ICPAC

Statement from the 70th Greater Horn of Africa Climate Outlook Forum (GHACOF 70)

19-20 May 2025; Addis Ababa, Ethiopia

1.0 The Climate Outlook Forum

The 70th Greater Horn of Africa Climate Outlook Forum (GHACOF 70) was held from 19 - 20 May 2025, organised by the IGAD Climate Prediction and Applications Centre (ICPAC) in collaboration with the National Meteorological and Hydrological Services (NMHSs) of the Greater Horn of Africa (GHA), the World Meteorological Organization (WMO), and other international partners and hosted by the Ethiopia Meteorological Institute. The forum aimed at reviewing and documenting the performance and impacts of the March to May 2025 season, releasing the consolidated objective regional climate outlook for the JJAS 2025 season, discussing the implications of the JJAS 2025 climate forecast, and developing advisories and management strategies in various climate-sensitive socio-economic sectors.

The GHA region comprises eleven countries: Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Somalia, South Sudan, Sudan, Tanzania, and Uganda. Climate information users from the relevant socio-economic sectors such as disaster risk management, agriculture and food security, livestock, water resources, health, climate security and peace, and media, as well as NGOs and development partners, actively participated in a co-production process that highlighted the expected impacts and formulated advisories and mitigation strategies.

2.0 Consolidated Objective Climate Outlook for the June to September 2025 Rainfall Season

June to September (JJAS) is an important rainy season, especially in the northern and western parts of the GHA, where it generally contributes more than 40% of the total annual rainfall and more than 90% in parts of Sudan. The consolidated, post-processed seasonal forecast for JJAS 2025, based on six (6) Global Climate Models (GCMs-ECMWF-European Union, GFDL-United States, CMCC-Italy, DWD-Germany, CCSM4-Canada, JMA-Japan) initialised in May 2025, suggests an increased likelihood of above-average rainfall across most areas where the JJAS season is significant. Notably, there is a higher probability (around 55%) of above-normal rainfall over central Sudan, eastern South Sudan, parts of south-western and northern Ethiopia, western Kenya, and eastern Uganda. In addition, there is a substantial probability (approximately 45%) of wetter-than-average conditions across central

to western Uganda, central to western South Sudan, southern Sudan, central to western Ethiopia, Djibouti, and western Eritrea. However, exceptions include coastal regions of Somalia and Kenya, parts of north-western South Sudan, and south-eastern Ethiopia, where a 45% chance of experiencing below-normal rainfall is predicted (Figure 1).

There is a high probability (>90%) of rainfall exceeding 400 mm across most parts of the region where JJAS is an important rainy season, except for central Sudan and central to southern Uganda where probabilities fall below 30% (Figure. 2). The spatial distribution for the 500 mm threshold closely resembles that of the 400 mm. However, only a few areas, specifically the western parts of Ethiopia and South Sudan show a high likelihood (> 90%) of receiving more than 700 mm of rainfall. In contrast, eastern South Sudan has a low probability of exceeding 700 mm, while the rest of the region that usually experiences rain in JJAS is not expected to receive rainfall above this amount.

The predicted start of the JJAS 2025 season, based on 6 seasonal forecast systems that provided daily outputs (ECMWF-European Union, Météo-France, CMCC-Italy, DWD-Germany, ECCC-Canada, BOM-Australia), is shown in Figure 3. The onset dates are forecast to progress northwards consistent with the northward progression of the rainband. The forecast indicates that most parts of the region are likely to experience a normal onset of the season, with some areas showing a higher probability of an early start. However, a delayed onset is more probable in parts of western Ethiopia. It is important to note that in regions such as western Kenya, Uganda, parts of Ethiopia, and much of South Sudan, the early part of the JJAS season can manifest as a continuation of rainfall from the preceding season and therefore onset is not well-defined.

An examination of analogue years using the current Sea Surface Temperature (SST) pattern across the tropics and the predicted evolution of the Nino3.4 index (Figure 4) indicates that conditions expected in 2025 closely resemble those observed in 2001 and 2006. Analysis of the rainfall performance during JJAS in 2001 and 2006 shows wetter-than-normal conditions over much of the region, consistent with the JJAS 2025 objective consolidated forecast. However, it is important to note that the rainfall distributions observed in the analogue years represent just two examples of conditions that can occur when large-scale climate conditions are similar to those expected for JJAS 2025. The socio-economic impacts in those years can offer guidance to stakeholders on potential response strategies. However, it is emphasised that the objective forecast is based on the latest climate data specific for the upcoming season. In contrast, the information provided by the analogue years is indicative only and should not be used to replace the objective forecast.

