ICPAC

# The Continental Knowledge Sharing Workshop Report

09-13th March, 2026 | Kigali, Rwanda

**Executive Summary**

The Continental Knowledge Sharing Workshop on Climate Services, held from 9–13 March 2026 in Kigali, Rwanda, convened Africa's Regional Climate Centres (RCCs), National Meteorological and Hydrological Services (NMHSs), and key regional and international partners to strengthen collaboration, harmonize forecasting practices, and enhance the delivery of user-oriented climate services across the continent. The workshop was organized under the Enhancing the Preparedness of African Countries and Regions for Climate Solution Planning and Implementation Capacity project funded by AGRA and the WISER PASS (Pan-African Climate Services for Anticipatory Action) programme funded by the UK FCDO.

Participants included the following Regional Climate Centres ICPAC, ACMAD, AGRHYMET, CAPC, SADC-CSC and the Morocco RCC Node , alongside partners including the UK Met Office, WMO, NORCAP, and development agencies. In order to get feedback from the users the National Meteorological and Hydrological Services (NMHS) representing the different regions were also invited. Discussions underscored Africa's increasing vulnerability to climate-related hazards, including floods, droughts, and heatwaves—and the urgent need to strengthen the translation of climate information into actionable insights for sectors such as disaster risk management, agriculture, water resources, health, and energy.

The workshop highlighted progress made in advancing forecasting capabilities across RCCs, including the use of global and regional models, ensemble prediction systems, and emerging tools for impact-based forecasting. However, participants also identified persistent challenges, including inconsistencies in methodologies across Centres, limited interoperability of data systems, gaps in downscaling regional products to national and local levels, and barriers in effectively communicating forecasts to end users.

Key outcomes of the workshop included strengthened knowledge exchange and peer learning among RCCs and NMHSs, progress toward harmonization of forecasting practices, and renewed commitment to improving interoperability of climate data, tools, and services across institutions. The workshop also emphasized the importance of impact-based forecasting (IbF), encouraging the integration of hazard forecasts with exposure and vulnerability information to better inform decision-making and anticipatory action

A major milestone was the establishment of a Community of Practice (CoP) to sustain collaboration among RCCs and partners, fostering continuous learning, exchange of best practices, and coordinated development of climate services across Africa. Participants emphasized the need for sustained capacity building, co-production of services with users, and stronger institutional partnerships to ensure that technical advancements translate into real-world impact. The CoP will be chaired by ICPAC with ACMAD serving as the secretary.

In conclusion, the Kigali workshop marked a significant step toward a more coordinated, interoperable, and impact-driven climate services framework in Africa. By strengthening collaboration across RCCs, advancing harmonized forecasting approaches, and promoting sectoral integration, the workshop reinforced the critical role of climate services in supporting resilience, risk reduction, and anticipatory action across the continent.

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## 1.0 Introduction

Africa's vulnerability to climate-related hazards including droughts, floods, heatwaves, and erratic rainfall continues to intensify, posing profound risks to food security, public health, water resources, and economic stability. Effective climate services are therefore essential to support informed decision-making, anticipatory action, and climate resilience across the continent. However, the delivery of high-quality, timely, and locally relevant climate information requires strong coordination among Regional Climate Centres (RCCs), National Meteorological and Hydrological Services (NMHSs), and a wide range of sectoral partners.

This report presents the proceedings of the Continental Knowledge Sharing Workshop on Climate Services, held from 9–13 March 2026 in Kigali, Rwanda. The workshop was organized under two complementary initiatives: the "Enhancing the Preparedness of African Countries and Regions for Climate Solution Planning and Implementation Capacity" project, funded by the Alliance for a Green Revolution in Africa (AGRA), and the WISER Pan-African Climate Services for Anticipatory Action (PASS) programme, funded by the UK Foreign, Commonwealth and Development Office (FCDO). Together, these initiatives aim to strengthen the scientific and institutional foundations for climate services across Africa, improving the accuracy, accessibility, and applicability of climate information for diverse users and sectors.

The workshop brought together representatives from Africa's six Regional Climate Centres — ICPAC, ACMAD, AGRHYMET, CAPC-AC, SADC-CSC, and the Morocco RCC Node — alongside National Meteorological and Hydrological Services from across the continent, international partners including the UK Met Office, WMO, NORCAP, and representatives from the health, agriculture, and humanitarian sectors. Over five days, participants engaged in technical sessions, plenary discussions, and collaborative exercises focused on four thematic areas: seasonal forecasting methodologies, numerical weather prediction and artificial intelligence applications, climate data management and monitoring, and communication of climate information to users.

This report captures the key presentations, discussions, and outcomes from the workshop, highlighting progress made in advancing climate services across the continent and outlining the collaborative commitments and next steps agreed upon by participants. It is intended to serve as a reference document for the broader community of climate service providers, policymakers, development partners, and sectoral users engaged in strengthening Africa's climate resilience.

### 1.1 Opening Remarks

The Regional Climate Services Workshop in Kigali opened with a video from the UK Met Office, highlighting the WISER PASS Programme, which aims to strengthen sub-seasonal to seasonal climate services across Africa and support anticipatory action against climate extremes. The programme operates through Africa's Regional Climate Centres (ACMAD, ICPAC, AGRHYMET, SADC CSC), using a capacity cascade model to tailor regional climate information for national and local users. The Met Office emphasized Africa's vulnerability to climate variability, the need for timely, user-centered information, and strengthened partnerships with sectors such as agriculture, health, and youth networks to ensure actionable climate services. Challenges include gaps in translating regional forecasts into locally relevant information, which WISER PASS seeks to address through capacity building and collaboration.

***Figure 1: Opening Remarks from ACMAD, Rwanda Meteo and ICPAC***

ICPAC Director welcomed participants on behalf of the Centre, acknowledging partners including the UK Met Office, WMO, AGRA, NORCAP, and WISER. He highlighted the increasing severity of climate risks in Africa—droughts, floods, and heatwaves—and stressed the importance of making climate forecasts understandable and actionable. The Director outlined key objectives for the workshop: strengthening knowledge exchange, harmonizing forecasting methodologies, developing a common framework for coordinated climate prediction, and formalizing a community of practice among climate service providers. He emphasized the critical role of RCCs in bridging global forecasts with national services and called for strong collaboration to enhance climate services across the continent.
Director General of Rwanda Meteorology Agency welcomed participants on behalf of the Government of Rwanda. He highlighted Rwanda's vulnerability to climate change, including extreme rainfall, landslides, droughts, and rising temperatures, and the need for accurate and locally relevant climate information. He emphasized the workshop's role in promoting collaboration among RCCs, NMHSs, and partners, harmonizing methodologies, and sharing technical knowledge. He also stressed inclusivity in climate services, particularly for gender and youth perspectives, and encouraged active engagement to strengthen regional climate collaboration.
The Continental RCC Knowledge-Sharing Workshop aimed to harmonize climate products across African Regional Climate Centres (RCCs), promote knowledge exchange and best practices among RCCs and National Meteorological and Hydrological Services (NMHSs), and advance co-production of climate services with stakeholders. Key expected outcomes included the development of a draft common framework for consistent forecasting, establishment of a community of practice for ongoing collaboration, and strengthened coordination of continental climate outlook processes, including preparations for upcoming seasonal forecasts and the launch of the African Climate and Health Desk. Overall, the workshop sought to enhance collaboration, technical capacity, and the usability of climate services across Africa.

**1.2 Project Presentations: Funding Frameworks and Programme Overviews**

The following presentations introduced the key funding frameworks and programmes underpinning the workshop, providing participants with an overview of the strategic initiatives driving collaboration and capacity development among Africa's Regional Climate Centres. Each presentation outlined project objectives, institutional partnerships, and expected contributions to strengthening climate services across the continent.

