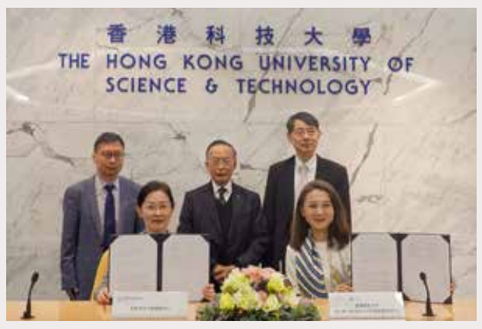
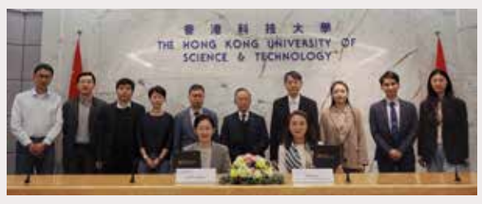
QUARTERLY REVIEW

Highlights

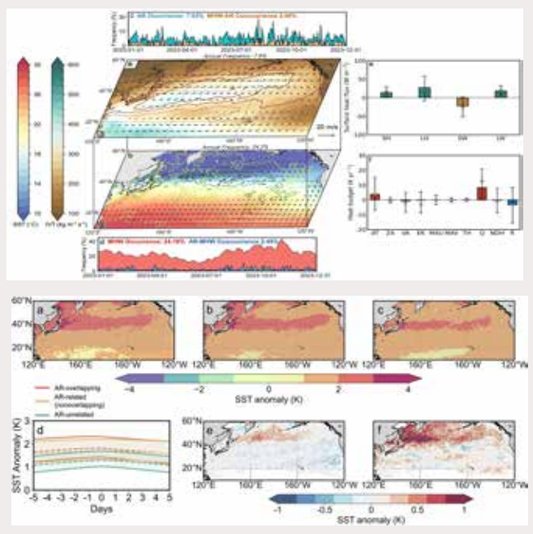
March

HKUST and the National Marine Environmental Forecasting Center Sign MOU





HKUST Study Reveals Coupling Between Atmospheric Rivers and Marine Heatwaves



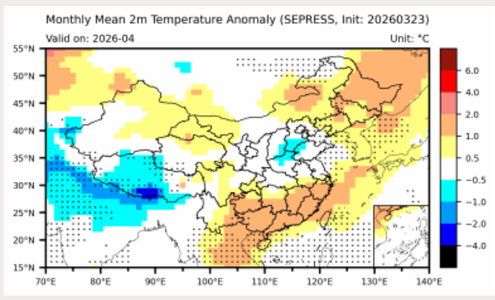
HKUST Launches IC-PSC to Advance Next-Gen Photovoltaics

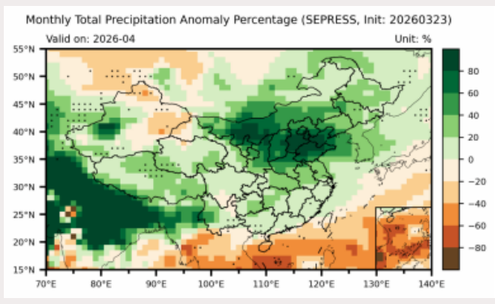
April

Director General FENG Lei of Shanghai Meteorological Service Leads Delegation to Visit HKUST

Academician XIA Jun and Team from Wuhan University Visit HKUST

SEPRESS Team Releases April 2026 Monthly Prediction and Outlook

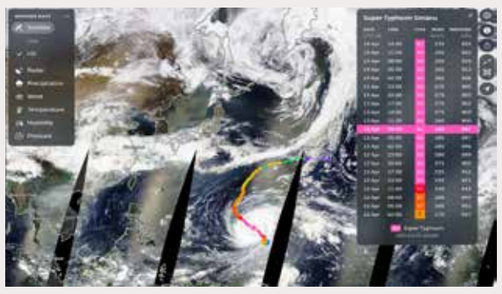


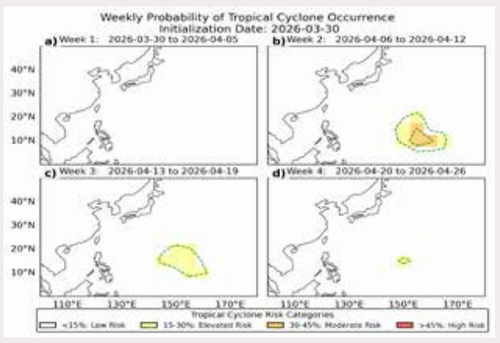


May

Climate, Weather and Water Forum 2026: Registration in Full Swing!