The consolidated objective temperature forecast from six (6) GCMS (consistent with the ones used for rainfall forecast) from Global Producing Centres (GPCs) indicates a likelihood of warmer than normal surface temperatures over most parts of the region (Figure 5). Probabilities for warmer than normal temperatures are most enhanced over northern and southern Sudan, most parts of South Sudan, central to southern Ethiopia, Somalia, central to eastern and southern Kenya, Rwanda, Burundi and Tanzania. Normal to cooler than normal conditions are expected over parts of central Sudan, western Eritrea, northern Ethiopia, Djibouti and cross border areas of South Sudan, Uganda, Ethiopia and Kenya.

The outlook is relevant for seasonal timescales and for relatively large geographical areas. Local and month-to-month variations might occur as the season progresses. While the rainfall forecast indicates that wetter than usual

conditions are most probable over most parts of the GHA region, which usually receive rain in the JJAS season, dry spells may occur in areas with an increased likelihood of above normal to near normal rainfall and vice versa. ICPAC will provide regional updates on a regular basis, while the National Meteorological and Hydrological Services (NMHSs) will provide detailed national and sub-national climate and weather updates.

3.0 Methodology

In line with the recommendation of the World Meteorological Organization (WMO), ICPAC has implemented an objective seasonal forecast procedure to generate climate forecasts for the Greater Horn of Africa (GHA). May 2025 initialized seasonal forecasts from six Global Producing Centres (GPCs) were utilized and processed using three calibration techniques (canonical correlation analysis, logistic and linear regression) to develop the JJAS 2025 seasonal climate outlook. The final consolidated forecast is obtained by averaging the forecasts generated by the three calibration techniques.

Forecast probability distributions are generated objectively to indicate the likelihood of above-normal, normal, or below-normal rainfall for each zone. Above-normal rainfall is defined as the upper third of historical JJAS rainfall totals, below-normal as the lower third, and normal as the range between the upper and lower third of the rainfall totals. Climatology here refers to the historical series of observed weather conditions over the 30-year period (1991-2020). Forecast probability distributions for temperature are also generated. The JJAS 2025 outlooks for both rainfall and temperature for the various zones within the GHA region are given in Figure 1 and Figure 5, respectively.

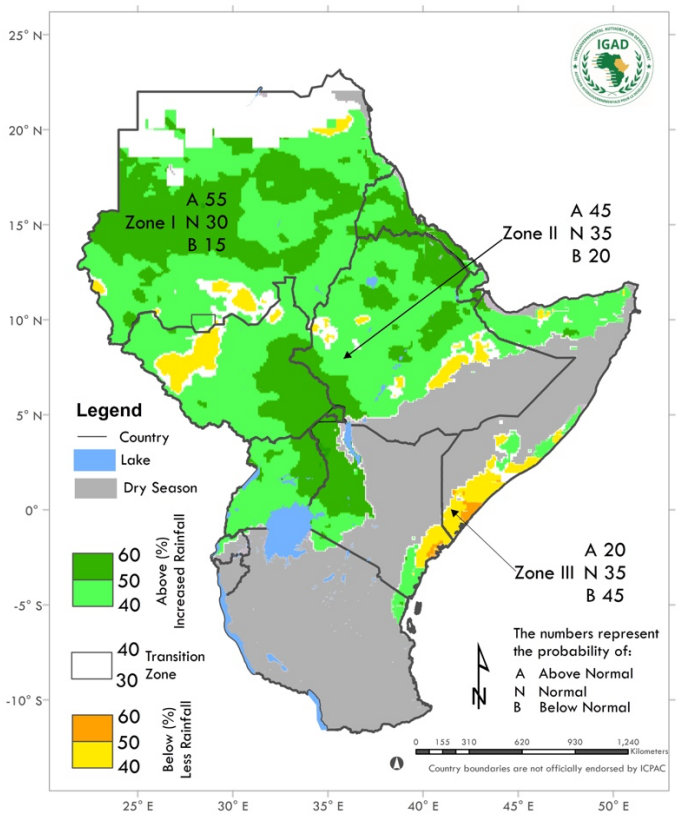
Experts also examined the prevailing and predicted SSTs over the Pacific, Indian, and Atlantic Oceans as well as other global and regional climate factors that affect the rainfall evolution during the JJAS season. These factors were assessed using dynamical and statistical models. The SST conditions over the equatorial Pacific Ocean are currently near average. WMO and major global producing centers have indicated that ENSO-neutral is favored to persist through JJAS 2025 season, with about a 75% chance during June-August and greater than 60% chance through July-September 2025. Currently, higher-than-average temperatures are present in the tropical Indian Ocean and the Indian Ocean Dipole is in neutral phase. The multi-model forecast from the global producing centers indicates that the IOD is expected to remain neutral until July and favor negative conditions from August 2025.

