



Gallagher Re

Q1 2023 Natural Catastrophe Report

Preliminary Overview

APRIL 2023



GLOBAL OVERVIEW

- 4 Global Overview

CONVERSATION STARTERS: Q1 2023

- 8 High Inflation Continues to Influence Global Catastrophe Loss Performance
- 9 IPCC releases Synthesis Report; The Final Content of the Sixth Assessment Report Series

WEATHER/CLIMATE REVIEW

- 11 Global Temperatures Above Average in Q1 2023; Regional Precipitation Totals Influenced By ENSO
- 13 End to the “Triple-Dip La Niña” and Likely Return of El Niño

MAJOR EVENT REVIEWS

- 16 Turkey: February Earthquake Sequence
- 17 US: California Atmospheric Rivers
- 18 US: Severe Convective Storms
- 19 New Zealand: Floods (January / February)
- 20 Southern Africa: Cyclone Freddy
- 21 Miscellaneous Events

APPENDIX

REPORT AUTHORS

GLOBAL OVERVIEW

US Thunderstorm Activity and Turkey Earthquake Sequence Lead Above Average Q1 Natural Catastrophe Losses

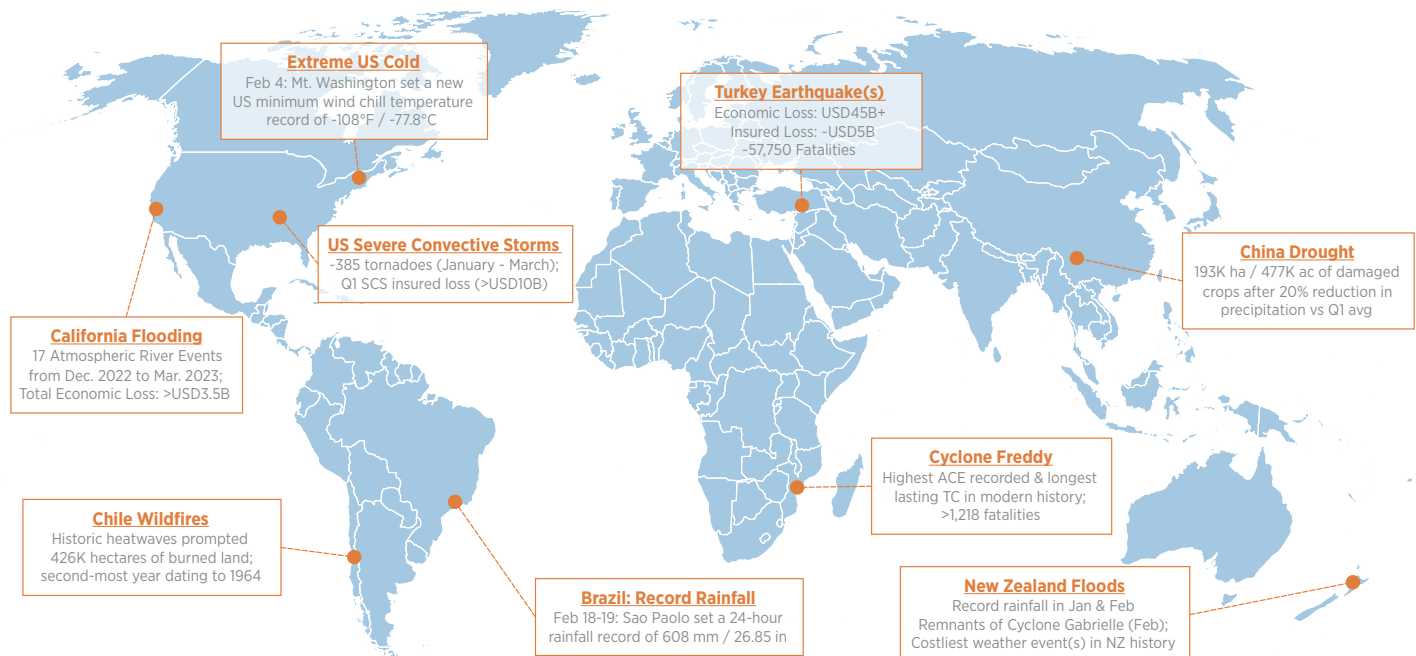
Preliminary Q1 Global Loss Totals: Economic (USD77 billion) and Insured (USD22 billion)

An active start to 2023 resulted in above average natural catastrophe losses around the world. The total economic loss for all natural hazards was preliminarily listed at USD77 billion. Public and private insurance entities covered at least USD22 billion of that total. This meant the protection gap, the portion of the economic loss not covered by insurance, was 72% (USD55 billion). These totals, which may be rounded in some cases, are subject to change as standard loss development occurs and new data is obtained in the weeks and months ahead.

The predominant driver was a series of powerful earthquakes that led to devastating impacts and a humanitarian crisis in Turkey and Syria, including more than 57,750 fatalities. The main magnitude-7.8 tremor that struck on February 6, and subsequent powerful aftershocks, resulted in direct physical damage costs likely to approach USD45 billion according to an initial highend

financial assessment from the World Bank. Despite a requirement to purchase residential earthquake insurance, just 49% of homeowners in the 11 hardest-hit Turkish provinces had active policies from the Turkish Catastrophe Insurance Pool (TCIP). Total insured losses were estimated to approach USD5 billion.

When looking solely at weather or climate-related catastrophes, which excludes the earthquake peril, economic losses were minimally of USD31 billion. Public and private insurers covered USD17 billion. The bulk of these losses were associated with the most expensive Q1 on record for US Severe Convective Storm (SCS) activity on both an overall economic (>USD13 billion) and insured (>USD10 billion) basis, a prolific series of more than a dozen Atmospheric River events that spawned flooding and other storm damage in California, historic flooding from separate events in New Zealand and ongoing major drought conditions across South America.



The total economic loss was the highest Q1 total since 2011 (USD383 billion in 2023 USD). That year was also marked by historic earthquake activity (Japan and New Zealand). The earthquake peril accounted for 60% of economic losses. SCS was the only other peril to account for at least 10% of the quarterly total.

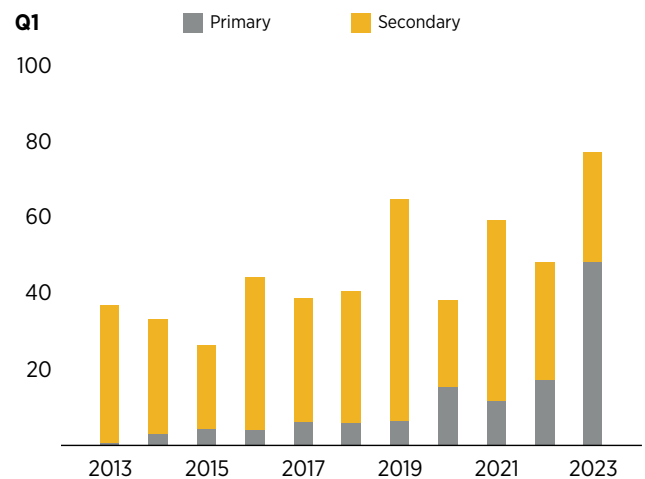
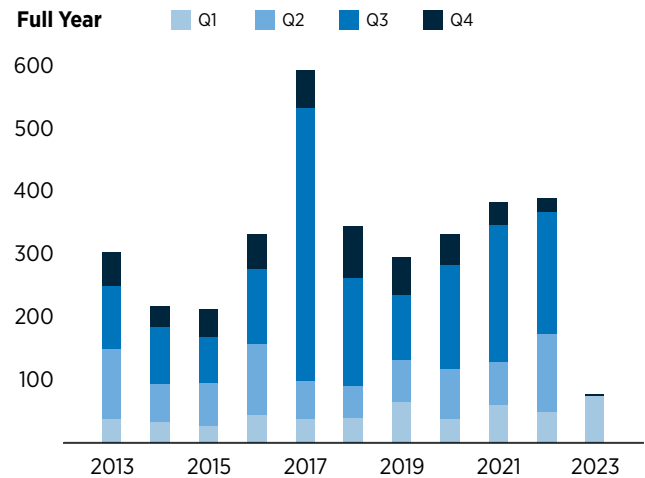
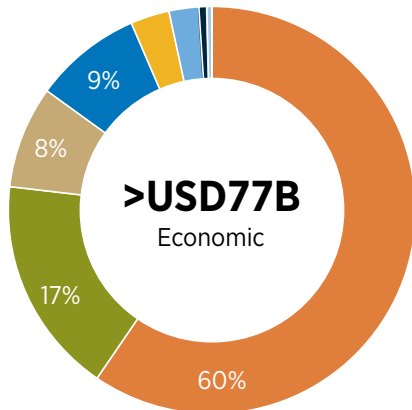
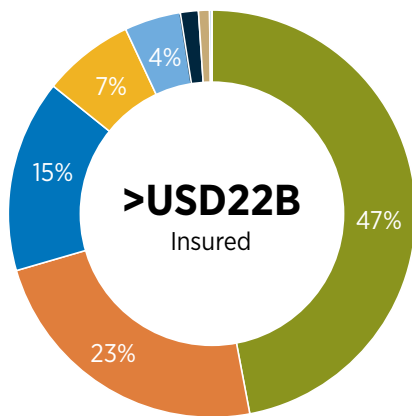
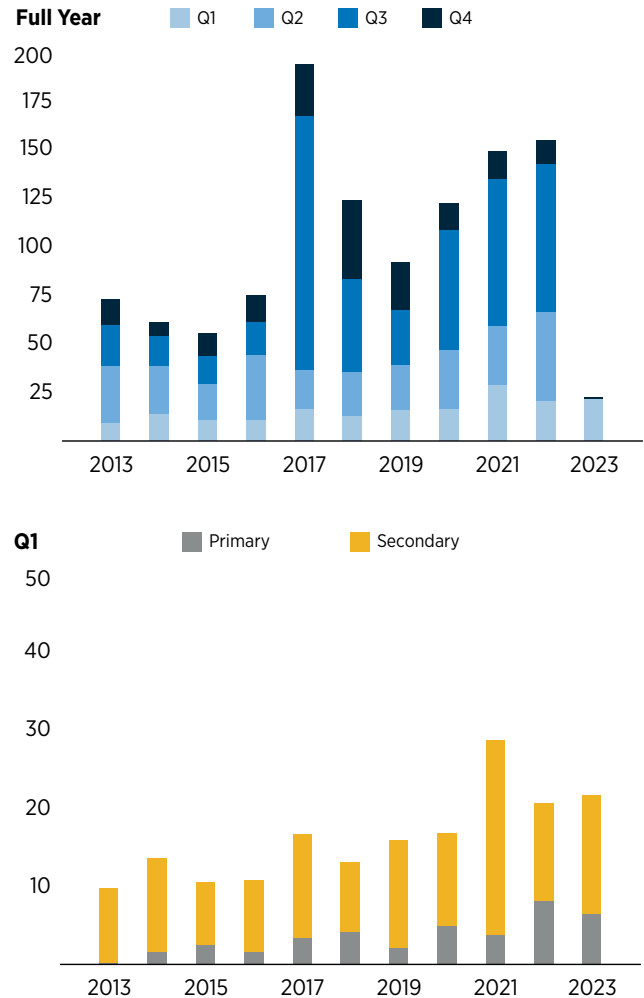


