Gallagher Re

OCTOBER 2024

Natural Catastrophe and Climate Report: Q3 2024

Preliminary Overview

Global Overview

Non-Peak Perils Drive Bulk of Global Insured Losses Thru Q3 as the Annual Total Tops USD100 billion for the 7th Time Since 2017

Preliminary YTD (Q1–Q3) Global Loss Totals: Economic (USD280 billion) and Insured (USD108 billion)

Through the first nine months of 2024, global natural catastrophe activity remained quite active despite translating to a near or slightly below average financial cost. The minimum USD280 billion in economic loss from all natural perils was lower than the most recent 10-year Q1–Q3 average (USD309 billion). The portion covered by the private insurance market or public insurance entities totaled at least USD108 billion, or 5 percent higher than the decadal average (USD102 billion). The above average insured losses continued to be driven by a higher frequency of low/mid-size events (losses at USD2 billion or lower), especially in parts of the world with higher insurance coverage. Please note that these estimates do not include the high loss costs emanating from Hurricane Milton, which struck the state of Florida in early October (Q4).

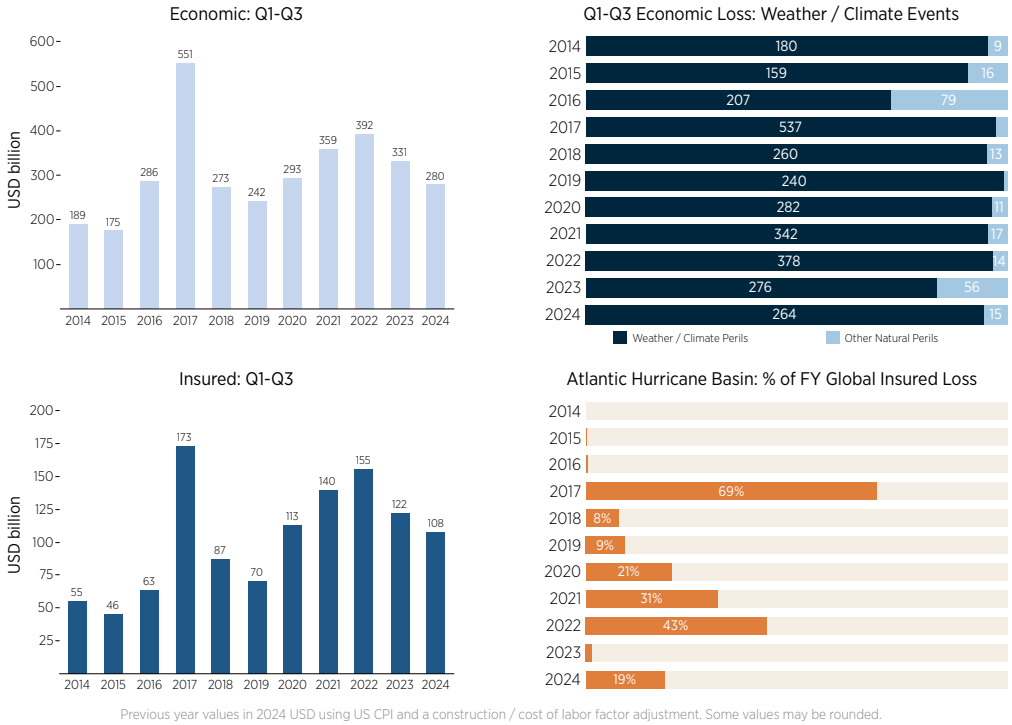
When looking solely at weather and climate–related disaster costs, which means excluding losses associated with earthquakes, volcanoes, or other non–atmospheric driven events, the economic cost was minimally USD264 billion. This was lower than the decadal average (USD286 billion). This was the ninth consecutive Q1–Q3 with weather / climate related economic losses at or above USD200 billion. Insurers covered at least USD103 billion which was 4% higher than the decadal average (USD99 billion).

As we enter the final stretch of the year, there remains focus on what has turned out to be a "backloaded" end to the Atlantic hurricane season. While the number of Atlantic storms has been less active than originally forecast, the season has already resulted in five hurricane landfalls in the United States. Colorado State University, a collaborative partner with the Gallagher Research Centre, notes that favorable conditions should persist into November. The insurance industry is also adjusting to an increased frequency of major natural hazard events occurring in non-traditional insurance markets. The fingerprints of climate change continue to become more evident on individual events. 2024 remains on pace to end as the warmest year ever officially recorded, with land and ocean temperatures measured as the warmest first nine months.

Key Takeaways from the First Nine Months of 2024:

- Near–average losses for the global insurance industry
- Hurricane Helene: Costliest industry event thru Q3 2024
- Major humanitarian toll from flood and drought events
- 51+ billion-dollar economic loss events
- 28+ billion-dollar insured loss events (19+ multi-billion)
- Warmest Q1–Q3 for the world on record dating to 1850

Note: All loss totals in this document are adjusted to 2024 USD unless explicitly stated otherwise. Totals were adjusted using the US Consumer Price Index and a construction index and cost of labor factor.



Previous year values in 2024 USD using US CPI and a construction / cost of labor factor adjustment. Some values may be rounded.

Figure 1: Q1–Q3 2024 executive summary of natural catastrophe activity | **Data & Graphic:** Gallagher Re

+1.58°C / 2.84°F

Q1-Q3 2024 Global Land & Ocean Temperature Anomaly (Copernicus Baseline: 1850-1900)

5

Consecutive years with a landfalling major hurricane in the United States; ties 1915-1919 for longest streak on record

7

Number of years in the last decade with global insured losses topping USD100 billion

USD7.7 billion

Amount requested by the UN's OCHA to fund the Humanitarian Response Plan for 2024 floods in West and Central Africa

Economic Loss

The total economic loss for the first three quarters of 2024 was preliminarily estimated at USD280 billion, which was below the decadal average (USD309 billion). The losses were driven by at least 13 individual events which resulted in economic losses greater than USD5 billion, including five which topped USD10 billion. The four largest individual events included Hurricane Helene in the United States, China's seasonal floods, Storm Boris (Anett) in central Europe, and Typhoon Yagi in Asia.

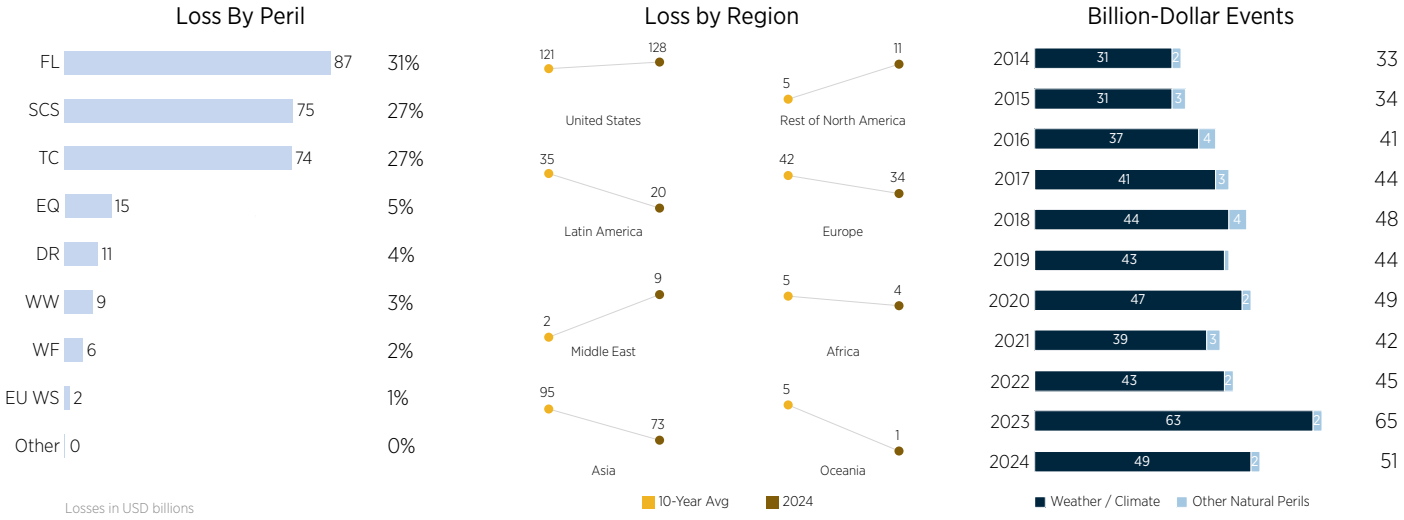
In total there were at least 51 individual billion-dollar economic loss events through the month of September. This was above the decadal average of 45 such events. These events included 30 in the United States (19 of which were from SCS outbreaks), 11 in Asia, 4 in Latin America, 4 in the Rest of North America (the Remnants of Hurricane Debby caused a multi-billion-dollar loss in Canada), 2 in Europe, and 1 in the Middle East. All but two (49) were weather / climate related events, which was above the 10-year average of 42.

A driving force in many of the weather / climate related disasters involved the occurrence of seasonal weather patterns, but also unusual behaving or "stuck" jet stream patterns (likely influenced due to ongoing warming tied to climate change) that promoted more extreme conditions. This was true for several major flood and drought events during the peak Northern Hemisphere summer months. The record ocean water temperatures also aided in several intense and impactful tropical cyclones. Every major continent on Earth has recorded at least one historically anomalous extreme weather / climate event in 2024.

There have been three dominant perils driving natural catastrophe losses thus far in 2024: flooding, tropical cyclone, and SCS. Those three perils alone accounted for 85% of economic losses during the first nine months of the year. The USD87 billion in global flood-related losses were 19% higher than the decadal average (USD73 billion). Tropical cyclone (27%) and SCS (27%) were the only other perils that accounted for at least 10% of economic losses. While global inflation continued to slowly decline as governments cut interest rates; supply, construction, labor, and claims litigation costs remained elevated and still had sizeable influence on disaster costs.

On a regional basis, the United States accounted for a minimum of USD128 billion, or 46%, of economic disaster costs. This was above the decadal average, but the damage costs associated with SCS, tropical cyclone, flood, and drought events were expected to bring further loss development in the coming months. Elsewhere, Asia accounted for at least USD73 billion, or 26%, of economic disaster costs. This was lower than average. The two other regions which have seen above average losses include the Rest of North America (excluding the US and Mexico) and the Middle East. All other regions, Europe, Latin America, Africa, and Oceania saw below average loss costs in the first three quarters of the year.

For context, the third quarter is typically the most expensive for natural catastrophes. In the last decade, Q3 alone has driven 49% of annual economic loss costs.



EQ: Earthquake | **SCS:** Severe Convective Storm | **TC:** Tropical Cyclone | **WW:** Winter Weather
DR: Drought | **EU WS:** European Windstorm | **WF:** Wildfire | **FL:** Flooding

Figure 2: Q1–Q3 2024 global economic loss statistics | **Data & Graphic:** Gallagher Re

Top 10 Costliest Q1–Q3 Economic Events and Event Visualization

The United States has accounted for four of the top 10 costliest events of the year to date; including Hurricane Helene, which made landfall as a Category 4 major hurricane in Florida before producing catastrophic inland flooding. At least five events topped USD10 billion globally, including three that exceeded USD20 billion. All but one of the top 10 events were weather-related. There was an equal split between "peak" peril and "non-peak" peril events. "Peak" perils include tropical cyclone, earthquake, and European Windstorm.

Event Name	Date	Region	Countries	Economic Loss (USD)	Insured Loss (USD)
Hurricane Helene	Sep 24–30	United States	CU, MX, US	>35 billion	>12 billion
China Seasonal Floods	Summer	China	CN	22 billion	700 million
Storm Boris	Sep 11–18	Europe	AT, CZ, DE, IT, HU, PL, RO, SK, SI	20 billion	3.1 billion
Typhoon Yagi	Sep 1–12	Asia	CH, LA, MM, PH, TH, VN	16 billion	920 million
Noto Peninsula Earthquake	Jan 1	Asia	JP	12 billion	3.0 billion
Arabian Gulf Flash Floods	Apr 13–17	Middle East	AE, BH, IR, OM, QA, SA, YE	8.6 billion	2.8 billion
Brazil Floods	Apr–May	Latin America	BR, UY, AR	7.6 billion	1.5 billion
Hurricane Debby	Aug 4–10	United States	US, CA	7.0 billion	3.4 billion
Hurricane Beryl	Jul 1–12	United States	BB, GD, JM, KY, MQ, MX, TT, US, VC, VE	6.7 billion	3.0 billion
Early May US SCS	May 6–10	United States	US	6.5 billion	5.3 billion
Grand Totals				**280 billion**	**108 billion**

Table 1: Top 10 costliest economic loss events (USD millions) in Q1–Q3 2024 | **Data:** Gallagher Re

The map in Figure 3 showcases the widespread natural catastrophe activity in all corners of the globe. The highest frequency of billion-dollar disasters was again found in the United States, where a highly active peak severe convective storm season saw repeated impactful thunderstorm outbreaks and multiple hurricane landfalls. Europe and Asia also accounted for a higher portion of global events overall.

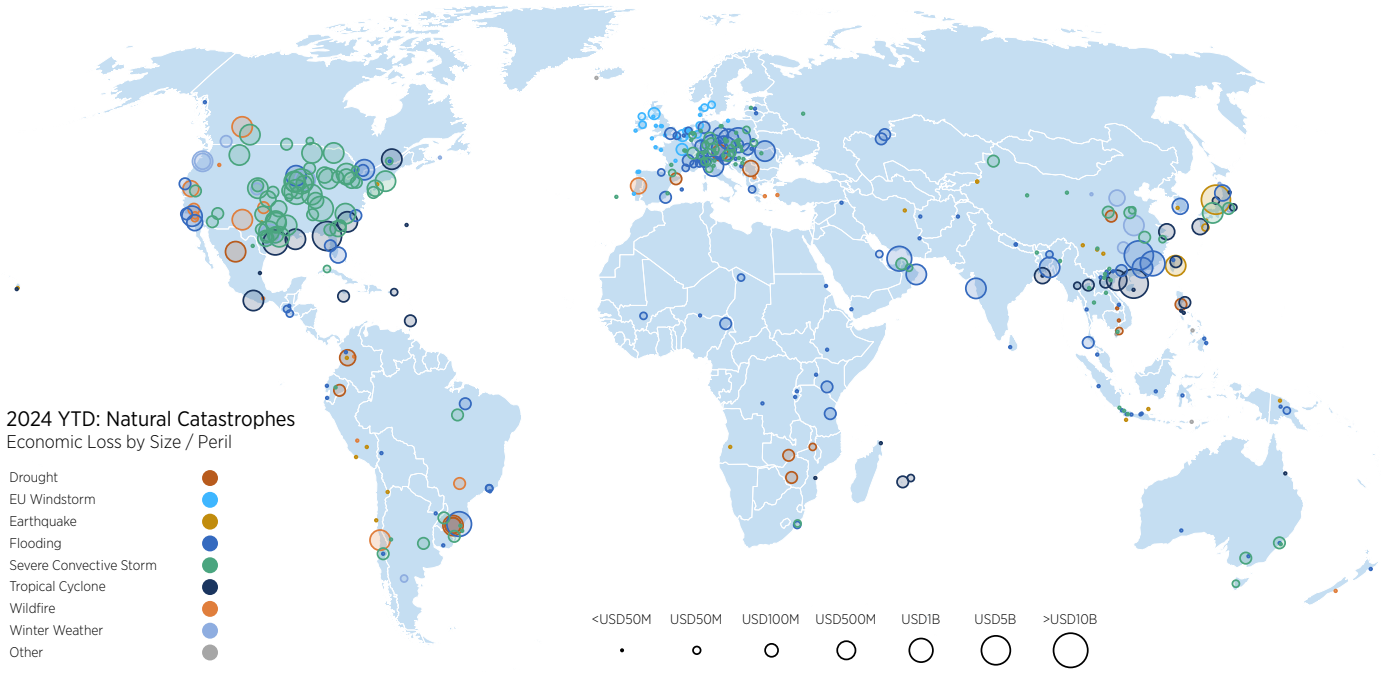


Figure 3: Q1–Q3 2024 map of economic loss events by size and peril | **Data & Graphic:** Gallagher Re

Insured Loss

The total insured loss for the first nine months of 2024 was preliminarily estimated at USD108 billion, which was slightly above the decadal average (USD102 billion). This total, which is expected to continue rising in the coming weeks and months, includes losses paid out by the private insurance market and public insurance entities. There were at least 28 individual billion-dollar insured loss events, which ties 2020 as the second highest Q1–Q3 total on record. Nineteen (19) of those events resulted in a multi-billion-dollar loss (USD2 billion or more), which is the most ever recorded in any year for insurers.