### 1.2.1 AGRA Project

The first presentation highlighted a newly launched collaboration between the IGAD Climate Prediction and Applications Centre (ICPAC) and the Alliance for a Green Revolution in Africa (AGRA). This initiative is designed to strengthen climate services and enhance climate resilience across Africa's agricultural sector.

The partnership emerged from initial discussions between ICPAC and AGRA, which identified three priority areas: engaging youth in climate services, addressing climate change impacts, and fostering stronger collaboration among African Regional Climate Centres to improve the quality and usability of climate information across the continent. Building on these discussions, a joint project proposal was developed and approved, receiving approximately USD 850,000 in grant funding from AGRA, complemented by USD 250,000 in in-kind support from ICPAC, primarily through technical expertise and human resources. The total project value stands at about USD 1.1 million.

Titled "Enhancing the Preparedness of African Countries and Regions for Climate Solution Planning and Implementation Capacity," the project seeks to strengthen the resilience and climate adaptation of Africa's agri-food systems. It will achieve this through capacity building, empowerment of youth and women, and the delivery of effective climate services to support agricultural decision-making.

The initiative is structured around three core objectives:
Enhancing youth engagement in the climate services value chain, recognizing young people as catalysts for innovation and climate action.
Supporting climate change action by providing technical assistance to countries in developing and implementing National Adaptation Plans (NAPs) and Nationally Determined Contributions (NDCs) under international frameworks such as the Paris Agreement.
Strengthening collaboration among Regional Climate Centres, improving production, coordination, and delivery of climate services continent-wide.
Expected outcomes include increased youth participation in climate initiatives, more resilient agricultural systems, and strengthened institutional capacity to develop climate investment strategies and implement adaptation and mitigation measures. The project also aims to foster knowledge sharing and partnerships among regional climate institutions.
Planned activities encompass training workshops for youth and young farmers, development of digital platforms to facilitate youth engagement, and capacity-building programs focusing on climate risk assessment, climate finance, adaptation strategies, and carbon markets. In addition, youth will be supported to participate in global climate discussions, including UNFCCC processes and future COP meetings.
The project further seeks to enhance the accessibility and use of climate projections, developing visualization tools and training to help decision-makers apply climate scenario information in practical adaptation planning. Finally, the initiative will strengthen institutional collaboration among African Regional Climate Centres through formal partnerships and Memoranda of Understanding (MOUs), supporting more coordinated and effective climate services across the continent.

### 1.2.2 Overview of WISER PASS–East Africa Project (PASS-EA)-(ICPAC)

The second presentation provided an overview of the WISER Pan-African Seasonal Strengthening – East Africa (PASS-EA) programme, highlighting its role in enhancing seasonal and sub-seasonal climate services in the Greater Horn of Africa. PASS-EA operates under a capacity cascade model, where climate information and expertise are developed at the regional level through Regional Climate Centres and then translated into actionable guidance for national and local users, including government agencies, humanitarian organizations, media, and communities.

A core focus of the programme is strengthening the scientific and operational capacity of ICPAC and National Meteorological and Hydrological Services (NMHSs), improving S2S forecasting through dynamical and statistical models, as well as emerging technologies like AI and machine learning. The initiative also supports expanded computational capacity, including high-performance computing for climate modeling and data storage.

PASS-EA emphasizes improving communication and usability of climate information, training journalists, policymakers, and sectoral users, while promoting inclusive climate services that integrate gender equality and social inclusion considerations. The programme builds on existing initiatives such as AICCRA to strengthen coordination and maximize impact.

Key achievements include capacity-building for national forecasters, support to regional and national climate outlook forums, and enhanced co-production of climate information with stakeholders. Through these efforts, PASS-EA aims to improve the science, coordination, and application of climate services, enabling better climate risk management and supporting climate-resilient development across the region.

### 1.2.3 WISER PASS Project Overview (ACMAD)

The third presentation provided an overview of the Pan-African Seasonal Strengthening (PASS) initiative as implemented by the African Centre of Meteorological Applications for Development (ACMAD) under the broader WISER programme. The initiative aims to strengthen the capacity to produce, communicate, and apply seasonal climate information across Africa, while enhancing collaboration between Regional Climate Centres (RCCs) and National Meteorological and Hydrological Services (NMHSs).

A key focus of the programme is improving the accessibility and usability of climate information for sectoral users, particularly in disaster risk reduction, agriculture, and health. This includes strengthening User Interface Platforms (UIPs) to facilitate co-production of climate services, ensuring forecasts and advisories meet the needs of key sectors. For the health sector, PASS supports early warning systems for climate-sensitive diseases, such as meningitis, and the development of climate-informed health products for decision-makers.

The programme also emphasizes enhancing cloud computing capacity, developing continental training and knowledge-sharing platforms, and promoting collaboration among RCCs and national institutions. Existing regional monitoring tools, like the East Africa Drought Watch, are being scaled to the continental level to improve drought monitoring and broader climate services.

Overall, the PASS initiative seeks to strengthen regional coordination, enhance climate data infrastructure, and deliver actionable climate services that support informed decision-making and improve climate resilience across Africa.

### 1.2.4 Accord Project

The second presentation on Day 3 introduced the ACCORD Project, presented by Godfrey from the African Centre of Meteorological Applications for Development (ACMAD). The initiative aims to address longstanding challenges in climate data availability, accessibility, and infrastructure across Africa, which continue to limit forecasting skill, climate research, and evidence-based decision-making.

A key issue highlighted was that much of Africa's historical meteorological data remains undigitized or stored outside the continent, often within international institutions. To address this, the ACCORD Project seeks to repatriate and centralize climate data by collaborating with global partners, including the Copernicus Programme, to recover historical station records and integrate them into operational climate systems.

In its initial phase, supported by partners including the Bill & Melinda Gates Foundation, pilot activities are being implemented in Kenya and Nigeria. These pilots focus on establishing a continental climate data library, developing automated data pipelines, and designing governance frameworks for

sustainable data management. The project is also exploring machine learning approaches to help digitize and integrate legacy datasets into modern forecasting workflows.
Beyond data archiving, the initiative aims to build a shared continental data infrastructure capable of supporting multiple applications, including operational forecasting, AI and machine learning development, hydrological and impact-based forecasting, and climate research. Capacity-building efforts will also support National Meteorological and Hydrological Services (NMHSs) in improving data management and integration into forecasting systems.
Overall, the ACCORD Project seeks to strengthen Africa's climate data sovereignty and forecasting capacity by developing interoperable data systems and fostering collaboration between NMHSs, Regional Climate Centres, and continental institutions.

## 2.0 Seasonal Forecasting Across Regional Climate Centers

### 2.1 ACMAD

The presentation by ACMAD focused on the methodologies used to generate seasonal climate outlooks for Africa, highlighting both objective forecasting and consensus-based approaches. Objective forecasting relies on quantitative, data-driven techniques, including statistical and dynamical climate models, historical climate datasets, large-scale climate driver analysis, and outputs from global models. These approaches minimize subjective judgment, although expert consensus remains crucial for refining and validating forecasts.

Key analytical techniques include trend analysis, climate variability analysis, analogue years, dry/wet year assessment, and rainfall distribution studies, which help forecasters understand potential seasonal conditions, onset timing, and intra-seasonal variability. Advanced methods such as Canonical Correlation Analysis (CCA) using the Climate Predictability Tool (CPT) are used to explore statistical relationships between climate predictors and seasonal rainfall, incorporating teleconnection signals to enhance predictive skill.

The presentation emphasized forecast verification to evaluate past predictions against observed conditions, improving the reliability of future forecasts. Challenges noted include limited data availability, variable data quality, and computational constraints, which often necessitate a hybrid approach combining objective model outputs with expert consensus. In conclusion, strengthening data sharing, harmonization, and forecasting infrastructure was highlighted as critical for improving seasonal climate prediction across Africa.

