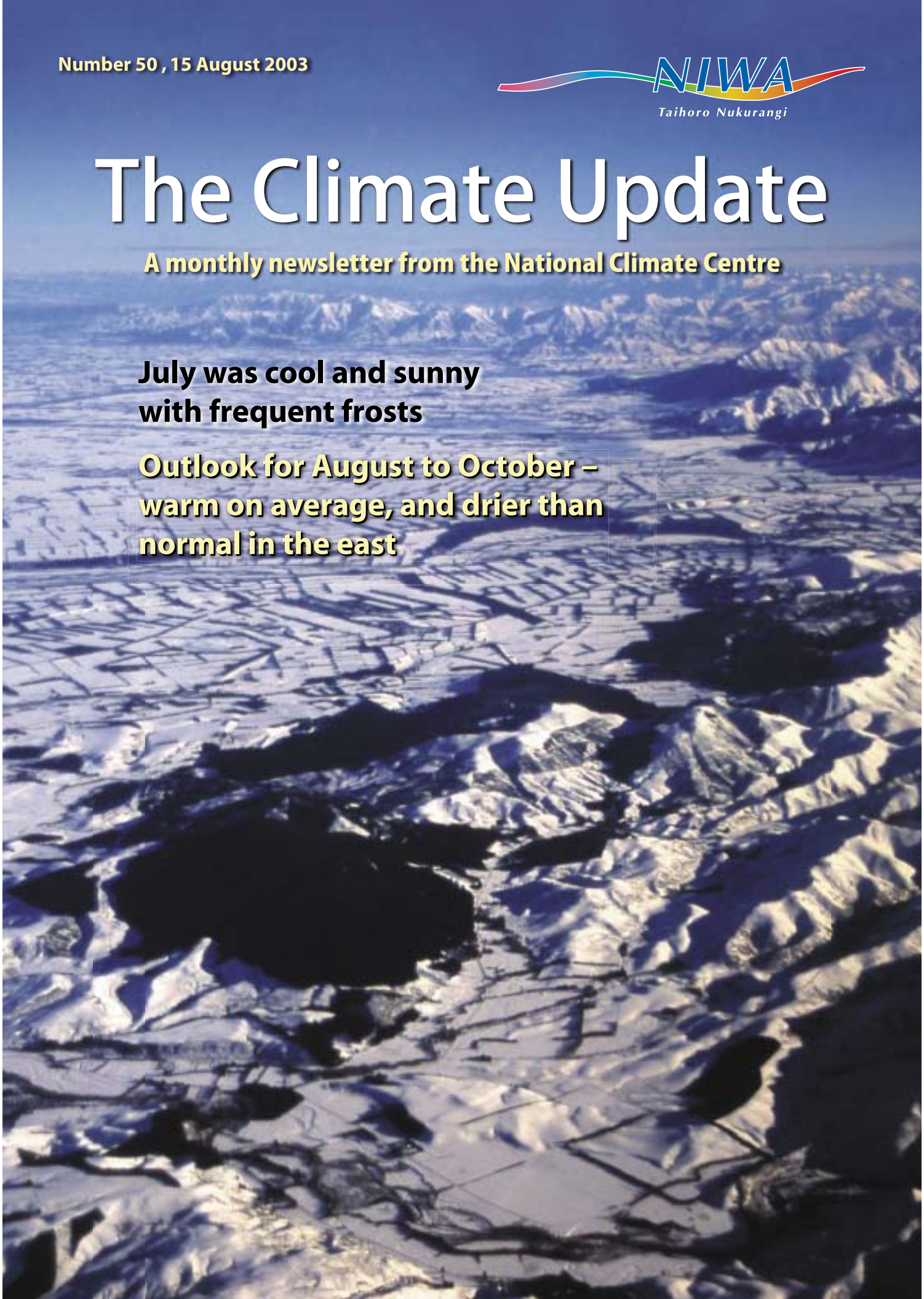
Number 50 , 15 August 2003

NIWA
Taihoro Nukurangi

The Climate Update

A monthly newsletter from the National Climate Centre

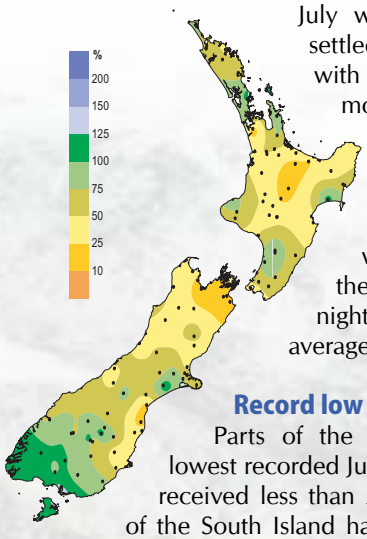


July was cool and sunny with frequent frosts

Outlook for August to October – warm on average, and drier than normal in the east

New Zealand climate in July 2003

Rainfall



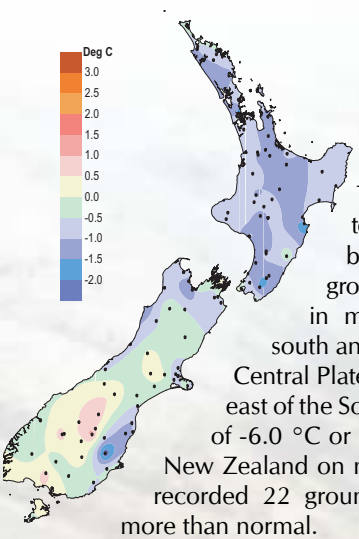
Cold, sunny, and frosty

July was colder, sunnier, and more settled and frosty than average, with well below normal rainfall in most areas. July climate patterns were associated with more anticyclones ('highs') than average over New Zealand and in the Tasman Sea. As a result, winds were mostly light during the month, and there were low nighttime temperatures, and above average sunshine in most regions.

Record low rain

Parts of the central North Island had the lowest recorded July rainfall. Kawerau and Rotorua received less than 20% of normal rain. The north of the South Island had the driest July in at least 60 years, with just 10% of normal rain in Nelson and 15% at Blenheim Airport.

Mean air temperature



Relatively cool month

