

N.Z. Meteorological Office Circular Note No. 16.

FLYING CONDITIONS AT RONGOTAI AERODROME.

551.5821629.13

By

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1. Surface Winds:

(i) The topography of Cook Strait and adjacent land areas produces marked dominance of winds from north to northwest and from south to southeast. This is especially marked with moderate or strong winds. Of winds of force 4 and over, 63.8 per cent are from the north or northwest, 32.2 per cent are from the south or southeast, while only 1.1 per cent are from the northeast or east and 2.8 per cent are from the southwest or west directions. (Kelburn 0900 hours winds, av. 12 year).

Northerly and northwesterly winds prevail during most of the year, but the proportion of southerlies and southeasterlies increases during the winter months and may exceed that of the northerlies and northwesterlies during June and July. Winds from the above directions are reinforced orographically and may reach sufficient strength to cause dangerous flying conditions. The northerly and northwesterly winds are often very gusty and turbulent but this gustiness is less marked with most southerlies and southeasterlies.

(ii) Strong Winds at Rongotai (Force 7 or more or with gusts above 40 miles per hour).

(a) Strong winds are more frequently northerly or northwesterly than southerly or southeasterly in the proportion of 1.8 to 1. Northwesterly winds are more frequent and usually stronger than northerly winds.

(b) Strong northerly and northwesterly winds are most frequently associated with the approach of a cold front from the southwesterly quarter. They may also occur with the approach of a warm front from the north or northwest and also with the deepening of a low to the west of New Zealand.

(c) A southwesterly current over New Zealand may be deflected through Cook Strait to reach Rongotai as a strong northwesterly if the gradient wind is more westerly than 220 degrees.

(d) Strong southerly winds most frequently result from the development of a low to the east or northeast of Cook Strait. It is only rarely that strong southerlies follow the passage of a simple undeformed meridional front over Rongotai.

(e) Strong winds may be expected at any season of the year but the months September to January inclusive are the windiest. It is during these months that northerly or northwesterly strong winds are most common.

(f) Although little or no diurnal change is shown by strong southerly winds, strong northerlies generally blow with maximum strength during the daylight hours. The strength of the latter winds tends to increase rapidly an hour or two after sunrise and to show a marked decline towards evening.

(g) Table 1: Seasonal Variation of Strong Winds at Rongotai.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Av. No. of days per month with gusts greater than 40 mph (average 9 years)	17	8	8	15	17	16	19	14	16	19	14	14
Av. No. of days per month with gusts greater than 60 mph (average 9 years)	1.0	1.1	0.3	1.1	1.7	1.3	2.2	1.0	1.0	1.3	0.1	1.2
Speed (mph) of strongest gust in 9 years (1931 - 39)	64	76	65	80	88	77	78	75	72	73	65	89

2. Upper Winds:(a) Wind Speeds.

(i) Wind streams from north to northwest (direction 310 degrees to 350 degrees at 3000 feet) are subject to a concentration in the lowest few thousand feet as they pass through Cook Strait, a relatively narrow gap in the mountain chains of the North and South Islands. There is a tendency for maximum speeds (at levels below 10,000 feet) to be attained at about 3000 feet.

(ii) Wind streams from southwest to west (direction 190 degrees to 270 degrees at 3000 feet) suffer a sheltering effect below 7000 feet due to the high country of the South Island (e.g., Kaikoura Range 7000 to 9000 feet). The undisturbed flow is found above about 7000 feet at Wellington.

(iii) Wind streams from the eastern semicircle are more irregular in their behaviour but, normally, northeast or east winds suffer considerable retardation below 3000 feet due to the sheltering effect of the Orongorongo Range (2000 to 3000 feet), although southeasterly wind streams often show a concentration at low levels as they blow round the southern end of the Orongorongo Range.

(b) Wind Directions.

(i) Wind streams which have a direction at 10,000 feet in the sector 230 to 360 degrees tend to converge to the sector 270 to 360 degrees at 3000 feet and to blow as surface winds with directions between 290 and 020 degrees.

