



## Northland Regional Council 4 Week forecast

Issued on 28 April 2020

# Introduction to 'ensemble forecasting'

**Ensemble forecasting is the method of running many different models, to handle 'initial condition' uncertainty (the fact that no weather forecast model is perfect at capturing the state of the atmosphere now, so forecast errors grow through time).**

MetService issues long-range (4 week) forecasts based on the ECMWF System 5 ensemble data. This is the best ensemble dataset in the world.\*

You can't run a single weather model out in time indefinitely! The model errors at initialisation (capturing what is happening now) grow and grow.....until the forecasts become very uncertain (effectively useless).

**If you compare 2 or 3 models at days 6-14, or weeks 2 and 3, they will all say different things.**

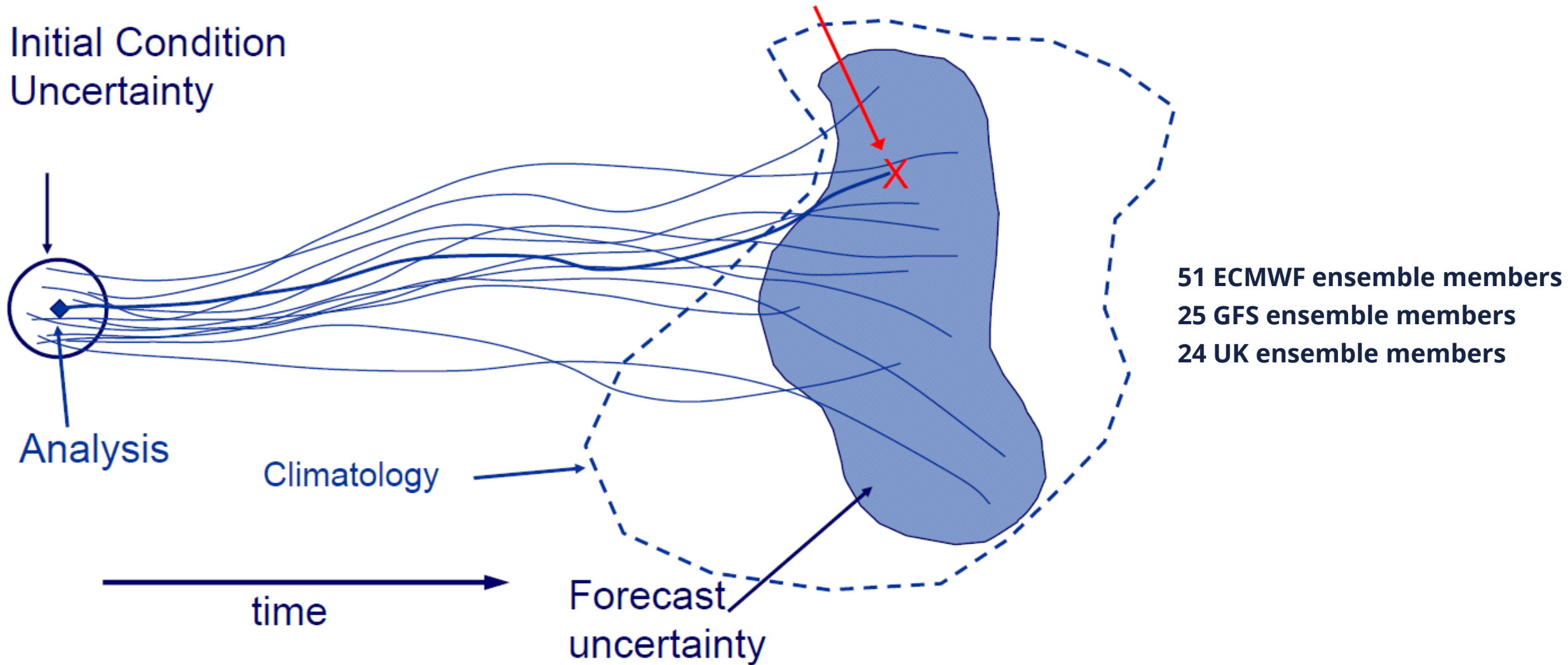
MetService handles this uncertainty at initialisation in a very clever way. We use an ensemble (group) of 51 models, all initialising slightly differently. The average outcome of the group often shows skill between 1-4 weeks.

The forecaster also adds value, by assessing what is driving the weather patterns over NZ, both recently, and into the future. In addition, commentary around model consistency, and model tendency (trend), is valuable information.

*\*Highest model resolution, and largest number of ensemble members.*



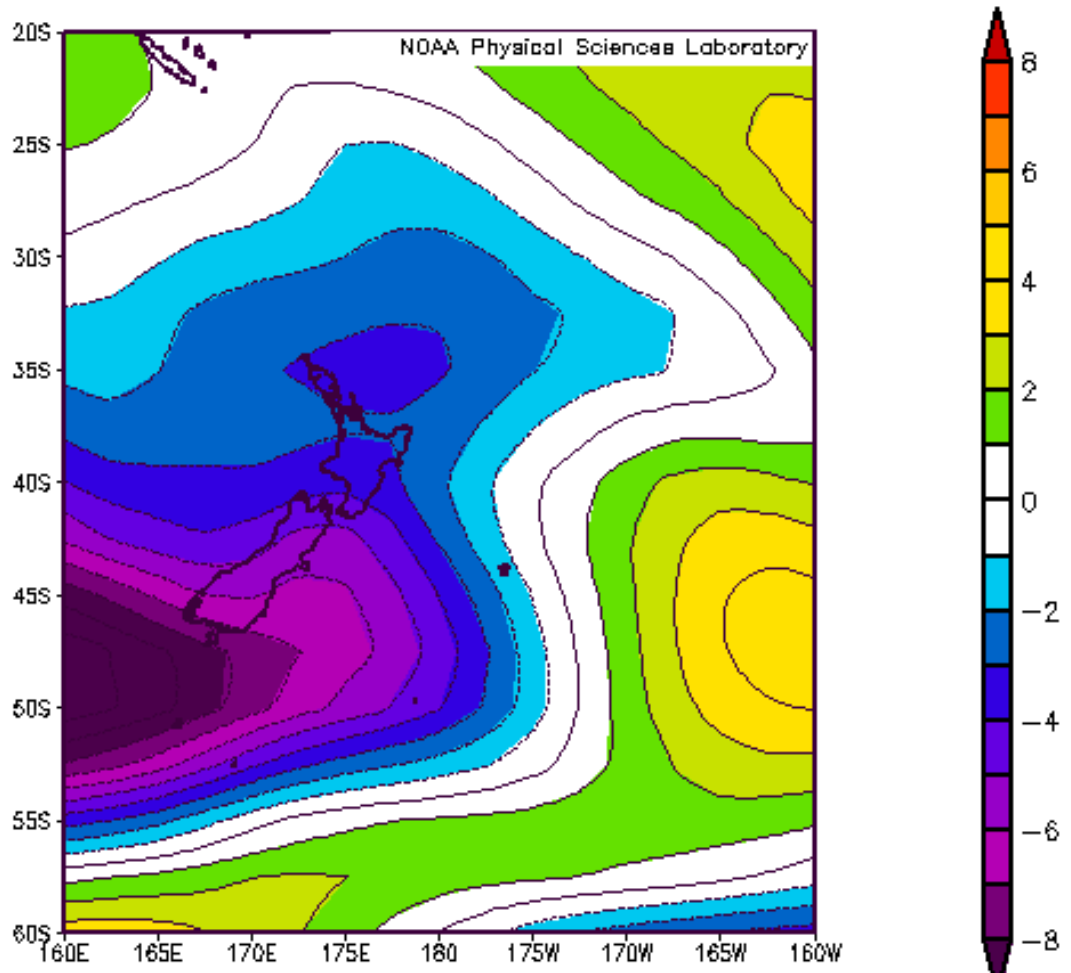
# Q: Single model forecast – how do you know if it is any good?



