State of the Climate 2018

Future Climates Australia

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Managing climate risk:

A rapidly changing landscape

World Economic Forum — Global Risks Report 2018

Top 10 risks in terms of Likelihood	Top 10 risks in terms of Impact
1 Extreme weather events	1 Weapons of mass destruction
2 Natural disasters	2 Extreme weather events
3 Cyberattacks	3 Natural disasters
4 Data fraud or theft	4 Failure of climate-change mitigation and adaptation
5 Failure of climate-change mitigation and adaptation	5 Water crises
6 Large-scale involuntary migration	6 Cyberattacks
7 Man-made environmental disasters	7 Food crises
8 Terrorist attacks	8 Biodiversity loss and ecosystem collapse
9 Illicit trade	9 Large-scale involuntary migration
10 Asset bubbles in a major economy	10 Spread of infectious diseases

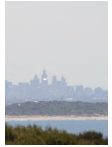
Categories

- Economic
- Environmental
- Geopolitical
- Societal
- Technological

Source: World Economic Forum Global Risks Perception Survey of Almost 750 experts and decision-makers in the World Economic Forum's multistakeholder communities

Note: Survey respondents were asked to assess the likelihood of the individual global risk on a scale of 1 to 5, 1 representing a risk that is very unlikely to happen and 5 a risk that is very likely to occur. They also assess the impact on each global risk on a scale of 1 to 5 (1: minimal impact, 2: minor impact, 3: moderate impact, 4: severe impact and 5: catastrophic impact). See Appendix B for more details. To ensure legibility, the names of the global risks are abbreviated; see Appendix A for the full name and description.

Clear impacts are already apparent



Increased frequency, intensity, duration and extent of heatwaves

Longer fire season with more extreme fire danger days

More time spent in drought and hotter droughts

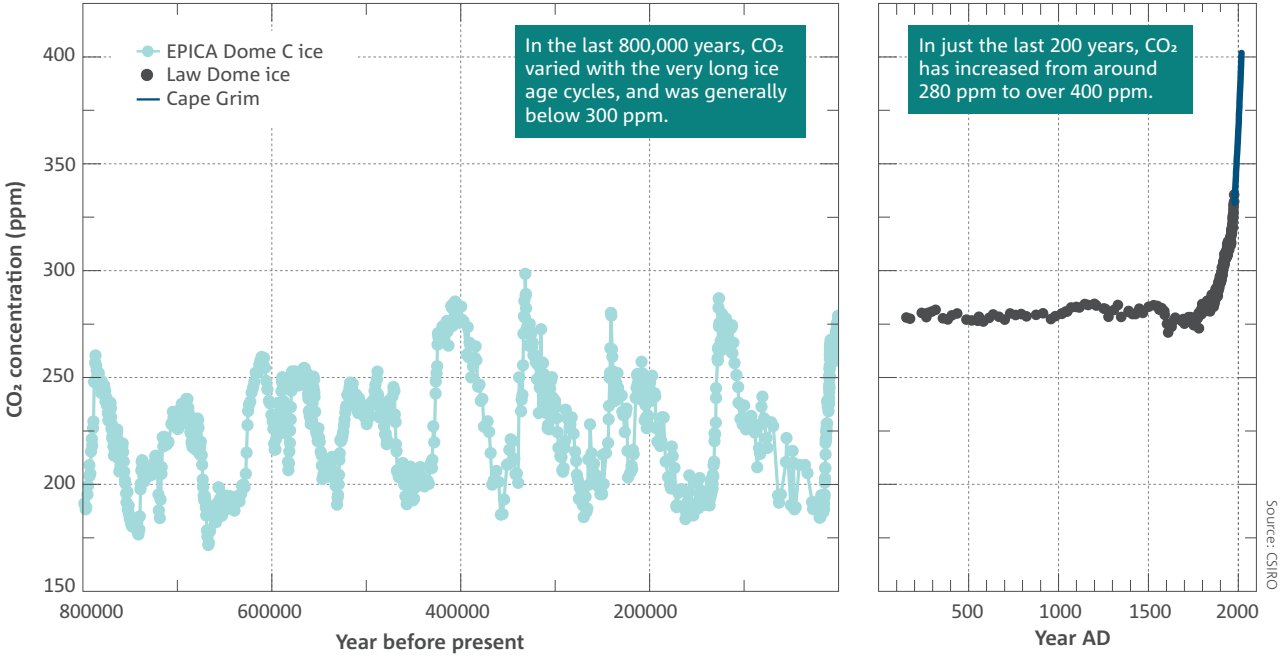
Greater proportion of rainfall from heavy rainfall events

Increased frequency of coastal storm surge inundation and recession

Prolonged high ocean temperatures

Greenhouse gases

Atmospheric carbon dioxide concentrations



Current CO2 levels probably unprecedented in >2M year

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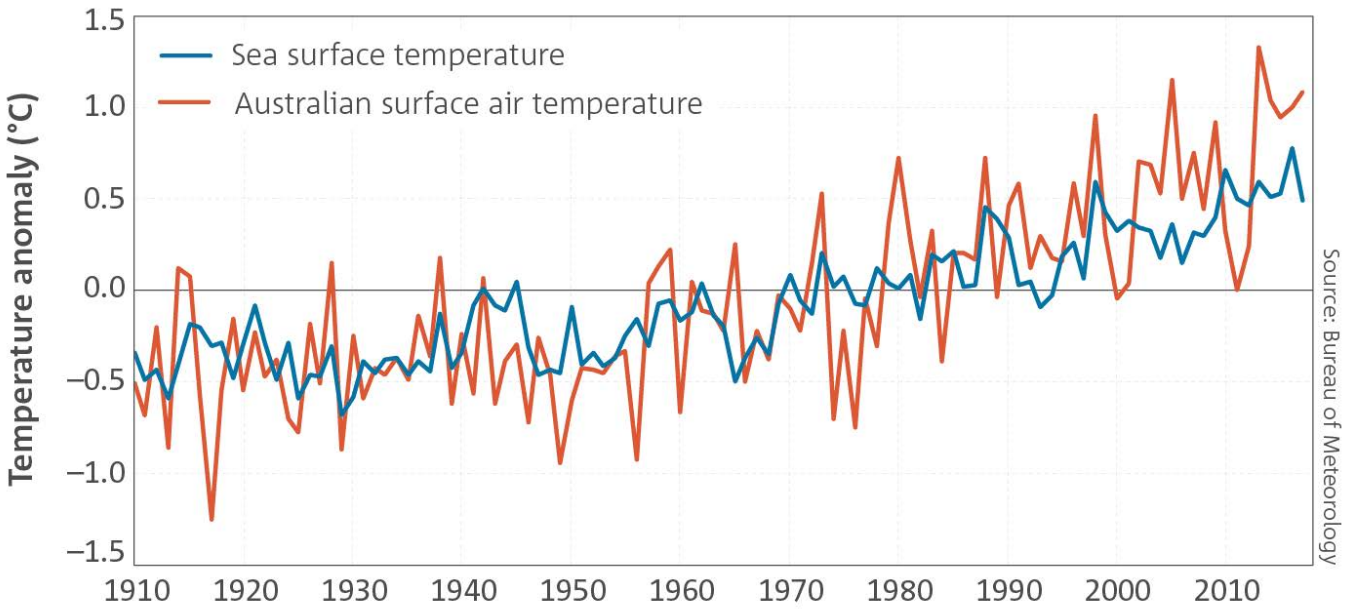
Australia's changing climate

