

Australian Actuaries Climate Index: La Niña briefly ends, but extreme rainfall seen in North Queensland & Sydney in Winter 2022

27 October 2022

- **La Niña briefly ended in Winter 2022.**
- **Extreme rainfall index remained high in North Queensland.**
- **A cold snap hit the South East in July, extreme warm temperature index values eased in Victoria, Tasmania, and parts of South Australia.**
- **Australia re-entered La Niña phase at the beginning of September, higher than average rainfall likely in Spring and Summer, especially on the East Coast.**

The Actuaries Institute today said the Winter 2022 reading of its Australian Actuaries Climate Index (AACI) partly reflected a brief reprieve in the rain-bearing La Niña phase which is again causing havoc across Eastern Australia. The Index was 0.32 in Winter 2022 compared with 1.10 in Autumn 2022 and 0.40 last Winter. A positive value for the Index indicates weather extremes being above the 1981-2010 historical average used as the AACI baseline.

The latest AACI report shows North Queensland recorded its second highest extreme rainfall index value during Winter 2022 (see Figure 1), while a cold snap in July resulted in falling extreme warm temperature index values in Victoria, Tasmania, and parts of South Australia (see Figure 2).

Winter 2022 is the 46th of 47 seasons to show the frequency of extreme weather across Australia and as a whole remains elevated above the AACI baseline.

Australia's weather is significantly influenced by climate cycles of the El Niño-Southern Oscillation (ENSO), the Indian Ocean Dipole (IOD), and Southern Annular Mode (SAM), which had a significant impact during the Winter quarter.

"After seven consecutive months of the ENSO climate cycle being in a La Niña phase, Australia experienced a brief reprieve in the months of July and August," said Rade Musulin, the Chair of the Actuaries Institute Climate Risk Working Group.

"However, Australia re-entered a La Niña phase at the beginning of September, which will likely bring another Spring and Summer of higher-than-average rainfall, especially on the East coast," said Mr Musulin, who will attend COP 27 in Egypt next month and who earlier this year led a global team tasked with helping actuaries assess risks arising from climate change and its impacts.

Institute Chief Executive Elayne Grace said the latest AACI report shows that extreme climate variations are continuing, increasing the urgency on all governments and industries to find workable pathways to reduce greenhouse gas emissions.

"We know that vulnerable Australians are especially exposed to the risks posed by a changing climate. The frequency of extreme weather events and natural disasters across the country in recent years highlights the need for collaborative and urgent action to improve resilience," Ms Grace said.

The ENSO climate system is just one of many factors that impact rainfall in Australia. Another influence this Winter was the IOD becoming negative and the SAM becoming positive. The negative IOD brought a concentration of warmer waters near Australia, increasing the moisture content of the air above the North Coast of Australia. The strong westerly winds closer to the Southern Coast of Australia in the positive phase of SAM then directed the moisture-filled air toward the East Coast and led to large amounts of rain¹.

¹ <https://media.bom.gov.au/releases/1034/key-climate-drivers-behind-record-rainfall-in-new-south-wales/>



This contributed to the second highest extreme rainfall index value being observed in the Wet Tropics, which covers the North Eastern parts of Queensland.

The East Coast South cluster also recorded a positive extreme rainfall index value. On the ground, this was experienced as severe flooding in parts of Sydney in July². Around 85,000 people were evacuated after what was the third major flood this year for some parts of the Eastern seaboard³.

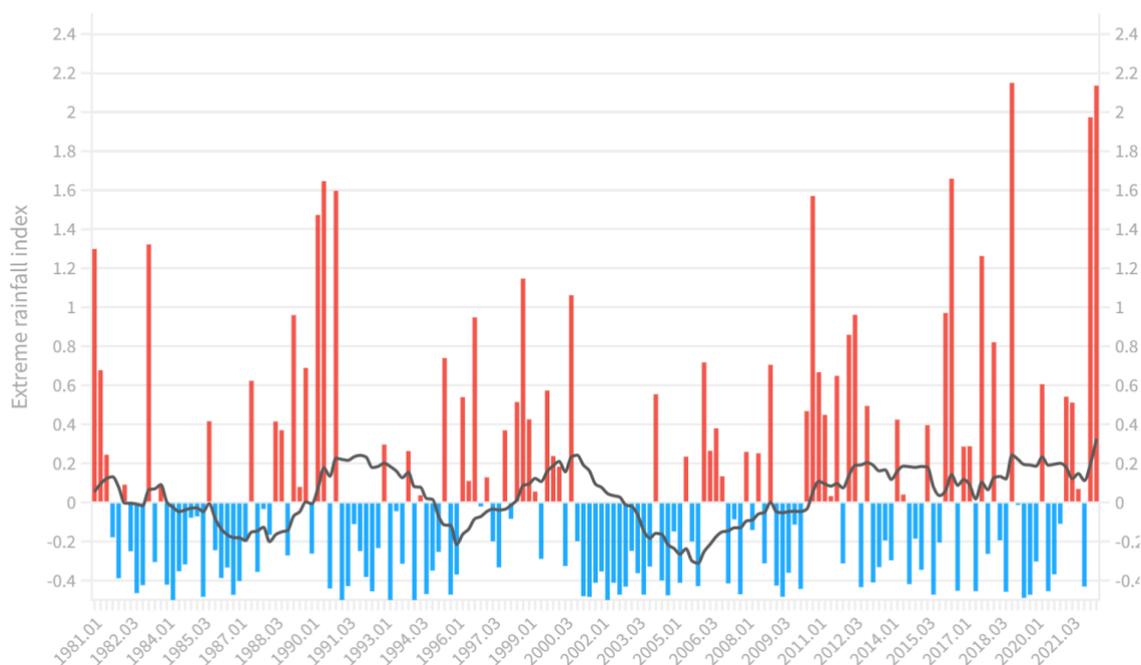
The Winter of 2022 was the first where Australia recorded a negative extreme warm temperature index value since 2012. This was particularly pronounced in the Southern Slopes (Vic), Southern Slopes (Tas) and Murray Basin clusters, where negative index values reflect the cold front that moved through the South Eastern parts of the country in July. This led to snow settling as low as 150 meters above sea level in Tasmania, while Victoria experienced severe frosts⁴.

