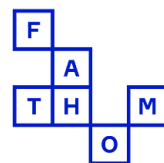




# Tropical Cyclone and Flood: Managing Tomorrow's Climate Risk Today

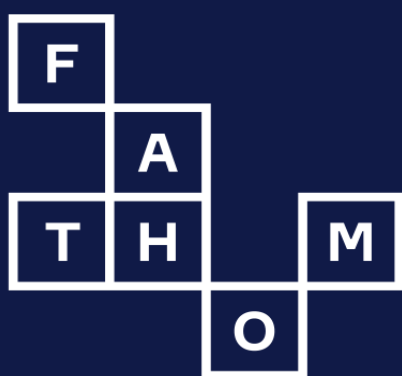
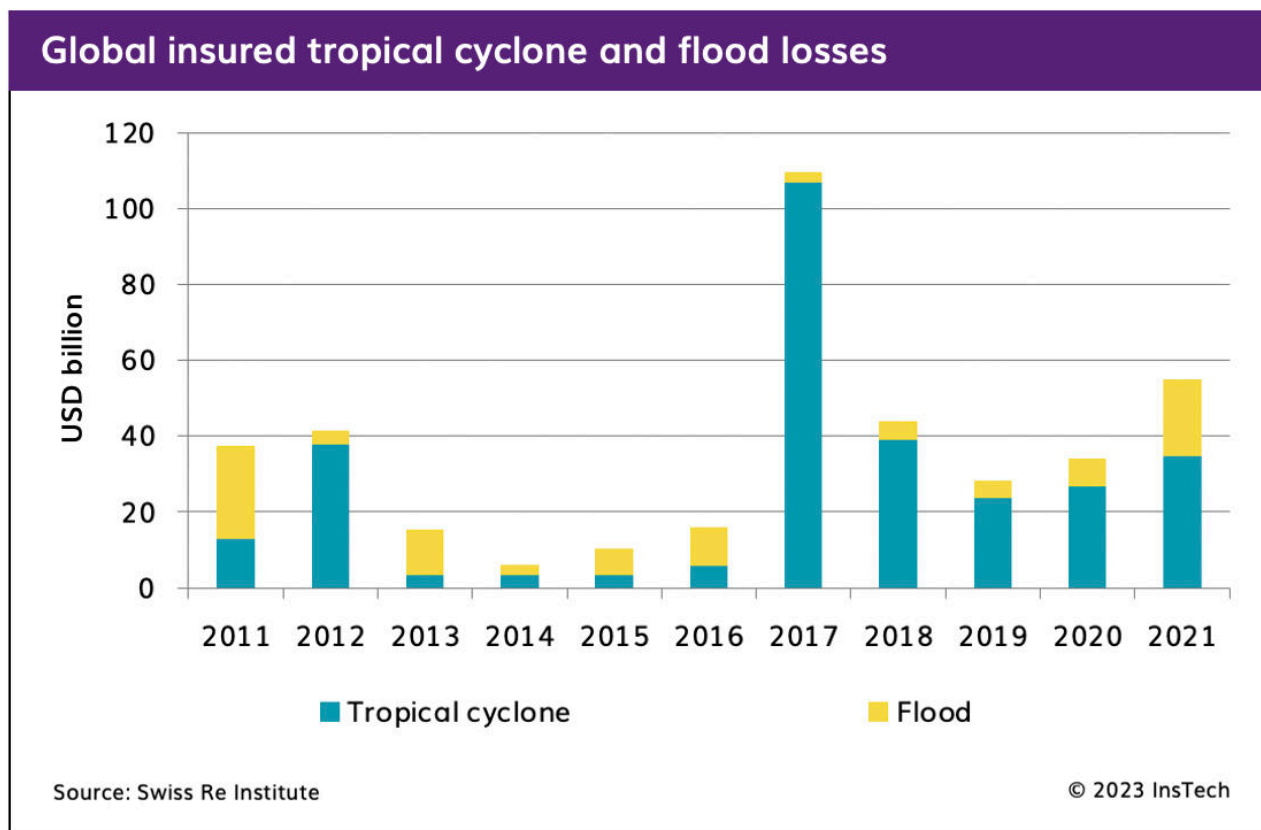
In partnership with:



# Introduction

For insurers, catastrophe models and hazard data are essential for risk selection, pricing and portfolio management. It is necessary to ensure that no singular catastrophic event can disproportionately impact the loss to an insurer.

