AON

Q1 Global Catastrophe Recap

April 2022

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2022: Sixth Consecutive $10B+ Q1 Insured Loss

The first three months of 2022 were highly active in many territories around the world. Significant natural hazard events occurred in **Western and Central Europe** (Windstorms Dudley/Ylenia, Eunice/Zeynep, and Franklin/Antonia), **Australia** (East Coast Floods), **Japan** (March 16 Earthquake), and the **United States** (Severe Convective Storms).

The first quarter is typically the quietest of the year, though 2022 marked the sixth consecutive year to record more than USD10 billion in insured losses. The **preliminary Q1 overall economic loss was $32 billion**. **Public and private insurers covered $14 billion** of this total. *However, it is important to remind that these totals are expected to be upwardly revised, perhaps considerably, in the coming weeks and months.* This type of loss development is standard and expected in the aftermath of larger scale events.

$32B

Preliminary overall economic loss in Q1 2022

30-50°C

Temperature anomalies compared to seasonal normal measured in Antarctica in mid-March

5

Record tying number of storms to make landfall in Madagascar during a season; Ana, Batsirai, Dumako, Emnati, and Gombe

$14B

Covered by public and private insurers

1.04M ha

Area burned in the Corrientes Province of Argentina in Q1; 12 percent of its land area was affected by wildfire

122 mph / 196 kph

Wind gust measured on the exposed Isle of Wight during Windstorm Eunice, the highest on record in England

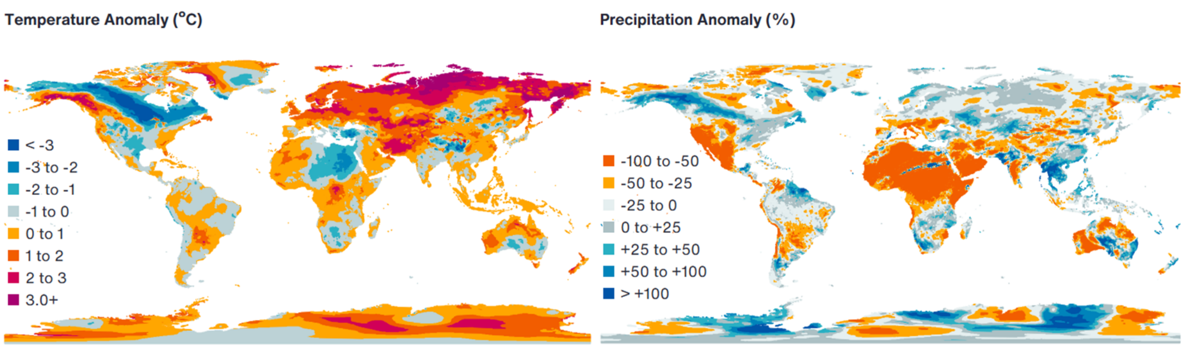
All currency in US dollars ($) unless noted otherwise

Anomalous Weather Aids Heightened Loss Totals

Natural Hazard Overview

Global temperatures and precipitation were heavily influenced by the continued effects of La Niña across the central and eastern Pacific Ocean. These influences resulted in notable hazard events including prolific and record-setting rainfall along Australia's East Coast, continued severe drought conditions in parts of Africa, South America, and the western United States, and an earlier start to severe weather season in the United States.

Exhibit 1: Q1 2022 Temperature and Precipitation Anomalies vs Climatology (1991-2020)



Data: ERA5 / Copernicus / ECMWF. Graphic: Aon (Catastrophe Insight)

Per NOAA: January was the sixth warmest, February was the seventh warmest, and March was the fifth warmest for the globe dating to 1880. March also marked the 447th consecutive month for global land and ocean temperatures to be above the 20th century baseline average. The tables below highlight the Top 10 warmest months in the official observed record; primarily populated by years in the 21st Century.

January

Year	Temp Anomaly °C / °F
2020	+1.14°C / 2.05°F
2016	+1.12°C / 2.02°F
2017	+0.98°C / 1.76°F
2019	+0.93°C / 1.67°F
2007	+0.92°C / 1.66°F
2022	**+0.88°C / 1.58°F**
2015	+0.83°C / 1.49°F
2021	+0.78°C / 1.40°F
2018	+0.75°C / 1.35°F
2010	+0.73°C / 1.31°F

February

Year	Temp Anomaly °C / °F
2016	+1.26°C / 2.27°F
2020	+1.16°C / 2.09°F
2017	+1.02°C / 1.84°F
1998	+0.87°C / 1.57°F
2015	+0.87°C / 1.57°F
2019	+0.85°C / 1.53°F
2022	**+0.81°C / 1.46°F**
2010	+0.80°C / 1.44°F
2010	+0.79°C / 1.42°F
2018	+0.76°C / 1.37°F

March

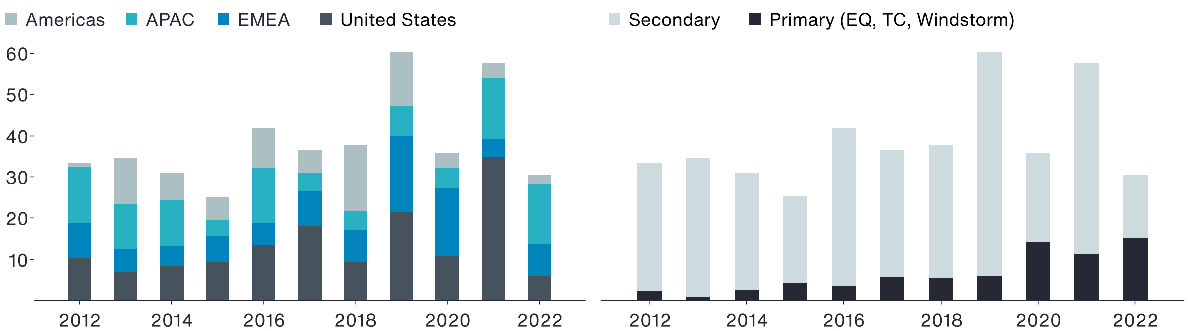
Year	Temp Anomaly °C / °F
2016	+1.31°C / 2.36°F
2020	+1.17°C / 2.11°F
2019	+1.10°C / 1.98°F
2017	+1.09°C / 1.96°F
2022	**+0.95°C / 1.71°F**
2015	+0.92°C / 1.66°F
2018	+0.89°C / 1.60°F
2010	+0.87°C / 1.57°F
2021	+0.85°C / 1.53°F
2002	+0.82°C / 1.48°F

Economic and Insured Loss Analysis

Years with elevated Q1 economic losses have often been amplified by major earthquake events, such as 1994 (United States), 2010 (Chile and Haiti), 2011 (Japan and New Zealand), 2020 (Croatia), and 2021 (Japan). In recent years, however, the growing impactful nature of "**secondary perils**" such as winter weather, flooding, and severe convective storm have accounted for a significant portion of the overall quarterly economic cost. This reinforces the question as to whether the term "secondary peril" has become obsolete because the losses associated with these perils are impacting more populated communities with increasing intensity and resulting in higher loss costs.

