



PROJECTIONS
FOR AUSTRALIA'S NRM REGIONS

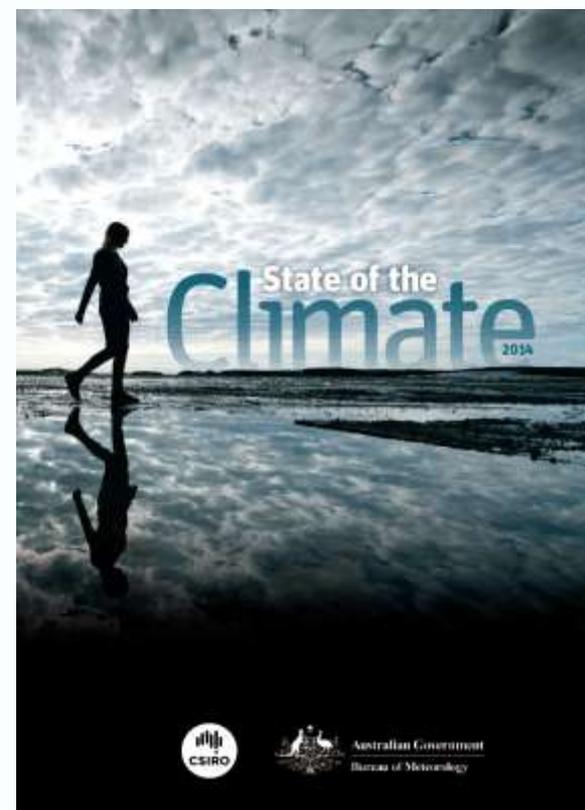


Australian Government
Department of the Environment
Bureau of Meteorology

-20° -10° 0° 10° 20° 30° 40° 50°

THE LATEST RESEARCH BUILDS UPON

- CLIMATE CHANGE IN AUSTRALIA (2007)
- IPCC 5TH ASSESSMENT REPORT (2013)
- STATE OF THE CLIMATE (2014)



KEY MESSAGES

AUSTRALIA'S CLIMATE HAS ALREADY CHANGED

- HOTTER SINCE 1910
- MORE RAIN IN NORTHERN AUSTRALIA SINCE 1970s
- LESS RAIN IN SOUTH-EAST AND SOUTH-WEST
- LESS SNOW
- MORE EXTREME DAILY RAIN AND FIRE WEATHER
- SEA LEVEL RISE

KEY MESSAGES

- FURTHER INCREASES IN GREENHOUSE GASES WILL CAUSE MORE CLIMATE CHANGE
- MORE HOT DAYS, FEWER COLD DAYS & LESS SNOW
- DRIER IN THE SOUTH
- MORE EXTREME DAILY RAIN AND FIRE WEATHER
- SEA LEVEL RISE
- OCEAN ACIDIFICATION
- FEWER BUT MORE INTENSE TROPICAL CYCLONES
- REAFFIRMS PREVIOUS PROJECTIONS BUT SOME UNCERTAINTIES REMAIN

A scenic landscape at sunset or sunrise. The sky is filled with soft, golden light, and the sun is visible on the right side, partially obscured by the branches of a large, leafless tree. The foreground is dominated by the dark silhouette of the tree's trunk and branches. In the background, there are rolling hills and mountains, with a valley filled with sparse, dry vegetation. The overall atmosphere is calm and serene.

WHAT'S NEW IN CCIA 2015?

KEY ELEMENTS OF THE PROJECTIONS PROJECT



Four emission scenarios and four time periods



Ranges of change for 21 climate variables based on 40 climate models



Addressing a range of user needs and building user capacity



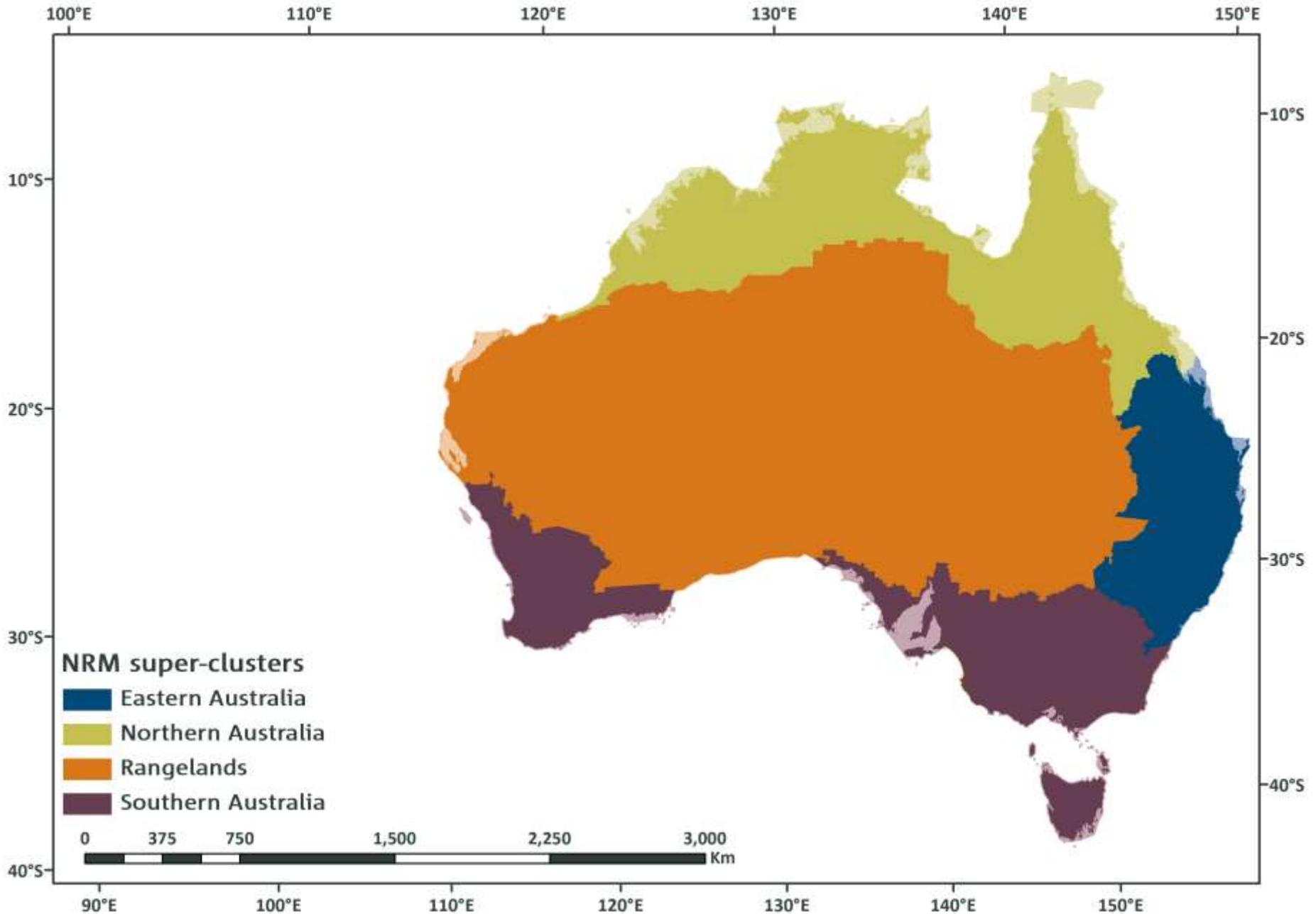
Providing users with data and information for decision making



