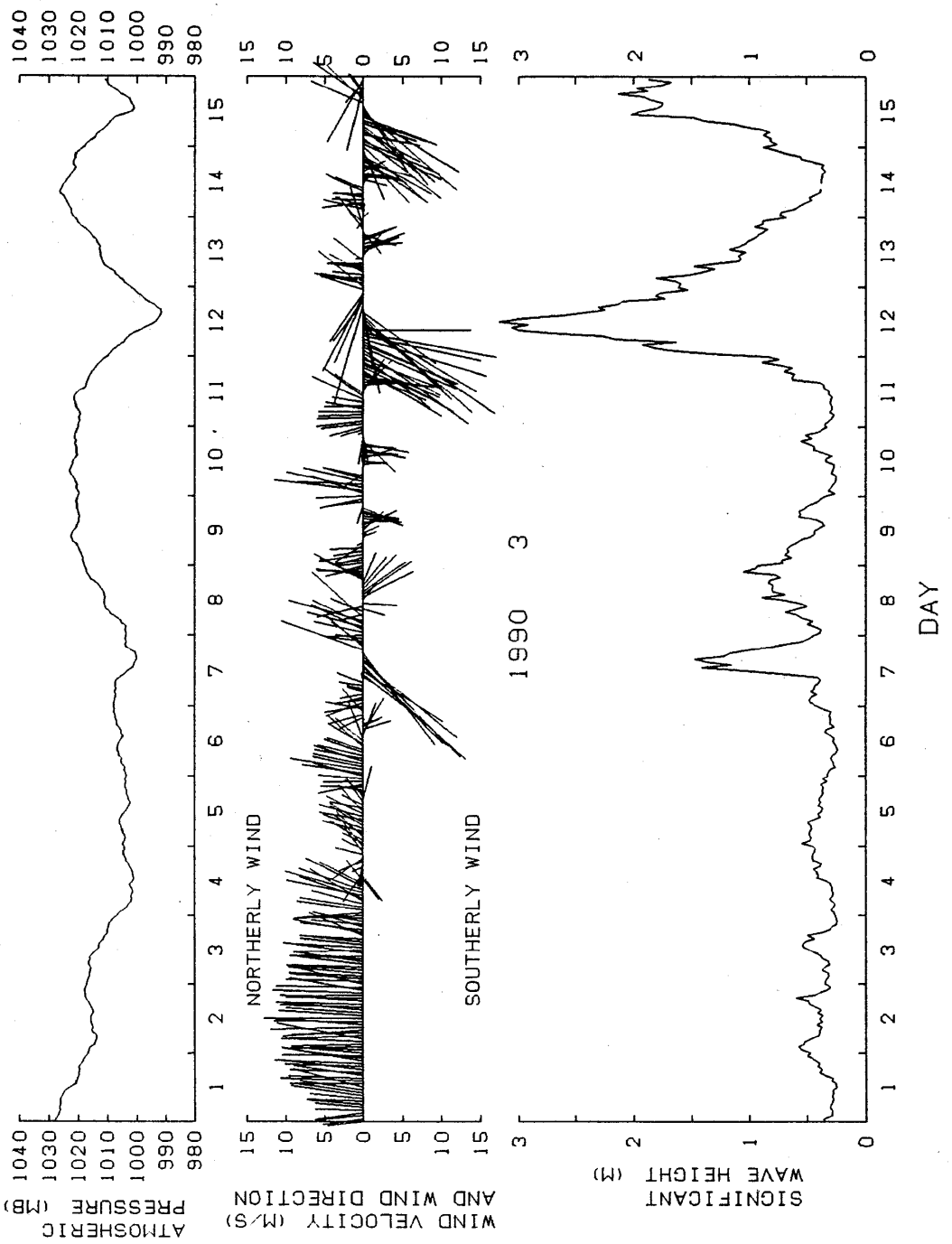

図5. １ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5 Hourly variation of significant wave height, direction and velocity of wind. and atomospheric pressure.

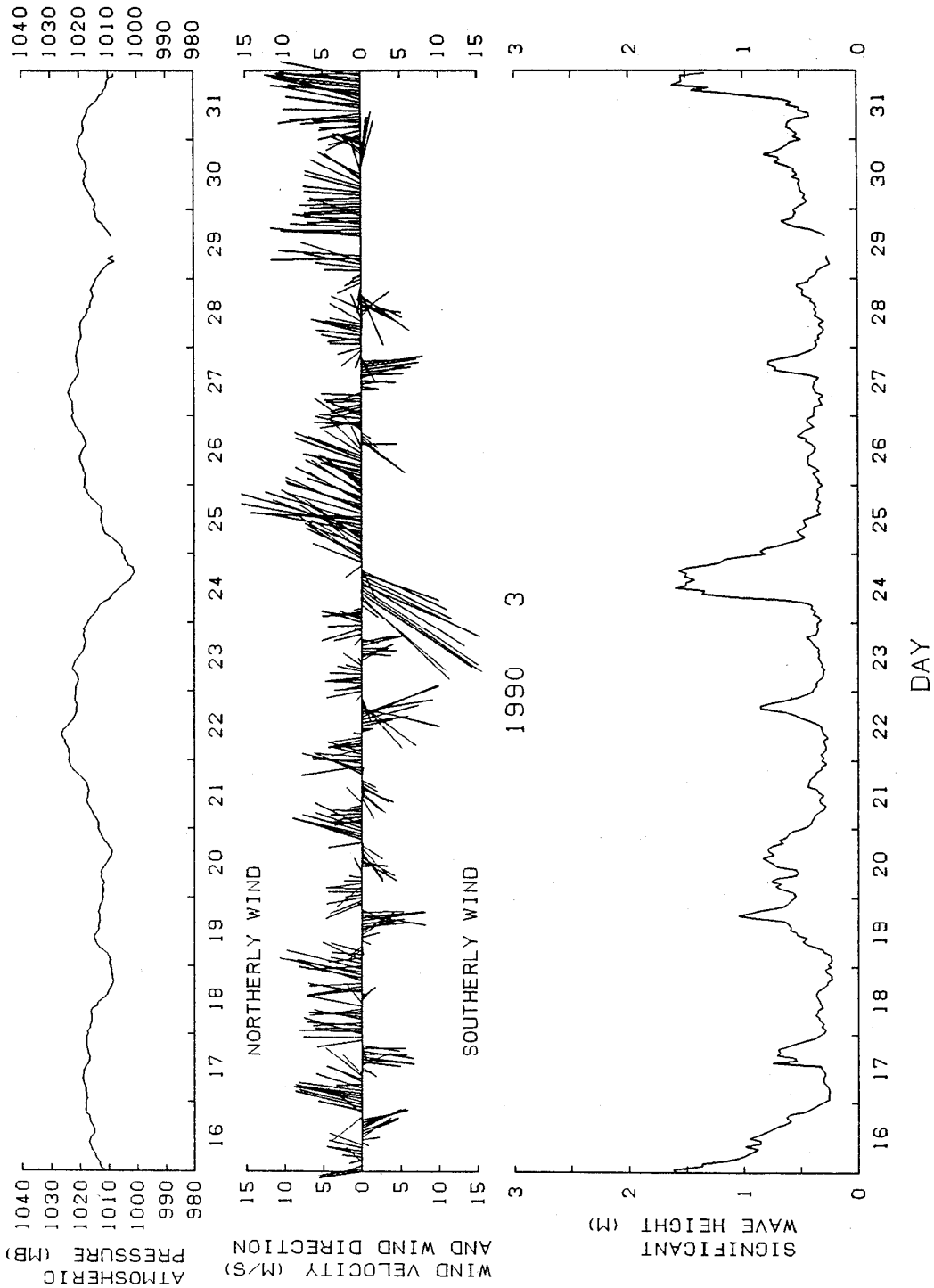
ATMOSPHERIC PRESSURE (MB)
1040
1030
1020
1010
1000
990
980
WIND VELOCITY (M/S) AND WIND DIRECTION
NORTHERLY WIND
SOUTHERLY WIND
15
10
5
0
SIGNIFICANT WAVE HEIGHT (M)
3
2
1
0
1990 3
DAY
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31

表2.　1ヵ月の有義波高と周期の頻度分布
Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1990　3

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30	1	4	24	38	35	4									106	14.4
30 — 60		13	62	83	128	104	20								410	55.6
60 — 90		23	13	8	28	29	12	1							114	15.5
90 — 120			8	1	2	6	15	1							33	4.5
120 — 150			6	5	2		2	7							22	3.0
150 — 180			2	6	1	1	6	9							25	3.4
180 — 210				1	4	2	2	4							13	1.8
210 — 240					2		4								6	0.8
240 — 270						1	1								2	0.3
270 — 300					1	2									3	0.4
300 — 330					1	2									3	0.4
330 — 360															0	0.0
360 — 390															0	0.0
390 — 420															0	0.0
420 —															0	0.0
TOTAL NUMBER	1	40	115	142	204	151	62	22	0	0	0	0	0	0	737	
PERCENT	0.1	5.4	15.6	19.3	27.7	20.5	8.4	3.0	0.0	0.0	0.0	0.0	0.0	0.0		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1990 4

