QBE Insurance

NZ Climate Risk Through an Insurance Lens

Dr Joanna Aldridge
Group Head of Research and Development – Catastrophe
School of Geosciences, University of Sydney

October2026

Real and Present Danger:
NZ's Catastrophe Risk Escalates

Wellington April 2026. (Facebook)

Landslide Jan 2026. Guardian.

TC Vaianu, April 2026. Youtube.

New Zealand Weather-Related Insured Losses

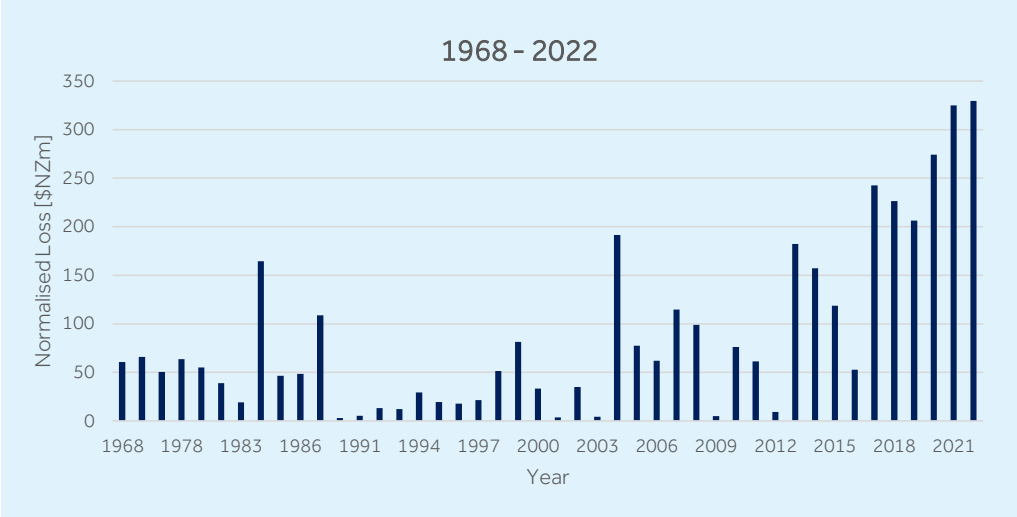
2023 puts NZ on the global reinsurance radar

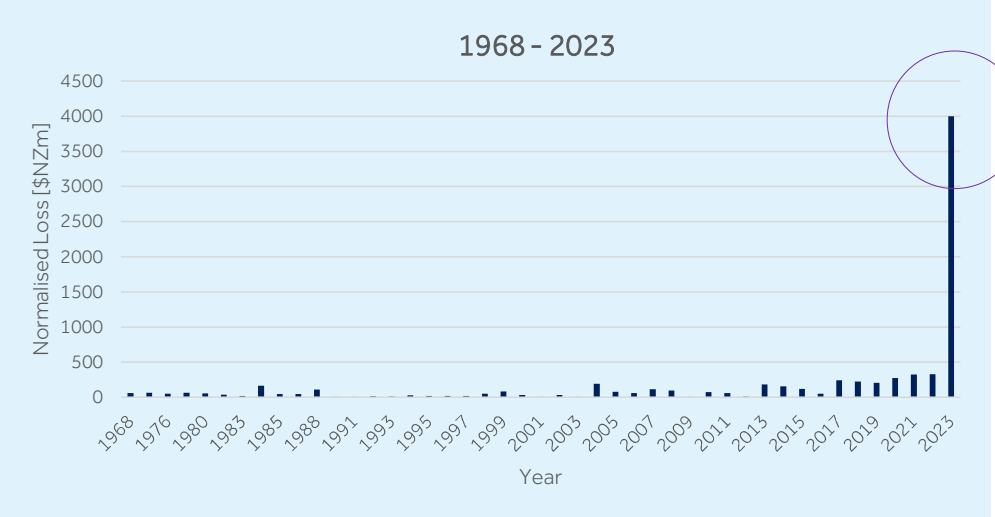
Jan 2023: Auckland Anniversary Floods ~$NZ2b

Feb 2023: ex-TC Gabrielle ~$NZ2b

Previous largest loss: 2019 Timaru hailstorm $NZ171m

ICNZ Non EQ Annual Insured Catastrophe Loss (normalised $NZm)





Catastrophe Risk Shapes the Entire Insurance Landscape

Exposure & accumulation management

Pricing

Capital management

Underwriting strategy

Reinsurance strategy, placement, allocation

Loss estimation

Business planning

Event response and preparedness

NZ 2026 National Climate Change Risk Assessment

Declining Insurability is a symptom of increasing hazard

He Pou a Rangi
Climate Change Commission

Findings

Inland flooding and Sea Level Rise are key hazards increasing with climate change.

Limited assessment of extreme hazards

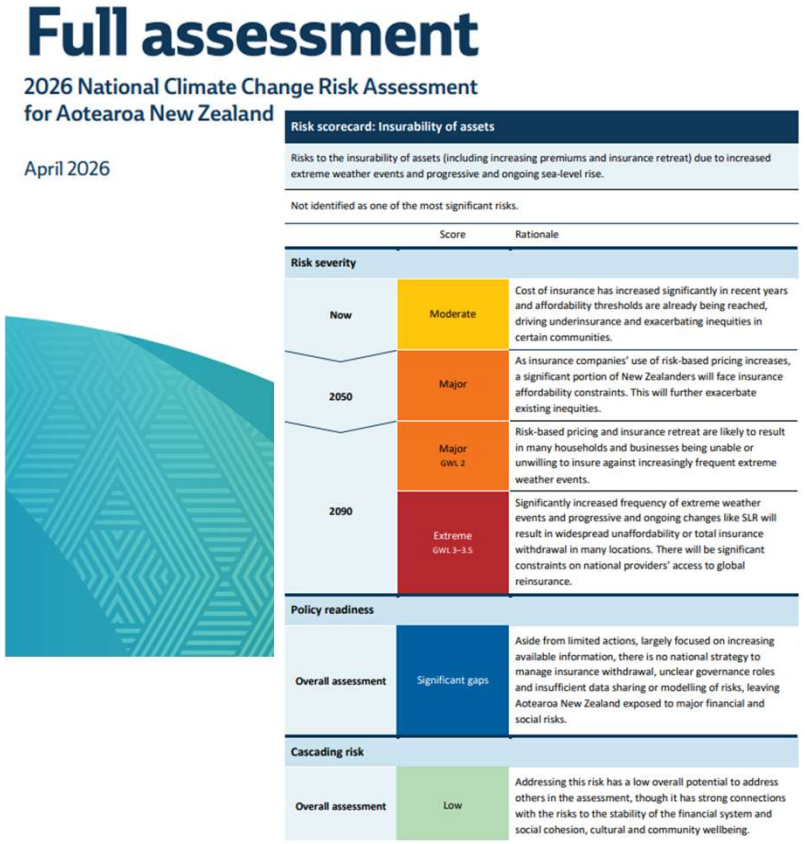
Inland flooding: 204k ($250b) of buildings exposed to now rising to 260k by 2090 (SSP3)

Coastal inundation: 32.6k ($11.4b) of buildings exposed to now rising to 95.6k by 2090 (SSP3) including 12 airports

Timing of insurability challenges is uncertain and locally specific

Challenges with underinsurance, reinsurance costs and increasingly granular risk selection

Need to move past data improvement to risk management



Full assessment

2026 National Climate Change Risk Assessment for Aotearoa New Zealand

April 2026

Risk scorecard: Insurability of assets

Risks to the insurability of assets (including increasing premiums and insurance retreat) due to increased extreme weather events and progressive and ongoing sea-level rise.