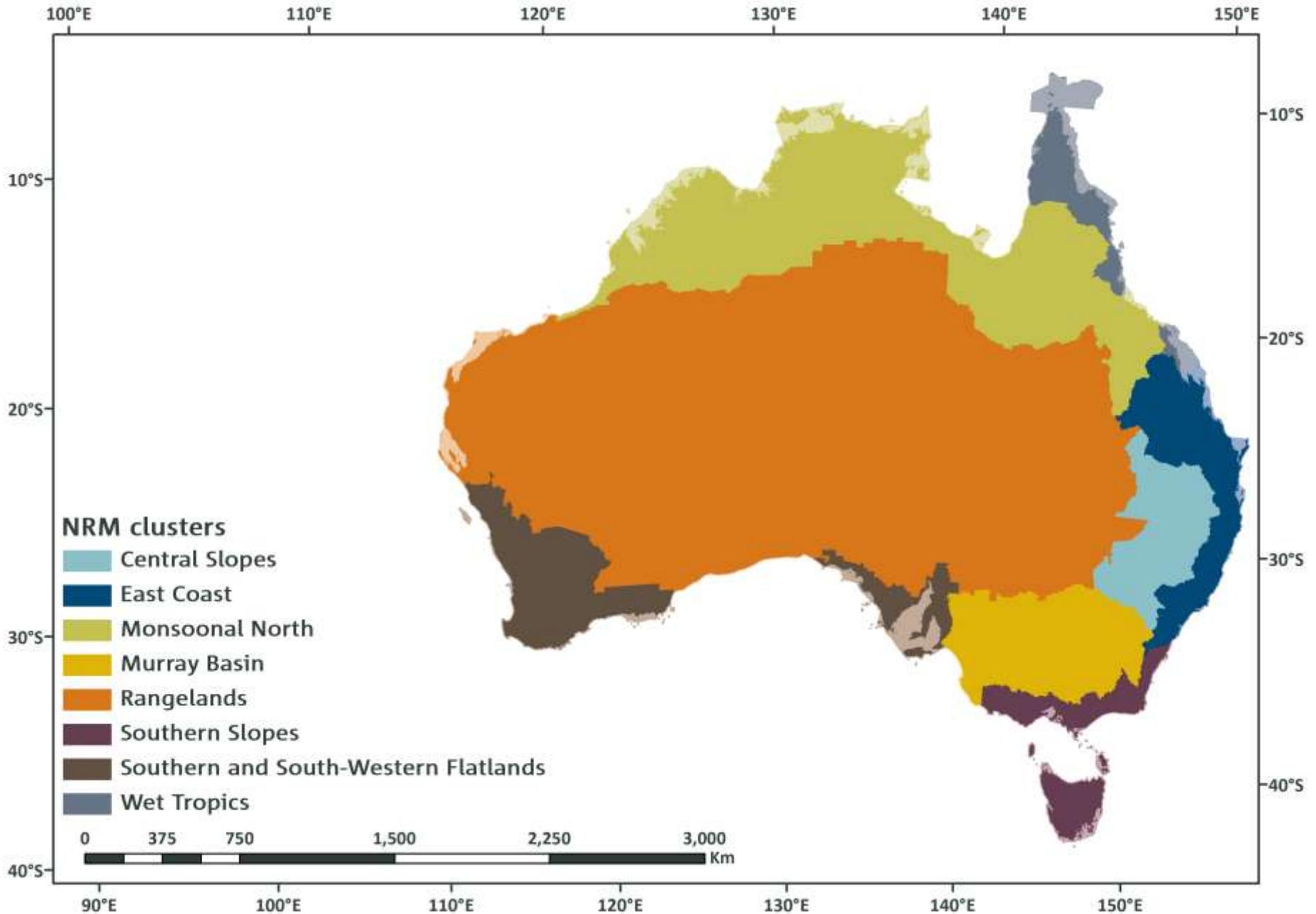
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REGIONAL INFORMATION – SUPER CLUSTERS

