Risky BUSINESS

A sequence of devastating earthquakes and a large number of weather-related catastrophes made 2011 the most expensive year ever for natural catastrophe losses for insurance companies. **Owen Gaffney** spoke to the world's largest reinsurance company Munich Re's Head of Geo Risks Research, **Peter Höppe**.

What is Munich Re's analysis of events in 2011?

2011 is a very special year in terms of natural catastrophes. By the end of the first half of the year we were already at a record level for total economic losses caused by natural catastrophes. In the second half to date we have had even more large natural catastrophes, for example the flooding in Thailand and Hurricane Irene in the US. Never before have we seen such high losses.

Which are the key events?

The predominant contribution has been the earthquake in Japan: this quake has been the most costly natural catastrophe in history. Much more expensive than Hurricane Katrina, which was up until then the most expensive natural catastrophe.

But it is not just earthquakes. It's the weather too. We had extreme floods in Queensland at the end of last year and early this year. These were caused by record precipitation in many places in Australia, associated with the highest sea-surface temperatures ever measured off the coast of Australia. The losses caused by large thunderstorm-related events such as tornadoes and hail in the US are at a record high, about 50 percent higher compared with 2010.

Never before have we seen such high losses.

What is the significance of the high sea-surface temperature?

Like many climate researchers, we see a link between the high sea-surface temperatures, increasing intense-precipitation events and the intensification of tropical storms. Increasing sea-surface temperatures are a logical consequence of global warming. They lead to more evaporation and thus a higher potential for extreme precipitation, and they provide more energy for tropical storms.

Also one of the largest and most intense cyclones in recorded history made landfall in Queensland this year. The warmer seawater provided its energy.

What is the long-term trend?

The long-term statistics of sea-surface temperature off the coast of Australia, but also in other ocean basins, show a significant trend upwards for the last 100 years. December 2010 had the highest sea-surface temperature on record off the Australian coast (Figure 1). The rise can only be explained by global warming.

What about La Niña this year? Doesn't that phenomenon cause periodic fluctuations?

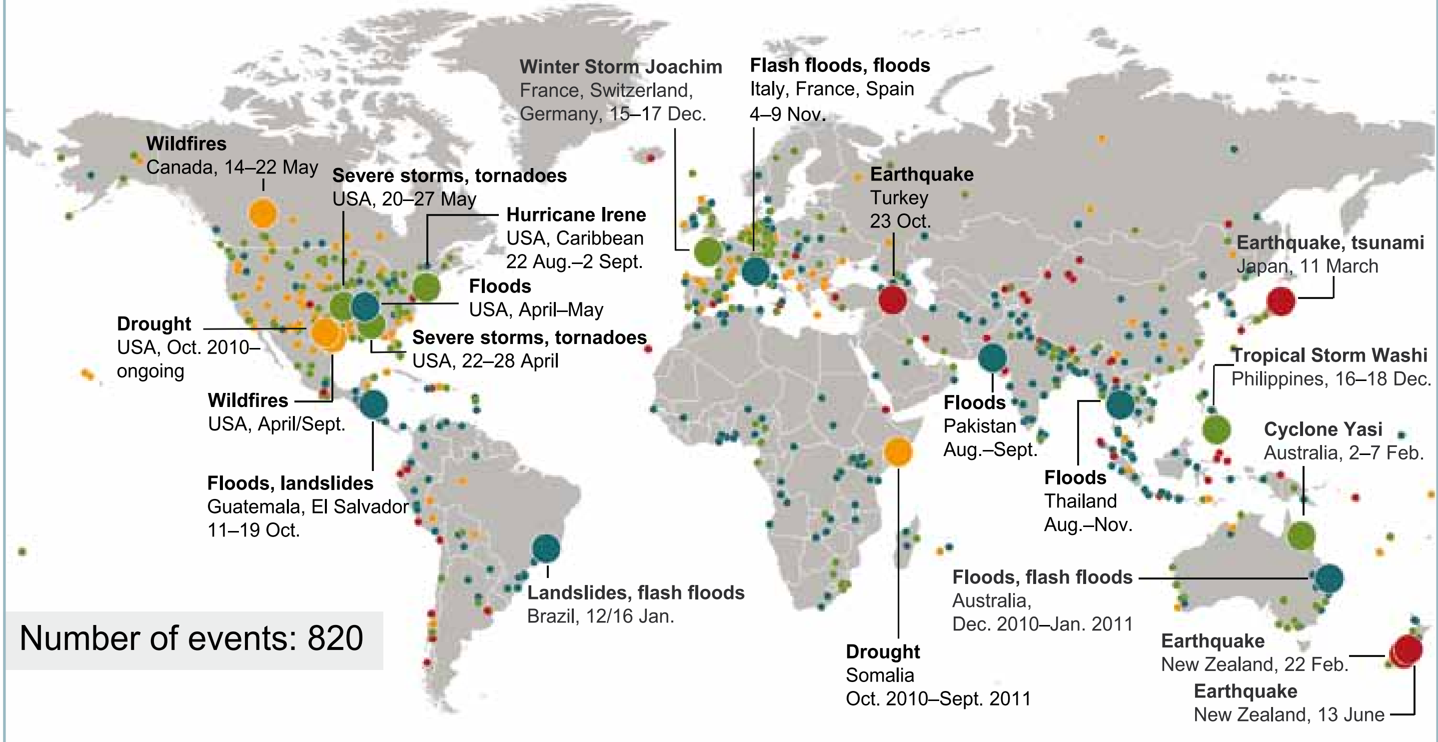
We do have year-to-year fluctuations in weather and sea