The overall costliest peril year-to-date remained SCS, which accounted for more than half of insured losses. The bulk of the USD57 billion in global SCS losses occurred in the United States (USD51 billion). This marked the second consecutive year which US SCS losses topped the USD50 billion threshold for the peril. The US has recorded at least 15 individual billion-dollar SCS insured loss events, including 11 which topped USD2 billion. This surpasses 2023 (10) for the most multi-billion-dollar US SCS events on record. The tropical cyclone peril was the second costliest globally at USD22 billion, and flooding was third at USD15 billion. The SCS, tropical cyclone, and flooding perils accounted for 88% of all global insured losses through the first nine months of 2024.

The costliest individual event was Hurricane Helene, which struck the US in late September. That event was poised to cost public and private insurers between USD10 billion and USD15 billion alone. Three other landfalling Atlantic hurricanes — Beryl, Debby, Francine — combined caused roughly USD8 billion in industry losses. This included a nearly multi-billion-dollar flood loss in Montreal, Canada following Debby's remnant rainfall, marking one of the most expensive natural catastrophe events on record for the Canadian insurance market.

At USD103 billion, weather / climate events drove 95% of Q1–Q3 2024 insured losses. This was slightly lower than the decadal average of 97%. However, as further loss development occurs from larger recent Q3 events, this percentage will likely grow. Additionally, there is traditionally a multi-month reporting lag for public insurance entity indemnity payout data, especially for costs associated with agriculture. As seasonal harvest periods arrive, this allows farmers to take stock of how much impact early season weather events have had on yields and determines how many claims are filed.

The US accounted for more than USD77 billion, or 71%, of the year's insured losses. This was above the region's decadal average of USD65 billion, and as previously mentioned, the expectation is that loss development will only further increase the US loss total in the weeks and months ahead. Other regions with higher-than-average insured losses included the Rest of North America and the Middle East. Industry losses have remained largely manageable elsewhere.

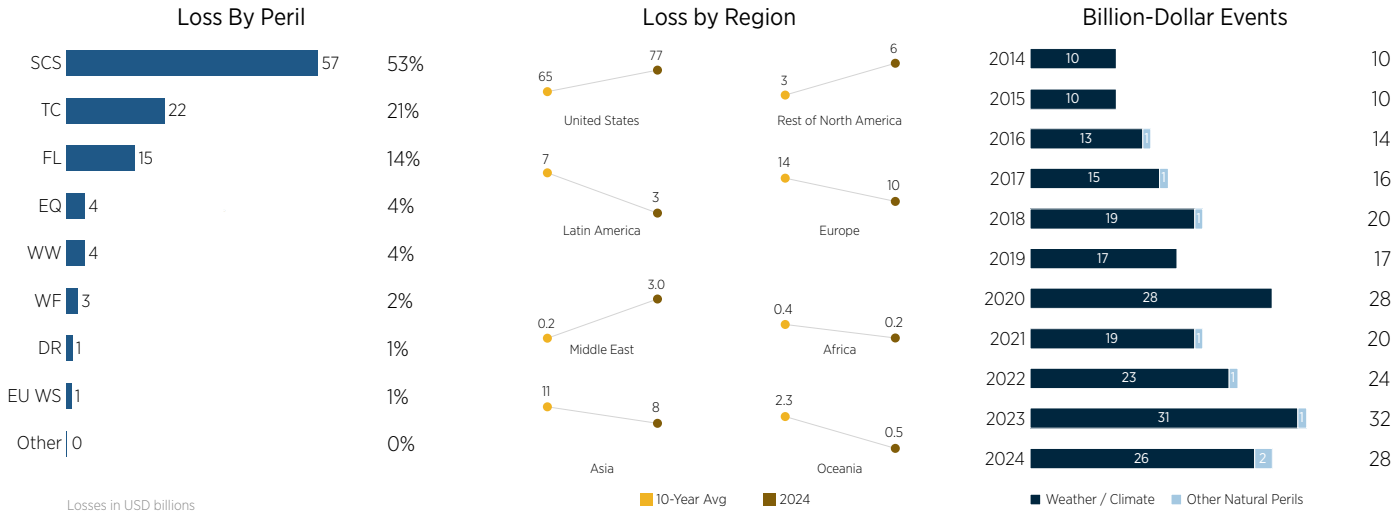


Figure 4: Q1–Q3 2024 global insured loss statistics | **Data & Graphic:** Gallagher Re

Top 10 Costliest Q1–Q3 Insured Events and Event Visualization

The United States accounted for seven of the top 10 costliest insured loss events through the first three quarters of 2024. Three events led to at least USD5 billion in losses for private and public insurers. All events but one were weather–related. Hurricane Helene was the most expensive individual event, but four of the other top 10 were from US SCS events, which further highlights how this peril continues to drive significant annual loss costs for the US insurance market. While not explicitly noted, the remnants of Hurricane Debby resulted in one of the most expensive insured loss events for the Canadian industry on record following flooding in Montreal.

Event Name	Date	Region	Countries	Economic Loss (USD)	Insured Loss (USD)
Hurricane Helene	Sep 24–30	United States	CU, MX, US	>35 billion	>12 billion
Early May US SCS Outbreak	May 6–10	United States	US	6.5 billion	5.3 billion
Mid-March US SCS Outbreak	Mar 12–17	United States	US	6.2 billion	5.1 billion
Mid-May US SCS Outbreak	May 17–22	United States	US	5.4 billion	4.3 billion
Hurricane Debby	Aug 4–10	US / Rest of NA	CA, US	7.0 billion	3.4 billion
Storm Boris	Sep 11–18	Europe	AT, CZ, DE, IT, HU, PL, RO, SK, SI	20 billion	3.1 billion
Noto Peninsula Earthquake	Jan 1	Asia	JP	12 billion	3.0 billion
Hurricane Beryl	Jul 1–12	United States	BB, GD, JM, KY, MQ, MX, TT, US, VC, VE	6.7 billion	3.0 billion
Arabian Gulf Flash Floods	Apr 13–17	Middle East	AE, BH, IR, OM, QA, SA, YE	8.6 billion	2.8 billion
Late May US SCS Outbreak	May 25–26	United States	US	3.3 billion	2.7 billion
Grand Totals				**280 billion**	**108 billion**

Table 2: Top 10 costliest insured loss events (USD millions) in Q1–Q3 2024 | **Data:** Gallagher Re

The map in Figure 5 showcases how a significant portion (72%) of the Q1–Q3 losses emanated from events in the United States. The US has endured 20 individual billion-dollar insured loss events; second only to the 25 in 2023 and 2020. Despite many other impactful and costly events in parts of Europe, Latin America, Africa, and Asia, the continued low rates of insurance penetration in these regions are driving a significant global protection gap. (The protection gap is the portion of economic losses not covered by insurance). Events from the first nine months of 2024 resulted in a protection gap of 61%; or USD172 billion. This total was slightly lower than the YTD decadal average (67%), and primarily due to the dominance of US wind and storm-related events that typically have high insurance coverage. The Q1–Q3 protection gap for non-US events was 80%.

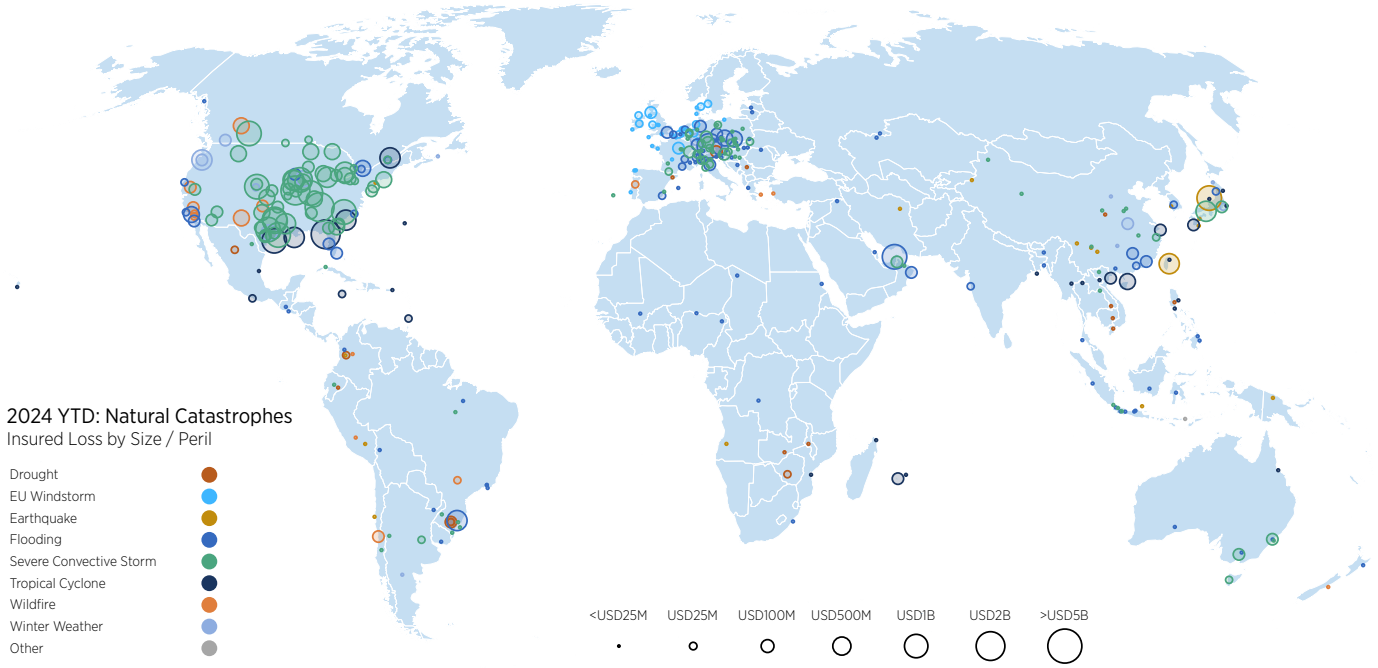


Figure 5: Q1–Q3 2024 map of insured loss events by size and peril | **Data & Graphic:** Gallagher Re

Conversation Starter: Q3 2024

Conversation Starter: Q3 2024

2024 Atlantic Hurricane Season: (Relatively) Quiet Start with a Race to the Finish

The 2024 Atlantic hurricane season exited September with a flurry of activity, but it followed an unexpectedly quiet stretch during the peak of the season from mid-August to mid-September. This lull in storm development ran counter to well publicized pre-season forecasts which suggested the potential for a hyperactive level of storm activity. Further driving the surprise was that the season started off with record-breaking Hurricane Beryl, which became the earliest Category 5 storm on record in the basin. To be clear, the season through September was essentially equal to the 30-year climatological average in terms of the number of named storms, hurricanes, major hurricanes, and Accumulated Cyclone Energy (ACE). But given the continued record warmth in the tropical Atlantic Ocean and other very favorable atmospheric conditions in place, the correct questions to pose are: 1) Why wasn't the peak season more active?, and 2) Will 2024 feature a "backloaded" season?

What Happened During the Peak Development Months?

It will take time to fully diagnose the sub-seasonal factors that drove the unexpected reduction in storm development during the peak seasonal months (August and September), but there are some initial takeaways which can help explain what happened. The season went a stunning 20 consecutive days without an active named storm in the Atlantic Basin from August 20 to September 8. There were no named storm formations from August 13 to September 8, which represented the first time such a lack of storm activity in the basin during this timeframe since 1968.

1

One of the most obvious justifications for the lack of activity involved an unexpected northward shift of the seasonal monsoonal trough in West and Central Africa. This trough, which is linked to the Intertropical Convergence Zone (ITZC), is where areas of low pressure typically traverse and enter the eastern Atlantic. These systems are most common during August and September. However, in 2024, the northward shift of the trough also combined with the presence of very dry air at a higher latitude in the Atlantic which essentially suffocated any storms from developing. The trough likely shifted north due to a notable difference in sea surface temperatures in the main tropical Atlantic (much warmer) and further south in the equatorial Atlantic (much cooler). This pattern increased cross-equatorial flow and influenced steering patterns.

It is worth noting that the northward shift in the monsoon trough also resulted in considerable rainfall in the Western Sahara that brought significant vegetative growth to a typically dry desert region. Figure 6 highlights the difference in vegetation during the period in late September 2024 with late September 2023. The rainfall also contributed to a very deadly flood season which left more than 1,000 people dead and widespread damage to hundreds of thousands of homes across several countries.

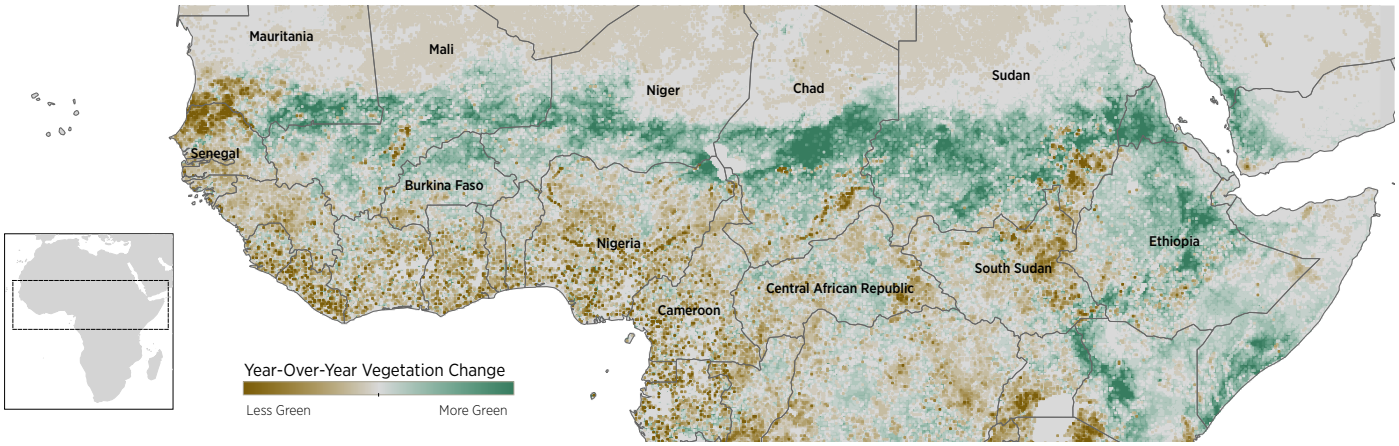


Figure 6: Year-over-year change in vegetation in northern Africa as of late September 2024 | **Data:** NASA | **Graphic & Analysis:** Gallagher Re