(ii) 10,000 foot wind streams in the sector 210 to 230 degrees may be associated with either southerly or northwesterly surface winds; if the wind stream at 3000 feet is more southerly than approximately 230 degrees the surface wind is usually southerly or southeasterly, while if it is more westerly than 230 degrees at 3000 feet the surface wind is usually westerly or northwesterly.

(iii) Wind streams which have a direction at 10,000 feet in the sector 140 to 210 degrees are represented at 3000 feet by wind streams in the sector 140 to 180 degrees and by surface winds blowing from directions between 130 and 180 degrees.

(iv) 10,000 foot wind streams coming from the easterly sector 360 degrees to 140 degrees are usually not deflected substantially at levels above 3000 feet. If they are from a direction south of east, surface winds are usually deflected to southeasterly and may sometimes be strong; if the upper winds are from the sector north to east, surface winds may vary throughout that sector also but are usually light owing to the sheltering effect of the nearby ranges.

(Note: The foregoing summary of upper winds was based on a study of pilot balloon ascents from Kelburn for the years 1941 and 1942. No flight was considered which showed a wind direction deviating 90 degrees or more between the 1500 and the 10,000 foot layers).

A study of upper wind frequencies at Kelburn for the years 1929-1940 showed that northwesterlies predominated at 1.0 km., but at 2.0 and 3.0 km., westerly to southwesterly winds predominated. Southerly 1.0 km. winds and southwesterly 2.0 and 3.0 km. winds were most frequent in the winter months.

3. Low Cloud:

"Low Cloud" conditions are taken as 7/10 to 10/10 of cloud whose base is less than 1000 feet above station level.

Low cloud conditions at Rongotai are in most cases associated with fronts. Occluded, warm and stationary fronts in the vicinity of the station together produce the greatest number of hours of low cloud, but the greatest single factor is the advance of a cold front from a southwesterly or westerly quarter. Disregarding the effect of fronts, southeasterly winds give a higher proportion of hours of low cloud than do winds from other directions. Low cloud persists for longer periods in southeasterly conditions.

Low cloud is at a minimum in the spring months and is more common in the winter and summer. It is most likely to occur in the morning hours reaching a maximum about 0900 hours.

4. Low Visibility:

A horizontal visibility of less than $2\frac{1}{2}$ miles has been considered "low visibility."

Low visibility is almost always associated with low cloud conditions, but in the majority of cases is caused by rain or drizzle and is poor only when precipitation is actually occurring. Fog is very rare at Rongotai; advection fog occasionally occurs in easterly weather, but radiation fog is most uncommon. In most cases visibility is poor for short periods only.

The most frequent cause of bad visibility (below 1000 yards) simultaneous with very low cloud (below 500 feet) is a stationary warm front or occlusion over Wellington; these conditions are usually of short duration while the centre of the depression is passing over and substantially calm conditions prevail, and as soon as a wind blows again visibility and ceiling tend to improve.

Low visibility occurs most frequently in the winter months June to August inclusive, and during the morning hours to 0900 hours. It is more common with southeasterly winds and it persists for longer periods with these winds than with winds from any other direction.

5. Thunderstorms, Squalls, etc.

Thunderstorms are rare and are usually of frontal origin. An average of five thunderstorms a year occurs at Wellington.

Line Squalls are more common. They usually accompany cold fronts which have moved up the east coast of the South Island and their passage on this coast generally gives ample warning of their arrival at Rongotai.

Hail is not infrequent but damage from hail is rare. Over the last 15 years hail has fallen 15 times per annum.

Snow is very rare. It has been reported on an average of 1.3 days a year and seldom persists on the ground for more than a few minutes.

6. Cloud Distribution about Cook Strait: This is given by the attached maps. The distribution refers to low cloud, and areas of 7/10 or more cloud have been indicated as a complete cover. The area examined is that within a 50 mile radius of Rongotai. No attempt has been made to indicate distribution with maximum amounts of cloud as this is usually represented by a 10/10 cover over the whole visible area.

