

# Aon Benfield Research Newsletter

*Edition Two – Spring 2011*

## Editorial

**Welcome to the spring edition of the Aon Benfield Research Newsletter, which shares the news on our global research organizations and highlights how academia can work hand in hand with business to improve risk awareness and deliver practical results for the insurance industry.**

In this issue our partners provide updates on the spectrum of natural hazards that have tragically hit Australia, New Zealand and beyond over the last year.

We will update you on the Japanese earthquake in the next edition, when we will have a more accurate picture of the event.

We also delve into new research on uncommon windstorm tracks, reveal the latest innovative products to support insurers and interview climatologist Dr. Joachim Pinto from the University of Cologne.

Enjoy!



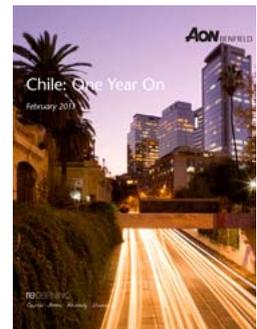
Paul Miller

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## Latest Research

### Chile earthquake one year on

Aon Benfield's new report 'Chile: One Year On', highlights how the earthquake tested the reinsurance market and that more tsunami research is needed to understand future losses.



The earthquake has now been recorded as the sixth largest since 1950. Its moment magnitude (Mw) of 8.8 has been exceeded only by the 1952 Kamchatka, 1960 Chile, 1964 Alaska, 2004 Sumatra and 2011 Great Tohoku earthquakes.

Dr Simon Day of the Aon Benfield UCL Hazard Centre noted that the size of the Chilean tsunami was small in relation to the large magnitude of the earthquake, particularly in comparison to the 1960 event which produced damage and deaths as far away as Hawaii and Japan.

This in turn highlights that, as a non-modeled peril, insurers need to consider potential tsunami damage in addition to output from catastrophe models' earthquake analysis.

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## Contents

Chile earthquake one year on	1	CERDA becomes new member	5
Uncommon European winter storms	2	New research projects with NTU Singapore	5
Learning from the Canterbury earthquake	3	ABUHC wins volcano resilience award	5
Australian floods: risk management lessons	3	First African natural hazards workshop	5
Risk Frontiers' Australian multi-peril platform	4	Interview with meteorologist Dr Joaquim Pinto	6
Updated catalogue of US hurricane insured losses	4	Feature: adapting to extreme weather	7
Creating calm in a chaotic climate	4	Aon Benfield Research links	8

## European winter storms: traditional perils posing new challenges

Aon Benfield has issued new research on uncommon European winter storm tracks in conjunction with the University of Cologne. The research points to a lower total number of events in the future but indicates intense storms moving over the North and Baltic Seas towards Eastern Europe, following a similar path to windstorm Kyrill.

In recent years, Europe has witnessed major damage from winter storms Klaus, Kyrill and Xynthia which followed uncommon tracks. These travelled eastwards and on a lower latitude than usual along the edge of the dominant North Atlantic storm track.

