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## Sea Ice Conditions and Meteorological Observations at Saroma-ko Lagoon, Hokkaido, November 1996-November 1997

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**Abstract :** Long-term meteorological data have been collected at a permanently installed 5-m tower at a cape of Saroma-ko Lagoon to characterize the general meteorological and climatological features at the lagoon. A number of atmospheric boundary layer variables such as air temperature, wind azimuth and speed, and solar radiation obtained from the meteorological tower were reported during the period from November 1996 through November 1997. Freeze-up, breakup and duration of complete ice coverage, and water temperature collected from the central area of the lagoon have been also reported.

**要旨 :** サロマ湖は毎年冬期間結氷する。このサロマ湖のキムアネップ岬に設置された 5 m の気象塔で通年の気象観測が、また湖の中央部では水温の連続観測が行なわれている。このサロマ湖の 1996 年 11 月から 1997 年 11 月までの日平均、日最高、日最低気温、日平均、日最高風速、日積算日射量等の気象要素及び水温観測について報告する。また、1964 年から観測されている湖面の結氷状況について報告する。

**Key words :** Meteorological variables, Sea ice, Saroma-ko Lagoon

キーワード : 気象要素, 海水, サロマ湖

## I. Introduction

Saroma-ko Lagoon located on the Okhotsk Sea coast of Hokkaido is 149.2 km<sup>2</sup> in area, 19.5 m in maximum depth and 14.5 m in mean depth (Fig. 1). The lagoon has two inlets which are connected to the Sea of Okhotsk. About 90 % of the total inflow from the sea to the lagoon passes through the first inlet opened in 1927. The remainder passes through the second inlet which was built in December, 1978. The opening of the inlets might have caused changes in the water mass and current circulation of the lagoon, and in the exchange processes of the water between sea and lagoon waters. Also, freshwater input which is mainly supplied by two major rivers causes a reduction of salinity to less than 32 PSU. During winter most of the lagoon surface is covered with sea ice. The Saroma Research Center of Aquaculture in Sakaeura has been monitoring ice conditions at the lagoon for over thirty years. It is shown from year-to-year changes in the duration of complete ice coverage in the lagoon that the trend of variations appears to decrease for the past ten years (Fig. 2). The Saroma Research Center has been also operating a 5-m meteorological tower at the cape of Kimuanepu in cooperation with the Sea Ice Research Laboratory of Hokkaido University to characterize the general meteorological and climatological features at the lagoon. In this report, time series of meteorological parameters during the period from November 1996 through November 1997 are shown. Time series of meteorological variables together with water temperature collected from the central area of the lagoon have been also reported since January 1992. Time series data of meteorological variables were reported for the period from December 1991 through December 1992 by Shirasawa *et al.* (1993), for January 1993 through November 1995 by Shirasawa *et al.* (1995) and for December 1995 through November 1996 by Shirasawa *et al.* (1996).

## II. Meteorological Data at Kimuanepu

A location map of the meteorological tower at Kimuanepu (44°06.08'N 143°56.12'E) is shown in Fig. 1. A thermometer, a pyrheliometer and a wind sensor were installed at the heights of 2.9, 4.2 and 5.0 m, respectively, of the 5-m tower set up at the cape of Kimuanepu in 1989. Instantaneous values of those sensors were recorded at every 10 min and stored in a data acquisition system (Intelligent Data-Stocker DS-64K2 and LM-30K, Kona Sapporo Co.). The threshold value for the wind speed was 2 ms<sup>-1</sup>. The daily values of air temperature, wind speed and azimuth, and solar radiation together with water temperature obtained at the station (44°07.77'N 143°52.17'E) during the period from January 1992 through November 1997 are shown

in Fig. 3. Time series of wind speed and azimuth, air temperature and solar radiation during the period from November 1996 through November 1997 at each month are shown in Fig. 4 and Table 1. Values for those graphs were obtained at a sampling interval of 10 min except for stick diagrams of wind vector on the uppermost frame in the figure, which were produced by data at a sampling interval of one hour. A time series of windrose at each month is shown in Fig. 5. Air temperatures during the period from 30 January through 28 March 1997 were not available. The maximum wind speed was at  $22.6 \text{ ms}^{-1}$  in May 1997. The duration of the complete ice coverage of the whole surface of Saroma-ko lagoon is also shown in Figs. 2 and 3. In winters 1988/89, 1990/91, 1992/93 and 1996/97 the lagoon surface was not completely covered with sea ice.

### Acknowledgments

We wish to thank the Saroma Research Center of Aquaculture in Sakaeura for their kind offers to use their facilities. Funding for this work was partly obtained from the Japanese Ministry of Education, Science and Culture (Monbusho) through grants-in-aid for Scientific Research "An Experimental Study for Modeling of Air-Sea-Ice-Ecosystem in Seasonal Sea-Ice Evolution" (No. 07458117, Principal Investigator : Kunio Shirasawa) and from the Sasakawa Scientific Research Grant from the Japan Science Society (Principal Investigator : Tohru Takatsuka).

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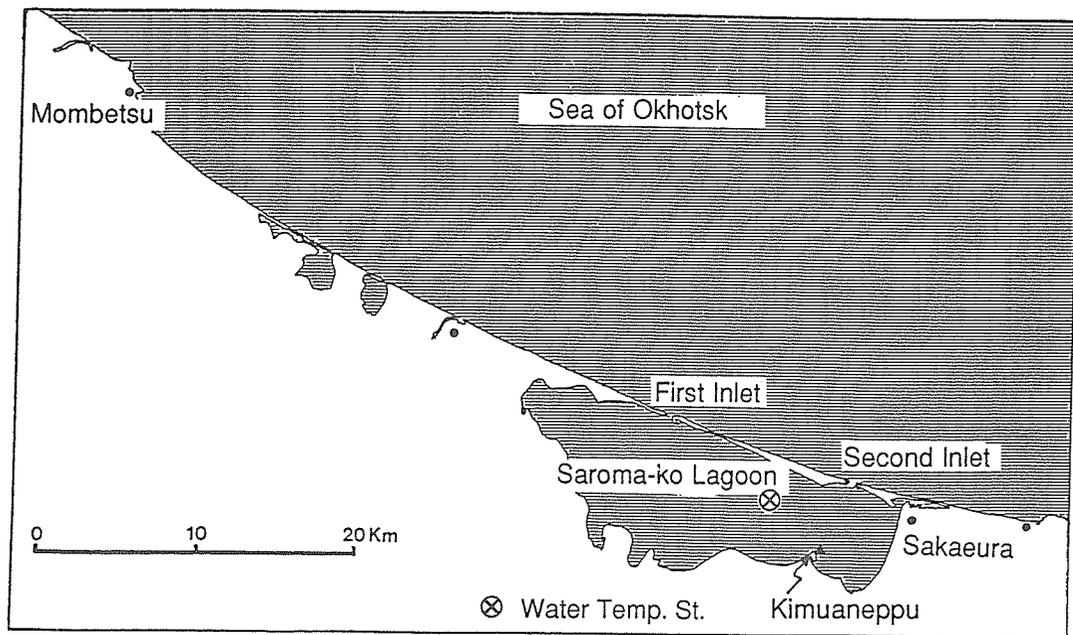


Fig. 1. A location map of Saroma-ko Lagoon.

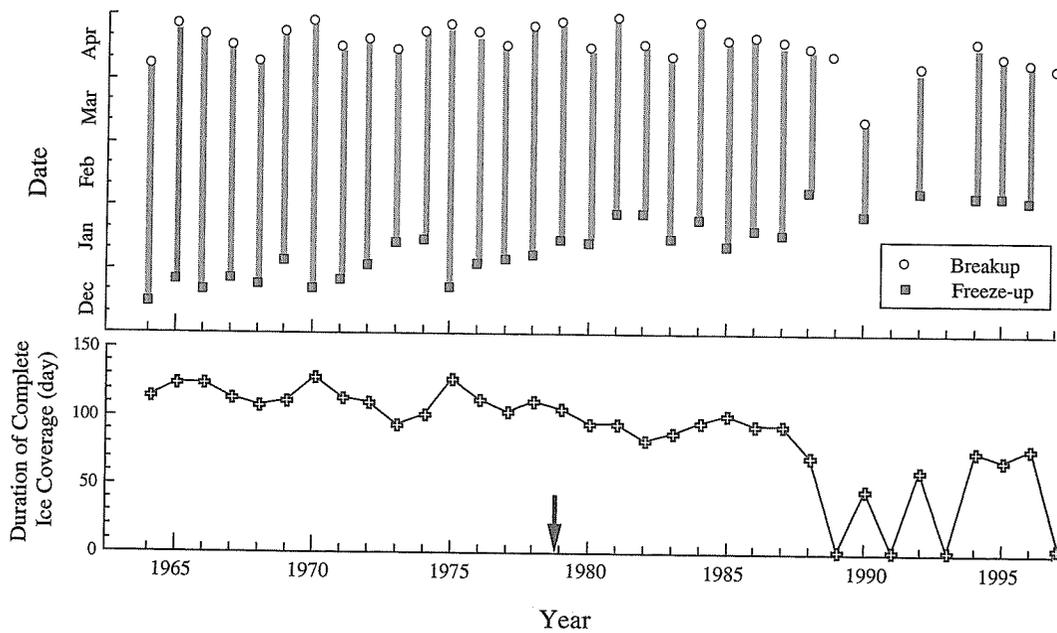


Fig. 2. Freeze-up, breakup and duration of complete ice coverage at Saroma-ko lagoon during the period from 1964 through 1997. The arrow indicates the date of the opening of the second inlet in December 1978.

## 1992 - 1997 Kimuanepu, Saroma-ko Lagoon

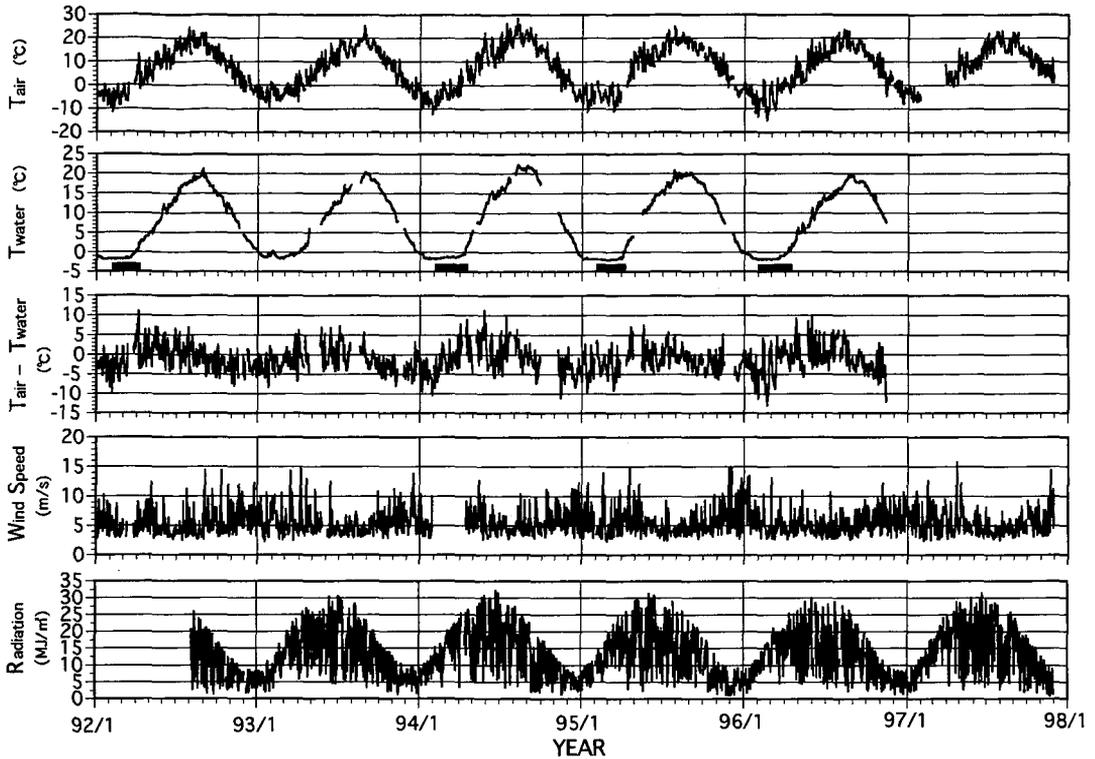
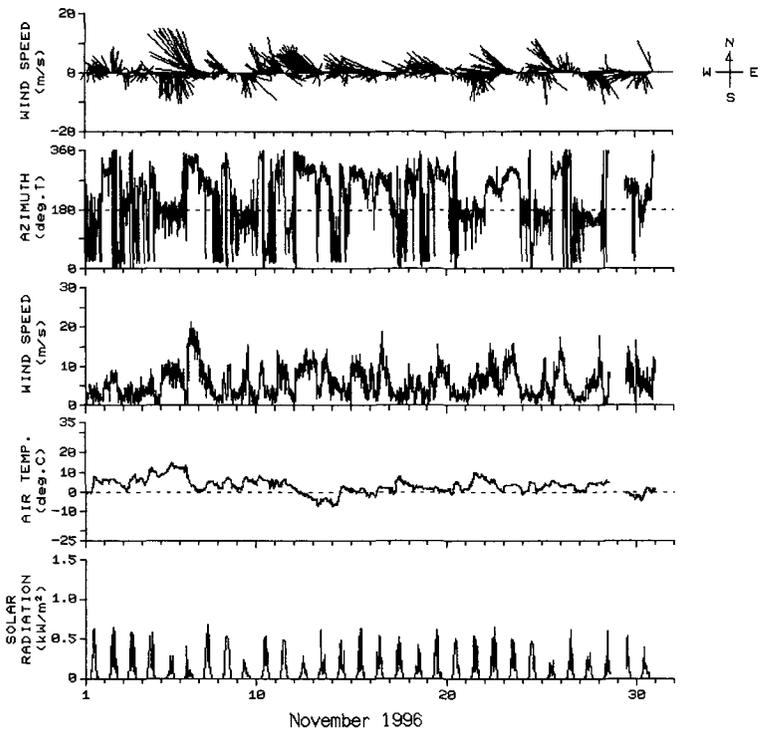


Fig. 3. Air and water temperatures, the difference between air and water temperatures, wind speed and daily cumulative solar radiation, obtained at Kimuanepu and the water temperature station during the period from January 1992 through November 1997. The bar in the frame of the water temperature indicates the duration of complete ice coverage of the lagoon surface.