	1／3有義波					最大波							
	平均		最大		標準	平均		最大		平均	最多	最大	
日	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	偏差 (CM)	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	風速 (M/S)	風向	風速 (M/S)	風向
1	104.3	8.7	138.9	9.1	21.3	172.8	8.9	299.8	9.9	3.0	SSW	8.4	ESE
2	65.6	7.9	83.1	7.8	9.3	112.7	8.5	156.7	7.8	5.7	N	9.5	N
3	71.0	6.2	131.1	4.7	28.6	118.2	6.6	211.4	4.5	6.6	SSW	12.3	SSW
4	118.6	5.1	152.3	5.2	23.5	198.5	5.2	275.9	4.5	9.8	SSW	15.8	SSW
5	88.8	7.3	111.7	7.3	12.3	144.9	8.4	196.8	8.4	6.6	NNE	13.5	SW
6	81.6	6.2	103.6	4.8	11.2	138.0	6.6	195.8	4.8	5.1	NNE	11.9	NNE
7	60.3	4.8	104.1	4.2	24.0	107.1	4.7	187.0	3.9	8.2	SW	14.5	SW
8	233.4	6.9	392.3	8.2	93.7	382.7	6.8	621.6	8.4	12.8	SSW	19.7	SSW
9	117.4	7.4	173.8	7.9	24.0	197.6	7.9	294.4	11.7	5.3	SSE	10.8	SSE
10	58.9	5.3	84.1	6.0	11.7	98.8	5.4	130.4	5.7	4.4	S	8.5	SSW
11	27.7	5.8	35.6	4.3	3.4	50.7	8.1	65.4	8.4	4.8	N	10.5	N
12	46.9	5.2	92.0	3.9	25.8	83.3	5.7	211.9	3.3	6.3	N	11.3	SSW
13	68.9	4.6	95.3	5.0	18.5	114.5	4.7	152.8	4.8	7.0	SSW	10.9	SW
14	103.9	7.4	150.4	7.8	24.1	171.8	8.0	241.2	7.8	5.7	N	10.2	N
15	75.4	7.1	94.5	8.0	12.5	129.2	7.2	159.2	7.8	5.7	NNE	10.8	ENE
16	37.4	6.5	46.3	6.9	3.8	65.0	6.8	82.0	6.6	5.2	N	8.9	NNE
17	28.9	6.8	32.9	7.4	2.8	56.2	8.1	73.7	7.8	6.0	N	8.0	NNE
18	29.2	4.7	40.0	5.6	5.7	53.9	7.7	69.3	8.7	6.9	N	11.4	N
19	47.4	6.5	60.1	8.0	5.1	78.7	7.1	102.5	9.3	4.0	N	6.3	N
20	41.3	5.8	98.2	5.1	14.5	71.3	6.3	167.5	3.6	4.9	N	10.6	ESE
21	123.4	6.8	188.5	5.9	36.5	208.2	7.0	359.4	5.1	7.2	N	11.8	SE
22	71.3	7.6	116.4	8.4	20.7	123.3	7.8	183.1	9.3	7.4	N	10.4	N
23	107.6	7.3	135.9	8.5	9.5	175.6	7.9	223.1	7.8	5.1	S	11.8	SSW
24	91.4	7.2	132.2	8.0	14.7	155.0	7.5	206.1	7.8	7.5	NNE	13.7	N
25	69.9	7.0	103.0	5.1	18.7	117.1	7.2	168.0	4.5	6.2	SSE	11.1	SSE
26	79.6	5.7	101.8	6.0	12.0	128.7	5.9	158.2	3.3	5.1	S	8.7	S
27	38.6	6.1	62.5	5.7	6.4	67.7	7.2	110.8	6.3	3.7	N	7.2	SE
28	52.6	6.2	89.0	4.0	16.6	91.1	6.8	148.4	3.9	5.8	SSE	11.4	S
29	59.6	5.3	76.9	4.2	13.6	101.5	5.7	143.6	4.5	7.1	N	16.6	NNE
30	36.4	7.3	42.4	5.6	3.0	63.9	9.4	79.6	9.9	4.1	N	7.4	NNW
平均	74.6	6.4	109.0	6.3	47.1	126.0	7.1	189.2	6.7	6.1	N	19.7	SSW

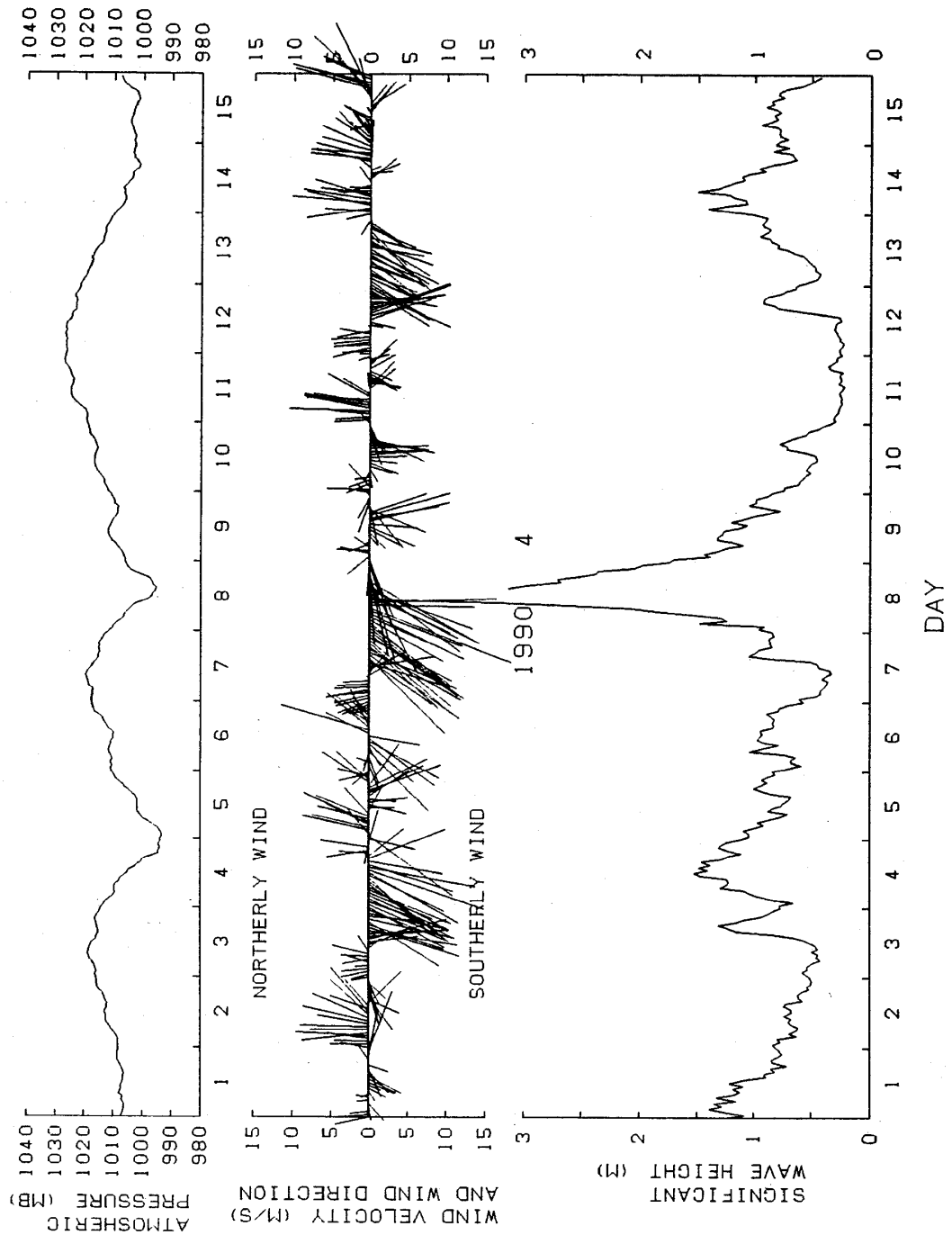

図5. １ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5 Hourly variation of significant wave height, direction and velocity of wind and atomospheric pressure.

