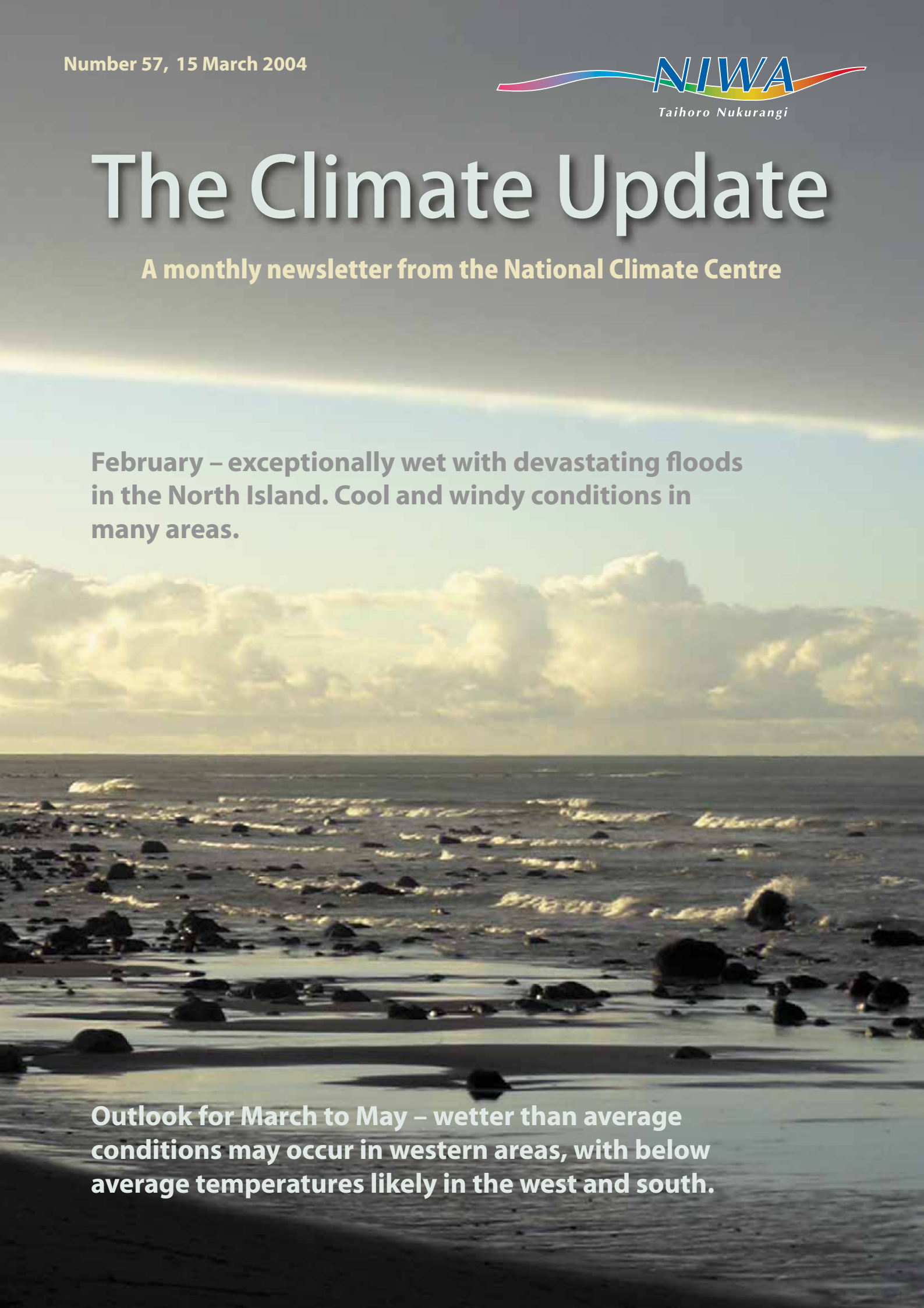
Number 57, 15 March 2004

NIWA
Taihoro Nukurangi

The Climate Update

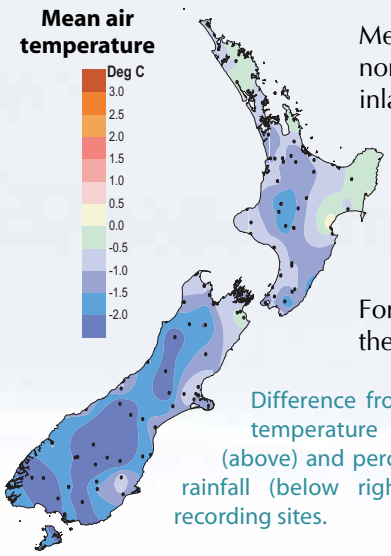
A monthly newsletter from the National Climate Centre



February – exceptionally wet with devastating floods in the North Island. Cool and windy conditions in many areas.