2

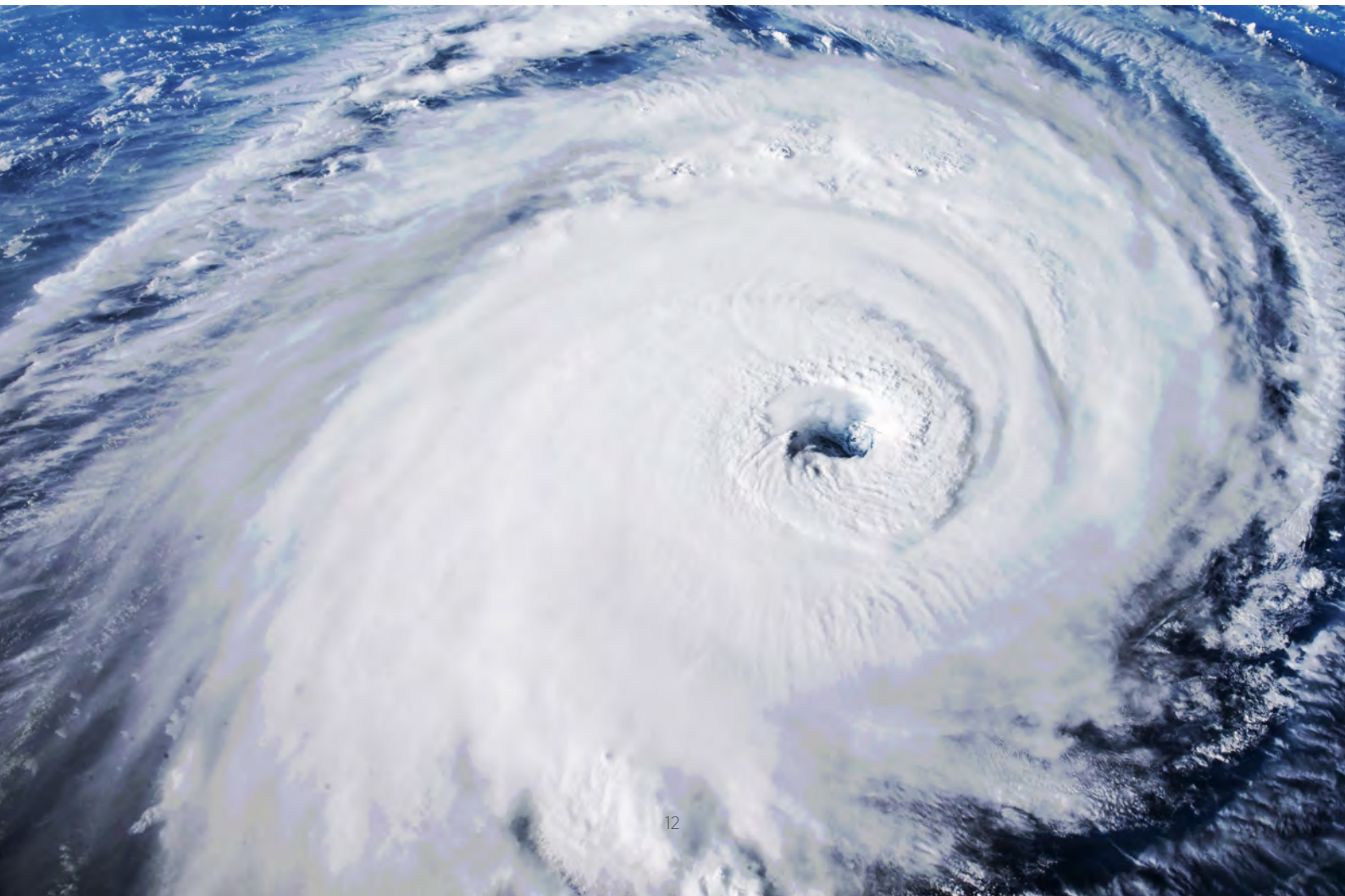
Another unusual observation in August and September involved conditions at the upper levels of the atmosphere. A single vertical column of the atmosphere almost always involves temperatures decreasing with height the further away from the surface. However, upper-level atmospheric temperatures during August 2024 were much warmer than they were in August 2023. While there has not been much historical correlation with upper-level temperatures and named storm formation, there are current hypotheses that the anomalous warmth in 2024 may have surpassed an unknown threshold which led to much more atmospheric stability than expected. A bigger contrast in temperatures at the surface and higher up in the atmosphere leads to more destabilization and, in turn, more storm formation. The opposite was true in August / September 2024.

3

Additional sets of factors that likely played a role in the reduction of activity included an ongoing strongly positive phase of the North Atlantic Oscillation (NAO), the arrival of anomalously strong wind shear in late August and early September in the Main Development Region (MDR), the prolonged presence of robust Saharan Dust, and weeks of unfavorable phases of the Madden-Julian Oscillation (MJO).

The NAO, which NOAA defines as a large-scale fluctuation in atmospheric pressure between a subtropical high-pressure system located near the Azores in the Atlantic Ocean and sub-polar low pressure system near Iceland, can bring big changes in steering currents and how the atmosphere behaves. A positive NAO means that there was a mid-latitude ridge of high pressure that likely helped bring more dry air into the MDR. It also connected with the northern shift in the West African Monsoon as previously noted.

Both strong wind shear and voluminous Saharan dust are also major deterrents for tropical cyclone formation as both severely limit the ability for thunderstorms to organize and obtain vertical cloud growth needed to develop. These were both actively present during the peak months. Additionally, the MJO (which is an eastward propagation of enhanced or suppressed tropical moisture that can spawn convection) was in a very unfavorable phase.



What About the Rest of the Season?

By the second half of September, virtually all the inhibiting factors began to dissipate. This then led to a rapid burst of cyclogenesis that has extended into the first half of October. Favorable conditions resulted in the eventual development and US landfalls of hurricanes Helene and Milton. Several other storms have since developed as the conditions that drove the pre-season hyperactive forecasts remained in place. This includes record warm tropical Atlantic Ocean waters and a limited amount of wind shear which coincides with the ongoing official transition towards La Niña. Such conditions helped lend credibility to the prospect of a "backloaded" season where most storms developed after the peak season months.

This leads to two important questions: Is there historical precedent for elevated late season activity, and have there been notable US landfalls in October and November?

While October and November (or December) are not typically the most prolific Atlantic storm activity months, there have been years in which a high volume of hurricanes or major hurricanes were generated. Most recently in 2020, the Atlantic (particularly in the Caribbean Sea), produced six hurricanes alone. Five of those were categorized as major hurricanes and three reached Category 4 intensity. Following Milton's historic development in the Gulf of Mexico during the start of Q4 2024, there have now been eight Category 5 hurricanes since 1924 in the months of October or November: Unnamed (1924), Unnamed (1932), Hattie (1961), Mitch (1998), Wilma (2005), Matthew (2016), Michael (2018), and Milton (2024).

Several notable hurricane (or hurricane-equivalent) landfalls have struck the US during this timeframe, too. In recent years this has included storms Zeta (Cat 3; 2020), Delta (Cat 2; 2020), Michael (Cat 5; 2018), Matthew (Cat 1; 2016), Sandy (extratropical; 2012), Wilma (Cat 3; 2005), and Opal (Cat 3; 1995). In 2024, Hurricane Milton struck the Florida peninsula in early Q4 and left catastrophic damage in many communities. While late season events are not hugely common, they can and do occur. Given the conditions in place, plus guidance from Colorado State University (Gallagher Research Centre partner) that suggests above-average activity, a heightened sense of awareness must exist for the rest of the season.

Final Thoughts

The 2024 Atlantic hurricane season has proven itself to be historic, unusual, surprising, and meaningful. This reinforces the reality that long-range forecasting for any type of weather, climate, or natural catastrophe peril is challenging and requires ample uncertainty to be factored. There remains too much focus on the frequency quantity within a forecast. While frequency forecasting is of course valuable, the intensity / behavior / location of an event ultimately drives the risk. It only takes one event to dramatically alter the perception of a year.

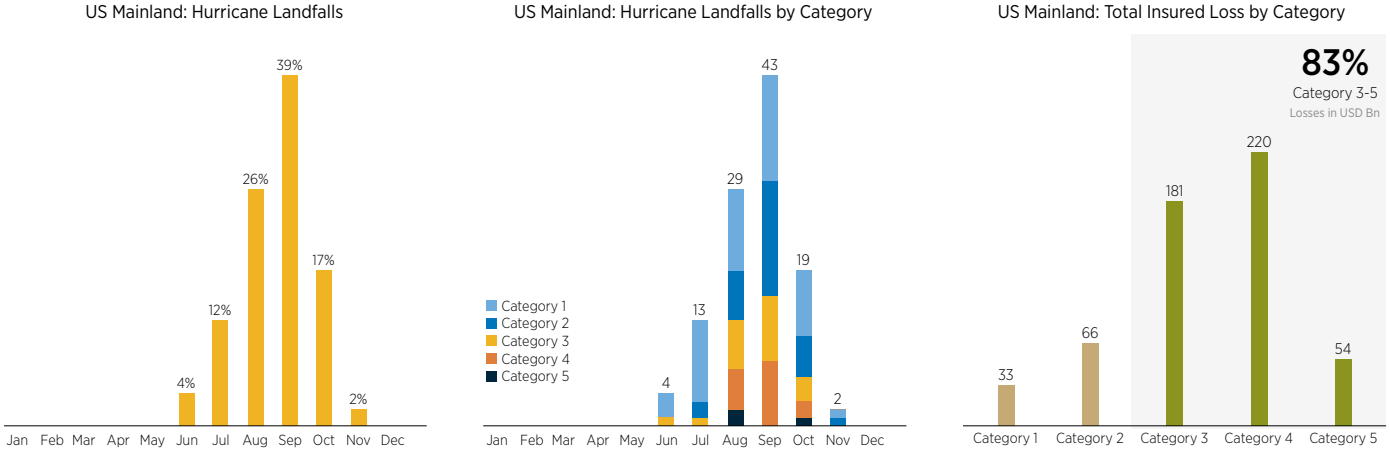


Figure 7: Atlantic Ocean monthly hurricane statistics and insured loss by category since 1950 | **Storm Data:** NOAA | **Loss Data, Graphic, Analysis:** Gallagher Re

SPECIAL FOCUS

Huricane Helene

Hurricane Helene's landfall in Florida's Big Bend region, and subsequent catastrophic impacts into southern Appalachia, resulted in not only the costliest storm of the 2024 Atlantic hurricane season through Q3, but also marked the deadliest US mainland storm since Hurricane Katrina in 2005. Helene came ashore as a Category 4 storm with 140 mph (225 kph) winds in sparsely populated Taylor County, Florida on September 26. Public and private insured losses were initially projected to eventually settle in the range of USD10 billion to USD15 billion. This included damage costs incurred by the private insurance market and publicly run insurance entities such as the National Flood Insurance Program (NFIP) and the USDA Risk Management Agency's crop insurance program. The overall direct economic impact, which includes direct physical damage and net-loss business interruption, was minimally estimated at USD35 billion. These estimates were subject to change as further assessments and claims filings occurred, which was expected to extend for months (if not longer.)

The quantification of Helene's direct financial impact will take a lengthier time than normal to determine. The storm's substantial swath of impacts spread from the Florida Peninsula into Appalachia. While the storm had an expansive wind field with hurricane force winds extending at least 60 miles (95 kilometers) and tropical storm-force winds extending at least 345 miles (555 kilometers) from the center at landfall, there were limited reports of complete destruction from the winds themselves. Helene's fast forward motion, however, meant that higher wind gusts were recorded well into Georgia that resulted in extensive tree damage onto properties.

The water-related impacts from Helene were catastrophic. Initially, the storm's broad wind field expanded the storm surge inundation potential into Florida's Gulf Coast. Record-setting inundation heights were recorded in the Tampa Bay area, Sarasota, and near the landfall point in the Big Bend. Water heights topped 15 feet (4.5 meters) in the Big Bend. Inundation levels at various locations in the Tampa Bay area surpassed previous modern records set during the March 1993 "No Name Storm", Hurricane Idalia (2023), and Hurricane Elena (1985) to become the region's new benchmark for surge events. The Tampa area has long been a concern for this risk, as the shallow / gradual extension of the continental shelf to the coastline makes the region one of the most vulnerable in the world for storm surge. Despite Helene's significant scope of damage in this area, it is important to remind that it was far from a worst-case scenario.

The most considerable damage and humanitarian impacts were spawned by an unprecedented volume of rainfall and inland flooding that devastated parts of the Southeast and Appalachia. Rainfall totals measured more than a 1-in-1,000-year return period, or a 0.1% chance of occurrence in any given year, in the hardest-hit parts of North Carolina, Tennessee, and Virginia. The scale of flooding prompted a federal response, and several mountain towns were isolated and largely destroyed. The rebuild in some communities was expected to take more than a full calendar year. Maximum rainfall totals in the hardest hit locations topped 30 inches (760 millimeters) in less than three days' time. Hundreds of people were killed, and most of Helene's fatalities were due to flooding.

Adding to the recovery challenge will be that inland counties with some of the worst flood damage had NFIP take-up rates of less than 2%. This means a sizeable portion of residential and commercial damage was expected to be uninsured. There was also substantial damage to critical agriculture and crop yields throughout the Southeast that will further add to damage totals. Helene became the latest example that while a storm's wind intensity is very important, it is often not the primary risk. The continued influence of climate change will only further enhance the water-related and inland risks from tropical cyclones in the future.

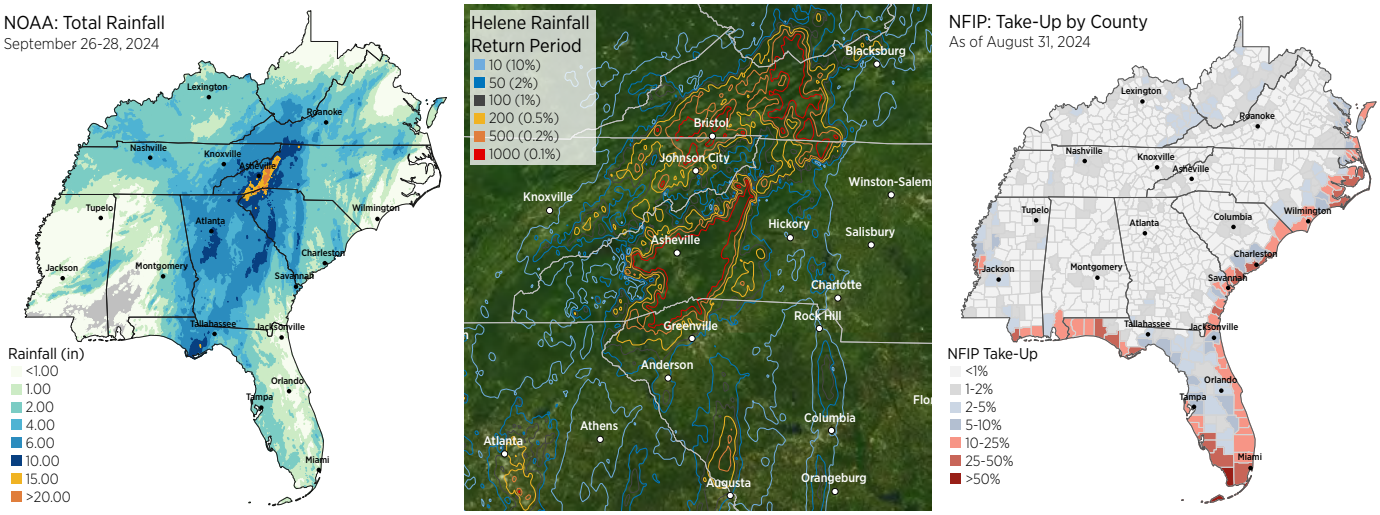


Figure 8: Helene total rainfall (left), rainfall return period (middle), NFIP county-level take-up (right) | **Data:** NOAA & US Census Bureau | **Graphic & Analysis:** Gallagher Re

Weather / Climate Review

Weather / Climate Review

NOAA & Copernicus: 2024 On Pace to Become Warmest Year on Record

Global land and ocean temperatures continued to stay on a record pace during the third quarter of 2024. Data from Copernicus indicated that the first nine months of 2024 represented the warmest January-September period in the Copernicus record: 0.71°C / 1.27°F above the 20th Century average. When compared to the Pre-Industrial Baseline (1850–1900), which is the key baseline adopted to show progress against global climate goals by the 2016 Paris Agreement, the anomaly was 1.58°C / 2.84°F. While this does not indicate a new normal, there is an 80% chance that the pre-industrial level will be breached every one in five years, and a 47% chance that the 2024–2028 five-year mean will exceed this threshold.

One record which did come to an end was a run of 15 consecutive months of record-setting temperatures. This was the longest such streak in recorded history which ran from April 2023 through June 2024. The table below shows how anomalous 2024 has been from a land and ocean temperature perspective. Note that all 10 of the warmest years since 1850 have each occurred in the past decade.

The warm surface temperatures align with mean atmospheric carbon dioxide levels measured at the Mauna Loa Observatory in Hawaii. The readings show a continued increase in carbon dioxide atmospheric concentration levels has been consistently ranging between 420 and 425 parts per million in 2024. The ongoing rise further highlights the gap between current existing international federal policies to limit further emissions and what has been explicitly deemed necessary to flatten or cause a decline in annual carbon emissions.

Both NOAA and Copernicus have communicated that 2024 is on pace to be the warmest year in the official record dating back to the mid-19th century. This is particularly significant since 2024 has been a transition away from an El Niño towards an emerging La Niña. Global temperatures tend to be warmer during an El Niño since the Pacific Ocean, which is the world's largest body of water, is anomalously warm during such a cycle. The fact that non-El Niño years are continually reaching new temperature heights within the official observational record book is another example of how anthropogenic fueled warming due to rising carbon dioxide emissions is amplifying how much the world is warming. However, global temperature anomalies are expected to modestly decline as the transition to La Niña occurs during the rest of the calendar year. This should mean a cooler start to 2025.

Please note that NOAA's NCEI data servers were knocked offline following Hurricane Helene. The NCEI is based in Asheville, North Carolina, a city which endured catastrophic damage. For this report, Copernicus has been used instead of NOAA given the lack of data availability as of this writing.

