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# NAVIGATING THE STORM

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**THE C-SUITE GUIDE TO  
MASTERING EXPOSURE  
MANAGEMENT**

A concise guide co-authored by a group of the world's  
foremost exposure management experts

# ACKNOWLEDGMENTS

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## ABOUT OASIS LOSS MODELLING FRAMEWORK

An open source catastrophe modelling platform, free to use by anyone. It is also a community that seeks to unlock and change the world around catastrophe modelling to better understand risk in insurance and beyond.

While its development is largely driven by the global (re)insurance community, it seeks to provide tools and utility to all. It is constituted as a not for profit company, and our team believes passionately in empowering more people around the world to better understand risk and uncertainty. Our ecosystem consists of more than 18 suppliers covering 100's of models.

**FIND OUT MORE: [OASISLMF.ORG](https://oasislmf.org)**



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# OBJECTIVE

What is the objective of this report?

The inherent complexity in managing exposure within the insurance industry presents a significant challenge, even for the most astute leaders. Understanding and navigating this landscape requires specialised insight, which is why we have created this report.

We assembled a group of the world's foremost experts to provide a concise, authoritative guide that addresses the pressing questions shaping our market today. This report is designed to be a go-to resource for leaders in the re/insurance sector, offering practical solutions and best practices for managing exposure.

Recognising the need for clarity amidst complexity, we have kept the report deliberately concise. For those seeking deeper exploration, we have included links to further reading and source materials. Our goal is to equip decision-makers with actionable insights and independent advice on risk modelling, helping to advance best practices within the industry.

Ultimately, this report is about answering the burning questions that will shape the future of exposure management and risk modelling in the insurance sector.

The key points of this report are intended to influence decisions and decision-making going forward, and will be presented and debated by a high level panel of experts.

As part of this objective, we are committed to providing advice virtually to senior executives – and for the first 15 companies who request this offer this service will be free of charge.

Presentations will be delivered by selected authors of the report to senior executives and are designed to deepen your understanding and application of the insights provided.

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explain your goals and to arrange a meeting

# CONTEXT

## The Evolving Landscape of Catastrophe Modelling in the (Re)Insurance Industry

The (re)insurance industry is at a critical juncture, facing challenges that are fundamentally reshaping risk assessment and management. From wildfires and Severe Convective Storms (SCS) to systemic cyber and technology incidents, peak perils are evolving in both severity and frequency.

The concerns around climate change impacts on the severity of capital impacting perils - including the evolving magnitudes of losses from more frequent earnings perils, alongside the rising threat of non-natural catastrophe risks - necessitates adaptation to new sources of major loss volatility to ensure resilience and profitability.

This report delves into the strategic significance of catastrophe modelling and exposure management within the C-suite, addressing key issues and investor concerns.

## The Role of Cat Modelling and Exposure Management in the (Re)Insurance Market

Catastrophe modelling has become essential for underwriters, brokers, and investors, enabling evaluations of potential losses from natural disasters and other extreme events.

The perception of cat modelling and exposure management within the market varies, significantly influencing how executive teams prioritise and implement these tools. In a competitive and rapidly changing market, accurate modelling and effective exposure management are increasingly viewed as value accretive and critical differentiators that can impact bottom line profitability with superior underwriting returns, cost savings and brand value protection.

Moreover, regulatory, market bodies and rating agencies play an instrumental role in shaping exposure management practices through monitoring catastrophe risk, while wider country-level regulation is shaping thinking around exposure to climate-related challenges. Effective risk modelling and adherence to regulatory frameworks often result in better ratings, enhancing the likelihood of being allowed to write more business.

## EXPOSURE MANAGEMENT - DEFINED

Exposure management in insurance refers to the process of identifying, assessing, and controlling the financial risks associated with an insurer's portfolio, particularly in relation to potential losses from catastrophes such as natural disasters.

Catastrophe teams play a critical role by analysing data on risk concentrations, using modelling tools to predict potential losses, and implementing strategies to minimise the impact of extreme events on the insurer's balance sheet. This ensures the insurer can maintain solvency while meeting policyholder obligations after large-scale disasters.

## Benefits of a Well-Integrated Function

Within the C-suite, catastrophe modelling and exposure management should be regarded as strategic assets rather than merely technical functions. When effectively integrated, they can:

- Appropriately de-risk and diversify catastrophe exposed portfolios
- Assist with risk transfer and mitigation strategies such as outwards reinsurance purchasing decisions in terms of coverage and relationships with key reinsurance partners
- Increase the firm's reputational standing and valuation where superior modelling is demonstrated
- Provide probabilistic accumulations from single and compound events
- Assist investors in understanding readiness for large-loss events impacting earnings and/or capital
- Establish measurable risk tolerance metrics that can improve capital allocation and reduce the cost of capital

Executives must ensure that catastrophe modelling and exposure management are integrated within broader business strategies, aligning modelling outputs with:

- Risk appetite decision-making
- Outwards reinsurance purchasing decisions
- Financial planning and regulatory compliance
- Stakeholder communication

Aerial view of The Eastern Scheldt storm surge barrier in Dutch Oosterscheldekering  
Shutterstock



It is also important to note that enhanced risk selection and pricing accuracy can enhance the ability to increase premium income through the demonstration - to regulators - of adherence to different levels of standards or superior portfolio management expertise.



