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sigma

Natural catastrophes and man-made disasters in 2014: convective and winter storms generate most losses

Executive summary

There were a record 189 natural catastrophe events in 2014.

In 2014, there were 336 disaster events. Of these, 189 were natural catastrophes, the highest ever recorded, and 147 were man-made disasters. More than 12 700 people lost their lives or went missing in the disasters.

Globally, total losses from all disaster events were USD 110 billion in 2014, with most in Asia.

The total economic losses generated by natural catastrophes and man-made disasters in 2014 were around USD 110 billion, down from USD 138 billion in 2013 and well below the inflation-adjusted average of USD 200 billion for the previous 10 years. Asia was hardest hit, with cyclones in the Pacific creating the most losses. Weather events in North America and Europe caused most of the remaining losses.

Insured losses were USD 35 billion, driven largely by severe thunderstorms in the US and Europe, and harsh winter conditions in the US and Japan.

Insured losses were USD 35 billion, down from USD 44 billion in 2013 and well below the inflation-adjusted previous 10-year average of USD 64 billion. As in recent years, the decline was largely due to a benign hurricane season in the US. Of the insured losses, USD 28 billion were attributed to natural catastrophes and USD 7 billion to man-made events. In the US and Europe, severe thunderstorms (also known as severe convective storms) triggered many of the insurance claims. Harsh winters in the US and in Japan were the other major cause of claims in 2014.

The number of victims of disaster events in 2014 was one of the lowest on record.

The number of victims of disaster events in 2014 was one of the lowest recorded, even though the number of natural catastrophes was the highest ever in a single year. Improvements in early warning systems and emergency preparedness meant fewer victims than otherwise may have been. Progress in local prevention and mitigation measures to strengthen resilience will be a key variable in total victim numbers in the future, especially if climate change leads to more frequent natural catastrophe events.

Losses from severe convective storms have been rising, increasing the need for more sophisticated risk modelling tools.

Severe convective storms[1] include tornadoes, hail, thunder and lightning, heavy rains and flash floods, and pose a significant threat to modern societies. The localised nature of the storms means they can cause considerable damage to crops, and also to properties and vehicles when they hit densely populated areas. This *sigma* includes a special chapter on severe convective storms and the trend of rising insurance losses therefrom. Increasing exposures as a result of economic development and the associated population expansion and urbanisation, among other factors, suggest that losses from severe weather events may well continue on an upward path. This calls for more sophisticated modelling techniques of the risks posed by the different sub-perils in the severe convective storm family.

[1] The criteria to classify a convective storm as "severe" is generally the threshold where damage is likely to to occur, typically winds of 90 km/56 miles per hour and/or hail of 2 cm/1 inch in diametre or more.

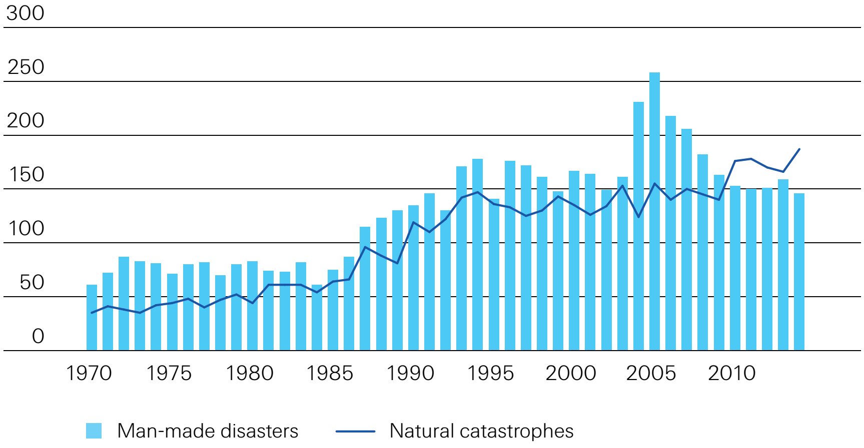
Catastrophes in 2014: global overview

Number of events: 336

There were 189 natural and 147 man-made disasters in 2014.

Based on *sigma* criteria, there were 336 catastrophe events in 2014, up from 325 in 2013. Of the total, 189 were natural catastrophes, the highest ever recorded in one year, and up from 166 in 2013. There were 147 man-made disaster events last year, down from 159 in 2013.

Figure 1
Number of catastrophic events, 1970–2014



Source: Swiss Re Economic Research & Consulting and Cat Perils.

What makes a catastrophe?

In *sigma* terminology, an event is classified as a catastrophe and included in the *sigma* database when insured claims, total losses or the number of casualties exceed certain thresholds. The following table details those thresholds.

Table 1
The sigma event selection criteria, 2014

Insured loss thresholds		
	Maritime disasters	19.6 million
	Aviation	39.3 million
	Other losses	48.8 million
or Total economic loss threshold		97.6 million
or Casualties		
	Dead or missing	20
	Injured	50
	Homeless	2000

Source: Swiss Re Economic Research & Consulting and Cat Perils.

Number of victims: 12 777

Last year ranks as the 40th most deadly year on *sigma* records.

In 2014, more than 12 700 people lost their lives or went missing in natural and man-made catastrophe events, one of the lowest totals ever recorded, even though the number of natural disasters was the highest ever recorded in a single year. The number of lives lost was nearly half the number in 2013 and well below the yearly average of around 66 000 deaths since 1990. An earthquake in Yunnan, China in August caused the most loss of life: at least 731 people died or went missing.

More than 7000 people died in natural catastrophes in 2014.

Globally more than 7 000 people were killed or went missing in natural disasters in 2014, the majority in earthquakes, floods and other severe weather events. In addition to the China earthquake, monsoon flooding in the state of Jammu and Kashmir in India and nearby regions of Pakistan claimed 665 lives. Freezing conditions also took their toll. According to official statistics, there were 505 deaths in Peru, mainly of children and the elderly due to very low temperatures. Elsewhere, many people died in flooding and landslides in Afghanistan, Nepal and Sri Lanka.

There were around 5700 deaths in man-made events, many in maritime disasters.

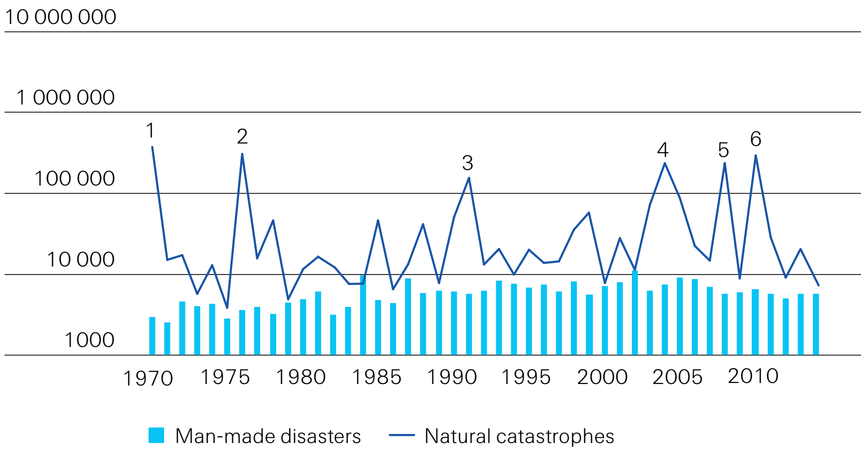
Man-made disasters claimed roughly 5 700 lives, about the same number as in 2013. The sinking of a passenger ferry in South Korea killed most, with 304 deaths from drowning. Overall, maritime disasters claimed 2 118 victims in 2014, almost double the previous year's number. Many refugees from war-torn lands died as the boats they boarded in search of a better life sank.

Aviation and terrorism also claimed a high number of victims.

Other man-made disasters claiming a high number of victims included a fire in a coal mine in Turkey (301 deaths), an aircraft crash in Ukraine (298) and one in the Indian Ocean (239). Together aviation losses claimed 960 lives, more than five times the previous year's toll. Terrorism attacks in different parts of the world claimed 1 361 lives, up from 1192 in 2013. Major fires and explosions took 490 victims, a quarter of the previous year.

Figure 2
Number of victims, 1970–2014

1 1970: Bangladesh storm
2 1976: Tangshan earthquake, China
3 1991: Cyclone Gorky, Bangladesh
4 2004: Indian Ocean earthquake and tsunami
5 2008: Cyclone Nargis, Myanmar
6 2010: Haiti earthquake



Note: Scale is logarithmic: number of victims increases tenfold per band.
Source: Swiss Re Economic Research & Consulting and Cat Perils.

Total economic losses: USD 110 billion

Total losses in 2014 were well below the 10-year average.

Estimated total economic losses[2] from natural catastrophes and man-made disasters were USD 110 billion in 2014, down from USD 138 billion in 2013 and well below the inflation-adjusted average of USD 200 billion of the previous 10 years. Disaster losses in 2014 were 0.14% of gross domestic product (GDP), below the 0.30% annual average of the previous 10 years.

Natural catastrophe-related losses were around USD 101 billion.

Natural catastrophe-related losses were around USD 101 billion in 2014, stemming mostly from floods, tropical cyclones and severe convective storms in Asia, North America and Europe.

Table 2
Total losses, in USD billion and as a % of GDP, 2014

Regions	in USD bn*	in % of GDP
North America	29	0.15%
Latin America & Caribbean	8	0.15%
Europe	16	0.07%
Africa	1	0.06%
Asia	52	0.21%
Oceania/Australia	2	0.14%
Seas / space	2	
Total	**110**	**0.14%**
10-year average **	200	0.30%

* rounded numbers
** inflation adjusted
Source: Swiss Re Economic Research & Consulting and Cat Perils.

Man-made disasters generated USD 9 billion in total losses.

Man-made disasters are estimated to have caused USD 9 billion of the total losses of USD 110 billion in 2014, little changed from the year before.

[2] From hereon, referred to as "total losses".

Insured losses: USD 35 billion

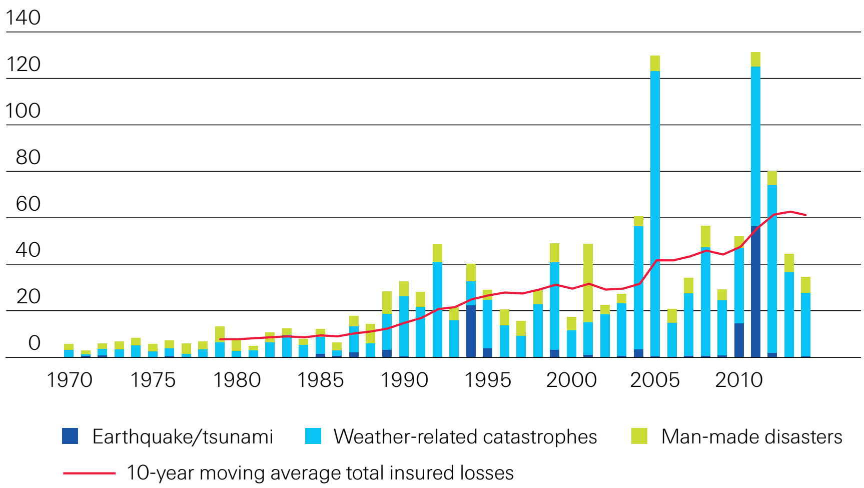
Natural catastrophe insured losses were below average last year …

The insurance industry covered an estimated USD 35 billion, or one-third of the total losses from natural and man-made disasters in 2014. Natural catastrophes resulted in claims of USD 28 billion, the lowest since 2009 and about half the previous 10-year inflation-adjusted average (USD 58 billion). Large man-made disasters led to claims of USD 7 billion, down from USD 8 billion in 2013.

… and equivalent to 0.04% of GDP.

Relative to GDP and direct non-life premiums written (DPW), the 2014 natural catastrophe losses were 0.04% of GDP and 1.8% of DPW, below the respective previous 10-year annual averages of 0.08% and 3.8%.

Figure 3
Insured catastrophe losses, 1970–2014, in USD billion at 2014 prices



Source: Swiss Re Economic Research & Consulting and Cat Perils.

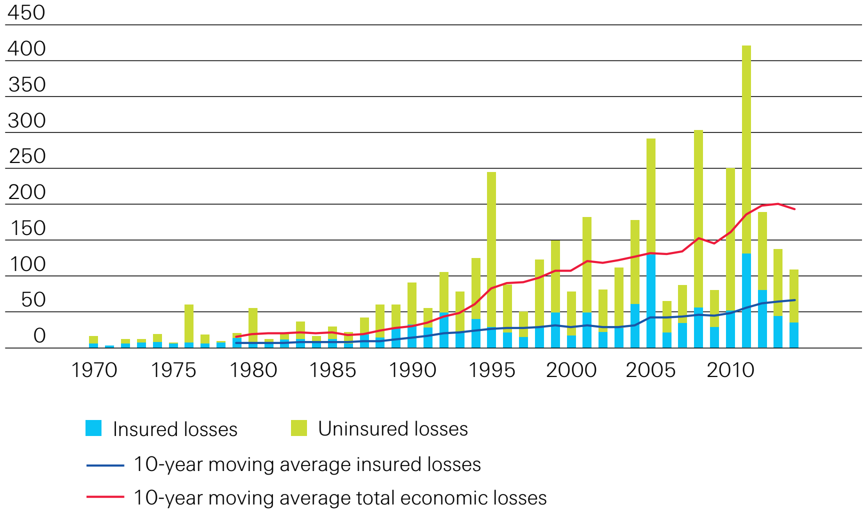
The largest single insured-loss event was in US.

Nine disasters triggered insured claims of USD 1 billion or more in 2014 (see Table 6 on page 22). A severe convective storm with wind and hail over a five-day period in the US in May was the single most expensive event of the year, causing an estimated USD 2.9 billion in insured losses. The second costliest was a winter storm in Japan, with claims of USD 2.5 billion. Hail and wind storm Ela in Europe in June led to insured losses of USD 2.2 billion, and Hurricane Odile in Mexico in September a further USD 1.7 billion.

The global insurance protection gap was USD 75 billion in 2014.

Figure 4 shows the difference between insured and total losses over time. The difference is defined as the insurance protection or funding gap. It is the amount of financial loss generated by catastrophes not covered by insurance. In 2014, the global protection gap was USD 75 billion. The rate of growth of total losses has outpaced the growth of insured losses. In terms of the 10-year moving average, insured losses grew at 10.7% between 1979 and 2014, and total losses by 11.4%.

Figure 4
Insured vs uninsured losses, 1970–2014, in USD billion in 2014 prices



Total losses = insured + uninsured losses
Source: Swiss Re Economic Research & Consulting and Cat Perils.

The protection gap can be narrowed with greater insurance penetration.

Economic development, population growth, a higher concentration of assets in exposed areas and a changing climate are increasing the economic cost of natural disasters. The above, if not accompanied by a commensurate increase in insurance penetration, will likely result in a widening protection gap over the long term.

Regional overview

The highest insured losses in 2014 were in North America and Europe.

Severe thunder (or convective) storms and hard winter conditions in the US and Europe caused the biggest insurance losses globally in 2014. In Asia, Cyclone Hudhud and other major storms led to the highest losses in the region, while an earthquake in China and monsoon floods in India and Pakistan took most lives.

Table 3
Number of events, victims, economic and insured losses by region, 2014

				Insured losses		Total loss	
Region	**Number**	**Victims**	**in %**	**in USD bn**	**in %**	**in USD bn**	**in %**
North America	51	206	1.6%	17.5	50.4%	28.6	26.0%
Latin America & Caribbean	31	883	6.9%	2.3	6.5%	8.2	7.4%
Europe	37	763	6.0%	6.6	19.1%	15.9	14.5%
Africa	47	2506	19.6%	0.8	2.3%	1.5	1.3%
Asia	130	7093	55.5%	5.2	15.0%	51.7	47.0%
Oceania/Australia	7	206	1.6%	1.0	2.9%	2.3	2.1%
Seas / space	33	1120	8.8%	1.3	3.8%	1.7	1.5%
World	336	12 777	100.0%	34.7	100.0%	109.9	100.0%

Source: Swiss Re Economic Research & Consulting and Cat Perils.