Outlook for March to May – wetter than average conditions may occur in western areas, with below average temperatures likely in the west and south.

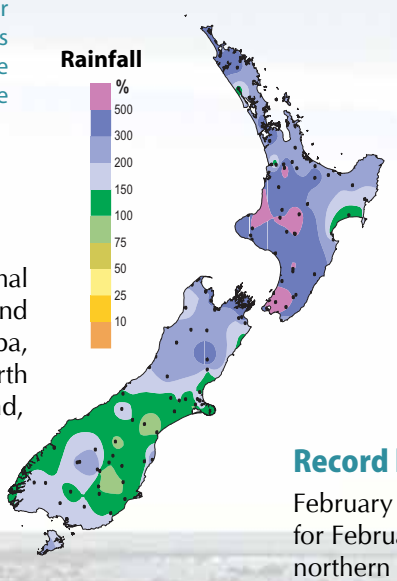
New Zealand climate in February 2004



Mean temperatures were up to 2.5 °C below normal in the Southern Lakes, Central Otago, and inland Canterbury, and below normal in most other regions. The only warm spot in the country was Hawke's Bay, where temperatures were slightly above average. The February national average temperature of 16.1 °C was 1.1 °C below normal.

For more information on the climate in February, visit the climate summaries page at www.niwa.co.nz

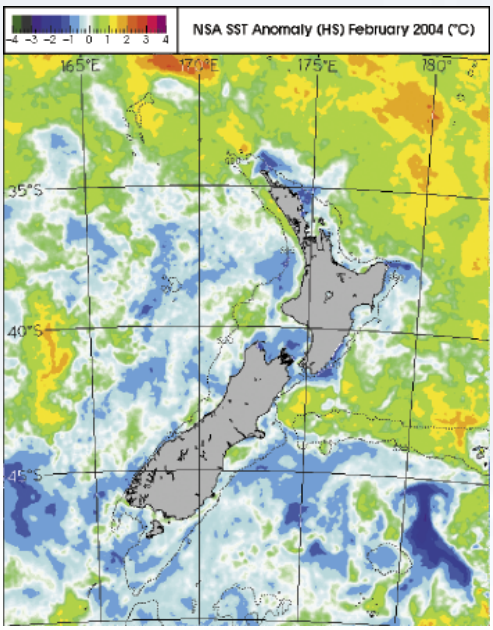
Difference from the average air temperature in degrees Celsius (above) and percentage of average rainfall (below right). Dots indicate recording sites.



February rainfall records tumble

Rainfall was 400–600% of the February normal in much of the south and west of the North Island from Waikato to Wellington, including Wairarapa, and 200–300% of normal in most other North Island regions, as well as in Buller, north Westland, Marlborough, and Nelson. It was wetter than average over most other areas of the South Island.

