

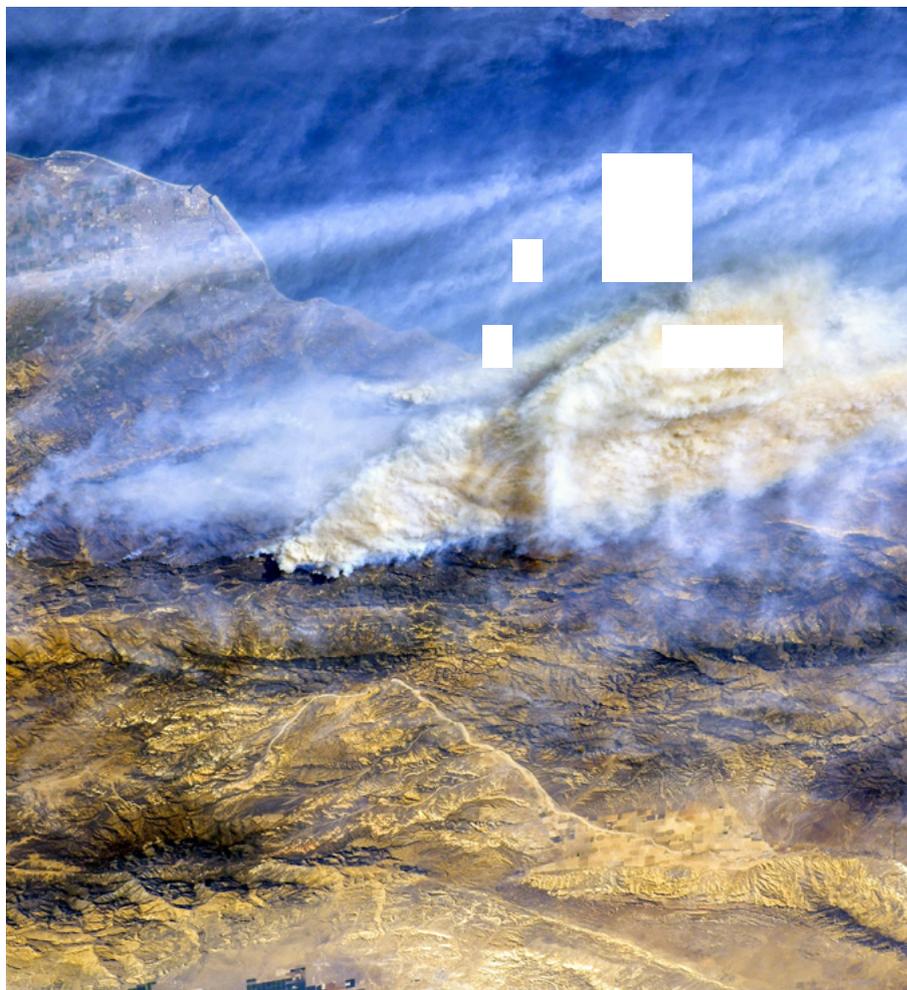
Willis Research  
Network Newsletter

Q3 2019



## WRN Newsletter - Q3 2019

In this summer newsletter, you will find a selection of topics showing the variety of research partnerships facilitated by the Willis Research Network (WRN).



- We are delighted to announce a couple of new initiatives: one on volcanic ash cloud forecasting (MITIGA), and one on hail modelling (NASA).
- We also pride ourselves on the continuation of fruitful collaboration with long-standing WRN members: on tsunami, earthquake and climate research
- And it isn't all about the natural world: people and technology risks are an increasingly important research focus – see our work on geopolitical risk and cyber.

As ever, if you would like to discuss any of those projects further, don't hesitate to get in touch with your usual Willis Towers Watson point of contact, or with the WRN team.