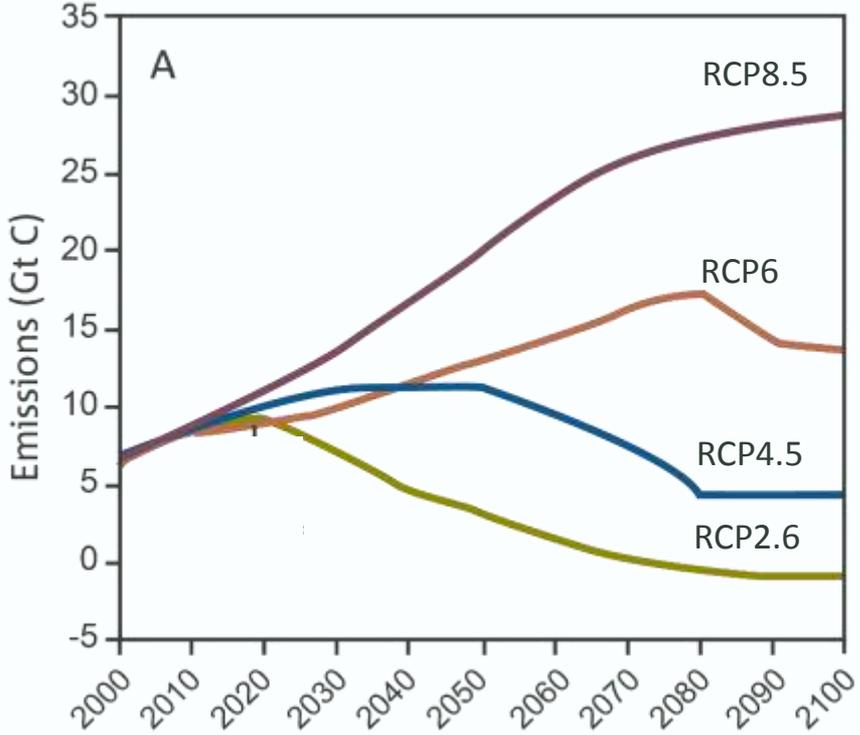


REGIONAL INFORMATION - CLUSTERS

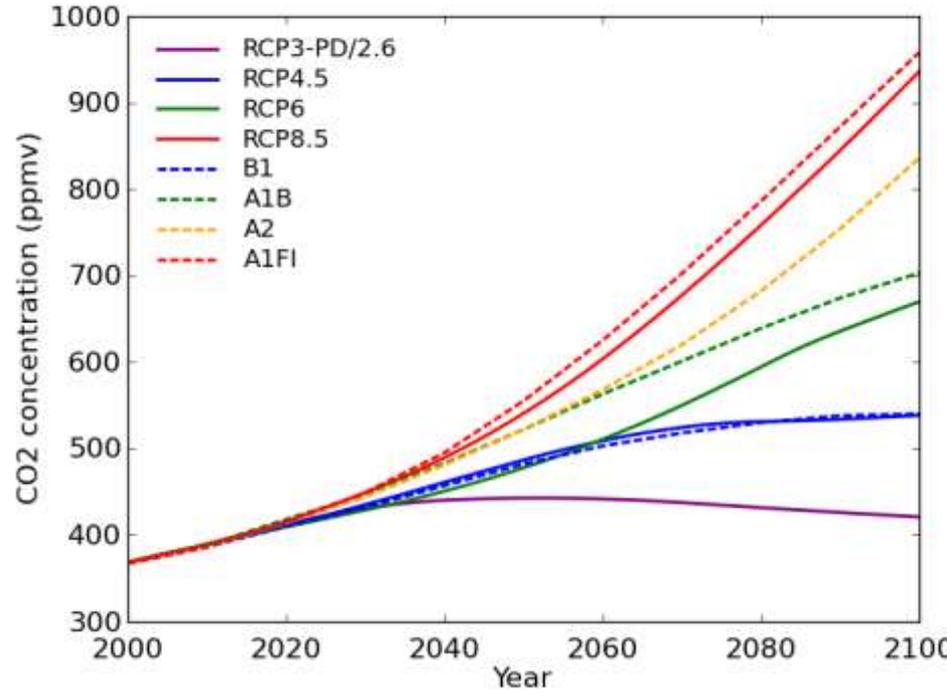


GREENHOUSE GAS EMISSIONS & CONCENTRATION PATHWAYS

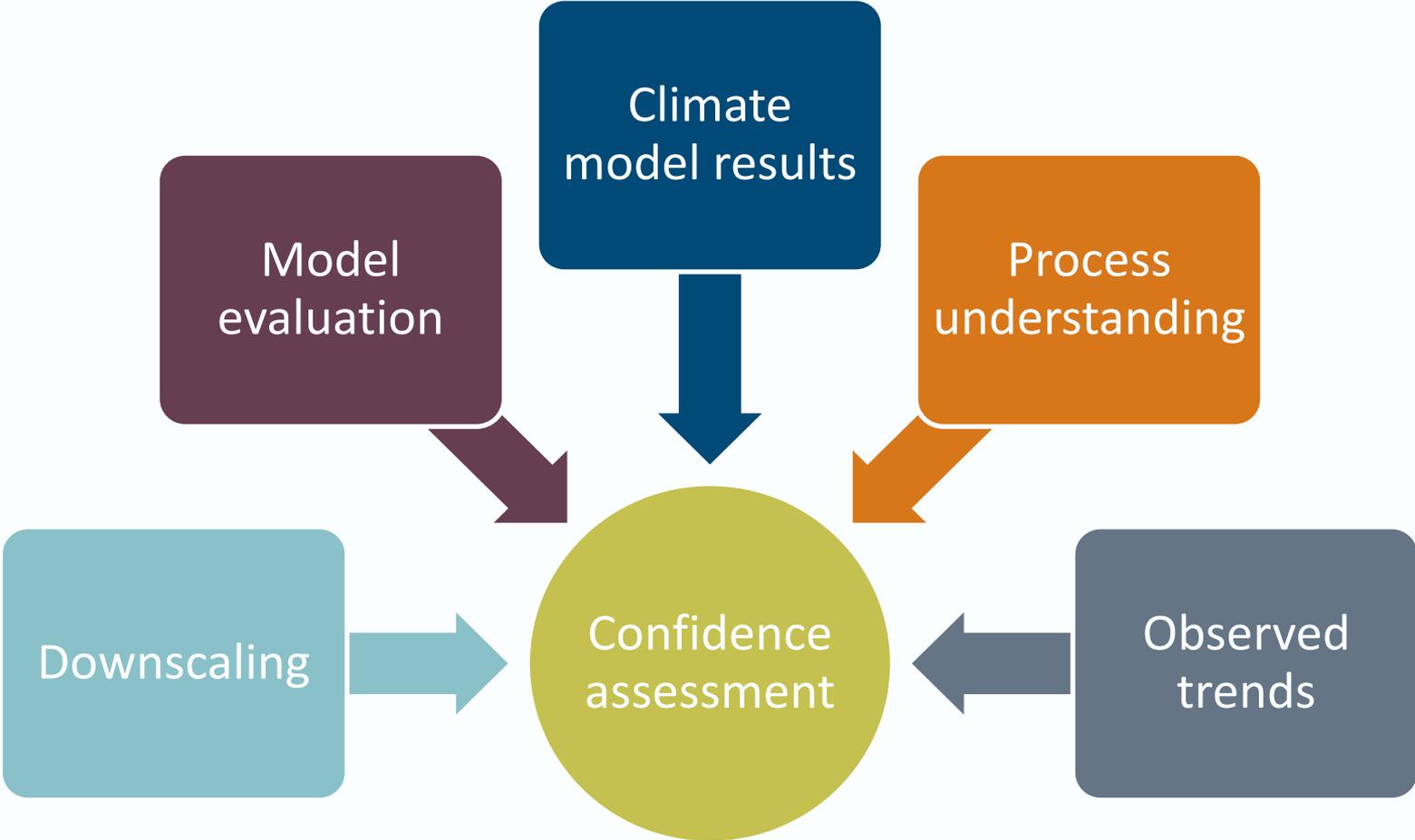
EMISSIONS SCENARIOS



CONCENTRATION PATHWAYS



ASSESSING CONFIDENCE IN PROJECTIONS





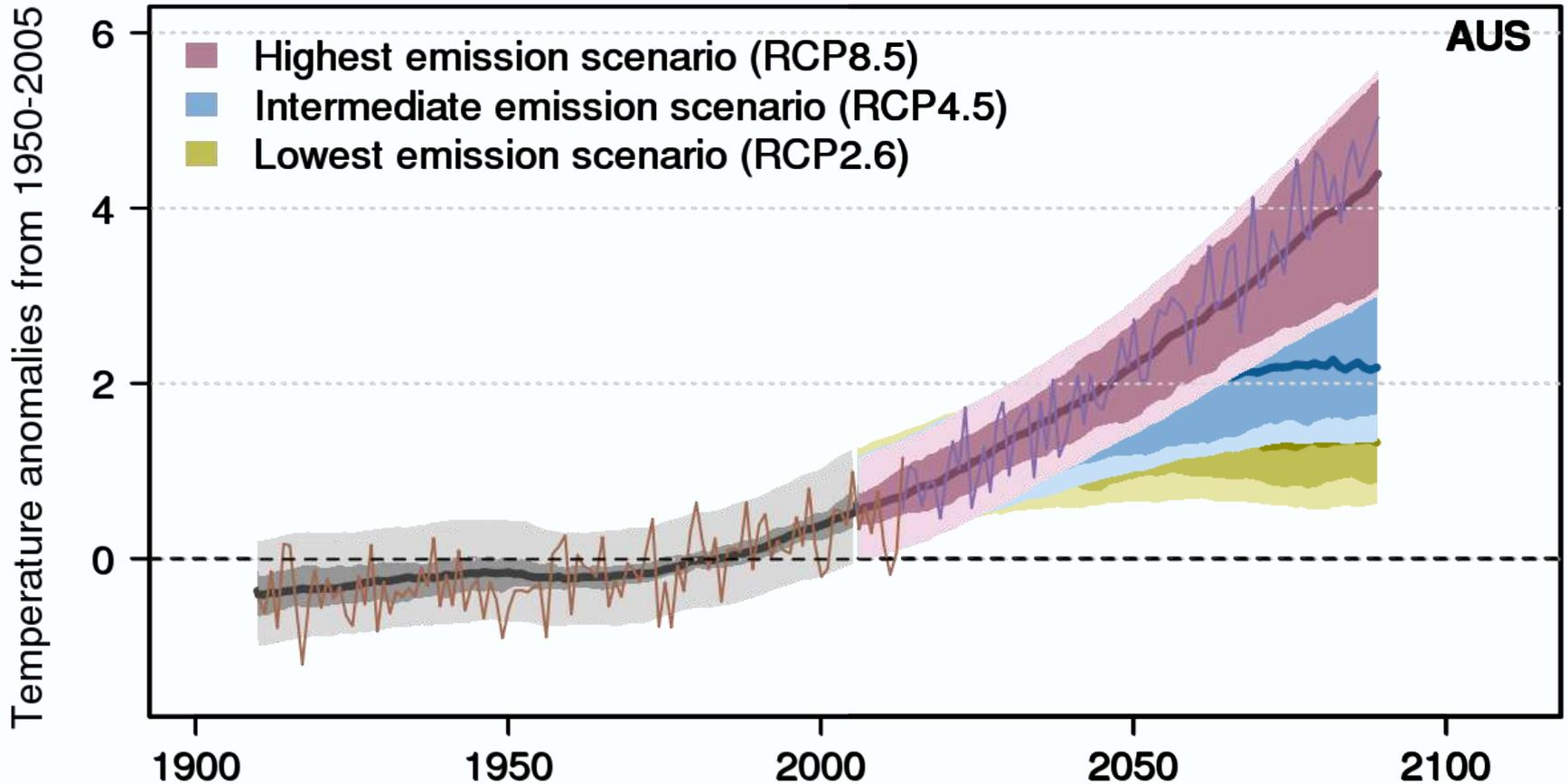
TEMPERATURE

AUSTRALIA WILL WARM SUBSTANTIALLY DURING THE 21ST CENTURY





AUSTRALIA WILL WARM SUBSTANTIALLY DURING THE 21ST CENTURY



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AUSTRALIA WILL WARM SUBSTANTIALLY DURING THE 21ST CENTURY

There is *very high confidence* in continued increases of mean, daily minimum and daily maximum temperatures throughout this century for all regions in Australia.

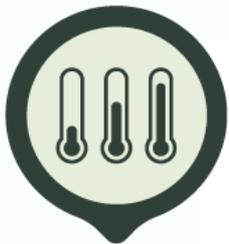
Warming will be large compared to natural variability in the near future (2030) (*high confidence*) and very large compared to natural variability late in the century (2090) under high emissions (*very high confidence*).

More frequent and hotter hot days (*very high confidence*).

