

Human-Centered Weather Forecasts Initiative

Weather forecasts should be accurate as well as tailored to the specific human needs on the ground, and then delivered at the right time and place to inform decisions. The Human-Centered Weather Forecasts Initiative embodies this concept, using the latest innovations in artificial intelligence (AI) to expand access to weather forecasts in low- and middle-income countries—putting people at the center of a revolution in weather forecasting.

THE CHALLENGE

Low- and middle-income countries have historically not had access to the type of accurate, real-time forecasting available in other parts of the world. As climate change makes the weather more unpredictable, this information is needed more than ever. At the same time, a revolution in weather forecasting, largely driven by AI, has found ways to generate high-quality forecasts at a fraction of the cost and time, and has even opened the door to tailoring forecasts for specific users.



OUR APPROACH

The Human-Centered Weather Forecasts (HCWF) Initiative leverages the power of artificial intelligence to evaluate and build weather forecasts that can target what people on the ground need to know. The team of climate scientists, AI experts and economists then work with low- and middle-income countries to disseminate forecasts, test dissemination strategies, refine based on user feedback, and scale them up. In doing so, the Initiative provides communities with an essential tool for climate adaptation.

“Weather forecasts optimized for people’s specific needs have an incredible return on investment. The Human-Centered Weather Forecasts Initiative works with partners around the world to bring weather forecasting services to hundreds of millions of people.”

— Michael Kremer,
University Professor in Economics



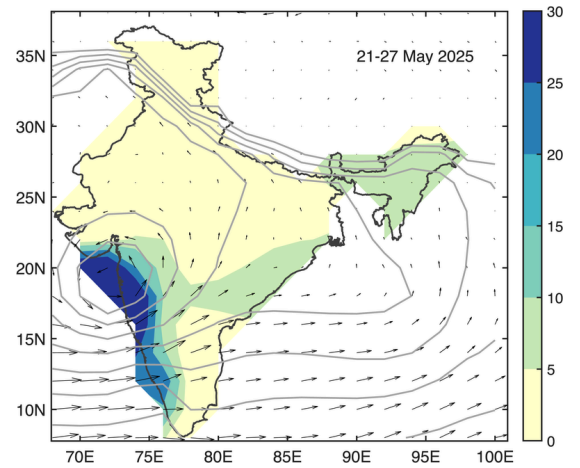
UChicago’s Amir Jina meets with Bill Gates, Hosni Ghedira (MBZUAI), and Mariam Almheiri (UAE Minister of Climate Change and Environment) in Abu Dhabi.

TRAINING GOVERNMENTS ON AI WEATHER FORECASTS

HCWF and the Mohamed bin Zayed University of Artificial Intelligence (MBZUAI) are working to ensure that governments in low- and middle-income countries can adopt advances in AI weather forecasting early and build world class national weather services. The team is providing training to national meteorological and hydrological services staff and ministries of agriculture on how to use AI weather forecasting models that are tailored to their specific needs. The training combines technical expertise with hands-on capacity building, giving national meteorological teams the tools and autonomy to generate and deliver these tailored forecasts. The first training cohort included meteorologists from Bangladesh, Chile, Ethiopia, Kenya, and Nigeria. In total, the program plans to train meteorologists and agricultural practitioners from 30 countries by 2027.

FORECASTS FOR FARMERS

Hundreds of millions of smallholder farmers across the tropics depend on information about when the rainy season, known as the monsoon, will come each year. This advanced knowledge allows farmers to make more informed decisions about when to plant seeds, irrigate, and hire labor. However, accurate forecasting of when the monsoon will begin, especially at long lead times and at local scales, has remained a century-old challenge. AI has revolutionized global weather forecasting, promising new tools for predicting phenomena as complex as the monsoon. Researchers at HCF led an international, multidisciplinary collaboration to harness advances in AI to better predict the beginning of the monsoon in India. The Indian Ministry of Agriculture and Farmers' Welfare distributed this forecast, which accurately predicted an unusual monsoon season, to 38 million Indian farmers. The project in India offers a compelling blueprint for the future. The team is working with AIM for Scale, a global initiative backed by the Gates Foundation and the United Arab Emirates, to scale similar programs in other low- and middle-income countries.



An AI forecast produced by the HCF team predicts early onset of the monsoon over southern India. Two weeks later, the progression of the monsoon would stop, which the forecasts accurately predicted.

FUTURE WORK

Providing farmers with critical task-specific information is just the beginning. The Initiative is exploring other forms of weather forecasts, like how tailored heat forecasts could help those without access to air conditioning protect themselves. The team will utilize the climate impacts data collected by the Climate Impact Lab—an initiative based at the UChicago Institute for Climate and Sustainable Growth—to target the regions and industries where the dissemination of tailored weather forecasts could be most beneficial.

OUR LEADERSHIP



Michael Kremer

- + University Professor in Economics
- + Director, Development Innovation Lab
- + 2019 Nobel Laureate
- + Focus: Development economics; Behavioral science



Amir Jina

- + Assistant Professor, Harris Public Policy
- + Affiliated Faculty, Energy Policy Institute at UChicago
- + Focus: Climate impacts on human well-being



Pedram Hassanzadeh

- + Assoc. Professor, Geophysical Sciences
- + Committee on Computational and Applied Mathematics
- + Focus: Machine learning to improve climate modeling

UCHICAGO'S LEGACY IN WEATHER FORECASTING

The University of Chicago has a long history in the field of weather forecasting. In 1940, the meteorologist Carl-Gustaf Rossby came to the University to lead its newly established Institute of Meteorology, which eventually became the Department of Geophysical Sciences. While at UChicago, Rossby advanced revolutionary research in weather forecasting, which included identifying the importance of the jet stream. Rossby and his students' University of Chicago research also laid the foundation for what is known today as numerical weather and climate prediction, and trained cohorts of professional meteorologists in these cutting-edge efforts on the eve of World War II. Eighty-five years later, HCF builds off this work—ensuring it no longer remains in just the wealthier countries who can afford the infrastructure. The Initiative is working to ensure the rest of the world can not only catch up, but surpass the current frontier, by focusing on the needs of those who could most benefit and helping to build the tools to get them there.