## Addressing Investor Priorities

Investors, both within and outside the (re)insurance sector, are increasingly focused on how firms manage catastrophe risks. Their primary concerns include:

- **Climate Change and Climate Change Impact:** Investors are keen to see that catastrophe models align with recent loss activity and incorporate scenarios reflecting current/near future climate conditions.
- **Understanding Catastrophe Bonds:** Investors require clear, comprehensible data on the models underlying catastrophe bonds to accurately assess risk and return profiles.
- **Communicating "Own View of Risk":** Linked but independent to climate change concerns, investors require clear and concise communication about how an insurer has implemented a view of risk that is reflective of, and resilient to, the insurer's attitudes to volatility and stability.



“Model commoditisation typically leads to lower prices, increased competition, and a focus on cost efficiency rather than product differentiation - but this only rings true when they are part of a fully commoditised market.

“However, in the catastrophe market, non-commoditised models often offer better outcomes for both companies and investors, providing pricing differentiation and unique underwriting insights.”


- Dickie Whitaker,  
CEO Oasis Loss Modelling Framework

## Key Issues in Catastrophe Modelling

To enhance the efficacy of catastrophe modelling, several pressing issues must be addressed:

- **Emerging Risks:** The rapid evolution of some key emerging risks including cyber threats and the unpredictable nature of pandemics and geopolitical events highlight the need for robust models that can anticipate and incorporate emerging risks.
- **Climate Change and Natural Disasters:** The increasing frequency and intensity of natural disasters due to climate change demand continuous updates to traditional models to reflect current, rather than historical, risk levels. This requires research and development, rather than using some models "out of the box".
- **Macroeconomic and Market Dynamics:** The post-quantitative easing environment, characterised by rising interest rates and inflation, requires accurate catastrophe modelling that reflects inflated repair costs to maintain profitability and meet capital requirements.
- **Socioeconomic (Claims/Exposure) Evolution:** Urban sprawl and increasing populations along catastrophe risk exposed coastlines, coupled with changing claims behaviour, have the potential to create unexpectedly high losses.
- **Perceived Lack of Accuracy/Reliability:** There are, at present, no openly available and transparent tests widely used to scientifically validate catastrophe models. While this remains the case, it is likely that scepticism around their use will be prevalent in many sectors of the industry. However, models undergo extensive validation by vendors to ensure that they meet benchmarks. The fit of a model to a particular portfolio is an area for investigation by your exposure management team or advisor.  
  
Close attention needs to be made for perils and parts of the world not currently being modelled or where exposure capture is inadequate. To further complicate the issue, reviewing the most recent events will provide low levels of insight as models are not inherently designed to be accurate for one event. Where exposure is un-modelled is the question rather than which perils or territories are un-modelled as models exist for virtually every peril or country.
- **Multiple Standards/Lack of Transparency:** While there are some initiatives to standardise data formats to improve translatability between vendors, there are many methodological differences that exist across the market. Although a multitude of views is desirable, the deep methodological differences make model comparisons very difficult to understand, especially with the lack of transparency to those without model access. This limits the reliable use of multiple models.
- **Systemic Risk of Major Providers:** There is growing concern about the systemic risk posed by reliance on a few major model providers. Diversifying model usage and ensuring independent validation are essential steps to mitigate this risk.





# Chapter 1: What is the Function of an Exposure Management Team?

## INTRODUCTION

In the (re)insurance industry, the role and structure of an Exposure Management (EM) team can vary significantly depending on the size of the organisation, the types of business underwritten, the functions of the EM team and the corporate hierarchy. Despite these differences, the core functions of an EM team can be understood through several key questions. Each firm manages their EM function uniquely within the insurance sector, and this chapter explores these questions, examining how EM teams operate, what they need to achieve, and how they can be structured to maximise their effectiveness within a company.

# KEY QUESTIONS EXPLORED

## What is the Role of Risk Aggregation in Exposure Management?

Understanding how an organisation collects and manages its data is foundational to all other EM functions. Key considerations include:

- **What types of business are being underwritten?** This determines the nature and extent of the exposure data required.
- **How is data being collected for risk aggregation?** Efficient data collection processes are crucial for timely and accurate decision-making. Differences in data collection can not only introduce unhelpful variances but are hugely inefficient.
- **How are emerging risks monitored?** Continuous monitoring ensures that the organisation can adapt to new risks as they arise.
- **Data quality – how accurate and complete is the schedule data?** Have there been any bulk coding assumptions regarding key location characteristics (e.g. occupancies) or any assumptions made such as inflationary impacts to the total insured values?

