

SOME LOCAL PECULIARITIES IN THE WEATHER AT WIGRAM.

By Flight Lieutenant C.G. Green.

The weather at Christchurch may normally be explained by either orographical or air mass effects. The former depend on and the latter are much modified by the direction from which the air comes, and this can usually be classified under one of three headings.

NORTHEAST:

Northeast winds (including east-northeast) are the commonest at both Wigram and Harewood. At times they are accompanied by northeast or north winds to levels as high as 10,000 ft., but more commonly they are replaced by northwest at a much lower level. In this case there will usually be found northwest winds up to 2000-3000 ft. in the morning, followed by a gradual change to northwest over the next one or two thousand feet. During the day the northwest works downwards without affecting the surface wind even when the northeast layer is less than 500 ft. deep, and the transition now becomes very abrupt. Until it is displaced by the northwest the northeast is surprisingly strong (often 20-30 m.p.h.) up to about 1500 ft. after which it decreases and, as stated above, tends to northwest. This is probably an orographical effect of the Port Hills which should not extend more than about ten miles from Christchurch. Out to seaward the speed drops quickly to about half its Wigram value. The northeast is no reliable guide to the strength of the northwest above, which frequently replaces it during the day (see under "Northwest").

Under normal conditions (i.e. with northeast winds on the surface and northwest above) the latter have come over the Southern Alps and will give characteristic northwest weather (see below), or else clear skies. During the summer half of the year (about November to April), however, a layer of stratus is very common out to sea. This may extend out for many miles with the top sometimes below 1000 ft. and the base at a few hundred. It usually breaks over the land during the day but in the evening can come well in from the coast before breaking up. The formation and dissipation of this cloud is most erratic, but the conditions at dusk usually prevail for the next few hours, i.e. if the cloud has dispersed the sky remains clear but when the cloud has advanced the sky remains overcast for some time. Under these conditions, however, the ceiling at Wigram is not usually less than 400-500 ft. This cloud is particularly likely to form about the Port Hills owing to orographical lifting and is less common out over the plains. Occasionally there is 10/10 of stratus at 600 to 1000 ft. at Wigram while the sky overhead and to the west from Harewood remains clear.

With a depression centred just off the east coast of Canterbury or Marlborough the tendency is for east to southeast winds. Southeast winds above 2-3 m.p.h., however, are not found at Wigram (nor presumably at Harewood) because of the presence of Banks Peninsula, and the surface wind will be either east-northeast or southwest depending on whether it arrives from the north or the south side of the Peninsula. Such a situation is usually accompanied by low ceilings (as low as 100-200 ft.) and thick drizzle or rain which can persist for a day or two over the whole Canterbury Plains area.

NORTHWEST:

The commonest winds above 2000 ft. are west or northwest and in the normal course of events these would give northwest to north on the ground. The prevalence of northeast is due to the orographical effect of the Southern Alps on the pressure distribution, but there are plenty of times, particularly in spring and summer, but occasionally at all seasons, when a strong northwest extends down to the ground. These occasions are almost invariably preceded by a characteristic appearance of the sky. There is a thick altostratus/altocumulus cloud sheet overhead with frequently a clear strip running the length of the Alps (the "Northwest Arch") through which may be seen a clear blue sky or a higher cloud sheet. Further to the west will be seen the tops of the cloud which is bringing the rain in Westland which is the normal accompaniment of a Canterbury nor-wester.

The eastern edge of the clear strip is variable. Sometimes it can lie west of Lake Coleridge while at other times it may be over the western edge of the plains. On occasions it will advance steadily from the west and the cloud sheet will pass away out to sea, but this is not very common.

When the Arch is visible the winds above 2000 ft. are always strong, ranging from 20 to as high as 60 m.p.h. They are very variable in force both from level to level and from place to place about the plains.