Kimuanepu, Saroma-ko Lagoon



Kimuanepu, Saroma-ko Lagoon

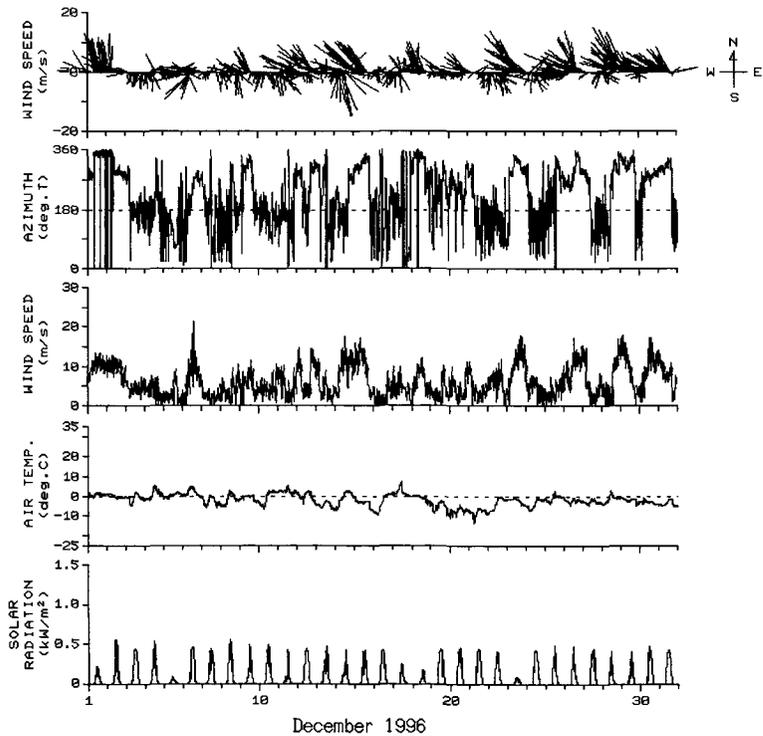
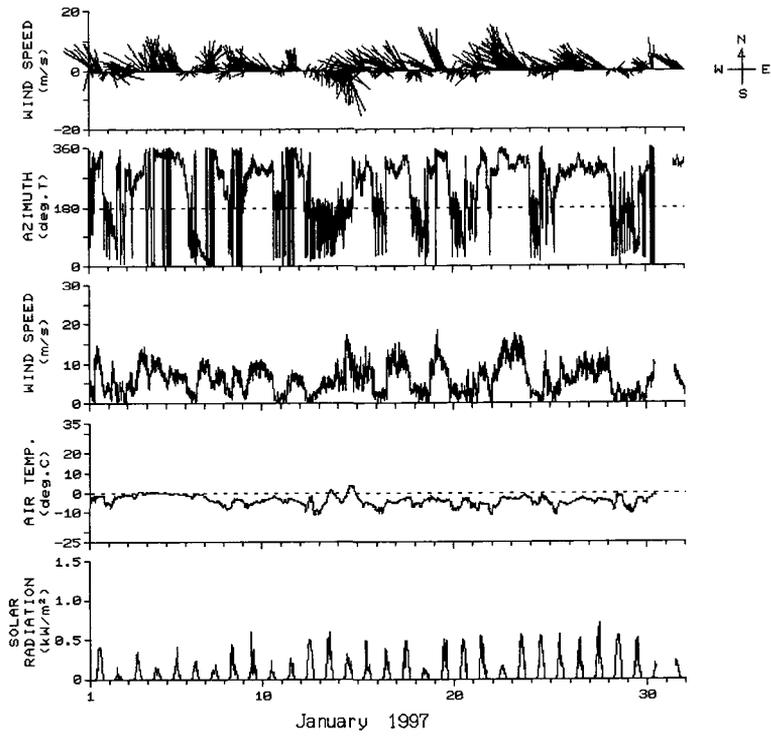
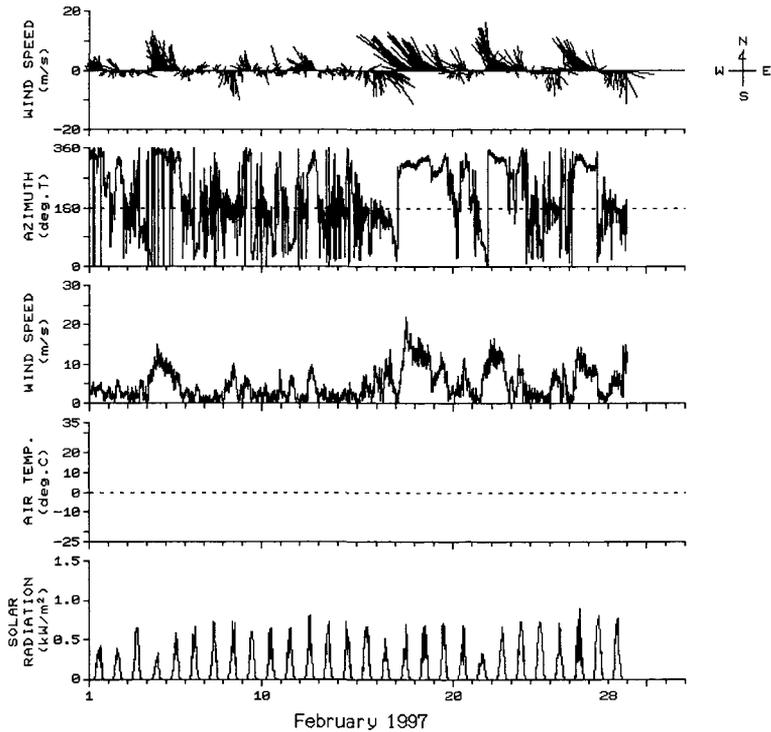


Fig. 4. Wind speed and azimuth, air temperature and daily cumulative solar radiation obtained at Kimuanepu during the period between November 1996 and November 1997.

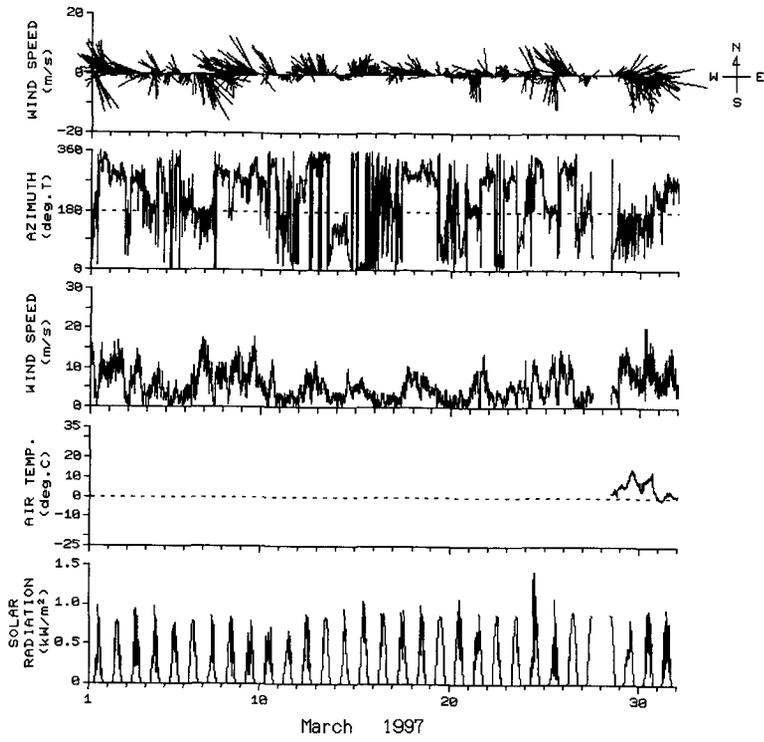
Kimuaneppu, Saroma-ko Lagoon



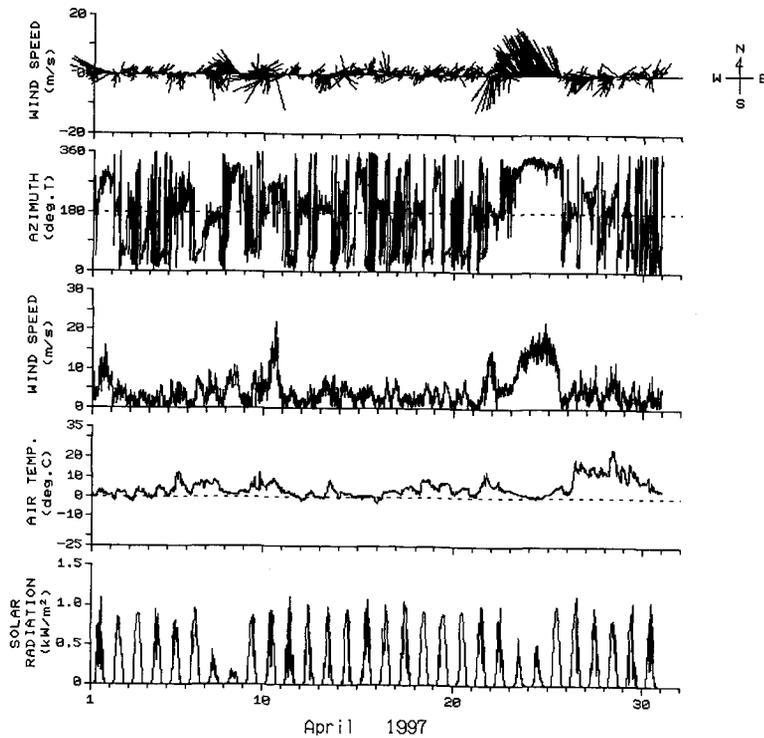
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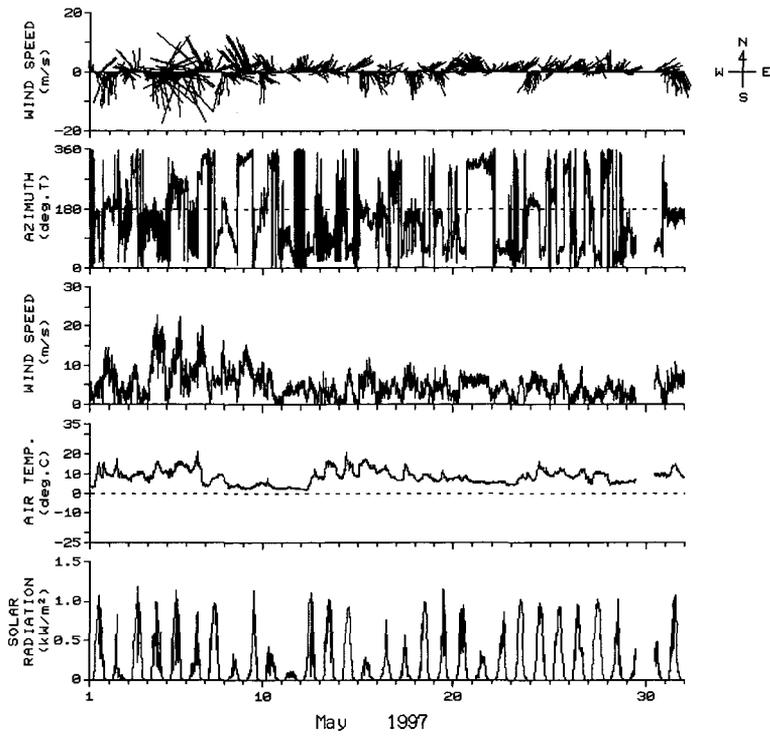
Kimuanepu, Saroma-ko Lagoon