### 2.2 CPAC-AC

The presentation introduced the Climate Application and Prediction Centre for Central Africa (CAPC-AC) and its operational forecasting systems, currently functioning as a Regional Climate Centre (RCC) in a demonstration phase. Headquartered in Cameroon, and established in 2015, CAPC-AC produces climate services to support disaster risk management, agriculture, and socio-economic planning across Central Africa.
Monthly forecasts are based on CFSv2 initial conditions, while sub-seasonal forecasts (4–6 weeks) use blended outputs from dynamical and multi-model ensembles.
Seasonal forecasts rely on objective techniques using multi-model ensembles from Copernicus Climate Change Service (C3S) and statistical tools like PyCPT.
CAPC-AC processes outputs through GIS and multi-model analyses to produce risk-based climate products, including probabilistic rainfall forecasts, threshold-based rainfall monitoring, convection risk

maps, and dry air intrusion assessments. Forecast verification uses both model outputs and satellite observations to ensure reliability.

Operational forecasts at sub-seasonal to seasonal scales are provided in probabilistic categories (below-normal, near-normal, above-normal) to guide anticipatory action and disaster preparedness. Challenges include limited in-situ observational data, reliance on satellites, and computational infrastructure constraints.

The presentation emphasized standardized thresholds, collaborative product development with member states, and data-sharing across RCCs to ensure harmonized and user-relevant climate services. Overall, CAPC-AC integrates multiple models and observational datasets to support early warning, preparedness, and regional climate resilience, while continuing to enhance interoperability and coordination at the continental level.

### 2.3 ICPAC

The IGAD Climate Prediction and Applications Centre (ICPAC) presented its methodologies for producing objective seasonal climate forecasts for the Greater Horn of Africa, highlighting the use of statistical calibration techniques to improve forecast skill and reliability. A key challenge discussed was the transition from the IRI Data Library, historically used to access model datasets for tools like the Climate Predictability Tool (CPT). With maintenance of the library discontinued, ICPAC is migrating to datasets provided directly by the Copernicus Climate Data Store (C3S) to ensure continuity of operational forecasting.

ICPAC currently employs three primary calibration methods. Linear regression is used to correct model outputs by relating ensemble mean forecasts from global climate models (GCMs) to observed rainfall, validated through leave-one-out cross-validation to ensure robustness. Canonical Correlation Analysis (CCA), implemented via CPT and PyCPT, identifies correlations between large-scale climate predictors and rainfall patterns, enabling multi-model ensemble forecasts. Logistic regression is applied to categorical outcomes, such as the probability of above- or below-normal rainfall, with predictors including Indian Ocean sea surface temperature (SST) gradients, which are strongly associated with dry conditions during the March–May season. This method has shown promise for dry-season predictions.

The Centre is also exploring skill-based calibration techniques, which adjust model output distributions to match observed climatology, improving reliability, particularly for precipitation forecasts.

Following calibration, ICPAC produces consolidated seasonal forecasts by averaging outputs from multiple models and methods, with flexibility to select model subsets for specific regions or seasons. These forecasts are provided in digital formats for a wide range of sectoral applications, including hydrological modeling, threshold-based rainfall forecasting, drought monitoring via the Standardized Precipitation Index (SPI), and intraseasonal rainfall characterization such as onset, dry spells, and wet spells. Large ensembles, sometimes up to 200 members, allow estimation of probabilities for early, normal, or delayed rainfall onset.

Verification of forecasts is conducted at the end of each season using statistical skill scores. Forecast skill varies seasonally, with higher accuracy generally observed during the October–December (OND) season compared to June–September (JJAS).

Overall, the presentation underscored the importance of combining statistical calibration, multi-model ensembles, and climate drivers to enhance seasonal forecasting skill. It also highlighted ICPAC's ongoing efforts to modernize forecasting workflows, transition to new data platforms, improve calibration methods, and strengthen verification practices, all aimed at providing more reliable and actionable climate information for the Greater Horn of Africa.

**2.4 North Africa RCC Node**

The North Africa Regional Climate Centre (RCC), represented by Morocco, presented its approach to seasonal forecasting, highlighting the ongoing transition from consensus-based methods to objective, data-driven forecasting. Since 2013, Morocco has been operating high-resolution climate models (55 km resolution) and conducting subsurface predictions and downscaling tests to improve seasonal forecast performance. These forecasts support a range of applications, including regional climate trend monitoring, reservoir management, coordination among Arab countries, and sub-seasonal forecasting.

The move toward objective forecasting integrates full climate datasets, dynamic and statistical models, and increasingly leverages machine learning and AI techniques, aligning with WMO recommendations for reproducibility and well-documented outputs. Collaboration with international partners such as the UK Met Office, NOAA, and regional networks supports skill assessment, bias correction, and calibration of forecasts, ensuring the information is actionable across socio-economic sectors.

Three main priorities guide the transition: assessing forecast skill and verification, producing probabilistic and calibrated outlooks, and expanding the use of machine learning techniques. Pilot studies, including Canonical Correlation Analysis (CCA) calibration of tropical and regional models, have been conducted at *Hassania* School of Morocco. The RCC has also adopted Open CHIRPS datasets to enhance data reliability amid limited LAA data availability. Forecasts now incorporate direct and indirect climate signals to maximize model-observation correlation.

Examples from the 2024–2025 season demonstrated strong forecast skill, particularly during the DJF season, with ROC scores exceeding 0.63 in some areas. A six-model ensemble successfully captured dry conditions across the region, verified against ERA5 reanalysis, marking the third consecutive season of successful application.

Looking ahead, Morocco plans to expand its seasonal and sub-seasonal forecasting capacity, integrate over 35 identified climate drivers into operational forecasts, and strengthen regional collaboration, further advancing climate services and supporting decision-making in the MENA region.

**2.5 SADC-CSC**

The SADC-CSC follows a multi-step process to produce seasonal forecasts. Statistical models are run using two tools: CFT and PyCPT which perform downscaling of global model outputs and statistical regression using observed predictor data. Results from multiple models are compiled into a consolidation table, and the CFT Synthesis tool is then used to generate an Objective Consensus Outlook. Forecasters discuss and finalize the outlook at a Pre-COF meeting, drawing zones of homogeneous outlook before compiling either an Outlook Statement or a full Seasonal Bulletin.

The CFT tool uses multivariate regression between historical predictors and predictands. It offers six regression model options: Ordinary Least Squares, Lasso, Ridge, Random Forest, Decision Trees, and Multi-Layer Perceptron. For dimensionality reduction of gridded predictors, users can choose between Principal Component Analysis (PCA) or Canonical Correlation Analysis (CCA). Probabilistic forecasts are derived by intersecting the prediction error distribution with observed climatological terciles.

Objective seasonal forecast principles and confidence levels were introduced in 2023. Outlook maps are annotated with confidence information derived from model agreement, demonstrated skill, and forecaster judgment. The most recent outputs shown were SARCOF-32 outlooks covering FMA, MAM, and AMJ 2026, with much of the southern SADC region expecting normal to above-normal rainfall.

## 2.6 AGRHYMET

The presenter from AGRHYMET highlighted the evolution of seasonal forecasting in West Africa and the Sahel, emphasizing the shift from consensus-based to objective forecasting approaches. Seasonal forecasts are a critical adaptation tool, helping decision-makers manage rainfall variability and optimize responses to both adverse and favorable conditions. Traditionally, AGRHYMET produced consensus-based forecasts through Regional Climate Outlook Forums, combining qualitative analysis of major centers' forecasts, sea surface temperature (SST) conditions, statistical models from member countries, and expertise from national meteorological services. These outputs, presented as above-normal, near-normal, and below-normal maps, provided a regional outlook but lacked probabilistic detail, objectivity, and local relevance.