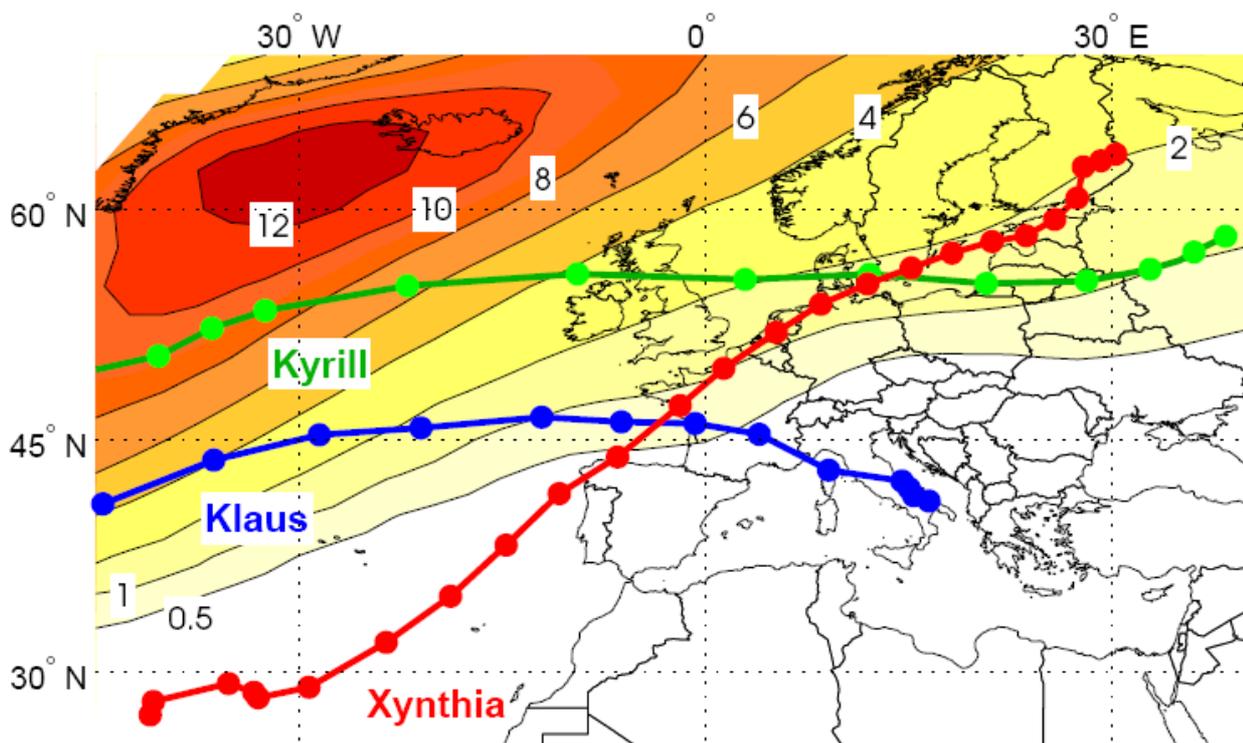
Dr Joaquim Pinto from the Institute of Geophysics and Meteorology at the University of Cologne – part of Aon Benfield Research’s academic and industry collaboration – explains: “Scientific research shows that the storm climate in Europe has changed considerably over the past 130 years, exhibiting decadal periods of high and low activity. The last decade was characterized by average or calm

conditions, following a period of strong activity which peaked during the early nineties. The occurrence of recent storms like Klaus, Kyrill and Xynthia are therefore considered to be a part of the climate system’s natural variability.”

Dr Adam Podlaha, international head of Impact Forecasting, commented: “Central and Eastern Europe’s insurance market penetration continues to grow, resulting in a gradual increase in exposure. As a result, while the meteorology may remain mostly unchanged, losses in the near future might increase, thus heightening the appetite for understanding the risks to the region.”

In response, Impact Forecasting, Aon Benfield’s catastrophe model development centre of excellence, and the University of Cologne are working together to create a pan-European windstorm model. Using the latest research and data, the model will generate the most comprehensive loss estimations and allow detailed analysis of the impact of extreme windstorms on re/insurers’ European portfolios.

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## Natural Hazards Round-Up

### Learning from the Canterbury earthquake

The Canterbury earthquake sequence was a major and unusual event in New Zealand's history, according to David Middleton, visiting professor at the Aon Benfield UCL Hazard Centre. It was the worst natural disaster since the Hawkes Bay earthquake of 1931 in terms of lives lost and has modified the natural environment, provided new perspectives on seismic hazard and tested infrastructure and buildings.



In response, New Zealand is bringing together its experts to build upon its history of collaboration among research institutions. These include the Natural Hazards Research Platform and Resilient Organisations.

