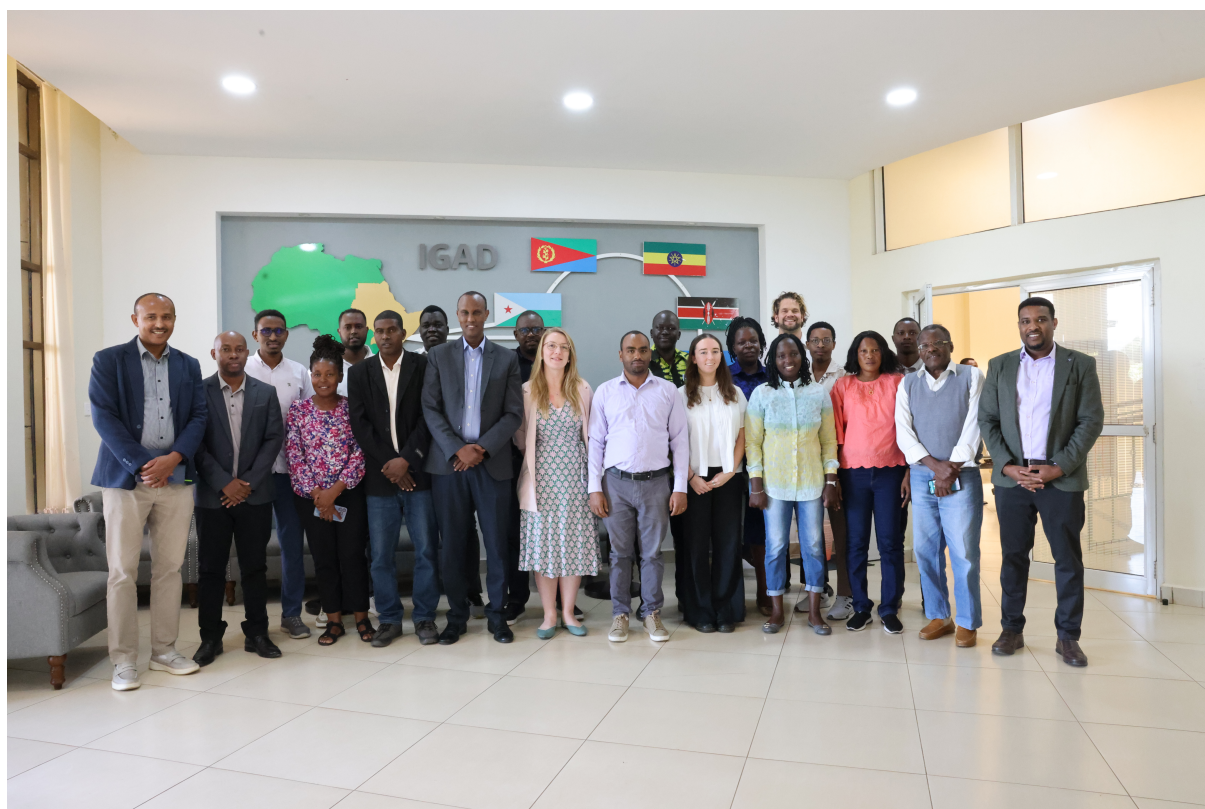




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PRE-GHACOF70 CAPACITY BUILDING TRAINING WORKSHOP FOR JJAS 2025 SEASON



12th - 16th May 2025

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1.0 Introduction

The June to September (JJAS) season is one of the most critical rainfall periods in the Greater Horn of Africa (GHA), particularly for the northern and western sectors, where it contributes over 40% of the annual rainfall—and up to 90% in parts of Sudan. Given its importance to agriculture, water resources, and livelihoods, accurate and timely seasonal forecasts are essential for effective planning and decision-making across the region.

In this context, the 70th Capacity Building Training Workshop (Pre-COF70) for climate scientists from ICPAC Member States was held physically from 12th to 16th May 2025 at ICPAC Offices in Nairobi, Kenya. The workshop was supported by the EU-funded Intra-ACP Climate Services and Related Applications (ClimSA) Project, the World Bank-funded Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA), Climate Risk and Early Warning Systems (CREWS) Greater Horn of Africa, and UK Met Office.