- **How current is the data?** Addressing issues with data vintage is essential to maintain the relevance and accuracy of the exposure management function.
- **What input data are the models most sensitive to?** Answering these questions allows EM teams to prioritise data enrichment activities, helping drive down uncertainty in model output.
- **Can catastrophe models accurately estimate post-event losses?** Catastrophe models aren't designed for precise post-event loss estimates. While they can offer useful insights for risk assessment, it's best not to rely on them for detailed loss projections after an event.
- **How Does Regulatory Compliance Shape Exposure Management?** There are many examples where regulators, or rating agencies have driven a set of responses from the affected entities.

In general terms these interventions have been positive. However, as often can be the case, unintended consequences have created some problems.

These have included:

- Tuning a portfolio to deterministic events
- Overly complex requirements and too much variability from different entities
- Move away from principles based approaches



## How can you maximise the effectiveness of your exposure management function?

### Clarify the Purpose:

- Recognise your EM team as a strategic partner in risk management, working closely with underwriters to manage risk across the organisation, not merely a technical support function

### Strategic Positioning:

- The EM team can sit naturally in several functions but it should be ensured they are closely working with underwriters who need the insight and experience on model interpretation
- Be conscious that exposure management is a separate discipline from actuarial science
- Look for possible conflicts that can occur with any reporting lines; EM should be exposed to line 2 validation

### Allocate resources:

- Much of the above requires resource allocation that is sometimes stretched at smaller (re)insurers, or difficult to join the dots between departments at larger organisations, particularly during surge times

### Communication and Integration:

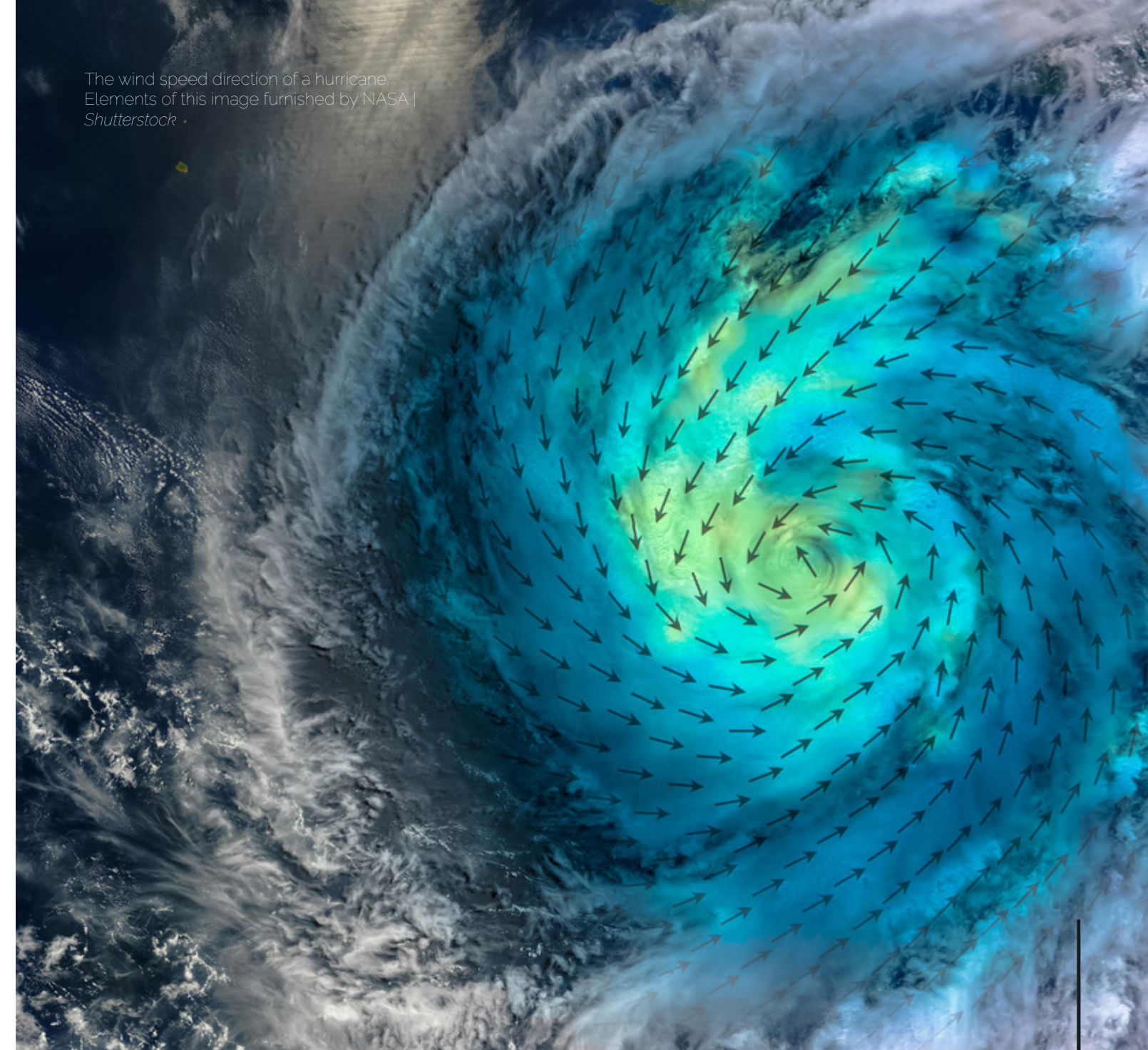
- Foster robust communication channels between the EM team and all relevant departments
- Ensure that exposure insights are integrated into every level of decision-making

