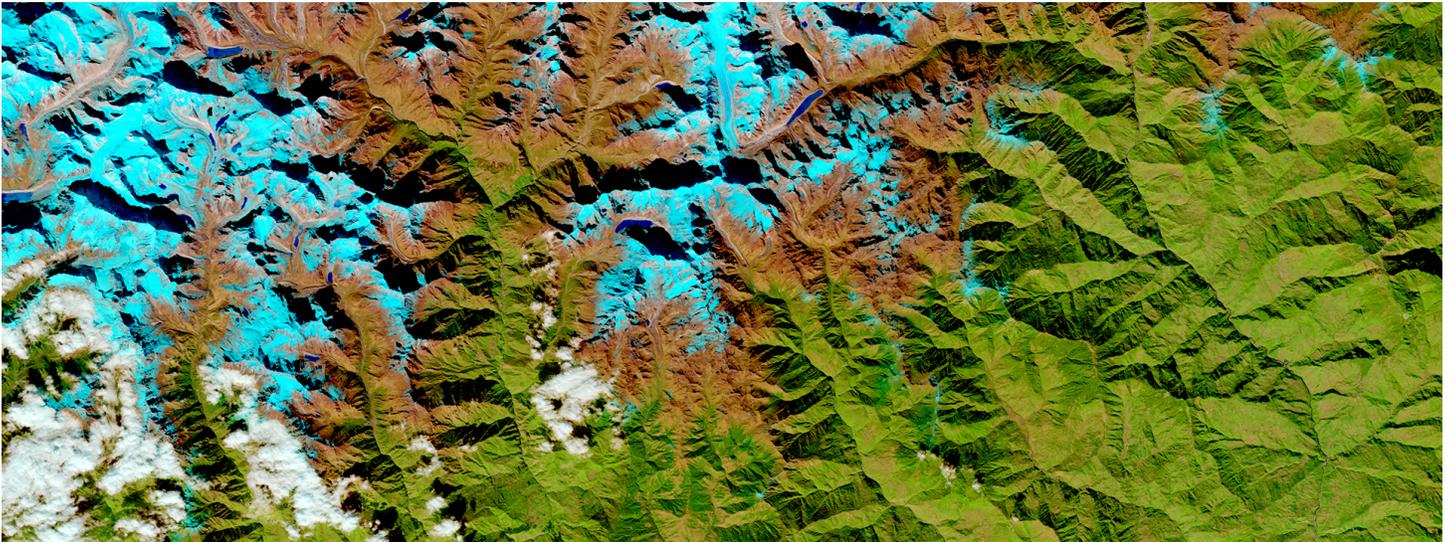


IBM Advances Geospatial AI to Address Climate Challenges

- IBM collaborating with Mohamed Bin Zayed University of Artificial Intelligence, Government of Kenya and the United Kingdom's Science and Technology Facilities Council (STFC) Hartree Centre to expand application of IBM's geospatial AI technologies to urban heat island mapping, reforestation and climate resiliency in aviation.

-IBM and NASA to create new AI foundation model for weather and climate.



YORKTOWN HEIGHTS, N.Y., Nov. 30, 2023 /PRNewswire/ -- IBM (NYSE:IBM) today announced new efforts that apply its geospatial AI technologies, including IBM's geospatial foundation model developed in collaboration with NASA, to climate efforts including analysis of urban heat islands in the United Arab Emirates (UAE); reforestation across Kenya; and climate resiliency in the United Kingdom (UK).

IBM continues to advance its AI model strategy in part through the creation, training, fine-tuning and open-sourcing of foundation models – models that can be used for different tasks and apply information from one situation to another – designed for domains beyond natural language, including geospatial applications.

These models, which are trained on geospatial information such as satellite images, present a unique opportunity to address climate change because unlike traditional AI models tailored for specialized tasks, geospatial foundation models – encompassing satellite and weather data – create knowledge representations from petabytes and exabytes of climate-relevant data that can facilitate accelerated and streamlined discovery of environmental insights and solutions. These models can also be fine-tuned and applied across a multitude of areas driving or revealing climate change, from flood detection to fire scars.