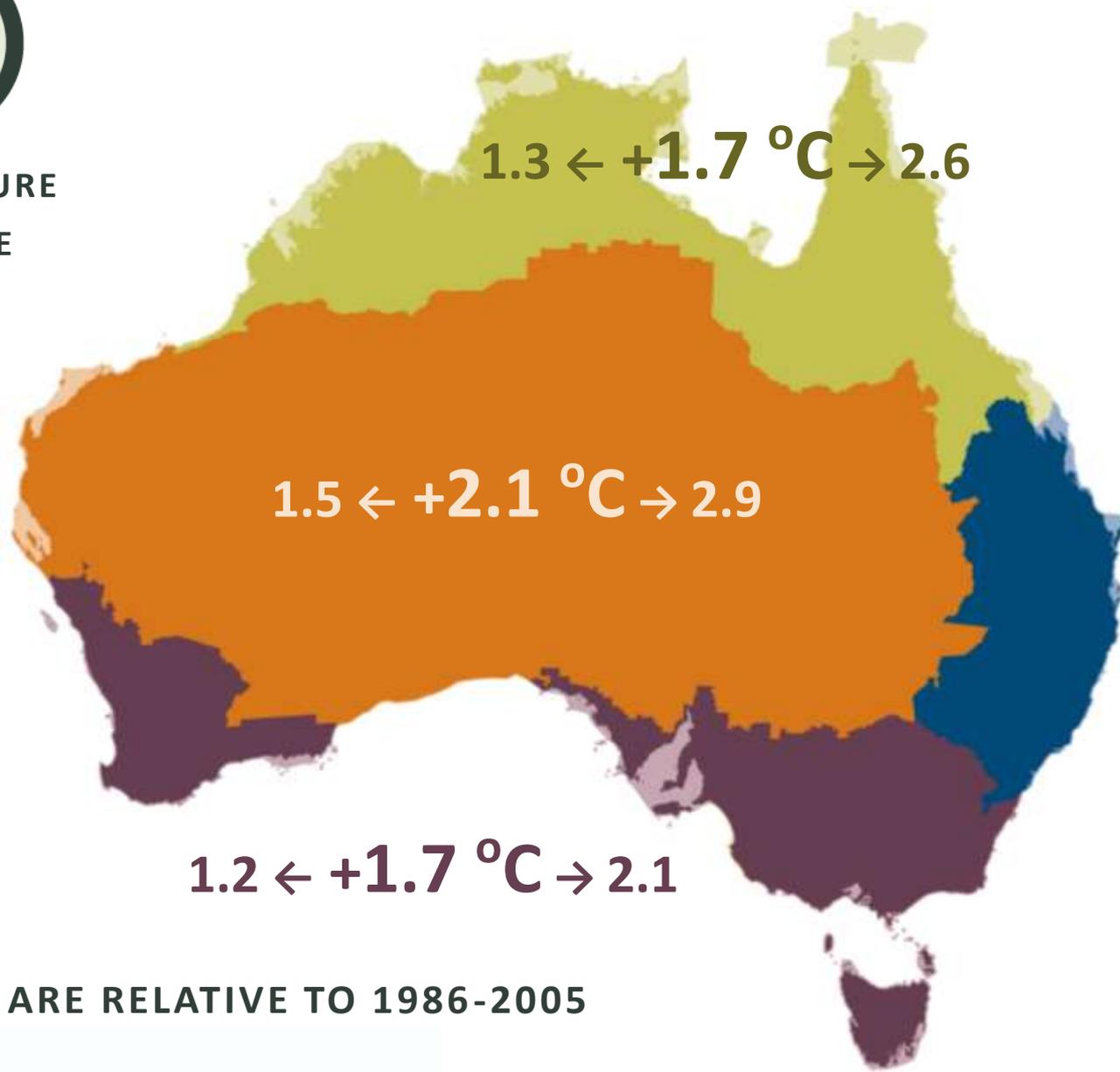
Fewer frost days are projected (*high confidence*)

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TEMPERATURE
INCREASE
2090
RCP4.5



