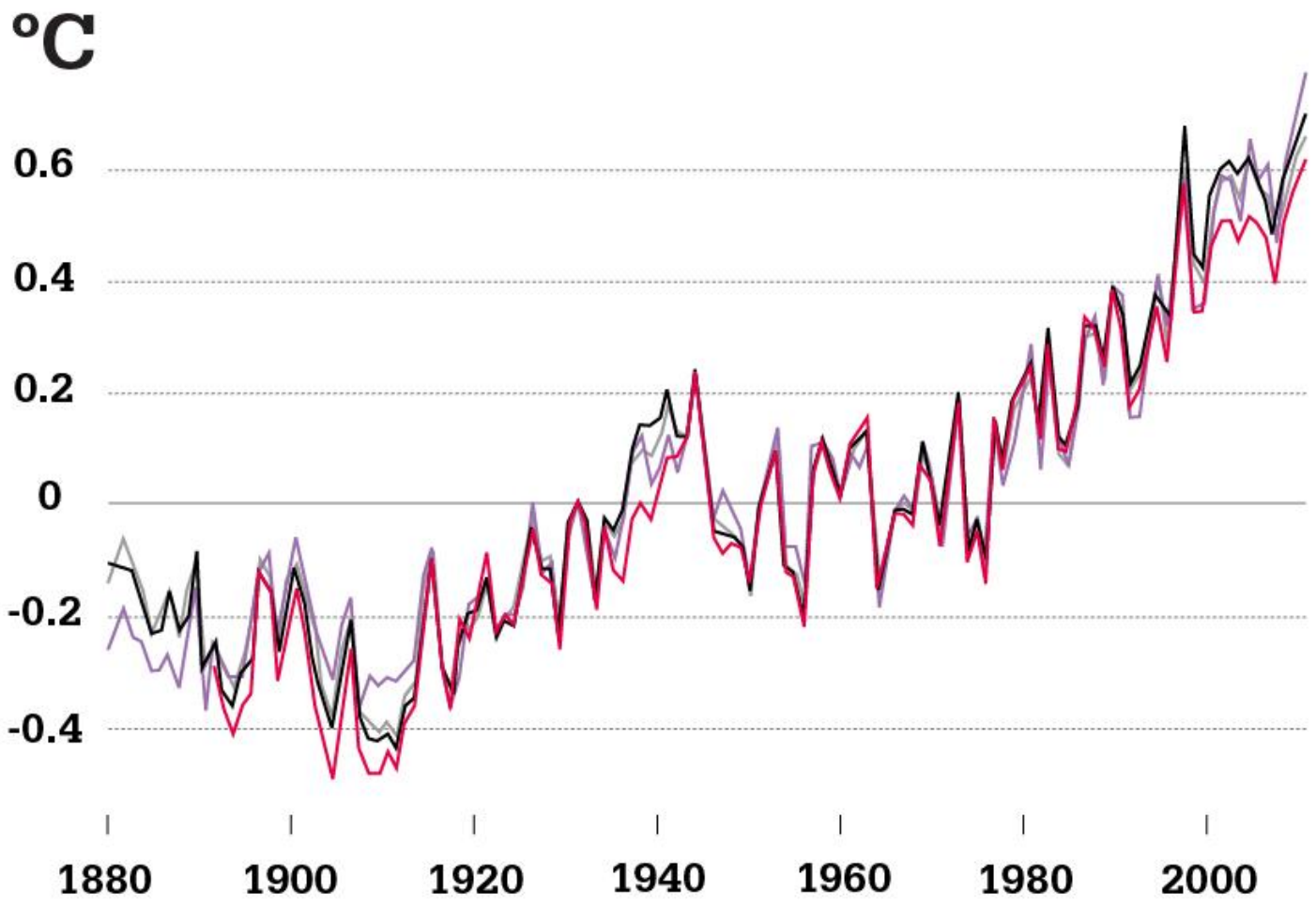
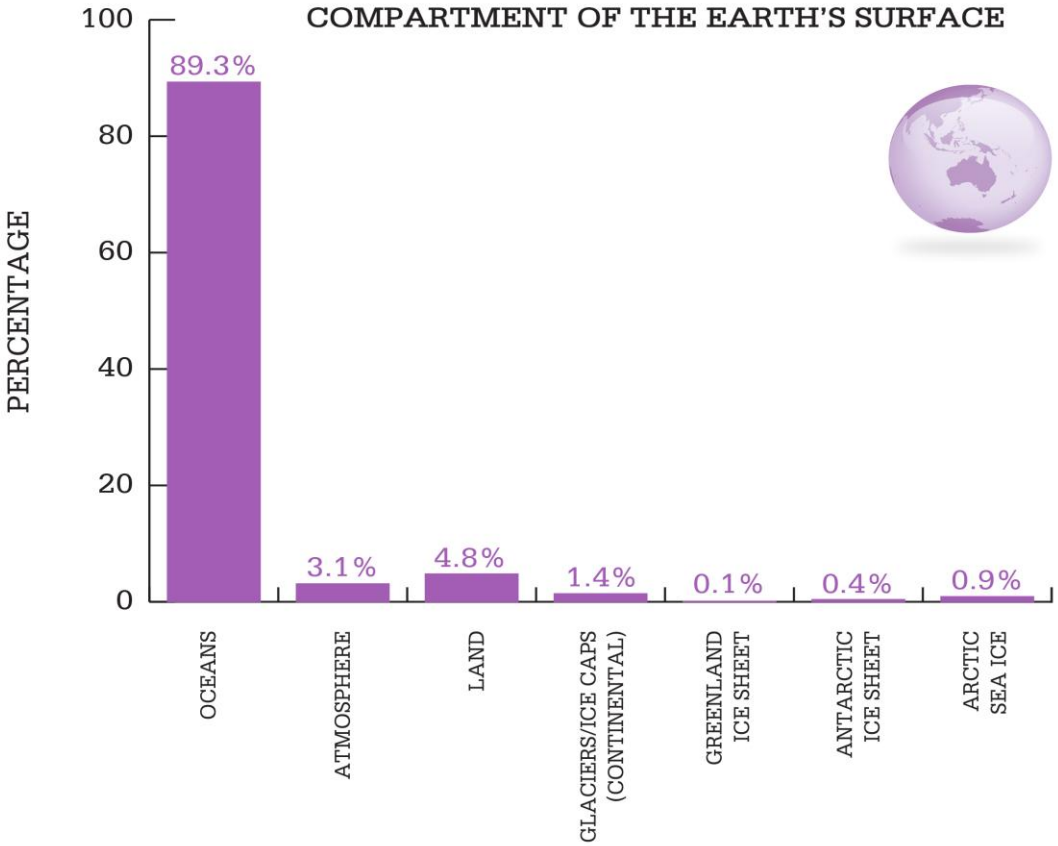
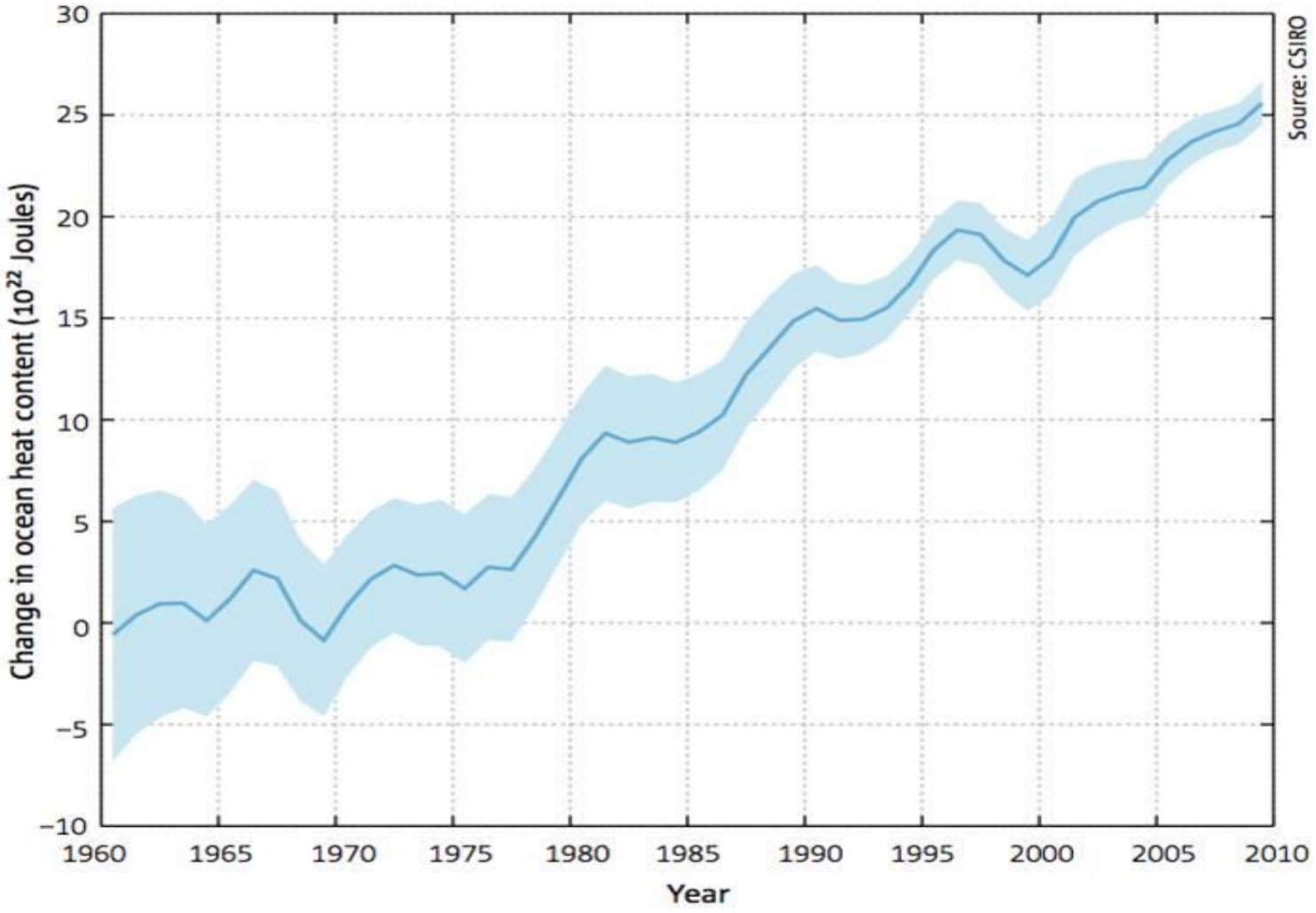
The atmosphere is warming