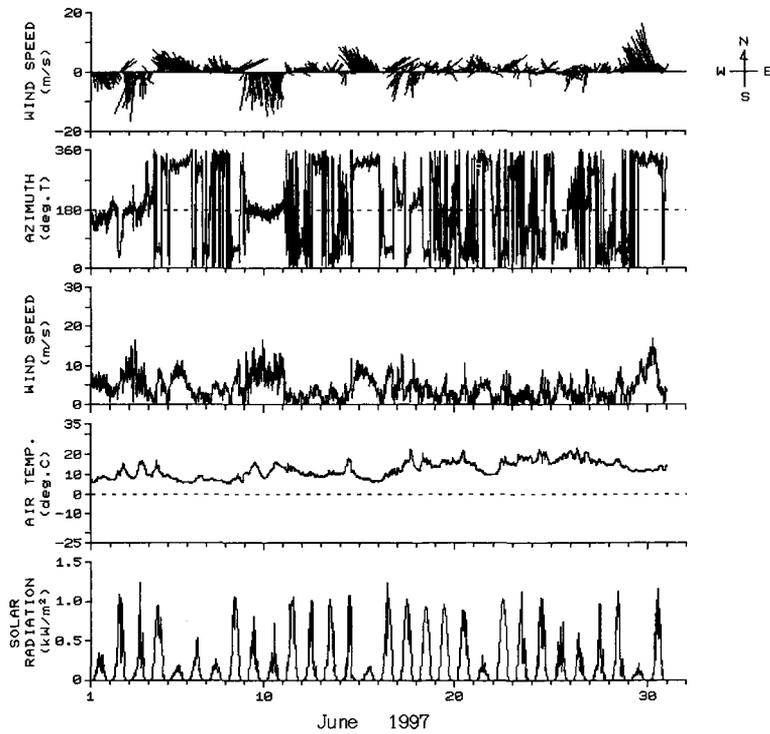
Kimuanepu, Saroma-ko Lagoon



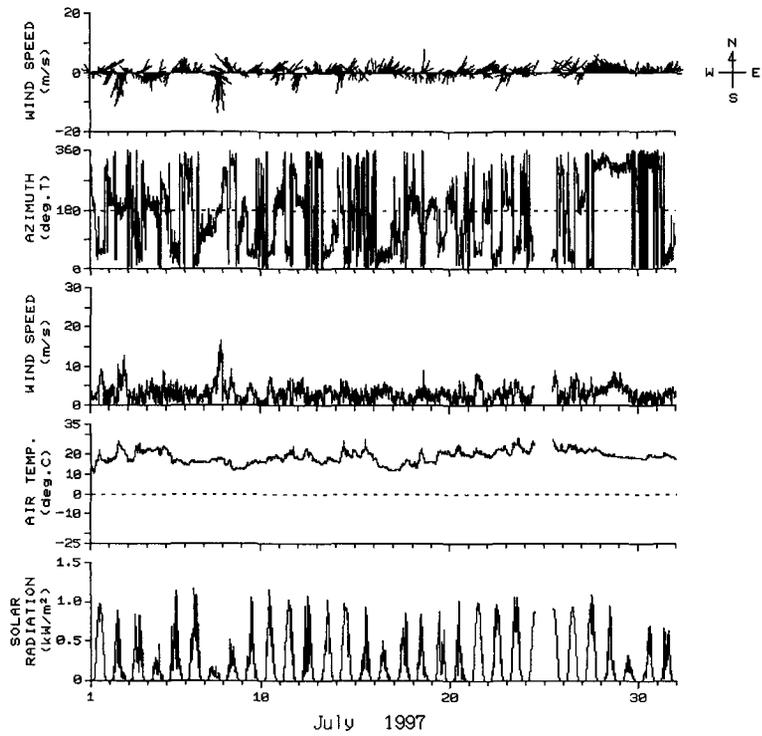
Kimuaneppu, Saroma-ko Lagoon



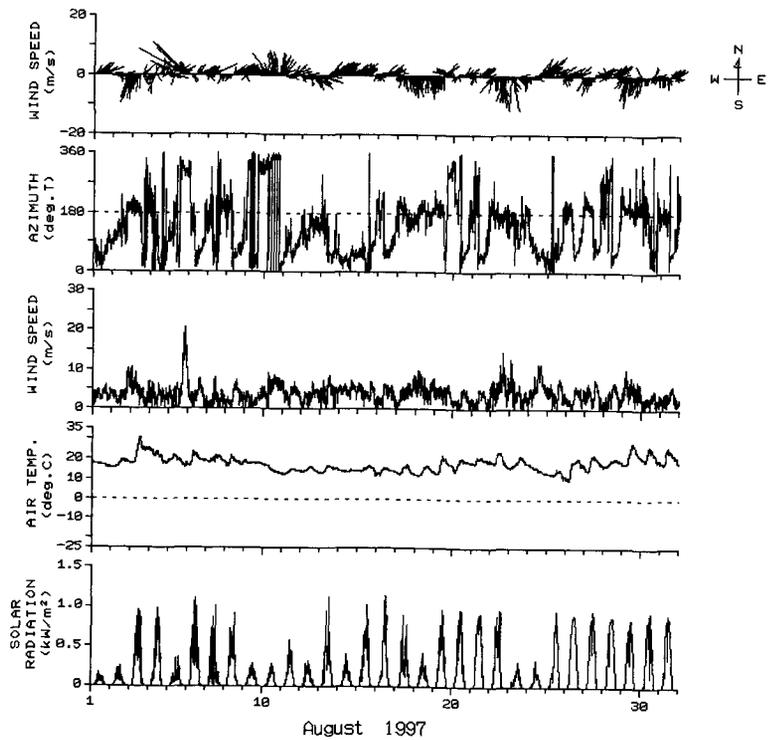
Kimuaneppu, Saroma-ko Lagoon



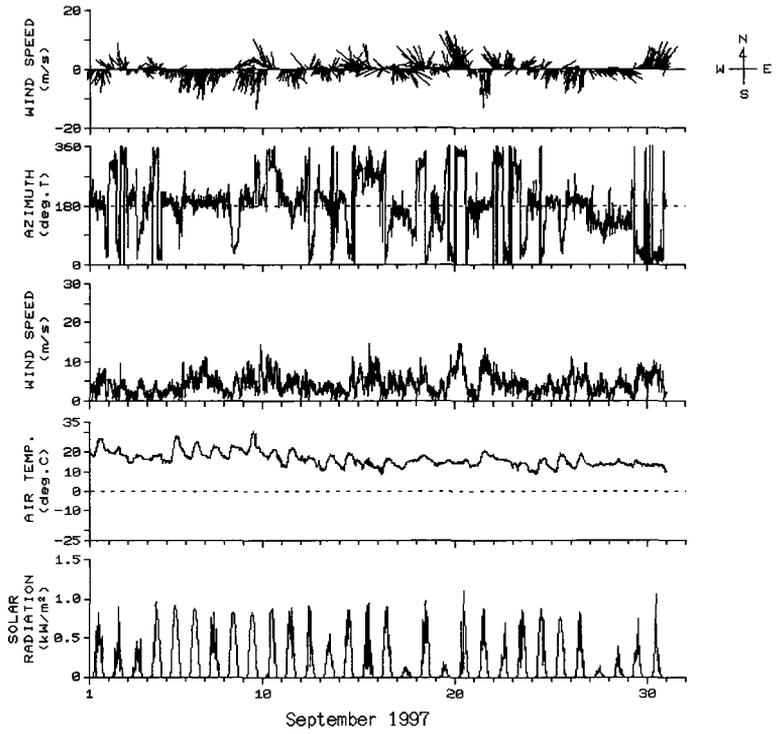
## Kimuaneppu, Saroma-ko Lagoon



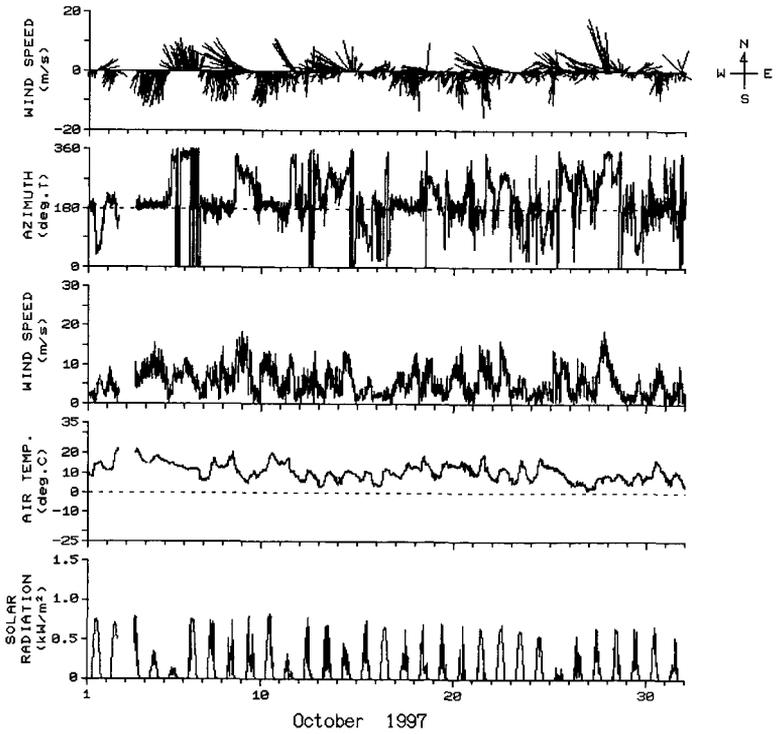
## Kimuaneppu, Saroma-ko Lagoon



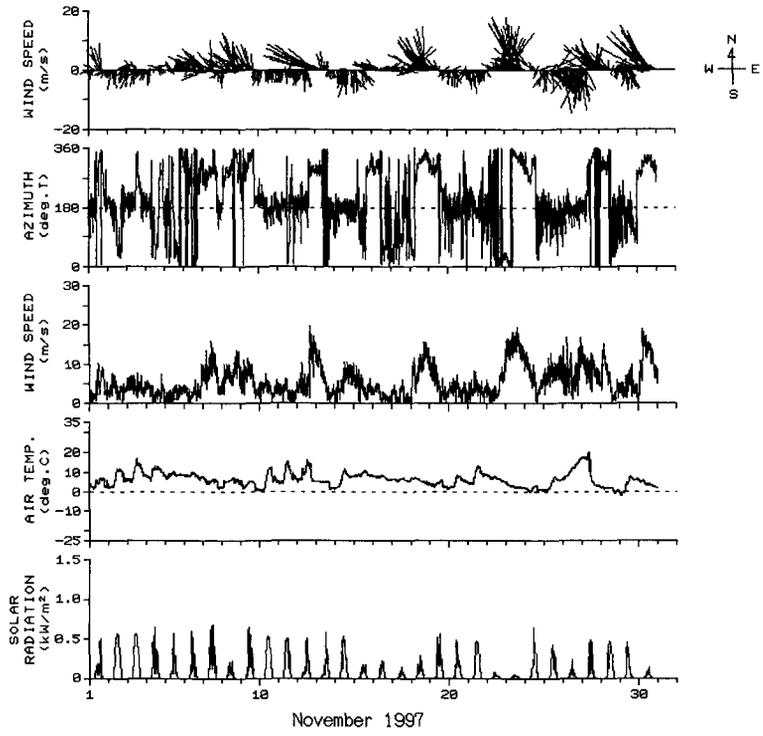
Kimuaneppu, Saroma-ko Lagoon



Kimuaneppu, Saroma-ko Lagoon



Kimuanepu, Saroma-ko Lagoon



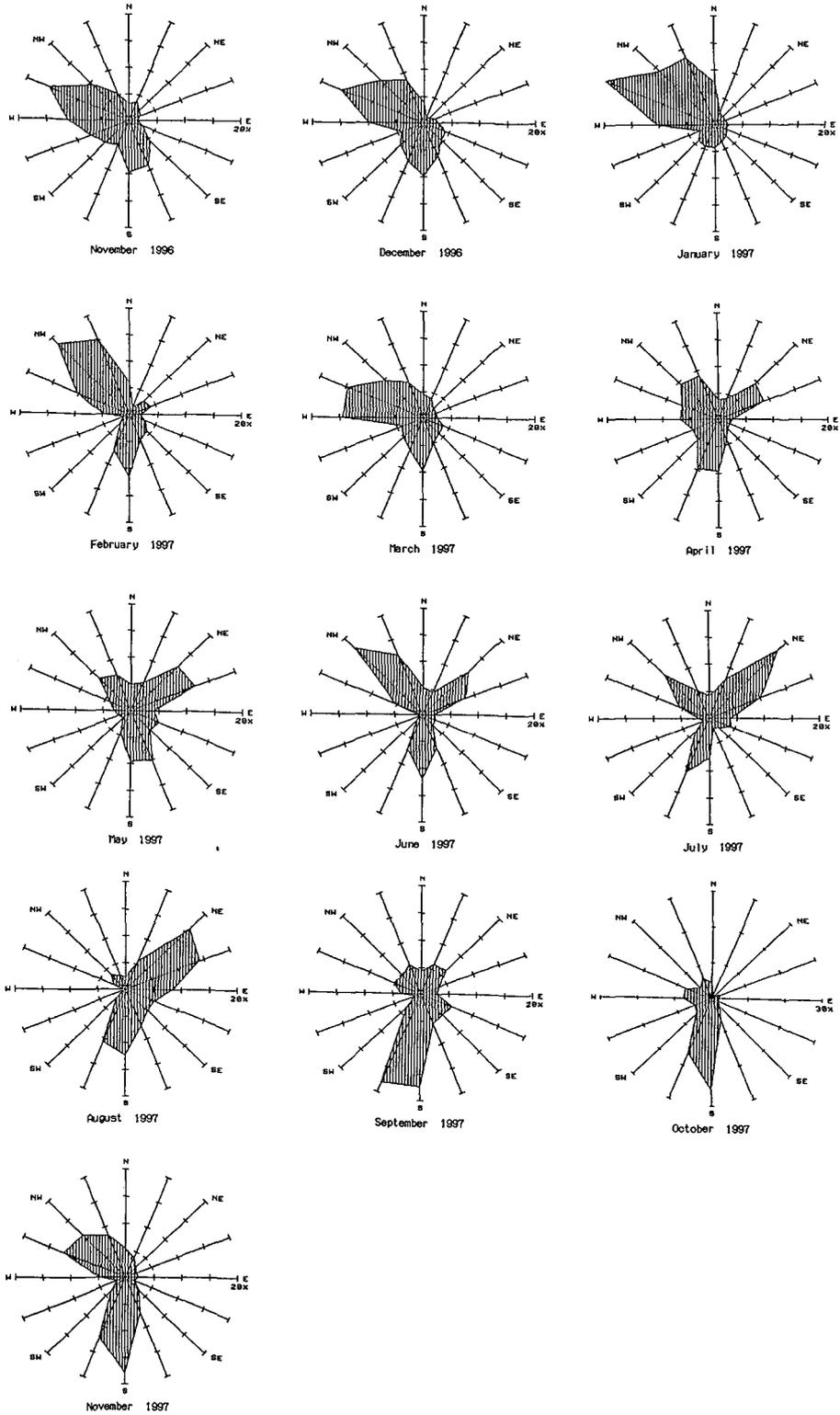


Fig. 5. Windroses for each month during the period between November 1996 and November 1997 at Kimuanepu.

**Table 1.** Daily values of air temperature, wind speed and azimuth, and daily cumulative solar radiation obtained at Kimuaneppu during the period between November 1996 and November 1997.

November 1996 Kimuaneppu, Saroma-ko Lagoon

Date	Air Temperature			Wind				Solar Radiation		
	Mean °C	Max. °C	Min. °C	Mean m/s	Max. m/s	Min. m/s	Most Freq. Dir.	Cumulative MJ/m <sup>2</sup>	Max. kW/m <sup>2</sup>	Min. kW/m <sup>2</sup>
1	3.6	7.8	-0.9	3.4	5.9	2.0	NNE	8.60	0.64	0.00
2	5.5	6.7	2.3	5.7	8.8	2.0	WNW	8.39	0.65	0.00
3	5.1	9.3	0.6	3.5	7.4	2.0	S	10.34	0.58	0.00
4	8.0	12.1	3.3	3.9	9.1	2.0	WSW	7.67	0.58	0.00
5	11.5	14.8	8.2	8.3	11.6	3.7	S	3.13	0.29	0.00
6	6.8	13.6	0.0	12.1	21.4	2.3	NNW	2.33	0.41	0.00
7	3.2	5.7	0.3	6.6	14.9	2.0	WSW	9.85	0.68	0.00
8	4.0	7.2	0.6	4.8	10.5	2.0	NW	11.43	0.53	0.00
9	4.5	7.8	0.8	5.2	15.6	2.0	S	2.97	0.24	0.00
10	5.6	8.8	1.6	5.2	11.5	2.0	NNW	7.81	0.53	0.00
11	4.2	6.9	2.2	6.5	13.9	2.0	ESE	8.70	0.50	0.00
12	-1.1	2.2	-4.0	9.9	14.7	6.2	WNW, NNW	3.48	0.29	0.00
13	-4.5	-3.1	-7.5	8.0	14.3	2.2	WNW	5.63	0.62	0.00
14	-1.0	3.8	-7.3	4.6	10.6	2.0	NE	6.16	0.48	0.00
15	0.2	2.2	-2.5	7.6	13.1	2.2	WNW	8.02	0.64	0.00
16	0.7	2.8	-2.7	7.7	18.7	2.2	W	6.19	0.54	0.00
17	3.6	7.9	-1.6	3.4	10.6	2.0	S	7.42	0.52	0.00
18	2.3	3.6	0.6	4.3	8.8	2.0	WNW	4.71	0.42	0.00
19	1.1	3.1	-0.7	7.2	15.7	2.0	WNW	7.38	0.61	0.00
20	2.0	5.6	-1.8	4.0	10.6	2.1	SSE, WNW	9.46	0.50	0.00
21	6.0	9.9	0.8	5.7	10.8	2.2	S	5.53	0.54	0.00
22	4.1	7.6	-0.2	7.0	15.8	2.2	WSW, W	9.61	0.65	0.00
23	3.1	4.4	-1.3	9.7	15.9	2.2	WNW	8.64	0.51	0.00
24	1.9	5.7	-1.3	2.9	5.9	2.0	SSW	8.82	0.48	0.00
25	4.1	6.3	1.9	6.8	17.4	2.0	WNW	2.83	0.24	0.00
26	2.6	3.9	-0.1	6.5	15.3	2.0	NW	6.23	0.62	0.00
27	2.8	5.0	-0.3	5.1	10.1	2.1	SSE	4.78	0.34	0.00
28										
29										
30	-0.6	2.1	-4.6	6.2	16.5	2.1	WSW	4.07	0.39	0.00

