Institute for Catastrophic Loss Reduction
Building resilient communities

CATtales

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Inside this issue

ICLR researching wind damage to partially-built wood framed structures

The Institute for Catastrophic Loss Reduction is "seeking to better understand" why partially-built wood frame structures fail in high winds.

"Every year, several partially built single family homes, duplexes and other small wood framed structures in Canada collapse as a result of severe wind," ICLR says, adding that on Sunday, October 15 four partially-framed homes collapsed in Waterloo, Ont. "as a result of wind gusts exceeding 100 km/h."

ICLR and researchers from Western University are also seeking "related insurance claim data from insurers that cover home builders against such loss," ICLR announced, adding that insurers willing to offer such data should contact ICLR managing director Glenn McGillivray.

"ICLR is interested in isolating options for home builders, including off-the-shelf products or custom measures that builders can take to prevent such failure," added ICLR.

Researchers from Western University visited a site north of London, in the community of Ilderton "which was hit by high straight line winds on Saturday, October 7," ICLR reported. ►

Failure of partially constructed wood-framed office in Ilderton, Ontario October 7, 2017

"Strong gusts led to the failure of a partially built wood-frame office. Accompanying photos indicate wood truss and wall failure."

A preliminary report from the researchers suggests "that the temporary bracing between the top chords of the roof joists was very short, and only spanned between each truss," ICLR noted.

"Researchers indicated that the walls of the structure were entirely sheathed, however windows, doors and drywall had yet to be installed (window and door openings effectively double the drag, the opposing force caused by the wind, on the structure)," ICLR added.

At a recent conference, Greg Kopp, a civil engineering professor at Western, suggested that builders could construct homes that are resilient to tornadoes measuring up to 2 on the Enhanced Fujita scale.

"So many of the failures that we see" in houses due to wind "are related to quality of construction issues," Kopp said Oct. 5 during the 44th Annual Engineering Insurance Conference (AEIC).

"Our houses are built in a manufacturing process but it is a kind of uncontrolled manufacturing process by different qualities of labour," Kopp added during a presentation at AEIC, titled *Tornadoes and Revisiting Residential Construction Practices*.

Strong winds lead to the failure of several partially constructed homes in Waterloo, Ontario Sunday, October 15, 2017 (Source: Mike Muncic and CTV News)

Partially constructed townhomes collapsed in Regina, Saskatchewan October 18, 2017 (Source: Kevin Martel, 980 CJME)

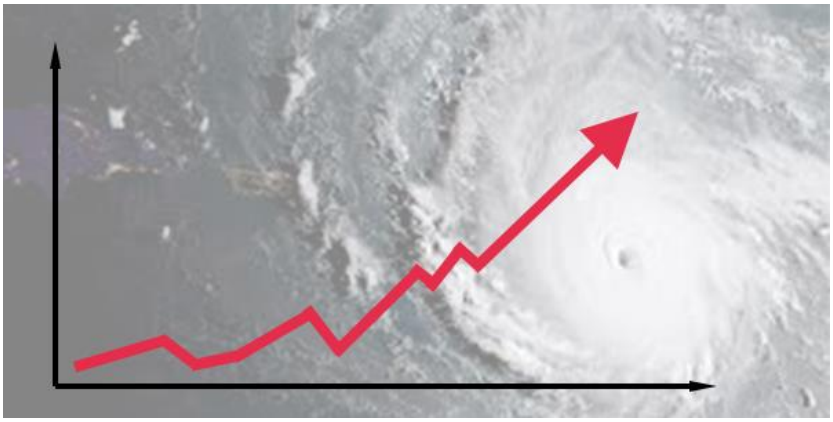
During a separate presentation at AEIC, McGillivray said ICLR has been trying to make hurricane straps mandatory under Ontario's Building Code. The current version of the Ontario Building Code requires that roof joists be toe-nailed into the upper plate of walls using a minimum of three nails.

Hurricane straps are metal bands that wrap around trusses and connect to walls. Hurricane straps "would have kept roofs on" to some homes that were badly damaged during tornadoes in Angus in 2014 and in Vaughan in 2009, Kopp said at AEIC. **CT**

This article first appeared in Canadian Underwriter Online, October 16, 2017

Three hurricanes and an earthquake (oh, yeah, and some wildfires)

By Glenn McGillivray, Managing Director, ICLR



Every once in a while, a unique or particularly severe insured loss event or series of events forces (re)insurers to re-evaluate the assumptions they make about the risks they take onto their balance sheets. This is usually either because something occurs that no one ever considered possible or probable (and, thus, didn't model), or because new learnings about a known hazard come to light.