1.3
↑
+1.9 °C
↓
2.6

CHANGES ARE RELATIVE TO 1986-2005

-20°

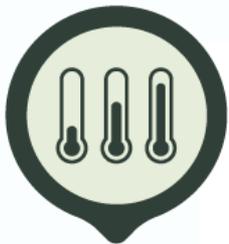
10°

20°

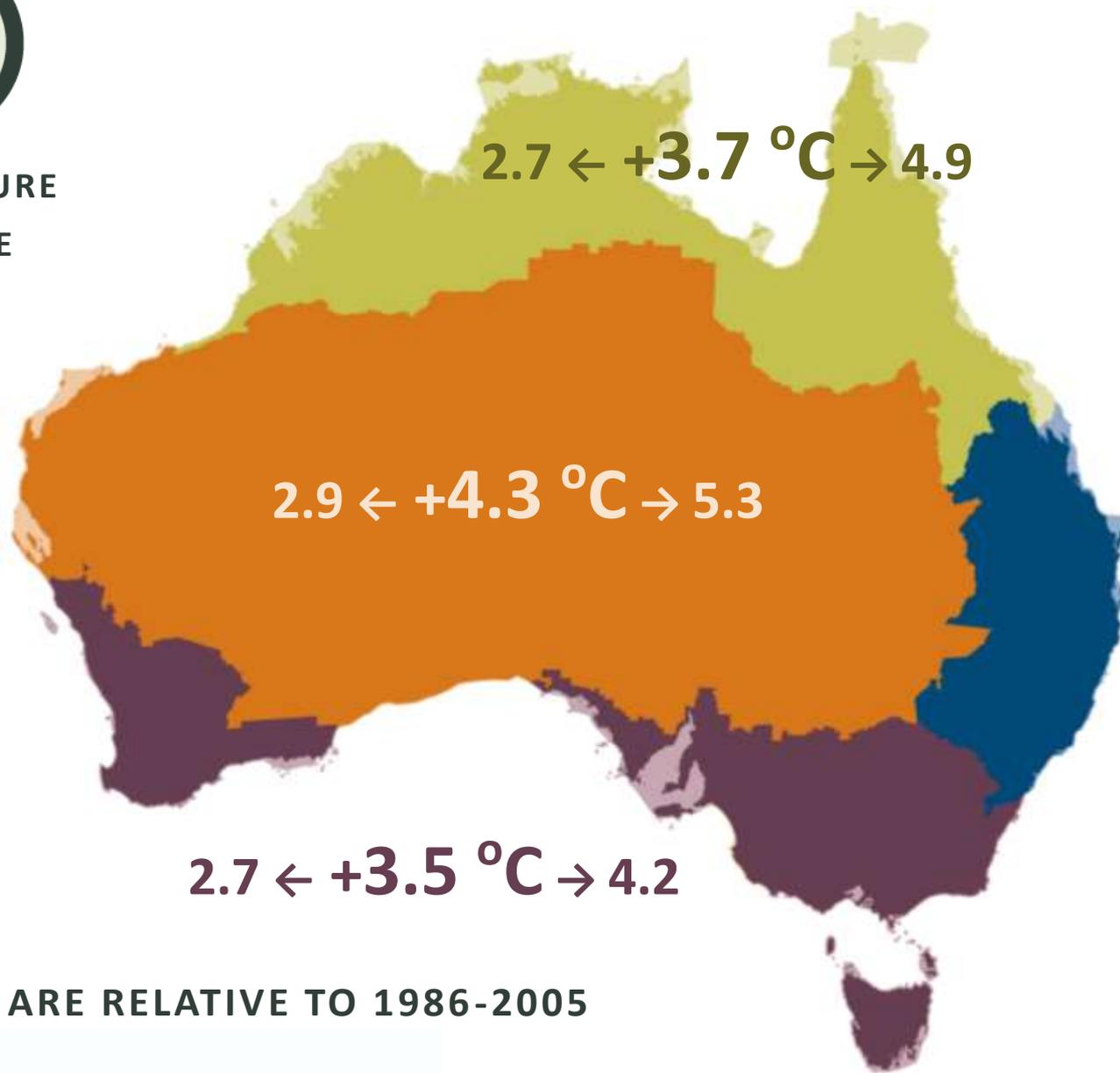
30°

40°

50°



TEMPERATURE
INCREASE
2090
RCP8.5



2.8
↑
+3.9 °C
↓
5.0

CHANGES ARE RELATIVE TO 1986-2005

-20°

10°

20°

30°

40°

50°



HOT DAYS

DAYS OVER 35 °C

2090 / RCP4.5

DARWIN
+ 100 days

CAIRNS
+ 8 days

ALICE SPRINGS
+ 39 days

SYDNEY
+ 3 days

PERTH
+ 15 days

ADELAIDE
+ 12 days

MELBOURNE
+ 5 days

CHANGES ARE RELATIVE TO 1986-2005

-20°

10°

20°

30°

40°

50°





RAINFALL

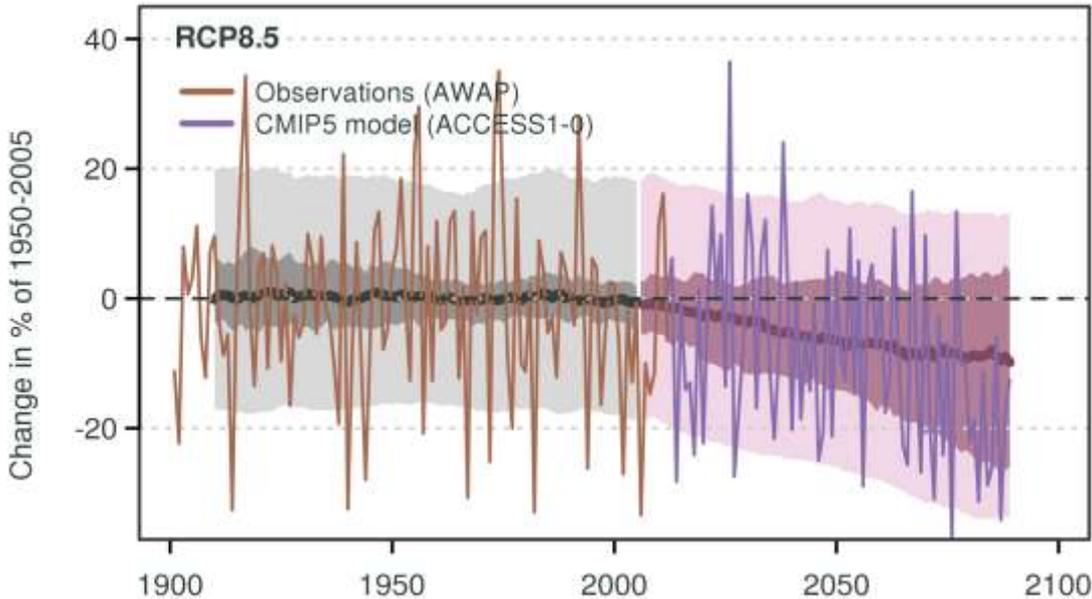
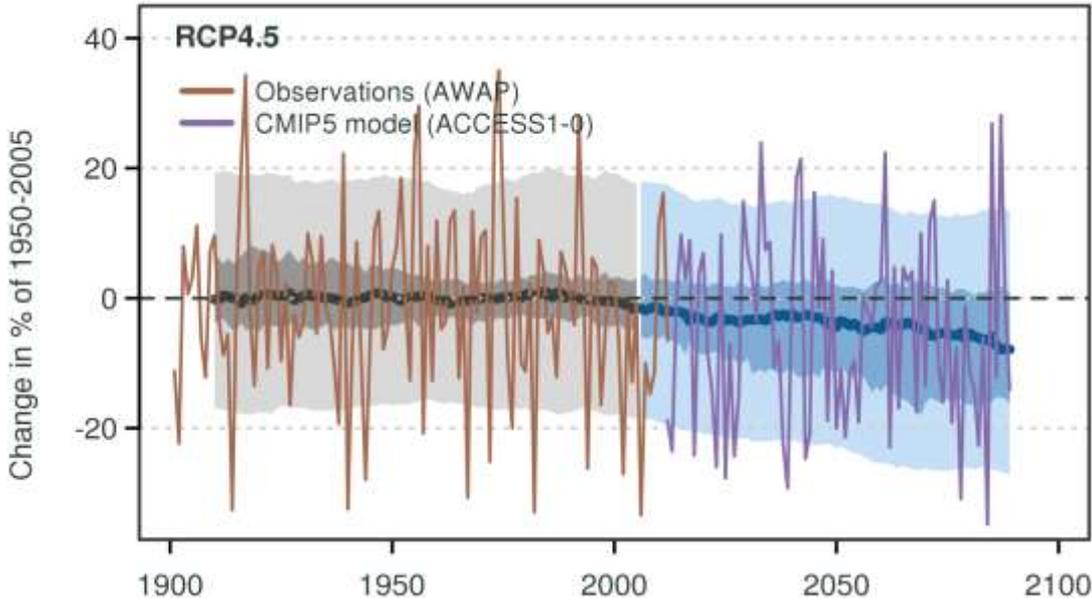
**WINTER/SPRING RAINFALL IS PROJECTED TO
DECLINE IN SOUTHERN AUSTRALIA**

