

Communicating Climate Change

Module 3

August 2008

An initiative of the National Agriculture and Climate Change Action Plan

Glimpsing South Australia's future climate

Climate change projections indicate that South Australia's climate in the decades ahead will be different to that of the past. Farmers will need to modify their practices to manage the risks presented by the change in climate.

Key facts

- Climate model projections are tools for understanding how the climate will respond to increased greenhouse gas concentrations.
- Unknown future greenhouse gas levels and climate-model uncertainty mean there is a range of projected climates.
- Temperature projections for South Australia indicate continued warming over the coming decades.
- Rainfall projections for South Australia are more mixed than for temperature but most indicate a drying trend during winter and spring.
- Potential threats from climate change have been identified for agriculture in South Australia.
- Farming marginal land is likely to become increasingly difficult.
- Farmers need to prepare for unavoidable climate change, as well as help reduce greenhouse gas emissions.

Climate model projections

Climate projections are computer model simulations of the climate. We use them to understand how the world's climate will respond to the rapid increase in atmospheric greenhouse gases associated with human activities.

The projections indicate a wide range of possible future climates. There are two main reasons for this:

- We do not know precisely how greenhouse gas concentrations will vary in future. Due to demographic, economic and technological factors, a range of greenhouse gas emission scenarios are possible for the 21st century.
- The climate system is so complex that it is not possible for models to predict the exact state of the Earth's climate several decades into the future.

Scientists use a range of different independent climate models and emission scenarios to estimate future climate. From the spread of these model projections, they can identify the changes that are likely to occur, and those that are unlikely to occur.

Climate models are constantly being improved with higher resolution and inclusion of more climate system processes, leading to greater confidence in climate projections.

A cooperative venture between



Australian Government
**Department of Agriculture,
Fisheries and Forestry**
Bureau of Meteorology



Using climate projections

The uncertainty of climate projections makes it difficult for farmers and policymakers to incorporate model output directly into the decisions they make. Nevertheless, climate projections can help them identify potential long-term threats and opportunities associated with climate change.

The climate projections we present here are based on the average projections provided by different climate model simulations using low-, medium- and high-emission scenarios. Information about the spread of these projections can be found at: <http://www.climatechangeinaustralia.gov.au>

Changes in mean rainfall

By 2030, annual rainfall in South Australia is projected to decrease by 2–5 per cent relative to the climate around 1990 (Figure 1).

By 2070, a decrease of 5–10 per cent is most likely under a low greenhouse gas emission scenario, or a 10–20 per cent decrease under a high-emission scenario.

Winter and spring rainfall is likely to decrease, whereas changes in summer and autumn rainfall are less certain.

We expect natural climate drivers to strongly influence rainfall variability for many decades to come. These will counteract and heighten the projected human-induced changes.

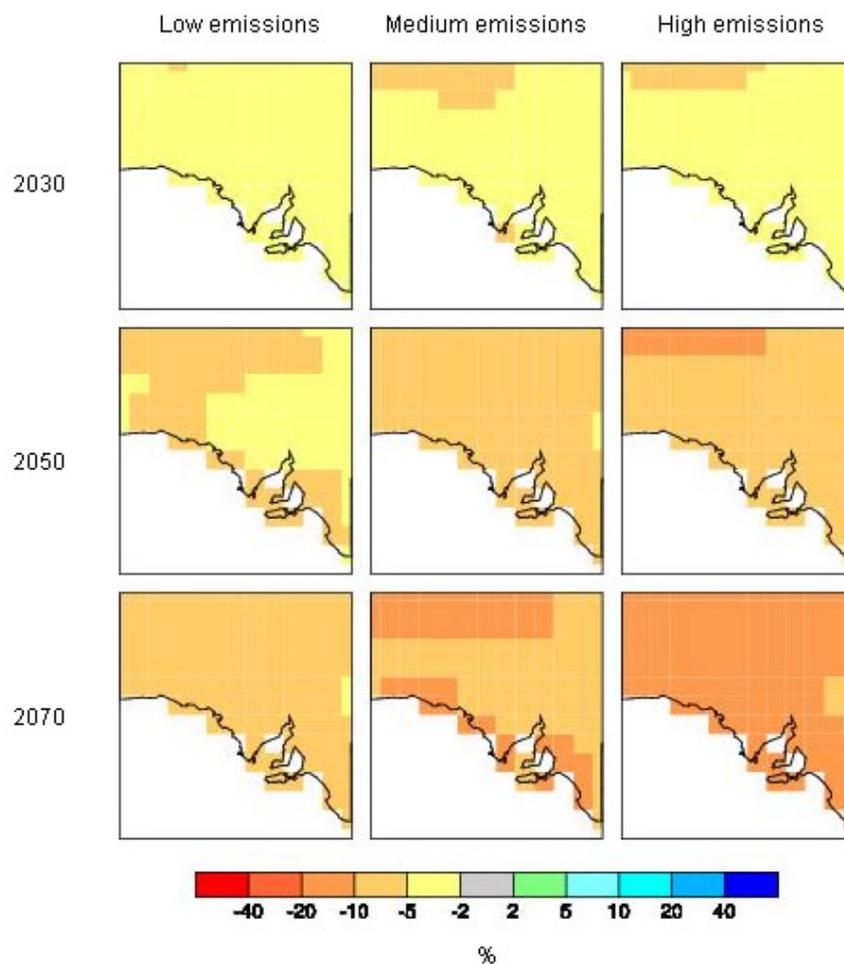


Figure 1: Best estimate (50th percentile of model projections) for South Australian annual rainfall change (per cent) for 2030, 2050 and 2070 using low, medium and high greenhouse gas emission scenarios

