CAPC-AC, Outil Régional d'Analyse de Vulnérabilité et d'Adaption au Changement Climatique pour une Prise de Décision Eclairée.

Octobre, 16 2025

Douala,

The Climate Application and Prediction Centre for Central Africa (CAPC-AC)

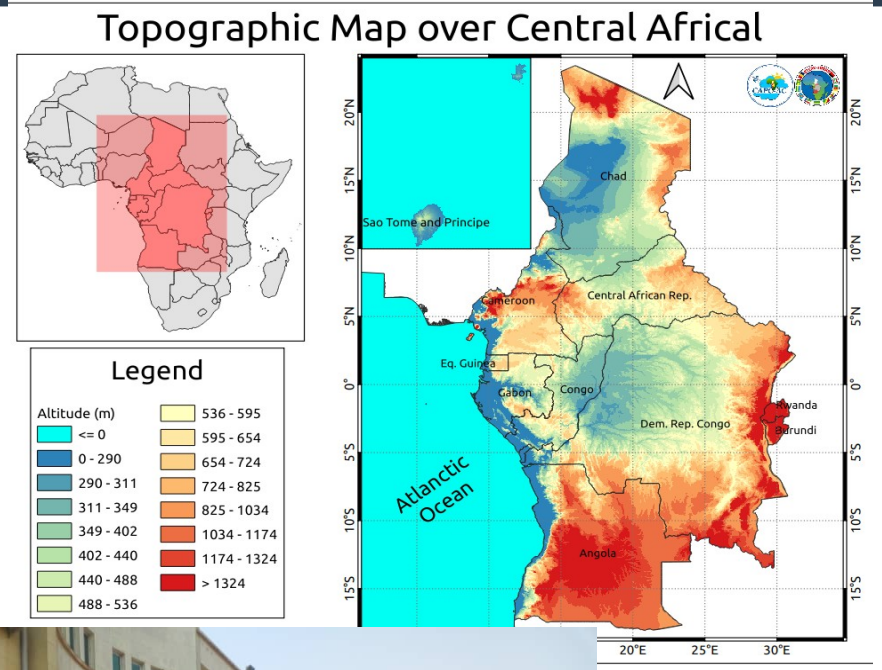
The CAPC – A Technical and Scientific Advisory Institution for Climate-Informed Policy Decisions for Sustainable Development in Central Africa: An Integrated Instrument of the ECCAS Environmental Diplomacy.

Guided by the vision of shared prosperity and resilience, the Conference of Heads of State and Government of ECCAS aspires to make Central Africa the most climate-resilient region on the continent, capable of turning climate challenges into opportunities for sustainable development.

- The Conference of Heads of State and Government (CHSG) of ECCAS is determined to safeguard the vital maritime interests of ECCAS Member States and the Gulf of Guinea.
- The CHSG aims to significantly improve the health and well-being of the populations of ECCAS Member States and neighboring regions.
- The CHSG is committed to accelerating the structural transformation of the natural resource-based economy to foster inclusive and sustainable growth.
- The CHSG of ECCAS is committed to making Integrated Water Resources Management, together with a coherent regional policy on environment and natural resources, a cornerstone of sustainable development and resilience in Central Africa.

Mandate: To support the implementation of Community Sectoral Policies and Strategies aimed at fostering the integration and sustainable development of Central Africa.

The ECCAS Climate Application and Prediction Centre (CAPC-AC)



- Created: 2015
- Location: Douala, Cameroon
- Member States: Angola, Burundi, Cameroon, Central African Republic, Republic of Congo, Democratic Republic of the Congo, Gabon, Equatorial Guinea, Rwanda, São Tomé and Príncipe, Chad

- Mandate:
  To support the implementation of Community Sectoral Policies and Strategies aimed at promoting regional integration and sustainable development in Central Africa.

- Missions:
  Strengthening the capacities of the National Meteorological and Hydrological Services (NMHSs) of the region, all of which are Members of the World Meteorological Organization (WMO).

- Vision:
  To become a WMO Regional Climate Centre (RCC) and a Specialized Centre for High-Resolution Regional Numerical Modelling, serving as a hub for climate services, forecasting, and anticipatory action in Central Africa.

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- Mandate:
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- Missions:
- The CAPC-AC is an intergovernmental cooperation body of the ECCAS Commission, entrusted with the execution of a public service mandate.
- In this capacity, it contributes to strengthening the capacities of the National Meteorological and Hydrological Services (NMHSs) of the region, all of which are Members of the World Meteorological Organization (WMO).

- Vision:
- To become a WMO Regional Climate Centre (RCC) and a Specialized Centre for High-Resolution Regional Numerical Modelling, serving as a hub for climate services, forecasting, and anticipatory action in Central Africa.

The ECCAS Climate Application and Prediction Centre (CAPC-AC)

Core Function	Description
Data Collection and Processing	Acquisition of climate and environmental data (satellite, in situ, and numerical models such as WRF, GFS, CMIP6).
Forecasting and Modelling	Production of meteorological and climate forecasts (seasonal, real-time, nowcasting) and risk modelling (floods, droughts, heatwaves).
Climate Services Production	Development of Advosiries bulletins, agrometeorological products, risk indices, dynamic mapping, and interactive platforms.
Information Dissemination	Multichannel communication (web portal, email, WhatsApp, SMS, TV/radio) to end users, governments, NGOs, and humanitarian agencies.
Training and Capacity Building	Technical sessions for forecasters, national focal points, regional institutions, and projects (anticipatory action, community early warning systems, use of NetCDF data, etc.).
Technical Assistance and Regional Coordination	Support to Member States and coordination with ECCAS, CICOS, CBLT, ALG, and UNDRR for integrated early warning systems.

Supportin Functions and Activities	Description
Infrastructure & Information Systems	HPC system, station networks, servers, web platform, Python applications, and GIS tools.
Partnership Development	Cooperation with WMO, UNDRR, ACMAD, AfDB, NOAA, and projects under GCF/GEF/CREWS, among others.
Strategic Management	Integrated regional vision aligned with Agenda 2063, the Sustainable Development Goals (SDGs), the National Adaptation Plans (NAPs) of Member States, and international frameworks including the Paris Agreement, Sendai Framework for Disaster Risk Reduction, and the Early Warning for All (EW4ALL) initiative.
Innovation & R&D	Co-production of innovative services (impact-based alerts, AI, IoT, integrated risk indices).
Human Capital	Experts in climatology, hydrometeorology, GIS, ICT, disaster-risk management, and scientific communication.

The ECCAS Climate Application and Prediction Centre (CAPC-AC)

Strategic resources	Key Resources
Human	CAPC Coordinator, Deputy Coordinator, M&E Expert, Climate Expert (LF), Early Warning/Impact Based Forecast Expert, Admin and Finance Assistant.
Technological	WRF/GEFS/CMIP6 models, HPC systems (not installed), NetCDF databases, visualization tools (Matplotlib, Cartopy), and GIS platforms (QGIS, ArcGIS).
Informational	Historical and real-time datasets, regional shapefiles, climate atlases, bulletins, and sectoral knowledge databases.
Institutional	Regional status recognized by ECCAS; in the process of WMO RCC designation; leadership role in climate early warning systems.
Partnerships	Strategic collaboration with WMO, UNDRR, ECCAS, WMO RCCs, regional agencies, and research institutes.