Temperature



Rise of 1.4ºC in Australian land surface temperatures

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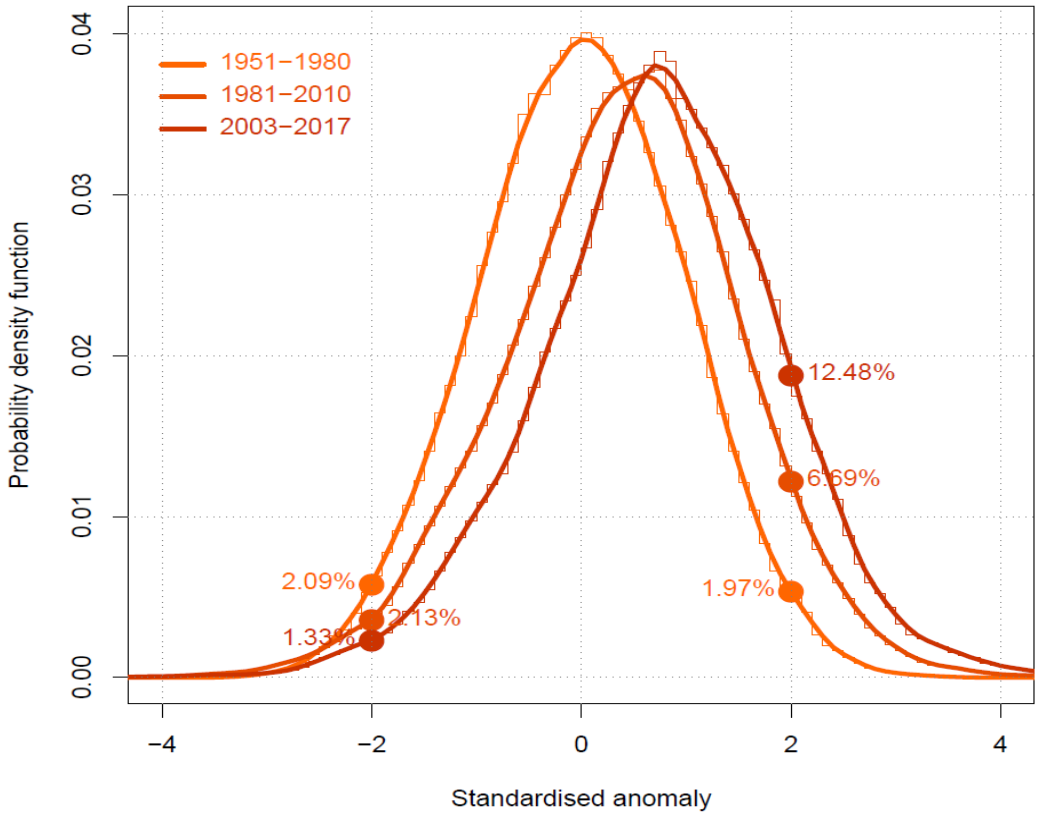
Why does 1ºC matter?

Increase in temperature has increased the occurrence of very warm monthly daytime temperatures



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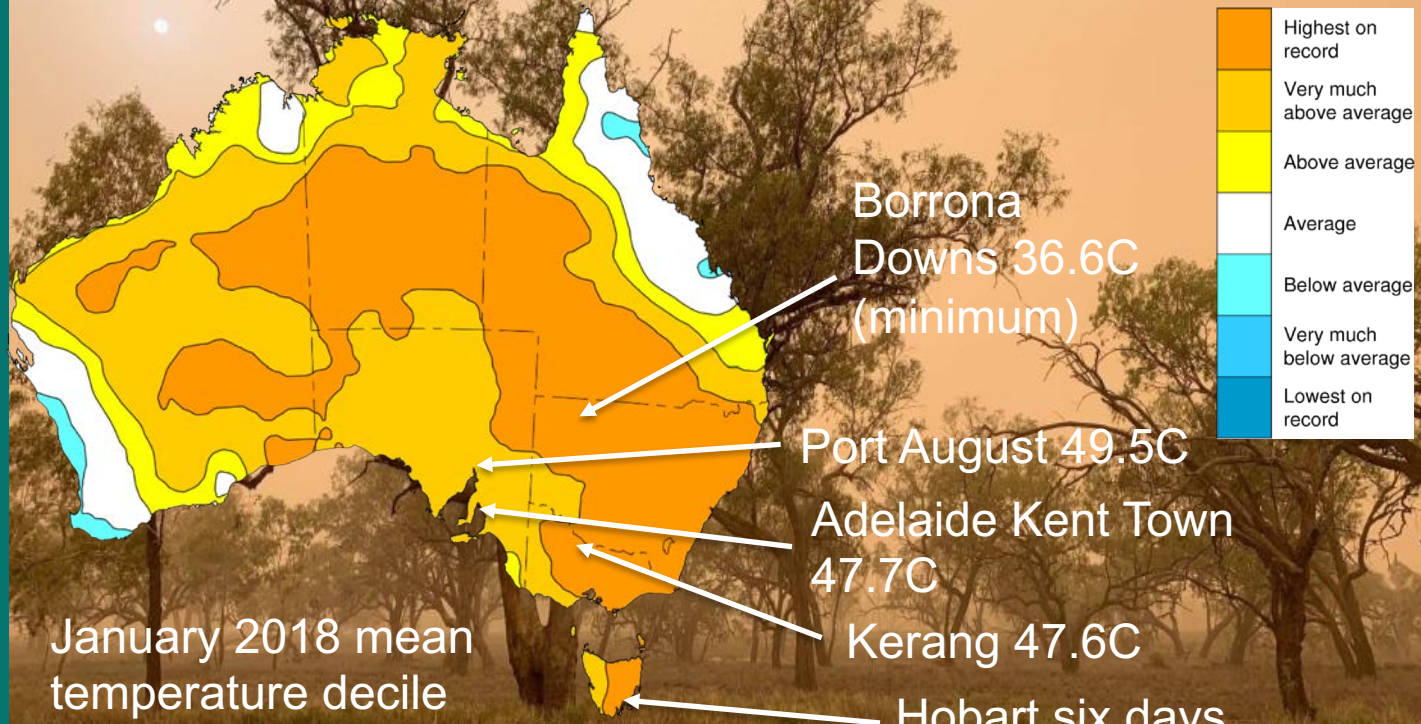
January 2019: Australia's hottest month on record

Averaged across the country, 8 of the 10 warmest days occurred during January 2019



ABC News, NSW Dust Storm

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Impacts?

Human health
Agriculture
EM sector
Need for cooling
Cost of power
Tourism

Queensland flying fox species decimated by record heatwave

'As far as we know, [the spectacled flying fox] has never suffered heat deaths before,' ecologist says

▲ Conservationists estimate more than 4,000 spectacled flying foxes have died this week in the heatwave.
Photograph: Marc Mccormack/EPA

eatened flying foxes have dropped dead due to heat stress

What caused the blackouts in Melbourne, and do Victorians need to get used to power cuts?

By Dan Harrison

Updated Mon at 9:23am

PHOTO: More than 200,000 Victorians had their power interrupted on Friday. (ABC News: Zalika Rizmal)

Mass fish die-off in Darling River could impact fish numbers in other states

ABC Riverland By Sowaibah Hanifie and Nadia Isa

Updated 15 Jan 2019, 4:13pm

PHOTO: Experts believe the mass die-off of Murray cod in NSW will impact fish numbers in other states. (Facebook: Rod Mackenzie)

Climate change costs will have knock-on effect on interest rates, Reserve Bank warns

7.30 By Laura Tingle

Updated Tue at 10:50pm

The Reserve Bank has warned it will have to take the impact of climate change into account when setting interest rates.

"The economy is changing all the time in response to a large number of forces," Guy Debelle said in a keynote address to the Centre for Policy Development.

"Monetary policy is always having to analyse and assess these forces and their impact on the economy.