**A: You don't, unless you run a group (ensemble)**



## Mean sea level pressure anomaly last week (19-25th April):



Higher than usual pressures are shaded yellow/orange;  
Lower than normal pressures are shaded blue/purple.

For the second week in a row, lower than usual pressures affected New Zealand, producing another fairly wet and windy spell in most regions.

Both the Tasman Sea and Southern Ocean have favoured their 'negative' (stormy) phase recently.



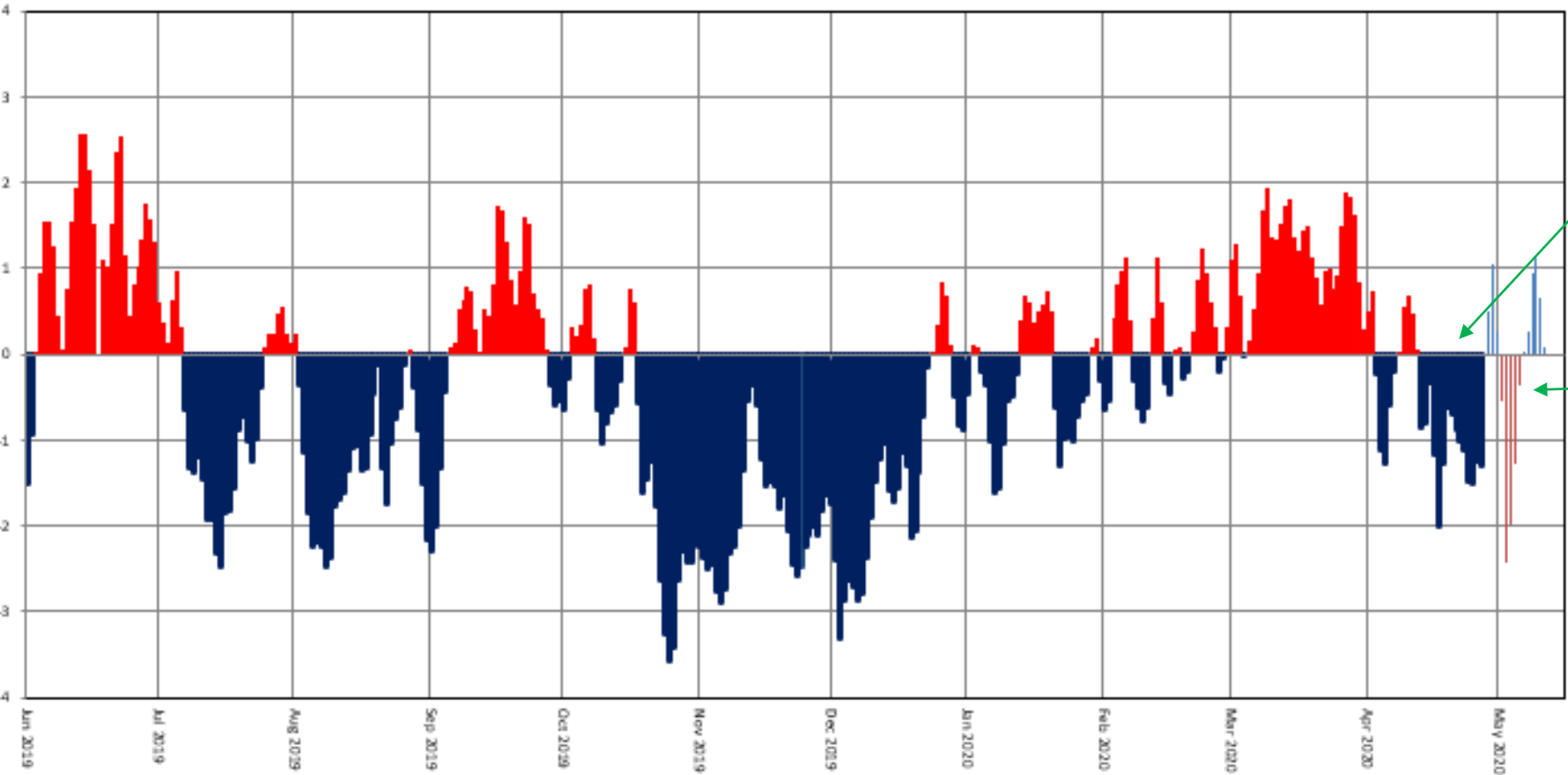
# The Southern Annular Mode (SAM) a.k.a. Southern Ocean Storminess:

The Southern Ocean was very quiet (persistently positive) during February and March.

A recent swing to predominantly negative conditions during April has produced some decent rain in some areas.



## The Southern Annular Mode (Southern Ocean storminess)



**Observed SAM (solid)**

Strong and persistent positive SAM in March.

Mostly negative during April.