Figure 1: Global economic losses in 2023 USD billions | Data and Graphic: Arthur J. Gallagher & Co.



The total insured loss 38% higher than the decadal average and 47% higher than the decadal median. SCS activity accounted for nearly half of the Q1 tally, with a minimum of USD10 billion coming from the US alone. That total is expected to rise. The Turkish earthquake sequence and major flooding in New Zealand led those two perils as the next costliest.



TC: Tropical Cyclone
 SCS: Severe Convective Storm
 EQ: Earthquake
 FL: Flooding
 DR: Drought
 WF: Wildfire
 WW: Winter Weather
 EW: European Windstorm
 Other

Figure 2: Global economic losses in 2023 USD billions | **Data and Graphic:** Arthur J. Gallagher & Co.

Most economic losses were incurred in the Middle East due to the Turkey Earthquake sequence. However, nearly two-thirds of insured losses were in North America (primarily the US) due to elevated SCS, winter weather and flood-related events.

Economic



Insured



North America
 Latin America
 Europe
 Africa
 Middle East
 Asia
 Oceania

Figure 3: Q1 2023 Economic (top) and Insured (bottom) loss total percentages by region | **Data and Graphic:** Arthur J. Gallagher & Co.

CONVERSATION STARTERS

High Inflation Continues to Influence Global Catastrophe Loss Performance

The cost of inflation continued to remain a critical point of focus for the insurance industry on catastrophe claims performance during the first three months of 2023. Rates of inflation stayed at decades-level highs in many parts of the world, though the rise in interest rates helped cool further inflationary increase in most areas. While inflation levels have slowly begun to decline—notably in the US, Europe and Asia—it remains a notable point of focus for the cost of catastrophe claims. The price of construction, supply, labor and claims litigation has been a consistent driver in enhancing individual property values alongside replacement or new-build costs in the aftermath of an event. Such pressure has continued to raise claims costs by a high single-digit, or in some cases, double-digit amount.

Inflation directly and indirectly played a key role in January 1, 2023 and April 1, 2023 reinsurance renewals for the market. Reinsurers

cited elevated costs associated with access to capital, which in turn fueled one of the hardest January 1 contract renewal cycles in many years. The renewal cycle at April 1 was not as challenging as January 1, but still saw elevated rates as fresh capital to the market remained constrained in a stubbornly challenging environment. Gallagher Re recently noted in its [latest Reinsurance Market Report](#) that available reinsurance capital at the end of the 2022 fiscal year was USD638 billion, which marked a 12% year-over-year reduction, driven in part by a decline in the value of investments.

The cyclical nature of a hard reinsurance market, due to more expensive and higher-volume claims payouts from natural disasters, geopolitical tensions, inflation, etc., means that premiums at the policyholder level also faced a price reevaluation to ensure insurance carrier solvency and the health of the broader market.



IPCC releases Synthesis Report; The Final Content of The Sixth Assessment Report Series

The Synthesis report consolidated the contents of the Sixth Assessment Report (AR6) Working Group reports and the three AR6 special reports. It highlighted that the physical and non-physical damage and other impacts to humanity and the global ecosystem from climate change was already being felt around the world. These impacts will only grow in the future, and the report called for the immediate, planned mainstreaming of effective and equitable climate action.

While climate financing for resilience/mitigation/adaptation has grown by 60% since 2013, there remains a significant coverage gap to adequately prepare for the climate of today and tomorrow. Despite evidence of emerging solutions such as regional risk insurance pools and broader implementation of financing systems, there remain ample gaps between what is critically needed to limit carbon emissions versus what has been declared (promised) by the most robust emitting nations.

The report is an important part of the 2023 Global Stocktake, which is a fundamental component of the 2015 Paris Agreement. The report monitors how much (or how little) collective progress has been made in achieving agreed goals and commitments by nations. Stocktake findings will be revealed at COP28 in Dubai at the end of 2023.

Primary takeaways from the AR6 Synthesis Report

- Global temperatures rose by 1.1°C above 1850-1900 levels in 2011-2020, with larger increases of 1.6°C observed over land. This brought severe impacts to the atmosphere, ocean, cryosphere and biosphere
- Many climate-related risks are now assessed to be higher with the same level of warming compared to IPCC AR5 from 2013/14
- Human mortality from floods, droughts and storms was 15 times greater in highly-vulnerable regions compared to resilient built-up areas between 2010 and 2020
- In the near term, extreme weather events are projected to become more intense and impactful as warming continues
- Compounded impacts from weather and climate-related events, such as productivity losses and supply chain disruptions, will increasingly amplify and cascade in the coming years
- Greenhouse gas emissions need to be cut in half by 2030 (vs 2019 levels) to limit warming above pre-industrial levels to 1.5°C
- At least three times the current climate investment is still needed to finance and meet mitigation and adaptation needs

The IPCC's next cycle, AR7, will likely conclude around 2030, and by then it can be ascertained whether the 2030 greenhouse gases (GHG) emission scenarios have been met.

WEATHER/CLIMATE REVIEW

Global Temperatures Above Average in Q1 2023; Regional Precipitation Totals Influenced By ENSO

Global land and ocean temperatures during the first three months of 2023 ranked as the 4th warmest since 1850, per NOAA. The warmth occurred despite lingering La Niña conditions to start the year before transitioning to ENSO-neutral. The most anomalous warmth occurred in parts of Europe, eastern North America, central/southern South America and Asia. Many regions recorded one of their Top 5 warmest Q1 periods on record. The agency cited that it is virtually certain (>99.0%) that 2023 will rank as one of the Top 10 warmest years on record, and there is a 96% chance it will rank among the Top 5. Every year in the current Top 10 warmest years since official records began being kept in 1850 has occurred since 2010.

Rank	Year	Temp Anomaly
1	2016	+1.30°C/2.34°F
2	2020	+1.16°C/2.09°F
3	2017	+1.11°C/2.00°F
4	2023	+1.04°C/1.87°F
5	2019	+0.99°C/1.78°F
6	2022	+0.98°C/1.76°F
7	2015	+0.89°C/1.60°F
8	2018	+0.88°C/1.58°F
9	2010	+0.82°C/1.48°F
10	2021	+0.79°C/1.42°F