### Technology and Automation:

- Invest in technology and automation to enhance data processes
- Allow the EM team to focus on strategic analysis and decision support rather than administrative tasks
- Leverage automation to reduce costs and increase efficiency

### Continuous Development:

- Encourage continuous professional development and knowledge sharing within the EM team.
- Stay ahead of emerging risks and evolving best practices



The wind speed direction of a hurricane.  
Elements of this image furnished by NASA |  
Shutterstock

### Underwriting Support:

- Establish a close working relationship between EM teams and underwriters, particularly in small insurers and syndicates
- Encourage EM teams to work physically alongside underwriters, creating a strong feedback loop that enhances real-time decision-making and risk assessment
- While this close collaboration is more achievable in smaller organisations, it can be challenging for larger entities. Nonetheless, it is crucial to foster strong communication and collaboration to maintain the link between underwriting and exposure management



# CALL TO ACTION

When strategically managing and developing their EM structure, (re)insurance firms should prioritise the below five primary purposes of EM teams:

1. Provide a comprehensive understanding of an organisation's risk landscape
2. Enable informed decision-making and safeguard the company's financial stability
3. Aggregate and analyse data, evaluate models, and generate insightful reports
4. Ensure regulatory compliance and support the organisation's ability to anticipate and manage both current and emerging risks
5. Protect the business from significant loss events and ensure resilience in a rapidly changing environment

By repositioning your exposure management team within a senior risk function:

- You empower them to take a more central role in your organisation's risk management strategy
- This enhances the team's effectiveness and ensures your organisation is better prepared to navigate the complexities of the modern risk environment

Now is the time to:

- Ensure your EM strategy aligns with the firm's strategy - too often there is no alignment or strategy around EM
- Reassess your EM reporting lines
- Strengthen collaboration across departments
- Embrace innovative practices that will keep your business resilient in the face of ever-changing risks

# Chapter 2: What Are The Challenges of Risk Models In A Commercial Environment?

## INTRODUCTION

In a world increasingly shaped by the unpredictability of natural disasters, how can (re)insurers effectively navigate the complexities of catastrophe models? With the growing challenges of climate change, market competition, and model uncertainties, it's more crucial than ever to understand the challenges surrounding risk models in a commercial environment.

# KEY QUESTIONS EXPLORED

## 1. Is the Acceptance of Catastrophe Models as a Commodity a Challenge?

The commoditisation of catastrophe models presents some challenges. When models are treated merely as interchangeable products, the nuanced understanding of their outputs can be lost. This approach risks underestimating the unique value each model can bring when its limitations are fully understood and appropriately applied. While catastrophe models might seem like commodities at first glance, the real competitive advantage lies in how well you comprehend their intricacies, customise their outputs, and maintain a disciplined approach to their use. All other things being equal this will reduce volatility and provide better solutions for buyers.

Treating catastrophe models as commodities while lowering the barriers to entry can lead to complacency. The efficacy of these models varies significantly by region and peril, and use case which necessitates a blend of empirical approaches and rigorous evaluation techniques. To gain a real competitive advantage, you must move beyond treating models as mere commodities. Instead, focus on understanding their limitations, customising your analyses, and maintaining a disciplined approach to their application. This mindset will enable you to make more informed decisions and manage risks more effectively and generate superior underwriting returns.

## 2. Building vs. Licensing Models: What's the Best Strategy?

The debate between building in-house models and licensing third-party models is ongoing. Some major reinsurers develop their own models, which allows for deep understanding and flexibility. However, for organisations with less experience or resources, focusing on specific inadequacies in vendor models can be a practical middle ground. The key to success lies in the effective communication of model assumptions and flaws. Underwriters and decision-makers need to fully grasp the limitations of the models they rely on. This understanding is critical to making informed, balanced decisions and aligning with strategy.