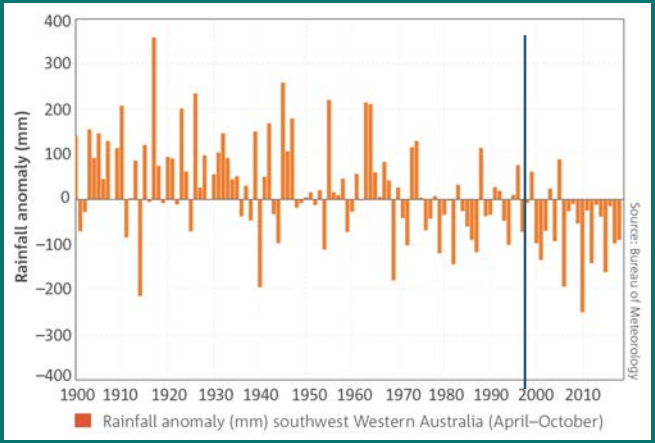
"But few of these forces have the

PHOTO: Reserve Bank Deputy Governor Guy Debelle delivering his speech to the Centre for Policy Development. (ABC News)

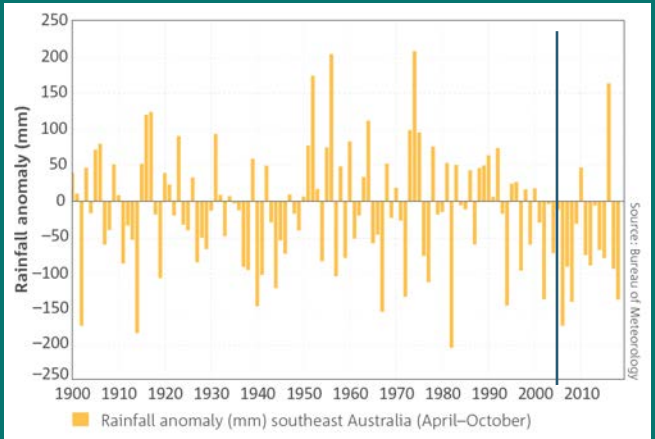
The current drought has had a dramatic effect on economic output, reducing farm output by 6 per cent..

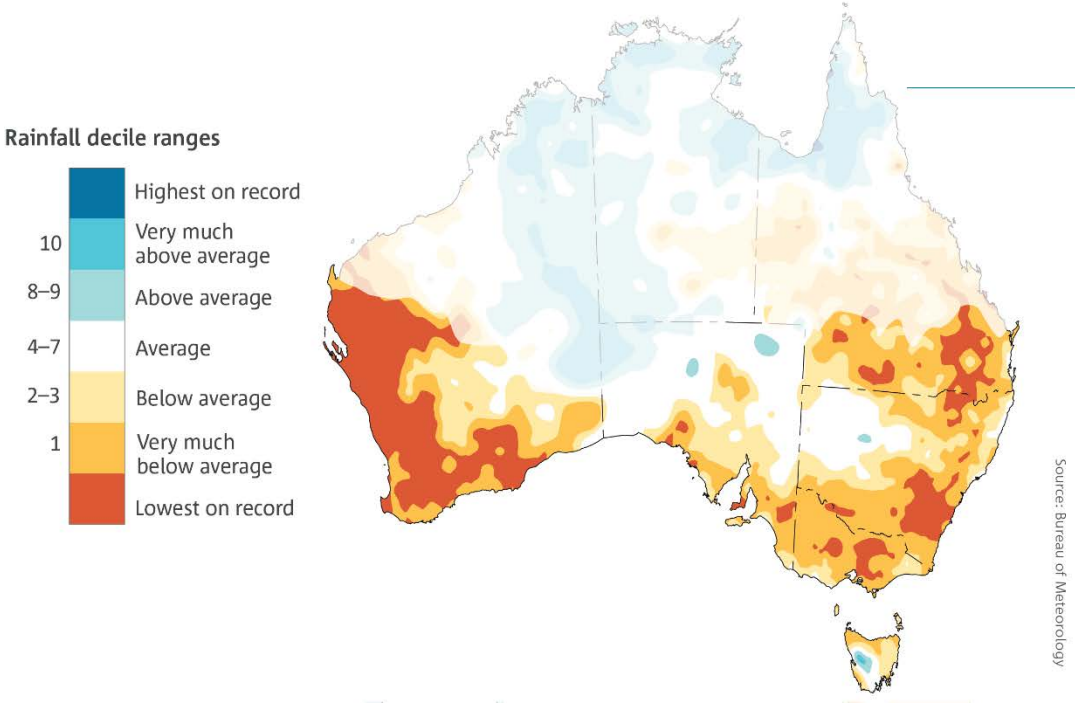
Rainfall

IOCI



SEACI





20 year April-October rainfall deciles: declines in south

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Southern Australia's decline an example of good adaptation in cities?

The Indian Ocean Climate Initiative (IOCI) research partnership established in 1998.

The South Eastern Australian Climate Initiative (SEACI) research partnership established in 2005.

Cost of desalination plants

Melbourne	$3.5bn
Sydney	$2.4bn
Adelaide	$1.83bn
Gold Coast	$1.2bn
Perth	$955m

Lake Hume 2007 Source Image: Wikipedia

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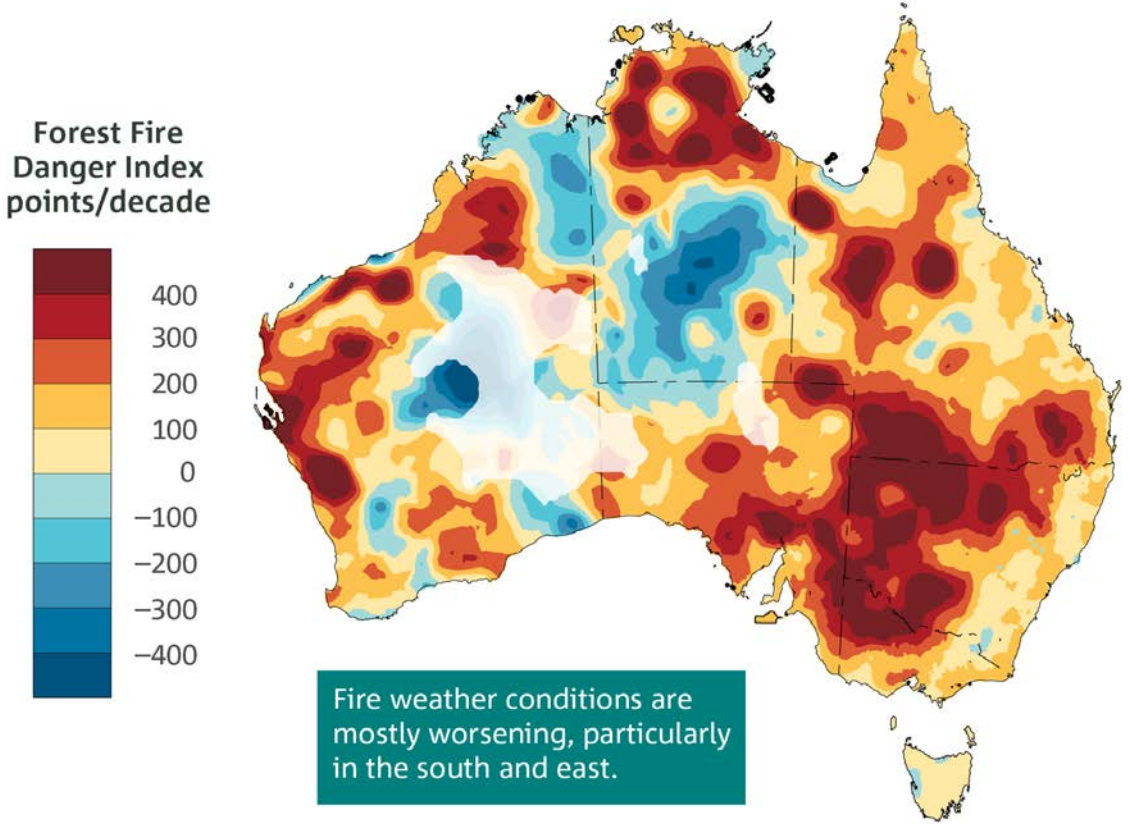
Australia's changing climate

Fire weather



Fire weather conditions are mostly worsening, particularly in the south and east.