Not identified as one of the most significant risks.

	Score	Rationale
Risk severity		
Now	Moderate	Cost of insurance has increased significantly in recent years and affordability thresholds are already being reached, driving underinsurance and exacerbating inequities in certain communities.
2050	Major	As insurance companies' use of risk-based pricing increases, a significant portion of New Zealanders will face insurance affordability constraints. This will further exacerbate existing inequities.
2090	Major GWL 2	Risk-based pricing and insurance retreat are likely to result in many households and businesses being unable or unwilling to insure against increasingly frequent extreme weather events.
	Extreme GWL 3–3.5	Significantly increased frequency of extreme weather events and progressive and ongoing changes like SLR will result in widespread unaffordability or total insurance withdrawal in many locations. There will be significant constraints on national providers' access to global reinsurance.
Policy readiness		
Overall assessment	Significant gaps	Aside from limited actions, largely focused on increasing available information, there is no national strategy to manage insurance withdrawal, unclear governance roles and insufficient data sharing or modelling of risks, leaving Aotearoa New Zealand exposed to major financial and social risks.
Cascading risk		
Overall assessment	Low	Addressing this risk has a low overall potential to address others in the assessment, though it has strong connections with the risks to the stability of the financial system and social cohesion, cultural and community wellbeing.

Understanding NZ Extremes: Challenges for Insurers

Insurers are interested in extreme events impacting exposures

- Extreme rainfall
- Cyclones
- Hailstorms
- Wildfire

And the **annual clustering** of these events.

But in Global Climate Models, NZ is poorly represented.

- The topographic effects are not captured
- Downscaling studies mainly focus on average or percentile Wind Speeds and Rainfall, not events.
- Recent CMIP6 downscaling studies (Gibson et al 2024) show improvement in capture of NZ multiday rainfall extremes and cyclone tracks.

IOP Publishing Environ. Res.: Climate 4 (2025) 012001 https://doi.org/10.1088/2752-5295/ada1f0

ENVIRONMENTAL RESEARCH
CLIMATE

TOPICAL REVIEW

Climate change impacts to extreme weather events associated with insured losses in New Zealand: a review

Joanna Aldridge[1,2,*] and Rob Bell[3,4]

[1] School of Geosciences, University of Sydney, Sydney, Australia
[2] QBE Insurance Sydney, Sydney, Australia
[3] Bell Adapt Ltd, Hamilton, Hamilton, New Zealand
[4] Environmental Planning Programme, School of Social Sciences, University of Waikato, Te Whare Wananga o Waikato, Waikato, New Zealand
[*] Author to whom any correspondence should be addressed.

E-mail: joanna_aldridge@outlook.com

Keywords: New Zealand, extreme weather, climate risk, South Pacific, climate review

OPEN ACCESS

RECEIVED
3 July 2024

REVISED
24 November 2024

ACCEPTED FOR PUBLICATION
20 December 2024

PUBLISHED
10 January 2025

Original content from this work may be used under the terms of the Creative Commons Attribution 4.0 licence.

Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.

Abstract

In 2023, New Zealand experienced two consecutive weather-related events that exceeded previous insured losses by more than a factor of ten: the Auckland Anniversary Day floods and ex-Tropical Cyclone Gabrielle. Further, climate reporting for financial services becomes mandatory in this jurisdiction in 2024, yet established catastrophe models are not available for a range of perils in New Zealand. Insurers hence need to better understand weather-related catastrophes in New Zealand and the impact of climate change in this island nation exposed to strong marine influences and weather events of both tropical and temperate origin. This comprehensive review seeks to