Frequency of Wind Direction

Date	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
1	0	14	10	8	7	13	9	8	7	5	4	0	0	1	9	2	97
2	30	16	3	2	0	0	0	0	1	1	0	0	1	45	9	8	116
3	2	8	3	6	3	4	4	3	17	10	9	4	12	0	2	3	90
4	0	7	6	3	3	4	4	7	3	5	14	19	15	7	8	0	105
5	0	0	0	0	3	2	9	38	80	11	1	0	0	0	0	0	144
6	1	0	0	0	0	0	1	11	15	9	2	5	5	17	30	38	134
7	0	5	1	2	1	0	0	0	2	16	37	24	29	3	2	8	122
8	3	6	1	3	1	2	1	2	4	9	14	3	1	7	38	5	100
9	0	0	2	2	0	11	24	32	37	10	1	0	0	0	0	0	119
10	11	5	13	11	4	1	3	0	2	1	4	3	2	9	6	25	100
11	4	3	3	2	8	25	13	4	1	1	0	1	7	23	16	18	129
12	14	0	0	0	0	0	0	0	0	0	0	0	2	41	37	41	135
13	0	6	0	0	2	2	0	0	2	4	7	12	29	43	31	1	139
14	0	12	18	10	6	8	4	10	6	8	13	7	13	5	5	0	125
15	0	0	0	0	0	0	0	0	0	1	14	12	23	64	23	0	137
16	0	0	0	0	0	1	0	0	3	6	13	17	61	36	0	0	137
17	1	11	7	7	4	4	10	12	13	10	4	9	3	3	1	2	101
18	3	14	4	0	1	1	5	3	0	3	11	6	22	34	9	7	123
19	0	9	5	0	0	0	0	0	3	1	3	2	31	58	19	6	137
20	2	3	5	2	0	3	7	19	16	10	2	2	14	19	8	1	113
21	0	0	0	4	4	2	12	49	50	7	1	0	0	0	0	0	129
22	0	0	0	0	0	0	2	0	7	8	33	45	45	3	1	0	144
23	0	0	0	0	0	0	0	1	0	2	0	3	36	67	23	0	132
24	5	4	7	8	1	3	12	13	15	28	2	1	2	0	0	0	101
25	1	0	0	1	2	5	6	28	28	0	0	0	5	29	18	2	125
26	22	9	4	4	4	0	0	0	0	0	0	0	0	11	31	16	101
27	0	0	1	0	0	1	51	52	6	0	0	0	0	0	0	0	111
28																	
29																	
30	2	0	0	0	1	1	2	6	23	20	28	33	10	1	0	12	139
Total	101	132	93	75	55	93	179	298	339	172	196	221	363	552	327	189	3385

December 1996 Kimuanepu, Saroma-ko Lagoon

Date	Air Temperature			Wind				Solar Radiation		
	Mean °C	Max. °C	Min. °C	Mean m/s	Max. m/s	Min. m/s	Most Freq. Dir.	Cumulative MJ/m <sup>2</sup>	Max. kW/m <sup>2</sup>	Min. kW/m <sup>2</sup>
1	0.7	1.7	-0.6	10.1	13.4	6.1	N	3.34	0.22	0.00
2	-0.2	1.2	-1.3	9.6	12.8	4.7	WNW	5.08	0.56	0.00
3	-1.0	2.0	-5.0	4.4	7.9	2.1	S	8.70	0.44	0.00
4	0.8	5.6	-1.9	4.1	7.6	2.0	S	6.72	0.53	0.00
5	0.4	2.2	-1.5	4.4	9.1	2.0	ENE	1.37	0.09	0.00
6	1.7	4.8	-0.7	8.4	21.3	2.6	W	8.12	0.46	0.00
7	-2.7	0.2	-6.0	3.0	6.2	2.0	S	7.65	0.43	0.00
8	-1.9	2.6	-5.5	4.9	10.5	2.0	SSE	7.94	0.55	0.00
9	-1.0	0.3	-3.4	5.9	11.5	2.1	NW	5.95	0.48	0.00
10	-0.8	3.0	-6.3	4.4	10.5	2.1	S	7.32	0.49	0.00
11	2.2	5.4	0.6	5.4	10.1	2.0	S	3.79	0.42	0.00
12	-0.3	3.0	-4.2	8.0	14.7	2.0	WNW	8.44	0.44	0.00
13	-4.7	-2.3	-6.9	5.4	11.8	2.0	NW	5.69	0.47	0.00
14	-0.8	3.1	-7.1	9.2	17.4	2.1	W	4.03	0.42	0.00
15	-3.7	-0.9	-7.7	9.7	17.1	2.0	NW	6.72	0.42	0.00
16	-3.6	1.3	-9.3	3.7	8.7	2.0	S	7.65	0.43	0.00
17	1.6	7.5	-0.4	4.7	9.7	2.0	N, SSW	2.91	0.25	0.00
18	-1.1	0.4	-5.3	6.7	12.0	2.3	NNW	2.12	0.18	0.00
19	-5.6	-1.9	-10.4	4.2	10.3	2.0	SW	8.00	0.44	0.00
20	-7.3	-4.3	-10.8	4.8	11.0	2.1	WSW	8.26	0.45	0.00
21	-8.0	-5.8	-13.2	4.7	11.1	2.0	WNW	8.20	0.44	0.00
22	-3.8	-0.2	-8.6	6.2	11.6	2.1	S	6.44	0.41	0.00
23	-2.3	0.0	-4.9	10.6	17.9	2.2	WNW	1.49	0.09	0.00
24	-3.6	-1.0	-7.5	5.0	10.7	2.1	SSE, S	7.78	0.43	0.00
25	-0.9	3.1	-3.9	4.0	10.1	2.0	NW	6.04	0.49	0.00
26	-2.3	-0.8	-4.9	9.7	17.2	3.5	WSW, WNW	5.74	0.48	0.00
27	-2.9	-0.8	-4.9	6.4	14.7	2.0	WNW	7.45	0.44	0.00
28	-1.4	3.1	-4.2	7.8	16.9	2.0	WNW	3.50	0.41	0.00
29	-2.1	-0.4	-4.5	9.1	17.9	2.1	NW	4.02	0.42	0.00
30	-3.2	-1.2	-4.4	9.3	17.3	2.1	WNW	7.37	0.47	0.00
31	-3.7	-1.5	-5.4	7.8	13.5	2.1	NW	8.42	0.43	0.00

Frequency of Wind Direction

Date	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
1	52	1	0	0	0	0	0	0	0	0	0	0	25	15	7	44	144
2	32	0	0	0	0	0	0	0	0	0	0	0	11	70	12	19	144
3	0	1	0	0	0	6	5	16	46	31	6	2	16	9	2	0	140
4	0	1	0	1	0	5	10	15	29	28	12	1	4	2	4	2	114
5	0	2	0	23	11	8	14	16	2	0	0	0	0	0	0	0	76
6	0	0	1	0	1	5	2	6	9	13	15	9	42	14	1	0	118
7	0	5	7	5	5	5	4	5	15	11	11	2	10	3	0	0	88
8	1	3	2	10	7	7	6	23	20	6	7	5	7	2	7	0	113
9	0	0	0	0	0	0	0	4	15	11	10	3	11	22	26	21	123
10	0	0	0	1	9	21	15	24	35	18	13	0	0	0	0	0	136
11	1	5	3	1	0	4	10	17	24	12	4	7	11	12	1	3	115
12	0	0	0	3	1	3	2	6	7	3	16	14	9	45	29	1	139
13	6	2	0	3	1	6	6	3	8	12	7	1	8	23	26	2	114
14	0	0	1	0	3	10	14	18	23	20	5	9	32	7	0	0	142
15	0	2	0	2	1	1	2	2	6	5	6	1	5	18	60	32	143
16	1	4	7	2	6	6	3	4	12	9	9	5	1	1	4	3	77
17	16	13	14	1	3	2	6	4	14	16	15	2	2	2	4	6	120
18	20	0	0	0	0	0	0	0	0	0	2	3	16	25	10	65	141
19	0	0	0	2	4	0	2	1	5	10	18	9	14	16	16	0	97
20	0	0	0	0	0	0	0	1	3	9	21	34	27	13	11	1	120
21	0	1	1	2	5	12	12	6	12	19	12	1	3	25	7	0	118
22	0	0	2	10	12	20	16	28	32	9	1	2	0	0	0	0	132
23	0	0	0	2	6	3	1	0	0	0	0	0	0	60	30	36	138
24	0	1	8	5	7	12	15	18	18	11	6	2	2	9	8	0	122
25	3	2	4	0	1	1	6	9	6	5	4	6	19	16	25	2	109
26	6	0	0	0	0	0	0	0	0	0	6	34	33	34	4	27	144
27	0	0	1	3	4	13	4	6	9	10	7	5	14	33	0	0	109
28	1	0	2	1	2	9	7	15	8	3	2	0	6	27	21	12	116
29	3	0	0	2	4	5	4	2	7	7	0	0	0	12	49	45	140
30	0	1	0	2	0	0	0	4	4	5	3	8	52	59	1	0	139
31	0	0	2	2	4	2	6	2	5	7	3	0	2	41	56	7	139
Total	142	44	55	83	97	166	172	255	374	290	221	165	382	615	421	328	3810

January 1997 Kimuaneppu, Saroma-ko Lagoon

Date	Air Temperature			Wind				Solar Radiation		
	Mean °C	Max. °C	Min. °C	Mean m/s	Max. m/s	Min. m/s	Most Freq. Dir.	Cumulative MJ/m <sup>2</sup>	Max. kW/m <sup>2</sup>	Min. kW/m <sup>2</sup>
1	-3.0	-1.4	-6.6	7.0	14.5	2.1	NNW	7.55	0.41	0.00
2	-2.6	-0.9	-8.0	4.5	10.9	2.1	ESE	1.26	0.16	0.00
3	-0.8	0.6	-3.1	7.7	14.4	2.1	W	4.97	0.35	0.00
4	0.0	0.4	-0.3	8.2	12.3	3.4	NNW	2.70	0.16	0.00
5	-0.6	-0.1	-1.3	6.7	9.4	3.5	NNW	4.27	0.41	0.00
6	-1.3	0.0	-2.7	5.9	11.3	2.1	NE	3.76	0.24	0.00
7	-4.5	-1.8	-6.9	6.9	11.2	3.5	N	2.87	0.18	0.00
8	-5.1	-3.0	-8.2	5.4	9.5	2.0	N	4.97	0.44	0.00
9	-5.4	-3.7	-7.9	7.3	11.0	2.0	WNW	5.04	0.60	0.00
10	-3.0	-1.4	-4.4	7.5	11.0	2.1	WNW	2.30	0.23	0.00
11	-4.1	-2.9	-5.6	5.4	8.4	2.0	N	3.73	0.27	0.00
12	-7.0	-1.4	-11.2	3.5	7.0	2.0	W	9.61	0.50	0.00
13	-3.3	1.4	-10.4	5.2	11.0	2.1	S	8.69	0.60	0.00
14	-0.7	3.8	-5.6	8.6	17.1	2.7	S	5.36	0.32	0.00
15	-5.5	-2.4	-9.2	6.8	14.3	2.0	WNW	4.77	0.49	0.00
16	-6.1	-3.4	-10.1	7.4	15.0	2.0	NW	4.90	0.40	0.00
17	-4.0	-2.1	-7.5	8.1	15.2	2.3	WNW	8.58	0.50	0.00
18	-4.3	-1.6	-7.2	4.6	11.0	2.0	WNW	2.62	0.14	0.00
19	-4.6	-2.5	-8.8	9.3	18.5	2.1	NNW	6.65	0.50	0.00
20	-5.8	-2.7	-9.0	3.2	8.3	2.0	SSE	9.32	0.51	0.00
21	-7.0	-5.0	-11.2	5.7	10.1	2.0	SW	7.21	0.56	0.00
22	-4.3	-2.2	-9.6	10.3	16.1	5.0	NNW	3.03	0.17	0.00
23	-2.7	-1.2	-4.4	10.9	17.5	2.3	NW	10.07	0.56	0.00
24	-4.3	-0.7	-6.7	5.1	13.0	2.0	WNW	10.14	0.56	0.00
25	-6.7	-4.5	-11.3	5.4	11.6	2.0	W	7.47	0.57	0.00
26	-3.9	-2.3	-5.5	7.4	12.8	4.1	WNW	6.52	0.51	0.00
27	-4.1	-3.3	-5.7	8.7	13.7	4.6	WNW	10.02	0.70	0.00
28	-4.7	-0.4	-9.2	4.7	12.1	2.0	W	11.64	0.55	0.00
29	-6.0	-2.9	-10.3	2.9	5.1	2.0	ESE	7.31	0.51	0.00
30										
31										

Frequency of Wind Direction

Date	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
1	5	1	0	0	3	3	5	11	8	10	5	0	5	12	28	30	126
2	0	4	8	8	8	17	14	7	3	1	1	2	13	10	3	3	102
3	3	1	0	0	0	0	0	1	1	0	12	22	48	40	6	8	142
4	57	12	0	0	0	0	0	0	0	0	0	0	0	0	8	67	144
5	22	0	0	0	0	0	0	0	0	0	0	1	3	42	76	144	144
6	0	3	33	20	9	2	7	1	2	3	11	8	9	1	0	0	109
7	44	28	2	0	0	0	0	0	0	0	0	0	14	24	7	25	144
8	43	10	2	1	1	0	1	2	3	5	26	1	12	11	2	15	135
9	0	0	0	0	0	0	0	0	2	1	10	4	29	58	23	5	132
10	0	1	0	0	0	1	1	1	0	0	0	0	4	70	18	0	96
11	42	10	0	0	0	0	0	0	2	5	0	3	12	8	30	30	112
12	1	5	3	0	2	3	5	4	14	10	0	0	15	14	2	3	81
13	0	5	9	10	18	20	18	26	28	10	0	0	0	0	0	0	144
14	0	0	1	0	2	5	12	17	47	25	8	5	5	8	8	1	144
15	0	0	0	0	0	1	0	3	6	4	7	16	32	38	30	2	139
16	0	2	1	0	1	5	5	8	4	15	5	0	1	30	35	1	113
17	0	0	0	0	1	2	2	2	2	17	6	2	23	33	27	27	144
18	0	1	0	4	14	10	12	10	10	8	0	0	10	22	2	0	103
19	11	1	1	0	0	1	2	1	4	6	1	3	8	15	15	68	137
20	0	0	2	8	15	7	11	17	6	13	3	7	3	0	0	0	92
21	8	0	0	1	1	2	2	4	7	8	20	13	6	18	17	18	125
22	17	0	0	0	0	0	0	0	0	0	0	0	19	42	8	57	143
23	0	0	0	0	0	0	0	0	0	1	1	0	0	52	67	21	142
24	0	1	1	1	2	0	2	2	5	15	1	6	11	18	8	0	73
25	0	0	1	0	0	0	2	1	4	6	18	11	45	34	4	0	126
26	0	0	0	0	0	0	0	0	0	0	0	0	15	80	32	17	144
27	0	0	0	0	0	0	0	0	0	0	0	0	26	83	34	1	144
28	0	1	4	8	9	6	7	2	2	4	1	1	16	10	1	0	72
29	0	0	11	15	3	7	3	4	4	1	1	1	3	1	0	0	54
30																	
31																	
Total	253	86	79	76	89	92	111	124	162	165	142	102	376	739	435	475	3506