The combined risk of floods and hurricanes is becoming increasingly important for insurers to understand. These perils are two of the biggest loss drivers, and their impact is only increasing. Fathom and Reask have partnered to connect these two perils directly into one model.



Water  $\times$  Wind Risk Intelligence

In November 2022, Reask and Fathom co-hosted an InsTech event which reviewed how to understand and manage the key drivers of climate change in cyclones and floods. The large audience was made up of many of the major insurers and brokers. The discussions covered how insurers are incorporating future climate risk into underwriting and portfolio management, as well as views on the future of climate analytics and data from industry experts.

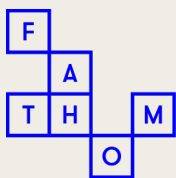
Speakers included:

- Jamie Rodney, CEO, Reask
- Andy Smith, Co-founder and Chief Operating Officer, Fathom
- David Vicary, Research and Development Manager, Brit
- Rob Porter, Product Director, VAVE
- Ollie Wing, Chief Research Officer, Fathom
- Sue Barenbrug, Independent Consultant
- Thomas Loridan, Co-founder and Chief Science Officer, Reask
- Paul Wilson, Partner, Securis
- Kris le Sage de Fontenay, Vice President, Insurance Leader UK, Capgemini
- Dickie Whitaker, CEO, Oasis Loss Modelling Framework

To hear directly from the speakers, the event's highlights can be found on the InsTech podcast episode 220.



The Fathom and Reask team in Bristol



**Fathom** provides risk management professionals with tools and intelligence to understand water risk. Its dedicated team of scientists develop catastrophe models, maps and geospatial data for portfolio modelling and underwriting. The company provides coverage for the whole planet, with bespoke models and data for the US, Japan and the UK.



**Reask** provides models to support the assessment of natural catastrophe risk around the world, in particular tropical cyclones. The company's models are globally correlated, meaning different regions are not treated separately.

[WWW.FATHOM.GLOBAL](http://WWW.FATHOM.GLOBAL)

[WWW.REASK.EARTH](http://WWW.REASK.EARTH)

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## Reask and Fathom: bringing new approaches to address climate change

In 2022, Reask and Fathom announced a partnership to create new hazard data maps and catastrophe risk models, covering the combined perils of flood and wind. Floods and tropical cyclones are modelled completely differently, so combining models for these two perils presents some challenges. The Reask and Fathom partnership believes this new solution is part of an evolution of catastrophe modelling as it becomes more forward looking.

Fathom was founded in 2013 by Andrew Smith and Christopher Sampson whilst undertaking their PhDs at the University of Bristol. At the time, building flood models at a global scale was a very new science. Creating models at this scale, which included the most data-poor areas in the world, was a key differentiator for Fathom compared to other flood modellers.

The company offers transparency into how its models are built and publishes papers in leading academic journals. Fathom believes that allowing end users to understand how its models are built, and their limitations, is an important part of its offering.

Fathom's starting point for creating models is to have a robust understanding of the physics of flooding. This means that the models are able to incorporate information such as climate data. At the event, Andrew Smith observed that until the last few years commercially available catastrophe models were not intended to measure the impact of future losses due to climate change. He explained that this does not invalidate the value of catastrophe models overall. Incorporating climate data to create future predictions now adds another component that needs to be understood and communicated.

Reask is not the only company that Fathom collaborates with to build new models. The company is working with insurer AXA to build a European flood model. Fathom has built the hazard component of the event set, whilst AXA has built the vulnerability and financial parts of the model to suit its own needs. This collaboration means that AXA has a full understanding of how the model works. Working with clients to create these models also allows Fathom to offer a new set of products and solutions to insurers. Once the models are complete AXA will have an alternative view of flood risk compared to other insurers and commercial model outputs.



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## Insurer perspective: modelling climate risk

Brit Insurance



**David Vicary**  
Brit Insurance  
Research and  
Development  
Manager

Brit Insurance is a global specialty insurer and reinsurer based in London. David Vicary, Research and Development Manager at Brit, has 14 years of experience in modelling catastrophes. His focus is on advising how Brit should apply its own view of risk to third-party catastrophe models.