Source: Bureau of Meteorology

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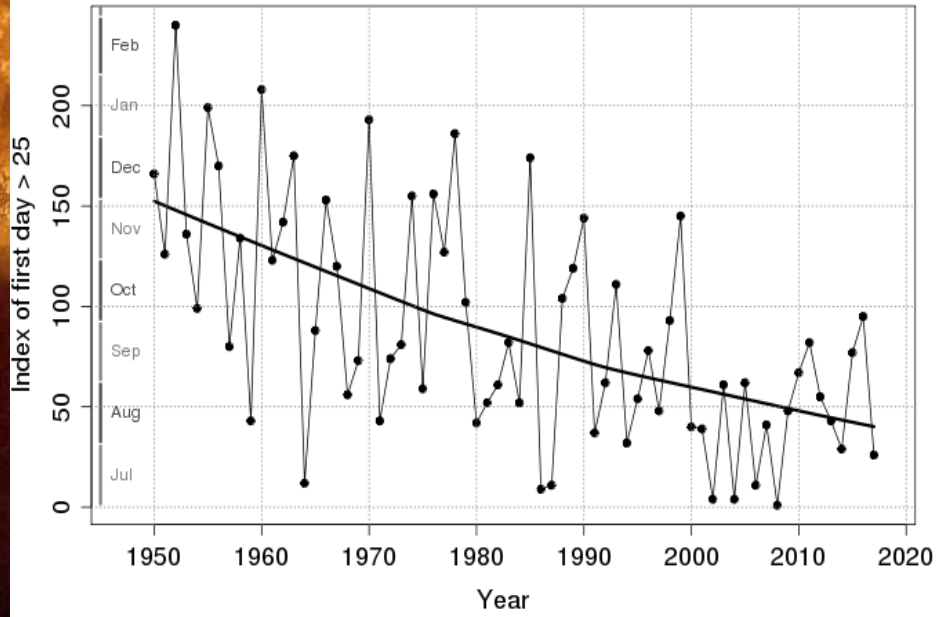
Longer more intense fire seasons

Bega Valley, 15 August 2018 (ABC)

Albany, 25 May 2018 (ABC)

Earliest day with south-coastal NSW daily FFDI > 25

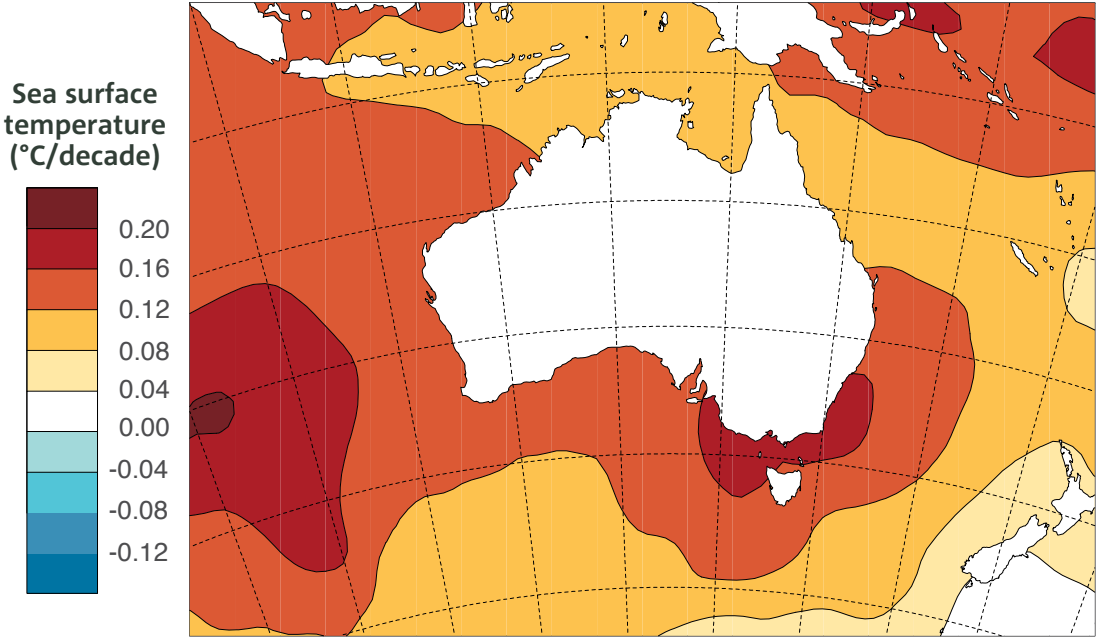


Ranch Fire California, August 2018 (SFGate)

Oceans

Sea surface temperature

The ocean surface around Australia has warmed, especially to the southeast.



Source: Bureau of Meteorology

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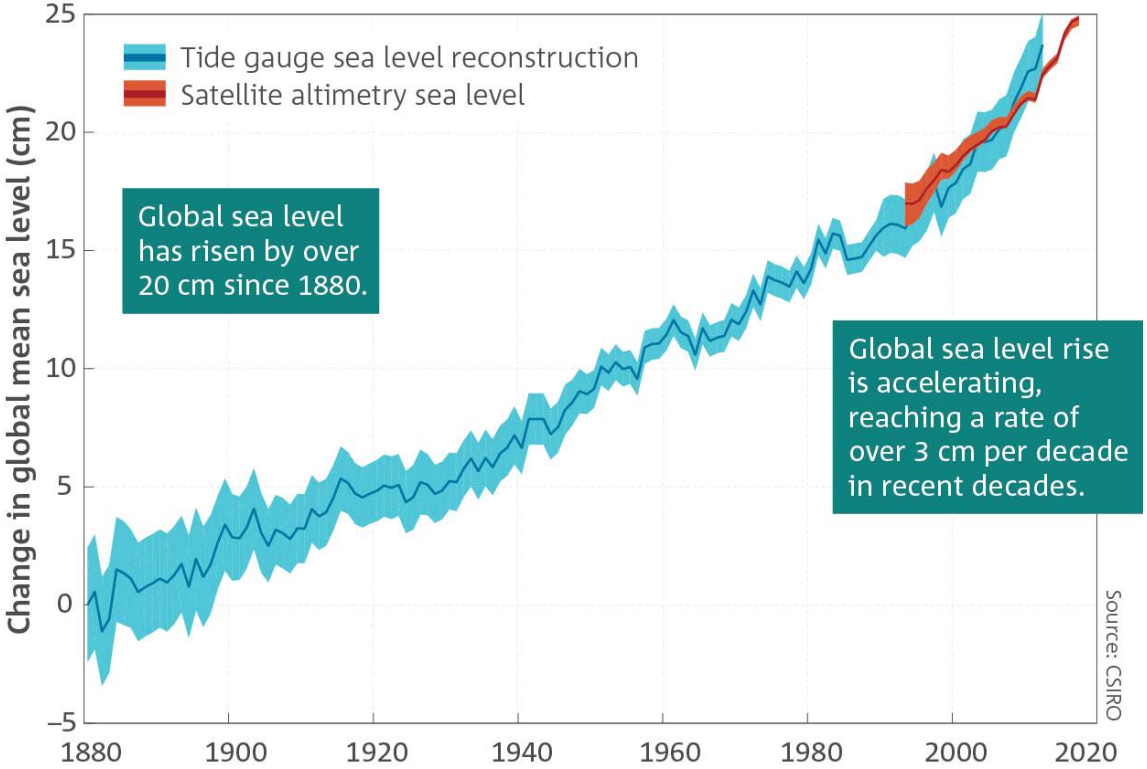
Oceans

