Enhancing Capacities of National Meteorological and Hydrological Services in Eastern Africa: Best Practices, Challenges, and Opportunities

Hussen Seid
IGAD Climate Prediction and Applications Centre (ICPAC)

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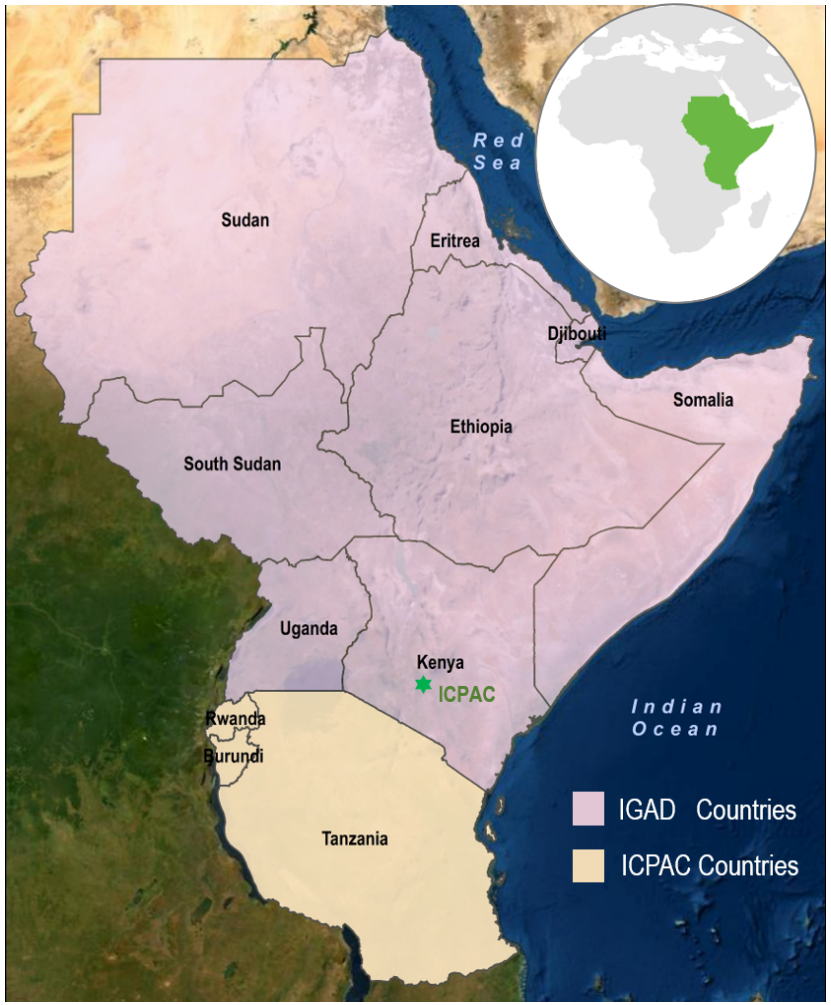
About ICPAC



ICPAC is a specialized institution of IGAD and a WMO designated regional climate centre for the Eastern Africa.

Service Areas

- Climate Monitoring & Forecasting
- Disaster Risk Management
- Water Resources
- Agriculture and Food Security
- Environmental Monitoring
- **Capacity Development**
- Climate Change
- Climate Information and Co-production

Capacity development is a core activity of ICPAC

Data Infrastructure and computing

- **High-Performance Computing (HPC):**

- ICPAC acquired HPC through ClimSA, in addition to the WISER and AFDB HPCs, to enhance advanced climate data analysis and computing resources.

- All NMHSs in ICPAC member states have accounts and access to the ICPAC HPC, enabling them to run higher-resolution models.

- **Tools and Datasets Available on ICPAC HPC:**

- NMHSs also have access to extensive historical and ensemble datasets, scripts, and custom tools like PyCPT for seasonal and sub-seasonal prediction.

- This enables NMHSs to access essential climate datasets, utilize advanced analytical tools to deliver timely and high-quality climate information.

