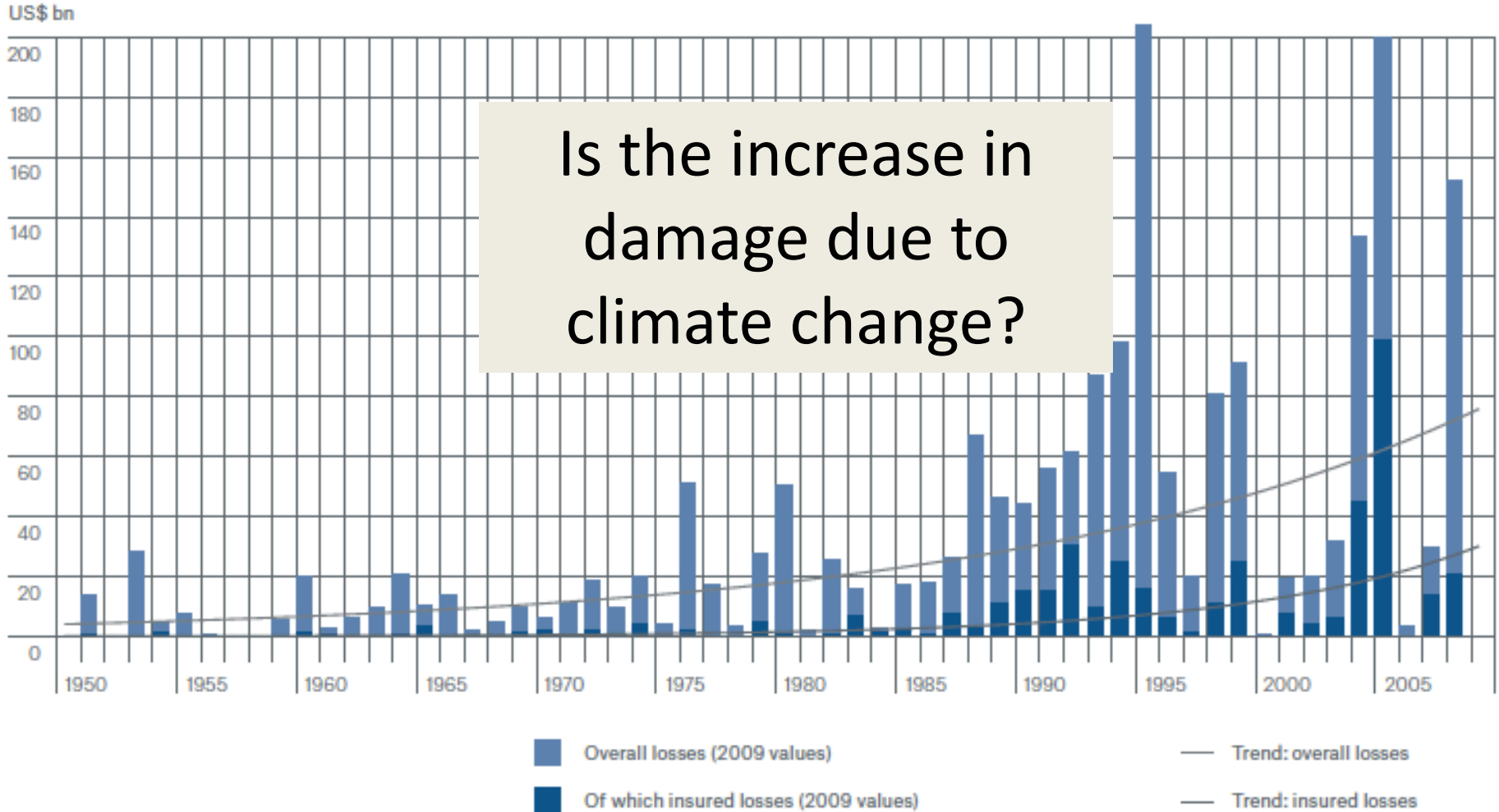


Is climate change increasing the costs of weather-related disasters?