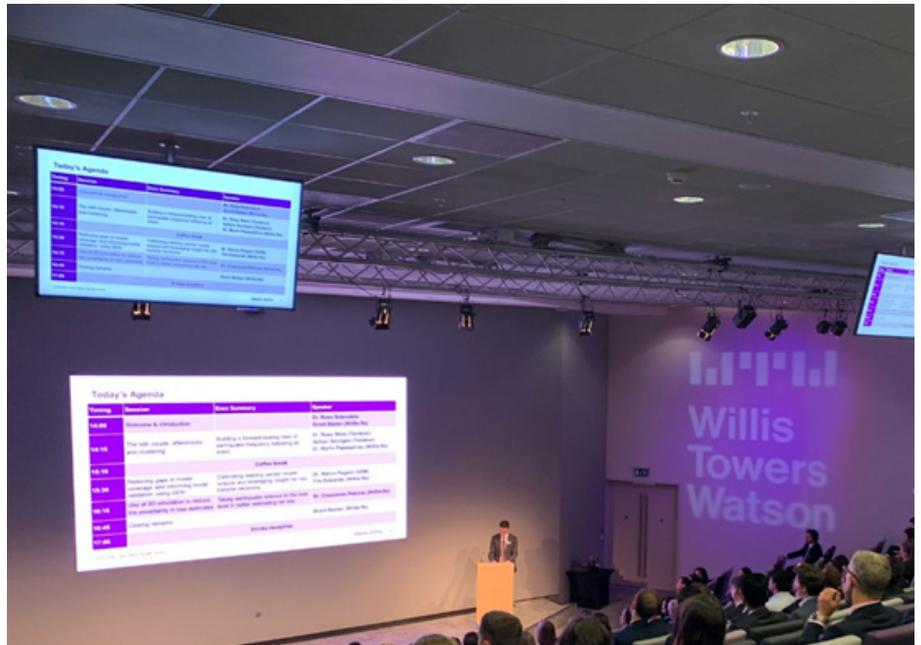
# Content

1. <a href="#">The 2019 WRN Seismic Risk Seminar</a> .....	4
2. <a href="#">Hurricane watch</a> .....	5
3. <a href="#">Increasing societal resilience to Tsunami Risk</a> .....	6
4. <a href="#">Climate risk research</a> .....	7
5. <a href="#">RUSI Modern Deterrence Conference: societal defence and resilience</a> .....	8
6. <a href="#">NATO Cyber Wargaming Workshop</a> .....	9
7. <a href="#">UCL's EPICentre Encounters</a> .....	10
8. <a href="#">MITIGA Solutions: Volcanic ash cloud forecasting for air traffic management</a> .....	11
9. <a href="#">Expanding hail modelling with KIT and NASA</a> .....	12



# The 2019 WRN Seismic Risk Seminar

A recent seismic risk seminar in London showcased the latest science funded by the WRN and how it is supporting reinsurance, capital and original risk underwriting decisions.

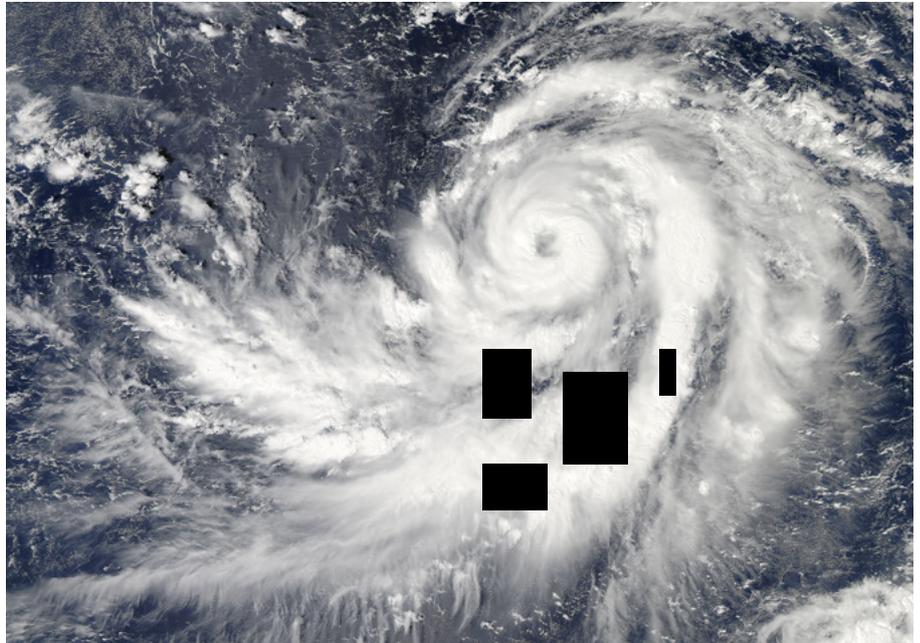


Last May, WRN Seismic Risk Seminar presented how Willis Re use cutting-edge earthquake science to inform their own view of risk, and how these insights can be used to support reinsurance, capital and risk underwriting decisions. To address these and many other questions we had a list of world-renowned experts on earthquake risk joining us from the risk management industry and academia. Dr. Ross Stein (Temblor), Dr. Marco Pagani (GEM), Dr. Myrto Papaspiliou (Willis Re) and Dr. Crescenzo Petrone (Willis Re), were

amongst the speakers on the day. The event was well attended and received very positive feedback. As a result, we are now working on new areas of focus for the next phase of our global research projects, such as exploring 3D modelling of earthquake risk in other areas across the world. Our continued support of these projects allows us to continue delivering innovative, bespoke and well informed risk solutions across the main areas which form our core service offering to clients. See this follow up article for further details.

