

SEPTEMBER 2025

NEWSLETTER

The Uninvited Guest on 5 August 2025 The IX Convection Permitting Climate Modeling Workshop Workshop Theme: Extreme Precipitation in Coastal Cities (5-7 August 2025)



Hong Kong's skies staged their own keynote when a record-breaking downpour hit on 5 August - right as HKUST opened an international conference on extreme rainfall. The first day was promptly washed out, shifted online under Black Rain signals. The irony wasn't lost on participants.

Organizers dubbed the storm "our star and self-invited participant." Scientists could have spliced fresh footage of flooded roads and stranded cars straight into their presentations! The Danish scientist Ole B. Christensen joked he was grateful for the chance to "see convective precipitation first-hand" and the Finnish colleague Laura Utraiainen added she'd never seen anything like it.

Behind the humour lay a serious point: Hong Kong is on the frontline of climate extremes. Dense populations, steep hillsides, and an intricate urban fabric make forecasting sudden cloudbursts a nightmare. Traditional climate models often miss these hyper-local

events, leaving what one speaker called "a blind spot" for planners and emergency services.

That's why new convection-permitting climate models are game-changers. By creating new models, HKUST scientists can better capture thunderstorms and torrential bursts, giving us tools to test how cities and infrastructure in the tropics and sub-tropics might cope in the decades ahead.

As HKUST's Professor Fei Chen reminded the audience: "Cities don't just experience weather, they shape it. Urban land use and heat contrasts feed back into rainfall patterns themselves."

Related Media Coverage: Bloomberg (11 August 2025) - [Star Guest at Hong Kong Rain Summit Highlights Threat to Cities](#)



The collage includes several news snippets:

- Hong Kong (frequent) rains record black rainstorm warning in 4 hours, citizens suspended** (from a social media post)
- Hong Kong reets from heaviest August rain since 1884** (from a news article)
- Hong Kong lashed with another torrential downpour** (from a news article)
- Torrential Rain Batters Hong Kong, Flooding the Waterlogged City** (from a news article)
- Hong Kong battles floods amid heaviest August rainfall since 1884** (from a news article)
- Downpours pound parts of Hong Kong as first black rainstorm signal of year issued** (from a news article)
- Bloomberg: Hong Kong Sets Rainfall Record Before Alert Downgraded** (from a news article)
- HK workers form an black rain warning issued after morning rush hour** (from a news article)

Professor Fei CHEN

Associate Head and Professor in HKUST's Division of Environment & Sustainability
Director, IAS Atmospheric Research Center



Prof. Fei Chen is one of the world's leading climate and urban-weather modelers, blending deep expertise in atmospheric dynamics, land-surface coupling, and city-scale processes.

Chen first studied in China and then earned his PhD in Atmospheric Sciences from Blaise Pascal University (France) in 1990 and spent over two decades at NCAR (USA) where he led research in hydrologic processes, land-atmosphere interactions, and complex earth system modeling. At NCAR

he eventually became Deputy Director of the Hydrometeorology Applications Program. Over time, his interests shifted increasingly toward urban climatology and fine-scale weather modelling in complex landscapes.

Since joining HKUST in 2024, Chen has spearheaded work on convection-permitting climate simulations, high-resolution downscaling, and the integration of models that combine physical processes with AI/data analytics. He has assumed leadership roles in multiple international efforts, most notably as co-chair of the World Meteorological Organization's (WMO) Urban Prediction Initiative under the World Weather Research Programme (WWRP). His projects aim to make dense cities more resilient by better predicting localized extreme events: from cloudbursts to urban heat stress and air quality spikes.

In 2025, Chen was honoured with the Luke Howard Award – the top accolade from the International Association for Urban Climate (IAUC). The award is given annually to recognize outstanding contributions in urban climatology, combining excellence in research, teaching, and service to the global community of urban climate scholars. IAUC praised his "exceptional leadership and impact in urban climate modelling" and noted his work in shaping climate-informed policy tools for vulnerable urban regions.

Beyond modelling, Chen is a vocal advocate for bridging the "last mile" gap: turning scientific projections into tangible decisions and policies. As he puts it: "I hope our work can make cities more liveable and resilient under future climate pressures."

