Measuring Tropical Cyclone Windspeeds

Existing wind speed measuring systems are sparse in the tropical regions of Australia. Less than 2% of the peak wind speeds of cyclones making landfall in Australia have crossed where there is a capability to measure them (Harper, et al 2008). All Cyclone Testing Station (CTS) post-disaster damage investigations of communities across Australia over many years have highlighted the difficulties of determining peak wind speeds impacting buildings and infrastructure (Ginger et al 2007; Boughton et al 2011). The reports recommended the development of a suite of portable anemometers, to be positioned appropriately in front of an impending cyclone. This information would then complement what was available from Australia's fixed anemometer network. Ideally, it would also offer a finer grid of information for the buildings in the area of interest.

The CTS damage investigations have relied on “guesstimates” for deriving the wind loads from back-calculating failure wind loads on bent simple steel structures, such as road signs. However, accurate information on peak wind speeds is important in understanding the vulnerability of housing and in evaluating the effectiveness of current standards and building code regulations. More so, delays in announcing cyclonic wind speeds that impact communities (or differing assessments of estimated wind speeds) can unfortunately promote complacency within the building sector and among the public with the over-reporting of wind speeds.

The primary objective is to measure gust wind speeds at the height of a house in representative locations within impacted communities. Secondary objectives relate to analysis of wind speed data, the promotion of community awareness and education on cyclone preparedness and better building practices within the engineering and building communities.

To this end, the CTS has been developing the Surface Weather Information Relay and Logging Network (SWIRLnet). We have six 3.2 m units built. The units will record and store data on wind speed, direction, temperature, relative humidity and pressure and
upload 10 minute summaries via a 3G modem (while the phone network is operational).

The propeller anemometers are on custom made foldable 3.2m tripods which are stored on a purpose built trailer. Along with the tripod racks the trailer also carries data cabinets, ground-screw anchors and installation equipment and other field equipment.

As we are endeavouring to measure wind speeds impacting communities our current planned locations are open parks or sporting fields. The tie-down design of the tripods can be realised by using 1 m long ground screw anchors or, preferably, a pre-determined site location with an already installed ground anchor.

We have had great cooperation from the Townsville City Council and Holcim for installation of permanent anchor sites in and around Townsville. Councils from Mackay through to Cook Shire have all been very helpful in discussions about possible locations in their regions.

The positioning of the SWIRLnet is in the 24 to 48 hr period before landfall, and will be in consultation with Bureau forecasters and local councils. We had a lot of support from the Bureau of Meteorology in providing best guidance on possible tracks and landfall locations.

The initial development work has gone well. We have deployed our six SWIRLnet units for Cyclone Dylan which crossed near Bowen on 31st January and Cyclone Ita, which crossed the coast north of Cooktown in April, 2014. Both deployments of this equipment demonstrated just how quickly accurate information could be made available with very positive feedback received by the councils and emergency services.

Fortunately the wind speeds were lower than expected, so there was little damage. It did, however, highlight a lot of the real challenges that exist in trying to predict the path of a cyclone and deploy equipment in inclement weather across a wide area in a short space of time and sometimes on other people’s properties.

For Cyclone Ita, three units were deployed in and to the west of Cooktown with another three units set up in suburban and open terrain near Port Douglas. Analysis of the data is continuing, with initial work being able to describe the gust ratios and durations at house level for open field, semi-suburban and suburban terrains. The data captured has added another dimension to our building damage surveys with mapping of the debris fields (type, distances, source) to the recorded gusts and directions from nearby SWIRLnet units.

In developing our units, we are grateful for the advice and support from John Schroeder and his team from Texas Tech University and Forrest Masters from University of Florida. Matt Mason from QUT is working closely with us on this project. The initial funding to develop and build the six units came from a one off grant from the Queensland Department of Community Safety along with seed funding from Risk Frontiers. RMS has recently joined as a sponsor to assist with expanding the system and operational support.

This is a significant and long term project. The Cyclone Testing Station would like to hear from any organisation...
Reinsurance Lessons from the Christchurch Earthquakes

Three years on from the worst of the series of earthquakes that devastated the city of Christchurch, reconstruction is under way and many claims have been settled by insurers and reinsurers. However, as with any large catastrophe event, there are valuable lessons to be learnt, so what can the reinsurance market learn from the Christchurch experience so that next time mistakes may be avoided and practices improved?

Although it can be argued that protecting insurers’ capital against the aggregation of losses from Nat Cat events by Cat XL programs and other forms of reinsurance is a long established practice, from a reinsurer’s perspective, Christchurch presented a number of unwelcome surprises. These may be categorised in two broad groups:

1. Inadequate quantification of the loss potential leading to insufficient Cat XL purchases and insurer insolvency. This principally arose from:
   a) The failure of Cat models to adequately allow for the extent of liquefaction experienced in Christchurch due to its location on the alluvial soils along the River Avon
   b) The provision by NZ insurers of home policies without a sum insured but providing full replacement value, again a feature not adequately reflected in Cat models

2. Legal action or arbitration in cases where the interpretation of wordings was ambiguous or where non-disclosure was alleged.

Insurers in Difficulty

In the first category, we saw a number of the locally owned companies in severe difficulties, namely AMI, Civic (and its associated fund known as LAPP – Local Authority Protection Programme) and Western Pacific, together with the government owned EQC.

