


CRC for Climate & Weather Risk Technologies

Business confidence in a climate of uncertainty

Met Office Hadley Centre

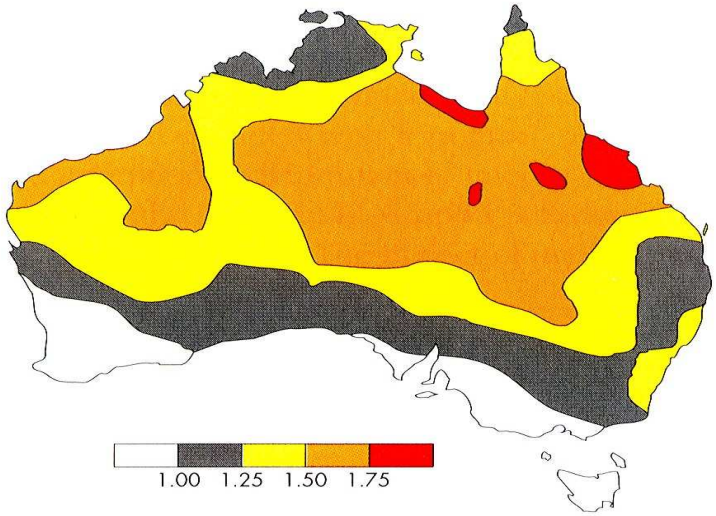
THE AUSTRALIAN NATIONAL UNIVERSITY

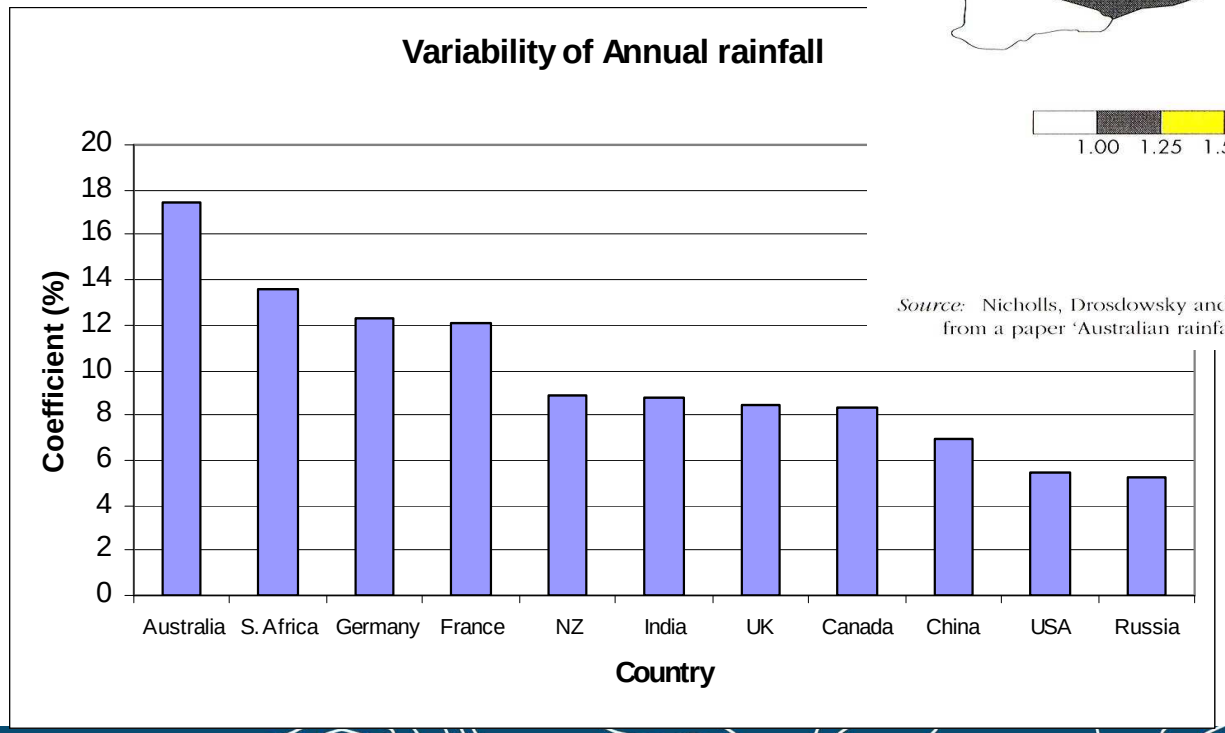
USQ AUSTRALIA

The challenge

High-impact weather: severe thunderstorms, heatwaves, bushfires, floods, tropical cyclones and droughts; ‘costing money and lives’, and with climate change, potentially, they may become more frequent and/or more severe in many sectors.