Climate Science at ReThink

11 September 2025

At ReThink, Professors Jimmy Fung and Charles Ng painted a vivid picture of Hong Kong's climate future. Their central message: climate modelling matters. Traditional global climate models have low resolution, operating on coarse grids that are good for big-picture trends, but blind to the hyper-local extremes.

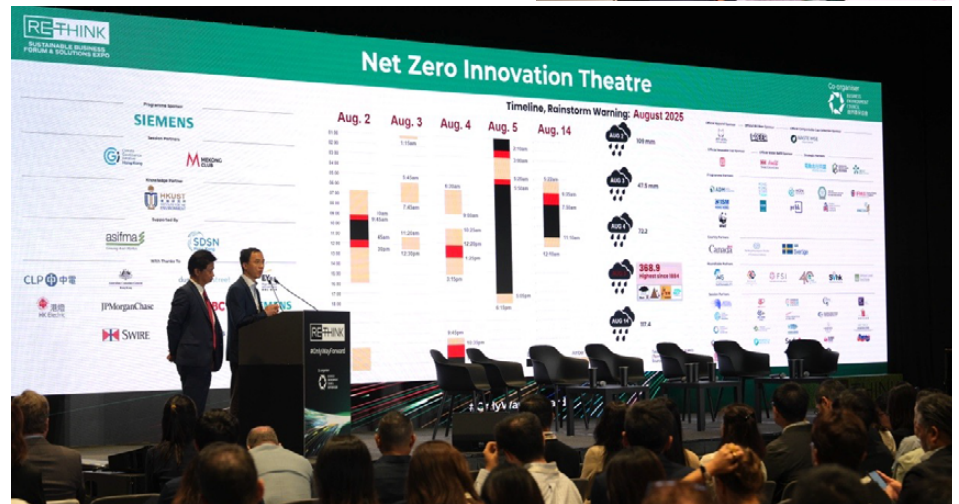
Using the August 2025 Black Rain as an example, they showed how extreme hourly rainfall records are already tumbling – 158 mm in 2023, with projections climbing to nearly 300 mm by the late 21st century. Such bursts can overwhelm drainage, destabilize slopes, and trigger deadly debris flows.

Their talk also highlighted:

- **Landslides & Debris Flows:** Recent tragedies in Mainland China and elsewhere show how fragile mountain slopes are under extreme rain.
- **Coastal Threats:** Low-lying areas, including in Hong Kong and the GBA – remain acutely vulnerable to storm surges.

- **Heat & Health:** Rising humidity and heatwaves could push outdoor work into dangerous territory, with "feels like" temperatures hitting lethal levels.

The takeaway? High-resolution, locally tailored climate models are essential, and AI can help, but only with careful training on quality data. As the speakers put it: *the goal is not just to predict the future, but to be ready for it and this is what scientists and engineers at HKUST are working towards.*



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Panel Spotlight

Climate-Science + Policy Crossover at ReThink

Right after Professors Jimmy Fung and Charles Ng wrapped their talks on fine-scale climate projections, Prof Christine Loh took the stage to steer a lively panel spanning science, policy, industry, and finance together with Fung and Ng.

Others on the panel:

Qing MA, Siemens Greater China (focusing on technology)

Bradley Mellicker, UN International Organization on Migration (focussing on climate change and displacement of people)

Debra Tan, CWR (focussing on sea level rise and threats to buildings, infrastructure and cities)

Ke WANG, OCBC (focussing on climate risks and banking)

What they talked about – in short:

Bridging model science to decisions: The panel explored how advanced, high-resolution climate models (like those Fung & Ng presented) can actually feed into real-world policy, finance, and infrastructure planning.

Barriers & gaps: They discussed what stands in the way, including from data access and model interpretability to institutional silos, regulatory inertia, and mismatches between scientific and business timescales.

Roles of different sectors: Each panellist brought a different lens – industry, tech, and policy – debating cross-sector collaboration.



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HKUST & Insurance Authority: Climate Risk Meets Finance

12 September 2025

On September 12, Hong Kong's Insurance Authority (IA) and the Hong Kong Federation of Insurers (HKFI) co-hosted an event *Bridging Finance and Future: The Insurance Industry as a Pillar of Climate Resilience for the insurance industry*. At the event, IA, HKFI, and HKUST announced a landmark collaboration on climate risk modelling.