North America

In North America, the biggest losses came from convective activity and winter storms.

In North America, insured losses were USD 17.5 billion in 2014, the highest of all regions. Losses were primarily caused by convective activity and by a series of winter storms in the US. Five independent events each caused insured losses of USD 1 billion or above, all of them in the US. Canada experienced relatively few catastrophes last year.

Tornadoes and hail in May and June caused major damage.

In mid-May, a spate of severe convective storms over a five-day period brought large hail and strong winds across the Rockies, Midwest and Eastern states, with Pennsylvania, Colorado and Illinois the worst hit. The storms caused USD 2.9 billion in insured losses, the most from a single weather event in the year. Another hail event in June also caused significant damage to property and agriculture, particularly in Nebraska. There was also a tornado outbreak which, with the hail storms, caused overall combined insured losses of USD 1.3 billion. Central Nebraska's corn and soybean crops suffered more damage in July, again because of hail. July is the most critical growth period for these crops.

The total number of tornadoes in the US in 2014 was well below the annual average …

Overall the number of recorded tornadoes in the US was below average for the third year running. The Storm Prediction Centre of the National Oceanic and Atmospheric Administration (NOAA) tallied 888 tornadoes in 2014, well below the yearly average of 1235 since 1990, and less than half the 1811 of the record season in 2004. Last year's number was also the lowest on record since the start of the Doppler radar era in the early 1990s.

… but even so, the year ranks fourth highest in terms of tornado-induced insurance losses.

Nevertheless, with an estimated USD 13 billion in insured losses from tornado outbreaks and thunderstorms, 2014 ranks as the fourth costliest year on *sigma* record in terms of insured losses from these perils. Four of the thunderstorm events caused losses of USD 1 billion or more, compared to three in 2013.

The losses from harsh winter conditions were above average.

It was an active winter season in the US in 2014, with multiple storms bringing heavy snowfall, icy winds and long periods of freezing temperatures. At the beginning of January, a storm caused widespread damage in 17 states, with snow falling as far south as Florida. The damage was estimated at USD 1.7 billion, and came mainly from burst frozen water pipes, ice weight and water damage to houses and businesses. Overall insured losses from winter weather damage in the US in 2014 were USD 2.4 billion, more than double the previous 10-years' annual average.

Heavy rainfall triggered severe flooding in parts of Northeast, and Arizona had its rainiest day on record.

In August, a slow-moving low pressure system delivered rainfall in excess of 12.7 cm/5 inches, resulting in widespread flooding in several cities across Michigan, with the metro Detroit area worst affected. Flooding also occurred in Maryland and Long Island, New York, as part of the same weather system. In Islip, NY, a new 24-hour rainfall record was set. The preliminary estimate for the total damage was USD 1.6 billion, with approximately one third insured. A month later, on 8 September Phoenix, Arizona experienced its rainiest day on record.[3]

However, California had its driest year ever ...

The western US, however, had very little rain. California had its driest year on record in 2014. Following two consecutive dry years, a state of emergency was declared in January and state officials took all necessary actions to prepare for water shortages. As of late September, the US Drought Monitor classified 58% of California as experiencing "exceptional" drought, the worst category, with more than 80% in "extreme" drought conditions.[4]

... leading to an estimated total loss of USD 2.2 billion, mainly in agriculture.

California is a major producer of fruit, vegetables, nuts and dairy products. Its extensive system of water infrastructure and groundwater pumping helped counteract the water shortages. Even so, agriculture suffered an estimated total loss of USD 1.5 billion out of overall economic losses of USD 2.2 billion.[5] Private insured losses were limited by farmers' increasing reliance on the federal insurance program after the passage of the Federal Crop Insurance Act of 1980 and after 1995, when the catastrophic (CAT) option became available for specialty crops such as fruits, vegetables and tree nuts. Drought conditions still lingered in early 2015 and are expected to continue. As groundwater depletion is likely to increase the cost of irrigation, agriculture losses are expected to rise further.

The North Atlantic hurricane season was very quiet in 2014.

The 2014 Atlantic hurricane season produced eight named storms (13 in 2013), six of which became hurricanes (two in 2013). Two were major hurricanes (Category 3 or stronger on the Saffir-Simpson scale; there were none in 2013). Only Hurricane Arthur, the first named storm of the season, made US landfall last year. It was also the first Category 2 hurricane since Ike in 2008, according to the National Weather Service.[6] It caused power outages and limited flooding and damage. Last year was the ninth in succession (ie, since 2005) that no major hurricane made US landfall,[7] the longest stretch since the 1860s.

Stable weather conditions limited the formation of storms.

Overall in terms of numbers, collective strength and duration of named storms and hurricanes, 2014 ranks as the 10th-least active Atlantic hurricane season on record since 1950. According to the Climate Prediction Centre of the NOAA, the combination of stable atmospheric conditions and high wind shear in the large parts of the main hurricane generation region curbed the development of storms.

[3] *Record-breaking rain in Arizona*, NOAA,10 September 2014, http://www.climate.gov/news-features/event-tracker/record-breaking-rain-arizona
[4] R. Heim, *California*, US Drought Monitor, 20 September 2014, http://droughtmonitor.unl.edu/MapsAndData/MapArchive.aspx
[5] R. Howitt, Josué Medellín-Azuara, Duncan MacEwan et al., *Economic Analysis of the 2014 Drought for California Agriculture*, Center for Watershed Sciences, University of California, UC Agricultural Issues Center and ERC Economics, 23 July 2014, p 10, https://watershed.ucdavis.edu/files/biblio/DroughtReport_23July2014_0.pdf
[6] *Hurricane Arthur*, National Weather Service, 3–4 July 2014, http://www.weather.gov/mhx/Arthur
[7] Hurricane Sandy in 2012 produced the third-biggest loss ever from a storm event, but being rated Category 1 on the Saffir-Simpson scale, it is not considered a "major" hurricane. The damage wreaked was because of Sandy's very large size, which drove a strong storm surge into the affected areas on land.

The South Napa earthquake caused limited losses.

Earthquake South Napa, measuring 6.0 on the moment-magnitude (M_w) scale[8], struck just north of San Francisco on 24 August 2014. It was the most powerful in the San Francisco Bay Area since the 1989 Loma Prieta earthquake. The quake caused structural damage mainly to old unreinforced masonry buildings and also inventory damage, particularly in the numerous barrel storage facilities of the local wine industry. The estimated insured losses of USD 0.15 billion were limited by low insurance penetration in the region. In spite of the high exposure to seismic risk, insurance take-up in San Francisco County and in California overall is still very low, even for commercial properties.

In Canada, insured losses were below average ...

In Canada, the biggest loss-inducing natural disaster was a series of thunderstorms in Calgary, Alberta in mid-August, leading to insured losses of USD 0.46 billion. After record losses in 2013, it was a quiet year in terms of natural catastrophes in Canada.

... but 17 people died in a fire at a home for the elderly.

With respect to man-made disasters, a fire at a petrochemical plant in Texas, US caused the biggest insured loss. Another main event was a fire at an elderly home in Canada in January, which claimed 17 lives.

Europe

Hail, wind and flooding caused the heaviest losses in Europe.

Natural catastrophes and man-made disasters caused total losses of USD 15.9 billion in Europe in 2014. Insured losses were USD 6.6 billion. Most losses came from convective storms and heavy precipitation in several countries.

The Balkans were hit by devastating floods ...

During the third week of May, the low pressure system Yvette brought very heavy rainfall to Serbia, Bosnia and Croatia. For some areas, it was the heaviest downpour in 120 years. Several dams were broken and the ensuing floods and debris flows destroyed houses, infrastructure and crops. The devastation caused total losses of USD 3 billion, much of which was uninsured. Eighty-two people died, the largest loss of life from a natural catastrophe event in Europe last year.

... while severe hail and winds struck France, Belgium and Germany.

In early June, the low pressure system Ela brought severe hail storms to France and Belgium, and strong winds in Germany. After a period of above-average temperatures, the severe storms from northwest Europe moved south-eastwards, mixing with an influx of warm air and creating the conditions for strong winds, thunder, rainfall and hail. Damage was severe in parts of northern France, Belgium and north-west Germany. More than 600 000 houses and 500 000 vehicles were damaged, and the associated insured losses were USD 2.2 billion. Ela is the second most expensive convective storm event in Europe on *sigma* records after hail storm Andreas just one year earlier.

The risk of rising hail losses in Europe

Hail and other severe convective storms occur frequently in Europe.

Hail is a familiar hazard in Europe and one of the major drivers of residential, business and agricultural property damage. Areas of significant to high hail risk include central, eastern and southern Europe, including the Alps and the Pyrenees mountain regions. Hail storms can come in isolation or, more often, as part of more complex convective storms, which may also leave wind and flood damage. In Europe, hail and flash floods tend to be the main drivers of severe convective storms losses. In general, the limited spatial scale and lack of uniform detection methods of severe hail events limits full assessment of their impact beyond local damage reports.[9]

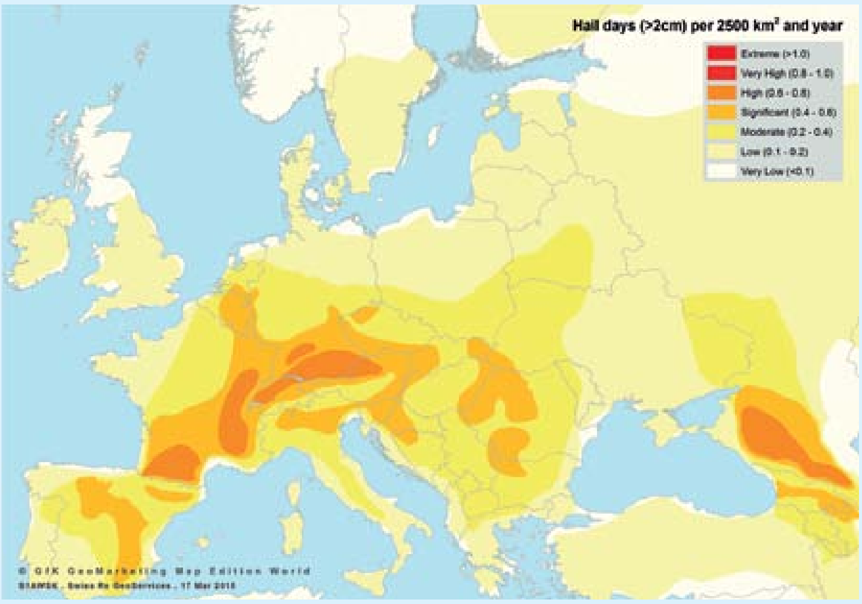
[8] The moment magnitude scale measures the scale of earthquakes based on the area of earth ruptured by a quake. For more see *Measuring the Size of an Earthquake*, US Geological Survey, http://earthquake.usgs.gov/learn/topics/measure.php

[9] H. J. Punge, K. M. Bedka, M. Kunz et al, "A new physically based stochastic event catalog for hail in Europe", *Natural Hazards*, vol 73 issue 3, September 2014, pp 1625–1645.

Hail risk is a standard component of building insurance in Europe ...

Nevertheless, hail risk is a standard component of building insurance in Western Europe, purchased as part of a package for protection against windstorm damage. The insurance penetration for these perils is above 75% in the region, except in Italy. In some countries (eg, France, Switzerland and Belgium), hail and wind storm insurance are compulsory, along with fire coverage,[10] which is why insured losses after hail storms can be high.

Figure 5
Hail hazard map in Europe



Source: Swiss Re CatNet®.

... and the loss potential has increased considerably recently.

The loss potential in Europe has been on an upward trend due to increased exposure from societal and economic development. In addition, average claim severity has risen because the modern building materials used for thermal insulation and energy generation systems are susceptible to damage from hail stones. The localised nature of hail events limits the overall losses, especially compared to winter storm losses, the biggest weather-event risk in Europe. But the loss experience of the last two years is a stark reminder that multi-billion-loss convective storm events do happen. Stronger mitigation measures in building construction, and more comprehensive risk modelling are needed.

Multiple low pressure systems from the North Atlantic led to a cluster of windstorms and heavy precipitation in northwest Europe.

The 2013–2014 winter windstorm season in Europe was very active, especially from early December 2013 to mid-February 2014. A series of low pressure systems triggered major losses in December 2013, and winter storms continued to flow into northwest Europe from the Atlantic well into 2014. Individually, the January and February storm events were not significant but their quick succession brought heavy rainfall and widespread inland flooding, particularly in the UK. The combination of strong winds coincided with peak high tides, leading to coastal inundations that exacerbated the flood situation. The UK Met Office classified January 2014 as the wettest calendar month in southeast and central southern England since records began in 1910.[11] The resulting insured losses were USD 0.5 billion.

[10] *Hailstorms in Europe – a new look at a familiar risk*, Swiss Re, 2005.
[11] *Record wet January for parts of southern Britain*, Met Office, 30 January 2014, http://www.metoffice.gov.uk/news/releases/archive/2014/Early-January-Stats

Mediterranean cyclone activity triggered convective precipitation and flash flood events in France and Italy.

In addition to the North Atlantic winter storms, multiple low pressure systems originating in the Mediterranean generated a series of wind, flood and landslide events in central and southern Europe. France and Italy, in particular, experienced numerous episodes of heavy precipitation. France had its wettest July on record and the highest number of tornadoes since 2004: around 50, almost three times the annual average.[12] The total losses from the flood events in France and Italy are estimated to have reached at least USD 2 billion, and insured losses USD 0.5 billion.

Winter weather caused severe forest damage in Slovenia and Croatia.

In Slovenia and Croatia, heavy snowfall, freezing rains and floods in the period from 31 January to 6 February caused damage to forest stands, roads, ski-trails and other infrastructure, with total losses estimated at around USD 0.9 billion. A state of emergency was declared in affected areas and EU solidarity funds were dispersed.

Europe was hit by deadly and costly man-made disasters.

Of man-made disasters, in May a fire at a coal mine in Turkey claimed 301 lives. In June, a major fire followed by explosion at an oil refinery in Russia caused the biggest man-made financial loss in Europe.

Asia

The Asia region has suffered the most loss of life from catastrophic events for three years running.

Asia was hardest hit in terms of human loss in 2014, with over 7000 victims from natural and man-made catastrophes. The region also suffered the most loss of life relative to others in 2013 and 2012. The total cost of disaster events in the region in 2014 is estimated to be around USD 52 billion. Insured losses were over USD 5 billion.

Snow covered and damaged parts of Japan.

In mid-February, a severe cold snap brought the heaviest snowfall seen in Japan for many decades, killing 26 people and injuring many more, primarily in road accidents. Metropolitan Tokyo was also hit hard. The snow caused widespread damage to residential and commercial property, and to agriculture. Insurers estimated claims of USD 2.5 billion, making it the costliest disaster of the year in Asia. Total losses were USD 5 billion.

Heavy monsoon rains hit northern India and Pakistan.

In early September, monsoon rains in the northern state of Jammu and Kashmir in India and the neighbouring region in Pakistan resulted in the worst flooding in 60 years. At least 665 perished and over 200 000 houses were destroyed. The total losses from the destruction of housing in India were set at USD 4.4 billion. However, the rural communities were hit harder as the floods came at harvest time for rice and apple crops, the livelihood of many farmers. Together, the total losses in India and Pakistan were USD 5.9 billion, and insured losses were at least USD 0.2 billion.

Cyclone Hudhud caused the largest loss from a tropical cyclone.

The biggest storm of the Pacific and Indian Ocean season was Cyclone Hudhud in October. Hudhud made landfall near the port city of Visakhapatnam in the Indian state of Andhra Pradesh with winds of up to 200 km/124 miles per hour and a storm surge of up to three metres in some areas. The storm brought heavy rains and flooding in neighbouring states also. With a population of 2 million, Visakhapatnam is the third largest city on India's east coast. The total losses were estimated at USD 7 billion, the largest of all natural catastrophes in the world in 2014. However, the insured losses were a fraction of the total at just USD 0.6 billion. The cyclone claimed 68 lives but the number could have been much higher. Early warning and evacuation of up to 400 000 people ahead of the storm saved many lives.