February 1997 Kimuanepu, Saroma-ko Lagoon

Date	Air Temperature			Wind				Solar Radiation		
	Mean °C	Max. °C	Min. °C	Mean m/s	Max. m/s	Min. m/s	Most Freq. Dir.	Cumulative MJ/m <sup>2</sup>	Max. kW/m <sup>2</sup>	Min. kW/m <sup>2</sup>
1				3.1	6.6	2.0	NNW	7.24	0.42	0.00
2				3.4	6.1	2.0	NW	7.14	0.40	0.00
3				3.5	6.0	2.0	ESE	12.24	0.65	0.00
4				9.1	14.8	2.0	N	5.13	0.33	0.00
5				6.5	11.3	2.0	NNW	9.11	0.59	0.00
6				3.1	4.6	2.0	ENE	10.32	0.66	0.00
7				2.4	3.2	2.0	NE, SSW	10.86	0.72	0.00
8				5.0	10.3	2.0	S	11.40	0.72	0.00
9				3.8	6.8	2.0	NNW	12.31	0.61	0.00
10				3.6	8.5	2.1	S	10.56	0.65	0.00
11				3.9	7.1	2.0	ENE	10.91	0.64	0.00
12				5.8	9.8	2.0	NW	9.91	0.81	0.00
13				2.9	4.6	2.0	SSW	12.73	0.72	0.00
14				2.7	5.4	2.0	S, W	11.86	0.73	0.00
15				4.7	9.6	2.0	S	14.52	0.67	0.00
16				6.3	13.6	2.2	SE	7.57	0.52	0.00
17				12.6	22.0	2.1	NW	9.02	0.69	0.00
18				11.1	16.9	2.9	NW	10.99	0.67	0.00
19				6.9	13.2	2.1	WNW	13.11	0.70	0.00
20				4.8	11.5	2.0	NW	9.23	0.68	0.00
21				8.3	16.4	2.1	N	6.55	0.32	0.00
22				9.8	16.7	2.7	NW	11.48	0.67	0.00
23				5.3	12.3	2.0	WNW	14.90	0.73	0.00
24				2.6	3.7	2.0	SSE	17.30	0.72	0.00
25				5.7	10.2	2.2	S	10.59	0.70	0.00
26				9.1	14.4	2.1	NNW	11.80	0.89	0.00
27				6.8	10.0	2.0	NW	17.69	0.81	0.00
28				6.3	14.8	2.0	S	14.20	0.77	0.00

## Frequency of Wind Direction

Date	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
1	23	3	0	0	0	0	0	0	0	1	6	8	8	4	9	58	120
2	0	0	1	2	0	3	4	1	8	10	4	2	8	16	25	5	89
3	0	0	1	2	11	31	3	0	4	0	2	1	3	4	0	0	62
4	60	7	21	0	0	0	0	0	0	0	0	0	0	0	0	49	137
5	21	0	0	0	0	0	0	1	1	6	5	0	0	7	36	44	121
6	0	0	13	19	0	2	5	3	6	13	2	0	0	0	0	0	63
7	2	1	6	1	0	1	0	0	0	6	0	0	0	2	0	2	21
8	0	0	2	0	1	1	3	16	62	20	8	1	0	0	0	0	114
9	19	8	7	6	1	0	1	4	6	1	1	1	0	5	8	25	93
10	0	1	6	2	0	1	5	7	13	5	0	0	0	0	4	11	55
11	0	1	10	26	6	2	0	0	11	4	4	1	1	1	1	0	67
12	1	0	0	0	0	0	0	0	1	2	0	1	8	23	31	16	83
13	1	1	0	1	0	6	6	7	8	11	0	0	1	0	0	0	42
14	4	1	0	0	0	0	0	4	9	6	7	2	9	6	3	2	53
15	0	1	5	8	0	5	12	25	31	18	0	0	0	0	0	0	105
16	0	0	0	8	15	11	44	25	28	0	0	0	0	0	0	0	131
17	0	0	3	0	0	0	0	0	0	0	0	0	1	36	85	0	125
18	0	0	0	0	0	0	0	0	0	0	0	1	11	19	81	32	144
19	0	0	0	0	0	0	0	0	0	0	7	5	23	49	25	17	126
20	0	2	0	0	0	1	3	7	18	18	3	0	9	19	29	9	118
21	19	11	11	17	6	1	0	0	1	11	0	1	0	0	0	18	96
22	0	0	0	0	0	0	0	0	0	0	0	0	8	11	65	48	132
23	7	0	0	0	1	1	2	6	5	0	1	1	17	25	20	20	106
24	0	1	4	5	1	3	6	9	3	8	2	0	0	0	0	0	42
25	4	0	1	5	3	3	6	5	46	20	1	4	15	1	0	4	118
26	1	0	0	0	0	0	0	0	0	1	0	0	3	21	45	48	119
27	0	2	3	4	4	4	2	0	1	2	0	0	0	27	32	8	89
28	0	1	1	2	3	6	16	18	60	24	6	0	0	0	0	0	137
Total	162	41	95	108	52	82	118	138	311	194	59	32	125	276	499	416	2708

March 1997 Kimuanepu, Saroma-ko Lagoon

Date	Air Temperature			Wind				Solar Radiation		
	Mean °C	Max. °C	Min. °C	Mean m/s	Max. m/s	Min. m/s	Most Freq. Dir.	Cumulative MJ/m <sup>2</sup>	Max. kW/m <sup>2</sup>	Min. kW/m <sup>2</sup>
1				8.6	15.9	2.1	NNW	10.73	0.98	0.00
2				9.4	16.8	2.0	WNW	15.98	0.78	0.00
3				7.0	14.7	2.0	W	13.54	0.94	0.00
4				5.0	11.2	2.0	S	13.49	0.98	0.00
5				3.5	6.6	2.1	SSW	13.65	0.75	0.00
6				7.7	17.5	2.1	S	17.80	0.79	0.00
7				8.4	16.5	2.1	WNW	10.48	0.86	0.00
8				7.9	15.4	2.2	WNW	15.99	0.83	0.00
9				8.6	17.7	2.0	W	12.92	0.78	0.00
10				5.3	12.2	2.0	W	11.42	0.72	0.00
11				2.7	4.3	2.0	NE	12.38	0.67	0.00
12				6.2	11.8	2.2	NNW	16.85	0.87	0.00
13				4.4	7.8	2.0	N	20.15	0.84	0.00
14				4.4	9.8	2.0	N	13.72	0.95	0.00
15				4.1	7.5	2.1	NNE	18.96	1.04	0.00
16				2.7	3.6	2.0	SW	18.99	0.89	0.00
17				5.9	10.3	2.0	WNW	17.57	0.93	0.00
18				5.9	9.3	2.0	WNW	18.71	0.99	0.00
19				3.8	6.1	2.0	W	21.89	0.85	0.00
20				3.1	4.8	2.1	ENE	21.36	1.07	0.00
21				6.8	13.5	2.1	S	18.17	0.90	0.00
22				3.2	5.2	2.0	WNW	19.27	0.87	0.00
23				4.9	12.0	2.1	W	19.57	0.87	0.00
24				5.6	12.5	2.0	NNW	19.79	1.42	0.00
25				8.2	14.7	2.1	S	10.65	1.08	0.00
26				7.0	13.6	2.1	NW	24.04	0.91	0.00
27										
28										
29	8.7	13.9	5.0	9.4	15.7	3.5	S	15.98	0.80	0.00
30	6.4	12.7	-0.4	9.0	20.5	2.0	SSE	19.66	0.93	0.00
31	0.8	3.3	-1.5	7.5	15.2	2.7	W	16.36	0.94	0.00

Frequency of Wind Direction

Date	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
1	5	2	0	0	3	5	4	9	7	6	8	1	11	12	22	43	138
2	0	0	0	0	0	2	5	2	1	0	1	5	26	73	14	0	129
3	0	0	0	0	0	0	3	2	1	4	17	13	60	21	2	0	123
4	0	1	0	2	0	1	3	7	34	19	10	7	12	13	17	8	134
5	0	0	0	0	2	0	1	5	8	22	9	1	2	1	16	15	82
6	0	0	0	2	2	6	13	33	47	21	9	1	2	0	0	0	136
7	0	0	0	0	3	8	12	8	27	5	4	1	8	33	20	4	133
8	0	0	0	0	0	0	0	5	14	4	11	13	24	66	5	0	142
9	0	0	0	0	0	0	1	0	1	4	4	11	58	26	28	11	144
10	0	0	0	0	0	1	7	5	5	4	3	6	30	7	27	18	113
11	4	10	14	4	3	7	6	2	2	8	4	4	2	1	1	1	73
12	12	2	0	0	0	0	0	1	0	2	10	8	23	8	32	41	139
13	38	5	6	3	1	19	14	0	0	0	0	0	5	1	26	0	118
14	25	9	13	2	13	22	7	4	2	0	0	0	0	0	5	14	116
15	49	81	1	0	0	0	0	0	0	0	0	0	0	0	0	5	136
16	4	0	3	1	0	0	2	8	4	6	13	4	7	9	4	0	65
17	0	0	0	0	0	0	0	1	6	2	4	1	23	48	17	8	110
18	0	0	0	0	0	0	0	0	0	0	0	0	24	73	33	13	143
19	4	2	12	5	5	1	0	1	0	0	2	19	18	4	3	0	76
20	1	0	6	17	1	1	0	1	5	5	3	1	9	0	0	0	50
21	2	0	0	1	1	1	4	8	45	10	0	3	38	16	8	3	140
22	9	23	9	3	0	0	0	0	0	3	5	12	25	8	1	0	98
23	0	0	3	12	20	14	1	3	5	10	4	0	34	20	8	0	134
24	0	0	1	0	0	0	0	0	3	20	11	6	16	12	26	30	125
25	0	0	1	1	2	1	4	11	55	15	3	2	2	8	26	8	139
26	2	0	0	1	0	6	5	2	0	0	1	10	23	28	7	0	85
27																	
28																	
29	0	1	5	15	15	16	23	24	43	2	0	0	0	0	0	0	144
30	0	0	1	2	5	18	17	26	14	15	23	15	8	0	0	0	144
31	0	0	0	0	1	0	1	1	2	21	23	30	58	7	0	0	144
Total	155	136	75	71	77	129	133	169	331	205	177	141	518	525	352	259	3453

April 1997 Kimuaneppu, Saroma-ko Lagoon

Date	Air Temperature			Wind				Solar Radiation		
	Mean °C	Max. °C	Min. °C	Mean m/s	Max. m/s	Min. m/s	Most Freq. Dir.	Cumulative MJ/m <sup>2</sup>	Max. kW/m <sup>2</sup>	Min. kW/m <sup>2</sup>
1	1.1	3.4	-0.5	7.1	16.1	2.1	WNW	15.24	1.10	0.00
2	0.8	3.5	-2.0	3.7	7.3	2.0	SSW	20.47	0.85	0.00
3	0.9	4.5	-2.6	2.8	4.2	2.0	NE	24.71	0.90	0.00
4	1.9	5.6	-1.5	3.5	5.6	2.1	NE	19.66	0.95	0.00
5	5.9	12.3	-0.2	3.9	6.8	2.0	SSW	18.25	0.81	0.00
6	4.8	8.1	0.1	4.9	7.8	2.0	ENE	23.36	0.96	0.00
7	5.7	8.3	1.7	4.4	9.6	2.0	SSE	6.52	0.45	0.00
8	1.6	3.1	0.8	6.3	10.9	2.1	NW	4.13	0.18	0.00
9	4.7	12.3	1.3	5.3	11.2	2.1	ENE	19.82	0.86	0.00
10	6.1	9.2	2.6	9.1	22.1	2.4	W	21.17	0.93	0.00
11	1.3	3.8	-1.5	3.2	5.6	2.0	NNE	14.02	1.11	0.00
12	0.3	3.3	-2.2	3.4	6.0	2.0	SSW	17.49	1.01	0.00
13	2.7	8.7	-0.8	4.7	8.5	2.1	SSW	15.82	0.98	0.00
14	1.0	2.7	-1.0	4.1	7.0	2.0	NE	20.51	0.95	0.00
15	-0.4	0.6	-3.7	3.6	6.0	2.0	N	19.23	1.07	0.00
16	1.6	3.4	-3.1	4.2	8.0	2.0	NE, NNW	21.33	1.00	0.00
17	3.9	6.3	1.2	3.0	7.1	2.0	NE	22.89	1.06	0.00
18	6.2	9.2	0.7	3.8	6.5	2.0	ENE	25.96	0.93	0.00
19	5.6	7.5	1.9	4.4	6.9	2.0	ENE	24.53	0.90	0.00
20	3.6	5.4	0.8	4.0	7.8	2.1	NE	21.41	0.93	0.00
21	5.9	12.8	0.4	7.7	15.0	2.0	SSW	22.33	1.00	0.00
22	5.1	8.8	3.5	5.6	13.3	2.5	S	15.26	0.99	0.00
23	1.9	3.9	0.1	11.2	16.6	5.0	NNW	7.80	0.61	0.00
24	0.5	1.9	-0.6	15.8	22.1	11.3	NNW	8.60	0.52	0.00
25	4.0	6.9	1.6	9.7	16.8	2.0	NW	28.75	0.99	0.00
26	12.1	19.1	2.4	4.6	10.1	2.1	S	26.06	1.13	0.00
27	13.2	16.3	10.8	4.2	11.4	2.0	S	19.83	0.97	0.00
28	15.6	24.1	8.5	5.4	11.7	2.0	SSW	22.22	0.82	0.00
29	10.8	17.1	7.2	3.7	7.7	2.1	NE	18.27	1.04	0.00
30	6.3	10.8	3.7	3.7	8.9	2.0	N, NE	19.04	1.06	0.00