The JJAS rainfall interannual variability in the GHA is strongly linked with SST anomalies in the tropical Pacific Ocean. El Niño (La Niña) episodes have been shown to be associated with dry (wet) conditions during the JJAS season across much of the northern part of the GHA region. However, historically, the IOD has shown little to no effect on JJAS rainfall over the GHA. Updates on the ENSO and IOD conditions will be provided regularly by the WMO and the major global producing climate centers.

The seasonal forecast was developed during the pre-COF70 climate capacity-building workshop held in hybrid format from 12th to 16th May 2025. During this workshop, regional scientists and forecasters from ICPAC Member States used ICPAC's High-Performance Computing (HPC) cluster and developed regional and national-level climate outlooks.

4.0 Probability Forecast of Rainfall for June to September 2025

The rainfall outlook for various zones within the GHA region is given in Figure 1:



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.

Figure 1. Probability forecast of rainfall for various zones within the GHA region for June to September 2025. Grey shading indicates regions where JJAS is climatologically a dry season.

Note: In Fig 1, the numbers (next to A, N and B) for each zone indicate the probabilities of rainfall in each of the three categories: above-, near-, and below-normal. For example, in Fig. 1, the top number (A) indicates the probability of rainfall occurring in the above-normal category; the middle number (N) is for near-normal and the bottom number (B) is for below-normal category. In the case of Zone-I (Fig. 1) for instance, there is 55% probability of rainfall occurring in the above-normal category, 30% probability of rainfall occurring in the near-normal category; and 15% probability of rainfall occurring in the below-normal category. Note that boundaries between zones should be considered as transition areas. It is important to consider the associated uncertainties, as the forecast also indicates a 35% chance of near-normal rainfall and a 20% probability of below-normal rainfall.

5.0 Probability of Exceedance for user specified thresholds

The probability of seasonal rainfall exceeding a certain user specified thresholds are indicated in Figure 2. High chances (>90%) of exceeding *400mm* and *500mm* are evident for the regions that have an active JJAS season. Western South Sudan and Ethiopia are forecast to have high chances (>90%) of exceeding *700mm* however, parts of eastern South Sudan have a low chance (< 30%) of exceeding this threshold.

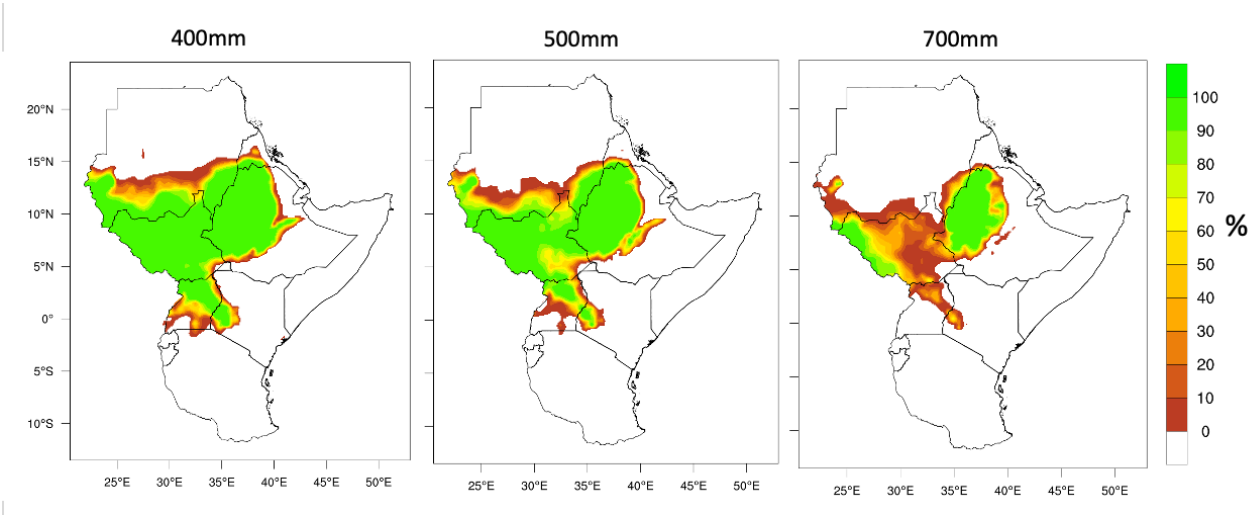


Figure 2: The Probability (%) of the JJAS seasonal rainfall exceeding 400 mm (left), 500 mm (middle) and 700 mm (right)

6.0 Probability Forecasts of the Start of JJAS 2025 Season and the Expected Approximate Onset Dates

The predicted most likely start dates of the June to September 2025 season as well as forecast probabilities for three categories of onset time (early/normal/late) are provided in Figure 3. The forecast was generated by utilizing daily rainfall forecasts derived from six Global Climate Models, from the C3S Climate Data Store, incorporating a total of 223 ensemble members.