Mean and minimum temperatures were below average over much of New Zealand, although it was warmer than average in parts of inland and Central Otago. The July national average temperature of 7.3 °C was 0.4 °C below average. There were more ground and air frosts than usual in many areas, especially in the south and west of the North Island, the Central Plateau, and parts of the north and east of the South Island. Severe ground frost of -6.0 °C or lower occurred somewhere in New Zealand on most days of the month. Levin recorded 22 ground frost days, which was 10 more than normal.

Above and left: percentage of average rainfall (left) and difference from the average air temperature in degrees Celsius (above). Dots indicate recording sites.

Snowfall

A very cold southerly outbreak brought significant snowfall to sea level in the eastern South Island on 4–5 July, with heavy snowfall settling to 300–500 m in the central and eastern North Island on the 5th. Severe overnight ground frosts followed for several days, especially in the South Island.

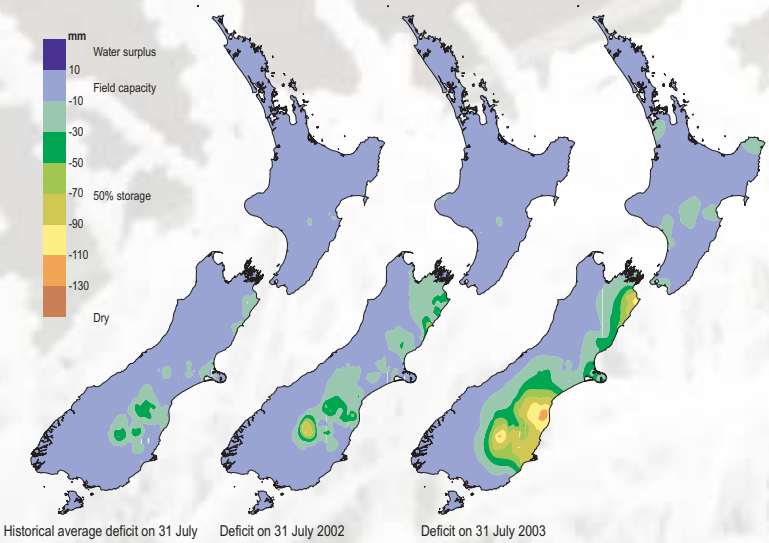
Some soils still await winter top up

Marlborough, South Canterbury, and Central Otago soils had not received normal winter recharge by the end of July. Soils in parts of these regions were much drier than usual at the end of the month, with deficits of more than half their available water capacity. Soils were at field capacity elsewhere in the South Island and in most of the North Island.

