

The Future of WA's Climate



What are climate projections?

Climate projections describe possible changes in the future climate and are useful tools for making long-term policy and investment decisions. These projections are produced by computer models which simulate the atmospheric processes and depend on the future concentrations of greenhouse gases in the atmosphere, amongst other things. These concentrations in turn are determined by assumptions about future socioeconomic and technological developments, which are used to create a range of “scenarios”.

The Intergovernmental Panel on Climate Change (IPCC) released a Special Report on Emissions Scenarios in 2000, which sets out possible trajectories of greenhouse gas emissions. These “emission scenarios” show the expected concentrations of greenhouse gases in the atmosphere from 2000 to 2100 and are fed into climate models to enable them to predict the future climate and determine the impacts of the enhanced greenhouse effect.

What does the future hold for the climate of WA's south-west?

In the south-west of WA, rainfall has already decreased and is projected to continue decreasing throughout this century. Future increases in temperature and potential evaporation are also anticipated; however, predicting impacts of global climate change at a regional and local level is difficult.

The **Indian Ocean Climate Initiative (IOCI)** research program has been studying the climate of WA's south-west since 1998. Projections under all scenarios and all models point to drier conditions across the south-west in the future.



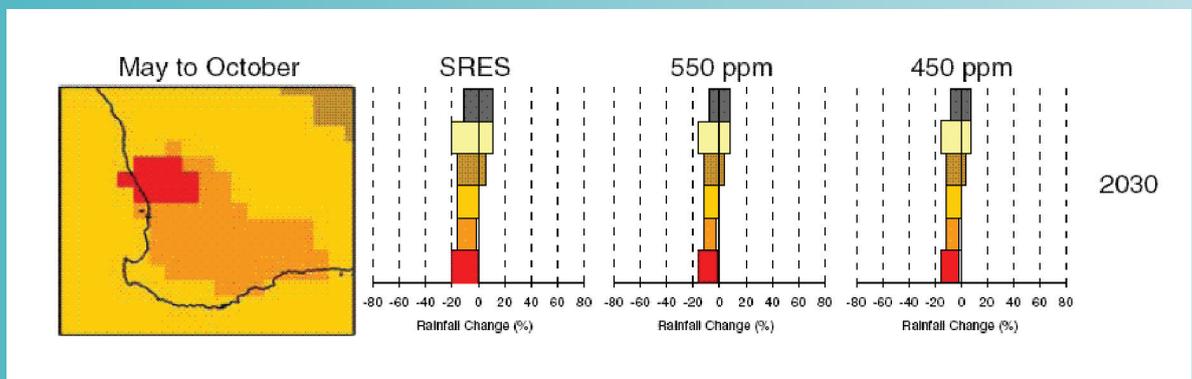


Figure 1 Projected precipitation changes for 2030 relative to 1960–1990 as determined by runs from nine international climate models forced by the full range of the SRES scenarios and the 550 ppm and 450 ppm stabilization scenarios (Bates et al, 2008).

The current global climate models all agree on the direction of change in winter (June to August) across the south-west with a mean reduction in south-west WA's winter rainfall of approximately 20 percent predicted (**Figure 1**). Results from IOCI research for south-west WA projects that relative to 1960-1990 (Bates et al, 2008):

- By 2030, rainfall will decrease by between 2 to 20 percent;
- By 2030, summer temperatures will increase by between 0.5 to 2.1 degrees C;
- By 2030, winter temperatures will increase by between 0.5 to 2.0 degrees C;
- By 2070, rainfall will decrease by between 5 to 60 percent;
- By 2070, summer temperatures will increase by between 1.0 to 6.5 degrees C; and
- By 2070, winter temperatures will increase by between 1.0 to 5.5 degrees C.

For further
information on
the IOCI research
program, go to

www.ioci.org.au

Uncertainties associated with climate projections

1. The inherent chaotic nature of weather systems. A real world climate system has two components – a longer term trend component and a shorter term variability about the trend. The shorter term variability is chaotic and random in nature. In projecting future climate, the longer term trend component is important. To address the uncertainty due to the inherent variability about the trend component, IOCI scientists use a group of different models and simulations.