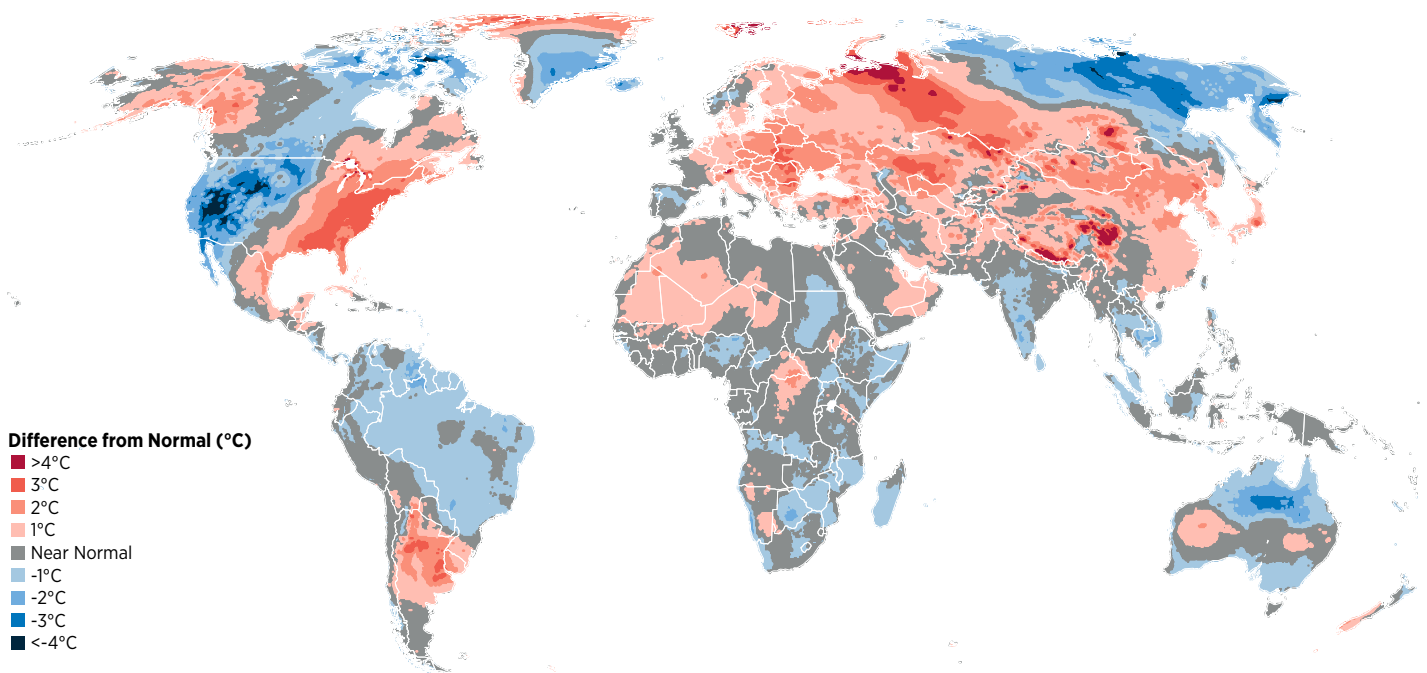


Figure 4: Q1 global temperature anomalies compared to the 1991-2020 climatological normal | **Data:** Copernicus (ERA5) | **Graphic:** Arthur J. Gallagher & Co

There were distinct differences in precipitation extremes across the globe. Parts of Asia, Europe, Latin America, and North America saw a continuation of limited precipitation that exacerbated severe drought conditions. Other areas, such as parts of the US, Africa, Oceania and

the Middle East, registered record-setting rainfall that prompted widespread and significant flooding. The sensitivities of global atmospheric and oceanic patterns in relation to ENSO phase again played a key role in what was observed.

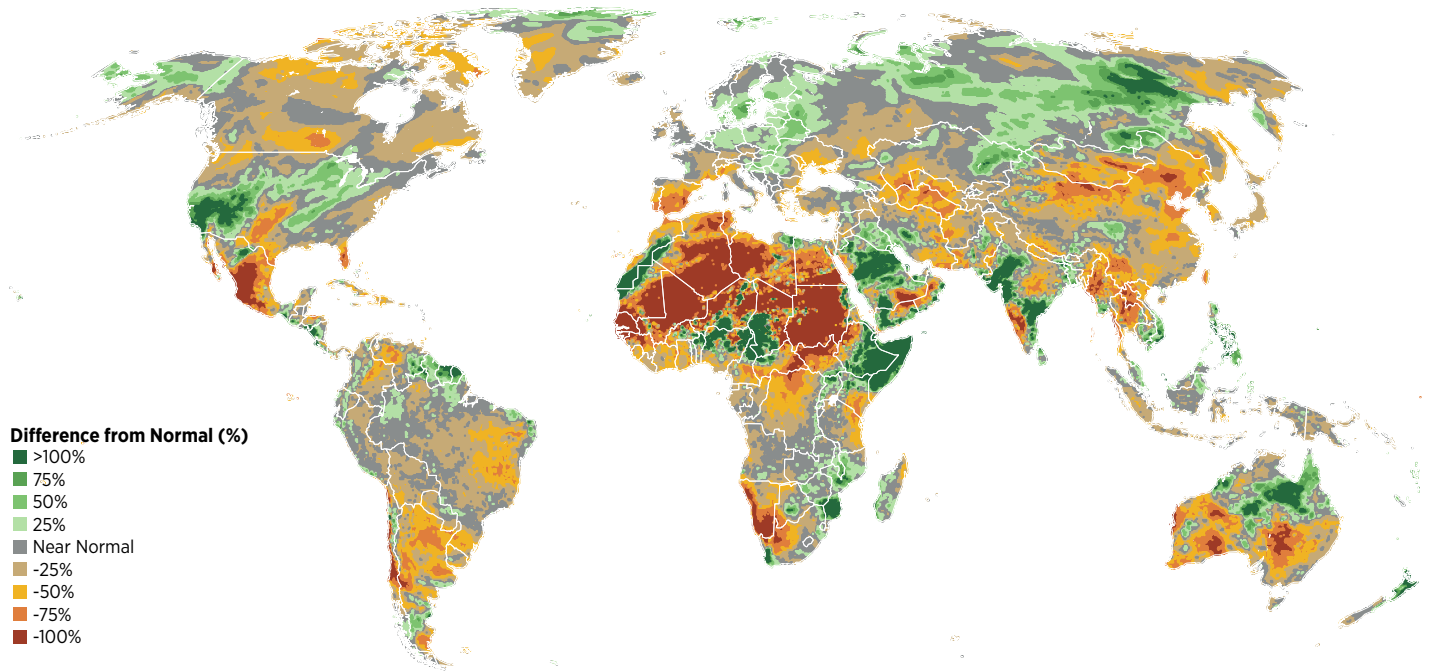


Figure 5: Q1 global precipitation anomalies compared to the 1991-2020 climatological normal | **Data:** Copernicus (ERA5) | **Graphic:** Arthur J. Gallagher & Co.

End to the “Triple-Dip La Niña” and Likely Return of El Niño

Various centers including the National Oceanic and Atmospheric Administration (NOAA) and the Bureau of Meteorology (BoM) declared the end of La Niña in the tropical Pacific in mid-March, which had persisted since 2020. It included a rare

“Triple-Dip La Niña”—meaning it had lasted across three annual cycles. The El-Niño Southern Oscillation is now ENSO neutral in the coupled ocean-atmosphere system and expected to maintain this way until at least the early boreal (Northern Hemisphere) summer.

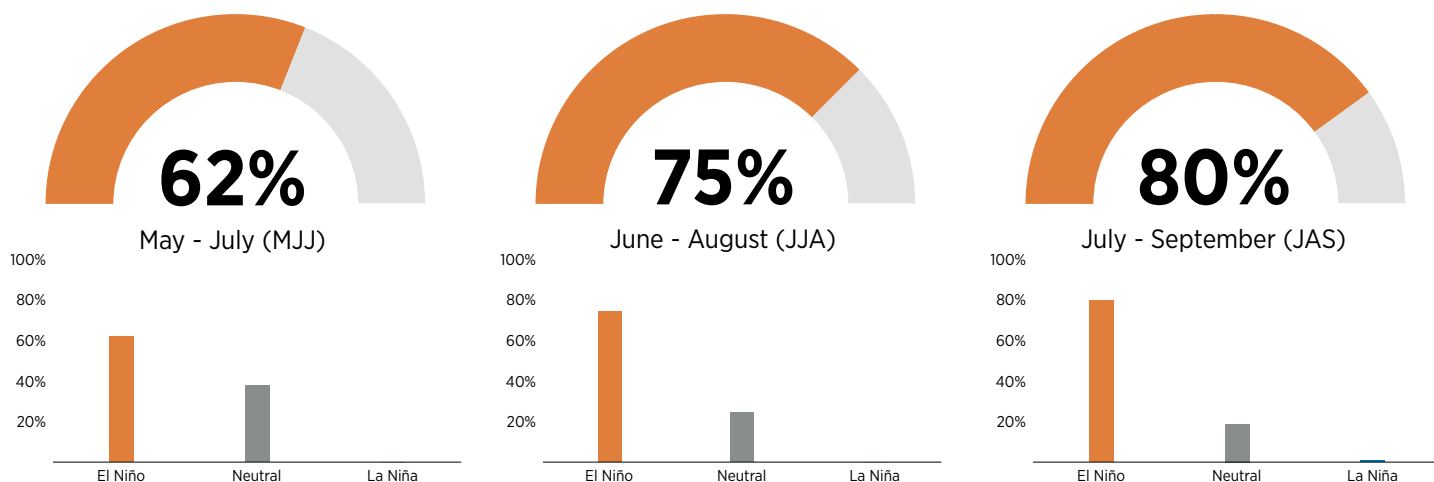


Figure 6: El Niño probabilities (top) and all ENSO type probabilities (bottom) for April, May, June 2023 | **Data:** NOAA and IRI | **Graphic:** Arthur J. Gallagher & Co.

A key consequence to expect from this transition is the warming of global surface temperatures. The Earth typically warms less during La Niña years, and 2023 has a high chance of being warmer than 2022. However, climate change accelerates as carbon emissions further rise, and years identified as La Niña-driven continue to show further warming. The hottest year in the official record came

in 2016, an El Niño year. The World Meteorological Organization (WMO) estimated a 93% likelihood that at least one year between 2023 and 2026 will set a new annual temperature record. During Q1 2023, without El Niño conditions in place, parts of the world saw anomalous heat. Sydney, Australia observed four consecutive days of more than 30°C (86°F) for the first time in 165 years.