To improve forecast reliability and usability, AGRHYMET has implemented objective forecasting through the ICRA project, automating statistical methods using the BICT/WAS2S software. The objective approach consolidates multiple independent methods, incorporates machine learning, and standardizes outputs for monthly updates. The four contributing methods include: skill-verified machine-learning calibrated ensembles, calibrated model predictors, observation-based lagged forecasts, and analog-based forecasts using self-organizing maps. Outputs are combined via equal averaging, skill-weighted averaging, or non-homogeneous Gaussian regression.

Evaluation against observed data for the 2023–2025 seasons demonstrated that objective forecasts often better capture rainfall patterns than consensus forecasts, notably in western Senegal and the Central-South region. Capacity-building workshops under ICRA Phase 2 have trained national meteorological staff in using WAS2S, with plans to expand training, extend forecast horizons, and promote localized, impact-based climate services.

In conclusion, AGRHYMET's transition to automated, objective seasonal forecasts enhances the accuracy, credibility, and actionability of climate information, supporting improved decision-making across West Africa and the Sahel.

## 2.7 Discussion on Objective and Consensus-Based Forecasts

The second day of the workshop focused on comparing objective and consensus-based seasonal forecasting, guided by WMO operational recommendations for objective forecasting (2020).

Consensus-based forecasts, traditionally used in Regional Climate Outlook Forums, rely on expert judgment, qualitative analysis of model outputs, sea surface temperatures, and national statistical models. While these forecasts provide a shared regional outlook, they face notable limitations: procedures are often not traceable or reproducible, outputs are broad and lack local detail, verification is limited, and products are rarely digitized.

Objective forecasting, in contrast, is systematic, reproducible, and quantitatively grounded. It employs statistical or dynamical models, produces digitized outputs, and allows forecast skill to be quantified. Expert input focuses on methodology selection and interpretation rather than directly shaping outcomes. This approach improves transparency, reproducibility, and integration of forecasts into applications such as crop and hydrological models.

The discussion highlighted the advantages of objective over consensus forecasts, including traceability, digitization, structured expert roles, and the ability to produce spatially detailed forecasts. Nevertheless, consensus forecasting has historically been valuable due to limited data, modeling tools, and the need for regional coordination.

Practical examples from Ethiopia and Kenya (March 2026) demonstrated that climate patterns cross political boundaries, reinforcing the need for spatially detailed, reproducible forecasts. The session concluded by emphasizing the gradual transition to objective forecasting to enhance transparency, usability, and the effective application of seasonal climate information at national and regional levels.

## 3. Numerical Weather Prediction Tools and Machine Learning Initiatives

### 3.1 Dynamical Downscaling for Regional Climate Prediction -ACMAD

ACMAD presented its mandate and operational activities aimed at enhancing weather and climate information services across Africa, with a focus on strengthening national meteorological services, consolidating monitoring systems, facilitating regional information exchange, and providing early warning for disaster risk reduction.

The center produces a wide range of climate products, including seasonal and sub-seasonal forecasts, short-term weather predictions, heatwave and tropical cyclone alerts, and drought monitoring tools initially developed under the East Africa Drought Watch project, now scaled to the continental level. These products support agriculture, health, and disaster risk management, providing actionable information such as rainfall onset monitoring, yield projections, meningitis risk assessments, and flood hazard overlays.

ACMAD emphasized co-production with stakeholders, combining forecasts, hazard modeling, and exposure data (including vulnerable populations like refugees and IDPs) to generate relevant and practical climate products. Operationally, the center integrates NWP and GCM outputs with observational data, using ensemble approaches to enhance forecast reliability and provide publicly accessible maps via websites and geoportals.

A key challenge remains the variability in data reporting from national meteorological stations, which can affect forecast accuracy. ACMAD addresses this through capacity strengthening, model integration, and ensemble forecasting. Pilot projects in West and Central Africa are being expanded to improve methodological consistency and continental applicability.

Overall, ACMAD's work demonstrates the importance of integrated climate monitoring, modeling, and co-produced services to inform planning, risk reduction, and humanitarian response across Africa.

### 3.2 Dynamical Downscaling for Regional Climate Prediction -ICPAC

ICPAC employs the WRF (Weather Research and Forecasting) model to generate weekly forecasts, intraseasonal characteristics, and tropical cyclone monitoring products. Intraseasonal forecasts provide information on rainfall onset, dry and wet spells, and seasonal transitions, while weekly forecasts deliver anomaly maps and extreme rainfall alerts using percentile thresholds for early warning and flood risk management.

Global forecasts, including NOAA operational products, are downscaled to regional resolutions of 100 km, 30 km, and 10 km, with the highest resolution supporting weekly forecasts and cyclone tracking. ICPAC has also developed regional hindcasts spanning up to 40 years, providing high-resolution climatologies (70 km continental, 10 km East Africa) crucial for probabilistic forecasting and skill assessment. Ensemble forecasting and AI-based approaches are being incorporated to improve forecast reliability.

Operational applications include flood forecasting, extreme heat indices for health and livestock, and intraseasonal guidance. Capacity-building efforts have trained national meteorological services in Ethiopia, Kenya, Uganda, and Tanzania to generate forecasts, enhancing regional ownership and sustainability. Plans include expanding applications to renewable energy planning and sector-specific decision support, while continuing to improve probabilistic forecast skill and regional collaboration among RCCs.

### 3.3 Dynamical Downscaling for Regional Climate Prediction -AGRHYMET

AGRHYMET, established in 1973 in response to severe droughts, now serves thirteen member states in West Africa and the Sahel, supporting interventions in food security, water management, desertification control, and climate adaptation. Its structure includes a Secretariat in Ouagadougou, central regional offices in Niamey, and the Institute du Sahel in Bamako.

The institution's mandate focuses on collecting, managing, and disseminating climate, hydrological, and meteorological information, while strengthening technical and institutional capacity across member states. The Department of Climate, Water, and Meteorology (OAMAO) leads the development of tailored climate and weather services for regional stakeholders.
AGRHYMET produces operational weather and climate products using NWP and GCM data in collaboration with international centers. These forecasts are downscaled, bias-corrected, and analyzed to provide actionable information, including consecutive dry days, total rainfall, rainy days, temperature extremes, wind speed, and atmospheric pressure. Operational runs occur four times daily, providing ten-day, two-day, and six-hourly forecasts accessible online for member states.
The center is implementing the MPASS (Model for Prediction Across Scales) system, currently at 12 km resolution, aiming for 3 km as HPC capacity increases, to deliver high-resolution regional forecasts. Hydrological forecasting complements climate services, with the EF5 model producing flash flood forecasts and the *Phamphar* system providing ten-day hydrological predictions during rainy seasons.
At the seasonal scale, AGRHYMET produces monthly precipitation and temperature products, including rainfall totals, onset and cessation of rainy seasons, drought spell risks, and runoff estimates, combining both consensus-based and objective approaches. Sector-specific applications support agriculture, food security, and pastoral monitoring through tools like the SARAM and NGDI systems.
Overall, AGRHYMET delivers an integrated suite of NWP, GCM, hydrological, and sectoral products, enhancing decision-making, early warning, disaster preparedness, and climate resilience across West Africa and the Sahel.

### 3.4 Dynamical Downscaling for Regional Climate Prediction -CAPC-AC

CAPC-AC operates a robust short-range to medium-range forecasting system that delivers operational weather products across its 11 ECCAS member states using the Weather Research and Forecasting (WRF) model at a high spatial resolution of 8 km. At the short-range scale (1–10 days), the centre produces daily convection risk maps derived from key atmospheric variables including wind components, vertical motion, equivalent potential temperature, and relative humidity, enabling forecasters to distinguish between deep convection, moist convection, dry air inhibition, and stable atmospheric conditions across the region. Complementing this, mid-atmosphere dry air intrusion products track moisture-suppressing air masses at the 600–500–400 hPa pressure levels, flagging areas where relative humidity drops below 40% and water vapour falls below 1.0 g/kg — critical diagnostics for understanding rainfall suppression and supporting early warning decisions.