Climate@QBE Research Partnerships

01

Australian Hail

UNSW Institute for Climate Risk & Response

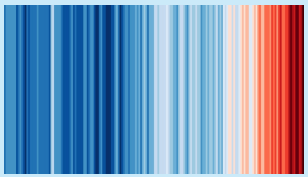
02

North America Severe Convective Storm

NSF | NCAR Operated by UCAR

03

European Windstorm



04

Australian Tropical Cyclone

The University of Western Australia

05

New Zealand Hail

MetService Te Ratonga Tirorangi

Victoria University of Wellington Te Herenga Waka

06

Australian Extreme Events

Natural Hazards Research Australia

07

North Atlantic Hurricane

reask earth system risk

08

Australian Hail

early warning network

09

Australian Flood

ICEYE

10

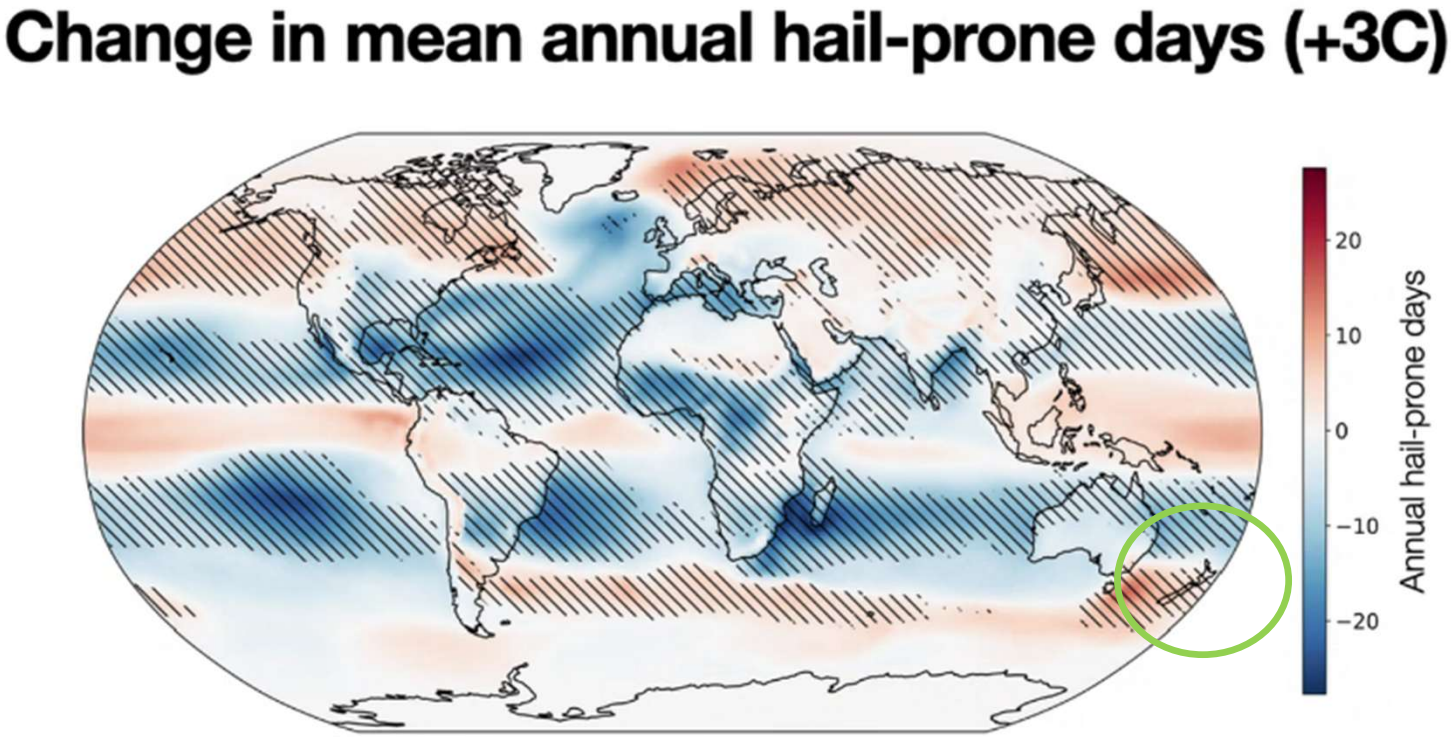
North American Wildfire

CAPE ANALYTICS

QBE

Peril: Severe Convective Storms

Temperate climate zones globally are showing an increase in hail potential



Raupach et al (2026) UNSW

New Zealand Hail Climatology

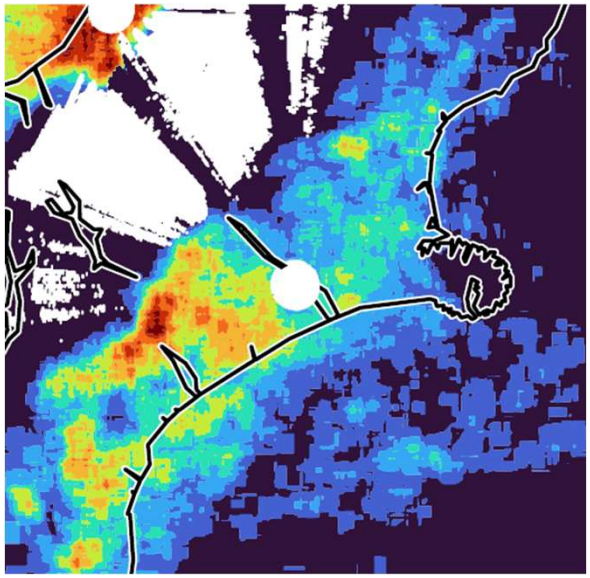
Issue: No nation-wide hail hazard understanding for NZ.

MetService and VUW: Hail day climatology developed from radar.

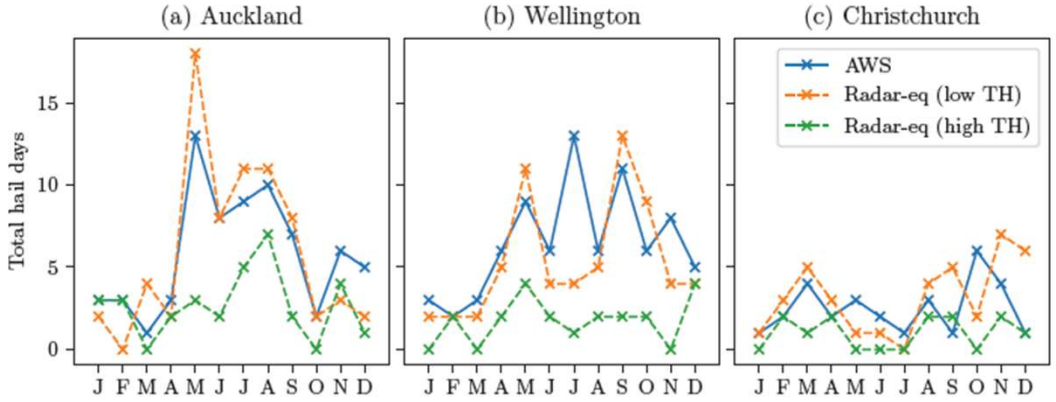
Combining hail products improves detection of hail events of interest by sampling complementary information across different storm layers

Output: Hail frequency maps for New Zealand.

Impact: Risk quantification for previously unmodelled peril.



Annual average hail days Canterbury. with distance-weighting correction.