Rank	Year	1991-2020 Baseline	Pre-Industrial Baseline
1	2024	0.71°C / 1.27°F	1.58°C / 2.84°F
2	2023	0.52°C / 0.93°F	1.40°C / 2.51°F
3	2016	0.46°C / 0.84°F	1.34°C / 2.42°F
4	2020	0.45°C / 0.81°F	1.33°C / 2.39°F
5	2019	0.38°C / 0.68°F	1.26°C / 2.26°F
6	2017	0.35°C / 0.63°F	1.23°C / 2.21°F
7	2022	0.31°C / 0.56°F	1.19°C / 2.14°F
8	2018	0.25°C / 0.45°F	1.13°C / 2.03°F
9	2021	0.25°C / 0.44°F	1.12°C / 2.02°F
10	2015	0.19°C / 0.34°F	1.07°C / 1.92°F

Table 3: Top 10 warmest Q1–Q3 global land and ocean temperature anomalies
Data: Copernicus (Dataset: 1940–2024)

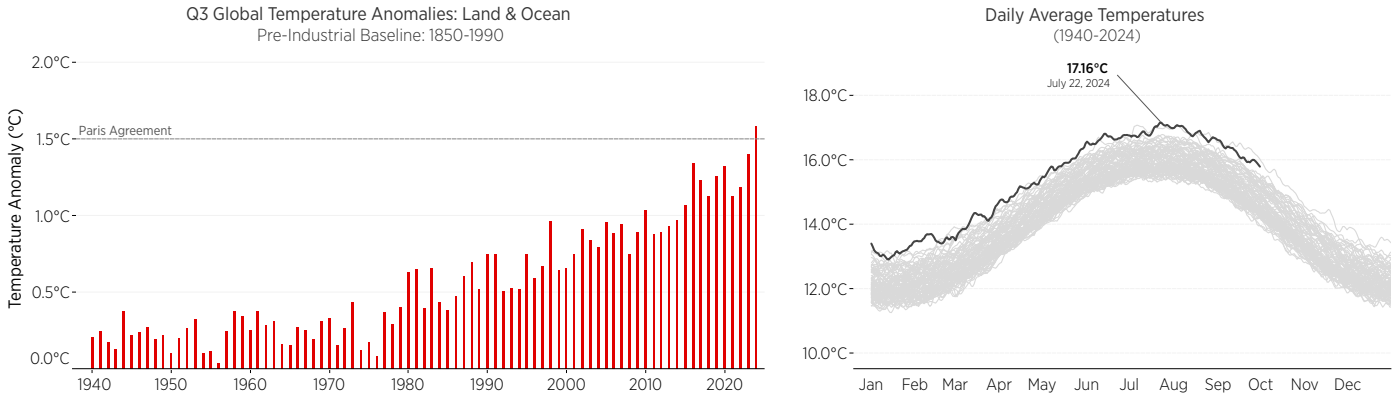


Figure 9: Q3 global land and ocean temperature anomalies (left), and daily average temperatures (right) | **Data:** Copernicus (ERA5) | **Graphic & Analysis:** Gallagher Re

During the third quarter (July–September), there were notable heatwaves observed in parts of the western United States, the Balkans and Italy (Europe), and Japan and South Korea (Asia). Multiple countries set a record for their hottest summer months. Most parts of the globe were above normal except for the eastern US, northwestern Europe, far eastern Russia, Kazakhstan, parts of South America, and the Sahel. The ERA5 dataset from Copernicus recorded a new daily global temperature high at 17.16°C (62.9°F) on July 22.

Among the most significant heatwaves of the Northern Hemisphere summer occurred in southern and eastern Europe. Parts of Italy and the Balkans saw temperatures exceed 40°C (104°F). The intense heat caused wildfires to rapidly spread in North Macedonia and Rusanda Lake in Serbia to dry up. The air temperature at the summit of Mont Blanc (the tallest mountain in western Europe) remained above freezing for an unprecedented 33 hours on August 10–11.

In central and eastern Asia, warm temperature anomalies were observed in the Himalayas, central China, South Korea, and Japan. It was the hottest July in Japan in at least 126 years. The pattern was enhanced by a strong, stationary ridge of high pressure that ushered warm, humid air into the country. The event resulted in an enormous influx of hospitalizations that prompted the Japanese Association for Acute Medicine to add a fourth category to its three-level classification of heatstroke index. Tokyo would later record its latest calendar day with the daytime temperature exceeding 35°C (95°F) on September 18. The mercury in South Korea topped 40°C (104°F) on August 4, the first time since 2018. It was also the country's longest stretch of tropical nights on record, averaging 20.2 days for the June to August period. Seoul experienced 39 consecutive tropical nights, far surpassing the previous 26 nights record. The phenomenon of "tropical nights" is a concept of warm nights when the temperature does not fall below 25°C (77°C). China recorded its warmest July–September period, despite a wet monsoon and plum rain season. Hong Kong saw the launch of the first heatwave parametric insurance this year.

Elsewhere, the US experienced its 4th warmest meteorological summer on record (June–August) with episodes of anomalous heat focused in the Southwest and Southeast. In Phoenix, temperatures reached 100°F (38°C) for a record 113 consecutive days between May–September. The city likewise set new daily warm records each day during the last seven days of September. Australia experienced its warmest August since 1910, with records seen in New South Wales, Victoria, Tasmania, Queensland, and South Australia. Western Australia had its warmest winter on record.

There were some events with anomalous cold. This was most obvious in the Southern Hemisphere during its ongoing winter months. A cold snap impacted the Patagonia region in Chile and Argentina in July, with temperatures falling as low as -15°C (5°F). This is the result of a weakened Antarctic polar vortex (band of upper-level westerly winds which circle around the pole), which allowed cold air to dive into higher latitudes. Multiple rivers in Santa Cruz, Argentina, were frozen. Elsewhere, it was also cooler for the Sahel region (Africa) due to above-normal rainfall, particularly in mid-August. In northwest Europe, a dip in the jet stream dropped south of the United Kingdom during early July and brought periods of cool and unsettled weather. It was the coldest summer for Britain since 2015, according to the UK Met Office.

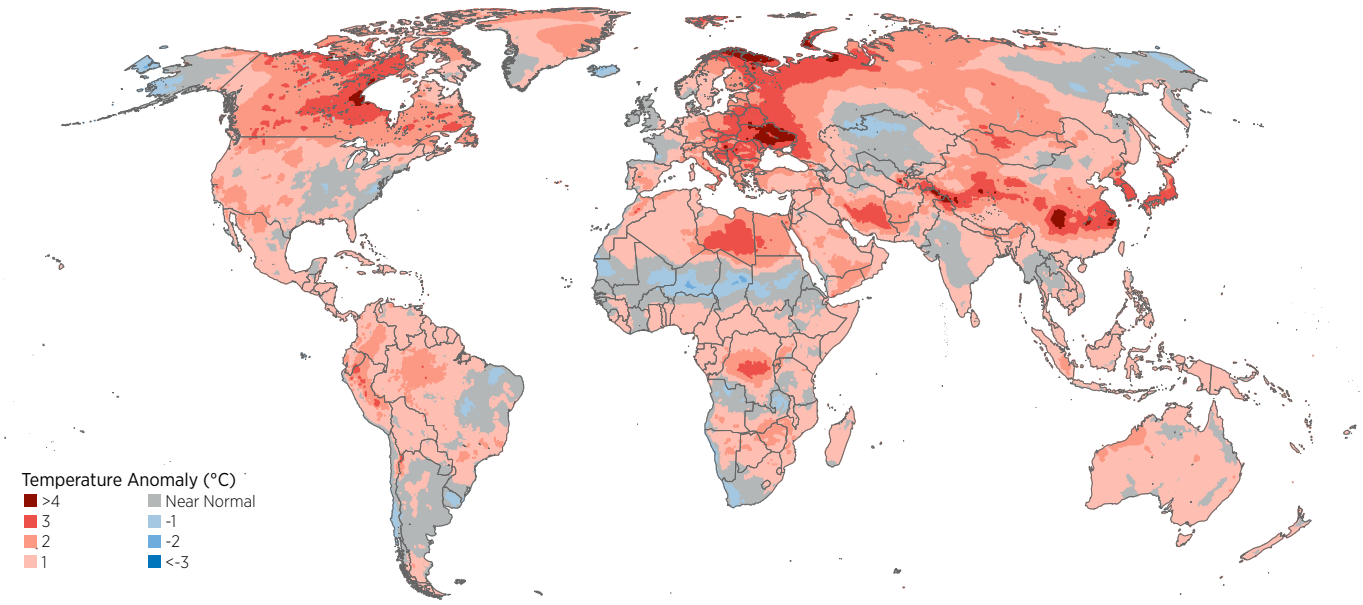


Figure 10: Q3 2024 global temperature anomalies compared to the 1991–2020 climatological normal | **Data:** Copernicus (ERA5) | **Graphic:** Gallagher Re

From a precipitation perspective, Q3 2024 featured a striking dichotomy of areas experiencing anomalous rain and extreme drought. As highlighted earlier in this report, parts of North Africa endured record-setting precipitation and subsequent flooding as the seasonal West African Monsoon shifted a bit further north than historically seen which also influenced behavior of the Atlantic hurricane season. This prompted considerable flooding in several African countries with more than 4.4 million people directly affected or displaced from their homes. Mali alone experienced its wettest July to September period since at least 1967. Conversely in Africa, severe drought conditions affected much of southern Africa that triggered multiple drought-related parametric insurance payouts through the African Risk Capacity (ARC) risk pool to countries such as Zambia, Botswana, and Malawi.

In the US, heavy rains associated with the landfalls and remnants of hurricanes Beryl, Debby, and Helene brought considerable flooding to parts of Texas, the Southeast, and Appalachia. The rains from Helene's remnants were preceded by days of heavy rains spawned by associated tropical moisture interacting with a stalled frontal boundary well ahead Helene's landfall. Parts of the Southwest were much drier than normal as well-above average temperatures persisted.

Elsewhere in the Americas, Brazil continued to endure a widespread and record-breaking hydrological drought with rivers falling below the critical levels required for movement of goods. Further impacts were expected as La Niña conditions evolve in the months ahead. Ecuador is similarly facing its worst drought in 61 years. The hydropower-dependent country announced power cuts across half of its province during the last week of September. Millions of acres (hectares) of forest and farmland in South America were further consumed in wildfires. Parts of the Amazon and Pantanal Wetlands cited their worst wildfires in nearly two decades.

In Europe, the most significant event was Storm Boris which spawned exceptional rainfall to central Europe in September. Some countries experienced higher rainfall levels than historically significant recent events in 1997, 2002, and 2013. The investment in flood protection measures in some areas, especially in Prague, Czechia, helped to dramatically mitigate against impacts that helped to reduce a worst-case damage loss. Areas without flood protection suffered heavy damage.

Shifting to Asia, the passage of tropical cyclones, in particular typhoons Yagi and Gaemi, enhanced the southwest monsoon over the Philippines. Yagi's impacts in particular led to catastrophic flood damage in many countries, most notably in northern Vietnam, northern Laos, northern Thailand, and Myanmar. Elsewhere in China, an active rainy season across the north sparked widespread and considerable flooding in parts of Shandong, Jilin, and Liaoning provinces. Seasonal flooding also swelled rivers in North Korea and in Japan's Akita and Yamagata prefectures in late July. Parts of south Asia further endured major flooding. Pakistan recorded its second-wettest August on record (second only to 2022). India noted its wettest July and August stretch in 30 years, but the overall monsoonal rainfall (108%) remained below 2019 levels (110%).

Unseasonable rain in northwestern Australia during September resulted in record daily totals in many rural areas. Darwin Airport recorded its fourth-highest daily rainfall for September, and the highest since 1981. Drought conditions had largely waned in Australia, though some rain deficiencies persisted.

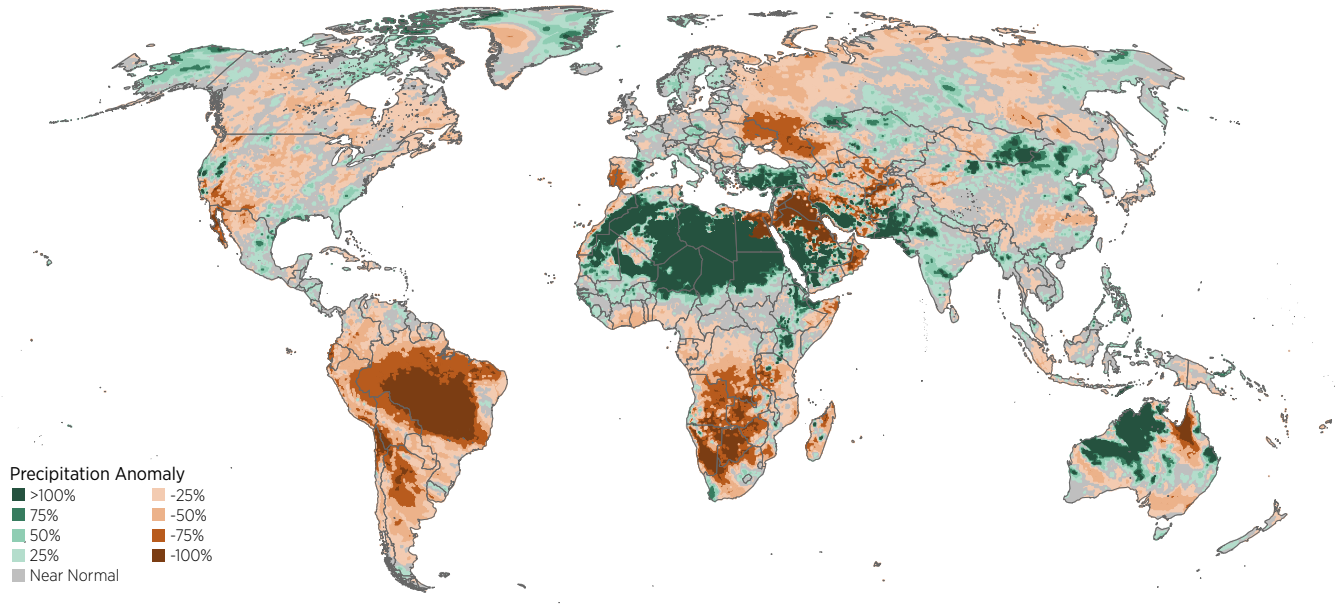


Figure 11: Q3 2024 global precipitation anomalies compared to the 1991–2020 climatological normal | **Data:** Copernicus (ERA5) | **Graphic:** Gallagher Re

Major Event Review

Major Event Review

Update: US Severe Convective Storms

Severe convective storm (SCS) losses in the US continued to drive a significant portion of global insured losses through Q3. While there was continued activity from July to September, the overall annual losses remained primarily driven by activity during the first half of the year. Loss development played a further role in overall loss totals rising to USD51 billion for the year; marking the second-costliest year on record for the peril in the US, only behind 2023.

US SCS accounted for 47% of global insured losses during the first nine months of 2024.

Even more remarkable, when combining insured US SCS losses, FY 2023 and YTD 2024, we have officially topped USD114 billion. This is a staggering sum, and the costliest two-year stretch ever recorded for the peril. For context, this threshold has only been breached twice on the US mainland for the tropical cyclone peril (2004/2005: USD179 billion and 2020/2021: USD105 billion). The hail sub-peril continues to drive a sizeable portion of thunderstorm-related losses for insurers on an annual basis.

- Preliminary US SCS Economic Loss: USD64 billion
- Preliminary US SCS Insured Loss: USD51 billion
- Second-costliest Q1–Q3 total on record behind 2023 (USD59 billion); third was 2020 (USD40 billion)
- US: 15 individual billion-dollar insured SCS loss events YTD; two individual events reached the USD5 billion mark
- US YTD: More than 1,660 reported tornadoes; nearly 1,500 confirmed, including 38 rated EF3 (34) or EF4 (4)

There remains a major emphasis on US SCS activity as it continues to bring significant challenges to primary insurance carriers, with losses staying highly elevated. With the reduction in aggregate coverage availability from reinsurance, or the high cost to obtain such coverage, this has resulted in increased direct loss costs for insurers that have eroded underwriting performance and quarterly earnings. The drivers for these increased losses include inflation; the rising costs of supplies and repairs; expanding urban footprints in SCS prone regions; and aging US housing stock. While there are currently limited signals in overall increased SCS frequency or intensity, future climate scenarios depict spatial and/or temporal shifts in activity. Most notable is a southward and eastward shift in SCS activity, an anticipated earlier start to the season, and an increasing trend in the number of days with conditions favorable for SCS outbreaks.