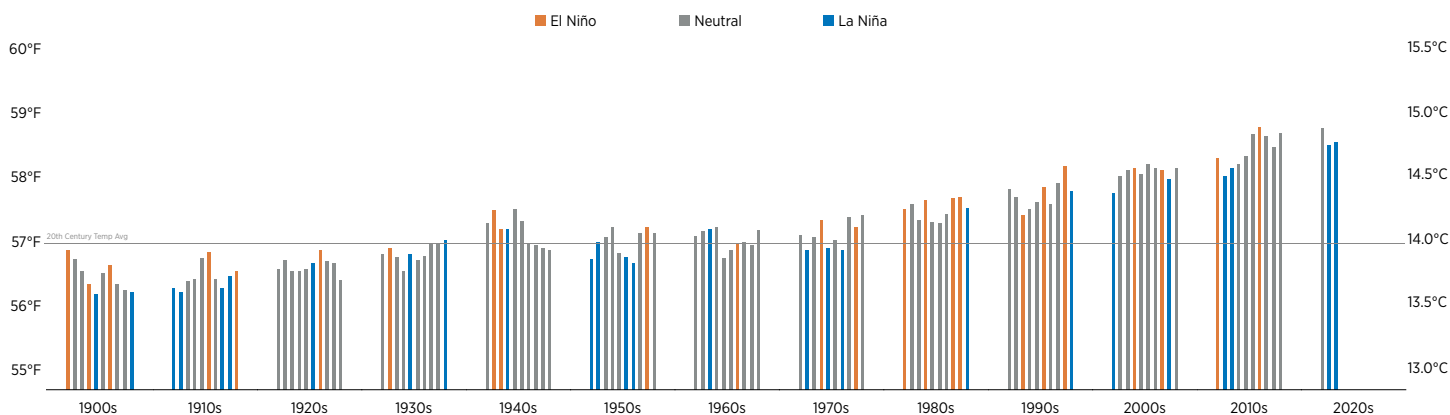


Figure 7: Annual global land and surface temperatures by phase of ENSO | **Data:** NOAA | **Graphic:** Arthur J. Gallagher & Co.

The other changes are global precipitation and tropical cyclone patterns. La Niña typically enhances hurricane activity in the Atlantic basin (Hurricane Ian, Fiona) and suppresses it in the central and eastern Pacific basins. In the western Pacific, the locations of tropical cyclone (TC) genesis also shifted northward to northwestwards during La Niña, which led to shorter mean TC durations. The shift to El Niño will bring increased TC risk to Asia as more storms bring more potential for physical risk impacts.

More broadly for the re/insurance industry, El Niño brings a pivot in terms of physical loss and humanitarian impact potential around the world. Since El Niño correlates to warmer surface conditions, this allows for more volatility in weather patterns that can prompt floods to be more prolific and droughts to be more intense. This puts specific pressure on written agricultural insurance products or those in development. Additionally, an increased frequency potential of TCs in East Asia may bring higher regional catastrophe losses.



MAJOR EVENT REVIEW

Turkey: February Earthquake Sequence

Economic losses and fatalities in Q1 2023 were driven by the devastating Kahramanmaraş earthquake sequence in February that predominantly impacted Turkey and Syria and resulted in a humanitarian emergency. The sequence generated economic losses that were likely to approach USD45 billion according to a high-end estimate from an initial assessment released by the World Bank. Public and private industry losses in Turkey alone were anticipated to reach USD5 billion. Much of the residential portion of losses was to be covered by the Turkish Catastrophe Insurance Pool (TCIP). TCIP noted in early April 2023 that it had already paid TRY17.1 billion (USD0.9 billion) from 450,982 filed claims. These totals will keep rising. Additionally, the Insurance Association of Türkiye (TSB) cited that private insurers were expected to pay at least TRY76 billion (USD3.9 billion) in claims. This ranked as the largest industry loss for the Turkey market on record.

Estimations from TCIP, a public institution responsible for the acquisition, implementation and management of compulsory earthquake insurance in the country, revealed that residential

insurance take-up in the regions most affected by the earthquakes was approximately 49%. This included 11 of the hardest hit Turkish provinces. Insurance take-up for commercial properties was notably lower in the 11 main affected provinces compared to the TCIP residential penetration rate.

Early on February 6, a violent USGS magnitude-7.8 (Mw-7.8) earthquake struck southeastern Turkey in the Gaziantep Province near the Syrian border. This was followed hours later by a strong Mw-7.5 aftershock. In subsequent days, thousands of aftershocks rattled the region, including a notable Mw-6.3 tremor on February 20. The quakes struck in a seismically active region near the intersection of three major tectonic plates, the Anatolian, Arabian and African. At the time of publication, at least 57,759 deaths in Turkey (50,500) and Syria (7,259) were reported, while an additional 121,700 people were injured. Hundreds of thousands of buildings were damaged or destroyed. The severity of shaking combined with widespread sub-standard building stock contributed to the catastrophic damage

What It Means: When moving beyond the enormous humanitarian toll of the earthquake sequence, the challenges are manifested by the significant protection gap left in the wake. The scale of the protection gap is nearly 90%. Even with a 49% insurance take-up penetration rate for residential risks managed by the Turkish Catastrophe Insurance Scheme, the paid out compensation will represent only a modest share of the reconstruction costs owing to policy limits which have fallen far behind inflated material and labor costs. This will be the focus for both the Turkish insurance industry and government in preparing for future events, and should serve as another reminder of the importance of insurance in areas of the world where opportunities exist to provide protective cover for people often the most vulnerable to catastrophe risk.

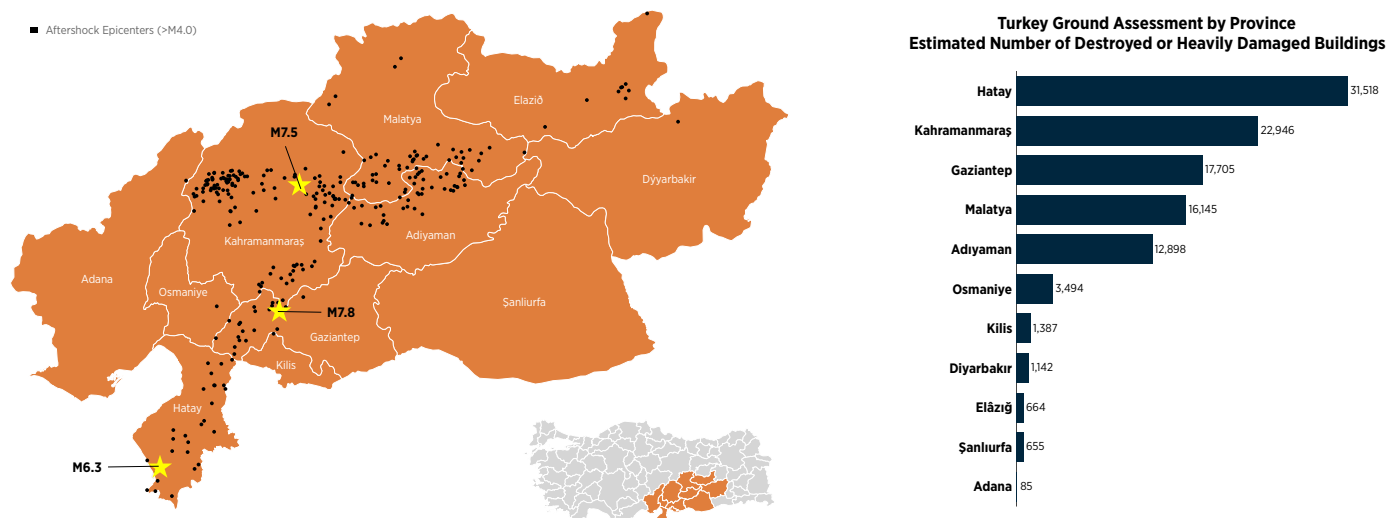


Figure 8: Turkey earthquake epicenters and damage assessment statistics | **Data:** USGS and the Turkish Ministry of Environment, Urbanization and Climate Change

Graphic: Arthur J. Gallagher & Co.

US: Severe Convective Storms

Losses in the US from severe convective storms (SCS) in the first three months 2023 were driven by major events in March. This resulted in Q1 SCS insured losses ranking among the Top 5 on record. Economic losses for the peril during this period exceeded USD13 billion, though this total was preliminary and expected to rise. This marked the costliest Q1 on record for US SCS activity, surpassing the USD12.6 billion (2023 USD) in Q1 2017. An active start to the SCS season across the South and Southeast was partially attributed to lingering La Niña conditions, which influenced the position of the jet stream over North America.

A powerful storm complex in the first days of March brought high winds and severe thunderstorms to a dozen states spanning from the Southern Plains to the Great Lakes. Thirteen fatalities were confirmed. More than 1 million customers lost power, a majority residing in Kentucky and Tennessee. The storm broke all-time low-pressure records in the Kentucky towns of Louisville and Bowling Green and prompted a State of Emergency declaration. Hundreds of severe wind reports and dozens of tornadoes further contributed to the multi-billion-dollar loss for the industry.

Amid a multi-day SCS outbreak, a long-lived supercell generated violent nocturnal tornadoes across Mississippi and Alabama on March 24. The strongest reached EF4 intensity and resulted in widespread impacts in the towns of Rolling Fork and Silver City, among others. Notable tornadic losses were further incurred in Tennessee and Georgia.

Q1 ended with a regional SCS outbreak that spawned at least 142 confirmed tornadoes across 16 states on March 31 and April 1. March 31 ranked among the Top 20 convective days (12 UTC to 12 UTC) in terms of number of tornado and severe thunderstorm warnings issued by the National Weather Service (NWS) since 2002, and furthermore ranked among the top tornado-producing days regardless of month on record across the US (dating to 1950). Exceptional damage occurred in parts of Arkansas, Tennessee, Iowa, Illinois and Indiana. In total, at least 33 people were killed. Two separate EF3 tornadoes affected hundreds of homes and businesses in the Arkansas communities of North Little Rock, Jacksonville and Wynne.

March 2023 ended as an active month for tornadoes in the US. Confirmed tornado-related fatalities in March reached 47, with the Q1 total reaching 56. Only 23 tornado related fatalities occurred in all of 2022. Preliminary data indicated March 2023 saw at least the 5th most March tornadoes on record. The preliminary confirmed tornado count for the first three months of 2023 (385) marked the second-highest Q1 total since records began in 1950; only behind 2017 (398).