Collaroy Beach, 2016

Altona Beach, 2014

Sea level



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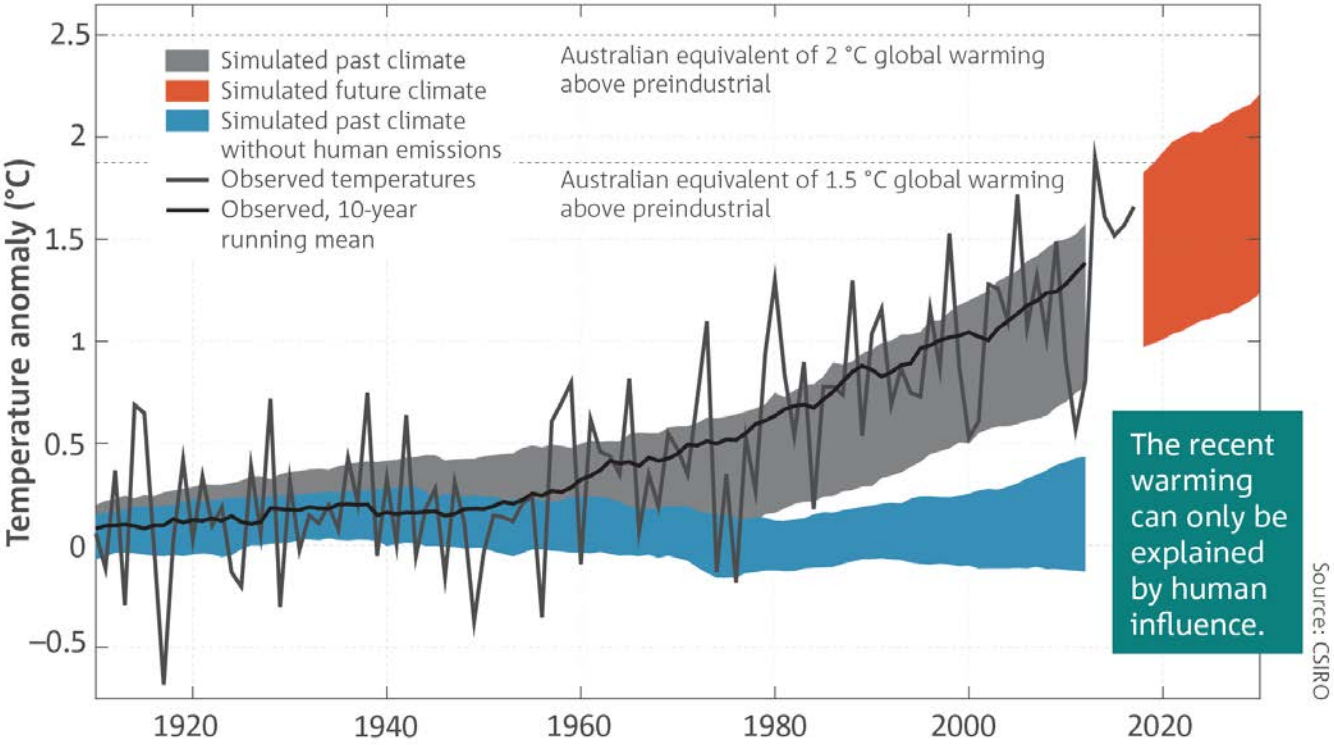
What are our options?

"belief in climate change is optional, but participation is mandatory"

Jim Beever, southwest Florida Regional Planning Council

Climate change is with us and impacts will accumulate



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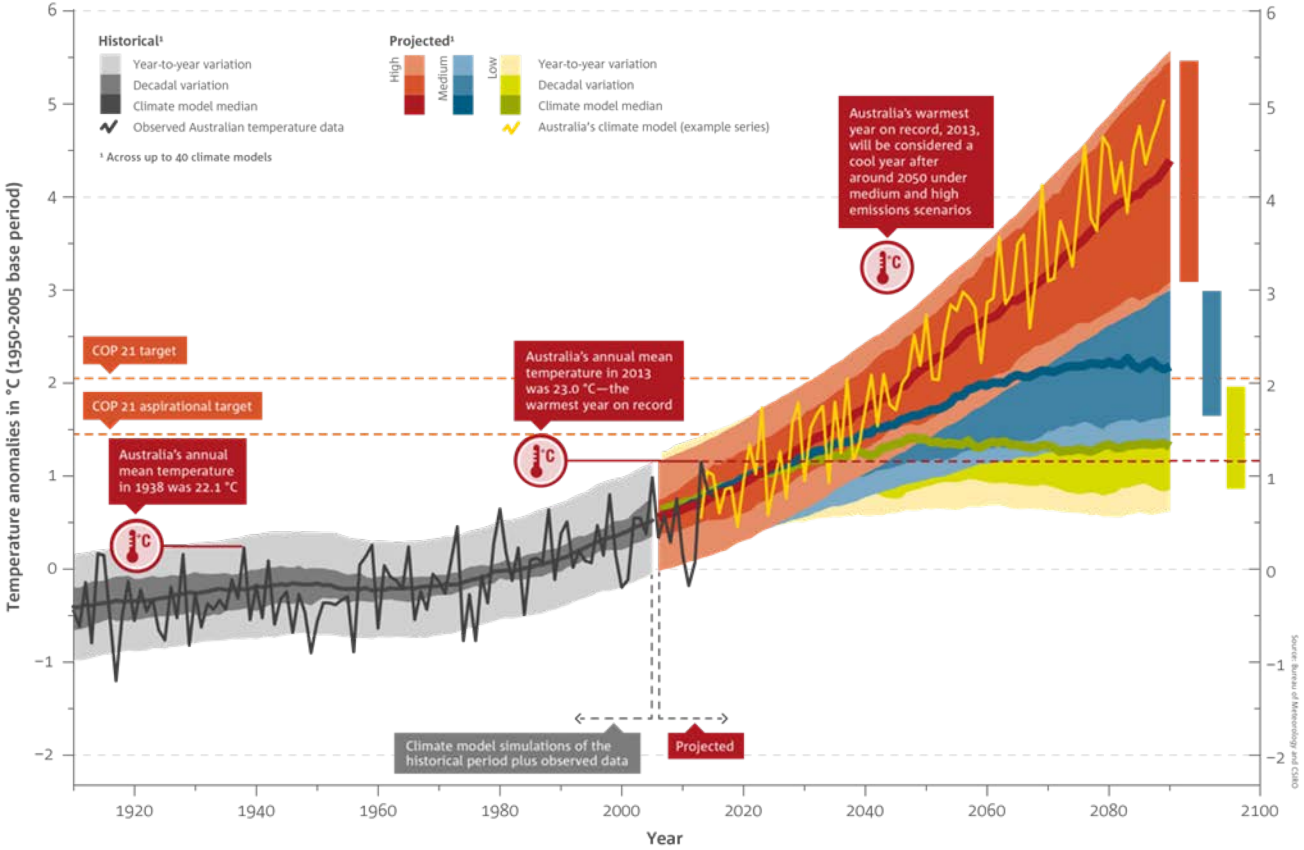
Australia's climate: large future change likely?