Through Q3 economic losses were tentatively tallied to at least USD64 billion with insurers covering USD51 billion of the total. 2024 already ranks as the second costliest insured SCS year on record, behind 2023 (USD63 billion) and followed by 2020 (USD45 billion). Of the 15 billion-dollar-plus insured SCS loss, 11 saw multi-billion-dollar industry loss totals (USD2+ billion). Further loss progression will continue in the months ahead.

The period from July to September was not highly active, but it did feature several notable events. A multi-day mid-July SCS outbreak encompassed rounds of impactful storms which traversed the periphery of a large heat dome and generated costly damage in the Midwest and Northeast. This included at least two separate derecho (long-lived windstorm) events. The July 15 derecho generated at least 32 confirmed tornadoes in the Chicago region, a daily record for the NWS Chicago office.

WHAT IT MEANS

As is now widely known and accepted, the insured costs associated with the US SCS peril have continued to drive a greater portion of annual losses in recent years. This is putting tremendous strain on national and regional primary insurance carriers who are increasingly forced to absorb most, if not all, of their claims payouts given a very small portion of losses being ceded to reinsurance. Higher reinsurance premium costs to obtain aggregate covers mean insurers pay more for the same or less coverage. As primary insurer losses rise and quarterly earnings are impacted, this is now leading to higher premiums being felt by residential policyholders. These higher reinsurance costs are driving the bulk of premium rate rises.

Canada: Record-Setting Year for Natural Catastrophe Insured Losses

The Canadian insurance market dealt with a significant series of natural catastrophe events in the third quarter which has resulted in the most expensive year on record for the nation's insurers. The aggregate cost from a relentless series of thunderstorms, floods, and wildfires also included a record number of filed insurance claims in July and August, per the Insurance Bureau of Canda (IBC). The most notable events comprised of multiple rounds of flooding in southern Ontario (especially in the greater Toronto metro region), extensive damage in Alberta from the Jasper Wildfire Complex, a historically expensive August hailstorm in Calgary (Alberta), and historic rainfall and flooding in southern Quebec (notably around Montreal) that was aided by the remnants of Hurricane Debby.

- Through Q3 2024: Insured losses exceeded USD6 billion, the costliest year on record for Canadian insurers
- Four individual billion-dollar-plus economic loss events in 2024; of which two were billion-dollar-plus insured events
- August 5: Calgary hailstorm became the country's costliest insured SCS event on record (USD2.2 billion)
- Torrential rains aided by the remnants of Hurricane Debby resulted in economic losses nearing USD4 billion in the greater Montreal area alone
- Jasper Wildfire Complex was the most expensive fire for Alberta since the Slave Lake Fire in 2011

Toronto Floods

Multiple rounds of intense thunderstorm complexes brought torrential rainfall to urbanized regions in and near the greater Toronto metro region in mid-July. This resulted in thousands of properties being inundated. Further losses were likewise incurred to infrastructure and agriculture. In total, insured losses from the floods reached USD700 million. Later in the summer, renewed flooding returned as a slow-moving low-pressure system brought heavy rainfall and severe storms to southern Ontario. Losses were enhanced by hail and tornadic winds. A tornado in Ayr (Ontario) on August 17 damaged multiple residential and commercial properties. On the same day, Toronto's Pearson Airport measured 128.3 millimeters (5.05 inches) of rain.

Overall, Toronto's Pearson Airport registered a record 511 millimeters (20.1 inches) of rain from June to August. This surpassed the previous record of 396 millimeters (15.6 inches) set in 2008. Records for the airport extend back through 1938.

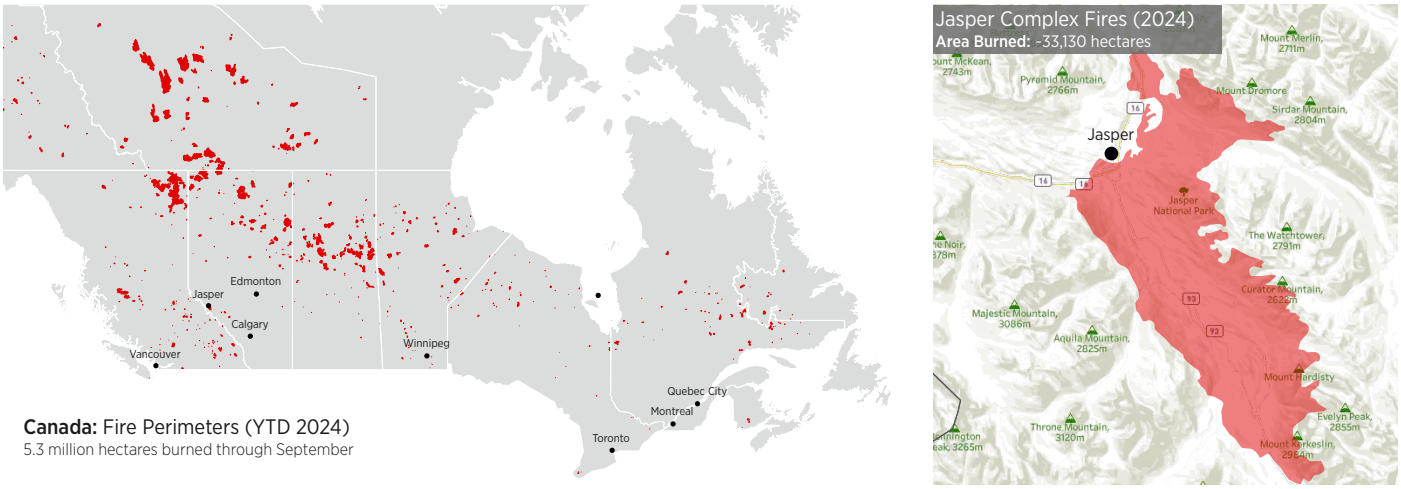


Figure 12: Canada YTD wildfire perimeters (left) and Jasper Wildfire Complex (right) | **Data:** CWFIS / Parks Canada | **Graphic:** Gallagher Re

Jasper Wildfire

A pair of merging wildfires fueled by anomalous summer warmth in tandem with dry and windy conditions impacted several hundred properties in Alberta's Jasper National Park and the neighboring Jasper Townsite on July 24–25. Damage surveys indicated that 358 homes and businesses in the townsite were burned, accounting for approximately one-third of the total structures. The fire complex became the province's most expensive fire event since 2011's Slave Lake Fire.

The Canada wildfire peril has been an increasing cost driver for the local market in recent years. The record-breaking extent of the wildfire season in 2023 resulted in annual aggregate insured losses that topped USD900 million. In 2021, a wildfire likewise burned the small town of Lytton in British Columbia amid a prolonged heatwave. Alberta had similarly been impacted by some of Canada's costliest wildfires on record, including the 2016 Fort McMurray fire which resulted in USD3.8 billion in insured loss (losses are in today's dollars). This remains the costliest loss event for the Canadian market.

Calgary Hail

A pair of prolific hailstorms left a wide swath of substantial property damage to northern and extreme southern sections of the greater Calgary (Alberta) metro region on August 5. The swaths included hailstones registered at golf-ball sized or greater. The largest hail exceeded the size of a baseball 2.75 inches / 7.0 centimeters. The combination of large hail and strong winds resulted in significant property damage to homes, businesses, and vehicles across heavily populated regions. Specific types of damage included shredded siding, dented roofs on properties and vehicles, broken windows and windshields, and impacted vegetation. The roof at the Calgary Airport was likewise damaged. Tens of thousands of structures saw impacts. This event now ranks as the costliest SCS event on record for the Canadian market, with estimated insured losses reaching USD2.2 billion. The previous record was caused by a hailstorm which struck northeast Calgary in June 2020 and left insured losses nearing USD1.2 billion (today's dollars).

Central Alberta (including Calgary) is a high-risk region for the thunderstorm peril and regularly experiences large hail events. Calgary, Red Deer, and Edmonton are highly exposed regions to this risk. Hailstorms in this region are locally enhanced by favorable topography on the lee side of the Rocky Mountains in tandem with lowered freezing levels which allow larger hail to reach the surface. It has the same thunderstorm risk profile as seen in Denver, Colorado (US).

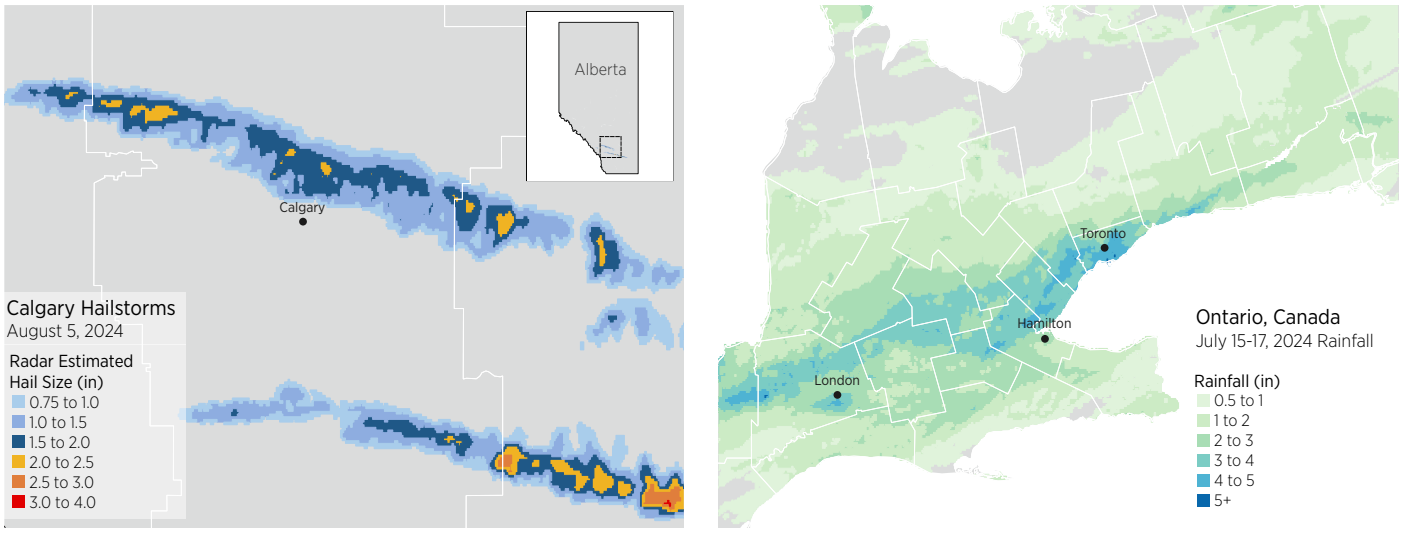


Figure 13: Calgary August 5 hail swath (right) and radar estimated rainfall July 15–17 (UTC) across southern Ontario (left) | **Data:** NSSL / MRMS | **Graphic:** Gallagher Re

Quebec Flooding / Remnants of Hurricane Debby

The interaction of the remnants of Hurricane Debby (which surged northward after initially coming ashore in Florida's Big Bend region) with a large trough aided in prolific rainfall across parts of southeastern Canada on August 9–10. The most considerable damage from flooding was recorded in Quebec. An all-time daily rainfall record was broken in Montreal (Dorval) where 154 millimeters (6.1 inches) was measured. The greatest impacts spanned between the Ottawa (Ontario) and Quebec City corridor, including Montreal. Multiple municipalities in Quebec declared states of emergency as thousands of properties were flooded in tandem with significance damage to roads and infrastructure. The volume of water likewise overwhelmed older infrastructure.

Insured losses from the floods were on pace to exceed USD1.9 billion. This would rank as the second costliest flood or tropical cyclone related event for Canada, following the 2013 Calgary Floods which saw the Bow and Elbow rivers overflow.

As the climate continues to warm, Canada is expected to endure a higher frequency of extreme rainfall and flooding events. This concurrently increases the risk of impactful and costly flash-flooding and urban flooding which puts lives, property, and public infrastructure at risk. Increased investment and proactive measures continue to be necessary to mitigate the amplified flood risk in today's climate.

WHAT IT MEANS

Canada has already endured their costliest year on record for the country's insurance market in just the first nine months of 2024. The minimum USD6 billion in estimated insured losses exceeds the previous annual record of USD5.3 billion set in 2016 (today's dollars). The 2016 total was driven primarily by the devastating Fort McMurray wildfire. As insured losses due to weather and climate disasters continue to climb, government and private entities are compelled to further collaborate on building resilient communities which can more readily adapt to the changing climate. It will also force more discussions between reinsurers and primary carriers to better account for growing hazard risks across the country.

Central / Eastern Europe Flooding

A nearly stationary low-pressure system generated incessant rainfall across central Eastern Europe primarily from September 12–19 which resulted in life-threatening and costly flooding across Poland, the Czech Republic, Slovakia, Austria, Hungary, Slovenia, Romania, Italy, and surrounding countries.

- Preliminary view: Insured losses were expected to range between EUR2 billion to 3 billion (USD2.2 to 3.3 billion)
- The overall economic loss was expected to exceed USD20 billion, ranking among the costliest weather / climate events on record for this part of the European continent
- The hardest-hit regions recorded two to five times above their September monthly average rainfall
- Recent investments in flood defenses were critical in mitigating some losses, especially in major cities

The primary area of low pressure which caused the deluge was given the international name “Boris”, while it was also named “Anett” in other territories. The system prompted prolific rainfall, with event totals in some of the hardest-hit regions exceeding 300 to 400 millimeters (12 to 16 inches). This was a well-forecast event by numerical weather prediction models, and the public warnings issued by meteorologists and local officials well in advance likely aided in limiting the death toll.

More than 1,300 instances of damage or direct impacts from heavy rain was reported via the European Severe Weather Database (ESWD). Thousands of homes and businesses were inundated along with vehicles and agribusiness operations. Multiple weather stations across central and eastern Europe set new daily rainfall records during the event, and numerous streams throughout the region burst their banks. Several localities in the Alps saw their earliest snowfall on record.

Thunderstorms and corresponding flooding that was enhanced by the remnants of Boris would later bring major impacts to northern Italy. The Emilia-Romagna region, which saw catastrophic flooding in May 2023, was particularly hard-hit. Beyond the property damage, at least 24 people died.

The slow moving or “cut-off” storm system was fueled by an amplified upper-level weather pattern and warm / moist Mediterranean air. While no two flood events are alike, the broad scale weather pattern during this event was like several of Central Europe’s most notorious flooding episodes such as 2013, 2002, and 1997. All were the result of a “Genoa Low”, a named based on their origin near the Gulf of Genoa. A Genoa Low was also to blame for flooding that left extensive damage in southern Germany in late May and early June 2024. That event prompted insured losses exceeding USD2 billion.

In recent years, improved public awareness, increased warning times, and flood defense systems have aided in reducing both injuries and industry losses. Flood protection had largely evolved as a direct response to the major events in 1997, 2002, and 2013, with large cities being the best protected. Recent flooding highlighted the increasing need for additional funding and protection, especially across less populated towns and communities that incurred significant damage in Q3.

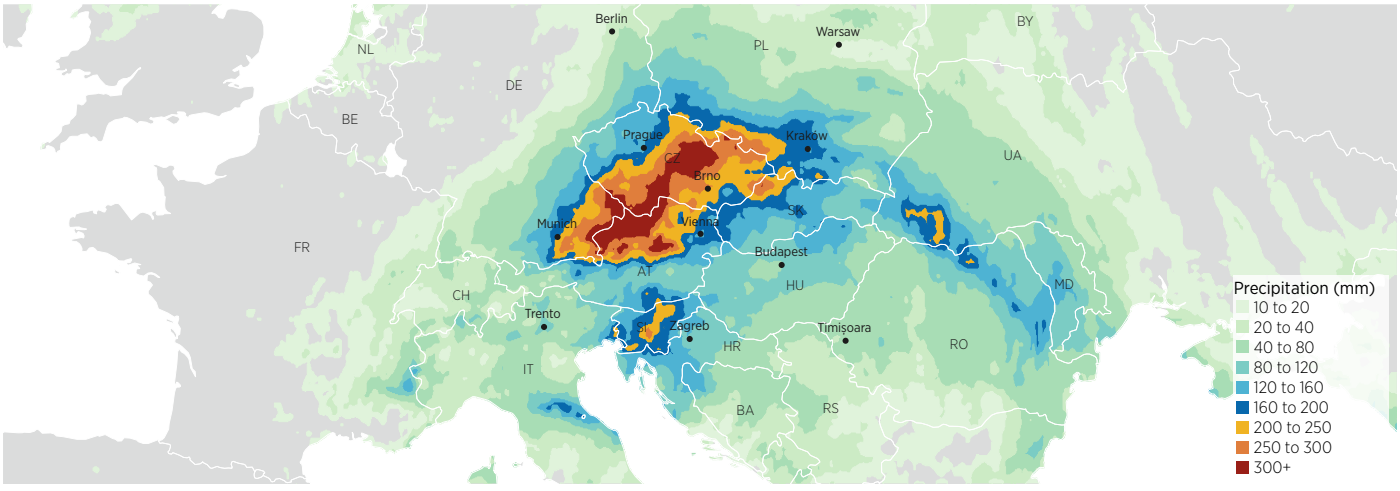


Figure 14: Satellite estimated precipitation (mm) from September 11–19, 2024 | **Data:** NASA / GPM | **Graphic:** Gallagher Re

Seasonal Monsoon Rainfall Brings Flooding in Asia

Seasonal monsoon rainfall prompted flooding across parts of Asia during the third quarter of the year. Flooding induced by the seasonal Baiu front (defined as a prolonged seasonal frontal boundary associated with monsoonal rains in the western Pacific Ocean) and other seasonal summer monsoon patterns were severe and costly in several countries.

