Some aspects of the glaciology of the marr ice piedmont, Anvers Island, Antarctica

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SOME ASPECTS OF THE GLACIOLOGY OF THE MARR ICE PIEDMONT, ANVERS ISLAND, ANTARCTICA.

By

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APPENDIX

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ABSTRACT

The results of a comprehensive three-year study of the Marr Ice Piedmont, Anvers Island, Antarctica are presented.

The piedmont stands on a low coastal platform ranging from slightly below sea level to 200 m. a.s.l. Ice thickness ranges from 60 to 80 m. at the coastal cliffs to more than 600 m. inland.

Annual accumulation is high. There is a strong relationship between elevation and accumulation rates and a marked variation of accumulation rates from year to year.

Surface ice velocities range from 14 m/year to 218 m/year and there is considerable ice streaming as a result of the subglacial topography.

The mass balance of a representative part of the piedmont is considered to be in equilibrium or possibly, slightly positive. A study of a peripheral ramp shows annual fluctuations of balance and it is hypothesised that there may be a long-term tendency towards a positive regime.

Ice core studies indicate that there is no dry snow facies but all other facies are identified. The saturation line lies at approximately 600 m. a.s.l. and the equilibrium line ranges from 60 to 120 m. a.s.l.

Englacial ten-metre temperatures range from -0.8 °C near the coast to -4.9 °C inland.

Deformation velocities have been calculated and basal sliding velocities inferred. It is hypothesised that basal conditions are not everywhere the same and that parts of the piedmont are frozen to bedrock.

It is suggested that basal sliding and erosion are related and that the piedmont is selectively eroding its bed and accentuating the subglacial topography. Evidence of erosion, debris-rich ice, exists in the piedmont but is below sea level at the coastal cliff. The piedmont is not a "Strandflat Glacier" which is cutting a planed surface at a level controlled by the sea.

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METEOROLOGICAL INSTRUMENTATION

Instrument Type	Height	From	To
Maximum Thermometer, Liquid-in-Glass, Wexler, USWB	2.0 m.	2/1/65	12/31/67
Minimum Thermometer, Liquid-in-Glass, Wexler, USWB	2.0 m.	2/1/65	12/31/67
Thermometer, Exposed Spirit, Liquid-in-Glass, Wexler, USWB.	2.0 m.	2/1/65	12/31/67
Psychrometer, Liquid-in-Glass, Wexler, USWB	1.25 m.	2/1/65	12/31/67
Thermograph, Bendix Friez, 7-day, USWB	1.75 m.	2/1/65	12/31/67
Anemometer, Portable, USN	2.25 m.	2/1/65	12/31/67
Wind Recorder, Mechanical, Lambrech Mod. 1482, 31-day	10.0 m.	2/1/65	12/31/67
Barograph, Bendix Friez, 4-day, USWB	1.75 m.	2/1/65	12/31/67
Barometer, Precision Aneroid, Wallace and Tiernan	1.75 m.	2/1/65	12/31/67
Rain Gauge, 8-inch, Nonrecording, USWB	1.0 m.	2/1/65	12/31/65
Rain Gauge, 12-inch Shielded, Automatic-Weighing	3.7 m.	1/1/66	12/31/67

Fig. 1. Meteorological Facility at Palmer Station. (Photo by L.E. Brown)

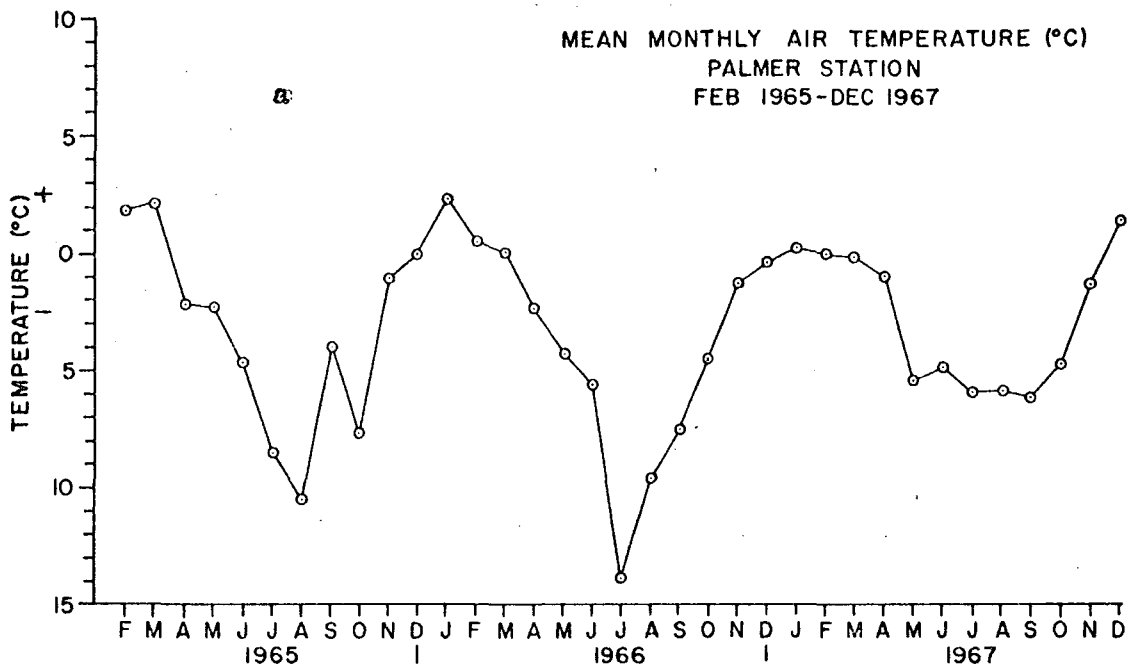
has the effect of counteracting any tendency for the temperature to depart appreciably from 0 °C. During the austral summer diurnal fluctuations are frequently only one or two degrees and rarely as much as ten degrees (O. Orheim, personal communication, Deception Island; Burdecki 1957; Rundle et al 1968; Rundle and DeWitt 1968).

Annual Temperature Variation

The annual temperature variation at Palmer Station is shown in the plot of mean monthly air temperature (Fig. 3a). Generally, the curve shows a clear and simple pattern of seasonal variation. The prominent reversal in the temperature trend in September 1965 is associated with the general storminess of that month but it cannot be related to a single meteorological parameter alone. The mean wind speed in September was 12.9 knots (6.6 m/sec) while that for October was 10.0 knots (5.1 m/sec); but the mean temperature for October does not appear to be anomalous. Wind direction is also significant. Over 47 percent of the wind in September was from the north and northeast and was associated with relatively high temperatures; the mean temperature of the north wind, which accounted for 13.5 percent of the total, was 1.0 °C.

The low mean temperature in July 1966 is exceptional in this record and is accountable by the relatively high percentage (12%) of winds from the south-southeast through south-southwest, bringing cold air with a mean temperature of -22 °C.

When compared with the two previous years, 1967 experienced a slightly cooler summer which can be related to a greater prevalence


a
MEAN MONTHLY AIR TEMPERATURE (°C)
PALMER STATION
FEB 1965-DEC 1967
TEMPERATURE (°C)
10
5
+
0
5
10
15
F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1965
1966
1967

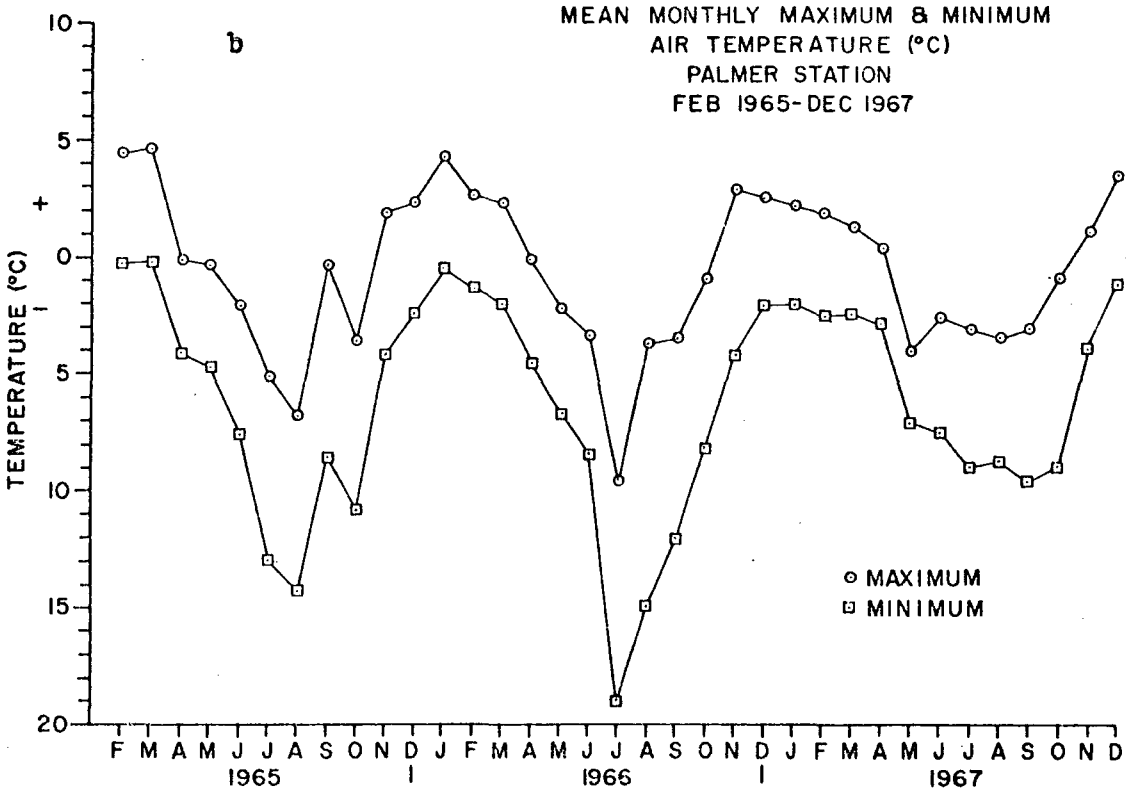

b
MEAN MONTHLY MAXIMUM & MINIMUM
AIR TEMPERATURE (°C)
PALMER STATION
FEB 1965-DEC 1967
TEMPERATURE (°C)
10
5
+
0
5
10
15
20
MAXIMUM
MINIMUM
F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1965
1966
1967

Fig. 3.

of winds from the southern quadrants and a paucity of winds from the northern quadrants. The extremely mild winter of 1967 may be attributable simply to the reversal of these wind conditions during the winter but southerly winds were no less prominent during that winter than during the previous years, suggesting that widespread temperature conditions in the peninsula area were milder and that the climate throughout the year was more maritime, perhaps the result of relatively less intense sea ice cover. The curves of the mean maximum and minimum temperatures (Fig. 3b) emphasise the difference in temperature regime during the three years and indicate that the mildness of the 1967 winter was more the result of higher minimum temperatures than of higher maximum temperatures, again suggesting a diminished degree of continentality in 1967. The intensity of the 1967 winter was only 50 to 75 percent that of the two previous years.

Temperature Conditions on the Marr Ice Piedmont

A remote meteorological facility was established on the piedmont on April 15 1965 at an elevation of 300 m. (approx. 1000 feet). It had previously been set up at 600 m. elevation (approx. 2000 feet) in February, but because of difficulty in properly servicing the instruments at that elevation, the facility had to be moved. No reliable data were obtained from the higher elevation.

Temperature data obtained from the 300 m. elevation are summarised below. Throughout the period of investigation, the mean monthly air temperature never exceeded or reached 0 °C.

Direct comparison of the remote temperature data with those from

Palmer Station is not possible, because the remote record is not as complete as that from the main station. For comparative use (Table I), the Palmer Station record has been adjusted so that the only values considered are for days when remote values also are available. Therefore, the main station values in Table I differ slightly from those tabulated below in Part 3 of this Appendix.

Lapse Rate

On the basis of 12 month data (for 1966 only) the lapse rate is approximately 0.75 °C per 100 meters elevation increase, while on the basis of 9 months data (3 years), the rate is 1.0 °C per 100 m. These values approximate the accepted "normal" values.

MEAN MONTHLY AIR TEMPERATURE (°C)
(300 m. Elevation)

1965

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
-	-	-	-4.8	-5.6	-8.6	-11.8	-15.1	-6.9	-10.9	-3.2	-3.3

Mean (9 Mo): -7.8

1966

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
-1.4	-2.1	-3.0	-4.6	-7.4	-8.1	-16.7	-9.6	-8.6	-6.2	-3.1	-1.7

Mean (12 Mo): -6.0
Mean (9 Mo): -7.3

1967

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
-	-	-	-5.2	-10.7	-10.7	-9.1	-10.3	-10.2	-7.4	-4.3	-0.7

Mean (9 Mo): -7.6

TABLE I

MEAN MONTHLY AIR TEMPERATURE
PALMER AND REMOTE STATIONS

Adjusted for Number of Days
(°C)

	1965			1966			1967		
	Palmer	Remote	Diff	Palmer	Remote	Diff	Palmer	Remote	Diff
JAN				1.5	- 1.4	2.9			
FEB				0.3	- 2.1	2.4			
MAR				0.0	- 3.0	3.0			
APR	- 2.0	- 4.8	2.8	- 2.3	- 4.6	2.3	- 1.0	- 5.2	4.2
MAY	- 2.5	- 5.6	3.1	- 4.3	- 7.4	3.1	- 5.4	-10.7	5.3
JUN	- 5.5	- 8.6	3.1	- 6.0	- 8.1	2.1	- 6.4	-10.7	4.3
JUL	- 8.5	-11.8	3.3	-13.8	-16.7	2.9	- 5.0	- 9.1	4.1
AUG	-11.7	-15.1	3.4	- 7.5	- 9.6	2.1	- 4.9	-10.3	5.4
SEP	- 3.6	- 6.9	3.3	- 7.4	- 8.6	1.2	- 6.8	-10.2	3.4
OCT	- 8.1	-10.9	2.8	- 4.5	- 6.2	1.7	- 4.9	- 7.4	2.5
NOV	- 1.5	- 3.2	1.7	- 1.3	- 3.1	1.8	- 1.3	- 4.3	3.0
DEC	- 0.1	- 3.3	3.4	0.4	- 1.7	2.1	1.4	- 0.7	2.1
MEAN	- 4.8	- 7.8	3.0	- 5.2	- 7.3	2.1	- 3.8	- 7.6	3.8

1965	1966	1967	
-7.8	-7.3	-7.6	Remote (9 months) Mean
-4.8	-5.2	-3.8	Palmer (9 months) Mean
3.0	2.1	3.8	Difference; 9 months
	-6.0		Remote (12 months) Mean
	-3.7		Palmer (12 months) Mean
	2.3		Difference: 12 months

Average Difference (9 months) 3.0 °C = 1.0 °C/100 m.
Average Difference (12 months) 2.3 °C ≈ 0.75°C/100 m.

Temperature and Wind Direction

On the basis of the 35-month record of daily mean temperature and mean wind direction, the relationship between temperature and direction is well defined. The individual annual records however, indicate variations which are probably related to widespread geoclimatic factors. The mean temperature for each wind direction is given below.

MEAN TEMPERATURE (°C) AND WIND DIRECTION AT PALMER STATION, 1965 to 1967

	DIR	N	NNE	NE	ENE	E	ESE	SE	SSE
TEMP	1965	-1.8	-2.5	-2.0	-2.3	-4.4	-3.4	-5.1	-3.0
	1966	-4.1	-3.9	-3.8	-7.2	-3.1	-4.0	-5.6	-4.0
	1967	-1.8	____	-5.1	____	-4.3	____	-2.7	____
MEAN		-2.6	-3.2	-3.6	-4.4	-3.9	-3.7	-4.5	-3.5
	DIR	S	SSW	SW	WSW	W	WNW	NW	NNW
TEMP	1965	-5.3	-6.5	-2.1	-4.3	-3.4	-2.4	-2.6	-2.4
	1966	-4.7	-7.6	-4.5	-3.6	-4.0	-5.2	-4.1	-4.3
	1967	-3.9	____	-4.6	____	-5.3	____	-3.1	____
MEAN		-4.6	-5.0	-3.7	-3.9	-4.2	-3.8	-3.3	-3.6

Generally, the lowest temperatures were recorded when the wind was from the southeast through southwest, though in 1967 the west and northeast winds were the coldest. The cold northeast wind during that year may have resulted simply from cold air being brought across the peninsula from the Larsen Ice Shelf and the Weddell Sea but the cold west wind is difficult to understand unless it was related to heavy pack ice concentrations in the Armundsen and northern Bellingshausen Seas. The climatic continentality of 1966 is reflected by the markedly lower temperatures for all winds with only 3.6 °C separating

the coldest wind from the warmest.

These southerly winds are best described as "semi-continental" in that they transport cold air from the Antarctic mainland and the pack-ice concentrations of the Bellingshausen Sea. In contrast, the northerly winds are "maritime", are usually associated with severe storm conditions and are significantly warmer than the southerly winds. Thus the basic relationship between temperature and wind direction is geographic - maritime versus continental - with the extreme low temperatures occurring with southerly (continental) winds and the extreme highs with the northerly (maritime) winds.

Temperature and Wind Speed

Only to a degree is there a relationship between temperature and wind speed and this is marked only in the winter months when prevailing low temperatures, with associated low wind speeds, are increased with the onset of northerly, high-speed storm winds. It is therefore, more a function of the wind direction than the wind speed that the temperature increases, though as a generalisation, low temperatures, particularly in winter, are not associated with high wind speed.

Temperature and Storm Conditions

The climate of Anvers Island and the Antarctic Peninsula as a whole is characterised by an almost continual progression of cyclonic storms. Only in the height of summer, during January and February, does this general storminess abate. Cyclonic storms over Anvers Island are generally of short duration and though violent, are much less so than in other parts of Antarctica and the Antarctic Peninsula. They

originate in the Armundsen and Bellingshausen Seas to the west and follow an easterly and southeasterly track across the peninsula and weaken and dissipate over the Weddell Sea. Abrupt changes in temperature are associated with storm conditions and the interaction of the various meteorological parameters is strongly evident.

A typical storm occurred in mid-August 1965 when, on August 17, extremely low temperatures prevailed under dead calm conditions and clear sky (Fig. 4). Atmospheric pressure was steadily increasing from a previous low. An initial temperature increase of 10 °C in 15 hours resulted from a gradual cloud buildup and fogginess, with associated light snowfall, reflecting the approach of the warm storm front. A further temperature increase of 3.6 °C in two hours was associated with a light wind of 2.1 m/sec (4.0 knots) from the north-northwest. Temperature then again decreased under partially clearing sky. During this period winds were light and variable at about 1.0 m/sec (2.0 kts) but were turbulent, with no definite, sustained direction; such being typical of pre-storm conditions at Palmer Station. Meanwhile, air temperature showed a normal diurnal variation with the maximum at 10 am. and 11 am. (local time, August 18).

A sudden and violent fall in pressure resulted in the onset of wind which accelerated from less than 1.0 m/sec to 27.5 m/sec (50 knots) in five hours. This was initially from the east but swung rapidly to the north-northeast. This was the maritime wind and caused a temperature increase of 22 °C in 12 hours, with the largest hourly element of 4.5 °C. The temperature continued to increase with decr-

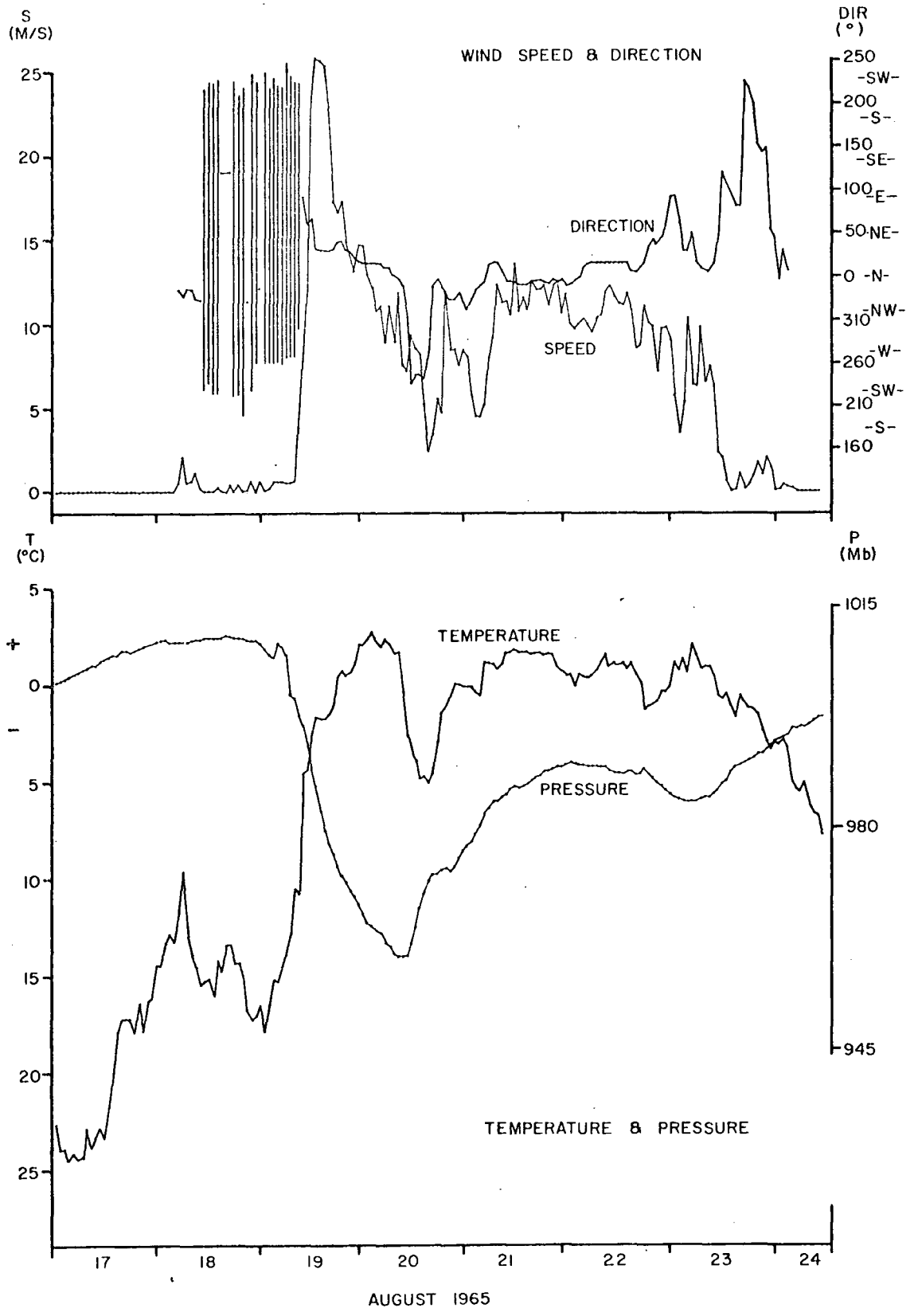


Fig. 4. Anatomy of cyclonic storm of mid-August 1965

easing wind speed, but with direction sustained in the north-northeast. Temperatures did not fall until the wind shifted to the west and southwest. Wind-shift back to the north-northwest to north-northeast restored and maintained the high temperature, which did not decrease again until the wind moved through the east and south to southwest and decreased in speed.

The elements of this storm indicate a close relationship between air temperature and wind direction and an incidental, though less pronounced, correlation between temperature and wind speed. Wind speed itself however, is not a temperature governing factor, while direction is, irrespective of wind speed.

ATMOSPHERIC PRESSURE

The plot of mean daily atmospheric pressure (Fig. 5) and mean monthly atmospheric pressure (Fig. 6) indicate that there is no systematic seasonal pattern in the occurrence-distribution of pressure at Palmer Station. Only a loose generalisation holds: that relatively low pressure might be expected in March or April and between September and November, and that high pressures are more likely to occur between June and August and again in January or February.

Distinct seasonal patterns of pressure distribution have been reported from other areas of the Antarctic (for example, Hofmeyr 1957; McDowall 1960; Cameron 1963) with the form of the periodic cycle being dependent on latitudinal position relative to the deep circumpolar pressure trough at approximately 64 °S latitude, which sep-

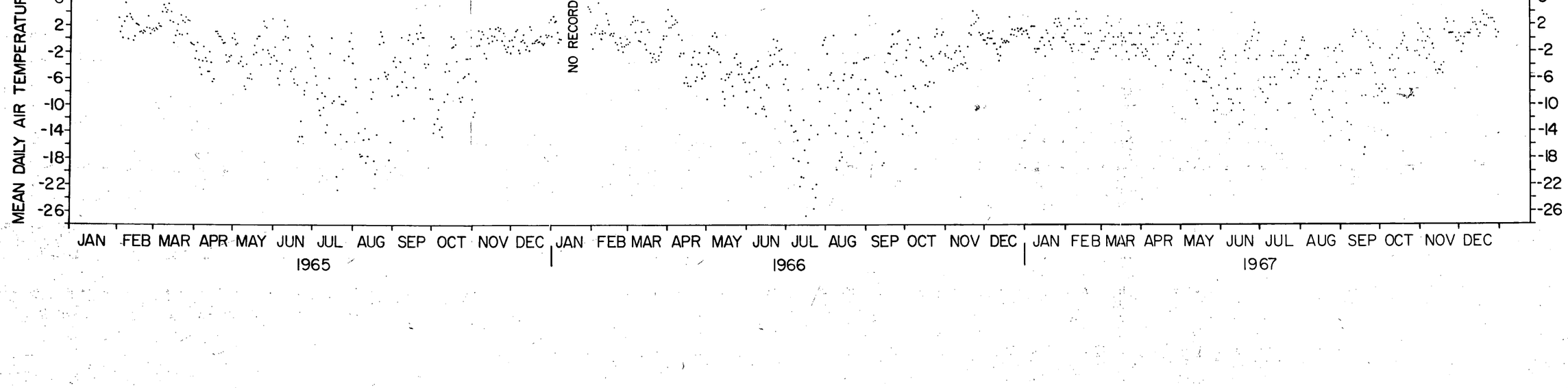


Fig. 2. Mean daily air temperature

APPENDIX I: Part 1

METEOROLOGICAL CONDITIONS AT PALMER STATION

TEMPERATURE

General

Air temperatures at Palmer Station are influenced by several factors which, though they all have some effect on the temperature regime, some are not readily identified and are difficult to correlate, while others are well defined.

The altitude of the sun (time of year) and cloudiness have marked effects, but the progression of low pressure systems from west to east out of the Bellingshausen and Amundsen Seas, with associated, and frequently sudden changes in wind direction and speed, results in the most significant variations in temperature. These effects are most pronounced during the winter months when the buildup of sea ice over the surrounding oceans produces a degree of continentality to the regional climate.

The mean temperature for the 35-month period from February 1965 to December 1967 was -3.3 °C. and while the mean annual temperature for 1965 and 1966 were similar (-3.6 °C and - 3.8 °C respectively), 1967 was warmer with a mean annual value of -2.8 °C. This latter value resulted from an extremely mild winter, the effects of which were not offset by a slightly cooler summer. The documentation of sea ice cover in the peninsula area is limited, but the difference in temperature during the 1967 winter may have been the result of a

less intense sea ice cover compared with the two previous years.

The occurrence of the coldest and warmest months varied considerably from year to year; August was the coldest month of 1965 with a mean temperature of -10.5 °C but the absolute minimum temperature of -28.1 °C was recorded on October 3. The coldest day was July 19, with a mean temperature of -22.8 °C. The warmest month of that year was March with a mean temperature of 2.1 °C and the absolute maximum on March 8 was 7.9 °C. The warmest day of 1965 however, was February 6 when the mean temperature reached 5.4 °C.

Temperature conditions during 1966 were similar but the coldest month was July with a mean temperature of -13.8 °C and the absolute minimum of -29.5 °C was recorded on July 16. This also was the coldest day of 1966 with a mean of -26.7 °C. The warmest month was January with a mean of 1.3 °C and January 9 was the warmest day of the year with a mean temperature of 4.9 °C. The absolute maximum was 9.0 °C on November 22 which was also the absolute maximum temperature recorded during the entire 35-month period.

A very mild winter prevailed in 1967 with September the coldest month with a mean of -6.2 °C. The coldest day was September 18 with a mean of -17.8 °C and on that day also the absolute minimum of -21.1 °C was recorded. December was the warmest month with a mean of 1.3 °C and the absolute maximum of 7.2 °C was recorded on December 11 and 19. The warmest day was February 6 with a mean temperature of 3.9 °C.

Diurnal Temperature Fluctuations

Diurnal temperature fluctuations are shown in the plot of mean daily air temperature (Fig. 2). There is a pronounced seasonal pattern with a markedly lower range of diurnal fluctuation occurring during the summer months. During winter, day-to-day temperature fluctuations over a range of 8 to 10 degrees are common and are occasionally recorded over a range of 12 to 14 degrees. In any winter month between June and September the difference between the lowest and the highest mean daily air temperature can exceed 25 °C, while in summer from December to March, it is only one or two degrees.

The wider range of daily temperatures in winter can best be ascribed to the passage of low pressure systems which cause relatively warm northerly air to be drawn into the central peninsula region. According to Burdecki (1957) in a summary of the climate of the Antarctic Peninsula, diurnal temperature fluctuations are greatest in September because the border of the sea ice shifts rapidly south and because of increasing solar insolation, though the observations from Palmer Station do not offer strong support for this suggestion.

Throughout the peninsula the most regular temperature distribution occurs during the summer months when, according to Burdecki (1957), the modal temperature very nearly coincides with the mean temperature and the standard deviation of temperature is remarkably small. The low values of standard deviation was ascribed by Burdecki (1957) primarily to the fact that in summer the mean temperature lies very near to the melting point of ice and that the latent heat of ice formation

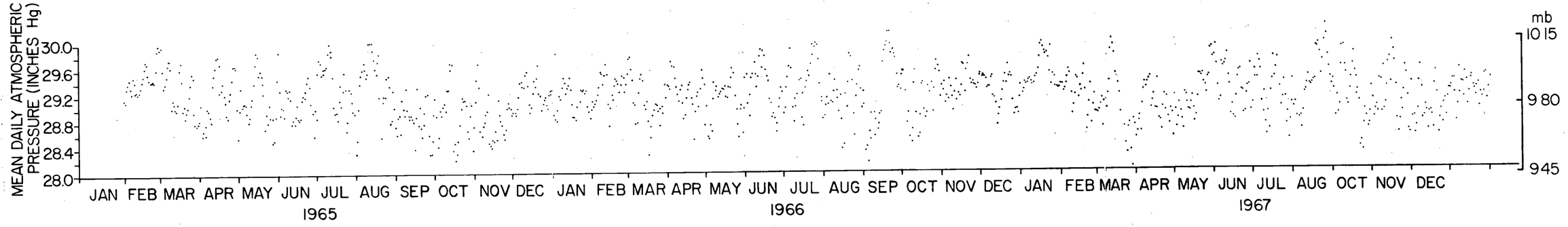


Fig. 5. Mean daily atmospheric pressure

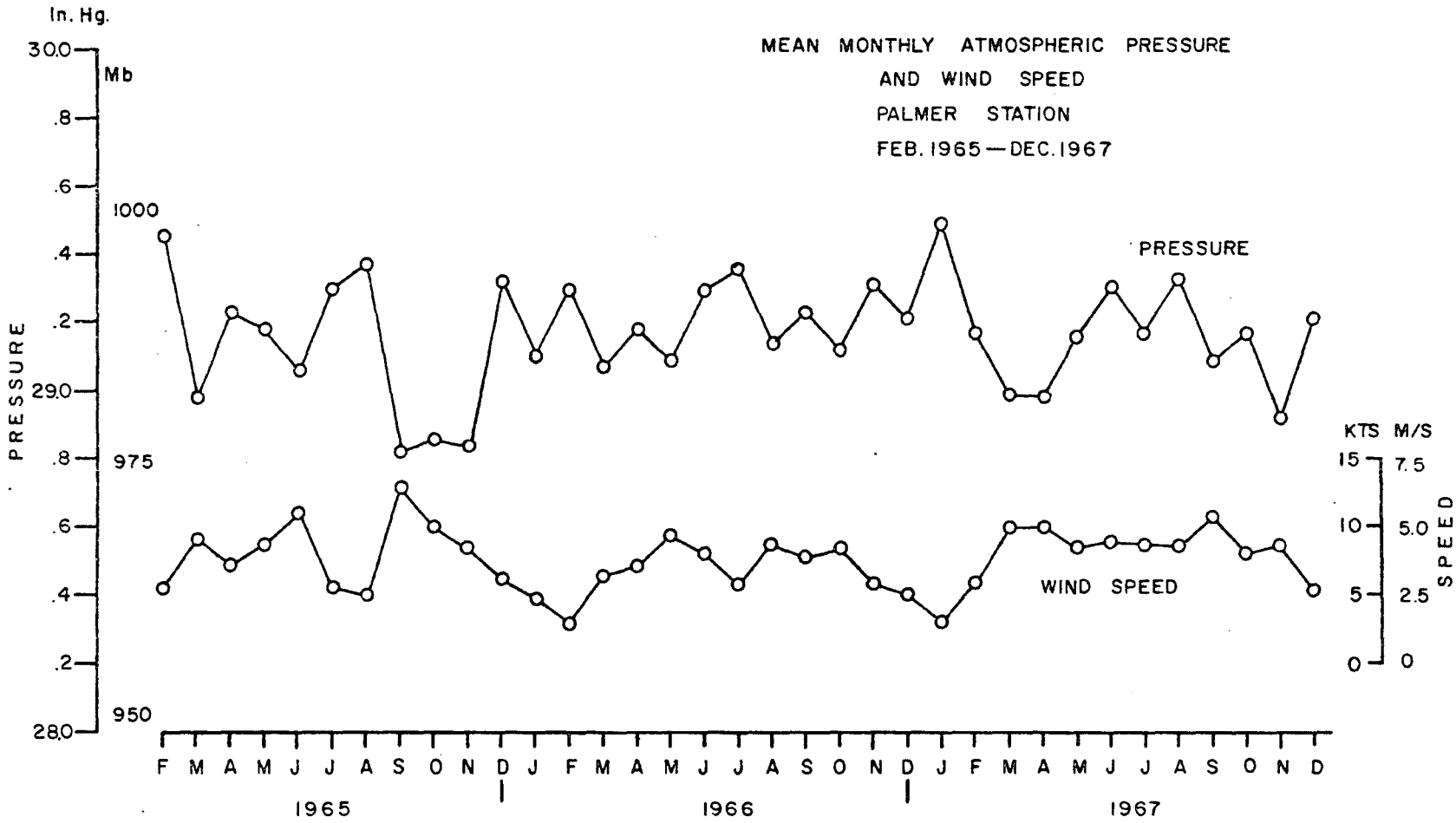

MEAN MONTHLY ATMOSPHERIC PRESSURE
AND WIND SPEED
PALMER STATION
FEB. 1965 — DEC. 1967
In. Hg.
30.0
.8
.6
.4
.2
29.0
.8
.6
.4
.2
28.0
Mb
1000
975
950
PRESSURE
PRESSURE
WIND SPEED
KTS M/S
15
10
5
0
7.5
5.0
2.5
0
SPEED
F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1965
1966
1967

Fig. 6.

arates the high pressure systems of temperate latitudes and the well defined polar anticyclone (Hofmeyr 1957).

