SEP 22-26
AIM for Scale
AI Weather Training Program

AIM FOR SCALE

WEATHER PACKAGE

Localizing AIWP Models in Africa

Rendani Mbuvha (AfriClimate AI), Olivia Graham (Google Research) and Eli Kruse (Google Deepmind)

Advancing the state of the art with Google Research and Google DeepMind

Impossible? Let's see.

Whether foundational research, Quantum AI or AI for science and society, collaborating with Governments and communities, we strive to continuously progress AI research, and improve the lives of billions of people.

We publish hundreds of research papers each year, sharing our latest developments in order to collaboratively progress computing and science.

Google DeepMind awarded the Nobel Prize in Chemistry for their work developing AlphaFold.

Revolution in Forecasting Over the Past Few Years

Can AI (data-driven methods) be used to forecast weather at a medium-range timescale?

Graphcast

2023

nature

Article | Open access | Published: 20 March 2024

Global prediction of extreme floods in ungauged watersheds

Grey Nearing, Deborah Cohen, Vusumuzi Dube, Martin Gauch, Oren Gilon, Shaun Harrigan, Avinatan Hassidim, Daniel Klotz, Frederik Kratzert, Asher Metzger, Sella Nevo, Florian Pappenberger, Christel Prudhomme, Guy Shalev, Shlomo

Nature **627**, 559–563 (2024) | Cit

AI + physics

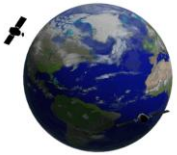
Article | Open access | Published: 22 July 2024

Neural general circulation models for weather and climate

Dmitrii Kochkov, Janni Yuval, Ian Langmore, Peter Norgaard, Jamie Smith, Griffin Mooers, Milan Klöwer, James Lottes, Stephan Rasp, Peter Düben, Sam Hatfield, Peter Battaglia, Alvaro Sanchez-Gonzalez, Matthew Willson, Michael P. Brenner & Stephan Hoyer

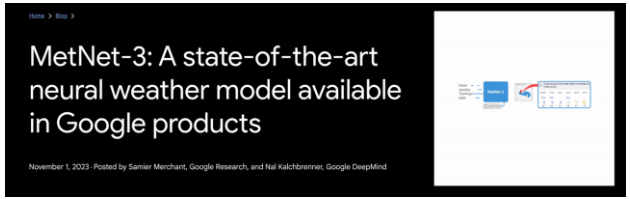
Nature **632**, 1060–1066 (2024) | Cite this article

MetNet-4 (Global Nowcasting)



2024

2025



nature

Article | Open access | Published: 04 December 2024

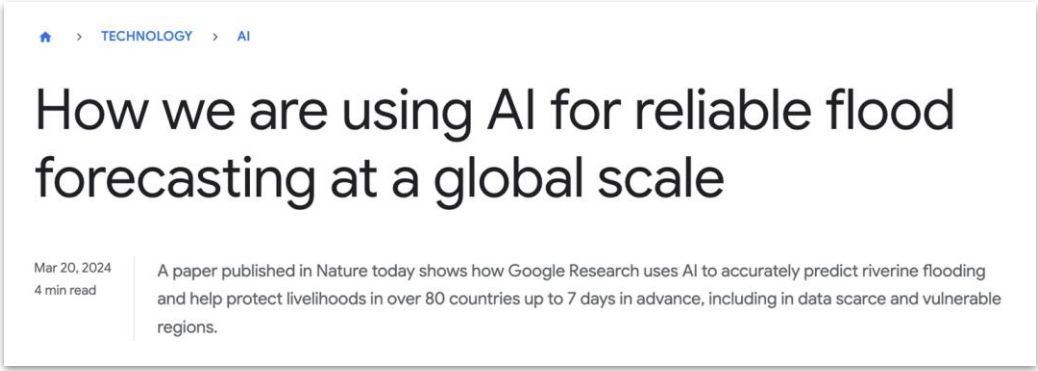
Probabilistic weather forecasting with machine learning

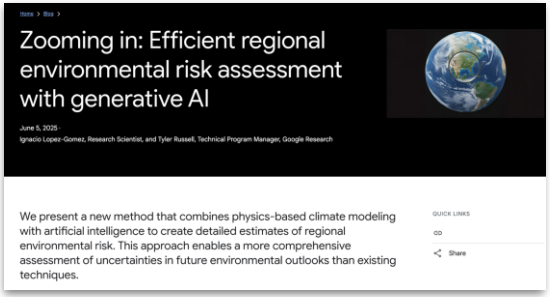
Ilan Price, Alvaro Sanchez-Gonzalez, Ferran Alet, Tom R. Andersson, Andrew El-Kadi, Dominic Masters, Timo Ewalds, Jacklynn Stott, Shakir Mohamed, Peter Battaglia, Remi Lam & Matthew Willson

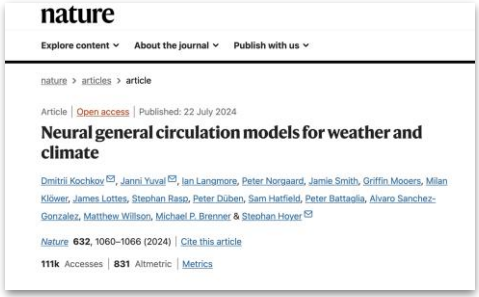
Gencast

What unique capabilities do AI models have? Can they assimilate new data sources? Learn to forecast difficult phenomena?