SEPRESS/HKUST V1 Captures Rare Super Typhoon Sinlaku Three Weeks in Advance





CIFI Chairman WU Hai Leads Delegation to Visit HKUST

Monthly Outlook

HKUST | CCRS | WSDI | DMS

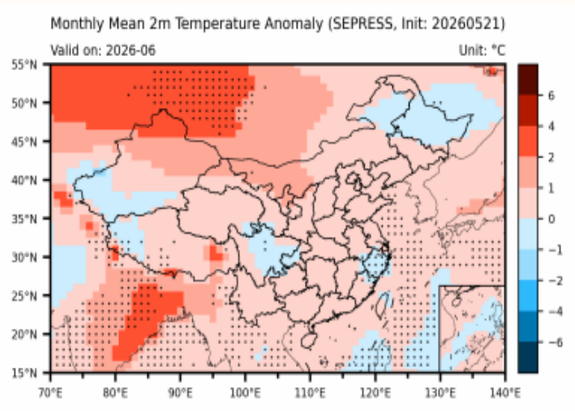
NEWSLETTER

SEPRESS Team Releases June 2026 Forecasts for Key Climatic variables and Assessment of Disaster Trends in China and Globally

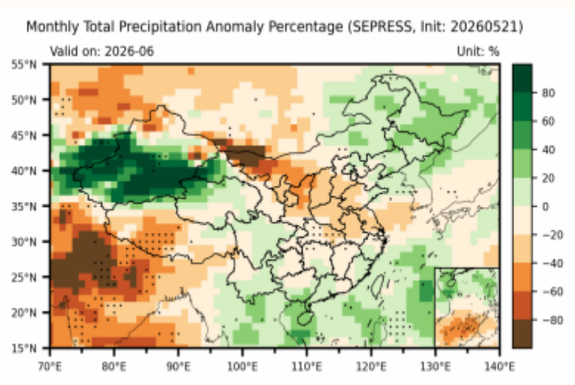
The SEPRESS team has released its latest monthly climate forecasts for June 2026, highlighting a complex pattern of regional climate anomalies across China and globally, with particular attention to the rapid development of an El Niño event and unusually active tropical cyclone activity over the western North Pacific.

Across China, surface temperatures in June are expected to follow an overall warm pattern with localized cooler areas. Precipitation will exhibit a "more in the northwest and northeast, less in the central and southwest" distribution, with most of Xinjiang potentially exceeding 80% above normal rainfall, while Tibet and parts of North China face deficits of 40–80%, posing a high meteorological drought risk. Forest and grassland fire danger is rated moderately high nationwide, with western Yunnan, southeastern Tibet, and northern Xinjiang categorized as high risk.

Globally, the equatorial central-eastern Pacific is forecast to continue warming, with Niño3.4 warm anomalies reaching 0.5–1°C, suggesting rapid development into a strong to super El Niño event this summer. Northwest Pacific tropical cyclone activity in June is expected to be exceptionally active, with approximately four tropical cyclones forming—double the historical average—and landfalls in China expected to increase by 9.2%. Cross-Pacific atmospheric rivers are forecast to exhibit a Type I+P+ pattern, shifting paths northward and potentially affecting northern China, Japan, and Alaska.



Predicted 2-Meter Temperature Anomaly in China and Surrounding Areas for June 2026.



Predicted Precipitation Anomaly Percentage in China and Surrounding Areas for June 2026.

For the full forecast and figures, please visit: https://wsdi.hkust.edu.hk/SEPRESS/Monthly_Outlook/

Op-Ed: Unprecedented May Rainfall in Southern China Linked to Abnormal Atmospheric Rivers

By Prof. Mengqian LU
Director, World Sustainable Development Institute, Otto Poon Center for Climate Resilience and Sustainability, The Hong Kong University of Science and Technology

China's average precipitation in May hit a ten-year high, with widespread unseasonable extreme rainfall across Southern China. Normally, only Southeast China receives Longzhou rainfall, rather than heavy rain covering the entire southern region extending to the Yangtze River basin, where plum rains typically prevail later in the season.

Sustained extreme rainfall depends on stable and abundant moisture supply transported to rainy zones. Our analysis of May atmospheric river activity identifies anomalous atmospheric river activity across the whole of Southern China, which transports massive moisture from the South China Sea and Bay of Bengal.