North of the trough a clearly defined pattern of annual pressure distribution exists with higher pressure being recorded about June and November and the lower pressures about March and September. South of the trough the reverse is true, with the highs around March and August to September and the lows in June and December. Thus the virtual lack of systematic pressure distribution at Palmer Station can best be related to the fact that Palmer Station lies within the trough, across which all relationships and correlations are poor (Hofmeyr 1957).

The average pressure at Palmer Station during the 35-month period was 987.7 mb with only a fractional variation from one year to the next; in 1965 the average pressure was 986.4 mb; in 1966, 988.9 mb. and in 1967, 987.6 mb. The slightly higher pressure of 1966 again reflects a more continental character to the climate in that year compared with the other two. The extreme maximum pressure was 1022.9 mb. recorded on August 25 1967 and was associated with sustained periods of clear sky, relatively low temperatures and very light winds. The extreme minimum pressure of 939.7 mb. was associated with the latter part of a violent storm and was recorded on September 4 1966.

As a generalisation only, months with low pressure were months with high winds and months with high pressure were months with low winds and sustained calms (Fig.6).

WIND

General

Winds at Palmer Station are generally light but persistent with a marked decrease in frequency of occurrence with increase in velocity class (Fig. 7). They are variable in direction but predominently northerly. High winds from the north-northwest through north-northeast are associated with cyclonic storms, while lighter winds occur from all directions. Rarely are high winds recorded from the southern quadrants.

The mean wind speed for the 35-month period was 3.85 m/sec (7.5 knots) and 1967 had the highest mean annual wind speed of 4.1 m/sec (8.0 knots). The mean for 1966 was 3.45 m/sec (6.7 knots) and that for 1965 was 4.05 m/sec (7.9 knots). The percentage calm in 1965 was 19.4, and in 1966, 11.4, giving an average calm for the 23-month period of 15.4 percent. Data on calm are not included in the available 1967 record.

The mean monthly wind speed (Fig. 6) ranged from 1.5 m/sec (3.0 knots) in February 1966 to 6.65 m/sec (12.9 knots) in September 1965. The highest hourly wind speed was 25.75 m/sec (50.1 knots), recorded on August 19 1965. Peak gust data are not available due to the method of recording but it is unlikely that the strongest gusts reached 40 m/sec (approximately 75 knots).

The mean monthly wind speed data show a general tendency toward lighter winds in summer and high winds during the winter months with peak values around September. This trend is typical of Antarctic

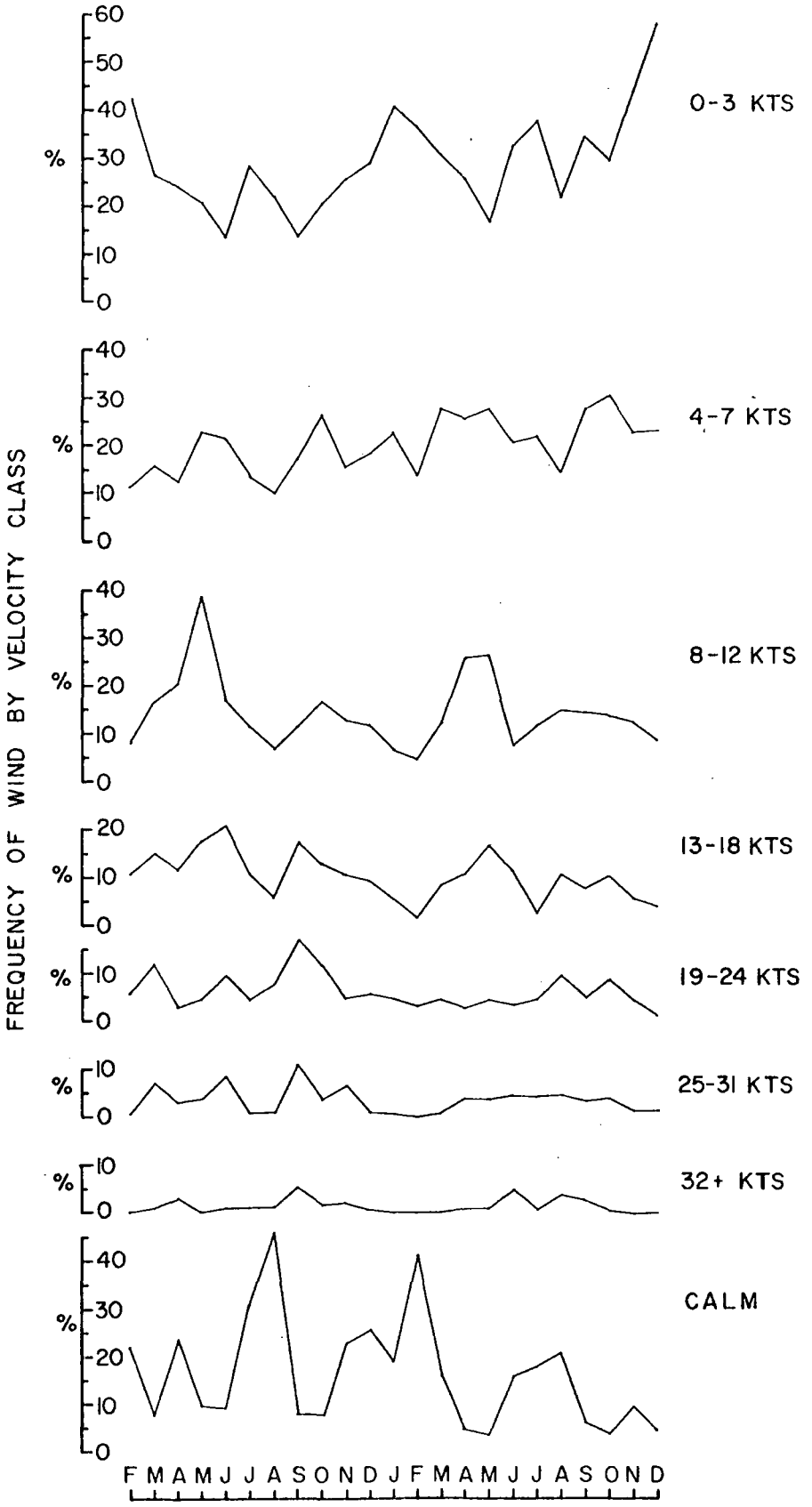


Fig. 7. Frequency-occurrence of wind by velocity class

coastal stations, caused in part by the influx of summer maritime air which prevents anticyclonic air from reaching the coastline, while at Palmer Station, the trend is enhanced by the summer decrease in cyclonic storm activity. The peak values around September can best be ascribed to the shifting boundary of regional sea ice, increasing solar insolation and an intensification of storm activity.

From Burdecki's (1957) summary of wind conditions throughout the Antarctic Peninsula, Palmer Station and vicinity emerge as typical of the central and southern parts with no pronounced anomalies. Wind speeds to the north, generally from Deception Island northwards, however, exceed those at Palmer Station by 100 percent or more and probably result from a higher incidence of storm conditions caused by more frequent variations in winter pack ice conditions and closer proximity to the prevailing westerly atmospheric circulation.

Wind Direction - Frequency and Speed

The percentage frequency of the different wind directions and mean wind speed for each month of 1965 and 1966 are given below in Part 3 of this Appendix and are shown as wind roses in Figure 8. From the data available, a detailed discussion of wind direction and speed in 1967 is not possible. The average annual elements of direction and speed for 1965 and 1966 are summarised below.

Though there were some variations in the prevailing wind direction from one month to another, the prevalence of wind from the north-northeast is strongly evident from Figure 8. Notable exceptions are June 1965, when the prevailing direction was south-southwest, and

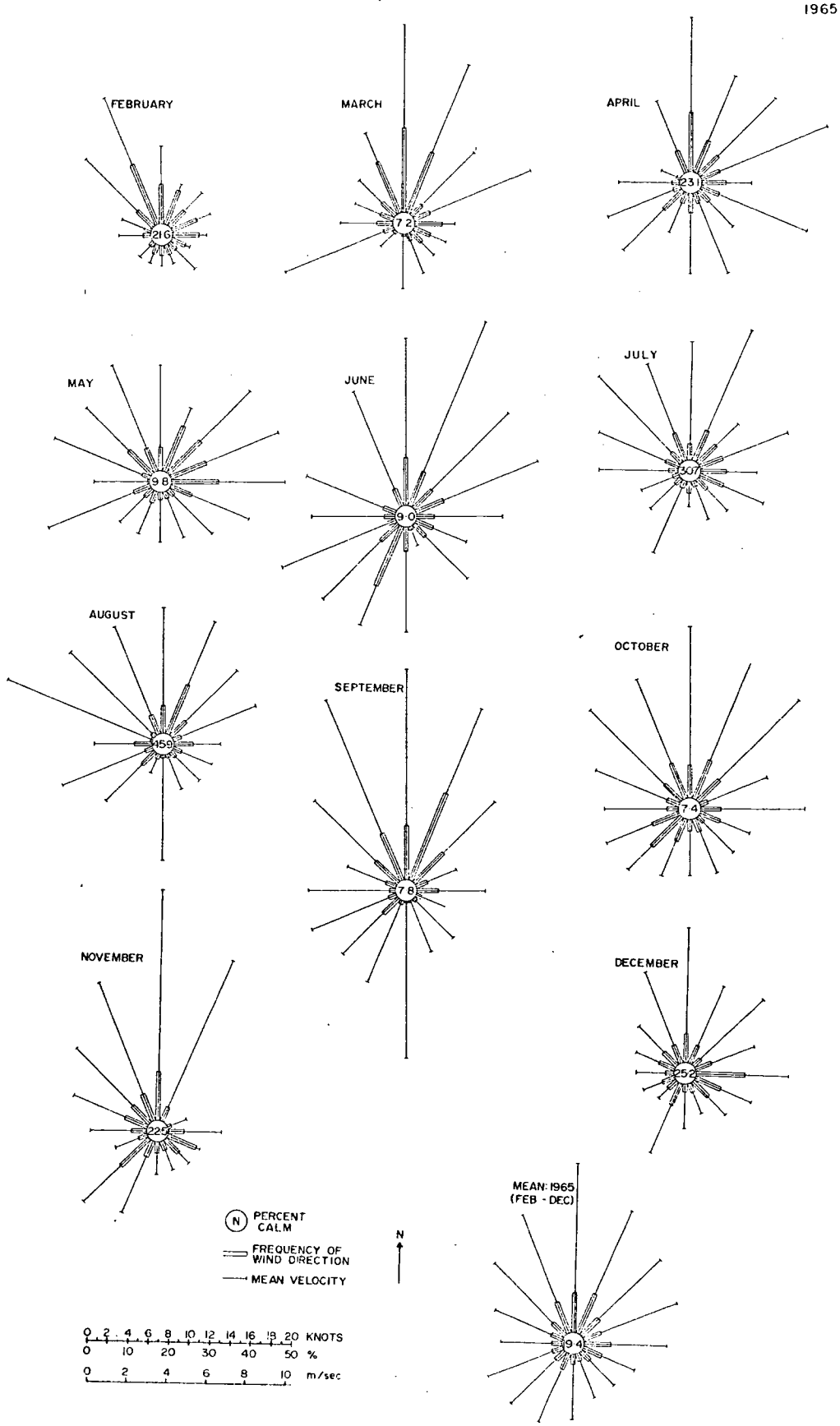


Fig. 8. Wind roses: 1965

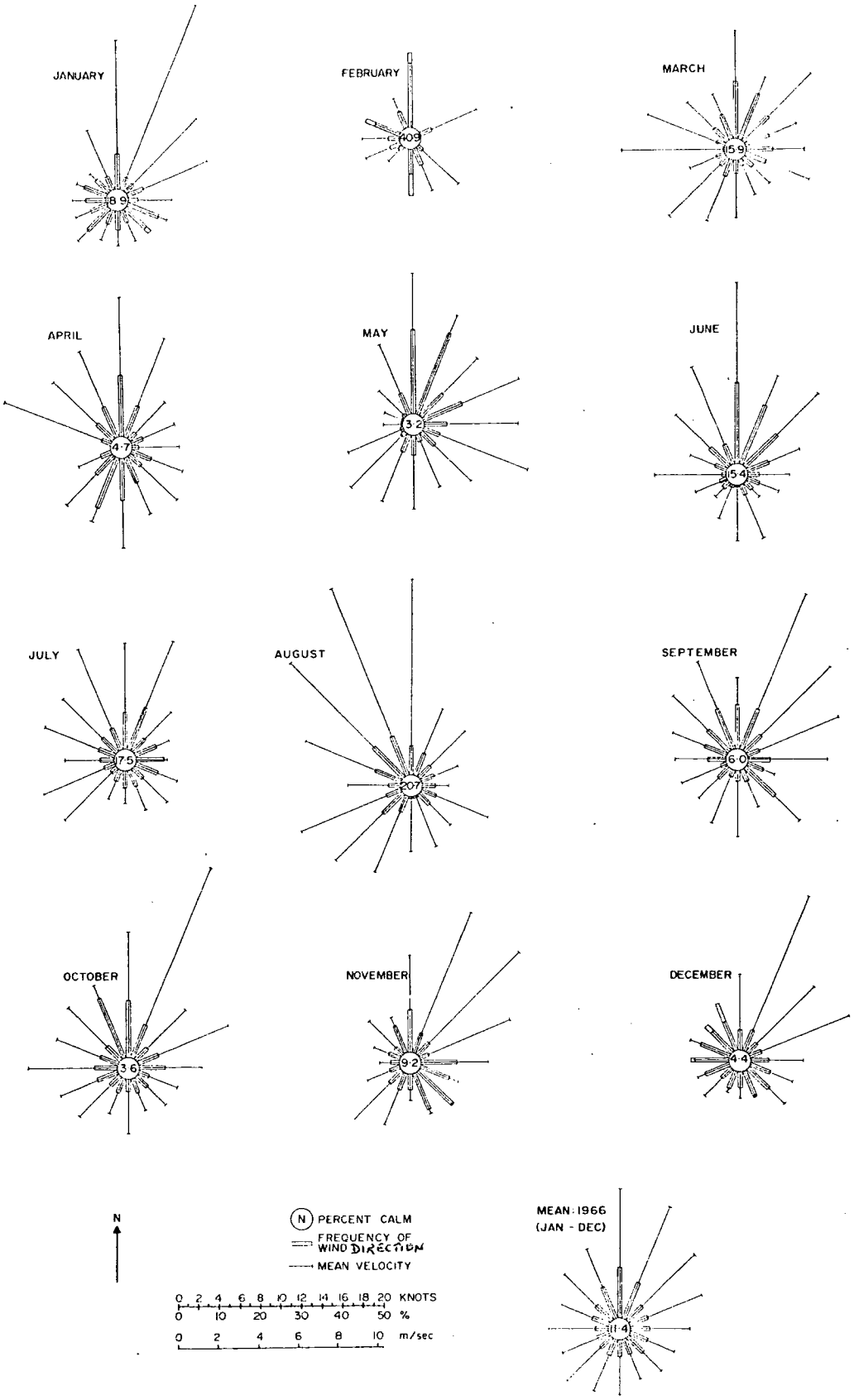


Fig. 8. (continued)
Wind roses: 1966

November 1966, when it was southeast. In both these months however, winds from the northeast quadrant were more significant.

AVERAGE FREQUENCY (%) AND MEAN WIND SPEED (m/sec)
AT PALMER STATION, 1965 - 1966

DIR	N	NNE	NE	ENE	E	ESE	SE	SSE
FREQ	11.0	10.0	5.6	4.8	5.7	4.9	4.4	3.0
SPEED	7.5	6.4	5.1	4.4	3.5	2.6	2.4	2.3
DIR	S	SSW	SW	WSW	W	WNW	NW	NNW
FREQ	3.3	4.3	4.3	3.0	2.8	3.7	4.8	9.9
SPEED	3.0	3.3	3.4	3.2	2.8	3.1	4.1	5.0

The significance of the various wind directions in terms of frequency and speed is shown as vectors in Figure 9. These are the product of the frequency and mean speed and are one expression of the total wind from each direction. These data de-emphasise the isolated occurrence of high mean wind speed from some directions (for example the mean wind speed of 7.9 m/sec (15.5 knots) from the south, in September 1965, resulted from one occurrence only) but do not suppress the occurrence of sustained direction, for example, the south-southwest wind in June 1965 and the south and south-southwest winds in April 1966 which were of significant proportion. However, the occurrence of these southerly winds is exceptional in this record and the prevailing winds, both in direction and strength, were from the northern quadrants. In 1965 the prevailing direction was marginally north-northeast over due north but the strongest wind was from due north.

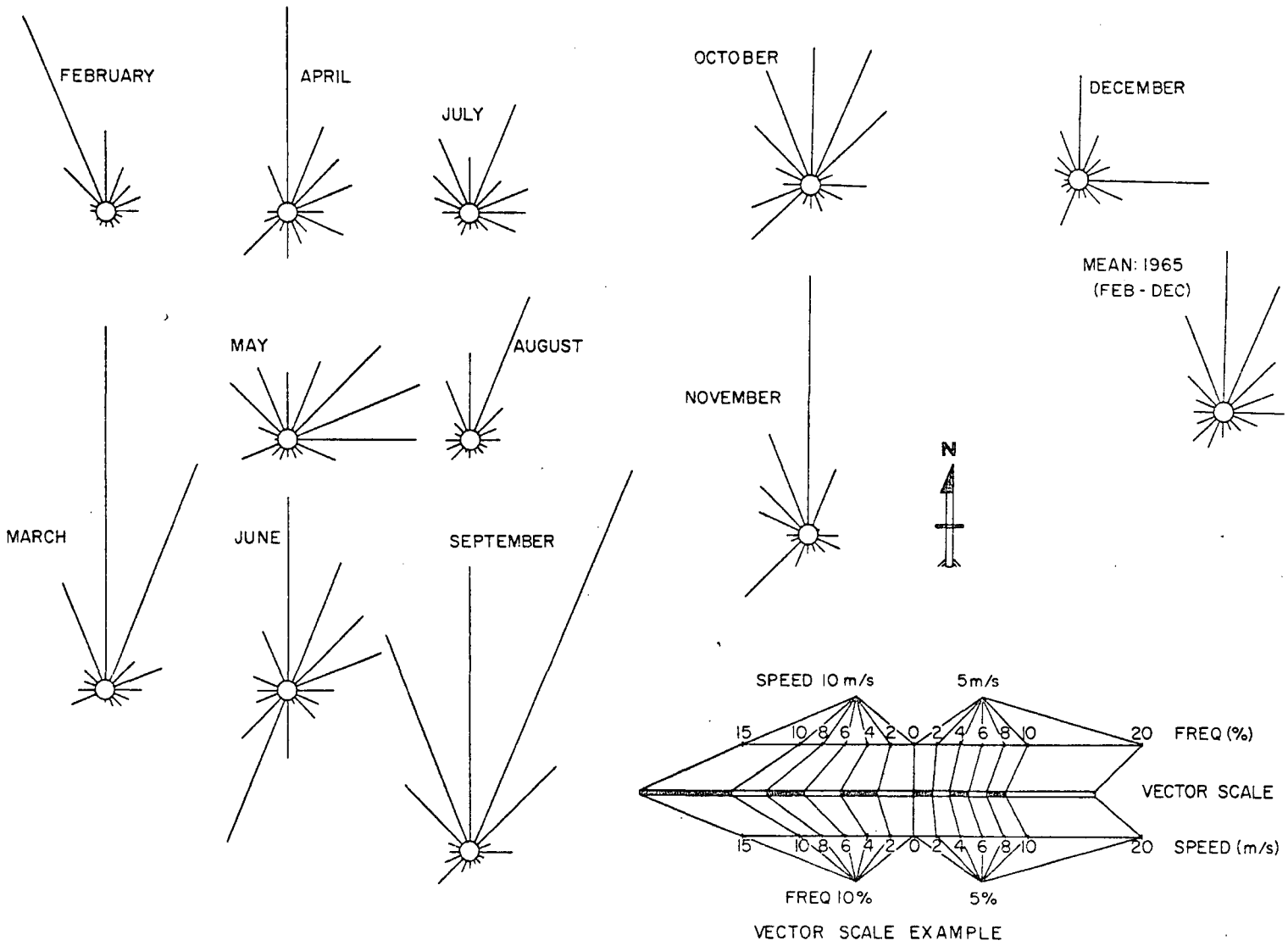


Fig. 9. Wind vectors: 1965

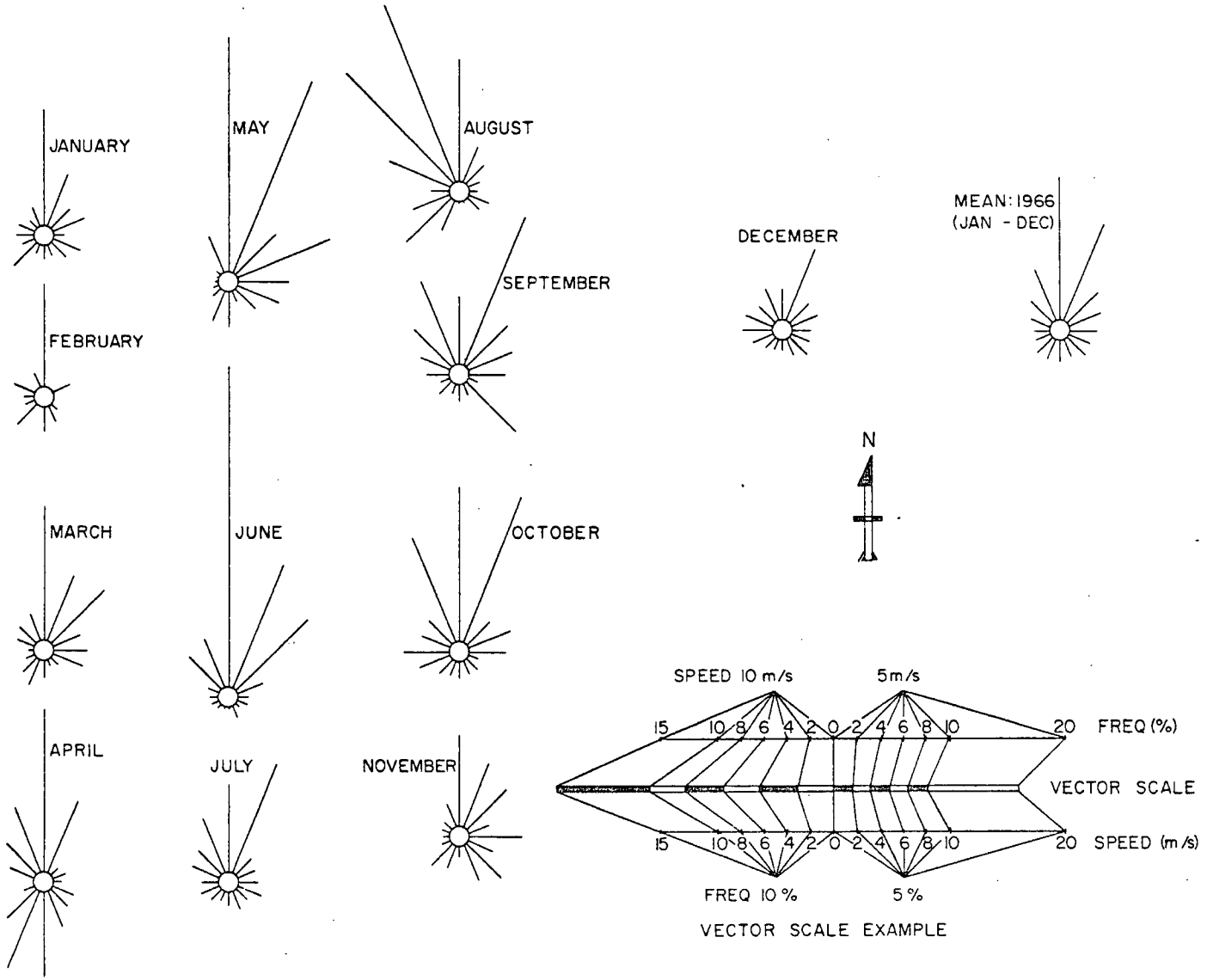


Fig. 9. (continued)
Wind vectors: 1966

In 1966 the prevailing wind, both in strength and direction, was north.

These data point to a very marked relationship between wind direction and speed with the highest velocity classes between northwest through northeast but with the greatest frequency of high velocity classes in the north and north-northeast. This distribution is a direct reflection of the cyclonic character of the climate and the dominant effect of storm conditions on the overall wind structure over Anvers Island.

PRECIPITATION AND CLOUD COVER

Precipitation at Palmer Station

The record of precipitation obtained from Palmer Station is of doubtful value because of the manifest problems of measuring solid precipitation but the record indicates that precipitation is high and ranks with the highest in the Antarctic Peninsula. It occurs in all months but with the lowest values in the summer months when it occurs frequently as rain and sleet. Snow is the principal form of winter precipitation but rain and sleet, and one occurrence of hail, in August 1966, have been recorded in several winter months.

During 1965 (11 months) precipitation at Palmer Station was recorded as 57.1 cm. water; in 1966, 30.1 cm. and in 1967, 30.5 cm. (for 10 months only; data for January and February are not available). The discrepancy in the 1965 value results from the fact that precipitation in that year was obtained from snow stake measurements and density determinations, because of the total inadequacy of the precip-

itation gauge. In the following years the record was obtained from a more sophisticated, though still inadequate, gauge which it is estimated, recorded perhaps 50 percent of the actual precipitation. The 1965 value is therefore, regarded as being more representative of conditions at Palmer Station.

Of the 1,005 days for which the record is available, precipitation in some form occurred on 633 days or 59.5 percent of the time. The 1965 record is 334 days long with precipitation on 202 days (60.5%). In 1966 and 1967 the length of the record was 345 days and 306 days respectively; precipitation occurred on 188 days (54.5%) in 1966 and on 243 days (79.4%) in 1967.

Cloud Cover

Only daylight observations of cloud cover were possible and in 1965 and 1966 sky cover was recorded in tenths. In 1967 sky cover was recorded only as clear, part cloudy or obscured.

A total of 1,592 observations were recorded in 1965. The average cover during the year was 7.89/10. The least average monthly cover was 4.36/10 in August but is based on only 80 observations. With a full complement of observations, the average sky cover inAugust would have computed to be much less as most of that month was clear. However, that month was exceptional. The greatest monthly average cover was 9.29/10 in November. The sky was clear with unlimited visibility on only 8.7% of the observations and was totally obscured on 63.8% of the observations.

In 1966 a total of 1,774 observations were made and the average

cover for the year was 8.23/10. The smallest monthly average cover was 7.20/10 in February but as this was computed from only a small number of observations, the 7.83/10 sky cover in May is considered as more representative of the lowest monthly average. The maximum monthly average was 9.10/10 in October. The sky was clear on 5.1% of the observations and totally obscured on 68.8 percent.

Figure 10 is a graphical summary of cloud cover and precipitation occurrence at Palmer Station between February 1 1965 and December 31 1967. For 1967 the reports of part cloudy have been arbitrarily plotted as 5.0/10.

CLIMATE CLASSIFICATION

According to Köppen's (1936) system of classification, areas in which the average temperature of the warmest month is over 0 °C but below 10 °C are classified as Tundra Climate (ET). At Palmer Station the average temperature of the warmest month ranged from 1.3 °C in December 1967 to 2.3 °C in January 1966. On this basis, the climate at Palmer Station and immediate vicinity is Tundra.

Directly from the remote temperature record, and considering the identified local adiabatic lapse rate, the climate of the ice piedmont is classified as Perpetual Frost (EF), in which the mean daily air temperature of all months is below 0 °C.

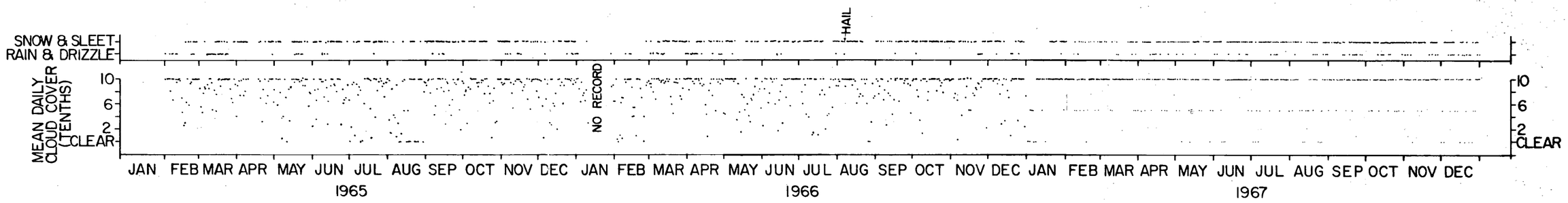


Fig. 11. Mean daily cloud cover and daily occurrence of precipitation

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APPENDIX I: Part 2

THE METEOROLOGY PROGRAM

Introduction

Normally, direct observation of dry- and wet-bulb temperature, station pressure and description of cloud cover, sky condition and current weather were made at 3-hour intervals from 1200 GMT through 0300 GMT but, because the meteorological program was subordinate to the glaciology program, it was occasionally necessary to place total reliance on the automatic-recording instruments. As far as possible, the thermograph was corrected daily against the dry-bulb thermometer. Maximum and minimum thermometers were read at 1200 and 0000 GMT (0700 and 1900 local time). The barograph was corrected daily against the station barometer.

Accuracy of Instrumentation

The barograph had an inherent error of ± 0.02 inch Hg. and was calibrated to 0.02 inch Hg. It could be interpolated to ± 0.001 inch Hg. with a probable reading accuracy of ± 0.005 inch Hg. Perhaps the most significant error in reading the barograms can be attributed to slack in the clockwork drive mechanism, which at times caused an error of ± 20 minutes. During a steep rise or fall in pressure, such an error could correspond to ± 0.03 inch Hg.

The Wallace and Tiernan barometer had an inherent error of ± 0.03 millibar, was calibrated to 1.0 mb and could be interpolated to ± 0.1 mb with a probable reading accuracy of ± 0.3 mb. The barometer was calibrated against the ship's barometer (USS Edisto) in January 1965 and

again in January 1966 against the mercurial barometer at the British station on Argentine Islands. Several weeks of comparative readings indicated that the barometer had an error of only 0.1 mb. (the reading accuracy of the scale).

When direct surface observations were made, thermometers were read to ± 0.1 °F, correct to within 0.3 °F. The running record of temperature on the thermograph was checked daily as far as possible and kept to within ± 1.0 °F. Other errors in the thermograms can be attributed to slack in the clockwork drive mechanism accounting for an error of ± 1.0 °F.

The Lambrecht wind recorder provided a graph which, on an hourly basis could be interpolated to ± 2%. The wind direction was recorded to within ± 5°. The major deficiency in the anemomograms resulted from occasional mechanical failure which caused the chart to be improperly advanced so that the record was lost for some periods.

The rain gauges were useful only during the summer months when precipitation occurred as rain. Following significant rainfalls, depth was read directly in hundredths of an inch, although the reliability of these measurements as being representative of precipitation at Palmer Station is questionable.

COMMENTS

Ceiling and Visibility

The meteorological facility was not equipped with a ceiling light so the cloud base could be determined during daylight hours only. Even

at such times the observations had to be made as an estimate by comparison with nearby mountains in the Neumayer Channel area or against the Cape Monaco promontory. Problems arose when low clouds and fog formed in the Neumayer Channel and low clouds formed locally over Cape Monaco and obscured the reference. Local comparison against the ice piedmont was not possible as the steep grade leading away from the station leads to an horizon only ¼-mile (0.4 km) away.

Observation of ceiling height greater than 5,000 feet (1,525 m.) was not possible because of lack of reference. Low ceiling, up to 1,500 feet (457 m.) could be determined accurately by virtue of the experience of the glaciology group, who frequently reached the cloud base at known elevations.

The record of visibility is inadequate for tabular compilation. Visibility however, is generally good at sea level even with ceiling down to 500 feet (150 m.). The predominant cloud type is stratus (Fig. 11) which does not preclude visibility at sea level except for local snow squalls and drifting banks of sea fog.

Precipitation

During 1965 the facility was equipped with a standard US Weather Bureau 8-inch nonrecording rain gauge. During the period mid-December to early April, when the bulk of the precipitation occurs as rain, this instrument may have some measure of reliability. At times when precipitation occurred as snow, the instrument was virtually useless.

To provide precipitation data for Palmer Station in 1965, six stakes were set at the foot of Norsel Point ramp and frequently measured to

Fig. 11. Stratus cloud over Bismarck Strait, January 1966. Cloud base about 300 feet (90 meters).

record snow depth. Snow pits were dug to observe snow density.

In 1966 the 8-inch gauge was replaced by a shielded 12-inch automatic-recording rain gauge. This was set at 12 feet (3.7 m.) elevation and partly filled with anti-freeze with anoil slick. Analysis of the precipitation record and the snow pit and stake observations for 1966 indicates that the shielded gauge collected approximately 30% of the precipitation as recorded by the stakes and pits. Taking into account the possible accumulation on the ramp because of drifting

snow and rime and ice formation, it is unlikely that the shielded gauge collected more than 50% of the actual precipitation.

Consequently, the values of precipitation in 1965 given below, are taken from the 8-inch gauge between February 1 and March 31 only. All others are from the stake and pit record. All values for 1966 and 1967 are from the shielded gauge.

Station Pressure

The tables of frequency of pressure for 1965 and 1966 are made up of 3-hourly recorded values from the barograms. The table of frequency of pressure in 1967 is compiled from Honkala's data which contained only daily mean pressure values.