Australia has the highest level of climate variability in the world





Source: Nicholls, Drosdowsky and Lavery, Bureau of Meteorology Research Centre, from a paper 'Australian rainfall variability and change', yet to be published.

Love (2005)

Thunderstorm incidence

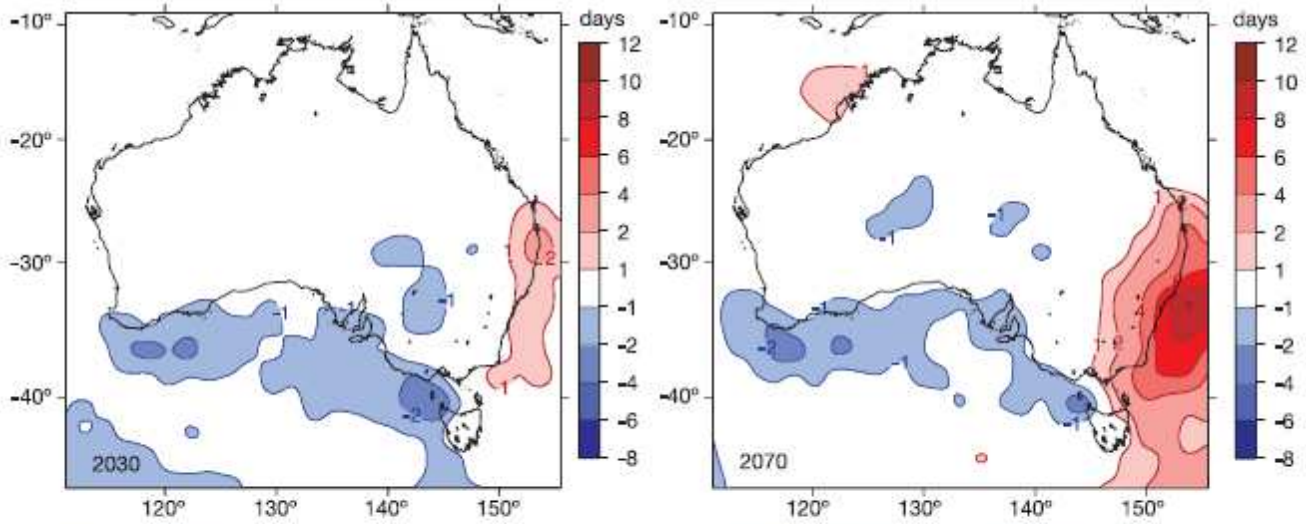
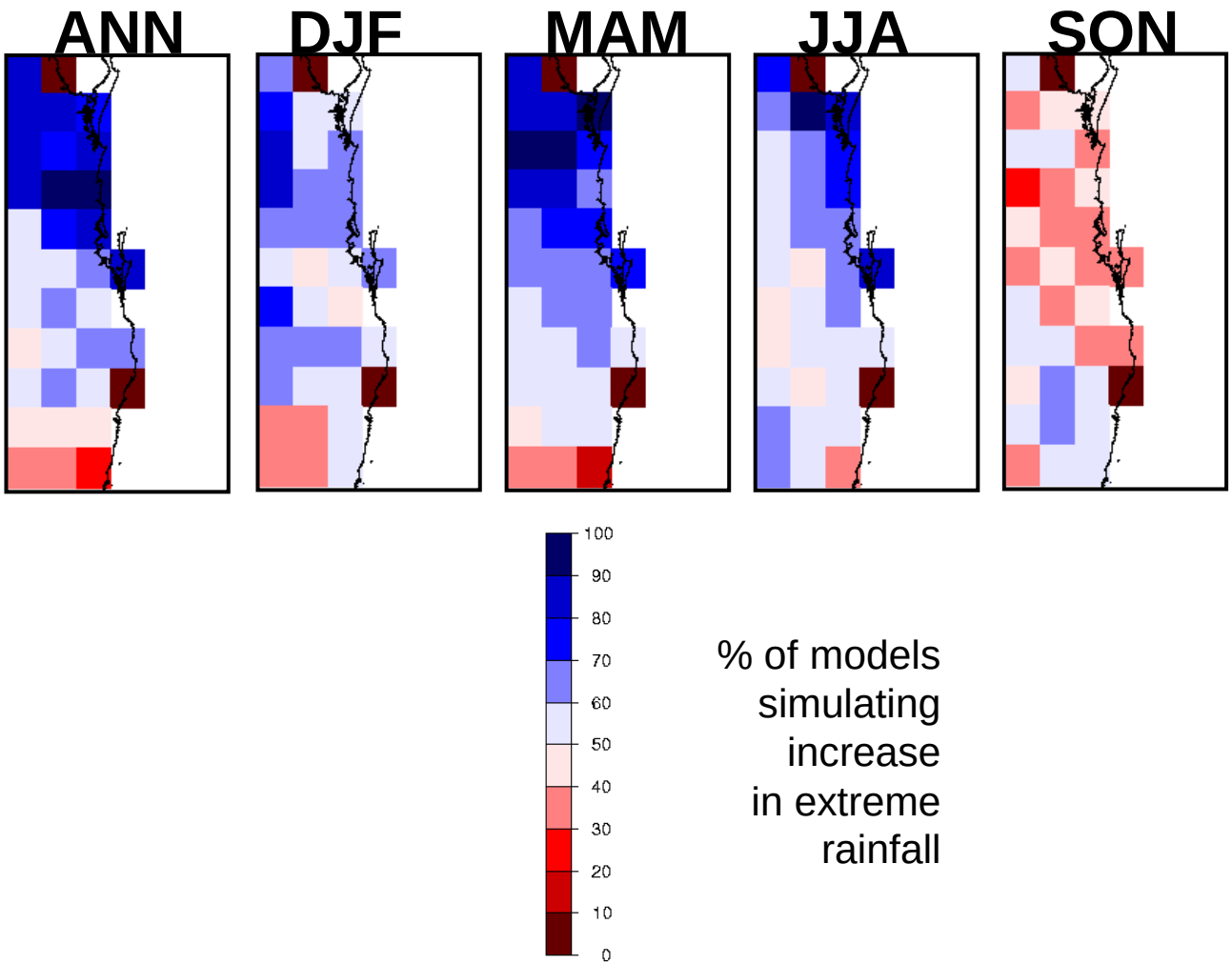


