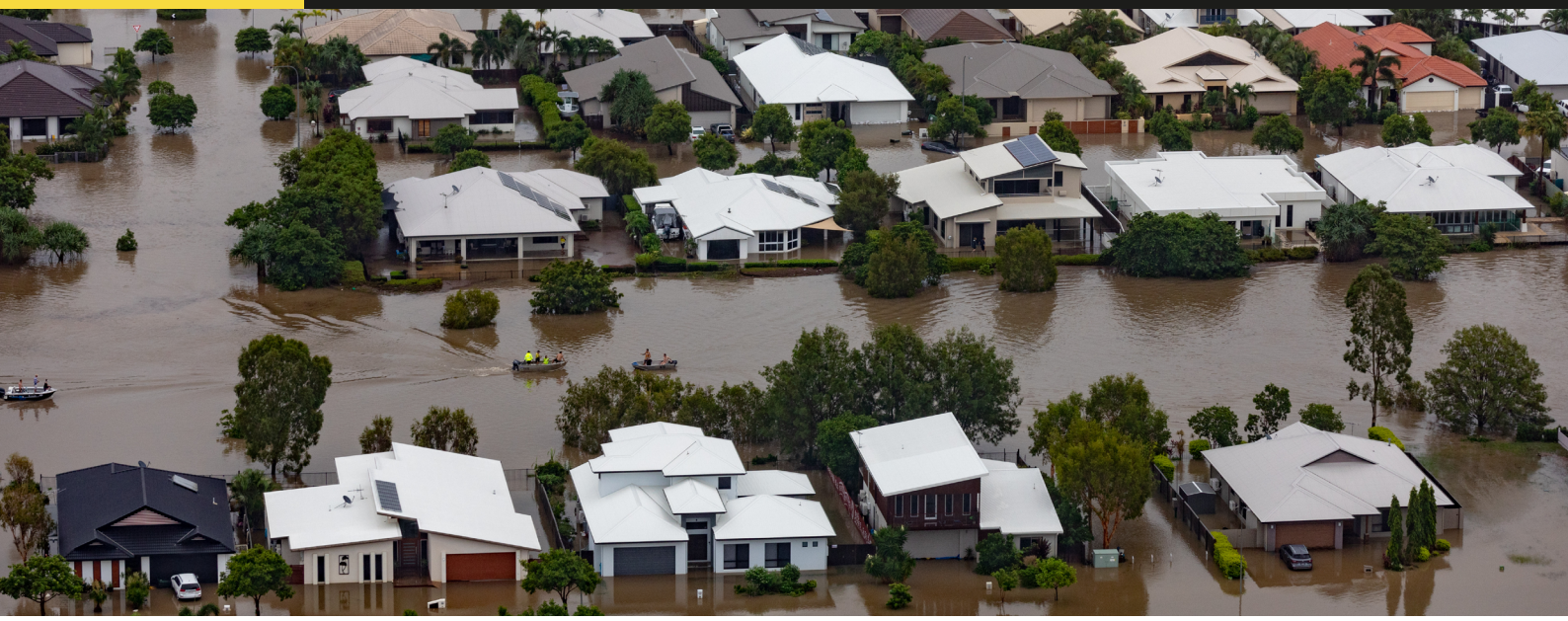
PLUGGING THE GAPS: HOW WELL DO YOU UNDERSTAND YOUR FLOOD EXPOSURE?

2020



Catastrophic flood events happen every year in all parts of the world and flood is one of the hardest perils to model. Nasdaq provides access to catastrophe models available on the Oasis Loss Modelling Framework on its multi-vendor Risk Modelling for Catastrophes SaaS platform.

With the support of Nasdaq, InsTech London recently brought together some of the industry's leading catastrophe model developers from Ambiental, Aon, Fathom, Guy Carpenter and JBA Risk Management to discuss different approaches to producing flood models and what the future of flood modelling holds.

Over 500 people have viewed the event. The following is a highlight of the main themes discussed. The full event is available to watch or listen to from the **InsTech London Events Page**. The session was divided into two parts and I had the chance to host and ask the questions. Nasdaq offers risk models from 12 model providers on its Risk Modelling for Catastrophes software platform, covering geographies across the world and a wide range of perils, including flood, earthquake, wind and hail, more information is **available here**.