The forgotten catastrophe

While the insurance industry reeled from heavy losses, 2011's greatest humanitarian catastrophe unfolded in Africa. Famine caused countless deaths in the midst of the worst drought in decades on the Horn of Africa. These fatalities and economic losses are not included in calculations of insured losses, a fact not overlooked by Munich Re.

Natural Catastrophes 2011

Munich RE



○ **Natural catastrophes**

◯ **Selection of significant loss events**

● **Geophysical events** (earthquake, tsunami, volcanic activity)

● **Meteorological events** (storm)

● **Hydrological events** (flood, mass movement)

● **Climatological events** (extreme temperature, drought, wildfire)

Natural catastrophes in 2011

	The figures of the year 2011	The figures of the year 2010	Average of the last 10 years 2001-2010	Average of the last 30 years 1981-2010
Number of events	820	970	790	630
Overall losses in US$ m (Original values)	380,000	152,000	113,000	75,000
Insured losses in US$ m (Original values)	105,000	42,000	35,000	19,000
Fatalities	27,000	296,000	106,000	69,000

The five largest natural catastrophes of 2011
Ranking by overall losses

Date	Country/Region	Event	Fatalities	Overall losses in US$ m	Insured losses in US$ m
11.3.2011	Japan	Earthquake, tsunami	15,840	210,000	35,000-40,000
1.8-15.11.2011	Thailand	Floods, landslides	813	40,000	10,000
22.2.2011	New Zealand	Earthquake	181	16,000	13,000
22-28.4.2011	USA	Severe storms/ tornadoes	350	15,000	7,300
22.8-2.9.2011	USA, Caribbean	Hurricane Irene	55	15,000	7,000

temperatures associated with El Niño and La Niña events. But in the long term – as the IPCC special report (see page 5 of this issue) assumes – there will be an increase in average tropical cyclone maximum wind speeds in some ocean basins. Again, we don't see this only around Australia. We see increasing sea-surface temperature on a global level.

Peter Höppe, Head of Geo Risks Research, Munich Re

EPP Group

The United States has been hit hard this year.

If you put it all together, we had an extreme record drought in Texas. We had record floods in the Missouri and Mississippi region. We had an almost record season for tornadoes in terms of the total number. But an absolute record in terms of economic losses. If you take the tornadoes as a single event, then the tornado season of 2011 is the fifth costliest natural catastrophe in US insurance history.