The Asia-Pacific (APAC) region accounted for the highest percentage of Q1 economic losses ($15+ billion), with EMEA ($8 billion) and the United States ($6 billion) behind. With many large scale and impactful events occurring in the month of March, **it is expected that event loss totals will continue to develop in the weeks and months ahead**.

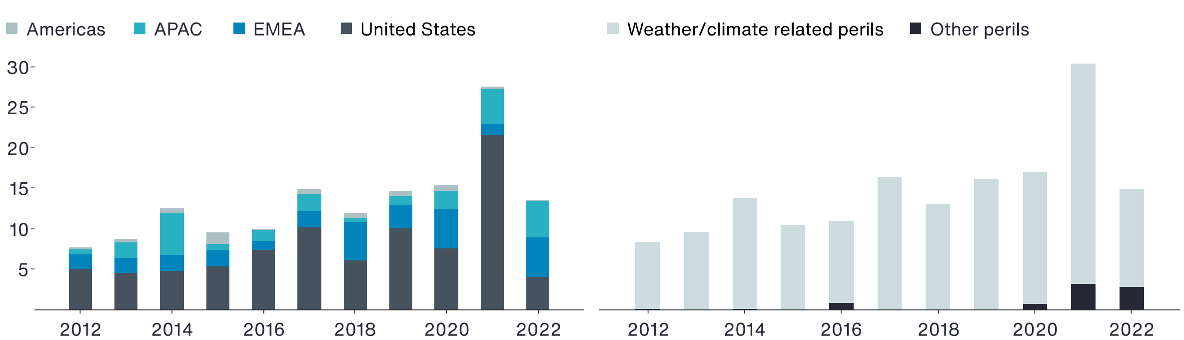
Exhibit 2: Global Q1 Economic Losses (2022 $ billion)



Data: Aon (Catastrophe Insight)

For public and private insurers, the $36 billion in Q1 weather-related insured losses in 2021 and 2022 represented the second-highest two-year total on record. This is second only to 2020 and 2021, which tallied $40 billion and was primarily driven by the $25 billion in 2021. Third place is $33 billion for Q1 events in 1990 (highlighted by major European Windstorm events) and 1991. For all natural hazard events, including earthquakes / tsunamis / volcanoes / etc, the two-year total of $41 billion ranks as the seventh-highest total on record. The record remains 2010 and 2011 at $98 billion.

Exhibit 3: Global Q1 Insured Losses (2022 $ billion)



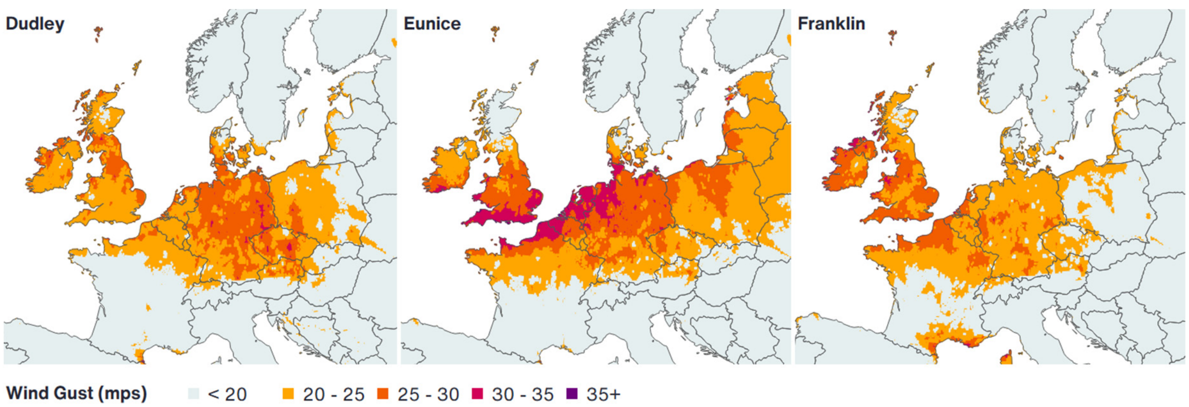
Data: Aon (Catastrophe Insight)

Eunice to be Costliest EU Windstorm Since 2010

During the period of February 16-21, parts of Europe experienced impacts of a series of low-pressure systems, which developed in quick succession. Unusual atmospheric conditions, with prolonged state of positive North Atlantic Oscillation (NAO) and Arctic Oscillation (AO) indices in place, led to the development of a sequence of windstorms each named by the UK Met-Office (UKMO), Met Éireann, and KNMI as Dudley, Eunice, and Franklin. Free University of Berlin named these areas of low pressure Ylenia, Zeynep, and Antonia respectively.

The weather pattern was driven by an active jet stream that propagated the low-pressure systems across anomalously warm waters in the North Atlantic Ocean and towards western sections of Europe. The strong frontal boundary that stretched through the North Atlantic became disturbed, which allowed for active cyclogenesis and the formation of several low-pressure systems in a short time span.

Exhibit 4: Impact Forecasting's modeled event footprints of storms Dudley, Eunice, and Franklin



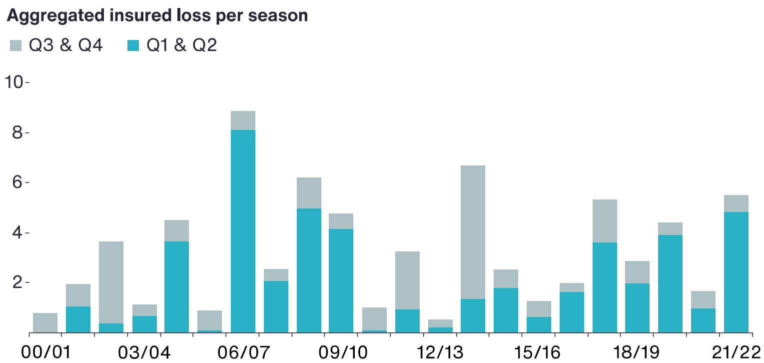
Data: Aon (Catastrophe Insight)

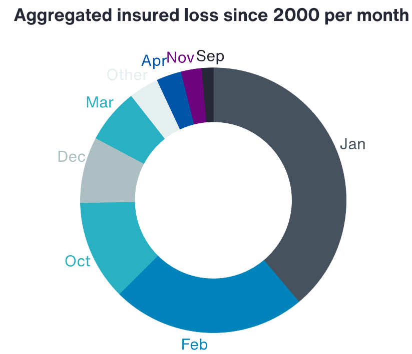
Impact Forecasting responded to this exceptional situation by a range of services, including loss forecasts through the Automated Event Response (AER), post-event estimates and release of the footprints. Various currently publicly available estimates suggest that the entire series might result in significant industry payouts, with aggregated totals approaching €4.0 billion ($4.3 billion). Industry losses directly attributable to **Windstorm Eunice suggest that the storm will become the costliest individual low-pressure system to impact Europe since Xynthia in 2010**.