**Predicted SAM (bars)**

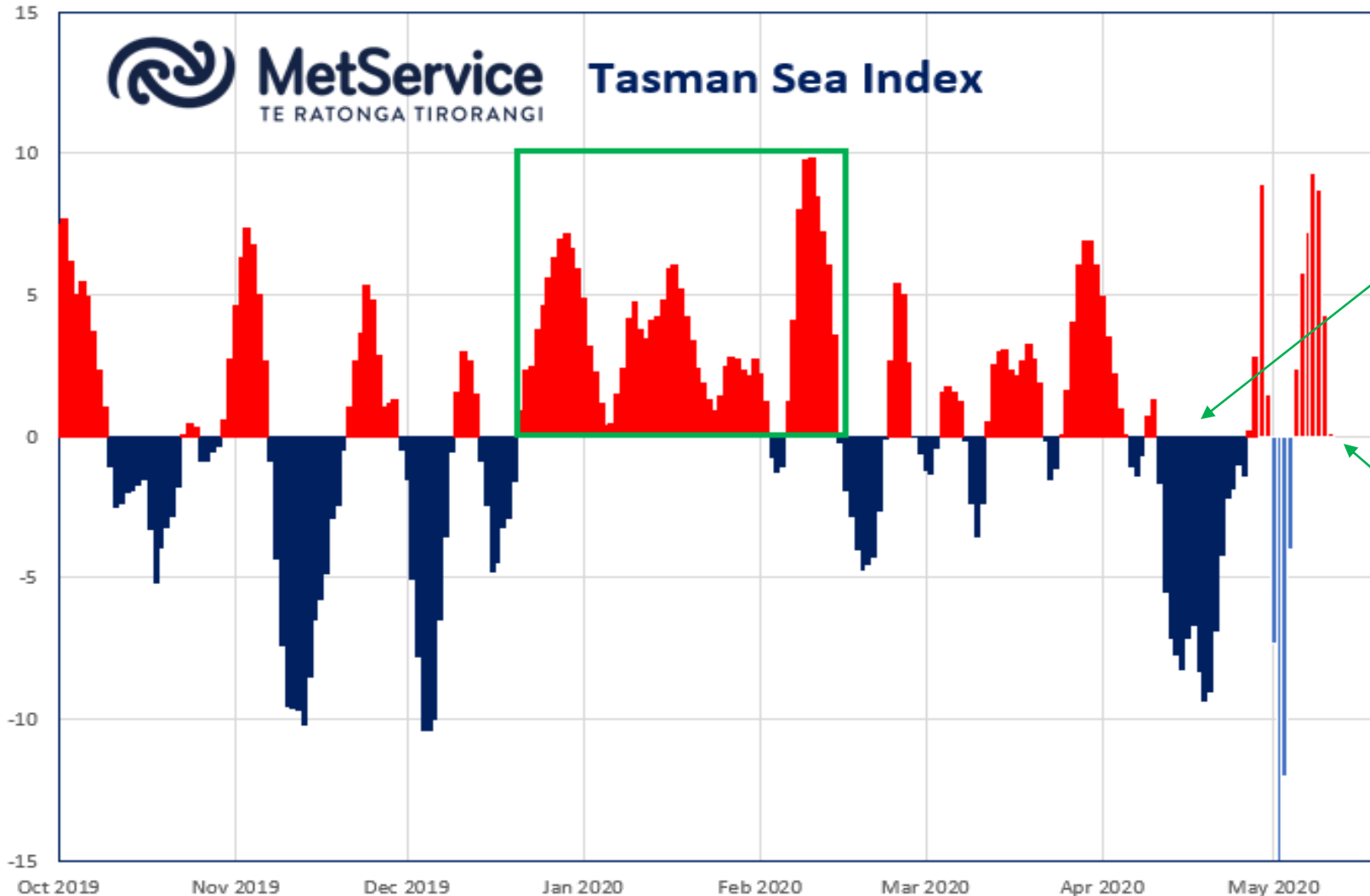
The coming fortnight is predicted to bounce strongly between spells of stormy, then settled, Southern Ocean weather.

Updated on: Tuesday, 28 April 2020



# The Tasman Sea Index (a measure of the storminess of the Tasman Sea):

A strongly positive/negative Tasman Sea Index (TSI) is correlated with drier/wetter weather for North Island.



**Observed TSI  
(Solid)**

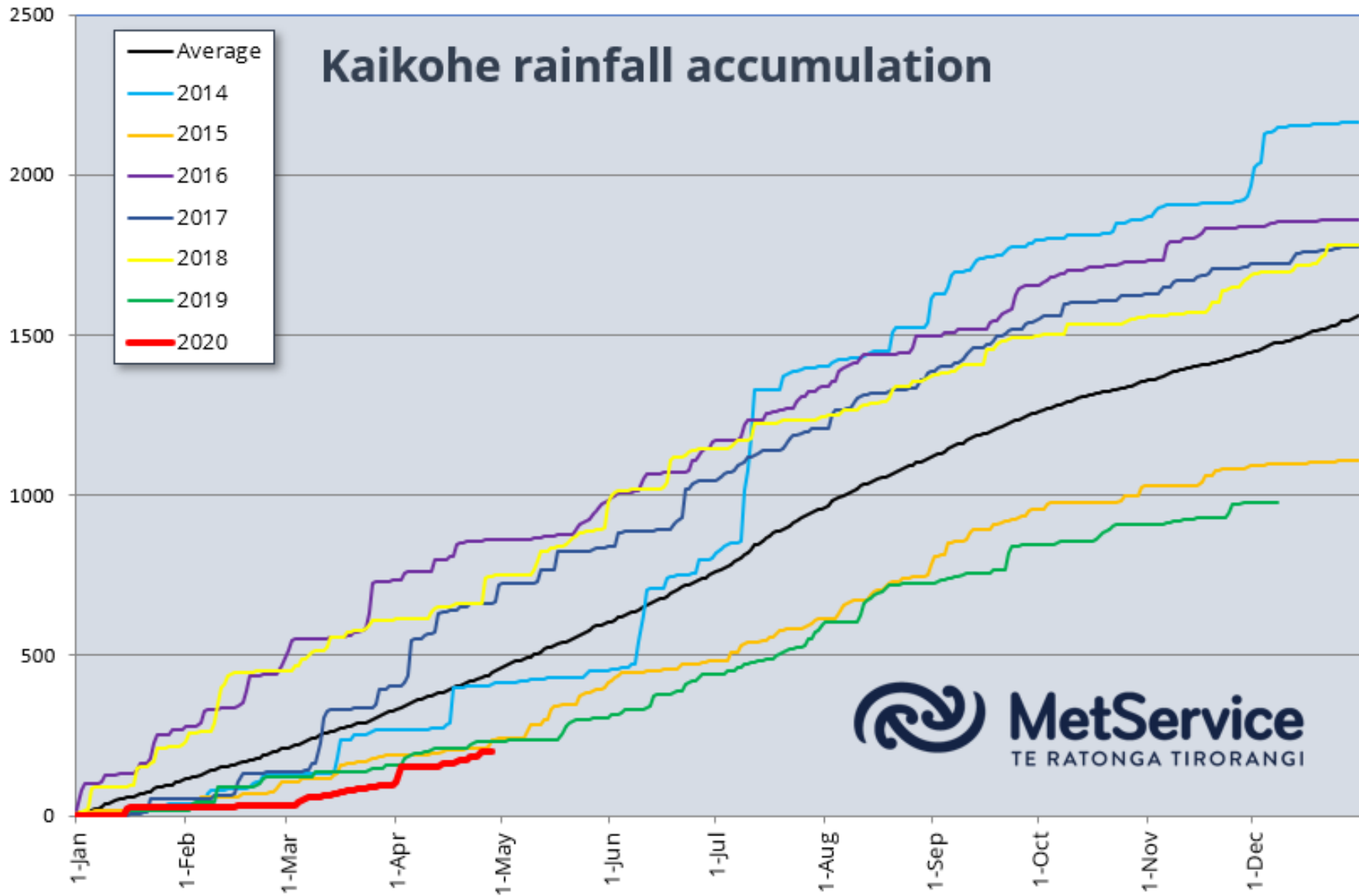
A recent swing to strongly negative TSI in mid to late April has produced intermittent rainfall for many regions.