The Pre-COF workshops continue to play a pivotal role in strengthening the technical capacity of national and regional climate experts. They provide a collaborative platform for participants to enhance their skills in climate prediction and downscaling techniques, share experiences, and co-develop the regional climate outlook. The primary objective of the pre-COF70 workshop was to generate the June to September (JJAS) 2025 seasonal climate outlook, which served as the key scientific input for the 70th Greater Horn of Africa Climate Outlook Forum (GHACOF70).

The workshop culminated in the production of the regional seasonal forecast, which was later presented during GHACOF70, held on 20th May 2025 in a hybrid format, with the physical session convened at Inter Luxury Hotel, Addis Ababa, Ethiopia. The GHACOF event was preceded by a one-day co-production session with sectoral experts to ensure that the climate information generated was tailored to the needs of various users.

The Pre-COF70 workshop was officially opened by Dr. Abdi Fidar, Officer-in-Charge of ICPAC, who underscored the importance of collaborative climate prediction efforts and capacity building in advancing climate resilience across the IGAD region.

Objectives of the workshop

The main objective of the workshop was to build the capacity of climate scientists from NMHSs to produce seasonal forecasts and associated intra-seasonal characteristics.

The specific objectives were;

- (a). Analyse the MAM 2025 performance
- (b). Enhance the knowledge of forecasters from NMHSs on procedures used by ICPAC in generating objective seasonal forecast
- (c). Produce national and regional consolidated forecasts for both rainfall and temperature for JJAS 2025

2.0 Presentations

2.1 Assessment of the MAM 2025 season vs the GHACOF69 and downscaled country forecasts

During the workshop, the observed performance of MAM in each country was presented by country representatives and an overall GHA regional perspective was presented by ICPAC. The verification outputs were generated using ICPAC customized verification tools. The forecast issued in January 2025 showed that most parts of the northern region were expected to record drier than usual conditions except over eastern South Sudan, western Ethiopia, eastern Uganda, south-eastern Kenya, and most parts of Tanzania where above normal rainfall was expected. Observations at the end of the season shows that most parts of the region recorded normal and above normal rainfall with western Uganda, most parts of South Sudan, eastern Ethiopia, Djibouti, central to northern Somalia, Rwanda and northern Burundi recorded depressed rainfall.