We assessed May atmospheric river frequency anomalies against a four-decade baseline, with mapping illustrating the unusual moisture transport pattern over southern China this May.

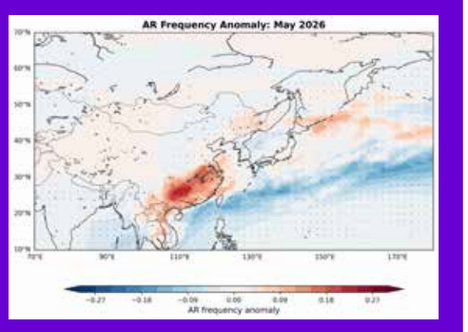


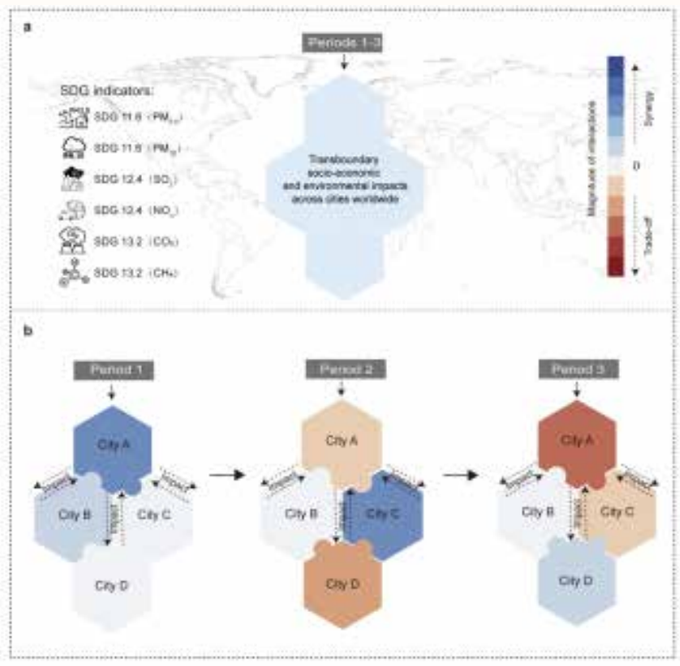
Figure contributed by Yurong SONG

What is an Atmospheric River?

Atmospheric rivers are narrow bands of intense moisture transport in the lower troposphere, with most moisture transported below 3,000 metres. They carry warm, moist air from low latitudes to higher latitudes, transporting both water and heat. Heat comes from warm air masses and latent heat released during precipitation.

Nature Communications Reveals Spatiotemporal Linkage Mechanisms of Emission-Related SDGs Among Global Cities

Does a city's emission reduction really only affect itself? A new study published in ***Nature Communications*** says no. Research teams from HKUST, Hong Kong Baptist University, HKU, PolyU, Michigan State University, Pusan National University, and Monash University systematically assessed inter-city interactions of emission-related SDG indicators across 4,116 cities worldwide from 2010 to 2020.



Research Framework

The study found that 93.51% of cities are significantly influenced by other cities' emission performance. When surrounding cities' SDG indicators for particulate matter (SDG 11.6), gaseous pollutants (SDG 12.4), and greenhouse gases (SDG 13.2) improve by 10%, the focal city's corresponding performance improves on average by 0.450%, 0.385%, and 0.200%, respectively. Cities exhibiting synergistic effects outnumber those with trade-off effects by approximately two to one.

Temporally, about 75.66% of inter-city influence intensities declined over the study period, suggesting cities are strengthening self-regulatory capacity. Less developed cities remain more susceptible to cross-city influences due to deeper embedding in regional production networks.

Through five scenario simulations, the study demonstrates that inter-city collaborative cooperation can improve overall SDG performance by 10.81% compared to independent governance. The findings underscore that emission governance is no longer a local affair but requires cross-regional coordinated advancement.

This research contributes to the UNESCO IDSSD (2024–2033) and the **SEPRESS Program** (2025–2032). All HKUST co-authors acknowledge support from the **Otto Poon Center for Climate Resilience and Sustainability**.

Otto Poon Lecture Series 2026 – "Taming the Storm: Can We Predict, Engineer, and Reduce Losses from Climate and Weather Extremes?"


Otto Poon Lecture Series 2026:

Taming the Storm: Can We Predict, Engineer, and Reduce Losses from Climate and Weather Extremes?