**Predicted TSI  
(bars)**

The Tasman Sea is predicted to flip-flop between strongly positive and strongly negative phases over the next fortnight.



Accumulated rainfall 1 Jan - 31 Dec (mm)

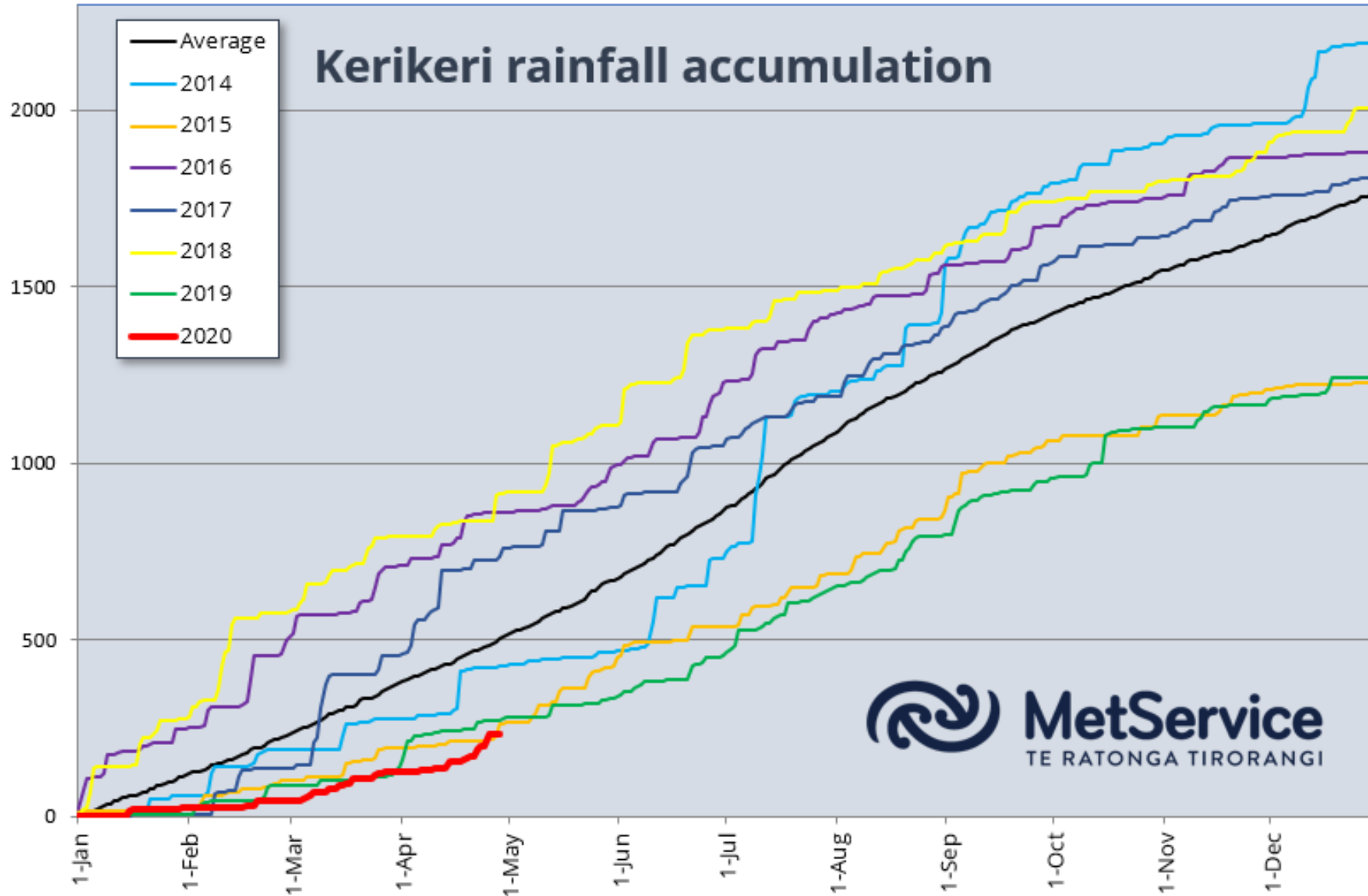


After some “decent” rain in Northland in the last 2 weeks, Kaikohe is sitting at **45% of year-to-date average rainfall**, as at 28 April.

Kaikohe has recorded 94mm of rain so far in April.