The Index is calculated at the end of each season by Finity Consulting following the release of data from the Bureau of Meteorology (BoM). It draws on six component indices measuring changes in the frequency of extreme high and low temperatures, heavy precipitation (rainfall), dry days, strong winds and changes in sea levels across 12 Australian regions that are climatically similar. It mainly concentrates on the 99th percentile of observations. Each season is compared to the same season in previous years, and against a reference period from 1981-2010⁵.

Figure 1

The Wet Tropics experienced the second highest extreme rainfall index value

Australian Actuaries Climate Index: Extreme rainfall in the winter of 2022



² <https://7news.com.au/news/nsw/no-power-shin-high-water-and-a-100000-bill-what-its-like-when-flooding-becomes-the-new-normal-c-7433946>

³ <https://www.reuters.com/world/asia-pacific/thousands-more-evacuate-sydney-even-though-heavy-rains-ease-2022-07-06/>

⁴ <https://www.theguardian.com/australia-news/2022/jul/19/arctic-blast-tasmania-blanketed-in-snow-as-cold-snap-hits-south-east-australia>

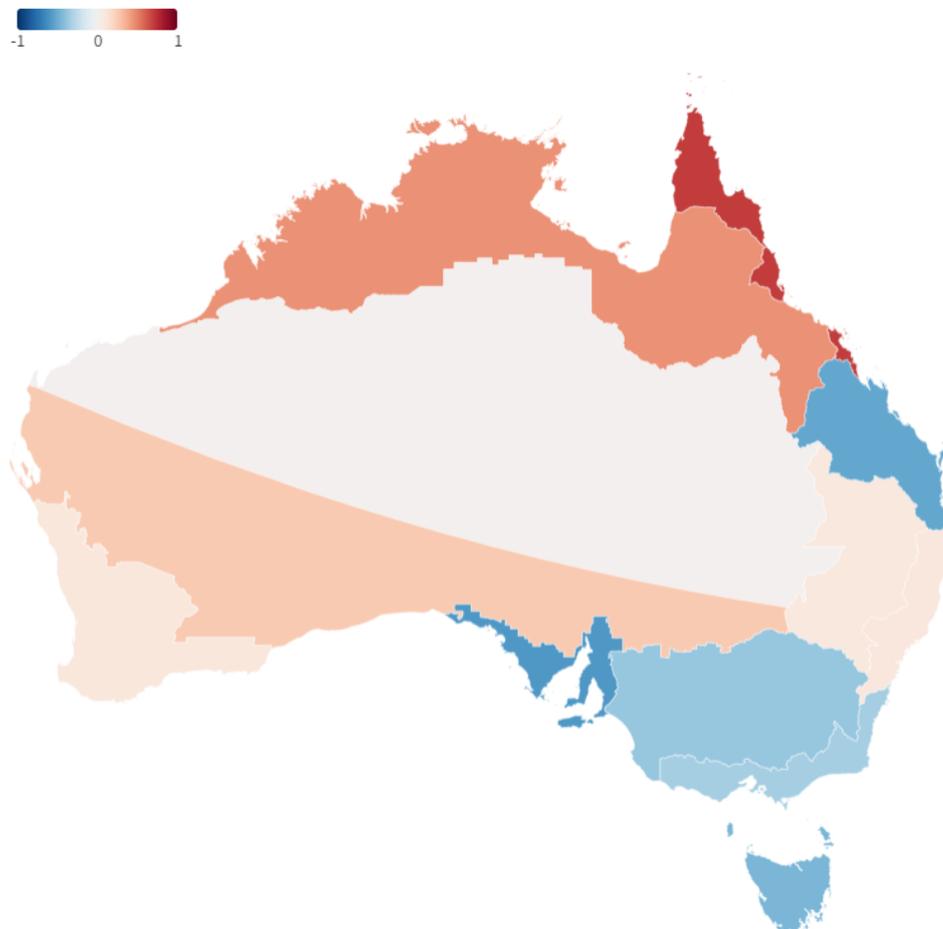
⁵ The detailed AACI Design Documentation is available at <https://www.actuaries.asn.au/microsites/climate-index/about/development-and-design>



Figure 2

Cold front in the south east shows in negative extreme warm temperature values

Australian Actuaries Climate Index: Extreme warm temperature in the winter of 2022



Note to charts: Red bars/areas indicate a reading which is above the reference period average and blue bars/areas indicate a reading which is below the reference period average. The black line in Figure 1 shows the five-year moving average and provides a robust measure of how the index and weather extremes are trending over the longer term.

A link to the [AACI](#) is here. The Actuaries Institute's broad range of papers on climate risk can be found here: [Climate Risk Resource Centre](#).

Mr Musulin, Chair of the Actuaries Institute Climate Risk Working Group and Principal at Finity Consulting, is available for comment.

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