



## Climate Change and the Wine Industry: Risks and Responses

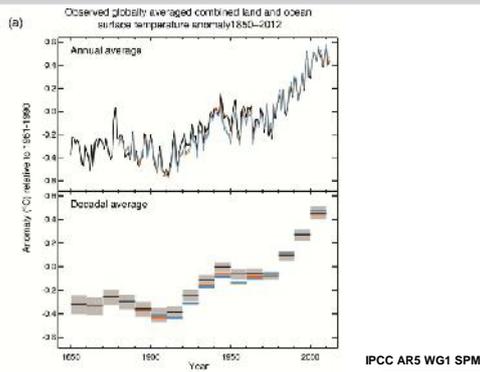
Professor Will Steffen  
The Climate Council of Australia  
The Australian National University

AWIEC2014, Adelaide, 25 September 2014

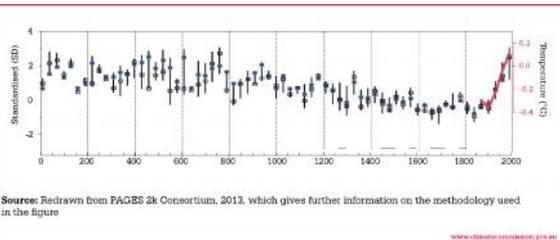
## Outline of Talk

1. The climate system is being destabilised. Human-driven greenhouse gas emissions are the primary cause.
2. The risks of a destabilised climate are serious and growing rapidly.
  - (i) Extreme heat
  - (ii) Changes in the water cycle
3. To stabilise the climate system, GHG emissions must be reduced rapidly and deeply.

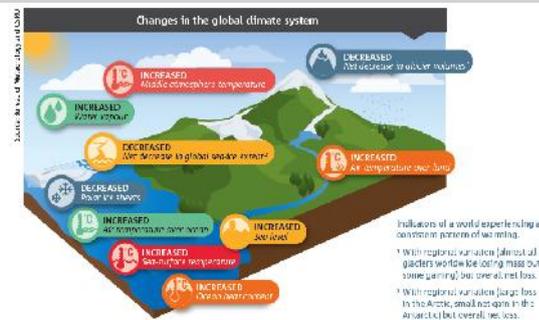
## The atmosphere is warming



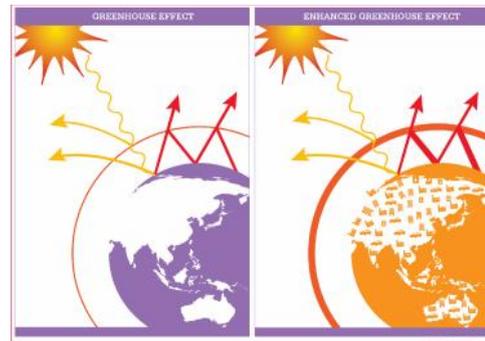
## 2,000 year global land temperature reconstruction



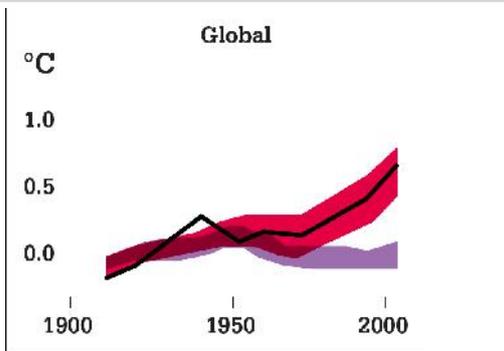
## Summary: Changes in the climate



## Enhanced Greenhouse Effect



## Human activities making it warmer



## Summary: Causes

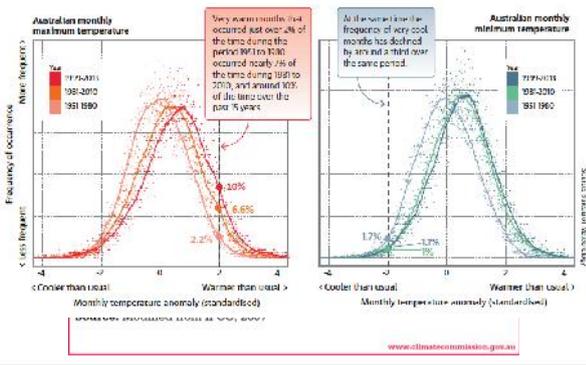
The total amount of energy in the climate system is increasing. The largest contribution is the increase in atmospheric concentration of CO<sub>2</sub> since 1750.

Human influence on the climate system is clear. The primary influence is the emission of greenhouse gases, most importantly, the emission of CO<sub>2</sub> from the burning of fossil fuels.