# Hurricane watch

The 2019 hurricane season is underway with two named storms in the Atlantic, one of which became a hurricane and made landfall (Barry). Willis Research Network (WRN) partners at the National Center for Atmospheric Research (NCAR) continue to support event response activity with seasonal forecasting information and live event commentaries, as well as insights from their relevant research.



As ever, we are keeping tabs on the latest scientific insights on the current hurricane season and are providing updates on the latest storms as they develop. Subtropical storm Andrea kicked off the 2019 season a little early in May but did not significantly affect any land areas. June was clear, but Hurricane Barry did arrive in July to bring heavy rain and damage to the Gulf of Mexico coastline in Louisiana as a category 1 storm. Along with updates of the latest forecasts, our Willis Re North America Catastrophe Analytics team also calls upon our partnership with Dr. James Done at the NCAR, to provide expert guidance and more detailed commentary on the storm's evolution and impacts, and complement insights from our Willis Re specialists. The latest WRN commentary on Barry as it threatened landfall can be found [here](#). These briefings will continue to be written and sent to our clients (upon request) whenever a tropical cyclone threatens to make landfall in the U.S.

Our ongoing research with James also looks into the frequency of tropical cyclone landfall in different 'Weather Types' (generalized pressure patterns across the Atlantic basin which influence the paths of storms). This work has been used to develop historical landfall frequencies and can be used in conjunction with seasonal forecast models to provide guidance on likely landfall rates in a given year. Skill is modest but statistically significant and can form part of the overall Willis Re View of Risk. This work was presented in a recent webinar hosted by Prasad Gunturi, Executive Vice President, Willis Re North America Catastrophe Analytics, along with the latest [summary of current hurricane seasonal forecasts](#). Watch the webinar [here](#) via our [WRN Events](#) page.

# Increasing societal resilience to Tsunami Risk

Through the Willis Research Network (WRN), Willis Re has worked closely with Tohoku University in Japan since 2010, improving the understanding and quantification of tsunami risk in south-east Asia. We provide an update on the recent research focus: assessment of multi-layered tsunami countermeasures; and insights into “black” tsunamis.



Professor Fumihiko Imamura, Director of Tohoku University’s International Research Institute of Disaster Science (“IRIDeS”) and members in his laboratory have conducted research into tsunami data collection, tsunami simulation, as well as the development of tsunami hazard maps and vulnerability functions.

## 1. Assessing the performance of multi-layered tsunami countermeasures before and after the 2011 Great Japan Tsunami

The 2011 Japan tsunami, with a wave more than 10m overtopping breakwaters and seawalls, destroyed properties, infrastructure and coastal pine forests but was largely blocked by the embankment-type expressway located at approximately 3 km from the shore. The idea of “multi-layered tsunami countermeasures” has been developed as one of the lessons from the 2011 tsunami. For example, Sendai City is now constructing a 6m elevated road at 1 km parallel to the sea as further mitigation to the tsunami power. We have quantitatively evaluated such mitigation effect in Sendai City, and other areas potentially at risk of Nankai Trough tsunami (Wakayama, Tokushima and Kochi cities). Reduced loss of life and property losses in areas with such countermeasure are expected as it is generally observed that tsunami inundation area can be reduced by up to 30%, and the tsunami arrival time can be delayed by up to 10 min.

## 2. Multi-sectoral collaboration to quantify the impacts of “black tsunamis”

Kawasaki City is one of the large cities in the Kanto region, with a large concentration of large companies and factories. Tohoku University collaborated with the University of Tokyo, Kawasaki City and Fujitsu to better understand and quantify the impacts of a “black” tsunami: images of the 2011 tsunami show it as “black” because the water contained sludge, mud and other hazardous substances. “Black” tsunamis have mid to long-term effects on health conditions of tsunami victims, for example very fine sediments would cause pneumonia or brain abscess. Our advanced tsunami simulation techniques revealed a high risk of the black tsunami in Kawasaki City. Our tsunami evacuation simulations highlighted areas with severe traffic, high occupancy of evacuees as well as expected numbers of casualties. Life insurance loss could then be quantitatively assessed by applying various tsunami scenarios together with various tsunami countermeasures and disaster awareness/preparedness of residents. These allow us to create realistic and research-based property and casualty tsunami Realistic Disaster Scenarios that can be used for reinsurance, portfolio optimisation, and creating our own view of risk.