Changes in drought and extreme rainfall

Potential evapotranspiration is projected to increase over South Australia. Evapotranspiration is the combination of evaporation from soil and water surfaces, and transpiration from vegetation. When these changes are combined with the projected declines in rainfall, an increase in aridity and drought occurrence is likely.

Climate projections show an increase in daily precipitation intensity and an increase in the number of dry days, suggesting that future rainfall patterns will have longer dry spells interrupted by heavier rainfall events.

Changes in mean temperature

We are more confident in our projections of mean temperature than those of rainfall.

By 2030, annual average temperatures over South Australia are projected to increase by at least 0.6°C in the south through to about 1.0°C in the north, relative to the climate around 1990 (Figure 2).

By 2070 this increase is around 1.5°C across the state under a low-emission scenario or 3°C under a high-emission scenario.

Less warming is expected along the coast. Projected warming for summer, spring and autumn is similar to the annual increase, but slightly less for winter.

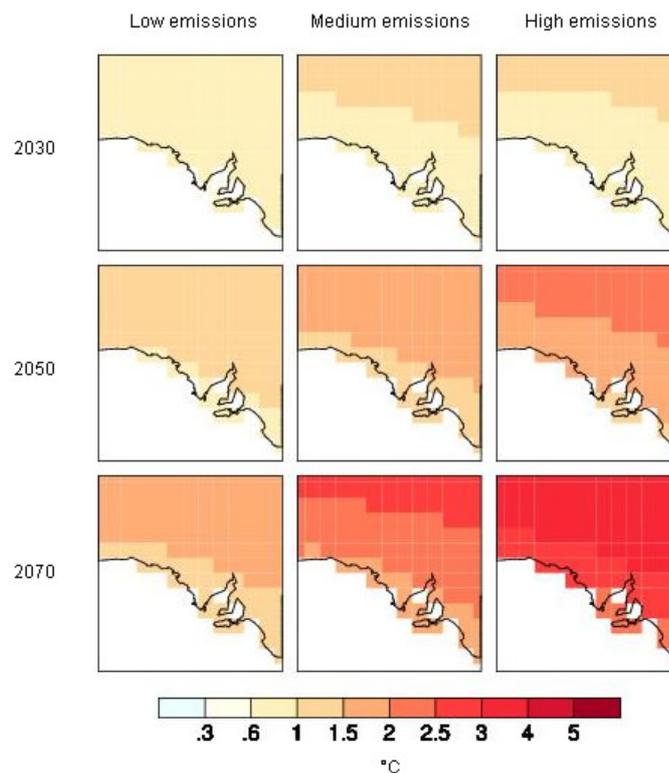


Figure 2: Best estimate (50th percentile of model projections) for South Australian annual mean temperature change (°C) for 2030, 2050 and 2070 using low, medium and high greenhouse gas emission scenarios.

Changes in extreme temperatures

Along with the increase in mean temperatures, an increase in the frequency of very hot days and nights is likely. Projections indicate that by 2030 Adelaide will experience several more days per year above 35°C than it does now, with about double the current frequency by 2070 under a high-emission scenario. Other locations are likely to experience similar increases.

Conversely, the frequency of frosts as well as very cold days and nights is likely to decline across the state.

Changes in other climate variables

Other projected climate changes with potential to impact agriculture in South Australia include:

- increases in sunshine in winter
- small decreases in relative humidity
- small decreases in wind speed in winter, and increases in other seasons

Changes in severe weather

Vulnerability to changes in severe weather varies regionally. Potential changes that may impact agriculture in South Australia include:

- higher bushfire risk
- fewer cool-season tornadoes
- higher heatwave frequency

Potential impacts

The combination of projected warming and less rainfall has serious implications for farming across the state. Farming of marginal land is likely to become even more challenging if rainfall declines substantially.

More general threats for agriculture across southern Australia include:

- decline in productivity due to increased drought and bushfires
- crop yields benefiting from warmer conditions and higher carbon dioxide levels, but vulnerable to reduced rainfall
- greater exposure of stock and crops to heat-related stress and disease
- earlier ripening and reduction in grape quality
- less winter chilling for fruit and nuts
- southern migration of some pests
- potential increase in the distribution and abundance of some exotic weeds

Planning for change

Farmers in South Australia need to prepare for climate change, as well as help mitigate global warming by reducing greenhouse gas emissions. While further human-induced warming is inevitable, the great range in projected climates by 2070 indicates that we still have a choice about what type of climate we will have by the end of this century.

Further information

The information presented here is sourced from:

- the *Climate Change in Australia* report: <http://www.climatechangeinaustralia.com.au>
- the Intergovernmental Panel on Climate Change: <http://www.ipcc.ch>