4.2 Weather and climate forecasts: They <u>are</u> different

Fact sheet objectives

- To outline the difference between a weather forecast and a climate forecast.
- To suggest that weather forecasts and climate forecasts might be more accurate than we think – it just depends on our perspective.
- To outline ways in which weather and climate forecasts might be useful when it comes to management decisions.

Climate is what you expect

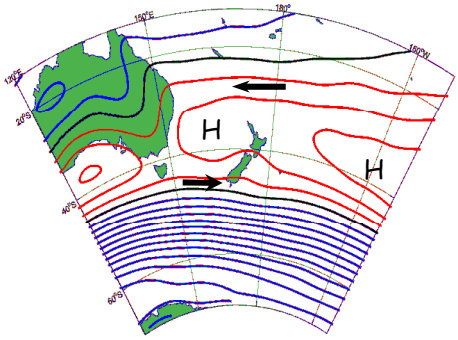

Figure 1 Average summer circulation over many years

Weather is what you get

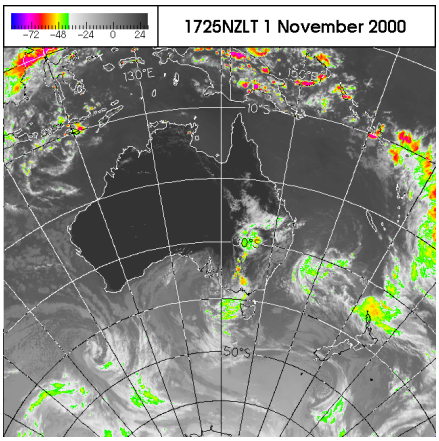

Figure 2 The shifting patterns of cloud and atmospheric pressure give us our day to day weather: depressions, rain, sunshine, wind and changing temperatures.

Weather and climate

Think of it this way:

Climate is what you expect, such as…

- The change in radiation and temperature from winter to summer
- The amount of rain that normally falls in August
- What happens we get an El Niño
- The cloudy summer we had this year

… **but weather is what you get**:

- The heavy rain expected this afternoon
- The frost we had last night
- The three fine days predicted for later this week that might be enough to get the hay in.

Forecasts of weather and climate

Similarly, weather and climate forecasts are (to a large extent) derived from processes that we observe and measure on different time scales:

Weather forecasts are based on:

- Current observations and the fluid motion of the atmosphere that is happening now and will evolve over the next few days
- Use of physical laws, such as the lifting of heated air masses, and the normal flow of air from places of high pressure to places of low pressure
- Propagation or onward movement of weather patterns. For example we know that as a low-pressure system passes, the wind flow might be first westerly, then calm, and then move round to the south.
- Frequent updates, because weather systems change in intensity and can slow down or speed up sometimes without much warning.

Weather forecasts are generally expressed in categorical statements (sometimes you may hear a forecaster say that there is a 20% chance of rain tomorrow.) eg.

- It will rain tomorrow afternoon.
- Expect southerly winds of 20-25 knots by 4 pm this afternoon.

Climate forecasts are based on:

- Assessing the combined impact of all weather events over a period of at least a month, but probably longer such as three months for routine seasonal forecasts, and sometimes on longer time scales as well.
- The expectation that climate will vary in the future much like it has in the past. Over short time scales, for example within a growing season, an example of this is called *persistence* – a condition of higher than normal temperatures early in the season may persist into later months. On longer time scales, the variations will show up in the way the current season is developing compared to say last year and the historical average. For example, climate forecasts are aimed at deriving the likelihood of having a warmer spring this year than last year, in relation to normal conditions.
- The use of regional and global scale atmospheric and sea circulation cycles and perturbations (differences from the average). For example, higher than normal sea surface temperatures around New Zealand, something that often happens on a time scale of several months or more, is likely to lower the risk of frosts in coastal areas, because the onshore air flow is warmer than normal. Similarly, if an El Niño is in place, it is likely to mean more southwesterly air flows over New Zealand, and can increase the risk of dry conditions in eastern areas of the country.
- The strength of climate signals. It often follows that climate outlooks can be made more confidently when there are strong changes from normal conditions. For example there would be a higher expectation of impacts from a strong El Niño than from a weak one.

Climate forecasts are generally expressed in statements that use probabilities eg.

- There is a 60% chance that spring will be warmer than normal
- The onset of El Niño this year has increased the risk of east coast summer drought in Canterbury to 60%.
- There has been a 'climate shift' in the southwest Pacific, which has changed typical circulation patterns over New Zealand, and increased the change of heavy rainfall events in the north of the country.

How dependable are weather and climate forecasts?

A forecast is useful if it is good enough and timely enough to enable the grower to make some management adjustments in response to the new or changing situation.

.Rainfall departure from average during the El Niño summer drought of 1997-98

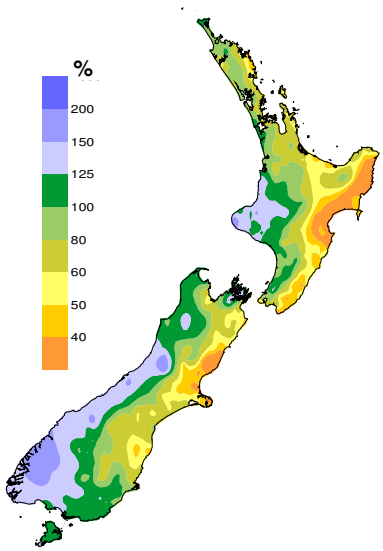

Figure 3 Example climate forecast: The onset of El Nino during increases the risk of summer drought along the east coast to 60%

Use your local knowledge to interpret and add value to forecasts

Think about changes in the timing and intensity of weather events

Useful Websites

Weather situation and weather forecasts:
www.metservice.co.nz/forecasts/index.asp
www.metvuw.com/
www.fencepost.com/weather/nzweathermap.jhtml

Climate forecasts:
www.niwa.co.nz/ncc/
International climate forecasts and information
http://iri.ldeo.columbia.edu/

If you sometimes get frustrated with the apparent inaccuracy of weather and climate forecasts, you might like to bear in mind the following:

- With weather forecasts, it may not happen exactly where or exactly when, but it (most likely) will happen.

Some years ago an experiment was conducted on the accuracy of rainfall forecasts, issued three days in advance, for the Bay of Plenty. Ten kiwifruit growers recorded both forecast and observed rainfall on or within sight of their individual properties. In over 95% of cases, the rain fell as forecast, but sometimes it only rained on one or two of the ten properties.

So a wider view based on your local knowledge, and on the variability of local conditions, is always a help.

With climate forecasts, it's a case of calling the odds, and judging most likely outcomes based on both new information and past experience.

If you were betting on a racehorse, you would be likely to think about things like which horse had won the most races on this track condition, which horse was known to be in top shape, and similar factors that would influence your expectation of the outcome of the race. You might assess the chance of the horse coming first at 80%. But you'd also weigh up the possibility, say a 20% chance, that the horse could fade on the home straight and come second.

Similarly the climate odds may keep changing, and need to be under constant review.

Summary Information

- Climate is what you expect; weather is what you get.
- Weather forecasts are based on events and observations within the last few hours, and a modelling of physical processes during the next few days.
- Climate forecasts are based on seasonal trends and expectations, on a time scale of at least a month, but more often three months or longer.
- Weather forecasts usually describe events, e.g. 'Heavy rainfall expected.'
- Climate forecasts are usually given in terms of departures from normal, e.g. 'Above average rainfall.'
- The dependability of forecasts depends on how well you interpret them!

A MAF Sustainable Farming Fund Project:

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