Core Competencies

Domain	Competency
Regional Forecasting and Risk Analysis	Ability to produce, interpret, and translate meteorological and climate forecasts at multiple scales, and to derive risk indicators.
Early Warning Systems	Design and support of community-based early warning systems (EWS), development of impact-based tools, and interoperability with disaster management platforms.
Training and Capacity Transfer	Capability to train Member States, National Focal Points, and regional institutions on the operational use of climate data and tools.
Co-Production with Users	Participatory design of climate services in collaboration with key sectors (agriculture, health, civil protection, energy, etc.).
Regional Integration	Coordination and harmonization of alerts among Member States and basin organizations, ensuring clear regional mandates and coherence.

CAPC-AC SERVICE AREAS

METEOROLOGY

CLIMATE CHANGE

DISASTER RISK REDUCTION

AGRICULTURE AND FOOD SECURITY

WATER

ENERGY

HEALTH

TRAINING

SCIENCE-BASED

COMMUNICATION AND KNOWLEDGE MANAGEMENT

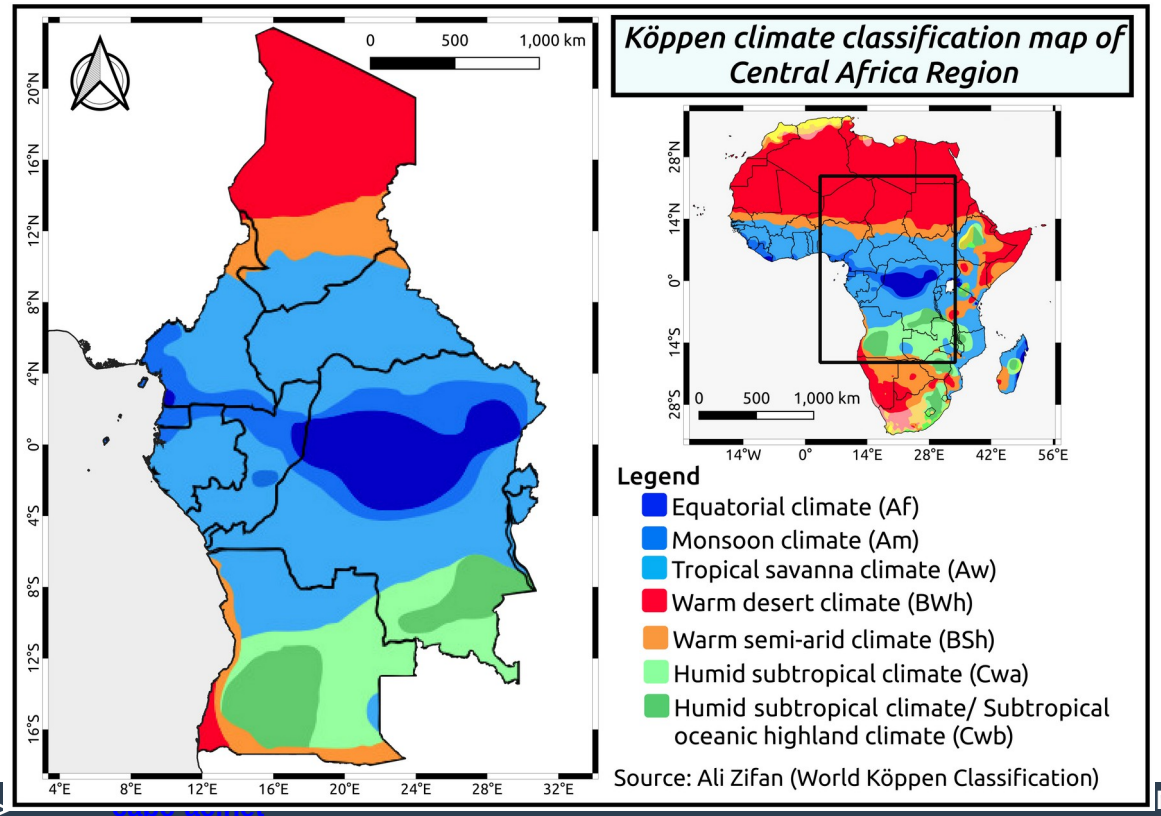
COLLABORATION

CAPACITY BUILDING

Tools, Data and Methodology

Communauté Economique des Etats de l'Afrique Centrale

Superficie	6,6 millions de Km^2
Population	181 millions d'habitants
Nombre de Pays	Angola, Burundi, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of Congo, Equatorial Guinea, Gabon, Rwanda, and Sao Tome and Principe



Presque tous les types de climats d'Afrique sont observés en Afrique Centrale

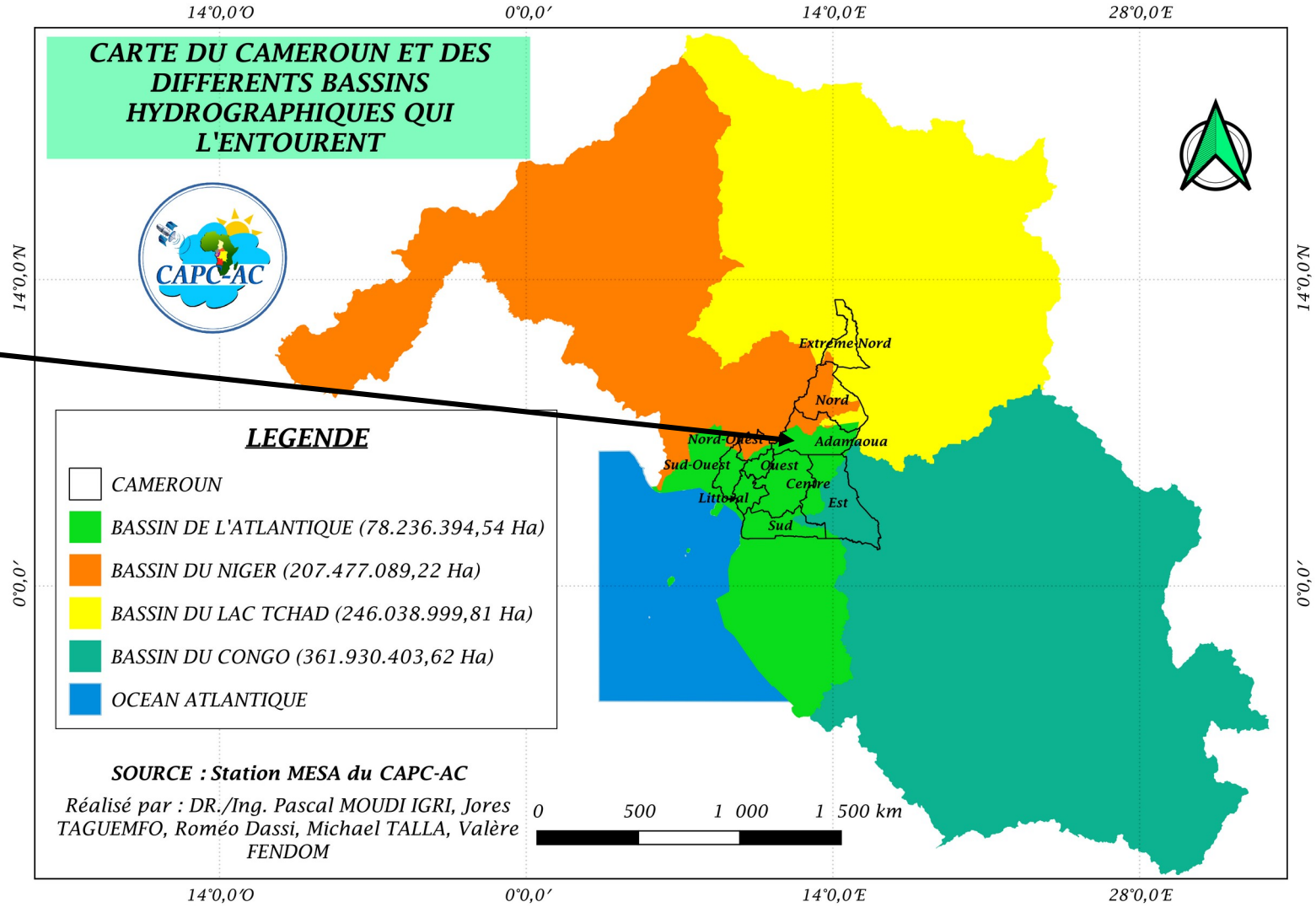
Veille Environnementale: Applications à l'Agriculture (SMHN)