Australian temperature projections



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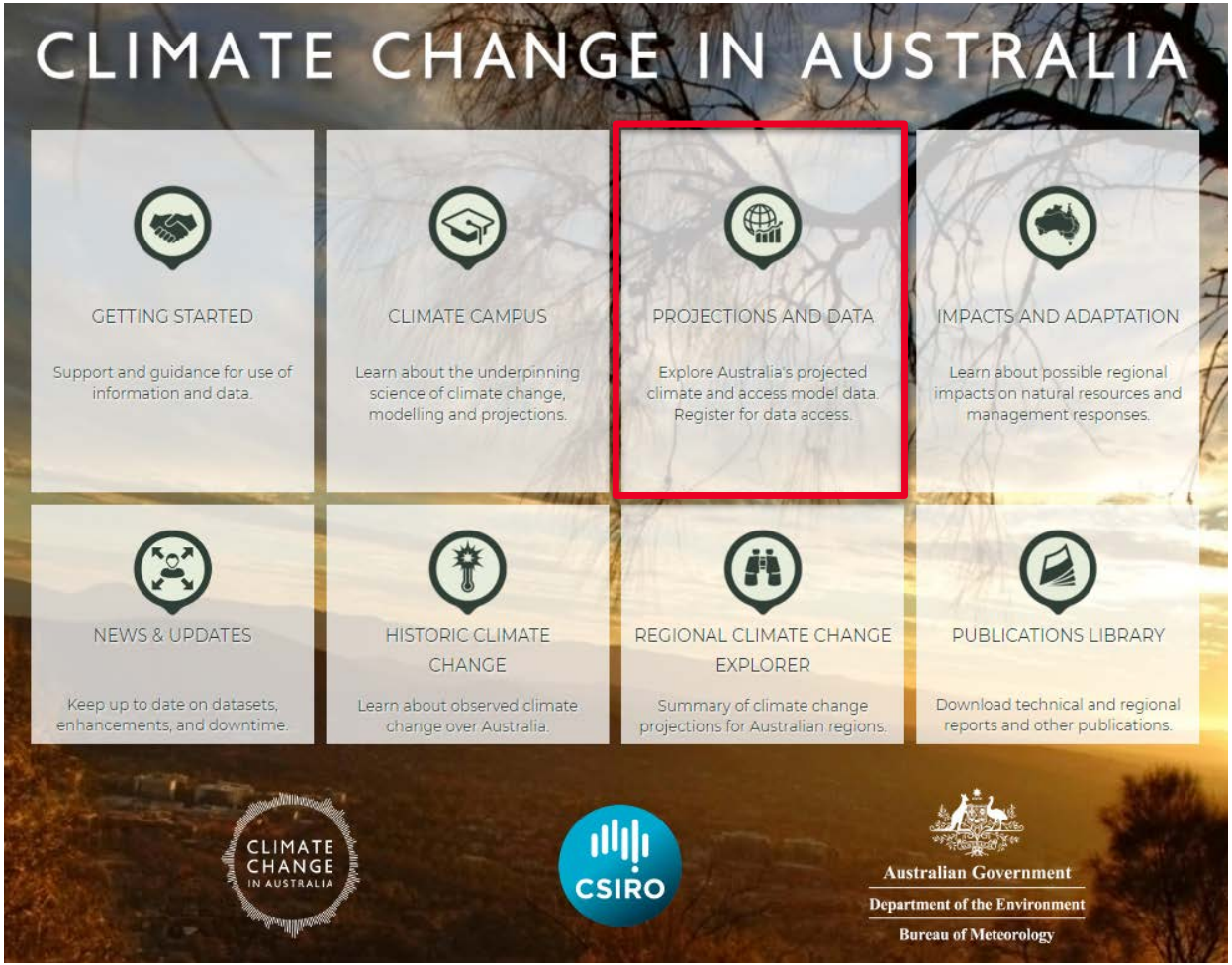
What will the future look like

Click on 'PROJECTIONS AND DATA'

https://www.climatechangeinaustralia.gov.au/en/climate-projections/climate-futures-tool/projections/



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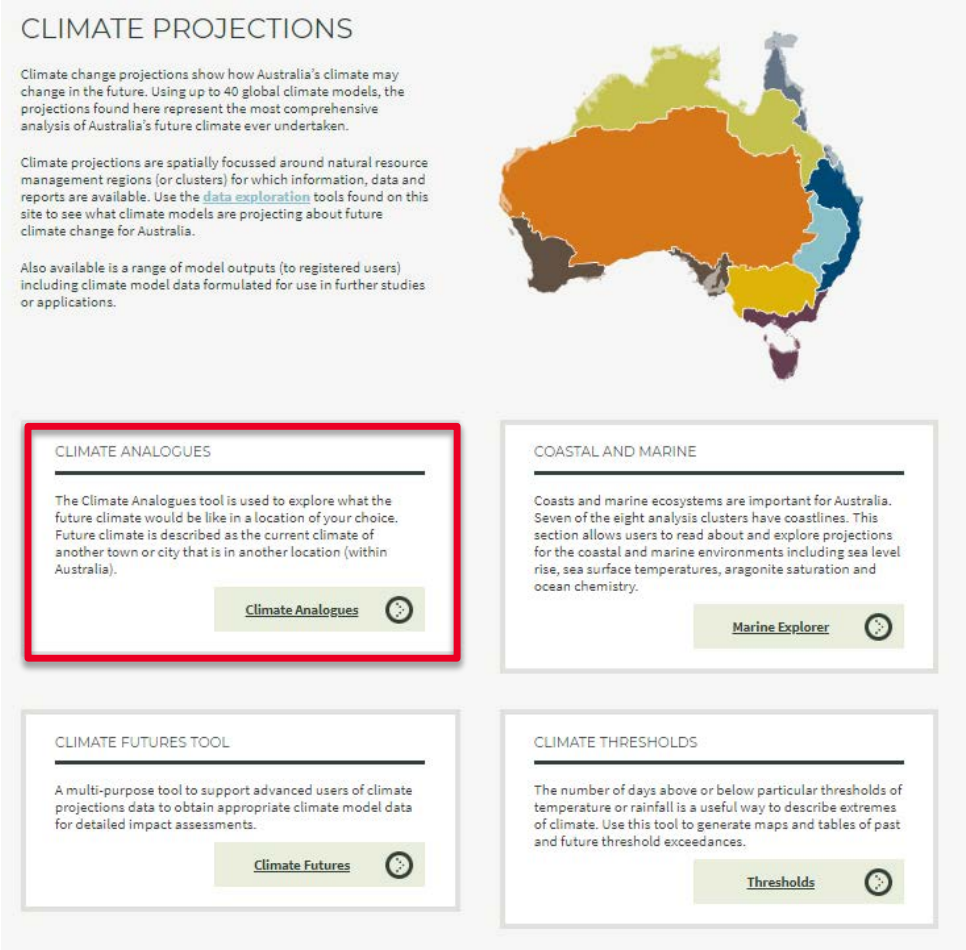
Climate change in Australia

Click on 'CLIMATE ANALOGUES'



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Climate change in Australia

Make use of the 'Analogue Explorer'

ABOUT CLIMATE ANALOGUES

TOOL: Analogues Explorer

Identification of areas that experience similar climatic conditions, but which may be separated in space or time (i.e. with past or future climates) can be helpful when starting to consider adaptation strategies to a changing climate. Locating areas where the current climate is similar to the projected future climate of a place of interest (e.g. what will the future climate of Melbourne be like?) is a simple method for visualising and communicating the impact of projected changes.