[12] *Les tornados en France en 2014: bilan national*, Keraunos,2 January 2015, http://www.keraunos.org/actualites/fil-infos/2015/janvier/tornades-en-france-2014-bilan-nombre-intensite-climatologie.html

Typhoon Rammasun hit China and the Philippines.

Typhoon Rammasun hit the Philippines and China in a double landfall in July, destroying over 140000 houses and damaging at least another 500000, while also causing crop losses in Vietnam. The total loss was USD 5 billion, of which USD 0.8 billion and 101 of the 202 total victims were in the Philippines. This was the deadliest and most damaging event for the Philippines in 2014, which one year earlier suffered the deadliest and most disastrous event in its history, Typhoon Haiyan. Another typhoon struck the Philippines later in the year, in December. This was Typhoon Hagupit. The country's disaster management authority managed to evacuate close to 1 million people ahead of the storm, saving many lives.

An M_w 6.1 earthquake in China killed 617 people.

In August, an M_w 6.1 earthquake struck Yunnan Province in southwest China, killing 617 people, while 114 remain missing. The high number of victims was due to the widespread use of unreinforced masonry in residential housing. The quake destroyed 25800 houses and caused damage to a further 40600. It caused damage to local infrastructure, generating total losses of USD 5 billion, according to local authorities.

An explosion at a metal factory in China caused the biggest loss of life.

In August, an explosion at a metal factory in China caused the largest loss of life generated by a man-made disaster (146). Numerous fires and explosion at refineries and various industrial plants triggered further losses.

Latin America and the Caribbean

Insured losses in Latin America were over USD 2.3 billion in 2014.

Natural catastrophes and man-made disasters caused total damage of at least USD 8.2 billion in Latin America and the Caribbean in 2014. Insured losses were over USD 2.3 billion. The main drivers were hurricanes and industrial accidents.

Hurricane Odile in Mexico caused the biggest insured losses …

While it was a quiet hurricane season in the North Atlantic, the eastern Pacific had 20 named storms. That's five more than the annual average of 15 since 1990, making 2014 the most active hurricane year in the region since 1992. The most devastating was Hurricane Odile in Mexico, which ties with Hurricane Olivia (1967) as the strongest hurricane to make landfall along the Baja of California peninsula during the satellite era.[13] The combination of strong winds and heavy rains resulted in insured losses of USD 1.7 billion, mainly from the tourist resort of Cabo San Lucas where commercial insurance penetration is relatively high given a large number of hotels and other commercial properties. Hurricane Odile is the second most costly catastrophe event in Mexico after Hurricane Wilma in 2005.

… while drought impacted other countries in the region.

Drought affected Brazil and Central America, disrupting coffee, maze and bean production and killing thousands of livestock. This impacted the livelihood of farmers and low-income families, particularly in Central America. International aid helped alleviate the situation. However, dry conditions were still lingering at the beginning of 2015. The preliminary estimate of total losses is USD 3 billion, at least.

More than 500 people died in a cold snap in Peru.

For the second successive year, very low temperatures caused high casualties in Peru. It is believed as many as 505 people, mainly children and the elderly, died in the Andean region because of freezing temperatures.[14]

[13] J.P. Cangialosi, T.B. Kimberlain, "National Hurricane Center Tropical Cyclone Report - Hurricane Odile", *www.nhc.noaa.gov*, 19 December 2014, http://www.nhc.noaa.gov/data/tcr/EP152014_Odile.pdf

[14] Instituto Nacional de Defensa Civil, http://www.indeci.gob.pe/objetos/alerta/ODly/fil20141015171856.pdf

Oceania

Hail was the main driver of large insured losses in Australia.

Natural catastrophes and man-made disasters in 2014 caused insured losses of just USD 1 billion in Oceania, primarily from hail in Australia. On 27 November 2014, a powerful storm system brought large hail, strong winds and heavy rainfall to Brisbane and southeast Queensland. Damage affected Brisbane's central business district. Estimated insured losses from the storm were around USD 0.9 billion, the costliest catastrophe event in Australia and the region last year. There were some other storm events and bushfires, but these were below the *sigma* threshold in terms of losses.

Africa

In Africa, 2506 people died in disaster events in 2014 …

Natural catastrophes and man-made disasters in Africa claimed 2506 lives in 2014 and caused total losses of USD 1.5 billion. The insured losses were just USD 0.8 billion. Late in the year, 47 people died in floods in southern Morocco, which inundated 356 villages causing thousands of houses to collapse, and damage to 505 bridges and 18 000 roads. Total losses were estimated to be USD 0.5 billion.

… of whom 900 were victims of terrorist incidents.

Elsewhere, floods hits Burundi, Tanzania, Zimbabwe, the Ivory Coast and Niger. Cyclone Bejisa hit La Réunion causing power outages that affected 170 000 homes and severe damage to sugar crops. Terrorism contributed to the largest loss of life in the region, resulting in at least 900 victims.

Severe convective storms: a growing global risk

Severe convective storms include tornados, hail, thunder and lightning, wind, heavy rains and flash floods.

Convective storms, or thunderstorms, are a meteorological hazard generated by the collision of cold dry air and warm moist air.[15] Most thunderstorms are localised and short-lived, but *severe* thunderstorms, also called severe convective storms, can persist for many hours and even develop into multi-day events. They consist of hail, tornadoes, straight-line winds, flash flooding and lightning. The classification of a storm as "severe" varies across regions, but generally the criteria are set at the threshold where damage is expected to occur (typically winds of 90 km/56 miles per hour and/or hail stones of 2 cm in diametre or more in countries using the metric system, and 1 inch or more in US reference terminology). The severe storms occur in many countries around the world to different degrees of frequency and severity, but it is in the US where they wreak most havoc.

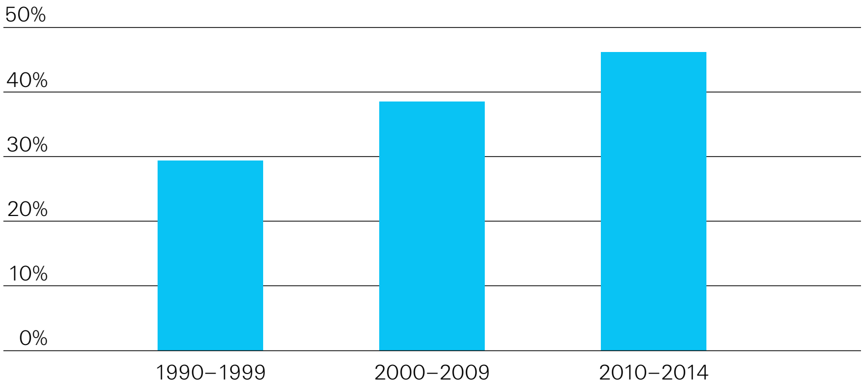
The damage inflicted by and costs of severe convective storms are on an upward trend.

The damage left in the wake of a severe convective storm can be extreme, and the impact and costs of such storms have been rising over the last 25 years. Tornadoes and hail are the two most damaging sub-perils of the severe convective storm family. Between 1990 and 2014, the global total and insured losses from severe convective storms grew at average annual rates of 7.7% and 9.0%, respectively.[16] In contrast, total and insured losses from all natural catastrophe events in the same period grew by 6.4% and 6.6% on average each year, respectively.

The number of severe convective storms resulting in insured losses of at least USD 1 billion is also rising.

The share of severe convective storm losses from all-weather event losses has similarly been on an upward trend. In the 1990s, the share of insured losses inflicted by severe convective storms was estimated to be about 29% of the total all-weather related insured losses. In the period 2010–2014, the estimated share was over 40% (see Figure 6).[17] Notably, from the early 2000s, with the exception of 2005, at least one severe convective storm each year has resulted in insured losses of USD 1 billion or more. Since 2008, there have been four to seven such storm events annually.

Figure 6
Severe convective storm-related insured losses as % of all-weather event insured losses



Source: Swiss Re Economic Research & Consulting and Cat Perils.

[15] *Peril classification and hazard glossary*, Integrated Research on Disaster Risk, January 2014.
[16] To smooth out the short term-fluctuations and highlight the longer-term trends, the annual growth rate is calculated based on the the average of the years 1986-1990 and 2010-2014.
[17] The *sigma* database does not include estimates for all drought events. Hence all-weather event-related losses may be understimated and the share of the losses from severe convective storms overestimated. However, in regions other than the US and Europe, given scarcity of information insured losses from convective storm activity in those regions may be underestimated.

The rising losses are due to the growing exposures that come with economic development.

Among the reasons for the rise in losses from severe convective storms are the growing exposures and increasing insurance penetration that come with economic development: expanding populations and urban centres, and increasing values and technology at risk. For example, the US states with the most severe convective storm activity have seen 15–48% population growth since 1990[18] and, in parallel, increasing risk exposure. The rising losses from convective storms worldwide is mostly due to the mounting levels of damage seen in the US. In addition, with better understanding of the meteorological systems responsible for the sudden and heavy precipitation that can come with severe convective storms, such as the cloud systems that cause the flash floods in the Mediterranean basin, in certain regions it is now possible to better-estimate the losses arising from specific storms. Previously, those losses would have been attributed to all-weather, not convective-storm, events.

Insurers need to be able to model a broad range of weather perils …

Today there are many models to assess the risks from "main" perils such as tropical cyclones and earthquakes. In contrast, modelling of severe convective storms is still in its infancy and is constrained by several limitations. For example, in many countries there is no official process to collect reports of observed severe convective storm events. And, even when there is such a system (eg, like in the US, since 1950, for tornadoes), the observed increase in the number of single events may be due to more effective reporting and recording than in the past, particularly after the introduction of Doppler radar technology in the early 1990s. As such, the observed frequency of tornadoes based on available records may not fully reflect the real frequency, which makes historical analysis more complicated.

… but the localised nature of sub-perils makes modelling difficult.

Even with better understanding of meteorological systems in certain regions, the modelling of severe convective storms remains challenging. They are local in nature compared to tropical cyclones, must often be observed remotely via Doppler radar or satellite technology, and frequently include different sub-perils interacting simultaneously. But in a world where convective storm-related losses are mounting, the development of probabilistic models for a broad range of perils is essential for insurers and communities to better assess this growing risk and manage the impacts.

Severe convective storms: the regional risk landscape

The US has more tornadoes than anywhere else in the world.

In North America, severe convective storm losses are mainly driven by hail and tornadoes, particularly in the US. According to the NOAA's Storm Prediction Center (SPC), there are on average around 1200 tornadoes in the US each year, and an average 216 days with hail of 1 inch in diametre or larger. The US has more tornadoes than any other country in the world, which is due to its geography. Cold dry air from Canada/Rocky Mountains, hot dry air from the desert southwest and warm moist air from the Gulf of Mexico all come together in the central US. In the spring, these air masses collide with the winds in the lower atmosphere coming from different directions at different speeds, causing thunderstorms to rotate. These rotating storms – supercells – are the source of the strongest tornadoes and largest hailstones. Up to 60 people die in US tornadoes each year and 1500 are injured.[19] In Canada, there are on average 60 tornadoes and 160 severe hail events every year, mostly in the lower latitude provinces of Alberta, Manitoba, Saskatchewan and Ontario.[20]

[18] *US and State Decennial Census Population Counts, 1990–2010*, Bureau of Business and Economic Research, University of New Mexico, https://bber.unm.edu/census/2010States.htm

[19] *Tornadoes: A Rising Risk?*, Lloyds, 2013, http://www.lloyds.com/~/media/lloyds/reports/emerging%20risk%20reports/tornadoes%20final%20report.pdf

[20] *Spring and Summer Weather Hazards*, Environment Canada, 28 January 2015 http://ec.gc.ca/meteo-weather/default.asp?lang=en&n=6c5d4990-1

In Europe, severe convective storm-related losses are driven mostly by hail…

In Europe, thunderstorms tend to be smaller scale than in the US. The Alps protect many countries against intense influx of moisture from the Mediterranean, which limits the formation of severe convective storms. Nevertheless, during the summer months moist air masses do move through continental central Europe, creating conditions for severe thunderstorms in which hail, rather than tornadoes, tends to be the cause of the larger losses. Tornadoes do happen in Europe but they are typically weaker and have less loss impact than in other tornado-prone regions. A recent study indicated that on average 276 tornadoes were reported each year in Europe from 2006 to 2013.[21] An earlier study estimated around 295 tornadoes annually but that only 169 of those were reported, an under-reporting of about 40%.[22]

… and flash flooding.

Flash flooding is another regular occurrence in Europe, particularly in south western France, north eastern Italy and the southern Pyrenees in Spain. The topography of these regions with steep mountains near the coast and torrent-like rivers, renders them susceptible to sudden flooding when there are heavy downpours.

Southern Brazil is prone to tornadoes.

In Latin America, the majority of the tornado and hail activity occurs in southern Brazil, Paraguay, Uruguay and Argentina. On average, Brazil experiences two tornadoes every year, mostly in the Sur region,[23] and around 68 hail storms throughout the country.

Northern India and Bangladesh are hit by severe convective storms, often with large loss of life. Storms happen in China regularly also …

In Asia, the bulk of the severe convective storm activity occurs in India and Bangladesh, most often in the pre-monsoon period from March-May. The storms are classified by wind speed, with speeds of 42 meters per second/151 km per hour or higher referred to as tornadoes, and below that as "nor'westers". The four deadliest tornadoes on *sigma* records were all in Bangladesh and the fifth and sixth in India. On 26 April 1989, a tornado in the Manikganj district of Bangladesh killed 1 115 people, the most ever. The twister injured a further 12 000 and left 40 000 people homeless. Elsewhere in Asia, China has many severe thunderstorms, with the highest activity over the central Tibetan Plateau and Qilian Mountain region. Nagqu has the highest number of hail days recorded per year at 33. The nationwide average is lower at one to five per year.[24] Overall, good reporting and data are scarce in Asia.

… and in Australia and New Zealand.

In Australia, on average 22 tornadoes were reported each year between 1990 and 2014, the majority in Western Australia near Perth.[25] Hail storms are also common in New South Wales, particularly in September through March, with about 45 events per year, although the number of hail storms reported in the last five year has fallen.[26] Meanwhile, the New Zealand National Institute of Water and Atmospheric Research estimates that seven to 10 tornado loss events happen in the country each year.[27]

Losses from severe convective storms are highest in the US

Since 2008, the insured losses from severe storms in the US have exceeded USD 10 billion each year.

Given the high frequency and intensity, particularly of tornadoes, the US is the most susceptible to high-impact, high-cost severe convective storms. It follows, therefore, that insured and total losses from this hazard in the US are higher than anywhere else in the world. Between 1990 and 2014, insured losses from severe convective storms in the US averaged USD 8 billion annually. Since 2008, those insured losses have exceeded USD 10 billion every year, including in 2014 which was the quietest year for tornado activity since the early 1990s. Hail activity was also below average

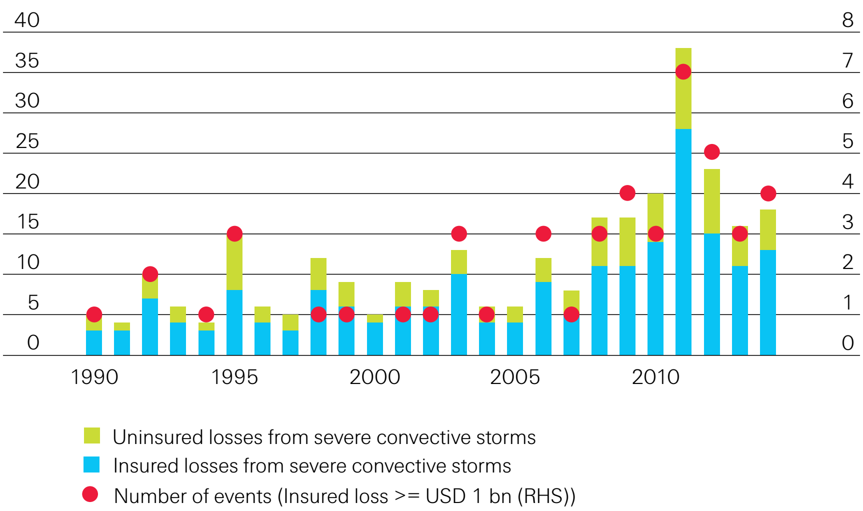
[21] P. Groenemeijer, T. Kühnem, "A Climatology of Tornadoes in Europe: Results from the European Severe Weather Database," *Monthly Weather Review*, vol. 142, 2014 pp. 4775–4790.
[22] N. Dotzek, "An updated estimate of tornado occurrence in Europe," *Atmospheric Research*, vol. 67–68, 2003, pp. 153–161.
[23] *Atlas Brasileiro de Desastres Naturais 1990 a 2012*, Universidade Federal de Santa Catarina and Centro Universitário de Estudos e Pesquisas Sobre Desastres.
[24] C. Zhang, Qinghong Zhang, 2008: "Climatology of Hail in China: 1961–2005" *Journal of Applied Meteorology and Climatology*, vol. 27, pp. 795–804.
[25] *Severe Storms Archive*, Australia Government Bureau of Meteorology, http://www.bom.gov.au/australia/stormarchive/
[26] Ibid.
[27] *Tornados in New Zealand – FAQs*, New Zealand National Institute of Water and Atmospheric *Research*, https://www.niwa.co.nz/natural-hazards/faq/tornadoes-in-new-zealand-faqs

in 2014. The high insured loss total of USD 13 billion in 2014 resulted because the less-than average number of severe events often hit densely populated areas.