### **At Brit, how do you interpret catastrophe model outputs to help the company make business decisions?**

It is not possible to directly take a model output from a vendor and use it to make decisions - there tends to be a missing piece. For example, inland flooding was not included in hurricane models in the past, so we had to do our own research and adjust for that. Model vendors catch up and respond to the needs of the insurance industry, but we are always trying to fill any gaps that remain.

### **What other data sources are needed to fill the gaps?**

A good example is the price of construction timber. It became drastically more expensive over the COVID-19 pandemic, leading to the potential undervaluation of property rebuild costs. Obtaining more specialised and specific data is becoming easier, but gaps remain.

### **What is driving the increased need to understanding how the climate is affecting natural catastrophe risk at Brit?**

On the one hand, I need to help underwriters make good decisions. Underwriters want to know that the view of risk that is being presented to them is the best view of the climate at this point in time. On the other hand, regulators are asking what Brit's exposure is going to look like in 30 or 50 years. Part of my role is balancing both, sometimes conflicting, requirements.

### **How should insurers be responding to growing regulatory pressure?**

I think there needs to be more cross-industry collaboration. Insurers need to get together to understand what we can provide to the regulators and what best practice looks like. We do not want to spend a lot of time working on a solution that in the end is not helpful to either us or the regulators.

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## Insurer perspective: automating the underwriting process

VAVE



**Rob Porter**  
VAVE  
Product Director

VAVE is an MGA that underwrites property catastrophe risk in the US, particularly focusing on flood and hurricane. Rob Porter, Product Director at VAVE, discussed how the company is automating its underwriting process and what changes he has seen in the climate risk space throughout his career.

With catastrophe-focused business, Rob noted that the best available science and data should be used at the point of underwriting and not left until after the risk has been bound. Undertaking analysis early allows for better risk selection and pricing. Due to complexities with technology and a lack of easily accessible data, this has not always happened.

Rob described how insurers that are involved in delegated authority business have had to deal with the problem of data latency. For some agents in the US, it can often take a week or more to get a quote to a customer, for example. To tackle this issue, VAVE has built a cloud-based pricing ecosystem. This enables potential customers to receive a quote within a few seconds. VAVE is working with Reask and Fathom to bring in hurricane and flood risk data to accurately price at an individual building level. One new data source is a 10 metre resolution flood map.

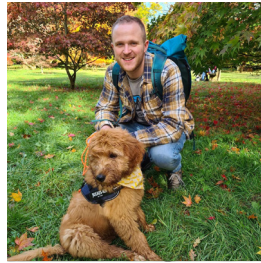
The majority of VAVE's book is made up of homeowner policies, which are mostly affected by wind or flood. Until recently, catastrophe models have only been able to analyse these as two separate perils. Events in the last few years have shown that these two perils need to be assessed together. Hurricane Ida in 2021, for example, caused severe wind damage on the coast in Louisiana. At the same time, 2,000 kilometres away in New Jersey there were severe flood losses. Whilst these would have previously been thought of as independent events, it is now understood that there is a correlation between two perils (flood and hurricane) and also between two distinct regions. This new understanding has implications for capital reserving and how insurers buy reinsurance. Rob mentioned how the Reask and Fathom partnership is starting to tackle some of these issues.

Rob has noticed several other changes in the climate risk space over the past ten years. Previously, insurers did not understand how to accurately price flood risk at a building level and aggregation of properties in a single floodable area was standard practice. Insurers now have more information about properties. For example, VAVE may have three different views of roof material for any given property obtained from external data providers and information from the insured.

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# Climate variability with Jasper the dog

## Fathom



**Ollie Wing**  
Fathom  
Chief Research  
Officer

The world is warming and catastrophic events are going to change as a result. In the near term, the signal from this long-term trend is quite small compared to natural variability. Regulators, investors and increasingly insurers themselves are interested in understanding long-term climate change, but it is natural variability that is causing losses in the short term. Fathom's Ollie Wing brought the difference between these two trends to life using his companion, Jasper the Double Doodle.