Matthew Grant
InsTech London Partner

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Nasdaq Risk Modelling for Catastrophes software platform

Part One: The broker modellers

Aon
Petr Punčochář
Head of Flood Model Development for EMEA and APAC, Impact Forecasting

Guy Carpenter
Mark Weatherhead
Head of Model Development

Nasdaq
James Sawle
Business Development for Catastrophe Risk Modelling

James, how did Nasdaq come to be involved in catastrophe modelling?

JS: Nasdaq is fundamentally a provider of mission-critical technology solutions. Our technology powers over 120 marketplace platforms, including stock exchanges around the world. Last year, we acquired Simplitium, with Matt Jones heading up the ModEx Product. This year, we launched an upgraded version of this platform and renamed it to Nasdaq Risk Modelling for Catastrophes, an easy to use, easy to access, robust SaaS platform.

The Nasdaq Risk Modelling for Catastrophes platform is powered by the Oasis Loss Modelling Framework (LMF) and is easily accessed through a web browser.

If there are any organisations thinking of developing their own models internally, as well as making them commercially available, and need an efficient way to host and operate them, they can contact me at **James.Sawle@Nasdaq.com**

Mark, what are the motivations for a broker to develop flood models, and what is Guy Carpenter's current coverage?

MW: Guy Carpenter started building flood models around 2004 primarily for Central and Eastern Europe, where we had clients with big exposures. We wanted to support our clients on that side, and since then we've built many models, mostly for Europe, but also for Asia, Latin America, and North America.

We have been working with Nasdaq on getting 40+ fluvial and pluvial models up and running on Oasis. It's a very good platform, but it was originally designed for individual analysts to explore. It's different when you try to run it at large scale, which is one of the reasons we partnered with Nasdaq, to make it more operational on a larger organisational scale.

Petr, how is AON working with Nasdaq? And what is the scope of your models?

PP: We built a large model suite covering fluvial, pluvial and coastal flood, which uses a database format similar to Oasis, which means we have been able to offer conversion of our existing models into Nasdaq platform.

In terms of scope, we have one of the largest dataset models for the US, Canada and Brazil, for insurance modelling as well as underwriting. In Europe, we have probabilistic models for Austria and Switzerland, and unique solutions for dike failures in the

Netherlands. Recently we have also added Malaysia, Vietnam, Indonesia, and by the end of 2020 will be releasing probabilistic models for some local scenarios in China.

Mark, how does Guy Carpenter source information for flood hazard and vulnerability?

MW: We have capabilities internally to build all the components, but it's reasonably cost-efficient to work with third-party providers especially on the hazard side. We've worked with JBA and CATRisk Solutions. We've also talked to Intel, Fathom, and others. In terms of vulnerabilities, we deal with financials, modelling grids, and disaggregation internally.

The work we do on cloudburst and flash flood is more specialized and local, for example, centring on Hong Kong or Stockholm, and requires high-resolution digital terrain models (DTM). Having said that, high-resolution DTM is not the be-all and end-all of modelling accuracy – it is important too for a DTM to be hydrologically correct, and take into account landscape features such as bridges and other artefacts.

Mark where do you see the accuracy and utility of flood analytics, going forward?

MW: To date, a lot of the modelling and forecasting has been done by specialists, and we're seeing now much more involvement and interest from big non-specialists like Microsoft and Google, who have unlimited processing power, and a lot of expertise in machine learning. Another is that insurance companies themselves are wanting more and more to understand their hazard at a global scale – as well as, in wider sectors, companies wanting to understand climate change and how it might impact decision making going forward.

Petr, same question; which developments do you see occurring?

PP: Climate change is, of course, a big thing. We are looking for a true application of global circulation models. We want to integrate those into our code and offer a range of scenarios. I think it will be very interesting to see the results of these analyses.

Mark, how are DTMs improved in terms of incorporating human artefacts, and is this a manual process?

MW: There are some automated processes to clean up DTMs, but there's still quite a lot of manual checking involved – there's no substitute for elbow grease! But we are also looking at machine learning approaches to make this process less labour intensive.

Petr, how confident should people be about models when looking at individual specific areas, for example, residential?

PP: When I started I didn't think it was going to be possible to use a model for single policy modelling. Nowadays, we have a resolution in Europe of 10m or even less, so I'm fairly confident that we have a fuller understanding and can describe and potentially adjust these designs to suit for selective underwriting.