Neville Nicholls, Monash University

The chart presents the overall losses and insured losses – adjusted to present values.
The trend curves document the increase in losses since 1950.



Bouwer, L. M., 2010: “Have disaster losses increased due to anthropogenic climate change” [BAMS, 91]

- Reviewed recent quantitative studies of observed trends in weather-related disaster losses, adjusted for “...inflation, and changes in exposure and vulnerability that are related to growth in population and wealth.”
- Most studies found no trend towards larger losses, once adjusted for changes in exposure.
- Bouwer concluded that “...although economic losses from weather related hazards have increased, **anthropogenic climate change so far did not have a significant impact on losses from natural disasters.**”

Crompton, R. P., et al, 2010: “Influence of location, population and climate on building damage and fatalities due to Australian bushfire: 1925-2009” [WCAS]

- Examined trends in Australian historical bushfire damage after normalising to account for increases in building numbers.
- Found no upward trend in normalised damage.
- Crompton et al concluded that “...there is **no discernable evidence that the normalised data is being influenced by climate change due to emission of greenhouse gases.**”

Damage is a function of **hazard**, **exposure**, & **vulnerability**

- **Hazard**: “A dangerous phenomenon...that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.”
- **Exposure**: “People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses.”
- **Vulnerability**: “The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.”

Crompton et al (2010) and most studies examined by Bouwer (2010) adjusted for **exposure**, but not for changes in **vulnerability**.

Possible causes of changes in **vulnerability**

- Urbanization
- Changes in building construction techniques
- Changes in building & planning regulation
- Changes in other regulations/laws/behaviour
- Changes in emergency preparation & response
- Improved weather forecasts