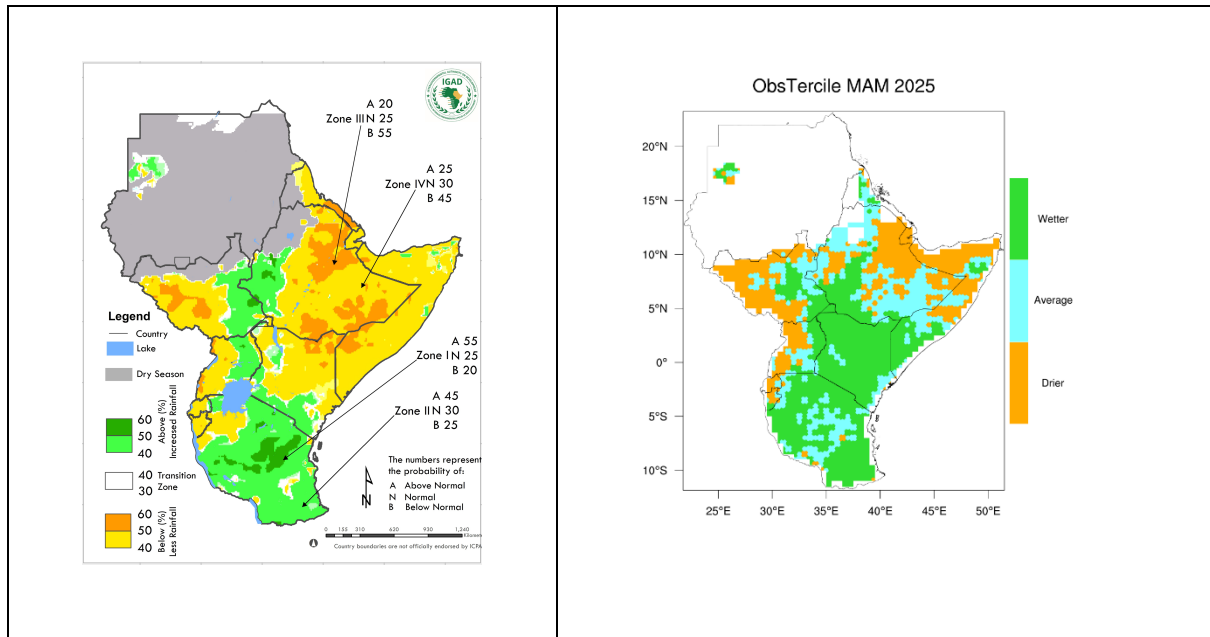


Figure 1: a) Forecast probabilities of tercile rainfall categories for MAM 2025 issued at GHACOF69 (left), and the observed terciles for MAM 2025 based on ICPAC-customised CHIRPS (right).

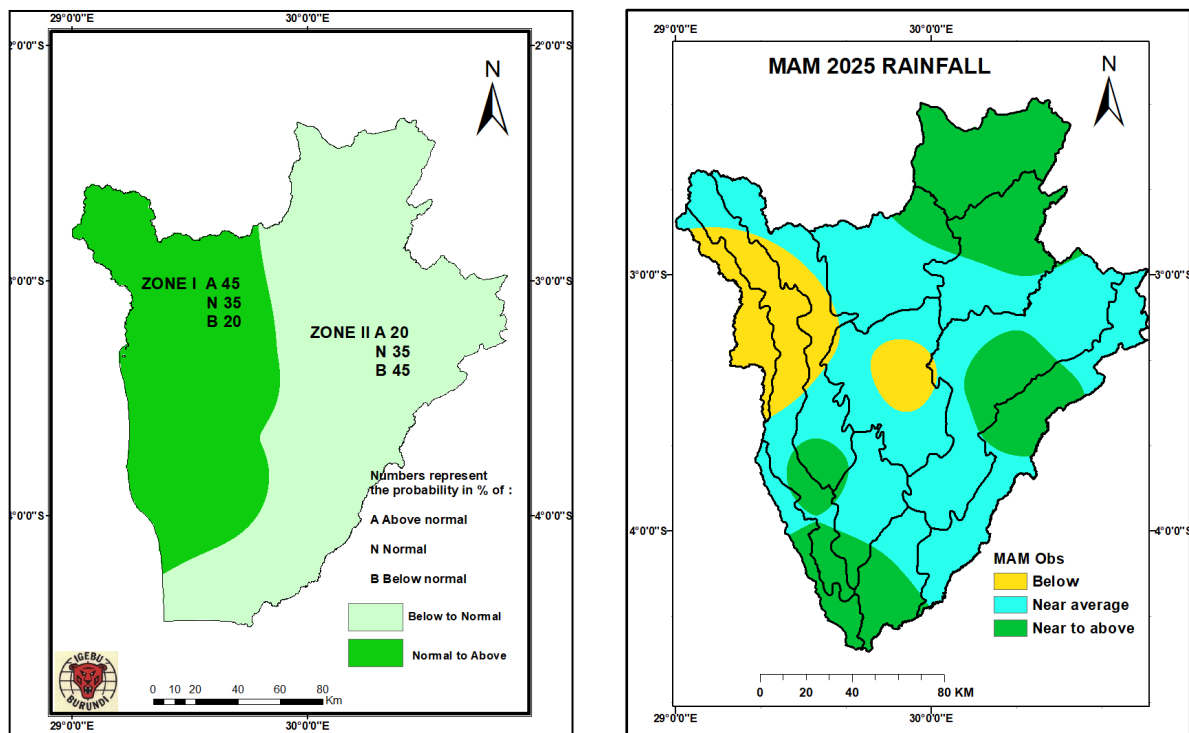


Figure 1b. Forecast probabilities of tercile rainfall categories for MAM 2025 issued at national level Burundi (left) and the observed rainfall for MAM 2025 (right).