It is worth noting that wind speeds initially forecast for Eunice by various meteorological models were substantially higher in some regions, particularly in England. Eventual impact was thus much lower than indicated, and the worst-case scenario, which suggested potential for market-wide industry losses comparable to those caused by Kyrill in 2007, did not materialize.

The windstorm series occurred in February, during the peak of the windstorm season. Historical data suggests that January and February are the months with the highest proportion of aggregated losses by far and are followed by Q4 months of October and December. In January 2022, several additional Northern and Central Europe, namely Gyda (January 12-13), Hannelore (January 16-17) and Malik, also known as Nadia (January 29-30). However, cumulative insured losses from these storms did not exceed $400 million.

Exhibit 5: EU Windstorm seasonal insured losses since 2000 (2022 $ billion)





Data: Aon (Catastrophe Insight)

Final Thoughts

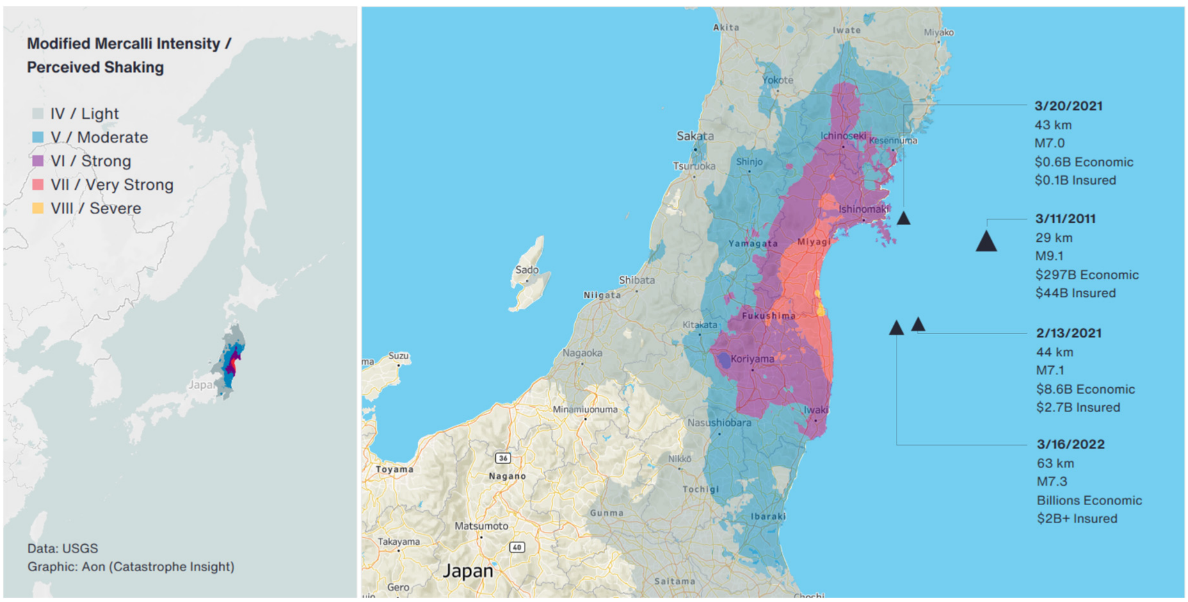
The European Windstorm peril, long considered a "primary" peril across the European insurance market, has been of keen interest given the potential for significant loss occurrences. Particularly when there are clustering instances, which can feature multiple storms impacting areas in quick succession. However, **the peril has not topped the $10 billion threshold (2022 USD) for the insurance industry since 1999**. The nearly $5 billion calendar year industry loss thus far in 2022 already puts it as the most expensive since 2013.

Impact Forecasting recently launched a comprehensive update to its European Windstorm model that added more historical events, re-calibrated its vulnerability component, and now better accounts for residential and automobile portfolios across Western, Central, and Eastern Europe. IF additionally added new peer-reviewed climate change research from Karlsruhe Institute of Technology (KIT) into the model to help better address seasonal storm clustering and its impact on losses.

Insurers Face $2B+ Toll from March 16 Japan EQ

One of the most significant individual events of the first quarter of 2022 occurred on March 16 just offshore Japan's Fukushima Prefecture. A USGS-registered magnitude-7.3 earthquake – along with several strong aftershocks and a notable foreshock – shook many prefectures throughout Japan. The event occurred just days after the 11th anniversary of the Great Tohoku Earthquake on March 11, 2011.

Exhibit 6: March 16 Japan M7.3 Earthquake USGS ShakeMap



According to Japan's Fire and Disaster Management Agency (FDMA), the March 16 earthquake resulted in four fatalities and left 244 others injured. An immediate power blackout ensued after the main shock, affecting more than 2.2 million households across 14 prefectures, including Tokyo. The tremor also ruptured water pipes and caused temporary water shortages to more than 34,000 households. Infrastructure was notably disrupted which led to five Shinkansen lines being suspended. JR East confirmed 1,000 cases of infrastructure damage, including 300 railway and 79 utility poles damages. The temblor also brought down a few units of cooling water pumps in Fukushima Daiichi and Fukushima Daini nuclear power stations, but no radioactive leakage occurred. There were twelve fire incidents, mainly in Miyagi Prefecture.

As of April 11, the FDMA cited that at least 10,414 homes and other structures had sustained some level of damage. Assessments remained ongoing and this total was anticipated to keep rising. The earthquake additionally left several manufacturing facilities closed. Some of these locations included microchip maker Renesas Electronics and electric components maker Murata Manufacturing. This were expected to further disrupt the current global supply chain crisis. **Preliminary estimates suggested an economic loss well into the billions (USD). Insurers were anticipating losses approaching and/or exceeding $2.0 billion.**

This part of Japan is no stranger to significant earthquake events. As noted in the graphic on the previous page, there have been three earthquakes of at least M7.0 intensity since 2021 alone in this region. These are all part of the same tectonic region where the M9.1 earthquake and subsequent tsunami occurred in March 2011. Perhaps most notably, a similar M7.1 temblor struck very near the March 2022 M7.3 event. That event was located just 12 km (7 mi) from the 2022 earthquake caused a rupture of 32 km by 24 km (20 mi by 15 mi) towards the southwest. However, the 2022 event ruptured towards the north covering a slightly larger area, leading to shortening of the rupture gap to just 30 km (19 mi) from the Great Tohoku earthquake.

The February 2021 earthquake cost the insurance industry at least $2.5 billion. The overall economic loss topped $8.0 billion. The table below compares the February 2021 and March 2022 events.