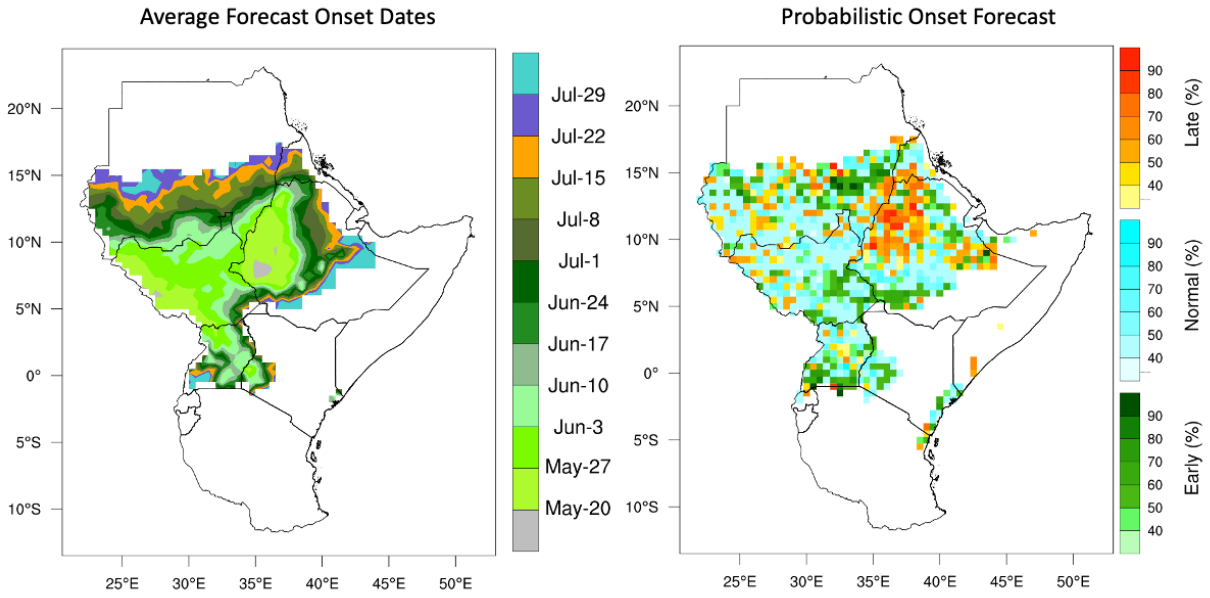


Figure 3: The most likely rainfall onset dates for the JJAS 2025 season from model ensemble mean values (left) and the forecast probabilities for three (tercile) categories of onset timing showing early, normal, or late onset (right).

7.0 Analogue Years based on the Current Global SST Patterns & Nino3.4 Index Evolution

The selection of analogue years based on the Nino3.4 index is carried out by calculating the correlation and the mean difference between the combined observed and forecast evolution of Nino3.4 in the target year and the corresponding Nino3.4 index for the same period in previous years (Fig. 4). Comparing the evolution of the Nino3.4 index in the analogue years with the observed/predicted evolution in 2025 indicates that ENSO neutral conditions will persist throughout the JJAS season.