Tohoku University will present at the [2nd World Bosai Forum](#) in Sendai in November.

# Climate risk research

Climate change and climate risk have become top topics of discussion within the (re)insurance market. Colleagues across Willis Towers Watson are coordinating their efforts, research and advisory services in order to help our clients respond promptly to all their climate-related regulatory and business pressures.



Climate-related risks are increasingly recognised by clients as material to their operations and potentially impacting both asset and liability sides of the balance sheet. Opportunities in this space are being accelerated by changing regulatory and reporting environments, such as the [Task Force on Climate-related Financial Disclosures \(TCFD\)](#) and [Bank of England / Prudential Regulatory Authority \(PRA\)](#) climate stress tests for general insurers.

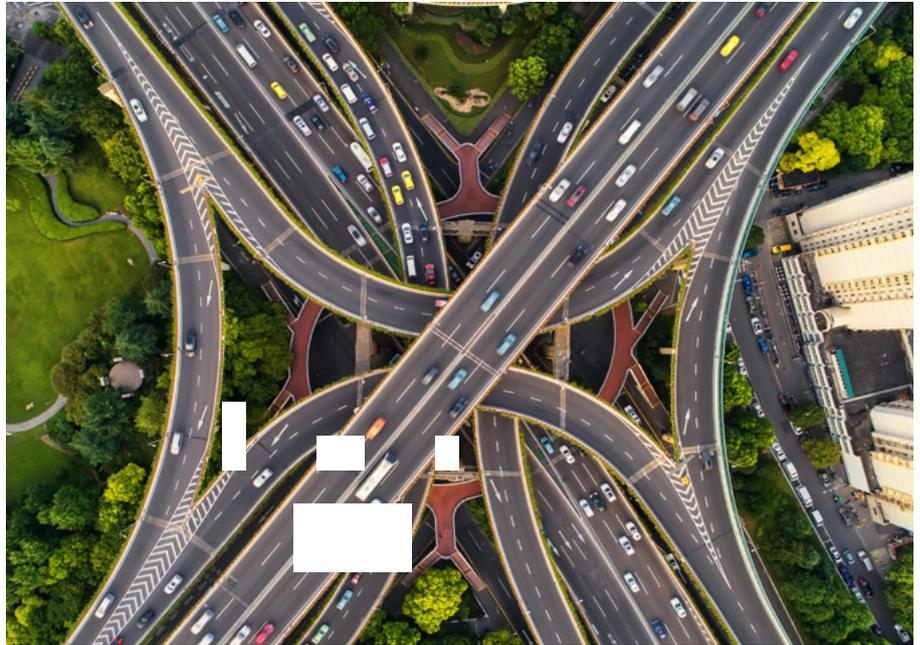
Working groups have been established to coordinate climate-related activities across Willis Towers Watson, covering re/insurance, corporates, banking, investment and infrastructure. These working groups focus on gathering climate risk-related knowledge, developing analytical tools and building necessary resources, in order to serve respective business sectors.

The Willis Research Network (WRN) will continue supporting these activities with climate-risk related research and is well-positioned to leverage the strong relationships we have forged

with academic partners around the world and across many disciplines. Whilst our Willis Re International Catastrophe Analytics team is currently working with Professor Chris Kilsby and his team at Newcastle University, regarding how we can advise clients on the new climate change stress tests issued by the PRA, we are also initiating new projects focusing on climate risk (tropical cyclone, hail, tornado/hail and flood) with a host of world leading academics at the National Center for Atmospheric Research (NCAR), Karlsruhe Institute of Technology (KIT), Columbia University and the National University of Singapore (NUS). These new projects will build on previous WRN research into climate variability and climate change, and as they develop we'll keep you posted on progress and research outputs via future newsletters and events

# RUSI Modern Deterrence Conference: societal defence and resilience

The annual conference of our Modern Deterrence programme at RUSI provided insights into civilian, political and military responsibilities when facing the range modern threats, from cyber-attacks and disinformation campaigns to power outages and wildfires.