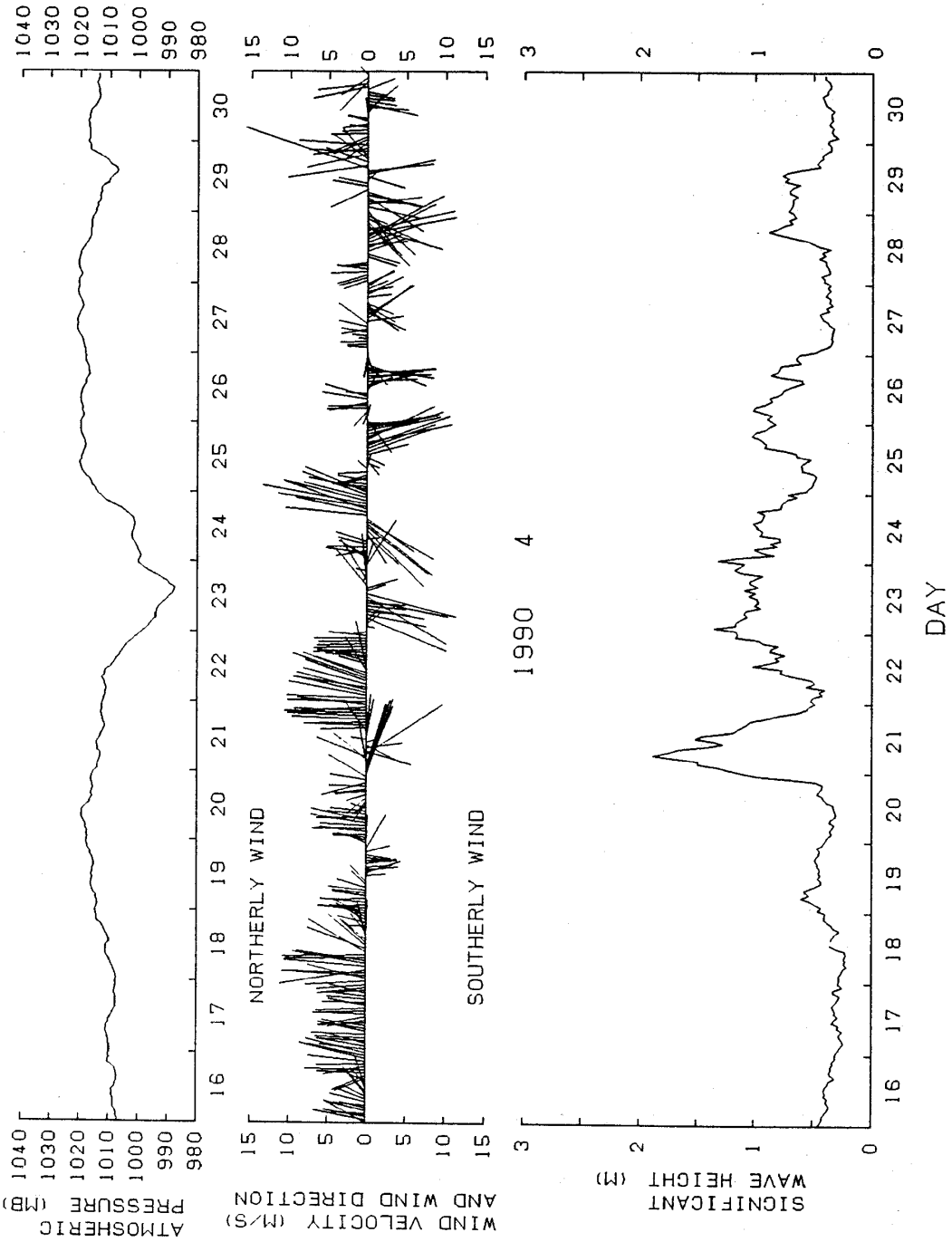
ATMOSPHERIC PRESSURE (MB)
WIND VELOCITY (M/S) AND WIND DIRECTION
NORTHERLY WIND
SOUTHERLY WIND
SIGNIFICANT WAVE HEIGHT (M)
1990 4
DAY

表2.　1ヵ月の有義波高と周期の頻度分布
Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　1990　4

WAVE HEIGHT(CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30	4	5	6	13	23	5	1								57	7.9
30 — 60	2	12	21	48	83	55	32	4							257	35.7
60 — 90		31	26	25	39	50	32								203	28.2
90 — 120		3	17	25	21	40	18								124	17.2
120 — 150			6	13	7	11	6	8							51	7.1
150 — 180				2	3	3	1								9	1.3
180 — 210				2	1	1	1								5	0.7
210 — 240							2								2	0.3
240 — 270					1		2								3	0.4
270 — 300							2								2	0.3
300 — 330					1		1								2	0.3
330 — 360															0	0.0
360 — 390					1		2								3	0.4
390 — 420							1								1	0.1
420 —															0	0.0
TOTAL NUMBER	6	51	76	128	180	165	101	12	0	0	0	0	0	0	719	
PERCENT	0.8	7.1	10.6	17.8	25.0	22.9	14.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1990 5

	1／3有義波					最大波							
	平均		最大		標準	平均		最大		平均	最多	最大	
日	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	偏差 (CM)	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	風速 (M/S)	風向	風速 (M/S)	風向
1	40.0	6.0	58.0	3.7	9.3	73.3	8.0	128.4	3.6	5.6	SSW	9.2	ESE
2	37.5	5.9	46.1	5.1	3.7	62.5	6.6	82.5	10.5	3.8	ENE	5.8	NNW
3	34.1	6.7	43.6	6.2	3.5	57.6	7.9	74.2	6.0	2.8	N	5.0	N
4	79.4	5.6	184.1	5.5	46.1	139.2	6.9	345.2	5.4	8.0	SSW	15.0	S
5	192.8	6.9	289.3	7.1	46.2	317.6	6.8	494.6	6.3	10.6	S	16.5	SSW
6	66.4	6.9	118.9	8.1	25.5	111.7	7.2	206.5	7.5	4.5	SW	7.1	NNE
7	38.0	6.6	42.8	6.2	2.0	64.5	6.7	82.5	6.0	2.4	N	5.3	SSW
8	68.2	6.4	119.7	4.9	27.4	114.3	6.3	210.0	4.5	4.4	S	11.2	S
9	62.0	6.4	74.8	6.5	5.8	103.3	6.9	133.8	6.6	3.1	S	5.6	N
10	66.8	4.7	93.0	4.2	13.1	111.8	5.0	165.0	3.6	5.4	S	11.1	SSW
11	73.3	4.6	104.1	4.6	18.6	125.6	5.0	223.6	4.5	7.8	SSW	15.0	SSW
12	54.2	5.2	81.6	4.0	11.8	89.6	6.0	133.8	5.4	3.2	SSW	11.5	SW
13	54.3	5.6	62.6	4.0	3.8	92.1	6.0	111.8	6.0	2.8	S	6.0	S
14	46.7	6.7	56.9	7.9	5.8	80.5	6.9	103.5	6.9	4.6	N	9.6	N
15	59.6	7.0	82.4	6.0	13.7	104.8	7.5	172.9	6.9	5.6	N	10.3	N
16	41.3	6.4	48.8	5.6	5.9	69.7	6.8	95.7	5.7	3.7	N	8.1	N
17	48.5	5.6	87.1	4.0	16.1	82.9	6.0	165.0	3.6	5.2	S	10.1	SSW
18	70.9	4.3	113.9	4.7	25.4	115.7	4.3	202.6	3.9	6.8	SSW	14.4	SSW
19	133.6	5.1	243.3	6.1	64.1	235.4	4.8	446.3	5.1	10.2	SSW	17.1	SSE
20	95.3	7.0	138.6	7.4	20.8	161.2	7.3	260.7	7.8	4.6	SSW	8.9	S
21	67.2	4.9	83.9	4.5	10.0	117.9	5.1	187.5	4.5	5.2	S	9.3	SSW
22	58.9	6.3	71.5	6.2	5.5	97.0	6.8	118.2	6.9	4.1	N	13.5	NNE
23	47.0	6.0	55.3	7.6	5.3	79.5	6.6	101.6	5.7	5.0	N	10.6	N
24	42.7	5.7	65.5	3.6	12.9	73.2	6.2	112.8	6.3	5.5	S	8.1	N
25	29.1	5.6	42.4	5.0	5.5	52.8	8.1	75.2	6.6	5.9	N	9.6	ESE
26	30.6	5.7	48.3	10.1	7.1	55.6	7.7	175.8	8.1	4.1	S	5.7	NE
27	35.6	5.1	62.9	3.4	10.3	65.6	5.8	147.9	4.8	4.1	SSW	8.4	SSW
28	40.8	4.4	79.9	3.5	16.6	70.6	4.8	165.5	3.9	4.0	S	9.6	S
29	31.2	4.4	40.1	4.0	3.5	54.0	5.9	75.7	5.4	3.5	S	6.7	SE
30	39.1	5.9	61.2	4.8	11.2	66.7	7.6	97.7	9.0	3.7	SSW	5.9	SSW
31	64.0	6.3	98.3	4.4	13.5	110.2	7.3	176.3	3.9	5.0	S	11.9	SSE
平均	59.7	5.8	90.3	5.5	38.5	101.9	6.5	170.1	5.8	5.0	S	17.1	SSE

