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Flood events that made us think again

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Introduction

Flood events that made us think again!

- North Sea Flood of 1953
- UK Summer 2007 Floods
- July 2021 Floods aka Bernd Floods
- 2022 Pakistan Floods
- Storm Daniel / Cyclone Daniel 2023

Challenges in Flood Modelling

Emerging Signals

Australian cyclones and AI

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North Sea Flood of 1953

31st January-1st February 1953

- Cause: combination of a severe storm and a high spring tide.
- Impact:
  - Caused numerous deaths and catastrophic damage in the UK, the Netherlands and Belgium.
  - In the UK, over 300 lives were lost and over 150,00 acres of land was flooded. In the Netherlands, over 1,800 drowned.
  - The estimated cost of the floods was £50m, equivalent to roughly £1.2bn today.

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North Sea Flood of 1953 - What has changed?

- Significant investment into coastal flood defences, including the UK's Thames Barrier and the Delta Works in the Netherlands.
- Investment into flood warning systems, including warning sirens that are still in use today.
- Improvement in weather and tidal forecasting, including the use of satellites, assisting in the provision of more accurate data and predictions.

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UK Summer 2007 Floods
31st January-1st February 1953

- Cause: 414mm of rainfall across England and Wales from May to July - more than in any period since records began in 1766
- Impact:
  - 48,000 homes without power for two days
  - 10,000 motorists were stranded on the M5 overnight
  - Surface water and river flooding affected more than 55,000 homes and businesses across the country
  - 17,000 families had to leave their homes, 7,000 people were rescued, 13 people died
  - Total losses at about £4bn, of which insurable losses were reported to be about £3bn

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UK Summer 2007 Floods - What has changed?

- Formation of Flood Re
- Build Back Better scheme, provides homeowners up to £10,000, above the cost of repair damage, to have flood resilience and resistance measures installed in their homes after a flood event.
- Be Flood Smart, which was launched earlier this year. This was a campaign launched in collaboration with the Environment Agency. The main aim of the campaign is to help educate homeowners about flood risk and mitigation measures.
- Collaborative effort is required to help drive the sustainability of managing UK flood risk

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July 2021 Floods aka Bernd Floods

- Cause: extreme rainfall hit various parts of Western Europe, including Germany, Belgium and the Netherlands.
- Impact:
  - Close to 200 people in Germany alone having lost their lives.
  - Insured industry estimates of c. EUR 8.2 billion following the floods.
  - Over the space of 24 hours, areas in Germany and Belgium got as much rain as they usually do in a month.

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July 2021 Floods aka Bernd Floods- What has changed?

- Insurance penetration improvements. Less than 50% of residential buildings that were affected by the flooding in Germany were appropriately insured at the time.
- Are we too quick to forget prior events in flood modelling? There are records of historic flood events of a similar magnitude in the Ahr Valley region (which was also heavily impacted by the Bernd Floods) in 1804 and 1910.

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2022 Pakistan Floods

- Cause: Pakistan faced its worst flooding in a decade in 2022 due to extreme monsoon rains that lasted for months.
- Impact:
  - One third of the country submerged
  - Displacement of approximately 33 million people
  - Death of over 1,700 people and approximately 800,000 cattle and other livestock
  - $15 billion in economic losses
  - The floods affected nearly 15% of Pakistan's rice crop and 40% of its cotton crop

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2022 Pakistan Floods - What has changed?

- Better Government response is needed in developing countries.
- This also includes improvements to existing infrastructure and future development.
- The impact of climate change on countries such as Pakistan. According to European Union, data shows that Pakistan is responsible for less than 1% of the World's planet-warming gases, yet, according to the Global Climate Risk Index, it is the eight most vulnerable nation to the climate crisis.

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2023 Storm Daniel

- Cause: A low-pressure system developed in the Mediterranean. This eventually intensified into storm Daniel, a tropical-like cyclone referred to as a “medicane”.
- Impact:
  - The loss of 4,000 lives among the Libyan population, while 50,000 people were forced from their homes.
  - Upon landfall, catastrophic flooding caused the collapse of two key dams in the Durma region of Libya.
  - Short-term economic damage to Greece atone is estimated to be around €5 Billion.

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2023 Storm Daniel - What has changed?

- The flooding in Libya highlights the need for regular dam (and other structural) maintenance.
- Several warnings over the preceding years discussed the “high potential for flood risk”. This flags the consequences of political instability and lack of financial allocation to public infrastructural development, leading some to argue that a lot of damage was, to an extent, man-made.
- One way in which some of the most climate change-exposed developing nations can be supported is through extreme weather event early warnings.

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Challenges in Modelling Flood Events

Key challenges:

- Data limitations and appropriateness of model assumptions.
- Non-modelled elements.
- Model granularity issues.
- Flood risk is non-static.

Example solutions:

- Ensure to be able to answer key questions about selected (vendor) models, e.g., data used in model calibration, as well as what is and isn't modelled.
- Flood model validation, e.g., compare outputs from different models/techniques and benchmarking.
- Communication of uncertainty and limitations.

Future models:

- AI has the potential to disrupt the flood modelling scene. Google already has established its Flood Hub tool.
- Need to consider what this means for the future actuary.