On 29 May the Royal United Services Institute (RUSI) Modern Deterrence programme organised an international conference to explore aspects of societal defence and resilience. The event featured an opening keynote from Ruth Smeeth MP and was broadly divided into three sessions:

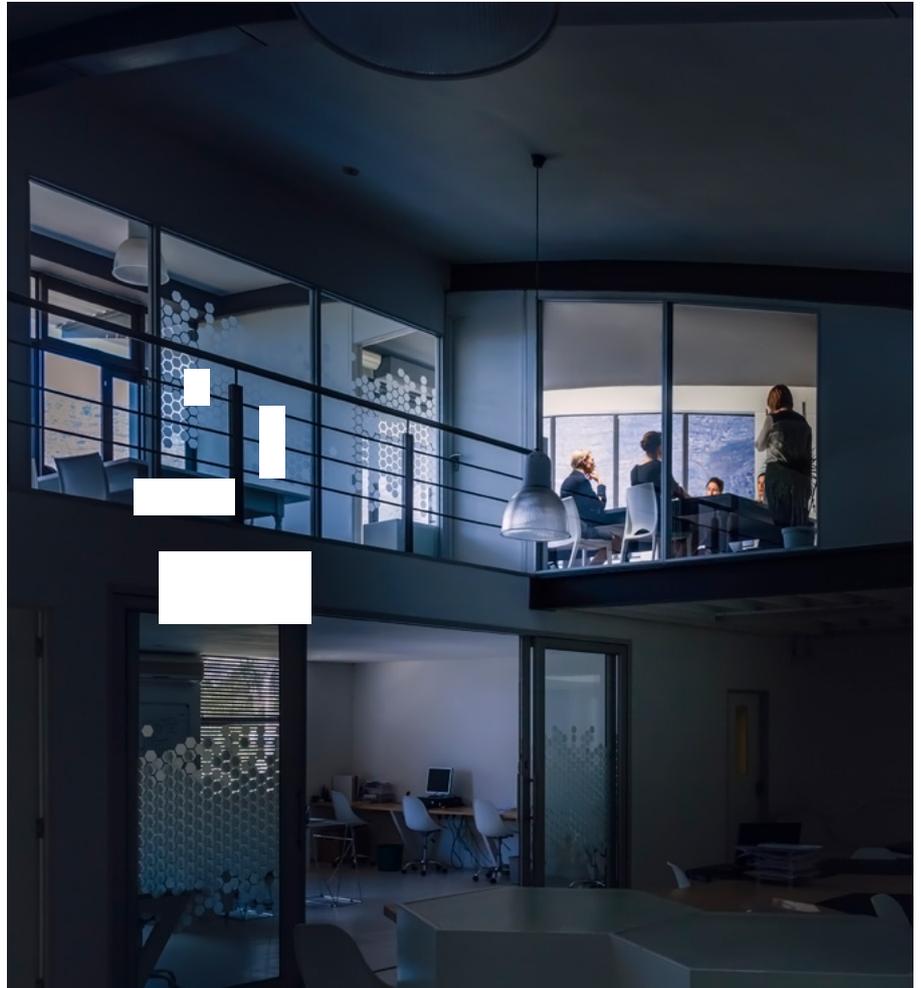
- Policy
- Planning and exercises
- Crisis response

Participants and speakers came from a range of government, industry and academic organisations. The main thrust of the conference was to define civilian, political and military responsibilities in deterring and countering a variety of modern threats, which range from cyber-attacks and disinformation campaigns to power outages and wildfires.

Willis Research Network (WRN) is a partner of the Modern Deterrence programme and was represented at the conference both in the audience and by Andrew Hall as a panel speaker. This engagement continues to place Willis Towers Watson in a position to inform these important debates, which are closely entwined with our [Geopolitical Risk initiative](#). By being at the forefront of these discussions, Willis Towers Watson is positioned as a credible and influential voice on geopolitical risk, informing policy, best practices and advising our clients.

# NATO Cyber Wargaming Workshop

Games can be much more than a jovial pastime. Beyond academia, the power of wargames has been recognised by various of professions, in particular for cyber security. This is why the Willis Research Network (WRN) continues to get involved in cyber wargaming workshops, e.g. the recent event organised by NATO in Germany.