- China: Economic loss cost from seasonal floods crossed the USD20 billion threshold; highest since 2021
- India: The city of Mumbai issued multiple red alerts for heavy rain with July ending as the second wettest ever recorded (1,408 millimeters / 55.43 inches)
- Bangladesh: August floods destroyed 26,991 homes and further damaged another 334,434
- Japan: July rainfall led to a 1-in-100 year flood (1% chance of occurring in any year) for much of Yamagata Prefecture
- Thailand: August rainfall prompted some of the most severe flooding in parts of the country in 80 years

China's Yangtze River recorded two significant flooding instances during the month of July. Parts of northeast China, which is an important agricultural region, saw above-average seasonal rainfall. Liaoning Province noted its single wettest day since at least 1951 after 528 millimeters (20.78 inches) of rain fell in Huludao on August 24. The summertime rains and monsoon were enhanced by lingering El Niño conditions. Such conditions often enhance the flood risk in the Yangtze River Basin and Jiangnan region, including historic years such as 1998 and 2016.

The Indian Meteorological Department issued two red alerts for the city of Mumbai in July and one in September. The rain gage at the Santacruz Observatory in Mumbai recorded its third highest 24-hour rainfall of 268 millimeters (10.6 inches) on July 8. Floods were also rampant in the states of Andhra Pradesh, Assam, Telangana, and Tripura. A series of fatal landslides further occurred in Wayanad, Kerala; killing more than 350.

Much of eastern Bangladesh was impacted by widespread floods in late August. This ranked as the worst floods for the region in 34 years. More than 500,000 people were displaced. A 2023 study by the Grantham Research Institute on Climate Change put Bangladesh at the top spot for fluvial (river) flood risk. The delay of the seasonal summer monsoon withdrawal further heightened this risk for Bangladesh and other South Asian countries. Nearby Nepal grappled with deadly floods towards the end of September. At least 245 people were left dead or missing in a deluge that left many neighborhoods and infrastructure underwater near the capital of Kathmandu. Rainfall totals up to 322 millimeters (12.67 inches) was recorded on September 28–29 alone; highest since 2002.

The seasonal Baiu front affected South Korea and Japan in late July. In South Korea's Seoul, heavy rains affected the city and elsewhere in Gyeonggi province in mid-July. The front extended from the Sea of Japan into northern Japan on July 25 which prompted extensive flooding in parts of Akita and Yamagata prefectures. The Mogami River (Tozawa Village), Hyuga River (Sakata City), and Sake River (Sakegawa Village) all overflowed their banks. Parts of Tozawa Village and Shinjo City saw flood depth above 5 meters (16.4 feet). On the Noto Peninsula, a record 540 millimeters (21 inches) of rain fell in 72 hours in September. Hourly rainfall totals in Wajima and Suzu topped 121 millimeters (4.8 inches) and 84.5 millimeters (3.3 inches) respectively. Both cities were previously damaged during the January 1 earthquake. Temporary housing complexes were inundated, with some residents forced to move back into evacuation centers.

In Thailand, August seasonal rains triggered a deadly landslide on the popular resort island of Phuket. The northern provinces were similarly affected, with the Thai Chamber of Commerce (TCC) estimating flood losses around THB8 billion (USD210 million). The remnants of Typhoon Yagi would later bring renewed catastrophic flooding to many parts of the region in September.

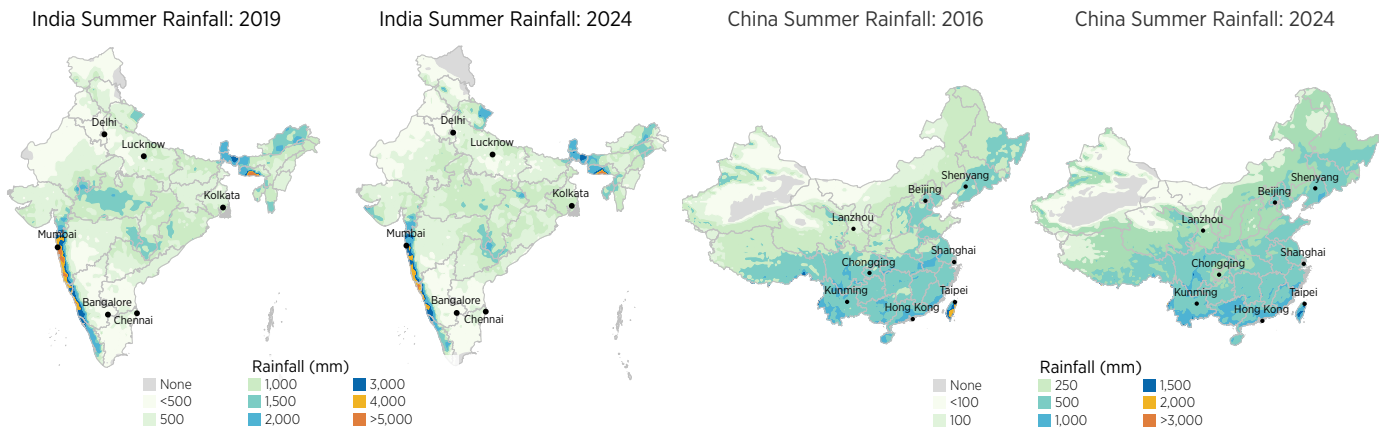


Figure 15: Rainfall (mm) during the monsoonal summer months in India (2019 vs 2024) and China (2016 vs 2024) | **Data:** ERA5 | **Graphic:** Gallagher Re

Update: Western North Pacific Typhoon Season

After a very quiet start to the 2024 Western Pacific Ocean typhoon season, activity picked up during Q3. This included storms Yagi, Gaemi, Shanshan, and Bebinca which proved very impactful for several cities across Asia. The season is now running near average for the number of storms.

- The combined economic toll of landfalling East Asia typhoons was listed beyond USD20 billion in Q3
- Wind and flood-related impacts from Typhoon Yagi in Vietnam resulted in an economic cost of USD3.3 billion; the costliest weather event in the country's history
- Typhoon Bebinca became the strongest typhoon to make landfall in Shanghai, the commercial center of China, since reliable records started in 1949
- Typhoons Yagi, Gaemi, and Shanshan left devastating flood impacts in parts of the Philippines, Vietnam, China, Thailand, Myanmar, Taiwan, North Korea, and Japan

Typhoon Yagi (East / Southeast Asia)

Typhoon Yagi, which has thus far been the second strongest tropical cyclone globally in 2024 (only behind Hurricane Beryl), left catastrophic impacts in multiple countries. The storm became only one of four known Category 5-equivalent tropical cyclones in the South China Sea: Pamela (1954), Rammasun (2014), and Rai (2021). It became China's strongest landfalling autumn season typhoon, Hainan's costliest typhoon on record, and Vietnam's most intense typhoon in at least 30 years.

Warm sea surface temperatures, coupled by moisture transport from low vortex systems in the Bay of Bengal and on the sea surface south of Japan on September 4, aided in fueling Yagi's intensity.

This track of Yagi, which differed from Rammasun (2014) since that storm only crossed the northeastern tip of China's Hainan, went directly through the provincial capital of Haikou. The storm resulted in considerable wind-related damage to property and infrastructure. As of mid-September, more than 92,000 insurance claims had been filed with an expected loss of USD500 million. These totals were expected to further rise. Most of these losses were likely to be absorbed by primary insurers and not ceded to reinsurance.

Yagi later brought widespread devastation to northern Vietnam. Along with flooding and landslides, the typhoon left 329 people dead or missing, and 1,929 people injured. It destroyed or damaged 257,000 houses, 1,300 schools and submerged 650,000 acres (262,000 hectares) of crops. Many commercial companies and their facilities were either directly damaged or shut down due to other regional impacts. The Red River in Hanoi, Vietnam's capital, swelled to 11.37 meters (37.3 feet), the highest level since 2004. Districts in Hoan Kiem, Tay Ho, Ba Dinh, and Lo Bien were heavily affected. Local authorities estimated that the total economic damage at up to USD3.3 billion and possibly depress the country's GDP growth in 2024. As of late September, the Insurance Supervision Department under the Ministry of Finance had processed more than 12,000 insurance claims.

The remnants of Yagi would later trigger regional flooding in parts of Laos, Thailand, Myanmar, and India. The Mekong River along with some of its tributaries (Luang Prabang, Vientiane, Chiang Khan, and Nongkhai) overflowed and inundated communities in low-lying areas. In Myanmar, the flood death tolls topped 300. More than 160,00 homes were damaged or destroyed. Moisture from a developing Yagi had previously led to flooding on the Philippines' Luzon, including metro Manila.

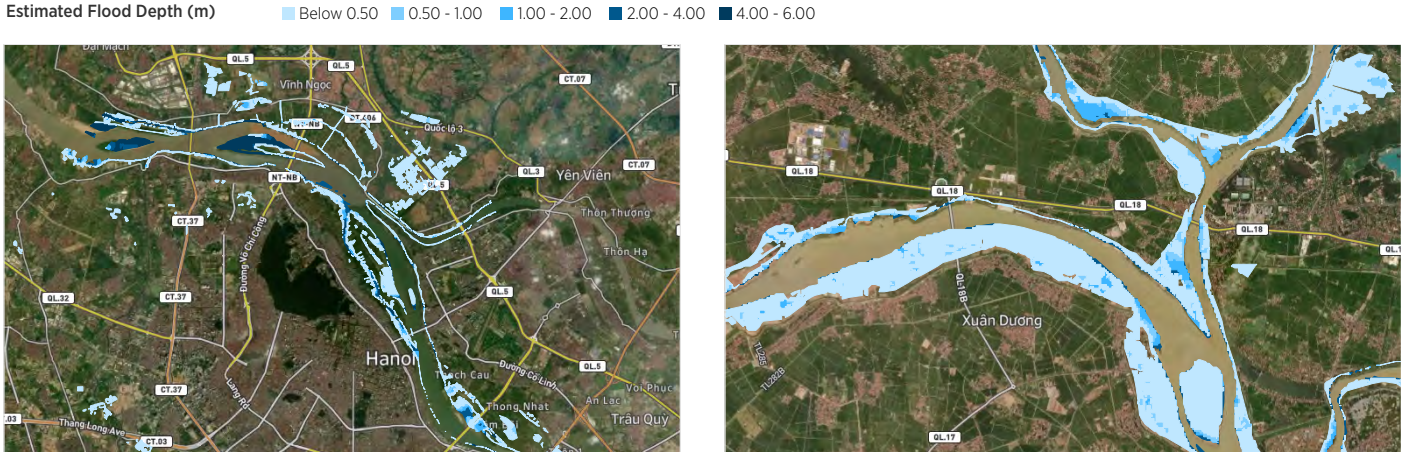


Figure 16: Estimated Flood Depths in Hanoi (left) and Hai Duong (right) following Typhoon Yagi's landfall | **Data:** Copernicus | **Graphic:** Gallagher Re

Typhoon Gaemi (East / Southeast Asia)

Unlike Typhoon Yagi, Typhoon Gaemi (Philippine name, Carina) did not make landfall in the Philippines but notably impacted the country as it enhanced the southwest monsoon and led to considerable flooding in metro Manila. Quezon City recorded 471 millimeters (18.5 inches) in 24 hours on July 24–25, which surpassed the 455 millimeters (17.9 inches) during Typhoon Ketsana in 2009. However, Ketsana brought 350 millimeters (13.8 inches) of rain in 6 hours, while Carina took nearly 18 hours. The Marikina River peaked at 20.7 meters (67.9 feet), neared the 21.5 meters (70.5 feet) record level set in 2009. Floodwaters reached up to waist- or chest- high in parts of Manila. The final agriculture damage was tallied at USD80 million, while infrastructural loss was USD97 million.

Gaemi made its first landfall in Yilan, Taiwan. With very broad circulation and accompanying cloud shield while enhancing the moisture flow, the typhoon was able to generate torrential rain hundreds of miles (kilometers) away in Kaohsiung. Its 24-hour rainfall was only behind Typhoon Herb (1996) and Morakot (2009) for wettest tropical cyclone on the island on record. Among the 3,308 flooding cases in Taiwan, 376 of them were related to buildings in Kaohsiung. More than USD110 million of crops were lost, but only a small fraction of the loss was covered by insurance. Gaemi and its remnants would later lead to an economic loss of USD2 billion on the Chinese mainland.

The remnants of Gaemi likewise resulted in catastrophic flooding and suspected casualties in North Korea. The downpours resulted in 4,100 damaged homes and inundated 7,400 acres (3,000 hectares) of farmland in Sinuiju and Uiju.

Typhoon Shanshan (Japan)

Typhoon Shanshan was a weakening system just as it came ashore on Kyushu Island in Japan. The system's rapid weakening saw its minimum central pressure rise from 935 millibars to 955 millibars in the hours before landfall near Satsumasendai in Kagoshima Prefecture. An instantaneous wind gust of 115 mph (185 kph) was recorded at Makurazaki City. Multiple tornadoes touched down in Miyazaki Prefecture, including an EF2 tornado in Sadowara town and an EF3 tornado in Saito city. This resulted in a large concentration of damaged buildings. Another characteristic of Shanshan was its slow speed while tracking over Kyushu and Shikoku, which enhanced rainfall across a wide swath of southern Japan.

Typhoon Bebinca / Tropical Storm Pulasan (China)

While affecting mainly China, Bebinca was notable for being the strongest typhoon to make landfall in Shanghai since Typhoon Gloria in 1949. Though it was only a Category 1-equivalent hurricane at landfall, it crossed through Shanghai and affected multiple major cities along the Shanghai-Nanjing railway route. Nearly 414,000 people, or 1.5 percent of Shanghai's population, were evacuated from China's largest city. As of September 18, insurers in Shanghai and Jiangsu received 109,900 claims totaling around USD188 million.

Three days later, Tropical Storm Pulasan also made landfall in Shanghai. This was the second time, after 2018, when Shanghai had more than one landfalling tropical cyclone in a single year. Rain was the bigger driver of impacts instead of wind. Pudong and Fengxian districts observed more than 300 millimeters (11.8 inches) rainfall in just six hours' time.

WHAT IT MEANS

The continued stretch of heightened weather / climate activity across Asia brings further awareness of the need to ensure greater access to insurance products and advisory to better mitigate against these growing risks. 2024 has resulted in several countries enduring economic loss costs well into the billions (USD) with just a small fraction covered by insurance. This promotes an opportunity to introduce new products — such as parametrics — that can help begin to limit this gap. As more tropical cyclones are rapidly intensifying prior to landfall due to warmer ocean waters, and rainfall rates from monsoon events grow, our vulnerabilities with property and infrastructure become more evident.

US Wildfires

Amid several episodes of prolonged summer heat, in tandem with gusty winds and low relative humidity the western US endured a multitude of notable and damaging wildfires in Q3, particularly in California.

- **Preliminary view:** YTD insured losses from the US wildfire peril on pace to exceed USD1.5 billion
- **Thru September:** 7.9 million acres (3.2 million hectares) burned across the US; above the 10-year average
- **California:** Park Fire became the state's 4th-largest wildfire on record dating to at least 1932
- **California:** At least 1,687 structures damaged or destroyed YTD fire acres burned topped 1 million

The US wildfire peril continues to be a topic of discussion as recent events, such as the 2023 Maui fire, reinforced that wildfire risk is not just limited to traditional "high-risk" areas of North America. Any ignited fire can spread and lead to extensive damage given favorable environmental conditions and vegetation. This is concerning as more properties continue to develop into the Wildland Urban Interface (WUI) or intermix, further increasing the potential of economic loss.