David commented: "These earthquakes and their impacts will dramatically increase the information base available for future research to improve earthquake forecasting, mitigation and response planning in New Zealand and around the world. Mass instrumentation has provided a detailed pattern of the shaking so the relationship with building performance can be studied. The response of the built environment demonstrates that it is time to take the next step in building codes from life safety to continued utility. This is also to bring older buildings up to modern safety standards.

"A reassessment of the value of retaining our heritage buildings, at the cost of human danger, is rapidly occurring in the public mind and this kind of renewed questioning needs to be informed by the engineering and social sciences."

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### Australian floods: risk management lessons

The Queensland floods were a timely reminder of the extreme hydrological and hydraulic conditions in Australia, according to HR Wallingford.

Cyclone Tasha was the specific cause of extreme rainfall which was exacerbated when floodwaters were fed by heavy rain over the Christmas period. The duration of the floods are also linked to the very flat topography of Queensland, which limited drainage.

The occurrence of floods of this magnitude in the area should not be viewed as unprecedented – for example, records for Rockhampton show even more severe conditions in January 1918 when the flood level reached in excess of 10 meters. The recent damage illustrates the vulnerability of modern society where development has taken place in flood-prone areas.

Dr Paul Samuels commented: "The mitigation of future flood losses is not straightforward. A traditional solution is raised defences constructed as a ring around settlements but this may fail or be exceeded by a flood greater than the design, as occurred in New Orleans in 2005. The nature of flooding then changes to one of rapidly rising flood water with little warning which can be a much greater danger to life. Thus, modern practice for flood risk management uses a portfolio of structural and non-structural measures to reduce both the frequency of inundation and the potential for floods to cause damage and loss of life."



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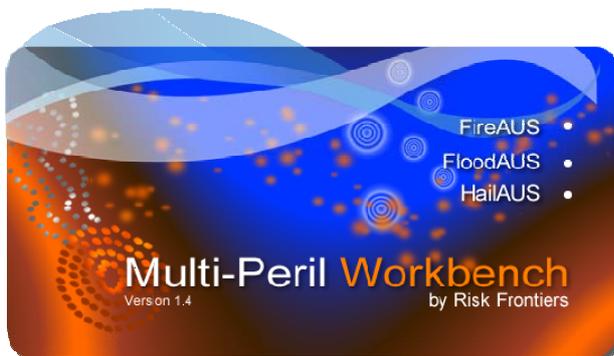
## Innovation

### Risk Frontiers' Australian multi-peril platform

Risk Frontiers has released its Multi-Peril Workbench, a platform which encompasses its new Australian Bushfire (FireAUS) and Riverine Flood Loss (FloodAUS) models, plus an updated hail model (HailAUS).

Input can be specified at address, postcode or ICA Zone resolution. Users can choose the previous ICA (or CRESTA) zones or those recently developed Risk Frontiers where the boundaries of the new zones are more risk informed and particularly appropriate for flood risk.

Results are displayed as Exceedance Probability (EP) curves, per-peril or as a multi-peril aggregate and may be exported as event lists.



Risk Frontiers will be adding its earthquake model (QuakeAUS incorporating a new ground motion prediction model) and updated Tropical Cyclone model (CyclAUS), in addition to extending HailAUS to cover Melbourne, Adelaide, Perth and Canberra.

The team is also developing a batch/parallel processing feature and the ability to deal with mixed line-of-business/mixed resolution portfolios.

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### Updated catalogue of US hurricane insured losses

The annual insured loss for US hurricanes is USD5.2 billion on average, according to new data from Tropical Storm Risk (TSR). Professor Mark Saunders and Adam Lea at TSR have updated and extended the award-winning catalogue of US hurricane insured losses created by Collins and Lowe in 2001. The annual loss figure has risen 81% from USD2.87 billion in the original catalogue.

The new catalogue lists the insured loss for all US striking hurricanes between 1900 and 2010. Figures are as if each hurricane struck under 2010 societal conditions. Changes in inflation, wealth per capita and number of housing units are taken into account.