Figure 5.52: Projected changes in hail risk (hail-days per year) for 2030 and 2070 from the CSIRO Mark 3.5 model for the SRES A2 scenario. Blue regions indicate a decrease in hail risk and red regions indicate an increase in hail risk. The large-hail risk for this region is projected to almost double, increasing by between 4 to 6 days per year.

As an example: there is likely to be an increased number of severe thunderstorms over the east coast – between Bundaberg and Tasmania **.**

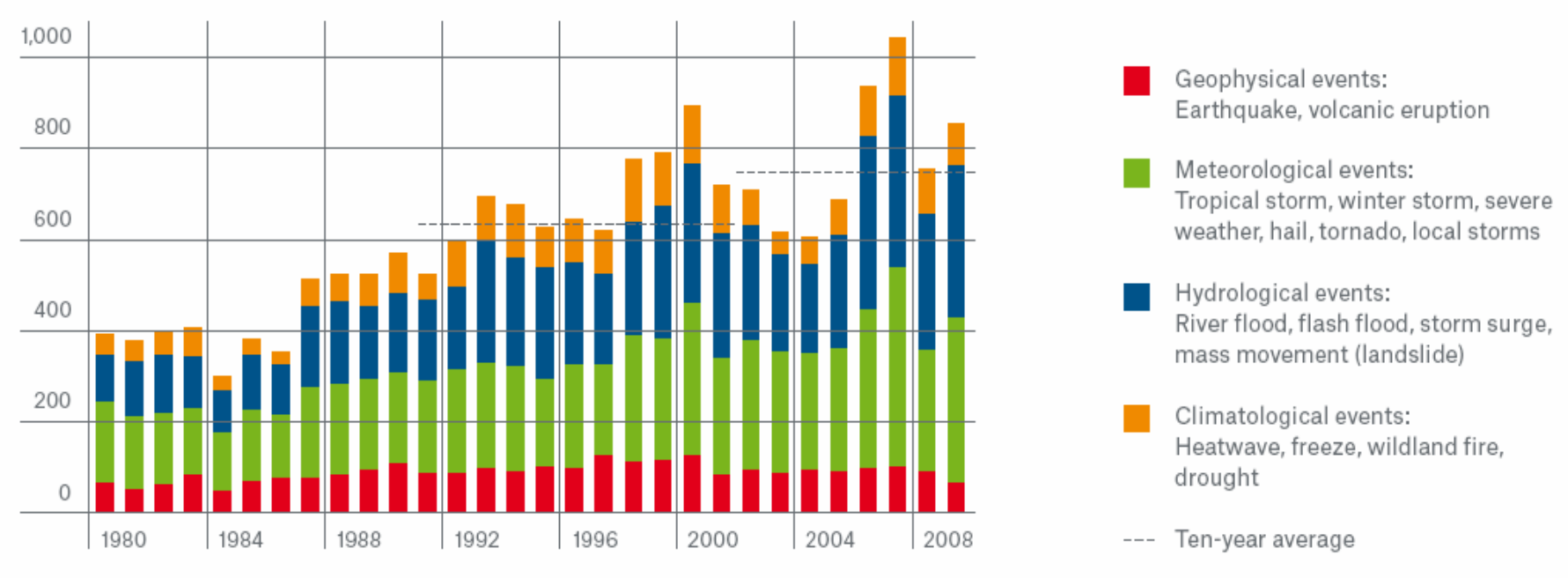
More extreme rainfall events



% of models simulating increase in extreme rainfall

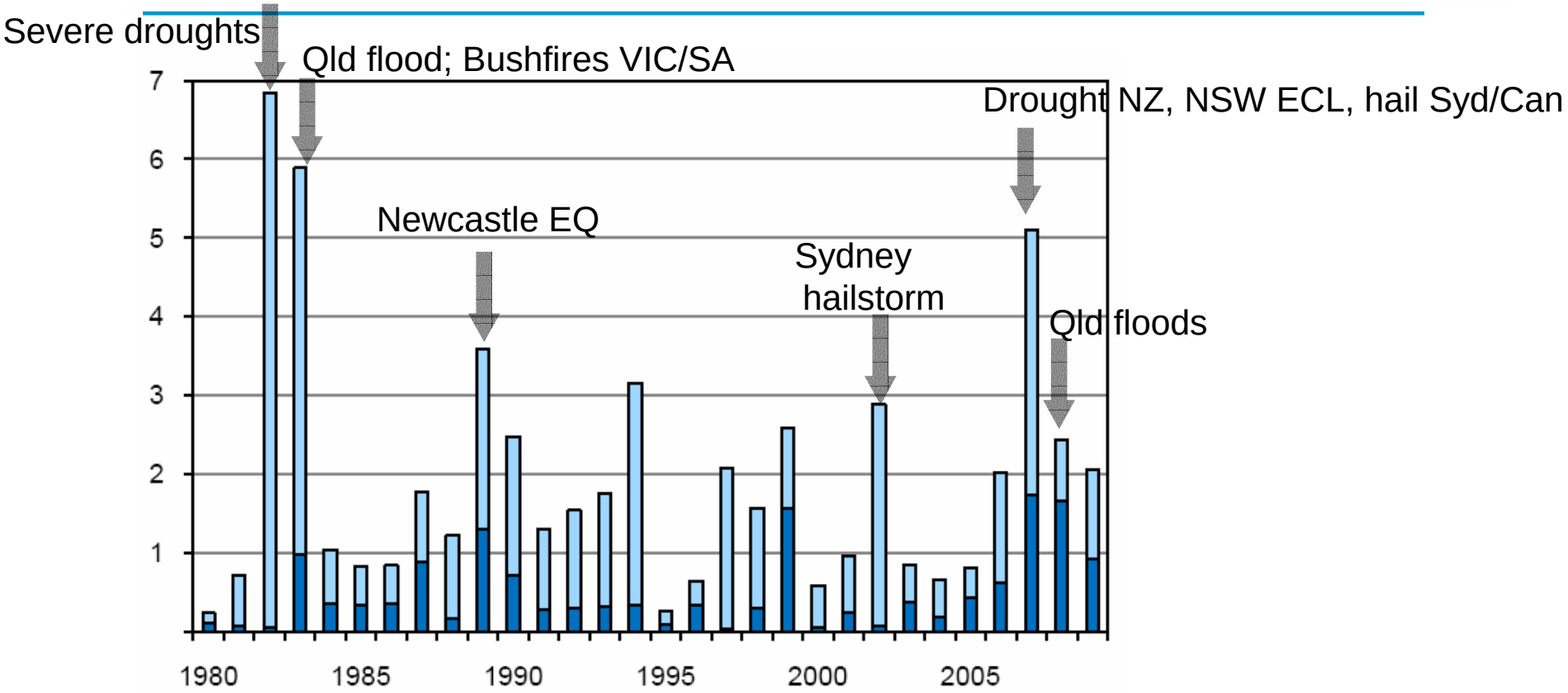
CSIRO

Natural catastrophes