2011 saw record losses from severe convective storms.

According to *sigma* records, 2011 was the record year in the US in terms of insured (USD 28 billion) and total losses (USD 39 billion) from severe convective storms. Most of the losses were caused by tornado outbreaks. There were 1690 tornadoes in the US that year, and new records were set for the highest number registered in both a single day and in a single month. Two outbreaks in the southern and Midwest states in April and May caused the most damage. A single Enhanced Fujita scale 5 (EF5) tornado,[28] the strongest category, hit the city of Joplin, Missouri on May 22 killing 160 people, the deadliest single tornado in the US since 1950. The outbreak at the end of April spawned a record 349 tornadoes, the highest for a single outbreak since 1950. In terms of insured losses, the two tornado outbreaks are the 12th and 13th most expensive US natural catastrophe events on *sigma* records, and the 19th and 20th worldwide. The most damaging hail event ever recorded in the US was in 2001, when a hailstorm inflicted severe damage on Kansas City, causing insured losses of USD 2.9 billion (in 2014 prices). The claims were mostly for vehicle and property damage.

Figure 7
US total and insured losses from severe convective storms in USD billions, and number of events leading to insured losses in excess of USD 1 billion



Source: Swiss Re Economic Research & Consulting and Cat Perils.

Severe convective storms: a need for robust modelling

Modelling severe convective storms is a challenging business …

The increasing losses from severe convective storms are a growing challenge for society and insurers alike. The multi-billion dollar severe convective storm loss events of recent years reaffirm the need for stronger mitigation measures, for example in building codes and construction practices. They also call for more comprehensive risk modelling in order to better understand the risks.

[28] The Enhanced Fujita scale is a ratings system to measure the strength of tornadoes based on the damage caused. There are six categories, zero to five, representing increasing degrees of damage. For more information, see http://en.wikipedia.org/wiki/Enhanced_Fujita_scale

Challenges in severe convective storm risk assessment

… with many ambiguities, including short and incomplete recording, impacting the quality of historical event data.

The reality, however, is that modelling severe convective storm risk is inherently difficult. The risk assessment models are typically built from the historical archives of events. Yet the archives for severe convective storms are not very reliable, if they exist at all. For example, the US record of tornadoes, hail and straight-line winds is the most complete in the world. Even so, to use this information for risk assessment presents still many challenges, such as:

- Short and incomplete entries.
- Duplicate entries (eg, when a tornado crosses state boundaries).
- Reporting biases near population centres and by time of day .
- Tornado intensity rating based on damage as a proxy for actual wind speed intensity, which can often lead to under-reporting of weak tornadoes and under-classification of strong tornadoes.
- Tornado intensity classification based on the maximum rather than the average or distribution of damage observed.
- Tornado path width and length based on the maximum rather than average or distribution of width observed. These parameters are also often rounded to the nearest 100 yards or mile.
- Recording of only the start and end points of the tornado damage path, and no information on path curvature.
- In the US, the Enhanced Fujita scale replaced the Fujita[29] scale in 2007. The tornadoes on record prior to 1970s were retroactively rated.
- Descriptions of hail storm intensity in reports are very subjective, and based on the relative size of common objects such as golf balls.
- Hail reports are from point locations only. Information on hail swaths has to be derived from other methods (eg, Doppler radar or satellite observations).

Added complications are that severe convection storm losses are generally aggregated, and the reporting thresholds can change.

In addition, insured losses for severe convective storms are generally reported with tornado, hail and straight-line wind losses aggregated. Also the historical reporting thresholds are high and can change. For example, from 1941–1981 the threshold used by the Property Claim Services (PCS) in the US was USD 1 million. That moved to USD 5 million in 1982–1996, and has been at USD 25 million since 1997.

Models for severe convective storms risk assessment

The localized nature of severe convective storms makes it difficult to build up a full overview of events.

There are many models to assess the risks from "main" perils such as tropical cyclones and earthquakes, but there are few that model severe convective storms. Risk assessment models generally use simulated event sets based on statistics derived from historical records. The localized nature of the severe convective storms, however, means that the associated damage can be concentrated over a very small area, and that hundreds of thousands to millions of years of simulated events would need to be generated to obtain enough data to assess the risk at any given location. Today, computing capability has reached a level where generating these millions of years of events is possible. But this is a recent development, which explains why risk assessment modelling for severe convective storms is still a new art.

There are some models to assess convective storm risk on the market …

The few severe convective storm risk assessment models that do exist have many shortcomings. The models are all hybrids incorporating, for example, statistical techniques coupled with numerical weather prediction modelling and claims analyses, or using satellite or Doppler radar data as proxies for hail or tornado-favourable environments. These techniques are used to circumvent some of the difficulties posed by the historical archives, but they have their own uncertainties and complications. Additionally, the grid spacing, spatial correlation, structural vulnerability and loss accumulation potential are generally all treated very differently from model to model. One model used in the US and Canada considers the impact of tornadoes, hail and straight-line winds together, while another used in the US, Canada and Australia can be run for each sub-peril independently or in combination.

[29] The predecessor to the EF scale, also rating six levels of tornado intensity based on damage caused. For more, see http://en.wikipedia.org/wiki/Fujita_scale

Yet another model focuses on tornadoes and hail storms in the US. Because of the wide variety of approaches and assumptions used, the models rarely compare well with one another. These challenges and difficulties are further amplified with short, incomplete, or non-existent historical records.

... but with recurring shortfalls in all.

Also, different approaches are required depending on whether the focus is a single risk/location or a large portfolio of risks/locations (ie, reinsurance treaty). This is particularly important from the reinsurance perspective. For reinsurance treaties, large severe convective storm outbreaks are the major loss drivers, and the losses tend to correlate better with market losses. For a single location, however, a single storm can cause significant to total loss, but the likelihood of the specific location being hit directly by a severe convective storm is much lower.

Swiss Re's models for severe convective storms

Swiss Re has three models to assess severe convective storm risk.

Swiss Re has three models for severe convective storm risk assessment. One is a combined tornado/hail model for the eastern US, and another a hail model covering central Europe, both for treaty business. A recent addition in 2014 is a tornado-only model for single-risk business in the US and Canada.

The latest is a single-risk tornado model for the US and Canada.

This latest model was developed based on the occurrence and severity of historical tornadoes, the spatial correlation of damage and the frequency of expected losses. A "hazard map" was developed using the SPC's 1950–2013 tornado track set after removing all EF/F0 tornadoes, the lowest intensity tornadoes based on the Enhanced Fujita/Fujita scales, and tornadoes caused by tropical cyclones. The number of tornadoes within a 100km/62 mile radius for each grid point on a 1km/0.62 mile grid was determined, and a severity factor was applied on a regional basis depending on the likelihood that a tornado would exceed a certain intensity. Finally, adjustments were made to account for reporting biases near population centres.

Table 4
Tornado path characteristics

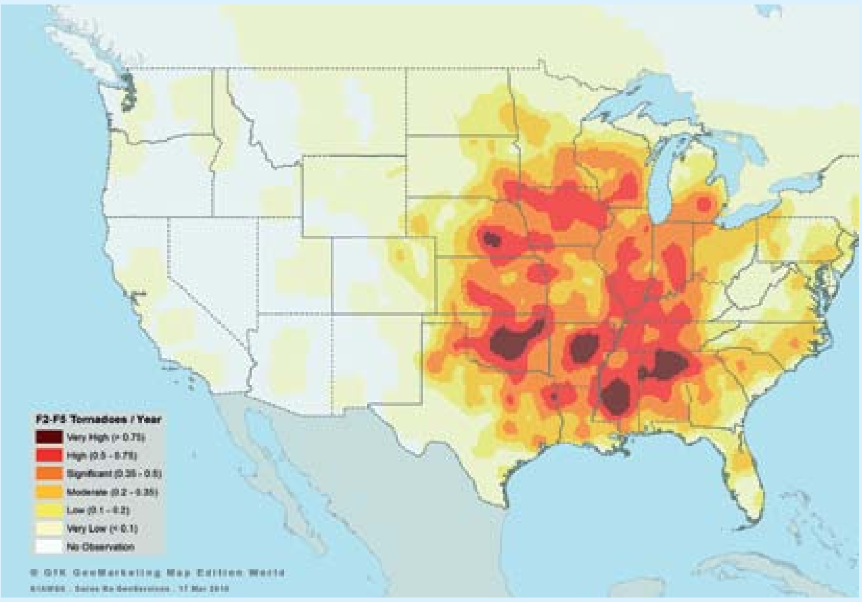
Enhanced Fujita/Fujita scale rating	Number of tornadoes evaluated	Average compass direction (degrees)	Tornado path length		Tornado path width	
			50th Percentile (km)	95th Percentile (km)	50th Percentile (m)	95th Percentile (m)
1	18691	67	1.6	21.1	46	305
2	8904	56	4.8	42.2	91	594
3	2510	62	15.5	77.4	183	1207
4	658	66	30.3	140.7	366	1609
5	81	54	48.4	182.6	487	1749

Source: Swiss Re.

The model builds a hazard map showing high and low risk areas.

An irregular grid was developed to take the spatial correlation of damage into account. The grid resolution and orientation are based on the average track direction (on a regional basis), and also the tornado path width and length characteristics (Table 4).

Figure 8
US tornado hazard map

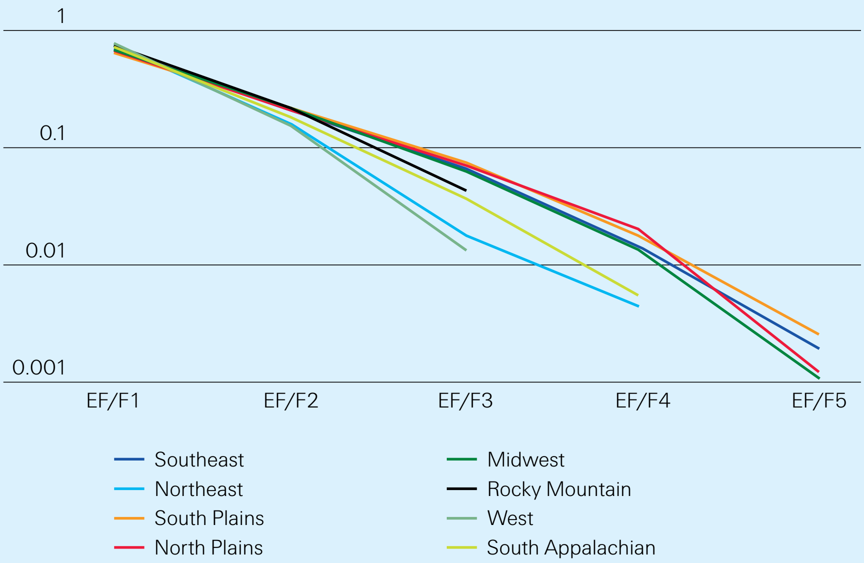


Source: Swiss Re CatNet®.

The expected losses are accumulated from the hazard map and irregular grid.

Using the "hazard map" and irregular grid, the expected losses were accumulated assuming full correlation within the grid cell, and no correlation between grid cells. Finally, the model was benchmarked by comparing expected market losses with severe convective storm loss data from Property Claim Services.

Figure 9
Regional exceedance probability curves for tornado intensity



Source: Swiss Re.

Much more needs to be done to improve severe convective storm risk assessment modelling.

Like all severe convective storm models, the Swiss Re models have shortcomings for all the same reasons mentioned previously. Models are only as good as the data and assumptions that go into them. That is why more attention needs to be devoted to building a longer and higher quality historical archive of events and losses, and also to developing probabilistic models for a broad range of perils. Only then will severe convective storm risk assessment be significantly improved.

Tables for reporting year 2014

Table 5
List of major losses in 2014 according to loss category

	Number	in %	Victims[30]	in %	Insured loss[31] (in USD m)	in %
Natural catastrophes	**189**	**56.3%**	**7066**	**55.3%**	**27749**	**80.0%**
Floods	61		3064		2162	
Storms	85		1195		18397	
Earthquakes	15		897		313	
Droughts, bush fires, heat waves	10		335		150	
Cold, frost	6		745		53	
Hail	5		7		6641	
Other natural catastrophes	7		823		34	
Man-made disasters	**147**	**43.8%**	**5711**	**44.7%**	**6958**	**20.0%**
Major fires, explosions	**43**	**12.8%**	**490**	**3.8%**	**4257**	**12.3%**
Industry, warehouses	12		152		1278	
Oil, gas	18		40		2928	
Other buildings	9		296		50	
Other fires, explosions	4		2			
Aviation disasters	**12**	**3.6%**	**960**	**7.5%**	**916**	**2.6%**
Crashes	7		940		337	
Explosions, fires	1		20			
Space	4				579	
Maritime disasters	**39**	**11.6%**	**2118**	**16.6%**	**783**	**2.3%**
Freighters	3		8		156	
Passenger ships	28		2000		231	
Drilling platforms	4				326	
Other maritime accidents	4		110		70	
Rail disasters (incl. cableways)	**5**	**1.5%**	**127**	**1.0%**		**0.0%**
Mining accidents	**7**	**2.1%**	**400**	**3.1%**	**110**	**0.3%**
Collapse of buildings/bridges	**3**	**0.9%**	**42**	**0.3%**		**0.0%**
Miscellaneous	**38**	**11.3%**	**1574**	**12.3%**	**893**	**2.6%**
Social unrest	1		21		350	
Terrorism	28		1361		543	
Other miscellaneous losses	9		192			
Total	**336**	**100.0%**	**12777**	**100.0%**	**34708**	**100.0%**

Source: Swiss Re Economic Research & Consulting and Cat Perils.

[30] Dead or missing.
[31] Property and business interruption, excluding liability and life insurance losses.

Table 6
The 20 most costly insurance losses in 2014

Insured loss[32] (in USD m)	Victims[33]	Date (start)	Event	Country
2 935	–	18.05.2014	Severe thunderstorms, large hail	US
2 502	26	08.02.2014	Snow storm	Japan
2 190	6	08.06.2014	Wind and hail storm Ela	France, Germany, Belgium
1 700	6	14.09.2014	Hurricane Odile	Mexico
1 669	21	05.01.2014	Winter storm	US
1 269	2	03.06.2014	Severe thunderstorms, large hail, tornadoes	US
1 220	33	27.04.2014	Thunderstorms, large hail, 83 tornadoes, severe flash floods	US
1 084	–	02.04.2014	Severe storms, large hail, tornadoes	US
ns	7	15.06.2014	Major fire and explosion at oil refinery	Russia
905	–	27.09.2014	Thunderstorms with winds up to 108 km/67 miles per hour, hail, flash floods	US
852	–	30.11.2014	Hailstorm	Australia
678	–	12.04.2014	Thunderstorms, large hail, tornadoes	US
ns	–	07.07.2014	Fire at petrochemical plant	US
635	–	10.05.2014	Thunderstorms, hail, tornadoes, flash floods	US
632	68	12.10.2014	Cyclone Hudhud	India
592	–	27.03.2014	Thunderstorms, winds up to 129 km/80 miles per hour, large hail, tornadoes	US
545	3	14.06.2014	Thunderstorms, >100 tornadoes, hail	US
539	2	11.08.2014	Torrential rains trigger severe floods	US
ns*	47	13.07.2014	Fighting at airport destroys aircrafts	Libyan Arab Jamahiriya
530	–	01.01.2014	Floods	UK

*Not shown.