Dr. Andreas Haggman represented the WRN at a cyber wargaming [workshop](#) held on 18-20 June at the German Command and Staff College in Hamburg. Organised by NATO Research Task Group [SAS-129](#), the workshop sought to develop prototypes for gamified approaches to cyber education. As a subject matter expert advisor to the Task Group, Andreas led the Strategy Track of the workshop using his own cyber wargame, based on which R&D and playtesting activities were conducted over the three days.

The workshop led to some significant improvements, which will be used to refine the game as a product in itself, and also fed into Willis Towers Watson's broader thinking and capability development in the areas of cyber threat awareness, assessment, preparedness and defense. The Task Group is due to deliver its final results in 2020.

## UCL's EPICentre Encounters

The Willis Research Network (WRN) and Willis Re talk about the role of science to inform business decisions at the UCL EPICentre encounters. The two-day knowledge exchange event in London was meant to bring together researchers, academics, practitioners and industry partners working at the nexus between risk, environmental hazards and the built environment.



WRN member the UCL EPICentre organised encounters on [Innovation in disaster risk reduction and resilience](#). The WRN was part of a panel of speakers talking about how new methodologies and technologies are being used to assist decision-making in complex risk scenarios. Representatives from the Industry and academia shared thoughts on how we make use of leading science

to inform business decisions in an evolving complex risk landscape. The WRN had the opportunity to talk about the various areas of Willis Towers Watson where science plays a role, in Reinsurance, Corporate Risk Consulting and in informing capital and public policy decisions aimed at closing the protection gap in the most vulnerable countries.

# MITIGA Solutions: Volcanic ash cloud forecasting for air traffic management

Our new partnership with MITIGA Solutions (offshoot of the Barcelona Computer Centre) will provide leading-edge volcanic ash cloud and sandstorm forecasting to inform air traffic management.



Since 2006 our award-winning [Willis Research Network](#) has created successful partnerships with diverse research teams across the world, leveraging leading-edge science for the benefits of our clients, putting science at the service of improved decision-making in a world of uncertain risks.

A partnership of particular relevance to our aviation and aerospace clients is our recently formalized collaboration with [MITIGA Solutions](#), an offshoot of the Barcelona Supercomputing Centre to predict and mitigate the impact of natural hazards to Air Traffic Management and aviation operations. Volcanic ash, sandstorms, mineral dust etc... are a key hazard for airlines, and affects flight safety, aircraft routes, infrastructure and engine lifetime. Harnessing the power of the MareNostrum IV supercomputer, data analytics, and weather and volcanic expertise, our MITIGA Solutions partners can help assess the extent and height of the impact of those hazards in realtime, at each stage of an aircraft operation and ongoing emergencies, for an efficient management of the emergency, and prior to an event, for early warning. This would allow airlines to mitigate their exposure, re-route planes, minimise delays and cancellations, and related economic losses. Their state-of-the art early-warning and real-time modelling can transform the decision-making process for air traffic. The implementation of this

proactive risk mitigation technology is expected to reduce maintenance costs, disruption costs and the total cost of risk; but also improve efficiencies, safety and passenger satisfaction. This is a subscription-based market-leading solution, both in terms of scope, sophistication, time and accuracy, and fills a gap left by the heterogeneous service provided by the Volcanic Ash Advisory Centres.

This subscription based service will be introduced as part of Willis Towers Watson's extensive support to the aviation and airline sectors, and can be integrated into existing relationships and risk practices as well as triggering new levels of interest and engagement. It will form part of the analytical suite of Willis Towers Watson capabilities, offered as either a stand alone initiative or as part of a broader and more interconnected package. There will also be the option to regularise the capability within the current operational practices of a firm, or to offer an event or time based service.

MITIGA Solutions is certified by Eurocontrol, and MITIGA Fall3d is the dispersion model currently in use by the Darwin as well as Buenos Aires VAACs.