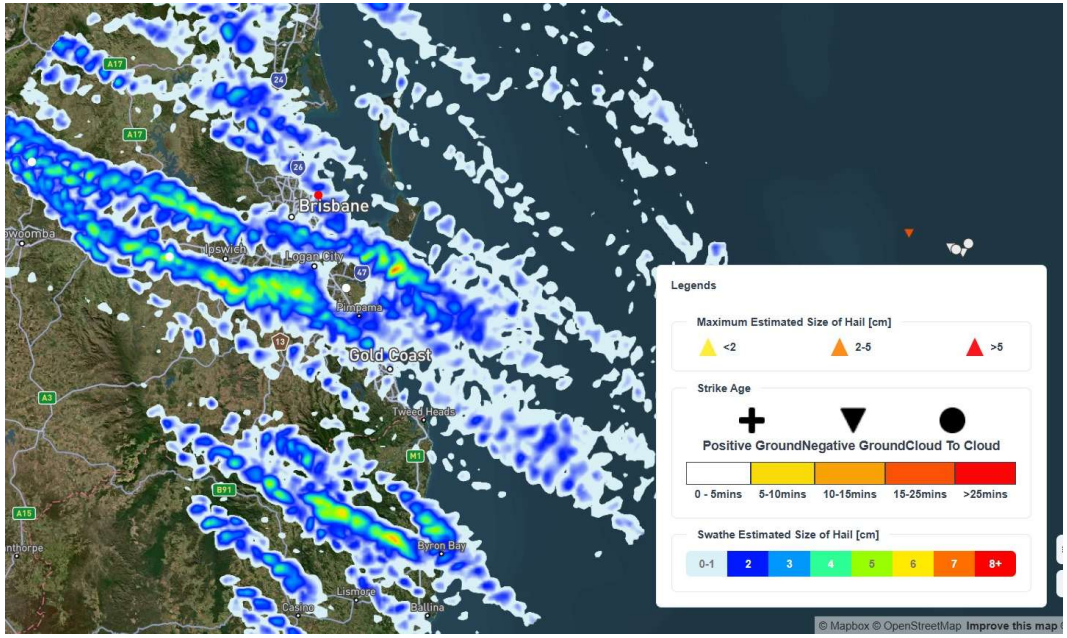


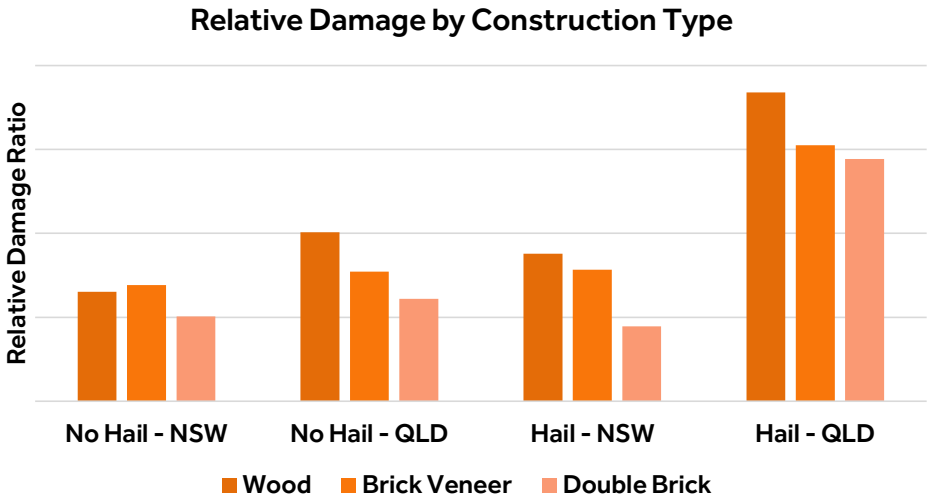
Monthly total hail days from weather station hail day observations (blue line) with radar-equivalent hail days (orange and green lines) for (a) Auckland, (b) Wellington, and (c) Christchurch.

Cracking the Code of Hail Damage

early warning network

Issue: Model inconsistency in treatment of rating factors	EWN: hail footprints with millimetre accuracy from 3D volumetric radar	QBE: combine location level claims insights derived from machine learning	Output: Customised damage ratios by building attribute and hail size.	Impact: More accurate Event Response, Cat modelling and pricing



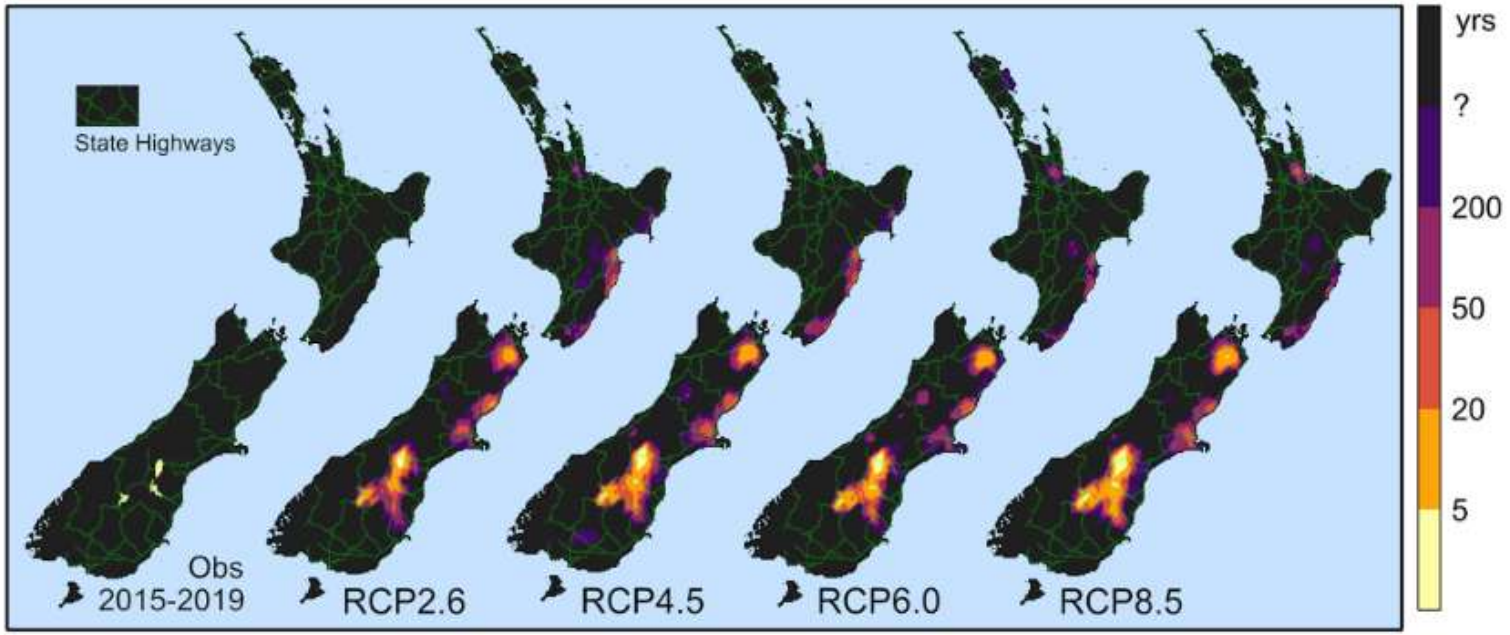


QBE

Peril: Wildfire Weather

NZ Fire weather may become more like southeastern Australia by end of century

Return Period of Very Extreme Wildfire Weather Conditions in the 21st Century: Catastrophic FWI



Melia et al (2022)

Peril: Ex-Tropical Cyclones

Warmer oceans bring potential for more intense cyclones

Climatology

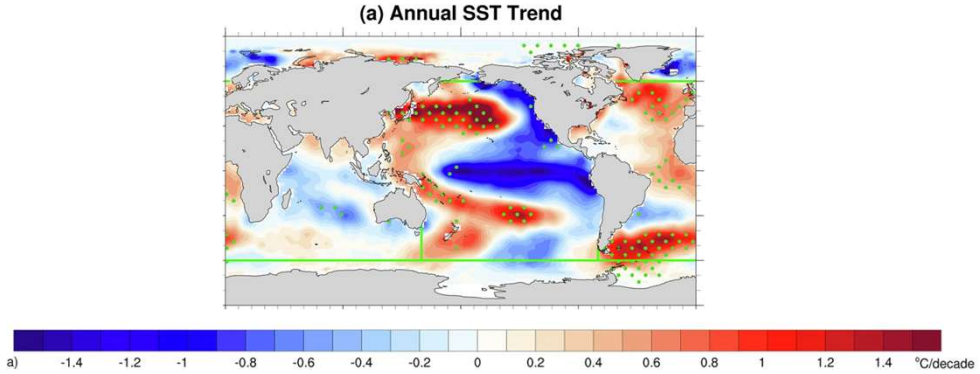
- Can steer from east or west.
- Intensification in extra-tropical transition.
- **Frequency**: 1 pa ranging from 0 to 4
  - Strong relationship with La Nina.