Source: Swiss Re Economic Research & Consulting and Cat Perils.

[32] Property and business interruption, excluding liability and life insurance losses; US natural catastrophe figures based on Property Claim Services, including National Flood Insurance Program (NFIP) losses (see page 43, "Terms and selection criteria" section).
[33] Dead and missing.

Table 7
The 20 worst catastrophes in terms of victims 2014

Victims[34]	Insured loss[35] (in USD m)	Date (start)	Event	Country
731	–	03.08.2014	Earthquake (M_w* 6.1); aftershocks and landslides	China
665	237	03.09.2014	Severe monsoon floods	India, Pakistan
505	–	13.04.2014	Cold wave; freezing temperatures	Peru
304	ns	16.04.2014	Passenger ferry sinks	North Pacific Ocean, South Korea
301	–	13.05.2014	Fire at coal mine	Turkey
298	ns	17.07.2014	Malaysia Airlines Boeing 777-2H6ER (Flight MH17) crashes	Ukraine
256	–	02.05.2014	Heavy rains trigger massive landslide	Afghanistan
251	–	22.03.2014	Overcrowded boat carrying refugees capsizes on Lake Albert	Uganda
250	–	13.01.2014	Overcrowded boat capsizes on the Nile	Sudan
241	–	13.08.2014	Monsoon foods	Nepal
239	ns	08.03.2014	Malaysia Airlines Boeing 777-2H6ER (Flight MH-370) crashes	Indian Ocean
212	–	15.03.2014	Terrorist attacks at area nearby prison	Nigeria
209	–	30.07.2014	Landslide triggered by heavy rains buries a village	India
202	250	15.07.2014	Typhoon Rammasun	China, Philippines, Viet Nam
196	–	29.10.2014	Massive landslide	Sri Lanka
190	–	11.04.2014	Heavy rains trigger floods and landslides	Afghanistan, Tajikistan
186	–	02.08.2014	Massive landslide	Nepal
180	–	01.01.2014	Heat wave	Pakistan
162	–	28.12.2014	Indonesia AirAsia Airbus A320-216 goes missing	Indonesia
154	–	22.04.2014	Floods	Tajikistan

*M_w = moment-magnitude scale.
Source: Swiss Re Economic Research & Consulting and Cat Perils.

[34] Dead and missing.
[35] Property and business interruption, excluding liability and life insurance losses.

Table 8
Chronological list of all natural catastrophes 2014

Floods

Date	Country Place	Event	Number of victims Amount of damage (where data available)
1.1.–24.1.	UK South	Floods; ongoing precipitation during winter storms trigger floods on saturated soil	GBP 340m (USD 530m) insured loss GBP 400m (USD 624m) total damage
1.1.–20.1.	Peru Cusco, Huancavelica	Floods	21 dead
4.1.–5.1.	Italy Liguria, Tuscany	Flash floods	EUR 154m (USD 186m) total damage
10.1.–28.2.	Bolivia Beni	Floods, landslides; 1 600 houses destroyed 2 200 houses damaged, 63 000 ha of cropland flooded, 108 231 livestock killed	64 dead, 10 missing USD 200m total damage
13.1.	Brazil Itaoca (Sao Paulo)	Flash floods	12 dead, 8 missing
14.1.–7.2.	Indonesia Jakarta	Floods	32 dead USD 20m insured loss USD 600m total damage
16.1.–19.1.	France, Italy Var (France), Liguria, Tuscany (Italy)	Flash floods, landslides; train derails in Italy	1 dead 3 injured EUR 140m (USD 169m) insured loss EUR 320m (USD 387m) total damage
19.1.	Italy Modena, Bologna (Emilia Romagna)	Flash floods caused by torrential rains; River Secchia burst its banks; 6 500 ha of agricultural land flooded	2 dead 1 injured 1 000 homeless EUR 99m (USD 120m) total damage
22.1.–23.1.	Tanzania Morogoro	Flash floods; 500 houses destroyed	5 000 homeless
24.1.	Argentina El Rodeo (Catamarca)	Floods cause landslide	24 dead
27.1.	Peru Tambopata, Manú	Heavy rains and floods; 500 houses destroyed, 1 240 houses damaged	6 000 homeless
30.1.–31.1.	Italy Rome	Floods caused by torrential rains	EUR 243m (USD 294m) total damage
1.2.–30.3.	Zimbabwe	Floods	4 000 homeless
6.2.	Sri Lanka	Floods	27 dead
19.2.–10.3.	Burundi Bujumbura	Floods, landslides	64 dead, 32 missing 182 injured 12 500 homeless
25.2.–10.3.	Paraguay Asuncion	Floods	2 000 homeless
15.3.–15.5.	Colombia Caquetá, Magdalena, Chocó, Cauca	Floods	33 dead
2.4.–3.4.	Solomon Islands	Flash floods	22 dead
5.4.–9.4.	Argentina Neuquén, Rio Negro, Cordoba, Santa Fe, Entre Rios, Catamarca, Santiago del Estero	Floods	3 000 homeless
11.4.–13.4.	Afghanistan, Tajikistan	Heavy rains trigger floods and landslides	190 dead
11.4.–17.4	Tanzania Dar es Salaam	Floods	41 dead
22.4.–30.4.	Tajikistan	Floods	154 dead
2.5.	Afghanistan Badakhshan	Heavy rains trigger massive landslide; 300 houses destroyed	256 dead

Date	Country Place	Event	Number of victims Amount of damage (where data available)
2.5.–4.5.	Italy Senigallia, Chiaravalle (Marche)	Flash floods caused by torrential rains; Rivers Triponzio and Misa burst their banks; 2670 houses damaged	3 dead EUR 99m (USD 120m) total damage
12.5.–16.5.	China Hunan	Floods as a result of torrential rains	53 dead USD 700m total damage
12.5.–21.5.	Serbia and Montenegro, Bosnia and Herzegovina, Croatia, Romania, Slovakia, Poland	Severe floods, landslides	82 dead < USD 100m insured loss USD 3.1bn total damage
24.5.–28.5.	China Guangdong	Floods; more than 90000 houses destroyed or damaged	37 dead USD 1.1bn total damage
27.5.–31.5.	Russia Altai region, Khakassia Republic, Altai Republic	Floods caused by heavy torrential rains; 4000 houses severely damaged	6 dead 2000 injured RUB 500m (USD 8m) total damage
1.6.–10.6.	Iran Khorasan, Golestan	Floods	37 dead
2.6.–7.6.	Ivory Coast Abidjan	Floods, landslides	23 dead
2.6.–10.6.	China Guishou, Gangdong	Floods; over 70000 houses damaged; damage to agriculture	33 dead CNY 4.2bn (USD 677m) total damage
5.6.–20.6.	Brazil, Paraguay, Argentina Paraná (Brazil), El Chaco (Paraguay)	Floods	13 dead 7000 homeless USD 500m total damage
6.6.	Afghanistan Guzargah-e-Nur (Baghlan)	Flash floods; 380 houses destroyed, 40 houses damaged	81 dead 35 injured
16.6.–25.6.	China Sichuan, Fujian	Monsoon floods, thundestorms, hail; over 80000 houses damaged or destroyed; damage to cropland	34 dead CNY 5.74bn (USD 925m) total damage
18.6.–20.6.	Bulgaria Varna, Dobrich, Gabrovo, Veliko Tarnovo, Burgas, Montana, Kyustendil, Plovdiv, Haskovo, Yambol, Sofia	Thunderstorms trigger flash floods and hail	15 dead 1260 homeless EUR 311m (USD 377m) total damage
19.6.–11.7.	Ivory Coast Abidjan	Floods	23 dead
23.6.–25.6.	India Assam	Floods	27 dead
26.6.–28.6.	China Sichuan, Zhejiang	Monsoon floods	24 dead USD 900m total damage
3.7.–29.7.	Brazil, Uruguay Rio Grande do Sul (Brazil), Paysandú (Uruguay)	Floods	10 dead 8405 homeless
3.7.–7.7.	China Guizhou, Yunnan	Floods; 5000 houses destroyed	15 dead, 8 missing USD 500m total damage
13.7.–18.7.	China Fujian, Jiangxi, Shandong	Floods; 5800 houses destroyed, 16300 houses damaged	66 dead USD 1.25bn total damage
29.7.–3.8.	Germany, Bulgaria, Romania North Rhine-Westphalia, Baden-Württemberg (Germany)	Thunderstorms trigger flash floods and landslides; severe flood damage in city of Münster (Germany)	6 dead EUR 140m (USD 169m) insured loss EUR 300m (USD 363m) total damage
30.7.–31.7.	Cambodia Mekong River	Flash floods	45 dead
2.8.–20.8.	Niger Tillabéry	Floods; 4700 houses destroyed	38 dead 36000 homeless
7.8.–8.8.	India Odisha	Floods caused by monsoon rains	45 dead USD 100m total damage

Date	Country Place	Event	Number of victims Amount of damage (where data available)
11.8.–13.8.	US Detroit (MI), NY, MD	Torrential rains trigger severe floods in Michigan and Northeast	2 dead USD 600m-1bn insured loss USD 1.6bn total damage
11.8.–19.8.	China Fujian, Jiangxi, Hunan, Guangdong, Sichuan and Guangxi regions	Flood caused by heavy monsoon rains	27 dead USD 400m total damage
13.8.–20.8.	Nepal	Monsoon foods	92 dead, 149 missing
13.8.–18.8.	Bangladesh Bhola District, Barisal	Monsoon floods; 16 314 houses destroyed, 110 682 houses damaged	59 dead USD 150m total damage
20.8.	Japan Hiroshima	Landslides triggered by heavy rains	74 dead 67 injured USD 30.9m insured loss USD 38m total damage
22.8.–28.8.	China Guizhou, Hebei, Qinghai, Ningxia, Hunan, Sichuan, Inner Mongolia, Shaanxi, Gansu	Floods	10 dead USD 600m total damage
1.9.–8.9.	China Chongqing, Sichuan, Guizhou provinces	Floods caused by monsoon rains	65 dead USD 570m total damage
3.9.–10.9.	India, Pakistan Jammu and Kashmir (India)	Severe monsoon floods	665 dead 53 735 injured >INR 15bn (USD 237m) insured loss USD 5.97bn total damage
19.9.–20.9.	France Hérault, Gard, Ardèche (Languedoc)	Thunderstorms cause flash floods, hail	6 dead EUR 120m (USD 145m) insured loss EUR 150m (USD 182m) total damage
20.9.–25.9.	India Assam, Meghalaya	Floods following Typhoon Kalmaegi	73 dead INR 10bn (USD 158m) total damage
28.9.–30.9.	France Montpellier, Hérault, Montagnac, Saint-Pargoire (Languedoc-Roussillon)	Thunderstorms cause flash floods, hail	EUR 200m (USD 242m) insured loss
8.10.–13.10.	Italy Genoa, La Spezia (Liguria)	Flash floods	1 dead EUR 250m (USD 303m) total damage
15.10.–27.10.	Nicaragua, Honduras, Guatemala	Floods caused by heavy torrential rains	33 dead 32 000 homeless
28.10.–24.11.	Colombia	Floods	44 dead
4.11.–16.11.	Italy, France, Switzerland, Slovenia Lombardy, Piedmont, Liguria, Trentino-Alto Adige, Tuscany, Friuli-Venetia, Sicily (Italy), Provence-Alpes-Cote d'Azur, Languedoc-Roussillon (France), Ticino (Switzerland)	Multiple low depression systems trigger thunderstorms, flash floods and tornadoes	12 dead, 3 missing 5 injured EUR 300m (USD 363m) total damage
22.11.–30.11.	Morocco, Spain Guelmim-Es-Semara, Souss Massa Drâa (Morocco)	Storms trigger severe floods and damage to infrastructure	47 dead USD 450m total damage
3.12.–4.12.	Colombia Chocó	Flash floods	44 dead
17.12.–30.12.	Malaysia, Thailand	Floods	36 dead USD 284m total damage

Storms

Date	Country Place	Event	Number of victims Amount of damage (where data available)
2.1.	Réunion	Cyclone Bejisa; power cuts to 170000 houses, roads damaged by high waves, severe damage to sugar cane crops	2 dead 15 injured EUR 41m (USD 49m) insured loss EUR 70m (USD 85m) total damage
3.1.–5.1.	US MA, NJ, NY, PA, CT	Winter storm	16 dead USD 100–300m insured loss USD 210m total damage
5.1.–8.1.	US GA, OH, NY, TN, IL, PA, MI, MD, NJ, IN, VA, NC, KY, AL, MO, SC, MS	Winter storm	21 dead USD 1.67bn insured loss USD 2.5bn total damage
11.1.	Tonga Ha'apai	Cyclone Ian (Cat 5) with winds up to 430 km/267 miles per hour; 800 houses damaged or destroyed; 17 schools damaged; extensive damage to staple crops	1 dead 14 injured 2300 homeless TOP 62m (USD 31m) total damage
12.1.–20.1.	Philippines	Tropical Storm Linglin	64 dead 36 injured USD 13m total damage
25.1.	Burundi Nyanza-Lac	Lightning strikes a school	7 dead 51 injured
1.2.–11.2.	Afghanistan Jawzjan	Winter storm, heavy snowfall, cold wave	63 dead
4.2.–6.2.	France, Spain, UK, Ireland	Winter storm Petra, floods	EUR 77m (USD 94m) insured loss EUR 130m (USD 157m) total damage
4.2.–6.2.	US PA, MD	Winter storm, icy winds	USD 100–300m insured loss USD 260m total damage
6.2.–9.2.	France, Ireland, UK, Spain, Portugal	Winter storms	EUR 125m (USD 151m) insured loss EUR 170m (USD 206m) total damage
7.2.–14.2.	China South	Winter storm, heavy snowfall	10 dead 90 injured USD 675m total damage
8.2.	Japan	Snow storm	26 dead 600 injured USD 2.5bn insured loss USD 5bn total damage
11.2.	US GA, NY, NC, PA, SC	Winter storm, icy rains, snowfall	12 dead USD 100–300m insured loss USD 650m total damage
12.2.–13.2.	UK, Ireland	Windstorm Tini (Darwin); winds up to 180 km/112 miles per hour; heavy rainfall exacerbates flooding in southern England.	1 dead USD 362m insured loss[36] USD 500m total damage
14.2.–15.2.	Ireland, UK, France, Belgium, Norway	Winter storm Ulla	EUR 136m (USD 165m) insured loss EUR 160m (USD 194m) total damage
17.2.–21.2.	China Sichuan, Guizhou, Yunnan	Winter storm, snow fall; damage to houses and agriculture	USD 140m total damage
20.2.–21.2.	US MO, IL	Thunderstorms, tornadoes, hail	1 dead USD 100–300m insured loss USD 170m total damage
3.3.–4.3.	India Hyderabad (Andhra Pradesh)	Thunderstorms, hail, flash floods; 374 houses damaged	7 dead 58 injured
6.3.–7.3.	US NC	Winter storm, icy rains, flooding	USD 50–100m insured loss USD 100m total damage