Do you see any long-term trends there?

We've done an extensive study on this. There is a long-term trend visible on the so-called convective event losses – all the losses from big thunderstorms – including hail, tornadoes, flooding. We see a significant upward trend in the US during the last decades. This is in line with some trends from meteorological data where we see a rising number of days with the potential to develop these large thunderstorm systems. When comparing regions in the trends of frequencies of weather-related natural catastrophes, we see the largest increase in North America, followed by Asia.

As the world's largest reinsurance company you seem convinced you are seeing strong links between the trend in weather-related natural catastrophes and anthropogenic climate change.

We see increasing sea-surface temperature on a global level.

An individual event cannot be taken as proof of climate change. Each of the events we have seen in the last decades could have happened without climate change. As you say, we are the largest reinsurer and we have good data on such weather-related extreme events. Our statistics, however, indicate significant changes. We think we can only explain the full range of these significant changes by the contribution of global warming.

An increasing global interconnectivity seems to amplify the impact of natural catastrophes. Do you see that?

We see more global connections, particularly with these large events. Take the earthquake in Japan. That had an effect on car manufacturers in the US and Europe because some parts made in Japan could not be produced anymore so they ran out of these parts and could not produce their cars.

It also had surprising political influence. If you just think of the Fukushima event. The damaged nuclear power reactors had repercussions on the energy policies of Germany, Switzerland and Italy. This has triggered new laws to phase out nuclear energy, or in the case of Italy, to cancel plans to start building such power plants.

Did it affect the global recession?

I don't think so as most of the disasters have affected wealthy countries rather than being spread around the world. Man-made disasters like 9/11 have more of an effect on financial markets. While the financial losses are high and this means a lot in an economic sense, I don't think they are big enough to influence the long-term international financial markets. And indeed, after such big catastrophes the repair work can boost economies.

What's your take on the trend of global weather-related disasters?

First, the upward trend in the frequencies of loss events from natural catastrophes is predominantly down to weather-related events, not geophysical.

Losses are increasing, however, for all kinds of natural catastrophes, and the main drivers are population growth, rising wealth and increasing settlement in risky regions.