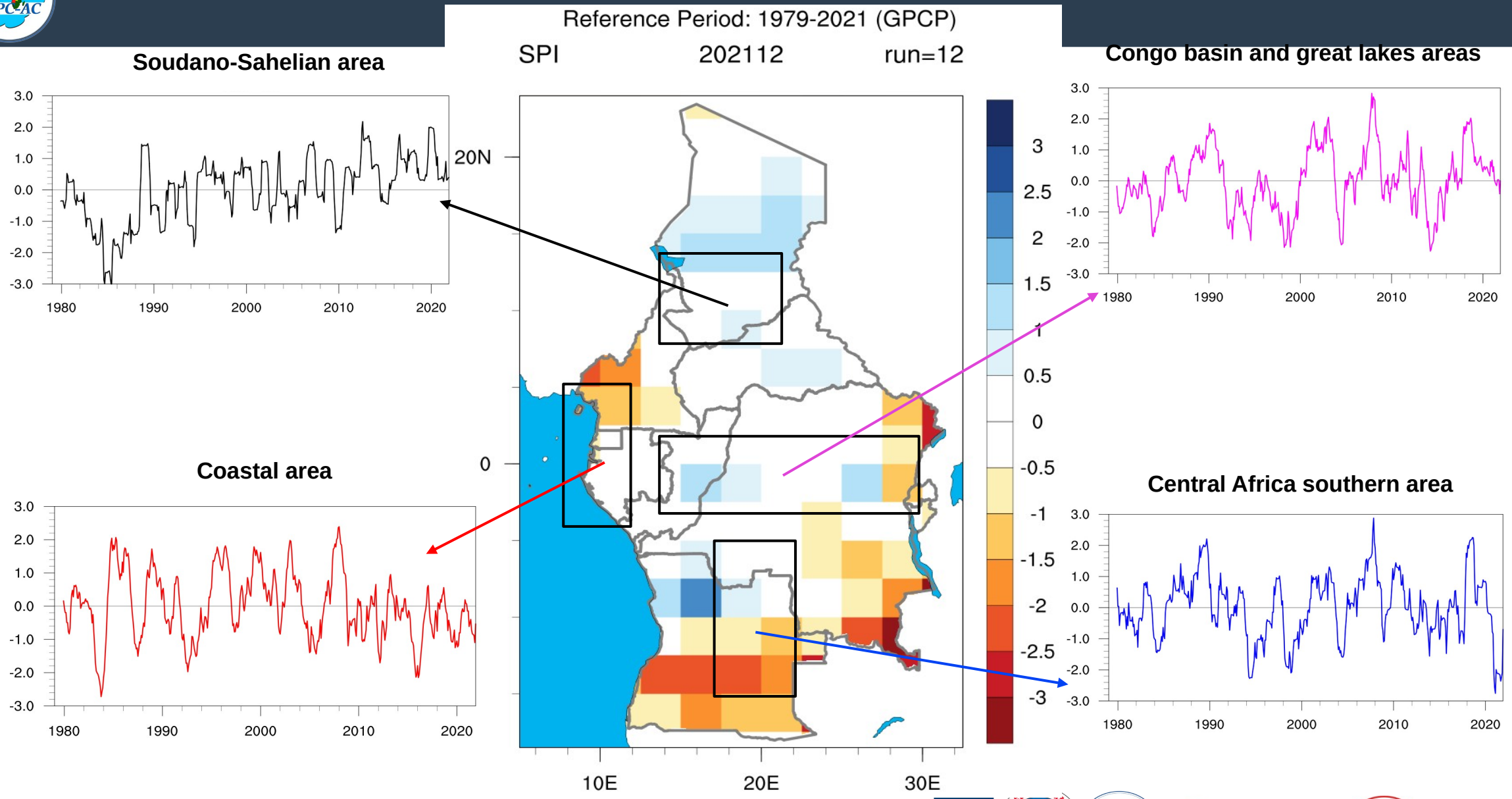
Barrière convective de l'Adamaoua

Zone agricole par excellence

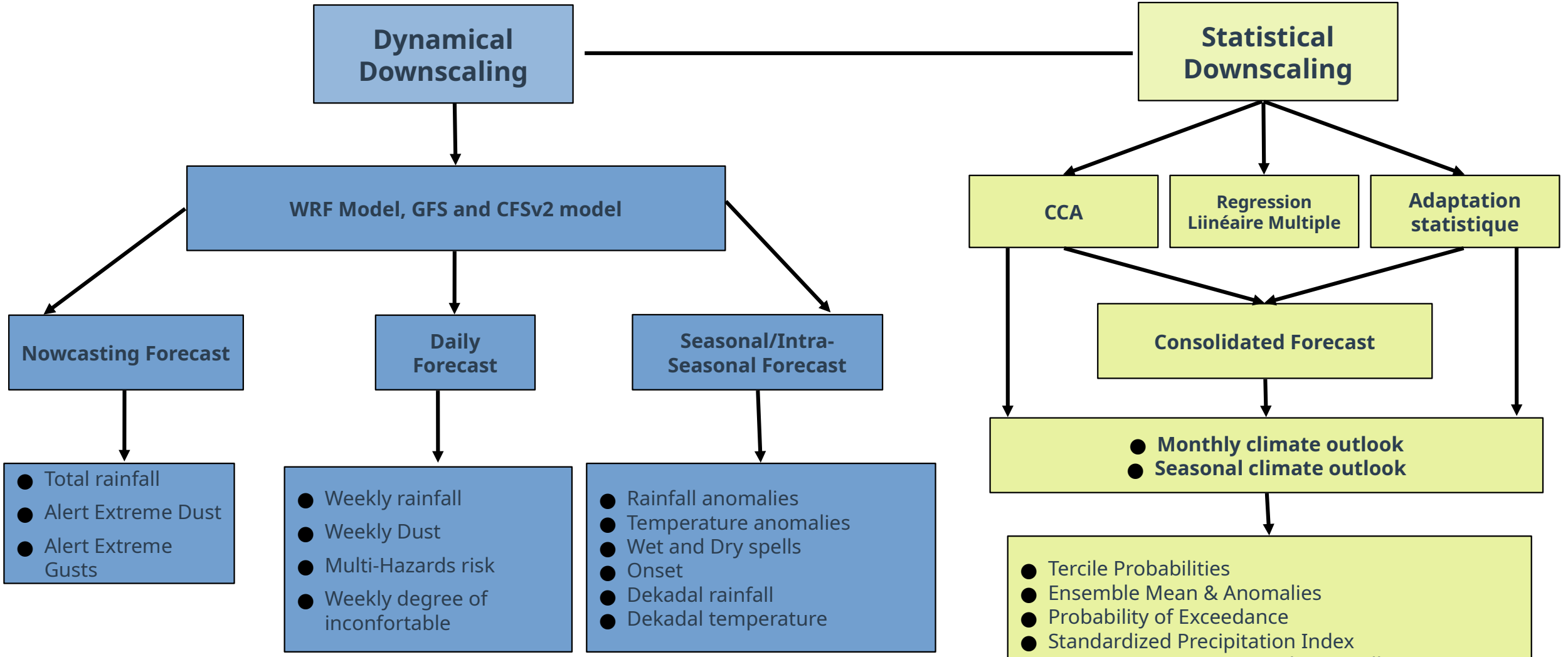
Changement Climatique:
- Evaporation plus prononcée
- Rechauffement

Plus de nuages, plus de turbulences, etc





Les tendances pluviométriques ne sont pas homogènes dans la sous-région


Dynamical Downscaling
Statistical Downscaling
WRF Model, GFS and CFSv2 model
CCA
Regression Liinéaire Multiple
Adaptation statistique
Nowcasting Forecast
Daily Forecast
Seasonal/Intra-Seasonal Forecast
Consolidated Forecast
Total rainfall
Alert Extreme Dust
Alert Extreme Gusts
Weekly rainfall
Weekly Dust
Multi-Hazards risk
Weekly degree of inconfortable
Rainfall anomalies
Temperature anomalies
Wet and Dry spells
Onset
Dekadal rainfall
Dekadal temperature
Monthly climate outlook
Seasonal climate outlook
Tercile Probabilities
Ensemble Mean & Anomalies
Probability of Exceedance
Standardized Precipitation Index
Onset, Cessation, Wet and Dry spells

(b)