[36] Data taken from Perils AG, http://www.perils.org/

Date	Country Place	Event	Number of victims Amount of damage (where data available)
6.3.–7.3.	US NC	Winter storm, icy rains, flooding	USD 50–100m insured loss USD 100m total damage
14.3.–16.3.	Germany, Denmark, Norway, Sweden	Winter storm	EUR 67m (USD 81m) insured loss EUR 100m (USD 121m) total damage
16.3.	Thailand	Thunderstorms, heavy rains, hail	2 000 homeless
19.3.–20.3.	China Sichuan, Xinjiang, Henan	Thunderstorms, hail	1 dead CNY 728m (USD 117m) total damage
26.3.–5.4.	Madagascar, Comoros, Mozambique	Tropical cyclone Hellen (Category 4); over 600 houses destroyed, over 1 000 houses damaged	12 dead 2 736 homeless USD 20m total damage
29.3.–4.4.	China Guangdong, Guangxi, Guizhou	Storms, hail, landslides	21 dead USD 155m total damage
2.4.–4.4.	US TX, IL, KS, MO	Severe storms, large hail, tornadoes	USD 1.08bn insured loss USD 1.6bn total damage
7.4.–16.4.	China	Winter storm, heavy snow fall, freezing temperatures	128 dead USD 100m total damage
12.4.–14.4.	US IL, MI, TX, IA, W	Thunderstorms, large hail, tornadoes	USD 678m insured loss USD 800m total damage
14.4.–16.4.	Australia, Solomon Islands, New Zealand	Cyclone Ita; over 760 houses destroyed (mainly on the Solomon Islands), over 1 066 houses damaged; severe damage to banana plantations and public infrastructure.	22 dead 9 000 injured USD 50m insured loss USD 981m total damage
17.4.–20.4.	India	Storms	27 dead
17.4.–19.4.	China	Severe storm	3 dead USD 156m total damage
23.4.–26.4.	China Xinjiang, Shaanxi, Guangxi, Hunan, Jiangxi, Qinghai	Severe storms, heavy rains, flash floods, landslides; over 5 000 houses destroyed or damaged, damage to cropland	9 dead CNY 2.83bn (USD 456m) total damage
27.4.–1.5.	US MS, AL, AR, FL, MD, PA, TN, GA, KS, MO, NJ, NY, VA, NC, DE, DC	Thunderstorms, large hail, 83 tornadoes; heavy precipitation triggers flash floods in Florida and Alabama	33 dead 115 injured USD 1.22bn insured loss USD 1.9bn total damage
28.4.	Bangladesh Netrokona	Thunderstorms, hail; 1 000 houses destroyed	16 dead 4000 homeless
3.5.–7.5.	China	Storm, freezing temperatures	CNY 2.6bn (USD 419m) total damage
7.5.–9.5.	US TX, MN, CO, KS, MO	Thunderstorms, large hail, tornadoes, flash floods	USD 100–300m insured loss USD 200m total damage
10.5.–14.5.	US OH, MO, IN, NE, KS, TX, IL, WV	Thunderstorms with winds up to 160 km/ 99 miles per hour, hail, tornadoes, flash floods	USD 600m-1bn insured loss USD 1bn total damage
24.5.–28.5.	US TX, NM	Thunderstorms, tornadoes, hail, flash floods	USD 100–300m insured loss USD 200m total damage
2.6.–4.6.	Chile	Thunderstorms trigger flash floods	7 injured 2 000 homeless
3.6.–5.6.	US Blair (NE), IA, KS, AR, WY	Severe thunderstorms with winds up to 128 km/80 miles per hour, large hail, tornadoes; severe hail damage in city of Blair and to agriculture.	2 dead USD 1.27bn insured loss USD 1.7bn total damage
5.6.–6.6.	US SD	Thunderstorms, large hail, 1 tornado, flash floods	USD 100–300m insured loss USD 170m total damage
6.6.–9.6.	China Beijing, Tianjin	Thunderstorms, strong winds, floods; damage to cropland	1 dead USD 193m total damage

Date	Country Place	Event	Number of victims Amount of damage (where data available)
12.6.–13.6.	US Texas	Thunderstorms, large hail, tornadoes	USD 300–600m insured loss USD 560m total damage
13.6.–21.6.	China Shantou City (Guangdong)	Tropical Storm Hagibis	USD 131m total damage
14.6.–18.6.	US SD, NE, CO, MN, IA, WI, KS	Thunderstorms, >100 tornadoes and hail; large damage from twin EF4 tornadoes from single supercell thunderstorm in the city of Pilger	3 dead 17 injured USD 300–600m insured loss USD 800m total damage
24.6.–25.6.	US CO, WY	Thunderstorms, large hail, flash floods	USD 100–300m insured loss USD 270m total damage
28.6.–1.7.	Canada Saskatchewan, Manitoba	Storm bringing wind and flood damage	CAD 103m (USD 89m) insured loss CAD 200m (USD 173m) total damage
29.6.–1.7.	US IA, IL, IN, MI	Thunderstorms, tornadoes, large hail, flash floods	USD 300–600m insured loss USD 600m total damage
6.7.–7.7.	France, Germany, Luxembourg	Thunderstorms, heavy rains, hail, flash floods	EUR 300m (USD 363m) total damage
7.7.–9.7.	US NE, CO, MO, NY, PA	Thunderstorms with winds up to 113 km/70 miles per hour, hail, flash floods and tornadoes; severe hail damage to corn and soybean crops in central Nebraska (Buffalo County)	4 dead USD 100–300m insured loss USD 500m total damage
8.7.–14.7.	Japan Honshu	Typhoon Neoguri	3 dead 64 injured USD 156m total damage
15.7.–21.7.	China, Philippines, Vietnam	Typhoon Rammasun; more than 140 000 houses destroyed, 500 000 houses damaged	176 dead, 26 missing 125 injured USD 250m insured loss USD 5.15bn total damage
19.7.–20.7.	China Shaanxi, Shanxi	Thunderstorms, hail, flash floods; over 5 000 houses destroyed	5 dead CNY 1.7bn (USD 274m) total damage
19.7.–26.7.	China, Taiwan Fujian, Jiangxi, Shandong (China)	Typhoon Matmo	14 dead USD 500m total damage
26.7.–28.7.	US MI, TN, MA	Storms with winds up to 160 km/99 miles per hours, hail, flash floods and tornadoes	USD 100–300m insured loss USD 270m total damage
3.8.–10.8.	France, Germany, Belgium, Spain, UK	Remnants of Hurricane Bertha bring winds of up to 128 km/80 miles per hour, tornadoes, heavy rains, flash floods	1 dead EUR 200m (USD 242m) total damage
4.8.–5.8.	Canada Ontario	Thunderstorms trigger flash floods	4 injured CAD 100m (USD 87m) insured loss CAD 150m (USD 129m) total damage
7.8.–8.8.	Canada Airdrie, Calgary (Alberta)	Thunderstorms with winds up to 94 km/58 miles per hour, hail, flash floods	CAD 537m (USD 463m) insured loss CAD 700m (USD 604m) total damage
10.8.–11.8.	China Xishui (Guizhou)	Thunderstorms	9 dead, 11 missing CNY 190m (USD 31m) total damage
23.8.–24.8.	Dominican Republic, Haiti, Turks and Caicos Islands	Flooding after Tropical Storm Cristobal; more than 1000 houses damaged	5 dead, 1 missing 4000 homeless
7.9.–8.9.	US, Mexico Phoenix (AZ), Mexico	Remnants of Hurricane Norbert bring thunderstorms, heavy precipitation and flash floods (8 August 2014 was the rainiest day in Phoenix since 1895 (rainiest day on record))	6 dead USD 25–100m insured loss USD 325m total damage
10.9.–16.10.	China, Philippines, Vietnam, Hong Kong	Typhoon Kalmaegi	25 dead 45 injured <USD 3bn total damage
14.9.–16.9.	Mexico Cabo San Lucas (Baja California Peninsula)	Hurricane Odile	6 dead USD 1.7bn insured loss MXN 48bn (USD 3.26bn) total damage
19.9.–24.9.	China, Philippines, Taiwan	Tropical Storm Fung-Wong	21 dead, 4 missing USD 263m total damage

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Date	Country Place	Event	Number of victims Amount of damage (where data available)
25.9.–26.9.	China Gansu, Shanxi, Inner Mongolia	Thunderstorms, hail, flash floods	CNY 821m (USD 132m) total damage
27.9.–30.9.	US CO, AZ	Thunderstorms with winds up to 108 km/67 miles per hour, large hail, flash floods	USD 600m-1bn insured loss USD 1.4bn total damage
1.10.–3.10.	US Dallas (TX), KS	Thunderstorms with winds up to 145 km/90 miles per hour, large hail, flash floods	USD 100–300m insured loss USD 360m total damage
5.10.–10.10.	Japan	Typhoon Phanfone	6 dead, 1 missing 60 injured USD 100m total damage
10.10.	Japan, Philippines, Taiwan	Typhoon Vongfong, storm surge	9 dead, 2 missing 90 injured USD 80m total damage
12.10.–13.10.	India Visakhapatnam (Andhra Pradesh)	Cyclone Hudhud	68 dead 43 injured INR 40bn (USD 632m) insured loss USD 7bn total damage
12.10.–14.10.	US LA, AL, TX	Storms with winds up to 160 km/99 miles per hour, hail, tormadoes, straight line winds	2 dead USD 100-300m insured loss USD 170m total damage
15.10.	Nepal Manang, Mustang (Himalaya mountains)	Remnants of Cyclone Hudhud cause blizzard and massive avalanche; hikers, guides and herders perish	43 dead, 40 missing 175 injured
17.10.	Bermuda, Anguilla, Saint Kitts and Nevis, Antigua and Barbuda, Netherlands Antilles	Hurricane Gonzalo (Cat 2) with winds up to 175 km/108 miles per hour; 37 boats destroyed	2 dead, 2 missing 12 injured USD 41m insured loss USD 100m total damage
15.10.–28.10.	Congo, Democratic Republic of (DRC) South Kivu Province	Thunderstorms, flash floods	30 dead
2.11.–7.11.	Haiti, Dominican Republic	Strong winds, heavy rains, flash floods	17 dead 4000 homeless
10.11.–14.11.	China	Winter storm	USD 254m total damage
24.11.–25.11.	Canada Ontario, Quebec	Storm with winds up 100 km/62 miles per hour, flooding	CAD 96m (USD 83m) insured loss CAD 110m (USD 95m) total damage
26.11.–1.12.	France Var, Gard, Hérault, Aude, Pyrénées Orientales	Thunderstorms, flash floods	5 dead EUR 200m (USD 242m) insured loss EUR 250m (USD 303m) total damage
2.12.–4.12.	US CA	Thunderstorms, heavy rainfall, flash floods, mudslides	USD 25–100m insured loss USD 100m total damage
5.12.–6.12.	Japan Tokushima	Winter storm, heavy snowfall	24 dead 101 injured
6.12.–10.12.	Philippines Eastern Samar	Typhoon Hagupit (Ruby); 42 466 houses destroyed, 248 204 houses damaged	18 dead 916 injured 100 264 homeless PHP 6.39bn (USD 143m) total damage
10.12.–12.12.	US CA, WA, OR	Thunderstorms, heavy rains, flooding	1 dead 1 injured USD 100–300m insured loss USD 240m total damage
12.12.–13.12.	China, Russia Northeast China and Khabarovsk, Amnur(Russia)	Winter storm, blizzard, heavy snowfall; over 300 houses damaged	USD 135m total damage
24.12.	US Columbia (Mississippi)	Tornado	5 dead 50 injured
28.12.–29.12.	Philippines Surigao del Sur	Tropical storm Jangmi (Seniang) causes wind and flood damage; 610 houses destroyed, 2 687 houses damaged	66 dead, 6 missing 43 injured PHP 1.6bn (USD 36m) total damage

Earthquakes

Date	Country Place	Event	Number of victims Amount of damage (where data available)
26.1.–3.2.	Greece Argostoli and Livadi (Cephalonia Island)	Earthquakes (M_w 6.1 and M_w 6.0); 600 buildings destroyed, 2 500 buildings damaged; also damage to roads and ports	12 injured EUR 7m (USD 8m) insured loss EUR 147m (USD 178m) total damage
1.2.	Indonesia Sumatra	Volcano Sinabung eruption	32 dead
12.2.	China Yutian (Xinjiang)	Earthquake (M_w 6.9); 90 000 houses damaged	CNY 1.08bn (USD 174m) total damage
1.4.	Chile, Peru	Earthquake (M_w 8.2)	6 dead 9 injured >CLP 92.4bn (USD 152m) insured loss >CLP 347bn (USD 571m) total damage
10.4.	Nicaragua Nagarote	Earthquake (M_w 6.1); 1001 houses damaged, landslides blocked a highway	3 dead 250 injured USD 3m total damage
24.5.	Greece, Turkey Kamariotissa, Thessaloniki	Earthquake (M_w 6.9); 11 houses destroyed, 312 houses damaged	3 dead 324 injured EUR 4m (USD 5m) total damage
7.7.	Guatemala San Marcos	Earthquake (6.4 Richter scale) ; 10 050 houses damaged (of which 3 087 severely damaged)	1 dead 274 injured 9 940 homeless
3.8.	China Wenping (Yunnan)	Earthquake (M_w 6.1), aftershocks and landslides; 25 800 houses destroyed, 40 600 houses severely damaged	617 dead, 114 missing 3 143 injured USD 5bn total damage
18.8.	Iran Mormori (Ilam province)	Earthquake (M_w 6.2), aftershocks; 17 000 buildings damaged	250 injured 12 000 homeless IRR 1160bn (USD 43m) total damage
24.8.	US South Napa (CA)	Earthquake (M_w 6.0); over 500 buildings damaged; content damage to wine industry	1 dead 200 injured USD 153m insured loss USD 700m total damage
27.9.	Japan Honshu	Mount Ontake eruption	57 dead, 6 missing 69 injured
7.10.	China Yongping (Yunnan)	Earthquake (M_w 6.6); 6987 houses destroyed, 79 146 houses damaged	1 dead 324 injured CNY 1.7bn (USD 274m) total damage
14.10.–22.10.	Indonesia North Sumatra	Mount Sinabung volcano activity	50 dead
22.11.	China Kangding (Sichuan)	Earthquake (M_w 5.9)	5 dead 54 injured USD 50m total damage
6.12.	China Weiyuan	Earthquake (M_w 5.5)	1 dead 22 injured 2000 homeless

Droughts, bush fires, heat waves

Date	Country Place	Event	Number of victims Amount of damage (where data available)
1.1.–30.11.	Brazil	Severe drought	USD 3bn total damage
1.1.–30.4.	Pakistan	Heat wave	180 dead
1.1.–31.12.	US San Joaquin Valley, Central Coast (California)	Drought in California	USD 2.2bn total damage
13.1.–18.1.	Australia Victoria	Heatwave	139 dead
Summer	China Henan	Drought; 508 000 ha of cropland lost	CNY 7.3bn (USD 1.18bn) total damage
Summer	China Liaoning	Drought; 471 000 ha of cropland lost	USD 110m insured loss USD 2.5bn total damage
12.4.–16.4.	Chile Valparaiso	Wildfires	15 dead 10 injured 8 000 homeless USD 34m total damage
Summer	China Mongolia	Drought; 178 000 ha of cropland destroyed	USD 459m total damage
1.6.–10.10.	Guatemala	Severe drought in Central America	USD 100m total damage
31.7.–25.8.	Sweden Västmanland	Wildfires	1 dead >USD 30m insured loss >USD 100m total damage

Cold, frost

Date	Country Place	Event	Number of victims Amount of damage (where data available)
3.1.–20.1.	India	Cold wave, dense fog	24 dead
23.1.–31.1.	Thailand Loei, Tak	Cold wave	63 dead
31.1.–6.2.	Slovenia, Croatia Slovenia: whole country Croatia: Primorje-Gorski Kotar, Karlovac, Sisak-Moslavina, Varazdin, Zagreb	Heavy snowfall, icy rains and floods from ice breaks cause severe forest damage; over 500 000 ha of forest destroyed or damaged (40% of Slovenia forest resources)	EUR 721m (USD 873m) total damage
13.4.–27.9.	Peru Ancash, Apurimac, Arequipa, Ayacucho, Cusco, Huancavelica, Huanuco, Junin, Lima, Moquegua, Pasco, Puno and Tacna	Cold wave; freezing temperatures	505 dead
17.11.–19.11.	US Buffalo (NY)	Winter storm (lake-effect storm) brings heavy snowfall; Buffalo gets 1.5 metres of snow	13 dead USD 25-100m insured loss USD 100m total damage
23.12.–30.12.	India Uttar Pradesh	Cold wave, icy winds, dense fog	140 dead