At the medium-range scale (10–30 days), CAPC-AC extends its forecast guidance through a suite of products that combine WRF model runs driven by both GFS and ECMWF boundary conditions. These include regional heavy rainfall advisories generated through a structured four-step methodology — numerical weather prediction, forecast analysis, expert interpretation, and QGIS-based mapping — alongside ensemble probability maps that quantify agreement between models and rainfall anomaly maps that highlight departures from climatological norms. The system further produces spells indices tracking dry spells, wet spells, hot spells, and cold spells at daily resolution, providing sector-relevant information for agriculture, disaster risk management, and public health. All products are consolidated into harmonised bulletins disseminated to ECCAS National Meteorological and Hydrological Services, reinforcing CAPC-AC's role as a regional technical hub that bridges scientific forecasting with anticipatory action.

### 3.5 AI/ML Applications in Post-Processing and Forecast Skill Enhancement (ICPAC)

In the afternoon session, ICPAC presented ongoing initiatives to integrate artificial intelligence (AI) and machine learning (ML) into post-processing of climate and weather forecasts, aiming to enhance forecast skill across short-range, sub-seasonal, and seasonal timescales. These projects remain in research and testing phases and are not yet operational.

The motivation for AI/ML adoption stems from challenges in traditional forecasting, including extended rainfall variability, computational limitations of high-resolution dynamical models, and low-resolution seasonal forecasts that constrain actionable guidance. Users have emphasized the need for higher-resolution, probabilistic outputs to support early warning and impact-based decision-making.

ICPAC highlighted two key AI/ML projects. The first, initially funded by Google and later supported by other partners including Google.org, Oxford, ACMAD, WFP, and national agencies, uses conditional generative adversarial networks (cGANs) to post-process forecasts from the Integrated Forecasting System (IFS). The system trains on multiple meteorological variables—winds, precipitation, and sea-level pressure—producing probabilistic ensemble forecasts with 50 to over 1,000 members. Early tests show AI-enhanced forecasts capture median rainfall and seasonal trends well, though extreme events remain underestimated.

On sub-seasonal timescales, ICPAC employs the Anemoi framework and graph neural networks trained on ERA5 reanalysis data to improve week-3 and week-4 forecasts, capturing spatiotemporal dependencies across East Africa. Seasonal applications leverage AI/ML techniques, including Random Forests and XGBoost, to enhance probabilistic rainfall forecasts by incorporating climate drivers such as ENSO indices, West Indian Ocean gradients, Indian Ocean variability, and regional soil moisture. Models are trained on homogeneous regions to avoid bias and improve skill for both wet and dry years.

Beyond atmospheric forecasting, ICPAC is exploring impact-based applications, particularly for agriculture. AI models integrate socio-economic indicators—such as poverty, access to extension services, fertilizer and seed use, and gender-specific access to capital—to predict crop yields at sub-national scales. These outputs aim to inform early warning, preparedness, and targeted interventions for vulnerable populations.

Overall, ICPAC's AI/ML initiatives demonstrate the potential to enhance probabilistic forecasting, complement traditional deterministic methods, and translate forecast outputs into actionable decision-making, from short-term rainfall events to seasonal agricultural planning.

### 3.6 AI/ML Adoption in Climate and Weather Services (ACMAD)

During the session, ACMAD presented ongoing efforts to integrate artificial intelligence (AI) and machine learning (ML) into climate and weather services, aiming to enhance forecast accuracy, localization, and impact-based decision-making across Africa. Framing the discussion from a data science perspective, the presenter highlighted AI's potential to overcome limitations in traditional forecasting systems and deliver more user-focused, actionable products.

The rationale for AI adoption includes improved forecast skill using both historical and current datasets, the ability to produce tailored, localized forecasts, and enhanced prediction of extreme events to support Impact-Based Forecasting (IbF). AI enables automated early warning thresholds, directly linking forecasts to decision-making and preparedness actions, reducing the latency between prediction and response.

The session outlined the AI landscape, distinguishing between general AI, machine learning, and deep learning, and discussed supervised, semi-supervised, and reinforcement learning approaches. Emphasis was placed on the critical importance of data understanding and preparation, which can account for up to 80% of successful AI model development.

ACMAD applies AI at multiple stages of the forecasting workflow, from bias correction of global models to refinement of forecast outputs using methods such as Random Forests, gradient boosting, deep neural networks, and support vector machines. AI is also deployed to enhance early warning systems by automating threshold detection and facilitating timely alert dissemination.

Several challenges were noted, including limited and uneven data availability, constraints in computing resources, skill gaps, integration of multiple modeling systems, project sustainability, trust in AI outputs, and limited digital infrastructure. Addressing these challenges requires collaboration

among regional climate centers, national meteorological and hydrological services (NMHSs), and stakeholders.
ACMAD has initiated AI-driven projects, such as the Early Warning System (EWS), developed in partnership with UNHCR, and Kenya Met. This project integrates climate, weather, and socio-economic data to generate actionable insights for refugee camps. The center has also aggregated climate and weather datasets to support research and participated in the AI Quest competition with its Moya forecast model, demonstrating growing operational capacity in AI applications.
Looking ahead, ACMAD aims to strengthen data sharing and aggregation, develop interoperable systems with standardized protocols, and expand capacity-building initiatives. By doing so, the center envisions a continent-wide network of AI-enabled climate services that enhance forecast accuracy, early warning, and support for IBF, positioning AI as both a technical tool and a strategic driver for transforming climate services across Africa.

### 3.7 Panel Discussion and Reflections

The workshop concluded with a panel discussion reflecting on Africa's current and future role in climate and weather services, with particular emphasis on AI, data, and forecasting infrastructure. Participants recognized the continent's abundant talent but stressed that maximizing its impact requires strategic coordination, awareness-raising, and investment in African-led initiatives.
A major theme was the need for African-led modeling and forecasting. Reliance on external data and models from Europe, the U.S., and global institutions such as IRI limits climate sovereignty. The panel called for Regional Climate Centres (RCCs) and National Meteorological and Hydrological Services (NMHSs) to drive continental initiatives, contributing local data and expertise to improve relevance and ownership.
Data availability and sharing emerged as a critical challenge. Limited access to high-quality historical and real-time datasets constrains forecasting and AI applications. Panelists highlighted ongoing efforts to digitize historical data, repatriate datasets held abroad, and develop centralized data repositories to support operational and AI-based forecasting.
Infrastructure and capacity considerations focused on efficient use of high-performance computing (HPC). Rather than duplicating resources across RCCs, the panel advocated for regional specialization—centers focusing on AI, numerical weather prediction, or drought monitoring—while contributing to a continental framework.
The discussion emphasized sustainability and partnerships, citing initiatives like the ACMAD-Gates Foundation project, which aims to develop an AI-driven data library and forecasting tool in pilot countries (Kenya and Nigeria). Early engagement with partners, structured concept notes, and long-term planning were highlighted as essential for African ownership of forecasting resources.
A shared vision emerged for building climate sovereignty, including the potential establishment of a continental African forecasting center capable of producing contextually relevant data and forecasts accessible globally. This vision also incorporates partnerships with universities to nurture research and talent development.
Next steps include continued dialogue on data governance, sharing protocols, and monitoring and dissemination tools, ensuring coordination among RCCs, NMHSs, and academic institutions. ACMAD is expected to share strategies, GitHub projects, and ongoing initiatives to inform continental planning.
Overall, the panel underscored the urgent need for Africa to strengthen its forecasting capacity, leverage AI, consolidate data, and ensure sustainability through continental cooperation, specialization, and African ownership.

## 4.0 Climate Monitoring, Data Platforms, and Data Sharing

### 4.1 AGRHYMET

The third presentation was delivered by a representative from the AGRHYMET Regional Centre, highlighting the Centre's role in climate monitoring, data management, and data-sharing governance across the West African Sahel. AGRHYMET supports regional decision-making in areas such as food security, water resources, natural resource management, and resilience, while also strengthening the technical capacity of national institutions through training, e-learning, and knowledge transfer.