## 3. Adjusting Cat Models: Coherently Combining Subjectivity and Objectivity?

Adjustments to catastrophe models are necessary, but they must be comprehensive. Too selective adjustments can lead to biased outcomes that justify preconceived positions. A full review of model assumptions is essential to ensure that any changes are credible and scientifically valid. It is however very challenging as today catastrophe models are extremely complex which makes adjustments hard to calibrate with few tools given for user adjustment. However, this approach, if done properly and within the constraints of the complexity of the models, can enhance the reliability of your risk assessments and also strengthen your organisation's ability to manage and mitigate risk effectively.

## 4. Do Multiple Models Add Value Given Additional Costs?

Employing multiple models usually offers a more robust analysis by highlighting inherent uncertainties. While this approach is more resource-intensive, it provides a comprehensive view that is essential for accurate catastrophe risk assessment. While this is broadly true, analysis needs to be made of the regions and types of business this is done for and how the information is used of course.



## 5. Uncertainty and Error: What Constitutes an Unacceptable Level of Inaccuracy?

Uncertainty is an inherent characteristic of all models, including catastrophe models, and must be thoroughly understood by all users. These models, by their nature, contain margins of error that reflect the limitations of available data, assumptions, and methodologies. A common challenge lies not in the models themselves, but in how their outputs are interpreted and applied. It is not just about understanding the models; it's about possessing the expertise to use them critically and contextually.

In terms of margins of error, these can vary based on the complexity of the model and the data inputs. For instance, stochastic models might present error ranges that could easily span 30-50% at the lower end of the tail and significantly higher further out, depending on factors like market accepted convergence or frequency of the event being modelled. It's vital to assess whether this level of uncertainty aligns with your organisation's risk appetite.

Ultimately, the key is not to view models as definitive answers but as decision-support tools. They should be combined with expert judgement, a clear understanding of the model's assumptions, and a broader assessment of real-world conditions. An unacceptable level of inaccuracy is one that leads to decisions misaligned with your tolerance for risk or that consistently fails to capture critical risk factors specific to your portfolio. Staying critical of the results and remaining aware of their limitations is essential for effective decision-making.

## 6. How is Technology Driving Transformation in Exposure Management?

It is well known that subscribing to risk modelling platforms represents a significant cost base for (re)insurers, and merely improving traditional methods in EM is no longer sufficient. But how is technology driving change in the way we manage exposure? This is not just about incremental improvements, it's about fundamentally shifting the way risk models are valued, altering cost structures, and ensuring that technology is not just a support function but a critical driver of strategic transformation.

## 7. What are the Benefits and Risks of Cloud Deployment in EM?

Cloud deployment offers significant advantages to businesses, including insurers. Flexibility is a key benefit, allowing businesses to scale their computing resources up or down as required, without the need for heavy investment in physical infrastructure.

## 8. How Does Leveraging API-Driven Workflows Revolutionise the Insurance Industry?

Application programming interfaces (APIs), are crucial in the digital transformation of the insurance industry. APIs allow different software components to interact seamlessly, creating automated workflows that integrate various tasks across a company's cloud infrastructure. This reduces human error, eliminates redundancy, and ensures consistency in operations.

## 9. What Role do Digital Ecosystems and Platforms Play in Transforming the Insurance Landscape?

The rise of digital ecosystems and platforms is reshaping the insurance industry. A digital insurance ecosystem is a network of interconnected entities — including insurers, brokers, reinsurers, and service providers — who collaborate and exchange data electronically. These ecosystems are often supported by private digital interconnection, which offers enhanced performance, security, and reliability compared to public internet connections.

# CALL TO ACTION

As you navigate the increasingly complex landscape of catastrophe models, remember that these tools are just that — guides to inform, not dictate, decisions. Their real value comes from how well you interpret, adjust, and apply them in context, especially when accounting for non-catastrophe risks such as political violence (PV), strikes, riots, civil commotion (SRCC), and renewables, or non-modelled risks like contingent business interruption (CBI).

These overlooked or under-modelled risks can significantly impact your exposure and should be part of a holistic risk management strategy. Consider integrating these factors into your analysis to ensure you're not leaving critical gaps in your risk assessments.

By critically evaluating the models you rely on, adjusting them to reflect new realities, and broadening your approach to include these non-modelled risks, you can better manage the uncertainties that define catastrophe risk. Stay informed, stay critical, and ensure your use of catastrophe models aligns not just with industry standards, but with your organisation's specific risk appetite and strategic objectives.