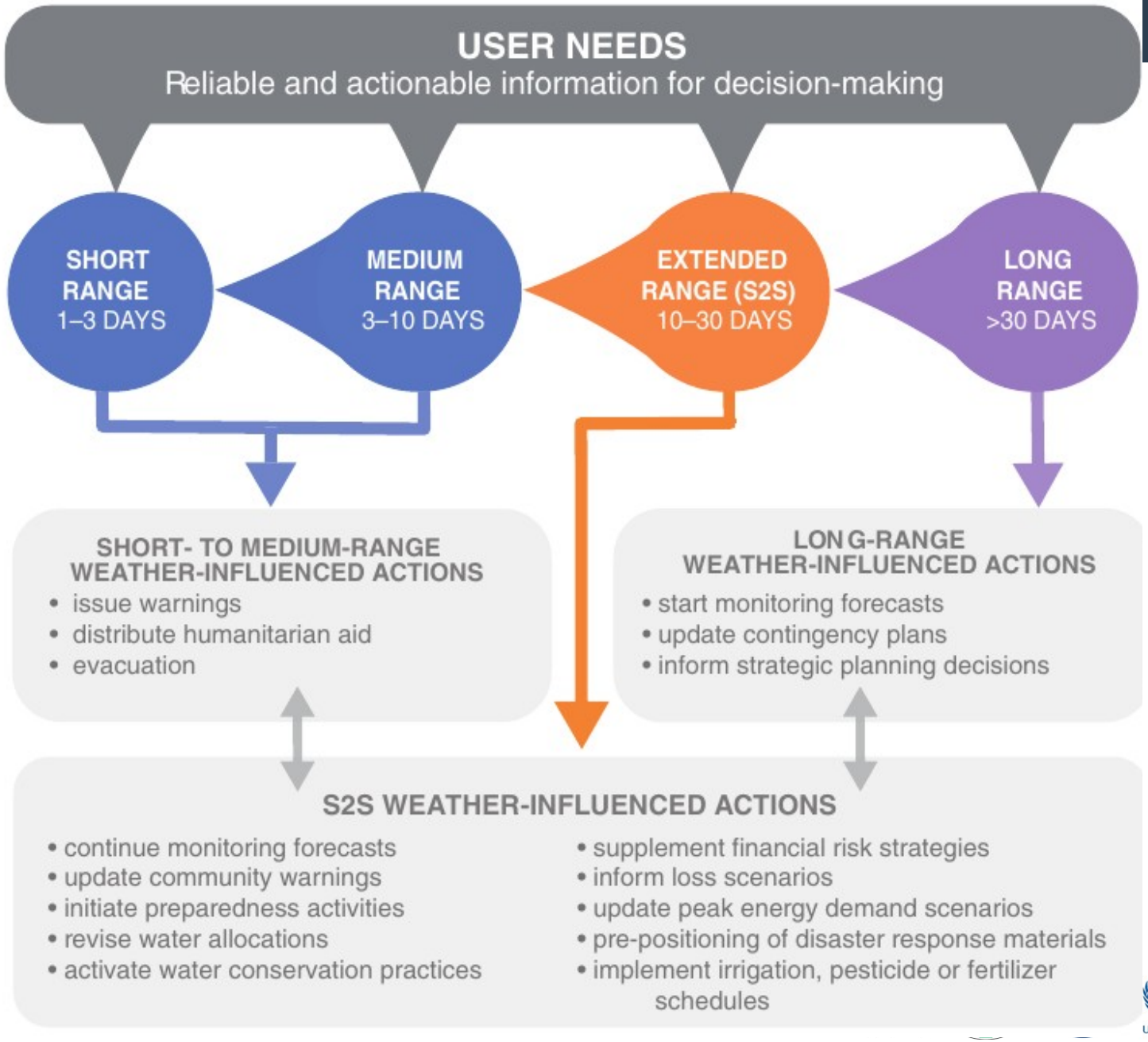
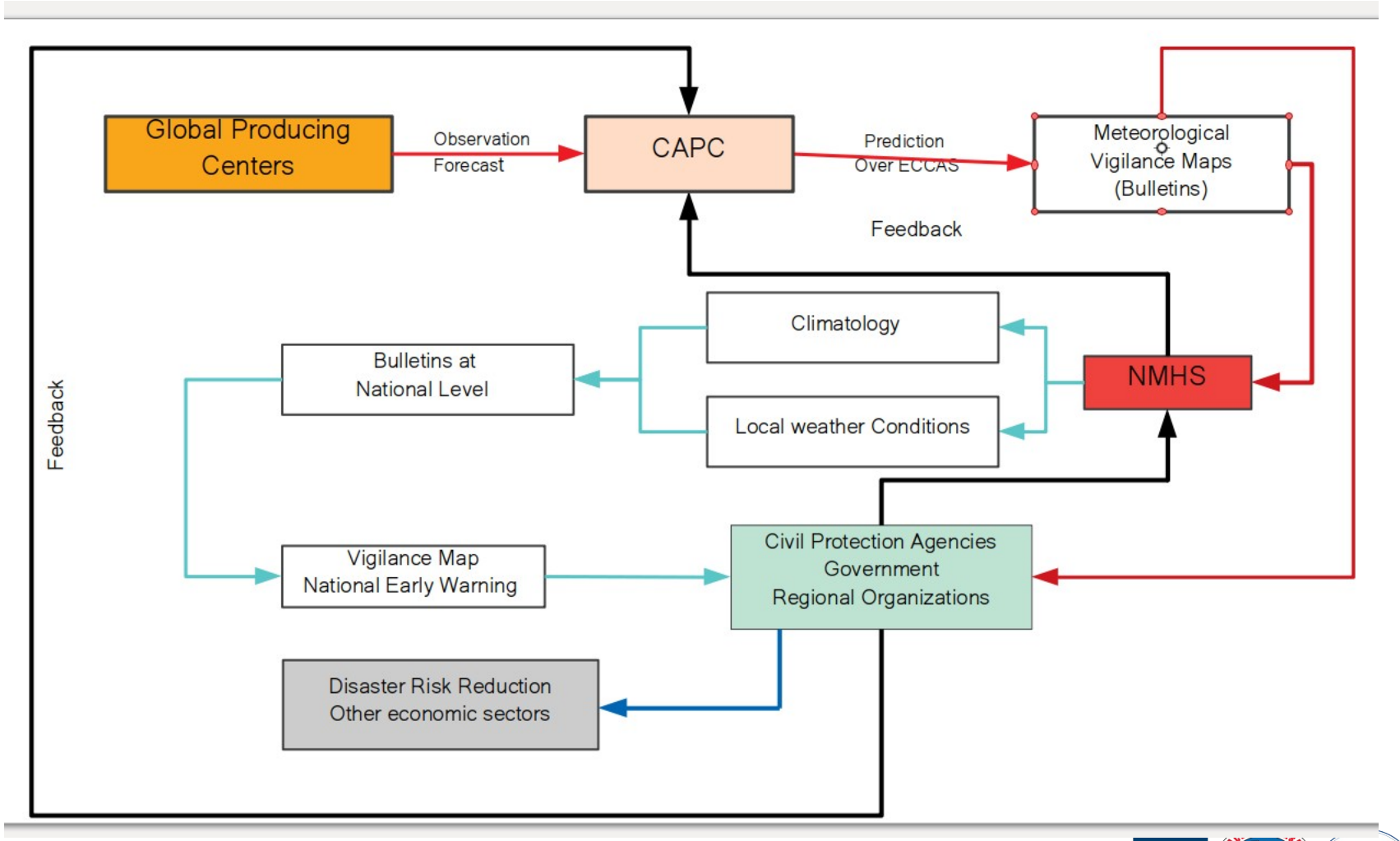

USER NEEDS
Reliable and actionable information for decision-making
SHORT RANGE 1–3 DAYS
MEDIUM RANGE 3–10 DAYS
EXTENDED RANGE (S2S) 10–30 DAYS
LONG RANGE >30 DAYS
SHORT- TO MEDIUM-RANGE WEATHER-INFLUENCED ACTIONS
• issue warnings
• distribute humanitarian aid
• evacuation
LONG-RANGE WEATHER-INFLUENCED ACTIONS
• start monitoring forecasts
• update contingency plans
• inform strategic planning decisions
S2S WEATHER-INFLUENCED ACTIONS
• continue monitoring forecasts
• update community warnings
• initiate preparedness activities
• revise water allocations
• activate water conservation practices
• supplement financial risk strategies
• inform loss scenarios
• update peak energy demand scenarios
• pre-positioning of disaster response materials
• implement irrigation, pesticide or fertilizer schedules

Tableau de correspondance prévisions-bulletins météorologiques

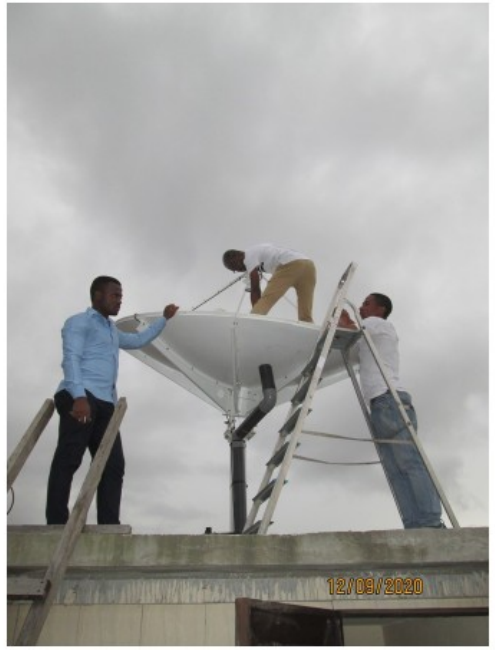
Types de prévision	Echéances	Echelles	Dimensions		Phénomènes observables	Type de bulletins Météorologiques	Produits
			spatiales	temporelles			
Prévision Immédiate (Nowcasting)	00 à 02 h	-Micro échelle -Echelle aérologique	Du mètre à 10 km	Seconde, Minute, Heure	Tourbillon de poussière, torrnades, rafales de vent, orage, brouillard	Bulletins d'alerte, avertissement (Warning)	Imagerie satellitaire, Profil verical, Radiosondage, Humidité Relative, températures, pression atmosphérique, vents, OLR