Accumulated rainfall 1 Jan - 31 Dec (mm)



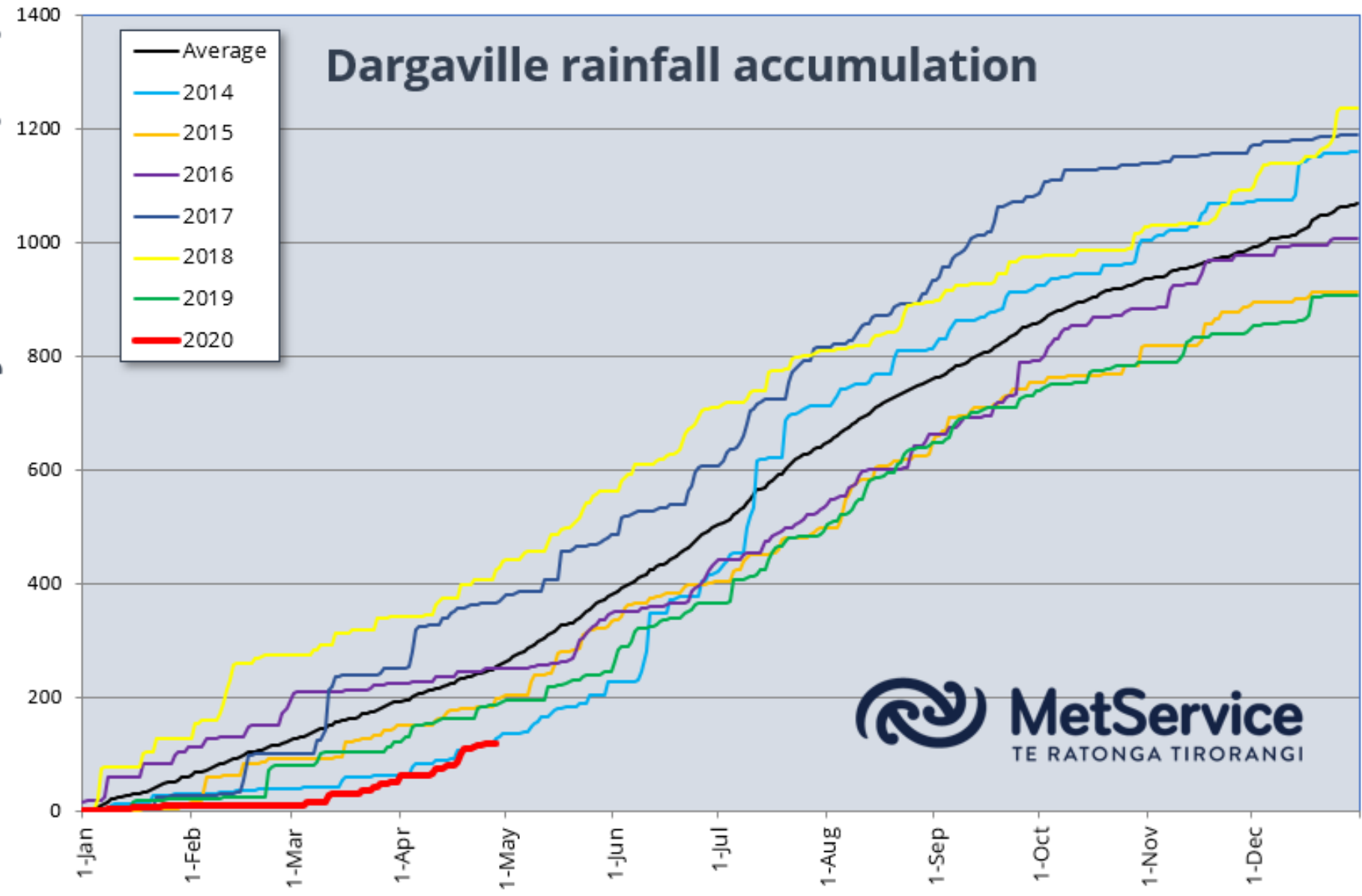
Kerikeri is sitting at **46% of year-to-date average rainfall**, as at 28 April.

Kerikeri has recorded 106mm of rain so far in April.





Accumulated rainfall 1 Jan - 31 Dec (mm)

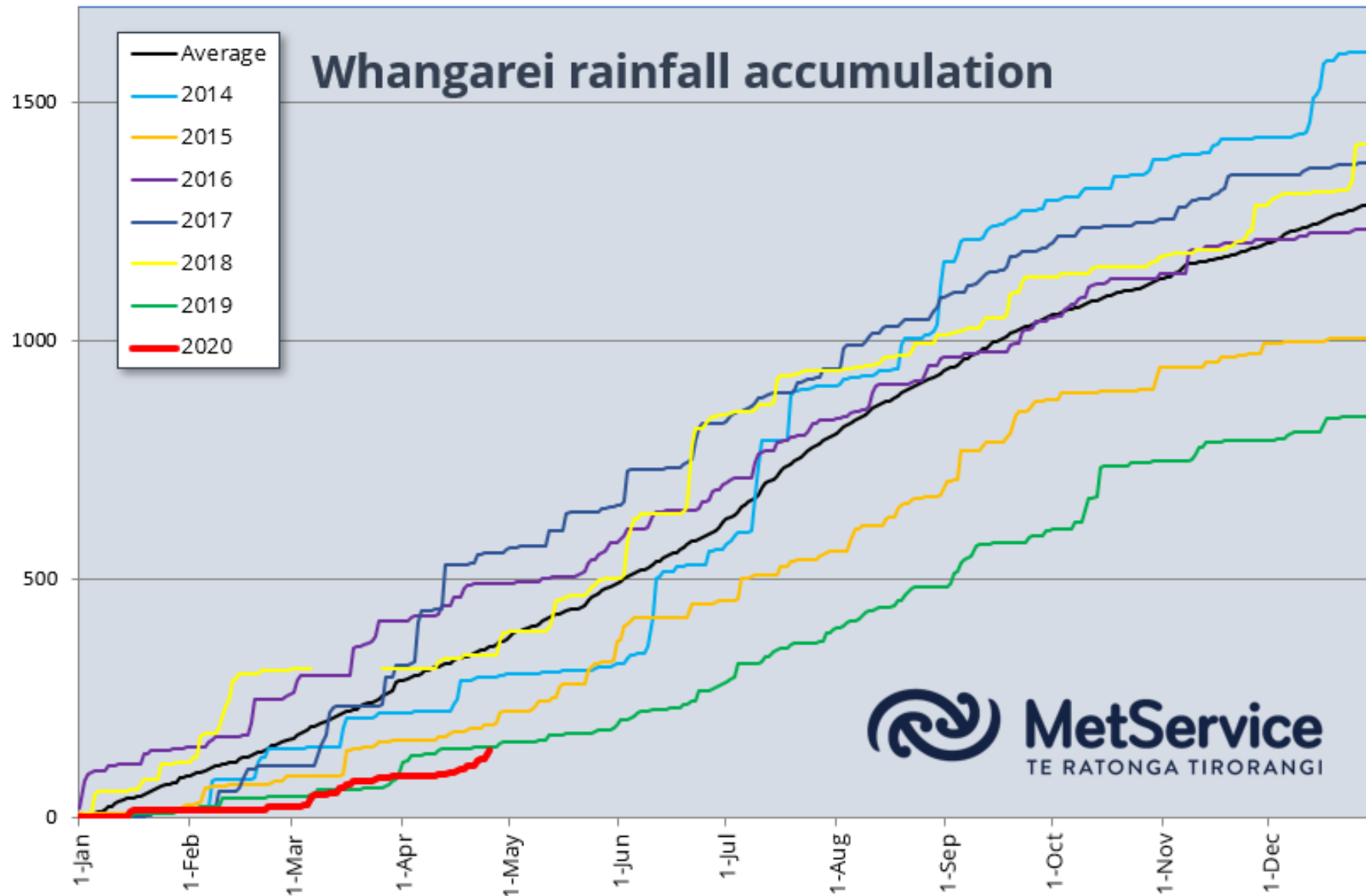


Dargaville is sitting at **47% of year-to-date average rainfall**, as at 28 April.