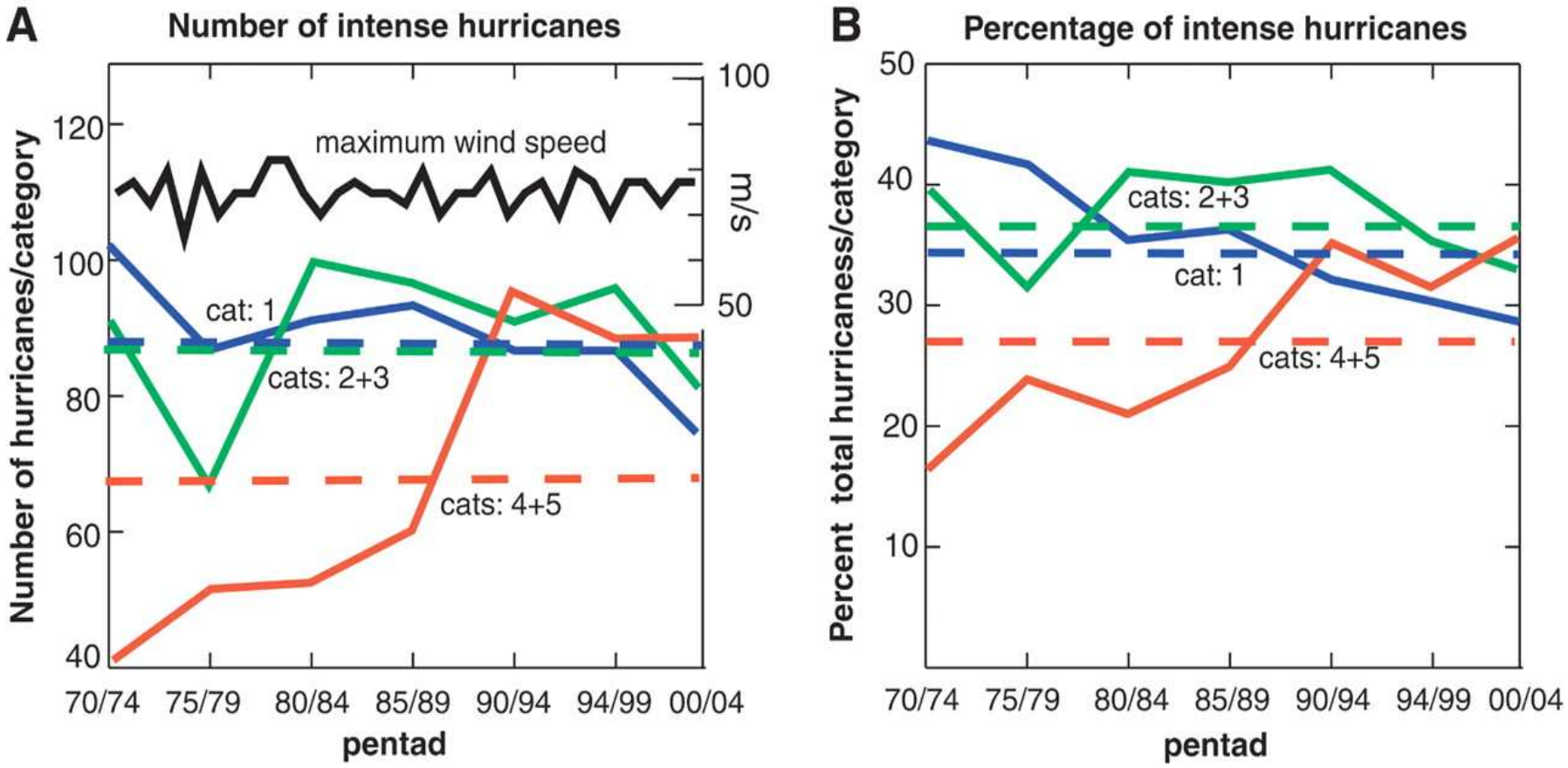
Global number of natural catastrophes 1980 to 2009 (Source: Munich Re)

Extreme events



Annual losses in Australia/Oceania, 1980 to 2009; US$bn in 2009 values. (Source: Munich Re)

Intensity of hurricanes according to the Saffir-Simpson scale (categories 1 to 5):
100% increase in Category 5 and Category 4 systems since 1970.