Prévision à très courte échéance (Nowcasting)	02 h à 12 h	-Echelle aérologique -Méso échelle	10 -100 km	Quelques heures à 1 jours	Orages, tornades, formation des nuages convectifs, brouillard	Bulletins d'avertissement, bulletin d'alerte (Warning)	Imagerie satellitaire, Profil verical, Radiosondage, Humidité Relative, températures, pression atmosphérique, vents, OLR
Prévision à courte échéance (Journalière)	12 h à 05 jours	-Méso échelle -Echelle synoptique	100 à 1000 km	1 à 3 jours	Lignes de grains, ondes d'Est, brume sèche, aérosols	Bulletins d'avis (Advisory)	Pression, températures, vents, Profil verical, Humidité Relative, CAPE, PWAT, OLR
Prévision à moyenne échéance (Journalière)	03 à 10 jours	Echelle synoptique	100 à 1000 km	Quelques jours (03 à 10 jours)	Brume sèche, ligne de grains, ondes d'Est et équatoriales, cyclone, anticyclone, aérosols	Bulletins d'avis (Advisory)	Pression, températures, vents, Profil verical, Humidité Relative, CAPE, PWAT, OLR
Prévision à échéance prolongée (intra-saisonnière)	10 à 30 Jrs	Echelle synoptique	100 à 1000 km	Quelques jours à 30 jours	Vents régionaux (Jets, mousson, harmattan), les centres d'actions (Anticyclones et dépressions) et les ondes équatoriales	Bulletins de veille (Watch)	Pression, températures, vents, géopotentiel,
Prévision à longue échéance (saisonnière)	1 à 6 mois	Echelle planétaire	Au-delà de 1000 km	Du mois à l'année	Jets, Ondes équatoriales, alternance de saisons	Bulletins de tendance (Outlooks)	Pression, températures, vents, géopotentiel
	6 mois à 2 ans						
Prévision climatique	plus de 02 ans	Echelle planétaire	Au-delà de 1000 km	Du mois à l'année	Variabilité climatique	Bulletins de projection climatique	Pression, températures, vents, géopotentiel