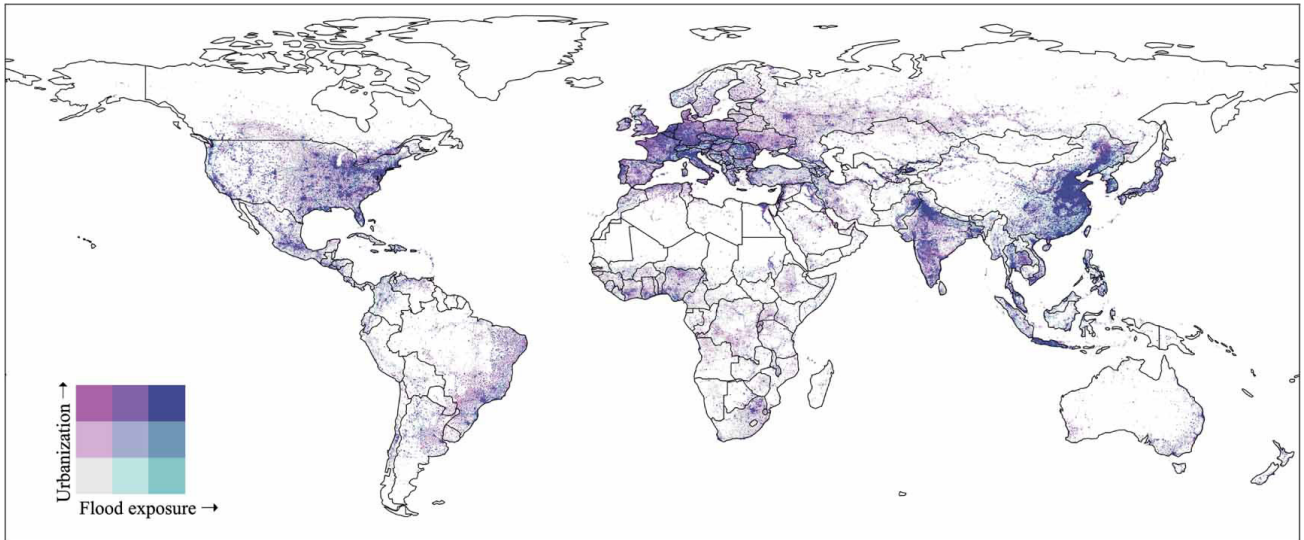
**"When trying to explain the difference between climate change and natural variability, I like to think of walking my dog, Jasper. When I leave my house, the route I walk can be thought of as representing the long-term climate trend of global warming. As soon as I let Jasper off the lead, he's off. At any given moment I don't know where he will be; he could be ahead of me, behind me or right next to me. Jasper's movements represent the unpredictable variations in natural climate variability.**

**My route is very predictable; I walk at a steady, consistent pace. Meanwhile, Jasper could be way off in the park chasing a rabbit. The climate equivalent of this could be a volcano erupting and cooling the climate or the consequence of an El Niño phase having an impact in a single year. These events are what is driving insurance losses. With the Fathom and Reask partnership, we are beginning to try to pin down the short term climate equivalent of where Jasper is at any one time during our walk."**

- Ollie Wing, Chief Research Officer, Fathom

Ollie continued to explain that for longer-term business decisions, organisations are more interested in the overall trend of climate impacts. Hazards such as sea level rise are best predicted by Ollie's walking route, which represents average climate change. More acute perils, such as hurricanes, are more responsive to natural variability in any given year. Many of the most recent climate risk tools focus on understanding the average changes in events, but as catastrophe modellers Fathom and Reask are interested in the extremes. The partnership is aiming to help insurers understand how natural variability, or Jasper running around, is driving annual industry losses.

Another aspect that is impacting flood losses is demographic shifts. In a 2022 research paper, Fathom used satellite data to explore how urban footprints have changed since the 1980s. The research found that there are now twice as many urban areas within floodplains globally. Ollie explains that for those that are only interested in their organisation's current property portfolio, understanding socioeconomic changes is less relevant. However, to understand which properties in what locations an insurer may want to underwrite in the coming decades, watching demographic changes is vital. Notably, Fathom's research shows that changes in exposure have a greater impact on risk than changes in the hazard itself as a result of global warming.