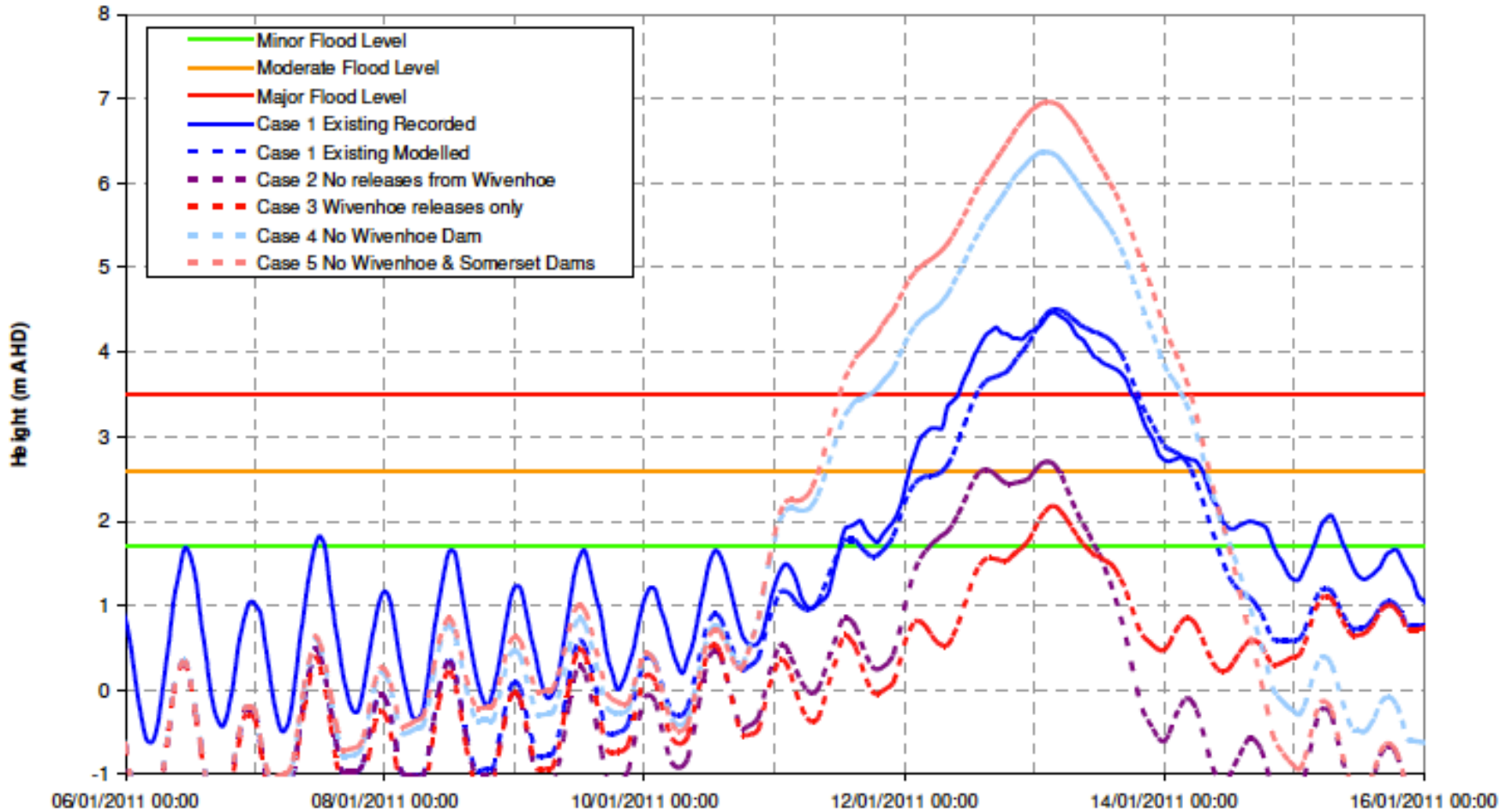


“It is anticipated that during a large flood similar in magnitude to that experienced in 1974, by using mitigation facility within Wivenhoe Dam, flood levels will be reduced downstream by an estimated 2 metres.” [www.seqwater.com.au]




Wivenhoe Dam, Brisbane River, Queensland

Impact of Somerset and Wivenhoe Dams at Brisbane Port Office



Source: *January 2011 Flood Event. Report on the operation of Somerset Dam and Wivenhoe Dam.* SEQWater, 2 March 2011.



Payneham fire
brigade, 1910

‘By January 1927, enough money had been raised to permit the purchase of...three axes, three files, a “Success” pattern spray pump, a lock and five keys, and a number of beaters “on the lines of the Belgrave beaters”.’
(www.ferntreegullycfa.com.au)

B 27774

No publication of this image in any form without permission: contact the State Library of South Australia.



‘By 17:30 there were eight tankers, three slip-ons and three pumpers on the ground. The Helitack was still working over the fire...’

(Upper Ferntree Gully fire, 7 February 2009 – Royal Commission on the Black Saturday bushfires)



“Elvis” 2009

1962



See what we're driving at?