2021 Fukushima Earthquake		2022 Fukushima Earthquake
7.1	USGS Magnitude	7.3
44	Depth (km)	63
73	Distance from land (km)	57
Severe	Modified Mercalli Intensity Scale	Severe
0.2	Maximum Tsunami Height (m)	0.3
3	Fatalities	4
186	Injuries	244
36,299	Homes Damaged	10,414*

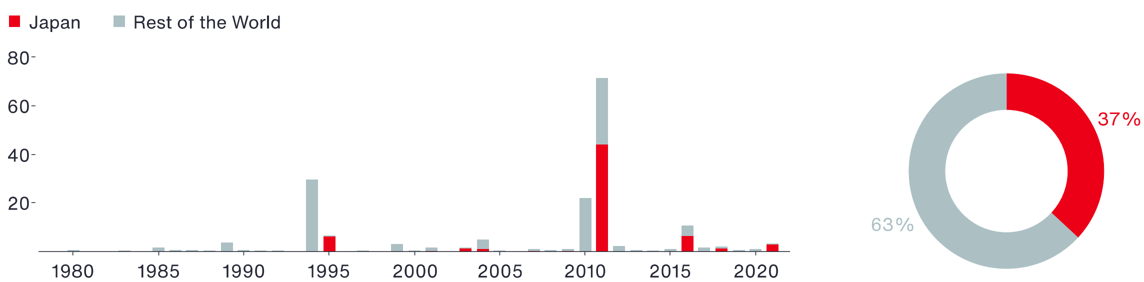
*Based on the 19th Update via the Japan Fire and Disaster Management Agency

Final Thoughts

The General Insurance Association of Japan (GIAJ) continues to assess the March 16, 2022 event and is working with local and global insurers. It will take months to get a complete view of where the final insurance impact will eventually land. The agency noted that the February 13, 2021 event resulted in 260,966 non-life residential claims being filed. **It remains too preliminary to conclude if claims totals for the 2022 event will exceed this total**, but initial guidance suggests this is a reasonable first comparison.

Earthquake insurance for home dwellings has been incrementally increasing in Japan in recent years. The percentage of homes with peril coverage rose from 30.5% in 2016 to 33.9% at the end of 2020.

Exhibit 7: Global insured losses from the earthquake peril since 1980 (2022 $ billion)

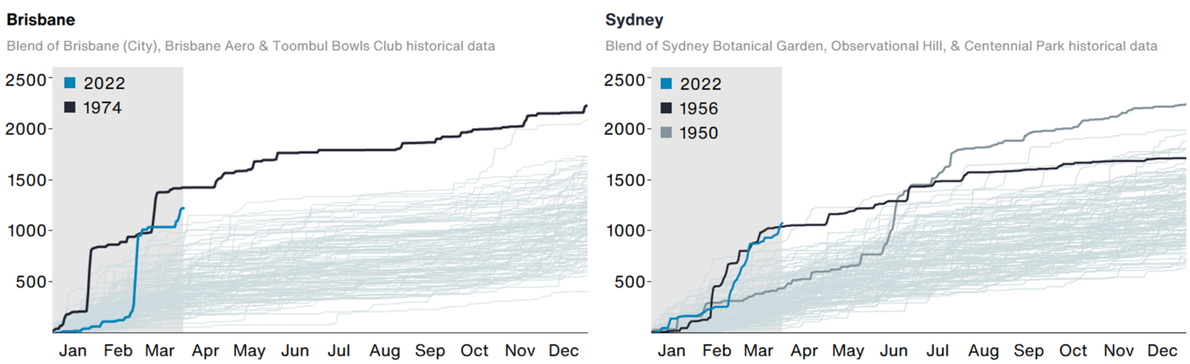


Data: Aon (Catastrophe Insight)

Historic Floods Inundate Australia's East Coast

A prolific and historic period of torrential rainfall affected broad swaths of Australia's East Coast during the latter half of February through March. Parts of New South Wales and Queensland were among the hardest hit, which resulted in substantial flooding in the greater Brisbane and Sydney metropolitan areas in addition to other localized communities in each state. Australia's Bureau of Meteorology noted that several areas set numerous one-day (24-hour), monthly, and quarterly rainfall records. Many of these records were set in locations with more than 100 years of observational data.

Exhibit 8: Annual cumulative rainfall in Brisbane and Sydney (mm)



Data: Bureau of Meteorology. Graphic: Aon (Catastrophe Insight)

The most significant period of flooding was noted from February 23 to March 8. During this time, a persistent trough of low pressure remained quasi-stationary along Australia's East Coast and a serious of areas of low pressure developed while funneling moisture towards the coastline. The persistence of the trough allowed phenomenal flooding to occur as dozens of rivers overflowed their banks. The Mary River alone crested at a level not seen since at least 1893. More than 30 recording sites in New South Wales – especially between the towns of Gympie and Numinbah – recorded more than 1,000 mm (39.40 in) of rain during one six-day period alone. In Queensland, Brisbane recorded three consecutive days of rainfall totals topping 220 mm (9.0 in). This is historically unprecedented for the region.

Further rains would later fall during the last two weeks of March that would cause some towns, such as Lismore, to endure repetitive flooding. The expansive nature of the floods across Queensland and New South Wales were the worst since the late 2010 and early 2011 floods that resulted in nearly $8 billion in economic losses: mostly in Brisbane.

The Insurance Council of Australia (ICA) declared an insurance catastrophe and cited that at least 173,346 claims had already been filed as of April 8 with an estimated value of AUD2.43 billion (USD1.81 billion). These totals will continue to increase. There will be additional insured losses to agriculture. The overall economic toll – including uninsured or underinsured damage – will be well into the billions (USD). **This will likely end as one of Australia's costliest flood-related events on record**.

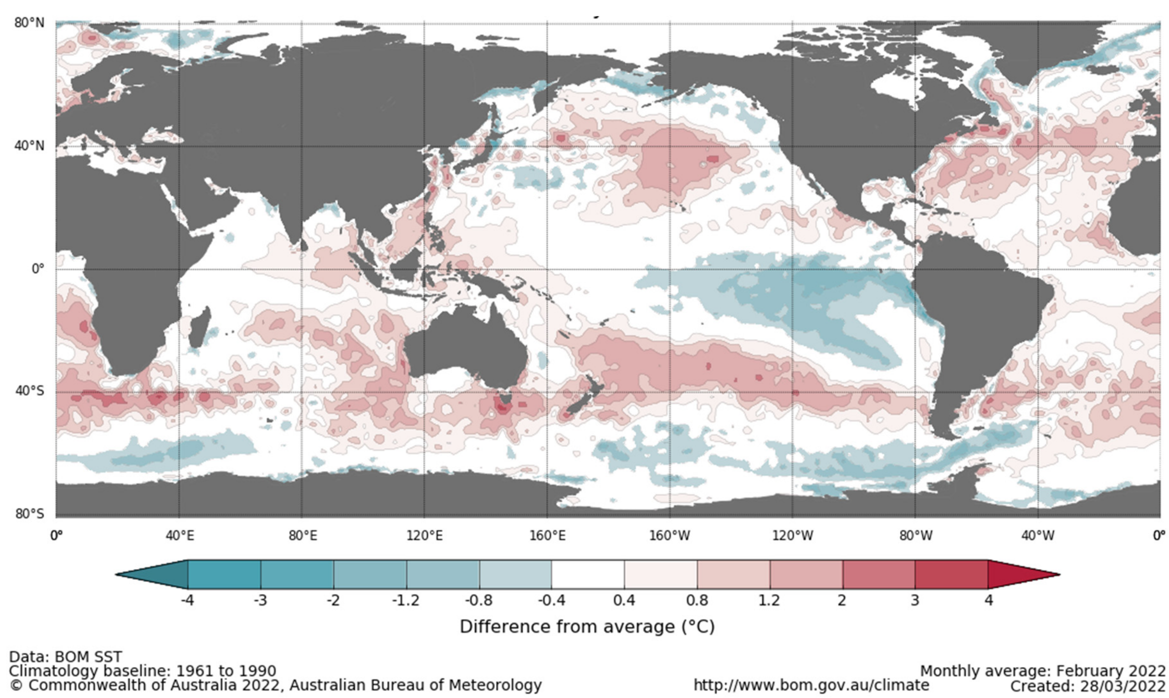
The influence of climate change continues to become increasingly evident in the behavior of individual events. This is especially clear in heavy precipitation events as warming temperatures in the air and in the oceans allow the atmosphere to hold more moisture which can fall to the surface. In the context of damage loss costs, the growth of population and exposure into high-risk areas continues to enhance damage potential. Most recent census surveys in the Brisbane and Sydney metro regions show that the housing stock had increased by 20 percent (Brisbane) and 13 percent (Sydney) in the last decade alone.