Such reassessments occurred after the terrorist attack of 9/11 and Hurricane Andrew.

In the case of the former, no one ever considered the possibility that multiple fully loaded airliners could be commandeered and used as fuel-laden missiles against key landmarks. Insured losses from the attack totalled US$25.5 billion (2016 dollars, Swiss Re).

Prior to Hurricane Andrew, the previous worst-case insured loss estimate of a major U.S. landfalling hurricane was US$8 billion. Andrew came in at US$15.5 billion (1992 dollars) – almost twice the worst-case – and the storm didn't even hit Miami square on. Insurers and reinsurers were forced to ask themselves many questions, not the least of which was what if Andrew did hit Miami?

September 11th prompted an almost immediate reckoning by insurers and reinsurers of their exposures to terrorism and a re-underwriting of all property and liability policies with inclusion of new wordings that excluded terrorism right across the board.

Andrew forced a major re-evaluation of hurricane risk along the coastal U.S. and drove many changes in the insurance and reinsurance sectors, including the rise of the Bermuda property market and of an insurer of last resort in Florida, and the birth of Alternative Risk Transfer instruments. I discuss the fallout from Andrew in my last Insblogs (see *Hurricane Andrew: The benchmark* at https://www.insblogs.com/uncategorized/hurricane-andrew-benchmark/7761).

The North Atlantic hurricane seasons of 2004 and 2005 also lead to a substantial re-evaluation of U.S. hurricane risk.

In 2004, four major hurricanes (Charley, Frances, Ivan and Jeanne) tore through the Caribbean, causing massive damage before eventually hitting Florida. Total insured damage from the events came in at US$37.7 billion (2016 dollars, Swiss Re). It was the first time that four hurricanes impacted a particular state in a single season since a quartet of storms battered Texas in 1886, causing a major rethink of the potential losses that could be associated with a series of U.S. landfalling hurricanes.

Many thought the insured loss record struck in 2004 would remain for a while, but it was blown out of the water the very next year with hurricanes Katrina, Rita and Wilma (aka KRW). That trio triggered insured losses of US$109.4 billion (2016 dollars, Swiss Re).

Fallout from the 2004 Atlantic hurricane season included legislated changes to the way that Floridians pay hurricane deductibles for multiple storms experienced in a single season. Essentially, after the 2004 hurricane season, hurricane deductibles were made aggregate; while insureds had to pay a full hurricane deductible for a first event, they only had to pay a standard non-hurricane deductible for subsequent events in the same season. This came into effect in 2005.

Legislation was also passed that required Florida insurers to pay their full Florida Hurricane Catastrophe Fund (FHCF) retention on their two largest covered events. After that, the FHCF retention dropped to one-third of the full retention for additional events. The industry aggregate retention was also 'reset' to US$4.5 billion. Other legislation required the Florida Office of Insurance Regulation and Consumer Advocate to be provided full access to the assumptions and factors used in "developing the actuarial methods, principles, standards, models, or output ranges" before they could be used in a rate filing.

Beginning in 2005, one model vendor "incorporated the option for users to apply aggregate demand surge to catastrophe modelling runs." Previously, demand surge could be applied in the models for any single occurrence, but this was ►

the first time a model vendor allowed the possibility for demand surge to be factored into multiple events. “This option was largely adopted by the industry and eventually that model vendor phased out the original single-occurrence demand surge, leaving aggregate demand surge as the only option in their model which still exists today.”

However, while this and other model changes made as a result of the 2004 storm season were fairly significant, it was the back-to-back impacts of the 2004 and 2005 seasons together that prompted Guy Carpenter to quip that “The big [model] changes… where yet to come.”

Changes that came after the incredibly destructive 2005 season (Hurricane Katrina currently remains as the costliest insured disaster in insurance history at US$80.7 billion (2016 dollars, Swiss Re)) included the addition of a near-term or medium-term view of risk in the models, allowing model users to “represent perceived hurricane activity over a rolling five-year horizon.” Guy Carpenter noted that “Today, all three models [i.e. RMS, AIR and EQECAT, now Corelogic] continue to include both historical (long-term) and alternative views of risk.”