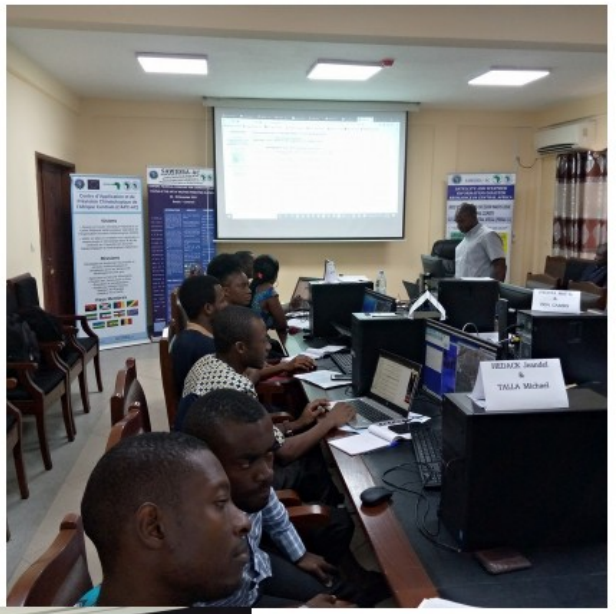
Products and Services

Dissémination



Ecoles Polytechniques du Cameroun et CAPC-AC





ECCAS/CAPC-AC situation room (UNDRR)

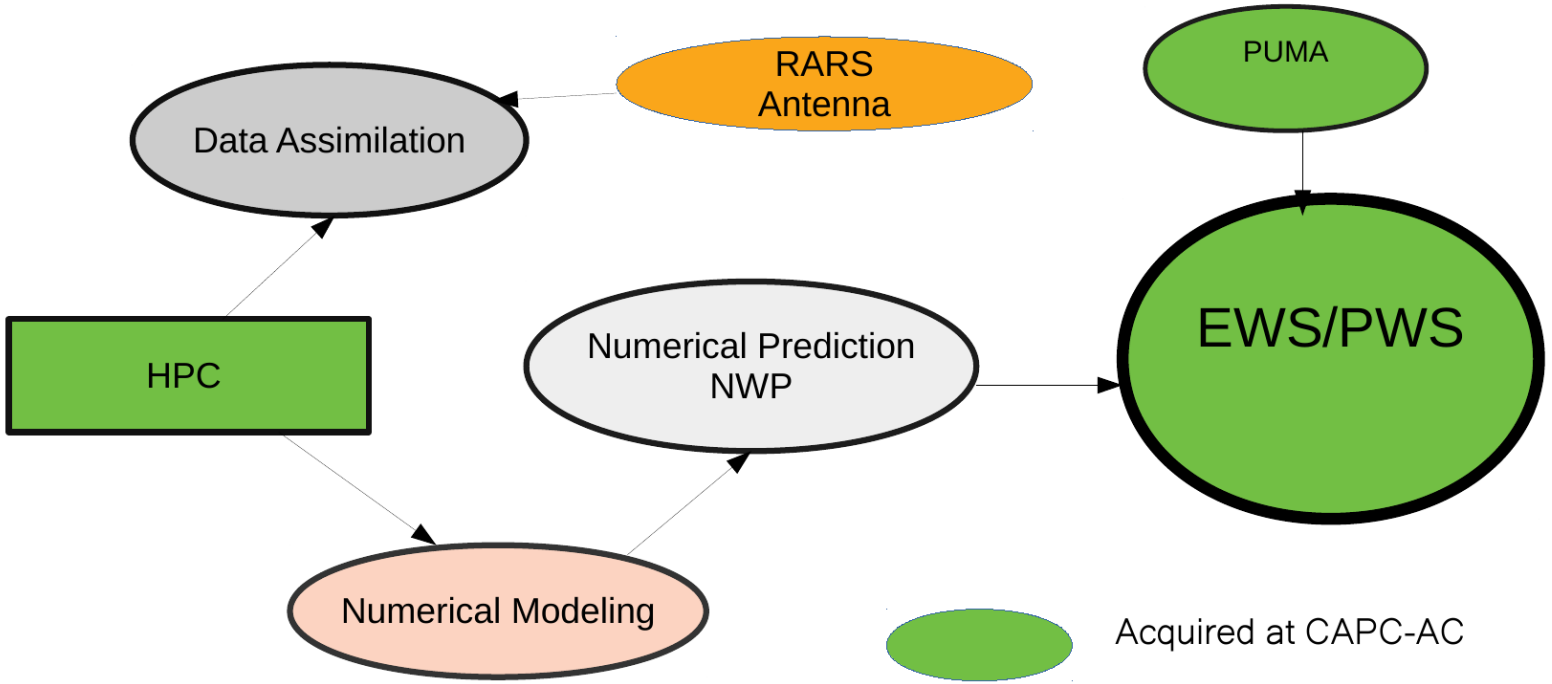
- Hazard Monitoring
- Coordinate early action
- Rapid mapping of affected areas
- Capacity building
- Training

UN Office for Disaster Risk Reduction

Cas Congo Brazza: 26 novembre 2022

Equipements opérationnels: Financement ClimDev

En Première ligne de l'action climatique



Overview of CAPC's Multirisk Early Warning Products

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Foreword

The CAPC-AC goes beyond traditional meteorology. It embraces an integrated risk management approach, centered on food security, public health, and climate resilience, with the aim of anticipating and reducing the impacts of disasters across the region.