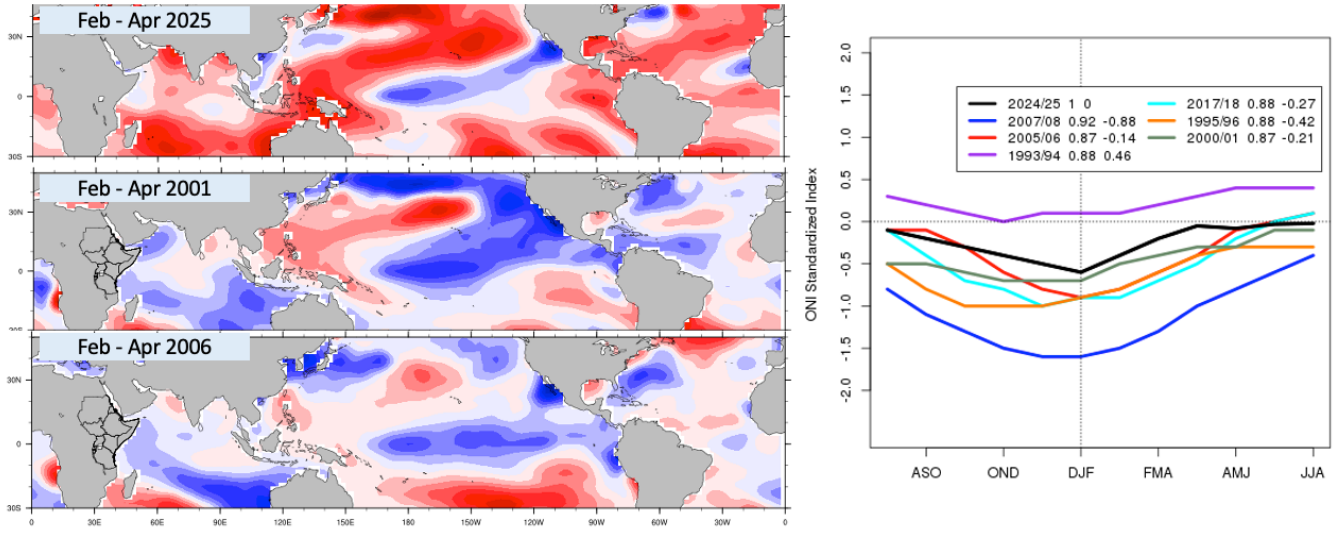
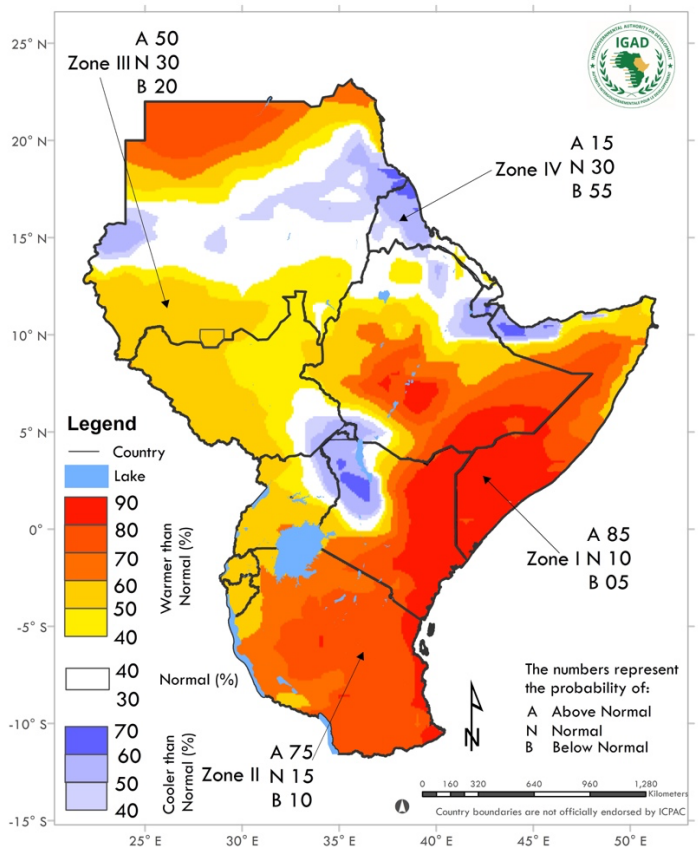


Figure 4: The plot on the left (top) shows the current (February - April 2025) pattern of SST anomalies over the tropical Oceans. The plot on the right shows the evolution of the Nino3.4 index extended by the predicted values (black) compared with the observed evolution for years which closely match that shown for 2025. The closeness of the match is measured by the temporal correlation and the mean difference (given in the box). The February-April SST anomalies for two of the selected analogue periods (2001 and 2006) are provided (left, bottom) for comparison with the February – April 2025 anomalies.

8.0 Probability Forecast of Temperature for June to September 2025

The temperature outlook for various zones within the GHA region is given in Figure 5.



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.

Figure 5: Probability forecast of mean surface temperatures for June to September 2025 season.

Partners

GHACOF 70 was organized jointly by IGAD's Climate Prediction and Applications Centre (ICPAC) and the National Meteorological and Hydrological Services (NMHSs) of the Greater Horn of Africa (GHA) and climate scientists, as well as other experts from national, regional, and international institutions and organizations: UK Met Office, NOAA CPC-International Desk and WMO Global Producing Centres (GPCs). Ethiopia Meteorological Institute hosted the event.

Funders