Additional events of note included a hailstorm that impacted urbanized areas near the Dallas/Fort Worth Metroplex on March 16. An early season derecho, or long-lived windstorm, traversed the Southern Plains in late-February. The derecho generated wind gusts in excess of 80 to 100 mph (130 to 150 kph).

What It Means: The re/insurance industry has been grappling with escalating US SCS losses for nearly two decades. The US has surpassed the USD10 billion threshold for insured SCS losses in every year since 2008. Even more notable is that annual losses have averaged more than USD25 billion in the past decade alone. While the more frequent nature of SCS events often leads to insurers seeing most impacts felt in their quarterly earnings reports, the peril is being viewed in a fundamentally different way today as expanding population centers in known active SCS areas are causing a re-evaluation of how to properly view and write the risk.

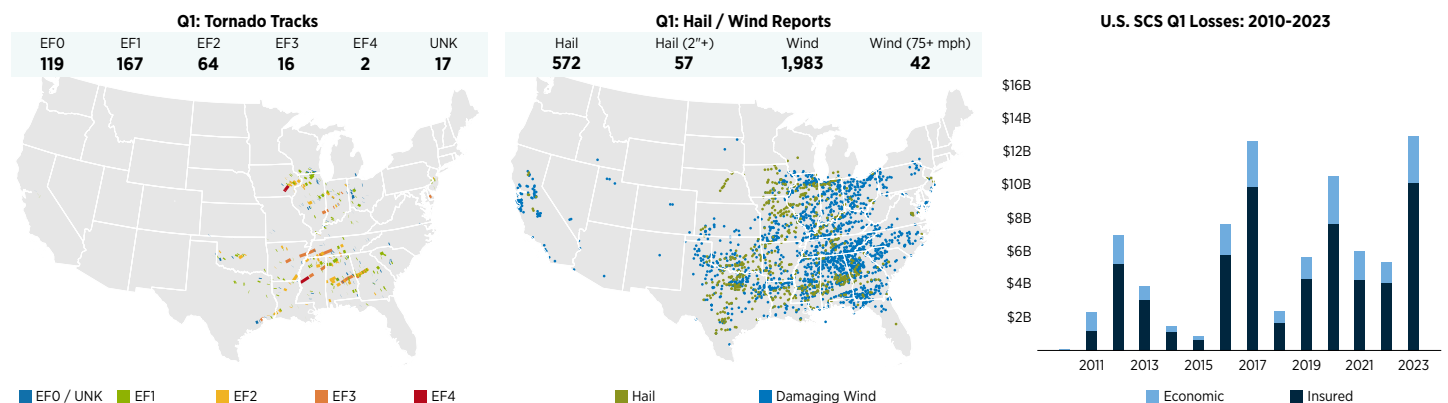


Figure 9: Q1 2023 US tornado paths and hail/damaging wind reports (left/middle) and historical Q1 US SCS losses in 2023 USD (right) | **Data:** NOAA | **Graphic:** Arthur J. Gallagher & Co.

US: California Atmospheric Rivers

An unusually active weather pattern across California since the end of 2022 resulted in at least 17 individual Atmospheric River events that brought torrential rainfall, thunderstorms, damaging winds and near to record-breaking snow accumulations. Total economic losses in the state were estimated at more than USD3.5 billion, with public and private insurance covering at least USD2 billion of that total in Q1. Relatively low National Flood Insurance Program (NFIP) take-up rates across highly impacted counties combined with coverage limits, resulted in a sizeable portion of flood related damage being uninsured or underinsured.

Amid a warming climate and rising GHG emissions, an increasingly volatile precipitation pattern is projected across California in the coming decades. This signifies higher intensity and moisture laden atmospheric rivers/precipitation events will increase flooding risk across the state, as warmer air can hold progressively more moisture. Concurrently, dry periods between such events are expected to increase in length.

The parade of storms in Q1 were aided by persistent upper level troughing and an extended Pacific jet-stream which advected

recurrent rounds of tropical and sub-tropical moisture toward the state in phenomena known as an 'Atmospheric River'. Multiple localities in coastal California were particularly impacted as year-to-date rainfall exceeded 40 to 50 in (1,016 to 1,270 mm). Statewide snow water equivalent (the water content obtained from melted accumulated snow) surpassed 200% of the daily average throughout the end of March. Mammoth Mountain in Mono County reported a record 695+ in (1,765+ cm) of snow accumulation during the 2022-2023 season, historical records for the station date back to 1969. At the peak, 31 of California's 58 counties were under a state level disaster declaration. Damage was amplified as the storms were accompanied by periods of high winds, with maximum gusts at lower elevations reaching and exceeding 60 to 80 mph (95 to 130 kph).

The relentless precipitation substantially alleviated multi-year and record-breaking drought conditions. Only 28% of land area in California was affected by drought at the end of March 2023, down from 98% at the start of the calendar year. Water levels in Lake Oroville, the state's second largest reservoir, rose by nearly 200 ft (61 m) since late 2022.

What It Means: The relentless stretch of Atmospheric River events put notable focus on the California insurance market despite a bulk of the direct damage costs attributed to flood-related effects that are not typically covered by traditional homeowner or commercial privately written insurance policies. The challenge for re/insurers for such a sequence of events is the compounded, multi-peril implications that can complicate how to view the loss or write the risk. Many flooded areas in the Q1 2023 sequence were damaged by wildfires during the past decade that left burn scars highly susceptible to mudslides or debris flows.

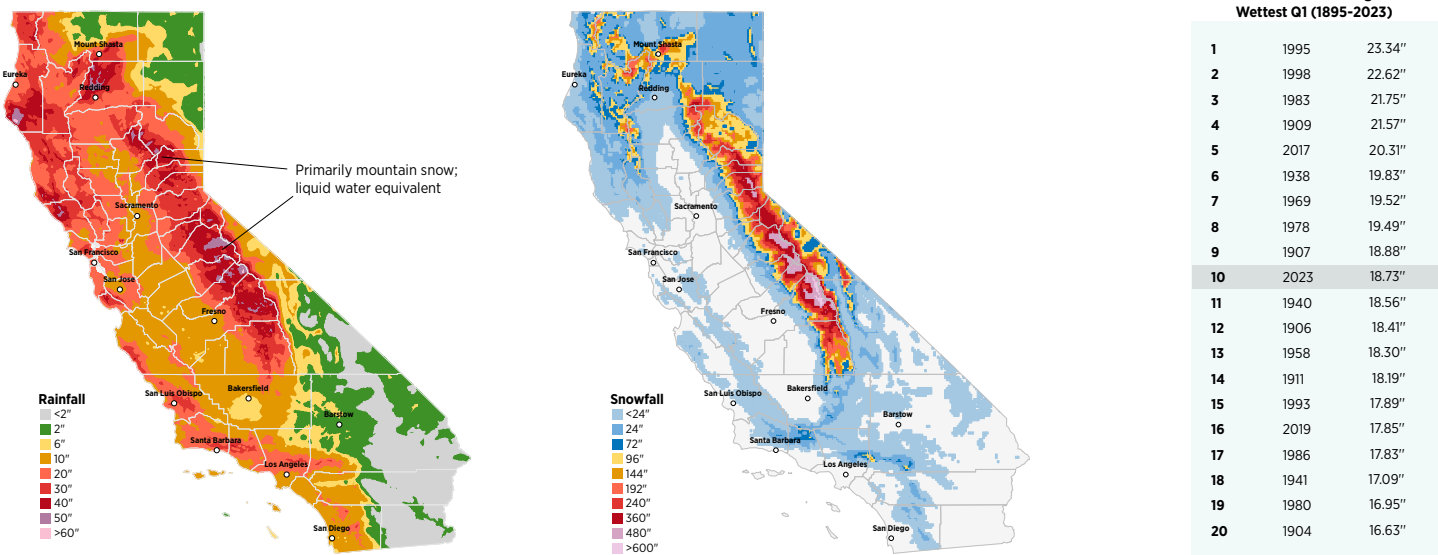


Figure 10: California precipitation totals for rain (left) and snow (right) from Jan 1, 2023 to Mar 31, 2023 | **Data:** NOAA | **Graphic:** Arthur J. Gallagher & Co.

New Zealand: Floods (January/February)

The Oceania region has felt the impacts of climate change more than any other region in the world over the last two years. Following a record loss year for Australia, extreme weather events hit hard in New Zealand in Q1 2023. Insured payouts arising from weather-related disasters this year were expected to reach a record high for New Zealand. This followed an increase from NZD274 million in 2020 to NZD336 million in 2022. Projected losses from two weather events alone in Q1 2023 were estimated to exceed NZD3 billion (USD2 billion), which is more than all insured natural catastrophe losses in the country combined from 2017-2022.

An ongoing La Nina, positive Southern Annular Mode (SAM), prolonged marine heatwave, and warming environmental temperatures influenced the prolific rainfall in Auckland in late January. The city observed its wettest January since 1853, with the highest 1-day rainfall 265 mm (10.43 in) recorded at Mangere. Most

of the rainfall fell on January 27 between late afternoon and evening. For the North Island, the southern half of Northland, the Coromandel Peninsula, western Bay of Plenty and parts of Hawke's Bay all received at least 400% of the normal January rainfall. Seventeen stations broke their monthly records for January. Soil moisture was consequentially higher than normal across the North Island.

Cyclone Gabrielle was historic in terms of climate records and loss impacts. The air pressure dipped to 968 hPa in Whitianga which was only surpassed by the 2008 North Island Weather Bomb. At least ten stations in the North Island saw winds gusting above 100 kph (60 mph), with the strongest gusts of 150 kph (95 mph) observed at Mokohinau. Nine stations broke their monthly rainfall records for February. The cyclone resulted in catastrophic winds, substantial storm surge, serious riverine flooding and the country's third-ever national state of emergency declaration.