Hurricane Irma heading towards the Caribbean Sea. Elements of this image furnished by NASA | Shutterstock





# Chapter 3: What Are The Main Challenges in Managing Climate Change Exposure?

## INTRODUCTION

One of the most significant challenges exposure managers face are the increasing risks associated with climate change. Traditionally, catastrophe models have relied on historical data to predict future risks, grounded in the assumption that past patterns can reliably forecast what lies ahead. However, this assumption is increasingly less relevant as the effects of climate change become more evident. The climate we now confront is not the climate of the past, and the models that depend on historical records often fall short in capturing the unprecedented changes we are experiencing without modification or adjustment.

As the world warms, we are witnessing shifts in weather patterns, intensification of extreme events, and the emergence of new risks. These developments expose the limitations of traditional models, which were never designed to accommodate the rapid pace and scale of climate change. This chapter explores the critical questions that arise in managing climate change exposure, examining how different perils are affected, the role and limitations of current models, and the implications for future risk management. Understanding these challenges is essential to ensuring that we are not under-prepared for the extreme events that may become more frequent and severe in the years to come.



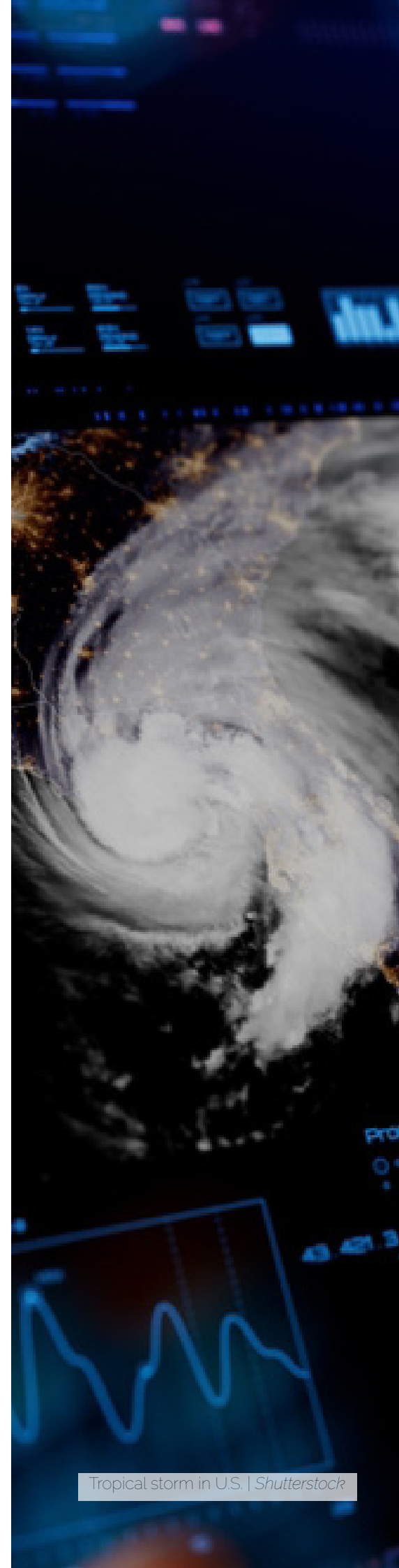
# KEY QUESTIONS EXPLORED

## 1. How does climate change impact various perils?

Climate change exerts a profound influence on various natural perils, and understanding these impacts is critical for effective risk management. Different perils respond to climate change in diverse ways, with some more directly and obviously influenced by rising global temperatures. The clearest connections between climate change and peril impacts can be seen in the following areas:

- **Droughts and Wildfires:** As global temperatures rise, the hydrodynamic cycle intensifies, exacerbating droughts and increasing the risk of wildfires. Warmer temperatures lead to drier periods, which make dry regions even more susceptible to prolonged droughts. This in turn creates conditions ripe for wildfires, particularly when combined with dry vegetation and extreme heat.
- **Heavy Precipitation and Flooding:** The intensified hydrodynamic cycle also results in wetter periods becoming even wetter, leading to more frequent and severe flooding. Heavy rainfall, particularly following periods of high temperatures and little rainfall, increases the likelihood of flash flooding. Additionally, rising sea levels contribute to elevated risks of storm surges and coastal flooding, especially during events like king tides.
- **Hurricanes and Storm Surges:** Climate change is expected to make hurricanes more intense, with recent studies indicating that these storms could become more frequent and severe due to increased moisture in the lower levels of the atmosphere. Rising sea levels further compound the risks associated with hurricanes by amplifying storm surges, leading to more extensive coastal flooding.

The impacts of climate change on these perils are not uniform, and some perils have more nuanced responses. For instance, while hurricanes are expected to become more intense, other perils such as hail storms may also see changes in frequency and severity, largely due to alterations in atmospheric conditions.



Tropical storm in U.S. | Shutterstock

“Genuine model diversity will help us to consider different perspectives: what really is the bottom line? ...are we being constrained into certain courses of action because we only have one model?”