7. Summary:

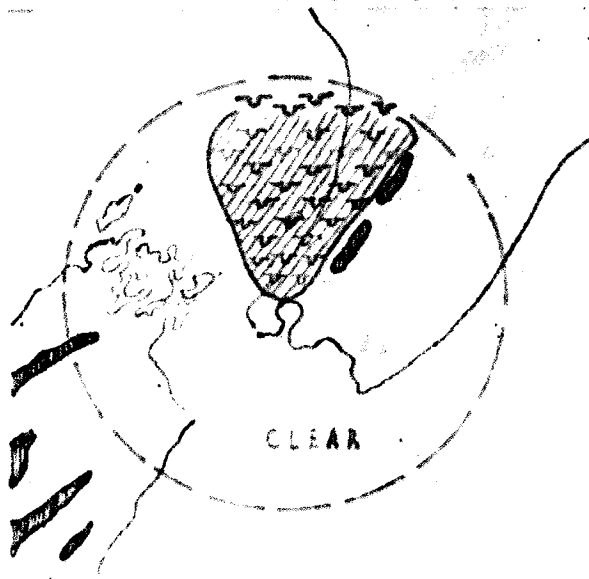
The meteorological phenomena likely to give dangerous flying conditions at Rongotai may be summarised in order of importance as follows -

(a) Strong Winds. Winds in the northwesterly to northerly quarter are reinforced orographically and gusts of over 60 miles per hour are not uncommon. Violent turbulence and gustiness may frequently be experienced. Southerly and southeasterly winds are frequently strong but not usually as turbulent.

(b) Low Cloud. Low cloud usually occurs in association with fronts and is more common when the wind is southerly or southeasterly. Such conditions may be very persistent but the cloud base is rarely less than 300 feet and the low elevation of the aerodrome and the open approach from the sea make it possible to use the field in many instances when the cloud base is low. It should be realised, however, that the surrounding hills will be obscured in such circumstances.

(c) Poor Visibility. Poor visibility is less common than low cloud and is not as persistent. Fogs are very rare.

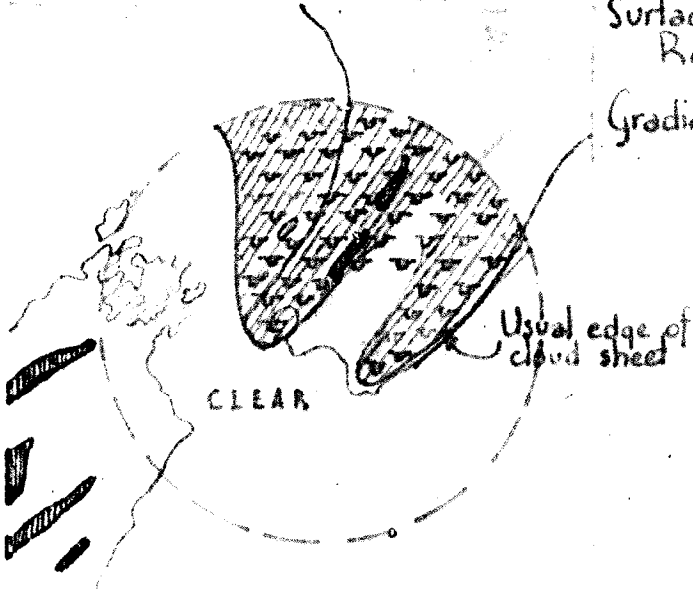
FIG. 1: MODERATE CLOUDINESS.



Surface wind
at Rongolai: Light N.
Gradient wind: N-NNW

(Slight cloudiness: only isolated
Cu and Sc along Tatarvas)

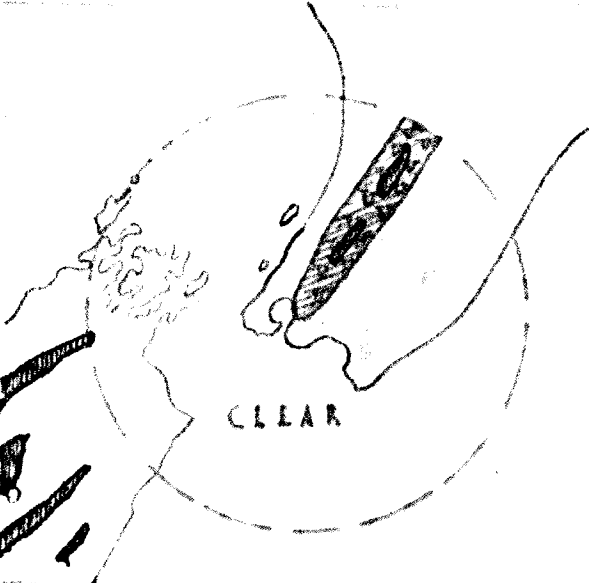
FIG. 2: MODERATE CLOUDINESS.