What It Means: The back-to-back nature of record setting weather events in New Zealand during January and February brought renewed focus on the increasing nature of weather and climate-related insurance claims and subsequent payouts in the country. The high volume of claims payouts resulted in some companies reporting reinsurance recovery. New Zealand and the Oceania region is another part of the world where the hard reinsurance market has featured higher renewal rates, and where carriers are seeking new or alternative avenues to attract new capital.

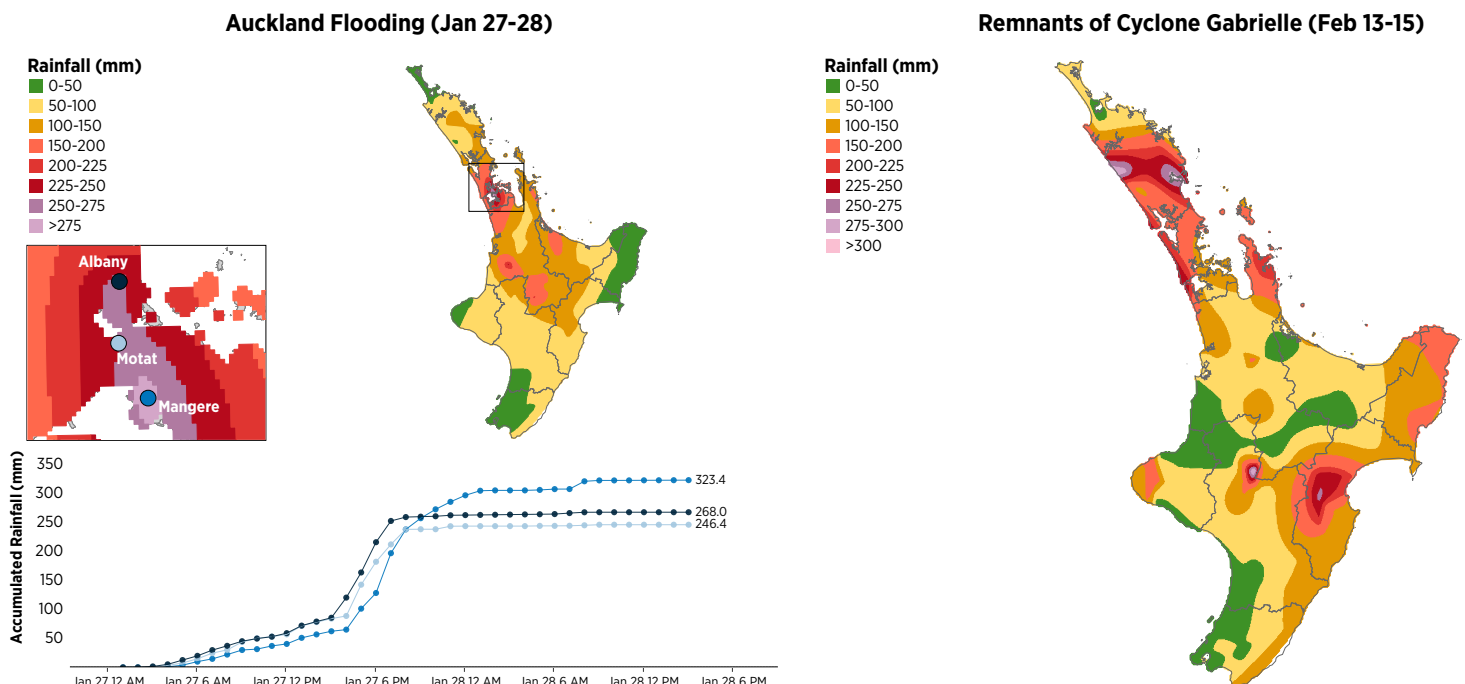


Figure 11: Auckland rainfall map and hourly station totals on Jan 27-28 (left) and rainfall from the remnants of Cyclone Gabrielle in the North Island from Feb 13-15 (right)

Data: New Zealand's National Institute of Water and Atmospheric Research (NIWA) | **Graphic:** Arthur J. Gallagher & Co.

Southern Africa: Cyclone Freddy

The remarkably long-lived and record-breaking Cyclone Freddy generated widespread socio-economic and humanitarian impacts across regions of Southern Africa since it first made landfall in Madagascar in late February. Freddy recorded three landfalls, which included one in Madagascar and two in Mozambique. As of this writing, Freddy and its remnants resulted in at least 1218 fatalities, in Madagascar (17); Mozambique (198); Malawi (1,000+); Zimbabwe (2) and Mauritius (1). More than 100,000 homes were damaged or destroyed. In Malawi, the storm prompted a system-wide shutdown of the nation's power grid. The most severe impacts occurred in and near Blantyre, the country's second largest city.

The storm began its unique journey off the northern Australian Coast when it was named on February 6. Freddy subsequently became the fourth storm in recorded history to traverse the entirety of the Indian Ocean basin. Along this extraordinary path, the Cyclone reached a maximum intensity of 270 kph (165 mph) on February 16 (1-min avg), the first Category 5-equivalent storm of 2023.

Cyclone Freddy further became the first storm to undergo seven rapid intensification cycles, and preliminarily holds the record as the longest-lived tropical cyclone globally. Freddy generated more Accumulated Cyclone Energy (ACE) than any storm in the Southern Hemisphere. ACE is a metric that accounts for both storm duration (longevity) and intensity. Freddy ranked as one of the wettest tropical storms on record for Mozambique. Climate change and warming sea surface temperatures are playing a role in making tropical cyclones wetter and more intense. Localities in Madagascar and Mozambique have been particularly susceptible to tropical cyclone landfalls in recent years.

What It Means: Cyclone Freddy was the latest event to bring significant weather or climate impacts to the African continent. As one of the areas anticipated to face some of the most notable effects of climate change, there is a significant push to bring more insurance presence to the region. Gallagher Re's newly announced role as sole insurance broker and risk advisor to the African Risk Capacity Limited (ARC) will be a key step in bringing parametric insurance cover to countries seeking more guaranteed protection from future climate or other disaster-related impacts.

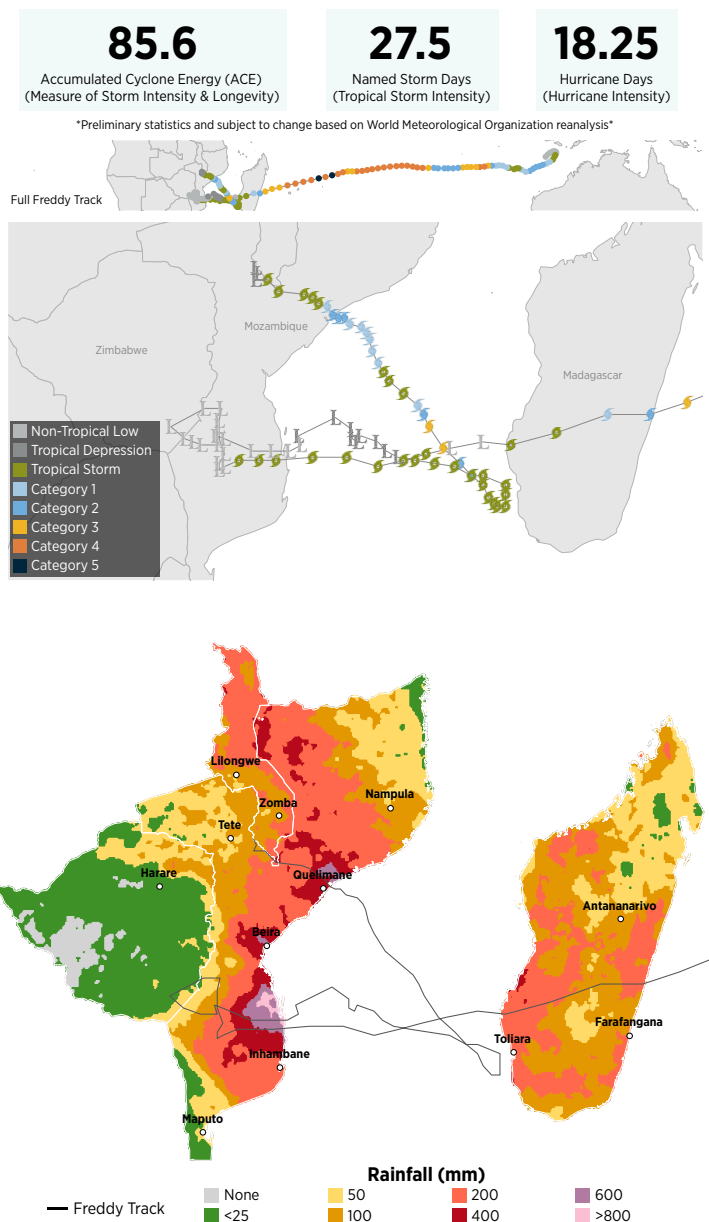


Figure 12: Cyclone Freddy track map, preliminary statistics and satellite estimated rainfall totals | **Data:** NOAA and NASA | **Graphic:** Arthur J. Gallagher & Co.

Miscellaneous Events

South America (Argentina, Chile)

Intense summer heatwaves enhanced near to record breaking drought and wildfire conditions across portions of South America, particularly Argentina, Brazil and Chile in Q1 2023. The expanding drought in Argentina had a substantial impact on livestock, agriculture, water supplies and vulnerable populations. By the end of February, more than 11.4 million ha (28.2 million acres) of cropland were subject to severe drought conditions. Multi-year drought across Brazil's southern growing regions likewise continued in

2023, with significant impacts to soybean production noted in Q1. Preliminary economic losses were already estimated by government officials in Argentina and Brazil at USD3 billion in each country.

