# CHINA

## Nation shares early warning weather system with world

By **ZHOU WENTING**
*zhouwenting@chinadaily.com.cn*

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The China Meteorological Administration launched an AI-powered integrated meteorological system to provide early warnings for all at the opening ceremony of the 2025 World Artificial Intelligence Conference in Shanghai on Saturday. The aim of the system is to address global climate challenges and share China's expertise and technological achievements with the world, especially developing countries.

In the presence of Celeste Saulo, secretary-general of the World Meteorological Organization, head of the China Meteorological Administration Chen Zhenlin donated MAZU-Urban, a multi-hazard early warning intelligent system for urban settings, to representatives from Djibouti and Mongolia during the ceremony. This will enable the system — which integrates advanced algorithms and multisource data to enhance early warning practices and disaster mitigation efforts globally — to be used internationally for the first time.

"Ensuring universal access to meteorological early warning systems is not only a shared vision of the global community, but is also an important mission of China's meteorological departments," Chen said.

MAZU's mission includes providing early warning technical support, enhancing capacity building, strengthening risk identification and assessment systems, and developing cooperation mechanisms and models, the CMA said.

Named after the ancient Chinese goddess of the sea, MAZU embodies a spirit of protection and preparedness, according to the CMA, with the acronym standing for multihazard, alert, zero-gap and universal.

MAZU-Urban is the first globally shared product developed and promoted by the Shanghai Meteorological Service in collaboration with other institutions, including the National Meteorological Center and the Shanghai Academy of AI for Science.

Core technologies of the intelligent system include flexible multi-hazard monitoring tools and forecasting analytical applications in monitoring and early warning. The smart system can also generate disaster bulletins during the warning release phase automatically, and use AI-empowered large language models to generate role-based, disaster-specific defense guidelines and emergency plans while supporting Q&A with users to enhance response efficiency.

The system also integrates a three-tiered structure, catering to meteorological and emergency management departments, industry-specific users and the general public. It offers real-time disaster monitoring, personalized risk assessments and localized emergency response guidance.

The intelligent system has been used on a trial basis in 35 countries and regions across Asia, Africa and Oceania since January, receiving widespread acclaim, the CMA said.

In recent years, the administration has jointly developed cloud-based early warning systems with the meteorological departments of Pakistan, Ethiopia and the Solomon Islands, among others.

"The Ethiopian Meteorological Institute and the CMA have carried out fruitful cooperation," said Fetene Teshome, director of the Ethiopian Meteorological Institute. "Through the joint development of early warning systems, we have enhanced the capabilities in disaster prevention and mitigation, which have served socioeconomic development."

Through international training courses, scholarship programs and visiting scholar programs, the CMA has also collaborated with its counterparts in other countries to facilitate cross-border experience sharing and technological innovation, and to help developing countries cultivate local talent. The CMA has also shared China's practices in disaster risk survey and assessment, and has supported other countries in establishing a scientific basis for making decisions regarding risks.

"I hope we can continue to deepen cooperation in supporting such initiatives to accelerate global actions for early warnings for all," said David Hiba, director-general of the Solomon Islands Meteorological Services.

## Showing off skills

Young dancers compete at a national youth street dance club competition in Haizhu district in Guangzhou, Guangdong province, on Sunday. Participants from Guangzhou, Shenzhen and other areas of the Guangdong-Hong Kong-Macao region showcased their street dance skills at the competition. CHEN CHUHONG / CHINA NEWS SERVICE

## AI meet and greet

Visitors interact with robots at a store dedicated to embodied artificial intelligence robots in Shenzhen, Guangdong province, on Monday. ZHANG ZIXIAN / XINHUA

# Smart farming tools set to help slash grain losses nationwide

### Better training and machinery help farmers harvest more with less waste

By **ZHAO YIMENG**
*zhaoyimeng@chinadaily.com.cn*

China has intensified efforts to build a nationwide food loss reduction system that covers production, storage, distribution and consumption, officials said at a recent conference in Shandong province.