Hail

Date	Country Place	Event	Number of victims Amount of damage (where data available)
27.3.–29.3.	US TX, MO, LA	Thunderstorms, winds up to 129 km/80 miles per hour, large hail, tornadoes; considerable hail damage in Texas	USD 600m-1bn insured loss USD 1bn total damage
18.5.–23.5	US PA, CO, IL, MT, SC, IN, NY, IA, OA, VA	Severe thunderstorms, large hail	USD 2.94bn insured loss USD 3.7bn total damage
8.6.–10.6.	France, Germany, Belgium	Storm Ela brings large hail in France and Belgium, and wind damage in Germany; over 600 000 houses and 500 000 vehicles damaged	6 dead EUR 1.81bn (USD 2.19bn) insured loss EUR 2.6bn (USD 3.15bn) total damage
8.7.	Bulgaria Sofia	Severe hailstorm; severe damage in Sofia, 10 000 vehicles damaged	1 dead 40 injured EUR 60m (USD 73m) insured loss EUR 450m (USD 545m) total damage
30.11.	Australia Brisbane	Hailstorm; 17 509 houses and 51 472 vehicles damaged	12 injured AUD 1.04bn (USD 852m) insured loss AUD 1.3bn (USD 1bn) total damage

Other natural catastrophes

Date	Country Place	Event	Number of victims Amount of damage (where data available)
22.3.	US Oso (Washington State)	Landslide	43 dead 4 injured USD 20m total damage
13.4.	Indonesia Kediri District (Java)	Ash fall from Volcano Kelud eruption, cold lava flooding exacerbated by concomitant rains; 11 093 houses severely damaged, 15 412 houses with moderate damage	7 dead 70 injured USD 103m total damage
30.7.	India Malin, Pune district (Maharashtra)	Landslide triggered by heavy rains	209 dead
2.8.	Nepal Sindhupalchowk district	Massive landslide	33 dead, 153 missing
29.10.	Sri Lanka Haldummulla (Badulla District)	Massive landslide; 63 houses destroyed	4 dead, 192 missing
20.12.	Indonesia Banjarnegara (Java)	Landslide; over 100 houses destroyed	95 dead, 13 missing 2 000 homeless

Note: Table 8 uses loss ranges for US natural catastrophes as defined by the Property Claim Services.

Source: Swiss Re Economic Research & Consulting and Cat Perils.

Table 9

Chronological list of all man-made disasters 2014

Major fires, explosions

Date	Country Place	Event	Number of victims Amount of damage (where data available)
10.1.	Saudi Arabia	Fire at a petrochemical plant	
18.1.–19.1.	Norway Laerdalsoyri	Fire destroys a historical village	50 injured
20.1.	Kuwait	Fire at an oil refinery	
23.1.	Canada L'Isle-Verte (Quebec)	Fire at a home for the elderly	17 dead, 15 missing
8.2.	Saudi Arabia Medina	Fire at a hotel	15 dead 130 injured
12.2.	US Connecticut	Fire at a gas turbine plant	
26.2.	Russia Stavropol Krai	Fire at a petrochemical plant	
9.3.	South Korea	Fire at an electronics plant	
10.3.	Sweden Lysekil	Fire at an oil refinery	
12.3.	US New York	Gas leak causes explosion in two apartment blocks	5 dead 63 injured
17.3.	North Sea, Norway	Fire at an offshore pipeline	
22.3.–24.3.	Argentina Mendoza	Fire at an oil plant	
22.3.	US Storm Lake	Fire at a meat processing plant	
29.3.	South Korea	Fire at an optical company	
30.4.	US Pensacola (Florida)	Gas explosion in a jail	2 dead 184 injured
5.5.	US Colorado Springs	Fire at a power plant	1 injured
12.5.	Germany Hesse	Explosion at a thermal power station	
28.5.	South Korea Jangseong	Fire at a hospital	21 dead
29.5.	US	Fire at an oil well	
9.6.	Thailand Rayong	Fire at a refinery	
12.6.	India Chhattisgarh	Explosion at a steel plant	6 dead 50 injured
14.6.	Ghana Sekondi-Takoradi	Damage at an oil plant	
15.6.	Russia Achinsk (Krasnoyarsk Krai)	Major fire and explosion at an oil refinery	7 dead 12 injured
20.6.	India Bhatinda (Sirsa)	Fire at a refinery	
25.6.	Canada Becancour	Explosion at a chemical plant	1 dead
27.6.	Brazil	Fire at a hydroelectric plant	
28.6.	India Chennai	Eleven-storey building under construction collapses	61 dead 27 injured

Date	Country Place	Event	Number of victims Amount of damage (where data available)
7.7.	US Port Arthur	Fire at a petrochemical plant	2 injured
11.7.	Morocco Casablanca	Collapse of three residential buildings	23 dead 55 injured
24.7.	Angola Luanda	Fire at a food retailer's warehouse	
31.7.	Taiwan Kaohsiung	Series of underground gas explosions in pipelines	32 dead 321 injured
31.7.	UK Yorkshire	Fire at a power station	
2.8.	China Kunshan	Explosion at a metal factory	146 dead 185 injured
8.9.	Brazil Sao Paulo	Fire destroys 600 houses (80%) in a shanty town	2 000 homeless
9.9.	Pakistan Lahore	Roof failure at a mosque	24 dead
9.10.	Saudi Arabia Jeddah	Fire at a large bakery plant	
9.10.	South Africa Kya Sands (Johannesburg)	Fire at a shanty town	8 injured 2 000 homeless
13.10.	Nigeria Lagos	Collpase of a church hostel building	115 dead
6.11.	Argentina Córdoba	Explosion at a chemicals plant	66 injured
12.11.	Thailand Pathum Thani	Fire at an electronic component plant	2 injured
16.11.	Spain Burgos	Fire at a meat processing plant	
18.11.	US Los Angeles	Explosion at a wastewater plant	52 injured
8.12.	US Los Angeles	Fire at a residential building	

Aviation disasters

Date	Country Place	Event	Number of victims Amount of damage (where data available)
25.1.	Congo, Democratic Republic of (DRC) Mbuji-Mayi	Explosion at arms depot triggered by lightning strike	20 dead 50 injured
11.2.	Algeria Aïn Kercha	Algerian Air Force Lockheed C-130 Hercules crash lands	76 dead
8.3.	Indian Ocean	Malaysia Airlines Boeing 777-2H6ER (Flight MH-370) crashes in unknown circumstances	239 dead
15.4.	Space	Power anomaly on satellite in orbit	
16.5.	Space	Communications satellite lost after failing to reach orbit	
17.7.	Ukraine Donetsk	Malaysia Airlines Boeing 777-2H6ER (Flight MH17) crashes in unknown circumstances	298 dead
23.7.	Taiwan Penghu Islands	TransAsia Airways ATR 72-500 crash lands	48 dead
24.7.	Mali Gossi	Air Algérie McDonnell Douglas MD-83 crashes	116 dead
26.7.	Space	Failure of transmission beam on satellite in orbit	
28.10.	Space Wallops Island (Virginia)	Rocket carrying supply to space station blows up shortly after launch	
31.10.	US Mojave Desert (CA)	Spacecraft crashes during test flight	1 dead 1 injured
28.12.	Indonesia Java Sea	AirAsia Airbus A320-216 crashes in Java Sea	162 dead

Maritime disasters

Date	Country Place	Event	Number of victims Amount of damage (where data available)
13.1.	Sudan Nile	Overcrowded boat capsizes on the Nile	250 dead
26.1.	Indian Ocean, India Nicobar Islands	Boat carrying tourists capsizes	22 dead 9 injured
3.2.	Bangladesh Sunamganj	Boat carrying workers catches fire and capsizes on Surma river	11 dead, 30 missing
10.2.	Gulf of Mexico, Mexico	Fire on oil rig	
2.3.	Indian Ocean, Indonesia East Java	Ground subsidence causes damage to oil rig	
6.3.	Nigeria	Fire at offshore oil rig	
12.3.	Indian Ocean, Yemen Beer Ali (Shabwa)	Boat carrying migrants capsizes	43 dead
17.3.	North Pacific Ocean, Japan Tokyo Bay	Cargo vessel collides with container ship and sinks	8 missing 1 injured
22.3.	Uganda Ndaiga (Kibaale district)	Overcrowded boat carrying refugees capsizes on Lake Albert	251 dead

Date	Country Place	Event	Number of victims Amount of damage (where data available)
22.3.	Gulf of Mexico, Mexico Bay of Campeche	Blowout at oil rig	
7.4.	North Pacific Ocean, Japan Wakayama	Cargo ship catches fire	
16.4.	North Pacific Ocean, South Korea Jeju	Passenger ferry sinks	297 dead, 7 missing
3.5.	Bangladesh, Meghna River, Kalagasia, Munshiganj	Ferry capsizes in rough weather	58 dead, 12 missing
5.5.	Mediterranean Sea, Greece Samos	Boat carrying migrants capsizes	22 dead
6.5.	Mediterranean Sea, Libyan Arab Jamahiriya Tripoli	Boat carrying migrants capsizes	36 dead, 42 missing
31.5.	Red Sea, Yemen, Indian Ocean Dhubab	Overcrowded boat carrying migrants capsizes	60 dead
18.6.	North Pacific Ocean, Malaysia Sepang	Ferry carrying migrants capsizes	10 dead, 20 missing
30.6.	Mediterranean Sea, Italy off Sicilian coast	30 people die of asphyxia on boat carrying migrants	30 dead
13.7.	Baltic Sea, Germany	Pontoon sinks and cargo value is lost overboard	
14.7.	Indian Ocean, Malaysia Southern Malaysia	Boat carrying migrants capsizes	2 dead, 18 missing
19.7.	Mediterranean Sea, Malta Malta	Boat carrying migrants capsizes	29 dead
1.8.	Brazil Santos	Fire at sugar export terminal	
4.8.	Bangladesh Munshiganj district	Ferry capsizes on Padma River	130 missing
22.8.	Mediterranean Sea, Libyan Arab Jamahiriya Guarabouli	Boat carrying migrants capsizes	119 dead
23.8.	Sudan Shagarab	Boat carrying migrants capsizes on Atbara River	21 dead
23.8.	Mediterranean Sea, Italy Mediterranean Sea	Boat carrying migrants capsizes	18 dead, 10 missing
23.8.	Mediterranean Sea, Libyan Arab Jamahiriya North Libya	Fishing boat capsizes north of the Libyan coast in bad weather	24 dead
12.9.	Central African Republic Bangui	Boat capsizes on M’poko River	80 missing
16.9.	North Pacific Ocean, Indonesia North Maluku	Passenger boat capsizes in rough weather	14 dead, 7 missing
6.10.–6.12.	Red Sea, Indian Ocean, Yemen Al-Makha (Taiz province)	Boat carrying migrants capsizes in rough weather	70 dead
7.10.	South Pacific Ocean, Indonesia Bali	Passenger ferry capsizes due to engine malfunction	22 dead, 21 missing
10.10.	North Atlantic, Guinea Benty	Overcrowded boat capsizes	18 dead, 20 missing

Date	Country Place	Event	Number of victims Amount of damage (where data available)
24.10.	Zambia Lake Kariba	Overcrowded ferry capsizes on Lake Kariba	26 dead
31.10.	North Atlantic, Bahamas	Grounding of cruise ship	
3.11.	Black Sea, Turkey Istanbul	Boat carrying migrants capsizes in the Bosphorus Strait	24 dead
1.12.	North Pacific Ocean, Russia Anadyr Bay, Chukotka Peninsula	Fishing vessel capsizes in rough weather	27 dead, 26 missing
12.12.–12.12.	Congo, Democratic Republic of (DRC) Tanganyika Lake	Boat capsizes on Tanganyika Lake	129 dead
13.12.	Red Sea, Egypt Suez	Containership collides with fishing boat	13 dead, 14 missing
28.12.	Mediterranean Sea, Greece Corfu	Passenger ferry catches fire; rescue operations hindered by severe weather	9 dead (at least), 18 missing

Rail disasters, including cableways

Date	Country Place	Event	Number of victims Amount of damage (where data available)
22.4.	Congo, Democratic Republic of (DRC) Katanga	Freight train derails	63 dead 162 injured
2.5.	South Korea Seoul	Two subway trains collide at station	200 injured
4.5.	India Raigad	Passenger train derails	18 dead 124 injured
26.5.	India Khalilabad, Uttar Pradesh	Two trains collide	26 dead 74 injured
18.8.	India Bihar	Train strikes an autorickshaw at a railway crossing	20 dead

Mining accidents

Date	Country Place	Event	Number of victims Amount of damage (where data available)
8.4.	China Chongqing	Explosion at a coal mine	22 dead 2 injured
25.4.	Colombia Buritica	Explosion at a gold mine	4 dead 95 injured
13.5.	Turkey Soma	Fire at a coal mine	301 dead 80 injured
3.6.	China Chongqing (Wansheng)	Gas explosion at a coal mine	22 dead 2 injured
21.8.	Central African Republic Bambari	Gold mine collapses	25 dead, 2 missing
25.10.	Australia Koolan Island	Seawall at an iron ore mine fails	
26.11.	China Liaoning	Fire at a coal mine	24 dead 52 injured

Collapse of building/bridges

Date	Country Place	Event	Number of victims Amount of damage (where data available)
4.1.	India Canacona (Goa)	Five-story building under construction collapses	32 dead 14 injured
11.1.	China Dukezong (Yunnan)	Fire at a guesthouse spreads to nearby buildings; 242 houses destroyed	2600 homeless
18.2.	South Korea Gyeongju	Auditorium roof collapses	10 dead 100 injured

Miscellaneous

Date	Country Place	Event	Number of victims Amount of damage (where data available)
1.1.	Philippines	Fireworks explode during a New Year's eve celebrations	2 dead 599 injured
9.1.–10.1.	US Charleston (West Virginia)	Chemical spill into West Virginia's Elk River	169 injured
14.1.	Nigeria Maiduguri, Borno State	Suicide bombing at a market district	30 dead 50 injured
17.1.	Afghanistan Kabul	Suicide bomb attack at a restaurant	21 dead 12 injured
18.1.	India Mumbai	Stampede at a funeral	18 dead 56 injured
21.1.	Pakistan Balochistan	Bomb explosion on a bus carrying pilgrims	24 dead 31 injured
24.1.–25.1.	Egypt Cairo	Series of car bomb explosions outside police headquarters	7 dead 100 injured
26.1.	Nigeria Kawuri, Borno	Gunmen attack village	85 dead 50 injured
15.2.	Nigeria Izghe	Gunmen attack village	106 dead
19.2.	Lebanon Beirut	Suicide bombing attacks near a cultural centre	7 dead 100 injured
25.2.	Nigeria Buni Yadi	Terrorist attack at a university college	59 dead
1.3.	China Kunming	Terrorist attack at a metro station	28 dead 113 injured
15.3.	Nigeria Maiduguri	Terrorist attacks at a prison	212 dead
9.4.	Pakistan Islamabad	Bomb explosion at a market	22 dead 100 injured
14.4.	Nigeria Abuja	Bomb explosions at a bus station	71 dead 124 injured
25.4.	Congo, Democratic Republic of (DRC) Kikwit	Stampede at a music festival	21 dead
1.5.	Nigeria Abuja	Car bomb explosion in a residential area	19 dead 60 injured
13.5.	Vietnam	Anti-China riots; over 400 factories damaged	21 dead
20.5.	Nigeria Jos	Bomb explosions at a market and bus station	118 dead 84 injured
23.5.	China Ürümqi	Bomb explosion at a market	31 dead 90 injured

Date	Country Place	Event	Number of victims Amount of damage (where data available)
24.5.	Nigeria Borno	Terrorist attacks at a village	28 dead
25.5.	Thailand Pattani	Bomb explosions in shops and public offices	3 dead 55 injured
30.5.	Central African Republic Bangui	Gunmen attack in a church	30 dead
8.6.	Pakistan Karachi	Terrorist attack at the airport	36 dead 18 injured USD 10m insured loss
8.6.	India Shalanala Village, Mandi district (Himachal Pradesh)	Students on educational trip drown after flood gates of the Larji Hydro Power Project opened	24 dead, 1 missing
15.6.	Kenya Mpeketoni	Terrorist attack	48 dead
18.6.	Nigeria Damaturu	Bomb explosion at public venue	21 dead 27 injured
13.7.–20.7.	Libyan Arab Jamahiriya Tripoli	Fighting at the airport destroys airplanes	47 dead 120 injured
29.7.	Guinea Conakry	Stampede at a concert	24 dead
31.7.	Pakistan Karachi	Picnikers drown during Eid celebrations	33 dead
19.9.	Nigeria Mainok	Gunmen attack a market	30 dead
26.9.	China Xinjiang	Explosions at a police station, shop and market	50 dead 54 injured
3.10.	India Patna (Bihar)	Stampede at a religious festival	33 dead 29 injured
29.11.	China Xinjiang	Terrorist attack at a busy market	26 dead
2.12.	Nigeria Mandera	Shooting at a stone quarry	36 dead
16.12.	Pakistan Peshawar	Shooting at a school	145 dead 130 injured
31.12.	China Shanghai	Stampede during new year celebrations	36 dead 49 injured

Source: Swiss Re Economic Research & Consulting and Cat Perils.