The Centre produces dekadal (10-day) and monthly climate monitoring reports that track rainfall and temperature conditions across the region. These analyses combine ground-based observations and satellite data to assess rainfall anomalies, cumulative precipitation, and temperature patterns. Monitoring also incorporates key climate drivers such as the El Niño–Southern Oscillation, which significantly influences seasonal climate variability in West Africa.

Additional indicators used in monitoring include the Standardized Precipitation Index (SPI) to assess drought and wet conditions, and the Intertropical Discontinuity, a key atmospheric boundary separating dry Saharan air from the moist West African monsoon flow. These indicators are integrated into regular regional climate briefings that also incorporate information relevant to agriculture, hydrology, pastoral systems, food security, and health.

Beyond climate variables, AGRHYMET monitors river flows, reservoir levels, vegetation productivity, and biomass availability, which are essential for agricultural and pastoral livelihoods in the Sahel. Satellite-based monitoring supports the assessment of vegetation conditions and grazing availability, while land-use and land-cover analyses help track long-term environmental changes.

To improve access to climate information, the Centre has developed several online platforms and data portals that provide datasets and analysis on rainfall characteristics, seasonal indicators, evapotranspiration, and climate hazards. Information is disseminated through web portals, regular bulletins, mailing lists, and social media channels. The Centre is also developing regional disaster risk and impact databases, capturing information on floods, losses, and damages reported by national disaster management agencies to support risk mapping and early warning.

Despite these advances, challenges remain in data harmonization, impact data collection, and formalized data-sharing agreements among countries. Currently, only a limited number of countries have formal protocols for systematic data sharing.

Looking ahead, AGRHYMET aims to strengthen integrated regional data platforms, expand partnerships with national institutions, and apply machine learning and advanced modeling tools to improve climate monitoring and forecasting. Efforts are also underway to scale up impact data systems and finalize broader data-sharing agreements, enabling more comprehensive climate services and risk management across West Africa.

### 4.2 ACMAD

This presentation from the African Centre of Meteorological Applications for Development (ACMAD) highlighted the development of digital tools, platforms, and data infrastructure designed to strengthen climate monitoring, forecasting, and data sharing across Africa. The initiative integrates multiple datasets, analytical methods, and digital technologies to improve access to climate information and support continental climate services.

The systems follow a structured data workflow, including data acquisition, quality control, processing, analysis, and dissemination. Data are sourced from satellite observations, ground-based stations, and other climate datasets, and are archived to support climate monitoring, diagnostics, and decision-support products. A key feature of the platform is the use of Application Programming Interfaces (APIs), which enable partner organizations and users to directly access and query climate datasets.

Several operational platforms were presented, including climate monitoring tools, drought monitoring systems, and weather forecasting portals that allow users to visualize climate conditions, download datasets, and generate analytical reports. One example is the African drought monitoring system, which integrates satellite-derived indicators and climate data to assess drought conditions across the continent.

The technical architecture supporting these platforms is built on cloud-based infrastructure, containerized applications, and scalable databases, ensuring reliability, interoperability, and the flexibility to integrate new datasets and analytical tools. Recent developments also include the integration of additional drought indicators and forecasting datasets.

The presentation further highlighted emerging AI-supported tools, including a prototype chatbot interface that enables users to interact with climate data through conversational queries. This approach aims to simplify access to complex datasets, allowing users to request summaries, analyses, or visualizations more easily.

Overall, the presentation demonstrated how modern digital infrastructure, automated workflows, and AI technologies are being leveraged by ACMAD to enhance climate data management, improve accessibility of climate services, and support evidence-based decision-making across Africa.

During the session the African Centre of Meteorological Applications for Development (ACMAD) presented the Climate Monitoring Tool (CMT), a web-based system designed to strengthen climate monitoring and early warning capabilities across Africa. The tool supports the detection of emerging climate risks—such as droughts, floods, and heatwaves—and helps translate climate data into actionable information for disaster risk reduction, climate adaptation, and development planning.

Originally developed by the NOAA Climate Prediction Center, CMT integrates multiple datasets and analytical processes to generate near-real-time climate monitoring products. Users can visualize rainfall patterns, download data, and produce spatial maps and time-series analyses to track evolving climate conditions.

The system draws on several key datasets, including RFE2 rainfall estimates, ARC2 rainfall dataset, and CPC-Unified precipitation data, alongside vegetation and hydrological indicators. These inputs enable the generation of operational monitoring products such as the Standardized Precipitation Index (SPI), Seasonal Rainfall Performance Probability, soil moisture and runoff percentiles derived from the Leaky Bucket hydrological model, and the Vegetation Health Index (VHI). Together, these indicators provide a comprehensive view of rainfall conditions, vegetation health, and hydrological status.

Operationally, the tool automatically processes near-real-time rainfall data and climatological records to produce spatial maps and rainfall statistics across multiple time windows (7, 10, 30, 60, 90, and 180 days). These outputs help forecasters identify anomalies, monitor dry or wet spells, and detect potential climate hazards.

Through its interactive web interface, CMT allows analysts and forecasters to quickly visualize climate trends and communicate findings to stakeholders in sectors such as agriculture, water management, food security, and disaster risk reduction. The system also supports retrospective climate analysis, enabling users to evaluate past seasonal performance and conduct post-event assessments.

Looking ahead, ACMAD plans to enhance the tool by incorporating additional rainfall statistics, including quantiles and ranking indices, as well as temperature-based monitoring products to improve detection of climate extremes. Overall, the Climate Monitoring Tool provides a comprehensive operational framework for climate monitoring in Africa, supporting early hazard detection and informed decision-making for climate resilience.

### 4.3 ICPAC

The presentation from the IGAD Climate Prediction and Applications Centre (ICPAC) highlighted the Centre’s role in regional climate data services, monitoring, and dissemination across Eastern Africa. As a World Meteorological Organization Regional Climate Centre, ICPAC primarily focuses on data services and analysis rather than direct data collection, relying on observations provided by National Meteorological and Hydrological Services (NMHSs) and supplementing them with satellite datasets to generate regional climate products.

These datasets support a range of climate monitoring and forecasting outputs, including rainfall and temperature monitoring and climate indicators such as the Standardized Precipitation Index for drought assessment. The data are also used to calibrate and bias-correct dynamical forecast model outputs, improving the reliability of monthly and seasonal forecasts across the region.

Currently, ICPAC receives observational data from about 157 active stations across 11 countries, which remains limited for comprehensive regional analysis. To address this gap, the Centre has been strengthening data-sharing agreements with member states, enabling the exchange of daily station data necessary for improved monitoring and forecast verification.

ICPAC also supports member countries through capacity building and standardized climate data management tools. Two key systems highlighted were Climsoft, used for managing climate databases and digitizing historical records, and Climate Data Tool, which facilitates data processing, merging, visualization, and climate analysis. Harmonizing these systems across countries is expected to enable more efficient and automated regional data sharing.

The presentation also discussed infrastructure developed to enhance satellite data access, including a satellite receiving antenna installed through regional projects to provide near-real-time meteorological observations. These data are intended to support numerical weather prediction and data assimilation, although further capacity development is needed to fully operationalize these capabilities. Additional initiatives, such as the African Union-led Space for Early Warning in Africa, aim to further strengthen satellite-based forecasting in the region.

In terms of operational services, ICPAC produces climate monitoring products at multiple timescales, including three-day, monthly, and seasonal updates, which are disseminated through online platforms and communication channels to support decision-making. Overall, the presentation emphasized the need to strengthen data sharing, harmonize data management systems, and expand observation networks to enhance the quality and reliability of climate services across Eastern Africa.

