

NEW ZEALAND METEOROLOGICAL OFFICE CIRCULAR NOTE NO.2.NOTES ON AVIATION FORECASTING AT OHAKEA.

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A. Sea Breeze Effects:

1. During the day the surface wind generally rises to the same value as the wind at 1-2000 feet at 6 a.m., both in speed and direction. This is due to the fact that when the wind is from a westerly quarter the sea breeze overcomes any effect due to friction, while if from the east, convergence through the gorge will have the same result.
2. With anything except a strong gradient from an easterly quarter, a NW sea breeze will come in during the day: (a) in an anticyclone the sea breeze is about 10 m.p.h.; (b) if it is reinforced by the gradient it will be the sum of the two effects and will commence at sunrise; (c) if there is a light gradient from an easterly quarter the sea breeze may not commence till middle of the afternoon.
3. Occasionally the sea breeze may be from the SW, but this is very rare and only occurs when gradient is rather uncertain, and upper winds light and with a SW tendency.
4. Unless a front is approaching and we are in a strong NW gradient, the sea breeze drops one hour after sunset, and about two hours later turns to NE if in a northerly gradient and SE if in a southerly gradient.

If, however, there is a strong northwest gradient, the wind often does not drop till 10 p.m., and then it only decreases 10 m.p.h. (the sea breeze effect), and gustiness decreases.

B. Conditions associated with the prevailing Northwesterly:

As most of our weather is associated with a moderate to strong NW current, we have more information to offer about northerlies than about southerlies.

As stated above, we have a NW surface wind with any gradient between N, NW, and SW. If the upper wind gets slightly east of north we are liable to get a surface northeasterly.

With a strong NW gradient, the surface NW increases after sunrise to the value observed at 6 a.m. between 1-2000 feet, due to the sea breeze effect.

About 8.30a.m. long rolls of turbulent st-cu. at 1500-2000 feet form parallel to the coast.

If we are just in the first isobars of the NW gradient (i.e. just out of the anticyclone) this cloud dissipates in the afternoon; but when we are properly in the NW current, the turbulent cloud will only break in the afternoon, rising to 3000 feet (heights vary considerably of course, but seem to have a fairly good average value irrespective of humidity).

This turbulent cloud appears the first morning we get into the NW current. It forms over Ohakea, Wellington and Taranaki, often before it forms over Westland. In such a cloud the gorge is not usually closed for flying until we get further into the NW isobars where the air is more humid, and orographical rain forms along the ranges. Well into the humid NW current, cloud height here is above 1500, gradually lowering to 800 near Terawhiti, and breaking again over the Straits and Wellington. There is orographical rain at Terawhiti, but it is practically unknown here, except for a little rain and mist in exceptionally moist air just before a front.

C. The Passage of Fronts:

The NW wind falls every night, as described, unless a front is approaching, when strong winds and a certain amount of gustiness continue. A wind change with a front is very rare, although rain, pressure rise and temperature fall are practically simultaneous. The following cases of cold front or occlusion passages seen more or less standardised,-

(a) When a front passes with light winds from a southerly quarter behind it:

NW winds may continue in the daytime, at night the NW drops, giving way to a light steady NE (reinforced by the land breeze) which may continue for a few days.

(b) When a rather more vigorous front passes with moderate or fresh southerlies behind it:

As a rule a change to southeasterlies comes in about three hours after the front has passed, moderate in force at first, but becoming strong a day or so later when the front is often moving more slowly near East Cape. (This refers to a cold front travelling up the Canterbury coast, with little fall of pressure in Westland).

(c) Where a cold front has a very strong SW gradient behind it:

No wind change is noticed here, and the following winds ensue with the passage of the front: Strong NW from Foxton to Ohakea, W gale at Wanganui, and strong SW at New Plymouth. NW usually continues in Straits. Weather is clear at Wellington, Blenheim and up coast to Ohakea. But cloud forms from here northwards. Instability showers in the cold SW air are uncommon here.

(d) A front with WNW winds behind, such ~~x~~ fronts being associated with a deep depression just southeast of Canterbury. Rain falls here and at Wellington, pressure starts to rise, but with no wind shift. Weather soon after clears from Straits to Taranaki before we actually get into the SW gradient. As the depression moves away, a SE often comes through gorge quite independently of any southerly current which may be moving up the east coast. This SE may gradually develop until it is far stronger than the gradient wind.

Once the wind here has changed to SE, E, NE, the sky usually clears, due to a slight Fohn effect; but the first day after the front has passed, some scattered cumulus may form depending on the stability of the air, and especially if the wind is light.

Summary: The main features are as follows:-

1. Wind changes occur a considerable time after a front passes.
2. Rain occurs practically only at a front, except perhaps in thick weather immediately before fronts.
3. Orographical rain does not occur here, although it does further down the coast towards Terawhiti, and in moist air occurs along these ranges and at Palmerston.
4. There is a large diurnal change in wind direction, in quiet conditions, NW in day, NE at night (or SE if the gradient is inclined to be SE).
5. There is generally little cloud in easterly winds (unless they are N.E) associated with a vigorous depression west of Tarawhiti; even in this case there may be only cloud at moderate height and rain is unlikely.
6. In northwesterlies, turbulent cloud occurs early and usually dissipates or breaks in afternoon depending on the gradient wind.

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7. Fogs are very rare; when they occur they are radiation fogs and seem to dissipate immediately on sunrise.

These conditions have been observed during the six months October, 1940 to March 1941; but I think they would apply to conditions in winter, with the exception that an occasional fast-moving front would probably bring strong southerly winds immediately behind it.