2.2 State of global climate drivers

The current state of the global climate was presented by Rosanna Amato, who highlighted several key developments. Globally, March 2025 recorded unprecedented temperatures, ranking as the second warmest March on record after March 2024. Temperatures reached 1.5 °C above the pre-industrial reference period, signalling continued global warming.

Rosanna emphasized the importance of regional differences due to spatial variability. Notably, above-average temperatures were observed across various regions, including Ethiopia, illustrating how global trends manifest differently at the local level. Several factors were identified as key drivers of seasonal variability, including soil moisture levels, volcanic activity, ocean temperatures, and stratospheric conditions. In the Pacific Ocean, sea surface temperatures (SSTs) are currently near normal, and the present ENSO status is categorized as ENSO Neutral.

Model projections indicate that ENSO-neutral conditions are likely to persist from May through December 2025. However, the lingering effects of the recent La Niña may still influence weather patterns. Specifically, La Niña's residual impact could bring wetter-than-normal conditions during the June to September (JJAS) season, particularly in northern parts of East Africa, where it has historically been associated with increased rainfall.

The Madden-Julian Oscillation (MJO) is expected to play a significant role in shaping seasonal rainfall performance. In a changing climate, MJO is projected to induce more intense convective activity. Although the Indian Ocean Dipole (IOD) also influences rainfall patterns, it is currently forecast to remain in a neutral phase during this season. As a result, IOD is unlikely to have a major influence, especially since it shows little to no correlation with rainfall during the JJA period.

Finally, sub-seasonal drivers like the MJO are becoming increasingly important under changing climate conditions, particularly when major drivers such as ENSO and IOD are in neutral phases. However, MJO's predictability extends only about two weeks ahead, underscoring the importance of closely monitoring its evolution throughout the season.

2.3 June to September 2025 consolidated objective seasonal climate outlook

The JJAS season contributes more than 50% of the annual rainfall in the northern parts of the Greater Horn of Africa (GHA), highlighting its critical importance for the region. The forecast was generated using an objective multi-model approach that incorporated six global climate models: GFDL, CCSM4, ECMWF, CMCC, DWD, and JMA. These models were calibrated using three different statistical techniques; ensemble regression, logistic regression, and canonical correlation analysis which account for local, global, and ENSO influences on East African rainfall, respectively. The final seasonal outlook was derived by averaging the results from these three calibration methods.

The three calibration methods produced similar spatial rainfall patterns, indicating a consensus for above-normal rainfall across much of the northern GHA. This includes regions such as western Kenya, Uganda, South Sudan, Sudan, Eritrea, Djibouti, Ethiopia, and the northern coastal area of Somalia. The analogue years were also identified, 2001 and 2006 were chosen

Dry spell forecasts indicated that the longest post-onset dry periods are expected in areas such as western Kenya, eastern Uganda, and northern Sudan. Most of the region is likely to experience an initial dry spell ranging from 4 to 8 days.

Lastly, the temperature outlook revealed a significantly higher likelihood of above-normal temperatures in southern Ethiopia and Somalia, eastern Kenya, and northern Sudan. Conversely, normal to below-normal temperatures were forecast for northwestern Kenya, northeastern Uganda, southeastern South Sudan, Djibouti, Eritrea, central Sudan, and northeastern Ethiopia.

3.0 Methodology and Tools

3.1 Intra-seasonal characteristics

ICPAC produces seasonal forecasts with associated intra-seasonal characteristics. The intra-seasonal characteristics include onset (dates, anomalies, probability), length of season, cessation, dry and wet spells and the expected date of the spells. To generate these, five GCMs were used (ECMWF, ECCC, DWD, CMCC, and Meteo-France). The participants were taken through all the steps required to generate these characteristics for their respective countries.