Other model changes include updates of vulnerability curves, largely due to the inputting of claims data from 2004 (and some 2005) hurricane losses. Additionally, a new class of structure and new occupancy class were added into the RMS model and square footage and year of construction was introduced as a new primary characteristic for personal lines risks. For some models, vulnerability for certain construction types was also increased.

Other changes include modifications in the way that storm surge was considered in the models and at least one model vendor introduced the concept of Loss Amplification in their 2006 model. Additionally, as reported by Guy Carpenter, insurance and reinsurance companies began to make their own internal adjustments to modeled output after 2005.

Additional changes to the insurance and reinsurance industries that came directly out of the 2004 and 2005 hurricane seasons, as outlined by Guy Carpenter, include changes in wordings and exclusions, particularly surrounding flood and storm surge. Higher premiums, deductibles and sub-limits were also implemented, and overall cat capacity was slashed.

Several other industry changes, including rating agency practice, came about directly due to the 2004 and 2005 hurricane seasons, many of them well laid out in a pair of Guy Carpenter reports.

And so?

It is difficult to imagine that 2017 losses experienced so far (the year isn’t over) will have no short-to mid-term impact other than claims cost on the insurance and reinsurance sectors. And while it takes time for models to be changed, for example, price increases and tightening of contract wordings can be managed in much tighter time frames depending on the resolve of those involved.

The three major hurricanes (Harvey, Irma and Maria, now collectively know as HIM), earthquakes in Mexico and the California wildfires have to drive a least some hardening of rates and tightening of terms. The questions are when and how much.

One reinsurer has already announced an increase in available capacity, anticipating at least some hardening of rates and terms at 01/01/18 treaty renewals (the irony is that if enough companies make such announcements, there will be no hardening). Several primary insurers and reinsurers are reporting higher share prices due to an anticipated increase in rates.

At writing, S&P’s released an analysis of 01/01/18 treaty renewals in which it has altered its previous view on rate changes, from projected 0 to 5% price decreases at renewal to 0 to 5% increases. Anticipating second-half catastrophe losses of US$100 billion (first half losses came in at US$20 billion), S&P’s is calling HIM and the Mexican earthquakes a capital event – not just an earnings event – for the reinsurance sector.

There is some speculation that hardening may come from the top down (i.e. starting with the retro reinsurance market). Additionally, there is some talk that 2017 cat losses may spook ILS investors from reinvesting, leading to a precipitous drop in cat capacity in that segment.

It remains to be seen whether one, the other, or both of these projections come to pass.

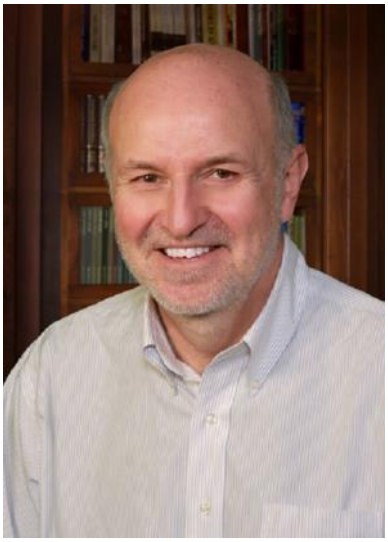
Regardless, a total swing of the market pendulum doesn’t appear to be in the cards as there is an astounding amount of surplus capital floating around out there, and a lot of lip-licking by some companies looking to pick up the slack left by others who pull cat capacity in the new year.

That being said, at least some effects will have to be felt from 2017 cat losses – or else nothing makes sense.

But then again, not much about the latest soft reinsurance cycle has made sense, so we’ll see. **CT**

Blue book celebrates one hundred issues of certitude

By Paul Mayne, Reporter, Editorial Services, Western University



It was exactly 30 years ago when Slobodan P. Simonovic published the first volume of the Water Resources Research Report, also known as the Blue Book, while at the University of Manitoba.

Since bringing his research lab – the Facility for Intelligent Decision Support (FIDS) – to Western in 2000, little did the Civil and Environmental Engineering professor know he'd still be publishing and, just this past month, published Volume 101.