Professor Alexis Lau noted the gaps in current insurance models which rely on coarse grids and miss the steep hills, dense cityscape, and land-sea dynamics that drive Hong Kong's weather extremes – much like what Professor

Jimmy Fung discussed at ReThink. Professor Lau also shared what the HKUST's modelling team under Professor Fei CHEN's team is doing – that by building high-resolution models that could capture these details, HKUST is turning science into tools that insurers can use for underwriting, claims, and new product design.

As Eric Hui of HKFI emphasized, extreme weather already causes billions of dollars in damages. Closing the modelling gap will help the insurance industry, and Hong Kong as a whole, build resilience and align with the city's sustainable finance ambitions.



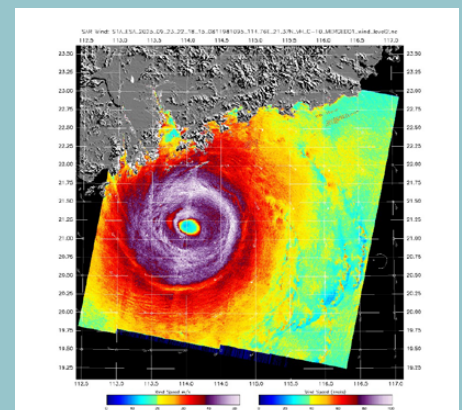
Hong Kong Faces Rising Storm Surge Threats: Lessons from Ragasa and New Climate Science

Supertyphoon Ragasa swept past Hong Kong on 23–24 September 2025, packing winds of up to 230 km/h near its centre and unleashing more than 300 mm of rain in just 24 hours. It was the most impactful storm to hit Hong Kong since Supertyphoon Mangkhut in 2018. Ragasa crossed the Luzon Strait without being affected by the neighboring terrain and became the second most intense storm ever observed in the South China Sea since records began in 1950. Satellite images showed two concentric eyewalls on the morning of 24 September, with Hong Kong affected by the periphery of the outer eyewall. Even so, the city recorded peak gusts of 186 km/h at Tate's Cairn. Some districts saw a month's worth of rain in a single day, and Victoria Harbour rose more than 1.5 metres above normal tide. Hundreds of flights were cancelled, schools closed for two days, more than a thousand reports of fallen trees were received, and some coastal facilities were damaged by severe overtopping waves amid the storm surge.

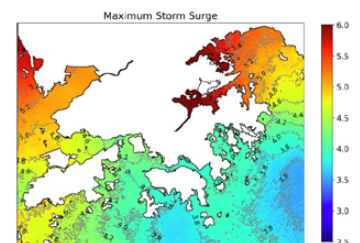
Ragasa serves as a stark reminder that extreme storms are not outliers anymore; they are part of the new normal. Had Ragasa edged closer or even made landfall over Hong Kong, the consequences could have been much more disastrous. This underlines the urgent need for the city to be prepared for such eventualities.

A recent scientific study led by Prof. Alexis Lau and his colleagues highlights the severity of future storm surge impacts in a warming climate. Using a very high-resolution, fully coupled atmosphere-wave-ocean model, researchers simulated worst-case storm surge scenarios by the 2040s. By recreating Typhoon Mangkhut (2018) under projected future conditions, including maximum atmospheric and oceanic warming and altered storm tracks, the study found that storm surges could exceed astronomical tides by approximately 4.0 metres in Victoria Harbour, 5.2 metres in Deep Bay, and 6.2 metres in Tolo Harbour. These levels are significantly higher than anything observed in Hong Kong's history and would pose an extraordinary threat to lives, property, and the city's economic backbone.

The message from both recent events and scientific projections is clear: the impact of storm surge in Hong Kong can be truly devastating, and the risks are rising. As climate change increases the likelihood of intense typhoons, the city must enhance monitoring, strengthen its infrastructure, and invest in robust disaster preparedness. Early warning systems, public education, and climate-adaptive planning must become priorities to reduce the socioeconomic impacts of future storm surges.



Synthetic Aperture Radar (SAR) winds from Sentinel satellite on the morning of 24 September, showing two concentric eyewalls of Ragasa. Hong Kong was only affected by the periphery of the outer eyewall.



Spatial distribution of projected maximum storm surge levels (m) above astronomical tide over Hong Kong waters in 2040.

Extreme weather is becoming the new normal in Hong Kong. The time to prepare for damaging storm surge is now, before the next Ragasa or Mangkhut hits closer to home.