The catalogue will assist the distribution modeling of hurricane insured loss and the quantification of return periods.

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### Creating calm in a chaotic climate

While freezing temperatures hit Europe over the winter, EuroTempest was busy advising the insurance industry on how to manage these seasons of uncertainty.

In response to requests from reinsurers, EuroTempest developed ReLoad™ (Reinsurance Loss And Damage), a new loss-ratio product. This combines wind speed data and vulnerability curves to deliver representative loss-ratio maps within 24-hours of an event to help guide loss assessment and response. ReLoad™ addresses the complexity of reinsurance contracts and the diversity of risk data, which makes loss estimation and effective response management more challenging for reinsurers.

In addition, EuroTempest combines real-time forecasts and observation data with vulnerability models to provide estimates of claims volume and distribution. EuroTempest post-event loss estimates for windstorms Klaus and Xynthia were within 5% of the final published loss for specific insurers.

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## Member News

### CERDA: new member

The Civil Engineering Risk and Decision Analysis (CERDA) group has become a member of Aon Benfield Research. Based at the Technical University of Denmark, the new unit has been launched by Dr Michael Havbro Faber and Dr Kazuyoshi Nishijima to conduct state-of-the-art research and education on natural hazard risks, impact of climate change on infrastructure, engineering risks, life safety, sustainability and decision supports in civil engineering.

Kazuyoshi is working on several projects a joint research project with Aon Benfield to develop a probabilistic typhoon risk model. He commented: "Collaborations with industries and governmental organizations are a core activity as this is a valid way for our research outcomes to be disseminated and facilitated in the society."

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### Aon Benfield launches research projects with NTU Singapore

Aon Benfield Research has partnered with the Institute of Catastrophe Risk Management and Nanyang Technological University (NTU) in Singapore to sponsor two new projects.

These will assess the impact of catastrophes on maritime business in the Maritime School and research Asian motor liability in the Actuarial School.

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### First African Natural Hazards Workshop

The Aon Benfield Natural Hazard Centre at the University of Pretoria has hosted the first ENHANS International Workshop on Extreme Natural Hazards and Disaster Risk in Africa.

The event brought together Africa's leading experts to help mitigate and manage the consequences of extreme natural hazards across the continent.

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### Aon Benfield UCL Hazard Centre wins volcano resilience award

The Aon Benfield UCL Hazard Centre (ABUHC) has been awarded UK Research Council funding for its Project Volcanoscope to improve emergency forecasts of eruptions.

Volcanic hazards are an increasing threat to human activity worldwide and mostly caused by the spread of populations into unsafe areas.

A similar pattern is emerging among multinational businesses as global expansion takes them to districts vulnerable to eruptions, particularly in nations bordering the Pacific Ocean. Increasing resilience to volcanic hazards is thus an important challenge both to local communities and to global business.



Of particular concern are forecasts at volcanoes that have been quiet for generations and so are rarely perceived as a threat. Forecasts must be reliable and delivered in a way that is readily understood by local authorities and emergency planners who may never have witnessed a volcanic crisis.

Coordinated by the ABUHC, the collaborative project includes partners from the UK, USA, European Union, Costa Rica and Mexico, as well as international Non-Governmental Organizations.

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## Interview

*Dr Joaquim Pinto is a senior scientist at the Institute of Geophysics and Meteorology at the University of Cologne, Germany. He explains how he became hooked on meteorology, developments in event clustering and how his research can help insurers tackle their Solvency II requirements.*



### What's your specialist area?

Meteorology. My research deals mostly with windstorm diagnostics, modeling and impact assessment. We use different approaches to gain insight on the mechanisms associated with the development of extreme wind storms. This enables us to enhance the predictability of such events and produce better estimates of their impacts. In addition, we analyze possible influences of climate change on extreme weather events, decadal variability of atmospheric large-scale modes and downscaling techniques.