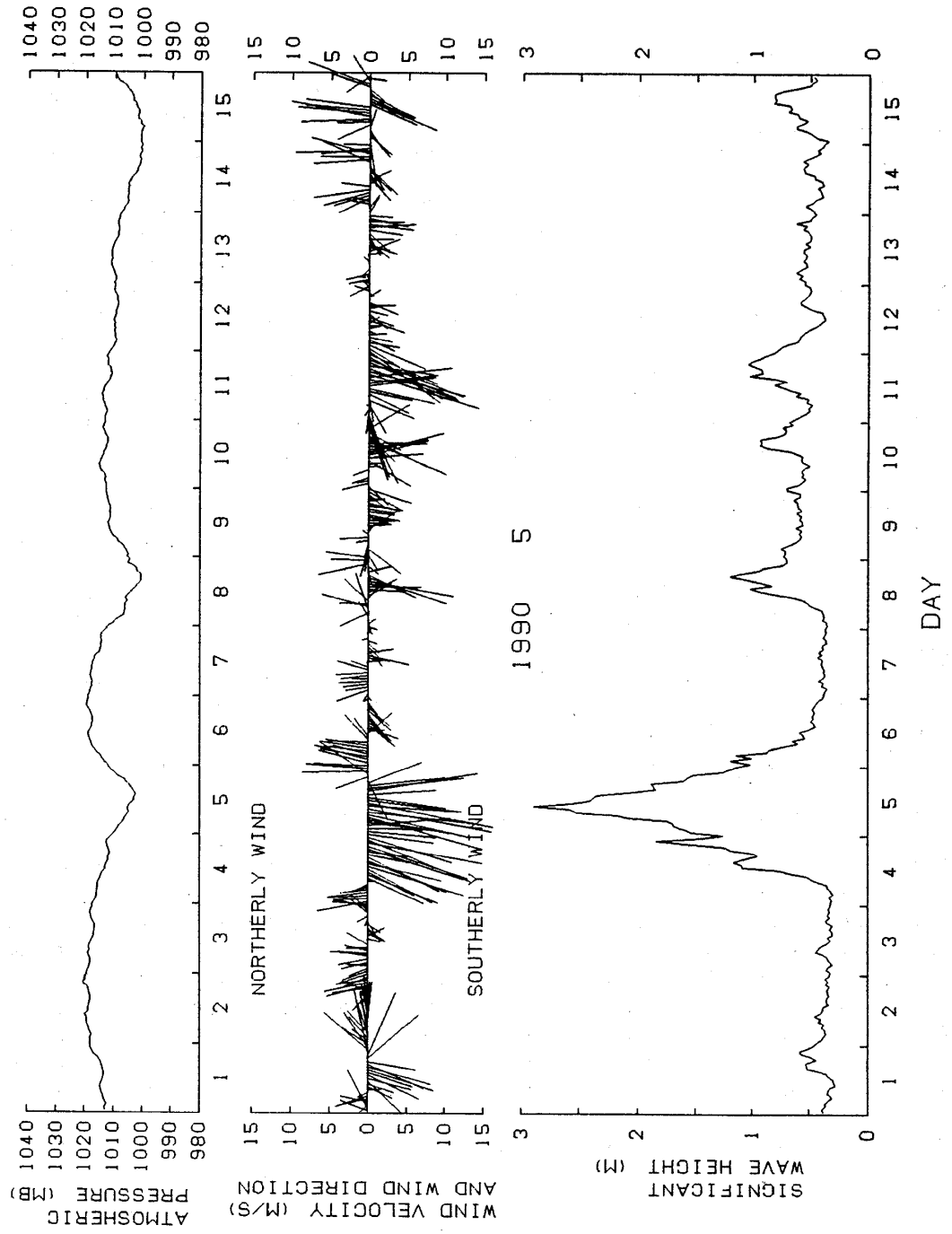

図5. １ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5 Hourly variation of significant wave height, direction and velocity of wind, and atomospheric pressure.

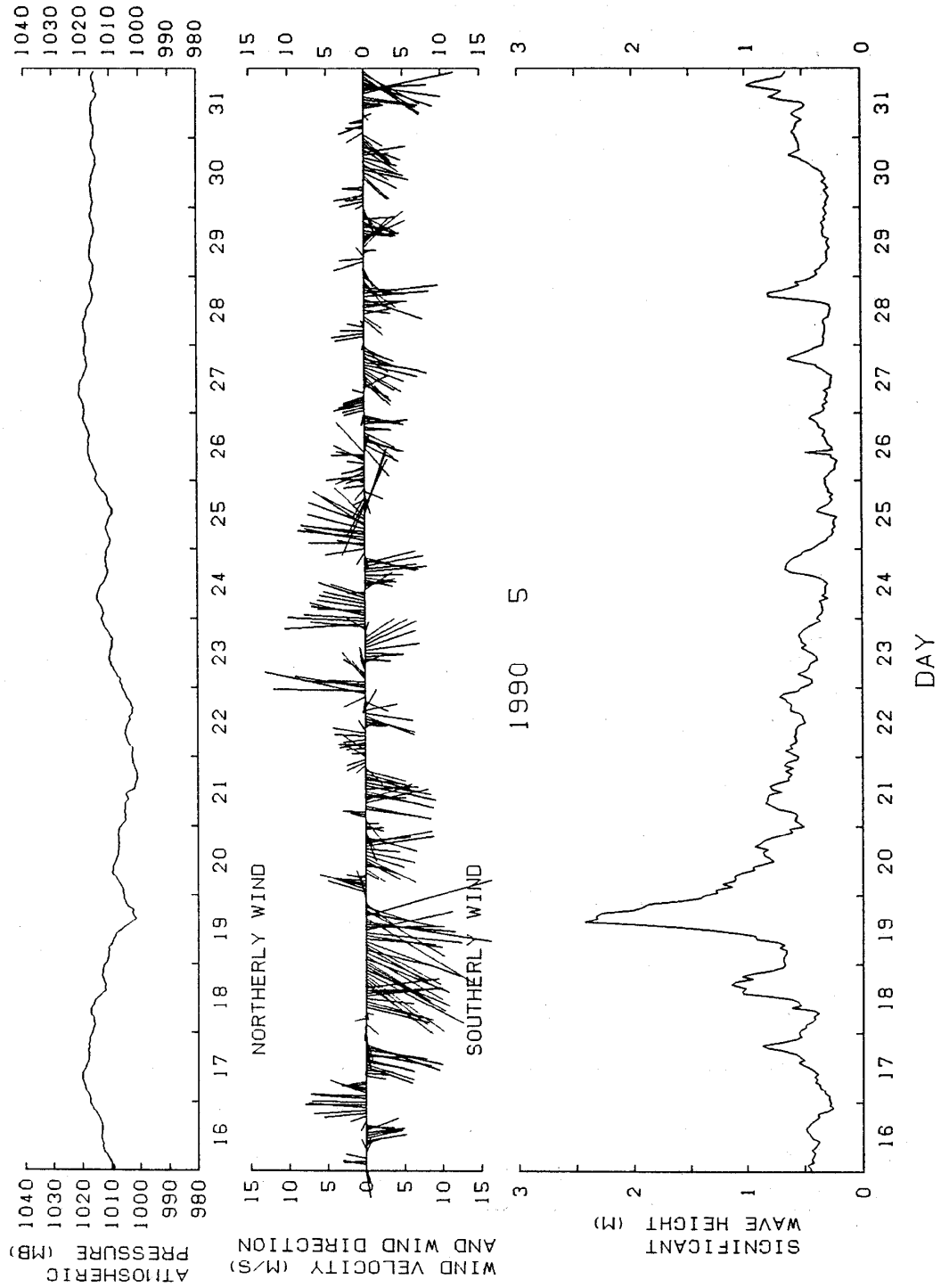
ATMOSPHERIC PRESSURE (MB)
WIND VELOCITY (M/S) AND WIND DIRECTION
SIGNIFICANT WAVE HEIGHT (M)
NORTHERLY WIND
SOUTHERLY WIND
1990 5
DAY

表2.　1ヵ月の有義波高と周期の頻度分布
Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1990　5

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30		3	17	16	27	9									72	9.7
30 — 60		34	75	102	134	82	6	2	1						436	58.7
60 — 90		29	45	19	29	18	1								141	19.0
90 — 120			29	6	3	10	2								50	6.7
120 — 150			1	3		7									11	1.5
150 — 180				6	1	4									11	1.5
180 — 210				2	4	4									10	1.3
210 — 240					3	3									6	0.8
240 — 270					2	3									5	0.7
270 — 300						1									1	0.1
300 — 330															0	0.0
330 — 360															0	0.0
360 — 390															0	0.0
390 — 420															0	0.0
420 —															0	0.0
TOTAL NUMBER	0	66	167	154	203	141	9	2	1	0	0	0	0	0	743	
PERCENT	0.0	8.9	22.5	20.7	27.3	19.0	1.2	0.3	0.1	0.0	0.0	0.0	0.0	0.0		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1990 6

日	1／3有義波 平均 波高 (CM)	平均 周期 (SEC)	最大 波高 (CM)	最大 周期 (SEC)	標準偏差 (CM)	最大波 平均 波高 (CM)	平均 周期 (SEC)	最大 波高 (CM)	最大 周期 (SEC)	平均風速 (M/S)	最多風向	最大風速 (M/S)	最大風向
1	80.6	5.1	109.6	5.0	13.7	135.6	6.2	200.2	4.5	9.7	SSW	13.2	SSW
2	111.2	7.3	178.7	8.3	26.8	186.3	7.4	330.6	7.8	3.6	N	9.1	N
3	76.2	7.3	109.1	8.3	16.8	126.5	7.6	184.6	6.9	3.6	SSW	7.7	S
4	44.3	6.6	53.9	6.1	4.9	73.6	6.7	92.8	7.5	2.4	S	6.2	SSW
5	43.4	6.8	58.2	7.5	10.2	77.2	7.5	100.6	6.9	6.8	NNE	12.9	N
6	47.8	6.7	54.8	7.9	4.8	87.8	7.7	170.4	10.2	3.3	SSE	6.2	SSE
7	38.9	5.5	46.3	3.6	5.1	67.9	6.8	85.0	7.5	4.3	S	7.2	S
8	37.8	4.7	45.9	3.7	4.4	64.9	6.5	85.4	8.1	4.6	SSE	6.9	SSE
9	115.3	6.9	235.6	6.6	62.7	196.7	7.0	398.4	6.3	6.6	S	15.8	S
10	162.8	6.9	286.5	7.9	63.0	265.3	7.1	455.6	6.3	9.4	SSW	15.6	SSW
11	83.3	5.6	107.0	7.0	10.2	138.3	5.8	185.1	6.0	6.5	S	11.4	S
12	51.6	5.2	70.9	3.8	11.0	84.8	5.8	127.9	3.3	5.5	SE	11.0	SE
13	61.4	4.8	88.7	4.2	15.0	103.5	4.8	154.8	4.2	6.0	S	13.3	SSW
14	42.1	6.2	55.0	5.7	5.6	72.5	6.7	92.8	6.9	3.9	NNE	5.9	NNE
15	42.3	5.0	81.7	4.0	11.6	75.8	5.7	141.1	4.2	5.1	S	12.8	SSW
16	159.7	5.9	197.7	6.1	27.6	270.2	6.0	381.8	6.6	11.3	SSW	16.9	SSW
17	81.6	6.3	153.4	6.1	31.9	137.6	6.6	234.9	6.6	3.5	S	8.0	SW
18	40.7	6.7	49.1	6.5	3.2	70.3	7.4	85.0	6.0	3.2	SSW	4.4	SW
19	63.6	5.7	97.3	4.0	22.5	108.6	6.2	176.3	3.3	6.0	S	11.6	SSE
20	76.3	5.2	100.9	4.5	16.3	126.3	5.1	195.3	4.5	4.6	SW	10.2	SW
21	56.6	6.0	86.3	5.9	10.3	93.6	6.4	141.6	6.3	2.0	WSW	4.0	WSW
22	85.6	5.5	112.7	5.6	12.8	145.0	5.7	189.9	5.1	5.5	SSW	10.1	N
23	65.4	7.1	84.4	11.3	9.3	109.8	8.4	160.6	12.3	4.7	SSW	8.1	NNE
24	81.9	9.8	130.9	8.4	16.4	140.9	12.0	190.4	13.2	3.6	S	8.0	SSE
25	73.1	9.8	91.1	11.2	11.9	120.5	11.1	162.6	11.4	2.4	WSW	5.4	SW
26	56.5	7.4	80.4	10.0	12.7	99.0	9.0	159.2	10.5	3.0	S	5.8	SSE
27	64.2	7.7	76.5	6.6	6.7	106.8	8.3	126.0	5.7	5.4	NNE	7.4	NNE
28	53.2	8.7	64.4	10.5	6.0	94.0	10.2	139.6	11.1	5.8	NNE	7.9	NNE
29	44.1	7.9	55.5	7.3	6.3	76.6	9.0	104.0	10.5	5.4	N	7.9	NE
30	40.9	7.5	48.4	8.6	4.3	76.5	9.5	120.1	9.0	6.1	NNE	7.9	NNE
平均	69.6	6.6	100.4	6.7	38.3	118.1	7.3	179.1	7.3	5.1	S	16.9	SSW