MW added: Linking back to Nasdaq, the Oasis platform has probably been mostly known for portfolio level analysis, but we're starting to look at being able to get down to the individual property level, and we're interested in hearing from people who can add to this piece of work.

"insurance companies themselves are wanting more and more to understand their hazard at a global scale"

- Mark Weatherhead, Guy Carpenter

Part Two: The dedicated flood modellers

In part two, Matthew Grant talked to three flood modelling specialists about their work, and how they've linked up with Nasdaq's platform

Ambiental
Rubini Santha
Lead Catastrophe Modeller

Fathom
Andrew Smith
Chief Operations Officer

JBA Risk Management
Stephen Hutchings
Head of Modelling, JBA Risk Management

Stephen, how much of the globe has JBA modelled?

SH: Very simply, we've got an inland probabilistic flood model for every country in the world - 99.98%, if you exclude Antarctica and Greenland, and this is at 30m horizontal resolution worldwide. Within that model, we also offer high-resolution options of 5m in certain regions such as the UK and parts of Europe.

What degree of confidence do you have in the models?

SH: We have a high level of confidence in the consistency and quality, but in specific locations invariably work with clients to assess the types of exposure they have, to make sure that certain model components suit their needs.

Rubini what is the scope of Ambiental's models?

RS: We've worked with customers like AON and QBE and developed pluvial, fluvial and coastal models, using a mixture of internal and third-party data sources – the most recent has been for ground and subsurface flooding from groundwater. Our approach has not been global, but to focus on core territory, where we've seen the greatest demand from customers. So, for instance, we cover 80% of properties at 5m resolution for urban LiDAR products in Australia. This focus is our USP.

Andrew, which regions does Fathom cover, and what distinguishes Fathom from other modelling companies?

AS: In terms of probabilistic models and cat models that we provide to market at the moment, we have a US model, which is going to include coastal in the coming months. It's exciting because we have data with which to validate the models we're now building, principally in the insurance market; these models are able to replicate data that have cost billions of dollars to produce. In lots of areas of the US, you can use our models now for both underwriting and portfolio management. We've worked with Canopius, Hiscox, and Chaucer, to name some customers, but we're not limited to insurance – for instance, we've worked with Microsoft to model risk for their global data-centres,

and we're also working with conservation agencies, principally in the US, looking at preserving floodplain areas. It's really diverse.

Stephen, why did JBA choose to work with Nasdaq, and not via your own platform?

SH: JBA does some work through our own platform, Fly Technology. But Oasis and Nasdaq have represented a real step change to the industry, moving away from a position where only three companies supplied all the cat data and results. Nasdaq is allowing entry to the wider market to organisations like mine and those on this panel, in the process, improving interoperability and standardisation. So we're a big supporter and have been from the start.

Rubini, what prompted Ambiental to run models through the Nasdaq platform?

RS: In the deployment phase Nasdaq was crystal clear about the steps, the types of data sets we needed, and it saved a lot of energy. Oasis is intuitive, and it made my life a lot easier in terms of testing – rather than concentrating on organising files, I was able to focus on input and output. It gives a lot of freedom for the user."

Andrew, similar question for you, why did Fathom work with Nasdaq?

AS: We're building models, say of the US, that are high resolution, and have hundreds of thousands of events. The result of that is that we have data that are not just gigabytes, but terabytes in size. Nasdaq enables us to run millions of assets through a portfolio in minutes, not hours, and that ability is critically important to us. I'm really excited that we have our models on the platform.

> **"Nasdaq enables us to run millions of assets through a portfolio in minutes, not hours, and that ability is critically important to us. I'm really excited that we have our models on the platform."**
>
> - Andrew Smith

Matthew Grant to the panel: How much hazard and vulnerability information are you willing to share with clients – do outputs come from a 'black box', or not?

SH: Our models now are intended to, essentially, answer that question. They're not pre-compiled anymore – our Fly software, whether in or out of Oasis, goes direct to our maps, goes direct to our event sets, be they spatial or otherwise. They're all there for the user to interrogate and look at.

RS: I don't think it's a black box anymore, because the flood hazard map is actually used to produce our event sets, so customers have access to what actually goes into our flood cat model.

AS: Being a research-led organization, we publish everything that we build in peer-reviewed journals, so that should not only give faith in the methods but also means that they're transparent. Anybody right now can type into their browser **http://www.floodfactor.com** and all of our US data is available there to view.