In Chile, deadly wildfires in the south-central regions burned more than 400,000 ha (1 million acres) since the end of January. In the 2023 season to date (July 1 to June 30), more than 2,500 homes were destroyed, 26 people were killed and thousands were injured by the 6,000+ ignited wildfires.

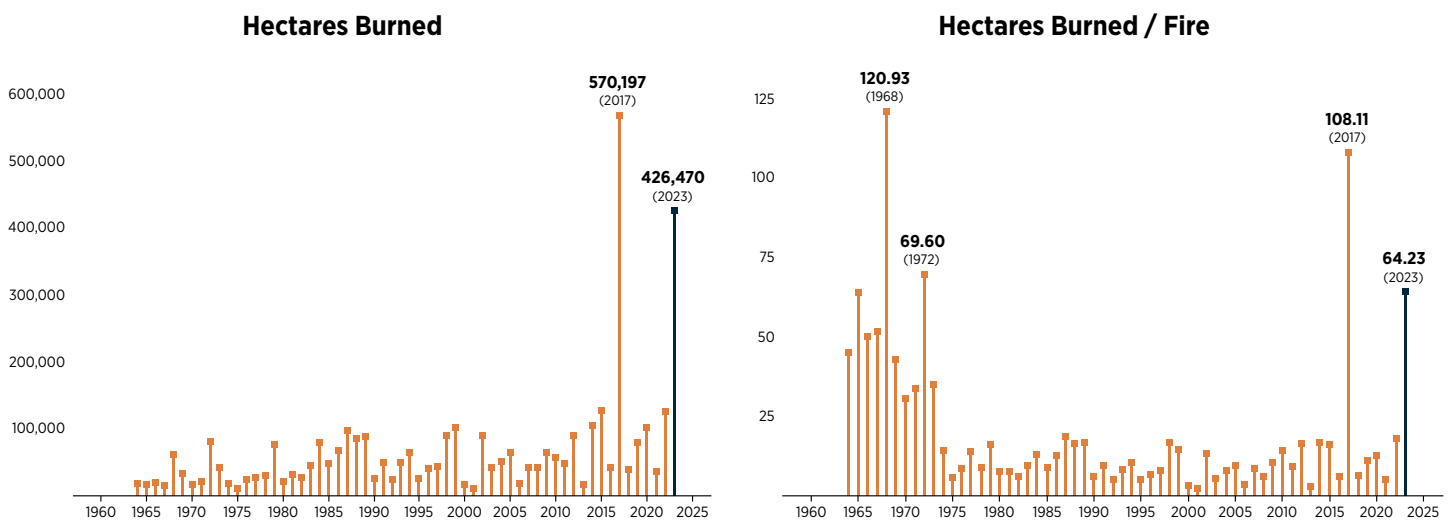


Figure 13: Historical wildfire data in Chile (1964-2023) | **Data:** Chile's National Forest Corporation (CONAF) | **Graphic:** Arthur J. Gallagher & Co.

Africa (South Africa, Mozambique, Eswatini)

Incessant rainfall during the first half of February, primarily caused by a meandering upper-level low, resulted in severe flooding and flash-flooding across South Africa, Eswatini and southern Mozambique. In South Africa, Kruger National Park, the largest reserve in the country, was significantly inundated. In the KwaZulu-Natal State, 24-hour rainfall totals ending February 12 reached 173 mm (6.81 in). A national state of disaster was declared. In total, at least 29 deaths were reported, thousands of homes were damaged or destroyed, and numerous roadways and bridges were impassable. Infrastructure damage in South Africa alone was projected to reach into the hundreds of millions (USD).

Asia (Malaysia, Thailand, China)

A late monsoon surge and Borneo vortex spun off continuous heavy rainfall in Southern Malaysia that affected more than 14,000 households. Widespread flooding with multiple rivers at danger levels lasted for weeks in Johor as rainfall topped 872 mm (34.33 in) in five days. The state formed a Climate Change and Natural Disaster Committee following the event.

Towards late March, the strong confluence of winds brought giant hailstones to northern Thailand and southern China. Hail fell for nearly 20 minutes in Chiang Mai on March 18, and more than 4,000 properties were damaged across seven provinces in northern Thailand. Heavy rain and hail also wreaked havoc in Fujian, Guangxi and Jiangxi, damaging more than 30,000 houses.

Europe

In contrast to other regions, Europe experienced a relatively quiet Q1 in 2023 in terms of economic loss. According to EU Copernicus, the continent felt their second warmest winter on record (December–February) with a temperature anomaly of +1.4°C (+2.5°F). The warm temperatures combined with below average precipitation, particularly in France, Italy and Spain, enhanced concerns of on-going drought conditions amplifying into the northern hemispheric spring and summer months. Amid a below average windstorm season, Storm Otto/Ulf in February, and Storm Larisa/Diethelm and Storm Mathis/Markus in March generated locally notable damages in regions of Western and Central Europe.



APPENDIX

January–March 2023 Events: Preliminary Statistics

Please note that the Appendix solely includes a listing of global events that resulted in >USD100 million in economic loss and/or >10 fatalities. It does not include a listing of aggregated loss totals from agencies that are not easily attributed to an individual event. Economic losses are provided in USD millions. **These totals are to be considered preliminary and are subject to revision.**

Drought

Event Name	Date	Region	Countries Affected	Economic Losses (USD mn)	Fatalities
Argentina Drought	Jan 1-Mar 31	Latin America	AR	3,000+	—
Brazil Drought	Jan 1-Mar 31	Latin America	BR	3,000+	—
US Drought	Jan 1-Mar 31	North America	US	100s of Millions	—

Earthquake

Event Name	Date	Region	Countries Affected	Economic Losses (USD mn)	Fatalities
Jurm EQ	Mar 21	Asia	AF, PK	—	21
Guayas EQ	Mar 19	Latin America	EC, PE	—	18
Western Azerbaijan EQ	Jan 28	Middle East	IR	100+	3
Turkey and Syria EQ	Feb 6-23	Middle East	TR, SY	45,000+	57,658

European Windstorm

Event Name	Date	Region	Countries Affected	Economic Losses (USD mn)	Fatalities
Larisa/Diethelm	Mar 7-10	Europe	AT, BE, CZ, DE, FR, IE, GB, NL, LU	100+	—
Mathis/Markus;	Mar 30-31	Europe	BE, CH, CZ, DE, FR, GB	100+	—

Flooding/Landslides

Event Name	Date	Region	Countries Affected	Economic Losses (USD mn)	Fatalities
Southern Africa Floods	Feb 4-14	Africa	ZA, MZ, SW	380+	29
—	Mar 20-Apr 1	Africa	ET	—	29
—	Mar 22-25	Africa	SO	—	21
—	Mar 23-27	Africa	KE	—	12
Philippines Flooding	Jan 1-18	Asia	PH	30+	45
Serasan Landslide	Mar 6	Asia	ID	—	50
—	Mar 18-20	Asia	PK	Millions	10
Ecuador Rainy Season	Jan 1-Mar 8	Latin America	EC	Millions	20

Flooding/Landslides

Event Name	Date	Region	Countries Affected	Economic Losses (USD mn)	Fatalities
Peru Flooding	Feb 5-7	Latin America	PR	—	40
Sao Paulo Floods	Feb 18-20	Latin America	BR	Millions	64
Alausi Landslide	Mar 26	Latin America	EC	—	30
Storm Yaku	Mar 7-13	Latin America	PE	330+	6
—	Mar 15	Middle East	TR	—	18
CA Atmospheric River #1	Jan 4-10	North America	US	850+	11
CA Atmospheric River #2	Jan 11-16	North America	US	600+	2
CA Atmospheric River #3	Jan 17-19	North America	US	140+	—
Western US Upper Level Low	Feb 21-22	North America	US	350+	—
CA Atmospheric River #4	Feb 23-25	North America	US	400+	—
CA Atmospheric River #5	Feb 26-Mar 2	North America	US	215+	—
CA Atmospheric River #6	Mar 9-12	North America	US	250+	2
CA Atmospheric River #7	Mar 13-15	North America	US	575+	2
CA Bomb Cyclone	Mar 21-23	North America	US	350+	5
North Island Floods	Jan 26-Feb 2	Oceania	NZ	1,600+	4

Severe Convective Storm

Event Name	Date	Region	Countries Affected	Economic Losses (USD mn)	Fatalities
—	Mar 16-20	Asia	IN	Millions	16
Selma Tornado and SCS	Jan 12	North America	US	750+	8
Houston Tornado and SCS	Jan 24	North America	US	260+	—
—	Feb 7	North America	US	280+	—
—	Feb 15-17	North America	US	255+	—
Southern Plains Derecho	Feb 26-28	North America	US	650+	1
Early March SCS and Wind	Mar 1-3	North America	US	4,750+	13
Dallas / Fort Worth Hail	Mar 16-17	North America	US	550+	—
Mississippi Tornado and SCS	Mar 23-28	North America	US	2,000+	24
Central US Outbreak	Mar 30-Apr 1	North America	US	3,150+	33

Tropical Cyclone

Event Name	Date	Region	Countries Affected	Economic Losses (USD mn)	Fatalities
Tropical Storm Cheneso	Jan 18-25	Africa	MG	20+	33
Cyclone Freddy	Feb 25-Mar 5	Africa	MG, MU, MW, MZ, ZW	340+	1,218+
Cyclone Gabrielle	Feb 11-17	Oceania	NZ	1,500+	11