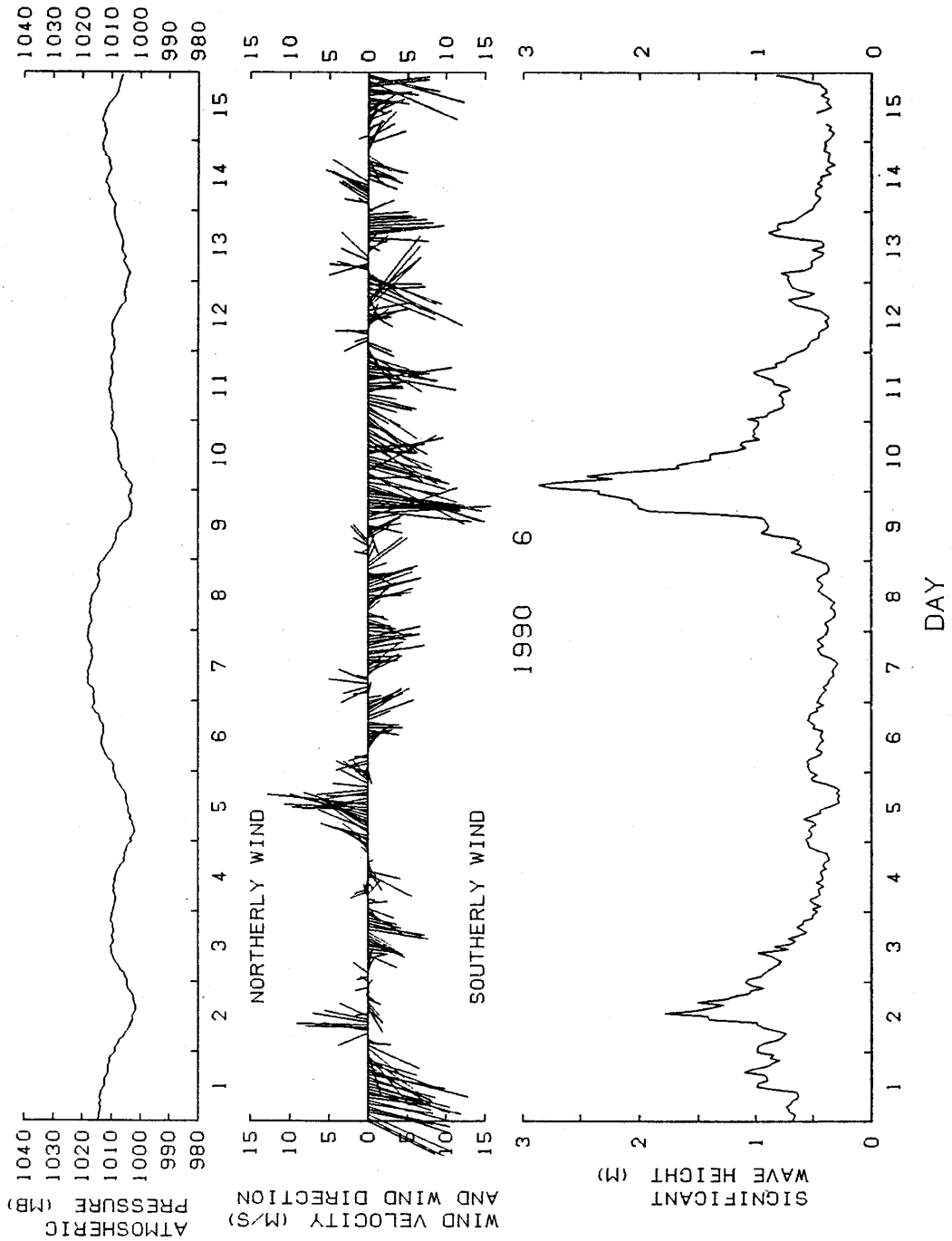

図5. １ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5 Hourly variation of significant wave height, direction and velocity of wind. and atomospheric pressure.

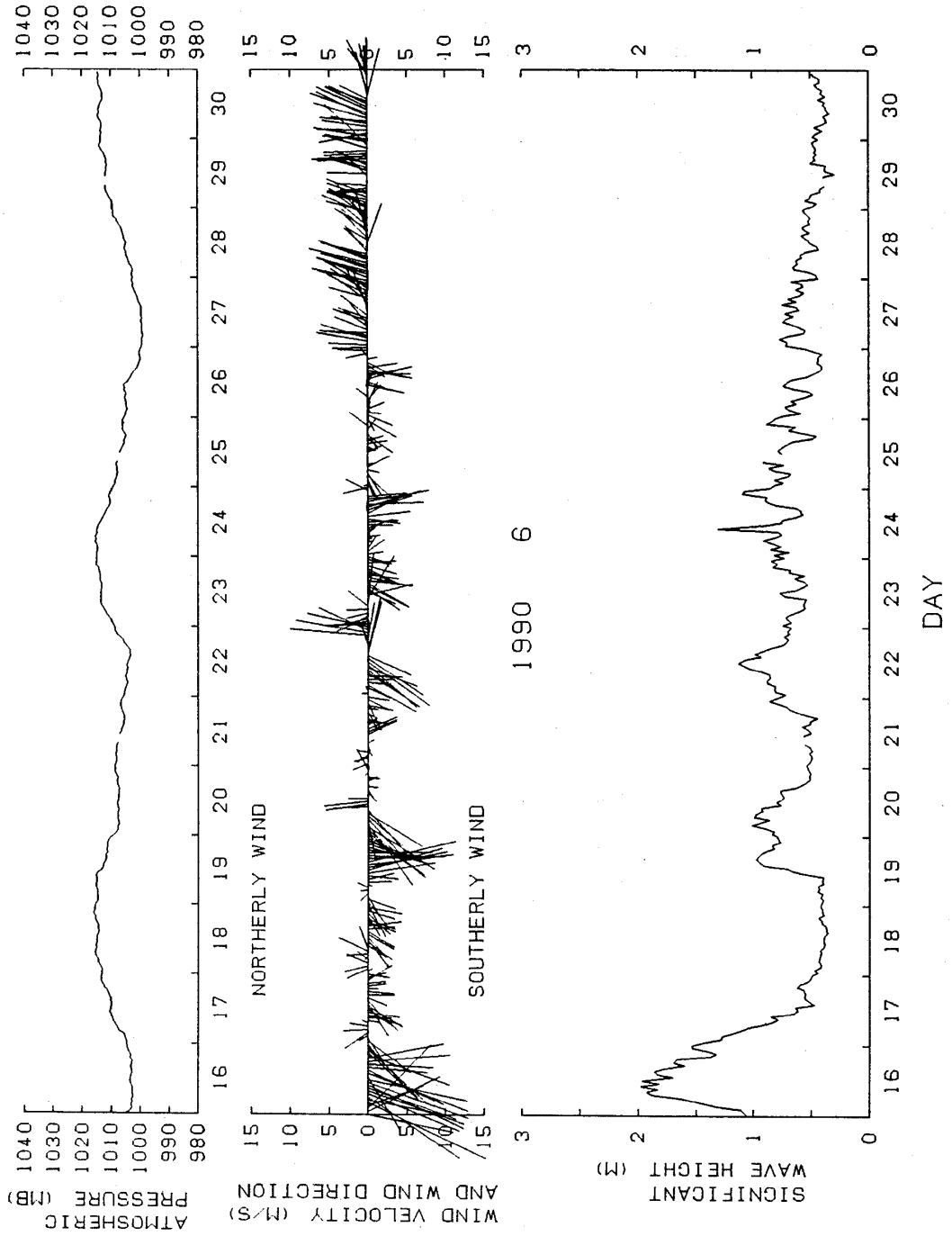
ATMOSPHERIC PRESSURE (MB)
WIND VELOCITY (M/S) AND WIND DIRECTION
SIGNIFICANT WAVE HEIGHT (M)
NORTHERLY WIND
SOUTHERLY WIND
1990 6
DAY