The northwest is a Föhn wind and is characteristically dry; so dry that the cloud base is usually above 15,000 ft., and is probably in the neighbourhood of 17,000 to 20,000 ft., although sometimes there is present ragged stratocumulus at 6000-8000 ft. The high northwest cloud is very characteristic in appearance, being a slaty grey colour with an undulating lower surface, and is very likely anywhere from 5,000 to 10,000 ft. in depth. A Föhn wind implies heavy rain to windward of the mountain chain, i.e. in Westland. Sometimes the cumulonimbus cloud and rain will extend right across the Alps to the eastern foothills so that from Christchurch there is seen a wall of white cloud with the nearest foothills obscured or only just visible. The cloud bank will have an indefinite fuzzy top due to the ice crystal cloud in the upper part of the cumulonimbus, and the presence of the bank is always a sign of strong northwest or west (usually west) winds. Also, on occasions large cumulonimbus can be detached from the Alps and carried out over the plains giving "northwest showers." These are very localised but are fairly common close to the ranges. As far away as Christchurch they are not experienced more than three or four times a year.

About the time the sky begins to take on its characteristic appearance strong northwest winds blow down the various gorges in the foothills (i.e. Ashley, Waimakariri, Rakaiia, etc) and out on to the plains. They will extend towards the coast displacing the northeast, and may eventually extend right out to sea. Christchurch is one of the last places to lose the northeast and the arrival of the northwest on the surface is preceded firstly by a steady lowering of the upper surface of the northeast layer and secondly, shortly before the definite change, by occasional gusts from the northwest during the northeast period. This change often occurs about the middle of the day, thermal turbulence assisting the northwest wind, but it can occur at any time day or night depending on conditions.

A northwest wind is uncommon at Christchurch unless the barometer is falling and a strong northwest (say gusts of over 30 m.p.h.) is not likely unless the barometer is falling fairly rapidly (say more than 0.5 mb./hr.) When the barometer falls very rapidly the northwest is likely to be very strong but this is by no means always the case.

The northwest is very local in its effects, particularly opposite the gorges. Ashburton normally has a stronger northwest than Christchurch because of the Rakaiia Gorge, while the Motunau Island region is notorious. Harewood receives them more strongly than Wigram, probably because of the lack of wind breaks to the northwest.

Flying conditions in a northwest are usually but not always very bumpy. There are three possible causes (1) turbulence acquired during its passage through cumulonimbus clouds on the West Coast; (2) the mechanical turbulence caused by its passage at high speed over 50 miles of very rough country, and (3) thermal turbulence over the hot Canterbury Plains, particularly the riverbeds, when the sky is clear. When bad this turbulence extends over 100 miles out to seaward.

There exist in Canterbury very strong up and down currents under northwest conditions. These occur regularly in certain areas, e.g., between Harewood and the Waimakariri a strong up current is common, but there is doubt whether they may not also move across the plains. In such a case particular areas could not be relied upon to produce standard conditions. The currents probably extend to at least 10,000 ft. and on occasions exceed 500 ft. per minute, both up and down.

SOUTHWEST:

These winds usually come in the wake of a cold front. Although the wind is southwest at Wigram this can be an orographical effect due to Banks Peninsula and the Port Hills as the isobars will run from anywhere between southwest and southeast.

If they run from the southwest, Canterbury is sheltered by the high country of Otago and Southland and will have fine weather.

If from about south-southwest, Canterbury is again shielded, but Banks Peninsula projects into the air which has not passed over the hills, and may deflect a current in around Christchurch. This will bring showery weather to an area north of the Rakaia or Selwyn River and about 10-20 miles inland from the Port Hills. The line of demarcation between the two types of air usually runs southward to about Moeraki and can be so pronounced as to resemble a stationary front.

With the wind from the south or southeast, frequent showers or drizzle and low ceilings are likely over the whole of Canterbury into at least the first line of ranges. West of here the sky is clear. In such cases the improvement extends slowly from the south but Christchurch usually has at least one day's showery weather after the improvement over South Canterbury.

CALM and LIGHT WINDS:

FOGS are fairly frequent at Wigram, less frequent at Harewood and still less frequent at the satellite landing grounds north of the Waiakariri. This is because of the differing degrees of dampness of the soil. They develop mostly in anticyclonic situations with little wind and clear skies. They are commonest in autumn. On a foggy morning Harewood is usually workable an hour to an hour and a half earlier than Wigram.

