



SOUTHERN AFRICAN DEVELOPMENT COMMUNITY
CLIMATE SERVICES CENTRE

CCARDESA
Centre for Coordinated Agricultural Research and Development for Southern Africa



AICCRA
Accelerating Impacts of CGIAR
Climate Research for Africa



ILRI
INTERNATIONAL
LIVESTOCK RESEARCH
INSTITUTE



CONCEPT NOTE

Regional Training on Sub-seasonal Prediction for Eastern and Southern Africa

September 9 – 13, 2024 | Gaborone, Botswana

1. Background

Eastern and Southern African countries are highly vulnerable to extreme climate events such as droughts and floods. In recent years, these phenomena have intensified and become more frequent, severely hindering the recovery efforts of affected populations. From 2020 to 2022, the East Africa region endured an extended drought that resulted in the loss of over 13 million livestock, which is crucial for pastoralist communities' livelihoods, income, and nutrition. Following this prolonged drought, extreme flooding was experienced during the October to December 2023 rainfall season, further exacerbating the challenges faced by communities. This flooding significantly impaired recovery efforts, leaving communities with limited resources and infrastructure to withstand subsequent disasters. Most recently, heavy rainfall from March to May (MAM) 2024 led to widespread flooding across East Africa, particularly affecting Kenya and Uganda. This event caused devastating impacts, including loss of life, destruction of infrastructure, and environmental degradation. The floods washed away roads and bridges, disrupted access to essential services, and exacerbated food and water insecurity. Similarly, the recent flood events in Southern Africa have been significant, affecting various countries across the region. In Mozambique, heavy rainfall and cyclone Freddy in 2023 caused severe flooding and widespread damage to infrastructure, homes, and agriculture, leading to significant displacement of communities. Intense storms in April 2023 in many provinces in South Africa resulted in severe flooding, landslides, and property damage. Many communities faced disruptions with significant impacts on transportation and infrastructure. Cyclone Batsirai brought heavy rains and strong winds to Zimbabwe in early 2022, leading to widespread flooding in several country areas. The relentless cycle of extreme climate events in Eastern and Southern Africa underscores the urgent need for comprehensive disaster preparedness and resilience-building measures. Addressing these challenges requires concerted efforts to enhance adaptive capacities, improve early warning systems, and promote sustainable development practices that mitigate the impact of future climate extremes.

Climate services are crucial in bolstering climate resilience across Eastern and Southern Africa, where climate change is increasingly causing devastating impacts. In particular, sub-seasonal predictions spanning from two to eight weeks ahead are valuable for informing decision-making and early warning systems for various sectors, including agriculture, water management, energy, and disaster preparedness. While short-term weather forecasts (up to 7 days) and seasonal forecasts (3-6 months) are well-established, the intermediate sub-seasonal predictions remain challenging. This is due to the complexity of atmospheric and oceanic processes that influence weather patterns over this timeframe. Despite these challenges, sub-seasonal predictions are crucial because they fill the gap between short-

term and seasonal forecasts, providing valuable information that can improve decision-making and planning in various sectors.

The Accelerating the Impact of CGIAR Climate Research for Africa (AICCRA) project aims to enhance access to climate information services and validated climate-smart agriculture technologies in Africa to help these countries strengthen the resilience of their agricultural sectors to the threat posed by climate change. As part of the AICCRA project, ICPAC, in collaboration with the International Livestock Research Institute (ILRI), is organizing a regional training on sub-seasonal forecasting using the latest Python version of the Climate Predictability Tool (PyCPT v2.8). This training program aims to equip meteorologists, climate scientists, and relevant stakeholders with the necessary skills and knowledge to improve the accuracy and application of sub-seasonal predictions.

The training program will utilize the latest Python-based Climate Predictability Tool (PyCPT v2.8) version, developed by the International Research Institute for Climate and Society (IRI). This latest version includes several significant advancements that enhance its functionality for sub-seasonal predictions. By building the capacity of National Meteorological and Hydrological Services (NMHSs) and ICPAC staff to use the latest version of PyCPT, the training aims to significantly enhance sub-seasonal operational forecasting systems. This improvement in forecasting has the potential to safeguard and improve the livelihoods of communities in the region by providing more accurate and timely weather predictions.

2. Objective of the Training Workshop

The main objective of this regional training is to equip meteorologists and climate scientists in Eastern and Southern African countries with the necessary skills, knowledge and tools to improve the accuracy and application of sub-seasonal predictions. Participants will gain a comprehensive understanding of the theoretical foundations of sub-seasonal forecasting, learn to use advanced prediction models and techniques and develop the ability to interpret and apply forecast information within their respective countries. By the end of the training, they will be well-prepared to leverage sub-seasonal predictions to benefit their communities and sectors, ultimately contributing to more effective weather-related risk management and planning.