Through the first nine months of 2024 approximately 7.9 million acres (3.2 million hectares) were burned across the US, this was above the 10-year average of approximately 6 million acres (2.4 million hectares), and well above the 2023 annual total of 2.7 million acres (1.1 million hectares), according to data from the National Interagency Fire Center (NIFC).

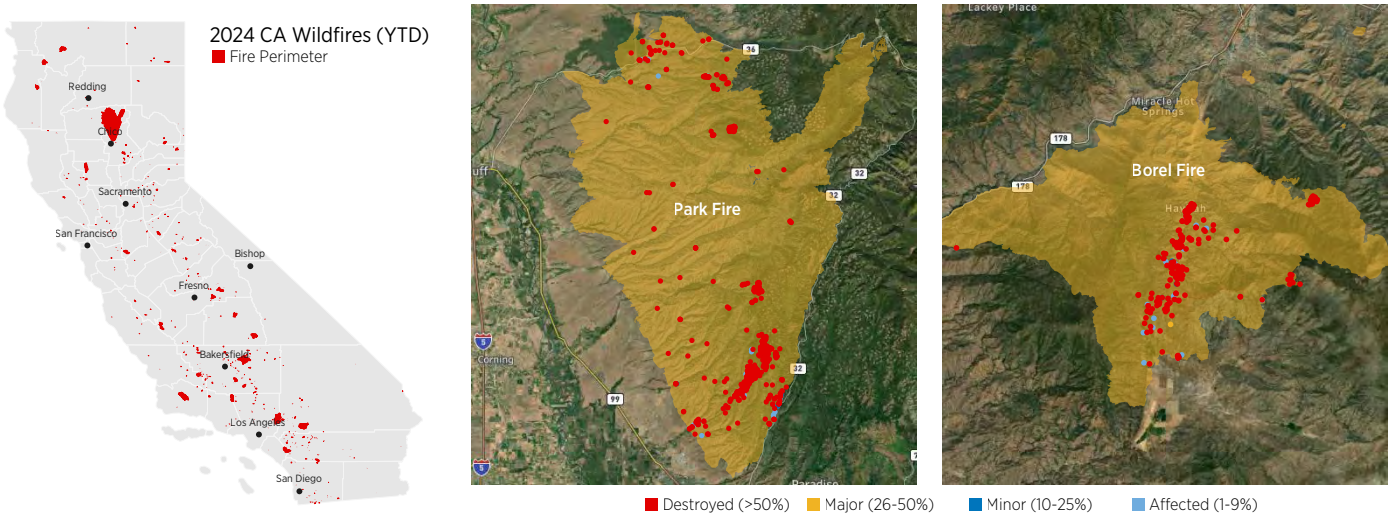


Figure 17: YTD wildfires perimeters in CA (right) Fire perimeters and damaged structures from California's Park and Borel fires (left) | **Data:** CalFire | **Graphic:** Gallagher Re

In California, the Park Fire which spread across Butte and Tehama counties in late July burned more than 429,000 acres (173,610 hectares) and became the 4th largest fire in the state on record since at least 1932. The fire damaged or destroyed 763 structures and was human caused. During the same time, the Borel Fire in Kern County spread near Bakersfield and impacted 252 structures and affected 59,288 acres (24,000 hectares).

Aiding in the rapid spread of the fires was California enduring its warmest summer (June to August) on record, with records dating to 1895.

Additional structures were lost in early September as fires quickly spread in southern California amid a late season heat wave. The most notable incidents included the Airport (194 structures impacted), Bridge (98 structures impacted), Boyles (39 structures impacted), and Line (5 structures impacted) fires. In total, more than 1,700 structures had been damaged or destroyed during the calendar year to-date.

The costliest fires in 2024 so far were the June / July South Fork and Salt Fires in New Mexico. These deadly merged fires damaged or destroyed at least 1,400 structures (500 of which were residences), with significant impacts in the Town of Ruidoso. Insured losses exceeded USD925 million. In Q1, the Smokehouse Creek fire in the Texas Panhandle scorched nearly 1.06 million acres (429,000 hectares) to become the state's largest recorded fire. The mega-fire resulted in industry losses that approached USD275 million.

WHAT IT MEANS

The wildfire peril continues to represent a traditionally "non-peak" peril which has exhibited increasing importance to the re/insurance industry. With more population and exposure entering higher risk Wildland Urban Interface (WUI) areas, this will only enhance the loss potential as climate change makes ground conditions more susceptible for erratic fire. behavior. With the US and other countries around the world seeking to better understand and underwrite this increasingly expensive peril, the need for better data and a philosophical understanding of future hazard risk which is directly linked to insurability comes into focus.

Q3: Miscellaneous Events

US

Tropical moisture from a slow-moving low-pressure system generated torrential rainfall across the Carolinas between September 14–17. In coastal North Carolina, 12 to 20 inches (300 to 510 millimeters) of rain was measured (most of which fell in 12 to 24 hours' time). The heaviest occurred near and south of Wilmington in Brunswick and New Hanover counties. Numerous homes and businesses were inundated, and several roadways were washed away. Most of the damage went uninsured.

Persistent summer rains produced substantial flooding across parts of South Dakota, Minnesota, Iowa, and Nebraska in June / July. Rain exceeding 10 to 12 inches (250 to 305 millimeters) prompted rivers within the Mississippi watershed to burst their banks. Some river stations topped levels experienced in the historic 1993 floods. In Iowa alone, thousands of properties were inundated. Economic costs were likely to approach USD1 billion. Insured losses were notably less, given low National Flood Insurance Program (NFIP) take-up rates in the most impacted counties.

Annual drought costs continued to add up across central and western sections of the country as crop yields were increasingly impacted by summer heat and a lack of rainfall in key growing areas. The economic cost was already calculated as a multi-billion-dollar total.

Latin America

Severe drought conditions continued to impact the economically vital Amazon River basin and the biodiverse Pantanal Wetlands in South America. These conditions have been ongoing since mid-2023. The drought has generated critical economic and humanitarian impacts as low river levels affected transportation of goods and access to clean water.

In Brazil, regions of Minas Gerais went more than 100 days without measurable rainfall. By the end of Q3, record drought conditions spanned from Acre and Amazonas toward Minas Gerais. Economic losses due to drought in Brazil alone were likely to exceed USD4 billion, with further non-negligible impacts from surrounding countries.

Concurrently, a record-breaking number of wildfires across Brazil had caused widespread damage and deteriorated air quality. Fires near Sao Paulo in August and September generated hundreds of millions (USD) in economic losses. Earlier in the year, wildfires in Chile resulted in a billion-dollar economic loss.

The fires and drought were driven in part due to lingering El Niño conditions, which tend to bring drier weather to northern Brazil (while enhanced rainfall is expected in southern Brazil). This was further amplified amid impacts from a warming climate.

Update: In April and May, Brazil's Rio Grande do Sol state suffered the costliest insured flooding event on record for the country. Hundreds of thousands of homes were inundated and further assessed insured losses reached USD1.5 billion.

In Mexico, Hurricane John made landfall to the southwest of Marquelia (Guerrero) on September 23 as a Category 3 storm. In subsequent days, John tracked and reformed off the Pacific Coast while generating torrential rainfall and deadly flooding across the Oaxaca and Guerrero coast (including Acapulco). Notable impacts were incurred in Acapulco where five-day rainfall totals through September 27 measured 40 inches (1,013 millimeters). Economic losses were expected to be significant. John recalled Hurricane Otis (2023), which underwent a historic period of rapid intensification to Category 5 intensity prior to landfall in Acapulco. That event generated economic losses of more than USD15 billion, the costliest recorded tropical cyclone event in Mexico's history.

Europe

While several regions of Europe endured heavy rainfall and historical flooding during the first nine months of the year, others continued to deal with prolonged heat, drought, and wildfire.

Greece saw their hottest June and July on record which enhanced ongoing drought conditions. In mid-August, the heat and dry conditions in tandem with strong winds aided in a wildfire outbreak in Attica (near the outskirts of Athens). The fires resulted in at least two deaths and dozens of injuries. More than 145 homes were damaged or destroyed. This region was previously affected in August 2023, when the Evros Fire became the largest since 2000 across the European Union. That blaze burned more than 93,000 hectares (230,000 acres).

In Portugal, fires ravaged the northern half of the country in mid-September. Reports indicated that seven people were killed, including three firefighters. Dozens were injured, and numerous homes and structures were destroyed.

Elsewhere, severe drought conditions in the Balkan Countries translated to large agricultural losses and water supply issues.

Africa

As detailed earlier in this report, anomalous rainfall totals across parts of normally arid western and central Africa resulted in a humanitarian emergency. More than 1,000 fatalities were confirmed in the final weeks of Q3. In the most impacted regions of Chad, Nigeria, Mail, and Niger, rainfall totals were among the heaviest seen in decades. Millions of residents were impacted, and exceptional damages were incurred to homes, livestock, and agriculture.

The rains were aided by a northern shift in the seasonal African Monsoon, which brought locally impactful rains to the Saharan Desert region. Africa remains highly vulnerable to extreme weather events. Further financial investment is critical to help the region adapt to more frequent extreme weather and a changing climate.

Asia

A magnitude-7.1 (Shindo 6-) earthquake struck in the Hyūga Sea off the coast of Miyazaki, Japan on August 8. The earthquake did not cause significant damage but prompted the issuance of a Nankai Trough earthquake advisory. While part of the rationale was to prioritize disaster preparedness and public safety, the advisory resulted in some service interruptions out of abundant caution.

In the late afternoon of September 19, Hachioji City in western Tokyo was impacted a notable hailstorm, measuring mostly from 1.6 to 2.4 inches (4 to 6 centimeters) in diameter. There were reports of damages to cars and windows. The unstable atmospheric condition was due to warm and humid air channeling from the Sea of Japan under the influence of a front. This was the second major hail event in Japan in 2024, following the Hyogo hailstorm in April. That event resulted in at least a USD1 billion insured loss for the local industry. Hail events are escalating and becoming more frequent in Japan, based on observations in the recent three years.

Oceania

A powerful cold front ushered in destructive winds across Victoria and Tasmania on September 1 and 2. More than 660 homes were damaged, while massive power outages hit approximately 130,000 users. Ferry services between Tasmania and mainland Australia were also rescheduled.

Appendix

January – September 2024 Events: Preliminary Statistics

Please note that the Appendix solely includes a listing of global events that resulted in approximately USD100+ million in economic loss and/or 10+ fatalities. It typically 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 and are adjusted to year-to-date dollar values using the US Consumer Price Index and further implementation of CPI variables such as a construction index and a cost of labor factor. Totals may be rounded and are subject to future development.

Drought

Event Name	Date	Region	Countries	Economic Loss	Fatalities
Zimbabwe Drought	Jan 1–Sep 30	Africa	ZW	430+	-
Zambia Drought	Jan 1–Sep 30	Africa	ZM	230+	-
China Drought	Jan 1–Sep 30	Asia	CN	210	-
Philippines Drought	Jan 1–Sep 30	Asia	PH	175	-
Austria Drought	Jan 1–Sep 30	Europe	AT	250+	
Spain Drought	Jan 1–Sep 30	Europe	ES	100s of millions	-
Serbia Drought	Jan 1–Sep 30	Europe	RS	500	-
Brazil Drought	Jan 1–Sep 30	Latin America	BR	4,250	-
Ecuador Drought	Jan 1–Sep 30	Latin America	EC	100s of millions	-
Mexico Drought	Jan 1–Sep 30	Latin America	MX	2,000	-
US Drought	Jan 1–Sep 30	US	US	2,000+	-

Earthquake

Event Name	Date	Region	Countries	Economic Loss	Fatalities
Noto Peninsula Earthquake	Jan 1	Asia	JP	12,000+	376
Hualien Earthquake	Apr 3	Asia	TW	3,000	18

European Windstorm

Event Name	Date	Region	Countries	Economic Loss	Fatalities
Isha / Iris	Jan 20–22	Europe	BE, CH, DE, DK, FR, GB, IE, NL, NO	525	5
Jocelyn / Jitka	Jan 23–24	Europe	GB, IE, DE, DK, NL, NO, PL	160	-
Ingunn / Margrit	Jan 31–Feb 1	Europe	NO, GB, IE, SW	150	-
Louis / Wencke	Feb 21–23	Europe	FR, BE, NL, DE, DK, SE	600	1
Nelson / Nadja	Mar 27–29	Europe	FR, PT, ES, GB	100	4
Olivia / Sabine & Kathleen / Timea	Apr 4–7	Europe	IE, GB, FR, ES, PT, NL	125	-

Flooding/Landslides

Event Name	Date	Region	Countries	Economic Loss	Fatalities
Jan Congo Floods	Jan 1–17	Africa	CD	Millions	238
South Africa Jan Flood	Jan 10–20	Africa	ZA	10s of millions	13
Simiyu Region Landslide	Jan 13	Africa	TZ	-	22
East Africa Rainy Season	Mar 24–May 15	Africa	TZ, KE, UG, RW, ET, PG	750	550+
Idiofa Town Landslide	Apr 13	Africa	CD	-	15
Algeria Spring Floods	May 24–Jun 8	Africa	DZ	-	15
Chad Seasonal Floods	Jun 1-Sep 30	Africa	TD	380+	487
Niger Summer Floods	Jun 10-Sep 30	Africa	NE	225+	265
Ivory Coast Floods	Jun 17-25	Africa	CI	-	27
Burkina Faso Floods	Jul 1-Sep 30	Africa	BF	275	-
Cameroon Floods	Jul 1-Sep 30	Africa	CM	115	-
CAR Floods	Jul 1-Sep 30	Africa	CF	150	-
DRC Annual Floods	Jul 1 -Sep 30	Africa	CD	875	-
S Ethiopia Landslides	July 20-23	Africa	ET	-	257
Nigeria Floods	Aug 6-Sep 30	Africa	NG	225+	269
Mali Floods	Jul 22-Sep 30	Africa	ML	165+	62
Arbaat Dam Collapse	Aug 23	Africa	SD	20+	60
Morocco Floods	Sep 6-8	Africa	MA	-	11
Caraga & Davao Flood	Jan 16–19	Asia	PH	Millions	18
Zhenxiong Landslide	Jan 22	Asia	CN		44
Mindanao Flood/Landslide	Jan 28–Feb 6	Asia	PH	50	120
Nuristan Landslide	Feb 18	Asia	AF	-	25
Afghanistan & Pakistan Flood	Feb 20-May 18	Asia	AF, PK	30+	741
West Sumatra Floods	Mar 7–8	Asia	ID	60	32
Central Java Floods	Mar 13–14	Asia	ID	-	13
Snowmelt & Orsk Dam Burst	Mar 27–Apr 20	Asia	RU, KZ	570	3
Tana Toraja Landslide	Apr 13	Asia	ID	-	20
China April Flood	Apr 15–21	Asia	CN	1,650	24
China May Flood	May 1–31	Asia	CN	165	3
South Sulawesi Flood	May 3	Asia	ID	-	16
West Sumatra Lahar	May 11	Asia	ID	-	67
Sri Lanka Seasonal Floods	May 15–Jun 30	Asia	LK	Millions	37
China Seasonal Floods	Jun 1–Sep 30	Asia	CN	21,500	605
India Seasonal Floods	Jun 4–Sep 30	Asia	IN	2,500	1,905
Nepal Seasonal Floods	Jun 11–Sep 30	Asia	NP	250	468