表2.　1ヵ月の有義波高と周期の頻度分布
Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1990　6

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30				2	3	1									6	0.8
30 — 60		18	33	57	136	71	40	8	1						364	51.2
60 — 90		13	41	37	43	24	14	7	19	13					211	29.7
90 — 120		1	20	17	16	7	8		1	3	1				74	10.4
120 — 150			2	2	6	3	5								18	2.5
150 — 180				2	7	3	3								15	2.1
180 — 210				7	5	2									14	2.0
210 — 240					3	1	1								5	0.7
240 — 270							1								1	0.1
270 — 300						3									3	0.4
300 — 330															0	0.0
330 — 360															0	0.0
360 — 390															0	0.0
390 — 420															0	0.0
420 —															0	0.0
TOTAL NUMBER	0	32	96	124	219	115	72	15	21	16	1	0	0	0	711	
PERCENT	0.0	4.5	13.5	17.4	30.8	16.2	10.1	2.1	3.0	2.3	0.1	0.0	0.0	0.0		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1990 7

日	1／3有義波 平均 波高 (CM)	平均 周期 (SEC)	最大 波高 (CM)	最大 周期 (SEC)	標準偏差 (CM)	最大波 平均 波高 (CM)	平均 周期 (SEC)	最大 波高 (CM)	最大 周期 (SEC)	平均風速 (M/S)	最多風向	最大風速 (M/S)	最大風向
1	39.4	7.3	50.9	7.7	3.6	71.8	8.5	86.4	9.3	6.4	N	7.5	N
2	35.4	6.8	44.6	8.3	5.7	62.8	7.9	85.9	8.1	5.1	N	7.6	N
3	58.0	6.7	83.7	6.8	14.1	95.5	6.7	154.8	6.6	2.8	N	5.7	NNW
4	72.0	6.5	88.9	6.8	7.8	120.2	6.6	166.0	6.6	3.5	SSE	8.5	SSE
5	71.6	6.5	94.1	5.6	12.7	117.8	7.1	177.7	4.8	3.4	SSE	7.4	SSE
6	43.4	6.1	62.0	6.6	6.5	72.6	6.4	98.6	6.9	3.0	S	4.4	S
7	35.1	5.8	42.4	4.7	3.3	61.3	7.1	106.9	4.2	4.0	NNE	6.0	NE
8	31.0	6.7	35.0	6.9	2.4	56.3	7.9	122.6	8.7	3.5	NNE	6.4	N
9	26.7	5.9	33.4	4.7	2.9	47.1	7.3	56.6	6.6	3.1	S	5.1	SSE
10	29.3	6.6	34.4	6.0	2.6	49.1	7.9	69.8	5.1	2.5	NE	5.5	NNE
11	30.6	6.3	45.8	5.7	6.0	54.9	8.4	76.2	7.2	4.1	NNE	6.2	N
12	48.7	8.2	61.7	9.0	9.4	84.7	9.2	116.2	9.6	4.5	NNE	9.1	N
13	60.4	6.9	83.4	7.8	12.3	104.6	7.6	137.7	6.9	7.5	N	11.8	N
14	62.4	6.4	84.6	7.3	13.4	103.9	7.0	140.1	7.5	2.8	SSW	6.2	SSW
15	86.5	4.7	144.9	4.8	34.9	145.5	5.3	309.6	3.9	10.1	SSW	18.1	SSW
16	90.5	4.9	106.4	4.9	6.3	155.2	5.1	187.5	5.4	9.3	SW	13.6	SW
17	88.4	5.0	104.6	5.0	7.5	144.8	5.1	172.9	4.5	8.3	SW	14.3	SW
18	78.1	5.3	90.5	4.5	8.1	130.9	5.5	187.0	5.4	4.9	SSW	13.2	SSW
19	72.6	5.7	87.6	5.7	10.4	118.2	6.1	145.5	6.3	4.0	S	7.5	NNE
20	49.8	6.9	68.8	7.3	10.5	80.6	7.5	110.8	6.3	4.8	NNE	6.6	NNE
21	46.9	6.7	56.3	6.6	5.7	78.5	7.7	101.6	7.8	3.7	S	7.5	SSE
22	54.2	4.8	90.9	4.0	18.6	100.3	6.0	173.8	3.9	4.8	S	8.9	S
23	41.9	4.3	68.3	3.8	12.3	71.8	5.5	123.5	4.2	3.1	S	5.2	SSW
24	57.9	4.0	104.3	4.4	21.6	96.7	4.5	179.2	3.9	6.8	S	12.1	SSW
25	69.8	4.1	102.4	4.5	12.3	117.6	4.1	154.8	4.5	7.1	S	10.1	SSW
26	51.9	4.9	66.5	4.5	8.0	87.8	4.9	127.9	4.2	3.8	N	6.8	S
27	35.5	5.6	43.7	5.9	4.3	61.2	6.9	75.2	5.7	5.3	NE	7.8	ESE
28	30.9	5.5	34.0	5.3	2.3	56.6	7.4	65.9	4.5	4.7	NNE	6.4	NNE
29	36.2	6.8	48.6	6.0	6.9	65.7	9.1	113.3	15.6	3.6	NE	5.2	SSE
30	58.2	9.8	74.1	10.9	10.4	97.2	10.5	127.9	12.0	2.9	SSE	5.4	E
31	64.3	9.0	78.2	9.6	6.7	110.2	9.8	173.8	10.2	4.7	NE	8.7	ESE
平均	53.7	6.2	71.5	6.2	21.8	91.4	7.0	133.1	6.7	4.8	S	18.1	SSW

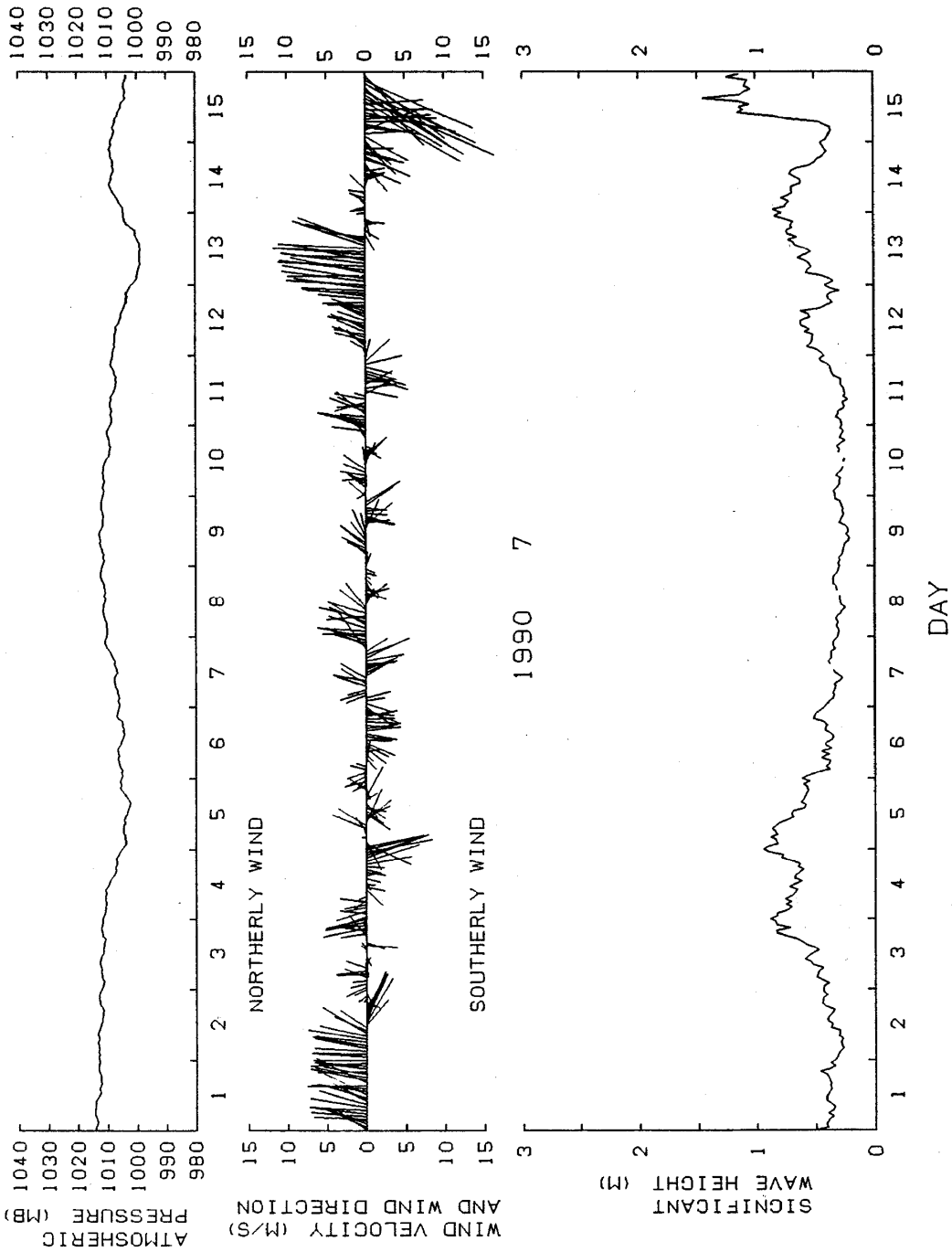

図5. １ヵ月の毎時の波浪の特性，気圧および風向風速分布
Fig.5 Hourly variation of significant wave height, direction and velocity of wind. and atomospheric pressure.