The Ministry of Agriculture and Rural Affairs has rolled out targeted strategies along the agricultural supply chain — from field to table — with a focus on improving farm management, disaster prevention, storage and transportation, Vice-Minister Zhang Zhili said.

In 2024, mechanical harvest loss rates for wheat stood at 0.93 percent, rice at 1.76 percent and corn at 2.06 percent — a drop of 1 to 2 percentage points compared with 2021, Zhang said at the 2025 International Conference on Reducing Food Loss and Waste.

More than 25 billion kilograms of grain loss have been prevented in the past three years. Losses due to pests and diseases were kept below 5 percent, and losses in grain and oil processing were reduced to under 1 percent, Zhang added.

At a forum on mechanized loss reduction, Ma Jianhai, head of an agricultural machinery cooperative in Weifang, Shandong, shared how his team improved yields through better equipment and training.

"By improving the skills of machine operators and optimizing agricultural equipment, the cooperative's wheat yield increased from 6 metric tons per hectare to 9 tons, and its corn yield rose from 7.5 tons to 9.7 tons per hectare since it was founded in 2013," Ma said.

Shandong, a major agricultural province and the cradle of traditional Chinese farming, plays a key role in national food production, said Lin Wu, the province's Party secretary.

In recent years, Shandong has accelerated the development of a food-saving system to safeguard food security, Lin said. He highlighted the province's push to promote grain loss reduction technologies.

During the conference, participants visited a digital agriculture demonstration base in Jinan, where an AI-powered platform supports field management. The system enables early warnings and smarter decision-making, helping reduce annual corn losses by 5 percent, according to Chen Xufeng, a representative of the platform's developer.

A South-South cooperation action plan on reducing grain loss was also released during the conference, outlining joint efforts over the next three years in key areas such as digital technology and knowledge sharing.

Li Xiangdong, president of the Shandong Academy of Agricultural Sciences, said he hopes to actively take part in cooperative projects related to grain loss reduction.

"By identifying priority partner countries and carrying out targeted initiatives, we aim to contribute more Chinese solutions to the realization of the 2030 Agenda for Sustainable Development," Li said.

## Team develops machine to produce bricks on moon

A Chinese research team has developed a "lunar brick-making machine" that can produce bricks from moon soil, bringing the sci-fi vision of "building houses on the moon with local materials" closer to reality.

The in-situ lunar soil 3D printing system, developed by the Deep Space Exploration Laboratory based in Hefei, Anhui province, uses concentrated solar energy to melt and mold lunar soil, the Science and Technology Daily reported on Monday.

According to Yang Honglun, a senior engineer at DSEL, the lunar brick-making machine uses a parabolic reflector to concentrate solar energy. The concentrated energy is then transmitted through a fiber optic bundle.

At the end of this bundle, the solar concentration ratio can exceed 3,000 times the normal intensity. A high-precision optical system then focuses this concentrated sunlight onto a small point, heating it beyond 1,300 C to melt lunar soil.

The bricks produced by the machine are made entirely from in-situ lunar soil resources without any additional additives. Moreover, these lunar soil bricks exhibit high strength and density, making them suitable not only for constructing buildings but also for infrastructure needs such as equipment platforms and road surfaces.

From conceptual design to prototype development, the research team spent about two years to figure out how to overcome multiple technical challenges in the future, such as efficient energy transmission and lunar soil transport.

For example, the mineral composition of lunar soil varies significantly across different regions of the moon. To ensure the machine can adapt to various types of lunar soil, researchers developed multiple simulated lunar soil samples and conducted extensive testing on the machine before finalizing its design.

"Although the lunar brick-making machine has achieved breakthroughs, constructing habitable structures on the moon still requires overcoming other technological barriers," Yang said.

He explained that under the moon's extreme conditions, such as high vacuum and low gravity, lunar soil bricks alone cannot support habitat construction.