Pakistan Seasonal Floods	Jul 1-Sep 30	Asia	PK	Millions	341
South Korea Floods	Jul 6-18	Asia	KR	500	5
Bone Bolango Landslide	July 6-7	Asia	ID	-	23
Eastern Afghanistan Floods	July 15-16	Asia	AF	-	58
Akita and Yamagata Floods	Jul 25	Asia	JP	720	5
Thailand Floods	Aug 16-30	Asia	TH	210	22
Bangladesh Floods	Aug 20-Sep 3	Asia	BD	1,200	71
North Maluku Floods	Aug 25	Asia	ID	-	18
Noto Peninsula Heavy Rain	Sep 21-23	Asia	JP	Millions	15
Henk / Annelie & Flooding	Jan 1–5	Europe	BE, DE, FR, NL, GB	610	3
Italy / Germany Floods & SCS	May 14-17	Europe	DE, IT	600	-
Southern Germany & Central Europe Floods	May 28-Jun 5	Europe	DE, IT, CH, HU, AT	5,050	10
Southern Spain Floods	Jun 10-15	Europe	ES	150	-
Xandria / Alps Floods	Jun 21-23	Europe	CH, FR, IT, CZ, BA, PO, HU	220	5
Storm Annelle	Jun 28-30	Europe	FR, IT, CH	375	7
Boris / Anett	Jun 11-18	Europe	AT, CZ, RO, HU, DE, SK, PL, SI, IT	20,000+	27
Bolivia Q1 Floods	Jan 1-Mar 31	Latin America	BO	10s of millions	50
Colombia Landslide	Jan 12	Latin America	CO	Millions	36
Rio De Janeiro Jan Floods	Jan 13-14	Latin America	BR	90	12
Southeast Brazil Floods	Mar 22-23	Latin America	BR	75	27
April Para Floods	Apr 1-2	Latin America	BR	300	-
Rio Grande do Sul Floods	Apr 27-May 13	Latin America	BR	7,600	175
Central America Flooding	Jun 15-Jun 24	Latin America	MX, SV, GT, HN, EC	180	30
Arabian Gulf Flash Flood	Apr 13-17	Middle East	AE, OM, YE, BH, QA, IR, SA	8,550	33
Yemen August Floods	Aug 2-7	Middle East	YE	-	45
Chimbu Floods	Mar 13-19	Oceania	PG	50	23
Maip Mulitaka Landslide	May 24	Oceania	PG	-	670
Toronto Floods	Jul 15-16	N. America	CA	2,250	-
Southern Ontario Floods	Aug 17-18	N. America	CA	275	-
S. California Flash Flood	Jan 19-22	US	US	500	-
Western Atmospheric River	Jan 31-Feb 1	US	US	100	-
CA Atmospheric River #1	Feb 3-6	US	US	1,200	9
CA Atmospheric River #2	Feb 17-21	US	US	150	-
Southern Florida June Floods	Jun 10-14	US	US	750	-
Midwest Summer Flooding	Jun 19-30	US	US	1,000	2
US Gulf Coat Flooding	Sep 1-7	US	US	425	-
PTC8 / Carolinas Floding	Sep 16-17	US	US	200	-

Severe Convective Storm

Event Name	Date	Region	Countries	Economic Loss	Fatalities
South Africa Cut-Off Low	May 31–Jun 4	Africa	ZA	50	23
China April SCS	Apr 1–31	Asia	CN	310	17
Hyogo Hailstorm	Apr 16	Asia	JP	1,500	-
China May SCS	May 1–31	Asia	CN	140	13
Mumbai and Delhi Dust Storm	May 10–13	Asia	IN	-	19
West Bengal Malda Storm	May 16	Asia	IN	-	12
North China July SCS	Jul 1-31	Asia	CN	220	10
China August SCS	Aug 11-27	Asia	CN	380	17
West Tokyo Hail	Sep 19	Asia	JP	250	-
Easter Weekend SCS	Mar 30–Apr 3	Europe	CZ, FR, IT, PO	100	2
Storm Tina	Jun 6–10	Europe	AT, DE, HU, CH, SK, RO	515	-
Storm Wibke	Jun 17–20	Europe	DE, FR, CZ, PO, CH, BE	520	-
Storm Zoe	Jun 26-28	Europe	DE, CZ, PL, SK	325	-
Storm Elke	Jul 9-12	Europe	FR, DE, BE, PL, CZ, AT, KS	100	-
Storm Frieda	Jul 12-14	Europe	IT, DE, AT, PL, SI, BY	125	-
Mid-August SCS	Aug 12-13	Europe	CH, DE	125	-
Northern Italy Hail	Aug 26-27	Europe	IT	100	-
Para March SCS	Mar 5	Latin America	BR	200	
Argentina Hail & Floods	Mar 8–21	Latin America	AR	250	1
Southern Brazil Late-May SCS	May 27-30	Latin America	BR	105	-
Chile June SCS	Jun 10–16	Latin America	CL	100	1
Ecuador June SCS	Jun 15–16	Latin America	EC	Millions	19
Late-June SCS	Jun 21-24	Latin America	BR	100	-
UAE Hail & Floods	Feb 11–13	Middle East	AR, OM	250	4
Victoria Valentine's Day SCS	Feb 14	Oceania	AU	175	-
Severe Weather NSW & QLD	Apr 3-8	Oceania	AU	370	1
Saskatchewan SCS	Jun 23	N. America	CA	100	-
Calgary Hailstorm	Aug 5	N. America	CA	2,800	-
Early Jan SCS & WW	Jan 8–10	US	US	2,800	6
Jan Southern SCS & Flood	Jan 22–26	US	US	650	
Early Feb Outbreak	Feb 8–13	US	US	1,225	1
Feb Polar Front & SCS	Feb 26–28	US	US	1,620	
Western US Storm	Feb 28–Mar 4	US	US	130	2
Early March Storm Complex	Mar 6–11	US	US	655	
Mid-March SCS Outbreak	Mar 12–17	US	US	6,200	3

San Antonio Hail & SCS	Mar 21–23	US	US	750	
Late March Southern SCS	Mar 24–28	US	US	200	
Early-April Outbreak	Mar 31–Apr 4	US	US	2,625	1
Southern SCS & Floods	Apr 6–12	US	US	2,700	-
April Mid-Atlantic SCS	Apr 14–16	US	US	115	-
April Plains & Midwest SCS	Apr 15–16	US	US	100	-
Central & Eastern Outbreak	Apr 17–20	US	US	975	-
Texas April SCS	Apr 19–21	US	US	300	-
Late April Central SCS	Apr 25–29	US	US	1,725	6
Early May Hail & Flooding	Apr 30–May 2	US	US	525	1
Texas Flooding & SCS	May 3–5	US	US	350	-
Early-May SCS	May 6–10	US	US	6,900	5
Southern Flood & SCS	May 11–14	US	US	1,300	-
Houston Derecho	May 15–19	US	US	2,550	8
Mid-May SCS	May 17–22	US	US	5,350	5
Late May Plains Outbreak	May 23–24	US	US	750	-
Late May Central & East SCS	May 25–26	US	US	3,275	21
Dallas Hail & SCS	May 27–29	US	US	2,900	2
Denver Hail & SCS	May 30–Jun 1	US	US	2,750	-
TX Hail & MD Tornadoes	Jun 2–5	US	US	650	3
Early June Outbreak	Jun 6–10	US	US	700	-
Colorado June SCS	Jun 9-10	US	US	155	-
Midwest Mid-June Outbreak	Jun 12–14	US	US	1,025	-
Central & East Mid-June SCS	Jun 14–18	US	US	260	-
Central & East Late-June SCS	Jun 19–25	US	US	850	-
Midwest Late-June Outbreak	Jun 24–26	US	US	1,625	2
US Late-June Outbreak	Jun 27-30	US	US	515	-
Early July Plains Outbreak	Jul 1-4	US	US	175	-
Early July Central Outbreak	Jul 6-7	US	US	150	-
Chicago Derecho & SCS	Jul 13-18	US	US	2,550	5
Arizona Monsoon SCS	Jul 14-15	US	US	200	-
Late July Central Outbreak	Jul 19-20	US	US	245	-
Southeast SCS & Flooding	Jul 19-24	US	US	285	-
July Southwest Monsoon	Jul 21-15	US	US	150	-
Late July US SCS Outbreak	Jul 24-Aug 1	US	US	1,175	-
Early Aug Eastern Outbreak	Aug 2-3	US	US	245	-

Minnesota Aug SCS	Aug 3-5	US	US	150	-
Northeast July SCS	Aug 4-6	US	US	580	-
Mid-August SCS & Floods	Aug 12-19	US	US	1,200	2
August Northern Outbreak	Aug 22-30	US	US	850	-
Oklahoma City Hail & SCS	Sep 21-24	US	US	500	-

Tropical Cyclone

Event Name	Date	Region	Countries	Economic Loss	Fatalities
Cyclone Belal	Jan 14-16	Africa	RE, MU	275+	4
Cyclone Gamane	Mar 27-29	Africa	MG	25	19
Cyclone Remal	May 26-28	Asia	IN. BD	625	79
Tropical Storm Prapiroon	Jul 21-23	Asia	LA, VN	20	10
Typhoon Gaemi	Jul 23-28	Asia	TW, CN, PH	2,550	151
Typhoon Shanshan	Aug 28-31	Asia	JP	800	8
Typhoon Yagi	Sep 1-12	Asia	CH, PH, VN, LA, TH, MM	16,300	818
Typhoon Bebinca	Sep 15-17	Asia	CN, PH	950	8
Hurricane Ernesto	Aug 13-19	Latin America	BM, PR, VI, AG, GP	150	-
Hurricane John	Sep 22-28	Latin America	MX	1,000	22
Tropical Storm Alberto	Jun 19-21	US	US, MX	165	4
Hurricane Beryl	Jul 1-12	US	US, GD, VC, TT, MQ, BB, KY, JM, MX, VE	7,740	28
Hurricane Debby	Aug 4-10	US	US, CA	7,000	8
Hurricane Francine	Sep 10-15	US	US	1,500	-
Hurricane Helene	Sep 24-28	US	US, CU, MX	35,000+	240

Wildfire

Event Name	Date	Region	Countries	Economic Loss	Fatalities
N Portugal Wildfires	Sep 14-18	Europe	PT	500	7
Central Chile Wildfires	Feb 1–Mar 22	Latin America	CL	1,000	134
Brazil / Sao Paulo Fires	Aug 23-Sep 6	Latin America	BR	375+	2
Jasper Fire Complex	Jul 22-Aug 17	N. America	CA	1,100	1
Smokehouse Creek Fire	Feb 26–Mar 15	US	US	420	2
South Fork & Salt Fires	Jun 17–25	US	US	1,700	2
Borel Fire	Jul 24-Aug 20	US	US	250	-
Park Fire	Jul 24-Aug 20	US	US	500	-

Winter Weather

Event Name	Date	Region	Countries	Economic Loss	Fatalities
China January Freeze	Jan 12–23	Asia	CN	365+	3
China Feb Winter Freeze #1	Feb 1–5	Asia	CN	1,770	7
China Feb Winter Freeze #2	Feb 17–22	Asia	CN	980	-
Europe April Freeze	Apr 16–25	Europe	CZ, DE, AT, FR	670	
Western Canada Freeze	Jan 12–15	N. America	CA	325	
US January Freeze	Jan 11–14	US	US	1,200	7
Northwest Winter Storm #1	Jan 12–15	US	US	1,550	12
US Jan Polar Vortex	Jan 15–17	US	US	1,250	70
Northwest Winter Storm #2	Jan 16–18	US	US	500	8
Rockies Winter Storm	Mar 11–15	US	US	105	

Other

Event Name	Date	Region	Countries	Economic Loss	Fatalities
Thailand Heatwave	Jan 1–May 10	Asia	TH	-	61
India Heatwave	Mar 1–Jun 30	Asia	IN	-	143+
Myanmar Heatwave	Apr 1–May 3	Asia	MM	-	50
Bangladesh Heatwave	Apr 22–30	Asia	BD	-	15
Japan Heatwave	Apr 29-Sep 30	Asia	JP	-	119+
South Korea Heatwave	Jun 8-Sep 30	Asia	KR	-	32
Pakistan Heatwave	Jun 21–30	Asia	PK	-	49+
Mexico H1 Heatwave	Mar 17–Jun 30	Latin America	MX	-	172
Saudi Arabia Heatwave	Jun 14–19	Middle East	SA	-	1,301+

Country Name	Abbreviation
Afghanistan	AF
Åland Islands	AX
Albania	AL
Algeria	DZ
American Samoa	AS
Andorra	AD
Angola	AO
Anguilla	AI
Antarctica	AQ
Antigua and Barbuda	AG
Argentina	AR
Armenia	AM
Aruba	AW
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
Bonaire, Saint Eustatius, and Saba	BQ
Bosnia and Herzegovina	BA
Botswana	BW
Bouvet Island	BV
Brazil	BR
British Indian Ocean Territory	IO
British Virgin Islands	VG
Brunei	BN
Bulgaria	BG
Burkina Faso	BF
Burundi	BI
Cambodia	KH
Cameroon	CM
Canada	CA
Cape Verde	CV
Cayman Islands	KY
Central African Republic	CF

Country Name	Abbreviation
Chad	TD
Chile	CL
China	CN
Christmas Island	CX
Malaysia	MY
Maldives	MV
Mali	ML
Malta	MT
Marshall Islands	MH
Martinique	MQ
Mauritania	MR
Mauritius	MU
Mayotte	YT
Mexico	MX
Micronesia	FM
Moldova	MD
Monaco	MC
Mongolia	MN
Montenegro	ME
Montserrat	MS
Morocco	MA
Mozambique	MZ
Myanmar	MM
Namibia	NA
Nauru	NR
Nepal	NP
Netherlands	NL
Fiji	FJ
Finland	FI
France	FR
French Guiana	GF
French Polynesia	PF
French Southern Territories	TF
Gabon	GA
Gambia	GM
Georgia	GE
Germany	DE
Ghana	GH
Gibraltar	GI
Greece	GR
Greenland	GL
Grenada	GD
Guadeloupe	GP
Guam	GU

Country Name	Abbreviation
Guatemala	GT
Guernsey	GG
Guinea	GN
Guinea-Bissau	GW
Guyana	GY
Haiti	HT
Heard Island and McDonald Islands	HM
Honduras	HN
Hong Kong	HK
Hungary	HU
Iceland	IS
India	IN
Indonesia	ID
Iran	IR
Iraq	IQ
Ireland	IE
Isle of Man	IM
Israel	IL
Italy	IT
Côte d'Ivoire	CI
Jamaica	JM
Japan	JP
Jersey	JE
Jordan	JO
Kazakhstan	KZ
Kenya	KE
Kiribati	KI
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
Madagascar	MG
Malawi	MW
North Macedonia	MK
Malaysia	MY

Country Name	Abbreviation
Maldives	MV
Mali	ML
Malta	MT
Marshall Islands	MH
Martinique	MQ
Mauritania	MR
Mauritius	MU
Mayotte	YT
Mexico	MX
North Macedonia	FM
Moldova	MD
Monaco	MC
Mongolia	MN
Montenegro	ME
Montserrat	MS
Morocco	MA
Mozambique	MZ
Myanmar	MM
Namibia	NA
Nauru	NR
Nepal	NP
Netherlands	NL
New Caledonia	NC
New Zealand	NZ
Nicaragua	NI
Niger	NE
Nigeria	NG
Niue	NU
Norfolk Island	NF
North Korea	KP
Northern Mariana Islands	MP
Norway	NO
Oman	OM
Pakistan	PK
Palau	PW
Palestinian Territory	PS
Panama	PA
Papua New Guinea	PG
Paraguay	PY
Peru	PE
Philippines	PH
Pitcairn	PN

Country Name	Abbreviation
Poland	PL
Portugal	PT
Puerto Rico	PR
Qatar	QA
Republic of the Congo	CG
Réunion	RE
Romania	RO
Russia	RU
Saint Kitts and Nevis	KN
Saint Lucia	LC
Saint Martin	MF
Saint Pierre and Miquelon	PM
Saint Vincent and the Grenadines	PM
Samoa	WS
San Marino	SM
São Tomé and Principe	ST
Saudi Arabia	SA
Senegal	SN
Serbia	RS
Serbia and Montenegro	CS
Seychelles	SC
Sierra Leone	SL
Singapore	SG
Sint Maarten	SX
Slovakia	SK
Slovenia	SI
Solomon Islands	SB
Somalia	SO
South Africa	ZA
South Georgia and the South Sandwich Islands	GS
South Korea	KR
South Sudan	SS
Spain	ES
Sri Lanka	LK
Sudan	SD
Suriname	SR
Svalbard and Jan Mayen	SJ
Swaziland	SZ
Sweden	SE
Switzerland	CH
Syria	SY
Taiwan	TW

Country Name	Abbreviation
Tajikistan	TJ
Tanzania	TZ
Thailand	TH
Togo	TG
Tokelau	TK
Tonga	TO
Trinidad and Tobago	TT
Tunisia	TN
Turkey	TR
Turkmenistan	TM
Turks and Caicos Islands	TC
Tuvalu	TV
Virgin Islands (US)	VI
Uganda	UG
Ukraine	UA
United Arab Emirates	AE
United Kingdom	GB
United States	US
Uruguay	UY
Uzbekistan	UZ
Vanuatu	VU
Vatican City	VA
Venezuela	VE
Vietnam	VN
Wallis and Futuna	WF
Western Sahara	EH
Yemen	YE
Zambia	ZM
Zimbabwe	ZW

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