The relationship between pressure in inches and pressure in millibars has been taken from the compiled tables of the American Practical Navigator (USNHO), 1962 edition, in which the following basic conversion formula was used:

$$P = \frac{B_m \cdot Dg}{1000}$$

where

P = Pressure in millibars
B_m = Height of a column of mercury in millimeters
D = Density of mercury (13.5951 g/cm^3)
g = Standard value of gravity (980.665 cm/sec^2)

The actual value of gravity at Palmer Station is 982.309 cm/sec^2 (Dewart 1971). The difference is not likely to significantly effect the pressure tables.

Thus the millibar values corresponding to inches are;

In	mb
30.12-30.40	1020-1029
29.83-30.11	1010-1019
29.53-29.82	1000-1009
29.23-29.52	990- 999
28.94-29.22	980- 989
28.64-28.93	970- 979
28.35-28.63	960- 969
28.05-28.34	950- 959
27.75-28.04	940- 949

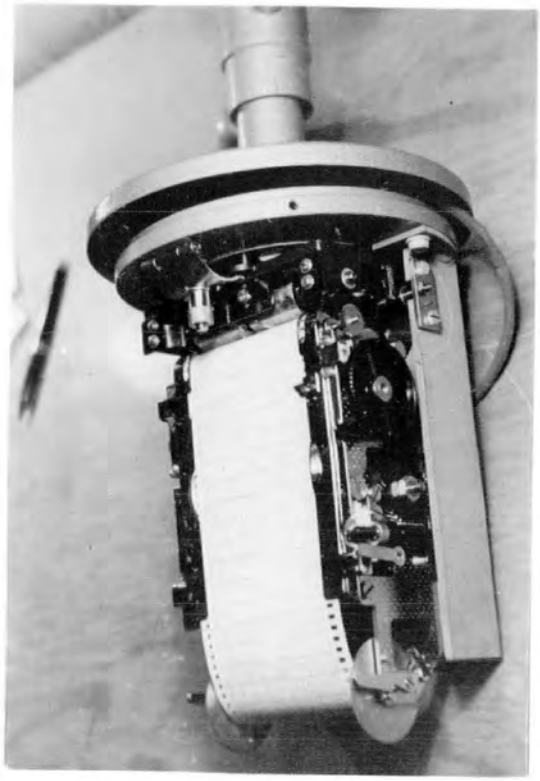
Mechanical recording of wind

The Lambrecht wind recorder (Fig. 12) is a clockwork-driven instrument which records wind direction and wind run. It does not provide a record of prevailing wind speed. Figures 13, 14 and 15 show examples of the type of wind records obtained.

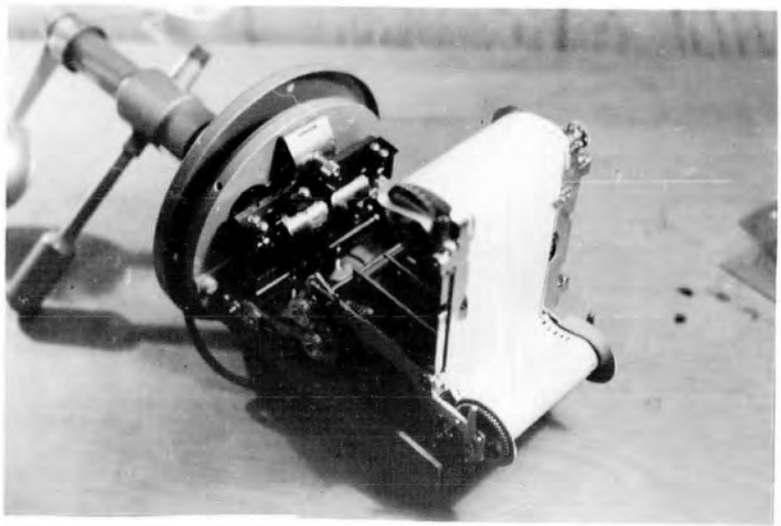
The clockwork drive advances a wax-coated chart which passed beneath two cylindrical drums upon each of which is a helical ridge. One drum is connected directly to the wind vane and moves in accordance with it. The gear ratio of 1:1 causes one revolution of the drum for one revolution of the wind vane. Pressure acting on the recording drum causes the helical ridge to wear away the wax coating on the chart and gives the record of wind direction as a continuous trace.

The second drum, measuring wind run, is connected to the anemometer cups. The gear ratio between the cups and the drum is 7.44:1 which, with the given cup dimension, gives one complete revolution of the drum for each 10,000 meters wind run. As is evident from Figures 13-15, each single wind run trace represents the passage of 10 kilometers of wind.

The method of reduction of the data charts for compilation of



a. Outer casing removed showing mechanism in operating position



b. Inner mechanism open.

Fig. 12. Lambrecht wind recorder (photos by L.E. Brown).

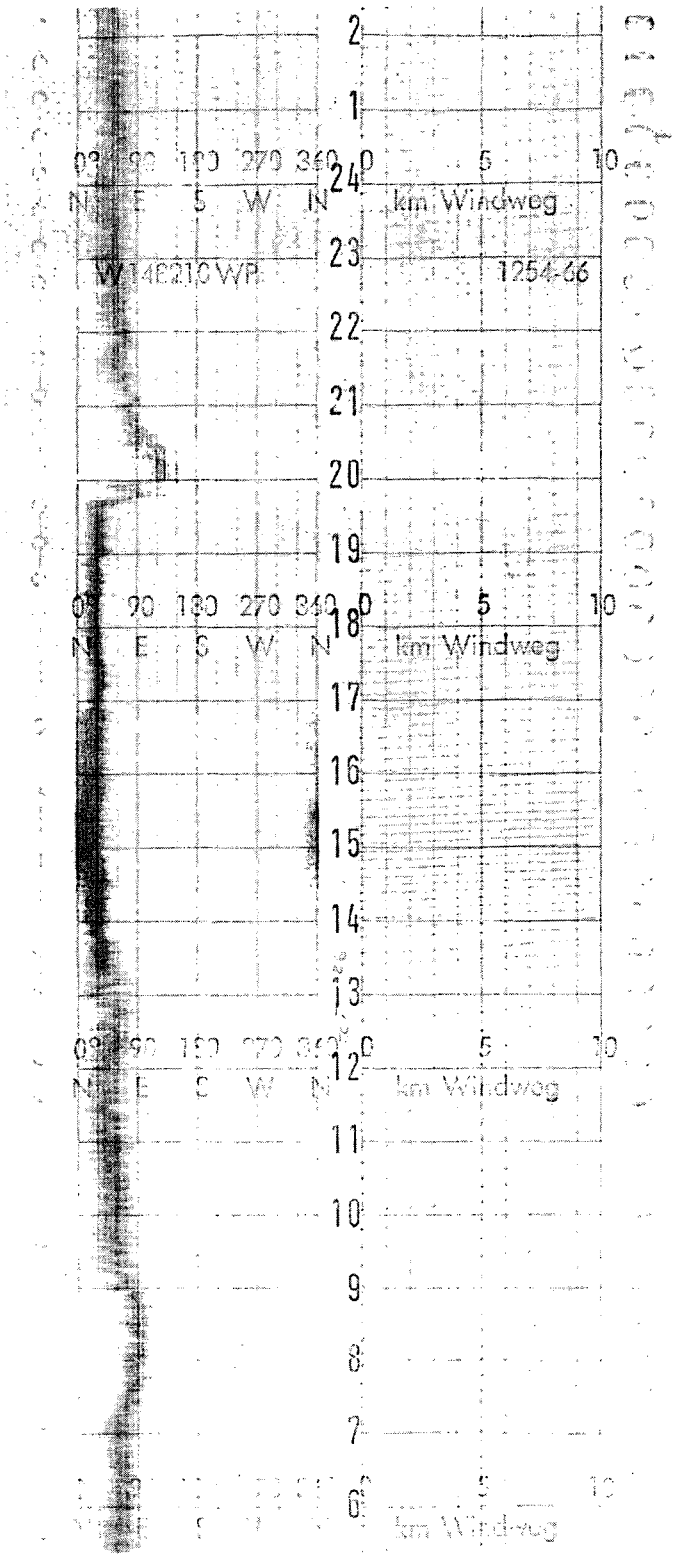


Fig. 13. Lambrecht anemomograph (actual size) showing general nature of record obtained. Note sudden increase in wind speed at 1400 hrs. and sudden wind shift at 2000 hrs.

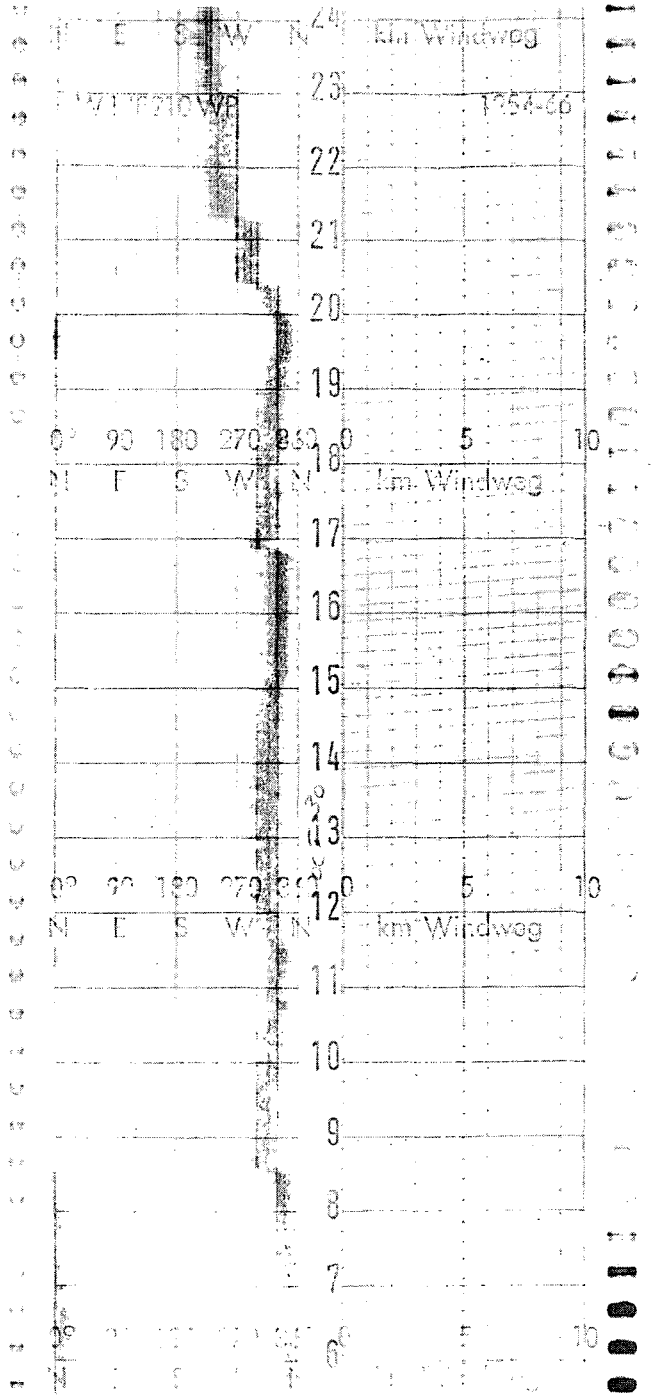


Fig. 14. Lambrecht anemomograph (actual size) showing sudden shift in wind direction at 2000 hrs.

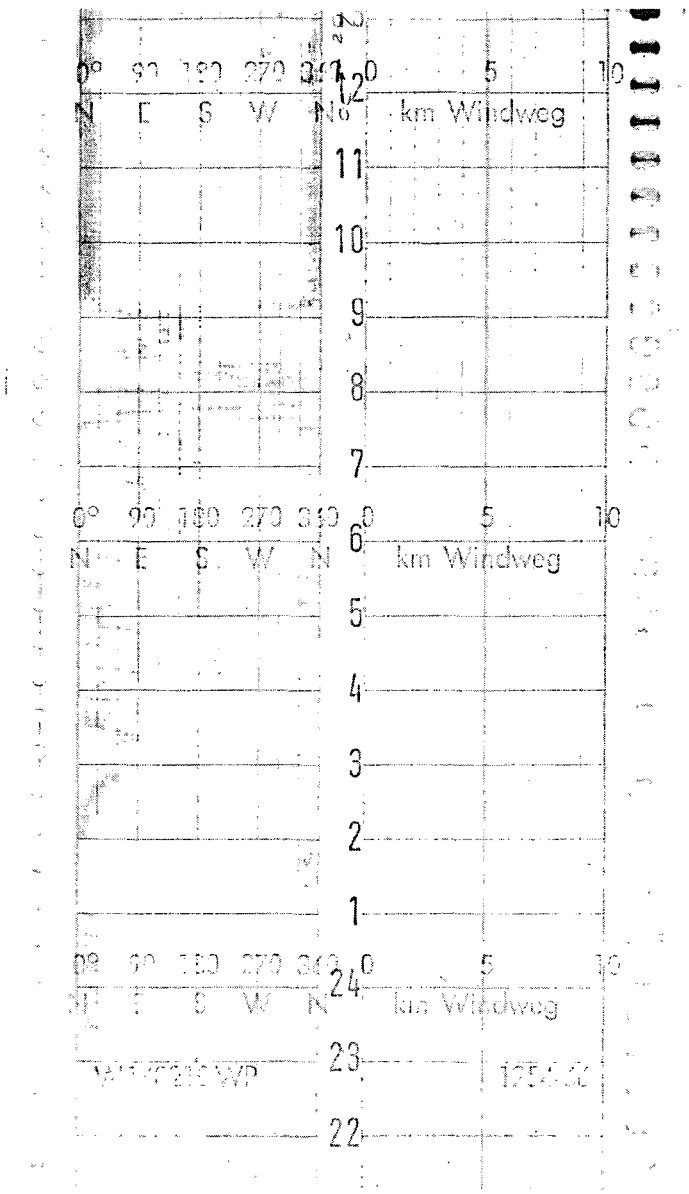


Fig. 15. Lambrecht anemomograph (actual size) showing direction indeterminate from 0730-0830 hrs. and wind not blowing at 2230-2330 hrs. and 0515-0615.

the tables of wind speed and direction given below, was similar to that of Kosiba (1964) and employs the accuracy of short-term averages. The recording of wind speed and direction was synchronous but because of the manner of recording, speed had to be calculated on the basis of "total wind" over given time intervals. The total wind passage was taken from the wind record at hourly intervals and interpreted as the average speed for that hour. By using a specially constructed template, the direction of the wind was taken from the chart, to the nearest 5°, at each $\frac{1}{4}$-hour interval and the mean of these was interpreted as the average direction for that hour. Kosiba (1964) has stressed that the mean values of anemometric vector parameters at 15-minute intervals are much more representative than instantaneous values.

Whenever possible, the instrument was checked each day to maintain the maximum degree of accuracy of time on the chart. Such inspection involved making a tick on the chart with the appropriate time written in. By using the $\frac{1}{4}$-hour-graduated template, it was possible to reduce the record with time accurate to $\frac{1}{4}$ hour.

The beginning and end of the hourly wind run occur when the trace crosses the printed hour line. In determining the value of the wind run, the intersection of the trace and hour line has been determined to the nearest 0.1 km, but reading accuracy varied according to wind speed. The chart speed was 10 mm. per hour giving an estimated reading accuracy of $\pm$ 0.1 km for wind passage values of 10-40 km/hr (2.8 to 11.1 m/sec), and up to $\pm$ 0.3 km for higher wind passage values. Over-

all, for wind passage values of 10 km/hr (2.8 m/sec) or greater, the estimated accuracy of the values presented is ± 2%, allowing for an inaccuracy of reading of ± 1% at the beginning and end of the hour. For values up to 10 km/hr, reading error increases from ± 2% at 10 km/hr to ± 20% for 1 km/hr (0.3 m/sec). Technically, the reading error can amount to as much as 50% for values less than 1 km/hr, though at these very low values the error is probably not particularly meaningful.

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APPENDIX I: Part 3a

DATA TABLES

Tabulated Data for 1965

TEMPERATURE

MONTHLY AVERAGES

AVERAGE AIR TEMPERATURE (°C)

YEAR 1965

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
-	1.8	2.1	-2.2	-2.5	-4.7	-8.5	-10.5	-4.0	-7.7	-1.1	-0.1

Mean: -3.6

AVERAGES AND EXTREMES OF MAXIMUM AND MINIMUM DAILY AIR TEMPERATURE (°C)

YEAR 1965

	JAN		FEB		MAR		APR	
	DEG	DAY	DEG	DAY	DEG	DAY	DEG	DAY
MAX	-	-	7.7	9	7.9	8	5.5	16
AVG	-		4.4		4.6		-0.1	
MIN	-	-	-2.0	5	-3.9	31	-9.7	15
AVG	-		-0.3		-0.2		-4.2	

	MAY		JUN		JUL		AUG	
	DEG	DAY	DEG	DAY	DEG	DAY	DEG	DAY
MAX	5.3	30	5.1	9	4.2	29	3.2	20
AVG	-0.3		-2.1		-5.1		-6.8	
MIN	-9.6	13	-16.7	19	-26.1	19	-24.7	17
AVG	-4.7		-7.6		-13.0		-14.3	

	SEP		OCT		NOV		DEC	
	DEG	DAY	DEG	DAY	DEG	DAY	DEG	DAY
MAX	5.7	20	3.2	30	6.4	24	6.2	30
AVG	-0.3		-3.6		1.9		2.3	
MIN	-20.2	17	-28.1	3	-13.2	1	-5.2	14
AVG	-8.6		-10.8		-4.2		-2.4	

OBSERVED VALUES OF MAXIMUM, MINIMUM AND MEAN DAILY AIR TEMPERATURES (°C)

YEAR 1965

FEBRUARY

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	5.1	0.1	3.2	15	4.9	0.5	2.2
2	4.3	-1.1	1.2	16	6.4	-0.8	2.1
3	4.2	0.6	1.9	17	4.6	-1.4	1.1
4	1.6	-4.3	0.2	18	2.9	-0.6	1.1
5	6.2	-2.0	2.6	19	2.3	-0.1	0.9
6	7.0	4.0	5.4	20	4.1	-0.6	1.2
7	4.9	2.3	3.4	21	3.3	-1.3	1.1
8	2.3	-1.8	0.0	22	5.7	-0.1	1.7
9	7.7	0.1	3.8	23	5.7	1.6	3.4
10	4.9	1.1	3.2	24	2.9	0.6	1.6
11	4.7	0.9	3.0	25	1.8	0.0	0.7
12	1.1	-1.6	-0.2	26	3.4	-0.8	1.4
13	3.9	-1.7	0.4	27	2.8	0.3	1.5
14	4.6	0.9	2.3	28	2.9	0.1	1.1

MARCH

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	3.5	0.4	1.6	17	2.0	0.4	1.3
2	3.8	-1.0	1.4	18	4.6	0.4	2.2
3	5.6	0.6	2.3	19	1.8	-0.7	0.7
4	5.1	-0.3	1.9	20	5.2	1.8	3.6
5	3.8	0.5	1.8	21	3.7	-0.3	0.6
6	5.5	2.6	4.1	22	6.6	-0.9	2.7
7	6.3	3.2	5.1	23	4.4	0.1	2.5
8	7.9	1.5	4.7	24	4.8	2.3	3.3
9	7.2	2.2	4.0	25	2.7	-1.3	0.7
10	6.0	2.1	4.3	26	4.9	-1.9	2.8
11	6.6	4.1	5.3	27	4.2	1.2	2.7
12	5.6	0.4	2.1	28	1.9	-3.6	-0.6
13	6.8	1.1	4.1	29	2.8	-3.9	-0.8
14	5.0	-0.3	2.6	30	2.6	-3.7	-0.9
15	1.1	-2.4	-0.6	31	-2.3	-3.9	-3.0
16	6.1	-3.3	0.5				

YEAR 1965

APRIL

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	1.1	-3.7	-1.9	16	5.5	-3.5	1.1
2	2.1	-2.9	-0.6	17	3.1	-0.6	1.1
3	-2.4	-3.9	-3.2	18	2.3	-0.8	0.7
4	-2.9	-6.5	-4.4	19	2.9	-0.8	0.3
5	-4.1	-7.9	-5.4	20	3.8	-1.4	0.3
6	0.1	-7.2	-3.3	21	2.8	-3.1	-0.2
7	-0.1	-2.1	-1.2	22	2.4	-3.2	-0.7
8	-1.3	-4.8	-2.9	23	0.6	-1.8	-0.6
9	-1.2	-5.6	-3.4	24	-0.1	-4.1	-2.4
10	-3.3	-7.2	-4.8	25	-2.2	-5.7	-3.5
11	-1.5	-8.2	-4.9	26	-2.3	-4.2	-3.4
12	-1.4	-2.6	-2.0	27	-2.4	-4.2	-2.7
13	-2.6	-5.1	-3.7	28	0.6	-4.7	-2.5
14	-4.4	-9.2	-6.5	29	2.4	-2.6	0.1
15	-3.6	-9.7	-6.1	30	2.4	-0.1	0.9

MAY

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	0.8	-0.8	-0.1	17	-0.6	-4.3	-2.1
2	0.3	-2.2	-0.9	18	1.2	-3.1	0.1
3	1.7	-3.8	-0.8	19	1.2	-0.8	0.4
4	-2.7	-5.3	-3.7	20	1.3	0.0	0.4
5	-1.2	-5.7	-3.4	21	0.5	-6.8	-3.9
6	-1.7	-4.9	-2.6	22	0.0	-7.4	-1.6
7	-1.8	-6.6	-4.2	23	4.7	1.2	2.7
8	-4.4	-9.4	-7.1	24	2.8	0.7	1.9
9	-4.3	-9.5	-7.6	25	4.4	-0.4	1.7
10	-2.8	-6.6	-3.9	26	0.7	-3.4	-1.7
11	-2.7	-7.4	-6.0	27	1.9	-4.5	-2.2
12	-4.4	-8.1	-6.0	28	-2.8	-5.3	-3.8
13	-3.3	-9.6	-5.3	29	0.4	-7.5	-2.8
14	-3.1	-9.3	-6.1	30	5.3	0.6	3.0
15	-1.7	-3.7	-2.3	31	2.0	-6.6	-2.6
16	-0.3	-3.9	-1.0				

YEAR 1965

JUNE

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	1.3	-4.0	-1.3	16	-4.9	-8.9	-6.7
2	-0.9	-8.2	-3.3	17	-2.2	-8.0	-4.3
3	-4.6	-7.5	-5.9	18	-1.9	-13.4	-6.9
4	-4.8	-10.6	-7.0	19	-12.9	-16.7	-15.6
5	-2.8	-6.4	-4.8	20	-11.1	-15.9	-14.7
6	0.7	-6.8	-3.7	21	-10.1	-15.8	-12.4
7	1.6	-2.1	-0.2	22	-13.3	-16.0	-14.7
8	4.8	-0.9	2.9	23	-4.4	-14.1	-8.3
9	5.1	-1.7	0.4	24	-4.2	-11.6	-7.8
10	3.0	-0.4	1.9	25	-2.7	-11.5	-6.6
11	2.8	-2.1	0.2	26	0.7	-6.1	-1.8
12	0.6	-5.1	-1.6	27	2.0	-2.1	0.4
13	-2.8	-6.9	-4.8	28	0.9	-5.9	-2.8
14	-2.1	-7.0	-4.6	29	2.7	-2.7	0.8
15	-3.9	-8.8	-6.0	30	0.4	-3.2	-1.1

JULY

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-0.3	-6.8	-4.4	17	-6.9	-22.0	-15.9
2	-0.9	-8.7	-5.5	18	-16.9	-23.4	-20.7
3	-4.5	-11.2	-6.9	19	-18.5	-26.1	-22.8
4	-8.2	-10.8	-9.0	20	-2.8	-20.3	-8.7
5	-9.1	-14.1	-10.7	21	-11.6	-19.1	-14.3
6	-9.3	-14.1	-11.5	22	-8.8	-13.4	-9.8
7	-6.8	-13.9	-8.1	23	-3.8	-15.0	-9.9
8	-7.0	-13.9	-10.4	24	-1.1	-5.2	-3.2
9	-5.6	-13.3	-8.6	25	-2.4	-13.7	-9.4
10	-11.7	-16.5	-14.1	26	-12.6	-17.7	-15.5
11	-9.8	-16.1	-13.0	27	-0.3	-12.8	-2.6
12	-0.4	-12.9	-5.9	28	2.9	-4.4	-0.3
13	0.1	-4.7	-2.2	29	4.2	-2.2	0.9
14	0.4	-1.8	0.2	30	4.2	-5.2	-1.4
15	-0.3	-17.9	-9.7	31	-0.9	-5.9	-3.7
16	-7.6	-17.4	-9.4				

YEAR 1965

AUGUST

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-4.8	-7.7	-6.0	17	-14.4	-24.7	-20.4
2	-4.3	-11.1	-7.2	18	-8.9	-17.9	-14.4
3	-9.3	-13.3	-11.1	19	-2.1	-18.2	-5.9
4	-12.1	-16.2	-14.2	20	3.2	-5.3	-0.7
5	-14.9	-20.9	-17.4	21	2.2	-1.0	1.2
6	-15.4	-20.5	-17.7	22	1.7	-1.8	0.4
7	-15.9	-20.4	-17.7	23	2.1	-3.3	-0.4
8	-10.7	-19.8	-15.2	24	-2.7	-8.2	-4.9
9	-10.5	-20.0	-13.5	25	-1.6	-7.9	-5.5
10	-14.9	-21.8	-18.6	26	-3.2	-9.0	-5.8
11	-14.5	-21.8	-17.7	27	-1.6	-10.2	-5.3
12	-6.9	-22.2	-15.1	28	-10.2	-20.7	-18.2
13	-4.4	-7.6	-6.1	29	-11.7	-19.6	-15.6
14	-4.9	-15.0	-9.0	30	-4.7	-13.3	-8.4
15	-5.1	-13.2	-8.0	31	-2.7	-5.5	-3.3
16	-12.4	-23.2	-18.4				

SEPTEMBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-1.2	-5.2	-2.7	16	-4.8	-18.8	-12.0
2	-2.9	-7.0	-4.2	17	0.3	-20.2	-7.3
3	-1.8	-11.7	-7.1	18	2.7	0.1	0.9
4	-0.1	-12.6	-8.3	19	2.8	-3.5	0.1
5	1.1	-13.4	-3.4	20	5.7	-1.6	2.1
6	1.8	-0.7	0.3	21	2.7	-4.1	1.0
7	0.4	-15.0	-6.4	22	1.9	-5.9	0.3
8	-4.9	-16.9	-12.2	23	1.8	-3.3	0.3
9	-1.8	-10.2	-4.8	24	0.3	-6.0	-3.7
10	-2.2	-14.8	-7.4	25	-1.7	-7.1	-4.2
11	0.9	-2.7	-0.1	26	2.4	-6.3	-2.3
12	1.3	-0.4	0.8	27	-0.9	-7.2	-3.7
13	1.1	-12.1	-2.9	28	-4.9	-10.3	-7.5
14	1.3	-8.3	-0.6	29	-5.3	-12.2	-9.0
15	1.7	-9.6	-5.7	30	-7.8	-11.2	-9.0

YEAR 1965

OCTOBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-10.8	-17.3	-14.1	17	1.9	-0.4	0.1
2	-5.0	-23.2	-12.9	18	0.7	-5.4	-0.8
3	-14.9	-28.1	-21.7	19	-2.2	-4.3	-3.3
4	-5.6	-16.7	-11.9	20	-3.7	-7.9	-6.4
5	-7.2	-14.8	-10.6	21	-7.3	-10.1	-8.8
6	-8.6	-18.1	-13.6	22	-7.0	-11.9	-9.4
7	-9.9	-16.4	-13.2	23	-2.8	-14.6	-8.6
8	-10.9	-17.6	-14.7	24	-3.4	-8.2	-5.8
9	-6.7	-13.8	-9.3	25	0.9	-9.8	-5.6
10	-1.1	-11.2	-4.7	26	-0.4	-5.3	-2.9
11	-1.1	-7.0	-3.7	27	0.3	-5.8	-2.9
12	-4.6	-12.1	-8.1	28	-2.7	-11.1	-5.1
13	1.3	-13.3	-4.7	29	0.7	-8.7	-2.8
14	2.9	-5.6	0.5	30	3.2	-4.3	0.3
15	0.3	-4.9	-1.2	31	-3.3	-11.8	-9.1
16	0.3	-3.8	-1.1				

NOVEMBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-9.4	-13.2	-11.7	16	2.2	-1.5	-0.3
2	-6.7	-13.2	-11.0	17	3.3	-2.3	0.5
3	-1.2	-10.4	-6.3	18	4.8	-1.7	1.6
4	1.4	-12.1	-0.9	19	3.9	-4.8	-0.1
5	3.3	-0.6	1.3	20	6.0	-1.6	1.8
6	0.2	-1.8	-0.9	21	5.6	-0.9	1.3
7	0.8	-3.6	0.0	22	3.9	-0.4	1.6
8	1.6	-0.4	1.2	23	4.9	-4.5	-0.2
9	1.3	-0.1	0.8	24	6.4	-3.0	1.1
10	0.2	-5.6	-2.2	25	3.4	-4.2	-0.8
11	1.1	-8.1	-2.9	26	2.8	-3.1	-1.4
12	2.8	-5.9	0.3	27	1.2	-4.2	-1.9
13	0.6	-2.7	-0.6	28	4.2	-5.2	-1.2
14	2.9	0.3	1.8	29	2.8	-2.6	-0.2
15	3.2	-2.7	0.6	30	0.0	-4.8	-2.2

YEAR 1965

DECEMBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	2.3	-3.9	-0.1	17	1.2	-2.9	-0.6
2	0.2	-1.4	-1.1	18	2.3	-1.8	-0.5
3	1.1	-0.3	0.4	19	-0.1	-2.1	-0.3
4	3.3	-2.2	1.3	20	1.1	-2.5	-0.1
5	5.2	-3.7	1.4	21	2.9	-3.8	-0.4
6	2.2	-4.1	-1.7	22	1.1	-2.7	-0.4
7	-0.1	-4.4	-2.1	23	2.1	-1.2	0.4
8	2.5	-3.0	-0.3	24	0.7	-1.7	-0.6
9	0.7	-2.2	-0.2	25	0.6	-1.8	-0.8
10	2.3	-2.2	0.7	26	1.0	-2.2	-0.7
11	2.9	-3.9	-0.6	27	3.3	-0.8	0.7
12	0.1	-4.0	-1.6	28	1.7	-1.1	0.4
13	1.2	-2.6	-1.1	29	5.9	-2.9	0.6
14	2.2	-5.2	-1.7	30	6.2	-0.1	2.5
15	4.4	-0.6	1.9	31	4.6	2.0	2.9
16	4.6	-1.7	1.5				

PRESSURE

BAROMETRIC PRESSURE (P) (in mb)

YEAR 1965

	JAN		FEB		MAR		APR	
	(P)	DAY	(P)	DAY	(P)	DAY	(P)	DAY
MAX	-	-	1015.4	28	1014.5	1	1010.8	13
AVG	-	-	997.4		981.4		989.9	
MIN	-	-	984.2	2	966.2	29	965.1	1

	MAY		JUN		JUL		AUG	
	(P)	DAY	(P)	DAY	(P)	DAY	(P)	DAY
MAX	1013.6	14	1002.2	1	1017.3	10	1022.0	11
AVG	988.2		984.0		992.3		994.5	
MIN	963.5	27	960.7	29	955.1	31	959.5	20

	SEP		OCT		NOV		DEC	
	(P)	DAY	(P)	DAY	(P)	DAY	(P)	DAY
MAX	1001.6	17	1007.6	12	1005.9	3	1007.2	20
AVG	976.1		977.2		976.5		992.8	
MIN	952.9	15	952.1	17	952.5	14	976.7	27

FREQUENCY OF PRESSURE
(by 10 mb)

(P)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1020-1029	-							13				
1010-1019	-	14	8	3	17		23	11				
1000-1009	-	48	55	55	29	4	71	71	3	13	11	17
990- 999	-	136	55	61	46	61	54	60	13	15	13	94
980- 989	-	25	71	48	82	89	48	38	61	93	66	106
970- 979	-		46	50	56	80	35	22	104	49	75	29
960- 969			7	17	18	6	10	13	37	46	58	
950- 959			4				5	3	22	32	13	
TOTAL OBS		223	246	234	248	240	246	231	230	248	236	246

CLOUD COVER

TOTAL CLOUD AMOUNT OCCURRENCES BY TENTHS

YEAR 1965

SCALE 0-10	0	1	2	3	4	5	6	7	8	9	10	TOT OBS	AVG COVER
JAN	-	-	-	-	-	-	-	-	-	-	-	-	-
FEB	2	4	2	4	2	0	3	3	7	8	77	112	8.61
MAR	10	4	8	2	5	1	2	6	8	7	95	148	7.98
APR	9	1	3	2	1	1	5	7	4	8	78	119	8.28
MAY	18	2	4	4	4	3	2	4	7	5	99	152	7.79
JUN	14	0	4	5	6	1	4	8	10	8	110	170	8.14
JUL	23	16	2	6	0	2	4	4	6	10	101	174	7.17
AUG	36	2	2	2	1	2	1	4	3	5	22	80	4.36
SEP	11	4	2	7	6	2	1	2	4	9	116	164	8.26
OCT	8	2	3	2	3	4	4	6	10	20	102	164	8.48
NOV	1	1	0	1	5	3	1	4	6	14	124	160	9.29
DEC	6	5	1	3	3	0	4	3	7	25	92	149	8.41
											TOTAL OBS	1592	

ANNUAL AVERAGE COVER 7.89

OCCURRENCE OF CEILING HEIGHT
(Feet)

HEIGHT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	-	1	0	0	1	1	4	2	1	4	10	0
100-200	-	8	10	0	4	2	9	1	9	1	2	2
300-400	-	1	8	10	3	2	8	0	17	1	3	3
500-900	-	25	5	18	6	23	13	6	24	24	28	20
1000-1900	-	18	20	6	14	24	8	6	21	51	52	36
2000-2900	-	15	2	16	11	6	9	4	13	25	27	22
3000-5000	-	13	6	9	16	18	14	10	16	22	15	25
Over 5000	-	9	6	4	8	8	2	11	14	7	9	32
Total Obs	-	90	57	63	63	84	67	40	125	135	146	140