3.2 Objective rainfall and temperature forecasts

ICPAC produces forecasts by downscaling global models using three different statistical methods (CCA, Linear regression and logistic Regression). Canonical Correlation Analysis (CCA) is done using the Python based Climate Predictability Tool (PyCPT) developed by IRI. The technique correlates observed rainfall over the GHA with model precipitation outputs over the north western Pacific Ocean (western V Gradient domain). On the other hand, the local linear regression uses the observed historical rainfall (CHIRPS) at each grid point in the GHA region and regresses it on the hindcast predicted rainfall. This regression analysis is done using an R code developed by ICPAC. The logistic regression used SSTs over the Nino 3.4 region domains. The consolidated forecast combined forecasts from the three methods. The forecast was obtained from 6 global models; ECMWF, CMCC, DWD, GFDL-SPEAR, COLA-CCSM4 and JMA

Analogue years were established using the past 12 month and predicted 4-month evolution of the Nino3.4 SST. Pattern correlations were also computed using February to April average SST anomalies with 1981-2010 climatology. Years that have highest 3 months-running average correlation with least bias were taken as analogues. For JJAS 2025, JJAS 2001 and 2006 were considered the best analogue years.

4.0 The Consolidated JJAS Forecasts

The final consolidated and annotated forecast maps for rainfall and temperature that were the main output of the workshop are as shown below. Individual model outputs for GHA are also shown. The forecast generation procedures were done for both national and regional scales and sample country results are also shown in the Annex.

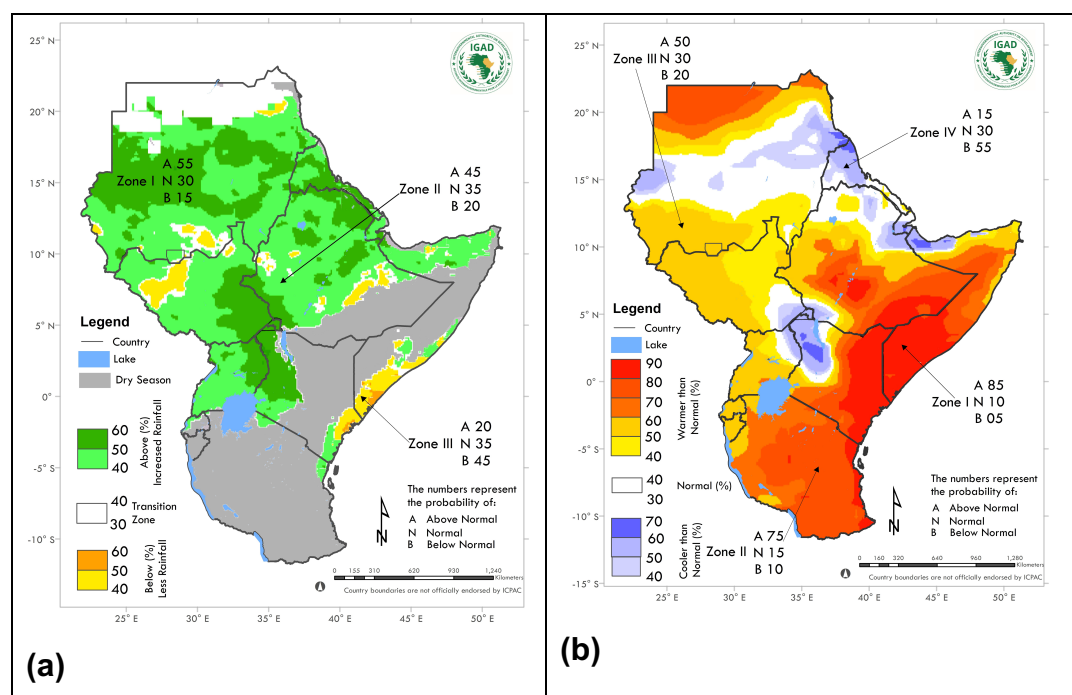


Figure 2: GHACOF70 issued a) Objective rainfall b) temperature forecast

The regional objective forecast shows that;

Rainfall

Zone I: In this zone (dark green), the probability for the above normal (wetter) category is the highest (55%). The probabilities for the normal and below normal categories are 30% and 15%, respectively.