Wildfire

Event Name	Date	Region	Countries Affected	Economic Losses (USD mn)	Fatalities
Chile Wildfires	Jan 30-Feb 18	Latin America	CL	300+	26

Winter Weather

Event Name	Date	Region	Countries Affected	Economic Losses (USD mn)	Fatalities
—	Jan 5-10	Asia	IN	Millions	25
Afghanistan Cold Spell	Jan 10-27	Asia	AF	—	166
Nyinchi Avalanche	Jan 17-23	Asia	CN	40+	28
Tajik Avalanche	Feb 15-16	Asia	TJ	—	20
Southern Plains Ice Storm	Jan 30-Feb 2	North America	US	400+	10
Northeast Freeze	Feb 2-5	North America	US	920+	—
Eastern Canada Freeze	Feb 3-5	North America	CA	155+	—
Upper Midwest Blizzard	Feb 21-23	North America	US	265+	3
March Nor'easter	Mar 13-15	North America	US	215+	—

Country Abbreviations

Country Name	Abbreviation
Afghanistan	AF
Albania	AL
Algeria	DZ
American Samoa	AS
Andorra	AD
Angola	AO
Anguilla	AI
Antigua and Barbuda	AG
Argentina	AR
Armenia	AM
Australia	AU
Austria	AT
Azerbaijan	AZ
Bahamas	BS
Bahrain	BH
Bangladesh	BD
Barbados	BB
Belarus	BY
Belgium	BE
Belize	BZ
Benin	BJ
Bermuda	BM
Bhutan	BT
Bolivia	BO
Bosnia and Herzegovina	BA
Botswana	BW
Brazil	BR
Brunei	BN
Bulgaria	BG
Burkina Faso	BF
Burundi	BI
Cambodia	KH
Cameroon	CM
Canada	CA
Cayman Islands	KY
Central African Republic	CF
Chad	TD
Chile	CL

Country Name	Abbreviation
China	CN
Colombia	CO
Comoros	KM
Cook Islands	CK
Costa Rica	CR
Croatia	HR
Cuba	CU
Cyprus	CY
Czech Republic	CZ
Democratic Republic of the Congo	CD
Denmark	DK
Djibouti	DJ
Dominica	DM
Dominican Republic	DO
East Timor	TL
Ecuador	EC
Egypt	EG
El Salvador	SV
Equatorial Guinea	GQ
Eritrea	ER
Estonia	EE
Ethiopia	ET
Fiji	FJ
Finland	FI
France	FR
Gabon	GA
Gambia	GM
Georgia	GE
Germany	DE
Ghana	GH
Greece	GR
Grenada	GD
Guadeloupe	GP
Guam	GU
Guatemala	GT
Guinea	GN
Guyana	GY
Haiti	HT

APPENDIX

Country Name	Abbreviation
Honduras	HN
Hong Kong	HK
Hungary	HU
Iceland	IS
India	IN
Indonesia	ID
Iran	IR
Iraq	IQ
Ireland	IE
Israel	IL
Italy	IT
Ivory Coast	CI
Jamaica	JM
Japan	JP
Jordan	JO
Kazakhstan	KZ
Kenya	KE
Kosovo	XK
Kuwait	KW
Kyrgyzstan	KG
Laos	LA
Latvia	LV
Lebanon	LB
Lesotho	LS
Liberia	LR
Libya	LY
Liechtenstein	LI
Lithuania	LT
Luxembourg	LU
Macau	MO
Macedonia	MK
Madagascar	MG
Malawi	MW
Malaysia	MY
Maldives	MV
Mali	ML
Malta	MT
Marshall Islands	MH
Martinique	MQ

Country Abbreviations

Country Name	Abbreviation
Mauritania	MR
Mauritius	MU
Mexico	MX
Micronesia	FM
Moldova	MD
Monaco	MC
Mongolia	MN
Montenegro	ME
Montserrat	MS
Morocco	MA
Mozambique	MZ
Myanmar	MM
Namibia	NA
Nepal	NP
Netherlands	NL
New Caledonia	NC
New Zealand	NZ
Nicaragua	NI
Niger	NE
Nigeria	NG
North Korea	KP
Northern Mariana Islands	MP
Norway	NO
Oman	OM
Pakistan	PK
Palau	PW
Panama	PA
Papua New Guinea	PG
Paraguay	PY
Peru	PE
Philippines	PH
Poland	PL
Portugal	PT
Puerto Rico	PR
Qatar	QA
Republic of the Congo	CG
Reunion	RE
Romania	RO

Country Name	Abbreviation
Russia	RU
Rwanda	RW
Saint Kitts and Nevis	KN
Saint Lucia	LC
Saint Vincent and The Grenadines	VC
Samoa	WS
Saudi Arabia	SA
Senegal	SN
Serbia	RS
Seychelles	SC
Sierra Leone	SL
Singapore	SG
Sint Maarten	SX
Slovakia	SK
Slovenia	SI
Solomon Islands	SB
Somalia	SO
South Africa	ZA
South Korea	KR
South Sudan	SS
Spain	ES
Sri Lanka	LK
Sudan	SD
Suriname	SR
Swaziland	SZ
Sweden	SE
Switzerland	CH
Syria	SY
Taiwan	TW
Tajikistan	TJ
Tanzania	TZ
Thailand	TH
Togo	TG
Tonga	TO
Trinidad and Tobago	TT
Tunisia	TN
Turkey	TR
Turkmenistan	TM

APPENDIX

Country Name	Abbreviation
Tuvalu	TV
Virgin Islands (U.S.)	VI
Uganda	UG
Ukraine	UA
United Arab Emirates	AE
United Kingdom	GB
United States	US
Uruguay	UY
Uzbekistan	UZ
Vanuatu	VU
Venezuela	VE
Vietnam	VN
Virgin Islands (UK)	VG
Yemen	YE
Zambia	ZM
Zimbabwe	ZW

Report Authors

Steve Bowen, M.Sc.

Chief Science Officer,
Gallagher Re
Steve_Bowen@GallagherRe.com

Brian Kerschner, M.Sc.


Western Hemisphere Meteorologist
Gallagher Re
Brian_Kerschner@GallagherRe.com

Jin Zheng Ng, M.Sc.

Eastern Hemisphere Meteorologist
Gallagher Re
JinZheng_Ng@GallagherRe.com

With special thanks to:

Vaughn Jensen, Carroll Desmond, Maurice Williams, Prasad Gunturi, Michael Thomas, Timothy Fewtrell, Hemant Nagpal, Nipun Mapara, Harriett Copestack, Jay Apfel, Paul Welsh, Crescenzo Petrone, Junaid Seria, Francesco Zuccarello, Roy Cloutier, Stephen Tench, Graham Felce, Paul Huggett, Tina Thompson



Global and Local Reinsurance

Drawing on our network of reinsurance and market specialists worldwide, and as part of the wider Gallagher company, Gallagher Re offers the benefits of a top-tier reinsurance broker, one that has comprehensive analytics and transactional capabilities, with on-the-ground presence and local understanding. Whether your operations are global, national or local, Gallagher Re can help you make better reinsurance and capital decisions, access worldwide markets, negotiate optimum terms, and boost your business performance.

It's the *way* we do it.

For more information, visit GallagherRe.com.



Gallagher Re

Copyright 2023 Arthur J. Gallagher & Co. and subsidiaries. All rights reserved: No part of this publication may be reproduced, disseminated, distributed, stored in a retrieval system, transmitted or otherwise transferred in any form or by any means, whether electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of Arthur J. Gallagher & Co. Gallagher Re is a business unit that includes a number of subsidiaries and affiliates of Arthur J. Gallagher & Co. which are engaged in the reinsurance intermediary and advisory business. All references to Gallagher Re below, to the extent relevant, include the parent and applicable affiliate companies of Gallagher Re. Some information contained in this document may be compiled from third party sources and Gallagher Re does not guarantee and is not responsible for the accuracy of such. This document is for general information only and is not intended to be relied upon. Any action based on or in connection with anything contained herein should be taken only after obtaining specific advice from independent professional advisors of your choice. The views expressed in this document are not necessarily those of Gallagher Re. Gallagher Re is not responsible for the accuracy or completeness of the contents herein and expressly disclaims any responsibility or liability, based on any legal theory, for damages in any form or amount, based upon, arising from or in connection with for the reader's application of any of the contents herein to any analysis or other matter, or for any results or conclusions based upon, arising from or in connection with the contents herein, nor do the contents herein guarantee, and should not be construed to guarantee, any particular result or outcome. Gallagher Re accepts no responsibility for the content or quality of any third-party websites that are referenced.

The contents herein are provided for informational purposes only and do not constitute and should not be construed as professional advice. Any and all examples used herein are for illustrative purposes only, are purely hypothetical in nature, and offered merely to describe concepts or ideas. They are not offered as solutions for actual issues or to produce specific results and are not to be relied upon. The reader is cautioned to consult independent professional advisors of his/her choice and formulate independent conclusions and opinions regarding the subject matter discussed herein. Gallagher Re is not responsible for the accuracy or completeness of the contents herein and expressly disclaims any responsibility or liability based on any legal theory or in any form or amount, based upon, arising from or in connection with for the reader's application of any of the contents herein to any analysis or other matter, nor do the contents herein guarantee, and should not be construed to guarantee any particular result or outcome. Gallagher Re is a trading name of Arthur J. Gallagher (UK) Limited, which is authorised and regulated by the Financial Conduct Authority. Registered Office: The Walbrook Building, 25 Walbrook, London EC4N 8AW. Registered in England and Wales. Company Number: 1193013. www.ajg.com/uk