Notable Events

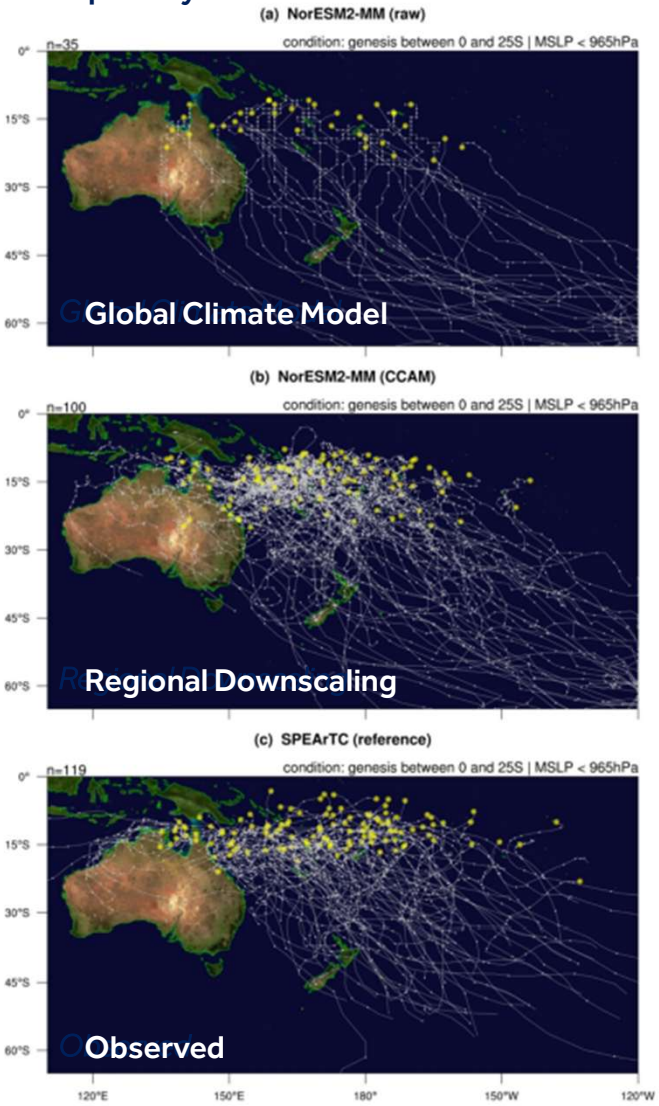
- TC Vaianu 2026
- TC Gabrielle 2023
- Ex-TC Bola 1989
- Ex-TC Giselle 1968
- 1937 ex-TC North Island

Climate Change

- Not well captured in Global Climate Models. Downscaling studies improving but underrepresent severe events
- Warmer SSTs and poleward shift in TCs in SW Pacific



Tropical Cyclone Tracks in the South Pacific

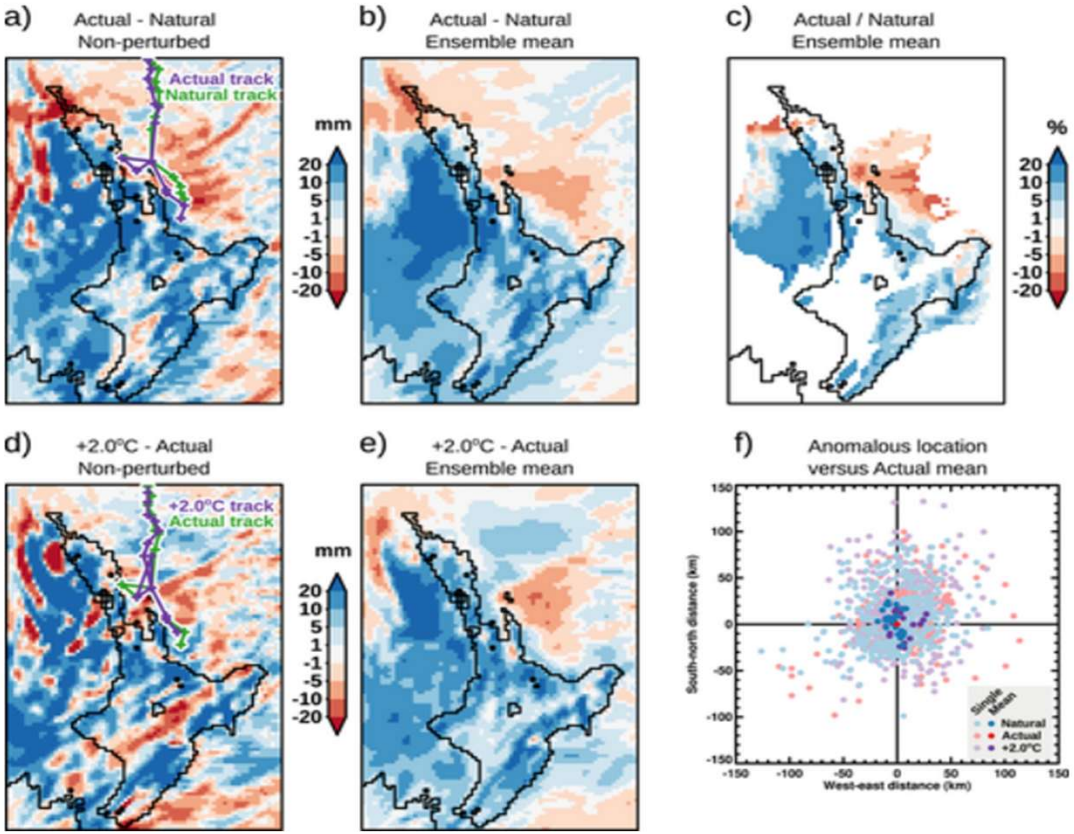


Gibson et al (2024)