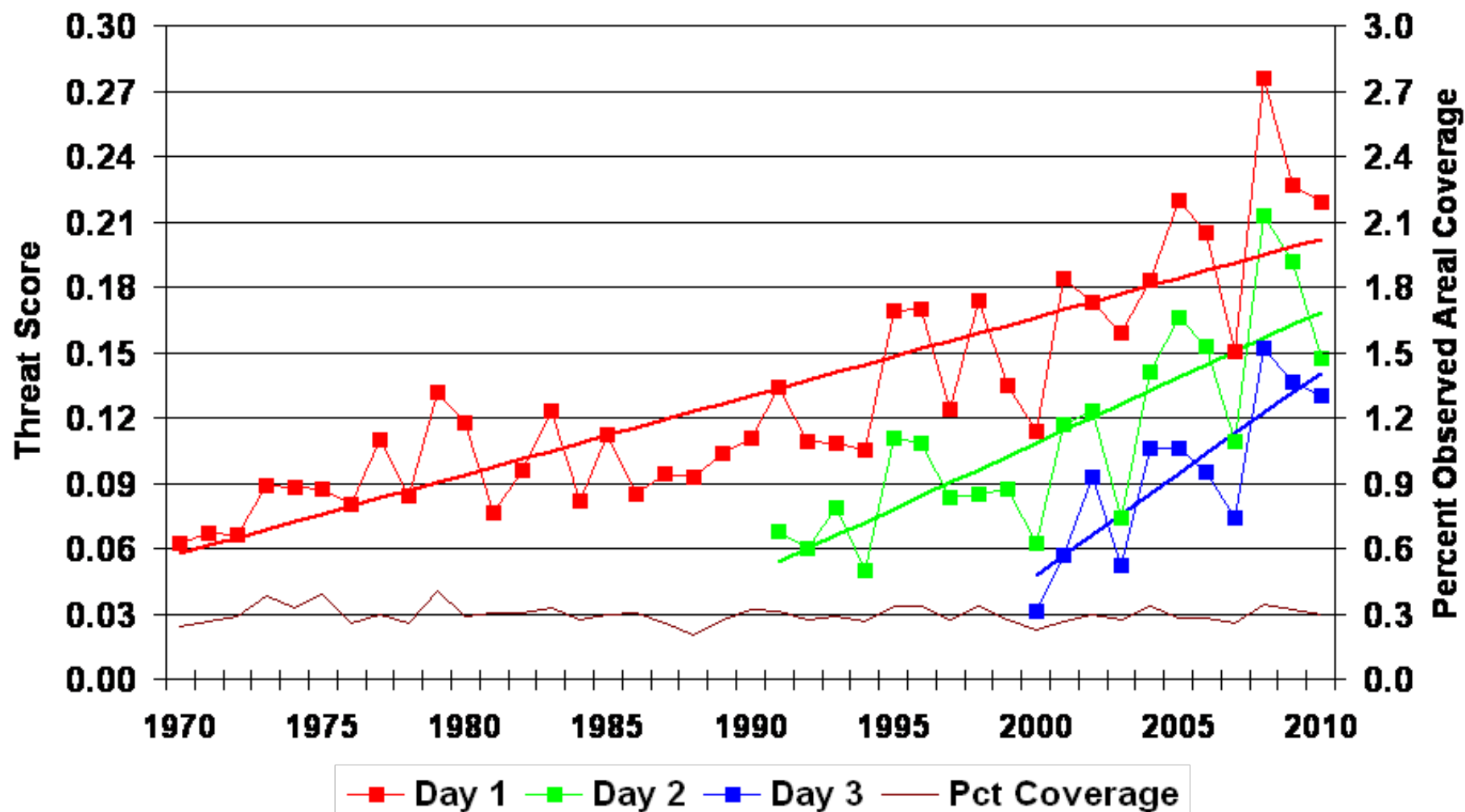
MOUNTAIN ASH — FIRE KILLED 1939
IT CAN HAPPEN AGAIN!
UNLESS YOU AVOID ALL OPEN FIRES