Surface wind at
Rongolai: Moderate N
Gradient wind: N-NNW

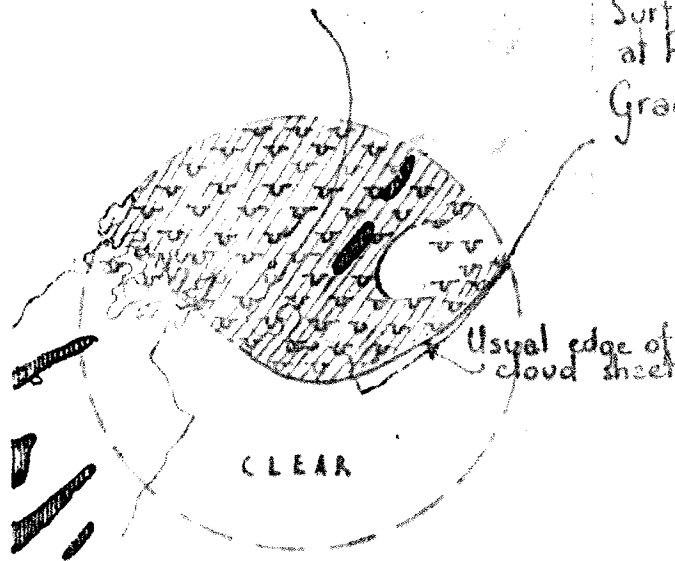
Usual edge of
cloud sheet

FIG. 2a: SLIGHT CLOUDINESS



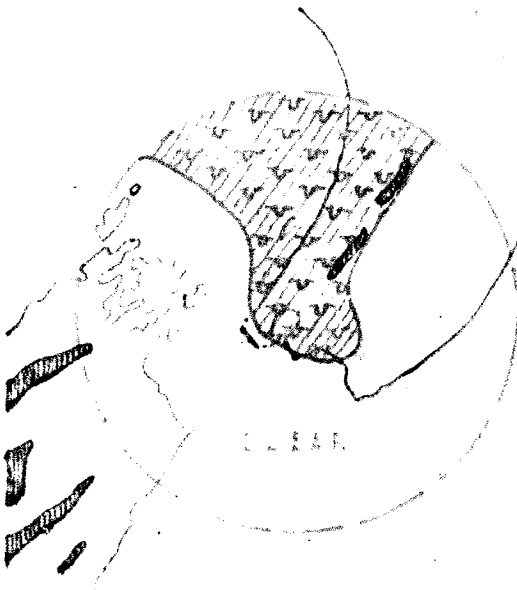
Surface wind
at Rongolai: Moderate N
Gradient wind: N-NNW

FIG. 3: MODERATE CLOUDINESS



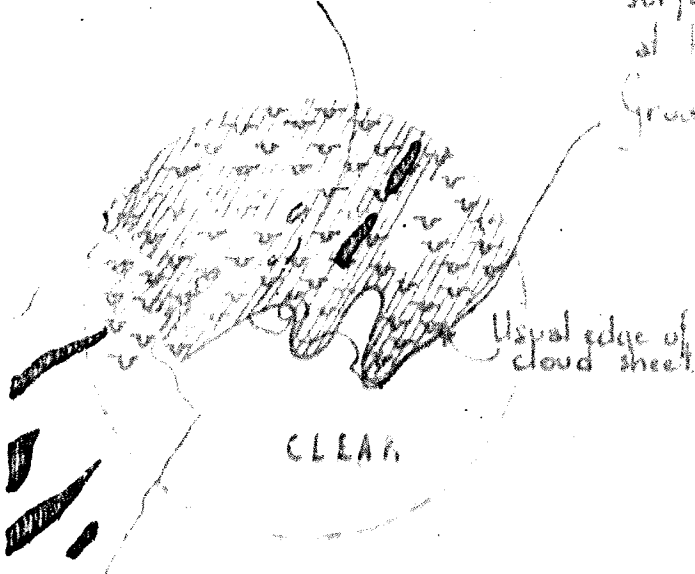
Surface wind
at Rongotai: Strong N.
Gradient wind: N-NNW.