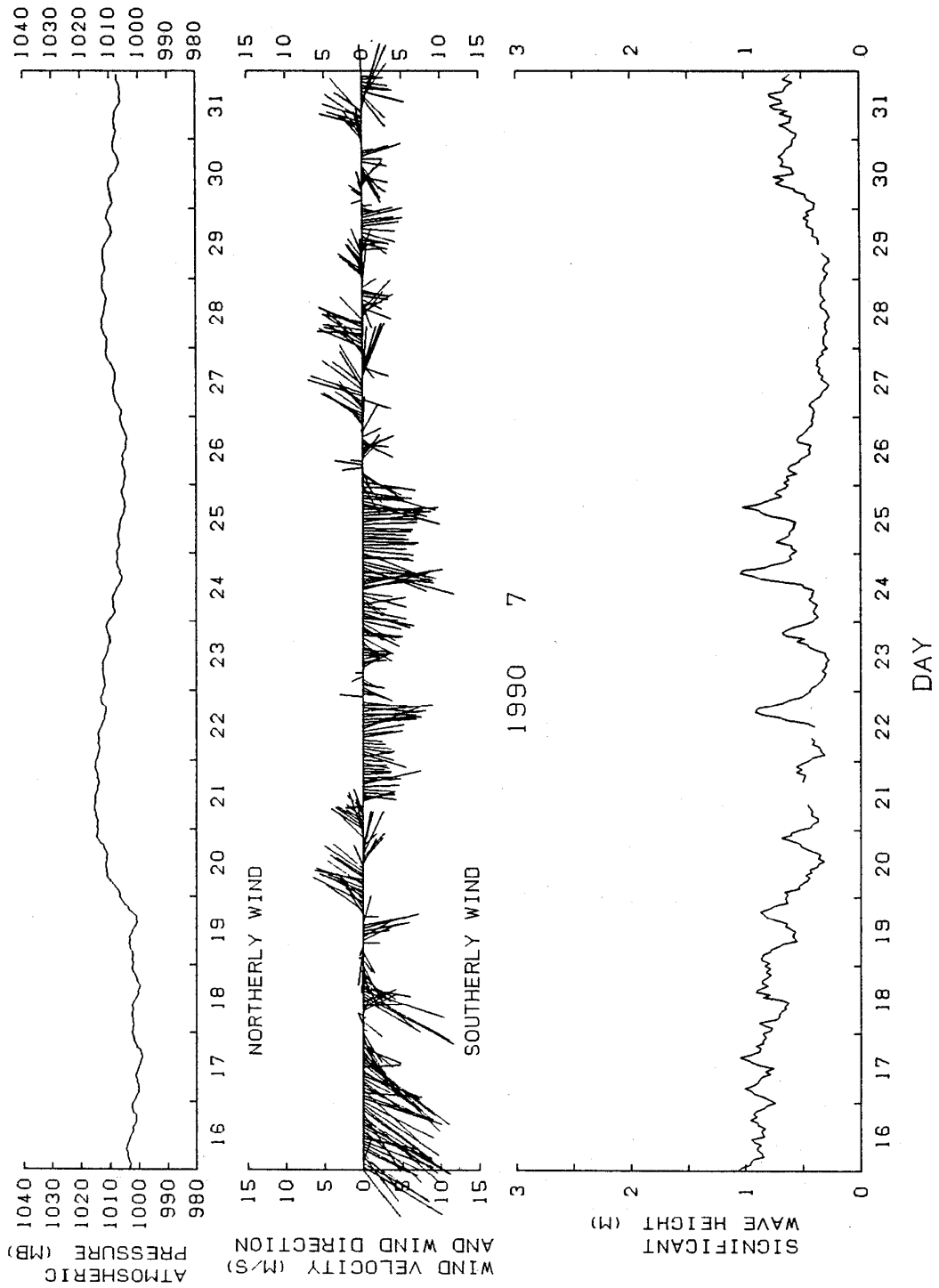
ATMOSPHERIC PRESSURE (MB)
1040
1030
1020
1010
1000
990
980
WIND VELOCITY (M/S) AND WIND DIRECTION
NORTHERLY WIND
SOUTHERLY WIND
15
10
5
0
SIGNIFICANT WAVE HEIGHT (M)
3
2
1
0
1990 7
DAY
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31

表2.　1ヵ月の有義波高と周期の頻度分布
Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1990　7

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30		1	8	19	38	17	2								85	11.7
30 — 60		19	81	67	105	59	29	7	9						376	51.6
60 — 90		15	46	54	55	27	8	8	11	1					225	30.9
90 — 120			31	10											41	5.6
120 — 150			1	1											2	0.3
150 — 180															0	0.0
180 — 210															0	0.0
210 — 240															0	0.0
240 — 270															0	0.0
270 — 300															0	0.0
300 — 330															0	0.0
330 — 360															0	0.0
360 — 390															0	0.0
390 — 420															0	0.0
420 —															0	0.0
TOTAL NUMBER	0	35	167	151	198	103	39	15	20	1	0	0	0	0	729	
PERCENT	0.0	4.8	22.9	20.7	27.2	14.1	5.3	2.1	2.7	0.1	0.0	0.0	0.0	0.0		

表1. 波と風の日平均月表
Table 1. Averaged daily data of wave height and wind on day.

1990 8

	1／3有義波					最大波							
	平均		最大		標準	平均		最大		平均	最多	最大	
日	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	偏差 (CM)	波高 (CM)	周期 (SEC)	波高 (CM)	周期 (SEC)	風速 (M/S)	風向	風速 (M/S)	風向
1	63.9	8.1	90.2	7.3	9.8	108.1	9.2	156.3	10.5	3.5	S	6.1	S
2	63.5	8.6	95.6	10.4	15.6	107.6	9.2	164.1	11.4	3.1	SSE	5.6	SSE
3	135.0	11.5	230.7	11.4	41.9	222.0	11.9	328.1	12.0	6.6	NNE	10.6	NE
4	167.5	10.2	230.9	10.9	50.8	268.2	10.6	405.8	9.9	11.2	N	14.9	N
5	37.6	6.3	60.0	8.2	7.1	69.1	8.5	121.1	9.9	8.2	N	11.9	N
6	48.5	6.9	84.4	7.7	12.6	85.4	7.5	164.1	7.5	5.7	N	9.1	N
7	59.4	6.7	79.1	7.3	14.1	102.7	7.6	147.0	8.7	3.7	S	9.3	SSE
8	65.2	6.7	101.8	7.0	14.1	108.9	8.0	144.5	4.2	4.8	S	9.1	SSE
9	74.2	7.8	185.8	8.7	35.6	133.3	9.3	338.4	9.6	4.9	SSE	8.0	NNE
10	288.2	7.9	495.0	7.6	93.7	475.1	8.2	966.8	2.4	15.0	ESE	29.3	SSE
11	108.2	5.3	152.3	6.3	22.0	180.8	5.5	239.7	5.7	10.4	SSW	15.4	SW
12	65.8	5.4	89.5	5.8	15.1	109.5	6.0	171.4	6.0	2.7	SSW	5.4	SSW
13	47.7	5.0	68.5	4.4	12.3	79.9	5.9	152.8	3.6	5.1	SW	9.2	SSW
14	74.1	4.2	113.6	4.7	16.9	128.3	4.5	212.9	5.1	8.7	S	11.3	SSW
15	96.4	4.4	130.9	4.6	21.2	163.1	4.3	229.0	4.5	8.4	SSW	11.5	SW
16	95.0	6.0	140.8	7.5	23.8	170.0	8.2	275.9	9.6	7.7	S	10.6	SSW
17	104.1	6.1	139.0	6.2	17.3	177.0	7.3	224.6	6.9	8.8	S	11.7	SSW
18	94.0	8.3	109.1	10.1	9.1	158.2	9.0	210.9	10.8	5.0	NE	9.5	SSW
19	142.2	11.9	186.8	11.1	27.5	222.8	12.0	308.1	10.8	4.2	NE	5.7	NE
20	164.5	11.5	251.9	13.9	33.5	267.6	13.0	357.9	13.8	5.4	S	11.1	S
21	168.2	11.9	222.4	12.6	22.6	265.2	11.7	344.7	12.6	3.2	SSW	5.5	SW
22	162.6	8.8	193.9	7.0	14.7	272.6	10.3	374.5	9.6	9.2	S	14.8	S
23	171.8	6.7	201.9	7.6	16.2	301.7	7.1	403.3	9.0	13.2	SSW	15.9	SSW
24	118.6	6.8	162.3	6.7	27.4	193.8	7.1	281.3	6.9	6.6	SSW	15.2	SSW
25	64.9	6.9	83.6	7.5	10.2	110.3	7.4	148.4	7.5	5.3	NNE	9.0	NNE
26	51.8	6.6	68.1	4.4	6.8	90.1	7.1	123.0	3.3	4.7	N	10.3	N
27	43.7	6.1	57.6	4.6	6.1	76.8	7.3	116.7	8.1	4.4	SSE	6.7	NNE
28	43.2	6.3	60.0	4.8	8.0	74.4	7.7	111.3	4.8	4.1	SE	6.7	SE
29	89.7	10.5	127.7	11.1	27.4	150.5	11.5	234.4	11.7	4.6	S	7.1	SSE
30	93.6	8.6	113.2	8.9	10.1	160.7	10.2	206.1	11.1	5.0	S	8.9	SSW
31	97.7	10.0	122.4	11.2	10.7	162.5	11.1	209.5	9.9	4.0	S	7.6	SSE
平均	100.5	7.8	143.5	8.0	60.5	168.4	8.6	254.0	8.3	6.4	S	29.3	SSE