Frequency of Wind Direction

Date	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
1	0	0	1	0	1	0	1	0	4	10	18	16	40	47	4	0	142
2	4	4	16	16	7	4	1	3	8	18	6	4	4	4	1	1	101
3	1	7	16	9	5	8	8	1	2	8	3	1	0	0	0	0	69
4	0	10	24	7	0	0	0	0	0	0	1	1	4	0	1	0	48
5	0	0	0	1	0	1	0	8	18	33	15	8	4	4	0	0	92
6	0	5	16	24	7	12	7	3	2	0	0	0	0	0	0	0	76
7	3	5	6	3	1	4	19	45	20	3	1	0	1	1	1	0	113
8	0	0	0	1	0	1	1	0	3	11	2	5	25	33	48	0	130
9	4	0	5	25	3	2	3	2	5	5	7	4	7	1	15	4	92
10	0	0	0	0	0	1	2	3	21	10	15	40	47	1	0	0	140
11	3	24	18	5	3	3	1	0	0	2	4	2	2	0	0	3	70
12	6	2	12	5	1	2	1	3	8	18	4	0	1	0	1	4	68
13	4	4	10	8	6	4	2	5	27	45	3	1	1	1	0	0	121
14	7	3	18	15	9	7	5	0	1	2	7	6	6	12	8	8	114
15	29	15	6	0	0	0	0	0	0	6	6	2	3	11	10	16	104
16	11	6	15	7	3	3	3	6	0	12	2	3	2	3	4	15	95
17	3	9	15	9	3	0	2	0	9	7	1	2	2	7	3	4	76
18	0	4	20	34	8	1	0	4	10	3	2	0	3	4	5	1	99
19	4	2	13	37	2	2	0	0	0	6	0	1	5	16	3	1	92
20	2	9	24	18	8	4	2	2	1	3	4	5	5	0	0	2	89
21	0	0	7	17	2	0	0	0	18	23	3	1	2	9	7	4	93
22	0	0	0	0	0	3	2	16	46	6	4	7	15	21	18	5	143
23	0	0	0	0	0	0	0	0	0	1	0	0	3	17	57	66	144
24	4	0	0	0	0	0	0	0	0	0	0	0	1	2	43	94	144
25	2	0	6	0	0	1	7	5	0	3	2	1	1	3	49	34	114
26	1	5	13	3	1	0	1	4	32	23	27	13	10	7	0	0	140
27	6	4	4	3	4	2	0	1	26	13	19	11	10	8	1	0	112
28	2	1	4	12	2	3	4	8	24	28	9	19	7	2	2	0	127
29	6	5	14	12	4	2	6	1	3	6	1	2	2	5	8	2	79
30	15	8	15	7	1	2	1	8	10	3	0	0	1	3	5	14	93
Total	117	132	298	278	81	72	79	128	298	308	166	155	214	222	294	278	3120

May 1997 Kimuanepu, Saroma-ko Lagoon

Date	Air Temperature			Wind				Solar Radiation		
	Mean °C	Max. °C	Min. °C	Mean m/s	Max. m/s	Min. m/s	Most Freq. Dir.	Cumulative MJ/m <sup>2</sup>	Max. kW/m <sup>2</sup>	Min. kW/m <sup>2</sup>
1	8.7	15.5	3.1	6.2	14.4	2.0	S	23.65	1.07	0.00
2	9.7	17.4	7.0	5.0	12.5	2.1	S	6.30	0.82	0.00
3	8.8	11.1	5.8	5.6	10.1	2.0	WNW, NW	28.49	1.19	0.00
4	11.0	16.1	5.6	12.1	22.6	2.5	SE	17.21	1.00	0.00
5	12.8	16.4	7.8	9.5	22.3	2.0	W	24.93	1.14	0.00
6	11.9	21.3	3.7	9.5	20.1	2.4	NNW	10.52	0.85	0.00
7	7.1	9.9	3.7	6.7	16.4	2.2	ESE	26.28	0.98	0.00
8	4.0	6.9	2.5	7.3	11.2	2.3	ENE, ESE	4.87	0.33	0.00
9	3.8	6.3	2.4	8.2	15.4	2.0	NNW	16.92	1.14	0.00
10	3.9	8.0	2.3	5.3	10.6	2.0	NNW	8.25	0.43	0.00
11	2.7	3.7	2.1	3.6	6.1	2.0	N	2.85	0.12	0.00
12	5.8	12.4	1.7	4.4	6.8	2.0	NE	22.34	1.11	0.00
13	12.0	16.5	7.3	4.0	8.3	2.1	ENE	26.62	1.02	0.00
14	11.8	20.5	7.5	5.3	9.2	2.0	ENE	26.41	0.93	0.00
15	14.0	17.4	8.6	6.0	11.9	2.1	SSE	6.22	0.29	0.00
16	10.3	14.3	7.0	4.1	7.0	2.0	SSE	9.17	0.75	0.00
17	9.0	14.9	6.4	5.3	10.6	2.0	SSE	8.06	0.56	0.00
18	7.9	9.9	6.3	4.1	7.5	2.0	ENE	22.76	1.00	0.00
19	7.4	11.5	6.1	5.0	9.7	2.1	SSE	16.61	1.15	0.00
20	7.5	9.4	6.1	5.4	8.5	2.0	NW	19.48	0.95	0.00
21	5.5	6.3	4.8	5.6	7.6	2.4	NW	7.32	0.37	0.00
22	5.3	6.1	4.3	3.9	6.0	2.1	NE	14.95	0.85	0.00
23	7.2	10.2	4.3	4.4	7.4	2.1	NE	23.78	1.03	0.00
24	10.3	16.1	6.4	5.2	8.7	2.0	SSW	26.07	0.98	0.00
25	10.2	12.9	8.4	5.0	10.3	2.0	ENE	24.43	0.93	0.00
26	9.4	12.4	5.7	3.7	9.6	2.0	ENE	22.53	0.96	0.00
27	9.0	11.2	4.9	3.4	7.0	2.0	NNE	30.17	1.02	0.00
28	5.3	6.9	4.3	3.9	7.1	2.0	NNE	14.30	1.03	0.00
29										
30										
31	10.7	14.7	7.7	5.8	10.8	2.0	SSE	22.00	1.07	0.00

Frequency of Wind Direction

Date	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
1	9	6	16	1	1	2	11	16	34	14	1	0	0	0	4	7	122
2	1	5	1	3	5	12	7	7	42	17	8	7	1	0	1	0	117
3	9	1	2	4	3	4	9	6	10	4	0	0	7	12	12	9	92
4	0	15	14	14	8	17	25	19	19	6	0	0	0	0	0	0	137
5	0	6	2	0	0	1	1	4	6	6	21	37	39	5	3	0	131
6	0	3	10	6	5	6	8	18	11	6	5	6	15	14	8	22	143
7	13	5	8	16	5	25	0	0	13	9	0	1	0	2	13	23	133
8	1	0	4	24	12	24	10	9	9	3	0	0	1	3	21	17	138
9	11	4	6	7	7	19	8	2	13	2	2	0	0	0	5	58	144
10	8	2	0	0	0	1	3	14	9	4	1	0	2	19	22	85	85
11	36	8	18	16	21	18	5	0	0	0	0	0	0	0	3	8	133
12	27	10	29	24	1	4	2	2	0	1	2	2	0	0	0	1	105
13	0	9	21	23	9	11	7	8	2	0	0	2	1	0	0	0	93
14	1	6	15	37	3	0	1	5	2	0	0	0	0	0	1	0	71
15	0	0	0	0	4	8	31	40	38	5	0	0	0	0	0	0	126
16	5	2	7	11	0	2	3	21	14	8	6	4	14	15	2	2	116
17	1	2	8	7	6	6	5	43	18	2	1	1	7	9	8	1	125
18	3	0	19	28	3	8	3	17	11	5	0	2	2	10	4	5	120
19	0	5	24	18	3	1	5	42	12	0	0	4	5	8	1	0	128
20	0	1	32	22	12	13	2	0	0	0	0	0	0	8	35	1	126
21	0	0	0	0	0	0	0	0	0	0	0	0	3	25	82	27	137
22	5	3	44	43	7	0	0	0	0	0	1	0	2	3	2	2	110
23	1	17	27	7	3	3	1	2	9	15	1	0	0	2	2	2	92
24	3	2	17	21	3	0	0	1	24	41	4	0	5	5	7	3	136
25	2	17	19	24	0	0	0	0	8	11	7	0	9	23	3	3	123
26	11	16	15	22	3	0	0	1	0	0	2	0	3	5	7	6	91
27	5	20	18	0	0	0	0	1	1	0	0	2	1	3	19	10	80
28	22	29	23	4	6	4	0	1	0	1	0	1	0	1	8	18	118
29																	
30																	
31	0	0	0	0	0	1	23	81	30	1	1	2	0	0	0	0	139
Total	174	194	399	382	130	189	168	349	332	163	69	80	104	140	291	247	3411

June 1997 Kimuaneppu, Saroma-ko Lagoon

Date	Air Temperature			Wind				Solar Radiation		
	Mean °C	Max. °C	Min. °C	Mean m/s	Max. m/s	Min. m/s	Most Freq. Dir.	Cumulative MJ/m <sup>2</sup>	Max. kW/m <sup>2</sup>	Min. kW/m <sup>2</sup>
1	7.7	9.2	6.1	5.1	8.2	2.1	SSE	7.51	0.35	0.00
2	10.0	15.6	7.2	6.0	12.1	2.0	S	22.38	1.10	0.00
3	11.4	16.8	7.6	7.0	16.6	2.1	S	13.32	1.23	0.00
4	10.7	16.6	8.3	4.9	9.3	2.0	NW	26.97	0.94	0.00
5	7.0	9.1	5.7	7.5	11.2	2.1	NW	4.61	0.18	0.00
6	7.1	9.4	5.6	3.3	5.4	2.0	NNW	9.04	0.53	0.00
7	6.8	7.8	5.9	3.9	6.1	2.0	NNW	5.85	0.27	0.00
8	7.3	10.6	5.6	5.1	11.4	2.0	ESE	28.33	1.06	0.00
9	12.0	15.8	8.2	8.3	16.5	2.0	S	14.36	0.81	0.00
10	12.4	16.4	7.8	8.3	14.2	2.5	S	8.37	0.72	0.00
11	12.1	15.3	9.6	3.4	9.2	2.0	NE	25.87	1.05	0.00
12	9.5	11.3	8.4	3.2	5.0	2.0	NW	15.20	1.02	0.00
13	9.9	11.8	8.4	3.1	5.5	2.0	NE	23.77	1.03	0.00
14	12.1	17.9	8.2	5.6	11.9	2.0	NW	15.74	1.08	0.00
15	7.1	8.6	6.1	6.8	10.2	2.5	NW	4.64	0.18	0.00
16	9.2	13.0	6.3	5.5	10.4	2.0	ESE	26.52	1.24	0.00
17	15.2	22.1	10.9	5.7	12.7	2.1	SSW	29.83	1.02	0.00
18	15.0	20.3	11.8	3.9	6.5	2.0	NE	28.34	0.93	0.00
19	15.5	17.9	13.3	3.6	8.1	2.0	NE	28.58	0.97	0.00
20	16.5	22.0	14.0	3.7	10.6	2.0	NE	24.85	0.89	0.00
21	11.2	15.3	9.5	4.4	6.9	2.0	NW	5.49	0.32	0.00
22	14.1	18.5	9.7	4.4	8.6	2.1	NE	31.34	1.03	0.00
23	17.2	20.0	14.2	2.9	5.1	2.1	E	19.40	1.11	0.00
24	17.9	22.5	15.1	4.1	8.8	2.0	ESE	24.64	1.04	0.00
25	18.0	21.6	15.3	4.2	8.1	2.1	ESE	10.89	0.75	0.00
26	19.1	23.3	15.7	3.9	9.0	2.0	S, SSW	10.16	0.60	0.00
27	15.9	17.5	14.4	3.6	7.0	2.0	WNW	13.64	0.96	0.00
28	14.8	17.6	12.7	4.8	9.6	2.1	ESE	18.85	1.13	0.00
29	11.5	12.5	10.8	6.3	11.9	2.1	NNW	3.72	0.20	0.00
30	12.4	14.5	11.3	8.2	17.0	2.2	NNW	22.96	1.15	0.00

Frequency of Wind Direction

Date	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
1	0	0	0	0	0	11	51	64	17	1	0	0	0	0	0	0	144
2	0	0	16	4	4	11	0	25	53	23	0	0	0	0	0	0	136
3	0	0	0	0	0	0	7	20	64	24	7	1	0	2	4	0	129
4	1	1	21	21	5	0	0	1	3	17	2	0	1	5	22	7	107
5	0	3	2	3	0	0	0	0	0	0	0	0	2	15	98	18	141
6	10	9	7	4	0	0	0	0	0	0	0	0	0	15	13	26	84
7	24	6	4	1	0	0	0	0	0	0	0	0	1	5	19	41	101
8	17	1	25	37	0	0	0	0	0	0	1	0	13	8	14	116	
9	0	0	0	0	0	3	0	30	93	12	2	0	0	0	0	0	140
10	0	0	0	0	0	0	2	60	64	18	0	0	0	0	0	0	144
11	5	2	11	8	1	1	0	7	6	4	3	3	4	7	4	67	
12	2	13	4	0	1	7	1	0	0	0	0	0	0	6	46	17	97
13	4	15	17	3	5	2	1	0	0	0	0	0	0	0	5	4	56
14	5	4	13	4	1	2	5	0	6	7	0	0	2	3	38	8	98
15	2	0	0	0	0	0	0	0	0	0	0	0	0	1	89	51	143
16	2	0	25	45	1	0	0	0	1	0	1	3	1	13	9	5	106
17	0	6	19	6	0	0	0	0	24	54	12	2	1	0	1	2	127
18	2	7	25	7	1	0	0	0	4	24	7	2	2	7	7	5	100
19	6	12	25	7	2	3	2	3	4	0	0	4	0	7	2	2	79
20	3	9	30	10	2	1	0	0	0	2	0	0	2	4	4	4	71
21	18	9	10	0	0	0	0	0	0	1	1	0	0	3	40	38	120
22	1	5	34	3	2	0	1	1	0	0	0	0	0	10	7	0	64
23	5	0	7	7	8	5	3	3	7	3	0	0	2	4	6	6	66
24	2	3	13	16	5	2	2	1	0	0	0	1	2	4	10	7	68
25	0	0	0	23	26	29	5	3	5	8	6	1	0	0	0	0	106
26	4	4	3	1	0	0	2	1	20	20	8	4	5	2	4	3	81
27	8	22	18	4	2	2	0	0	0	0	0	0	1	25	11	2	95
28	6	6	25	39	0	0	0	0	0	0	0	0	0	1	3	3	83
29	30	3	0	5	3	1	0	0	0	0	0	0	0	0	44	52	138
30	5	3	2	0	0	0	0	0	0	0	0	0	3	18	47	55	133
Total	162	143	356	258	69	80	83	212	372	220	50	22	28	167	544	374	3140