### 4.4 North Africa RCC-MENA

The presentation from the North Africa Regional Climate Centre (MENA) highlighted the tools and systems used to support climate monitoring and forecasting across the Middle East and North Africa region. A key component of their monitoring framework is the use of the ERA5 Reanalysis dataset, which provides high-resolution global atmospheric and surface data for analyzing temperature and precipitation patterns. These data support climate monitoring, model initialization, and the development of regional climate products.

For seasonal forecasting, the Centre uses a 51-member ensemble prediction system, enabling probabilistic climate outlooks by capturing uncertainties in atmospheric conditions. This ensemble approach improves the robustness of seasonal forecasts for rainfall and temperature variability and supports regional climate outlook processes and sectoral planning.

At the sub-seasonal timescale, the Centre applies dynamical downscaling using the Weather Research and Forecasting Model (WRF). The system downscales global model outputs to approximately 12 km spatial resolution, producing higher-resolution forecasts that better represent regional climate features and local weather patterns. These forecasts provide lead times of up to four weeks, supporting early warning, water resource management, and disaster preparedness.

Overall, the Centre's approach integrates global reanalysis datasets, ensemble seasonal prediction systems, and high-resolution dynamical downscaling to deliver climate services that support decision-making in sectors such as agriculture, water management, and disaster risk reduction across the MENA region.

### 4.5 Plenary Reactions and Feedback

The morning session concluded with a brief plenary discussion where participants reflected on the presentations and raised several points for clarification and collaboration.

Following the presentation by the AGRHYMET Regional Centre, a participant from the IGAD Climate Prediction and Applications Centre (ICPAC) asked about the primary users of climate information in the region. It was clarified that climate services support a wide range of stakeholders, including farmer federations, ministries responsible for transport, agriculture, health, disaster risk management, energy, and other sectoral agencies that rely on climate information for planning and decision-making. The same participant also highlighted the potential for technical support under the Santiago Network for Loss and Damage, noting that Regional Climate Centres (RCCs) and other institutions could explore opportunities to benefit from this mechanism, particularly in strengthening capacity for loss and damage assessment.

In response to AGRHYMET's presentations on loss and damage data and data-sharing frameworks, a participant from the Central Africa Climate Prediction and Applications Centre commended the efforts to compile impact data and suggested the possibility of developing a continental African database on loss and damage. Such a database could help support the transition toward Impact-Based Forecasting by strengthening the linkage between climate hazards and socio-economic impacts.

Regarding the ICPAC presentation, participants sought clarification on whether the 157 weather stations shared by National Meteorological and Hydrological Services were also distributed outside the IGAD region. ICPAC clarified that these data are not shared externally, as data exchange is governed by Memoranda of Understanding with member states.

ICPAC further noted ongoing challenges with timely and consistent data sharing among member countries, which affects regional data availability and can limit monitoring, forecasting, and verification processes.

Overall, the discussion highlighted the importance of strengthening data-sharing mechanisms, improving impact data systems, and enhancing collaboration across Regional Climate Centres to support more effective climate services in Africa.

## 5.0 ACCOF Downscaling and Forecasting Initiative

The session introduced the ACCOF (African Climate Outlook Forum) Downscaling and Forecasting Initiative, a collaborative project led by the African Centre of Meteorological Applications for Development (ACMAD) with funding from the  Gates Foundation. Launched in January, the project is designed as a four-year program aimed at improving seasonal climate forecasting through advanced modeling, downscaling tools, and enhanced communication of climate information for end users.

A central feature of the initiative is early and continuous engagement with users. Rather than developing forecasts independently, the project promotes co-creation and iterative prototyping, ensuring that forecasting tools are shaped by the needs of stakeholders and are practical for real-world decision-making.

The project aims to develop a modular open-source software platform for seasonal forecasting and downscaling that complements existing tools such as PyCPT. The platform will support standardized forecasting workflows, incorporating metadata integration, structured input and output formats, and template-based processes to enhance reproducibility.

Another major component is the creation of automated forecasting pipelines. Automation will streamline technical steps in the forecasting workflow, allowing forecasters to focus more on analysis, interpretation, and communication. The system will integrate data from multiple global forecasting centers and support multi-model processing, with potential integration of AI and machine learning methods.

The initiative also plans to develop interactive dashboards and communication tools to make forecast information more accessible and easier for users to interpret, including insights on potential impacts.

Looking ahead, the project will expand engagement with forecasters and users at both regional and national levels, gather feedback to refine the tools, and strengthen collaboration with existing climate service initiatives such as WISER and partners including the Stockholm Environment Institute.

Continuous input from workshop participants will help guide the development and implementation of the initiative.

The afternoon session focused on regional climate outlooks and coordination across Africa, featuring presentations from multiple Regional Climate Centres (RCCs), including AGRHYMET (West Africa), PRESAC (Central Africa), ICPAC (Greater Horn of Africa), SARCOF (Southern Africa), and ACMAD, culminating with the consolidated Africa Continental Climate Outlook produced through ACCOF.

The session began with an overview of ACCOF, established in 2023 to harmonize seasonal forecasts across the continent. ACCOF serves as both a technical and policy coordination mechanism, allowing RCCs to jointly review climate drivers, share forecast guidance, and produce a consistent continental outlook. By consolidating regional forecasts, ACCOF strengthens early warning systems, improves forecast reliability, and supports climate-resilient development, ensuring decision-makers receive coordinated and actionable climate information.

Each RCC then presented regional analyses. AGRHYMET reported that verification of the previous season showed rainfall largely aligned with forecasts. For the March–May period, rainfall is expected to be normal to slightly below normal in western areas, with early-season above-normal rainfall along the Gulf of Guinea. Temperatures are forecast to be above normal, which could increase evapotranspiration and stress water and agricultural systems. Risks include localized flooding, higher river flows, and waterborne diseases.

PRESAC highlighted that Central Africa is likely to experience normal to wetter-than-normal rainfall in several areas, including southern Chad, Cameroon, the Central African Republic, Angola, and the Democratic Republic of Congo. Elevated temperatures may occur in some locations. Verification of previous forecasts showed reasonable alignment with observed rainfall. Above-normal rainfall could raise the risk of flooding and waterborne disease outbreaks.

ICPAC presented forecasts for the Greater Horn of Africa, noting that previous drier-than-normal conditions in Somalia, eastern Kenya, and southern Ethiopia were largely confirmed. For March–May, models suggest an increased probability of above-normal rainfall across much of the region, including Djibouti, Ethiopia, Uganda, Rwanda, Burundi, central and western Kenya, and northern Somalia. Potential impacts include flooding and landslides. While ENSO is expected to remain neutral, other drivers such as the West Pacific gradient and the Madden–Julian Oscillation are also considered.

SARCOF reviewed rainfall performance in Southern Africa, reporting variable conditions with some areas experiencing above-average rainfall while others remained drier than normal. Moderate forecast skill was observed, and the region is transitioning from La Niña toward neutral ENSO conditions, which may influence upcoming rainfall patterns.

ACMAD provided a continental perspective, noting that rainfall patterns since late 2025 have been highly variable. Analyses indicate wetter conditions in parts of East Africa, while drier conditions are likely to persist in West and Southern Africa. Temperature forecasts suggest above-average conditions across much of the continent for the April–June and May–July periods.

The session concluded with the presentation of the consolidated Africa Continental Climate Outlook. By integrating regional forecasts through ACCOF, the outlook indicates that wetter-than-average conditions are expected in parts of East and Central Africa, while some areas in West and Southern Africa may experience below-normal rainfall. Across most of the continent, temperatures are projected to remain above average.

