

# Science in the city

**F**looding in the UK, hurricanes in the Atlantic, drought in Australia – are these extreme weather events becoming more frequent and more severe? Is this related to climate change?

Insurance companies are more sensitive than most to weather-related catastrophes. The Association of British Insurers estimate insured losses from the flooding in the UK in June and July this year will amount to around £3 billion. Munich Re reported that weather-related economic losses in 2005 amounted to over \$200 billion, with insured losses of over \$45 billion from Hurricane Katrina alone. And catastrophes don't have to strike the UK directly for UK-based companies to suffer heavy losses. As a result of Hurricane Katrina, Lloyds of London, the British insurance market, lost around \$2.5 billion.

Reinsurance is in place to insure insurance companies against the huge losses associated with catastrophic events. The figures quoted above make it easy to see why one of the world's largest

The insurance industry exists because of risk and uncertainty, so how is it dealing with climate change? **Jane Strachan** reports on a unique partnership between the industry and climate scientists.

reinsurance brokers, Willis Reinsurance, wants to protect itself from potentially massive future losses.

One of the main issues is uncertainty. While insurance companies exist because of uncertainty, too much can expose them to large losses.

Insurers are able in principle to adapt quickly to new risks emerging such as climate change. But the uncertainty associated with projected future climate impacts has made it difficult for them to respond.

To help, Willis Reinsurance has called on the Walker Institute for Climate System Research to become a major partner in a unique academic-industrial collaboration – the Willis Research

Network (WRN). This partnership brings together researchers from leading international scientific institutes, catastrophe modellers and insurers to increase knowledge of catastrophic events. The WRN is not just limited to climate-related disasters but also deals with a range of catastrophes, including earthquakes and terrorism – in this article we stick to climate.

As a Willis Research Fellow based at the Walker Institute, it is my job to act as the bridge between climate research and the insurance industry. But it's not just about translating scientific research into information that can be used by insurers; the network is a multi-way flow of information and learning. As research

Insured losses from the summer floods in the UK will amount to around £3 billion.

“Estimating losses relies heavily on catastrophe risk modelling.”



Hurricane Katrina cost the British insurance market around £1.25 billion.

“Up until now, catastrophe risk modelling has been mainly based on historical events.

fellows, we are quickly becoming integral members of the Willis team. Spending time in their grand offices in the centre of London's financial district is very different from the day-to-day university environment (and it's not just that I have to swap my jeans for a suit!). Willis have recognised that we can only begin providing them with the information that they need once we understand how the insurance industry works, the nature of catastrophe modelling, and the needs of their clients.

By spending time with catastrophe modellers we have learnt that estimating the losses from catastrophes for particular locations, which are then used to write premiums, relies heavily on catastrophe risk modelling. Up until now, catastrophe risk modelling of climate change has mainly involved using stochastic models, based on historical events, rather than dynamical models of the physical system like those used in global climate modelling. Climate change means that we may not be able to rely on past information about catastrophes to help predict what may happen in the future.

There are two important aspects of weather-related catastrophe that worry insurers – change in exposure (associated with the frequency and location of events) and change in extremes (associated with the severity of events).

On the Earth Simulator supercomputer based in Japan we are running some of the world's highest resolution simulations of the global climate system. These simulations are now able to produce extreme weather including hurricanes and typhoons – a very important achievement in global

climate modelling. By simulating a climate with increased carbon dioxide and higher sea surface temperatures in line with current trends, we can see what may happen, for example, to hurricanes in the Atlantic, with a changing climate. These simulations will not tell us how many hurricanes we will get next year or where the hurricanes will strike, but the statistical information will give us an estimation of how hurricane activity, in terms of frequency, severity and location, is likely to change. Our aim is to introduce this information into catastrophe modelling so that insurance premiums begin to take into account the impact of climate change and climate variability. In the next few years, we expect these simulations to improve our (and the insurance industry's) understanding of the impact of climate variability and change on extreme weather and importantly the associated uncertainty – essential information for catastrophe models.

The communication of uncertainty related to climate change projections underpins the successful knowledge transfer of climate science findings. It is particularly important to consider how users such as catastrophe modellers perceive or use the expressed uncertainties. For example, uncertainty is often perceived as scientists lacking

knowledge or disagreement amongst scientists. But, while this may sometimes be the case in some areas of climate science, uncertainty is actually an inherent aspect of climate change projections, helping us to express how confident we are about our findings.

In the last two decades, the scientific community has raised the alarm that the climate is changing and we are already experiencing the effects. The insurance industry has woken to the fact that they literally cannot afford to ignore it. Through long-term commitment and strong communication, our research will help the insurance industry understand changes in weather-related risk, allowing them to make informed decisions in the face of climate change. ❖

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