Peril: Tropical Cyclone Rainfall

A warmer atmosphere creates the potential for more extreme rainfall in cyclones

Rainfall from TC Gabrielle



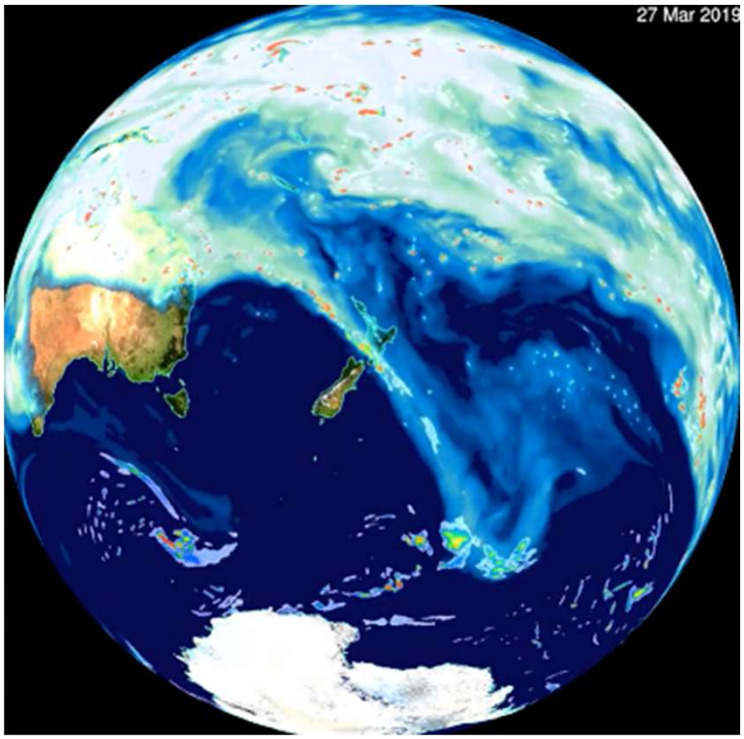
Blue = wetter

- Rainfall accumulation in TC Gabrielle ~10% higher due to historical warming

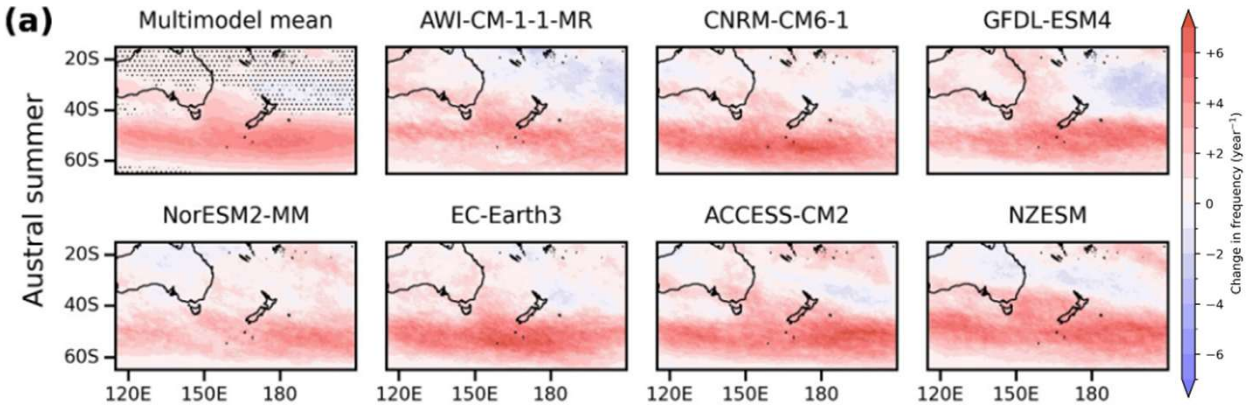
Stone et al (2024)

Peril: Atmospheric Rivers

Flood Driver: Associated with 9 out of 10 of NZ's top loss causing floods



Increase in Atmospheric River Frequency in Summer (RCP85, 2100).



NIWA: Goddard et al (2025)

Refs: Dean et al. 2013, Harrington et al. 2015, Prince et al. 2021; Shu et al. 2021, Reid et al., 2021, Goddard et al (2025)

Peril: Extreme Rainfall

Increases in short duration rainfall is a consistent finding in climate studies globally.

NIWA

- 16-18% increases in 1 hr rainfall across extreme return periods *per degree of warming*

→ *increases flash flood risk*

Sigid et al 2026: 12 km CMIP6 downscaled modelling for NZ annual max rainfall by 2070-2100

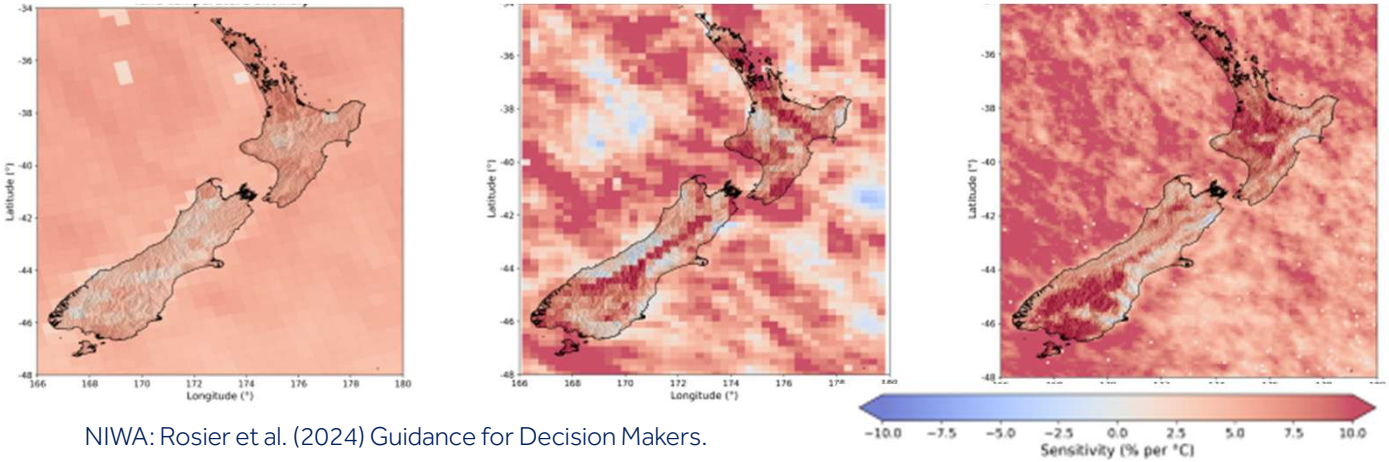
- 1-day rainfall +7-18% - SSP2-4.5
- +8-28% SSP3-7.0
- 3-day rainfall +4-15% - SSP2-4.5
- +5-24% SSP3-7.0

Sigid et al 2025: No trend in most extreme rainfall events with strong decadal variability (eg TC Bola, May 1923 South Island flood, 1971 Taranaki flood, 1984 Invercargill flood)

Extreme rainfall trends (%) for 1 hr to 168 hr durations: 10 to 500 yr RP.

ARI (years)	Island	Precipitation duration												
		1 hours	2 hours	3 hours	6 hours	12 hours	24 hours	36 hours	48 hours	72 hours	84 hours	96 hours	120 hours	168 hours
500	north	18.4	18.9	18.3	15.6	12.0	9.3	8.5	8.0	7.4	7.2	7.0	6.7	6.4
	south	16.9	17.4	16.4	13.5	10.3	7.7	6.7	6.0	5.2	4.9	4.7	4.3	3.9
250	north	18.3	18.7	18.2	15.4	11.8	9.1	8.4	7.8	7.2	7.0	6.8	6.6	6.2
	south	16.8	17.4	16.4	13.4	10.1	7.6	6.6	5.9	5.1	4.9	4.6	4.3	3.9
200	north	18.3	18.7	18.2	15.3	11.7	9.1	8.3	7.8	7.2	6.9	6.8	6.5	6.1
	south	16.8	17.4	16.3	13.4	10.1	7.6	6.6	5.9	5.1	4.8	4.6	4.2	3.9
100	north	18.2	18.6	18.0	15.1	11.5	8.9	8.1	7.6	7.0	6.7	6.6	6.3	5.9
	south	16.8	17.3	16.3	13.2	9.9	7.4	6.4	5.7	4.9	4.7	4.5	4.1	3.8
50	north	18.0	18.4	17.8	14.9	11.3	8.7	7.9	7.3	6.7	6.5	6.3	6.1	5.7
	south	16.7	17.3	16.2	13.1	9.7	7.2	6.3	5.6	4.8	4.6	4.4	4.0	3.7
20	north	17.8	18.2	17.5	14.5	10.9	8.3	7.5	7.0	6.4	6.1	5.9	5.7	5.3
	south	16.5	17.2	16.1	12.9	9.4	7.0	6.0	5.3	4.6	4.4	4.2	3.8	3.5
10	north	17.6	17.9	17.1	14.1	10.4	7.9	7.1	6.6	6.0	5.7	5.6	5.3	5.0
	south	16.4	17.1	15.9	12.6	9.1	6.7	5.8	5.1	4.4	4.2	4.0	3.7	3.4

Trends in 1 in 100 yr daily rainfall from three climate models (per degC of warming)



NIWA: Rosier et al. (2024) Guidance for Decision Makers.