To achieve these objectives, the CAPC-AC relies on the following pillars:

- **Environmental modeling:** Use of numerical models such as WRF to simulate atmospheric dynamics and anticipate extreme weather events.
- **High-resolution risk mapping:** Generation of dynamic maps using GIS tools (QGIS), integrating climatic, topographic, and socio-economic data to identify vulnerable areas.
- **Multi-source and multi-model analysis:** Integration of forecast outputs (WRF and other models) with satellite monitoring products (CM-SAF, LSA-SAF) to refine diagnostics and improve risk assessments.
- **Agricultural drought monitoring:** Use of vegetation indices, rainfall anomalies, and SAF products to anticipate water deficits and assess their impacts on crop production.

Foreword

- **Advisories and monitoring product generation:** Development of operational tools to support risk reduction and informed decision-making.
- **Support for anticipatory action and rapid response:** Contribution to early action mechanisms aimed at minimizing disaster impacts before they occur.
- **Regional coordination and information sharing:** Networking of national and regional stakeholders to ensure a coherent and effective response.
- **Climate-based disease surveillance:** Analysis of meteorological and environmental conditions (temperature, humidity, rainfall, vegetation, and water bodies) that influence the emergence, transmission, and spread of climate-sensitive diseases such as malaria, dengue, cholera, and meningitis, in order to support early warning, prevention, and public-health preparedness strategies

Foreword

Through this multidimensional and integrated approach, the **CAPC-AC** deploys a range of technical products tailored to the operational needs of the region.

These tools, derived from environmental modeling, satellite analysis, and multi-model forecasting, enable rigorous monitoring of climatic, health-related, and environmental risks.

The following section provides a detailed overview of the main products developed, their methodological foundations, and their strategic relevance in the context of risk reduction and anticipatory action.

Multirisk Monitoring Products

Summary of Multi-Risk Monitoring Products

Product / Tool	Objective & Variables	Spatial / Temporal Resolution	Application
Regional Downscaling & Forecasts	WRF-based rainfall, wind, humidity, soil-moisture simulations	8 km daily / 10-day / monthly runs	Operational meteorological forecasts
Heavy Rainfall Advisories	RAIN_SUM (RAINC + RAINNC)	8 km daily	IBF (Flood forecasting and warning)
Multi-Hazard Outlook & Early Action Maps	Rainfall (RAIN_SUM), runoff (SFROFF/UDROFF), soil moisture (SMOIS), wind (U10, V10), Height (HGT)	8 km daily	Multi-risk early-warning dashboards
Dry–Wet Spell Monitoring	Rainfall duration and frequency	8 km daily	Agricultural & drought risk tracking
Hot–Cold Spell Analysis	Mean Temperature (T2m)	8 km daily	Health and heatwave alerts
Convection Risk Maps	Potential Temperature, wind (ua, va), vorticity, omega	8 km daily	Severe storm potential
Mid-Atmosphere Dry-Air Intrusion	RH < 40 %, Qvapor < 1.5 g kg^{-1}	8 km daily	Forecast of storm suppression / fire risk
Multi-Model Seasonal Rainfall Forecasts	C3S ensemble (08 models)	1° monthly / seasonal	Seasonal climate outlooks
Onset–Retreat Monitoring	Rainfall thresholds (≥ 100 mm in 7 days) and dry-spell indices	1° decadal / seasonal	Agricultural calendar & drought-risk management
Composite Drought Index (CDI-A)	Weighted DHI (35 %), Precipitation (20 %), Evapotranspiration (20 %), LAI (15 %), Sunshine (10 %)	3–5 km monthly	Agricultural drought early warning
Health / Malaria Advisories	Temperature + Humidity + Land-use	8 km daily	Predictive mapping of malaria-risk zones

Regional Downscaling Simulations

CAPC's forecast relies on tools, models in particular, adapted models tailor to the region which are runned locally to prevent us from relying primarily on global forecast data that comes from international centers.

- We use the **WRF** model to make weather forecasts at different temporal scales using different input datas such as **ECMWF, GFS, CFSv2** ,...
- We usually run :
  - ➔ 10-days simulations for short-range weather forecasts
  - ➔ One month-simulations for long-range weather forecasts
- Those simulations are runned on a 8km-grid over the ECCAS domain and require high computational capabilities.

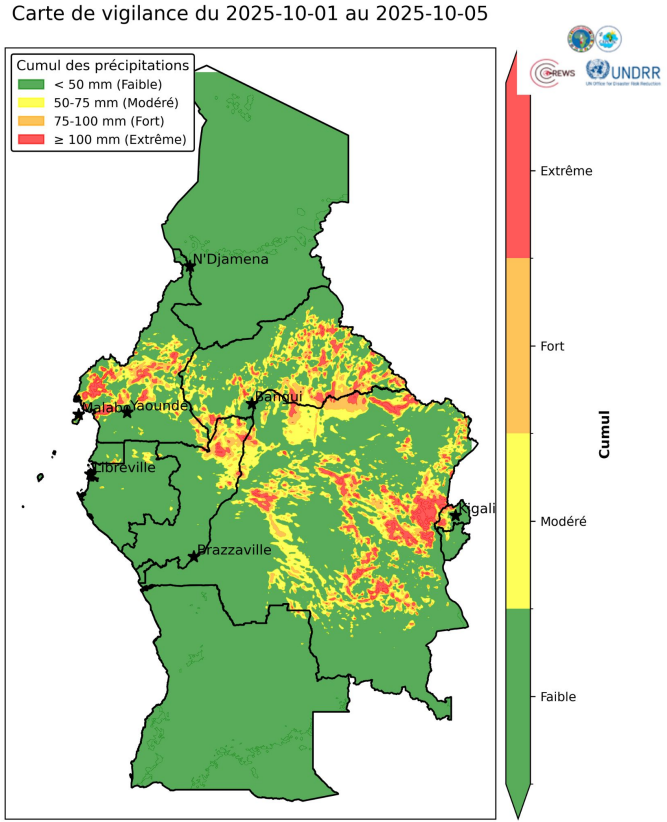
Regional Heavy Rainfall Advisories

Variables:

- WRF Output Variables : **RAIN_SUM** (RAINC + RAINNC)