Map showing the relationship between flood exposure and urbanization

Source: Fathom

## Advances in seasonal forecasting

Reask was founded to incorporate more climate physics into the catastrophe modelling process. When building a view of risk, it always starts with climatic conditions such as ocean temperatures and sea level pressure. From that, Reask derives an event set that gives a view of risk under given climate conditions. Reask can use projections of what the climate may look like in the next few months to give a seasonal hurricane forecast. Climate projections much further into the future, such as to 2030, can also be inputted to give a future view of risk.

To build confidence in its models, Reask can backtest over the last ten years. This allows clients to see that the model would have performed well in predicting the shift in hurricane activity that was historically observed. Another way that Reask deals with uncertainty and can communicate this with clients is by providing a full event set. This means that the company is not attempting to predict exactly what is going to happen in a given season, but instead it is providing a stochastic event set that reflects the range of possibilities that could occur, and the probability of each event, under given conditions.

Users of Reask's models do not need a background in climate science to understand the model outputs. However Thomas Loridan, the company's Chief Science Officer, notes that the more clients understand about catastrophes and climate science, the more they can get out of the models. Reask can work with its clients to evaluate the data and how it can be used to make business decisions.



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## Capital markets perspective: model outputs in action

### Securis Investment Partners



**Paul Wilson**  
Securis  
Investment  
Partners LLP  
Partner

Securis Investment Partners is an Insurance Linked Securities (ILS) investment manager based in London. The company provides a mechanism for an end investor, such as a large pension fund, to invest directly into underwriting risk. This means that they are able to benefit from underwriting investment returns more directly, rather than having to invest in an insurance company.

It is important for investment firms like Securis to be able to value a fund (known as “mark to market”) on any given day. Securis has to communicate with its clients as soon as an event happens and provide an updated valuation as quickly as possible. The company has a robust valuation process so that when an event like Hurricane Ian occurs, it can provide an updated value of the fund for its investors within a couple of days.

Paul, Partner at Securis, explained that the company does not attempt to model the exposure of the underlying insurance portfolio in the bonds it holds. Instead the company works with counterparties and cedents to understand their exposure. Securis will take account of the assumptions its counterparties have made, but needs to define its own view of risk and ensure that it makes consistent investment decisions based on this view.

Paul described how catastrophe bonds are one of the more liquid assets that Securis deals with. They are traded assets that can be bought and sold more easily than some other investments. This means that the company can use information around the change of risk to reposition funds. For example, if forecasts from companies such as Reask lead Securis to believe it should change its view to the upcoming hurricane season, it could decide to purchase more catastrophe bonds

The company wants to utilise climate data from companies like Reask, but does not want it to take a lot of time for analysts to reprice investments every time it updates its view of risk. Securis is therefore focused on creating a framework which allows it to have a more dynamic view of risk. This involves ensuring that its technology and in-house models are able to respond to climate change and that portfolio sensitivities can be tested more easily and rapidly.

Climate changes are not the only area that can impact how Securis thinks about risk. For example, Hurricane Ian in 2022 will not change Reask or Securis’ view of physical risk. However, the increase in loss potential from litigation is an example of an important emerging risk that Securis needs to consider.

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## Collaboration and transparency for understanding climate risk



**Dickie Whitaker**  
Oasis  
Chief Executive

Oasis Loss Modelling Framework provides an open source platform for developing, deploying and executing catastrophe models. It was created to increase the model choice for the insurance and reinsurance industry, whilst democratising risk for developing countries. Oasis' other aims include reducing costs to the industry, increasing innovation, supporting academics and reducing the barriers to entry for firms that want to get their models used within the insurance industry.

There are over 100 models on the Oasis platform, ranging from those provided by academics to catastrophe models from companies such as Fathom. Insurers including AXA and Swiss Re also have models on the platform.

Dickie Whitaker, Oasis' Chief Executive, believes that the industry could be doing more to incorporate climate change into catastrophe models. He sees that the younger, more nimble companies such as Fathom are leading the way in this space.

Building catastrophe models is not an easy feat; it takes a lot of time. It is important to understand the needs of the insurance industry to build solutions that work. However, Dickie believes that in five years' time, corporates and the banking industry may be the biggest buyers of these types of tools and models.

Dickie ended the event by highlighting the importance of collaboration to understand climate risk. Working with companies including Fathom, Oasis is starting a free scientific journal on catastrophe risk and resilience. It is aiming to make climate and catastrophe knowledge more open and accessible to the scientific, risk management and insurance community.

## Contact us

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