PRECIPITATION AND FOG

NUMBER OF OBSERVATIONS WITH OCCURRENCE OF WEATHER

YEAR 1965

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Rain and Drizzle/ Freezing Rain and Drizzle	-	6	31	1	7	7	1	0	9	0	15	8
Sleet	-	0	1	1	0	1	0	0	9	1	1	0
Snow	-	8	11	37	37	43	47	22	58	45	43	39
Fog and Ice Fog	-	12	8	6	0	11	20	12	2	5	10	8
Blowing and Drifting Snow	-	0	0	0	27	34	10	14	16	11	0	6

NUMBER OF DAYS WITH RAIN AND DRIZZLE/ FREEZING RAIN AND DRIZZLE

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
-	6	16	1	5	3	1	0	5	0	6	5

NUMBER OF DAYS WITH SNOW AND SLEET

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
-	5	10	17	15	20	18	8	22	18	19	16

TOTAL MONTHLY PRECIPITATION (cm)

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
-	4.7	5.3	5.3	7.5	5.1	10.4	2.2	5.9	4.1	4.4	2.2

Annual Total: 57.1

WIND

MEAN MONTHLY WIND SPEED

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG
Kts	-	5.4	9.1	7.2	8.7	11.0	5.7	5.0	12.9	10.0	8.4	6.2	7.9
M/s	-	2.8	4.6	3.7	4.4	5.7	2.9	2.6	6.8	5.1	4.5	3.2	4.0

YEAR 1965

THREE-HOURLY OBSERVATIONS OF WIND SPEED (10m) AND TEMPERATURE

GIVING

NUMBER OF OBSERVATIONS WITH OCCURRENCE OF WIND SPEED AND TEMPERATURE

YEAR 1965

FEBRUARY

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0-2.5	2.6-7.5	7.6-12.9	13.0 -		
4.5/ 7.2	5	6	9	1	21	40/44
1.7/ 4.4	40	17	8		65	35/39
-1.1/ 1.6	62	10	1		73	30/34
-3.8/ -1.2	1				1	25/29
	108	33	18	1	160	

MARCH

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0-2.5	2.6-7.5	7.6-12.9	13.0 -		
4.5/ 7.2	6	6	17	8	37	40/44
1.7/ 4.4	23	24	14	6	67	35/39
-1.1/ 1.6	22	23			45	30/34
-3.8/ -1.2	4				4	25/29
	55	53	31	14	153	

APRIL

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0-2.5	2.6-7.5	7.6-12.9	13.0 -		
1.7/ 4.4	1	4			5	35/39
-1.1/ 1.6	23	10	8	5	46	30/34
-3.8/ -1.2	22	15	2	1	40	25/29
-6.6/ -3.9	7	5	1		13	20/24
	53	34	11	6	104	

YEAR 1965

MAY

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0-2.5	2.6-7.5	7.6-12.9	13.0 -		
4.5/ 7.2		1			1	40/44
1.7/ 4.4	1	6	6		13	35/39
-1.1/ 1.6	12	33	15	6	56	30/34
-3.8/ -1.2	43	19	3	1	66	25/29
-6.6/ -3.9	20	25	3	1	49	20/24
-9.4/ -6.7	6	13	2		21	15/19
	82	97	29	8	206	

JUNE

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0-2.5	2.6-7.5	7.6-12.9	13.0 -		
1.7/ 4.4		3	6	7	16	35/39
-1.1/ 1.6	17	18	17	6	58	30/34
-3.8/ -1.2	9	11	21	5	46	25/29
-6.6/ -3.9	12	28	12	4	56	20/24
-9.4/ -6.7	10	10	3		23	15/19
-12.2/ -9.5	7	5			12	10/14
-15.0/-12.3	5	8	1		14	05/09
-18.7/-15.1	1	12	2		15	00/04
	61	95	62	22	240	

JULY

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0-2.5	2.6-7.5	7.6-12.9	13.0 -		
1.7/ 4.4		3	3		6	35/39
-1.1/ 1.6	1	11	12	2	26	30/34
-3.8/ -1.2	8	16	4	2	30	25/29
-6.6/ -3.9	19	8	5		32	20/24
-9.4/ -6.7	33	10	2		45	15/19
-12.2/ -9.5	39	6	1		46	10/14
-15.0/-12.3	25	3			28	05/09
-18.7/-15.1	10	3			13	00/04
-21.0/-18.8	4	2			6	-05/01
-23.8/-21.1	10				10	-10/06
-26.6/-23.9	2				2	-15/11
	151	62	27	4	244	

YEAR 1965

AUGUST

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0-2.5	2.6-7.5	7.6-12.9	13.0 -		
1.7/ 4.4			4	1	5	35/39
-1.1/ 1.6	2	4	16	2	24	30/34
-3.8/ -1.2	6	2	4	1	13	25/29
-6.6/ -3.9	30	10	3		43	20/24
-9.4/ -6.7	16	4			20	15/19
-12.2/ -9.5	19	1			20	10/14
-15.0/-12.3	20	1			21	05/09
-18.7/-15.1	33	2			35	00/04
-21.0/-18.8	26	5			31	-05/01
-23.8/-21.1	7				7	-10/06
-26.6/-23.9	1				1	-15/11
	160	29	27	4	220	

SEPTEMBER

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0-2.5	2.6-7.5	7.6-12.9	13.0 -		
4.5/ 7.2				1	1	40/44
1.7/ 4.4		1	4	4	9	35/39
-1.1/ 1.6	6	13	37	18	74	30/34
-3.8/ -1.2	17	13	6	7	43	25/29
-6.6/ -3.9	9	13	6		28	20/24
-9.4/ -6.7	16	3	1		20	15/19
-12.2/ -9.5	7	9	2		18	10/14
-15.0/-12.3			1		1	05/09
-18.7/-15.1		1			1	00/04
-21.0/-18.8	3				3	-05/01
	58	53	57	30	198	

YEAR 1965

OCTOBER

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0-2.5	2.6-7.5	7.6-12.9	13.0 -		
1.7/ 4.4		2	3	2	7	35/39
-1.1/ 1.6	3	6	24	4	37	30/34
-3.8/ -1.2	6	17	21	5	49	25/29
-6.6/ -3.9	20	15	1	1	37	20/24
-9.4/ -6.7	19	22	1		42	15/19
-12.2/ -9.5	13	14			27	10/14
-15.0/-12.3	22	7	1		30	05/09
-18.7/-15.1	5	7			12	00/04
-21.0/-18.8		2	1		3	-05/01
-23.8/-21.1						-10/06
-26.6/-23.9	1		1		2	-15/11
-29.4/-26.7		2			2	-20/16
	89	94	53	12	248	

NOVEMBER

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0-2.5	2.6-7.5	7.6-12.9	13.0 -		
4.5/ 7.2	1				1	40/44
1.7/ 4.4	13	15	7	3	38	35/39
-1.1/ 1.6	40	20	12	15	87	30/34
-3.8/ -1.2	35	12	2		49	25/29
-6.6/ -3.9	7	3			10	20/24
-9.4/ -6.7	3				3	15/19
-12.2/ -9.5	3	11	1		15	10/14
-15.0/-12.3		3			3	05/09
	102	64	22	18	206	

DECEMBER

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0-2.5	2.6-7.5	7.6-12.9	13.0 -		
4.5/ 7.2		1		1	2	40/44
1.7/ 4.4	15	9	13	2	39	35/39
-1.1/ 1.6	88	41	17		146	30/34
-3.8/ -1.2	37	19	2		58	25/29
-6.6/ -3.9	1				1	20/24
	141	70	32	3	246	

YEAR 1965

THREE-HOURLY OBSERVATIONS OF WIND SPEED (10m)

GIVING

NUMBER OF OBSERVATIONS WITH OCCURRENCE OF WIND SPEED AND DIRECTION

FEBRUARY 1965

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	6		8	2						9.9	7.7	4.0	16
NNE	6	7	1	1						9.2	4.3	2.2	15
NE	6	1	1	1						5.5	4.8	2.5	9
ENE	7	3		1						6.8	4.2	2.2	11
E	8	2		1						6.8	3.4	1.7	11
ESE	6									3.7	2.0	1.0	6
SE	2	2								2.5	3.7	1.9	4
SSE	4									2.5	2.0	1.0	4
S	4									2.5	2.0	1.0	4
SSW	4									2.5	2.0	1.0	4
SW	2									1.2	2.0	1.0	2
WSW										0	0	0	0
W	2	1								1.8	3.2	1.6	3
WNW	2	1								1.8	3.2	1.6	3
NW	4		1	2	2					5.5	9.4	4.8	9
NNW	6	1	2	9	7	1				16.0	13.7	7.0	26
								CALM		21.6			35
	69	18	13	17	9	1						TOTAL OBS	162
%	42.6	11.1	8.0	10.5	5.5	0.6							

MARCH 1965

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	1	1	6	7	9	8				20.9	18.5	9.5	32
NNE	2	2	4	8	7	1	1			16.3	15.7	8.1	25
NE	1	1	3	1						3.9	8.8	4.5	6
ENE	1		2	4						4.6	12.5	6.4	7
E	7	2	2							7.2	4.1	2.1	11
ESE	5	1	1							4.6	3.6	1.8	7
SE	5		1							3.9	3.3	1.7	6
SSE	1	2								2.0	4.3	2.2	3
S		1								0.6	5.5	2.8	1
SSW										0	0	0	0
SW	1									0.6	2.0	1.0	1
WSW		1	1	2						2.6	11.6	6.0	4
W	3	1	2							3.9	5.2	2.7	6
WNW	2	3								3.3	4.1	2.1	5
NW	3	2	2							4.6	5.0	2.6	7
NNW	8	7	1	1	2	2				13.7	8.5	4.4	21
	40	24	25	23	18	11	1		CALM	7.2			11
											TOTAL OBS		153
%	26.1	15.7	16.3	15.0	11.8	6.8	0.6						

APRIL 1965

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	4	1	3	2	1	2	2			14.4	14.8	7.6	15
NNE	1	3	3	1		1				8.6	10.2	5.2	9
NE	4		1		1		1			6.7	10.6	5.4	7
ENE			2	3						4.8	13.3	6.8	5
E	4	1		1						5.8	4.8	2.5	6
ESE	2			2	1					4.8	11.3	5.8	5
SE	2	1	1							3.8	4.9	2.5	4
SSE		1	2							2.9	8.5	4.4	3
S	2		2	1						4.8	7.9	4.1	5
SSW	1	2								2.9	4.3	2.2	3
SW	1	2	3	1						6.7	8.3	4.3	7
WSW		1	1							1.9	7.7	4.0	2
W	1		1							1.9	6.0	3.1	2
WNW	1									1.0	2.0	1.0	1
NW										0	0	0	0
NNW	2	1	2	1						5.8	7.5	3.9	6
	25	13	21	12	3	3	3		CALM	23.1		TOTAL OBS	24 104
%	24.0	12.5	20.2	11.5	2.9	2.9	2.9						

MAY 1965

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	5	1		6		1				6.0	10.5	5.4	13
NNE	8	12	2	2	2					12.1	6.8	3.5	26
NE	6	4	5	5	2	3				11.6	11.5	5.9	25
ENE	1	5	7	6	1	1				9.8	11.5	5.9	21
E	2	5	7	7	2	1				11.6	11.2	5.8	24
ESE	4	2	2	4						5.6	8.4	4.3	12
SE	2	1		1						1.9	6.2	3.2	4
SSE	2	1	1							1.9	4.9	2.5	4
S	2	1	1							1.9	4.9	2.5	4
SSW	2	5								3.2	4.5	2.3	7
SW	4		2							2.8	4.6	2.4	6
WSW	3	2		2	1	1				4.2	10.8	5.6	9
W		1								0.5	5.5	2.8	1
WNW	2		1	1	1					2.3	10.2	5.2	5
NW	1	4	11	2						8.4	9.2	4.7	18
NNW		5	5	2	1	1				6.5	11.3	5.8	14
	44	49	44	38	10	8			CALM	9.8			21
												TOTAL OBS	214
%	20.6	22.9	20.6	17.7	4.7	3.7							

JUNE 1965

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	5	4		5	6	8				12.0	16.5	8.5	28
NNE	2	1	3	4	6	6	1			9.4	19.7	10.1	23
NE	2	2	2	4	3	3				6.9	15.3	7.9	16
ENE	4	4	3	4	1	2	1			7.7	13.0	6.7	19
E	1	7	1	1		1				4.7	8.5	4.4	11
ESE	3	6	2							4.7	5.4	2.8	11
SE	1	6	1	2						4.3	7.6	3.9	10
SSE	2									0.8	2.0	1.0	2
S	1	3	5	5						6.0	10.4	5.3	14
SSW	3	9	13	9	3					15.9	10.5	5.4	37
SW		5	5	3	1					6.0	10.4	5.3	14
WSW	1	1		2	1					2.1	12.0	6.2	5
W	3	1		1	1					2.6	8.1	4.2	6
WNW	2	1	1	3						3.0	9.4	4.8	7
NW										0	0	0	0
NNW	1		4	6						4.7	12.3	6.3	11
	31	50	40	49	22	20	2		CALM	9.0			21
												TOTAL OBS	235
%	13.2	21.3	17.0	20.8	9.4	8.5	0.8						

JULY 1965

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	2	2	3	1	1		1			4.1	11.7	6.0	10
NNE	7	5	2	2	2	1	1			8.2	14.0	7.2	20
NE	8	4	2	2						6.5	5.6	2.9	16
ENE	4	3	4	2	2					6.1	9.2	4.7	15
E	7	4		4	1					6.5	7.5	3.9	16
ESE	8	2	2	4						6.5	6.8	3.5	16
SE	6	2		1						3.7	4.3	2.2	9
SSE	3		1							1.6	4.0	2.1	4
S	6	1								2.9	2.5	1.3	7
SSW	1	2	1	1						2.0	7.7	4.0	5
SW	3	1	1							2.0	4.3	2.2	5
WSW	3		1							1.6	4.0	2.1	4
W	3		1	2						2.4	7.8	4.0	6
WNW	2	3	2	1	1					3.7	8.6	4.4	9
NW	1	1	4	1	2					3.7	11.8	6.1	9
NNW	5	3	3	5	1	1				7.4	10.2	5.2	18
	69	33	27	26	10	2	2		CALM	30.7			75
												TOTAL OBS	244
%	28.3	13.5	11.1	10.6	4.1	0.8	0.8						

AUGUST 1965

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	3	3	2	1	6					6.8	12.4	6.4	15
NNE	10	6	1	2	7	2			1	13.2	12.0	6.2	29
NE	8		2	1			1			5.4	7.2	3.7	12
ENE	1	2	1		1					2.3	8.9	4.6	5
E	7	2	1	1						5.0	4.6	2.4	11
ESE	2	3								2.3	4.1	2.1	5
SE	4									1.8	4.0	2.1	4
SSE	1	1								0.9	3.8	1.9	2
S		1		1						0.9	10.5	5.4	2
SSW	3									1.3	2.0	1.0	3
SW	3		2	1						2.7	6.9	3.5	6
WSW	1	1		2						1.8	9.6	4.9	4
W	2	2	2							2.7	5.8	3.0	6
WNW				1						0.4	15.5	8.0	1
NW			2	1						1.3	11.8	6.1	3
NNW	3	1	2	2	3					5.0	11.5	5.9	11
	48	22	15	13	17	2	1		1	45.9	CALM		101
												TOTAL OBS	220
%	21.8	10.0	6.8	5.9	7.7	0.9	0.4		0.4				

SEPTEMBER 1965

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N		2	2	3	7	10	2			13.5	22.2	11.4	26
NNE	4	5	3	12	7	7	6	1		23.4	18.9	9.7	45
NE	3	6	4	3	3			1		10.4	11.7	6.0	20
ENE	2	4								3.1	4.3	2.2	6
E	3	3	3	1						5.2	6.8	3.5	10
ESE	2	1								1.5	3.2	1.6	3
SE		2								1.0	5.5	2.8	2
SSE		1								0.5	5.5	2.8	1
S				1						0.5	15.5	8.0	1
SSW	1			1						1.0	8.8	4.5	2
SW	3	2	3	2						5.2	7.8	4.0	10
WSW	1	2			1					2.0	8.9	4.6	4
W		1	2							1.5	8.5	4.4	3
WNW	3		2							2.6	5.2	2.7	5
NW	4	3	2	1	4	1				7.8	11.6	6.0	15
NNW		1	1	9	10	3				12.5	19.3	9.9	24
	26	33	22	33	32	21	8	2	CALM	7.8			15
												TOTAL OBS	192
%	13.5	17.2	11.4	17.2	16.7	10.9	4.2	1.0					

OCTOBER 1965

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.7-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	1	3	3	4	6	2		1		8.2	16.9	8.7	20
NNE	5	5	3	4	3	2	2	1		10.3	14.5	7.5	25
NE	2	2	4	5	3	2				7.4	14.0	7.2	18
ENE	2	1	1	1						2.0	7.0	3.6	5
E	3	3	2	2	1	1				4.9	10.2	5.2	12
ESE	5	5	3							5.3	5.2	2.7	13
SE	2	2	1							2.0	5.0	2.6	5
SSE	2	6		1						3.7	5.8	3.0	9
S	1	5		1						2.9	5.6	2.9	7
SSW	2	9	4							6.0	6.2	3.2	15
SW	7	5	10	3						10.3	7.5	3.9	25
WSW	4	8	3	2		1				7.4	7.8	4.0	18
W	1	4	2							2.9	6.3	3.2	7
WNW	1	3	2	2						3.3	8.9	4.6	8
NW	3	2	2	3	5					6.0	12.7	6.5	15
NNW	8	1	1	3	10					9.5	12.7	6.5	23
	49	64	41	31	28	8	2	2	CALM	7.4			18
											TOTAL OBS		243
%	20.2	26.3	16.9	12.7	11.5	3.3	0.8	0.8					

NOVEMBER 1965

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N			4	3	8	7	2	1		12.0	22.7	11.7	25
NNE	1		3		1	3				3.8	17.2	8.8	8
NE										0	0	0	0
ENE	1									0.9	2.0	1.0	1
E	2	5	1							3.8	5.2	2.7	8
ESE	9	7								7.6	3.5	1.8	16
SE	6	4								4.8	3.4	1.7	10
SSE	2	2		1						2.4	3.0	1.5	5
S	4	2								2.9	3.2	1.6	6
SSW	2	3	4							4.3	6.7	3.4	9
SW	5	2	8	5						9.6	8.9	4.6	20
WSW	3	2								2.4	3.4	1.7	5
W	4	2	1	1						3.8	5.6	2.9	8
WNW	5	2	2	4						6.2	7.9	4.1	13
NW	5		2	5		1				6.2	10.4	5.3	13
NNW	4	1	2	3	1	3	1			7.2	14.7	7.6	15
	53	32	27	22	10	14	3	1	CALM	22.5		TOTAL OBS	47 / 209
%	25.3	15.3	12.9	10.5	4.8	6.7	1.4	0.5					

DECEMBER 1965

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	3	3	3	7	1	1		1		7.7	13.3	6.8	19
NNE	4	3	3	1		1				4.9	8.2	4.2	12
NE		2	3	1						2.4	9.4	4.8	6
ENE	2	2	2	2	2					4.1	6.2	3.2	10
E	5	11	1	3	9					11.8	11.0	5.7	29
ESE	9	2	4	2						6.9	5.9	3.0	17
SE	8	4			1					5.3	4.6	2.4	13
SSE	4	2								2.4	3.2	1.6	6
S	3	1	1							2.0	4.3	2.2	5
SSW	4	2	7	1						5.7	7.5	3.9	14
SW	6	1								2.8	2.5	1.3	7
WSW	5	3								3.2	3.3	1.7	8
W	4	1								2.0	2.7	1.4	5
WNW	5	4	1							4.1	4.2	2.2	10
NW	6	2	2	1						4.5	5.3	2.7	11
NNW	3	2	2	5						4.9	9.5	4.9	12
	71	45	29	23	13	2		1	CALM	25.2			62
												TOTAL OBS	246
%	28.9	18.3	11.8	9.3	5.3	0.8		0.4					

MEAN: 1965 (Feb-Dec)

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	30	20	34	41	45	39	8	3	1	9.9	16.6	8.5	221
NNE	50	49	28	37	35	24	11	2		10.6	13.2	6.8	236
NE	40	22	27	23	12	8	2	1	1	6.1	10.8	5.6	136
ENE	25	24	22	23	7	3	1			4.7	9.8	5.0	105
E	49	45	18	21	13	3				6.7	8.1	4.2	149
ESE	55	29	14	12	1					5.0	5.5	2.8	111
SE	38	24	4	4	1					3.2	4.7	2.4	71
SSE	21	16	4	2						1.9	4.7	2.4	43
S	23	15	9	9						2.5	6.4	3.3	56
SSW	23	32	29	12						4.3	7.3	3.7	96
SW	35	18	34	15	1					4.6	7.4	3.8	103
WSW	21	21	6	10	3	2				2.8	7.8	3.9	63
W	23	14	11	4	1					2.4	6.0	3.1	53
WNW	25	17	11	12	2					3.0	7.2	3.7	67
NW	27	14	28	16	13	2				4.5	9.9	5.1	100
NNW	40	23	25	46	35	11	1			8.1	12.5	6.4	181
	525	383	304	287	169	92	23	6	2	19.4	CALM		430
												TOTAL OBS	2221
%	23.6	17.2	13.7	12.9	7.6	4.1	1.0	0.3	0.1				

AVERAGES AND EXTREMES OF MAXIMUM AND MINIMUM DAILY AIR TEMPERATURE (°C)

(300 m. Elevation)

YEAR 1965

	APR		MAY		JUN		JUL	
	DEG	DAY	DEG	DAY	DEG	DAY	DEG	DAY
MAX	2.4	16	3.1	30	1.9	8	0.1	29
AVG	- 1.9		- 2.9		- 6.1		- 7.0	
MIN	-18.0	15	-18.8	14	-19.0	19	-31.6	19
AVG	- 7.9		- 9.3		-11.6		-17.1	

	AUG		SEP		OCT		NOV	
	DEG	DAY	DEG	DAY	DEG	DAY	DEG	DAY
MAX	- 3.4	1,2,3	2.1	19	- 1.2	14	3.9	25
AVG	-11.5		- 3.6		- 7.1		- 0.4	
MIN	-27.7	6	-23.3	16,17	-30.8	3	-16.4	1
AVG	-21.5		-10.7		-15.4		- 5.9	

	DEC	
	DEG	DAY
MAX	3.8	5
AVG	0.1	
MIN	-11.7	14
AVG	- 6.0	

OBSERVED VALUES OF MAXIMUM, MINIMUM AND MEAN
DAILY AIR TEMPERATURE (°C)

(300 m. Elevation)

YEAR 1965

APRIL

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
6	1.7	-12.1	-6.6	19	1.2	-2.2	-0.7
7	1.7	-5.8	-3.9	20	1.4	-3.6	-0.1
8	-4.3	-6.9	-5.8	21	1.0	-7.0	-2.4
9	-3.4	-9.4	-6.1	22	-0.2	-7.6	-4.0
10	-5.8	-14.7	-8.8	23	-1.8	-4.9	-3.3
11	-4.2	-15.4	-7.8	24	-2.7	-7.8	-4.7
12	-3.8	-5.1	-4.7	25	-4.7	-10.0	-6.8
13	-5.0	-12.2	-6.9	26	-3.4	-7.4	-6.2
14	-7.0	-17.2	-12.0	27	-3.5	-6.2	-5.0
15	-5.3	-18.0	-12.2	28	-2.2	-7.2	-4.7
16	2.4	-7.4	-0.6	29	-0.2	-3.7	-2.6
17	1.2	-2.2	-0.1	30	-0.2	-3.1	-2.2
18	0.5	-1.7	-0.7				

MAY

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-2.0	-4.2	-2.8	17	-2.0	-6.1	-4.1
2	-2.4	-7.2	-4.4	18	-0.2	-2.0	-1.1
3	-1.2	-10.7	-4.5	19	0.4	-1.1	-0.6
4	-4.3	-14.7	-7.9	20	-0.1	-2.1	-1.1
5	-4.3	-14.7	-7.4	21	-1.3	-10.0	-6.3
6	-4.4	-8.9	-5.5	22	-1.4	-9.2	-2.8
7	-4.2	-14.7	-8.7	23	2.0	-1.8	0.2
8	-7.6	-13.4	-10.2	24	0.8	-2.2	-0.8
9	-8.0	-15.9	-11.3	25	1.4	-3.2	-1.1
10	-6.7	-9.7	-8.1	26	-2.7	-6.7	-4.1
11	-7.8	-16.4	-12.0	27	-0.4	-8.9	-5.1
12	-8.9	-16.7	-12.9	28	-5.3	-10.2	-7.4
13	-7.3	-17.3	-9.6	29	-2.9	-13.9	-7.7
14	-4.7	-18.8	-11.3	30	3.1	-3.8	-1.1
15	-3.8	-5.7	-4.8	31	-1.1	-13.1	-7.0
16	-1.9	-4.9	-2.8				

YEAR 1965

JUNE

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-2.8	-13.1	-5.2	16	-8.3	-10.6	-9.5
2	-	-	-	17	-4.1	-9.4	-6.5
3	-	-	-	18	-3.8	-15.8	-9.6
4	-9.6	-12.8	-11.3	19	-15.8	-19.0	-18.1
5	-8.2	-9.8	-8.9	20	-13.1	-18.9	-17.2
6	-5.8	-10.6	-8.1	21	-13.0	-15.3	-14.0
7	-2.7	-5.3	-3.4	22	-15.3	-17.4	-16.5
8	1.9	-2.7	-0.9	23	-6.7	-16.0	-11.0
9	-	-	-	24	-6.7	-12.9	-9.9
10	-	-	-	25	-7.2	-12.8	-10.5
11	-	-	-	26	-2.4	-8.4	-4.8
12	-	-	-	27	-0.8	-5.9	-2.1
13	-	-	-	28	-2.2	-12.2	-6.4
14	-4.3	-11.4	-6.8	29	-0.4	-6.1	-2.9
15	-6.7	-14.2	-9.2	30	-2.6	-5.7	-4.2

JULY

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-5.0	-14.0	-8.8	17	-10.1	-	-
2	-5.1	-17.1	-11.1	18	-	-25.5	-
3	-7.0	-19.2	-12.7	19	-12.2	-31.6	-26.2
4	-10.8	-19.3	-12.9	20	-4.5	-12.2	-7.6
5	-11.0	-21.4	-16.5	21	-11.3	-23.9	-18.2
6	-14.1	-23.1	-19.5	22	-11.7	-22.7	-13.9
7	-8.3	-21.5	-9.9	23	-4.8	-23.4	-12.7
8	-7.9	-21.8	-14.9	24	-3.3	-7.3	-5.3
9	-7.4	-19.6	-12.6	25	-3.5	-16.1	-11.1
10	-14.1	-21.3	-18.7	26	-15.3	-19.9	-17.1
11	-13.2	-21.2	-16.6	27	-2.2	-10.7	-3.9
12	-2.9	-21.4	-11.1	28	-1.1	-8.4	-3.6
13	-2.9	-6.8	-4.8	29	0.1	-5.2	-2.2
14	-1.5	-3.4	-2.2	30	-0.5	-9.8	-3.9
15	-2.4	-19.8	-13.2	31	-4.8	-7.1	-6.4
16	-11.7	-20.0	-13.5				

YEAR 1965

AUGUST

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-	-	-	17	-9.4	-20.8	-15.3
2	-	-	-	18	-9.3	-20.2	-13.8
3	-	-	-	19	-5.3	-19.2	-9.1
4	-20.6	-14.2	-22.6	20	-	-	-
5	-19.3	-27.6	-23.6	21	-	-	-
6	-14.1	-27.7	-22.1	22	-	-	-
7	-17.3	-25.0	-21.4	23	-	-	-
8	-11.4	-25.2	-18.4	24	-	-	-
9	-12.7	-26.7	-16.1	25	-	-	-
10	-16.3	-27.2	-22.2	26	-	-	-
11	-19.7	-27.1	-22.8	27	-	-	-
12	-8.5	-23.8	-15.5	28	-	-	-
13	-4.6	-9.3	-6.6	29	-14.3	-18.4	-16.3
14	-4.4	-14.4	-9.3	30	-6.8	-18.3	-10.6
15	-6.8	-20.8	-14.4	31	-4.6	-8.6	-6.2
16	-13.4	-22.1	-17.4				

SEPTEMBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-2.7	-9.9	-5.4	16	-	-	-
2	-5.0	-8.7	-6.8	17	-	-	-
3	-4.0	-13.9	-9.0	18	-0.9	-1.9	-1.4
4	-5.6	-16.4	-10.4	19	2.1	-7.2	-3.2
5	-1.7	-5.0	-3.4	20	-1.1	-4.4	-2.8
6	-1.7	-2.3	-2.2	21	0.4	-10.4	-4.2
7	-2.7	-18.3	-10.1	22	-1.6	-12.7	-5.9
8	-6.5	-23.1	-14.4	23	-2.2	-8.5	-4.2
9	-4.8	-10.6	-7.2	24	-4.1	-11.8	-7.7
10	-5.0	-17.9	-10.0	25	-4.6	-9.1	-7.6
11	-2.4	-5.7	-3.1	26	-4.8	-8.1	-6.4
12	-1.7	-2.8	-2.3	27	-3.8	-9.8	-8.0
13	-1.7	-2.8	-2.2	28	-8.9	-16.4	-12.1
14	-	-	-	29	-9.9	-19.7	-15.6
15	-	-	-	30	-8.4	-19.8	-14.2

YEAR 1965

OCTOBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-13.1	-18.9	-16.2	17	-	-	-
2	-7.1	-25.1	-14.9	18	-	-	-
3	-17.7	-30.8	-24.7	19	-	-	-
4	-11.3	-19.4	-16.3	20	-7.8	-10.7	-9.4
5	-10.5	-21.1	-13.2	21	-10.5	-13.2	-12.1
6	-12.1	-21.1	-16.4	22	-11.9	-14.2	-13.1
7	-13.0	-18.2	-15.9	23	-4.8	-21.6	-13.6
8	-13.4	-20.8	-17.4	24	-5.6	-13.4	-8.8
9	-6.7	-13.6	-9.8	25	-2.1	-17.6	-8.9
10	-3.3	-13.6	-7.0	26	-2.9	-7.0	-4.7
11	-3.2	-6.5	-4.7	27	-4.9	-10.4	-6.6
12	-4.1	-17.6	-8.9	28	-2.8	-16.1	-10.2
13	-1.7	-20.4	-7.4	29	-1.7	-4.9	-2.7
14	-1.2	-4.4	-2.9	30	-4.7	-6.7	-5.8
15	-	-	-	31	-6.3	-13.9	-11.5
16	-	-	-				

NOVEMBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-0.3	-16.4	-1.7	16	-	-	-
2	-0.7	-2.3	-1.7	17	-0.3	-2.2	-0.9
3	-2.3	-3.3	-2.9	18	-2.1	-4.4	-2.2
4	-3.3	-3.9	-3.7	19	1.7	-10.6	-2.7
5	-3.2	-3.8	-3.7	20	1.8	-3.9	-1.3
6	-2.7	-4.5	-2.9	21	3.4	-3.0	-1.2
7	-2.8	-4.5	-3.6	22	0.5	-2.1	-0.7
8	-1.3	-3.9	-2.5	23	3.8	-6.7	-1.7
9	-2.2	-4.9	-3.5	24	3.6	-3.5	-1.3
10	-3.6	-9.0	-6.9	25	3.9	-6.8	-3.1
11	-0.7	-10.4	-7.2	26	-0.1	-7.3	-4.8
12	-	-	-	27	-4.1	-7.2	-5.6
13	-	-	-	28	-0.8	-9.7	-4.7
14	-	-	-	29	-1.3	-6.0	-4.1
15	-	-	-	30	-0.7	-7.7	-5.1

YEAR 1965

DECEMBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-1.3	-6.2	-3.7	17	2.2	-8.4	-3.3
2	-3.1	-6.7	-5.0	18	0.9	-4.7	-3.3
3	-0.8	-4.9	-3.1	19	-2.1	-6.8	-4.5
4	0.2	-4.4	-1.8	20	-2.2	-5.9	-4.7
5	3.8	-9.2	-2.6	21	-0.4	-8.4	-4.0
6	1.1	-8.1	-4.6	22	-2.2	-6.6	-3.9
7	0.6	-7.0	-4.9	23	2.0	-4.3	-1.9
8	0.0	-5.7	-3.6	24	-0.4	-4.4	-3.0
9	-1.2	-5.4	-3.8	25	1.1	-4.9	-3.1
10	2.8	-5.4	-2.6	26	-2.2	-5.1	-3.7
11	0.3	-7.3	-3.7	27	0.3	-4.1	-2.3
12	-2.1	-9.5	-5.1	28	-1.6	-3.3	-2.7
13	-0.6	-5.2	-3.8	29	2.9	-8.7	-1.7
14	0.7	-11.7	-5.6	30	1.5	-1.3	-0.8
15	-0.6	-4.9	-1.8	31	0.7	-1.7	-0.7
16	2.9	-6.2	-2.1				

APPENDIX I: Part 3b

DATA TABLES

Tabulated Data for 1966

TEMPERATURE

MONTHLY AVERAGES

AVERAGE AIR TEMPERATURE (°C)

YEAR 1966

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2.3	0.5	0.0	-2.3	-4.3	-5.6	-13.8	-9.6	-7.5	-4.5	-1.3	0.4

Mean: -3.8

AVERAGES AND EXTREMES OF MAXIMUM AND MINIMUM DAILY AIR TEMPERATURE (°C)

YEAR 1966

	JAN		FEB		MAR		APR	
	DEG	DAY	DEG	DAY	DEG	DAY	DEG	DAY
MAX	6.7	30	6.1	12	6.7	7	7.4	1
AVG	4.3		2.7		2.3		-0.1	
MIN	-2.3	7	-4.2	25	-5.7	19	-10.1	23
AVG	-0.5		-1.3		-2.0		-4.5	

	MAY		JUN		JUL		AUG	
	DEG	DAY	DEG	DAY	DEG	DAY	DEG	DAY
MAX	3.4	5	2.8	21	2.6	30	2.3	6
AVG	-2.2		-3.3		-9.6		-3.7	
MIN	-12.3	1	-14.1	15	-29.5	16	-28.4	17
AVG	-6.7		-8.4		-19.0		-14.9	