Dargaville has recorded 56mm of rain so far this month.



Accumulated rainfall 1 Jan - 31 Dec (mm)



Whangarei is sitting at **40% of year-to-date average rainfall**, as at 28 April.

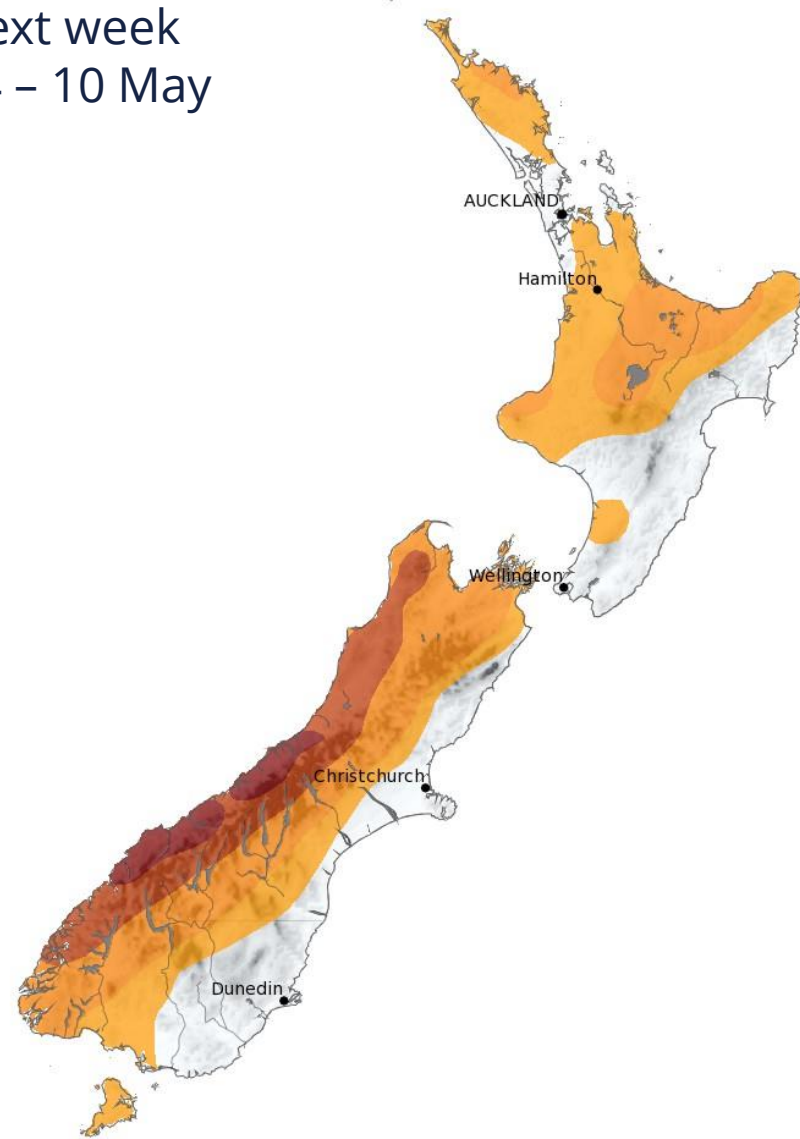
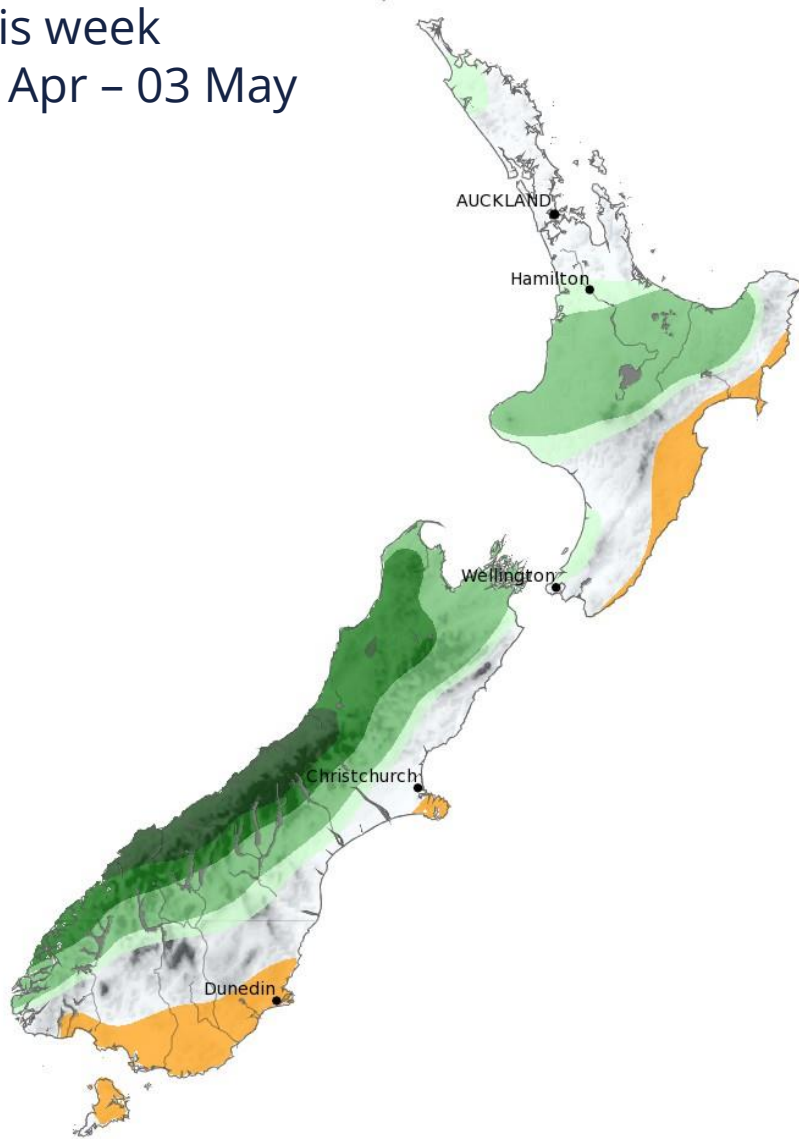
Whangarei Airport has recorded 56mm of rain so far this month.