- **Procured and delivered computers to all the participating NMHSs for data access**

Foundational Seasonal Prediction Training Workshop

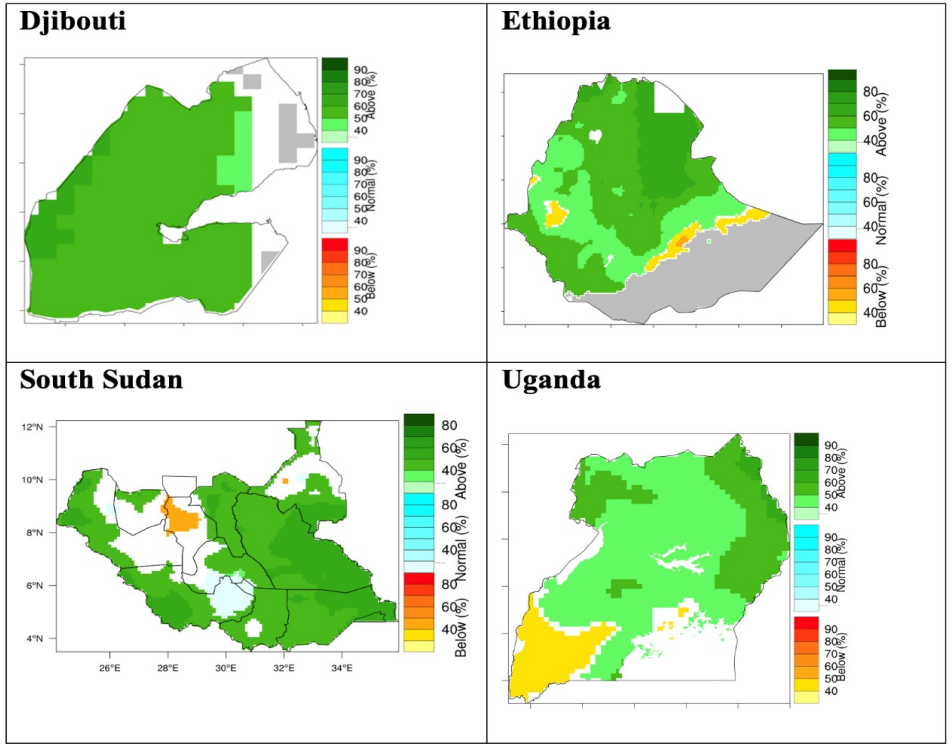
- Conducted annually for two weeks every November
- The goal is to build the foundational skills of participants in seasonal climate prediction, equipping them with the necessary tools, knowledge, and techniques to generate reliable seasonal forecasts.
- Participants of the Foundational Climate Prediction Training Workshop also take part in the pre-COF workshops held before each of the three GHACOF meetings in the following year.
- The foundation training workshop is organised in collaboration with partners such as UK Met Office
- Trained over 40 forecasters over the last four years.

Pre-GHACOF Training Workshops

PreCOF is conducted 3 times a year for the three rainfall seasons (MAM, JJAS & OND)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	NoV	Dec
		MAM			JJAS				OND		
Pre-COF and COF WORKSHOPs				Pre-COF and COF WORKSHOPs			Pre-COF and COF WORKSHOPs				

- The objective is to train NMHSs forecasters in objective seasonal forecasting tools and co-develop national and regional forecasts.
- It also prepares forecasters for their respective NCOFs by equipping them with the necessary skills and insights to deliver accurate and actionable climate forecasts
- Over 50 forecasters have participated in PreCOF workshops since 2020.



Examples of products developed in Pre-COF

Training in Climate Data Management System (CDMS)

- **Organized CDT trainings for all NMHSs and Climsoft CDMS implementation and Training in 2 countries, the latest being held at EMI from 17-28th June 2024.**

The following are some of the achievements realized:

- An operational Climsoft CDMS in a centralised database on ClimsA support for participating NMHSs computers.
- A customized metadata and key entry forms and operations geared towards smooth climate data operations.
- An automated ingestion procedure in place for ingestion of data from automatic weather stations into Climsoft system in real time.
- Trained climate data management staff with enough skills to operate and manage Climsoft CDMS.
- Training workshops on Automatic Weather Station maintenance and data management