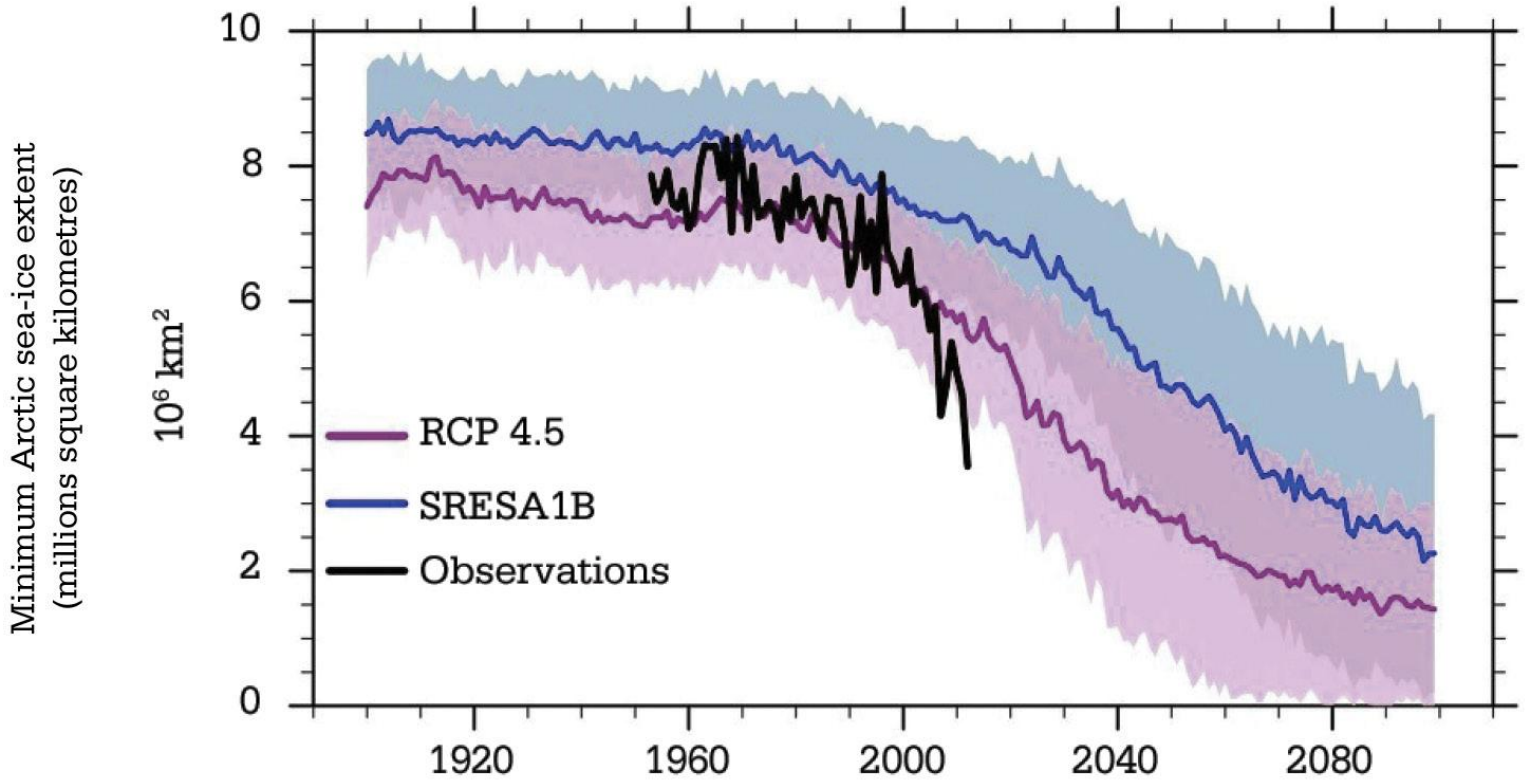
Where does the excess heat go?