3. Topics to be Covered:

- ⇒ Overview of subseasonal forecasting principles, techniques, and current capabilities specific to Eastern Africa.
- ⇒ Introduce PyCPT 2.8: Structure, inputs, outputs, workflow, examples, automation
- ⇒ Install and configure Anaconda environment
- ⇒ Basic introduction to Python
- ⇒ Install, configure and run PyCPT 2.8 to make the best sub-seasonal forecasts of precipitation and related quantities in participants' regions of interest
- ⇒ Assess the skill of the forecast using various forecast verification matrices
- ⇒ Interpreting subseasonal prediction products for different applications such as agriculture, water management, and disaster preparedness.
- ⇒ Facilitated discussions among participants to share experiences, challenges, and innovative approaches in utilizing subseasonal forecasts.

4. Expected Outcomes:

- Increased understanding and awareness of subseasonal prediction capabilities and limitations.
- Enhanced technical capacity to generate sub-seasonal forecasts at national and sub-national levels
- Strengthened technical skills in interpreting and applying subseasonal forecasts for various sectors.
- Enhanced collaboration among stakeholders for improved climate risk management and decision-making.
- Development of action plans or recommendations for integrating subseasonal forecasts into regional and national producing centers.
- Improved participants' ability to install and configure the Anaconda environment, Python, and PyCPT.

5. Budget:

A detailed budget was created to cover the venue, facilitators' fees, materials, and logistical arrangements.

6. Training Agenda

Time	Facilitator	
Monday, September 09		
8:30-9:30	Registration	AICCRA-ILRI, ICPAC
9:00 – 9:10	Welcoming remarks	Futhi Magagula, CCARDESA
9:10 – 9:30	Opening remarks Introduction of participants	Teferi Demissie, AICCRA-ILRI Sunshine Gamedze, SADC CSC Hussen Seid, ICPAC
9:30-10:30	Workshop Overview (Goals, Objectives, Agenda)	Hussen Seid
10:30-11:00	Group Photo and Coffee Break	
11:00-11:30	Introduction to Sub-seasonal Forecasting (progress, challenges)	Masilin Gudoshava
11:30-12:30	Sub-seasonal Drivers over Eastern and Southern Africa	Titike Bahaga (Eastern Africa) and Sunshine Gamedze (Southern Africa)
12:30-13:00	Skills of the sub-seasonal forecasts	Hussen Seid
13:00-14:00	Lunch Break	
14:00-15:00	Installation of Anaconda environment and PyCPT	Tamirat Bekele
15:00-15:30	Coffee Break	
14:00-15:00	Installation of Anaconda environment and PyCPT	Tamirat Bekele
16:00- 16:30	Introduction to Python and Jupyter Notebooks	Masilin Gudoshava/Tamirat Bekele
16:30- 17:00	Introduction to PyCPT version 2.5	Eunice Koech
Tuesday, September 10		
9:00-9:30	Introduction to model output statistics (MLR, PCR and CCA)	Angel Munoz
9:30-10:30	Configuration of PyCPT 2.5 for sub-seasonal forecasting	Hussen Seid
10:30-11:00	Coffee Break	
11:00-13:00	GCM models for sub-seasonal forecasts in the IRI Data Library Discussion on Seasonal vs. Sub-seasonal forecast systems	Hussen Seid/ Masilin Gudoshava
13:00-14:00	Lunch Break	
14:00-15:00	Hands-on**: Generating sub-seasonal forecast of weekly and biweekly rainfall total using the default case configuration	Facilitators and Participants
15:00-15:30	Coffee Break	

15:30-17:00	Interpretation of sub-seasonal predictions (deterministic forecasts, probabilistic forecasts, flexible format forecasts, skill scores)	All
Wednesday, September 11		
9:00-10:30	Optimizing a sub-seasonal rainfall forecast for the region of interest	Masilin Gudoshava
10:30-11:00	Coffee Break	
11:00-13:00	Hands-on: Sensitivity of the sub-seasonal rainfall forecast to the predictor domain for the region of interest	Facilitators and Participants
13:00-14:00	Lunch Break	
14:00-15:00	Hands-on: Sensitivity of the sub-seasonal rainfall forecast to MOS method	Facilitators and Participants
15:00-15:30	Coffee Break	
15:30-17:00	Discussion on the sensitivity of the rainfall forecast to the predictor domain and MOS method	All
Thursday, September 12		
9:00-10:30	Hands-on: Sensitivity of the forecast to the choice of the training season	Facilitators and Participants
10:30-11:00	Coffee Break	
11:00-13:00	Hands-on: Sensitivity to the choice of Dynamical Models	Facilitators and Participants
13:00-14:00	Lunch Break	
14:00-15:00	Discussion on the sensitivity of sub-seasonal forecast to the choice of the training season and dynamical model	All
15:00-15:30	Coffee Break	
15:30-17:00	Preparation of participants' presentations	Participants
Friday, September 13		
09:00-10:30	Participant presentations	Participants
10:30-11:00	Coffee Break	
11:00-13:00	Participant presentations	Participants
13:00-14:00	Lunch	
14:00-15:00	Workshop evaluation & Closing remarks	AICCRA, ICPAC Botswana Meteorological Services
15:00-15:30	Coffee Break	



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