# Weekly rainfall anomaly forecasts (deviation from weekly normal, mm)

This week  
27 Apr – 03 May

Next week  
04 – 10 May



**Green colours indicate wetter than usual conditions, overall.**

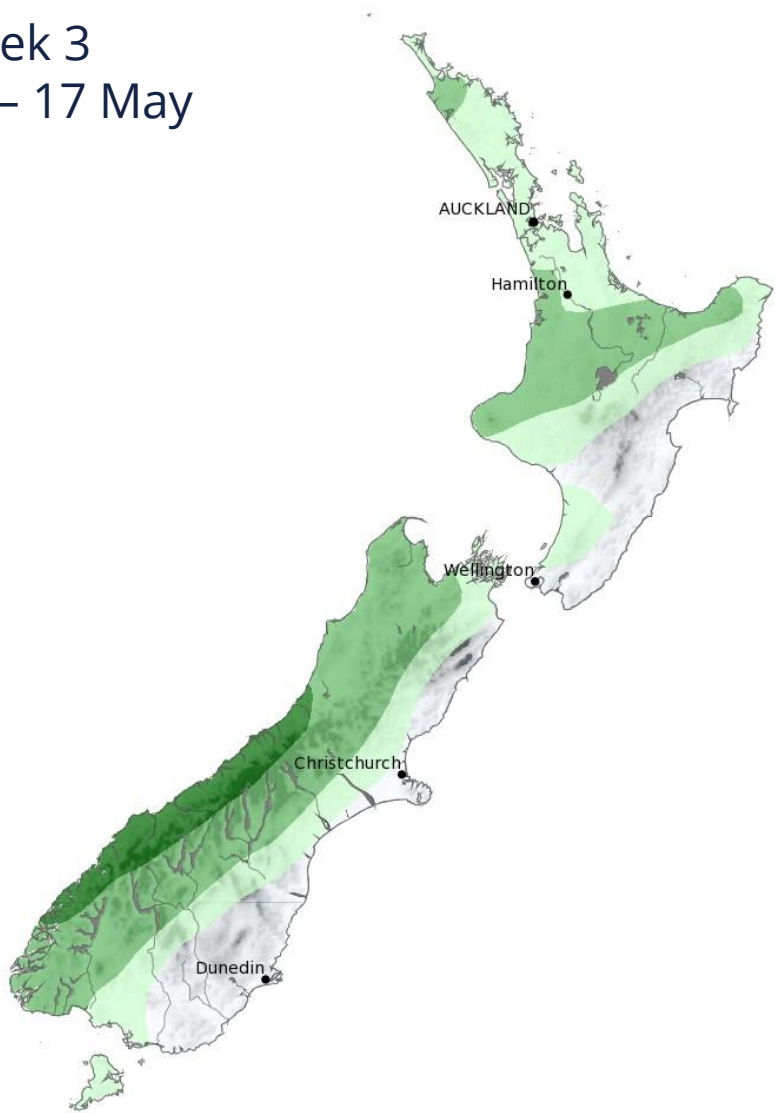
No shading indicates near average weekly rainfall totals