Training in Automatic Weather Stations (AWC) maintenance

- Held training workshop (in collaboration with OTT Hydromet & IMTR) from 25 – 29 July 2022 on Automatic Weather Station maintenance and data management for 3 technicians (2 Meteorological Assistants and 1 IT specialist) from each NMHS.
- The following results were realized at the end of the training workshop:

  - ❖ The participants were conversant with the basic procedures of maintaining and managing data from AWS, especially ADCON and SUTRON.
  - ❖ Participants were able to use Climate Data Tool to perform the necessary quality checks on the AWS datasets and produce some climate products.
  - ❖ Participants understood the importance of AWS Data Tool in managing their AWS network.

Scholarship Program for Master's and PGD Students

With support from the ClimSA project, ICPAC awarded scholarships to 12 students from the IGAD member states

- 5 pursued master's degrees and 7 pursued postgraduate diplomas in Meteorology
- The Postgraduate Diploma students completed their studies at the University of Dar es Salaam.
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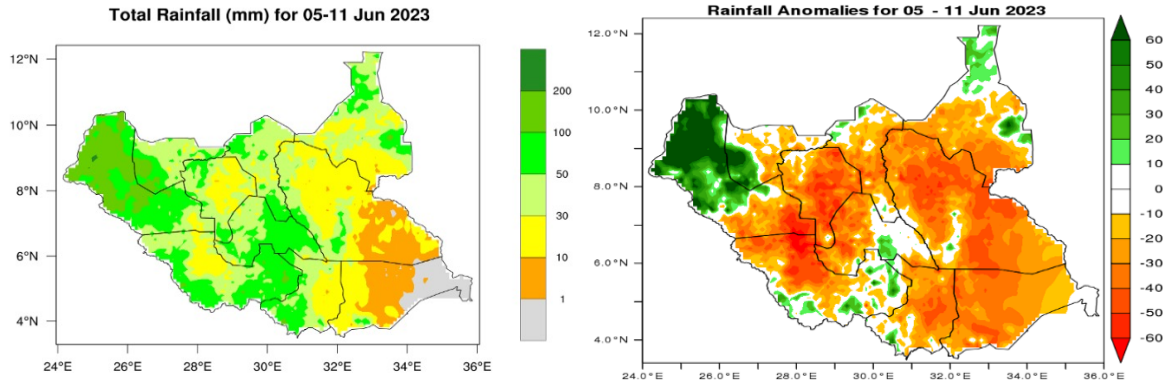
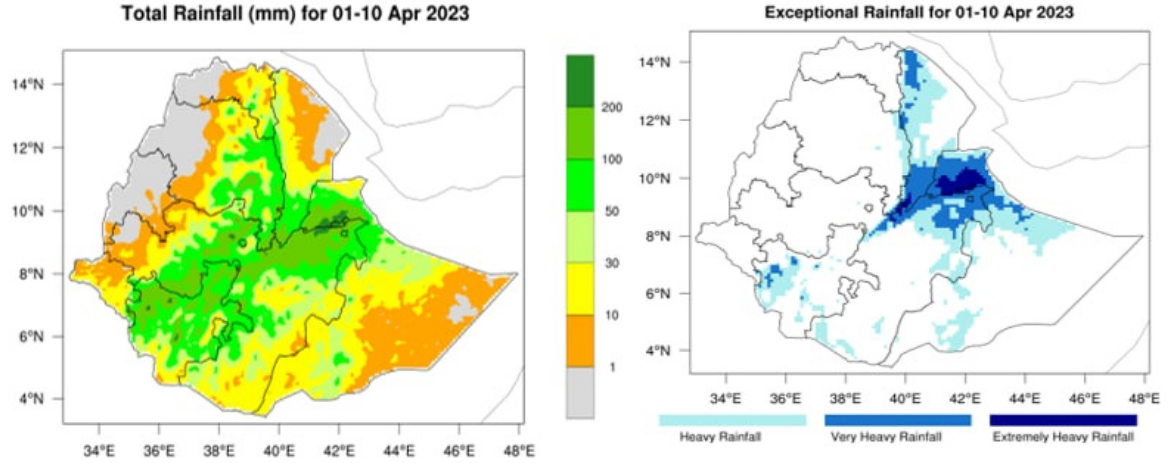
- They participated in an attachment program at the Tanzania Meteorological Authority.
- Master's degree students completed their studies at the University of Nairobi.
- Their attachment program at ICPAC is scheduled to conclude in February 2024.