State/ Region	Census	Census (2006)	Census (2011)	Census (2016)
Greater Brisbane	Population	1,852,501	2,065,998	2,270,800
	Housing	694,335	763,027	833,399
Greater Sydney	Population	4,119,190	4,391,673	4,823,991
	Housing	1,521,462	1,601,530	1,719,678

Final Thoughts
The El-Niño Southern Oscillation (ENSO) has a very robust influence on Australia's year-to-year climate variability. In 2021, a "double-dip" La Niña brought record rainfall across eastern Australia in March and November. La Niña conditions then extended into early 2022. Strengthened trade winds and warmer ocean waters created a favorable environment for an extreme weather pattern along the East Coast.

It is also worth noting of the correlation between ENSO phase and the Southern Annular Mode (SAM). During La Niña years, SAM is usually in the positive phase. This set-up further positions the steering ridge of high pressure southward in the South Pacific Ocean and allows more moist tropical onshore winds along the East Coast of Australia. This pattern was evident in late February and March 2022.

Exhibit 9: Difference from Average Sea Surface Temperature Observations in February 2022

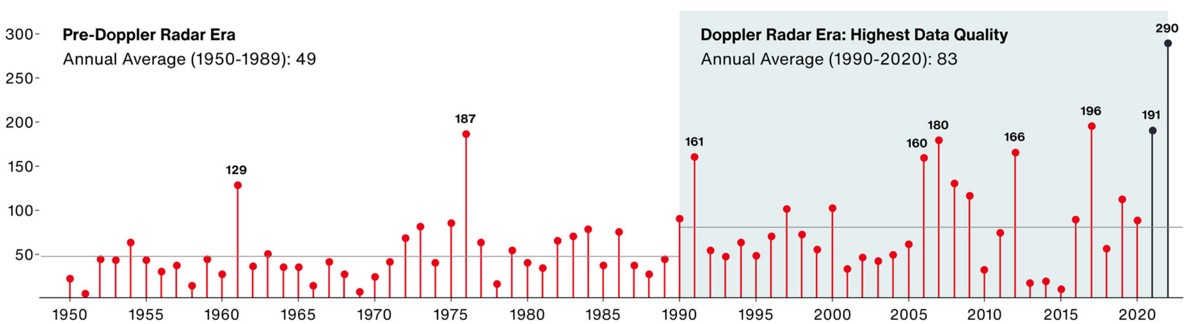


Record March Tornadoes Lead High US SCS Loss

The United States had a relatively benign winter weather season with only a handful of notable Nor'easter events that caused widespread damage along the East Coast. There were no events that matched the scope of the February 2021 Polar Vortex which resulted in more than $15 billion in insured losses alone. While winter weather may have been manageable, the presence of La Niña conditions again initiated an earlier start to severe weather season. The month of March proved to be exceptionally busy throughout the United States and featured numerous severe convective storm (SCS) outbreaks that resulted in deadly tornadoes, very large hail, and strong straight-line winds.

According to data from the Storm Prediction Center (SPC) there were at least 290 tornado Local Storm Reports (LSRs), of which 222 have thus far been unofficially confirmed via National Weather Service (NWS) surveys. This was well above the Doppler radar era (1990-2020) average of 83 and marked the first time that the month of March surpassed the 200-tornado threshold. In total, there were at least 354 tornado LSRs in Q1 (and 265 unofficially confirmed). Twelve (12) tornado fatalities occurred.

Exhibit 10: U.S. March Tornadoes



Data: NOAA Graphic: Aon (Catastrophe Insight) Note: 2021 & 2022 LSR data is preliminary and subject to change upon NOAA final confirmation

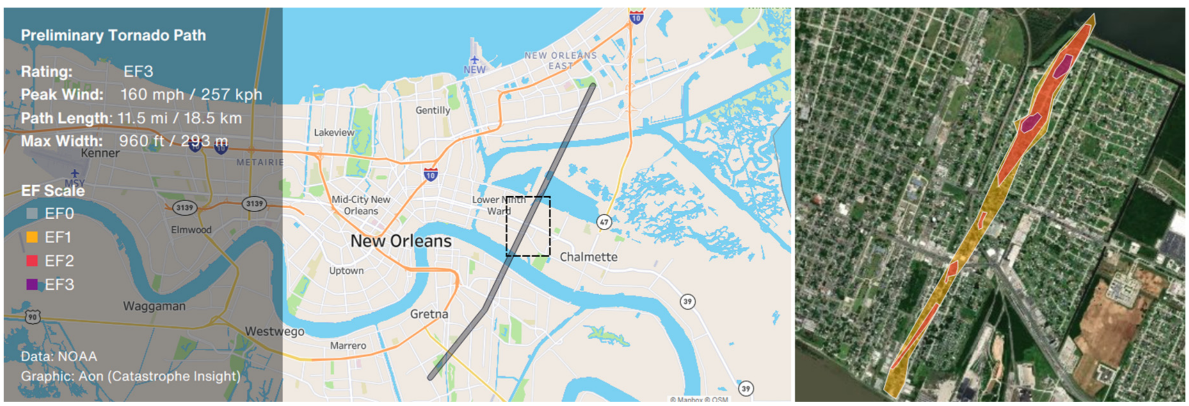
The month of March is typically the transitional start of peak U.S. severe weather season. The "peak" months from March through June cover the most of tornadoes, hail, damaging straight-line winds, and resultant financial losses from the SCS peril. As noted previously, La Niña conditions are known to enhance the frequency of springtime hail and tornado outbreaks across the U.S. Plains and Southeast. This occurs as La Niña tends to shift the trajectory of the jet stream further south and eastward and create more favorable environmental conditions which support more early season storm formation.