"The bricks will primarily serve as protective surface layers for habitats. They must be integrated with rigid structural modules and inflatable soft-shell modules to complete the construction of a lunar base," he added.

He mentioned a series of technological developments, including lunar brick manufacturing, architectural component assembly and the evaluation of building structure, along with operational validation of both the brick-making machine and construction processes under actual lunar surface conditions.

The habitat modules are designed to withstand the air pressure necessary for human occupancy and are also equipped to integrate with the lunar brick-making machine and surface construction robots, creating a complete building system, he added.

China initiated the International Lunar Research Station, a scientific experimental facility consisting of sections on the lunar surface and in lunar orbit. It is projected to be built in two phases: a basic model to be built by 2035 in the lunar south pole region, and an extended model to be built in the 2040s.

As of April this year, 17 countries and international organizations, as well as more than 50 international research institutions, have joined the ILRS.

Chinese scientists have made simulated lunar soil bricks and sent them to China's space station via the Tianzhou 8 cargo spacecraft that was launched in November 2024. Astronauts aboard the space station are set to conduct space exposure experiments on the bricks to evaluate their mechanical properties, thermal performance and radiation resistance to acquire critical data for future lunar construction.

XINHUA

## Study outlines path to preserve country's arable land

By **LI MENGHAN**
*limenghan@chinadaily.com.cn*

A recent study published in the journal Science proposes a sustainable path for agriculture by harnessing nature-based plant-soil feedback principles in a bid to preserve soil quality.

This approach, which emphasizes the intricate interactions between plants and the abiotic and biotic properties of soils, aims to significantly reduce reliance on chemical inputs while boosting crop yields.

"The key to high-quality sustainable agriculture lies in soil quality," said Zhang Fusuo, an academician of the Chinese Academy of Engineering and a corresponding author of the study. He highlighted the urgent need for such solutions, noting that nearly 70 percent of China's arable land — 92.7 million hectares — is considered low to medium-yield, severely limiting agricultural output. Unhealthy soil can lead to an estimated annual loss of 1.5 tons of yield per hectare.

The study, first-authored by Wang Guangzhou, an associate professor at China Agricultural University, underscores how intensive agriculture, with its singular focus on production, has inadvertently damaged soil health, leading to salinization, acidification, structural barriers and infertility. Wang stressed the critical role of microorganisms in fostering plant growth, enhancing soil quality, and optimizing positive plant-soil feedback.

"At the individual plant level, we propose measures such as enhancing the release of root exudates, which act as chemical signals to beneficial microbes," Wang said.

Root-associated microbes help plants absorb nutrients and fend off pathogens. The researchers recommend tailoring microbial engineering technologies and developing synthetic microbial communities to optimize these interactions. Properly applied, such microbes could serve as eco-friendly alternatives to pesticides and fertilizers, Wang said.

He also warned against the long-term damage of monoculture. In one case in April, farmers in Hebei province reported a severe outbreak of bean root rot disease after 15 years of continuous monocropping, with roots turning from white to black. Wang recommended traditional practices such as crop rotation, intercropping, cover cropping and organic fertilization to counteract the buildup of host-specific pathogens and restore positive plant-soil feedback.

Real-world application of the study's principles has already yielded results. In Long'an county in the Guangxi Zhuang autonomous region, banana yields increased by 18 percent after farmers adopted soil feedback-based techniques, Zhang said.

The findings also hold potential for addressing major soil degradation issues in Northeast China's black soil region, which is under strain from intensive farming and erosion. By restoring balance between positive and negative plant-soil interactions, the researchers hope to revitalize fertility and promote climate resilience.

"Soil health is a fundamental, long-term and systematic endeavor," said Wang Hongye, an official with the Ministry of Agriculture and Rural Affairs. He added that the study offers both theoretical support and practical tools for improving the ecological function of farmland soils.