Prof. Upmanu Lall

Abstract

Climate and weather extremes — storms, heat waves, floods, droughts, and compound events — have become the defining natural hazard challenge of the 21st century. Their growing frequency and intensity are overwhelming engineered infrastructure, disrupting global supply chains, and propagating risks across societies through teleconnections that no single country can insulate itself against. While climate change mitigation through decarbonization remains an urgent priority, even optimistic emissions trajectories leave us facing decades of increasing exposure. Climate adaptation efforts — improved infrastructure design, financial instruments, early warning systems — are essential but are constrained by limited data, deep uncertainty in future projections, and the diffuse question of who bears responsibility for action.

This talk argues that a third pillar is emerging and demands serious scientific and institutional attention: Climate Stabilization, or the deliberate modification of developing weather and climate extremes to reduce their societal impact. Rather than waiting for disasters to unfold and recovering afterward, this paradigm asks whether the physical dynamics of the atmosphere offer leverage points — windows in time and space — where strategically placed, small perturbations could redirect the trajectory of an extreme event. This is the core idea of Weather Jiu-Jitsu: exploiting the inherent instabilities and nonlinear sensitivities of atmospheric circulation to achieve large-scale redirection of an extreme using energy borrowed from the circulation itself, not brute-force external forcing. Related efforts, such as Japan's Moonshot Goal 8 program, are exploring similar scientific and technological frontiers.

In the context of CWWF's themes of seamless prediction, physical modeling, and AI for Earth science, I will sketch a research roadmap integrating chaos-informed perturbation theory to AI enabled adaptive control optimization that builds on AI-accelerated impact forecasting to provide the foundation for Climate Stabilization as a rigorous scientific enterprise and, within a decade, a viable business with measurable returns to investors and societies alike.

Lecturer Biography

Upmanu Lall is the director of the Water Institute at the Julie Ann Wrigley Global Futures Laboratory at Arizona State University. He is also a professor in the School of Complex Adaptive Systems within the College of Global Futures. Prior to joining ASU in January 2024, Lall was the Alan and Carol Silberstein Professor of Engineering at Columbia University and served as Director of the Columbia Water Center. He developed and led a Global Water Sustainability Initiative, a Global Flood Initiative, and the America's Water Initiative. In addition to contributing to hydrology, climate dynamics, statistics and machine learning, and risk/insurance analysis, he has worked with colleagues, development banks, governments and the private sector to implement financial, technical and policy solutions for water and climate challenges from village to country scale on all major continents. He was named an American Geophysical Union Fellow in 2017 and their Walter Langbein Lecturer in 2022. He was elected a fellow of the American Association for the Advancement of Science in 2018, and has received the Arid Lands Hydrology and the Ven Te Chow Awards from the American Society of Civil Engineers. He received the Henry Darcy Medal from the European Geophysical Union. In April 2021, he and two of his former students (Professors Balaji Rajagopalan, University of Colorado, Boulder; and Ashish Sharma, University of New South Wales, Australia) were named to the "Hot List of the world's 1,000 top climate scientists" by Reuters.

Otto Poon Lecture Series Poster

On the morning of July 9 (Thursday), Day 3 of the 6th Climate, Weather and Water Forum (CWWF 2026) at Lecture Theater C, HKUST, the Otto Poon Lecture Series 2026 will take center stage, featuring Prof. Upmanu Lall, Director of the Water Institute at Arizona State University's Julie Ann Wrigley Global Futures Laboratory.

Prof. Lall will introduce a provocative "third pillar" of climate action beyond mitigation and adaptation: Climate Stabilization—the deliberate modification of weather and climate extremes to reduce societal impact. Drawing on the concept of "Weather Jiu-Jitsu," he will explore how strategically placed, small perturbations could exploit atmospheric instabilities to redirect extreme events, borrowing energy from the circulation itself rather than relying on brute-force external forcing.

The lecture will address foundational questions: What physical mechanisms enable atmospheric steering? How can AI and adjoint methods identify intervention points? And how should ethical and governance frameworks evolve as this moves toward operational deployment?

Prof. Lall will outline a research roadmap integrating chaos-informed perturbation theory with AI-enabled adaptive control optimization, envisioning Climate Stabilization as both a rigorous scientific enterprise and a commercially viable endeavor within a decade.

Prof. Lall is an AGU Fellow, AAAS Fellow, and Henry Darcy Medal recipient, named among Reuters' world top 1,000 climate scientists in 2021.