CANTERBURY WEATHER

General

NewZealand lies across the 'Roaring Forties': a band of westerly winds that act as a conveyor belt for weather systems that generally travel eastwards over New Zealand. These winds drive a succession of high pressure (anticyclone) and low pressure (depression) cells across the South Island. This produces a great deal of variability in the regional weather, and often produces a cyclic weather pattern that repeats roughly weekly.

Anticyclones normally mean fine weather in Canterbury. In winter, however, conditions are often cloudy when the wind blows moist air from the sea onto land. Long lasting periods of high pressure often produce strong inversions and valley cloud, particularly in cooler conditions. Inland thermal flying in anticyclonic conditions often means waiting for sufficient heating from the sun to overcome stable air.

Depressions are usually preceded by high cloud. They are usually associated with fronts. These seldom bring heavy rain to the plains and Banks Peninsula, but can deliver stormy weather to alpine regions. When the front has passed and skies clear, air is usually well mixed and unstable.

Sometimes this westerly conveyor dies. When this happens, air from tropical or polar areas can move onto the region. Moist tropical air can bring rain, and cold polar air frequently brings low temperatures and showers.

The Southern Alps have a huge impact on Canterbury's weather. Winds blowing west to east over the Alps commonly bring rain to the mountains but warm, dry, 'foehn' conditions to most of Canterbury. Lee mountain waves are frequent. Stable conditions means that these winds seldom reach the surface around Christchurch due to the blocking effect of the mountains, but the low pressure region formed in the lee of the Alps often draws a northeast wind along the coast.

Canterbury's extensive coastline and low plains means that temperature and humidity are strongly affected by the sea when the wind blows onshore. Inversions (temperature increases with increasing altitude) over the plains are common, and haze formed by sea spray (aerosols) often reduces visibility in northeast conditions.

Flying in Canterbury

In most flyable conditions, coastal soaring has predictable weather hazards. Arguably the most common potential problems are:

> Northeast sites: increasing wind speed; cloud; a rapid change to northwesterly conditions
> Southerly/Southwest sites: a sudden substantial increase in wind speed, often in clear conditions; the arrival of a northeasterly

Inland flying in Canterbury can pose less predictable challenges. At times, we can find ourselves in a complex mix of the 'synoptic' (large scale) wind, local valley winds, and sea breezes. Inland conditions can be very strong, requiring an accurate assessment on launch and a good awareness of how things are changing during the flight.

Equally, we are sometimes blessed with days where inland conditions are mild, and suitable for low airtime pilots. Choosing the right day is a skill.

Northwesterly conditions

The Canterbury 'nor'wester' is unflyable.

If conditions are stable, a northwest flow is reluctant to rise over the Alps. The mountains block and divert the lower airflow, with much of it going around the northern parts of the South Island, through Cook Strait, and arriving in Canterbury as a shallow layer of north-east wind. It is quite common to fly in these conditions. The northeasterly can be relatively warm and sometimes gusty when the northeasterly layer is quite shallow and the nor'wester is close above.

When conditions are less stable, air travels over the Alps and much of Canterbury experiences the nor'wester. Often a morning inversion will keep the warm nor'wester above the coastal plains when it is present on the Port Hills. The nor'west often descends in altitude as the day progresses and the inversion weakens. We sometimes experience this at Allandale and Taylors Mistake, as conditions deteriorate over the day and the northeasterly is replaced by nor'west wind.

Flying at Taylors Mistake is often possible when a nor'wester is close above, but care is required. A shift to NW conditions at Allendale, increasing gusts and turbulence, and rising temperatures are all a sign that a nor'west change is likely.

The nor'wester commonly produces 'mountain waves'. Air rising over the Alps in stable conditions tries to return to its natural level of buoyancy on the lee side. As the air travels eastwards past the Alps, a repeated pattern develops whereby it descends in the lee of the Alps, overshoots its natural buoyancy level, rises again, overshoots again, descends again, and so on. This typically produces characteristic cloud patterns; the nor'west arch, or standing wave clouds (altocumulus lenticularis). These clouds do not necessarily mean conditions are dangerous, but are a sign that a call should be made.

Other signs of an approaching nor'west are often evident from the Port Hills. Dust being kicked up in the Waimakariri and Rakaia riverbeds, and lines of ragged cloud over the foothills and towards the Alps, are often visible.

A nor'wester is not a wind to trifle with. It's a dangerous wind, often bearing strong rotor, severe turbulence and strong gusts, even in light average flows. Launch conditions can be deceptive. Turbulence is normally associated with the air below the wave, and rapid increases in wind strength are common. Slight shifts in the wave can bring fast changes to local conditions. Beware!

Easterly conditions

The prevailing winds in Canterbury are northeast. There are many mechanisms for this: flow around an anticyclone, coastal flow in westerly conditions, a strong vertical gradient in dying southwesterly conditions, and summer afternoon sea breezes. South of Banks Peninsula, a sea breeze is southeasterly. Easterlies are generally moist, and can bring haze, cloudy conditions and fog to coastal areas.

The inland basins, such as the Waimakariri, MacKenzie and Hakatere, are separated from

the coast by mountain ranges, and can experience different conditions to coastal areas. Cool coastal air can be drawn inland through low ground to replace rising air in the basins, meaning that strong local winds can be present in places such as Porters Pass, Blowing Point and the Waitaki Valley when there is instability inland. Easterly winds can be strong where they exit narrow valleys into inland areas.

Southerly conditions

Cold air from the south travels over relatively warm sea before reaching Canterbury. This tends to build a high lapse rate and instability. In anticyclonic conditions, this can sometimes bring extensive low cloud and sometimes showery conditions to coastal areas, but generally inland Canterbury will remain clear. When the flow is light, inland soaring conditions can be excellent.

When these flows are associated with depressions, there tends to be low temperatures and reasonable amounts of rain. When a front passes, winds can be very strong. After the front passes, pressure begins to rise and the winds typically veer to the west. Inland parts of Canterbury begin to be sheltered by the mountains, and this effect slowly spreads to the plains. Winds around Banks Peninsula can remain strong while inland areas have light conditions.

Southwesterly conditions

Inland areas of Canterbury are usually fairly protected from these winds by mountains further south. Southwesterlies are common after the passage of a cold front.

In summer these flows tend to be quite shallow. Coastal areas can be affected by showers when a front passes, especially north of Rakaia. In winter, deeper flows are often found when cold polar air crosses the region, and wind can penetrate further inland.

Final thoughts

On the hill, what we observe must always take precedence over a forecast. Models are useful tools, but they aren't crystal balls.

A basic knowledge of flying weather is easy to get. For those wanting to learn more, a fundamental understanding of synoptic scale weather and boundary layer flows is really useful. The New Zealand Weather Book by Erick Brenstrum is a great primer on our specific synoptics. The boundary layer is where local effects of the sun on terrain dominate, and valley winds, thermals and sea breezes live.