Low flows follow dry month

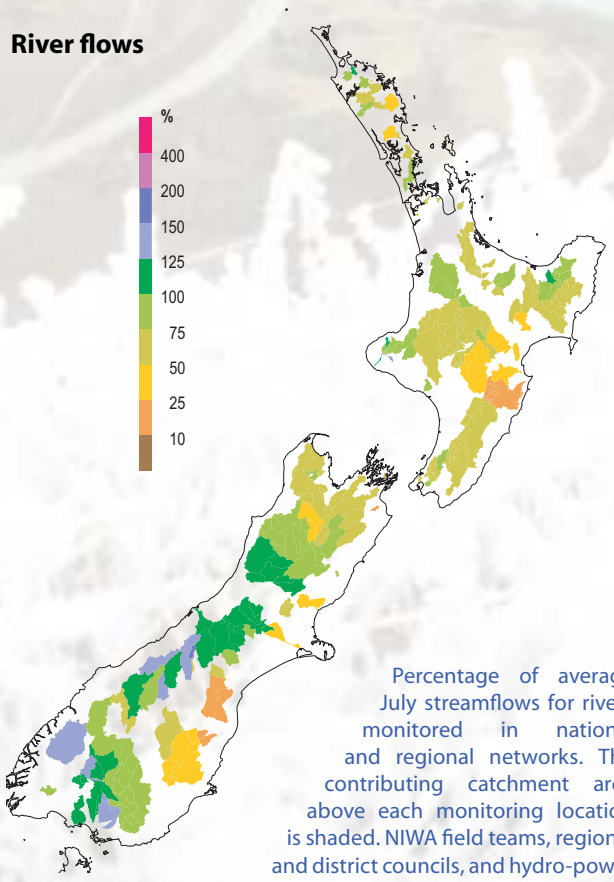
July streamflows were below normal in most of the North Island, Nelson, Marlborough, and the east coast of the South Island. Flows were normal to above normal for rivers in the west and south of the South Island.

Soil moisture deficit



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

River flows



Percentage of average July 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

Checkpoint

May to July 2003

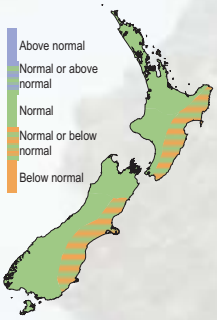
Rainfall occurred as predicted in many areas, particularly the normal or below normal rain in eastern areas. Some localities received above average rain.

Air temperatures were above average over much of New Zealand as was expected. Near average temperatures were recorded at a few locations.

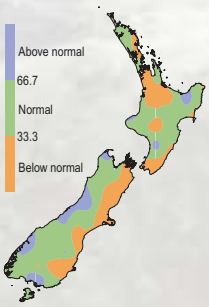
Below normal river flows occurred as predicted in the south and east of the North Island and the eastern South Island. River flows were normal in the north of both islands and in the west and south of the South Island.

Rainfall

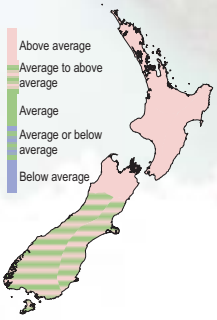
Outlook What we said

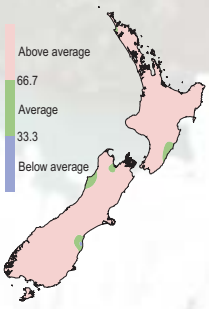


Outcome What actually happened

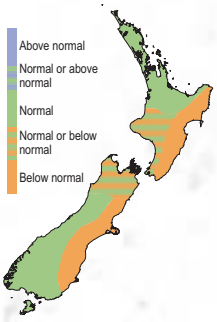


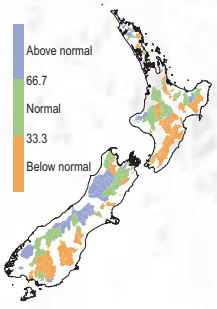
Mean air temperature





River flows





The three outcome maps (right column) give the tercile rankings of the rainfall totals, mean temperatures, and river flows that eventuated for May to July 2003. Terciles were obtained by dividing ranked May to July 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