‘Future’ ‘High-Res’ Model Trends

Game Changer in Model Quality and Functionality

Verisk

MOODY’S

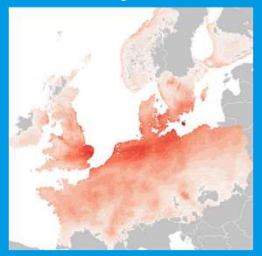
IMPACT FORECASTING
Powered by Aon

High Resolution Hazard

Detailed flood, seismic and wildfire maps

Updated climate

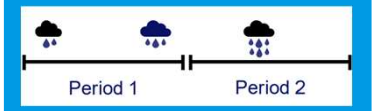
Climate Projections



Temporal Functionality

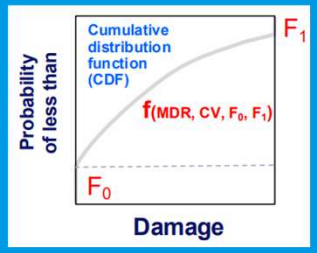
Clustering of events

- Seasonal and interannual cycles
- Hours clauses



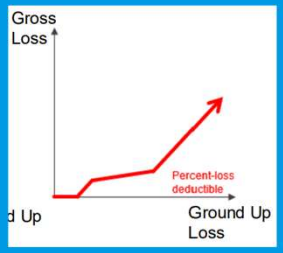
Sophisticated Damage Functions

- Zero and complete damage are captured via four-parameter vulnerability functions



Realistic Financial Conditions

- Flow of losses and claims are accurately modelled through risk transfer chain to ensure traceability



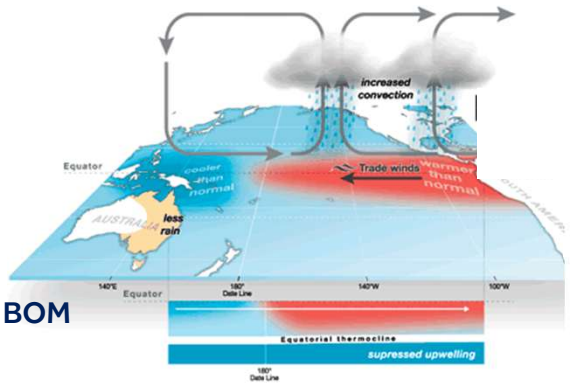
Challenges

- Impact of granular risk differentiation.
- Data informing building attributes

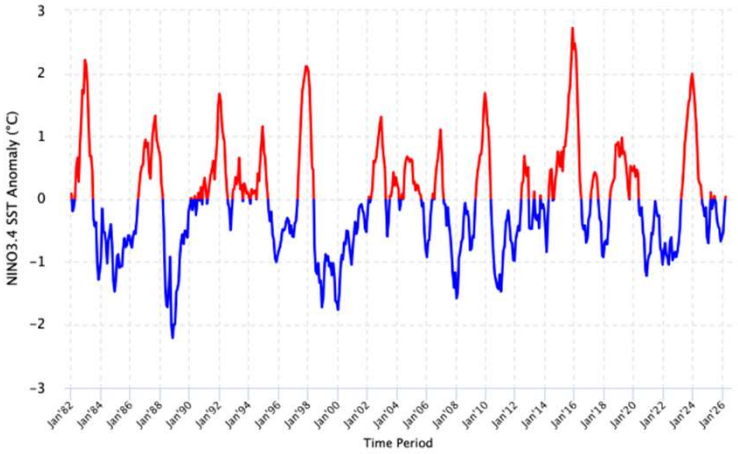
QBE

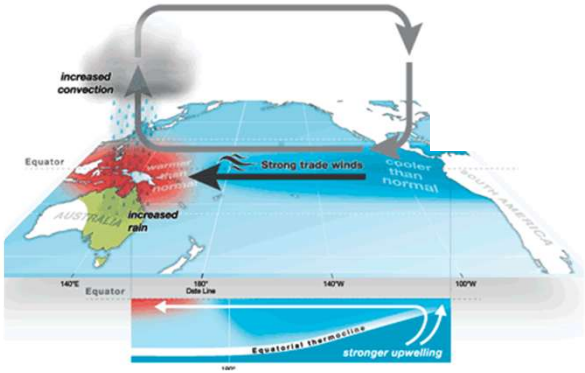
ENSO: The Dominant Driver of Climate and Loss Variability