- Erica Thompson,  
Escape from Model Land

## 2. Is climate change affecting the losses we experience today?

As global temperatures continue to rise, the impacts of climate change are becoming increasingly evident in the losses we experience from natural disasters. However, understanding the extent to which climate change contributes to these losses is complex. It however occurs against a backdrop of significant exposure growth, including the expansion of the built environment and increases in insured values, particularly in areas vulnerable to natural catastrophes which also need to be understood.

However, as climate change accelerates, its impact on losses may become more pronounced. Perils, such as flooding and wildfires, which are more directly influenced by climate change, are becoming more frequent and severe. These trends suggest that while exposure growth has been the dominant factor in increased losses to date, climate change could play a more significant role in the future, particularly if extreme weather events become more common.



## 3. Do current catastrophe models account for the climate change we've already experienced?

One of the key challenges in managing climate change exposure is the reliance on catastrophe models that are largely based on historical data. These models are typically calibrated using long-term records, under the assumption that the climate is relatively stationary. This means that they often fail to account for the ongoing changes in climate patterns and the increasing frequency and severity of extreme events.

Most catastrophe models incorporate data from various sources, including hazard, vulnerability, and loss data, to simulate potential outcomes. However, because extreme events are rare, models often rely on the longest possible historical record to capture these events. This approach assumes that the past is a reliable guide to the future, which is increasingly not the case in a changing climate.

For some perils, such as hurricanes, where a strong trend in underlying data exists, model vendors may choose to adjust their models to reflect the most recent climate conditions. However, this is not always straightforward.

Small-scale variations, such as differences in how one river catchment responds compared to another, complicates efforts to adjust models accurately. Additionally, human practices, such as changes in forest management, further complicate the ability to model certain perils accurately.

In general, catastrophe model vendors claim that their models are calibrated for the current climate. However, users must validate these models carefully, understanding their limitations and the extent to which they incorporate recent climate trends. As the climate continues to change, the need for models that can dynamically adjust to new conditions becomes increasingly urgent.



#### 4. Will climate change materially impact losses over the next five years?

In the short term, the impact of climate change on losses may be overshadowed by other factors, such as natural climate variability. For many perils, short-term climate cycles, such as the El-Niño Southern Oscillation (ENSO), play a more significant role in determining the level of interannual variability in losses. For example, ENSO has a strong influence on hurricane activity in the North Atlantic and Pacific, as well as on flooding in Australia.

The difference between active and inactive years, driven by these natural climate cycles, is often greater than the year-on-year changes caused by climate change. However, climate change may magnify the impact of these cycles, leading to more severe losses in active years. For instance, an active hurricane season influenced by ENSO could result in a higher frequency of intense storms, which are further exacerbated by the effects of climate change.

The next five years may see a change in the probability of extreme losses. An event previously estimated to occur once every 100 years could become four times more likely, happening roughly once every 25 years. This shift may not be immediately evident in annual trends, but it will translate to more frequent and severe losses in the long run.

#### 5. How does non-modelled risk vary by line of business, and is this trend improving or worsening?

Non-modelled risk refers to the perils or loss drivers that are not fully captured by existing models. These risks can evolve more quickly than models can adjust, presenting a significant challenge in managing climate change exposure. In some cases, the failure to model these risks accurately can lead to substantial underestimation of potential losses.

One example of non-modelled risk is the impact of severe convective storms in the United States. The Insurance Institute for Business & Home Safety (IBHS) has conducted several studies on the degradation of asphalt shingle roofs, particularly in relation to hailstorms. These studies have highlighted the significant escalation in roof damage as roofs age, which is not yet fully incorporated into existing models. For instance, the 2020 Iowa and Illinois Derecho revealed that roofs aged nine to 10 years suffered significantly more damage than newer roofs, leading to higher losses from water intrusion and roof cover damage.

Another area of concern is the impact of small hail, which has not been systematically recorded in the United States since 2012. IBHS research has shown that even hailstones less than 1 inch in diameter can cause significant deterioration of asphalt shingles over time, leading to increased susceptibility to future hail events. This cumulative damage is not adequately captured by current models, presenting a challenge in assessing and managing hail risk.

The trend in "non-modelled" climate perils varies by line of business and is a dynamic area of focus for insurers and model vendors. While efforts are being made to incorporate new data and research findings into models, the pace of change in climate conditions and the evolution of non-modelled risks often outstrips the ability of models to adjust. As a result, non-modelled risk remains a significant concern, particularly as climate change introduces new and unpredictable variables.



An aerial view of a glacier canyon in Antarctica | Shutterstock



## 6. How can insurers balance capturing tail risk from rare, high-severity events with modelling the cumulative impact of frequent, low-severity events?

Model loading is a critical component of catastrophe risk management, particularly in the context of climate change. The process involves assessing a range of plausible severe tail events, especially for perils that occur with high frequency but low severity, such as severe convective storms, winter storms, wildfires, and floods. These perils require a different modelling approach compared to rare but severe events like hurricanes and earthquakes.