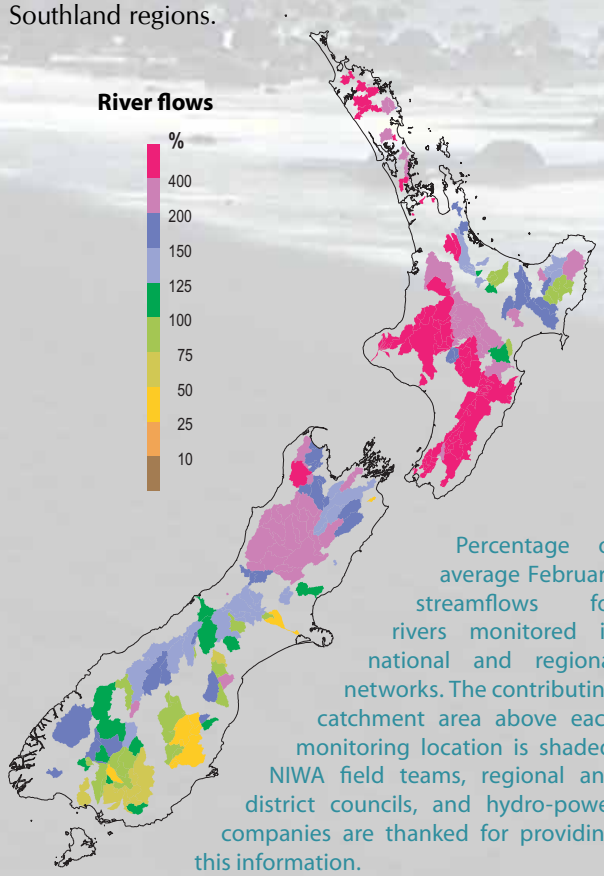
Sea surface temperatures



Difference from normal surface water temperatures in the seas around New Zealand. Mean temperatures for February were generally above normal to the north and east, and below normal to the south and west.

Record high river flows

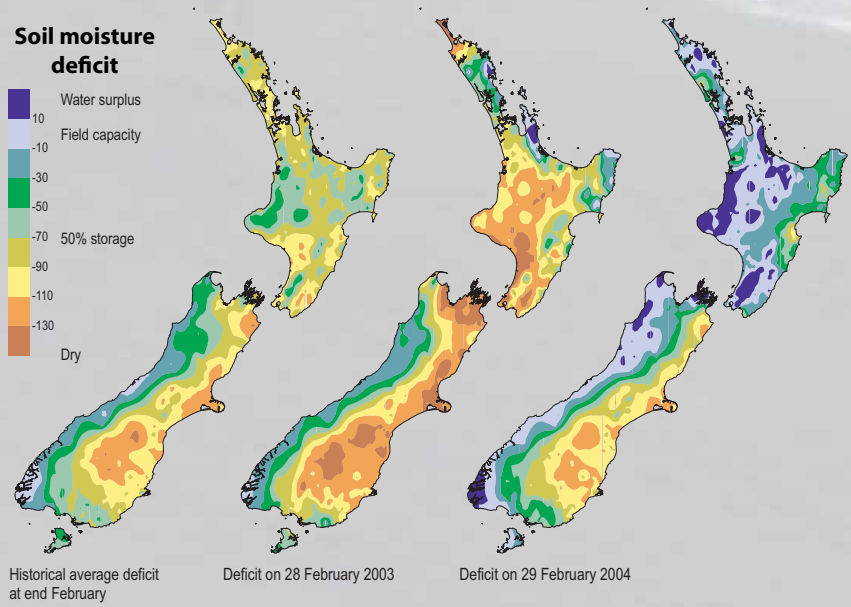
February streamflows were at highest known levels for February over much of the North Island and in the northern South Island. Elsewhere, above normal flows occurred in Bay of Plenty, East Cape, Hawke's Bay, and most of the South Island alpine-fed rivers. Flows were normal to below normal in the Maniototo and coastal Southland regions.



Percentage of average February streamflows for rivers monitored in national and regional networks. The contributing catchment area above each monitoring location is shaded. NIWA field teams, regional and district councils, and hydro-power companies are thanked for providing this information.

Saturated soils in the north and west

The heavy rain and resulting floods dominated soil moisture changes in February, particularly in the North Island. Topsoils in eastern regions of the South Island received welcome rain, with moisture levels in the total root zone improving to near average for this time of year.



Soil moisture deficit in the pasture root zone at the end of February (right) compared with the deficit at the same time last year (centre) and the long-term end of February average (left). The water balance is for an average soil type where the available water capacity is taken to be 150 mm.