2. Assumptions made when developing emission scenarios. Emissions scenarios are important inputs for climate models. The scenarios include assumptions about future socioeconomic, political and technological developments. As human behaviour is difficult, if not impossible, to predict, the scenarios are therefore

subject to uncertainty. A range of scenarios is commonly used to represent a range of plausible global scenarios. These scenarios are diverse but do not diverge greatly over the next 25 years.

Climate projections, for example temperature projections, using these different scenarios can vary widely.

Figure 2 shows an example of the range of temperature projections to 2100 based on a variety of the IPCC emission scenarios.

3. Errors in representing real climate systems.

These errors are due to limitations in computer models representing the real-world climate system. All international models used in the IOCI projections for 2030 have been evaluated so only those that more accurately model the major features of the climate of WA are selected. A technique known as downscaling can assist in reducing this type of uncertainty.

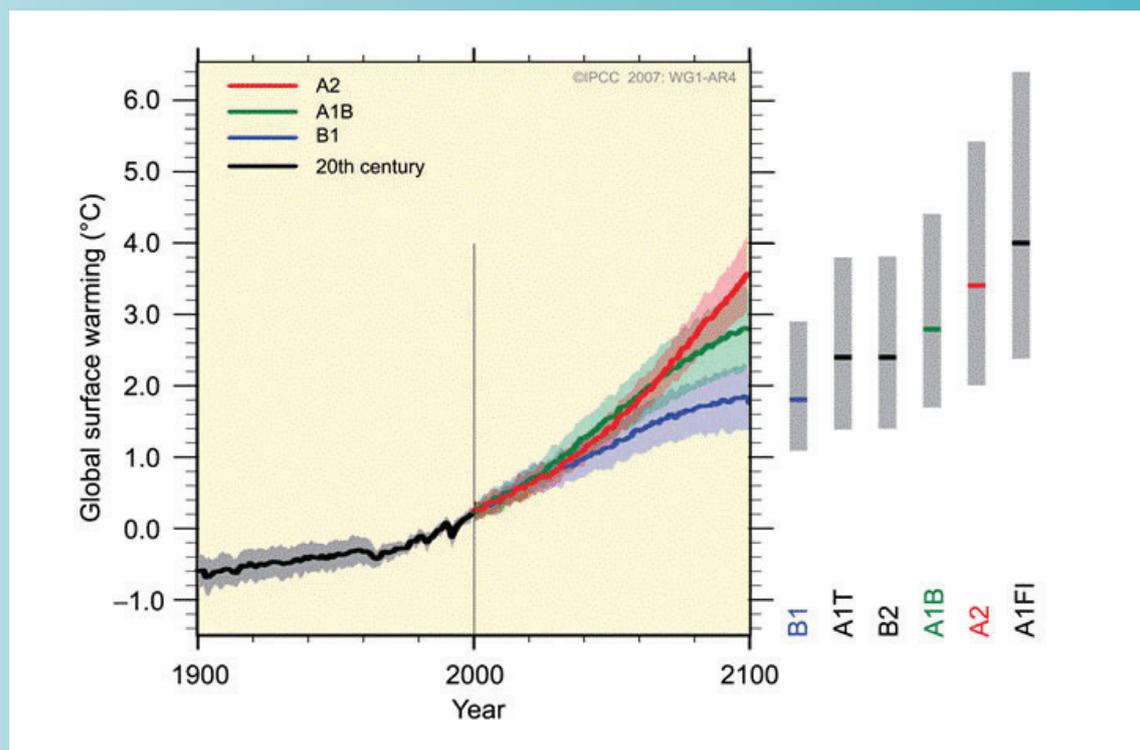


Figure 2 Projected global temperatures under a range of greenhouse gas concentration levels.



Useful links

www.ioci.org.au

www.bom.gov.au

www.csiro.au

www.dec.wa.gov.au/climatechange

www.climatechangeinaustralia.gov.au

Reference

Bates, B. C., Hope, P., Ryan, B., Smith, I. Charles, S. 2008 *Key findings from the Indian Ocean Climate Initiative and their impact on policy development in Australia* Climate Change (2008) 89:339-354, Springer Science + Business Media B.V. 2008