What do you all see happening in the future in terms of flood modelling?

SH: The first thing to look out for from JBA is a continuing of the encompassing of the cat model development workflow into a single routine along with loss calculations, because we believe it represents true power and benefit to the user. Secondly, and perhaps paradoxically, we think you'll see a reduction in the complexity of some modelling techniques – we can see distinct benefits in simplifying certain methodologies. And thirdly, development in real-time flood forecasting, particularly in its integration with cat models.

AS: The emergence of better global terrain data sets. We're all making the best of what's available right now, but at a global scale, the main data sets are far away from the scale and accuracy of the laser altimetry data that we have in places like the US and Europe. In my mind, the question we should ask is about vertical accuracy of the terrain datasets. We often get caught up on the horizontal resolution of terrain datasets.

In the last few minutes of the webinar, all the panellists returned to answer audience questions.

Mark, can you talk about the Nasdaq approach of allowing an open data exchange in flood modelling?

MW: It remains in the public domain as an open-source code. We helped develop this, and it's definitely gone back to the insurance community. We sit in the middle space, and the flow of data enables us to both innovate around flood and cat, but also investigate wider applications, such as cyber. Nasdaq's open data exchange enables organisations to model new perils, new geographies, and multiple views of all of these.

James, how can people access the models on the Nasdaq Risk Modelling for Catastrophes software platform?

JS: Almost all of the models we discussed today are available for free trials. Typically, trials last about a month and, as for full access to the platform, require no infrastructure to be set up by the user, so we can set people up very quickly. Access is through a web page, by signing in. I'm interested in being approached by anyone who wants to explore developing new Oasis LMF models.

"I was able to focus on input and output. It gives a lot of freedom for the user."

- Rubini Santha, Ambiental

Panel Biographies

Mark Weatherhead, Head of Model Development, Guy Carpenter

Mark Weatherhead joined Guy Carpenter in 2006 and is Head of Model Development, based in London. Mark leads a dedicated team responsible for the development of catastrophe models used to quantify risk and price reinsurance for countries and perils where commercial models are unavailable.

Matthew Grant, Partner, InsTech London

Matthew co-leads InsTech London which brings together a community of over 15,000 people building and using technology and analytics in and for the insurance community profiling the best organisations to work for and with. Matthew launched the European office for RMS in 1996 and headed up global sales and marketing until 2016. Matthew hosts the InsTech London weekly podcasts and writes and speaks widely on the topics of analytics in insurance.

Stephen Hutchings, Head of Modelling, JBA Risk Management

Stephen is JBA's Head of Modelling. With 15-years' previous experience in scientific and commercial software development. He joined JBA Risk Management in 2010 to lead the development of JBA's cat modelling software before shifting role to focus on the strategic development of JBA's suite of catastrophe models, including the world's first probabilistic global flood model.

Andrew Smith, Chief Operations Officer, Fathom

Andrew is one of the co-founders and directors at Fathom. He completed a PhD under Professor Paul Bates, and it was whilst undertaking his PhD that the idea of founding a company first emerged. Since completing his PhD in 2014, Andrew undertook a post-doctoral research position at the University of Bristol before becoming COO at Fathom full-time in 2016.

James Sawle, Business Development for Nasdaq Risk Modelling for Catastrophes, Nasdaq

James has 25 years' experience of insurance technology, primarily selling and supporting Marsh's Risk Management Information System where he led the EMEA Sales and Relationship Management team and also the EMEA and APAC Project Delivery teams.

Rubini Santha, Lead Catastrophe Modeller, Ambiental

Rubini is a Flood Cat model developer and expert of LiDAR remote sensing for hazard mapping applications. She has a PhD in Geomatics Engineering from Oregon State University specialising in disaster risk management. She has three years experience building landslide cat models and now heads up a catastrophe model development team, deploying and testing multiple models to Oasis LMF and other third-party analytics platforms.

Petr Punčochář, Head of Flood Model Development for EMEA and APAC, Impact Forecasting, Aon

Petr is responsible for the Impact Forecasting flood models and their development in all territories except the US. Petr earned a PhD in hydrology and open-channel hydraulics in February 2011 from the Czech Technical University, where he previously gained his Master of Science degree and where he continues to be a member of the Scientific Committee.

Email **james.sawle@nasdaq.com** or **hello@instech.london** for more information

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