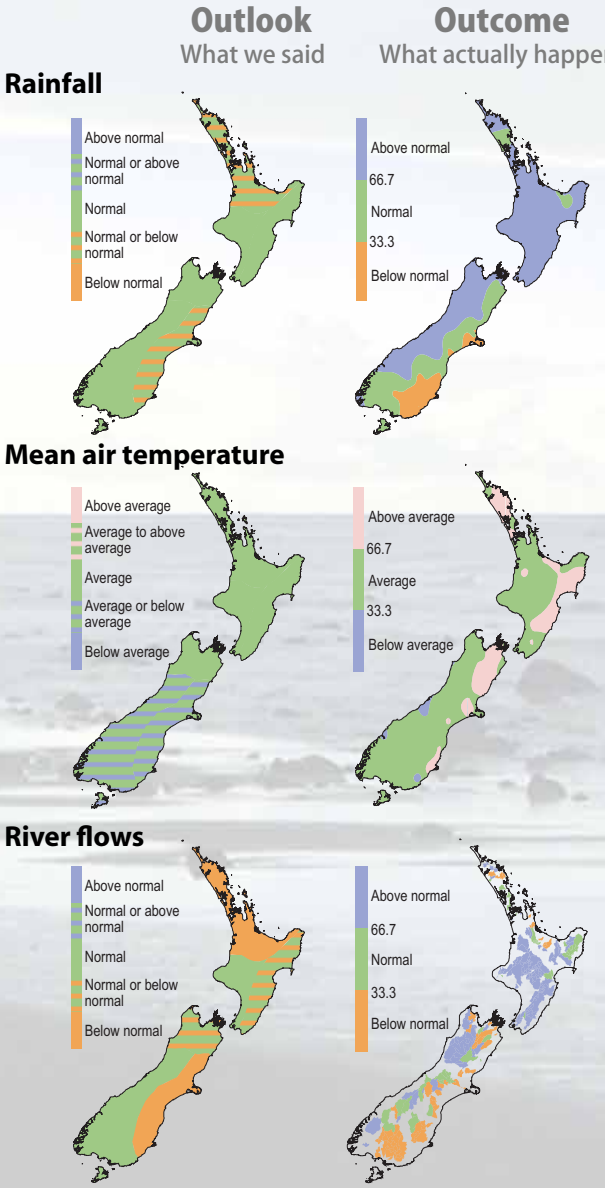
Checkpoint

December 2003 to February 2004

Rainfall was near normal or below normal, as predicted, in the eastern South Island and in Southland, but above normal in most other districts.

Air temperatures were higher than predicted in the east and north of New Zealand, while they were average or below average elsewhere as forecast.

River flows were below normal as predicted in the east of the South Island and in Bay of Plenty and Northland. Some flows in the central and southern North Island, and the west of the South Island, were higher than predicted, while others were normal as forecast.



The three outcome maps (right column) give the tercile rankings of the rainfall totals, mean temperatures, and river flows that eventuated for December 2003 to February 2004. Terciles were obtained by dividing ranked December to February data from the past 30 years into three groups of equal frequency (lower, middle, and upper one-third values) and assigning the data for the present year to the appropriate group. As an approximate guide, middle tercile rainfalls (33.3 to 66.7%) often range from 80 to 115% of the historical average. Middle tercile air temperatures typically occur in the range of the average plus or minus 0.5 °C. The upper, middle, and lower tercile ranges are indicated in the maps by the terms Above normal, Normal, and Below normal, respectively.

Outlook

March to May 2004

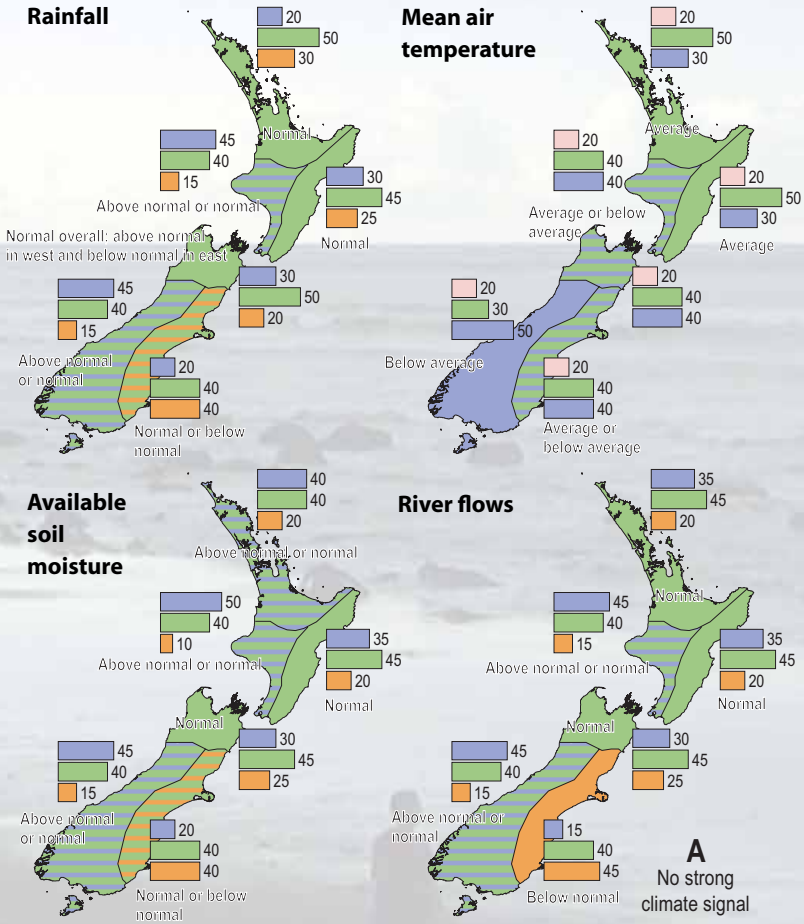
Below average mean sea-level atmospheric pressures to the south of the country may somewhat enhance westerly quarter winds through autumn. This is likely to bring relatively cool conditions to New Zealand and above normal rainfall in western areas. Local sea surface temperatures are likely to be warmer than average around the northern North Island, but below average in the south of the country.