### How did you come to specialise in this field?

After my degree in geophysics at the Classical University of Lisbon, Portugal, I moved to Germany in 1998 to do a doctorate in natural sciences at the University of Cologne. I studied climate variability in the Mediterranean and then had the opportunity to work on winter storms, focusing on the impacts for Germany. I have been hooked on this topic ever since.

### Why is this area so fascinating?

Winter storms are very interesting in scientific, societal and economic terms. They are the major natural hazard affecting Western Europe, with one single event potentially causing several billion Euros of damage. At the same time they are uncommon events, which are in most cases difficult to forecast accurately in advance. This makes them a very challenging topic to work with.

### Tell us about your current projects

We have joined forces with Aon Benfield's Impact Forecasting team to develop a state-of-the-art probabilistic pan-European wind storm risk model. We are also looking at the impact of climate change

for the insurance industry in Germany and extreme rainfall events over the Western Mediterranean. Our research also covers the decadal variability and coupling of atmospheric large-scale modes, such as the North Atlantic Oscillation.

### How will your work benefit the insurance industry?

We aim to increase knowledge of extreme wind storms, particularly on the mechanisms associated with their development and why some cause more damage than others. This is fundamental to create state-of-the-art models, which will help insurers to gain a deeper understanding of their wind storm risk in Europe and make more effective reinsurance purchases. Risk models developed this way will be scientifically robust, transparent and potentially serve Solvency II requirements.

### What's the latest exciting development of interest to the insurance industry?

Seasonal and decadal forecasts of wind storms could help companies ensure they have sufficient cover for impending risks. We will never be able to accurately predict the occurrence of single events before a few days in advance so the aim is to provide estimates of above/below average seasonal activity (similar to tropical storms forecasts).

Another hot topic is how wind storms are clustered like in January/February 1990 and January 2007. This is important to the industry as it impacts reinstatement policies.

### Where are you based and what makes this a great city?

I am based in Cologne – home of one of the largest universities in Germany. It boasts everything a modern city needs with wide green areas where one can leisurely ride a bike to work.



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## Feature

### Adapting to the extreme weather impacts of climate change – how can the insurance industry help?

As policymakers explore the link between climate change adaptation and established risk management practices, there is a growing need for the insurance industry to demonstrate how its risk reduction expertise can help.

A new report from ClimateWise analyzes the role of insurance in climate change adaptation. While insurance does not automatically lead to adaptation, the industry's expertise in loss reduction and risk management gives the sector a key role. Ten case studies from different countries and insurers form the basis of the report. They illustrate how the sector approaches the challenge of rising risk levels and provide lessons learned for the industry and external stakeholders, including:

- The Austrian Insurance Trade Association in partnership with the Ministry of Agriculture and local authorities, has developed a property risk assessment map. The industry is able to better price risk and it encourages individuals to adapt to the changing climate if they are at risk.
- Increased severity and frequency of hailstorms in Germany was putting pressure on the availability and affordability of caravan insurance. An industry collaboration led to aluminium ports with solar panels being installed in caravan parks to protect the vehicles and support the market.
- Research from Swiss Re included cost-curves of climate adaptation measures to inform best practice and demonstrate the role of insurance risk transfer measures.

A key lesson for the industry is that semantics matter. A wide range of loss prevention efforts and disaster risk management activities are currently being conducted within the industry without being referred to as explicit 'adaptation' activities. Once we have translated what insurers and climate policy-makers mean by

'loss prevention', 'risk reduction' and 'adaptation' we actually find cross-over in skill sets, expertise and experience. Insurers and policymakers need to start talking each other's language.

We need to be more aware of the distinctions between financial and physical resilience, understand that they go hand in hand, but focus on collaborative actions to reduce the underlying climate risk; this is where society, and therefore the insurance industry, can reap the broadest set of rewards.