FIG. 3a: SLIGHT CLOUDINESS.



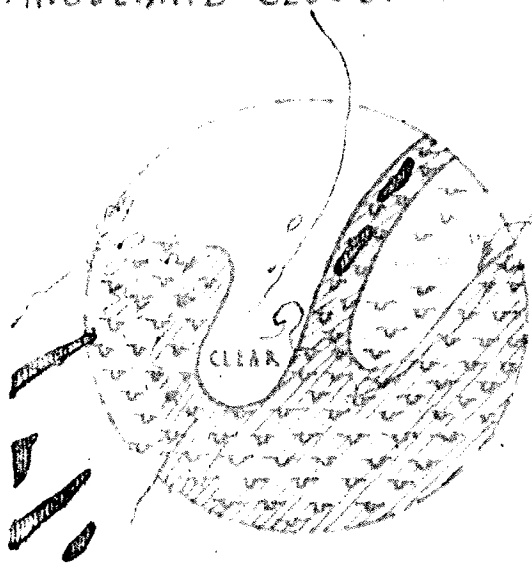
Surface wind
at Rongotai: Strong N.
Gradient wind: N-NNW.

FIG. 4: MODERATE CLOUDINESS.



Surface wind
at Rongotai: Moderate N.
Gradient: W-NW.

FIG. 5: MODERATE CLOUDINESS

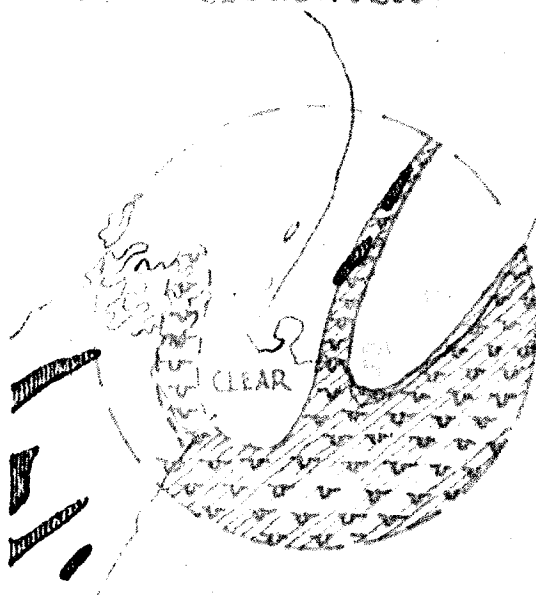


Surface wind at
Rongotai: light NE or Calm.

Gradient ... NE

Usual edge of
cloud sheet

FIG. 5a: SEVERE CLOUDINESS.



Surface wind at
Rongotai: light NE or Calm.