The ocean is warming

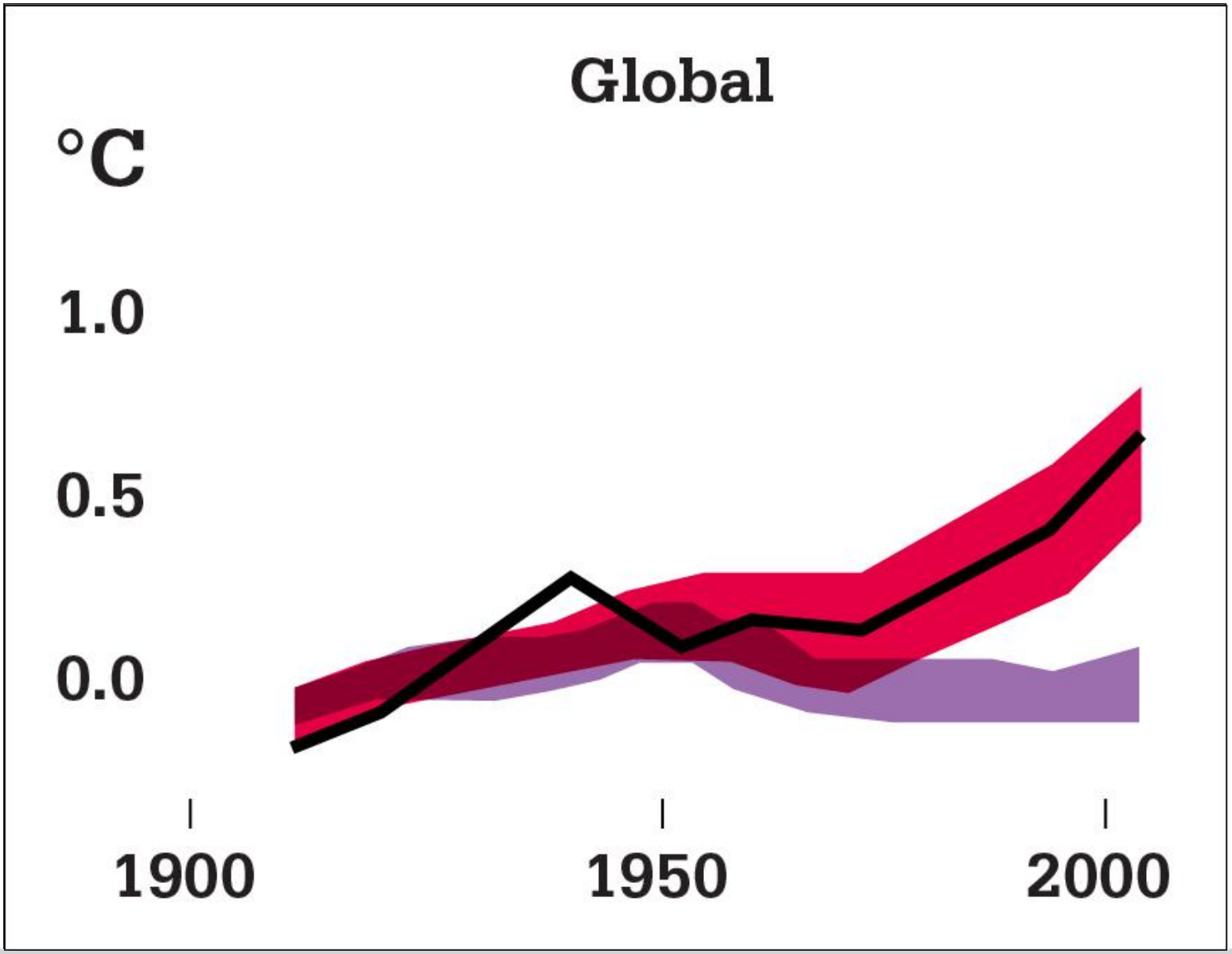


Changes faster than predicted



Source: Stroeve et al. (2012) updated to include observations to 2012

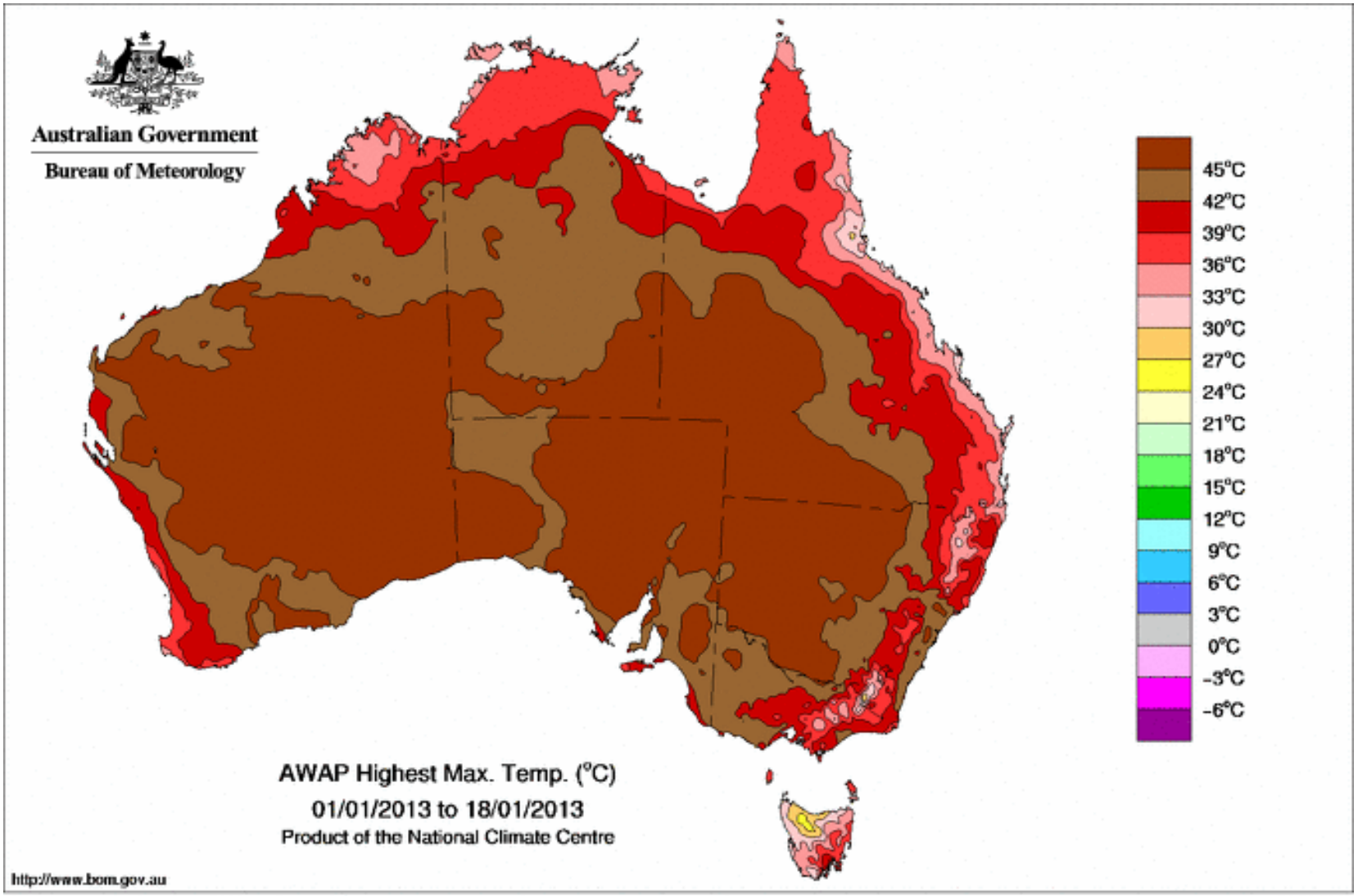
Human activities making it warmer



The Angry Summer – heatwaves

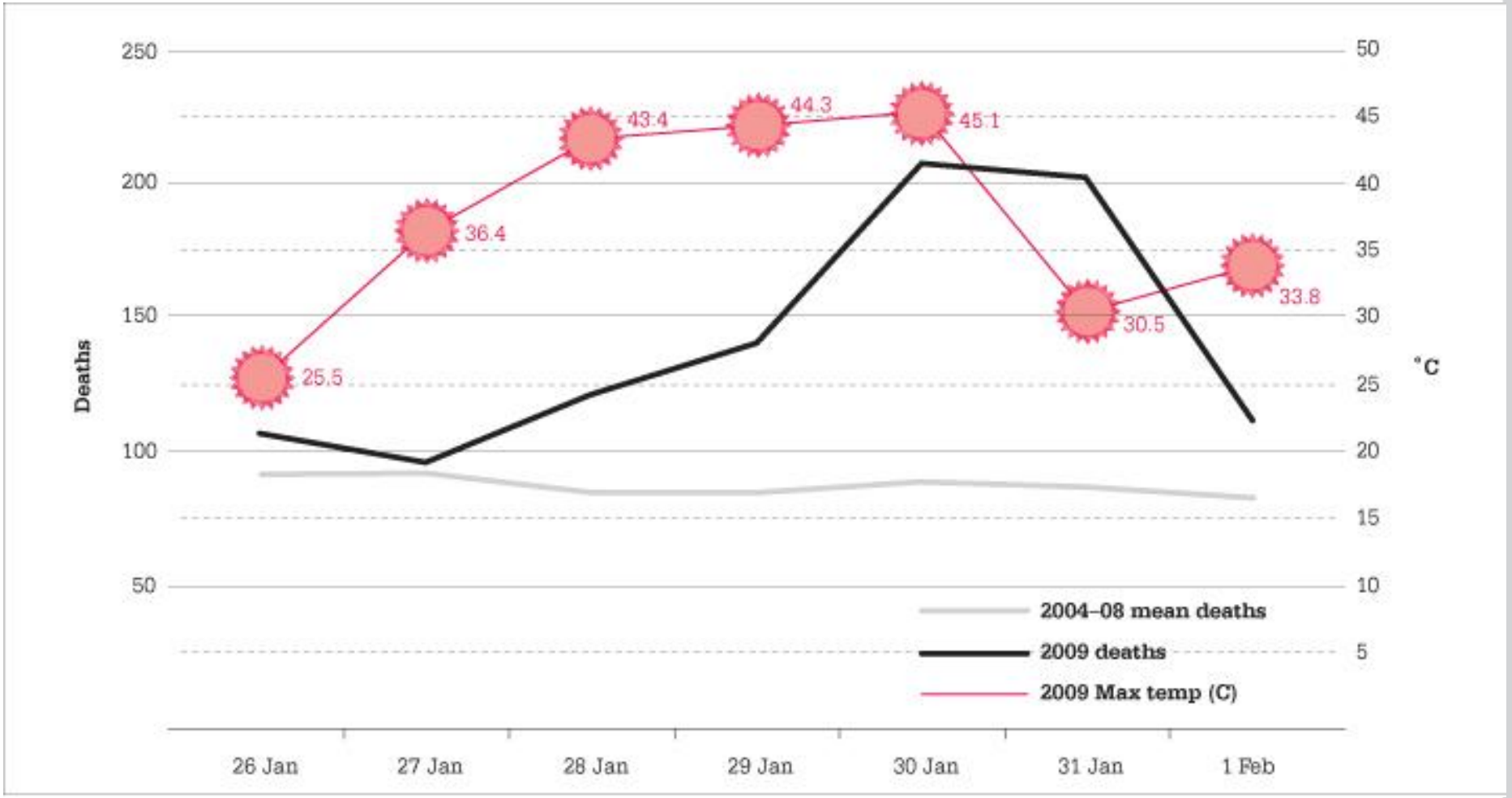
- Severe heatwave across 70% of Australia late Dec 2012 /early Jan 2013. Temperature records set in every state and territory
- Hottest ever area-averaged Australian maximum temperature, 7 January 2013: 40.30 C
- Hottest month on record for Australia – January 2013
- All-time high maximum temperatures at 44 weather stations
- Average daily maximum temperature for the whole of Australia was over 39 C for seven consecutive days (2-8 January)