The Equatorial Pacific is in a neutral state, and no El Niño or La Niña is expected through autumn 2004.

Rainfall is expected to be normal or above normal in western areas, normal or below normal in the eastern South Island, and near normal elsewhere. Average or below average temperatures are likely in all regions.

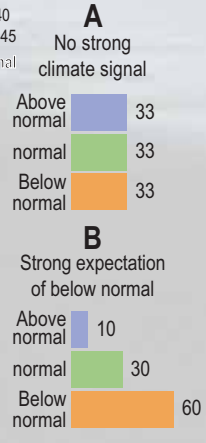
Soil moisture levels and river flows are expected to be normal or above normal in western regions, normal or below normal in the east of the South Island, and near normal elsewhere.

Despite the recent passage of ex-tropical cyclone Ivy, there is a continuing risk of an ex-tropical cyclone affecting New Zealand over the remainder of the cyclone season.



Key to maps (example interpretation)

In example A, climate models give no strong signals about how the climate will evolve, so we assume that there is an equal chance (33%) of the climate occurring in the range of the upper, middle, or lower third (tercile) of all previously observed conditions. In example B there is a relatively strong indication by the models (60% chance of occurrence) that conditions will be below normal, but, given the variable nature of climate, the chance of normal or above-normal conditions is also shown (30% and 10% respectively).



Backgrounder

How does the ocean influence our climate?

Dr Phil Sutton, Physical Oceanographer, NIWA, Wellington

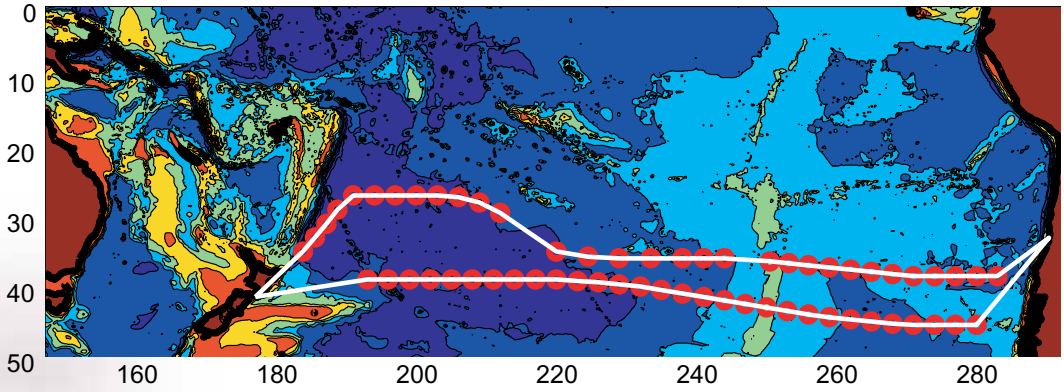
New Zealand is a group of small islands in a large ocean, and our climate is dominated by what happens beyond our shores. Research into ocean-atmosphere interactions is a key part of determining why our climate behaves the way it does.