	SEP		OCT		NOV		DEC	
	DEG	DAY	DEG	DAY	DEG	DAY	DEG	DAY
MAX	3.2	26	5.6	25	9.0	22	5.9	20
AVG	-3.4		-0.9		2.9		2.6	
MIN	-27.1	8	-22.7	6	-10.5	6	-7.4	12
AVG	-12.1		-8.2		-4.2		-2.1	

OBSERVED VALUES OF MAXIMUM, MINIMUM AND MEAN
DAILY AIR TEMPERATURE (°C)

YEAR 1966

JANUARY

DATE	MAX	MIN	MEAN
1	4.3	2.4	3.0
2	4.5	1.8	3.4
3	4.6	-0.1	2.6
4	5.7	0.0	2.7
5	2.6	-0.8	1.0
6	2.3	-1.8	-0.5
7	1.9	-2.3	0.1
8	1.8	-1.8	0.0
9	6.4	3.3	4.9
30	6.7	3.3	4.6
31	6.1	2.5	4.1

FEBRUARY

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	2.7	-1.2	0.8	15	3.6	-0.6	0.7
2	1.1	-3.9	-1.5	16	3.1	-0.8	0.8
3	3.9	-1.5	1.0	17	2.8	-1.7	0.5
4	5.3	-1.1	1.5	18	3.3	-2.2	0.9
5	5.0	-0.6	2.2	19	1.1	-1.1	-0.4
6	3.3	-1.9	0.6	20	0.6	-1.7	-0.8
7	2.8	-0.6	0.9	21	0.0	-3.6	-1.5
8	1.4	-1.1	0.0	22	2.5	-1.4	0.3
9	2.2	0.0	0.8	23	0.8	-2.5	-0.6
10	3.1	0.3	1.1	24	1.7	-2.8	-1.1
11	2.8	0.0	1.0	25	1.1	-4.2	-1.8
12	6.1	1.7	3.8	26	0.6	-1.9	-1.0
13	4.7	0.6	2.9	27	1.4	-2.2	-0.8
14	4.4	0.6	2.4	28	2.8	-1.4	0.1

YEAR 1966

MARCH

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	2.0	-0.4	0.7	17	4.8	-2.2	1.2
2	3.1	-1.1	0.5	18	-0.7	-4.4	-2.1
3	4.4	-0.1	2.3	19	0.6	-5.7	-3.3
4	4.2	1.1	2.6	20	-0.3	-5.5	-2.8
5	5.1	1.7	3.3	21	0.2	-4.4	-2.3
6	3.2	0.6	1.1	22	-0.7	-4.0	-3.1
7	6.7	-1.7	2.8	23	-1.8	-4.4	-3.4
8	4.0	-0.5	2.8	24	-1.2	-4.5	-3.2
9	1.1	-1.2	-0.2	25	0.8	-5.2	-2.6
10	1.9	-1.4	-0.3	26	-0.2	-3.3	-1.3
11	4.8	-0.7	1.2	27	-0.1	-2.3	-1.9
12	4.1	1.1	2.6	28	5.9	-5.0	-0.1
13	3.4	-0.1	2.6	29	2.2	-0.8	0.4
14	0.5	-2.7	-0.8	30	5.5	0.4	2.7
15	0.2	-2.6	-1.5	31	3.0	-0.8	0.4
16	4.2	-1.8	1.5				

APRIL

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	7.4	1.1	4.4	16	-5.4	-8.3	-6.7
2	5.7	-1.1	1.7	17	-6.0	-9.8	-7.2
3	3.9	-0.2	1.7	18	-6.4	-7.8	-7.1
4	7.2	0.8	3.4	19	-1.1	-6.6	-3.9
5	3.9	0.5	2.2	20	-0.8	-4.4	-2.8
6	5.1	-0.8	2.3	21	0.6	-5.1	-1.8
7	6.0	0.9	2.9	22	-4.6	-8.9	-6.6
8	4.4	1.1	2.6	23	-2.8	-10.1	-5.7
9	2.1	-1.2	0.7	24	-2.1	-6.6	-3.7
10	0.3	-3.6	-2.7	25	-0.8	-3.3	-2.1
11	1.1	-3.3	-2.1	26	-2.6	-6.1	-4.0
12	0.3	-1.1	-0.2	27	-5.2	-7.2	-6.0
13	-0.8	-5.6	-2.2	28	-3.8	-6.0	-5.0
14	-4.9	-7.8	-6.6	29	1.7	-7.8	-5.6
15	-4.4	-7.2	-5.8	30	1.2	-9.4	-3.8

YEAR 1966

MAY

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-6.2	-12.3	-9.1	17	-4.8	-7.2	-5.8
2	1.3	-9.4	-2.2	18	-3.3	-7.8	-5.4
3	0.7	-2.2	-1.1	19	-3.3	-6.2	-5.1
4	1.7	-2.9	-1.4	20	-6.0	-10.1	-7.2
5	3.4	-1.3	0.5	21	-3.5	-11.1	-8.5
6	0.1	-3.3	-1.7	22	0.2	-6.4	-2.8
7	2.9	-1.9	1.1	23	-0.3	-3.6	-2.3
8	2.8	-1.1	0.5	24	-1.1	-5.7	-3.8
9	0.6	-4.3	-2.0	25	-2.7	-8.6	-5.3
10	1.7	-5.0	-2.4	26	-2.3	-5.6	-3.7
11	0.0	-5.8	-3.4	27	-2.5	-5.9	-4.3
12	-3.9	-7.9	-5.9	28	-4.4	-6.9	-5.3
13	-7.2	-9.8	-7.9	29	-4.7	-7.6	-6.1
14	-7.3	-11.2	-9.9	30	-4.7	-9.2	-6.5
15	-3.8	-9.4	-6.3	31	-6.7	-9.0	-7.8
16	-3.6	-7.6	-5.3				

JUNE

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-8.3	-11.7	-10.3	16	-5.7	-7.8	-6.9
2	-3.9	-10.0	-6.5	17	-4.6	-12.3	-7.3
3	-4.4	-3.8	-5.8	18	0.1	-12.3	-4.1
4	-4.1	-5.6	-4.7	19	0.8	-6.2	-2.4
5	-3.8	-10.1	-5.9	20	-0.4	-7.9	-3.9
6	-5.2	-13.2	-7.6	21	2.8	-4.0	0.0
7	-6.7	-14.0	-11.4	22	1.8	-4.6	-2.2
8	-2.7	-6.8	-4.2	23	0.3	-3.9	-1.4
9	-2.3	-4.7	-3.3	24	1.2	-1.8	-0.3
10	-3.3	-8.4	-5.8	25	0.7	-4.7	-1.8
11	-7.1	-12.2	-8.7	26	-0.4	-5.4	-3.3
12	-8.6	-13.4	-10.5	27	0.4	-3.9	-1.6
13	-8.8	-13.1	-10.2	28	-2.7	-5.7	-3.9
14	-9.3	-12.6	-10.6	29	-4.6	-9.1	-6.8
15	-7.5	-14.1	-11.6	30	-1.4	-8.9	-6.1

YEAR 1966

JULY

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-1.6	-6.7	-3.9	17	-12.4	-24.2	-18.7
2	-6.5	-8.4	-7.7	18	0.2	-15.4	-4.6
3	-6.9	-13.0	-10.1	19	-0.1	-25.1	-15.1
4	-8.9	-13.3	-10.7	20	-7.3	-20.6	-13.0
5	-10.0	-18.6	-13.1	21	-14.4	-24.7	-22.7
6	-16.3	-20.1	-17.9	22	-22.6	-29.0	-25.5
7	-6.1	-20.0	-14.0	23	-20.6	-27.3	-23.8
8	-10.0	-17.8	-13.9	24	-16.8	-24.6	-21.9
9	-8.1	-20.1	-15.3	25	-8.7	-18.4	-14.4
10	-16.1	-19.6	-18.4	26	-5.3	-10.1	-6.9
11	-19.3	-24.7	-22.3	27	-6.6	-12.2	-9.4
12	-18.8	-23.1	-20.8	28	1.2	-13.8	-7.4
13	-18.3	-23.4	-20.9	29	0.1	-1.3	-1.1
14	-8.3	-18.3	-12.2	30	2.8	-3.3	-0.2
15	-9.6	-25.8	-16.8	31	2.6	-2.3	-0.2
16	-23.8	-29.5	-26.7				

AUGUST

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-0.6	-5.6	-2.3	17	-1.1	-28.4	-14.8
2	-5.3	-10.0	-7.2	18	-0.1	-20.1	-8.4
3	-6.6	-18.1	-13.1	19	-3.6	-18.9	-10.8
4	-3.9	-10.2	-5.4	20	-1.5	-12.8	-5.9
5	-0.4	-8.8	-5.2	21	-2.6	-9.0	-5.5
6	2.3	-1.4	0.5	22	1.5	-8.5	-3.7
7	0.8	-13.2	-6.2	23	2.3	-3.1	0.7
8	-6.6	-23.4	-14.3	24	0.2	-7.2	-3.6
9	-13.7	-25.6	-19.7	25	-6.5	-12.4	-7.8
10	-0.9	-18.9	-7.6	26	-10.4	-18.4	-14.1
11	-2.9	-24.6	-18.3	27	-13.1	-20.2	-17.2
12	-8.1	-23.4	-17.1	28	-10.9	-18.4	-14.9
13	-9.1	-23.0	-18.0	29	-3.6	-14.4	-9.6
14	-1.6	-14.4	-6.3	30	-0.3	-5.6	-3.1
15	-0.1	-12.8	-5.2	31	-1.7	-9.4	-6.1
16	-6.4	-22.9	-12.3				

YEAR 1966

SEPTEMBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	0.2	-7.3	-2.8	16	-1.0	-9.1	-4.9
2	0.1	-6.2	-2.8	17	1.2	-2.0	-0.5
3	-3.9	-14.6	-8.2	18	0.7	-4.3	-2.3
4	-5.6	-14.2	-10.3	19	0.6	-4.3	-2.3
5	-5.6	-17.7	-14.1	20	1.6	-3.4	-1.2
6	-3.2	-16.1	-13.0	21	2.6	-1.7	0.6
7	-14.9	-26.4	-21.9	22	2.2	-5.4	-0.8
8	-4.8	-27.1	-17.1	23	-1.8	-8.7	-5.7
9	-4.5	-13.8	-7.6	24	-0.7	-6.1	-3.2
10	-5.7	-16.7	-12.0	25	2.7	-6.6	-0.8
11	-3.4	-15.2	-8.1	26	3.2	-1.1	1.2
12	-5.1	-15.6	-9.3	27	-0.1	-13.2	-5.6
13	-15.3	-21.1	-19.0	28	-8.2	-15.5	-12.2
14	-13.8	-22.4	-18.8	29	-10.3	-17.9	-14.4
15	-6.8	-18.6	-13.3	30	-1.6	-13.3	-7.8

OCTOBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-1.1	-4.7	-2.9	17	-1.6	-8.3	-4.1
2	-0.8	-2.9	-1.7	18	-2.2	-9.7	-7.2
3	0.6	-1.3	-0.3	19	-2.1	-14.4	-6.7
4	0.6	-8.9	-0.9	20	-2.6	-16.6	-10.2
5	-6.5	-13.4	-9.7	21	0.5	-4.2	-2.6
6	-6.4	-22.7	-13.2	22	-0.5	-6.1	-3.1
7	-1.8	-12.3	-7.4	23	-2.2	-10.3	-6.7
8	-5.2	-13.6	-7.6	24	3.8	-6.7	0.3
9	-11.8	-17.2	-14.2	25	5.6	-1.1	1.4
10	-1.6	-17.8	-10.3	26	2.7	-4.3	0.7
11	2.6	-1.8	0.2	27	1.1	-4.0	-2.2
12	2.0	-3.8	-1.3	28	0.9	-4.1	-1.9
13	-1.1	-5.5	-3.2	29	2.9	-0.7	0.6
14	-0.2	-6.2	-3.4	30	3.7	-1.8	0.9
15	-6.1	-14.5	-11.1	31	-0.1	-4.6	-2.4
16	-1.2	-15.4	-7.1				

YEAR 1966

NOVEMBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	0.2	-6.2	-2.6	16	0.7	-8.8	-3.7
2	2.5	-3.2	-1.2	17	1.3	-9.9	-4.6
3	0.9	-6.6	-2.9	18	5.7	-1.3	1.2
4	2.3	-9.9	-4.7	19	4.3	-4.9	0.7
5	0.7	-6.2	-3.1	20	3.9	-0.9	0.5
6	1.2	-10.5	-5.0	21	6.4	0.0	2.1
7	-0.4	-8.2	-4.6	22	9.0	1.1	4.2
8	3.9	-5.1	-2.2	23	4.9	0.2	2.3
9	4.9	-5.1	-1.9	24	7.9	-1.8	2.5
10	-0.1	-9.9	-4.0	25	4.6	2.8	3.6
11	2.1	-2.9	-1.2	26	4.8	1.1	3.1
12	0.7	-3.3	-1.9	27	3.6	-0.2	1.0
13	-0.1	-5.8	-3.8	28	3.3	-1.4	0.5
14	-0.2	-9.2	-3.9	29	4.9	-3.2	0.7
15	1.2	-5.7	-2.7	30	1.8	-1.7	-0.2

DECEMBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	1.2	-1.1	-0.2	17	1.4	-1.8	-0.5
2	0.5	-1.8	-0.8	18	3.3	-4.1	-0.4
3	2.7	-2.1	0.1	19	5.0	-5.0	-0.5
4	1.6	-3.3	0.8	20	5.9	0.6	3.3
5	2.3	-6.2	0.0	21	2.4	-0.1	0.6
6	2.1	-1.1	0.0	22	5.4	-0.8	1.4
7	3.4	-1.1	1.2	23	1.6	-0.4	0.5
8	2.3	-3.6	-0.7	24	5.4	-0.2	1.4
9	1.8	-2.2	-0.7	25	3.2	-3.2	0.3
10	0.1	-3.7	-1.6	26	3.6	0.1	1.6
11	1.2	-6.1	-2.4	27	3.0	0.0	1.1
12	0.0	-7.4	-3.4	28	2.9	-0.1	1.3
13	0.6	-2.8	-1.3	29	3.4	-0.2	1.6
14	2.5	-2.7	0.0	30	3.9	-1.1	0.8
15	2.3	-3.9	-0.7	31	4.3	-1.8	1.1
16	2.4	-2.4	-0.4				

PRESSURE

BAROMETRIC PRESSURE (P) (in mb)

YEAR 1966

	JAN		FEB		MAR		APR	
	(P)	DAY	(P)	DAY	(P)	DAY	(P)	DAY
MAX	992.2	9	1005.8	11	1009.5	1	1007.6	3
AVG	985.4		991.8		984.5		988.2	
MIN	974.3	20,30	968.1	14	953.9	17	961.2	21

	MAY		JUN		JUL		AUG	
	(P)	DAY	(P)	DAY	(P)	DAY	(P)	DAY
MAX	1004.2	21	1013.9	12	1016.1	25	1011.0	20
AVG	985.2		992.0		994.4		986.9	
MIN	957.0	2	966.5	23	963.9	15	950.2	15

	SEP		OCT		NOV		DEC	
	(P)	DAY	(P)	DAY	(P)	DAY	(P)	DAY
MAX	1021.8	19	1006.9	27	1009.0	21	1005.4	21
AVG	989.8		986.1		993.7		989.3	
MIN	939.2	4	959.4	12	973.9	3	968.8	12

FREQUENCY OF PRESSURE
(by 10 mb)

(P)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1020-1029									12			
1010-1019						15	43	4	47			
1000-1009		27	30	32	12	51	40	34	28	40	37	15
990- 999	80	106	46	91	88	72	67	63	40	78	126	127
980- 989	84	77	85	74	67	50	61	82	17	53	68	56
970- 979	79	7	66	23	35	39	35	45	44	31	9	48
960- 969		3	11	9	30	10	2	10	35	44		2
950- 959			6		3			10	12	2		
940- 949									5			
TOTAL OBS	243	220	244	229	235	237	248	248	240	248	240	248

CLOUD COVER

TOTAL CLOUD AMOUNT OCCURRENCES BY TENTHS

YEAR 1966

SCALE 0-10	0	1	2	3	4	5	6	7	8	9	10	TOT OBS	AVG COVER
JAN*	0	1	2	3	3	3	3	3	10	11	30	69	8.10
FEB*	11	7	2	4	0	2	1	3	1	4	48	81	7.20
MAR	0	3	1	2	8	1	6	3	9	11	124	168	9.02
APR	8	2	2	3	5	8	3	2	6	11	103	153	8.39
MAY	11	1	1	5	12	6	1	3	4	8	83	135	7.83
JUN	11	2	7	5	3	4	5	2	3	2	115	159	8.17
JUL	12	6	12	8	3	4	2	11	2	7	102	169	7.54
AUG*	14	10	3	7	6	1	5	5	8	10	131	200	7.97
SEP	5	5	6	5	6	3	2	2	4	8	114	160	8.38
OCT	3	1	3	2	4	5	4	1	4	3	145	175	9.10
NOV	7	7	1	3	3	4	3	2	3	8	109	151	8.40
DEC	7	7	2	1	3	1	1	5	4	6	117	154	8.62
										TOTAL OBS		1774	
										ANNUAL AVERAGE COVER			8.23

* As above

OCCURRENCE OF CEILING HEIGHT

Insufficient data for table compilation

WIND

MEAN MONTHLY WIND SPEED

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG
Kts	4.9	3.0	6.4	7.1	9.3	8.1	5.9	8.9	7.8	8.4	5.8	5.0	6.7
M/s	2.5	1.5	3.3	3.6	4.7	4.1	3.0	4.6	4.0	4.5	3.0	2.6	3.4

PRECIPITATION AND FOG

NUMBER OF OBSERVATIONS WITH OCCURRENCE OF WEATHER

YEAR 1966

	JAN*	FEB*	MAR	APR	MAY	JUN	JUL	AUG*	SEP	OCT	NOV	DEC
Rain and Drizzle/ Freezing Rain and Drizzle	6	5	16	24	1	3	1	3	3	1	7	8
Sleet	0	0	0	1	0	0	0	2	0	0	0	1
Snow	2	4	30	31	34	40	60	65	34	71	35	41
Fog and Ice Fog	0	4	1	17	6	7	19	20	21	12	13	15
Blowing and drifting Snow	0	0	0	1	13	33	13	25	17	13	1	0

* JAN: Missing days 11-28 due personnel changeover
* FEB: Total of 84 observations only were taken
* AUG: Includes 8 observations per day 6-16 due aircraft activities

NUMBER OF DAYS WITH RAIN AND DRIZZLE/FREEZING RAIN AND DRIZZLE

JAN*	FEB*	MAR	APR	MAY	JUN	JUL	AUG*	SEP	OCT	NOV	DEC
3	3	9	13	1	2	1	1	1	1	4	4

NUMBER OF DAYS WITH SNOW AND SLEET

JAN*	FEB*	MAR	APR	MAY	JUN	JUL	AUG*!	SEP	OCT	NOV	DEC
1	2	20	15	14	17	18	20	17	24	16	15

* As above
! Hail $\frac{1}{4}$ inch diameter at one observation early August 7

TOTAL MONTHLY PRECIPITATION (cm)

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
-	1.5	2.8	6.2	1.6	3.1	1.7	2.1	2.3	2.6	3.4	2.8

Annulal Total: 30.1

YEAR 1966

THREE-HOURLY OBSERVATIONS OF WIND SPEED (10m) AND TEMPERATURE

GIVING

NUMBER OF OBSERVATIONS WITH OCCURRENCE OF WIND SPEED AND TEMPERATURE

YEAR 1966

JANUARY

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0-2.5	2.6-7.5	7.6-12.9	13.0 -		
4.5/ 7.2		5	4		9	40/44
1.7/ 4.4	15	16	10		41	35/39
-1.1/ 1.6	20	10	1		31	30/34
-3.8/ -1.2		2			2	25/29
	35	33	25		83	

FEBRUARY

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0-2.5	2.6-7.5	7.6-12.9	13.0 -		
1.7/ 4.4	18	2	1		21	35/39
-1.1/ 1.6	33	1			34	30/34
-3.8/ -1.2	2				2	25/29
	53	3	1		57	

MARCH

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0-2.5	2.6-7.5	7.6-12.9	13.0 -		
4.5/ 7.2			2		2	40/44
1.7/ 4.4	26	32	15		73	35/39
-1.1/ 1.6	55	27	4	2	88	30/34
-3.8/ -1.2	46	25	3		74	25/29
-6.6/ -3.9	5	3			8	20/24
	132	87	24	2	245	

YEAR 1966

APRIL

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0–2.5	2.6–7.5	7.6–12.9	13.0 –		
4.5/ 7.2		1	2	5	8	40/44
1.7/ 4.4	10	20	7	5	42	35/39
-1.1/ 1.6	3	30	6	1	40	30/34
-3.8/ -1.2	24	27	3		54	25/29
-6.6/ -3.9	34	31	2		67	20/24
-9.4/ -6.7	13	13	1		27	15/19
	84	122	21	11	238	

MAY

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0–2.5	2.6–7.5	7.6–12.9	13.0 –		
1.7/ 4.4	2		1	3	6	35/39
-1.1/ 1.6	8	21	5	5	39	30/34
-3.8/ -1.2	21	26	12	3	62	25/29
-6.6/ -3.9	26	50	11		87	20/24
-9.4/ -6.7	4	39	1		44	15/19
-12.2/ -9.5	3	5			8	10/14
	64	141	30	11	246	

JUNE

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0–2.5	2.6–7.5	7.6–12.9	13.0 –		
-1.1/ 1.6	2	6	12	15	35	30/34
-3.8/ -1.2	17	16	11	5	49	25/29
-6.6/ -3.9	55	10		2	67	20/24
-9.4/ -6.7	33	9	1	1	44	15/19
-12.2/ -9.5	27	11	1		39	10/14
-15.0/-12.3	3	3			6	05/09
	137	55	25	23	240	

YEAR 1966

JULY

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0-2.5	2.6-7.5	7.6-12.9	13.0 -		
1.7/ 4.4		1	1		2	35/39
-1.1/ 1.6	3	12	5	2	22	30/34
-3.8/ -1.2	5	2	2	2	11	25/29
-6.6/ -3.9	7	1	2	1	11	20/24
-9.4/ -6.7	14	8	2	4	28	15/19
-12.2/ -9.5	23	13	1	2	39	10/14
-15.0/-12.3	9	11		1	21	05/09
-18.7/-15.1	14	5			19	00/04
-21.0/-18.8	27	9			36	-05/01
-23.8/-21.1	32	2			34	-10/06
-26.6/-23.9	17	4			21	-15/11
-29.4/-26.7	3	1			4	-20/16
	154	69	13	12	248	

AUGUST

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0-2.5	2.6-7.5	7.6-12.9	13.0 -		
1.7/ 4.4				1	1	35/39
-1.1/ 1.6	1	4	4	6	15	30/34
-3.8/ -1.2	12	11	6	2	31	25/29
-6.6/ -3.9	13	14	4	1	32	20/24
-9.4/ -6.7	16	8	2	2	28	15/19
-12.2/ -9.5	10	6	4	1	21	10/14
-15.0/-12.3	22	2	2	1	27	05/09
-18.7/-15.1	18	2	1		21	00/04
-21.0/-18.8	3	5	3		11	-05/01
-23.8/-21.1	4	7	1		12	-10/06
-26.6/-23.9	2	1	1		4	-15/11
-29.4/-26.7		2			2	-20/16
	101	62	28	14	205	

YEAR 1966

SEPTEMBER

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0-2.5	2.6-7.5	7.6-12.9	13.0 -		
1.7/ 4.4	1	1	3	1	6	35/39
-1.1/ 1.6	15	27	1	2	45	30/34
-3.8/ -1.2	17	6	2	1	26	25/29
-6.6/ -3.9	12	11	3	4	30	20/24
-9.4/ -6.7	11	7	3		21	15/19
-12.2/ -9.5	20	4			24	10/14
-15.0/-12.3	14	3	4	3	24	05/09
-18.7/-15.1	13	3	1	2	19	00/04
-21.0/-18.8	3	7			10	-05/01
-23.8/-21.1	5				5	-10/06
-26.6/-23.9	3	3			6	-15/11
	114	72	17	13	216	

OCTOBER

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0-2.5	2.6-7.5	7.6-12.9	13.0 -		
1.7/ 4.4	4	3	3	1	11	35/39
-1.1/ 1.6	16	21	15	7	59	30/34
-3.8/ -1.2	27	38	15	1	81	25/29
-6.6/ -3.9	13	14	1	1	29	20/24
-9.4/ -6.7	16	7			23	15/19
-12.2/ -9.5	12	5			17	10/14
-15.0/-12.3	16	4			20	05/09
-18.7/-15.1	8				8	00/04
	112	92	34	10	248	

YEAR 1966

NOVEMBER

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0–2.5	2.6–7.5	7.6–12.9	13.0 –		
7.3/ 9.9				1	1	45/49
4.5/ 7.2		4	1		5	40/44
1.7/ 4.4	17	17	12	2	48	35/39
-1.1/ 1.6	48	20			68	30/34
-3.8/ -1.2	50	18	6		74	25/29
-6.6/ -3.9	17	11	2		30	20/24
-9.4/ -6.7	12	2			14	15/19
	144	72	21	3	240	

DECEMBER

TEMP °C	WIND SPEED (m/sec)				TOTAL	TEMP °F
	0.0–2.5	2.6–7.5	7.6–12.9	13.0 –		
4.5/ 7.2		1	2	1	4	40/44
1.7/ 4.4	31	10	4	2	47	35/39
-1.1/ 1.6	109	30	3		142	30/34
-3.8/ -1.2	35	9	3		47	25/29
-6.6/ -3.9	6	2			8	20/24
	181	52	12	3	248	

YEAR 1966

THREE-HOURLY OBSERVATIONS OF WIND SPEED (10m)

GIVING

NUMBER OF OBSERVATIONS WITH OCCURRENCE OF WIND SPEED AND DIRECTION

JANUARY 1966

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N		4	3	7	6					8.6	14.5	7.5	20
NNE			1	2	4	1				3.2	19.4	10.0	8
NE	1	2	2	1	1					2.8	10.0	5.1	7
ENE	2	5	1	2	1					4.4	8.5	4.4	11
E	2	4								2.4	4.3	2.2	6
ESE	10	8	2							8.1	4.2	2.2	20
SE	16	5								8.5	2.8	1.4	21
SSE	7	1	1							3.6	3.3	1.7	9
S	8	3	1							4.8	3.5	1.8	12
SSW	6	3								3.6	3.2	1.6	9
SW	8	9	2							7.7	4.5	2.3	19
WSW	7	4								4.4	3.4	1.7	11
W	9	3	1							5.2	3.4	1.7	13
WNW	11	3	1							6.0	3.2	1.6	15
NW	9	2								4.4	2.6	1.3	11
NNW	5	1	1	2						3.6	6.3	3.2	9
	101	57	16	14	12	1			CALM	18.9		TOTAL OBS	47 248
%	40.7	23.0	6.4	5.6	4.8	0.4							

FEBRUARY 1966

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	6	1	2	1	2					18.2	6.2	3.2	12
NNE										0	0	0	0
NE										0	0	0	0
ENE	1		1							3.0	6.0	3.1	2
E										0	0	0	0
ESE										0	0	0	0
SE		1								1.5	5.5	2.8	1
SSE	1	2								4.5	4.3	2.2	3
S	6	1								10.6	2.5	1.3	7
SSW										0	0	0	0
SW	1									1.5	2.0	1.0	1
WSW	1	1								3.0	3.7	1.9	2
W	1	1								3.0	3.7	1.9	2
WNW	5	1								9.1	2.6	1.3	6
NW										0	0	0	0
NNW	2	1								4.5	3.2	1.6	3
	24	9	3	1	2				CALM	40.9		TOTAL OBS	27 / 66
%	36.4	13.6	4.5	1.5	3.0								

MARCH 1966

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	7	6	11	4	5	1				13.9	10.4	5.3	34
NNE	11	12	2	2	1	1				11.8	6.5	3.3	29
NE	7	5	3	1	5					8.6	9.3	4.8	21
ENE	8	4	1	2						6.1	5.3	2.7	15
E	8	4	2	2						6.5	5.6	2.9	16
ESE	4	5	2	2						5.3	6.6	3.4	13
SE	4	4								3.3	3.7	1.9	8
SSE	2	2								1.6	3.7	1.9	4
S	1	6	1							3.3	5.6	2.9	8
SSW	4	4	1	2						4.5	6.4	3.3	11
SW	2	2	1	2						2.8	8.0	4.1	7
WSW	3	3								2.4	3.7	1.9	6
W			1							0.4	10.0	5.1	1
WNW	1	2	2	1						2.4	8.1	4.2	6
NW	4	5	1	1						4.5	5.5	2.8	11
NNW	9	4	2	1						6.5	4.7	2.4	16
	75	68	30	20	11	2			CALM	15.9			39
												TOTAL OBS	245
%	30.6	27.7	12.2	8.2	4.5	0.8							

APRIL 1966

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	6	5	5	7	4	5	1	1		15.0	11.6	6.0	34
NNE	8	4	1	1	1	4				8.1	10.4	5.4	19
NE	2	2	1							2.1	5.0	2.6	5
ENE	3	3	1							3.0	4.6	2.4	7
E	1	3								1.7	4.6	2.4	4
ESE	3	7	2							5.1	5.4	2.8	12
SE	3	3	3	1						3.9	6.4	3.3	9
SSE	5	5	6							6.9	6.1	3.1	16
S	2	5	15	2						10.3	8.8	4.5	24
SSW	10	10	6	5						13.3	6.8	3.5	31
SW	6	4	2	3						6.4	6.7	3.4	15
WSW	5	1	1							3.0	3.6	1.8	7
W										0	0	0	0
WNW		1	3	2						2.5	11.1	5.7	6
NW	2	4	5	2						5.6	8.2	4.2	13
NNW	3	3	10	2	1					8.1	9.2	4.7	19
	59	60	60	25	6	9	1	1	CALM	4.7			11
												TOTAL OBS	232
%	25.4	25.8	25.8	10.8	2.6	3.9	0.4	0.4					

MAY 1966

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	5	7	13	14	4	6	1			20.2	13.7	7.0	50
NNE	8	12	15	13	3	2				21.4	10.4	5.3	53
NE	5	7	3	2	2					7.7	8.0	4.1	19
ENE	3	9	8	3	1	1	1			10.5	10.2	5.2	26
E	4	3	3	4	1					6.0	9.2	4.7	15
ESE	2	5	3	1						4.4	7.0	3.7	11
SE	2	6	3	1						4.8	6.9	3.5	12
SSE	1	3	1							2.0	5.7	2.9	5
S	4	3	4	2						5.2	7.3	3.7	13
SSW	1	6	5							4.8	7.1	3.6	12
SW		2	2							1.6	7.7	4.0	4
WSW	1		1							0.8	6.0	3.1	2
W	1									0.4	2.0	1.0	1
WNW	1									0.4	2.0	1.0	1
NW	1	1								0.8	3.7	1.9	2
NNW	3	5	4	2						5.6	7.5	3.9	14
	42	69	65	42	11	9	2		CALM	3.2			8
												TOTAL OBS	248
%	16.9	27.8	26.2	16.9	4.4	3.6	0.8						

JUNE 1966

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	13	2		11	5	9	5	2		19.6	17.6	9.1	47
NNE	9	13	5	7		1	2			15.4	9.3	4.8	37
NE	6	8	5	3	2	1		1		10.8	10.0	5.1	26
ENE	6	5		2						5.4	5.4	2.8	13
E	3	4								2.9	4.0	2.1	7
ESE	5	3								3.3	3.3	1.7	8
SE	6									2.5	2.0	1.0	6
SSE	1	4	1							2.5	5.7	2.9	6
S		1								0.4	5.5	2.8	1
SSW	1	1								0.8	3.8	1.9	2
SW	5									2.1	2.0	1.0	5
WSW	3	2								2.1	3.4	1.7	5
W		2	1							1.2	7.0	3.6	3
WNW	5	2	1							3.3	3.9	2.0	8
NW	7	2	4	2	1					6.7	7.3	3.7	16
NNW	8		1	2			1	1		5.4	10.3	5.3	13
	78	49	18	27	8	11	8	4	CALM	15.4			37
												TOTAL OBS	240
%	32.5	20.4	7.5	11.2	3.3	4.6	3.3	1.7					

JULY 1966

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	7	7	1	1	3	3				9.0	10.3	5.3	22
NNE	11	4	2	3	2	4		1		11.0	11.4	5.9	27
NE	6	3	1		1					4.5	5.4	2.8	11
ENE	10	1	2	1						5.7	3.6	1.8	14
E	12	3	2							6.9	3.0	1.5	17
ESE	8	4	3							6.1	4.5	2.3	15
SE	6	1	1	1						3.6	4.8	2.5	9
SSE	5	5	1							4.5	4.3	2.2	11
S	7	4								4.5	3.3	1.7	11
SSW	4	3	1							3.3	3.1	1.6	8
SW		3	2							2.0	7.3	3.7	5
WSW	1	2	4							2.8	7.6	3.9	7
W	4	3	2							3.6	4.9	2.5	9
WNW	4	3	1		1	1				4.1	7.4	3.8	10
NW	5	2	4			1				4.9	7.4	3.8	12
NNW	2	6	2		3	1				5.7	10.7	5.5	14
	92	54	29	6	10	10		1	CALM	17.5			43
												TOTAL OBS	245
%	37.5	22.0	11.8	2.4	4.1	4.1		0.4					

AUGUST 1966

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	3		1	1	3	2	1	1		6.9	19.1	9.8	12
NNE	6	1		2	1					5.7	7.0	3.6	10
NE	4	1	1		1					4.0	6.4	3.3	7
ENE	4	1	1							3.4	3.9	2.0	6
E	5	1								3.4	2.6	1.3	6
ESE	3	1		2						3.4	7.1	3.6	6
SE	2	5								4.0	4.5	2.3	7
SSE		1								0.6	5.5	2.8	1
S		1								0.6	5.5	2.8	1
SSW	2	1	4	1						4.6	8.1	4.2	8
SW	1	3	6	2	1					7.4	9.3	4.8	13
WSW	1	1	3	1	1					4.0	10.6	5.4	7
W	3	1	2							3.4	5.2	2.7	6
WNW	1	3	4	2	2					6.9	10.2	5.2	12
NW	1	3	3	4	4	1	2			10.3	15.8	8.1	18
NNW	2	1	1	4	3	5	2			10.3	19.7	10.1	18
	38	25	26	19	16	8	5	1	CALM	20.7			36
												TOTAL OBS	174
%	21.8	14.4	14.9	10.9	9.2	4.6	2.9	0.6					