Gradient ... NE

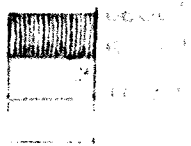
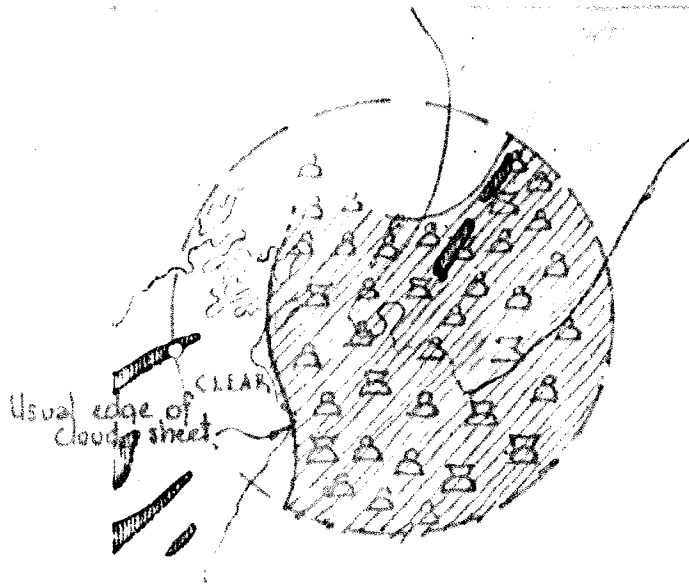
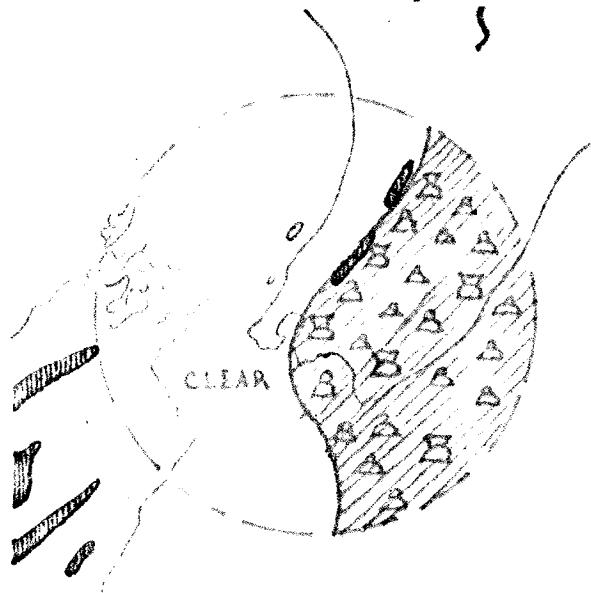


FIG. 6: MODERATE CLOUDINESS.



Surface wind at
Rongotai: Moderate S.
Gradient wind: S

FIG. 6a: SLIGHT CLOUDINESS.



Surface wind at
Rongotai: Moderate S.
Gradient wind: S

FIG. 7. MODERATE CLOUDINESS.

Surface wind
Range 10-15
Gradient 1-2 S

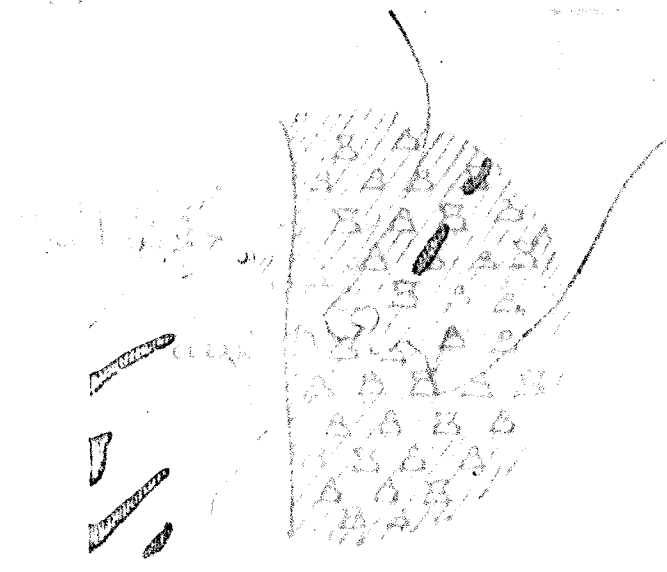


FIG. 8. SLIGHT CLOUDINESS.