Zone II: In this zone (green), the above normal rainfall (wetter) category also has the highest probability. The probability for the above normal category is 45%; the probabilities for the normal and below normal categories are 35% and 20%, respectively.

Zone III: In this zone (yellow), the below normal rainfall (drier) category has the highest probability (45%). The probabilities of the near normal and above normal categories are 35% and 20% respectively.

Temperature

Zone I: In this Zone (red), the above normal mean temperature (i.e., warmer) category is the most likely, with 85% chance. The probabilities for the near normal and below normal categories are 10% and 5% respectively.

Zones II: In this Zone (dark orange) also, the above normal mean temperature category has the highest probability (at 75%). The probabilities of the normal and below normal categories are 15% and 10%, respectively.

Zones III: In this Zone (yellow) also, the above normal mean temperature category has the highest probability (at 50%). The probabilities of the normal and below normal categories are 30% and 20%, respectively. Zones IV: In this Zone (blue), the below normal mean temperature category has the highest probability (at 55%). The probabilities of the normal and above normal categories are 30% and 15%, respectively

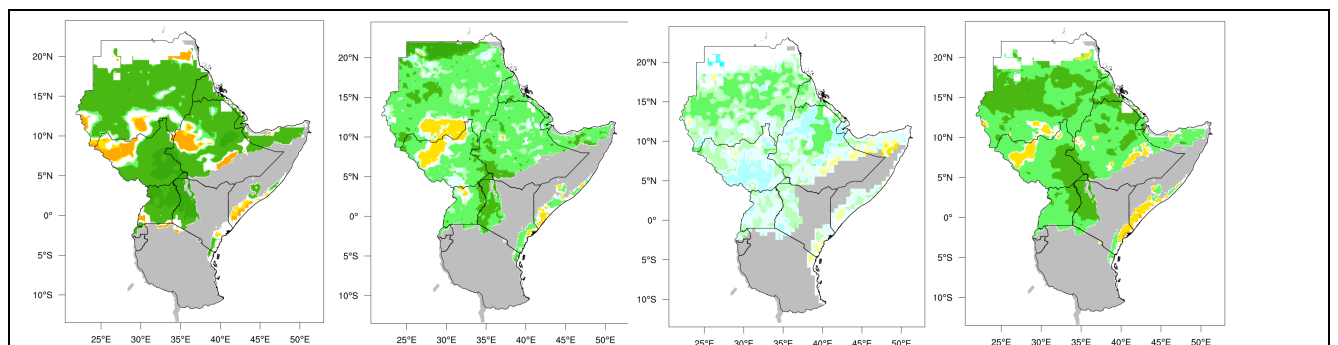


Fig 3a: The multi-model ensemble (MME) of each group: local regression (left), CCA (second) and the ensemble (right)