The role of climate change with severe convective storms remains uncertain. There has yet to be any obvious change in the annual number of tornadoes and hail or non-tornadic wind reports. Emerging academic research and climate model projections are, however, beginning to suggest more favorable environmental days for outbreaks to occur. The increased frequency of La Niña events in the last 30 years has shown this to be an accompanying issue to any climate influence. All of this is true within the context of population migration patterns moving further into highly vulnerable SCS areas from the Rockies to the Deep South. *Impact Forecasting recently announced a new collaboration with the University of Illinois and Central Michigan University to integrate new climate change research directly into its United States SCS catastrophe model.*

March SCS Outbreaks

The month of March featured several significant SCS and tornado outbreaks across the central, eastern, and southern United States. Iowa, Texas, Mississippi, Louisiana, and Alabama were the hardest hit. The **strongest tornado of the year to-date was a long-tracked EF4 tornado with up to 170 mph (275 kph) winds in Iowa on March 5**. The twister resulted in extensive damage in Madison County near the town of Winterset along its 70 mi (112 km) path. This represented the second-longest tornado path observed in Iowa since 1980. This was one of at least 14 confirmed Iowa tornadoes on March 5 that left at least seven people dead. The March 5 outbreak was the second highly anomalous tornado outbreak to affect Iowa during early and late winter months. An outbreak on December 15, 2021 spawned 63 tornadoes. **No other state had more tornadoes from Dec 1, 2021 to Mar 5, 2022 than Iowa**.

Exhibit 11: March 22 Arabi Tornado in New Orleans



The state of Louisiana was also heavily impacted by tornado activity in March, including metro New Orleans on March 22. A confirmed EF3 tornado with up to 160 mph (260 kph) winds left extensive impacts in New Orleans' Arabi neighborhood and adjacent Lower Ninth Ward. More than 150 homes and other structures were damaged to varying degrees. The tornado became the strongest on record to touch down in either Orleans, Jefferson, or St. Bernard Parishes.

Yet another major SCS outbreak that featured a confirmed 85 tornadoes swept across the central and eastern United States from March 29-31. The twisters were part of an expansive storm system that was marked by an elongated linear cluster of thunderstorms that additionally brought extensive straight-line wind damage from Texas to the Mid-Atlantic States. **The combined cost of Q1 U.S. SCS activity was expected to result in a multi-billion-dollar loss for the insurance industry**. The country is well on its way to recording its 15th consecutive year with insured SCS losses topping $10 billion.

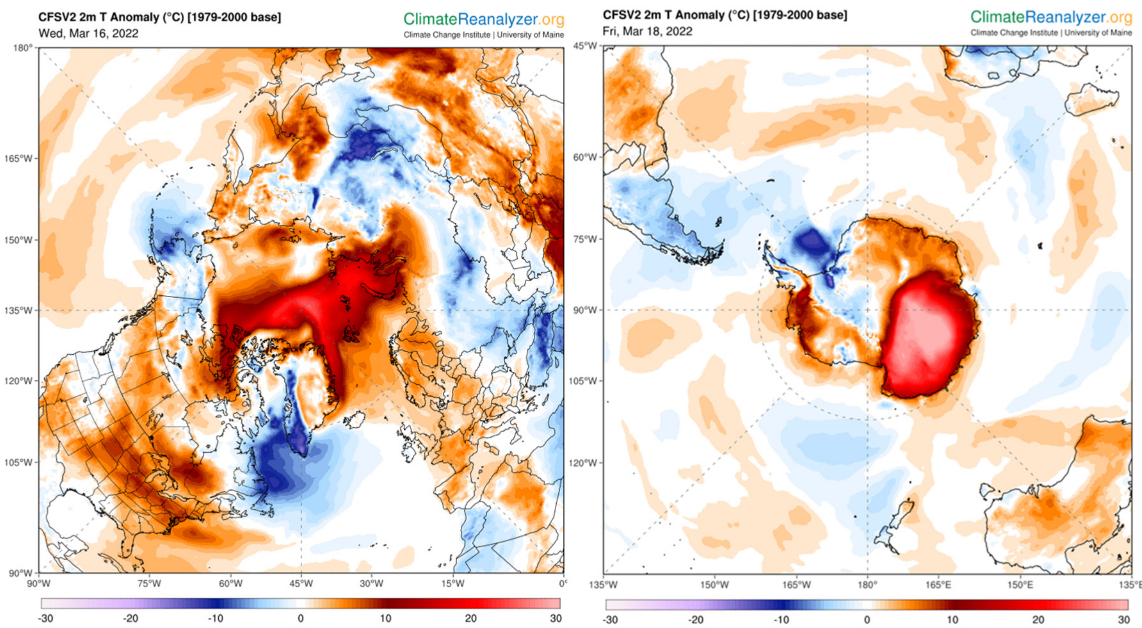
Final Thoughts

Perhaps the biggest takeaway of Q1 U.S. SCS activity was storm damage occurring in areas still recovering from previous disasters. This was especially true in New Orleans, where the March 22 tornado struck areas that still had tarp-covered roofs due to Hurricane Ida's landfall in August 2021. The **compounded nature of natural hazard events will only become more pronounced in the future**. This will amplify the importance of disaster planning and smart rebuilding efforts to mitigate against the next inevitable waves of natural hazard occurrences.

Extreme Warmth Engulfs Antarctica & the Arctic

Record-setting temperature events have become more pronounced in recent years. The Earth's poles often receive lots of attention given the Arctic and Western Antarctica are two areas that are most vulnerable to some of the fastest rates of warming in the world. **March 2022 featured two extreme anomalous warming events that have fundamentally altered what climate scientists believed can and will be possible** at opposite ends of the Earth's poles.

Exhibit 12: Extreme temperature Anomalies measured over the Earth's Poles in mid-March 2022



Antarctica

An extraordinary warming event affected parts of eastern Antarctica from March 16-20, 2022. An atmospheric river, which originated near the southeast coast of Australia, helped bring mild and moist air across eastern Antarctica. While this phenomenon was not new, the intensity of the warm air advection was kept in place by a blocking ridge of high pressure. This allowed **an area from the Adélie Coast to well inland on the continent's eastern ice sheet to experience temperature anomalies from 30 to 50°C (56 to 90°F) warmer than normal**. The Vostok measuring station broke its all-time March temperature record by 15°C (27°F) – an enormous record-breaking differential based on 65 years of data. The record warmth was especially unusual given this is a time of year where sunlight is still nearly constant during the day and ground snow typically reflects heat back towards the sky; not absorb it.

The warmth led to notable sea ice extent melt across much of the continent. After a period of Antarctic sea ice expansion in late 2021, including above-average spatial extent coverage on September 1, there was a notable reversal in Q1 2022. The extent decreased to a minimum of 1.91 million km^2 (0.74 million mi^2) on February 25. This was the first time that the extent fell below 2 million km^2 (0.77 mi^2) since satellite records began in 1979. However, two regions of high interest to researchers, Thwaites Glacier, and the central Weddell Sea, remained largely unaffected.