**INCREASES OR DECREASES ARE POSSIBLE
ELSEWHERE & IN OTHER SEASONS**

SOUTHERN AUSTRALIA



RAINFALL VARIABILITY VERSUS CHANGE



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Winter and spring rainfall is projected to decrease (*high confidence*), though increases are projected for Tasmania in winter (*medium confidence*).

The direction of change in summer and autumn rainfall in southern Australia cannot be reliably projected, but there is *medium confidence* in a decrease in south-western Victoria in autumn and in western Tasmania in summer.

SOUTHERN AUSTRALIA

Range of change in % for 2090	Summer	Autumn	Winter	Spring
RCP4.5	-13 to +8	-19 to +9	-19 to +2	-23 to 0
RCP8.5	-13 to +16	-25 to +13	-32 to -2	-44 to -3

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High confidence that in the near future (2030) natural variability will predominate over trends due to greenhouse gas emissions.

For late in the century (2090), there is *medium confidence* in a winter rainfall decrease. Other seasons have strongly contrasting results from climate models and downscaling.

EASTERN AUSTRALIA

Range of change in % for 2090	Summer	Autumn	Winter	Spring
RCP4.5	-15 to +13	-28 to +18	-25 to +8	-27 to +9
RCP8.5	-16 to +28	-33 to +26	-40 to +7	-41 to +8

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High confidence that natural climate variability will remain the major driver of rainfall changes until 2030 .

By 2090, decreases in winter rainfall are projected for the southern Rangelands with *high confidence*.



RANGELANDS

Range of change in % for 2090	Summer	Autumn	Winter	Spring
RCP4.5	-16 to +10	-23 to +27	-34 to +7	-26 to +11
RCP8.5	-22 to +25	-42 to +32	-50 to +18	-50 to +23

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There is *high confidence* that in the near future (2030), natural variability will predominate over trends due to greenhouse gas emissions.

There is *low confidence* in the direction of future rainfall change by late in the century (2090), but substantial changes to wet-season and annual rainfall cannot be ruled out.

NORTHERN AUSTRALIA

Range of change in % for 2090	Summer	Autumn	Winter	Spring
RCP4.5	-18 to +8	-17 to +12	SEASONALLY DRY	-32 to +27
RCP8.5	-24 to + 18	-30 to +26	SEASONALLY DRY	-44 to +43

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SNOWFALL IN THE AUSTRALIAN ALPS IS PROJECTED TO DECREASE, ESPECIALLY AT LOW ELEVATIONS

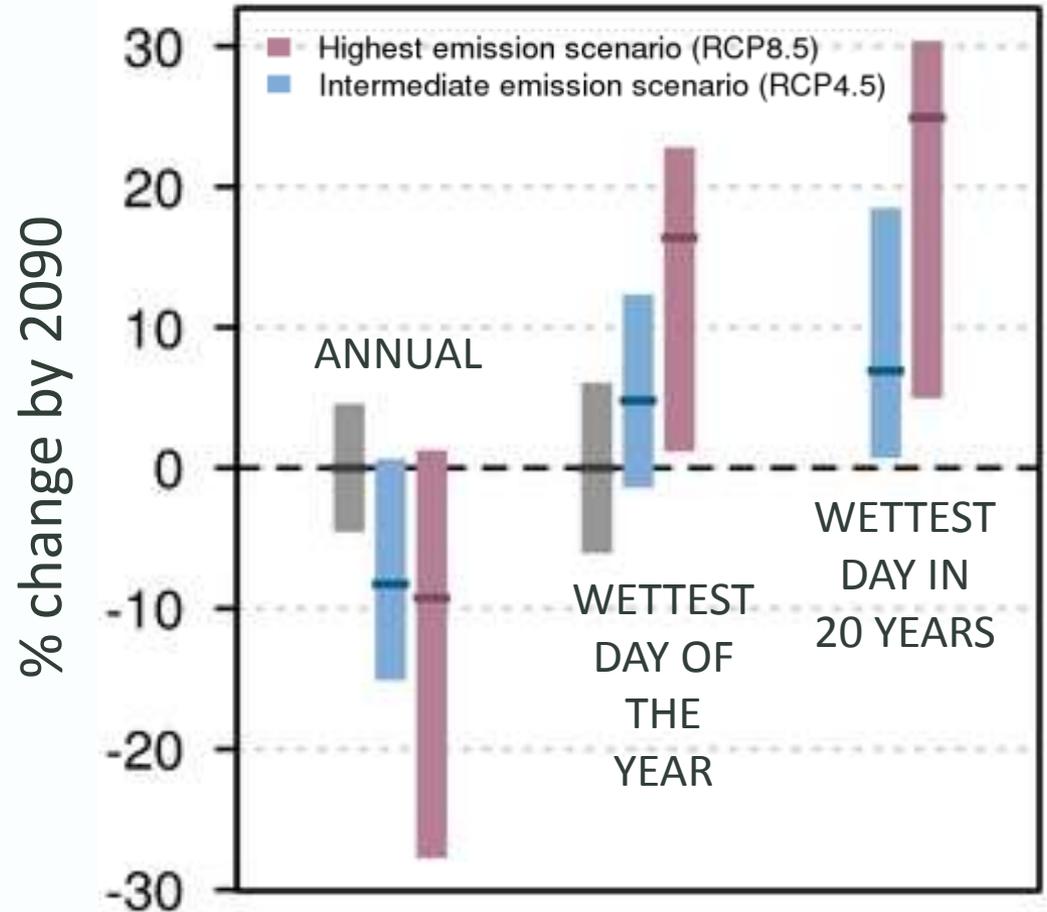


SNOW



EXTREME RAINFALL

Throughout most of Australia, extreme rainfall events (wettest day of the year and wettest day in 20 years) are projected to increase in intensity with *high confidence*