Heatwaves



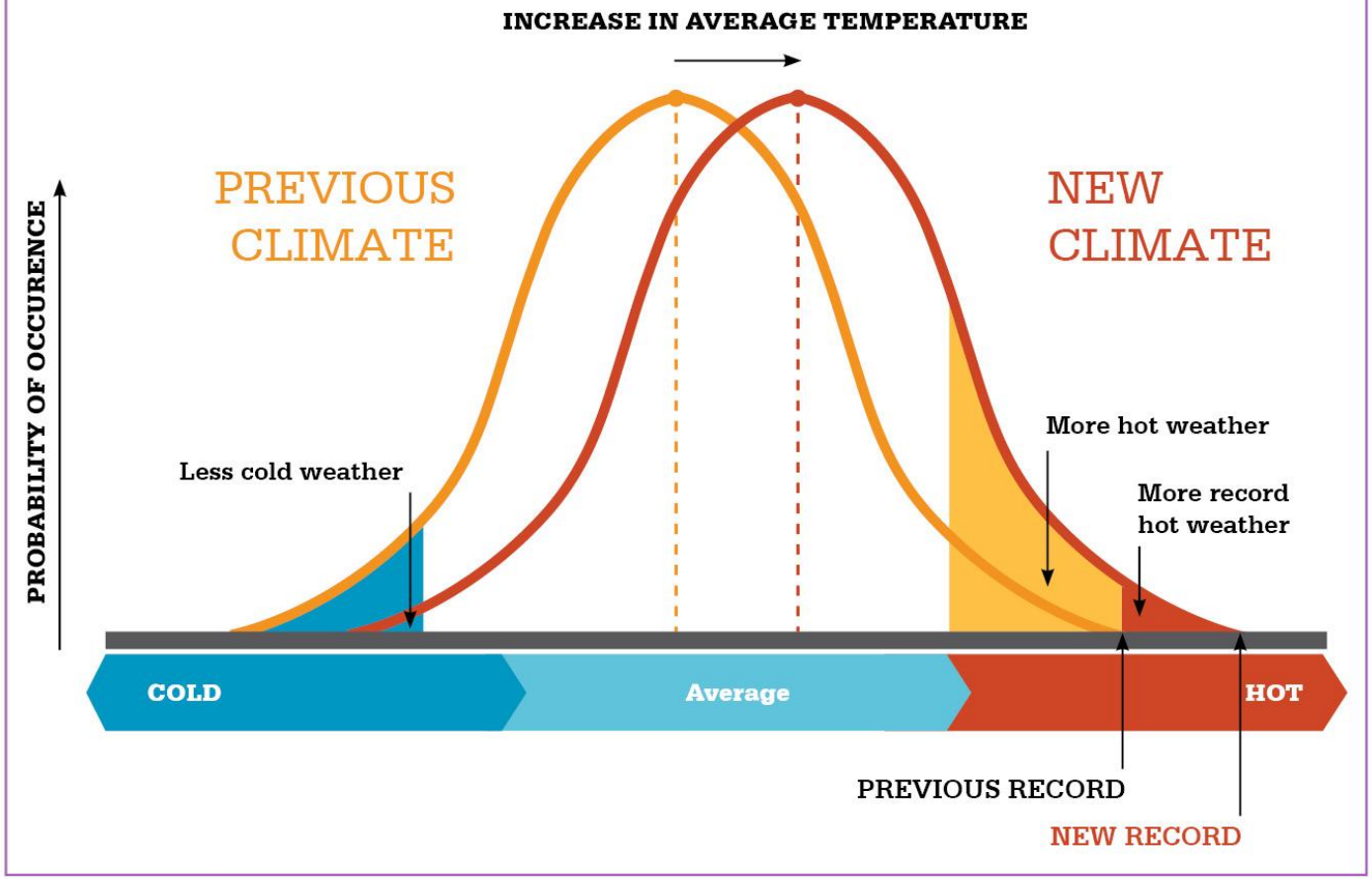
Source: Bureau of Meteorology

Melbourne 2009 heatwave



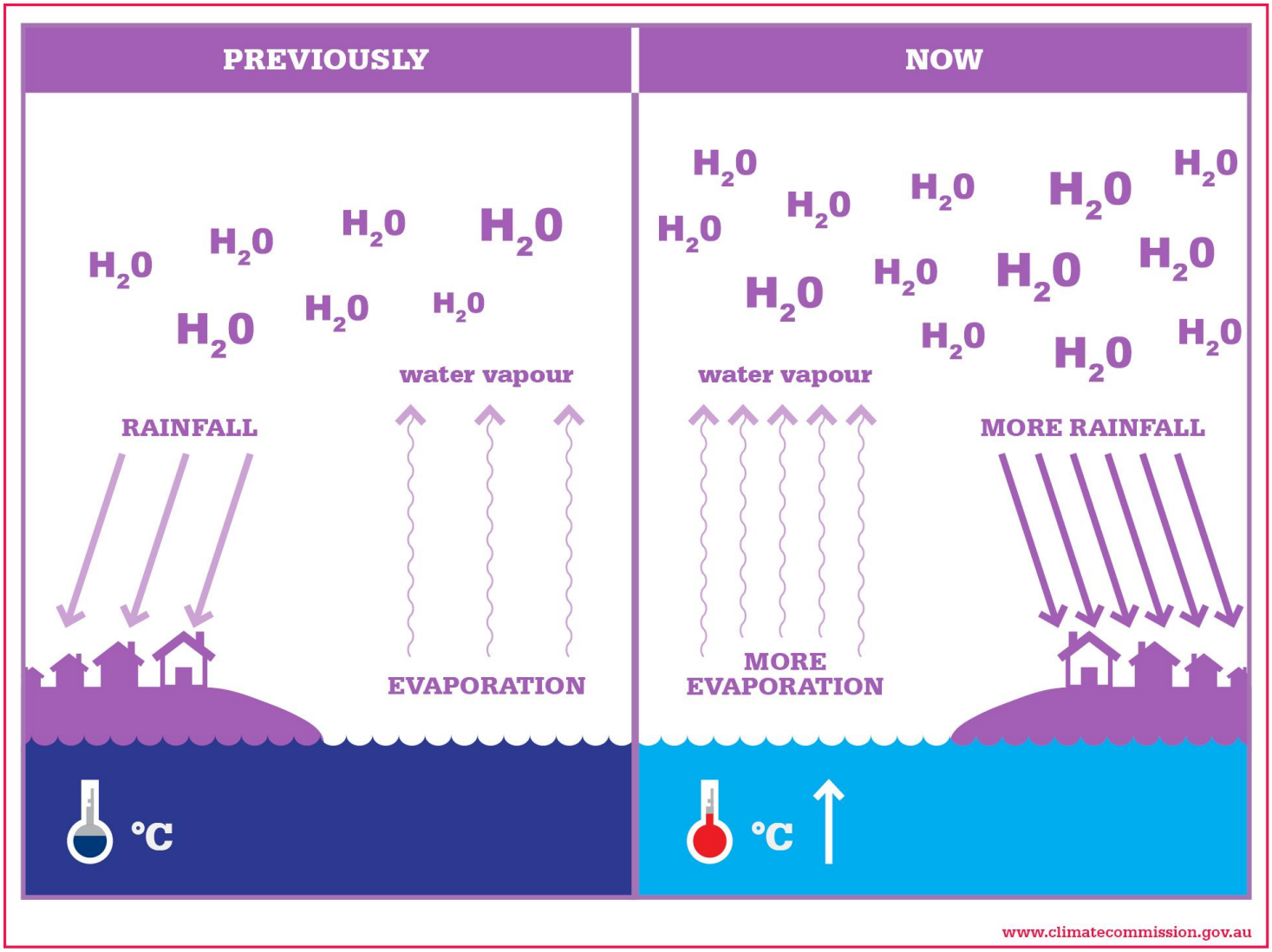
Source: Vic DHS 2009

We are living in a new climate

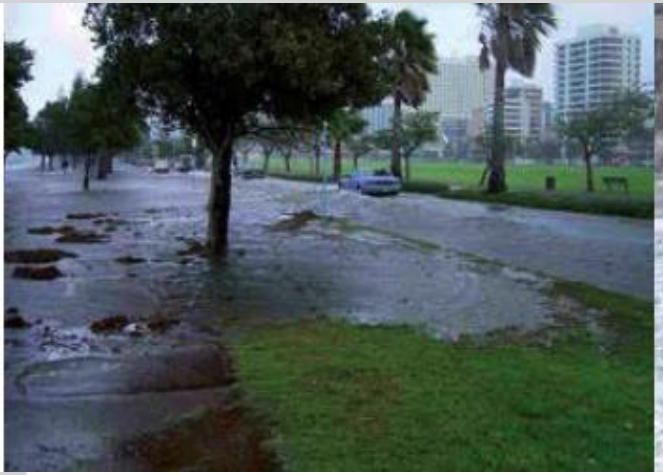