Surface wind at
Range 10-15
Gradient 1-2 S

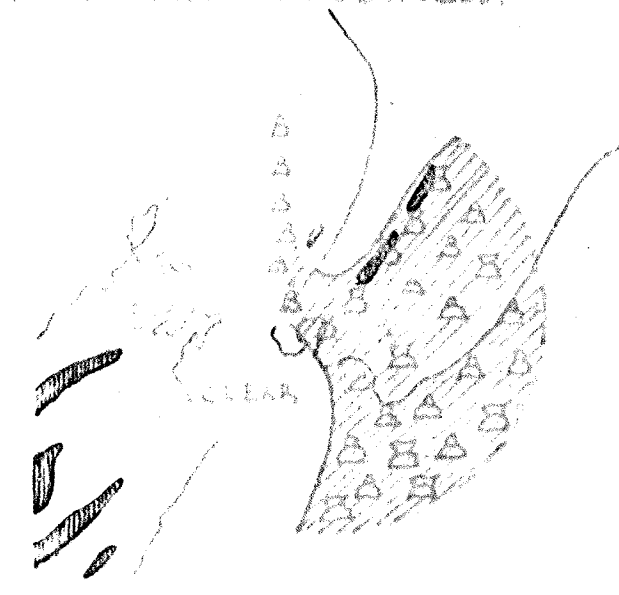
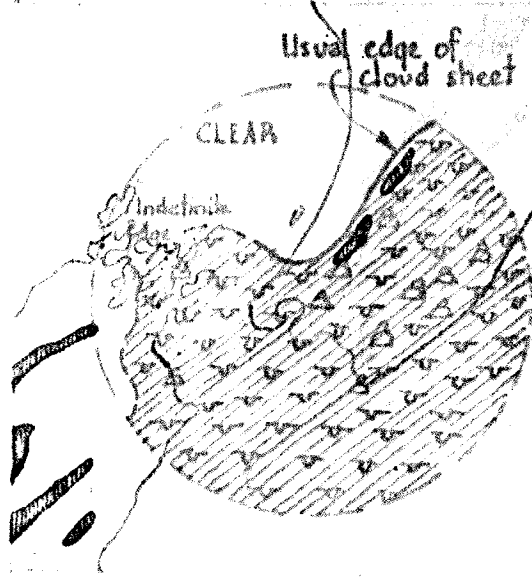


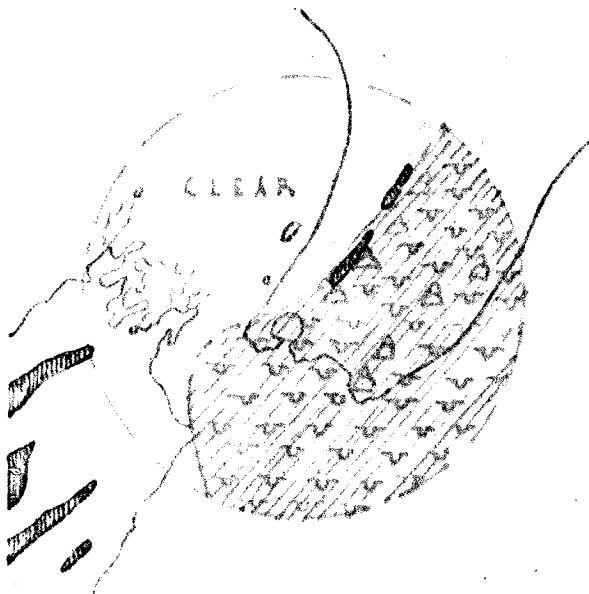
FIG 8: MODERATE CLOUDINESS.



Surface wind at Rongotai: Moderate SE.

Gradient wind: SE

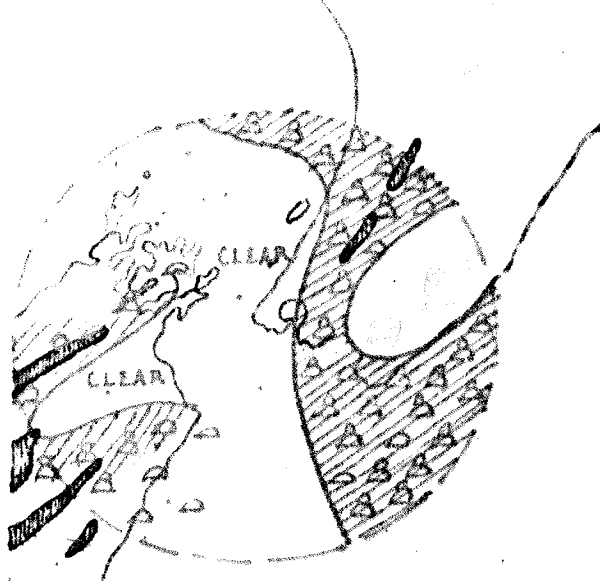
FIG 8a: SLIGHT CLOUDINESS.



Surface wind at Rongotai: Moderate SE.

Gradient wind: SE

FIG 9: MODERATE CLOUDINESS.



Surface wind at Rongotai: Variable.

Gradient wind: SW