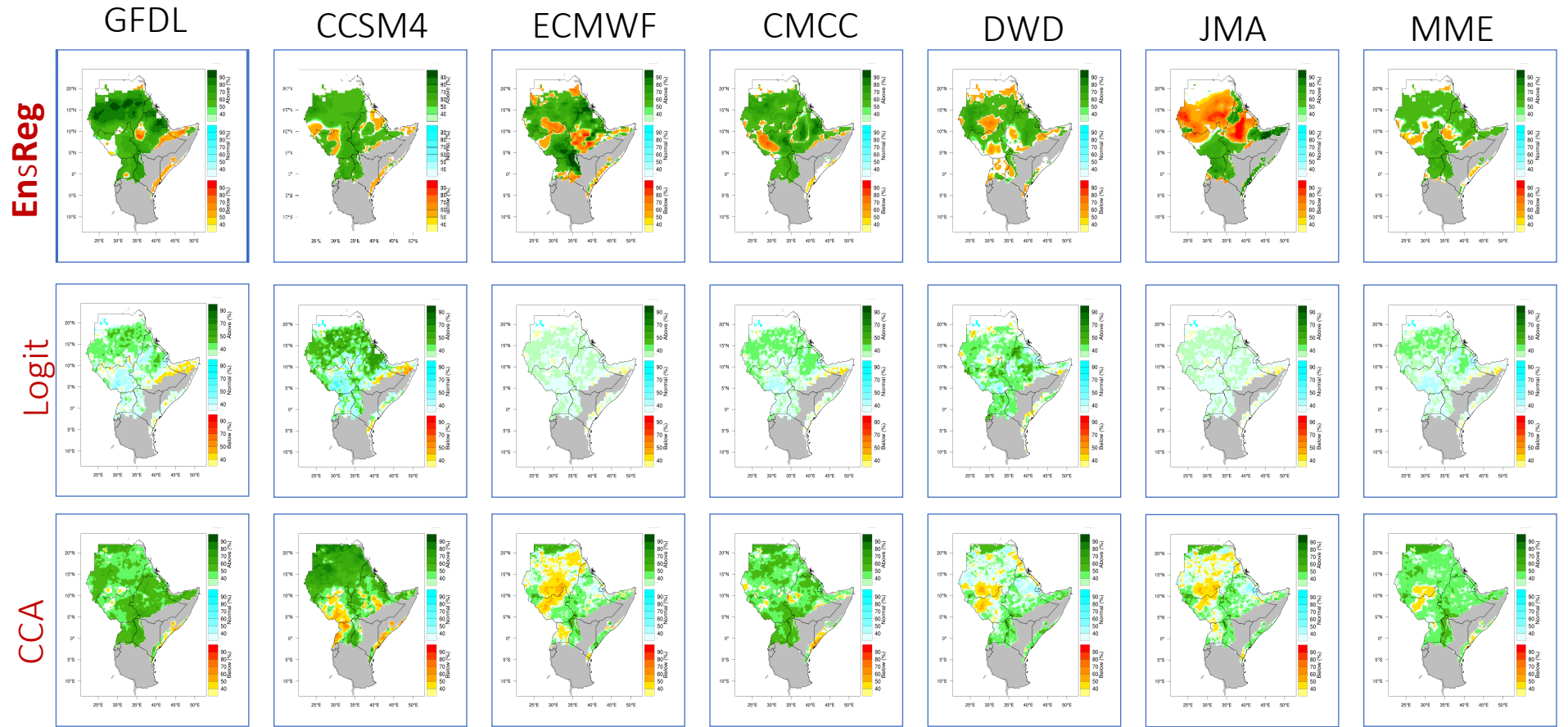


Figure 3b: Tercile probability outputs (probability of the most likely category) for JJAS 2025 from the 6 GCMs after post-processing with the EnsRegr (top row) and logit (middle row) and CCA (bottom) techniques and their respective model ensembles. The multi-model ensembles are shown at the end

5. Presentations and Closure

The training came to an end on Friday 16th May 2025 with country representatives giving a presentation of their results. The workshop was officially closed by Dr. Hussen Seid who thanked the participants and the facilitators for their hard work throughout the week. He encouraged them to actively contribute to GHACOF discussions that were expected to happen in Addis Ababa the following week.

Annex 1: List of Facilitators and Participants

List of Facilitators (ICPAC and Partners)

No.	Name	Country/Organization
1	Hussen Seid Endris	ICPAC
2	Masilin Gudoshava	ICPAC
3	Anthony Mwanthi	ICPAC
4	Paulino Omoj Omay	ICPAC
5	Stefan Lines	Partner
6	Eunice Koech	ICPAC
7	George Kabaka	ICPAC
8	Titike Bahaga	ICPAC
9	Tamirat Bekele	ICPAC

Country Representatives

No.	Name	Country
1	Donatien Ngendakumana	Burundi
2	Houssein Dirieh	Djibouti
3	Asaminew Teshome	Ethiopia
4	Caroline Amukono	Kenya
5	Aidarius Osman	Somalia
6	Samuel Thon	South Sudan
7	Ramadhan Omari	Tanzania
8	Ferdinand Vuguziga	Rwanda
9	Fathi Ali	Sudan
10	Mathew Roberts	Uganda