August to October 2003

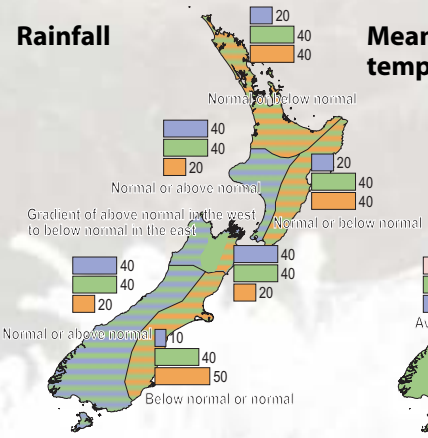
A mild start to spring is expected, with above average temperatures in all North Island districts and in the northern South Island. Temperatures are expected to be average or above average over the rest of the South Island. Despite this, some frosty spells are also expected, especially during the first half of the period.

Local sea surface temperatures are likely to remain above average and local circulation patterns are expected to favour enhanced westerly or northwesterly wind flow. Normal or below normal rainfall is expected in the northern North Island and the east of both Islands. Normal or above normal rainfall is expected in western areas of both Islands.

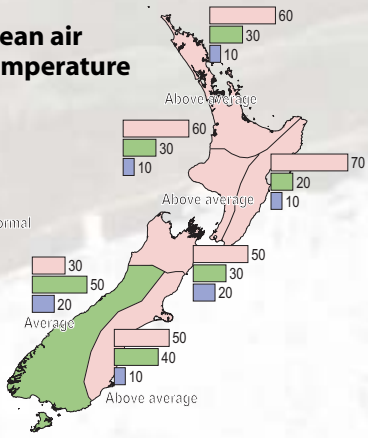
Below normal soil moisture levels and flows are predicted for the east coast of the South Island. Normal or below normal soil moisture levels and flows are predicted for the north and east of the North Island, but normal or above normal conditions are predicted for the west of the South Island.

The tropical Pacific has moved into a neutral state and is likely to remain neutral (no El Niño or La Niña) until the end of 2003.

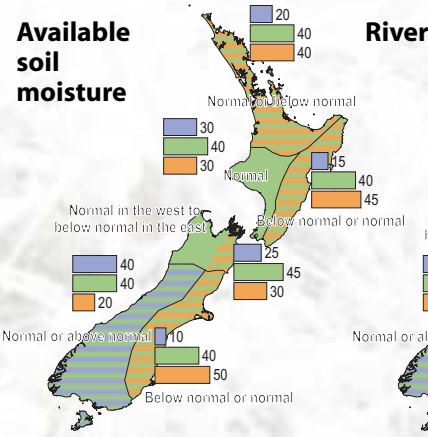
Rainfall



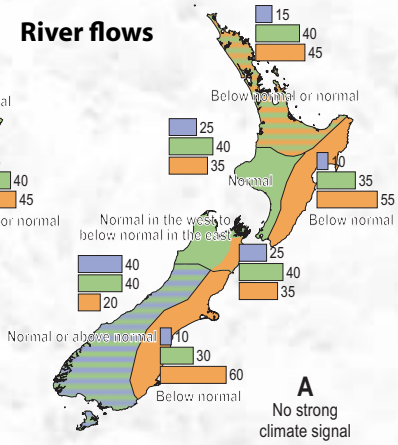
Mean air temperature



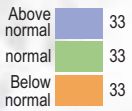
Available soil moisture



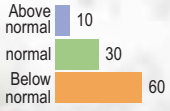
River flows



A
No strong climate signal



B
Strong expectation of below normal



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).