How can this report lead to more adaptive action rather than just ending up on the shelves of the ever increasing climate change library? Three most promising ways to progress are:

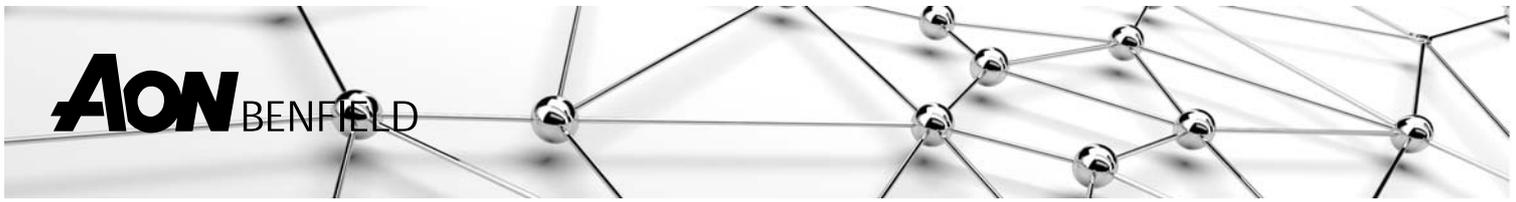
1. An industry-wide discussion about bringing these efforts to scale;
2. Looking at the role of developing countries and approaching adaptation in a global context; and
3. Pursuing innovation and technological progress improvements in data availability, risk modeling and innovative risk assessment methods for insurance.

Of course the report does not mark a 'fait accompli'. Key questions on how to scale existing activities, in both developed and developing world contexts, are highlighted as central to the next steps of this collaborative group. It is now up to the industry to stand up and take action.



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Read the full report here:  
<http://www.climatewise.org.uk/the-role-of-insurers-in-adapta/>



## Aon Benfield Research's Academic & Industry Links

- **University College London: Aon Benfield UCL Hazard Centre** - Europe's leading multidisciplinary academic hazard research centre, comprising geological hazards, meteorological hazards & seasonal forecasting, and disaster studies & management.
- **Pretoria: Aon Benfield Hazard Centre** - One of the leading research universities in South Africa, it serves as a harbour of information for the engineering, disaster management and insurance industries.
- **CERDA** - Based at the Technical University of Denmark (DTU), the Civil Engineering Risk and Decision Analysis research group focuses on natural hazard risks, impacts of climate change, engineering risks, life safety, sustainability and decision support.
- **ClimateWise** - a global collaboration of leading insurers, facilitated by the University of Cambridge Programme for Sustainability Leadership, focused on reducing the risks of climate change.
- **EuroTempest** - Transforms weather forecasts and observations into the specific information required to make successful live risk management decisions.
- **GFZ Potsdam** - National research center for Earth Sciences in Germany, investigating global geological, physical, chemical and biological processes which occur at the earth's surface and in its interior.
- **HR Wallingford** - world-leading analysis, advice and support in engineering and environmental hydraulics, and in the management of water and the water environment.
- **Lighthill Risk Network** - A not-for-profit organisation, which brings together scientific research worldwide, industry (initially Insurance), government and third party organisations in exchanging risk-related expertise.
- **Matrisk** - a leading consulting company specializing in risk assessment and decision support for the insurance, civil engineering and offshore industries worldwide.
- **NTU Singapore** - Institute of Catastrophe Risk Management - first multi-disciplinary catastrophe risk management research institute of its kind in Asia.
- **Risk Frontiers** - World leader in quantitative natural hazards risk assessment and risk management supported by the Australian insurance community.
- **Spurr Consulting** - Leading global consultancy on earthquake.
- **Tropical Storm Risk** - Unrivalled accuracy in real time mapping and prediction of tropical cyclones worldwide.
- **University of Cologne** - Leading research centre with a long record of wind storms diagnostics, extreme weather modeling and impact assessment.
- **University of Western Ontario** - Leading initiatives in earthquake physics and associated time-dependent seismic hazard at the Department of Earth Sciences.