AMI, a mutual and the second largest home insurer in New Zealand was rescued by IAG of Australia, but this did not include the earthquake claims which the NZ Government has taken responsibility for in the form of a claims handling facility called Southern Response Earthquake Services Ltd for AMI policy-holders.

Civic, an insurer owned by councils, is now in run-off, with the Reserve Bank of New Zealand issuing a special solvency standard for this company (and LAPP) whereby the Reinsurance Risk Capital Factor in respect of LAPP has been set at the minimum level of 2% regardless of the Counterparty Grade of the reinsurer.

Western Pacific, a small insurer based in Queenstown is now in liquidation. Reinsurance is its only major asset and one reinsurer is reported as commuting its earthquake claims exposure at 80% of the estimates, in other words they are paying the liquidators 80c in the dollar of their liabilities, rather than continuing to run them off.

The EQC also exhausted its Cat program of NZ$2.5bn in excess of NZ$1.5bn any one loss occurrence. Unlike the usual definitions met with in most Cat XL treaties, “Loss occurrence” is defined as meaning all individual losses arising out of and directly occasioned by one “catastrophe”, which in turn is defined in respect of earthquake as all earthquakes occurring within 720 consecutive hours (30 days) and a 250km radius of the original quake. The application of this clause means that out of the four major quakes, EQC has two very large “events” that went through


the top of the programme. EQC’s EQCover operated not only in respect of buildings and contents up to certain fixed limits, but also for remediation of land - which is unusual - and contributed to the huge losses that led to the EQC Cat program being exhausted.

In his article “Canterbury Earthquakes – Three Years On”, David Sinai of Swiss Re discusses the insurance implications and the pricing of earthquake risk in New Zealand, with particular emphasis on the EQC which has tripled its EQCover rates since these events.

It has also recently been announced that EQC has renewed its Cat XL program with a limit of NZ$4.25bn, which compares with $3.25bn last year, and NZ$2.5bn at the time of the 2010/11 quakes, making it one of the largest Cat programs in the world.

In the second category, there are arbitrations between Civic and AIG, and Civic and R + V Versicherung AG as well as a recent legal action between New India and the Local Authority Protection Programme (LAPP), a charitable trust run by Civic. The Civic cases involve interpretation of the reinsurance contract wordings, while the New India action against LAPP concerned non-disclosure of the most recent trust deed. Although New India was successful in its action, the High Court in Wellington determined that the non-disclosure was not material, and LAPP’s claim on New India is now settled with a payment of around NZ$17.5m.

The arbitrators’ decision in the AIG case was made public recently, and was in favour of Civic who will therefore receive the full recovery of NZ$242.5m it was claiming from AIG.

THE R+V case first came before the High Court, which ordered a stay so that the case could go to arbitration. In this case, Civic is asking for settlement of NZ$88m. Significant issues that arose include:

- Do the settlements made by Civic bind reinsurers?
- How do the limits of the treaty apply in respect of the value of the underlying claims?
- What is Civic’s retention?
- How do the reinstatement provisions work? (This is an excess of loss treaty)
- Do two risks with sums insured greater than NZ$100m fall under this treaty?
- What assets did underlying policies issued by Civic cover?

These and other matters will therefore be considered by the arbitral panel.

All the above cases mean that there have been significant delays in Christchurch City Council receiving the funds it needs for reconstruction, but the money is now starting to flow.

The Western Pacific collapse also resulted in litigation. In Ruscoe & Thorn v Canterbury Policy Holders, the High Court held that a charge arising by virtue of s9 of the Law Reform Act 1936 (NZ) could also apply to contracts of reinsurance, Ruscoe and Thorn being the liquidators from Grant Thornton. This means that NZ$33m of reinsurance recoveries was available to the liquidators.

Until all the remaining outstanding cases are resolved, potential payments of many millions of dollars are still in suspense.

The Lessons

So how can the market reduce the risk of such undesirable outcomes repeating themselves?

a) Although models such as Risk Frontiers QuakeNZ now include factors for the liquefaction risk, and the Reserve Bank of New Zealand is considering increasing the required return period to 1 in 1,000 years, insurers should still re-assess the adequacy of their Cat XL covers by more cautious interpretation of Cat model output in determining how much cover to buy.

b) Clarity of contract wordings – a few well-chosen words can eliminate uncertainty and save millions!

Sources: various media reports including Canterbury Law Review, insurancenews.com.au, DLA Phillips Fox, King & Wood Mallesons and Stuff.co.nz websites.

Contact: colin_packham@hotmail.com

---

**Better to always double-check. Always ask... Never assume**

His request approved, the Risk Frontiers Newsletter photographer quickly used his mobile phone to call the Avalon, Melbourne airport to charter a flight. He was told a twin-engine plane would be waiting for him at the airport.

Arriving at the airfield, he spotted a plane warming up outside a hangar.

He jumped in with his bag, slammed the door shut, and shouted, ‘Let’s go’.

The pilot taxied out, swung the plane into the wind and took off.

Once in the air, the photographer instructed the pilot, ‘Fly over Kinglake and make low passes so I can take pictures of the fires on the hillsides.’

‘Why?’ asked the pilot.

‘Because I’m a photographer for the RF Newsletter’ he responded, ‘and I need to get some close up shots.’

The pilot was strangely silent for a moment, finally he stammered, ‘So, what you’re telling me, is... You’re NOT my flight instructor?’

Dr José-Luis Arrúe, CSIC, Spain.