Table 10
The 40 most costly insurance losses (1970–2014)

Insured loss[37] (in USD m, 2014 prices)	**Victims**[38]	**Date** (start)	**Event**	**Country**
78638	1836	25.08.2005	Hurricane Katrina; storm surge, damage to oil rigs	US, Gulf of Mexico, Bahamas
36828	18520	11.03.2011	Earthquake (M_w 9.0) triggers tsunami	Japan
36079	237	24.10.2012	Hurricane Sandy, massive storm surge	US, Caribbean
26990	43	23.08.1992	Hurricane Andrew; floods	US, Bahamas
25104	2982	11.09.2001	Terror attack on WTC, Pentagon, other buildings	US
22355	61	17.01.1994	Northridge earthquake (M* 6.6)	US
22258	136	06.09.2008	Hurricane Ike	US, Gulf of Mexico, Caribbean et al.
16836	181	22.02.2011	Earthquake (M_w 6.3), aftershocks	New Zealand
16157	119	02.09.2004	Hurricane Ivan; damage to oil rigs	US, Caribbean, Barbados et al.
15783	815	27.07.2011	Floods caused by heavy monsoon rains	Thailand
15234	35	19.10.2005	Hurricane Wilma; torrential rain, floods	US, Mexico, Jamaica, Haiti et al.
12240	34	20.09.2005	Hurricane Rita; floods, damage to oil rigs	US, Gulf of Mexico, Cuba
11339	123	15.07.2012	Drought in the Corn Belt	US
10087	24	11.08.2004	Hurricane Charley	US, Cuba, Jamaica et al.
9813	51	27.09.1991	Typhoon Mireille	Japan
8730	71	15.09.1989	Hurricane Hugo	US, Puerto Rico et al.
8682	562	27.02.2010	Earthquake (M_w 8.8) triggers tsunami	Chile
8458	95	25.01.1990	Winter storm Daria	France, UK et al.
8241	110	25.12.1999	Winter storm Lothar	Switzerland, UK, France et al.
7681	321	22.04.2011	Major tornado outbreak; 343 tornadoes, hail	US
7418	177	20.05.2011	Major tornado outbreak (180 tornadoes)	US
6959	54	18.01.2007	Winter storm Kyrill, floods	Germany, UK, et al.
6456	22	15.10.1987	Storm and floods in Europe	France, UK et al.
6449	38	26.08.2004	Hurricane Frances	US, Bahamas
6134	50	22.08.2011	Hurricane Irene, torrential rainfall, flooding	US, Canada, Bahamas et al.
5780	64	25.02.1990	Winter storm Vivian	Switzerland, Germany
5740	26	22.09.1999	Typhoon Bart	Japan
5426	–	04.09.2010	Earthquake (M_w 7.0), over 300 aftershocks	New Zealand
5125	600	20.09.1998	Hurricane Georges; floods	US, Caribbean
4818	41	05.06.2001	Tropical storm Allison; heavy rain, floods	US
4765	3034	13.09.2004	Hurricane Jeanne; floods, landslides	US, Caribbean, Haiti et al.
4492	45	06.09.2004	Typhoon Songda	Japan, South Korea
4200	25	27.05.2013	Floods	Germany, Czech Republic et al.
4123	51	02.05.2003	Thunderstorms, tornadoes, hail, flash floods	US
4010	70	10.09.1999	Hurricane Floyd; heavy rain, floods	US, Bahamas
3899	–	27.07.2013	Hailstorms	Germany, France
3882	59	01.10.1995	Hurricane Opal; floods	US, Mexico, Gulf of Mexico et al.
3839	6425	17.01.1995	Great Hanshin earthquake (M 7.2) in Kobe	Japan
3501	25	24.01.2009	Winter storm Klaus	France, Spain
3410	57	27.12.1999	Winter storm Martin	Spain, France, Switzerland, Italy

* M = moment magnitude
Source: Swiss Re Economic Research & Consulting and Cat Perils.

[37] Property and business interruption, excluding liability and life insurance losses; US natural catastrophe figures based on Property Claim Services, including NFIP losses (see page 43, "Terms and selection criteria" section).
[38] Dead and missing.

Table 11
The 40 worst catastrophes in terms of victims (1970–2014)

Victims[39]	Insured loss[40] (in USD m, 2014 prices)	Date (start)	Event	Country
300 000	–	11.11.1970	Storm and flood catastrophe	Bangladesh
255 000	–	28.07.1976	Earthquake (M 7.5)	China
222 570	109	12.01.2010	Earthquake (M_w 7.0), aftershocks	Haiti
220 000	2506	26.12.2004	Earthquake (M_w 9), tsunami in Indian Ocean	Indonesia, Thailand et al.
138 300	–	02.05.2008	Tropical cyclone Nargis	Myanmar (Burma), Bay of Bengal
138 000	4	29.04.1991	Tropical cyclone Gorky	Bangladesh
87 449	403	12.05.2008	Earthquake (M_w 7.9) in Sichuan, aftershocks	China
74 310	–	08.10.2005	Earthquake (M_w 7.6); aftershocks, landslides	Pakistan, India, Afghanistan
66 000	–	31.05.1970	Earthquake (M 7.7) triggers massive avalanche and floods	Peru
55 630	–	15.06.2010	Heat wave with temperatures up to 40 degrees Celsius	Russia, Czech Republic
40 000	208	21.06.1990	Earthquake (M 7.7); landslides	Iran
35 000	1 622	01.06.2003	Heat wave and drought in Europe	France, Italy, Germany et al.
26 271	–	26.12.2003	Earthquake (M 6.5) destroys 85% of Bam	Iran
25 000	–	16.09.1978	Earthquake (M 7.7) in Tabas	Iran
25 000	–	07.12.1988	Earthquake (M 6.9)	Armenia, ex USSR
23 000	–	13.11.1985	Volcanic eruption on Nevado del Ruiz and avalanches	Colombia
22 300	312	04.02.1976	Earthquake (M 7.5)	Guatemala
19 737	134	26.01.2001	Earthquake (M_w 7.6) in Gujarat	India, Pakistan
19 118	1 421	17.08.1999	Earthquake (M_w 7) in Izmit	Turkey
18 520	36 828	11.03.2011	Earthquake (M_w 9.0) triggers tsunami	Japan
15 000	142	29.10.1999	Tropical cyclone 05B	India
14 204	–	20.11.1977	Tropical cyclone in Andrah Pradesh	India
11 069	–	25.05.1985	Tropical cyclone in Bay of Bengal	Bangladesh
10 800	–	26.10.1971	Odisha cyclone, flooding in Bay of Bengal and Orissa state	India
10 000	313	12.12.1999	Floods, mudflows and landslides	Venezuela
9 500	1 041	19.09.1985	Earthquake (M 8.1)	Mexico
9 475	–	30.09.1993	Earthquake (M 6.4)	India
9 000	726	22.10.1998	Hurricane Mitch in Central America	Honduras, Nicaragua et al.
8 135	518	08.11.2013	Typhoon Haiyan, storm surge	Philippines, Vietnam, China, Palau
7 079	–	17.08.1976	Earthquake (M 7.9), tsunami in Moro Gulf	Philippines
6 425	3 839	17.01.1995	Great Hanshin earthquake (M 7.2) in Kobe	Japan
6 304	–	05.11.1991	Typhoon Thelma (Uring)	Philippines
6 000	–	02.12.1984	Accident in chemical plant; methyl isocyanates released	India
6 000	–	01.06.1976	Heat wave, drought	France
5 749	47	27.05.2006	Earthquake (ML* 6.3); Bantul almost destroyed	Indonesia
5 748	508	14.06.2013	Floods caused by heavy monsoon rains	India
5 422	–	25.06.1976	Earthquake (M 7.1)	Indonesia
5 374	–	10.04.1972	Earthquake (M 6.9) in Fars	Iran
5 300	–	28.12.1974	Earthquake (M 6.3)	Pakistan
5 000	765	23.12.1972	Earthquake (M 6.2)	Nicaragua

*ML = local magnitude scale

Source: Swiss Re Economic Research & Consulting and Cat Perils.

[39] Dead and missing.
[40] Property and business interruption, excluding liability and life insurance.

Terms and selection criteria

A natural catastrophe is caused by natural forces.

Natural catastrophes
The term "natural catastrophe" refers to an event caused by natural forces. Such an event generally results in a large number of individual losses involving many insurance policies. The scale of the losses resulting from a catastrophe depends not only on the severity of the natural forces concerned, but also on man-made factors, such as building design or the efficiency of disaster control in the afflicted region. In this *sigma* study, natural catastrophes are subdivided into the following categories: floods, storms, earthquakes, droughts/forest fires/heat waves, cold waves/frost, hail, tsunamis, and other natural catastrophes.

A man-made or technical disaster is triggered by human activities.

Man-made disasters
This study categorises major events associated with human activities as "man-made" or "technical" disasters. Generally, a large object in a very limited space is affected, which is covered by a small number of insurance policies. War, civil war, and war-like events are excluded. *sigma* subdivides man-made disasters into the following categories: major fires and explosions, aviation and space disasters, shipping disasters, rail disasters, mining accidents, collapse of buildings/bridges, and miscellaneous (including terrorism). In Tables 8 and 9 (pages 24– 41), all major natural catastrophes and man-made disasters and the associated losses are listed chronologically.

Losses due to property damage and business interruption that are directly attributable to major events are included in this study.

Total losses
For the purposes of the present *sigma* study, total losses are all the financial losses directly attributable to a major event, ie damage to buildings, infrastructure, vehicles etc. The term also includes losses due to business interruption as a direct consequence of the property damage. Insured losses are gross of any reinsurance, be it provided by commercial or government schemes. A figure identified as "total damage" or "economic loss" includes all damage, insured and uninsured. Total loss figures do not include indirect financial losses – ie, loss of earnings by suppliers due to disabled businesses, estimated shortfalls in GDP and non-economic losses, such as loss of reputation or impaired quality of life.

The amount of the total losses is a general indication only.

Generally, total (or economic) losses are estimated and communicated in very different ways. As a result, they are not directly comparable and should be seen only as an indication of the general order of magnitude.

The term "losses" refer to insured losses, but do not include liability.

Insured losses
"Losses" refer to all insured losses except liability. Leaving aside liability losses, on one hand allows a relatively swift assessment of the insurance year. On the other, it tends to understate the cost of man-made disasters. Life insurance losses are also not included.

NFIP flood damage in the US is included.

NFIP flood damage in the US
The *sigma* catastrophe database also includes flood damage covered by the National Flood Insurance Program (NFIP) in the US, provided that it fulfils the *sigma* selection criteria.

Selection criteria

sigma has been publishing tables listing major losses since 1970. Thresholds with respect to casualties – the number of dead, missing, severely injured and homeless – also make it possible to tabulate events in regions where the insurance penetration is below average. Table 12 details the loss thresholds for the reporting year 2014.

Table 12
Thresholds for insured losses and casualties in 2014

Insured losses (claims):		
	Maritime disasters	USD 19.6 million
	Aviation	USD 39.3 million
	Other losses	USD 48.8 million
or Total losses:		USD 97.6 million
or Casualties:		
	Dead or missing	20
	Injured	50
	Homeless	2000

Source: Swiss Re Economic Research & Consulting and Cat Perils.

Adjustment for inflation, changes to published data, information

Losses are determined using year-end exchange rates and are then adjusted for inflation.

sigma converts all losses for the occurrence year not given in USD into USD using the end-of-year exchange rate. To adjust for inflation, these USD values are extrapolated using the US consumer price index to give current (2014) values.

This can be illustrated by examining the insured property losses arising from the floods which occurred in the UK between 29 October and 10 November 2000:

Insured loss at 2000 prices: USD 1045.7 million

Insured loss at 2014 prices: USD 1437.6 million

Alternatively, were the losses in the original currency (GBP) adjusted for inflation and then converted to USD using the current exchange rate, the result would be an insured loss at 2014 prices of USD 1 503 million, 4% more than with the standard *sigma* method. The reason for the difference is that the value of the GBP rose by almost 4% against the USD in the period 2000–2014, ie, more than the difference in inflation between the US (37.5%) and the UK (37.5%) over the same period.

Figure 10
Alternative methods of adjusting for inflation, by comparison

Floods UK		**Exchange rate**		**US inflation**
29 October–10 November 2000	GBPm	USD/GBP	USDm	USDm
Original loss	700.0	1.494	1 045.7	1 045.7
Level of consumer price index 2000	93.1			172.2
Level of consumer price index 2014	128.0			236.7
Inflation factor	1.375			1.375
Adjusted for inflation to 2014	962.7	1.561	1502.6	1437.6
Comparison			105%	100%

Source: Swiss Re Economic Research & Consulting.

Changes to loss amounts of previously published events are updated in the *sigma* database.

If changes to the loss amounts of previously published events become known, *sigma* takes these into account in its database. However, these changes only become evident when an event appears in the table of the 40 most costly insured losses or the 40 disasters with the most fatalities since 1970 (see Tables 10 and 11).

Only public information used for man-made disasters

In the chronological lists of all man-made disasters, the insured losses are not shown for data protection reasons. However, the total of these insured losses is included in the list of major losses in 2014 according to loss category. *sigma* does not provide further information on individual insured losses or about updates made to published data.

Sources

Newspapers, direct insurance and reinsurance periodicals, specialist publications and other reports are used to compile this study.

Information is collected from newspapers, direct insurance and reinsurance periodicals, specialist publications (in printed or electronic form) and reports from insurers and reinsurers.[41] In no event shall Swiss Re be liable for any loss or damage arising in connection with the use of this information.

Table 13
Exchange rates used, national currency per USD

Country	Currency	Exchange rate, end 2014
Australia	AUD	1.2213
Canada	CAD	1.1584
Chile	CLP	607.2500
China	CNY	6.2048
Europe	EUR	0.8264
UK	GBP	0.6414
India	INR	63.2500
Iran	IRR	27163.0000
Mexico	MXN	14.7395
Philippines	PHP	44.8000
Russia	RUB	59.7500
Saudi Arabia	SAR	3.7535
Thailand	THB	32.9150
Tonga	TOP	2.0243
U.S.A.	USD	1.0000
South Africa	ZAR	11.5671

Source: Swiss Re Economic Research & Consulting.

[41] Natural catastrophes in the US: those *sigma* figures which are based on estimates of Property Claim Services (PCS), a unit of the Insurance Services Office, Inc (ISO), are given for each individual event in ranges defined by PCS. The estimates are the property of ISO and may not be printed or used for any purpose, including use as a component in any financial instruments, without the express consent of ISO.

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