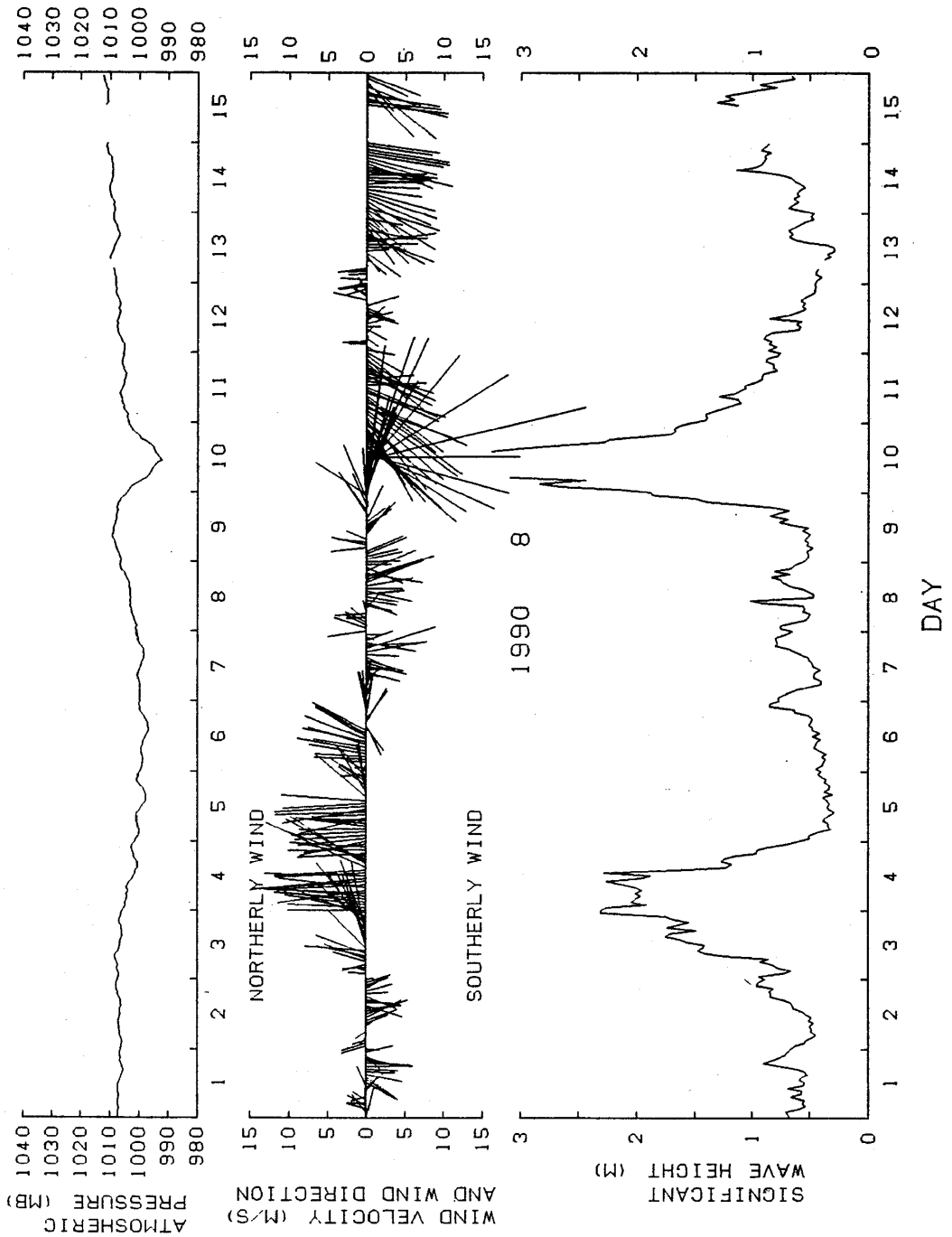

図5. **Fig.5** １ヵ月の毎時の波浪の特性，気圧および風向風速分布
Hourly variation of significant wave height, direction and velocity of wind and atomospheric pressure.

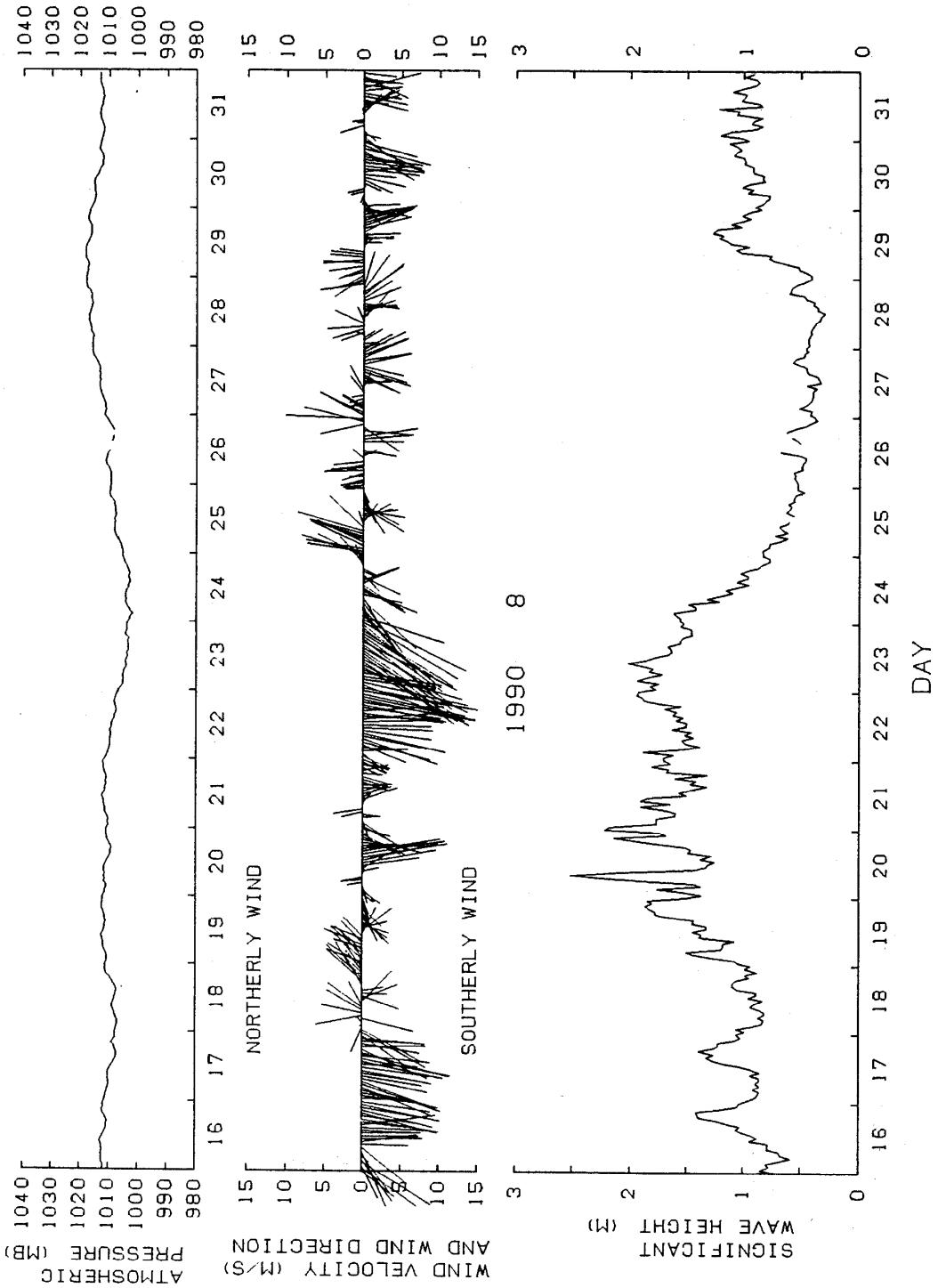
ATMOSHERIC PRESSURE (MB)
WIND VELOCITY (M/S) AND WIND DIRECTION
NORTHERLY WIND
SOUTHERLY WIND
SIGNIFICANT WAVE HEIGHT (M)
1990 8
DAY

表2.　1ヵ月の有義波高と周期の頻度分布
Table 2.　Distribution of frequency of significant wave class during a month.

SIGNIFICANT WAVE CLASS　　1990　8

WAVE HEIGHT (CM)	PERIOD (SEC) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL NUMBER	PER CENT
0 — 30			2	1											3	0.4
30 — 60		7	30	35	53	51	36	3							215	29.6
60 — 90		9	34	24	23	37	22	15	6	6	1				177	24.4
90 — 120			13	20	14	12	14	17	15	10	4	2			121	16.7
120 — 150			2	6	17	2	4	7	5	12	14	2			71	9.8
150 — 180					20	10	4	4	8	19	9	1			75	10.3
180 — 210					3	10	1		7	7	5	2			35	4.8
210 — 240						3		1	3	2	3		1		13	1.8
240 — 270						1	2					1			4	0.6
270 — 300						1		1							2	0.3
300 — 330						1		1							2	0.3
330 — 360															0	0.0
360 — 390							3	2							5	0.7
390 — 420							1								1	0.1
420 —						2									2	0.3
TOTAL NUMBER	0	16	81	86	130	130	87	51	44	56	36	8	1	0	726	
PERCENT	0.0	2.2	11.2	11.8	17.9	17.9	12.0	7.0	6.1	7.7	5.0	1.1	0.1	0.0		