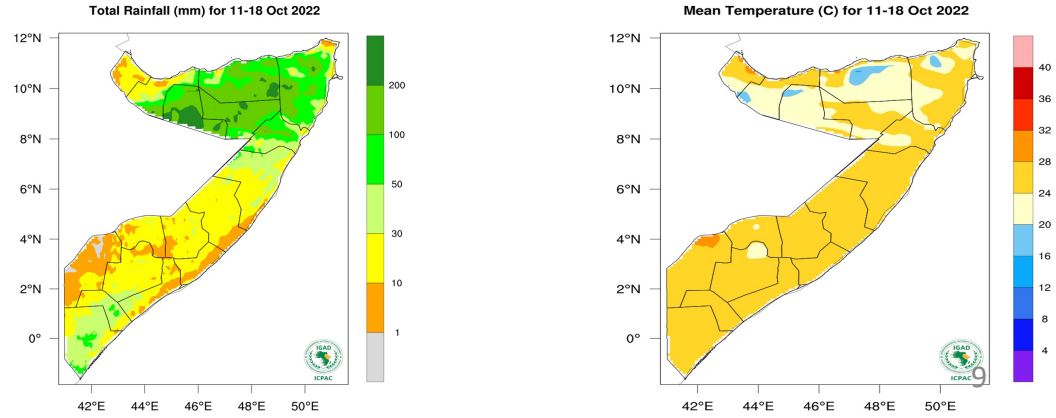
On-the-Job Training / Attachment Programme

Supported by the ClimSA project, 9 climate experts from IGAD member states completed attachments/ secondment at ICPAC.

- The programme aimed to enhance capacity of NMHSs in development of climate services including customization of sector-specific climate products.
- Experts were trained in ICPAC's forecasting tools, gaining skills in generating weekly, monthly, and seasonal forecasts.
- They also learned to develop sector-specific products at regional, national, and sub-national levels.







Best Practices in NMHSs Capacity Building

Training Programs:

- Training Programs such as foundational and pre-GHACOF workshops are very important in enhancing the capacity of NMHSs.

Access to HPC Infrastructure and Tools:

- Providing NMHSs with both computational resources and guidance to maximize them.
- Ongoing support and training for utilizing tools available on the HPC platform.

Scholarship and Attachment Initiatives:

- Hands-on training paired with academic development fosters a holistic approach to skill building.

Challenges Facing NMHSs in Eastern Africa

Resource Constraints:

- Limited financial resources for operations, technology updates, and staff training.

Technical Gaps in Climate Prediction and Communication:

- Shortage of trained personnel to manage data, forecast generation, and end-user communication.

Data Quality and Accessibility Issues:

- Data inconsistencies due to inadequate observational networks and gaps in historical records.

Difficulty in Disseminating & Reaching the Last miles:

- Reaching all stakeholders effectively, especially in remote areas with limited digital connectivity.

Opportunities for Future Development

Leveraging Advanced Technologies:

- Integrate cutting-edge technologies such as machine learning and AI to enhance the accuracy and timeliness of forecasts.

Strengthening policies that integrate climate services across sectors

- Development of National and Regional Frameworks for Climate Services (NFCS/RFCS) to coordinate, facilitate and strengthen collaboration among national institutions to improve the co-production, tailoring, delivery and use of

Strengthening Collaboration with Regional Climate Centers (RCCs):

- Continued partnership with ICPAC and other research and training Centers for knowledge exchange and harmonizing forecasting methodologies.

Expanding Access to Scholarships and Technical Attachments:

- Increasing opportunities for academic and hands-on training to build a stronger workforce in climate sciences (e.g., CAW)

Thank You!!