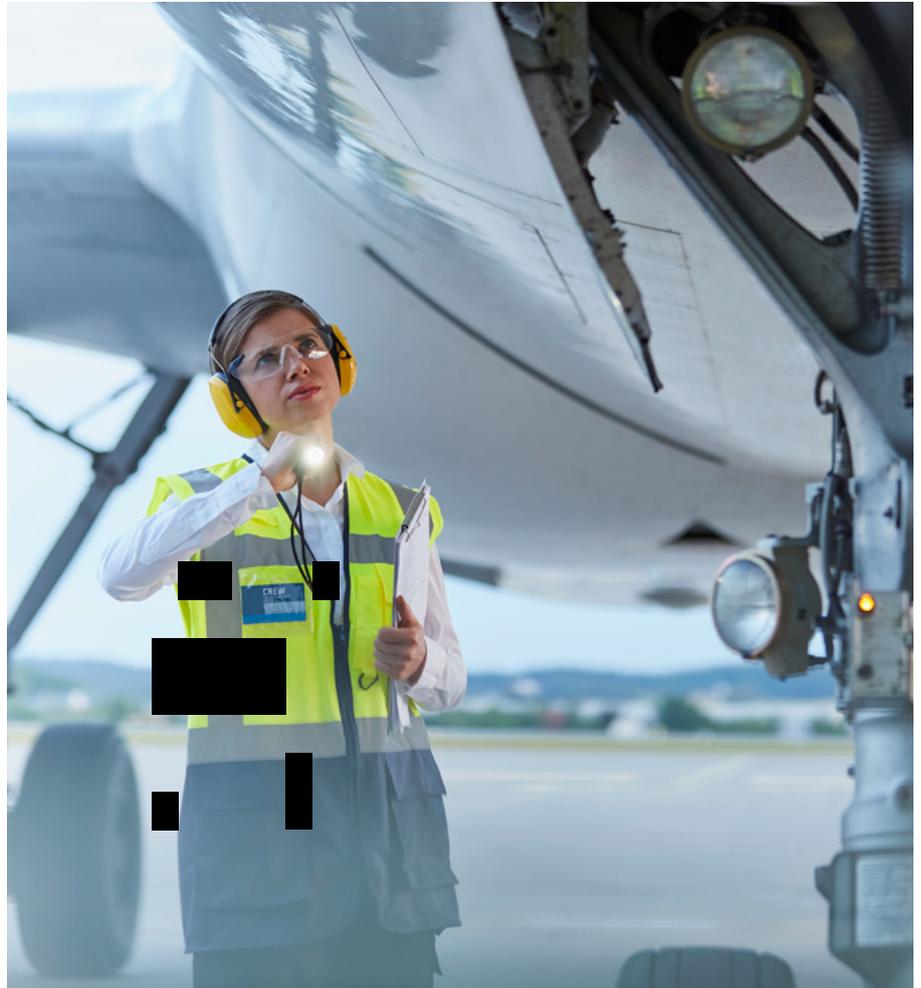
The Barcelona Supercomputing centre is also the official provider for the [Sand and Dust Storm warnings](#) of the World Meteorological Organisation.



MITIGA Solutions: Volcanic ash cloud forecasting for air traffic management

## Expanding hail modelling with KIT and NASA

Willis Research Network (WRN) partner Karlsruhe Institute of Technology (KIT) are helping Willis Re expand hail risk modelling capabilities to South Africa, as part of a broader NASA science initiative. This on-going research naturally draws from the rich experience developed both by Willis Re and KIT in building the European Hail Model.



Our collaboration with KIT continues to support the Willis Re View of Risk on hail. Building on previous work on extreme hail events in Europe and Australia, our Willis Re International Catastrophe Analytics modelling teams have been working with KIT to expand their current hail offering for the South Africa region. This project includes investigating a number of data sources, including lightning, radar and overshooting cloud tops data to apply the most up to date science within a region of historically poor data capture. It is also part of a wider collaboration on a initiative led by

NASA as part of their [Earth Science Applications: Disaster Risk Reduction and Response](#) project call.

This research will develop new technologies for using space-borne and radar-based hail observations for hail risk assessment and disaster risk reduction and response, which is very much aligned with the needs of the insurance and reinsurance industries. The goal for Willis Re is to allow for an increased geographic coverage of our hail catastrophe models, as well as the ability to incorporate a wider variety of lines of business.

# Willis Research Network Plan 2019

	Q1 2019			Q2 2019			Q3 2019			Q4 2019		
	January	February	March	April	May	June	July	August	September	October	November	December
<b>Week 1</b>				Q2 Newsletter 		Hurricane Season 	Climate Change Liability Risk 	Q3 Newsletter 		Q4 Newsletter 	2020 Brochure 	
<b>Week 2</b>	8th, Flood Club 			European Geosciences Union 	9th Seminar on Seismic Risk 	WRMA Annual Conference 					Seminar on weather & climate risks 	
<b>Week 3</b>					Royal Meteorological Society Panel 							Seminar on emerging risks 
<b>Week 4</b>			Flood Club 	CYBERUK 	An evening with Greg Holland 							

Publications		
Brochure	Newsletter	Blogs / Insights
		

Events		
Brochure	Newsletter	Blogs / Insights
		

External conferences		
Brochure	Newsletter	Blogs / Insights
		

## Recent Events

### **Willis Research Network Earthquake Seminar**

*May 09, 2019*

[Using earthquake science to inform business decisions](#)

### **Willis Research Network: An afternoon with Dr. Greg Holland**

*May 29, 2019*

A private session with Dr. Greg Holland (NCAR) highlighting latest research around tropical cyclone risk and climate change impacts on extreme weather. Slides available on request.