P. J. Webster et al., Science 309, 1844 -1846 (2005)

"Based on a range of models, it is likely that future tropical cyclones will become more intense, with larger peak wind speeds and more heavy precipitation associated with ongoing increases in tropical SSTs"

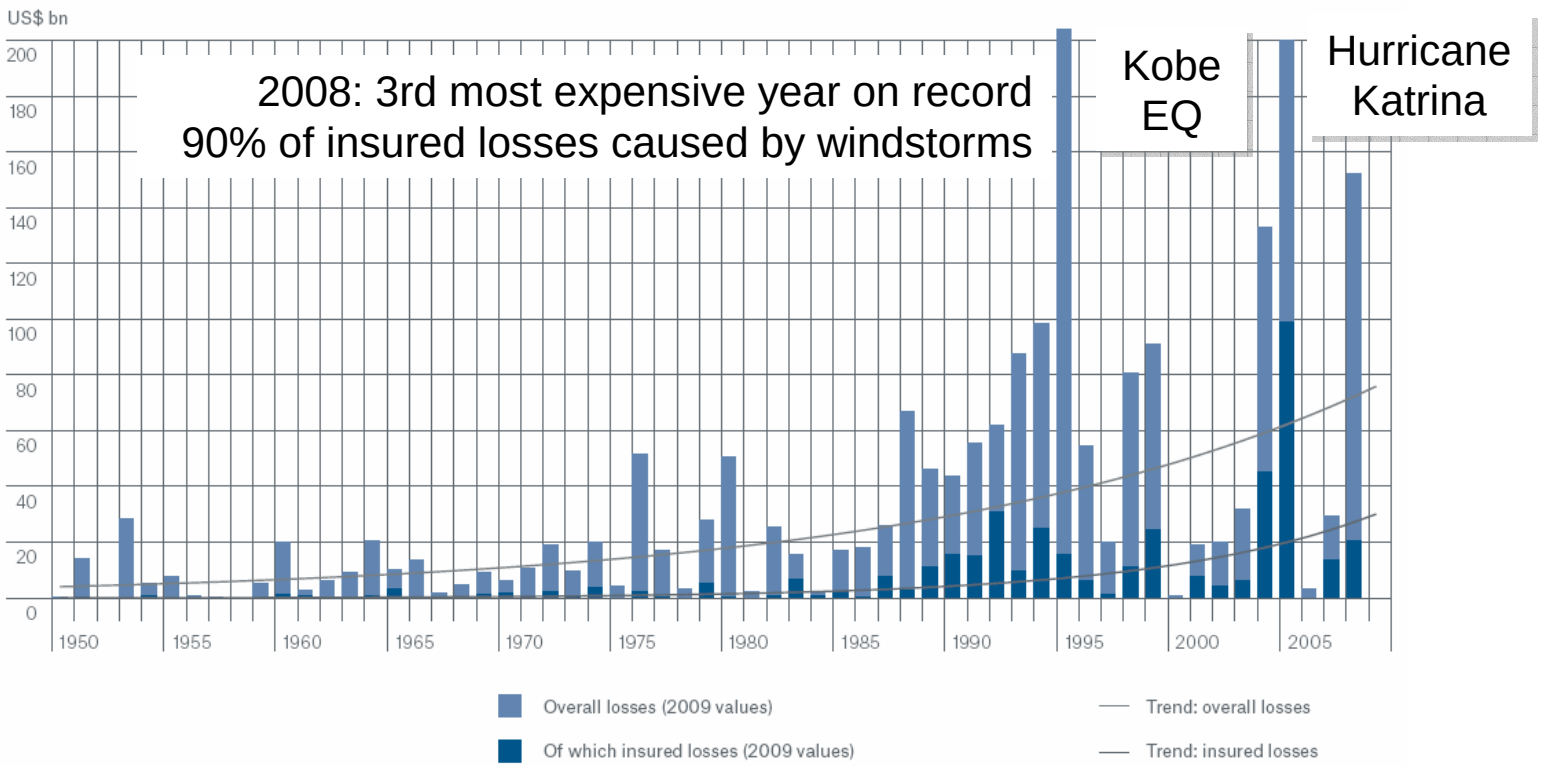
Return periods for tropical cyclones:

Table I. Return periods (yrs) for given cyclone intensities (hPa) under present and enhanced greenhouse climate conditions based on cyclones crossing the coast or passing within 1° of the coast between latitudes 14° S and 20° S

Return Period (years)	Central Pressure (hPa) for present climate	Central Pressure (hPa) for enhanced greenhouse climate
10	979	966
20	971	956
50	963	941
100	953	931
200	945	920
500	935	907
1000	927	887

McInnes et al., 2001

Counting the cost



Overall and insured losses from great natural catastrophes, 1950–2009; in 2009, US$50 billion overall, US$22bn insured (Source: Munich Re)

The threat, risk

In Australia, 19 out of the 20 largest property insurance losses since 1967 have been weather-related; the largest being April 1999 Sydney hailstorm ($A2 billion in 2005 dollars).

Globally, 37 of the 40 largest insured losses from natural catastrophes since 1970 have been weather-related.

- Australian Business Roundtable on Climate Change, April 2006

The vision for the CRC

“Our mission is to increase the wealth, safety and well-being of Australian and international businesses and communities by turning climate and weather science into applied risk management technologies, practices and tools”.

The research

Research designed to create practical tools that will assist the insurance, financial, energy, mining, transport, planning and legal sectors to manage risk in ways that would not otherwise be conceived.

Research aimed at enabling short-term management decisions and long-term strategic planning, through rigorous analysis and the application of world-leading science as it is developed.

The partners/affiliates so far

- University of Southern Queensland
- UK Met Office Hadley Centre for Climate Research
- Australian National University
- Willis Reinsurance Ltd; Suncorp Insurance, 65 regional councils
- US National Center for Atmospheric Research, Bureau of Meteorology

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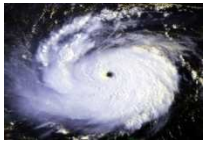


Interim CEO

Professor Roger Stone
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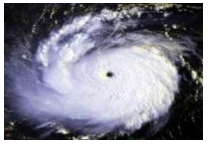


CRC for Climate & Weather Risk Technologies

Increasing profits, cutting costs, protecting assets, saving lives

Program 1 (UKMO lead Hewitt):
Fiduciary and financial risk
- Insurance/finance/investment
- Regulatory institutions
- Corporate, government social responsibility

Program 2 (USQ lead Cole):
Engineering and Infrastructure
- Mining and Energy
- Air, land, water transport
- Planning and design/systems resilience

Program 3 (ANU/UNSW):
Community Support
- Health issues
- Local government and community services
- Regional councils

Underpinning climate and weather science and integration (UKMO)

Decision systems and 'climate law' (ANU)

Climate and weather risk education and training (ANU/USQ)

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Example - Program 1: Fiduciary risk

This research program focuses on reducing exposure to financial risk associated with extreme weather/climate together with issues related to legal risk, particularly in relation to governance and operational responsibilities; this includes corporate and social responsibility, insurance, lending and investments, as well as climate law.

Financial

The outputs from particular projects may include:

- new insurance and financial products and premium assessments in advance of probable events;
- improved databases upon which to develop historical risk analyses; and
- better decision-making systems for extreme events.

Engineering, infrastructure

Tools, processes to mitigate damage to infrastructure and resources; these type of projects could deliver:

- climate and weather models that aid major business decision processes; and
- systems to assist businesses manage the impacts of climate and weather and to develop more resilient management systems.

Public safety

Protecting people from weather and climate risks the focus. The outcomes from various projects could be:

- risk management and preparedness decision-support systems to help regions manage and respond to severe weather events; and
- recovery strategies that reduce the time, cost and impact of extreme events.