For high-frequency events, the modelling approach must account for a large number of permutations to adequately capture the range of scenarios that could occur in a given loss year. This requires a more extensive modelling exercise, as the focus shifts from a few extreme events to a broader spectrum of smaller events that collectively contribute to significant losses.

In loading models, insurers are increasingly adopting hybrid approaches that blend experience-based actuarial methods with advanced predictive analytics. This approach allows for a more nuanced understanding of model shortcomings and inconsistencies across different lines of business.

By combining experience, class, and model assessments across the spectrum of high- to low-probability outcomes, insurers can develop a more robust view of risk that better reflects the changing climate.

As climate change continues to alter the risk landscape, the importance of model loading becomes even more pronounced. Insurers who can effectively incorporate predictive analytics and adapt their models to reflect the changing climate will be better positioned to manage the increased risks associated with more frequent and severe weather events.

## 7. What do we know about the attribution of US hurricanes to climate change?

Attributing specific hurricane events to climate change is a complex and evolving field of study. Recent advancements, such as the production of the climate-connected stochastic Tropical Cyclone set IRIS from Imperial College, London, have allowed researchers to quantify the additional impact of warming on the maximum wind speeds and potential intensity of major damaging hurricanes over the last four decades.

Outputs from IRIS indicate that the wind speed of major hurricanes in the present day has increased by up to 13% since 1980, with the return period for such events reducing by as much as 60% across various scenarios. This means that the probability of a major hurricane making landfall in the United States is now about 30% higher compared to the 1980 baseline.

Additionally, according to IRIS the likelihood of a Category 5 hurricane making landfall has nearly tripled, from a once-in-30-years event to a once-in-10-years event. While the findings represent a single model perspective, they underscore the likely growing influence of climate change on hurricane activity in the North Atlantic, with potentially significant implications for risk management and loss modelling.

As the impacts of climate change on extreme weather events continues to grow, insurers and policymakers may need to adapt their strategies to account for the heightened risks posed by these catastrophic perils.



# CALL TO ACTION

The challenges of managing climate change exposure are vast and complex, requiring a multifaceted approach that goes beyond traditional reliance on historical data. As climate change accelerates, the limitations of existing models become increasingly apparent, highlighting the need for more dynamic and adaptable risk management strategies.

To effectively manage these challenges, it is crucial to:

**Embrace New Data and Technologies:** Continuously update models with the latest data and research findings, particularly in areas where non-modelled risks are emerging or evolving rapidly.

**Adopt Hybrid Approaches:** Blend experience-based actuarial methods with advanced predictive analytics to create more robust models that can adapt to changing climate conditions.

**Enhance Collaboration:** Foster collaboration between insurers, model vendors, researchers, and policymakers to ensure that models are as accurate and comprehensive as possible.

**Prepare for Uncertainty:** Recognise the inherent uncertainties in climate change and risk modelling, and develop strategies that are flexible and resilient in the face of unforeseen challenges.

“When individuals in the market are heard to say, “the models are wrong” it’s often an indication that there is a lack of appreciation of the inherent and expected uncertainty”

- Dickie Whitaker,  
CEO Oasis Loss Modelling Framework

# What Should You Do Now?

Risks are constantly evolving, and exposure management is key to staying ahead. This report highlights critical questions (re)insurance leaders must ask to adapt. The answers may involve rethinking strategies, increasing short-term investment in EM, and pushing for more urgent action across the sector.

With climate change, technological advancements, and complex catastrophe models shaping the future, a proactive and adaptable approach to exposure management is crucial. This report offers insights into these challenges and stresses the need to embrace innovation, rethink risk models, and act on emerging risks now.

## Expert Panel Debates

The authors of this report are conveying a series of Expert Panel Debates featuring leaders from across the (re)insurance and risk management sectors to discuss and refine the recommendations outlined in this report. This will foster a collaborative approach to overcoming the challenges ahead and shaping the future of EM in your organisation.

More details will be available soon, please register your interest with the authors.

# Next Steps

## 1. Engage with Experts

We can arrange presentations – which will be delivered by selected authors of the report – to senior executives for no charge. These presentations will help deepen your understanding and application of the insights provided.

## 2. Deploy training for C-Suite

Implement targeted training sessions for your C-Suite, focusing on the latest exposure management strategies and technologies to ensure your leadership is well-prepared to make informed decisions.

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**We will commit to providing advice virtually to senior executives for the first 15 companies who request a presentation.**

Please contact  
**[dickie.whitaker@oasislmg.org](mailto:dickie.whitaker@oasislmg.org)**  
to explain your goals and to arrange a meeting.

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LOSS MODELLING  
FRAMEWORK