Source: Modified from IPCC, 2007

Influence of warming on the water cycle



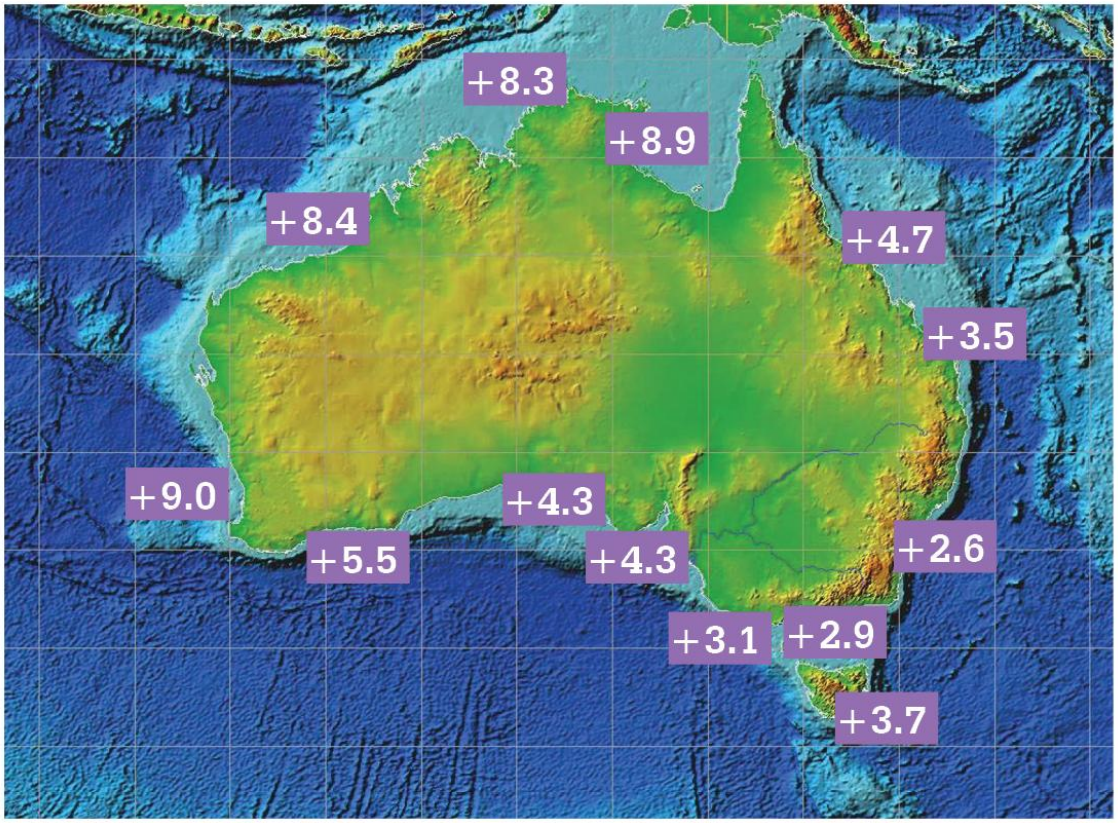
Consequences of sea-level rise



Western Australia – Perth region

Torres Strait Islands