The ocean makes up half of the climate system, a fact that is often overlooked because we live in the atmosphere! With 2.5 metres depth of water holding the same amount of heat as the entire depth of the atmosphere, the ocean temperature can have large influences on the overlying atmosphere. Even sluggish ocean currents can carry warm or cold water great distances. A continual problem with understanding the role of the ocean in climate, and including the ocean state in climate predictions, is lack of ocean data. The ocean covers 75% of the surface of the earth, and much of the ocean is inaccessible, making measurements difficult and expensive.

NIWA marine technician John Hunt checks an Argo float ready for deployment between New Zealand and Chile.

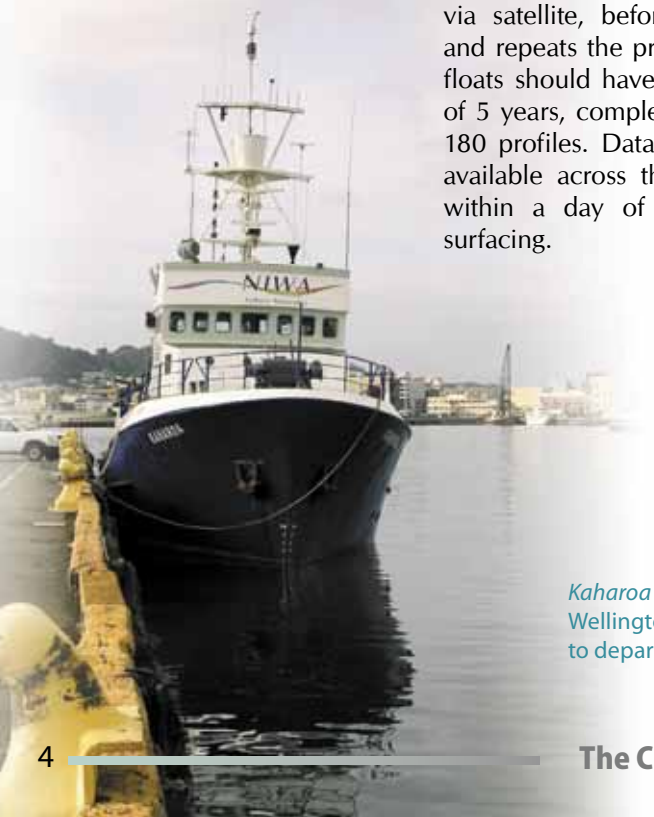
The aim of Argo is to deploy and maintain 3000 drifting floats in all of the world's oceans by 2006. To date, 17 countries have deployed nearly 1100 floats.

A global ocean observing project called Argo was started in 2000 to address the lack of ocean information. This programme uses a broad-scale array of profiling floats to measure the state of the upper ocean. The floats, worth $20,000 each, provide real-time measurements of the temperature and salinity of the upper ocean that will help forecast climate change and events like El Niño, and improve the prediction of tropical cyclones. Each float sinks to a pre-determined depth of between 1000 and 2000 metres, where it is carried by the currents for 9–10 days. It then ascends to the surface, measuring temperature and salinity as it rises. Once on the surface, the float transmits its location and the profile data via satellite, before it sinks and repeats the process. The floats should have a lifespan of 5 years, completing about 180 profiles. Data are freely available across the internet within a day of the floats surfacing.



Route map for Kaharoa. Red dots indicate deployment sites.

NIWA's research vessel *Kaharoa* is currently sailing from Wellington to Chile and back, deploying 61 Argo floats as part of a collaboration between NIWA, the University of Washington (Seattle), and Scripps Institution of Oceanography (San Diego). This deployment will increase the number of floats in the South Pacific by a factor of three, and is the largest single deployment of Argo floats to date. Data from these floats will be valuable because the South Pacific Ocean is particularly poorly measured as a result of its vast size and remoteness.
Web pages: www.argo.ucsd.edu



Kaharoa at Wellington prior to departure.

Oakura Beach looking southwest. The grey layer is receding frontal cloud ahead of a squall line that brought showers to Taranaki in late December.

Cover photo: *Alan Porteous*

The Climate Update is a monthly newsletter from NIWA's National Climate Centre, and is published by NIWA, Private Bag 14901, Wellington. It is also available on the web. Comments and ideas are welcome. Please contact Alan Porteous, Editor
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