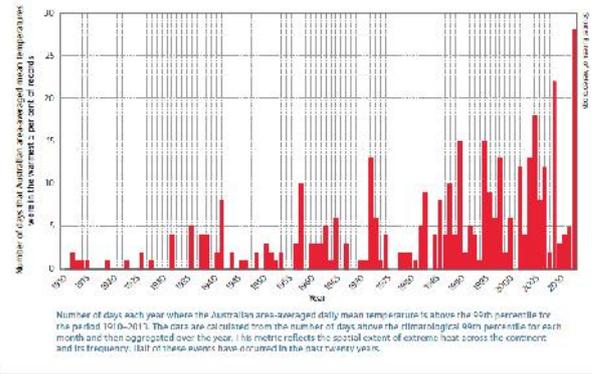
It is *extremely likely* that human influence has been the dominant cause of the observed warming since the mid-20<sup>th</sup> century.

IPCC AR5 WG1 SPM

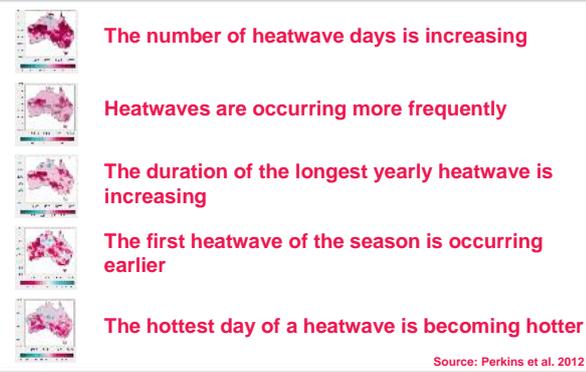
## We are living in a new climate



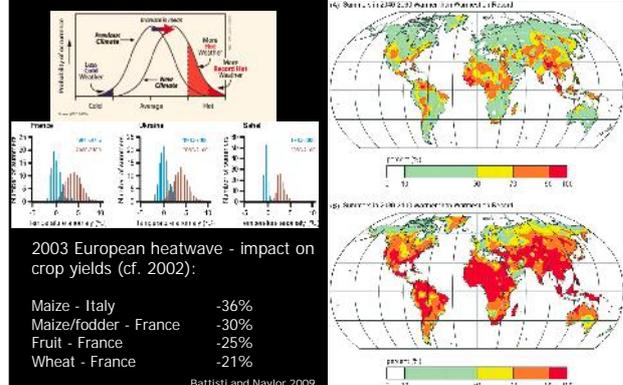
## Hot weather is increasing



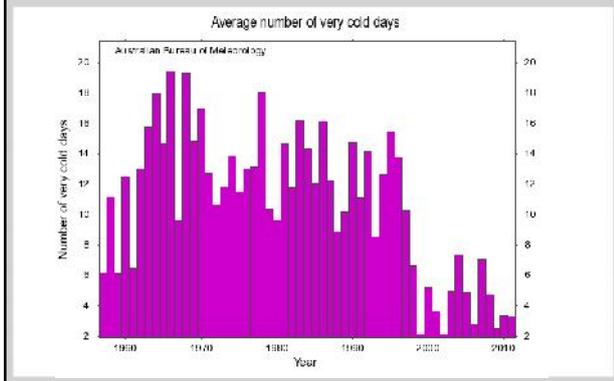
## Changing Australian heatwaves



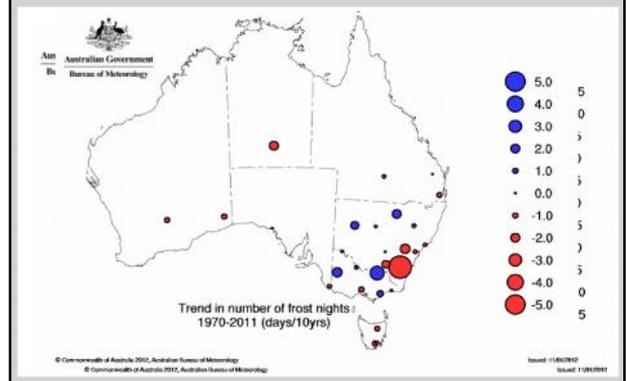
## Temperature extremes and food production