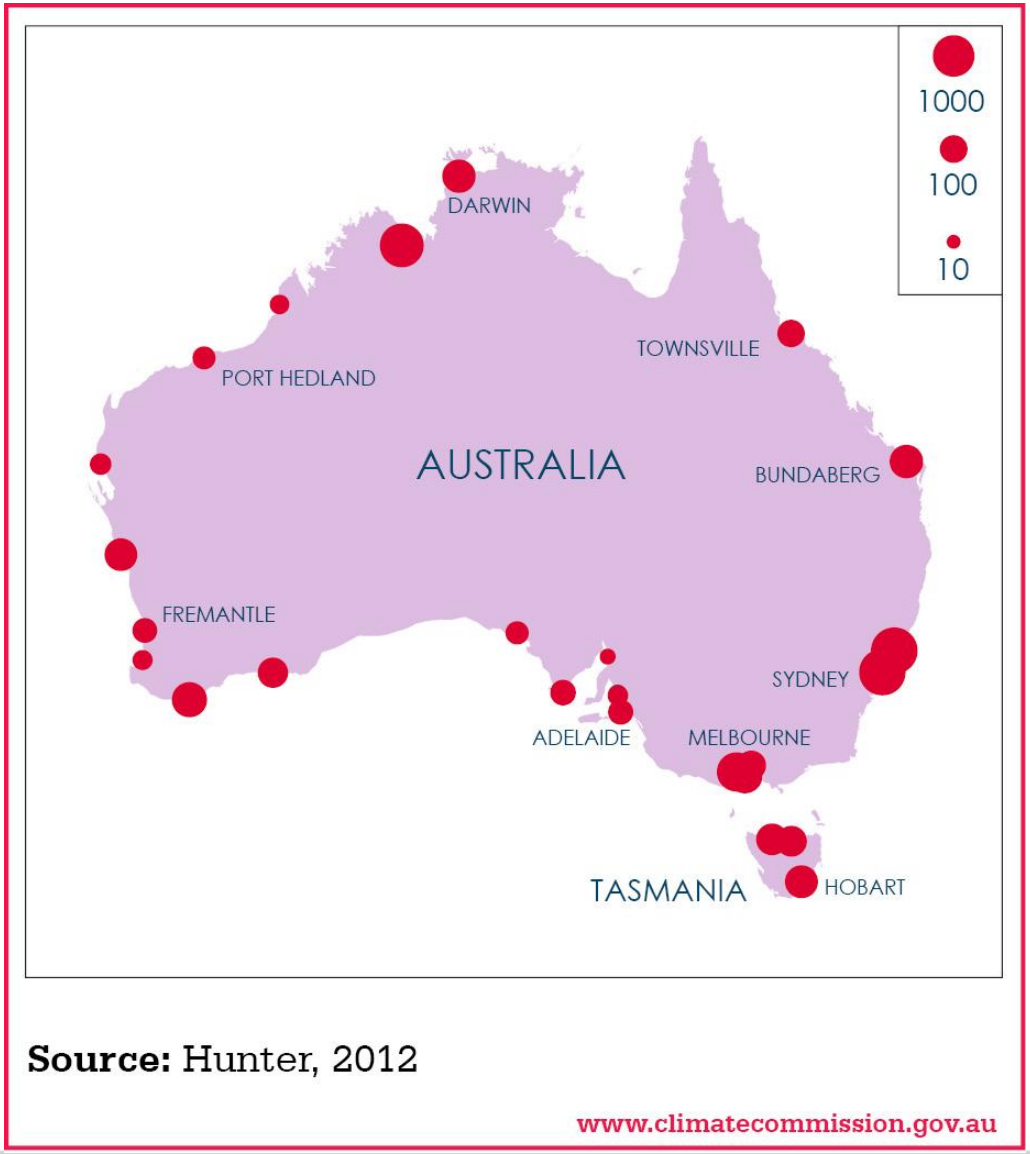
Variation in rate of sea-level rise



Source: NTC, 2011

www.climatecommission.gov.au

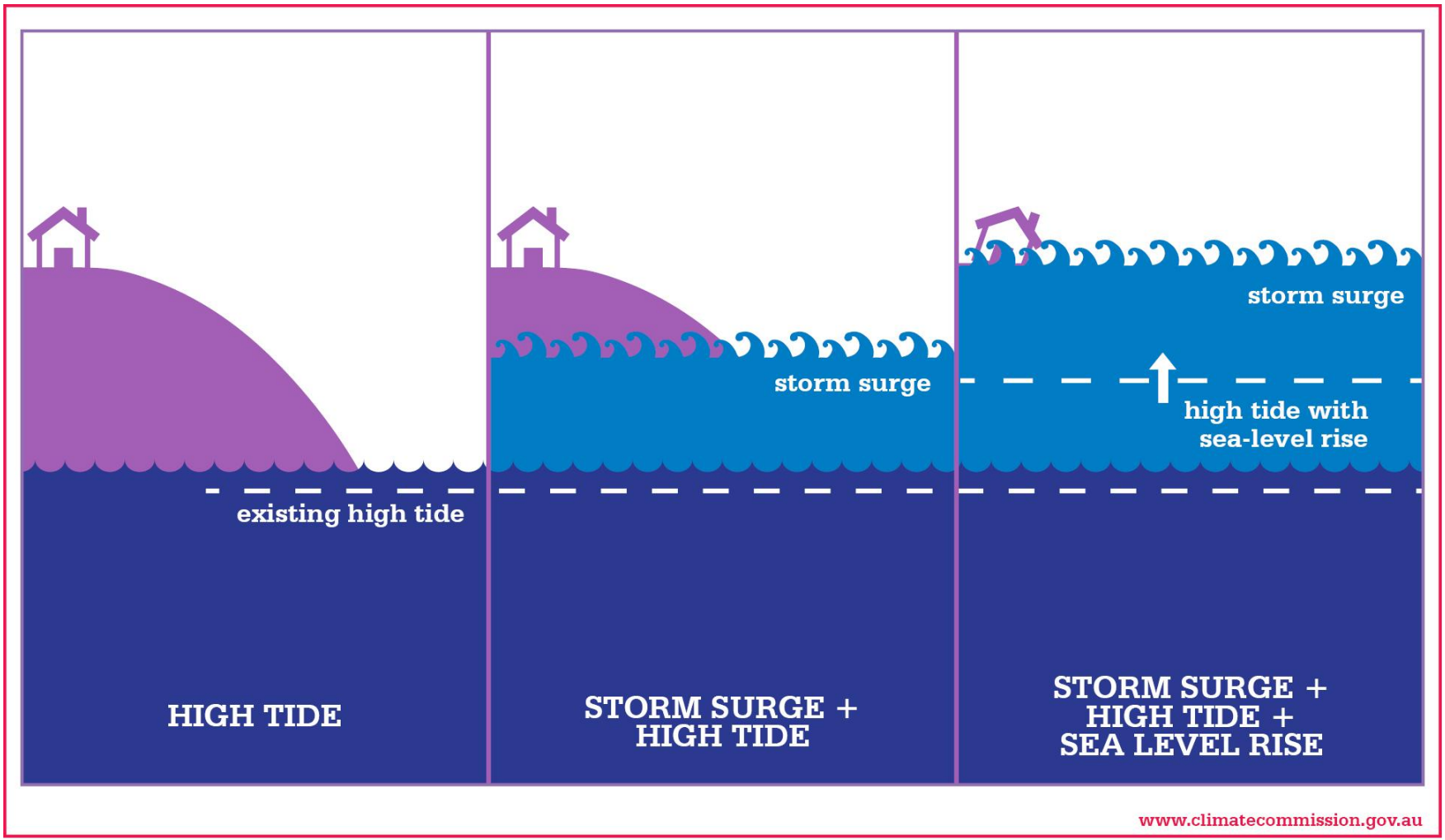
Increased risk of coastal flooding with sea-level rise of 0.5 m