"Climate change is a real and pressing issue that we must find new ways to address as quickly and efficiently as possible, including through today's most advanced AI technologies," said Alessandro Curioni, IBM Fellow and Vice President, Accelerated Discovery at IBM. "AI foundation models utilizing geospatial data can be a game-changer because they allow us to better understand, prepare and address the many climate-related events effecting the health of our planet in a manner and speed never before seen. We are hopeful these technologies can help accelerate the rate at which we derive and apply solutions for a safer and healthier planet for future generations."

Analyzing urban heat islands in the UAE

By the end of this century, many cities will likely experience disruptive and excessive heat waves if GHG emissions continue at high levels. To develop sustainable and equitable plans to keep cities habitable, the rising heat levels must be accurately mapped and addressed.

IBM and the Mohamed Bin Zayed University of Artificial Intelligence (MBZUAI) are pioneering an attempt to apply foundation models to the mapping of urban heat islands – areas with significantly higher temperatures compared to surrounding locations. This innovative research specifically applies a fine-tuned version of IBM's geospatial foundation model to understand the urban environment in Abu Dhabi and how the underlying landscape in the UAE impacts the formation of urban heat islands.

To date, the model has informed efforts that have succeeded in a reduction of heat island effects in the region by more than 3°C (5.4 F)¹. Going forward, the model is expected to continue to provide unique insights that inform the development of urban design strategies designed to help reduce urban heat stress in changing climates.

Professor Tim Baldwin, MBZUAI Acting Provost, said "Our collaboration with IBM marks a groundbreaking effort to utilize foundational AI models in analyzing and identifying solutions to urban heat islands for Abu Dhabi and parts of the UAE, a region which is particularly affected by climate change. This research underscores the vital role of AI in tackling global issues, emphasizing the urgency of continued exploration and innovation. By harnessing the power of AI, we are not merely addressing challenges; we are proactively shaping solutions for a sustainable future. In a world confronted by unprecedented challenges, MBZUAI stands at the forefront of pioneering research in AI, recognizing the transformative power it holds."

Advancing reforestation and water sustainability in Kenya

In December 2022, President of Kenya H.E. D.R William Ruto unveiled the National Tree Growing and Restoration Campaign designed to plant 15 billion trees across Kenya by 2032, including in areas of critically affected water towers – forested landscapes that retain water and source many rivers throughout Kenya. While water towers account for about three quarters of the nation's water resources, deforestation is contributing to increasing water scarcity in these regions.

IBM and the Kenyan government's office of the Special Envoy for Climate Change Ali Mohamed have signed a Memorandum of Understanding (MoU) to support the National Tree Growing and Restoration Campaign through a new "adopt-a-water-tower" initiative. The effort will be fueled by a new digital platform that leverages IBM's geospatial foundation model to enable users to track and visualize tree planting and tree growing activities in specific water tower areas. Local developers can also create fine-tuned models combining the IBM geospatial model with their own localized information to monitor forest restoration and measure above-ground biomass such as sequestered carbon, ultimately mobilizing on-the-ground efforts to plant more trees across Kenya's water tower regions.

The President's Spokesperson, Mr. Hussein Mohamed, MBS, said: "We recognize that technology plays a pivotal role in unlocking our full potential, optimizing resource utilization, and seizing opportunities. It serves as a means to ensure that we harness our resources most effectively to drive our grassroots-driven economic transformation agenda. Through our partnership with IBM, we have the capability of harnessing the power of artificial intelligence and geospatial data to advance our climate ambitions. These ambitions include planting 15 billion trees, rejuvenating our vital water towers, fostering increased collaboration with the private sector to promote a just energy transition for communities around our forests. Simultaneously, this collaboration will enhance our capacity to equitably participate in the carbon economy. The potential of this collaboration extends beyond our borders and has the capacity to be replicated in other nations seeking to enhance their forest cover while

also improving the economic and health well-being of their communities."