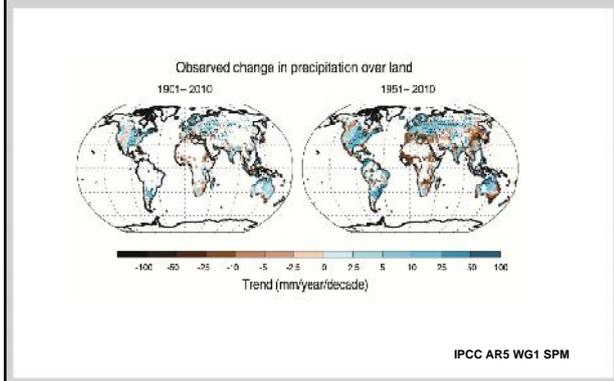
## Change in cold weather



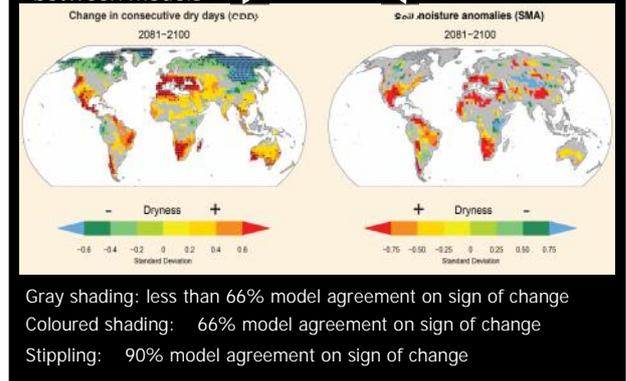
## Change in cold weather



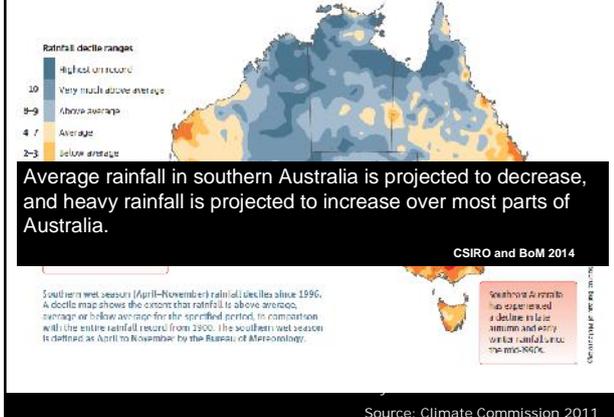
## Changing rainfall patterns



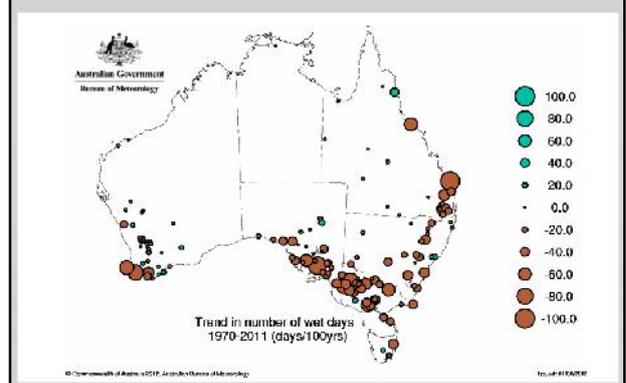
## Shading and stippling to show consistency between models



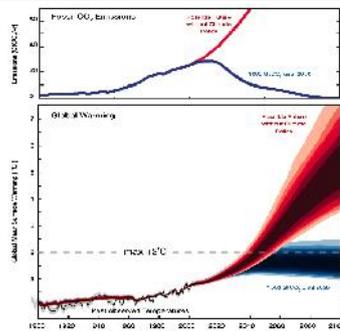
## Rainfall: water resources



## Change in wet weather



## What does a destabilising climate mean?



Meinshausen et al. 2009

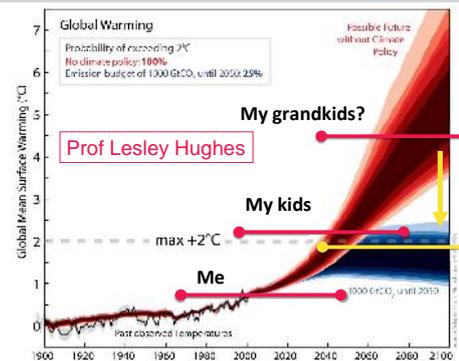
## Overspend in the carbon budget



## The fossil fuel equation

- The remaining global budget for CO<sub>2</sub> emissions from fossil fuel combustion is about 600 billion tonnes if we are to stay within the 2°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<sub>2</sub> (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.

## This is the critical decade for action



## Key Messages

- Warming of the climate system is unequivocal, especially since the 1950s. The atmosphere and ocean have warmed, snow and ice have diminished, and sea level has risen.
- We are more certain than ever that the warming since 1950 has been caused primarily by human activities.
- A destabilising climate poses great risks for Australian primary industries. These include extreme heat and changing rainfall patterns.
- To stabilise the climate, the world must move rapidly away from fossil fuels.

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