AI is Unlocking New Opportunities and Creating New Tools



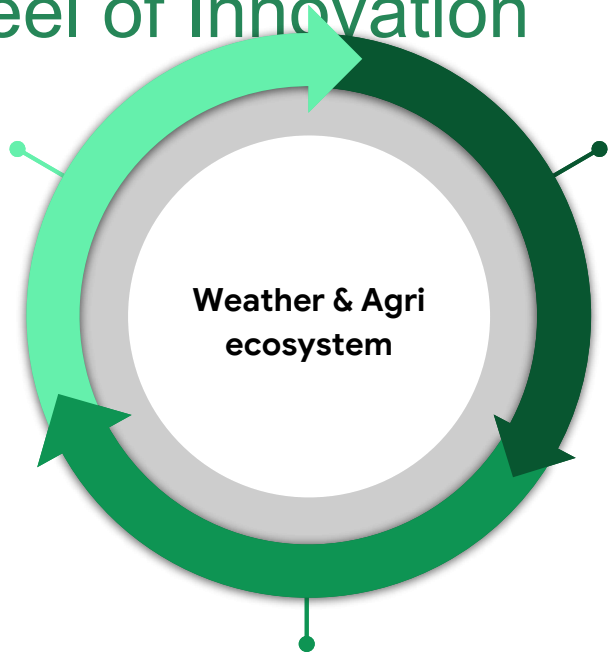




Many of these tools are open source, and the models have been published for use by the external ecosystem.

Google, Weather & Agriculture

Starting a Flywheel of Innovation



Google, Weather & Agriculture

Engaging across the innovation cycle

01

Catalysing the use of AI

02

Providing access to tools

03

Supporting adoption

AIM FOR SCALE

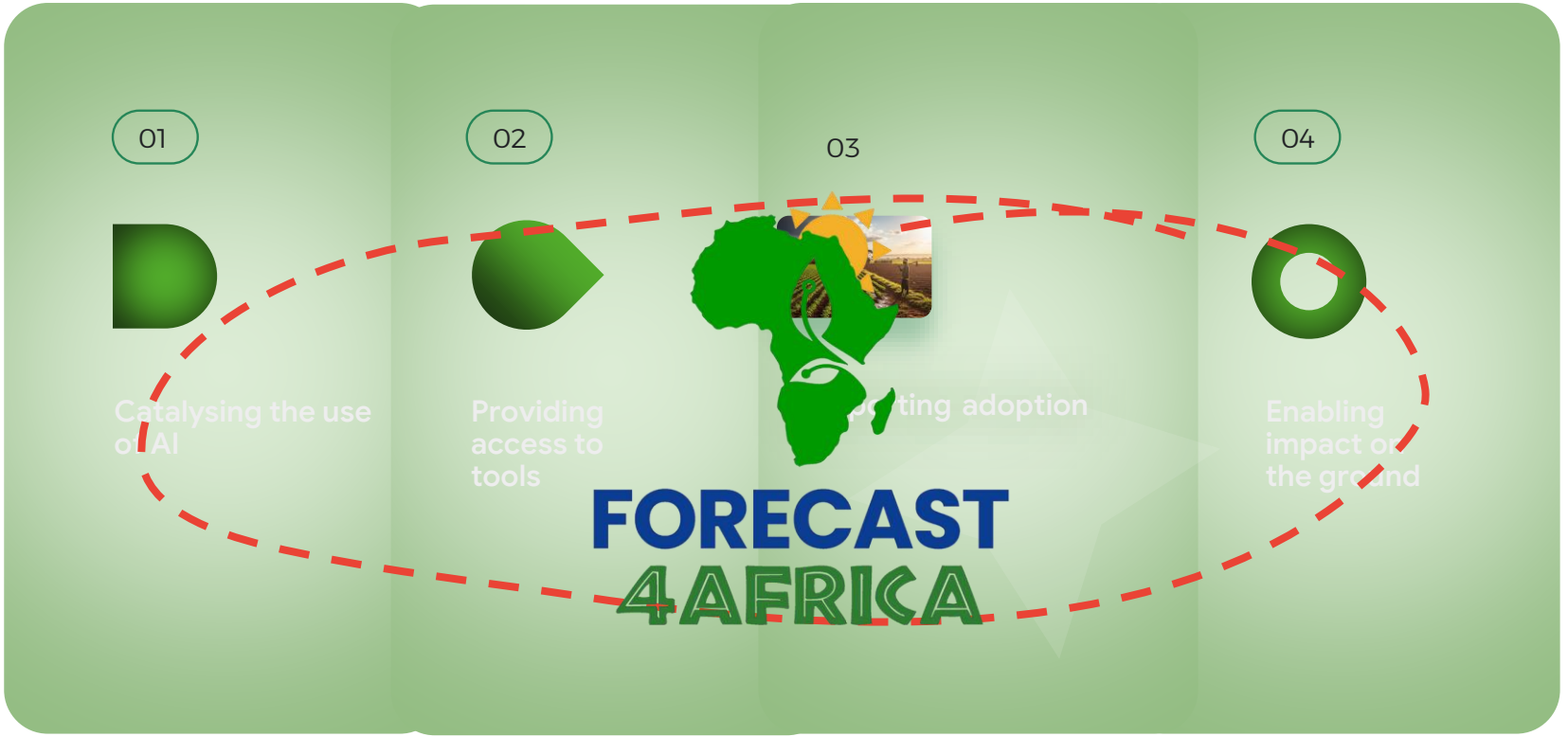
What are your tech needs?

04

Enabling impact on the ground

Google, Weather & Agriculture

Forecast4Africa



FORECAST 4AFRICA

Sponsored by

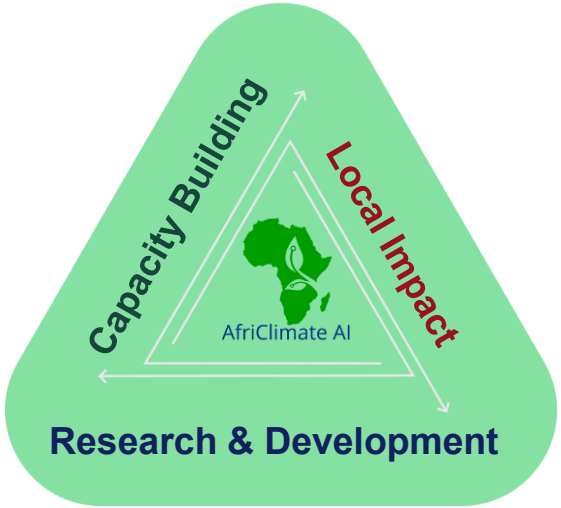
Google.org

Supported by

Google DeepMind

Our Mission

Our mission is to advance climate and AI research in Africa by building local skills, enabling context-aware research and development, supporting the deployment of AI solutions for climate action, and improving access to high-quality local climate datasets.