The climate analogue tool matches the proposed future climate of a region of interest with the current climate experienced in another region using annual average rainfall and maximum temperature (within set tolerances). This approach was used to generate the analogue cases presented as examples in each of the cluster reports .

The results from applying changes to annual temperature and rainfall settings in the analogues explorer capture sites of broadly similar annual maximum temperature and water balance. Users can refine the search for analogues by including potentially important differences in rainfall occurrences and other factors, such as rainfall seasonality (per cent of annual rainfall that falls in summer) and temperature seasonality (difference in summer and winter temperature). (See the tab at top right of the map interface in the analogue explorer).

The depiction on the right shows that after a 3 °C increase in annual maximum temperature and a 15 percent decrease in annual rainfall Melbourne's future climate matches the current climate in Dubbo (NSW).This could occur under high emissions by the end of the century.

NB: It is important to note that other potentially important aspects of local climate are not matched when using this approach, such as frost days or and other local climate influences. Furthermore, for agriculture applications, solar radiation and soils are not considered. Thus we advise against the analogues being used directly in adaptation planning without considering more detailed information.

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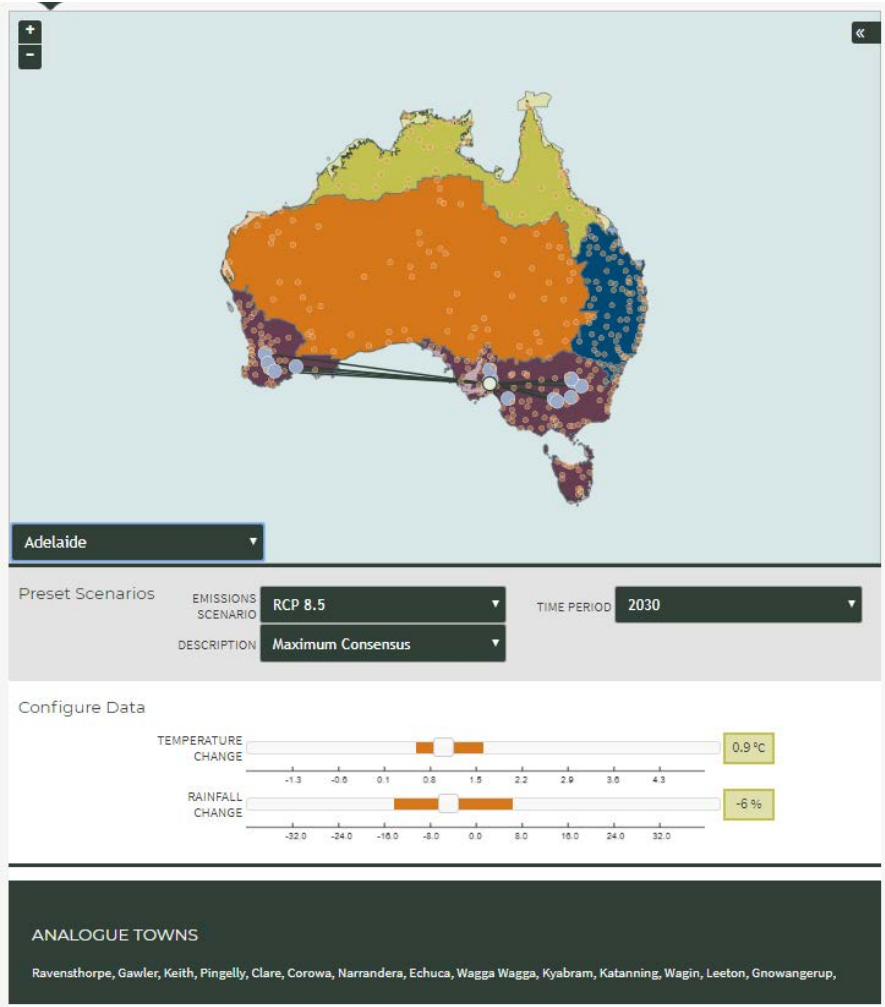
Make use of the 'Analogue Explorer'



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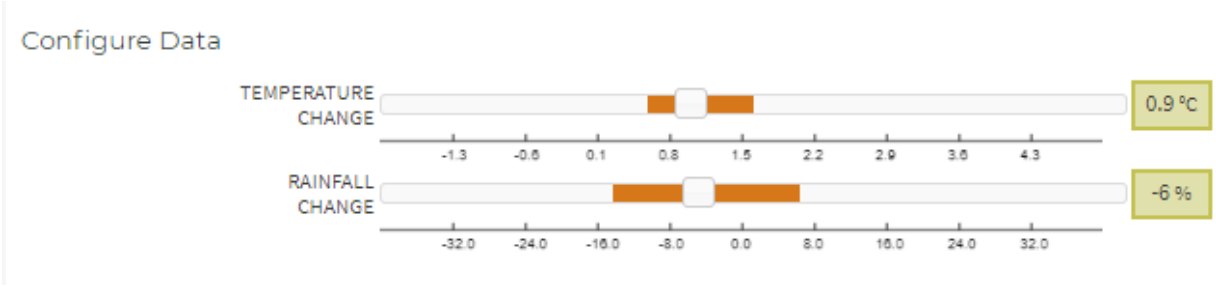
By 2030 expected conditions under a high emissions future



Under a high emissions scenario temperature likely to increase between 0.6 to 1.6 C at Adelaide by 2030…..median 0.9 C increase