Arctic / North Pole

On the opposite side of the globe, and what occurred only days earlier on March 16, was another significant anomalous warming event in the Arctic. An atmospheric river event brought a plume of warm and moist air from the North Atlantic Ocean and far north into the Arctic Ocean. An associated area of low pressure quickly deepened as it neared Greenland and the 934.1 millibar pressure reading at Ikermiuarsuk became the country's lowest pressure reading on record; surpassing the previous record of 936.2 millibars set in 1986 and 1988.

The deep low was countered by a very strong mid-latitude ridge of high pressure across the North Pole. This allowed warm air advection to penetrate the Arctic Circle and **bring temperatures as much as 30°C (56°F) warmer than normal**. Temperatures at the North Pole were remarkably near 0°C (32°F), and the city of Svalbard, Norway – one of the northern-most cities in the world – set an all-time March record with a high temperature of 5.6°C (42°F).

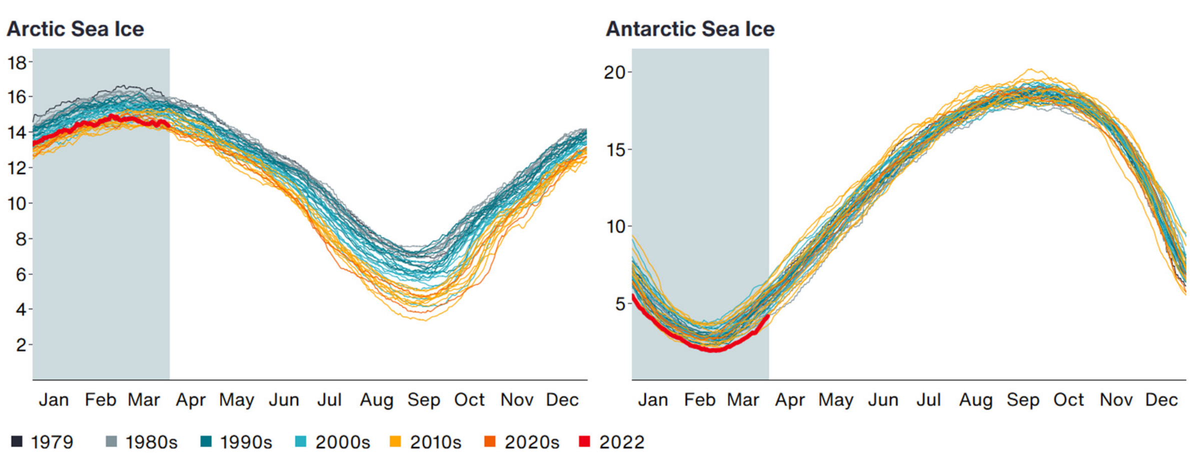
The warmth initiated notable rainfall and precipitation across the Arctic Circle and Greenland which aided in an acceleration of sea ice melt.

Final Thoughts

The Arctic remains at the forefront of global warming. A 2021 NOAA report found that **the Arctic is warming at a rate two to three times faster than the rest of the world**. The continuation of the extreme anomalous warming events as seen in March 2022 **will only accelerate the warming trend and the rate of sea ice melt that is already contributing to more rapid sea level rise**. While Antarctica has not shown the same rate of warmth and sea ice melt as the Arctic, any additional disturbance to the climate system across the Southern Hemisphere will only lead to greater effects to global circulation patterns.

The graphic below highlights daily sea ice readings in the Arctic and Antarctic dating to 1979. It is clear to see that the Arctic has shown marked melting in the past four decades. Antarctica had a period of sea ice expansion in the early 2010s, but there has since been a significant reversal in 2022. It is important to note that sea ice extent, while important, is not as critical of a metric as sea ice age and thickness. Older and thicker ice signifies healthier ice.

Exhibit 13: Arctic and Antarctic Sea Ice Extent (million km²)



Data: NOAA/NASA. Graphic: Aon (Catastrophe Insight)

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IPCC: Limited Time Left to Make Meaningful Change

The United Nations Intergovernmental Panel on Climate Change (IPCC) released two remaining parts of the Sixth Assessment Report (AR6) during Q1 2022. AR6 assesses the current state of the scientific, technical, and socioeconomic knowledge on climate change, and provides suggestions to reduce the rate at which climate change is taking place. Three different Working Groups (WGs) composed three AR6 parts: 1) WGI: The Physical Science Basis released in 2021 (see Aon's 2021 Weather, Climate and Catastrophe Insight for summary findings), 2) WGII: Impacts, Adaptation and Vulnerability published in February 2022, and 3) WGIII: Mitigation of Climate Change published in April 2022.

Primary WGII report takeaways:

- Approximately 3.3 to 3.6 billion people (42-46 percent of the world population) live in the conditions that are highly vulnerable to climate change
- Near-term actions (2022-2040) to keep global warming close to 1.5°C (2.7°F) above the pre-industrial baseline can still lead to a reduction in projected climate change-related losses and damage
- Mid to long-term (2041-2100) risks related to climate change depend strongly on near-term mitigation and adaptation actions
- Projected climate-related losses escalate with every additional increment of global warming; meaning that further warming will lead to compounding overall risk levels
- Adaptation, planning, and implementation need to be three key fundamental aspects to climate change preparedness and can lead to significant societal and ecological protection
- The most vulnerable communities with the lowest income will need greater global influence to take the steps required to build their own levels of resilience against worsening disasters
- Observed climate-change related events and subsequent impacts to lives and livelihoods have been accelerating at a faster rate than originally anticipated; this highlights the urgency of the situation
- **It is not too late to change emission outputs and human behavior that can bring meaningful near-, medium-, and long-term improvements to the world**

Primary WGIII report takeaways:

- All adaptation and mitigation efforts and strategies need to be done on a global level to tackle climate change efficiently
- We are not on track to limit warming to 1.5°C (2.7°F) but there is increased evidence of climate action. Global greenhouse gas emissions should peak before 2025 and need to be reduced by 43 percent by 2030 to limit warming to 1.5°C (2.7°F)
- Accelerated climate action is critical to sustainable development
- Technology and innovations are important drivers that are still limited in developing countries, particularly in the least developed countries
- **We know what to do, we know how to do it, and now it is time to implement our knowledge because we are still not doing enough**

Appendix: 2022 Data

United States

Date	Event	Location	Deaths	Economic Loss
01/01-12/31	DR	Nationwide	NA	850+ million
01/02–01/03	WW	Southeast, Mid-Atlantic	5	495+ million
01/08–01/09	SCS	Plains, South	0	60+ million
01/14–01/17	WW	Southeast, Mid-Atlantic	3	600+ million
01/21–01/22	SCS	California	0	175+ million
01/28–01/30	WW	Mid-Atlantic, Northeast	4	50+ million
02/01–02/05	WW	Rockies, Plains, Mid-Atlantic, Northeast	10	350+ million
02/16–02/18	WW	Plains, South, Mid-Atlantic, Northeast	0	350+ million
02/21-02/22	SCS	Plains, South	0	425+ million
03/05-03/07	SCS	Midwest, Mid-Atlantic, Northeast	8	500+ million
03/11-03/13	SCS	South, Mid-Atlantic	0	220+ million
03/14–03/16	SCS	Plains, South	0	345+ million
03/17–03/19	SCS	Plains, South	0	35+ million
03/17-03/25	WF	Texas	1	Millions
03/21-03/23	SCS	Plains, South	5	100s of millions+
03/29-04/01	SCS	Plains, South	2	100s of millions+
03/30-04/01	WF	Tennessee	0	10s of millions

Remainder of North America (Non-U.S.)