Deep Learning Indaba Community

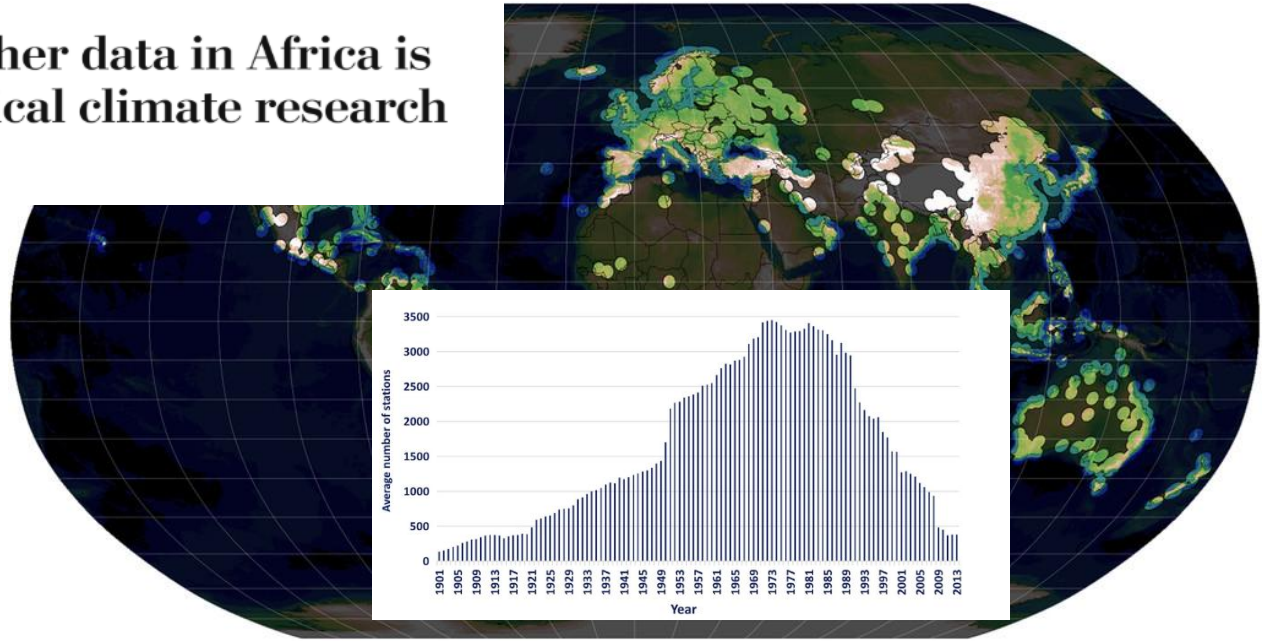
Africa’s Weather Data Gap

The Washington Post
Democracy Dies in Darkness

AFRICA

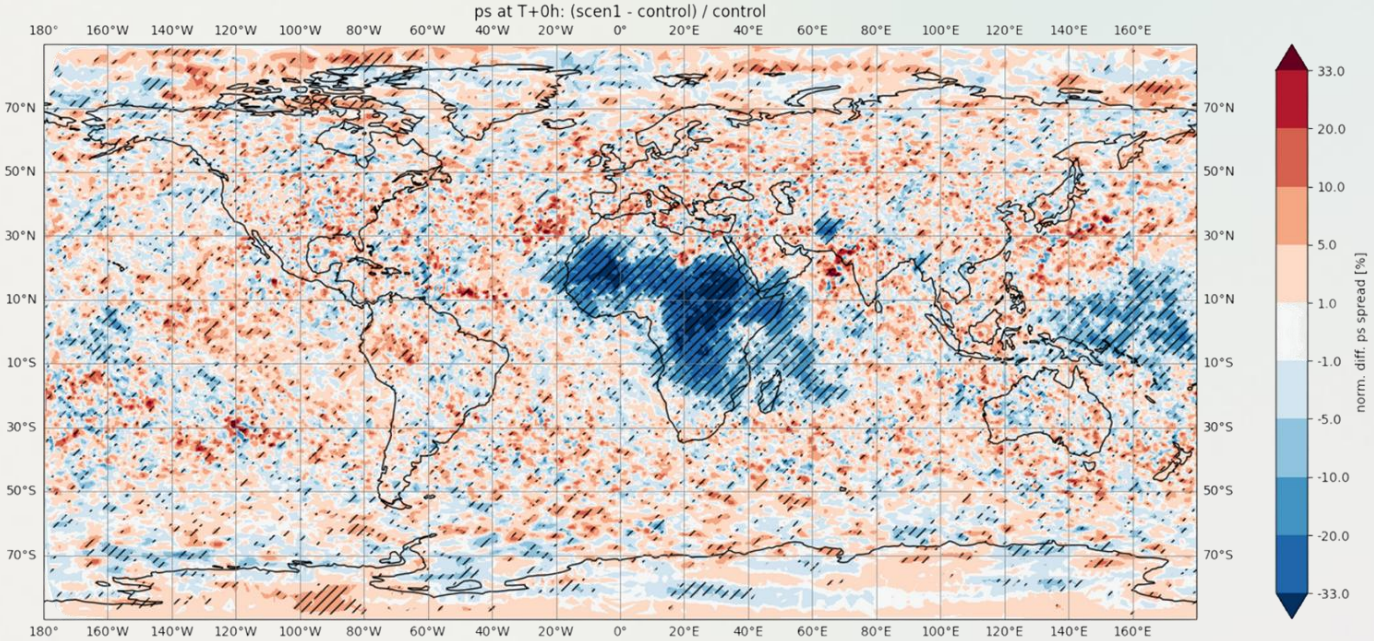
A lack of weather data in Africa is thwarting critical climate research