Rainfall between -15% and +7 %. Median -6%

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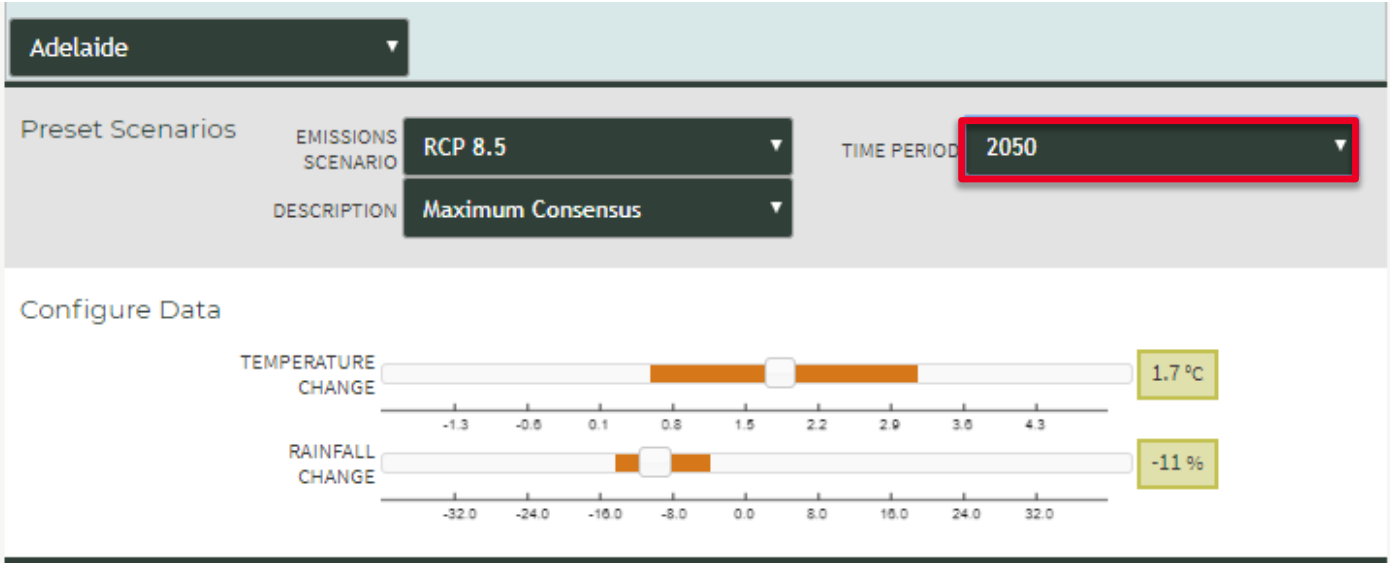
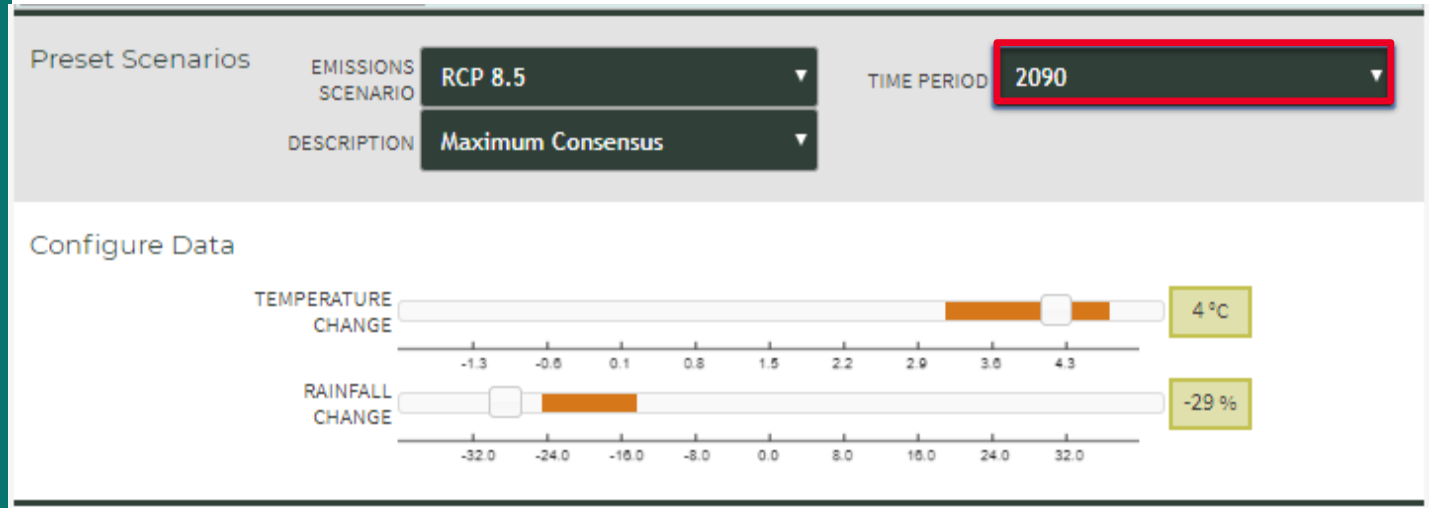
High emissions 2050 and 2090





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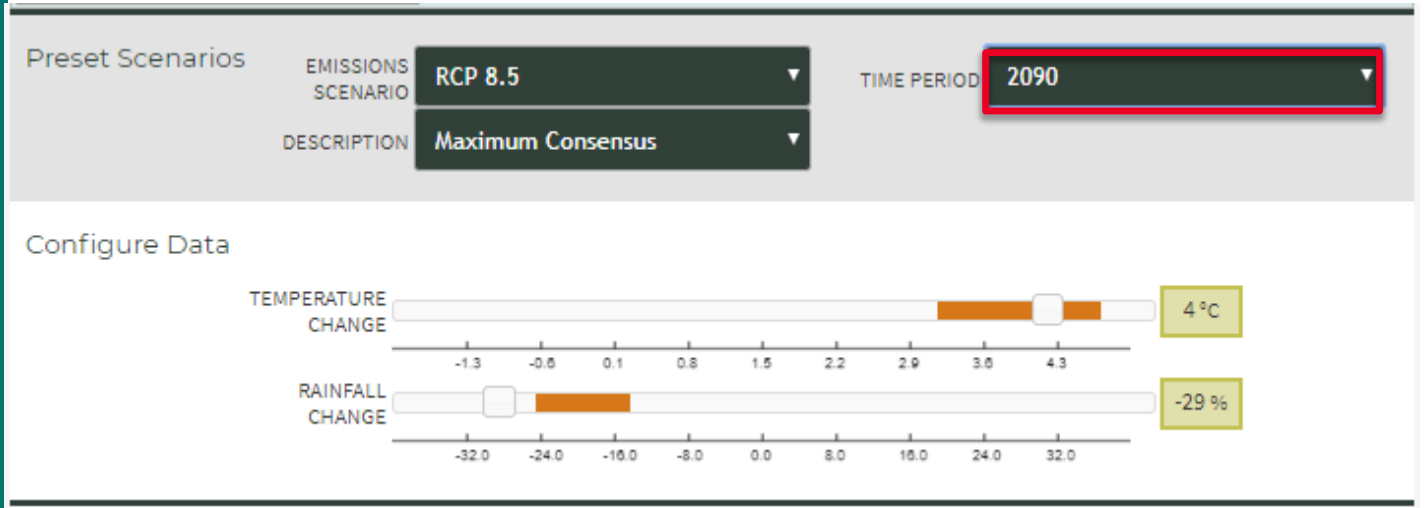
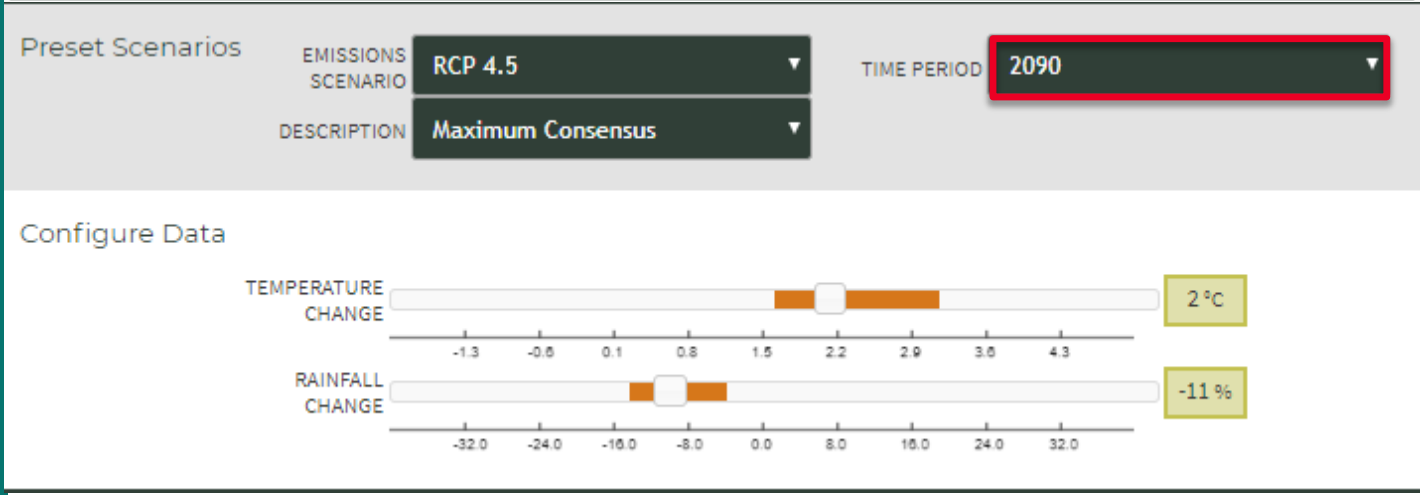
Differences between high emissions (top) and mid range emissions (bottom)





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Thank you

More information

www.bom.gov.au/state-of-the-climate

www.csiro.au/state-of-the-climate

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