**Orange colours indicate drier than usual conditions, overall.**

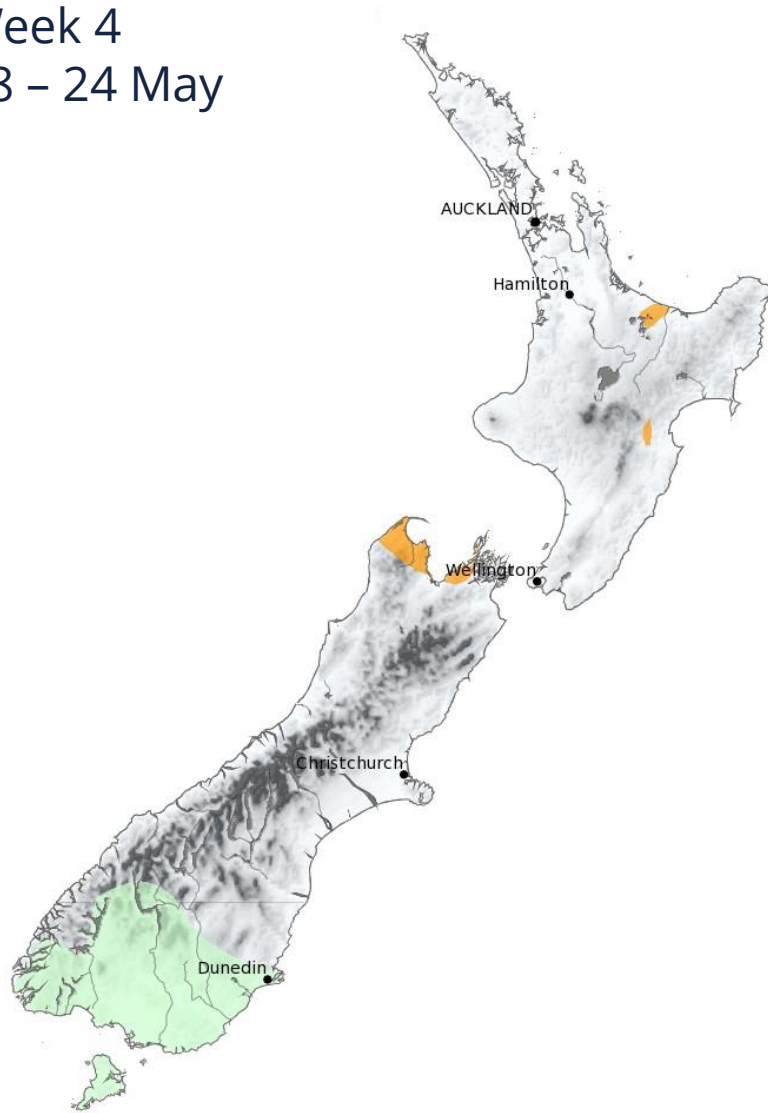


# Weekly rainfall anomaly forecasts (deviation from weekly normal, mm)

Week 3  
11 – 17 May



Week 4  
18 – 24 May



**Green colours indicate wetter than usual conditions, overall.**

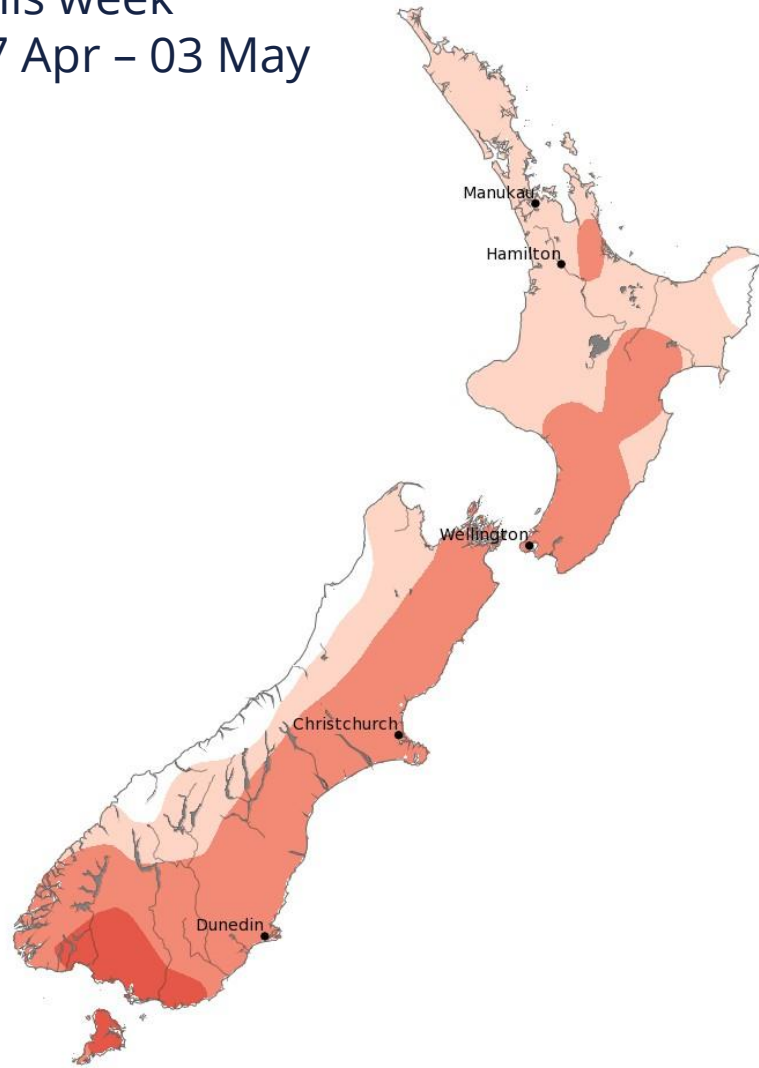
No shading indicates near average weekly rainfall totals

**Orange colours indicate drier than usual conditions, overall.**



# Weekly temperature anomaly forecasts (deviation from weekly average, Celsius)

This week  
27 Apr – 03 May



Next week  
04 – 10 May



**Blue colours indicate cooler than usual conditions, overall.**

No shading indicates near average weekly temperatures, overall

**Pink colours indicate warmer than usual conditions, overall.**



# Weekly temperature anomaly forecasts (deviation from weekly average, Celsius)

Week 3  
11 – 17 May



Week 4  
18 – 24 May



**Blue colours indicate cooler than usual conditions, overall.**

**No shading indicates near average weekly temperatures, overall**

**Pink colours indicate warmer than usual conditions, overall.**





## Weekly temperature & rainfall anomalies (deviations from the weekly normal for the time of year)

Midday to Midday NZ Time	Week One	Week Two	Week Three	Week Four
From:	27/04/2020	4/05/2020	11/05/2020	18/05/2020
To:	3/05/2020	10/05/2020	17/05/2020	24/05/2020

Temperature anomaly Deg C	Week 1	Week 2	Week 3	Week 4
Kaitaia	0.7	-1.5	0.1	-0.3
Kaikohe	0.7	-1.4	0.1	-0.4
Whangarei	0.8	-1.4	0.0	-0.4
Dargaville	0.7	-1.3	0.1	-0.3

Rainfall anomaly (mm)	Week 1	Week 2	Week 3	Week 4
Kaitaia	2	-6	7	-3
Kaikohe	5	-9	10	-3
Whangarei	2	-7	7	-3
Dargaville	2	-4	7	-2

Rainfall (% anomaly)	Week 1	Week 2	Week 3	Week 4
Kaitaia	6%	-18%	22%	-9%
Kaikohe	15%	-24%	28%	-8%
Whangarei	6%	-27%	29%	-12%
Dargaville	7%	-14%	28%	-8%

**This week, expect an intense High and dry weather for the working week, then a burst of rain, risk heavy, during the weekend.** Note that the timing of this rain may slide later Sunday or even into early Monday 4 May (TBA). [Previous model runs tagged this rainfall into the week starting Monday 4 May.]

This results in a weak “wetter than normal” signal for Northland for week 1, but we are going to have to watch the model tendency to over-forecast rain amounts.

**Next week, cold southerly winds and then an eventual return to high pressure result in a drier-than-normal recipe for Northland.**

**Week three remains highly uncertain,** with models showing a U-turn on previous “drier” predictions. The latest models show low pressures over the South Island, with a **wetter than normal signal for the upper North Island.**

**A drier than usual week returns for week four** (very low confidence).



# The Tasman Sea and Southern Ocean are now intermittently firing up – expect intense Highs (dry weeks) interspersed with active Lows (wet and windy weeks)

- Even after two weeks of unsettled weather in the New Zealand region, **Northland has received some excellent totals so far this April**. Kaikohe has recorded 94mm this month, Kerikeri 106mm, while both Whangarei and Dargaville have recorded 56mm.
- Looking ahead, **intense high pressure rules supreme for the working week**, before an **active low** affects the country **this weekend**. After a very dry week, **a burst of rain, risk heavy**, is forecast for Northland this weekend.
- **Next week is expected to run rather dry**, under cold southerlies, then ridging.
- **Week three remains highly uncertain\***, with models showing a U-turn on previous “drier” predictions. The latest models show low pressures over the South Island, with a **wetter than normal signal for Northland**.
- There is very little confidence in week four predictions at the present time\*.
- Temperature forecasts continue to bounce around, from relatively mild this week (due to both sunny afternoons this week, then mild northwesterlies this weekend), to unusually cold southerlies next week.

\*Note: COVID19 is impacting weather forecast model accuracy (even when using an ensemble-based approach to uncertainty). This is because of the lack of planes flying – aircraft measurement of the atmosphere (winds, temperatures) is a significant source of weather data used to initialise weather forecast models – and a particularly important source for the data-sparse Southern Hemisphere.







Thank you 