Warm water + onshore winds = rain

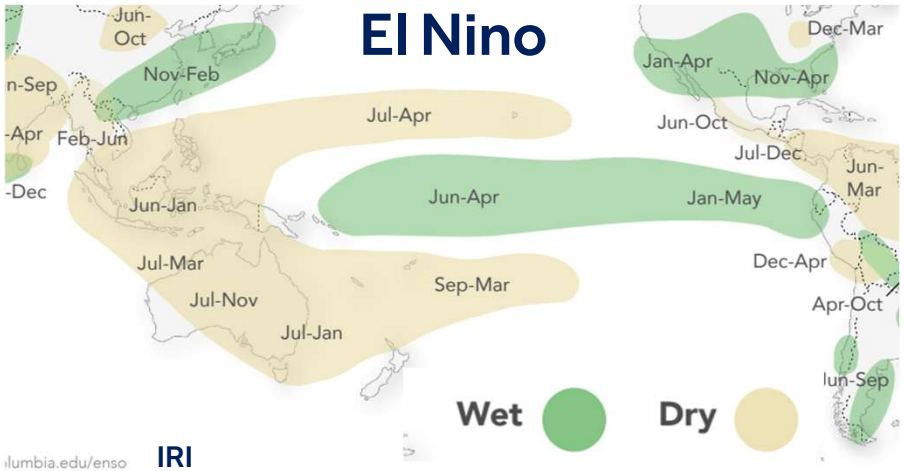


BOM



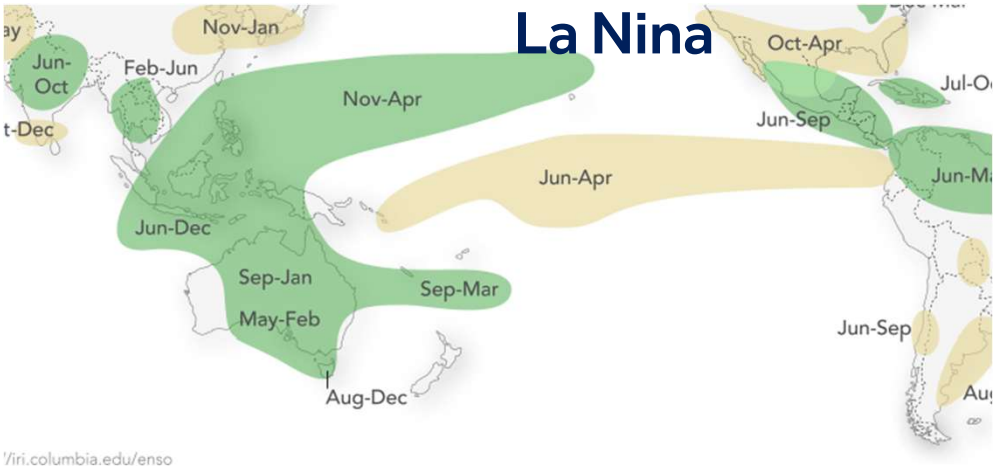


El Nino



IRI

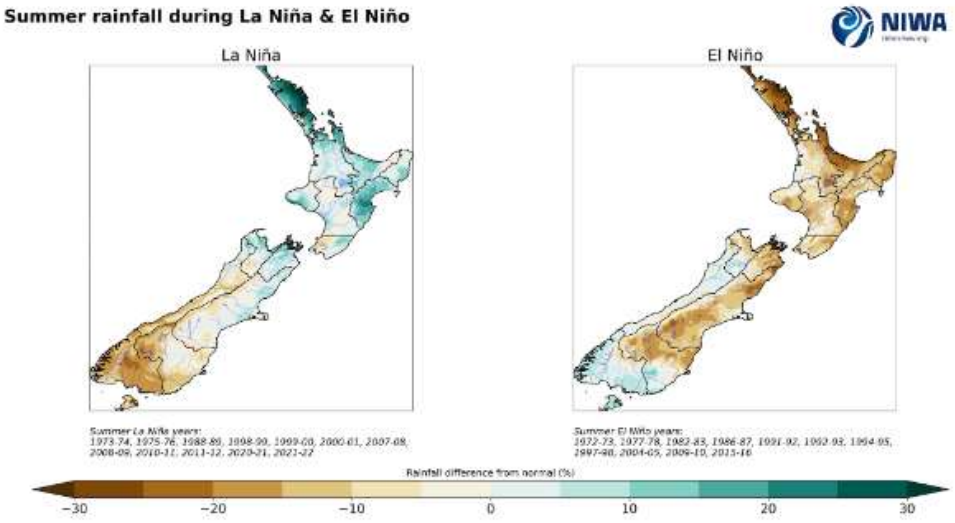
La Nina

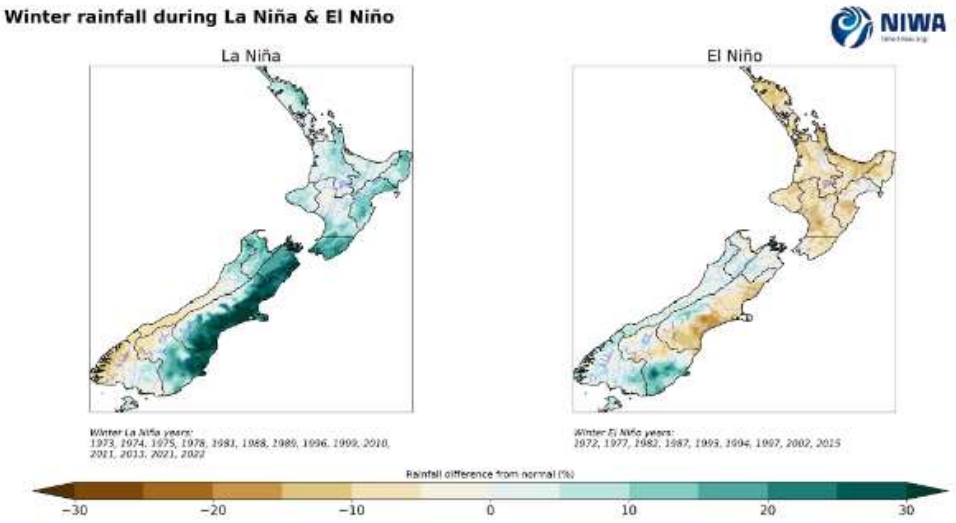


NZ Natural Variability and Climate Change

Clusters of wet years pose an insurance challenge

- ENSO cycles are projected to become more extreme with increased variability in SSTs and rainfall.
- Extreme El Nino and La Nina episodes may occur more frequently.
- More frequent 'La Nina' conditions bring wetter conditions due to high pressure SE of NZ and Rossby wave flow.





Refs: Gibson et al 2024, Cai et al 2021, Kidston 2009, Renwick & Thompson, 2006

Building Sustainability Markets through Resilience

We help our customers build resilience through advocacy, reform and education.

Action on Risk Reduction

Australia/New Zealand Building Code for Wind and Earthquake resilience

Advocacy

Insurance Council of NZ guiding mitigation investment

Education

Industry – Science Catastrophe Workshop Series 2023 – 2025

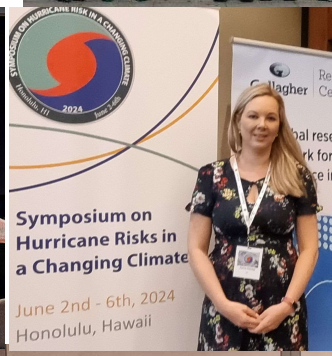
NZ Client Council 2026

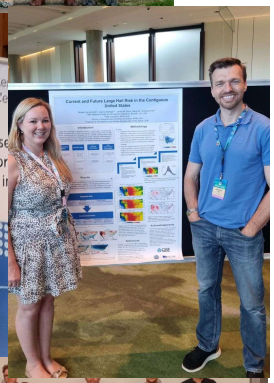
NZ Climate Change Impacts 2025, ICNZ, NZ Business Council, ANZIFF

Cyclones! JCU Townsville 2024

Storms! UNSW 2023

Storms! UNSW 2025





Earthquake!! Sydney Uni 2024

Summary

Dr Joanna Aldridge
Group Head of R&D - Catastrophe, QBE

Take Homes for Insurance

- Increasing potential for extreme rainfall events from subtropical systems.
- Greater interannual volatility and potential for sequencing of multiple wet events.
- Worsening wildfire weather.
- Ex-TC wind speeds could exceed building design standards.

Key Knowledge Gaps

- Changing frequency/severity of
  - Hail
  - Ex-Tropical Cyclones
  - Extratropical and other low pressure systems

Mitigation Action

- Wind code strengthening
- Stormwater and flood infrastructure upgrade
- Land use planning for flood and fire