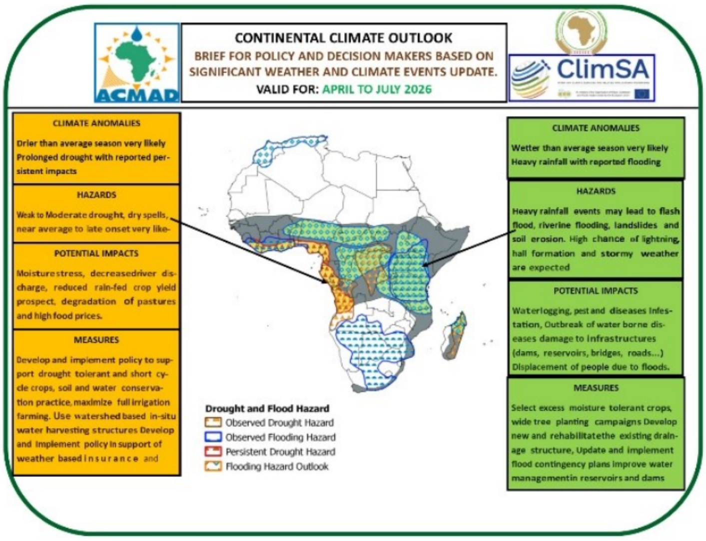


*Figure 2:Continental Climate outlook for the months April-July 2026*

Overall, the session highlighted the importance of regional collaboration and forecast harmonization. Through ACCOF, RCCs can coordinate analyses, improve forecast consistency, and enhance the delivery of climate information services that support early warning, disaster preparedness, and climate-resilient development across Africa.

### 6.0 Community of Practice for African RCCs

The session focused on in-depth discussions around the draft Community of Practice (CoP) framework for African Regional Climate Centres (RCCs), which is being developed as a mechanism to strengthen collaboration, coordination, and knowledge exchange across the continent. Participants reviewed the proposed framework document in detail, noting that it provides the strategic foundation for the CoP through clearly articulated background context, objectives, governance arrangements, membership modalities, and priority thematic areas. The framework is intended to create a structured platform through which RCCs can jointly address common technical and operational challenges, share experiences, and advance the delivery of climate services in Africa.

A major area of discussion centered on the harmonization of seasonal forecasting practices among African RCCs. Participants recognized that while RCCs operate within different climatic regimes and institutional contexts, there is significant value in enhancing consistency and coherence in forecasting methodologies across regions. In this regard, technical exchanges focused on key areas such as bias correction approaches, statistical and dynamical downscaling techniques, model calibration, verification procedures, and the communication of probabilistic forecasts. Strengthening methodological alignment was viewed as essential for improving the comparability, credibility, and usability of seasonal outlooks produced across the continent.

Participants also highlighted the importance of improving interoperability between forecasting systems and data platforms used by RCCs. This included discussions on promoting common standards for data sharing, metadata management, forecast formats, and collaborative use of computational resources. Enhanced interoperability would support more efficient production workflows, facilitate joint analyses, and enable the exchange of tools and innovations across centres. Furthermore, participants emphasized the need for continuous capacity development, peer-to-peer learning, and stronger linkages with National Meteorological and Hydrological Services (NMHSs), research institutions, and development partners.

The session further considered how the Community of Practice can serve as a vehicle for innovation, particularly in areas such as artificial intelligence, machine learning applications, impact-based forecasting, and climate risk information services. Participants agreed that the CoP should not only address current operational needs but also position African RCCs to respond to emerging scientific and technological opportunities.

A key outcome of the session was the agreement on leadership roles within the Community of Practice, which will provide strategic direction and oversight for the implementation of the framework and its activities. The following appointments were confirmed:

| Role | Institution | Mandate |
|---|---|---|
| **Chair** | **ICPAC** | Lead CoP governance and coordination |
| **Secretary** | **ACMAD** | Manage communications and administrative functions |

## 7.0 Major Outcomes and Conclusion

### 7.1 Major Outcomes

**1. Establishment of the Inter-RCC Community of Practice (CoP)**
A formal Community of Practice was established to sustain collaboration among Africa's Regional Climate Centres beyond the workshop. The CoP will be chaired by ICPAC, with ACMAD serving as secretary, and will provide a structured platform for continuous knowledge exchange, peer learning, harmonization of forecasting practices, and coordinated development of climate services across the continent.

**2. Progress Toward Harmonization of Seasonal Forecasting Practices**
Participants made significant progress toward harmonizing seasonal forecasting methodologies across RCCs. Discussions and technical sessions facilitated alignment on the transition from consensus-based to objective, reproducible forecasting approaches, agreement on common standards for bias correction and downscaling, and the development of a draft common framework for coordinated climate prediction operations across the continent.

**3. Strengthened Commitment to Impact-Based Forecasting**
The workshop reinforced the importance of Impact-Based Forecasting (IbF) as a critical bridge between technical climate outputs and actionable decision-making. Participants committed to integrating hazard forecasts with exposure and vulnerability data, strengthening linkages with sectors such as disaster risk management, agriculture, water resources, health, and energy, and expanding co-production of forecasts with sectoral stakeholders and affected communities.

**4. Adoption of AI and Machine Learning in Climate Services**
The workshop showcased concrete advances in the application of artificial intelligence and machine learning tools across multiple RCCs, including AI-enhanced probabilistic forecasting systems, graph neural networks for sub-seasonal prediction, and AI-driven early warning systems. Participants agreed

to deepen collaboration in this area, share methodologies, and develop a coordinated continental approach to AI adoption in operational climate services.

**5. Enhanced Climate Data Sharing and Infrastructure**

Participants reached consensus on the urgent need to strengthen climate data infrastructure across Africa, including improving data sharing agreements between NMHSs and RCCs, repatriating historical climate datasets held outside the continent, and developing interoperable data platforms capable of supporting operational forecasting, AI applications, and hydrological modeling. Initiatives such as the ACCORD Project and AGRHYMET's regional data platforms were highlighted as important steps in this direction.

**6. Production of the Africa Continental Climate Outlook (ACCOF)**

The workshop facilitated the production of the consolidated Africa Continental Climate Outlook through the ACCOF process, integrating regional seasonal forecasts from AGRHYMET, CPAC, ICPAC, SADC CSC, and ACMAD. The outlook indicated wetter-than-average conditions expected in parts of East and Central Africa, with below-normal rainfall likely in some areas of West and Southern Africa, and above-average temperatures forecast across most of the continent for the April–July 2026 period. This collaborative forecast process demonstrated the value of the ACCOF framework for coordinated, continent-wide climate communication.

### 7.2 Conclusion

The Continental Knowledge Sharing Workshop on Climate Services, held in Kigali from 9–13 March 2026, marked a significant milestone in Africa's collective efforts to strengthen the quality, coordination, and impact of climate services across the continent. Over five days of intensive technical sessions, plenary discussions, and collaborative exchanges, participants from Regional Climate Centres, National Meteorological and Hydrological Services, and key partner organizations worked toward a common vision: a more harmonized, interoperable, and user-driven climate services ecosystem in Africa.

The workshop demonstrated that significant progress has been made in advancing forecasting capabilities, including the adoption of objective forecasting methods, dynamical downscaling, ensemble prediction systems, and emerging artificial intelligence and machine learning tools. At the same time, participants acknowledged persistent challenges: methodological inconsistencies across centres, limited data sharing and interoperability, gaps in downscaling regional products to national and local levels, and barriers in effectively communicating forecasts to end users and decision-makers. One landmark achievement defined the workshop's legacy: the establishment of an Inter-RCC Community of Practice, chaired by ICPAC with ACMAD as secretary, to sustain ongoing collaboration and knowledge exchange among Regional Climate Centres.

Looking ahead, the commitments made in Kigali call for sustained investment in capacity building, co-production of services with end users, and strengthened institutional partnerships. The path forward will require African climate institutions to deepen their collaboration, invest in shared data infrastructure, embrace harmonized methodologies, and place user needs at the center of service development. By building on the momentum generated by this workshop, Africa's Regional Climate Centres and their partners are well-positioned to deliver climate services that are not only scientifically robust, but truly transformative in supporting resilience, risk reduction, and sustainable development across the continent.