Source: Hunter, 2012

www.climatecommission.gov.au

Influence of sea-level on coastal flooding

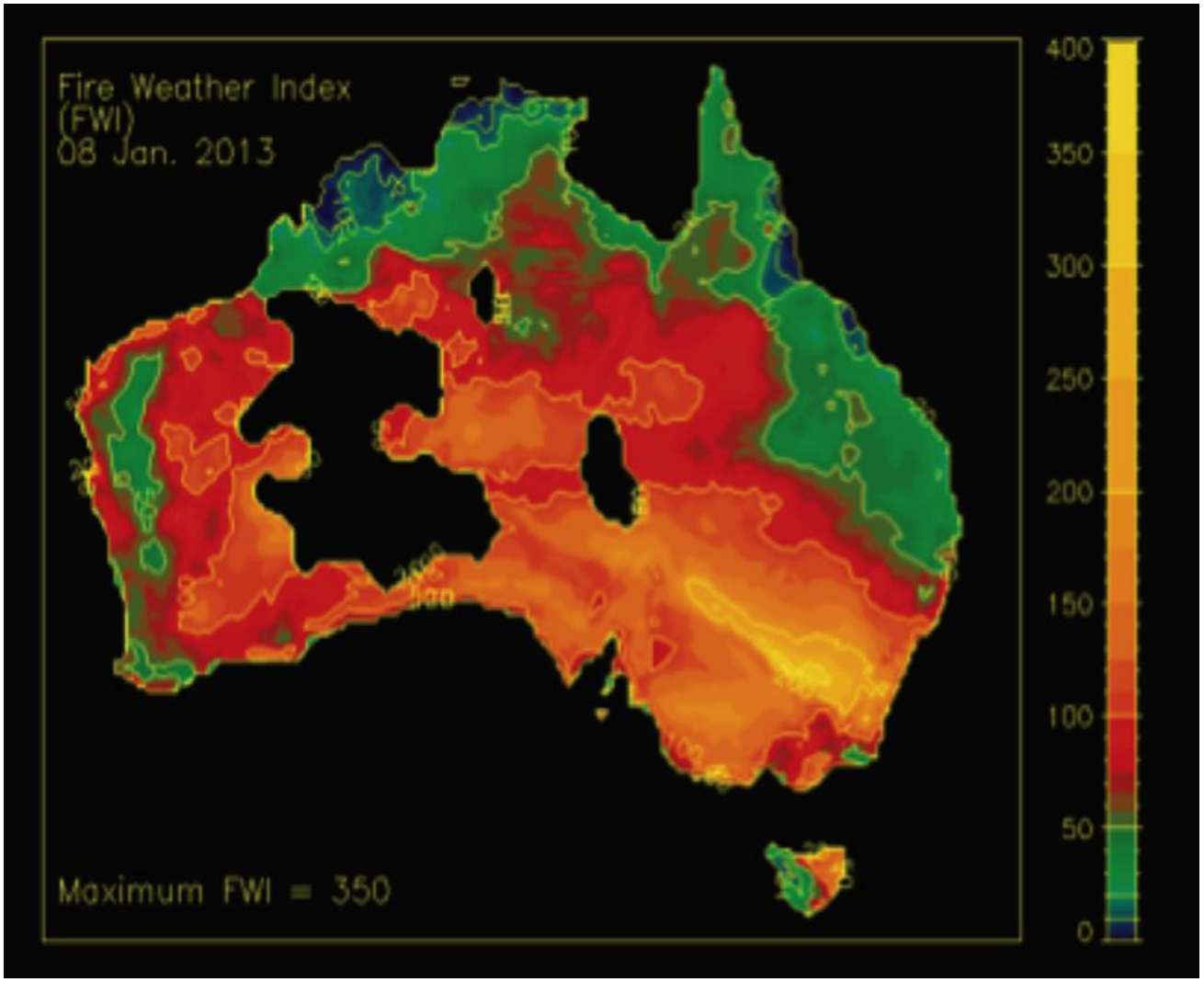


Heavy rainfall and flooding

Queensland 2010/11 floods

- December 2010 was Queensland's wettest December on record
- Floods broke river height records at over 100 observation stations
- 78% of the state was declared a disaster zone
- Economic cost estimated to be in excess of $5 billion
- 300,000 homes and businesses lost power in Brisbane and Ipswich