By Rachel Chason and Rael Ombuor
September 24, 2021 at 5:00 a.m. EDT



Evolution of the number of weather stations used in the GPCC full-data product over Africa (T.DINKU)

Data Scarcity Hurts Weather Forecasting



Percentage reduction in the surface pressure analysis uncertainty with simulated addional surface observations over Africa (ECMWF, 2025)

FORECAST 4AFRICA

Sponsored by

Google.org

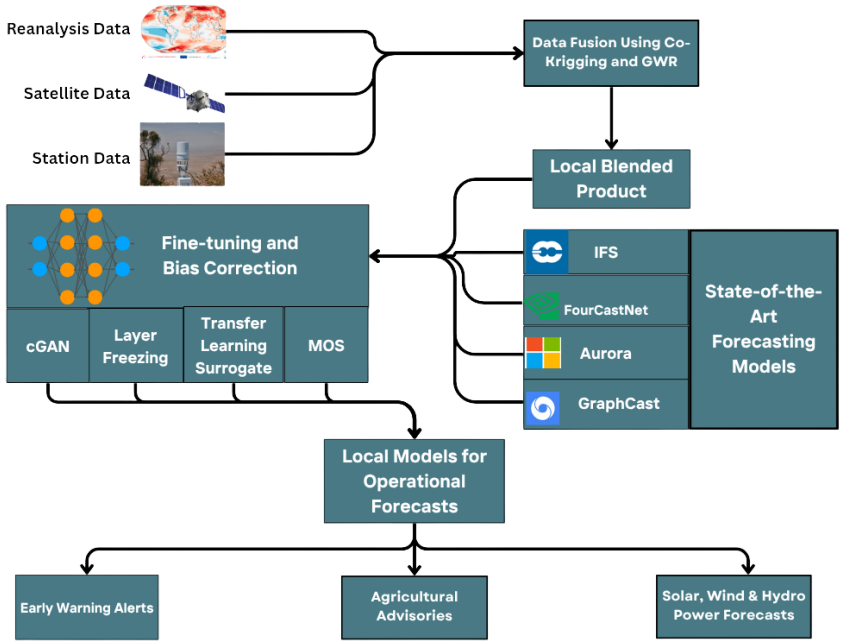
Supported by

Google DeepMind

research@africlimate.ai

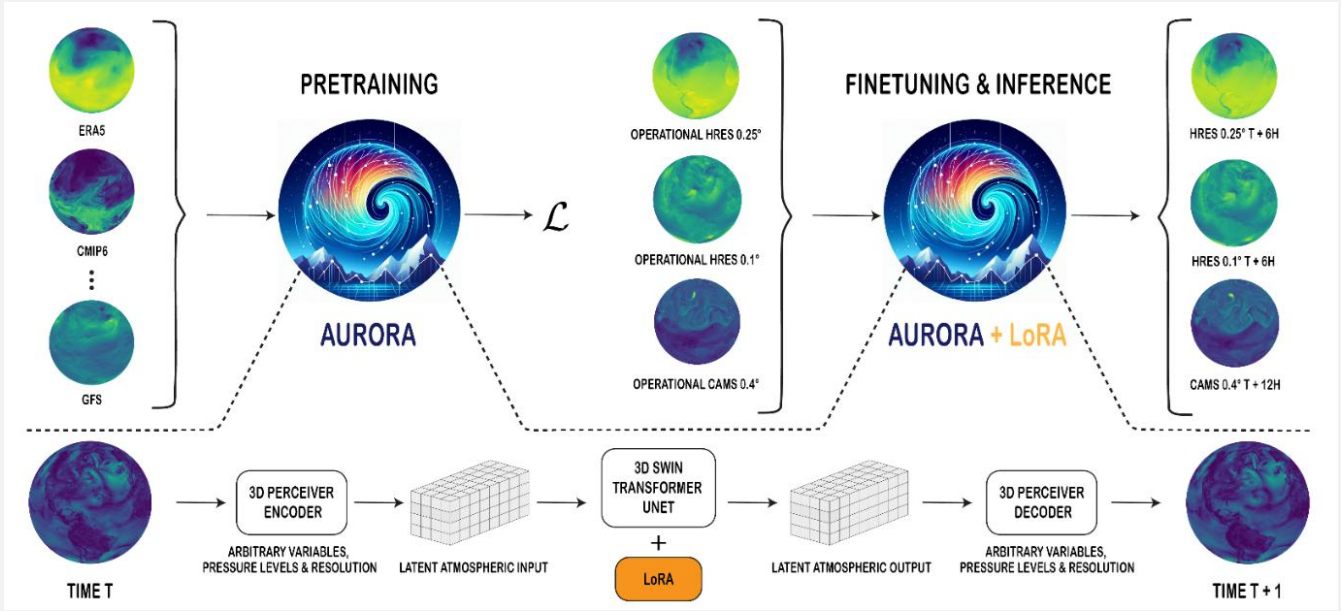
What Forecast4Africa Will Do

- **Fill the Data Gap**: Deploy 50-80 new weather stations in data-sparse regions of Southern Africa.
- **Co-Create** with leading agencies and Communities
- Develop **Open-Source Tools for localising** AI-based forecasting models with African data.
- **Building** local forecasting **capacity**



Why this Approach?