July 1997 Kimuaneppu, Saroma-ko Lagoon

Date	Air Temperature			Wind				Solar Radiation		
	Mean °C	Max. °C	Min. °C	Mean m/s	Max. m/s	Min. m/s	Most Freq. Dir.	Cumulative MJ/m <sup>2</sup>	Max. kW/m <sup>2</sup>	Min. kW/m <sup>2</sup>
1	15.9	22.4	10.5	4.6	9.1	2.1	ENE	30.04	0.97	0.00
2	20.4	27.0	16.1	5.6	12.7	2.2	SSW	14.21	0.88	0.00
3	20.5	25.7	15.8	3.2	6.3	2.0	ENE	18.35	0.84	0.00
4	22.3	24.0	19.5	4.1	8.9	2.0	SSW	6.88	0.45	0.00
5	17.1	23.0	14.5	3.6	6.3	2.0	NE	16.17	1.14	0.00
6	15.6	17.0	14.2	3.2	5.1	2.0	NNE	25.09	1.17	0.00
7	16.8	18.2	15.2	6.3	16.4	2.1	ESE	4.42	0.18	0.00
8	13.7	17.3	11.9	4.4	9.2	2.0	NW	9.06	0.52	0.00
9	15.0	16.9	12.5	3.6	5.7	2.0	NE	15.53	1.06	0.00
10	17.6	19.6	15.5	4.1	7.4	2.0	NE	21.21	1.16	0.00
11	19.1	24.5	16.2	4.0	6.9	2.0	SSW	27.87	1.02	0.00
12	18.8	23.3	16.2	3.9	7.3	2.0	SSW	14.73	1.07	0.00
13	16.5	18.4	14.8	3.4	5.3	2.0	ENE	20.15	1.03	0.00
14	19.7	26.6	15.6	3.8	6.8	2.0	S	28.02	0.98	0.00
15	20.3	27.3	16.9	3.0	5.2	2.0	NNE	12.62	0.92	0.00
16	13.7	18.1	11.5	3.7	6.0	2.0	NE	8.34	0.50	0.00
17	14.2	17.6	11.8	2.7	4.1	2.0	NE	14.29	0.85	0.00
18	16.6	22.8	12.9	3.4	8.9	2.0	S	13.70	0.84	0.00
19	19.4	21.9	15.0	3.0	4.7	2.0	E	15.23	0.87	0.00
20	20.6	24.9	19.0	3.4	6.3	2.0	NE	11.53	1.01	0.00
21	20.2	23.7	18.4	5.1	8.2	2.0	NE	28.55	0.99	0.00
22	21.2	24.2	18.3	3.1	6.5	2.0	NE	26.45	0.96	0.00
23	22.9	28.2	19.1	4.0	6.7	2.0	SSW	27.00	1.06	0.00
24										
25										
26	22.7	25.2	20.7	4.7	8.4	2.0	NE	27.45	0.93	0.00
27	21.7	23.6	20.3	3.6	7.2	2.0	NW	27.85	1.08	0.00
28	19.3	20.8	18.4	4.9	8.7	2.4	NW	14.11	0.95	0.00
29	18.2	18.9	17.7	3.9	8.1	2.0	NW	6.40	0.31	0.00
30	18.3	19.7	17.2	2.5	3.7	2.0	NNW	12.80	0.69	0.00
31	18.7	20.4	17.4	3.1	4.8	2.0	NE	12.77	0.67	0.00

Frequency of Wind Direction

Date	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
1	0	1	23	25	4	4	2	1	2	8	2	0	1	11	10	3	97
2	0	0	1	1	0	0	0	7	35	47	15	3	1	2	3	1	116
3	2	5	10	13	2	8	3	3	6	5	2	0	0	6	3	3	71
4	3	3	1	0	0	0	1	3	29	35	17	18	3	0	0	0	113
5	1	13	24	13	3	2	1	1	2	6	8	1	4	7	5	0	91
6	7	16	13	3	3	9	0	0	0	0	0	0	6	14	14	11	96
7	0	0	0	0	11	40	30	12	30	9	0	0	0	0	0	0	132
8	7	4	7	0	0	0	2	0	0	0	2	1	2	14	29	15	83
9	0	0	41	17	0	0	0	1	3	0	0	0	0	0	0	0	62
10	0	0	27	20	3	0	0	1	0	6	4	1	0	0	0	0	62
11	0	6	17	13	0	0	0	0	7	25	6	0	5	15	5	4	103
12	14	7	5	2	0	0	0	3	7	36	7	0	0	0	3	2	86
13	11	0	28	29	8	9	5	0	0	0	0	0	0	0	9	10	109
14	4	7	14	7	4	5	3	3	21	12	2	1	0	4	6	1	94
15	5	12	9	3	3	1	4	0	7	5	1	2	1	4	6	6	69
16	8	25	66	16	1	2	1	2	0	0	0	0	0	0	0	2	123
17	0	4	15	10	9	6	1	1	0	2	2	0	0	0	0	0	50
18	7	15	7	2	0	3	6	9	28	11	4	0	0	0	0	0	92
19	0	0	3	15	27	15	1	1	11	19	6	1	0	0	0	0	99
20	1	4	18	4	1	4	1	1	8	8	2	1	3	1	1	0	58
21	0	1	30	27	5	2	1	3	3	1	0	0	0	0	0	0	73
22	0	16	28	7	0	0	1	1	1	10	3	2	4	1	5	0	79
23	0	1	7	27	8	5	0	0	1	30	4	0	3	8	3	0	97
24																	
25																	
26	2	11	27	6	0	0	0	1	5	9	0	0	10	12	10	1	94
27	16	27	1	0	0	0	0	0	2	17	6	0	0	5	32	14	120
28	1	0	0	0	0	0	0	0	0	0	0	0	1	22	80	40	144
29	5	5	0	0	0	0	0	0	0	0	0	0	1	24	65	15	115
30	15	6	2	0	0	0	0	0	0	0	0	0	0	0	16	22	61
31	3	25	33	11	9	2	1	0	0	0	0	0	0	2	3	5	94
Total	112	214	457	271	101	117	64	54	208	301	93	31	45	152	308	155	2683

August 1997 Kimuaneppu, Saroma-ko Lagoon

Date	Air Temperature			Wind				Solar Radiation		
	Mean °C	Max. °C	Min. °C	Mean m/s	Max. m/s	Min. m/s	Most Freq. Dir.	Cumulative MJ/m <sup>2</sup>	Max. kW/m <sup>2</sup>	Min. kW/m <sup>2</sup>
1	16.7	17.9	15.4	3.3	6.1	2.0	NE	2.91	0.17	0.00
2	17.3	19.4	15.3	4.5	10.2	2.0	E	4.37	0.26	0.00
3	23.2	30.7	17.3	4.9	10.5	2.0	SSW	22.00	0.96	0.00
4	21.0	25.5	17.4	3.5	6.8	2.1	NNE	18.84	0.98	0.00
5	18.9	21.8	15.6	7.4	20.6	2.0	NW	4.65	0.36	0.00
6	19.5	23.8	16.3	4.1	8.0	2.1	ENE	21.22	1.11	0.00
7	19.5	21.5	17.8	3.3	7.9	2.0	SSW	13.35	1.02	0.00
8	18.2	21.9	16.3	4.0	7.4	2.0	ENE	15.14	0.92	0.00
9	17.9	19.2	17.3	3.1	5.5	2.0	NW	6.40	0.28	0.00
10	14.9	17.4	12.7	5.7	9.1	2.2	NNW	5.36	0.29	0.00
11	13.8	15.1	12.1	4.1	7.3	2.0	ENE	9.74	0.59	0.00
12	14.4	16.1	12.8	3.9	7.0	2.0	SSE	6.30	0.31	0.00
13	15.0	17.0	12.8	4.8	8.6	2.1	NE	16.57	1.13	0.00
14	14.0	14.6	13.5	4.7	7.3	2.2	NE	6.58	0.42	0.00
15	14.9	16.7	11.6	4.3	6.9	2.0	NE	18.52	1.03	0.00
16	14.0	15.5	12.0	4.0	6.4	2.0	ENE	17.24	1.14	0.00
17	14.2	17.1	12.4	4.6	8.5	2.0	SSE	12.64	0.89	0.00
18	14.2	16.6	11.9	5.3	9.9	2.1	S	7.38	0.43	0.00
19	16.9	22.0	12.8	4.3	6.5	2.0	SSW	19.87	0.96	0.00
20	17.8	20.6	13.6	3.4	5.4	2.0	ENE	18.45	0.96	0.00
21	19.4	21.1	17.1	3.5	5.2	2.0	NE	24.27	0.91	0.00
22	19.7	23.9	16.1	6.1	14.6	2.0	S	17.00	0.97	0.00
23	18.4	21.6	15.7	4.5	12.7	2.0	S	5.35	0.31	0.00
24	15.3	17.9	13.1	6.1	11.4	2.1	NE	4.76	0.33	0.00
25	13.1	15.6	10.4	4.3	7.8	2.0	ENE	16.64	0.94	0.00
26	16.3	20.8	9.7	3.7	5.9	2.0	ENE	25.74	0.91	0.00
27	18.3	22.4	14.5	4.2	7.7	2.0	SSW	23.67	0.94	0.00
28	18.9	20.7	16.6	4.2	6.9	2.0	NE	23.07	0.87	0.00
29	22.4	28.5	17.7	5.2	10.2	2.2	SSW	19.59	0.84	0.00
30	22.0	27.1	18.5	2.9	5.2	2.0	NE	22.34	0.93	0.00
31	21.1	26.3	17.5	3.4	5.9	2.0	S	23.11	0.90	0.00

Frequency of Wind Direction

Date	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
1	1	21	46	25	34	6	0	0	0	0	0	0	0	0	0	0	133
2	0	0	0	1	27	25	17	11	16	21	1	0	0	0	0	0	119
3	0	4	13	1	1	1	2	9	34	41	6	0	0	2	0	0	114
4	15	24	17	6	5	8	1	3	5	11	3	2	0	0	0	1	101
5	0	2	4	13	5	15	6	2	6	2	0	0	0	19	36	6	116
6	0	11	17	24	17	9	6	7	6	2	1	0	0	1	10	2	113
7	1	2	9	8	5	2	3	0	5	17	2	0	3	0	1	3	61
8	0	3	23	35	13	0	5	2	1	6	0	0	0	0	0	0	88
9	4	2	0	0	1	2	3	1	0	1	3	1	0	6	39	15	78
10	37	21	1	0	0	0	0	0	0	0	0	0	0	0	23	55	137
11	0	7	21	42	33	22	8	0	0	0	0	0	0	0	0	0	133
12	0	0	0	1	13	20	31	32	11	2	0	0	0	0	0	0	110
13	0	2	44	29	4	15	13	7	2	1	0	0	0	0	0	0	117
14	1	31	90	21	1	0	0	0	0	0	0	0	0	0	0	0	144
15	5	24	32	28	22	3	4	1	0	1	1	0	0	0	0	4	125
16	0	0	17	36	14	12	10	4	3	3	3	0	0	0	0	0	102
17	0	0	0	0	0	1	15	47	39	16	1	0	0	0	0	0	119
18	0	0	0	0	0	0	7	17	67	39	5	0	0	0	0	0	135
19	0	1	16	1	0	1	0	5	16	37	10	1	4	27	12	2	133
20	1	3	14	21	11	0	4	0	3	0	5	0	0	0	0	2	64
21	0	1	41	13	1	0	2	4	3	6	0	0	0	2	0	0	73
22	0	0	0	0	0	3	16	37	57	16	5	0	0	0	0	0	134
23	0	0	0	2	10	14	20	27	30	6	2	0	0	0	0	0	111
24	1	12	48	43	26	9	1	1	0	0	0	0	0	0	0	0	141
25	9	20	23	28	17	4	0	6	9	2	2	0	0	0	0	0	120
26	0	0	14	24	11	9	7	4	8	12	4	2	0	0	0	0	95
27	0	0	4	35	5	2	1	1	11	41	3	0	7	1	0	0	111
28	1	2	23	22	7	1	1	2	2	5	4	2	0	13	10	4	99
29	0	0	0	0	0	0	0	6	56	64	10	1	2	0	1	0	140
30	1	6	14	13	4	7	4	9	9	12	5	1	2	1	0	1	89
31	0	3	21	18	5	3	2	11	28	5	1	0	0	4	0	1	102
Total	77	202	552	490	292	194	189	256	427	369	77	10	18	76	132	96	3457

September 1997 Kimuanepu, Saroma-ko Lagoon

Date	Air Temperature			Wind				Solar Radiation		
	Mean °C	Max. °C	Min. °C	Mean m/s	Max. m/s	Min. m/s	Most Freq. Dir.	Cumulative MJ/m <sup>2</sup>	Max. kW/m <sup>2</sup>	Min. kW/m <sup>2</sup>
1	21.9	27.1	17.1	4.4	8.3	2.0	SSW	16.39	0.82	0.00
2	19.1	22.8	16.3	3.8	9.4	2.0	NW	9.42	0.90	0.00
3	16.5	18.4	14.1	3.4	5.6	2.0	ESE	7.59	0.49	0.00
4	16.7	18.8	14.3	3.1	4.9	2.0	NNW	19.23	0.97	0.00
5	20.8	28.2	14.1	3.7	9.9	2.0	S	23.82	0.91	0.00
6	20.0	25.5	16.0	6.1	11.2	2.2	S	23.92	0.87	0.00
7	19.5	23.4	16.6	4.7	10.9	2.3	SSW	14.26	0.82	0.00
8	20.5	23.6	16.4	4.6	8.5	2.0	SSW	22.11	0.82	0.00
9	22.5	30.3	18.9	6.0	14.4	2.2	SSW	21.80	0.81	0.00
10	18.3	21.1	12.2	5.9	11.7	2.0	WNW	18.89	0.86	0.00
11	17.1	22.3	12.1	4.4	7.6	2.0	SSW	18.68	0.89	0.00
12	15.6	18.2	11.4	3.7	7.9	2.0	SSW	15.93	0.92	0.00
13	14.5	18.4	10.4	3.2	5.1	2.0	SSW	10.96	0.55	0.00
14	15.4	19.3	10.6	4.2	11.1	2.0	SSW	18.55	0.86	0.00
15	13.4	16.5	11.2	6.5	14.8	2.3	W	9.88	0.95	0.00
16	13.5	16.9	8.7	4.7	9.6	2.0	ESE	19.35	0.89	0.00
17	13.8	15.8	11.2	4.4	8.4	2.0	SSE	2.57	0.13	0.00
18	16.2	18.2	13.0	4.9	10.8	2.1	NW	18.22	0.97	0.00
19	14.3	15.4	12.4	5.5	11.6	2.0	NNE	2.81	0.19	0.00
20	14.4	16.1	12.3	8.3	14.7	2.0	NNW	13.56	1.10	0.00
21	17.0	20.6	12.8	7.1	13.4	2.2	S	14.58	0.87	0.00
22	15.7	17.9	12.0	4.7	9.8	2.2	NW	8.13	0.70	0.00
23	12.9	14.7	9.5	4.1	7.2	2.0	NE	15.88	0.85	0.00
24	13.0	16.9	8.5	3.7	7.0	2.1	SSW	18.42	0.87	0.00
25	14.4	19.4	9.5	4.1	11.2	2.0	SSW	18.63	0.75	0.00
26	14.4	19.3	11.3	5.6	10.6	2.0	S	12.17	0.82	0.00
27	13.2	14.6	12.2	3.7	7.1	2.1	ESE	2.00	0.15	0.00
28	14.0	16.0	12.8	3.9	8.1	2.1	ESE	4.78	0.39	0.00
29	13.6	15.4	11.8	5.6	9.4	2.0	NE	10.33	0.75	0.00
30	12.8	13.8	9.5	6.0	10.3	2.0	NNE	10.43	1.05	0.00