Date	Event	Location	Deaths	Economic Loss
01/24	EQ	Haiti	2	Millions
01/30-01/31	FL	Haiti, Dominican Republic	5	Millions
02/17-02/19	WW	Canada	0	200+ million
03/06	WW	Canada	0	Millions

South America

Date	Event	Location	Deaths	Economic Loss
01/01-12/31	DR	Argentina	NA	500+ million
01/01-12/31	DR	Brazil	NA	500+ million
01/01-01/14	FL	Brazil	15	50+ million
01/15-02/28	WF	Argentina	0	100s of millions
01/16-01/17	FL	Brazil, Uruguay	0	Millions
01/27-01.30	FL	Brazil	31	65+ million
01/28-01/31	FL	Ecuador	25	Millions
02/07-02/09	SCS	Brazil	0	20+ million
02/08	FL	Colombia	16	Millions
02/15-02/16	FL	Brazil	232	25+ million
02/18-02/19	FL	Colombia	1	Millions
03/01 – 03/31	FL	Colombia	19	10s of millions

Europe

Date	Event	Location	Deaths	Economic Loss
01/12-01/13	WS Gyda	Norway	0	14+ million
01/16-01/17	WS Hannelore	Northern, Eastern & Central Europe	0	113+ million
01/29-01/30	WS Malik	Western, Northern & Central Europe	7	415+ million
01/30-01/31	WS Corrie	Western Europe	0	19+ million
02/03-02/06	WW	Austria, Switzerland	11	Negligible
02/06-02/07	WS Roxanna	Western & Central Europe	0	155+ million
02/16-02/17	WS Dudley	Western & Central Europe	7	863+ million
02/18-02/19	WS Eunice	Western & Central Europe	17	4.1+ billion
02/20-02/21	WS Franklin	Western & Central Europe	0	754+ million

Middle East

Date	Event	Location	Deaths	Economic Loss
01/01-01/06	FL	Oman, Iran	14	95+ million
02/13	FL	Oman	1	7+ million
03/17	EQ	Iran	0	35+ million

Africa

Date	Event	Location	Deaths	Economic Loss
01/01-12/31	DR	Somalia	NA	200+ million
01/01-12/31	DR	Kenya	NA	200+ million
01/01-12/31	DR	Ethiopia	NA	200+ million
01/01-01/25	FL	Rwanda	15	Negligible
01/08-01/09	FL	South Africa	10	66+ million
01/13-01/20	FL	Zambia	3	Millions
01/15-01/16	FL	South Africa	1	99+ million
01/17	FL	Madagascar	10	Negligible
01/21-01/31	FL	Democratic Republic of the Congo	0	Millions
01/21-02/02	SCS	Democratic Republic of the Congo	26	Negligible
01/22-01/25	TS Ana	Madagascar, Mozambique, Malawi	142	25+ million
02/02-02/07	CY Batsirai	Madagascar, Mauritius, Reunion	123	190+ million
02/15-02/16	CY Dumako	Madagascar	14	Millions
02/22-02/24	CY Emnati	Madagascar	14	Millions
03/08-03/18	CY Gombe	Madagascar, Mozambique, Malawi	72	95+ million

Asia

Date	Event	Location	Deaths	Economic Loss
01/01-01/06	FL	Pakistan, Afghanistan	14	5+ million
01/02	EQ	China	0	51+ million
01/06-01/19	FL	Indonesia	11+	Millions
01/07-01/08	WW	Pakistan	23+	Negligible
01/08	EQ	China	0	510+ million
01/14	EQ	Indonesia	0	Millions
01/17	EQ	Afghanistan	28+	Negligible
01/20-01/24	WW	China	0	100+ million
01/20-01/25	FL	Pakistan	12+	Negligible
01/22	EQ	Japan	0	50+ million
01/25-01/29	WW	China	0	170+ million
02/01-02/03	WW	China	0	180+ million
02/05-02/09	WW	China	0	149+ million
02/06	WW	Afghanistan	15+	Negligible
02/10-02/16	FL	Indonesia	1	Millions
02/11-02/14	WW	China	0	287+ million
02/16-02/22	WW	China	0	756+ million
02/25	EQ	Indonesia	18+	Millions
02/25-03/02	FL	Malaysia, Thailand	12+	Millions
03/14–03/18	SCS	China	0	89+ million
03/16	EQ	Japan	4+	Billions
03/20-03/22	SCS	China	0	23+ million

Oceania

Date	Event	Location	Deaths	Economic Loss
01/08-01/13	FL	Australia	2+	75+ million
01/15-01/16	VL	Tonga, Pacific Rim	3+	125+ million
02/09-02/13	CY Dovi	New Zealand, Vanuatu, New Caledonia	0	80+ million
02/23-03/31	FL	Australia	22+	4.0+ billion
03/20-03/21	SCS	New Zealand	0	10s of millions

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Additional Report Details

All financial loss totals are in US dollars ($) unless noted otherwise.

DR = Drought, EQ = Earthquake, WS = EU Windstorm, FL = Flooding, SCS = Severe Convective Storm, TC = Tropical Cyclone, WF = Wildfire, WW = Winter Weather, VL = Volcano

TD = Tropical Depression, TS = Tropical Storm, HU = Hurricane, TY = Typhoon, STY = Super Typhoon, CY = Cyclone

Fatality estimates as reported by public news media sources and official government agencies.

Structures defined as any building – including barns, outbuildings, mobile homes, single or multiple family dwellings, and commercial facilities – that is damaged or destroyed by winds, earthquakes, hail, flood, tornadoes, hurricanes, or any other natural-occurring phenomenon. Claims defined as the number of claims (which could be a combination of homeowners, commercial, auto and others) reported by various public and private insurance entities through press releases or various public media outlets.

Damage estimates are obtained from various public media sources, including news websites, publications from insurance companies, financial institution press releases and official government agencies. Damage estimates are determined based on various public media sources, including news websites, publications from insurance companies, financial institution press releases, and official government agencies. Economic loss totals are separate from any available insured loss estimates. An insured loss is the portion of the economic loss covered by public or private insurance entities. In rare instances, specific events may include modeled loss estimates determined from utilizing Impact Forecasting's suite of catastrophe model products.

Contact Information

Steve Bowen
Managing Director
Head of Catastrophe Insight
steven.bowen@aon.com

Brian Kerschner
Senior Catastrophe Analyst
brian.kerschner@aon.com

Ondřej Hotový
Catastrophe Analyst
ondrej.hotovy@aon.com

Michal Lörinc
Senior Catastrophe Analyst
michal.lorinc@aon.com

Jin Zheng Ng
Senior Catastrophe Analyst
jin.zheng.ng@aon.com

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