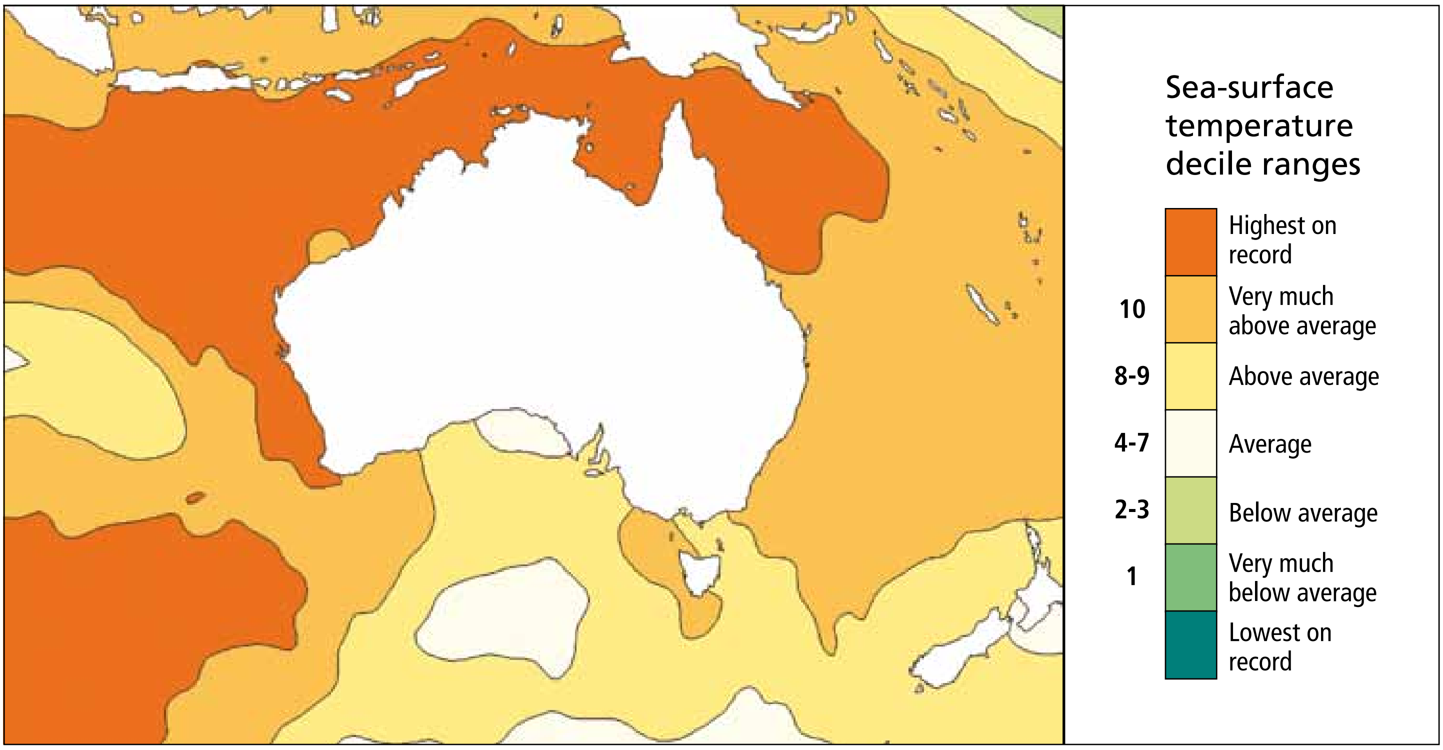


Figure 2. Sea-surface temperature off Australia for the year 2010. Deciles are calculated with respect to the 1900-2010 period from the NOAA Extended Reconstructed Sea Surface Temperature (NOAA_ERSST_V3) data provided by the NOAA/OAR/ESRL PSD, Boulder, Colorado, USA. Figure courtesy: Bureau of Meteorology of the Australian Government.

2011 in numbers

With some 820 loss-relevant events, the figures for 2011 were in line with the average of the last ten years. 90 percent of the recorded natural catastrophes were weather-related – however, nearly two-thirds of economic losses and about half the insured losses stemmed from geophysical events, principally from the large earthquakes. Normally, the dominant loss drivers are weather-related natural catastrophes. On average over the last three decades, geophysical events accounted for just under 10 percent of insured losses. The distribution of regional losses in 2011 was also unusual. Around 70 percent of economic losses in 2011 occurred in Asia.

But what happens when you normalise this adjusting for GDP and population growth?

Our own analyses and those done in collaboration with the London School of Economics suggest that for normalised insured losses there are significant trends upwards in the US and Germany.

If you look at the number of loss events then socio-economic influences have a smaller influence. We see an increase in the number of events. It is important to note we see a big difference between the geophysical events – tsunamis, earthquakes and volcanoes – and weather-related events. We would assume that in both cases population growth and reporting has a similar influence. For example, 30 or 40 years ago we may not have documented a small earthquake with few casualties or economic losses. Today, we would be more likely to document these kinds of events in our database. This creates a slight increase in the number of geophysical loss events we are recording.

But if you do the same for flood events and windstorm events they have increased far more. For flood events they have increased by more than a factor of three. And windstorm events have increased by a factor of about three.

It seems that this difference is driven not by population growth or value growth but rather by more of these extreme events and more intense events. The logical conclusion is that climate change is playing its part, be it natural variability or anthropogenic global warming. This is also what meteorologists and climate researchers are telling us. More evidence for this assumption has been provided by the IPCC special report on extreme events (see page 5 of this issue) and new studies conducted in Germany. There are indications there will be increasing losses caused by storms and floods driven by climate change during the coming three decades. ▮

The logical conclusion is that climate change is playing its part.

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