Finetuning Aurora in Africa



Koomi Toussaint AMOUSSOUVI, AIMS South Africa **BJ**

Fine-Tuned AuroraSmall vs. Pretrained AuroraLarge in South Africa

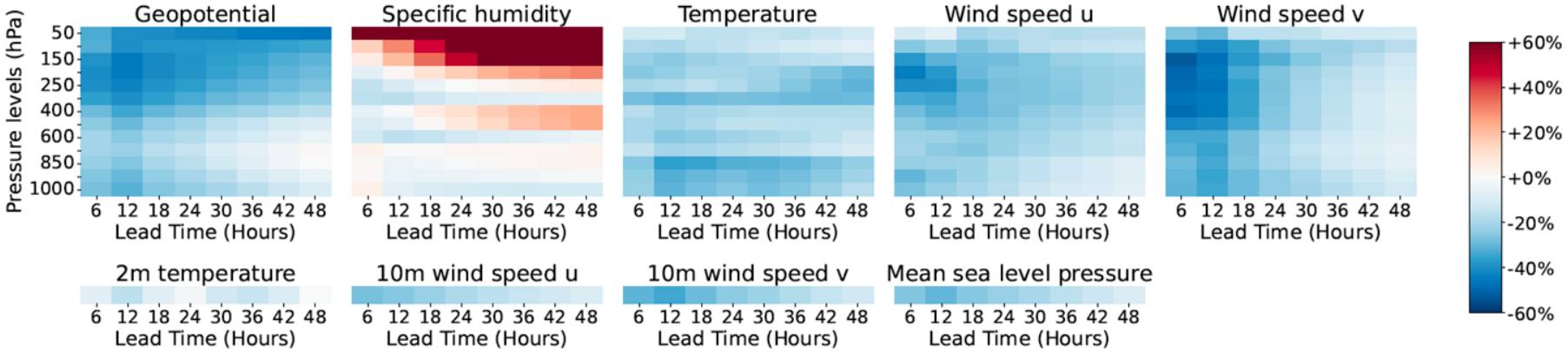
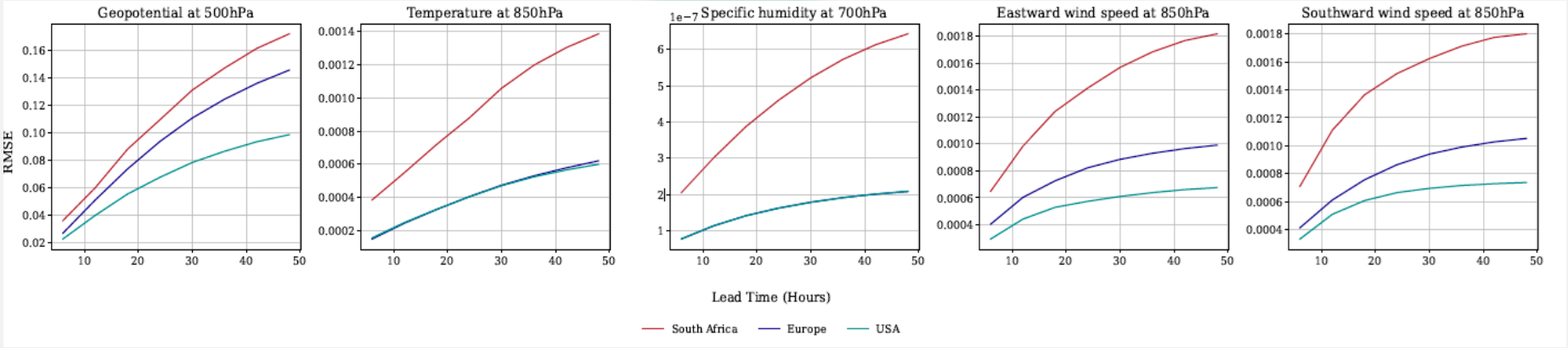


Figure: Scorecard comparing pretrained AuroraLarge and the fine-tuned AuroraSmall at 0.25° on HRES T0 (2022) over South Africa. **The blue indicates better performance of the fine-tuned AuroraSmall model**. We find that fine-tuned AuroraSmall outperforms pretrained AuroraLarge over South Africa.

Does Microsoft-Aurora Play Fair? A Cross-Regional Performance Check



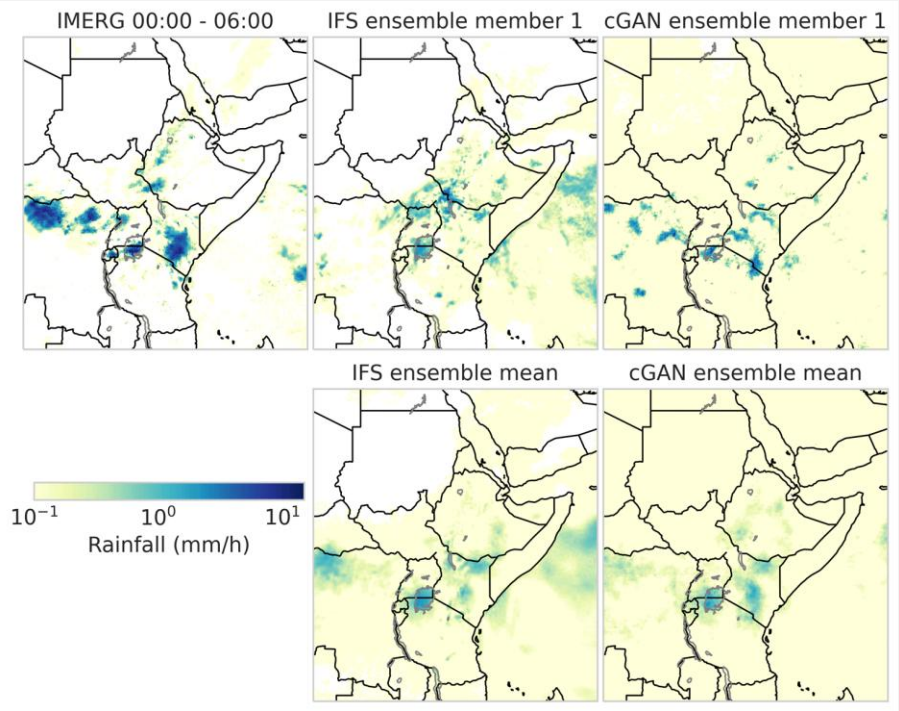
Koomi Toussaint AMOUSSOUVI, AIMS South Africa