Smoke is a frequent nuisance at Wigram, but much less so at Harewood. In light northeast conditions it drifts across from the city particularly in the evening and early morning. Visibility can be reduced to about 1 mile and if conditions are very bad, to half a mile. As this accompanies a light northeast wind in the morning it can make landing conditions difficult for an hour or two after sunrise.

WARM FRONTS are not of very much importance. They normally come down from the north or northwest, and before they get here the orographical lifting over Nelson and Marlborough has removed much of the moisture. On the occasions when a well-developed one does bring rain it follows true to type with the rain falling from a high altostratus sheet at first, with lowering ceilings, decreasing visibility and after the rain has been falling for some time, the sudden formation of fractostratus cloud at a few hundred feet about the Port Hills.

COLD FRONTS are much more frequent and are at times very well-developed with violent line squalls. Fortunately the normal track of a cold front is up the east coast of the Island and its approach can be watched. The rate of travel is variable, but 30 m.p.h. is a fair approximation. In this case it would take a front about 10 hours to travel from Bluff to Christchurch. When the front is accompanied by a line squall it is almost invariably indicated by the characteristic line squall cloud formation.

SEASONAL EFFECTS:

The effects which show the most pronounced seasonal variations are fogs, low stratus cloud from the northeast, nor'westers and strong southwest changes (line squalls). These have all been mentioned above but are repeated collectively.

Fogs are well spread out through the year but are not common in December and January. They average 6 to 8 per month in March and April, and then 2 to 4 per month up to September.

Low stratus cloud is found mostly between November and April and is very uncommon during the winter months.

Northwest winds occur all the year round, but most frequently in spring and summer when they are very hot and gusty. It is during these seasons that severe line squalls are most likely to be experienced, each

one accompanying a cold front which brings a change from northwest to southwest winds. The squalls sometimes arrive with gusts up to 50 or 60 m.p.h. but the wind drops away considerably within the succeeding hour. Usually these squalls advance up the coast so that warning can be given of their approximate time of arrival, and then reach Wigram about ten minutes before they reach Harewood, thus enabling a more precise warning to be given to the latter aerodrome.

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ADDITIONAL NOTES ON LOCAL WEATHER CONDITIONS NEAR WIGRAM, HAREWOOD  
AND NORWOOD AERODROMES.

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By Flying Officer Lancaster.

No regular reports are received from Norwood but, as far as can be ascertained, conditions there are much the same as at Wigram.

The account of fogs given above has not been verified by recent observations. It appears that many radiation fogs form first in the Waimakariri valley presumably due to katabatic drainage from the foothills. From here the fog develops over the plains reaching first Harewood then Wigram. No information is available concerning the frequency of fogs at Norwood. It has been noted repeatedly that widespread areas of fog surround Wigram which itself remains clear.

LEE EFFECT OF PORT HILLS:

A current passing over and round the Port Hills and bringing with it a layer of low cloud is often associated with a pronounced clearance in lee of the hills.

Examples: Southeasterly current over area producing light southerly surface wind at Wigram is sometimes associated with the following cloud distribution. Within 5 miles of Wigram 10/10 Sc, base 1500-2000 ft. Elsewhere 10/10 Sc, base 200-300 ft over land, and lower over sea.

In southerly currents bringing low cloud and drizzle to the area north of the Rakaiia River the base is often very low over Wigram, higher over Harewood and up to 1000-1500 ft. with cloud well broken at the Waimakariri landing ground. In this situation also a break in 10/10 cloud often persists north of Banks Peninsula.

A northeasterly current will bring a 10/10 layer around Banks Peninsula and over the Plains but a gap usually exists to the south of the Peninsula keeping the Birdlings Flat landing ground free of cloud.

WARM FRONTS:

The following comment may be of interest in this connection. The passage of depressions down the east coast of the South Island provides conditions true to warm front type, as here, there is little orographic interference. Such a situation is associated with continuous moderate or heavy rain for up to twelve hours, accompanied by strong southwesterly winds at the aerodromes under consideration, although the main current is southeasterly. If the centre of the depression is near the coast the rain is sometimes followed by a spectacular clearance brought about by the southwesterly wind veering and coming across the Southern Alps, as the centre moves down the South Canterbury coast. If the centre of the depression is any distance from the coast the southwesterly current continues for a long time bringing in drizzle and sometimes showers according to the stability.

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