And he's not stopping.

"I am a very persistent person who likes what he is doing," Simonovic said.

A century of volumes ago, Simonovic was inspired to publish the first Water Resources Research Report in order to insure the work of published researchers could be reproduced and built upon.

"I was very rarely able to do that from the journal papers," explained the Director of Engineering Works at the Institute for Catastrophic Loss Reduction. "That was the main motivation to publish more detailed reports, include the data, examples and computer programs, so the researchers reading them could reproduce our work and get going from that point."

While Blue Books don't have regular publishing intervals, they come out as a product of Simonovic's research. Publication follows progress in his lab.

"The Blue Book gave me an opportunity to discuss some practical application issues, and come up with pragmatic solutions for situations when you work with multiple decision makers that do not agree," he said.

While the first volume back in 1987, a very detailed multi-objective assessment methodology for long-term water resources planning, and following volumes may sound very 'inside baseball' to most, the academic world has embraced the ongoing work of Simonovic and FIDS.

According to Western Libraries, Blue Books have been downloaded more than 70,000 times by researchers around the world.

"I almost did not believe the figures coming in the regular monthly reports from Western Libraries," he said. "Imagine the feeling of empowerment – more than 70,000 people are reading, trying to build on what you have done and are spreading your work across the globe.

"I am fortunate to travel all around the world and there were many situations when people wanted to shake my hand or asked me to sign a book because they encountered my name reading this and that. Having such an impact makes you feel humble and very proud of your students, collaborators and your work." **CT**

Hurricane Irma damage assessment: Investigating the performance of Florida's homes during Hurricane Irma

In September, Hurricane Irma impacted the island countries of the Caribbean before traversing the west coast of Florida. Following the storm, Western University students Sarah Stevenson and Emilio Hong travelled to Florida to assist researchers at the University of Florida with early assessments of the structural damage. This week-long investigation covered the Northern and Southwestern regions of the Florida Peninsula and involved house-by-house inspections in the hardest hit neighbourhoods. The Fulcrum app was used, with a custom damage survey form prepared by faculty at Auburn University, to record damage survey observations and store photos for each surveyed property. The goal of the investigation was to assess the state-wide performance of residential structures subjected to coastal wind, tornado, and/or storm surge hazards resulting from Hurricane Irma. In this webinar, Sarah and Emilio will provide an overview of Hurricane Irma's path and wind speed history, and discuss the survey methodology and tools, observed damage, and preliminary findings of the investigation.

Sarah Stevenson is a PhD. student in Structural Engineering at Western University. Her research focuses on improving the hurricane resistance of residential structures in the Caribbean. Sarah recently completed her MESc. in Wind Engineering at Western. Her thesis research examined the behaviour of wood-frame roofs under extreme wind loads using data from past damage surveys and finite element modeling. Sarah has also participated in several post-storm assessments with Environment Canada, including surveying the damage from the Windsor, Ontario tornadoes in August, 2016.

Emilio Hong is currently working as a Research Engineer at Western University. His work is part of a project studying the identification of tornadoes in Northern Ontario based on tree-fall patterns from aerial imagery. Emilio completed his MESc. in Wind Engineering at Western in 2017. His thesis research examined pressure coefficients on the walls of mid- and high-rise buildings. Emilio has participated in post-storm damage surveys, highlighted by the Angus, Ontario tornado of 2014, the Windsor, Ontario tornado of 2016, and the Quebec tornadoes of 2017. **CT**

Date: November 17, 2017

Time: 10 am ET

Webinar link: http://bit.ly/2Aneql7

Institute for Catastrophic Loss Reduction

20 Richmond Street East
Suite 210
Toronto, Ontario
M5C 2R9
Tel: (416) 364-8677
Fax: (416) 364-5889
www.iclr.org
www.basementfloodreduction.com

Mission
To reduce the loss of life and property caused by severe weather and earthquakes through the identification and support of sustained actions that improve society's capacity to adapt to, anticipate, mitigate, withstand and recover from natural disasters.

Western University
Boundary Layer Wind Tunnel
1151 Richmond Street
London, Ontario
N6G 5B9
Tel: (519) 661-3338
Fax: (519) 661-3339
www.iclr.org
www.basementfloodreduction.com