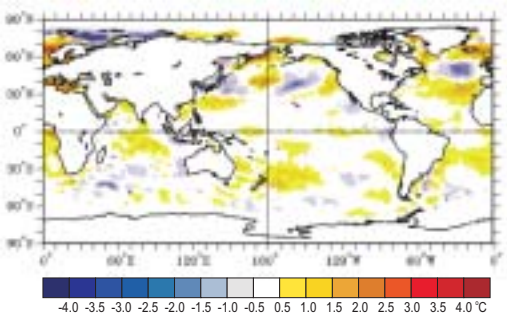
Global setting

ENSO goes quiet

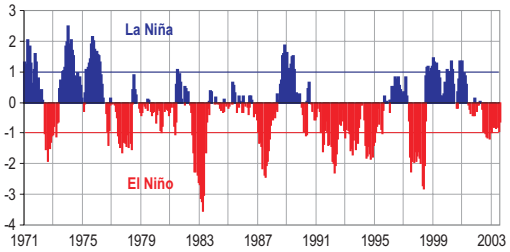
The Equatorial Pacific atmosphere and ocean surface conditions suggest that the El Niño-Southern Oscillation (ENSO) has moved into a neutral state in July, apparently ending the short-lived cooling (relative to normal) in sea surface temperatures that developed in May.

Most climate forecast models indicate there will be neutral conditions over the next 3 months. All models predict a neutral ENSO state by the end of 2003 and into early 2004.

Further information on ENSO is available on the World Meteorological web site, www.wmo.ch



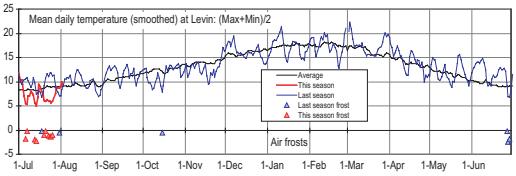
Above: Mean sea surface temperature departures from normal for July 2003. The New Zealand region average SST anomaly has been positive for all of 2003 so far. The anomaly for July was +0.7 °C, with the May-to-July mean about +0.6 °C. Although anomalies are positive generally, SSTs are below average about and south of the Chatham Rise. *Reproduced courtesy of NOAA/Climate Diagnostics Center*



Above: The Southern Oscillation Index (SOI), a measure of changes in the atmospheric pressures across the Pacific, smoothed over three months. The current three month value of the SOI is –0.6, while the SOI at the end of July was +0.3. La Niña or El Niño typically have an observable effect on the New Zealand climate when there is a large departure of the SOI from zero.

On line climate graphics

Climate maps and line plots of climate site observations are updated each week on the Climate Now website at www.niwa.co.nz/ncc/climatenow



Backgrounder

Snow: a valuable commodity

As shown on our cover the severe storm of 4–5 July left widespread snowfall. The NASA image below shows the extent of the snow on the South Island a few days later on 11 July.

The snow followed the development at the end of June of a deep depression to the south of New Zealand which persisted for a number of days and caused a very cold southerly air flow onto the country. The cold air was trapped against the Southern Alps, while the convergence of warm moist air above caused precipitation in the form of snow.

Snow is one of winter's most valuable commodities, providing everything from snow-based recreation to the recharging of lakes and aquifers. The seasonal maximum of the quantity of water stored in snowpack in the hydroelectric catchments is similar to the volume of water that can be held in controlled hydroelectric lake storages.

Snow records in New Zealand are often more descriptive than quantitative. For example, there are records in some locations of the number of days of snowfall but rarely are there good records on the depth of the fallen snow.

NIWA is working with Otago University and Otago Regional Council to quantify just how much snow there is. The key objective is to find out how much water there is in the snow because, apart from the ski industry, it's the potential water storage in the snow that is important. This information will have important benefits for planning water use, particularly in hydro-electric production and water supplies for industry and urban use.

A technique has been developed to estimate the build up of snow during the cool months, and find out how this varies in quantity and timing from year to year.

Image courtesy Jacques Descloitres, MODIS Rapid Response Team at NASA GSFC

The Selwyn River and the Malvern Hills in mid Canterbury on the afternoon of 6 July 2003, looking south from an aircraft departing for Australia. The Canterbury Plains and eastern ranges of the Southern Alps are in the background.

Photo: Dr Andrew Black, University of Dundee.

The Climate Update is a monthly newsletter from NIWA's National Climate Centre for Monitoring and Prediction, 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
Email: ncc@niwa.co.nz
Phone: 0-4-386 0300
Visit our webpage: www.niwa.co.nz