Generative Downscaling Approach

ECMWF

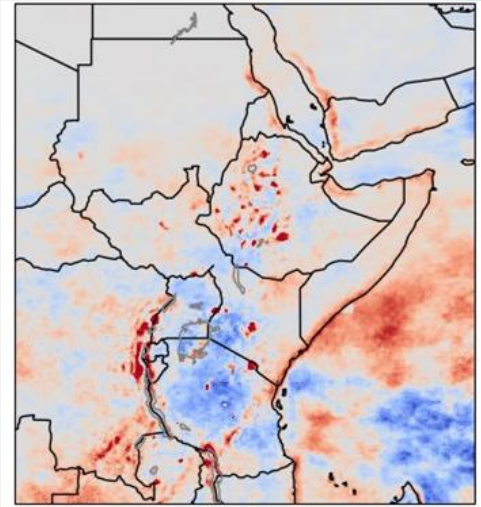
Forecast output:
CAPE
⋮
V component of wind

cGAN
Conditional Wasserstein Generalised Adversarial Network

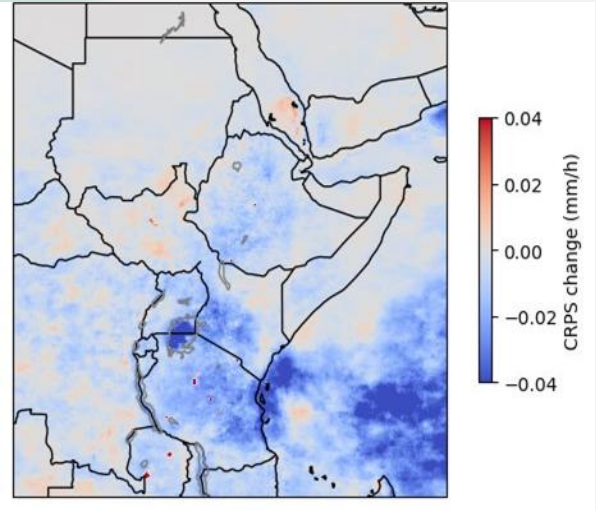


Value added on Top of Climatology

IFS



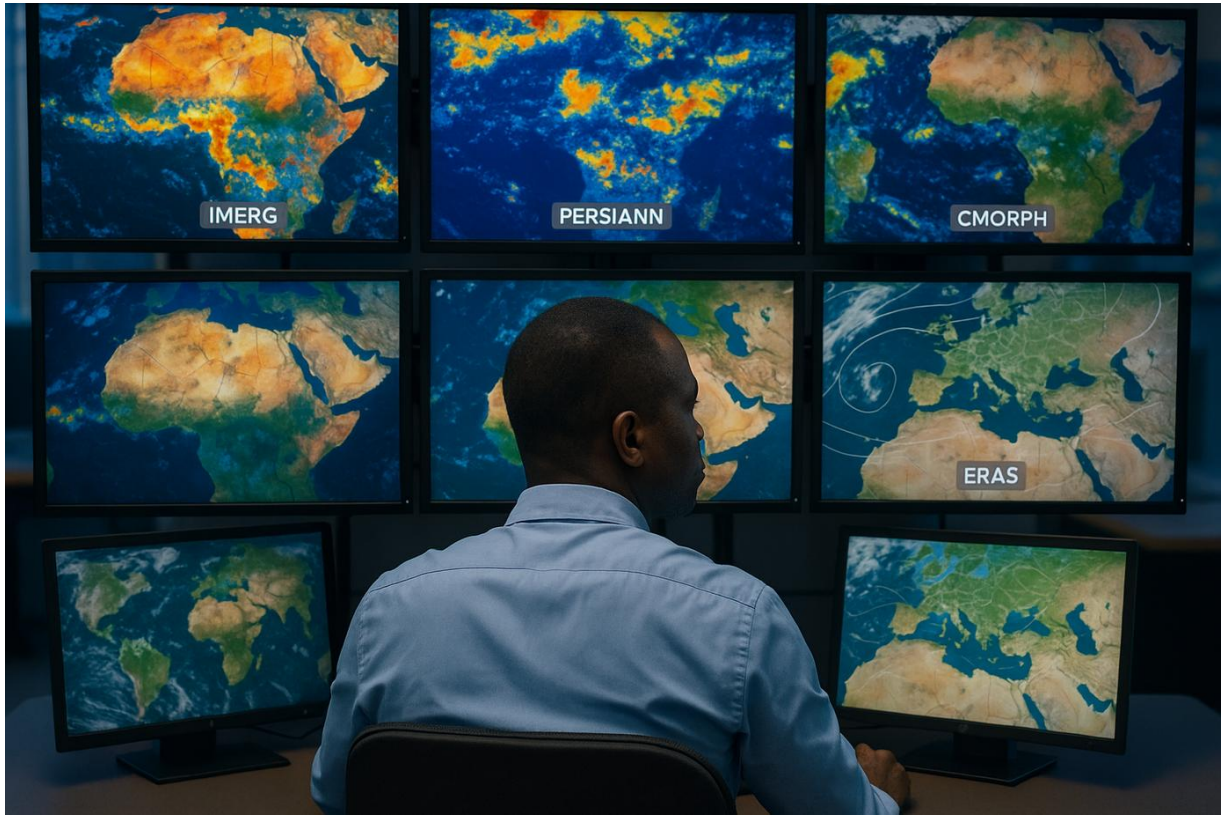
cGAN



Blue= Better than climatology

Red= Worse than climatology

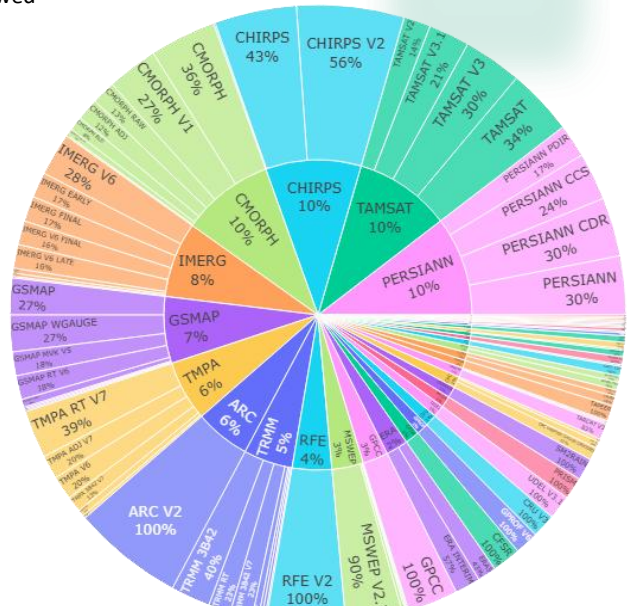
What is the Gridded Data Proxy for My Region?



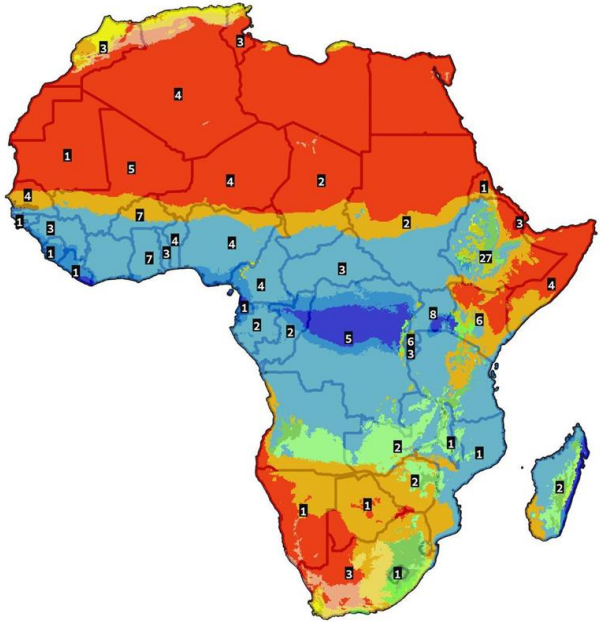
*AI Generated

Systematic Review of Rainfall Gridded Validation Studies Over Africa

- Review of over 400 peer reviewed rainfall validation studies over Africa
- Our 90 Gridded Datasets reviewed
- Sub-monthly timescales