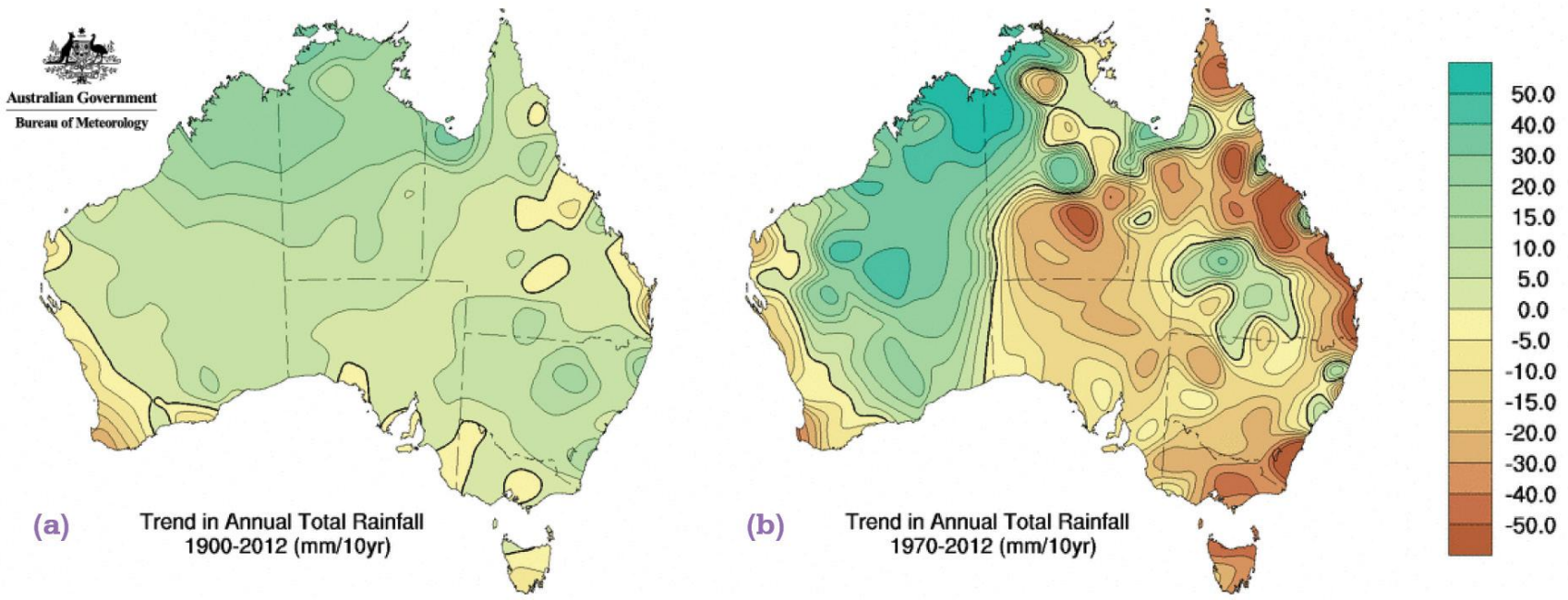
Fire Weather Index, 8 Jan 2013



Bushfires and Climate Change

- Climate change exacerbates bushfire conditions by increasing the frequency of very hot days.
- Between 1973 and 2010 the Forest Fire Danger Index increased significantly at 16 of 38 weather stations across Australia, mostly in the southeast. None of the stations showed a significant decrease.
- Projected increases in hot days across Australia, and in dry conditions in the southwest and southeast, will very likely lead to more days with extreme fire danger in those regions.

With changing rainfall patterns



Source: BoM, 2013c

Coral reef states under increasing CO_2 and T

375 ppm +1˚C

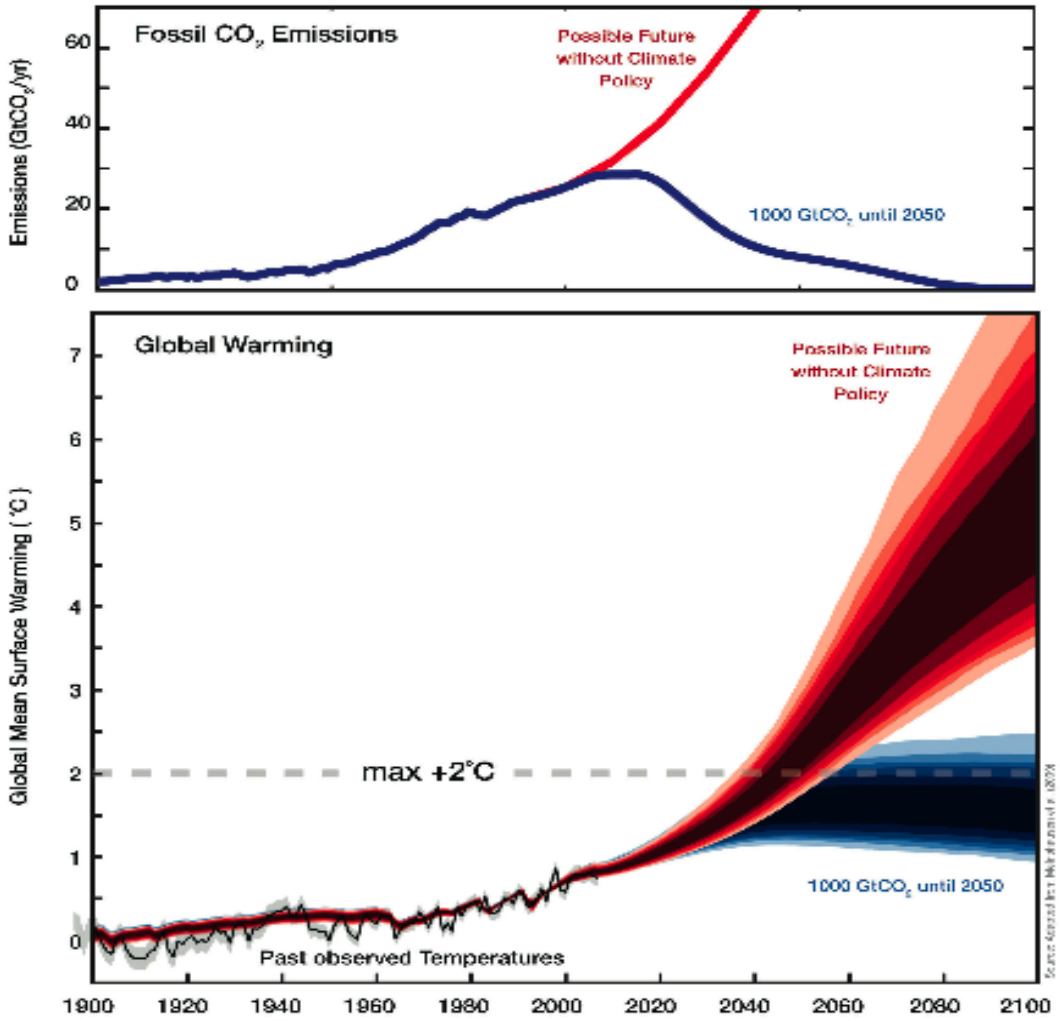
450 – 500 ppm +2˚C

> 500 ppm > +3 ˚C

Source: modified from Hoegh-Guldberg et al., 2007

www.climatecommission.gov.au

The carbon maths: future pathways



Meinshausen et al. 2009

Overspend in the carbon budget

The fossil fuel equation

- The remaining global budget for CO_2 emissions from fossil fuel combustion is about 600 billion tonnes if we are to stay within the 2^{o}C limit.

- The world's indicated fossil fuel reserves (coal, oil and gas), if all were burnt, would emit nearly 3,000 billion tonnes of CO_2 (IEA, 2012).

- This means that we can burn only about 20% of the world's known fossil fuel reserves. Most will have to stay in the ground.

- Australia's coal reserves represent about 51 billion tonnes of CO_2 emissions, about one twelfth of the world's allowable budget.

Key Messages

- The evidence for climate change is overwhelming and clear. It is beyond reasonable doubt that the burning of fossil fuels is the primary cause.
- We are already seeing the social, economic and environmental impacts of a changing climate, especially extreme events. The risks rise as climate shifts further.
- To stabilise the climate at a manageable level, most of the world's fossil fuel reserves must stay in the ground.
- This is the critical decade. Decisions we make from now to 2020 will determine the severity of climate change our children and grandchildren experience.

generation foundation

Stranded Carbon Assets

Why and How Carbon Risks Should Be Incorporated in Investment Analysis

October 30, 2013

One driver of change:

China’s war on pollution:

Air pollution cuts life expectancy in northern China by 5.5 years.

2017 target on cutting coal use to 65% of energy mix brought forward to 2014.

But coal use in China still to grow 1.6% over 2014

When will China’s emissions peak?

Speed of change

‘The Age of Renewables Has Begun.’ Citigroup 27 March 2014

“We predict that solar, wind, and biomass to continue to gain market share from coal and nuclear into the future,”

“coal only accounts for 2 per cent of the generation projects under development”

Final Thoughts

Global missions trends

WMO data for 2012: Rate of increase in emissions declined by at least one third.

Figures for 2013 to be released Nov. 2014.

Current projections indicate that absolute decline in global emissions unlikely this decade. So we will overshoot….

But… renewables are a disruptive technology.

China, responsible for 24% of global emissions, is increasing ambitions almost monthly.

US emissions down 10.9% on their 2008 peak.