Frequency of Wind Direction

Date	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
1	0	0	1	1	0	0	0	13	43	45	7	3	0	2	2	0	117
2	17	2	8	6	2	0	0	0	0	2	0	0	0	16	28	25	106
3	0	2	6	6	10	17	9	2	8	9	2	1	0	0	0	0	72
4	5	3	3	1	0	0	0	0	4	13	2	0	1	5	10	15	62
5	0	0	1	2	1	3	5	13	45	35	7	0	2	1	0	0	115
6	0	0	0	0	0	0	0	6	75	62	1	0	0	0	0	0	144
7	0	0	0	0	0	0	0	2	52	67	10	0	0	0	0	0	131
8	0	0	23	15	4	5	2	2	12	28	0	1	0	0	0	0	92
9	0	0	0	0	0	0	0	0	37	54	20	6	6	12	5	1	141
10	8	0	0	0	0	0	0	1	11	10	16	4	20	32	17	19	138
11	0	0	0	0	0	2	7	23	45	52	7	1	0	0	0	0	137
12	1	15	9	11	7	5	1	2	4	18	15	5	10	11	5	1	120
13	5	5	4	1	0	2	3	11	33	41	5	0	0	0	0	1	111
14	7	7	15	7	1	2	0	0	5	17	12	2	8	9	0	4	96
15	4	0	0	0	0	0	0	0	0	1	12	11	49	41	15	6	139
16	0	1	5	4	4	18	9	17	16	10	1	4	12	5	7	2	115
17	0	0	0	4	19	22	28	44	15	0	0	0	0	0	0	0	132
18	2	14	6	8	5	2	1	1	2	2	0	0	3	18	31	12	107
19	9	27	15	5	7	11	10	5	0	1	0	0	1	3	2	7	103
20	30	3	1	0	1	0	1	2	10	3	0	0	0	0	0	62	113
21	0	0	0	0	1	1	3	20	66	26	0	1	0	1	2	3	124
22	27	25	15	1	0	0	0	0	0	0	4	0	2	3	32	31	140
23	1	8	27	11	7	1	0	1	4	4	2	0	5	21	8	12	112
24	4	8	10	5	1	5	6	1	28	32	0	0	0	0	0	0	100
25	0	0	3	18	8	4	9	7	29	37	2	0	0	0	0	0	117
26	0	0	0	0	0	1	1	13	58	56	2	1	1	0	0	0	133
27	0	0	0	2	18	41	32	4	0	0	0	0	0	0	0	0	97
28	0	0	0	0	4	56	53	10	2	0	0	0	0	0	0	0	125
29	5	28	37	15	3	10	8	6	0	0	0	0	0	0	0	3	115
30	26	62	30	3	1	1	0	0	3	4	0	0	0	0	0	2	132
Total	151	210	219	126	104	209	188	206	607	629	127	40	120	180	164	206	3486

October 1997 Kimuaneppu, Saroma-ko Lagoon

Date	Air Temperature			Wind				Solar Radiation		
	Mean °C	Max. °C	Min. °C	Mean m/s	Max. m/s	Min. m/s	Most Freq. Dir.	Cumulative MJ/m <sup>2</sup>	Max. kW/m <sup>2</sup>	Min. kW/m <sup>2</sup>
1	12.0	15.2	7.8	3.7	7.0	2.0	S, SSW	18.83	0.76	0.00
2										
3										
4	16.3	18.6	14.7	9.2	15.6	5.2	S	6.17	0.35	0.00
5	14.0	15.7	12.4	6.2	11.2	2.0	NNW	2.69	0.14	0.00
6	10.8	12.6	5.8	6.2	11.5	2.0	N	17.75	0.75	0.00
7	11.5	17.1	6.1	6.6	14.4	2.2	S	12.50	0.75	0.00
8	13.5	20.3	8.0	8.2	16.8	2.2	S	7.06	0.74	0.00
9	8.0	11.1	4.9	8.0	18.5	2.1	WNW	9.03	0.79	0.00
10	15.2	19.9	10.2	8.1	13.4	2.2	S	15.90	0.82	0.00
11	12.5	17.5	6.6	6.0	12.7	2.1	S	3.38	0.32	0.00
12	7.9	11.7	2.6	5.3	13.2	2.0	S	12.31	0.78	0.00
13	7.1	10.8	2.6	5.3	11.2	2.0	W	11.25	0.68	0.00
14	9.3	11.5	4.5	7.3	13.4	2.0	WNW	7.03	0.46	0.00
15	7.7	11.2	3.6	3.7	7.0	2.0	E	10.26	0.75	0.00
16	8.5	12.1	3.3	3.1	6.2	2.0	SSW	15.53	0.66	0.00
17	11.2	15.5	7.2	6.0	12.6	2.3	S	7.28	0.63	0.00
18	13.1	18.7	6.6	6.7	13.0	2.0	W	8.81	0.69	0.00
19	12.1	16.0	7.0	4.5	10.1	2.0	S	7.85	0.70	0.00
20	13.2	15.9	9.1	6.7	15.1	2.1	S	5.99	0.67	0.00
21	12.1	19.2	7.2	8.0	15.3	2.3	S	12.03	0.64	0.00
22	9.7	12.9	5.0	7.1	16.2	2.0	W	15.11	0.69	0.00
23	9.6	17.0	4.9	4.2	7.6	2.1	SSW	14.02	0.61	0.00
24	12.5	18.3	5.8	3.4	6.0	2.0	S	11.70	0.56	0.00
25	10.4	13.4	5.2	7.3	13.7	2.0	NW	1.89	0.15	0.00
26	4.4	6.4	0.9	4.8	11.7	2.0	SW	6.64	0.55	0.00
27	6.1	8.9	2.1	9.4	18.8	2.1	WNW	8.11	0.65	0.00
28	7.9	9.8	5.5	6.0	13.0	2.0	W	10.78	0.64	0.00
29	7.3	10.4	4.0	3.9	7.9	2.0	ENE	7.20	0.65	0.00
30	11.3	16.5	7.5	5.6	10.9	2.1	S	10.81	0.66	0.00
31	7.4	10.9	3.0	3.7	9.9	2.0	S	5.48	0.53	0.00

Frequency of Wind Direction

Date	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
1	0	0	11	20	4	9	6	6	24	24	2	0	0	0	0	0	106
2																	
3																	
4	0	0	0	0	0	0	0	0	88	56	0	0	0	0	0	0	144
5	31	2	0	0	0	0	0	0	3	10	7	0	1	4	15	57	130
6	56	12	3	0	0	0	0	0	2	21	1	0	0	0	1	41	137
7	0	0	0	0	0	0	5	30	77	23	1	0	0	0	0	0	136
8	0	0	0	0	0	0	0	12	58	8	6	0	5	27	13	15	144
9	0	0	0	0	0	0	1	4	13	16	12	17	26	36	2	0	127
10	0	0	0	0	0	1	0	11	67	62	1	0	0	0	0	0	142
11	0	0	0	0	0	1	2	11	41	22	2	1	0	2	19	20	121
12	11	7	6	4	3	6	4	6	28	13	6	2	9	10	4	9	128
13	0	0	0	0	0	0	0	1	12	26	12	17	31	25	8	0	132
14	26	11	3	0	0	0	0	0	3	4	5	11	24	28	8	8	131
15	0	1	1	19	21	5	11	5	8	13	8	0	0	0	0	0	92
16	3	5	3	4	1	4	1	12	20	23	1	0	1	9	3	4	94
17	0	0	0	0	0	0	0	4	98	37	3	0	0	0	0	0	142
18	3	0	0	0	0	0	0	3	29	26	15	18	35	5	3	0	137
19	0	0	0	2	6	2	1	11	47	20	19	14	4	1	0	0	127
20	0	0	0	0	0	2	6	16	50	16	11	11	7	6	1	1	127
21	0	0	0	1	0	3	9	16	45	7	8	21	7	9	5	8	139
22	0	0	0	0	0	1	6	8	20	10	11	14	38	27	0	0	135
23	0	0	4	15	12	5	9	13	14	21	10	2	1	0	0	0	106
24	0	0	1	6	12	13	11	22	23	19	6	2	2	0	0	0	117
25	4	2	0	0	6	3	1	0	16	8	1	10	19	18	32	7	127
26	0	1	1	0	1	1	2	3	2	18	25	14	21	15	16	3	123
27	11	0	0	0	0	0	1	2	5	9	10	9	27	31	2	26	133
28	13	5	2	0	0	3	3	2	1	0	1	1	26	19	12	21	109
29	0	0	8	21	8	5	10	7	8	6	3	0	0	0	0	0	76
30	0	0	0	0	0	2	6	13	45	15	9	1	1	5	3	0	100
31	3	2	1	0	4	8	6	11	18	10	16	9	0	2	8	4	102
Total	161	48	44	92	78	74	101	229	865	543	212	174	285	279	155	224	3564

November 1997 Kimuaneppu, Saroma-ko Lagoon

Date	Air Temperature			Wind				Solar Radiation		
	Mean °C	Max. °C	Min. °C	Mean m/s	Max. m/s	Min. m/s	Most Freq. Dir.	Cumulative MJ/m <sup>2</sup>	Max. kW/m <sup>2</sup>	Min. kW/m <sup>2</sup>
1	4.5	7.2	1.1	4.7	10.1	2.0	NNW	4.18	0.50	0.00
2	6.6	11.7	1.9	3.9	7.5	2.1	SSW	12.49	0.57	0.00
3	9.7	16.5	5.0	4.3	7.6	2.1	S	12.50	0.57	0.00
4	9.7	13.0	5.5	3.9	7.1	2.1	S	7.49	0.64	0.00
5	8.5	10.5	6.4	3.2	4.8	2.0	NNE	4.93	0.57	0.00
6	8.3	10.1	6.2	3.9	9.8	2.0	N	5.67	0.60	0.00
7	5.0	7.5	1.1	7.5	16.0	2.2	WNW	10.21	0.68	0.00
8	5.4	7.2	2.2	7.6	13.2	2.0	WNW	2.90	0.23	0.00
9	3.5	5.9	0.3	6.0	11.6	2.1	NNW	7.83	0.64	0.00
10	5.8	12.5	0.1	4.0	7.5	2.0	S	11.38	0.53	0.00
11	8.2	15.4	4.2	3.3	6.3	2.0	SSW	10.10	0.51	0.00
12	8.7	16.0	4.5	7.6	19.9	2.0	S	5.00	0.50	0.00
13	4.0	5.7	0.7	6.5	15.3	2.0	WNW	4.88	0.59	0.00
14	6.5	11.8	1.1	6.2	10.4	2.1	S	9.64	0.54	0.00
15	8.9	11.1	7.7	4.7	9.4	2.0	S	3.13	0.17	0.00
16	7.4	8.3	6.0	3.3	5.2	2.0	NW	3.25	0.22	0.00
17	6.2	7.0	5.4	3.4	6.0	2.0	E	1.61	0.14	0.00
18	5.8	7.5	3.7	9.6	15.7	2.3	NNW	3.59	0.28	0.00
19	3.6	6.2	0.8	6.1	14.0	2.0	NW	6.70	0.57	0.00
20	5.1	8.3	1.1	3.8	7.2	2.0	S	5.41	0.49	0.00
21	8.2	13.1	3.9	3.9	8.1	2.0	S	9.57	0.48	0.00
22	6.9	9.1	5.1	5.0	11.6	2.0	NNE	1.07	0.07	0.00
23	3.0	5.5	1.8	14.4	19.4	8.9	NNW	0.92	0.05	0.00
24	1.2	3.2	-0.5	6.6	13.0	2.0	W	7.73	0.65	0.00
25	4.3	7.8	-0.1	7.9	12.7	2.3	SE, SSE	7.03	0.42	0.00
26	11.4	17.1	5.9	7.5	17.0	2.0	S	1.98	0.23	0.00
27	9.9	20.0	2.3	8.5	15.5	2.7	N	5.53	0.49	0.00
28	1.2	2.8	-0.7	6.9	15.3	2.0	NW	9.00	0.47	0.00
29	3.7	7.6	-2.3	4.6	9.8	2.0	SSE	4.98	0.45	0.00
30	4.0	6.1	1.4	11.1	19.2	2.2	NW	1.47	0.14	0.00

## Frequency of Wind Direction

Date	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
1	8	1	0	0	0	0	2	6	8	15	10	4	11	16	12	17	110
2	0	3	16	4	3	4	4	6	31	41	5	2	0	0	0	0	119
3	0	0	0	0	0	0	0	7	52	25	25	9	7	4	4	4	137
4	0	0	2	7	2	1	3	3	25	13	3	0	6	13	2	0	80
5	14	16	13	13	1	2	2	0	5	0	1	0	0	2	11	9	89
6	20	9	1	0	0	0	0	0	0	5	6	5	18	14	12	9	90
7	2	0	0	0	0	1	1	6	12	9	3	9	28	53	16	4	144
8	13	1	0	0	0	0	0	1	10	4	1	7	27	38	20	22	144
9	11	0	0	0	0	0	0	0	3	26	5	7	12	21	17	37	139
10	0	0	0	0	0	2	7	11	49	43	10	1	0	0	0	0	123
11	0	3	5	0	0	0	2	11	37	40	3	3	0	0	0	0	104
12	0	0	0	1	0	1	1	6	44	25	7	6	5	37	6	0	139
13	22	4	1	0	0	0	2	6	10	16	0	0	3	45	10	10	129
14	0	0	0	0	3	1	9	15	72	29	1	0	0	0	0	0	130
15	0	1	2	5	5	3	12	18	28	5	2	0	3	23	16	0	123
16	0	0	6	4	0	0	0	0	0	0	0	0	0	18	32	5	65
17	0	14	7	11	22	1	1	0	0	0	1	0	0	2	0	0	59
18	3	4	22	4	2	0	0	0	0	0	0	3	11	13	35	45	142
19	0	0	1	0	0	1	0	4	7	6	9	1	6	31	36	11	113
20	0	2	1	2	2	2	9	19	41	31	5	0	1	0	0	0	115
21	0	1	0	0	2	2	5	24	56	17	9	1	0	0	0	0	117
22	22	42	6	2	1	0	0	3	9	4	1	0	2	11	6	2	111
23	35	31	7	0	0	0	0	0	0	0	0	0	0	0	18	53	144
24	0	2	0	3	7	2	4	6	9	11	4	1	27	22	26	10	134
25	0	0	1	5	9	12	34	34	23	21	5	0	0	0	0	0	144
26	0	0	0	1	2	5	6	33	68	20	4	0	0	0	0	0	139
27	33	4	0	0	0	0	1	6	26	17	5	3	1	6	20	22	144
28	7	3	5	4	5	2	1	6	6	1	0	0	1	27	31	15	114
29	0	0	0	8	14	19	15	25	19	18	5	1	1	0	0	0	125
30	0	0	0	0	0	0	0	0	0	0	0	1	9	40	66	24	140
Total	190	141	96	74	80	61	121	256	650	437	129	65	166	440	398	302	3606