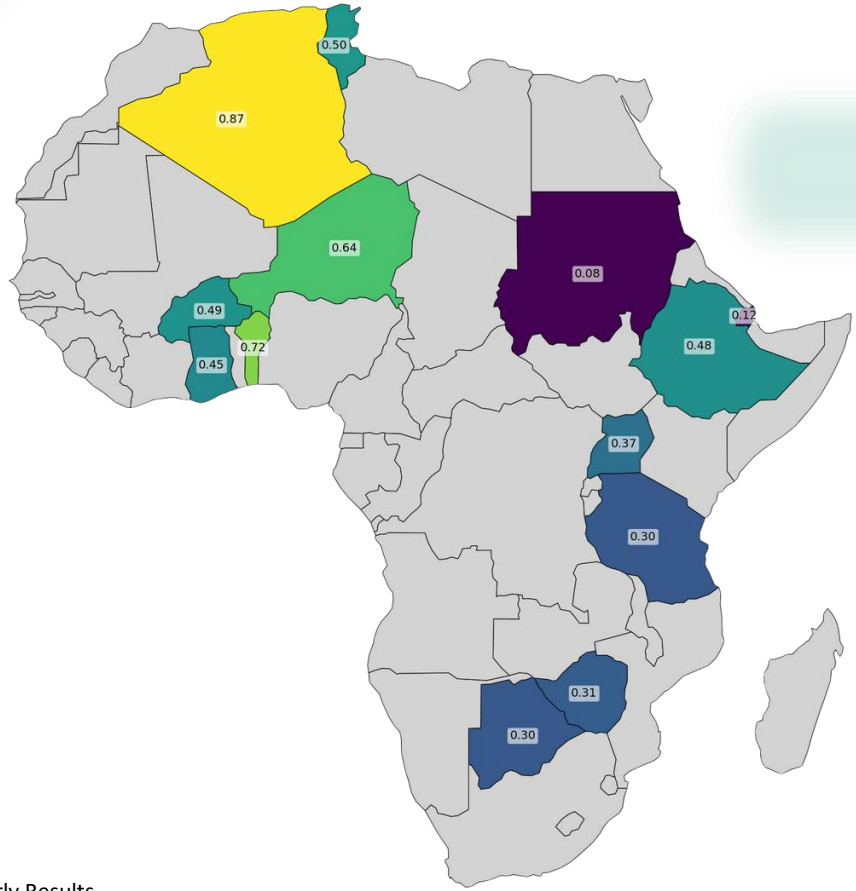


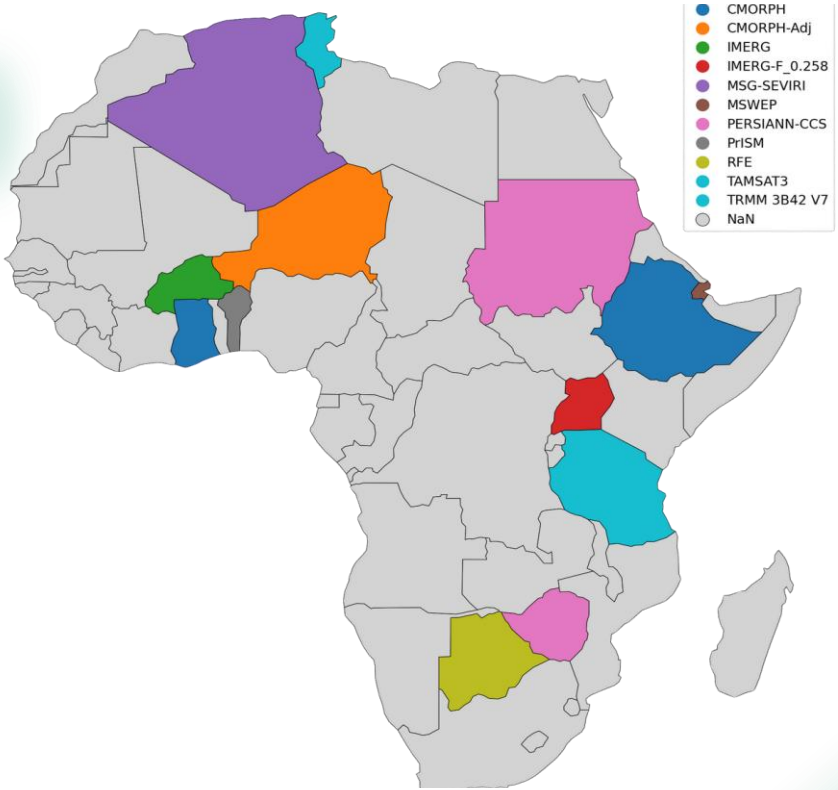
Products Reviewed



Coverage across Countries and Climate Regions

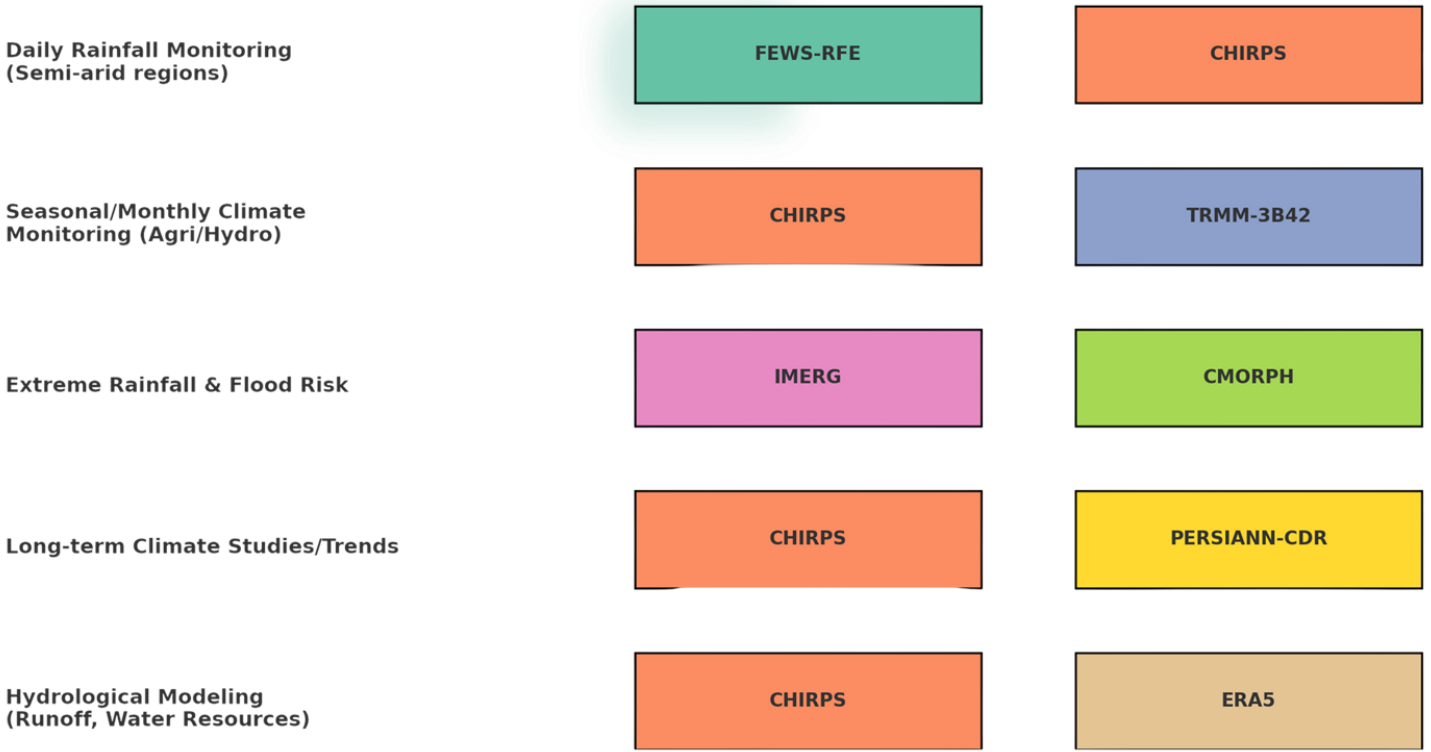
Performance by Country*





*Early Results

Recommendation* by Use Case



*Early Results

Getting Involved with Forecast4Africa

- 👩🏾‍💻 Refer People to our Team ..We are hiring!
- 🏛️ Collaborate .. Share ideas, experiences and networks.
- 🤝🏾 Engage .. Join our workshops and Webinars.

17-19 November, Pretoria South Africa

- 📢 Follow .. Track our progress!
- 🌍 Help us expand scale and Impact!

Keep in Touch

research@africlimate.ai

https://africlimate.ai

FORECAST 4AFRICA