SEPTEMBER 1966

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	8	9	1	4	1					10.6	6.9	3.5	23
NNE	6	2	3	3	3	2	2	2		10.6	16.3	8.4	23
NE	4	2	3			2	1			5.5	11.7	6.0	12
ENE	6	1	1	1	2	1				5.5	9.5	4.9	12
E	5	2	1	2	1					5.1	7.6	3.9	11
ESE	7	2								4.1	2.8	1.4	9
SE	9	7	3	1		1	1			10.1	7.5	3.9	22
SSE	3	4								3.2	4.0	2.1	7
S	2	1	3							2.8	6.5	3.3	6
SSW	1	2	1							1.8	5.7	2.9	4
SW	4	4	1							4.1	4.4	2.3	9
WSW	2	1	1							1.8	4.9	2.5	4
W	4	4	2							4.6	5.0	2.6	10
WNW	3	7	3							6.0	5.7	2.9	13
NW	4	6	3	2	1					7.4	7.7	4.0	16
NNW	6	6	5	3	2	1				10.6	9.2	4.7	23
	74	60	31	16	10	7	4	2	CALM	6.0			13
												TOTAL OBS	217
%	34.1	27.6	14.3	7.4	4.6	3.2	1.8	0.9					

OCTOBER 1966

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	8	5	6	3	11	1				13.7	12.2	6.3	34
NNE	3	1	1	2	5	8	1			8.5	19.9	10.2	21
NE	4	2	1	2		1				4.0	8.8	4.5	10
ENE	4	2	2	4	1					5.2	9.4	4.8	13
E	4	8	3	1						6.4	6.1	3.1	16
ESE	4	2	1							2.8	4.1	2.1	7
SE	4	6								4.0	4.1	2.1	10
SSE	7	2	1							4.0	3.5	1.8	10
S	3	4		1						3.2	5.4	2.8	8
SSW	6	3	1							4.0	3.8	1.9	10
SW	5	1	2	1						3.6	5.7	2.9	9
WSW	7	2	3	2						5.6	6.1	3.1	14
W	2	6	3	2	1					5.6	8.5	4.4	14
WNW	2	7	2	1						4.8	6.5	3.3	12
NW	2	6	2	2						4.8	7.3	3.7	12
NNW	8	18	6	4	3					15.7	7.7	4.0	39
	73	75	34	25	21	10	1		CALM	3.6			9
												TOTAL OBS	248
%	29.4	30.2	13.7	10.1	8.5	4.0	0.4						

NOVEMBER 1966

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	9	4	5	2	4	1				10.4	9.4	4.8	25
NNE	2	2	1	2	3	2				5.0	14.7	7.6	12
NE	2			6	2					4.2	14.0	7.2	10
ENE	1		3	1						2.1	9.5	4.9	5
E	7	6	6	2						8.7	6.6	3.4	21
ESE	10	6	2							7.5	4.0	2.1	18
SE	10	13	3							10.8	4.7	2.4	26
SSE	11	9	3							9.6	4.4	2.3	23
S	8	2								4.2	2.7	1.4	10
SSW	7	1	2		1					4.6	5.5	2.8	11
SW	6	1	2	1	1					4.6	6.8	3.5	11
WSW	4	3								2.9	3.5	1.8	7
W	7									2.9	2.0	1.0	7
WNW	7	2								3.7	2.8	1.4	9
NW	4		2							2.5	4.7	2.4	6
NNW	10	6	1							7.1	3.7	1.9	17
	105	55	30	14	11	3			CALM	9.2			22
												TOTAL OBS	240
%	43.7	22.9	12.5	5.8	4.6	1.2							

DECEMBER 1966

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	5	2	3	1	1					4.8	7.3	3.7	12
NNE	1	1	2	5	1	3				5.2	16.2	8.3	13
NE	1	1	5	1						3.2	9.1	4.7	8
ENE	2	1	1	2	1					2.8	10.3	5.3	7
E	4	4	2							4.0	5.0	2.6	10
ESE	5	6	1							4.8	4.4	2.3	12
SE	9	7	1							6.8	3.9	2.0	17
SSE	14	3								6.8	2.6	1.3	17
S	8	2								4.0	2.7	1.4	10
SSW	11	1								4.8	2.3	1.2	12
SW	4	5								3.6	3.9	2.0	9
WSW	11	4	1							6.4	3.4	1.7	16
W	16	5	2							9.3	3.4	1.7	23
WNW	11	6	1	1						7.7	4.2	2.2	19
NW	18	3	1							8.9	2.8	1.4	22
NNW	23	6	1							12.1	3.0	1.5	30
	143	57	21	10	3	3			CALM	4.4			11
												TOTAL OBS	248
%	57.7	23.0	8.5	4.0	1.2	1.2							

MEAN: 1966 (Jan-Dec)

m/sec	0-2.0	2.1-4.0	4.1-6.6	6.7-9.7	9.8-12.8	12.9-16.4	16.5-20.0	20.1-24.1	24.2-25.7	Freq %	Mean Speed Kts	Mean Speed m/sec	Total Obs
Knots	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-50				
N	77	52	51	56	49	28	8	4		12.2	12.6	6.5	325
NNE	65	52	33	42	24	28	5	3		9.5	11.9	6.1	252
NE	42	33	25	16	14	4	1	1		5.1	9.2	4.7	136
ENE	50	32	22	18	6	2	1			4.9	7.6	3.9	131
E	55	42	19	11	2					4.8	5.8	3.0	129
ESE	61	49	16	5						4.9	4.8	2.5	131
SE	71	58	13	4		1	1			5.6	4.8	2.5	148
SSE	57	41	14							4.2	4.3	2.2	112
S	49	33	24	5						4.2	5.4	2.8	111
SSW	53	35	21	8	1					4.4	5.5	2.8	118
SW	42	34	20	9	2					4.0	6.1	3.1	107
WSW	46	24	14	3	1					3.3	4.9	2.5	88
W	47	25	14	2	1					3.3	4.8	2.5	89
WNW	51	37	18	7	3	1				4.4	5.0	2.6	117
NW	57	34	25	13	6	2	2			5.2	6.4	3.3	139
NNW	81	57	34	20	12	7	3	1		8.1	7.3	3.7	215
	904	638	363	219	121	73	21	9	CALM	11.4			303
												TOTAL OBS	2651
%	34.0	24.1	13.7	8.3	4.6	2.7	0.8	0.3					

AVERAGES AND EXTREMES OF MAXIMUM AND MINIMUM DAILY AIR TEMPERATURE (°C)

(300 m. Elevation)

YEAR 1966

	JAN		FEB		MAR		APR	
	DEG	DAY	DEG	DAY	DEG	DAY	DEG	DAY
MAX	7.6	4	5.8	5	2.8	7	5.0	3
AVG	1.2		1.4		- 0.6		- 2.2	
MIN	- 7.0	7	-10.0	21	-14.4	19	-18.9	17
AVG	- 3.1		- 4.7		- 5.7		- 7.8	

	MAY		JUN		JUL		AUG	
	DEG	DAY	DEG	DAY	DEG	DAY	DEG	DAY
MAX	0.3	5	- 0.6	21,22	- 1.1	31	0.6	6
AVG	- 5.3		- 4.8		-11.0		- 5.6	
MIN	-18.1	14	-22.2	7	-33.6	16	-27.8	17
AVG	-10.0		-12.3		-21.3		-14.6	

	SEP		OCT		NOV		DEC	
	DEG	DAY	DEG	DAY	DEG	DAY	DEG	DAY
MAX	0.0	26	2.5	25	6.7	22	5.6	27
AVG	- 5.3		- 3.1		0.2		1.6	
MIN	-24.4	14	-19.7	16	-16.1	17	-12.8	12
AVG	-13.0		-10.4		- 6.7		- 4.6	

OBSERVED VALUES OF MAXIMUM, MINIMUM AND MEAN
DAILY AIR TEMPERATURE (°C)

(300 m. Elevation)

YEAR 1966

JANUARY

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	0.9	-1.6	-0.5	5	0.1	-3.3	-1.6
2	1.2	-0.8	0.3	6	-0.8	-5.2	-3.9
3	1.2	-0.9	0.3	7	1.9	-7.0	-2.7
4	7.6	-1.5	0.8	8	-2.4	-4.9	-4.1

FEBRUARY

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-	-	-	15	-	-	-
2	-	-	-	16	-0.8	-2.8	-2.0
3	3.1	0.0	1.8	17	2.5	-4.4	-2.1
4	5.3	-3.3	0.2	18	4.2	-6.7	-1.7
5	5.8	-4.2	0.3	19	-1.9	-4.4	-3.6
6	2.5	-5.3	-1.5	20	-0.8	-5.0	-3.6
7	-0.6	-3.9	-1.7	21	-1.1	-10.0	-4.7
8	1.7	-3.6	-2.3	22	-0.3	-4.7	-2.8
9	5.3	-1.9	0.2	23	-1.4	-8.3	-3.8
10	1.4	-1.7	-0.7	24	0.6	-9.4	-5.1
11	1.1	-1.1	-0.2	25	0.6	-9.7	-5.5
12	3.1	0.8	1.8	26	-0.3	-5.8	-3.7
13	-	-	-	27	0.8	-7.5	-3.9
14	-	-	-	28	1.9	-5.0	-2.8

YEAR 1966

MARCH

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-0.8	-4.4	-2.8	17	0.0	-4.7	-1.9
2	0.6	-6.1	-2.5	18	-4.7	-11.7	-6.3
3	3.9	-0.8	0.8	19	-3.9	-14.4	-9.4
4	3.3	-0.6	1.0	20	-4.4	-13.3	-8.5
5	1.7	0.0	0.8	21	-2.0	-8.6	-5.5
6	1.1	-3.1	-0.3	22	-3.6	-7.8	-6.3
7	2.8	-3.1	0.0	23	-3.1	-8.8	-6.5
8	1.1	-2.2	0.1	24	-3.9	-10.6	-6.9
9	1.1	-4.7	-3.4	25	-3.9	-10.6	-7.2
10	-0.6	-5.8	-3.2	26	-2.8	-8.9	-4.4
11	1.1	-4.4	-0.8	27	-2.8	-8.9	-5.0
12	0.8	-0.6	0.0	28	2.5	-10.6	-2.6
13	0.6	-2.2	-0.1	29	0.0	-2.2	-1.4
14	-2.2	-5.3	-3.8	30	1.9	-1.7	0.2
15	-3.3	-6.1	-4.9	31	1.4	-2.2	-0.8
16	-0.3	-3.6	-1.5				

APRIL

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	3.9	0.0	2.8	16	-8.3	-16.1	-11.1
2	3.3	-5.0	-0.4	17	-9.7	-18.9	-11.3
3	5.0	-3.3	1.7	18	-9.4	-12.2	-10.4
4	4.7	0.0	2.5	19	-3.6	-9.4	-6.2
5	1.7	-1.1	0.0	20	-3.9	-6.4	-5.2
6	2.2	-4.4	0.3	21	-3.1	-8.1	-4.9
7	4.4	0.6	1.8	22	-8.1	-15.8	-10.8
8	2.5	-0.6	0.5	23	-5.0	-17.5	-8.1
9	0.0	-2.8	-0.8	24	-3.3	-11.1	-6.2
10	-1.1	-6.7	-5.0	25	-2.8	-5.3	-4.2
11	-0.6	-5.6	-3.7	26	-5.0	-8.6	-6.8
12	-1.1	-2.5	-1.3	27	-5.6	-11.1	-8.7
13	-2.5	-7.8	-4.1	28	-4.2	-8.6	-6.6
14	-7.8	-11.9	-9.3	29	-0.3	-13.1	-6.8
15	-7.8	-11.1	-9.3	30	-1.1	-10.6	-5.7

YEAR 1966

MAY

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-9.4	-11.1	-10.3	17	-8.3	-13.3	-10.3
2	-0.8	-11.1	-3.9	18	-5.8	-13.6	-8.7
3	-1.1	-3.3	-2.6	19	-5.8	-9.7	-8.3
4	-0.6	-6.1	-2.6	20	-9.4	-15.0	-11.4
5	0.3	-3.9	-1.3	21	-7.2	-18.1	-12.0
6	-2.5	-6.7	-3.8	22	-3.1	-7.8	-5.3
7	0.3	-5.0	-1.1	23	-3.6	-5.0	-4.4
8	0.0	-3.3	-1.6	24	-4.7	-11.1	-8.0
9	-1.7	-9.7	-4.1	25	-5.0	-15.0	-8.8
10	-1.1	-6.1	-3.5	26	-5.8	-8.3	-6.9
11	-3.3	-6.1	-4.1	27	-6.4	-8.9	-7.5
12	-	-	-	28	-7.2	-9.7	-8.2
13	-10.6	-17.8	-13.6	29	-8.3	-14.4	-10.3
14	-10.8	-18.1	-15.1	30	-8.9	-16.7	-11.9
15	-5.6	-13.9	-8.8	31	-9.4	-11.1	-10.2
16	-3.9	-12.2	-8.4				

JUNE

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-11.1	-20.0	-15.9	16	-4.2	-9.4	-7.2
2	-6.7	-16.1	-9.3	17	-6.7	-16.7	-11.8
3	-	-	-	18	-1.7	-16.1	-5.6
4	-	-	-	19	-1.4	-11.1	-4.2
5	-	-	-	20	-2.2	-12.5	-6.2
6	-	-	-	21	-0.6	-6.7	-2.2
7	-6.7	-22.2	-12.6	22	-0.6	-6.9	-4.6
8	-2.5	-7.2	-4.7	23	-2.2	-6.7	-3.2
9	-2.8	-8.3	-5.3	24	-1.9	-4.4	-3.0
10	-5.3	-10.8	-8.2	25	-2.2	-6.7	-4.2
11	-9.4	-19.4	-11.9	26	-2.2	-7.8	-4.8
12	-10.6	-20.3	-14.4	27	-2.2	-5.6	-4.1
13	-8.9	-16.1	-12.4	28	-5.6	-8.3	-6.7
14	-10.8	-18.3	-15.1	29	-7.8	-16.1	-11.2
15	-4.2	-18.3	-13.3	30	-4.4	-11.1	-8.4

YEAR 1966

JULY

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-5.0	-8.9	-6.4	17	-11.1	-27.5	-18.0
2	-8.9	-11.7	-10.5	18	-2.2	-16.7	-5.9
3	-10.6	-20.8	-16.9	19	-1.9	-31.1	-17.7
4	-12.2	-20.3	-13.3	20	-8.6	-17.2	-13.1
5	-13.1	-18.0	-18.1	21	-16.1	-26.4	-24.3
6	-20.3	-26.7	-23.1	22	-26.4	-31.9	-29.4
7	-8.3	-26.7	-16.0	23	-22.8	-28.9	-26.4
8	-13.6	-22.8	-16.9	24	-22.8	-30.0	-26.4
9	-11.1	-23.9	-17.2	25	-10.8	-23.6	-17.1
10	-18.9	-23.3	-21.6	26	-7.5	-10.8	-8.7
11	-23.3	-32.8	-28.6	27	-7.8	-15.0	-11.6
12	-23.3	-30.6	-27.3	28	-1.4	-14.4	-6.2
13	-18.9	-30.6	-27.0	29	-2.2	-2.8	-2.4
14	-10.8	-18.9	-13.1	30	-1.4	-6.7	-3.3
15	-11.7	-27.8	-19.1	31	-1.1	-3.9	-2.1
16	-23.9	-33.6	-29.3				

AUGUST

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-3.6	-6.7	-4.3	17	-5.8	-27.8	-20.4
2	-	-	-	18	-2.8	-15.6	-8.1
3	-	-	-	19	-9.4	-16.9	-11.8
4	-	-	-	20	-5.6	-12.2	-8.9
5	-2.8	-10.6	-5.2	21	-5.0	-13.1	-7.1
6	0.6	-3.1	-0.9	22	-1.9	-13.9	-5.3
7	-	-	-	23	-0.6	-4.7	-2.6
8	-	-	-	24	-1.4	-6.7	-4.6
9	-	-	-	25	-6.7	-17.2	-9.5
10	-	-	-	26	-14.2	-20.0	-16.3
11	-	-	-	27	-9.4	-20.0	-17.1
12	-	-	-	28	-15.6	-23.3	-19.3
13	-	-	-	29	-6.4	-22.2	-12.9
14	-	-	-	30	-3.6	-7.5	-5.4
15	-2.8	-15.3	-7.4	31	-5.8	-15.0	-10.8
16	-9.4	-20.0	-13.8				

SEPTEMBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-4.4	-14.2	-7.2	16	-3.6	-11.9	-7.2
2	-3.6	-12.5	-7.1	17	-1.1	-3.9	-2.2
3	-5.6	-18.3	-10.5	18	-0.6	-3.9	-1.9
4	-7.5	-16.1	-11.5	19	-0.6	-7.2	-3.3
5	-8.6	-21.4	-16.3	20	-0.8	-6.1	-3.4
6	-7.2	-9.4	-8.2	21	-0.6	-2.8	-1.4
7	-	-	-	22	-0.8	-8.3	-3.2
8	-9.2	-16.7	-11.7	23	-1.7	-10.6	-5.7
9	-8.9	-17.5	-11.7	24	-1.7	-4.4	-3.0
10	-9.2	-19.4	-13.6	25	-0.8	-3.9	-1.8
11	-7.5	-16.9	-10.4	26	0.0	-2.8	-1.2
12	-8.9	-16.1	-11.7	27	-2.5	-18.3	-7.8
13	-16.1	-22.8	-20.7	28	-7.5	-18.3	-12.7
14	-16.1	-24.4	-20.7	29	-7.5	-17.8	-12.8
15	-10.6	-20.8	-15.8	30	-1.1	-11.9	-6.1

OCTOBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-2.8	-6.7	-4.7	17	-4.4	-11.1	-7.3
2	-1.9	-5.0	-3.4	18	-4.4	-12.2	-8.5
3	-1.4	-3.1	-2.2	19	-3.9	-16.4	-8.8
4	-1.1	-10.3	-2.9	20	-3.9	-18.3	-10.2
5	-8.3	-16.9	-11.7	21	-3.1	-5.8	-4.5
6	-6.7	-17.8	-13.0	22	-3.3	-7.8	-5.7
7	-5.3	-16.1	-9.4	23	-2.2	-19.4	-8.9
8	-6.1	-16.7	-10.3	24	-0.6	-7.8	-2.2
9	-13.9	-23.1	-17.6	25	2.5	-3.1	-0.8
10	-3.9	-17.8	-10.2	26	-0.3	-4.4	-1.8
11	-0.6	-3.9	-2.1	27	-0.6	-5.0	-3.3
12	-1.1	-5.8	-4.0	28	-0.6	-6.7	-2.5
13	-3.3	-8.1	-6.0	29	1.1	-1.7	-0.4
14	-3.9	-8.9	-6.1	30	0.8	-3.3	-0.8
15	-7.8	-15.0	-12.5	31	-1.4	-5.3	-3.6
16	-3.3	-19.7	-8.3				

YEAR 1966

NOVEMBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-2.2	-11.7	-5.1	16	0.6	-13.3	-7.9
2	-0.6	-4.4	-2.8	17	0.0	-16.1	-7.2
3	-2.5	-8.1	-5.1	18	1.4	-3.1	-0.7
4	-2.2	-14.4	-7.9	19	3.1	-6.1	-0.9
5	-1.7	-9.4	-5.6	20	2.2	-2.2	0.0
6	-1.1	-12.8	-7.2	21	4.2	0.0	1.7
7	-3.1	-12.2	-6.6	22	6.7	-0.3	3.1
8	-2.2	-6.1	-4.3	23	3.3	0.0	1.9
9	-2.5	-10.0	-4.6	24	5.0	-3.3	1.6
10	-1.4	-12.8	-5.9	25	2.2	0.6	1.4
11	0.6	-5.6	-2.8	26	2.8	0.6	1.6
12	-2.2	-5.3	-4.5	27	5.3	-1.7	0.4
13	-3.6	-7.8	-5.8	28	6.4	-2.2	0.9
14	-2.5	-14.4	-6.2	29	3.9	-5.6	-0.8
15	-3.3	-8.3	-5.6	30	1.7	-3.3	-1.5

DECEMBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-0.6	-3.1	-2.3	17	-1.7	-4.4	-3.4
2	0.3	-3.9	-2.2	18	5.0	-9.2	-1.9
3	1.4	-4.7	-2.1	19	2.8	-6.7	-1.4
4	2.5	-9.4	-2.6	20	4.4	-0.6	1.8
5	-1.4	-3.9	-2.6	21	4.7	-1.4	0.6
6	-0.6	-3.3	-2.3	22	3.6	-1.7	1.0
7	0.6	-2.8	-1.0	23	-1.1	-2.8	-1.8
8	-1.1	-8.3	-3.2	24	3.9	-1.7	0.9
9	0.0	-5.6	-3.1	25	3.1	-0.6	1.2
10	0.3	-5.3	-3.6	26	4.2	-0.6	1.2
11	1.1	-11.7	-5.6	27	5.6	-0.8	1.3
12	-1.4	-12.8	-6.1	28	1.9	-1.7	-0.3
13	-0.3	-4.4	-3.2	29	2.5	-1.7	-0.1
14	0.8	-6.4	-3.2	30	3.9	-2.2	-0.4
15	2.2	-10.3	-4.1	31	1.4	-6.1	-2.4
16	0.8	-5.6	-3.1				

APPENDIX I: Part 3c

DATA TABLES

Tabulated Data for 1967

TEMPERATURE

MONTHLY AVERAGES

AVERAGE AIR TEMPERATURE (°C)

YEAR 1967

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0.2	-0.1	-0.2	-1.0	-5.4	-4.9	-5.9	-5.9	-6.2	-4.8	-1.3	1.3

Mean: -2.8

AVERAGES AND EXTREMES OF MAXIMUM AND MINIMUM DAILY AIR TEMPERATURE (°C)

YEAR 1967

	JAN		FEB		MAR		APR	
	DEG	DAY	DEG	DAY	DEG	DAY	DEG	DAY
MAX	5.0	6,7,26	6.7	9	6.1	5	4.4	13,14
AVG	2.2		1.9		1.3		0.4	
MIN	-5.0	16	-7.2	22	-6.1	26	-7.2	23
AVG	-2.0		-2.5		-2.4		-2.8	

	MAY		JUN		JUL		AUG	
	DEG	DAY	DEG	DAY	DEG	DAY	DEG	DAY
MAX	4.4	1	3.3	27	1.1	20	2.2	27,28
AVG	-4.0		-2.6		-3.1		-3.4	
MIN	-13.9	27	-17.8	18	-16.1	6	-18.3	23
AVG	-7.1		-7.4		-8.9		-8.7	

	SEP		OCT		NOV		DEC	
	DEG	DAY	DEG	DAY	DEG	DAY	DEG	DAY
MAX	2.8	11	3.9	19	5.0	20	7.2	11,19
AVG	-3.0		-0.9		1.1		3.5	
MIN	-21.1	18	-18.9	6	-9.4	14	-4.4	2,3,4
AVG	-9.6		-8.9		-3.9		-1.2	

OBSERVED VALUES OF MAXIMUM, MINIMUM AND MEAN DAILY AIR TEMPERATURES (°C)

YEAR 1967

JANUARY

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	3.3	-1.7	1.1	17	2.8	-1.1	1.1
2	3.3	-2.8	0.6	18	2.2	-1.1	0.6
3	2.8	-3.3	0.0	19	1.1	-2.2	-0.6
4	2.2	-2.8	0.0	20	1.1	-3.3	-1.1
5	3.9	-1.1	1.7	21	0.0	-3.3	-1.7
6	5.0	-1.7	1.7	22	2.2	-2.2	0.0
7	5.0	-2.2	1.7	23	3.9	0.0	2.2
8	0.0	-3.9	-1.7	24	4.4	0.6	2.8
9	-1.1	-3.3	-2.2	25	3.3	0.0	1.7
10	0.0	-3.3	-1.7	26	5.0	0.6	2.8
11	-0.6	-3.3	-1.7	27	4.4	0.0	2.2
12	1.1	-2.8	-0.6	28	3.3	0.0	1.7
13	2.2	-2.2	0.0	29	3.3	-1.1	0.0
14	1.7	-2.2	0.0	30	1.7	-1.7	0.0
15	2.2	-4.4	-1.1	31	2.2	-1.1	0.6
16	-0.6	-5.0	-2.8				

FEBRUARY

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	1.1	-2.8	-0.6	15	-0.6	-2.2	-1.1
2	3.9	-2.2	1.1	16	3.3	-2.8	0.6
3	6.1	-0.6	2.8	17	4.4	0.6	2.8
4	0.6	-3.3	-1.1	18	4.4	-3.3	0.6
5	-0.6	-2.8	-1.7	19	0.0	-1.7	-0.6
6	-1.7	-3.3	-2.2	20	3.3	-2.8	0.6
7	-0.6	-2.2	-1.1	21	-2.2	-4.4	-3.3
8	4.4	-1.1	1.7	22	0.0	-7.2	-3.3
9	6.7	1.1	3.9	23	2.2	-5.6	-1.7
10	4.4	0.6	2.8	24	0.6	-5.0	-2.2
11	5.6	0.0	2.8	25	0.6	-5.0	-2.2
12	3.3	-0.6	1.7	26	1.7	-5.0	-1.7
13	-0.6	-2.2	-1.1	27	2.2	-0.6	1.1
14	0.0	-2.2	-1.1	28	-	-	-

YEAR 1967

MARCH

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	1.1	-2.2	-0.6	17	0.0	-1.1	-0.6
2	1.1	-2.2	-0.6	18	2.8	-3.3	0.0
3	1.1	-1.7	0.0	19	2.2	-3.3	-0.6
4	4.4	0.0	2.2	20	-1.1	-3.3	-2.2
5	6.1	0.0	3.3	21	-2.2	-5.0	-3.3
6	1.1	0.0	0.6	22	2.2	-1.1	0.6
7	0.6	-4.4	-1.7	23	2.2	-1.1	0.6
8	2.2	0.6	1.7	24	0.6	-2.8	-1.1
9	2.8	-3.3	0.0	25	0.6	-3.3	-1.1
10	1.1	-3.3	-1.1	26	3.9	-6.1	-1.1
11	1.1	-3.3	-1.1	27	-0.6	-5.0	-2.8
12	-1.7	-4.4	-2.8	28	1.1	-5.0	-1.7
13	1.1	-1.7	0.0	29	3.3	0.0	1.7
14	4.4	-0.6	2.2	30	2.2	-1.7	0.6
15	5.6	0.0	2.8	31	1.1	-3.3	-1.1
16	1.7	-1.1	0.6				

APRIL

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-0.6	-4.4	-2.2	16	2.2	0.0	1.1
2	-1.1	-4.4	-2.8	17	2.8	-0.6	1.1
3	-0.6	-5.6	-2.8	18	2.8	0.0	1.7
4	-1.1	-2.2	-1.7	19	2.2	-1.1	0.6
5	-0.6	-4.4	-2.2	20	1.1	-2.2	-0.6
6	-2.8	-4.4	-3.3	21	-1.7	-3.9	-2.8
7	0.0	-4.4	-1.7	22	-2.2	-5.0	-3.3
8	1.1	-1.1	0.0	23	-3.3	-7.2	-5.0
9	0.0	-2.2	-1.1	24	-0.6	-5.6	-2.8
10	0.0	-0.6	0.0	25	1.1	-6.1	-2.2
11	-4.4	-5.0	-4.4	26	1.1	-0.6	0.6
12	3.3	-2.8	0.6	27	0.0	-2.8	-1.1
13	4.4	-1.1	1.7	28	0.0	-2.2	-1.1
14	4.4	0.0	2.2	29	1.7	-3.3	-0.6
15	3.9	0.0	2.2	30	0.6	-0.6	0.0

YEAR 1967

MAY

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	4.4	-0.6	2.2	17	-3.3	-6.7	-5.0
2	1.1	-2.2	-0.6	18	-4.4	-8.9	-6.7
3	-1.1	-5.6	-3.3	19	-5.0	-8.9	-6.7
4	-3.9	-7.8	-5.6	20	-5.0	-8.9	-6.7
5	-2.2	-6.1	-3.9	21	-4.4	-6.7	-5.6
6	0.0	-3.3	-1.7	22	-3.9	-6.1	-5.0
7	0.0	-7.2	-3.3	23	-5.0	-7.8	-6.1
8	-1.1	-6.7	-3.9	24	-5.6	-10.0	-7.8
9	0.0	-2.2	-1.1	25	-7.8	-10.0	-8.9
10	-1.1	-5.0	-2.8	26	-9.4	-12.8	-11.1
11	-5.0	-8.9	-6.7	27	-11.7	-13.9	-12.8
12	-8.3	-11.1	-9.4	28	-8.9	-13.3	-11.1
13	-9.4	-11.1	-10.0	29	-8.9	-11.7	-10.0
14	1.7	-10.6	-4.4	30	-4.4	-10.0	-7.2
15	2.2	0.0	1.1	31	-2.2	-4.4	-3.3
16	0.6	-3.3	-1.1				

JUNE

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-3.3	-6.1	-4.4	16	-7.2	-8.9	-7.8
2	0.6	-6.1	-2.8	17	-8.9	-17.2	-12.8
3	-1.1	-3.3	-2.2	18	-4.4	-17.8	-11.1
4	-1.7	-5.6	-3.3	19	0.0	-4.4	-2.2
5	-5.0	-7.8	-6.1	20	1.1	-3.3	1.1
6	-6.7	-9.4	-7.8	21	2.2	-3.3	0.6
7	-7.8	-11.7	-9.4	22	-1.1	-5.6	-3.3
8	-6.7	-12.8	-9.4	23	0.6	-4.4	-1.7
9	-8.9	-13.3	-11.1	24	1.1	-2.8	-0.6
10	-8.3	-11.7	-10.0	25	2.2	-2.2	0.0
11	-3.9	-7.2	-5.6	26	2.2	-0.6	1.1
12	-1.7	-3.9	-2.8	27	3.3	1.1	2.2
13	-1.7	-13.9	-7.8	28	0.0	-6.7	-3.3
14	-10.6	-16.1	-13.3	29	1.7	-3.3	-0.6
15	-6.7	-13.9	-10.0	30	1.7	-1.1	0.6

YEAR 1967

JULY

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-1.1	-5.0	-2.8	17	0.6	-6.1	-2.8
2	-5.0	-10.6	-7.8	18	-1.7	-8.9	-5.0
3	-5.6	-11.1	-8.3	19	-1.7	-4.4	-2.8
4	-5.0	-7.8	-6.1	20	1.1	-3.3	-1.1
5	-7.2	-13.3	-10.0	21	0.6	-1.7	-0.6
6	-12.2	-16.1	-13.9	22	0.0	-7.8	-3.9
7	-5.6	-13.3	-9.4	23	-7.8	-12.2	-10.0
8	-6.1	-8.3	-7.2	24	-7.8	-12.2	-10.0
9	-4.4	-7.8	-6.1	25	-1.7	-11.1	-6.1
10	0.0	-6.1	-2.8	26	0.0	-8.3	-3.9
11	-0.6	-4.4	-2.2	27	0.0	-10.0	-5.0
12	-3.9	-8.3	-6.1	28	0.0	-6.1	-2.8
13	-3.3	-11.7	-7.2	29	0.0	-8.3	-3.9
14	-7.2	-15.0	-11.1	30	-2.2	-8.9	-5.6
15	-6.1	-14.4	-10.0	31	-1.7	-8.3	-5.0
16	0.6	-6.1	-2.8				

AUGUST

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	0.0	-3.3	-1.7	17	-4.4	-11.7	-7.8
2	0.0	-1.1	-0.6	18	-11.7	-14.4	-12.8
3	0.0	-0.6	0.0	19	-1.1	-12.2	-6.7
4	1.1	-2.2	-0.6	20	-0.6	-7.2	-1.7
5	-1.7	-5.6	-3.3	21	-0.6	-1.7	-1.1
6	-1.1	-4.4	-2.8	22	0.0	-3.9	-1.7
7	-1.1	-5.0	-2.8	23	-3.9	-18.3	-11.1
8	-2.8	-10.0	-6.1	24	-12.8	-17.8	-15.0
9	-8.9	-10.6	-9.4	25	-10.0	-15.0	-12.2
10	-7.2	-10.6	-8.9	26	-4.4	-12.2	-8.3
11	-8.9	-13.3	-11.1	27	2.2	-6.7	-2.2
12	-9.4	-13.9	-11.7	28	2.2	-5.6	-1.7
13	-3.9	-12.2	-7.8	29	-1.7	-6.1	-3.9
14	-4.4	-8.9	-6.7	30	-2.2	-10.0	-6.1
15	-3.9	-8.3	-6.1	31	-2.2	-10.0	-6.1
16	-3.9	-6.1	-5.0				

YEAR 1967

SEPTEMBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	0.0	-2.8	-1.1	16	-3.9	-6.7	-5.0
2	-1.1	-3.9	-2.2	17	-2.8	-15.0	-8.9
3	-3.3	-8.3	-5.6	18	-15.0	-21.1	-17.8
4	-3.9	-8.3	-6.1	19	-13.3	-19.4	-16.7
5	-8.3	-11.7	-10.0	20	-1.1	-16.7	-8.9
6	-10.0	-16.1	-12.8	21	1.1	-1.1	0.0
7	-12.8	-18.3	-15.6	22	0.6	-2.2	-0.6
8	-8.3	-18.3	-13.3	23	0.0	-3.3	-1.7
9	-2.2	-8.3	-5.0	24	-1.1	-6.7	-3.9
10	2.2	-2.8	0.0	25	-2.2	-6.7	-4.4
11	2.8	-0.6	1.1	26	1.1	-3.3	-1.1
12	1.1	-2.2	0.6	27	-0.6	-11.1	-5.6
13	-2.2	-10.0	-5.6	28	-1.1	-13.3	-7.2
14	-2.2	-9.4	-5.6	29	-1.1	-17.2	-8.9
15	-2.2	-7.8	-5.0	30	-0.6	-15.6	-7.8

OCTOBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	0.0	-3.3	-1.7	17	0.6	-3.3	-1.1
2	-2.2	-14.4	-8.3	18	2.8	-3.9	-0.6
3	-3.3	-11.7	-7.2	19	3.9	-3.3	0.6
4	-5.0	-15.0	-10.0	20	2.2	-2.8	0.0
5	0.0	-15.6	-7.8	21	-0.6	-2.8	-1.7
6	-11.7	-18.9	-15.0	22	-1.1	-3.9	-2.2
7	-2.8	-17.2	-10.0	23	-1.1	-10.6	-5.6
8	-1.1	-5.6	-3.3	24	-2.2	-13.3	-7.8
9	0.0	-10.0	-5.0	25	-6.7	-11.7	-8.9
10	0.6	-6.7	-2.8	26	-3.9	-13.9	-8.9
11	0.0	-10.0	-5.0	27	-1.1	-10.0	-5.6
12	-1.1	-9.4	-5.0	28	0.6	-5.6	-2.2
13	-1.1	-11.1	-6.1	29	2.2	-6.7	-2.2
14	1.1	-4.4	-1.7	30	3.3	-5.0	-0.6
15	1.1	-7.8	-3.3	31	1.1	-6.7	-2.8
16	-3.3	-12.8	-7.8				

YEAR 1967

NOVEMBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	3.3	-1.1	1.1	16	-2.2	-7.8	-5.0
2	0.0	-1.7	-0.6	17	-2.2	-7.2	-4.4
3	3.9	-3.3	0.6	18	-2.8	-8.9	-5.6
4	-0.6	-2.8	-1.7	19	0.6	-8.3	-3.9
5	0.6	-2.2	-0.6	20	5.0	-2.8	1.1
6	-1.1	-6.1	-3.3	21	4.4	1.1	2.8
7	2.2	-2.8	0.0	22	3.3	1.1	2.2
8	0.6	-6.7	-2.8	23	2.2	-1.1	0.6
9	3.3	-1.1	1.1	24	2.2	-1.1	0.6
10	1.1	-3.9	-1.1	25	2.2	-1.1	0.6
11	2.8	-6.1	-1.7	26	2.2	-1.7	0.6
12	-2.2	-6.1	-3.9	27	3.9	0.0	2.2
13	-2.2	-7.8	-5.0	28	2.2	-2.2	0.0
14	-2.2	-9.4	-5.6	29	1.1	-2.8	-0.6
15	-1.7	-8.9	-5.0	30	3.9	-5.0	-0.6

DECEMBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	4.4	-3.3	0.6	17	2.2	-1.1	0.6
2	4.4	-4.4	0.0	18	3.3	0.6	2.2
3	-2.8	-4.4	-3.3	19	7.2	0.6	3.9
4	2.2	-4.4	-1.1	20	5.6	0.6	3.3
5	1.1	-1.7	0.0	21	3.3	0.0	1.7
6	2.8	-2.2	0.6	22	3.3	0.0	1.7
7	3.3	-2.8	0.6	23	6.1	0.0	3.3
8	3.9	-2.8	0.6	24	4.4	1.1	2.8
9	2.2	-1.1	0.6	25	4.4	1.1	2.8
10	3.3	-1.1	1.1	26	5.6	0.0	2.8
11	7.2	-2.2	2.8	27	3.9	1.1	2.8
12	5.0	-0.6	2.2	28	3.9	0.0	2.2
13	4.4	0.0	2.2	29	3.3	-1.1	1.1
14	3.3	0.0	1.7	30	1.1	-1.7	0.0
15	3.9	-1.7	1.1	31	1.1	-1.7	0.6
16	1.7	-2.2	0.0				

PRESSURE

BAROMETRIC PRESSURE (P) (in mb)

YEAR 1967

	JAN		FEB		MAR		APR	
	(P)	DAY	(P)	DAY	(P)	DAY	(P)	DAY
MAX	1014.9	16	1002.7	18	1016.1	12	996.3	11
AVG	998.6		987.7		981.7		981.2	
MIN	978.0	23	967,5	20	953.6	24	964.4	29

	MAY		JUN		JUL		AUG	
	(P)	DAY	(P)	DAY	(P)	DAY	(P)	DAY
MAX	1012.7	29	1012.7	1	1008.6	16	1022.9	25
AVG	987.4		992.2		987.8		993.2	
MIN	963.8	7	971.2	15	960.5	28	943.4	4

	SEP		OCT		NOV		DEC	
	(P)	DAY	(P)	DAY	(P)	DAY	(P)	DAY
MAX	1013.4	8	1014.0	16	1001.0	7	1000.3	7
AVG	985.0		988.0		979.4		989.1	
MIN	954.3	24	955.5	30	963.8	21	971.4	5

FREQUENCY OF MEAN DAILY PRESSURE
(by 10 mb)

(P)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1020-1029								1				
1010-1019	4		3	2	2	1		5	2	1		
1000-1009	8	2	1	3	2	7	6	4	4	6	1	
990- 999	18	10	4	6	8	7	9	11	3	7	3	14
980- 989	1	10	7	8	8	9	7	3	10	6	8	15
970- 979		5	8	10	10	6	6	5	7	8	13	2
960- 969		1	3	1	1		3	1	2	3	5	
950- 959			3						2			
940- 949								1				
TOTAL OBS	31	28	29	30	31	30	31	31	30	31	30	31

CLOUD COVER

OCCURRENCE OF AVERAGE DAILY CLOUD AMOUNT

YEAR 1967

SCALE BY 1/10	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	5	1	0	0	3	3	3	5	0	0	2	5
1-9	5	7	6	6	7	2	6	9	3	9	2	7
10	21	20	25	24	21	25	22	17	27	22	26	19

PRECIPITATION AND FOG

NUMBER OF DAYS WITH RAIN AND DRIZZLE/FREEZING RAIN AND DRIZZLE

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	2	4	6	4	7	5	11	13	7	7	13

NUMBER OF DAYS WITH SNOW AND SLEET

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
8	10	12	21	22	25	26	21	24	28	22	17

NUMBER OF DAYS WITH FOG AND ICE FOG

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
13	8	12	3	5	6	10	9	13	12	16	13

TOTAL MONTHLY PRECIPITATION (cm)

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
-	-	4.7	1.9	4.0	5.8	1.7	3.9	1.7	3.6	1.4	1.8

Annual Total: 30.5

WIND

MEAN MONTHLY WIND SPEED

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG
Kts	3.2	6.0	9.9	10.0	8.5	8.9	8.7	8.5	10.7	8.1	8.7	5.3	8.0
M/s	1.6	3.1	5.0	5.1	4.3	4.6	4.4	4.3	5.4	4.1	4.4	2.7	4.1

AVERAGES AND EXTREMES OF MAXIMUM AND MINIMUM DAILY AIR TEMPERATURE (°C)

(300 m. Elevation)

YEAR 1967

	APR		MAY		JUN		JUL	
	DEG	DAY	DEG	DAY	DEG	DAY	DEG	DAY
MAX	1.1	14	0.0	1	1.7	21	- 1.7	11
AVG	- 3.1		- 7.7		- 7.4		- 5.3	
MIN	-16.1	3	-22.2	13,28	-23.3	9,18	-24.4	13
AVG	- 7.5		-13.7		-14.2		-12.9	

	AUG		SEP		OCT		NOV	
	DEG	DAY	DEG	DAY	DEG	DAY	DEG	DAY
MAX	0.6	27,28	0.6	10,11	2.2	30	1.1	9,20
AVG	- 6.4		- 6.7		- 3.6		- 1.7	
MIN	-23.3	12,23	-26.7	19	-27.8	6	-15.6	18
AVG	-14.6		-13.7		-12.0		- 7.3	

	DEC	
	DEG	DAY
MAX	7.2	26,29
AVG	2.0	
MIN	- 9.4	2,3
AVG	- 3.6	

OBSERVED VALUES OF MAXIMUM, MINIMUM AMD MEAN
DAILY AIR TEMPERATURE (°C)

(300 m. Elevation)

YEAR 1967

APRIL

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-3.3	-11.1	-7.2	16	-2.2	-3.3	-2.8
2	-5.0	-14.4	-9.4	17	-1.7	-3.3	-2.2
3	-5.6	-13.9	-9.4	18	-1.7	-3.3	-2.2
4	-5.6	-6.7	-6.1	19	-2.2	-4.4	-3.3
5	-6.7	-8.3	-7.2	20	-3.3	-7.2	-5.0
6	-6.7	-13.3	-10.0	21	-5.0	-8.3	-6.7
7	-2.8	-8.3	-5.6	22	-6.7	-13.9	-10.0
8	-1.7	-4.4	-3.3	23	-7.2	-16.1	-11.7
9	-2.8	-5.6	-3.9	24	-3.9	-13.9	-8.9
10	-2.2	-3.3	-2.8	25	-2.2	-13.9	-7.8
11	-2.8	-11.1	-6.7	26	-2.8	-3.9	-3.3
12	-1.1	-6.7	-3.9	27	-3.9	-5.6	-4.4
13	0.6	-1.1	0.0	28	-1.7	-5.0	-3.3
14	1.1	-2.8	-0.6	29	-0.6	-5.0	-2.8
15	-1.1	-3.3	-2.2	30	-0.6	-3.3	-1.7

MAY

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	0.0	-4.4	-2.2	17	-7.2	-13.9	-10.6
2	-5.6	-9.4	-7.2	18	-8.9	-12.2	-10.6
3	-7.8	-15.6	-11.7	19	-9.4	-14.4	-11.7
4	-6.1	-15.6	-10.6	20	-11.7	-18.9	-15.0
5	-4.4	-7.8	-6.1	21	-7.8	-15.0	-11.1
6	-1.1	-4.4	-2.8	22	-6.1	-13.9	-10.0
7	-3.3	-10.0	-6.7	23	-6.7	-14.4	-10.6
8	-3.3	-11.7	-7.2	24	-10.0	-17.2	-13.3
9	-2.8	-5.6	-3.9	25	-11.7	-15.6	-13.3
10	-5.6	-8.3	-6.7	26	-12.2	-15.6	-13.9
11	-7.2	-17.8	-12.8	27	-15.6	-20.6	-18.3
12	-17.2	-21.7	-19.4	28	-16.1	-22.2	-19.4
13	-15.6	-22.2	-18.9	29	-16.1	-21.1	-18.9
14	-3.3	-17.8	-10.6	30	-5.6	-18.3	-11.7
15	-2.2	-3.3	-2.8	31	-5.6	-8.9	-7.2
16	-2.2	-8.3	-5.0				

YEAR 1967

JUNE

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-5.6	-10.6	-7.8	16	-9.4	-11.7	-10.6
2	-2.2	-9.4	-5.6	17	-11.7	-20.0	-15.6
3	-2.8	-5.0	-3.9	18	-3.9	-23.3	-13.3
4	-3.3	-7.8	-5.6	19	-3.9	-5.0	-4.4
5	-7.2	-13.9	-10.6	20	-5.6	-9.4	-7.2
6	-10.6	-20.6	-15.6	21	-1.7	-5.6	-3.3
7	-12.8	-21.1	-16.7	22	-	-	-
8	-12.2	-21.1	-16.7	23	-	-	-
9	-13.3	-23.3	-18.3	24	-	-	-
10	-11.1	-16.1	-13.3	25	-	-	-
11	-4.4	-11.1	-7.8	26	-	-	-
12	-3.3	-5.6	-4.4	27	-	-	-
13	-3.3	-18.3	-10.6	28	-8.9	-15.6	-12.2
14	-16.1	-21.7	-18.9	29	-	-	-
15	-9.4	-17.2	-13.3	30	-	-	-

JULY

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-	-	-	17	-3.3	-10.0	-6.7
2	-	-	-	18	-4.4	-15.6	-10.0
3	-	-	-	19	-4.4	-8.9	-6.7
4	-	-	-	20	-2.8	-6.7	-4.4
5	-	-	-	21	-3.9	-6.1	-5.0
6	-	-	-	22	-4.4	-10.0	-7.2
7	-	-	-	23	-8.9	-17.8	-13.3
8	-	-	-	24	-11.1	-18.9	-15.0
9	-	-	-	25	-6.1	-16.1	-11.1
10	-2.2	-3.3	-2.8	26	-5.6	-13.9	-9.4
11	-1.7	-7.8	-4.4	27	-3.9	-15.0	-9.4
12	-6.7	-16.7	-11.7	28	-3.9	-11.1	-7.2
13	-8.3	-24.4	-16.1	29	-4.4	-11.1	-7.8
14	-11.7	-22.2	-16.7	30	-5.6	-12.2	-8.9
15	-5.6	-16.7	-12.2	31	-6.1	-15.0	-10.6
16	-2.8	-5.6	-3.9				

YEAR 1967

AUGUST

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-2.8	-7.8	-5.5	17	-8.3	-17.2	-12.8
2	-3.3	-10.0	-6.7	18	-	-	-
3	-3.3	-5.0	-3.9	19	-	-	-
4	-2.2	-5.6	-3.9	20	-	-	-
5	-5.6	-8.9	-7.2	21	-	-	-
6	-	-	-	22	-	-	-
7	-	-	-	23	-3.3	-23.3	-13.3
8	-7.8	-17.8	-12.8	24	-15.6	-21.7	-18.9
9	-13.9	-20.0	-16.7	25	-12.2	-18.3	-15.0
10	-11.7	-18.9	-15.0	26	-9.4	-15.6	-12.2
11	-	-	-	27	-0.6	-14.4	-7.2
12	-6.7	-23.3	-15.0	28	-0.6	-11.1	-5.6
13	-	-	-	29	-2.8	-10.6	-6.7
14	-10.0	-16.1	-12.8	30	-4.4	-14.4	-9.4
15	-5.5	-12.2	-8.3	31	-3.3	-13.9	-8.3
16	-7.2	-14.4	-10.6				

SEPTEMBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-2.8	-6.1	-4.4	16	-6.7	-9.4	-7.8
2	-5.0	-8.9	-6.7	17	-6.1	-	-
3	-7.2	-13.9	-10.6	18	-21.1	-23.3	-22.2
4	-7.2	-11.7	-9.4	19	-16.7	-26.7	-21.7
5	-11.1	-14.4	-12.8	20	-5.0	-20.6	-12.8
6	-13.3	-17.8	-15.6	21	-	-	-
7	-17.2	-25.0	-20.6	22	-5.0	-7.2	-6.1
8	-10.0	-25.0	-17.2	23	-3.9	-8.3	-6.1
9	-2.2	-11.1	-6.7	24	-5.0	-11.7	-8.3
10	-0.6	-5.0	-2.8	25	-5.6	-15.0	-10.0
11	-0.6	-3.3	-1.7	26	-3.3	-6.7	-5.0
12	-1.1	-4.4	-2.8	27	-3.9	-14.4	-8.9
13	-4.4	-17.2	-10.6	28	-5.0	-18.9	-11.7
14	-7.2	-16.1	-11.7	29	-5.0	-	-
15	-5.6	-15.6	-10.6	30	-	-	-

YEAR 1967

OCTOBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	-2.2	-7.8	-5.0	17	-1.7	-5.0	-3.3
2	-6.1	-21.1	-13.3	18	0.0	-	-
3	-8.3	-18.9	-13.3	19	0.6	-1.1	0.0
4	-8.9	-18.9	-13.9	20	0.0	-1.7	-0.6
5	-5.0	-22.8	-13.9	21	-1.7	-2.8	-2.2
6	-12.8	-27.8	-20.6	22	-3.3	-7.8	-5.6
7	-8.9	-24.4	-16.7	23	-3.3	-12.2	-7.8
8	-7.8	-10.0	-8.9	24	-3.3	-16.7	-10.0
9	-2.8	-12.8	-7.8	25	-9.4	-13.9	-11.7
10	-1.1	-9.4	-5.0	26	-7.8	-17.8	-12.8
11	-2.2	-15.0	-8.3	27	0.0	-12.2	-6.1
12	-6.7	-11.7	-8.9	28	0.0	-6.1	-2.8
13	-2.2	-12.8	-7.2	29	-0.6	-7.8	-3.9
14	0.0	-5.6	-2.8	30	2.2	-5.6	-1.7
15	-1.1	-	-	31	-0.6	-6.7	-3.3
16	-5.0	-	-				

NOVEMBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	1.1	-2.8	-0.6	16	-2.8	-10.6	-6.7
2	-2.2	-5.0	-3.3	17	-3.9	-10.6	-7.2
3	0.0	-3.3	-1.7	18	-7.8	-15.6	-11.7
4	-2.2	-5.0	-3.3	19	-1.1	-15.0	-7.8
5	-2.2	-4.4	-3.3	20	1.7	-2.2	0.0
6	-3.3	-9.4	-6.1	21	1.1	-0.6	0.6
7	-3.3	-13.3	-8.3	22	0.6	-7.2	-3.3
8	-0.6	-8.9	-4.4	23	0.6	-7.8	-3.3
9	1.7	-3.3	-0.6	24	-0.6	-2.8	-1.7
10	-1.7	-8.3	-5.0	25	-0.6	-3.9	-2.2
11	-1.1	-8.3	-4.4	26	-0.6	-3.9	-2.2
12	-5.6	-8.9	-7.2	27	1.1	-1.7	0.0
13	-6.1	-10.6	-8.3	28	0.0	-5.0	-2.2
14	-4.4	-12.8	-8.3	29	-2.2	-5.6	-3.9
15	-5.6	-13.3	-9.4	30	0.6	-8.9	-3.9

YEAR 1967

DECEMBER

DATE	MAX	MIN	MEAN	DATE	MAX	MIN	MEAN
1	1.7	-8.3	-3.3	17	-0.6	-3.9	-2.2
2	1.7	-9.4	-3.9	18	2.8	-3.3	0.0
3	-5.0	-9.4	-7.2	19	5.0	-0.6	2.2
4	-1.1	-6.7	-3.9	20	4.4	-0.6	2.2
5	-0.6	-3.3	-2.2	21	2.2	-1.7	0.6
6	1.1	-4.4	-1.7	22	3.3	-2.2	0.6
7	-1.1	-5.0	-2.8	23	3.9	-1.1	1.7
8	-	-	-	24	3.9	0.6	2.2
9	0.0	-2.8	-1.1	25	5.6	-2.8	1.7
10	1.1	-2.8	-0.6	26	7.2	-3.3	2.2
11	2.8	-3.9	-0.6	27	4.4	-1.7	1.7
12	3.3	-2.2	0.6	28	1.7	-2.2	0.0
13	1.7	-1.1	0.6	29	7.2	-3.3	2.2
14	3.3	-0.6	1.7	30	-0.6	-4.4	-2.2
15	0.6	-6.1	-2.8	31	2.2	-4.4	-1.1
16	-1.7	-6.7	-3.9				

APPENDIX II: Part 1

THE ICE MOVEMENT SURVEY

With the exception of the five stations surrounding Arthur Harbor, all surface velocities were derived with a traverse-survey technique. With this system, once the distance and bearing of one station from another are known, its position, relative to the preceding station, can be calculated from the latitudes and departures. A subsequent survey, using the same system and sequence, gives the change in absolute position of the stations and therefore, absolute ice movement values.

Previous use of this system has been made in Greenland and Antarctica. In Greenland stations were established using Tellurometer trilateration from fixed origins and the system aimed at avoiding entirely the measurement of angles. Except in a few cases where angle measurement could not be avoided, the survey relied entirely on the speed and high internal accuracy of the Tellurometer system (Hoffman 1960). In 1962-63, Hoffman (Hoffman and others 1964) established a line of ice movement stations along the northern edge of the Ross Ice Shelf, Antarctica, using a variation of this system. In this case the distance between stations was measured (twice) and the intervening angle was measured, very precisely, with a Kern DKM 3 theodolite, graduated on the centesimal system. It was this system that was used on Anvers Island.

With this technique, the inaccuracies of final position due to

observational errors are compounded as the survey progresses. Triangular adjustment is not possible so basic observational control becomes of major importance.

Distance Measurement

Distances were measured in one direction only. At each station the marker was temporarily removed and the Tellurometer was set up directly over the hole. Good set-up was assured by the use of a plumb line and any eccentricity of instrument set-up can be estimated at about one centimeter.

The coarse transit time was measured at least twice at different cavity tune settings. Occasionally, if there was some doubt as to the real value of the reading or if the instruments were behaving erratically, one or two more coarse values were obtained or an "ambiguity" check was run by moving the master set forward about 3 meters. Fine readings were made twelve times at increasing cavity tune settings, beginning at either 1 or 2 or setting 5. The mean of these readings, coupled with the coarse transit time, was adopted as the final, unadjusted total transit time. As the measured distances were relatively short (less than 4.5 km), the "ground swing" or variation in the fine values, was accepted only if it varied by less than 4.5×10^{-9} sec. (USCGS Tellurometer Manual). In isolated cases where it did vary in excess of this figure, additional fine readings were taken using every odd number setting on the dial. The total was meaned and taken as the final value. Nottarp (In Hoffman and others 1964) has discussed the performance of Tellurometers over a snow surface and it is obvious

in the cases mentioned here, that the ground swing was excessive because of the relatively large distance being measured (for example, stations G3-G4) Throughout the survey the ground swing usually varied with a double period.

Angle Measurement

The horizontal angle between forward and back stations was measured a minimum of six times in full sets, both direct and indirect with the telescope plunged. The system used by Dorrer (In Hoffman & others 1964) and Dorrer (1970) in which the traverse angle only was measured, did not give the desired consistency of results. Too large a variation of angle resulted, probably due to the shorter distances being sighted (1.5 - 3 km compared with 8 km) and to the coarser graduation of the theodolite baseplate (sexagesimal).

As full sets were taken, the complementary angle to the traverse angle was also observed, closures were recorded and errors noted. After each set had been completed the baseplate of the theodolite was rotated 60° to compensate for any systematic error of baseplate graduation. Angles were read to the nearest second of arc and further estimated to 0.1". Complete sets of angles were accepted only if the closure error was less than 5" and if the mean closure of the complete series of sets was less than 5". Occasionally, during very strong atmospheric refraction, it was necessary to accept a closure error of 8" in 8 sets.

Reduction of Tellurometer Measurements

The maximum velocity of radio waves in vacuo (V_o) is:

$$299{,}792.5 \pm 0.4 \text{ km/sec } *$$

In atmosphere, the velocity decreases according to the density of the air through which the wave is propogating and the velocity (V) is:

$$V = V_0 / n$$

where n is the refractive index for air.

Index of refraction (n) is a function of air temperature, humidity and barometric pressure. Ideally. the condition of the whole intervening atmosphere between stations should be known but in practice this is not feasible. Consequently, the necessary observations were made at each end of the measured line both before and after the measurement. The means of these readings were taken as representative of atmospheric conditions during the measurement.

Several formulae are available for the calculation of index of refraction for air and the following by Essen and Froom (1951) has been used:

$$n = \frac{1 + 10^6}{T}\left[103.49P + \frac{(0.4958 \times 10^6}{T} \quad -17.23)\ (Pe - 00066dT\ P)\right]$$

where T = absolute temperature in °K, P = barometric pressure in mm Hg. dT = wet bulb depression in °C and Pe = saturation water vapor pressure in mm Hg. This formula is a transposition by Dorrer of the formula officially adopted by the International Union of Geodesy and Geophysics (IGGU 1960).

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* This value was officially adopted by the International Union of Geodesy and Geophysics (IGGU 1958)

Saturation water vapor pressure (Pe) has been taken from the Smithsonian Meteorological Tables (List 1966) which were computed from the Goff-Gratch* formulation for the saturation water vapor pressure over pure ice, namely:

$$\text{Log}_{10}ei = -9.09718\left[\frac{To}{T-1}\right] - 3.56654\text{Log}_{10}\left[\frac{To}{T}\right] + 0.876793\left[\frac{1-T}{To}\right] \text{Log}_{10}eio$$

where ei = saturation water vapor pressure over a plane surface of pure ordinary water-ice (mb), T = absolute thermdynamic temperature (^{o}K), To = ice point temperature (273.16 ^{o}K), eio = saturation pressure of pure ordinary water-ice at ice point temperature (List 1966).

The calculation of final slope distances (LF) from the corrected Tellurometer signal transit times has been made from:

$$LF = V_{o}\ /2n = LZ\ 0.14989625/n$$

where LZ = corrected Tellurometer signal transit time (sec x 10^{-9}).

Reduction of Angle Measurements

By observing both the traverse angle (the angle to the right from a backsight on the previous station to the forward station) and its complement, the observational closure of error was known. For six or eight sets of angles with a closure error within the specified limits (5" or 8"), each angle was accepted and the error applied equally to the two angular components. The corrected sets were then meaned and

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Adopted by Resolution 164, Twelfth Conference of Directors of the International Meteorological Organisation (Washington 1947).

accepted as a final value.

Vertical angles were measured in full sets also, with three sightings direct and three indirect. All sightings were made to the marker-snow contact which was more easy to distinguish than the top of the marker. Simultaneous reciprocal sightings could not be made because the working group posessed only one theodolite. The mean of the six angle measurements in each set was taken as the final field value.

Calculation of Coordinates

A "baseline of sight" or originating azimuth was established between monuments on Litchfield Island and on Norsel Point. The azimuth was computed from celestial observations made during 1965. The point on Litchfield Island is taken as the origin of a rectangular coordinate system and was assigned coordinates $x = 10{,}000.000$, $y = 10{,}000.000$, with the x axis parallel to the primary azimuth. From this point the coordinates of all stations were carried forward in meters directly from the corrected Tellurometer values.

The entire network was surveyed on two occasions, the first in 1965, the second in 1966. Two intermediate surveys of the stations near Arthur Harbor were also accomplished. Each of the two major surveys took approximately three months to complete and usually the distances between stations were measured at different times from the corresponding angles.

The change of each angle and distance over the time period between its measurements was reduced to a daily rate then each was set at a common time or epoch. The first epoch was arbitrarily set at December

1 1965, the second at December 1 1966.

A SCATRAN program was written* to calculate the coordinates and surface velocities from the reduced survey data, by the IBM 7094 computer at the Ohio State University, Columbus. Slope distances were reduced to datum by application of the vertical angles. As mean sea level is not accurately known in this area, the fixed point on Litchfield Island (elevation 15 meters approximately) has been used as datum for the reduction of all slope distances. The position of each station from the preceding one was then calculated by sine and cosine functions. The final printout gives coordinates x, y and z for each epoch, absolute vertical and horizontal movement and direction of movement based on the primary azimuth (Az S = 0) between Litchfield Island and Norsel Point. The coordinates are shown in Table XVIII in the main text of this thesis.

Assessment of Accuracy of the Surveys

Maximum observational control was imposed during the surveys because errors are compounded as a traverse line progresses and because triangular adjustment is not possible.

However, one check of accuracy rests with station R which lies on a closed traverse loop and a junction point adjustment by the transit rule was carried out.

The azimuth P-R was computed from the coordinates of P in the traverse K,L,M, ----R and the coordinates of R in the traverse K,K1,

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* The author is grateful to Mr. H.H. Brecher of the Institute of Polar Studies and Department of Geodesy and Photogrammetry, Ohio State University, who wrote the SCATRAN program and who was most helpful in the assessment of accuracy of the traverse survey.

K2,K3,C1 ---R. The difference in this value and the azimuth P-R, obtained by adding up the horizontal angles in the traverse K,L,M, --R was distributed among the angles of both traverses, with weight inversely proportional to the number of angles in the traverse.

Coordinates were then computed using the corrected angles and the misclosures in x and y distributed among the points of the two traverses, with weights inversely proportional to the sum of the absolute values of the x and y differences in the two traverses.

Elevation misclosure was distributed among the points with weights inversely proportional to the square of the distances between points.

Accuracy

The misclosures in the two surveys are:

Survey	Wx(m)	Wy(m)	Wz(m)
1	0.08	1.36	2.86
2	1.00	2.44	5.23

The misclosure in x and y represents distances of 1.36 m. and 2.4 m. respectively. These can be expressed as relative errors by giving the ratios of these distances to the lengths of the traverses (23,357.18 m. and 23,423.67 m. respectively). The relative errors are:

Survey	Error
1	1/17,149
2	1/ 8,883

that is to say; approximately 1/17,000 and 1/9,000 respectively.

If the two determinations (via the two traverses) of the coordinates of station R are compared with the adjusted coordinates of this station and the differences used as residuals to compute the standard

error of one set of observations (ie. at the end of one traverse), and taking weights into account, then the standard errors are:

	Trav. K,L,M, ---R			Trav. K,K1, --C1, --R		
Survey	Mx	My	Mz	Mx	My	Mz
1	1.54	0.88	1.93	1.54	1.19	2.12
2	3.24	1.19	3.51	3.24	2.60	3.89

If this error were considered to be evenly contributed to at each station along each traverse, then the error of position at R would be:

Survey	Mx	My	Mz	Mx	My	Mz
1	0.31	0.18	0.39	0.31	0.38	0.42
2	0.32	0.12	0.35	0.32	0.26	0.39

All other traverse lines were open and the error of final position of most stations must be assumed from the K-R loop. The horizontal velocity component of station R when computed through the K,L,M,--R traverse was 49.89 m/yr (azimuth 233). When computed through the K--C1--R traverse, the velocity was 49.40 m/yr on azimuth 237. On this basis, a probable error of ± 2% seems reasonable to assume for the annual ice velocity values.

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APPENDIX II: Part 2

TRAVERSE SURVEY DATA

Traverse Survey Symbols

LZ Tellurometer signal transit time.

tm Dry-bulb air temperature.

dT Wet-bulb depression.

Pm Barometric Pressure.

Pe Saturated water vapor pressure.

L Primary slope distance.

n Index of refraction for air.

LF Final corrected slope distance.

β Traverse angle.

α Vertical angle.