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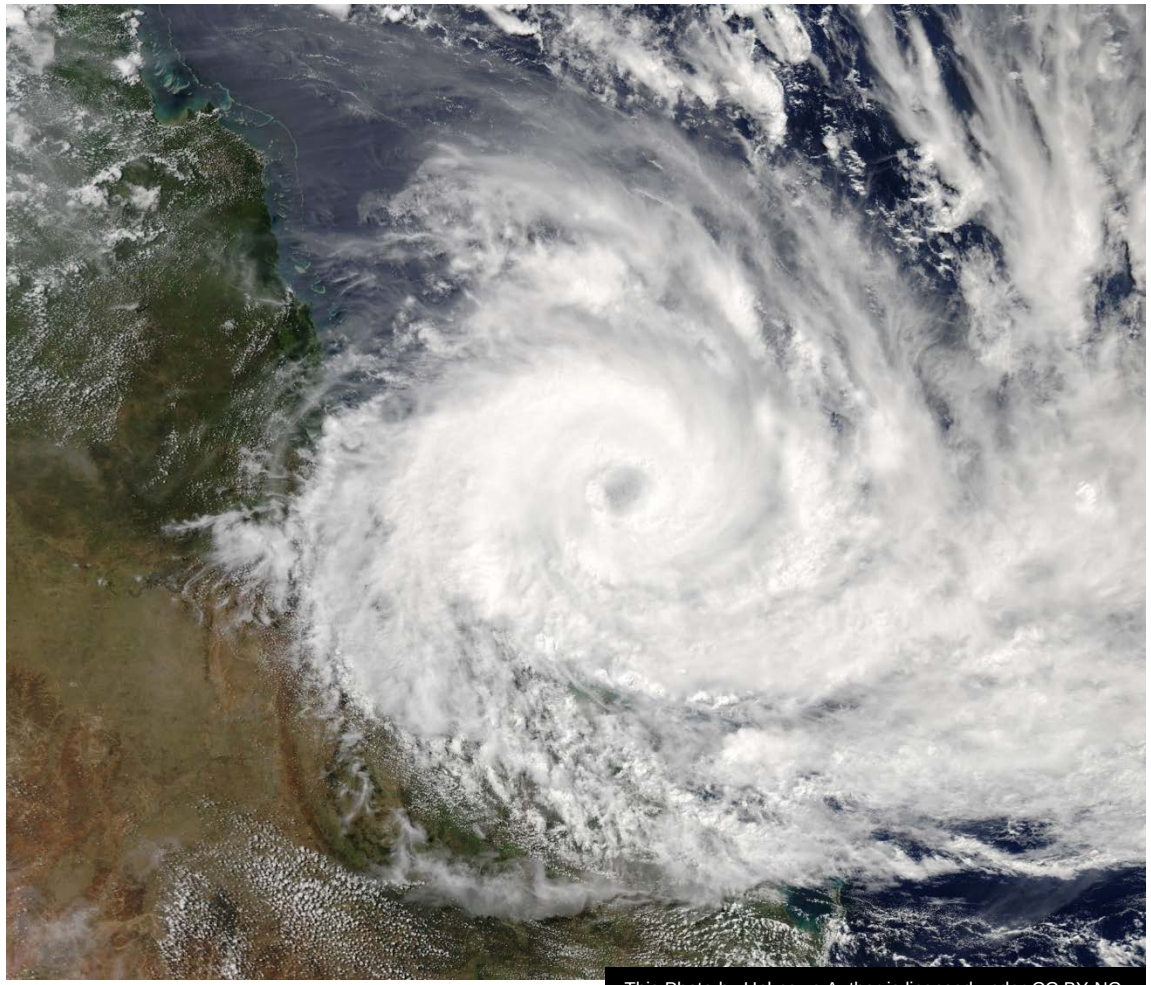
Emerging signals: Australian Flood and Cyclones



- Recently Australia set up the Cyclone Reinsurance Pool (CRP), a $10 billion Government guarantee aims to make property insurance more affordable.
- 12% of households are classified as experiencing home insurance affordability stress (up from 10% in March 2022) where affordability stress is defined as paying more than four weeks of household gross income towards home insurance premiums[1]
- The Cyclone Pool does not differentiate between affordability-stressed and non-affordability-stressed households, particularly as cyclone risks are geographically widespread.
- Contrastingly Australia's flood risk is highly localised among a relatively small number of households with significant exposure[2]

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1 Home Insurance Affordability Update (actuaries.asn.au), 2 Funding for Flood Costs: Affordability, Availability and Public Policy Options (actuaries.asn.au)

Conclusions

- Flood risk is devastating for individuals, businesses, communities and the economy. As has been observed in today's case studies, managing flood risk effectively requires a forward-thinking response and collaborative efforts between property owners, the Government and the insurance industry.
- Several key developments have shaped the industry, with significant progress having been made over the past few decades e.g., Build Back Better.
- However, recent flood events have highlighted that there is still more work to be done, for instance combating low insurance penetration rates (even within developed countries) and further investment into appropriate flood defence infrastructure in developing nations.
- As flood risk is dynamic, so must be our response to managing it.

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Questions

Comments

Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenter.

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Thank you