Have near-term cat models failed?

The former CEO of AIR Worldwide has criticised the near-term risk models introduced after Hurricane Katrina.

Since the late 1980s, insurers and reinsurers have used catastrophe models to control their exposure and estimate the likelihood that they will suffer a loss after a big event.

In 2006, the three main risk modelling firms – AIR Worldwide, Eqecat and Risk Management Solutions (RMS) – introduced a new type of hurricane model. Rather than using a long-term average (dating back to around 1900) to calculate future hurricane risk, as the previous models had done, these new near-term models predicted hurricane frequency over a much shorter time horizon – usually a five-year period.

But a recent report by Karen Clark, founder of risk modelling consultancy Karen Clark & Company and also the founder of AIR, argues that the near-term models have not performed as expected. The report, entitled *Near Term Hurricane Models: How Have They Performed?* says near-term models have repeatedly over-estimated the level of hurricane activity in the three years since their introduction.

AIR's 2006 model, known as the Near-term Sensitivity Catalogue, was based on the assumption that sea surface temperatures (SSTs) are likely to remain higher than the long-term average for the next several years. Compared with AIR's standard model, it predicted up to a 44% increase in hurricanes making landfall during the five-year period from 2006 to 2010, depending on the region. The model was later amended to predict a 10% increase in hurricanes and renamed the Warm SST Conditioned Catalogue.

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>
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RMS's method was to ask a panel of scientific specialists and use statistical analysis to predict hurricane activity for the period between 2006 and 2010. Its five-year model, released in 2006, assumed a 30% increase in category 3, 4 and 5 hurricanes making landfall, which led to increases in modelled annualised insured losses of around 40% across the Gulf Coast, Florida and the south-east US, and between 25% and 30% in the mid-Atlantic and northeast. It said increases in modelled annualised insured losses would be closer to 50% in the Gulf, Florida and the south-east.

RMS updates its five-year forecast every year. According to Christine Ziehmann, director of product management at RMS, the firm predicts that over the next five years the number of intense hurricanes (category 3 to 5) will be around 25% above the historical average, and the number of hurricanes overalll (category 1 to 5) will be 10% to 15% above the historical average.

Meanwhile, estimated countrywide annual losses from Eqecat's near-term model have consistently ranged between 35% and 37% above the long-term average, according to Clark.

These estimates are all well above the actual level of hurricane activity in the past three years, Clark's report says. Although the number of hurricanes was slightly above average during the cumulative period of 2006 through 2008, landfalling hurricanes were around 22% below average, and insured losses were more than 50% below average. For insured losses to reach 40% above average for the five-year period 2006 to 2010, the report says the next two hurricane seasons would have to be like 2004, or there would need to be another Katrina.

Clark concludes that five years is too short a period for hurricane loss estimation. "The traditional models worked pretty well," says Clark. "You can't really predict hurricane activity over any time horizon in medium- or short-term."

But the risk modellers defend their near-term models. According to Peter Dailey, director of atmospheric science at AIR, his firm's models – including the standard model and the warm SST model – aim to give clients a full range of potential losses, rather than predict losses for a given year. "It's not meant to be a prediction and therefore to try to test whether it's making an accurate prediction over a short period of time like three years is not a valid test," he says.

Ziehmann at RMS still recommends that insurers use the near-term models – which RMS calls its medium-term model – instead of models based on a long-term average. "We know that the models we have used that are input into our method of expert elicitation all have much higher skill than the long-term average", says Ziehmann. "For the time-frame that insurers and reinsurers are interested in, a forward-looking time frame over the next five years is absolutely the right thing to do."

But Clark does not agree. Her report indicates that hurricane activity over the past three years has been closer to the long-term average than the near-term models' predictions. While Clark does not suggest that the near-term models should not be used at all, she issues a word of caution.

"You really have to look at the models on a portfolio-specific basis, in order to make judgements as to whether the models are credible or not for your particular book of business," she says. "There are certain geographic areas where the near-term models just seem not to be credible and certainly in those areas those models should not be used." ●

By Karen Eeuwens