### **2019 Hurricane Season Webinar**

*June 05, 2019*

[Watch the webinar here](#)

### **WRMA Annual Conference**

*June 11 – June 12, 2019*

Associate Professor Michael Tippett (Columbia University) gave the opening presentation on climate change for the Weather Risk Management Association Annual Conference in New York. Slides available on request.

### **Climate Change Liability Risk Conference – co-hosted with Clyde & Co**

*July 05, 2019*

<https://bcove.video/2xTdNje>  
<https://online.flippingbook.com/view/648937/>

and watch our presentation on physical impacts  
(<https://bcove.video/2xTdNje>)

### **Cambridge Centre for Risk Studies – 10th year anniversary**

For their 10 year anniversary, CCRS reflected on the last 10 years and on “The Future Decade of Risk”. <https://www.jbs.cam.ac.uk/faculty-research/centres/risk/news-events/risk-summits/10th-risksummit-2019/>

### **Oasis Conference**

*June 18-19, 2019*

The conference titled ‘The good, the bad and the ugly’, showcased a multitude of topics and presenters. Main themes revolved around Climate change and Model suitability and transparency. Ioana Dima-West of Willis Re, Head of Model Research and Evaluation, presented on “Climate change and the (re)insurance industry”, in a workshop shared with PRA’s Technical Specialist Giorgis Hadzilacos and Reask’s Chief Commercial Officer Nick Hassam.

## Future Events

### **Willis Research Network Weather and Climate Risks Seminar**

*November, 2019*

More information to follow

### **Willis Research Network Emerging Risks Seminar**

*December, 2019*

More information to follow

## Recent blogs

1. [Managing geopolitical risk in the energy industry](#)
2. [7 key geopolitical drivers impacting the energy industry](#)
3. [Assessing climate risk: How and why you should create your own view](#)
4. [Insurance, behavior and reputation: What happens when aviation meets insurance](#)

---

# Contacts

For more information on any of the research above or other WRN projects, please get in touch with [our team](#) or visit our [website](#).

**[Geoffrey Saville](#), WRN Senior Research Manager**

For weather and climate related risks.

**[Rosa Sobradelo](#), WRN Senior Research Manager**

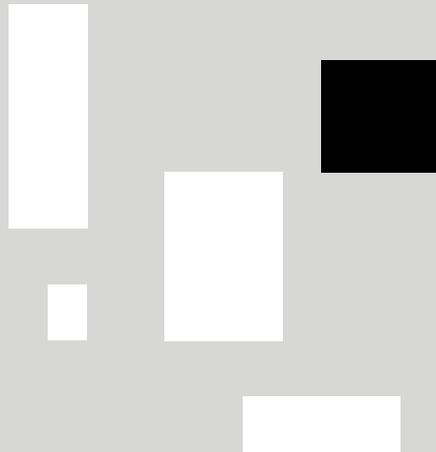
For seismic and volcanic risks.

**[Hélène Galy](#), WRN Director**

For emerging risks, general enquiries and getting involved.

**[Setareh Mayel Afshar](#), WRN Marketing Coordinator**

For general enquiries



## About Willis Towers Watson

Willis Towers Watson (NASDAQ: WLTW) is a leading global advisory, broking and solutions company that helps clients around the world turn risk into a path for growth. With roots dating to 1828, Willis Towers Watson has 45,000 employees serving more than 140 countries and markets. We design and deliver solutions that manage risk, optimise benefits, cultivate talent, and expand the power of capital to protect and strengthen institutions and individuals. Our unique perspective allows us to see the critical intersections between talent, assets and ideas – the dynamic formula that drives business performance. Together, we unlock potential. Learn more at [willistowerswatson.com](http://willistowerswatson.com).



[willistowerswatson.com/social-media](http://willistowerswatson.com/social-media)

Copyright © 2019 Willis Towers Watson. All rights reserved.  
WTW292100/0719

[willistowerswatson.com](http://willistowerswatson.com)

**Willis Towers Watson**