Issued by the Forestry Branch, D.C. Victoria



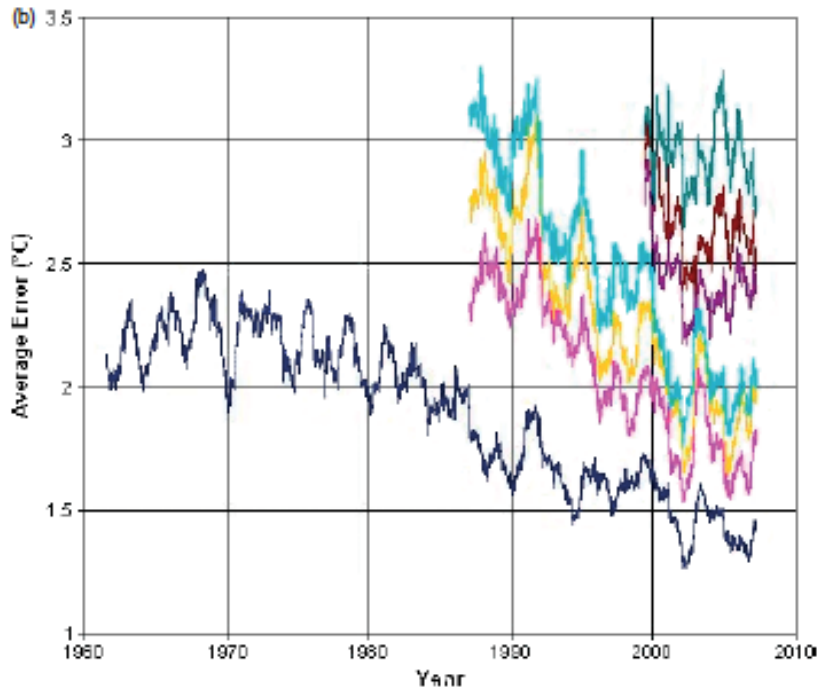
USA forecast skill trends: Threat score of zero = no skill; 1.0 = perfect forecast.

Annual HPC Threat Scores: 2.00 Inches Day 1 / Day 2 / Day 3



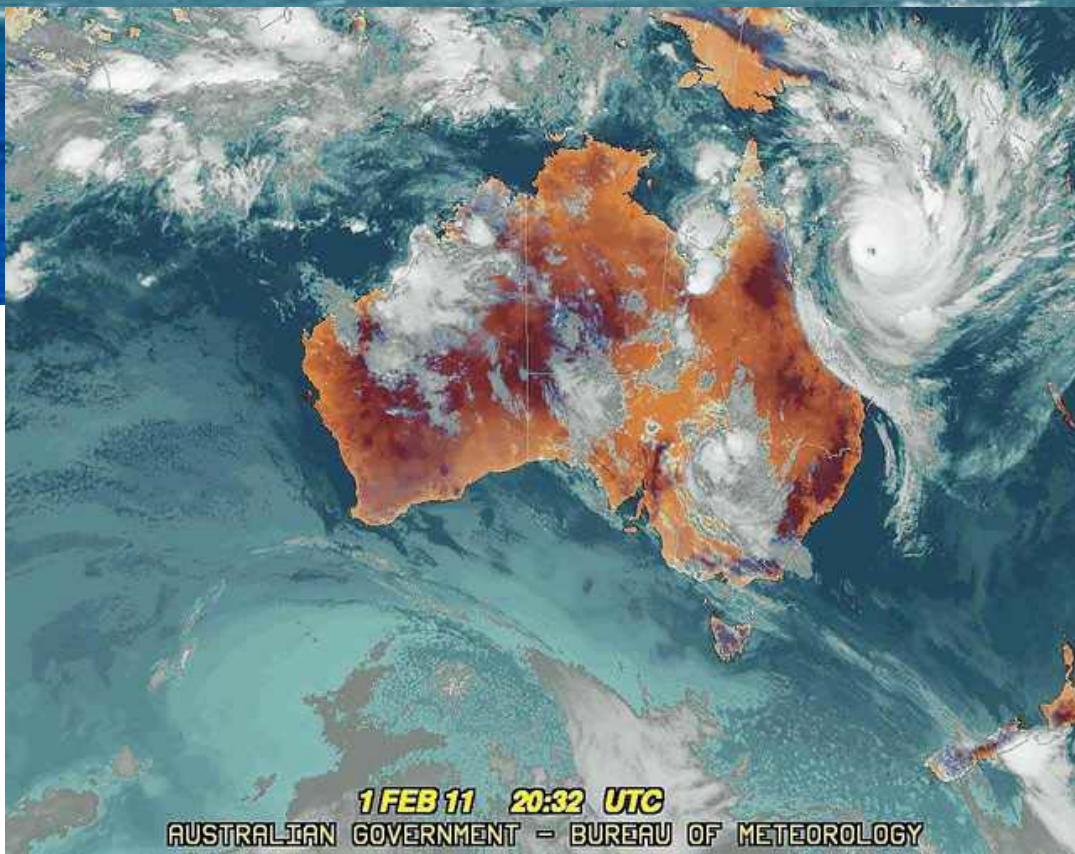
The accuracy of weather forecasts for Melbourne, Australia

