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NEWSLETTER

BREAKING: HKUST Becomes a Founding Member of the Chinese University Alliance of Earth System Science (CUAESS) with Tsinghua University, Nanjing University, and Tianjin University

HKUST has joined hands with Tsinghua University, Nanjing University, and Tianjin University to establish the **Chinese University Alliance of Earth System Science (CUAESS)**, officially inaugurated on December 8, 2025, at Tsinghua University. The Alliance emerged from years of collaboration among key partners, including **Prof. LU Mengqian**, Director of HKUST's Otto Poon Center for Climate Resilience and Sustainability (CCRS), who played a pivotal role in its formation and will lead its **Global Collaboration and Engagement**. The initiative builds upon HKUST's internationally recognized leadership in climate research, including its contribution to the **UNESCO-endorsed SEPRESS program** under the International Decade of Sciences for Sustainable Development.

Representatives of the four founding universities sign the CUAESS cooperation agreement.

During the inauguration ceremony, founding CUAESS President **Prof. CHEN Deliang** of Tsinghua University outlined the Alliance's mission as a national and international platform to advance Earth System Science and foster impactful scientific cooperation. He emphasized that CUAESS aims to integrate multi-source data, innovative modeling, and complex-system approaches to address the pressing challenges arising from coupled natural–human processes.

In the panel discussion on the role and responsibilities of CUAESS—chaired by **Prof. DING Aijun** of Nanjing University—**Academician LIU Congqiang**, Dean of the School of Earth System Science at Tianjin University, emphasized that the Alliance marks an important step toward a new paradigm for harmonizing the human–Earth relationship and strengthening interdisciplinary collaboration. **Academician GUO Yike**, Provost of HKUST, highlighted the growing transformative role of artificial intelligence in advancing Earth System Science. **Academician CHEN Deliang** noted that the Alliance should uphold strong interdisciplinary integration and leverage advances in observation and modeling to support sustainable development. **Academician FU Congbin** underscored that CUAESS must evolve into an innovation community that drives new scientific paradigms, talent development, and actionable solutions for sustainability.

Left: Panel discussion on the role and responsibilities of CUAESS. Right: Prof. LU Mengqian chairs the panel on opportunities and challenges for the future development of Earth System Science.

In the subsequent roundtable on future opportunities and challenges for Earth System Science—chaired by **Prof. LU Mengqian**, joined by **Academicians QIN Dahe**, **GUO Huadong**, **FU Bojie**, **XIA Jun**, **ZHANG Xiaoye**, and **HUANG Jianping**—experts collectively concluded that China holds significant research strengths in the cryosphere, digital Earth technologies will continue to empower scientific breakthroughs, and the water cycle remains a vital link across Earth's interconnected spheres. They emphasized the importance of attracting young talent to the Alliance and identified key priorities for overcoming current bottlenecks, including advancing observational technologies, enhancing the integration of AI and high-performance computing, and strengthening interdisciplinary collaboration.

Prof. Lu Mengqian stated that CCRS is exploring interdisciplinary integration across fields such as finance, humanities, atmospheric science, and hydrology. The goal is to establish a comprehensive research framework that connects Earth system science with social and economic systems.

During the exchange session, experts and scholars from Peking University, Fudan University, Zhejiang University, and Beijing Normal University discussed the role of universities in advancing Earth system science and provided valuable insights for the future development of the Alliance.

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A UN Ocean Decade-Endorsed Action Advances Global Research with Landmark Workshops in Latin America and Africa

The Hong Kong University of Science and Technology (HKUST) and the Guangdong Laboratory (Guangzhou) (GML), together with over 200 experts worldwide, have launched the Global Climate Impact of Methane Seeps (ClimETS) Initiative. Endorsed as a UN Ocean Decade Action, ClimETS aims to map global methane seeps and quantify their climate impacts. The initiative also seeks to connect regional research efforts that were previously fragmented, creating a more coordinated framework for studying seafloor methane release and its potential climate implications.

Prof. QIAN Peiyuan, Chair Professor of the Department of Ocean Science at HKUST, Deputy Director of GML and CCRS member, leads ClimETS as Program Director and Management Committee Chair. He emphasized the initiative's goal of promoting knowledge exchange, particularly in Global South regions where research resources are limited. Leveraging advanced facilities—including China's deep-sea research vessel Shen Hai Yi Hao—ClimETS will support international cooperation in methane seep exploration.

A group photo of Prof. QIAN Peiyuan (middle, in black suit), Chair Professor of the Department of Ocean Science at HKUST and the participants of the CliMetS-Central and South America Workshop.

A group photo of Prof. QIAN Peiyuan (second row, fifth right) and the participants of the CliMetS-Africa Workshop.

Recent milestone workshops held in South America and Africa brought together 217 scientists from 138 institutions across 53 countries, including many new early-career participants. These workshops co-developed research priorities, capacity-building plans, and a unified global agenda for methane seep research.

With strong foundations established, ClimETS plans to expand its global network, integrate regional findings, and advance large-scale expeditions. A real-time global methane seep observatory network is also under discussion to support climate-relevant scientific data and international mitigation efforts. As the initiative grows, it is expected to further enhance global collaboration, strengthen scientific capacity in underserved regions, and provide timely insights for policy development and climate risk management.