Managing the risk

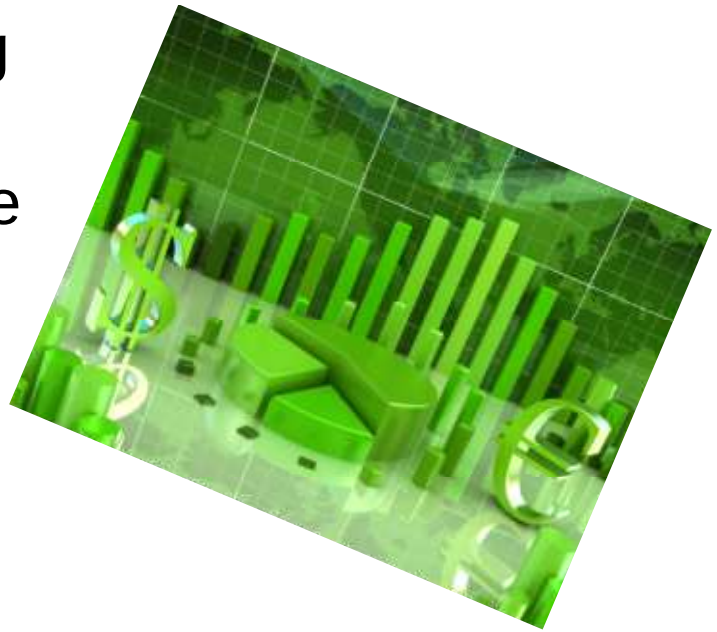
- Adapting insurance and financial risk models to accommodate increasing risk form extreme events associated with changing climate
- Assessing the rising vulnerability of modern societies and technologies
- Recognising higher risks for people in extremely exposed regions

Managing the risk

- Managing the insurance density caused by higher standards of living
- Recognising past weather activity does not necessarily represent the future
- Generating a more reliable and relevant climate and weather risk outlooks
- Setting competitive, real premiums

Financial Institutions

- Managing climatic risks affecting business portfolios
- Pricing and absorbing risks more effectively
- Accelerating the implementation of adaptation measures by the private sector
- Resilience building in particular sectors
- Operational risks



The overall benefit

A 5-year investment of $80 million in the proposed CRC for C&WRT could deliver a $1.68 billion return modelled over 5-10 years* by reducing the impact of the following weather events:

- Heatwave (heat-related death, fires, loss of productivity)
- Precipitation (floods)
- Tropical cyclones
- Seas surge/inundation (sea level rise and storms)
- Storms (heavy rain, hail, snow)

* SPP Consulting, independent economic analysis April 2010

Cooperative Research Centres

- Collaborative research ventures between end-users and researchers which tackle major challenges for the end-users
- Incorporates end-user focused education and training programs and that also includes PhDs
- Co-investment with international organisations
- Considerable leverage participant contributions with CRC program funding from Federal Govt.
- Participant contributions can be cash and in-kind

Involvement

- A **core** partner, providing research and associated activities
- An **associate** partner, involved in a specific project or activity with investment in that activity
- An **active** stakeholder involved in place-based research and activities
- A **registered user** or adopter of research and development or other outputs of the CRC
- A **sponsor** of the CRC's activities and products

The opportunity

"By considering the future climate when making decisions about infrastructure, health, water management, agriculture, biodiversity and housing, Australia will be in a better position to deal with the unavoidable impacts of climate change."

- Federal Department of Climate Change and Energy Efficiency website, April 2010

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Current approaches to assessment of high impact weather events rely solely on risks, without consideration of opportunities, and assume stationarity in climate systems and variability. For instance, many areas of corporate planning and engineering rely on assessment of a 1 in X year event. In the insurance sector, this type of approach is taken into the regulatory realm, with companies being required to have the financial capacity to survive 1 in 250 year (financial) events.

The development of a new understanding of high impact weather risks and a standard that can accommodate consideration of both risks and opportunities is a critical element of future corporate risk management, in a context of increasing severity of high impact weather, and particularly for the insurance, re-insurance and finance markets.

Feasibility of research plan

The CRC CWRT will use the following innovative research approaches to address the above challenges to focus on the needs of finance industry and corporate governance:

- assess the adequacy of the existing statistical conventions and metrics used to analyse and communicate weather-driven risks, and to understand their relevance in the context of Climate change
- develop models for assessment of weather data relevant to the needs of the finance sector and risk management in corporate governance.
- use an ‘open innovation’ process to develop new metrics and related technical standards referred to as the Standard Weather Opportunities and Risks Metrics (SWORM). The engagement of stakeholders in the open innovation process will help to generate widespread stakeholder ‘ownership’ of these new generic metrics and standards. SWORM will specify:
- the various dimensions of weather-driven risk parameters
- how co-variances/inter-dependencies between these variables should be handled
- how climate change driven shifts in the underlying statistical distribution of weather-driven risks should be characterised
- how ICT systems can transmit and receive data pertaining to weather-driven risks in an interoperable manner
- demonstrate, refine and promote SWORM in liaison with key stakeholders to create a prototype that is relevant to the needs of the re-insurance sector and corporate governance.