DATA FOR CALCULATION OF COORDINATES
FIRST EPOCH - DECEMBER 1 1965

Stations Fm	To	LF (m)	β (°	'	")	α (°	'	")
Lich	E	4185.077	81	08	28.4	03	52	37.0
E	H	902.741	139	39	50.2	01	49	44.5
H	K	1337.953	214	48	51.7	02	26	14.4
K	L	842.309	180	16	47.6	01	40	26.1
L	M	2105.874	180	01	06.2	02	09	41.7
M	N	2301.507	180	01	31.7	01	38	38.0
N	P	2233.548	180	06	20.6	01	20	48.4
P	R	1584.717	179	01	20.2	01	21	08.7
R	S	2156.996	180	24	11.4	01	11	49.1
S	T	1906.461	179	58	33.6	01	11	34.5
T	U	1978.434	180	00	50.7	00	58	41.4
R	N1	1508.381	293	14	34.0	-01	22	42.8
N1	N2	1192.746	181	41	52.8	-01	23	32.2
N2	N3	1328.128	180	08	48.3	-01	40	29.6
N3	N4	979.170	180	32	30.4	-02	21	55.6
N4	N5	1143.089	180	11	05.3	-01	38	04.3
N5	N6	894.605	178	01	21.0	-02	28	57.3
N6	N7	1186.228	180	46	58.0	-02	40	11.9
K	K1	1543.098	268	28	14.4	-00	21	27.3
K1	K2	1382.722	152	23	21.5	-00	25	28.0
K2	K3	1638.091	202	38	17.2	-01	53	34.8
K3	C1	1403.446	113	24	46.1	00	22	53.1
C1	C2	984.818	128	36	17.2	03	29	10.8
C2	C3	1001.646	179	01	46.7	03	18	45.7
C3	C4	2076.875	180	35	03.7	02	09	41.2
C4	C5	970.943	180	01	29.9	02	02	55.2
C5	C6	1600.021	179	58	09.2	01	50	08.9
C6	R	1687.570	180	03	55.1	01	33	51.1
E	H1	955.671	212	12	23.1	01	50	35.7
H1	H2	416.032	229	19	30.1	-01	12	58.1
H2	H3	2455.616	174	59	34.2	-02	17	26.7
H3	H4	748.238	197	43	41.2	-00	44	14.1

Continues

Stations Fm	To	LF (m)	β (°	'	")	α (°	'	")
E	G	1144.553	93	30	05.5	-00	14	56.6
G	G1	1045.493	211	01	03.2	01	21	49.7
G1	G2	1864.797	135	35	04.4	-01	13	18.7
G2	G3	1104.201	174	34	28.2	00	30	40.6
G3	G4	3471.281	197	12	44.0	00	26	42.2
G4	G5	1276.390	98	20	23.2	-00	53	52.8
R	Pi1	1883.760	228	42	15.9	00	22	10.9
Pi1	Pi2	1975.564	180	23	26.6	00	28	50.9
Pi2	Pi3	1569.929	179	17	12.7	00	22	34.0
Pi3	Pi4	2018.329	180	51	28.1	00	48	00.6
Pi4	Pi5	1252.588	178	16	52.6	01	40	35.8
R	T1	1014.663	156	01	58.7	01	22	59.6
T1	T2	1583.293	178	34	42.4	01	14	26.7
T2	T3	1425.431	180	38	20.9	01	02	32.1
T3	T4	1145.443	178	55	08.7	00	57	07.9
T4	T5	929.520	177	14	58.3	00	29	59.9
G2	Mu1	968.055	227	21	42.8	02	58	33.5

DATA FOR CALCULATION OF COORDINATES
SECOND EPOCH - DECEMBER 1 1966

Stations Fm	To	LF (m)	β (°	'	")	α (°	'	")
Lich	E	4164.859	81	11	17.4	03	52	37.0
E	H	900.854	139	11	31.3	01	50	09.0
H	K	1335.653	215	14	15.2	02	26	43.1
K	L	843.743	180	16	10.4	01	51	47.2
L	M	2106.755	180	19	16.1	02	08	58.7
M	N	2292.730	180	00	31.1	01	38	19.2
N	P	2224.190	179	54	05.9	01	21	04.1
P	R	1582.877	178	51	24.2	01	23	16.9
R	S	2161.141	180	16	15.5	01	10	09.5
S	T	1913.779	180	01	11.3	01	11	34.5
T	U	1984.204	180	02	42.4	00	59	15.6
R	N1	1525.091	293	43	06.2	-01	18	24.2
N1	N2	1208.684	181	41	18.1	-01	26	42.1
N2	N3	1353.174	180	21	50.5	-01	42	20.6
N3	N4	1006.653	181	27	35.5	-02	23	23.6
N4	N5	1156.971	181	35	02.3	-02	16	56.3
N5	N6	903.836	174	57	38.0	-05	05	42.2
N6	N7	1186.753	181	21	38.5	-02	35	53.4
K	K1	1552.551	267	55	49.0	-00	22	06.7
K1	K2	1391.274	153	36	56.9	-00	26	59.4
K2	K3	1672.722	202	54	16.8	-01	54	12.1
K3	C1	1386.546	113	11	20.9	00	20	15.6
C1	C2	976.233	128	41	32.9	03	20	15.4
C2	C3	1001.130	178	02	26.9	03	16	02.8
C3	C4	2086.517	180	08	45.4	02	09	41.2
C4	C5	985.189	180	00	23.5	02	03	38.0
C5	C6	1616.243	180	28	26.2	01	50	08.9
C6	R	1704.970	180	06	04.7	01	34	16.6
E	H1	960.936	212	09	03.5	-01	45	19.5
H1	H2	421.198	229	40	36.7	-01	08	06.0
H2	H3	2457.445	175	09	57.6	-02	22	12.9
H3	H4	763.889	197	16	36.8	-00	26	42.5

Continues

Stations Fm	To	LF (m)	β (°	'	")	α (°	'	")
E	G	1154.467	92	54	35.7	—00	16	05.4
G	G1	1044.885	211	41	37.7	01	22	38.7
G1	G2	1871.622	132	57	41.9	-01	16	35.0
G2	G3	1096.343	176	32	24.8	00	23	31.4
G3	G4	3459.115	199	41	23.5	00	31	15.6
G4	G5	1260.728	97	10	03.4	-00	49	13.8
R	Pi1	1878.548	229	06	53.0	00	22	31.7
Pi1	Pi2	1969.414	180	23	50.3	00	21	37.5
Pi2	Pi3	1559.380	178	52	56.4	00	35	00.6
Pi3	Pi4	1983.453	179	51	34.0	00	49	04.1
Pi4	Pi5	1273.214	177	58	06.6	01	41	43.9
R	T1	1022.478	155	55	58.5	01	24	09.7
T1	T2	1593.923	178	38	19.2	01	14	51.1
T2	T3	1434.597	180	42	21.4	01	01	17.7
T3	T4	1152.468	178	53	03.1	00	58	27.7
T4	T5	936.775	177	05	32.6	00	24	35.5
G2	Mu1	949.309	230	23	57.8	02	50	12.7

FIRST SURVEY

DATA FOR CALCULATION OF PRIMARY SLOPE DISTANCES (L)

Stations Fm	To	LZ (sec x 10^{-9})	tm (°C)	dT (°C)	Pm (mm Hg)	Pe (mm Hg)	Date (1965)
E	H	06034.893	-0.5	0.5	707.1	4.395	Apr 21
H	K	08940.464	-0.2	0.9	699.1	5.506	Apr 21
K	L	05619.589	-1.3	0.6	699.1	4.114	Apr 21
L	M	14050.857	-2.9	0.4	689.9	3.598	Apr 21
M	N	15391.089	-4.3	0.6	697.4	3.197	Apr 23
N	P	14941.821	-4.1	1.0	692.5	3.251	Apr 23
P	R	10583.650	-4.8	1.0	688.8	3.063	Apr 23
Lich	E	28006.768	-2.7	1.0	730.8	3.659	May 2
Lich	D	19904.997	-2.1	0.7	733.8	3.848	May 2
Lich	Delta	20514.147	-2.2	0.7	736.8	3.815	May 2
Lich	Alpha	12987.071	-1.7	0.4	736.4	3.979	May 2

PRIMARY SLOPE DISTANCES (L) CORRECTED FOR INDEX OF REFRACTION FOR AIR "n" (LF)

Stations Fm	To	L (m)	"n"	LF (m)
E	H	904.608	1.000296	904.340
H	K	1340.142	1.000293	1339.975
K	L	842.355	1.000292	842.110
L	M	2106.171	1.000289	2105.563
M	N	2307.066	1.000288	2307.401
N	P	2239.723	1.000285	2239.084
P	R	1586.449	1.000283	1586.000
Lich	E	4198.109	1.000304	4196.832
Lich	D	2983.684	1.000304	2982.779
Lich	Delta	3074.993	1.000306	3074.053
Lich	Alpha	1946.713	1.000306	1946.118

FIRST SURVEY

VALUES OF TRAVERSE ANGLE (β)

Stations (1	2	3)	(β °	'	")	Date (1965)
Nors	Lich	E	81	06	50.9	May 6
Lich	E	H	135	55	18.0	May 9
E	H	K	214	34	11.4	May 10
H	K	L	180	16	51.4	May 12
K	L	M	179	51	12.5	May 12
L	M	N	179	59	37.2	May 14

VALUES OF VERTICAL ANGLE (α)

Stations Fm	To	(α °	'	")	Date (1965)
Lich	E	03	52	56.7	May 6
E	H	01	49	42.1	May 9
H	K	02	26	10.1	May 10
K	L	01	48	23.4	May 12
L	M	02	10	30.9	May 12
M	N	01	38	47.4	May 14

SECOND SURVEY

DATA FOR CALCULATION OF PRIMARY SLOPE DISTANCES (L)

Stations Fm	To	LZ (sec x 10^{-9})	tm (°C)	dT (°C)	Pm (mm Hg)	Pe (mm Hg)	Date (1965)
Lich	D	19842.500	-3.2	0.6	734.6	3.509	Sep 24
Lich	E	27951.187	-7.0	0.9	706.1	2.534	Sep 28
E	H	06026.312	-11.7	0.2	698.8	1.673	Sep 29
H	K	08931.021	-9.2	0.6	696.6	2.090	Sep 29
K	L	05619.250	-9.5	0.3	693.9	2.036	Sep 29
L	M	14051.896	-15.5	0.4	693.6	1.183	Sep 29
M	N	15366.583	-9.2	0.9	689.5	2.090	Sep 30
N	P	14914.550	-13.9	0.1	676.5	1.370	Oct 4
P	R	10576.937	-12.0	0.5	672.9	1.629	Oct 4
R	S	14389.583	-12.2	0.3	669.2	1.599	Oct 4
S	T	12714.416	-13.9	0.2	666.5	1.370	Oct 4
T	U	13196.292	-14.6	0.6	664.1	1.286	Oct 4
U	V	07259.437	-18.6	0.3	662.5	0.884	Oct 4
V	W	13305.208	-9.8	0.3	666.2	1.983	Oct 28
W	x	16980.645	-9.8	0.1	664.2	1.983	Oct 28
R	N1	10063.523	0.3	1.2	670.1	4.686	Nov 23
N1	N2	07957.458	0.9	1.6	673.3	4.898	Nov 23
N2	N3	08859.617	0.2	1.2	676.0	4.651	Nov 23
N3	N4	06550.646	0.3	1.2	679.4	4.686	Nov 23
N4	N5	07626.250	2.0	2.7	682.6	5.307	Nov 23
N5	N6	05968.666	1.2	2.6	681.0	5.014	Nov 23
N6	N7	07915.854	0.4	1.7	685.7	4.722	Nov 23
E	G	07637.000	0.2	0.1	795.1	4.651	Nov 25
E	H1	06376.937	1.0	0.6	696.6	4.944	Nov 25
H1	H2	02775.812	1.0	0.7	703.4	4.944	Nov 25
H2	H3	16386.833	0.2	0.1	798.7	4.651	Nov 25
H3	H4	04993.208	-0.1	0.5	718.5	4.543	Dec 1
H4	H5	04730.054	-0.3	0.5	717.4	4.359	Dec 1
H5	H6	08730.123	-0.6	0.4	718.4	4.359	Dec 1
H5	Flag	11159.146	-0.8	1.1	715.6	4.288	Dec 1
Flag	K3	07235.937	-0.9	0.1	712.2	4.253	Dec 1
K3	K2	10931.396	-0.8	0.5	707.7	4.288	Dec 1
K2	K1	09227.250	-0.5	0.5	705.8	4.395	Dec 1
K1	K	10297.479	-0.4	0.6	704.5	4.432	Dec 1

Continues

Stations Fm	To	LZ (sec x 10^{-9})	(°C)	(°C)	Pm (mm Hg)	Pe (mm Hg)	Date (1965)
G	G1	06976.833	-0.5	1.2	710.4	4.395	Dec 1
G1	G2	12444.375	-1.9	1.0	711.6	3.913	Dec 1
G2	G3	07368.271	1.9	1.9	713.8	5.261	Dec 4
G3	G4	23164.077	1.0	1.8	712.0	4.944	Dec 4
G4	G5	08516.812	-2.0	0.8	711.4	3.880	Dec 4
K3	C1	09362.833	-0.9	0.1	722.0	4.253	Dec 10
C1	C2	06570.562	0.7	1.1	721.9	4.827	Dec 10
C2	C3	06684.167	-1.2	0.7	716.4	4.148	Dec 10
C3	C4	13861.000	-1.4	0.3	709.6	4.079	Dec 10
C4	C5	06481.667	-2.0	1.0	704.9	3.880	Dec 10
C5	C6	10679.958	-3.0	0.9	701.2	3.568	Dec 10
C6	R	11264.333	-4.0	0.9	692.1	3.279	Dec 10
R	Pi1	12569.375	-5.1	0.7	677.5	2.986	Dec 14
Pi1	Pi2	13181.771	-4.3	0.9	677.3	3.197	Dec 14
Pi2	Pi3	10473.854	-4.0	1.1	676.6	3.279	Dec 14
Pi3	Pi4	13460.292	-2.8	1.6	673.8	3.629	Dec 14
Pi4	Pi5	08363.583	-3.0	1.9	673.7	3.568	Dec 14
R	T1	06773.187	-0.8	1.1	687.2	4.288	Dec 16
T1	T2	10568.521	-0.8	1.2	685.1	4.288	Dec 16
T2	T3	09514.667	-1.3	1.0	682.4	4.114	Dec 16
T3	T4	07645.667	-1.9	0.9	680.9	3.913	Dec 16
T4	T5	06204.833	-2.8	0.8	680.2	3.629	Dec 16
G2	Mu1	06454.291	-0.6	0.5	722.5	4.359	Dec 17
Nord	Lich	09404.500	1.1	1.7	753.1	4.979	Dec 19

PRIMARY SLOPE DISTANCES (L) CORRECTED FOR INDEX OF REFRACTION FOR AIR "n" (LF)

Stations Fm	To	L (m)	"n"	LF (m)
Lich	D	2974.316	1.000303	2973.414
Lich	E	4189.778	1.000289	4188.567
E	H	903.322	1.000288	903.061
H	K	1338.726	1.000286	1338.344
K	L	842.304	1.000286	842.064
L	M	2106.326	1.000286	2105.724
M	N	2303.393	1.000282	2302.973
N	P	2235.635	1.000280	2235.010
P	R	1585.443	1.000277	1585.004
R	S	2156.944	1.000276	2156.349
S	T	1905.843	1.000275	1905.318
T	U	1978.075	1.000273	1977.534
U	V	1088.162	1.000275	1087.863
V	W	1994.401	1.000275	1993.853
W	x	2545.335	1.000275	2544.636
R	N1	1508.484	1.000281	1508.061
N1	N2	1192.793	1.000282	1192.457
N2	N3	1328.023	1.000283	1327.648
N3	N4	978.919	1.000282	978.643
N4	N5	1143.146	1.000283	1142.822
N5	N6	894.681	1.000282	894.428
N6	N7	1186.557	1.000285	1186.218
G	E	1144.758	1.000297	1144.417
E	H1	955.879	1.000293	955.598
H1	H2	416.084	1.000296	415.961
H2	H3	2456.325	1.000298	2455.591
H3	H4	748.463	1.000301	748.238
H4	H5	709.017	1.000300	708.805
H5	H6	1308.613	1.000300	1308.220
H5	Flag	1672.714	1.000297	1672.218
Flag	K3	1084.640	1.000292	1084.323
K3	K2	1638.575	1.000296	1638.091
K2	K1	1383.130	1.000295	1382.722
K1	K	1543.553	1.000295	1543.098

Continues

Stations		L		LF
Fm	To	(m)	"n"	(m)
G	G1	1045.801	1.000295	1045.493
G1	G2	1865.365	1.000305	1864.797
G2	G3	1104.476	1.000308	1104.136
G3	G4	3472.208	1.000296	3471.181
G4	G5	1276.638	1.000295	1276.261
K3	C1	1403.453	1.000302	1403.029
C1	C2	984.903	1.000301	984.606
C2	C3	1001.932	1.000298	1001.633
C3	C4	2077.712	1.000288	2077.113
C4	C5	971.578	1.000292	971.294
C5	C6	1600.886	1.000290	1600.421
C6	R	1688.481	1.000286	1687.999
R	Pi1	1884.102	1.000280	1883.575
Pi1	Pi2	1975.898	1.000280	1975.345
Pi2	Pi3	1569.991	1.000279	1569.553
Pi3	Pi4	2017.647	1.000278	2017.087
Pi4	Pi5	1253.670	1.000277	1253.323
R	T1	1015.275	1.000286	1014.985
T1	T2	1584.182	1.000285	1583.730
T2	T3	1426.213	1.000284	1425.807
T3	T4	1146.057	1.000283	1145.732
T4	T5	930.081	1.000282	929.818
G2	Mu1	967.474	1.000302	967.182
Nors	Lich	1409.699	1.000311	1409.260

SECOND SURVEY

VALUES OF TRAVERSE ANGLE (β)

Stations (1	2	3)	β (°	'	")	Date (1965)
Nors	Lich	E	81	07	59.2	Sep 28
Lich	E	H	139	44	37.3	Sep 29
E	H	K	214	44	32.9	Sep 29
H	K	L	180	16	53.9	Sep 29
K	L	M	179	58	04.1	Sep 30
L	M	N	180	01	41.8	Sep 30
M	N	P	180	07	35.1	Oct 24
N	P	R	179	02	20.6	Oct 24
P	R	S	180	24	59.6	Oct 24
R	S	T	179	58	17.6	Oct 24
S	T	U	180	00	39.7	Oct 25
T	U	V	179	35	34.5	Oct 25
U	V	W	182	47	45.2	Oct 28
V	W	x	182	30	45.9	Nov 11
R	N1	N2	181	41	54.6	Nov 11
N1	N2	N3	180	08	07.6	Nov 11
N2	N3	N4	180	33	38.8	Nov 11
N3	N4	N5	180	06	43.1	Nov 11
N4	N5	N6	178	04	52.4	Nov 23
N5	N6	N7	180	46	18.1	Nov 23
P	R	N1	293	14	01.2	Nov 23
Lich	E	G	93	30	40.5	Nov 24
Lich	E	H1	212	12	26.4	Nov 24
E	H1	H2	229	19	28.0	Nov 24
H1	H2	H3	174	59	24.0	Nov 24
H2	H3	H4	197	44	07.9	Nov 24
H3	H4	H5	114	59	20.8	Nov 24
H4	H5	H6	212	10	03.8	Nov 24
H4	H5	Flag	157	41	56.7	Nov 24
H	K	K1	268	27	53.1	Dec 5
K	K1	K2	152	24	09.9	Dec 5
K1	K2	K3	202	38	27.7	Dec 5
K2	K3	Flag	177	45	29.6	Dec 5

Continues

SECOND SURVEY

Stations (1	2	3)	β (°	'	")	Date (1965)
E	G	G1	211	01	29.9	Dec 5
G	G1	G2	135	32	29.2	Dec 7
G1	G2	G3	174	36	24.5	Dec 7
G2	G3	G4	197	15	10.6	Dec 7
G3	G4	G5	98	19	13.6	Dec 7
K2	K3	C1	113	24	26.3	Dec 10
K3	C1	C2	128	36	23.7	Dec 11
C1	C2	C3	179	00	09.2	Dec 11
C2	C3	C4	180	34	20.5	Dec 11
C3	C4	C5	180	01	28.1	Dec 11
C4	C5	C6	179	58	59.0	Dec 11
C5	C6	R	180	03	58.6	Dec 11
P	R	Pi1	228	43	08.5	Dec 14
R	Pi1	Pi2	180	23	27.4	Dec 14
Pi1	Pi2	Pi3	179	16	20.8	Dec 14
Pi2	Pi3	Pi4	180	49	20.1	Dec 14
Pi3	Pi4	Pi5	178	16	12.5	Dec 14
P	R	T1	156	01	43.9	Dec 16
R	T1	T2	178	34	51.3	Dec 16
T1	T2	T3	180	38	30.8	Dec 16
T2	T3	T4	178	55	03.6	Dec 16
T3	T4	T5	177	14	35.1	Dec 16
G1	G2	Mu1	227	29	41.8	Dec 17

SECOND SURVEY

VALUES OF VERTICAL ANGLE (α)

Stations Fm	To	α (°	'	")	Date (1965)
Lich	E	03	52	37.4	Sep 28
E	H	01	49	40.3	Sep 29
H	K	02	26	09.5	Sep 29
K	L	01	38	30.4	Sep 29
L	M	02	09	48.3	Sep 30
M	N	01	38	40.5	Sep 30
N	P	01	20	47.1	Oct 24
P	R	01	20	56.1	Oct 24
R	S	01	11	58.9	Oct 24
S	T	01	11	34.5	Oct 24
T	U	00	58	38.1	Oct 25
N1	N2	-01	23	22.3	Nov 11
N2	N3	-01	40	23.8	Nov 11
N3	N4	-02	21	51.0	Nov 11
N4	N5	-01	36	02.9	Nov 11
N5	N6	-02	22	47.7	Nov 23
N6	N7	-02	40	56.6	Nov 23
R	N1	-01	22	47.8	Nov 23
E	G	-00	14	56.6	Nov 24
E	H1	01	50	40.9	Nov 24
H1	H2	-01	13	02.9	Nov 24
H2	H3	-02	17	22.0	Nov 24
H3	H4	-00	44	31.4	Nov 24
H4	H5	01	10	07.6	Nov 24
H5	H6	01	36	04.6	Nov 24
H5	Flag	01	54	24.8	Nov 24
K	K1	-00	21	26.9	Dec 5
K1	K2	-00	25	27.0	Dec 5
K2	K3	-01	53	34.4	Dec 5
K3	Flag	-02	31	30.6	Dec 5

Stations Fm	To	α (°	'	")	Date (1965)
G	G1	01	21	49.0	Dec 5
G1	G2	-01	13	15.5	Dec 7
G2	G3	00	30	47.6	Dec 7
G3	G4	00	26	37.7	Dec 7
G4	G5	-00	53	57.4	Dec 7
K3	C1	00	22	57.0	Dec 10
C1	C2	03	29	25.4	Dec 11
C2	C3	03	18	50.1	Dec 11
C3	C4	02	09	41.2	Dec 11
C4	C5	02	02	53.9	Dec 11
C5	C6	01	50	08.9	Dec 11
C6	R	01	33	50.4	Dec 11
R	Pi1	00	22	03.5	Dec 14
Pi1	Pi2	00	29	06.3	Dec 14
Pi2	Pi3	00	22	11.4	Dec 14
Pi3	Pi4	00	47	58.3	Dec 14
Pi4	Pi5	01	40	33.4	Dec 14
R	T1	01	22	56.7	Dec 16
T1	T2	01	14	25.7	Dec 16
T2	T3	01	02	35.1	Dec 16
T3	T4	00	57	04.6	Dec 16
T4	T5	00	30	13.2	Dec 16
G2	Mu1	02	58	55.4	Dec 17

THIRD SURVEY

DATA FOR CALCULATION OF PRIMARY SLOPE DISTANCES (L)

Stations Fm	To	LZ (Sec x 10^{-9})	tm (°C)	dT (°C)	P (mm Hg)	Pe (mm Hg)	Date (1966)
E	H	06016.750	-16.4	0.2	720.8	1.088	Jun 13
H	K	08919.775	-13.8	0.3	717.4	1.383	Jun 13
K	L	05625.541	-10.6	0.2	714.1	1.847	Jun 13
L	M	14055.953	-10.6	0.5	714.5	1.847	Jun 15
M	N	15326.020	-11.9	0.4	707.7	1.643	Jun 15
N	P	14871.083	-15.5	0.1	702.0	1.183	Jun 15
P	R	10569.062	-12.8	0.5	698.1	1.515	Jun 15

PRIMARY SLOPE DISTANCES (L) CORRECTED FOR INDEX OF REFRACTION FOR AIR "n" (LF)

Stations Fm	To	L (m)	"n"	LF (m)
E	H	901.888	1.000298	901.620
H	K	1337.041	1.000295	1336.646
K	L	843.247	1.000294	842.999
L	M	2106.935	1.000293	2106.317
M	N	2297.313	1.000291	2296.645
N	P	2229.120	1.000290	2228.615
P	R	1584.263	1.000287	1583.808

THIRD SURVEY

VALUES OF TRAVERSE ANGLE (β)

Stations (1	2	3)	β (°	'	")	Date (1966)
E	H	K	215	00	45.1	May 15
H	K	L	180	16	44.4	May 16
K	L	M	180	09	28.2	May 16
Lich	E	H	139	27	35.6	May 17
L	M	N	180	01	01.8	May 17
Nors	Lich	E	81	09	43.8	May 18
M	N	P	180	00	12.5	May 30
N	P	R	178	56	32.3	May 30

VALUES OF VERTICAL ANGLE (α)

Stations Fm	To	α (°	'	")	Date (1966)
E	H	01	49	59.1	May 17
H	K	02	26	25.9	May 15
K	L	01	48	16.4	May 16
L	M	02	08	40.1	May 16
Lich	E	03	52	38.0	May 18
M	N	01	42	28.5	May 17
N	P	01	20	49.5	May 30
P	R	01	21	32.4	May 30

FOURTH SURVEY

DATA FOR CALCULATION OF PRIMARY SLOPE DISTANCES (L)

Stations Fm	To	LZ (sec x 10^{-9})	tm (°C)	dT (°C)	P (mm Hg)	Pe (mm Hg)	Date (1966)
E	H	06013.458	-8.9	1.0	697.1	2.147	Oct 6
H	K	08915.291	-9.6	1.3	701.2	2.018	Oct 8
K	L	05629.000	-10.3	0.3	698.1	1.897	Oct 8
L	M	14057.917	-11.7	0.2	693.4	1.673	Oct 8
M	N	15308.275	-12.0	0.4	687.2	1.629	Oct 8
N	P	14851.458	-16.7	0.2	682.0	1.057	Oct 8
P	R	10564.583	-19.8	0.1	678.1	0.789	Oct 8
R	S	14419.750	-4.3	1.2	683.2	3.197	Oct 23
S	T	12765.875	-2.4	1.0	680.5	3.752	Oct 23
T	U	13236.875	-2.0	1.6	677.5	3.880	Oct 23
R	N1	10169.875	-4.9	1.0	691.8	3.037	Nov 6
N1	N2	08053.167	-5.0	1.0	694.6	3.011	Nov 6
N2	N3	09019.000	-5.3	1.0	698.0	2.935	Nov 6
N3	N4	06705.542	-4.8	1.0	701.0	3.063	Nov 6
N4	N5	07714.625	-5.0	1.0	704.7	3.011	Nov 6
E	H1	06411.104	-4.8	1.5	717.3	3.063	Nov 15
H1	H2	02809.350	-2.0	1.0	717.4	3.880	Nov 15
K	K1	10357.968	-3.1	1.5	711.3	3.538	Nov 15
G	E	07701.354	-1.8	0.9	720.5	3.945	Nov 15
G	G1	06972.958	-2.9	1.0	719.7	3.598	Nov 15
G1	G2	12487.958	-2.3	1.0	720.9	3.784	Nov 15
K1	K2	09285.562	-1.7	1.0	708.8	3.979	Dec 11
K2	K3	11168.812	-2.0	1.3	712.2	3.880	Dec 11
K3	C1	09248.146	0.0	1.3	713.0	4.581	Dec 16
C1	C2	06512.313	1.5	0.9	711.2	5.120	Dec 16
C2	C3	06680.525	0.4	1.3	705.4	4.722	Dec 16
C3	C4	13926.479	0.2	0.5	699.3	4.651	Dec 16
C4	C5	06578.291	-0.8	0.4	694.6	4.288	Dec 16
C5	C6	10790.000	-1.5	0.0	693.0	4.046	Dec 16
C6	R	11382.371	-2.5	0.0	686.0	3.721	Dec 16

Continues

FOURTH SURVEY

Stations Fm	To	LZ (sec x 10^{-9})	tm (°C)	dT (°C)	P (mm Hg)	Pe (mm Hg)	Date (1966)
R	T1	06825.333	-3.0	0.0	683.6	3.568	Dec 16
T1	T2	10639.854	0.3	1.5	686.2	4.686	Dec 18
T2	T3	09576.167	0.2	1.7	683.4	4.651	Dec 18
T3	T4	07692.813	0.3	1.3	681.3	4.686	Dec 18
T4	T5	06253.521	0.3	1.4	680.5	4.686	Dec 18
R	Pi1	12534.293	-0.7	1.2	690.2	4.323	Dec 18
Pi1	Pi2	13140.375	-0.9	1.0	688.9	4.253	Dec 18
Pi2	Pi3	10402.958	-1.0	1.3	687.4	4.217	Dec 18
Pi3	Pi4	13225.104	-0.8	1.2	685.8	4.288	Dec 18
Pi4	Pi5	08502.808	-1.0	1.1	683.1	4.217	Dec 18
							(1967)
G2	G3	07311.583	-0.1	1.9	719.3	4.543	Jan 2
G2	Mu1	06323.666	-0.5	1.8	717.0	4.395	Jan 2
G3	G4	23076.542	1.2	1.3	721.0	5.014	Jan 3
G4	G5	08403.750	-0.3	0.7	719.9	4.469	Jan 3
E	Lich	27779.750	2.4	2.0	735.6	5.448	Jan 6
D	Lich	19651.646	4.7	2.2	739.2	6.287	Jan 6
Delta	Lich	20443.000	5.5	1.1	740.9	6.572	Jan 6
Alpha	Lich	12807.097	4.9	2.8	741.4	6.350	Jan 6
N5	N6	06041.733	-0.4	1.6	709.9	4.432	Jan 7
N6	N7	07919.854	0.7	2.4	714.0	4.827	Jan 7
H2	H3	16401.125	2.4	0.2	723.2	5.448	Jan 26
H3	H4	05113.708	2.3	0.4	726.7	5.412	Jan 26

PRIMARY SLOPE DISTANCES (L) CORRECTED FOR INDEX OF REFRACTION FOR AIR "n" (LF)

Stations Fm	To	L (m)	"n"	LF (m)
E	H	901.395	1.000285	901.138
H	K	1336.368	1.000285	1335.987
K	L	843.766	1.000287	843.534
L	M	2107.229	1.000286	2106.627
M	N	2294.653	1.000283	2294.004
N	P	2226.178	1.000282	2225.549
P	R	1583.591	1.000283	1583.144
R	S	2161.316	1.000281	2160.709
S	T	1913.557	1.000282	1913.017
T	U	1984.158	1.000280	1983.603
R	N1	1524.426	1.000284	1523.992
N1	N2	1207.139	1.000285	1206.795
N2	N3	1351.914	1.000287	1351.527
N3	N4	1005.136	1.000288	1004.846
N4	N5	1156.393	1.000289	1156.059
N5	N6	905.063	1.000294	904.797
N6	N7	1187.156	1.000294	1186.807
E	H1	961.000	1.000293	960.719
H1	H2	421.111	1.000296	420.986
H2	H3	2458.467	1.000301	2457.728
H3	H4	766.526	1.000307	766.290
K	K1	1552.621	1.000292	1552.168
K1	K2	1391.871	1.000294	1391.462
K2	K3	1674.163	1.000294	1673.671
K3	C1	1386.262	1.000296	1385.852
C1	C2	976.171	1.000298	975.880
C2	C3	1001.386	1.000294	1001.109
C3	C4	2087.527	1.000294	2086.914
C4	C5	986.061	1.000291	985.774
C5	C6	1617.380	1.000291	1616.910
C6	R	1706.175	1.000287	1705.685

Continues

FOURTH SURVEY

Stations Fm	To	L (m)	"n"	LF (m)
R	T1	1023.092	1.000286	1022.799
T1	T2	1594.874	1.000286	1594.418
T2	T3	1435.431	1.000284	1435.023
T3	T4	1153.124	1.000285	1152.795
T4	T5	937.379	1.000284	937.113
R	Pi1	1878.843	1.000287	1878.304
Pi1	Pi2	1969.693	1.000287	1969.128
Pi2	Pi3	1559.364	1.000285	1558.919
Pi3	Pi4	1982.393	1.000285	1981.828
Pi4	Pi5	1274.539	1.000284	1274.177
E	G	1154.404	1.000298	1154.060
G	G1	1045.220	1.000296	1044.910
G1	G2	1871.898	1.000297	1871.341
G2	G3	1095.979	1.000297	1095.654
G2	Mu1	947.894	1.000295	947.614
G3	G4	3459.087	1.000301	3458.048
G4	G5	1259.691	1.000300	1259.312
Lich	E	4164.080	1.000305	4162.810
Lich	D	2945.708	1.000308	2944.799
Lich	Delta	3064.329	1.000313	3063.369
Lich	Alpfa	1919.736	1.000307	1919.145

FOURTH SURVEY

VALUES OF TRAVERSE ANGLE (β)

Stations (1	2	3)	β (°	'	")	Date (1966)
E	H	K	215	10	25.5	Oct 6
H	K	L	180	16	15.9	Oct 6
K	L	M	180	17	52.4	Nov 2
L	M	N	180	00	35.6	Nov 2
M	N	P	179	55	02.2	Nov 2
P	R	S	180	16	49.1	Nov 4
R	S	T	180	00	59.9	Nov 4
S	T	U	180	02	34.3	Nov 4
P	R	N1	293	42	00.6	Nov 16
R	N1	N2	181	41	19.3	Nov 16
N1	N2	N3	180	21	22.6	Nov 16
N2	N3	N4	181	29	38.4	Nov 16
N	P	R	178	51	45.3	Nov 17
H	K	K1	267	56	52.9	Nov 19
K1	K2	K3	202	53	45.2	Nov 19
K2	K3	C1	113	11	47.5	Nov 19
K3	C1	C2	128	41	39.0	Nov 29
C1	C2	C3	178	02	46.5	Nov 29
C2	C3	C4	180	08	54.1	Nov 29
C3	C4	C5	180	00	23.8	Nov 29
C4	C5	C6	180	28	16.1	Nov 29
C5	C6	R	180	06	04.0	Nov 29
K	K1	K2	153	36	32.9	Nov 29
E	H1	H2	229	21	40.3	Dec 9
E	G	G1	211	42	51.2	Dec 11
G	G1	G2	132	52	57.1	Dec 11
G1	G2	G3	176	35	58.1	Dec 11
Pi3	Pi4	Pi5	177	57	10.9	Dec 18
Pi2	Pi3	Pi4	179	48	36.6	Dec 18
Pi1	Pi2	Pi3	178	50	52.5	Dec 31
R	Pi1	Pi2	180	23	52.4	Dec 31
P	R	Pi1	229	08	58.5	Dec 31

Continues

FOURTH SURVEY

Stations (1	2	3)	β (°	'	")	Date (1967)
P	R	T1	155	55	26.8	Jan 1
R	T1	T2	178	38	38.2	Jan 1
T1	T2	T3	180	42	42.7	Jan 1
T2	T3	T4	178	52	52.1	Jan 1
T3	T4	T5	177	04	43.0	Jan 1
H1	H2	H3	175	21	11.1	Jan 1
G1	G2	Mu1	230	40	26.3	Jan 2
G2	G3	G4	199	55	14.5	Jan 3
G3	G4	G5	97	03	30.0	Jan 3
Lich	E	H	139	08	53.6	Jan 3
Nors	Lich	E	81	11	34.9	Jan 6
N3	N4	N5	181	43	49.6	Jan 7
N4	N5	N6	174	38	10.6	Jan 7
N5	N6	N7	181	25	02.5	Jan 7
H2	H3	H4	197	12	17.4	Jan 26
Lich	E	G	62	38	09.0	May 17

FOURTH SURVEY

VALUES OF VERTICAL ANGLE (∝)

Stations Fm	To	∝ (°	'	")	Date (1966)
H	K	02	26	38.8	Oct 6
K	L	01	50	28.8	Oct 6
L	M	02	09	05.4	Nov 2
M	N	01	40	20.6	Nov 2
N	P	01	21	03.5	Nov 2
R	S	01	13	41.3	Nov 4
S	T	01	11	35.5	Nov 4
T	U	00	59	13.2	Nov 4
R	N1	-01	18	34.1	Nov 16
N1	N2	-01	26	34.8	Nov 16
N2	N3	-01	42	16.3	Nov 16
N3	N4	-02	23	20.2	Nov 16
P	R	01	23	09.9	Nov 17
K	K1	-00	22	05.1	Nov 19
K2	K3	-01	54	10.1	Nov 19
K3	C1	00	20	26.4	Nov 19
C1	C2	03	20	47.6	Nov 29
C2	C3	03	16	12.6	Nov 29
C3	C4	02	09	46.4	Nov 29
C4	C5	02	03	35.3	Nov 29
C5	C6	01	50	03.8	Nov 29
C6	R	01	36	45.8	Nov 29
K1	K2	-00	26	55.7	Nov 29
H1	H2	-01	07	49.2	Dec 9
G	G1	01	22	38.7	Dec 11
G1	G2	-01	16	34.5	Dec 11
G2	G3	00	23	20.8	Dec 11
Pi4	Pi5	01	41	42.3	Dec 18
Pi3	Pi4	00	49	02.5	Dec 18
Pi2	Pi3	00	31	57.9	Dec 31
Pi1	Pi2	00	21	32.7	Dec 31
R	Pi1	00	22	25.3	Dec 31
					(1967)
R	T1	01	24	09.9	Jan 1
T1	T2	01	14	00.2	Jan 1
T2	T3	01	01	17.4	Jan 1
T3	T4	00	58	27.9	Jan 1
T4	T5	00	24	34.6	Jan 1
H2	H3	-02	22	47.4	Jan 1
G2	Mu1	02	50	12.6	Jan 2
G3	G4	00	31	31.4	Jan 3
G4	G5	-00	48	57.7	Jan 3
E	H	01	50	05.1	Jan 3
Lich	E	03	52	36.8	Jan 6
N4	N5	-02	17	41.1	Jan 7
N5	N6	-05	05	33.6	Jan 7
N6	N7	-02	26	05.1	Jan 7
H3	H4	-00	22	18.4	Jan 26
E	G	-00	16	07.7	May 17