Harvey Stern, *Bureau of Meteorology, Melbourne, Australia*
Meteorol. Appl. **15: 65–71 (2008)**



“Day-4 forecasts of maximum temperature are currently more skilful than Day-1 forecasts of maximum temperature in the 1960s and 1970s.”

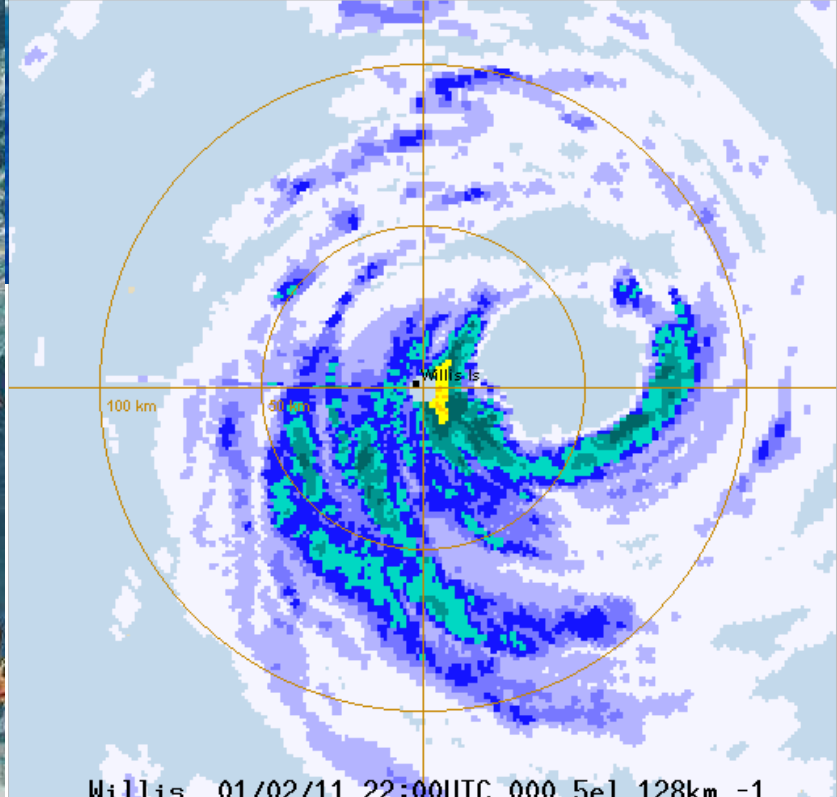
Willis Island & Tropical Cyclone Yasi



1 FEB 11 20:32 UTC

AUSTRALIAN GOVERNMENT - BUREAU OF METEOROLOGY

Copyright: Image by Bureau of Meteorology. For related Warnings, see www.bom.gov.au



Willis 01/02/11 22:00UTC 000.5e1 128km -1

Rain Rate



Summary

- $Damage = f(Hazard, Exposure, Vulnerability)$.
- *Vulnerability* should be decreasing.
- So *Damage* (adjusted for changes in *Exposure*) should be decreasing...
- ...unless something (climate change?) is increasing *Hazard* to offset decreases in vulnerability, or...
- ...data and adjustment techniques are inadequate.