Elevating climate resiliency across the United Kingdom

In 2021, IBM and the Science and Technology Facilities Council's (STFC) Hartree Centre collaborated to explore the application of next-generation technologies including AI from IBM to address climate risk and resiliency across the UK.

Now, IBM, STFC and Royal HaskoningDHV, a global consulting engineering company, have collaborated to establish a new service, leveraging IBM's geospatial AI tools, that seeks to automate and scale climate risk assessment processes for organizations. The service's first use case will focus on the aviation sector, in which IBM's geospatial AI will assess impacts weather-related issues, including:

- Short-term impact of extreme weather on aviation operations.
- Long-term impact of climate change on future airport operations and infrastructure.

In addition, IBM and STFC Hartree Centre, through the Hartree National Centre for Digital Innovation, are advancing a new area of research with Dark Matter Labs and Lucidminds, as part of their TreesAI project. The research project will apply IBM geospatial AI technologies to their Green Urban Scenarios (GUS) model to map urban locations where trees can be planted to help alleviate the risk of surface water flooding. The effort will eventually inform an end-to-end digital planning platform for urban planners, project developers and green urban investors across the UK.

Kate Royse, Director at STFC's Hartree Centre, said "There has never been a more important time to prepare for the challenges posed by climate change, both from an industrial and societal perspective. Here at STFC's Hartree Centre we're excited to be working with IBM and Royal HaskoningDHV, using advanced AI technologies to help the aviation industry prepare for climate risks, and become more resilient against the effects of extreme weather. Equally, our collaboration with IBM and Dark Matter Labs on the TreesAI project through our HNCDI programme will enable smarter decisions based on accurately predicting and managing flood risk, which is critical to all future city planning. Advanced AI technologies are key driver in enabling us to build a more resilient world against the adverse impacts of climate change."

Djeevan Schiferli, Climate Intelligence Business Strategist, Royal HaskoningDHV said "Operational and strategic planners in every company require a clear understanding of how weather and climate-related incidents affect their business operations. By harnessing AI and geospatial data, we will super charge our climate risk assessments on a global scale."

Chloe Treger, TreesAI UK Lead, said "Over 300,000 properties are at risk of surface-water flooding. Without action, this figure is set to almost double by 2055 due to climate change and urbanisation. Through our collaboration with IBM and STFC, we have been able to observe how trees contribute to reducing surface water flooding risks across the city under different scenarios, using GUS. This has enabled us and our partners to make the business case for tree planting and maintenance. After a successful pilot in Glasgow, we are now looking for further locations to embed this powerful data-enabled decision-making tool."

Extending NASA collaboration to apply generative AI to weather

Beyond their initial commitment to build and deploy a geospatial foundation model, IBM and NASA have also announced work on a new, separate [AI foundation model for weather and climate](#). By applying AI technology from IBM, the model aims to improve the accuracy, speed and affordability of weather forecasting and other climate applications. Sample applications of the

model not only include forecasting, but also super-resolution downscaling, identifying conditions conducive to wildfires, and predicting meteorological phenomena. IBM researchers will work alongside NASA domain experts to train and validate the model.

IBM at COP28

These latest efforts and [IBM's role at COP28](#) builds on the company's long history of action, research, and advocacy around the environment. IBM issued its first environmental policy more than 50 years ago, in 1971, and published a formal position on climate change in 2007. IBM is also a founding member of the United Nations Environment Programme's Science-Policy-Business Forum on the Environment and the Climate Leadership Council, and supports communities vulnerable to climate change and other environmental issues through initiatives like the [IBM Sustainability Accelerator](#).

To follow IBM at COP28, please visit: <https://www.ibm.com/events/unfccc-cop>

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Media Contacts:

Sarah Benchaita
IBM Research
sarah.benchaita@ibm.com

Bethany Hill McCarthy
IBM Research
Bethany@ibm.com

¹ <https://ai4good.org/wp-content/uploads/2022/08/FE2022-Urban-Forests-for-Carbon-Sequestration-and-Heat-Island.pdf>

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