The World's First Deep-Sea Multi-Omics Resource Platform Officially Launched, Facilitating Research on Biological Adaptation in Extreme Environments

A research team from the Department of Ocean Science and CCRS at HKUST, together with the Southern Marine Science and Engineering Guangdong Laboratory (Guangzhou), has published a paper in Nucleic Acids Research announcing the world's first and largest multi-omics database for deep-sea organisms. Co-corresponded by **CCRS members, Professors QIAN Pei-yuan and WU Longjun**, with **Dr. SHE Jijie as first author**, the DOO platform integrates multi-omics datasets and analytical tools to advance research on deep-sea biology and adaptation in extreme environments.

Prof. QIAN Peiyuan

Prof. WU Longjun

The deep ocean—Earth's largest yet least explored ecosystem—hosts exceptional biodiversity shaped by extreme pressure, cold, and nutrient limitation. While recent technological progress has revealed important genetic and metabolic adaptations, the lack of unified datasets has been a major barrier to broader scientific use. To fill this gap, the team compiled multi-omics data from 68 deep-sea species, covering 72 genomes, 950 transcriptomes, 1,112 metagenomes, and 15 single-cell transcriptomes across 7 phyla and diverse habitats such as vents, seamounts, and cold seeps. The platform also incorporates fossil records and multiple analysis modules supporting gene-level, evolutionary, and comparative studies, with integrated visualization through a customized browser.

Since its launch, DOO has attracted over 9,000 visitors from 28 countries, rapidly becoming a key global resource for deep-sea research.

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SEPRESS Team Participates in the WWRP Scientific Steering Committee Meeting and Shares Latest Advances in Seamless Prediction

Members of the SEPRESS team attended the Scientific Steering Committee (SSC) meeting of the World Weather Research Programme (WWRP) on 18 November 2025. This marked the team's first participation in the SSC meeting since SEPRESS was officially recognized by the World Meteorological Organization (WMO) as a WWRP-endorsed project. During the meeting, **Prof. LU Mengqian, Prof. BAO Qing, and Prof. JIA Xiaojing** each reported on recent progress in their respective project components and delivered thematic presentations.

Prof. LU Mengqian delivered a keynote presentation titled "Seamless Prediction and Services for Sustainable Natural and Built Environment (SEPRESS)" at the WWRP SSC meeting.

The meeting further strengthened SEPRESS's collaborative ties with WWRP. Leveraging WWRP's international cooperation platform, the project will continue to deepen exchanges with partner institutions in research networks and seamless prediction technologies. In particular, collaboration with the Societal and Economic Research Applications (SERA) Working Group will focus on enhancing interdisciplinary innovation and promoting the effective translation and application of seamless prediction methodologies and research outcomes. Looking ahead, SEPRESS will continue advancing the value of meteorological and climate science in disaster risk reduction, socio-economic development, and sustainable development, providing forward-looking and practice-oriented scientific support.

HKUST Researchers Develop High-Voltage Quasi-Solid Electrolyte for Safe Lithium Metal Batteries

Dr. DAI Chen

Prof. SHAO Minhua

Achieving high-energy and safe lithium metal batteries requires electrolytes with both high ionic conductivity and strong oxidation stability. In this work, DAI Chen from the group of **CCRS member Prof. SHAO Minhua** developed a quasi-solid electrolyte (QSE) via in situ polymerization of butyl acrylate in an adiponitrile (ADN) electrolyte. The resulting polybutyl acrylate (PBA) framework induces a solvation-competing effect that expels ADN from the Li^+ solvation sheath, effectively suppressing parasitic reactions at the Li anode. The QSE achieves a high lithium-ion transference number of 0.87, reduced concentration polarization, and stable interfaces on both the Li metal and high-voltage cathodes. As a result, $LiCoO_2$||Li cells cycle 1000 times at 4.45 V with 78% capacity retention, while a 250 Wh kg^{-1} pouch cell with ultrathin Li maintains around 80% after 200 cycles. This work demonstrates a practical and safe pathway for next-generation high-voltage QSE-based lithium metal batteries.

Prof. Christine Loh: City Must Step Up to Lead in Trade, Green Economy

As part of the **Otto Poon-supported project** on ecological civilization and its relevance to Hong Kong, a series of Op-Eds will introduce the concept to the public. Subsequent articles will explore how Hong Kong can contribute meaningfully to China's sustainability-led modernization.

Prof. Christine Loh

The first Op-Ed, City must step up to lead in trade, green economy, published in China Daily on 20 November 2025, examines Hong Kong's evolving role as China's international financial, trade, and shipping hub. The city must modernize its strengths to remain globally relevant amid shifting trade patterns, geopolitical tensions, and the rise of a climate-driven economy.

The article emphasizes that Hong Kong's future depends on integrating finance, technology, and sustainability, positioning itself as a trusted bridge between China and global markets. Its themes align with principles of decarbonization, biodiversity protection, resource efficiency, and resilience through green and blue development. By advancing leadership in green finance, carbon markets, clean shipping, sustainable aviation, and climate-aligned infrastructure, Hong Kong can support China's ecological civilization goals while enhancing its own competitiveness. Mobilizing financial markets, maritime expertise, and research institutions will be key to translating national strategy into local opportunity.