Southern Australia

-20° -10° 0° 10° 20° 30° 40° 50°

DROUGHT



**TIME IN DROUGHT IS PROJECTED TO
INCREASE IN SOUTHERN AUSTRALIA**

HIGHER EVAPORATION RATES



SOIL MOISTURE

THERE IS *HIGH CONFIDENCE* IN DECREASING SOIL MOISTURE IN THE SOUTHERN REGIONS (PARTICULARLY IN WINTER AND SPRING) AND *MEDIUM CONFIDENCE* IN DECREASING SOIL MOISTURE ELSEWHERE.

**SOUTHERN AND EASTERN AUSTRALIA
ARE PROJECTED TO EXPERIENCE
HARSHER FIRE WEATHER**

**CHANGES ELSEWHERE ARE
LESS CERTAIN**

FIRE WEATHER



Tropical cyclones are projected to become less frequent with a greater proportion of high intensity storms (stronger winds and greater rainfall) (*medium confidence*). A greater proportion of storms may reach south of 25 degrees South (*low confidence*)



**TROPICAL
CYCLONES**



SEA LEVEL RISE

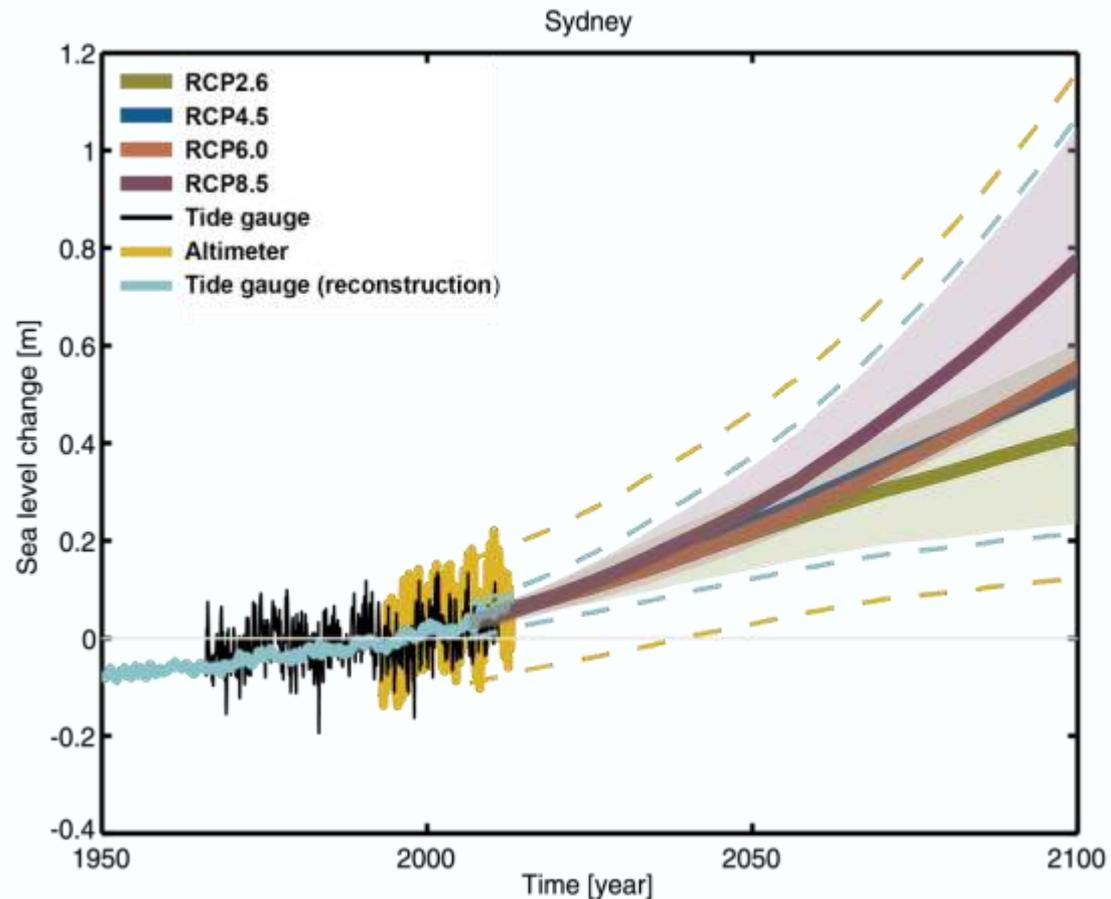
**SEA LEVELS WILL CONTINUE TO RISE
THROUGHOUT THE 21ST CENTURY
AND BEYOND**

EXTREME SEA LEVELS WILL ALSO RISE



SEA LEVEL RISE

In line with global mean sea level, Australian sea levels are projected to rise through the 21st century (*very high confidence*), and are very likely to rise at a faster rate during the 21st century than over the past four decades, or the 20th century as a whole, for the range of RCPs considered (*high confidence*)



-20°

-10°

0°

CHANGES ARE RELATIVE TO 1986-2005°

50°

There is *very high confidence* that sea surface temperatures around Australia will rise.

There is *very high confidence* that around Australia the ocean will become more acidic.

There is *medium confidence* that long-term viability of corals will be impacted, and that there will be harm to marine ecosystems.



SEA SURFACE
TEMPERATURE
AND
ACIDIFICATION

COMMUNICATION – REPORTS / BROCHURES

- Peer-reviewed journal papers
- Technical Report
 - The underpinning science behind all projections
- 8 x Cluster Reports
 - Focus on regional areas with distinct future climates
- 8 x Cluster Brochures
 - Easy to understand key messages about regional climate change
- Website:
www.climatechangeinaustralia.gov.au



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