Resolution

- spatial: 8 km x 8 km
- Temporal: daily



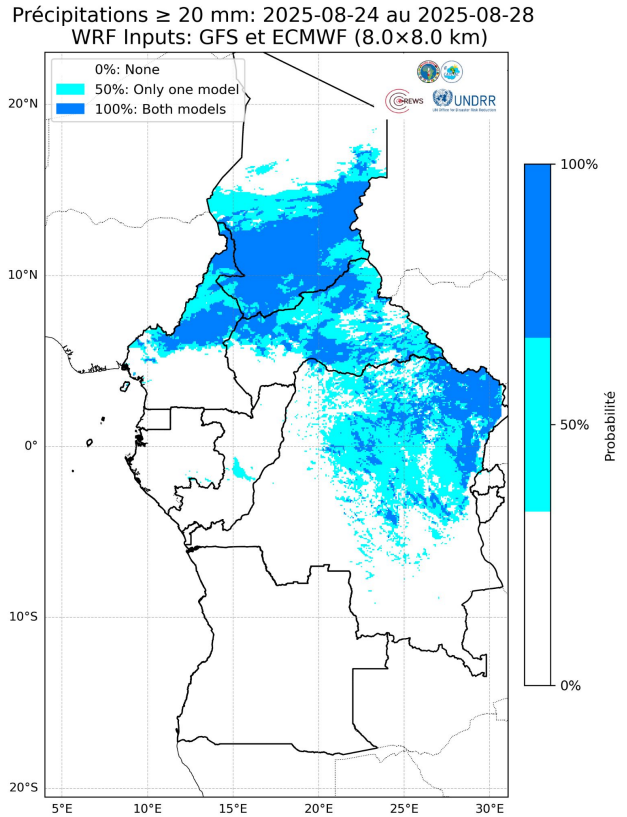
Regional Heavy Rainfall Advisories

Variables:

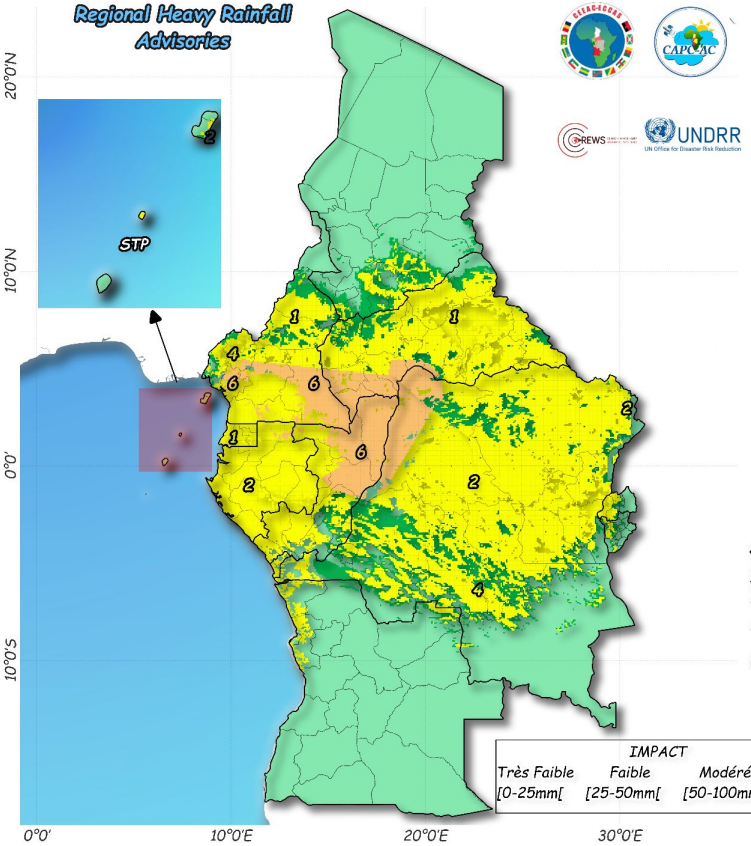
- WRF Output Variables : **RAIN_SUM** (RAINC + RAINNC)

Resolution

- spatial: 8 km x 8 km
- Temporal: daily, weekly



Regional Heavy Rainfall Advisories



Diffusion : 02/10/2025
Validité:06/10/2025 - 10/10/2025

Pas de Phénomènes Hydrométéorologiques Dangereux	Soyez Préparés
Soyez Conscients du Risque	Prenez des Mesures

Interprétation

(1)Très Probable d'avoir des cumuls compris 25 et 50 mm
(2) Certainement Probable d'avoir des cumuls compris entre 25 et 50 mm
(4) A peu près aussi probable que non d'avoir des cumuls compris entre 50 et 100 mm
(6) Très Probable d'avoir des cumuls compris entre 50 et 100 mm

Matrice Probabilité/Impacts

Probabilité	Très Faible	Faible	Modéré	Elevé
100% Certainement probable		2	7	10
90% Très probable		1	6	9
66% A peu près aussi probable que non			4	8
33% Improbable			3	5
01%				

IMPACT				
Très Faible	Faible	Modéré	Elevé	
[0-25mm[	[25-50mm[	[50-100mm[	≥100mm	

Classification de l'impact

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Salle de Veille Multirisque

Methodology

1- Numerical Weather Prediction with the WRF model

2-Forecast analysis

3- Expertise

4-Mapping

Multi-Hazard Outlook and Early Action

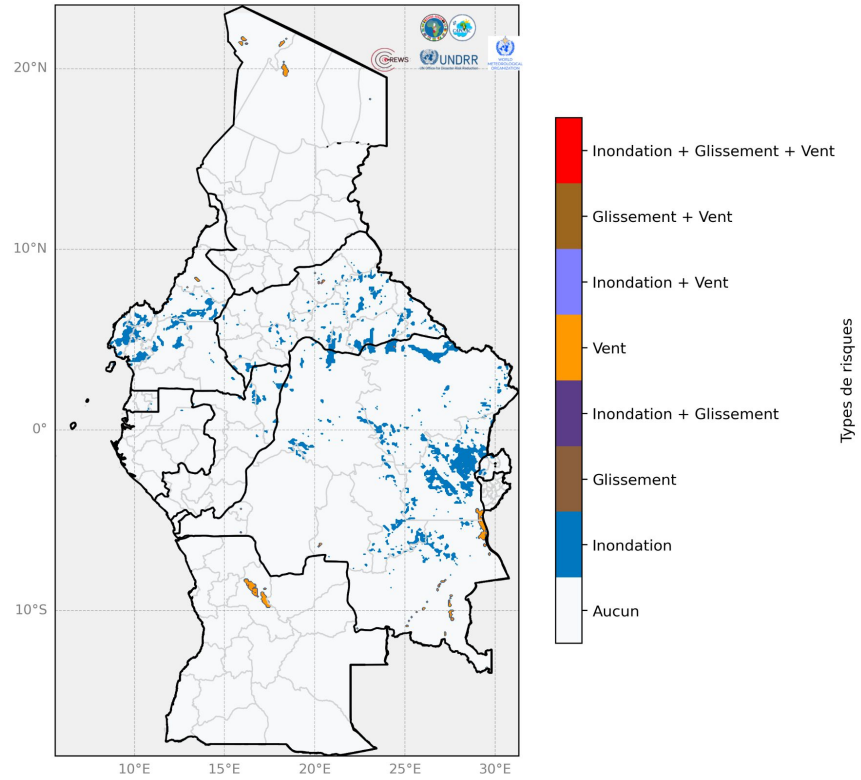
Variables:

- WRF Output Variables : Rainfall, HGT, SFROFF, UDROFF, U10, V10, SMOIS, ISLTYP

Resolution

- spatial: 8 km x 8 km
- Temporal: daily

Carte multirisque glissante – 2025-10-01 au 2025-10-05 (Cumul 5 jours)



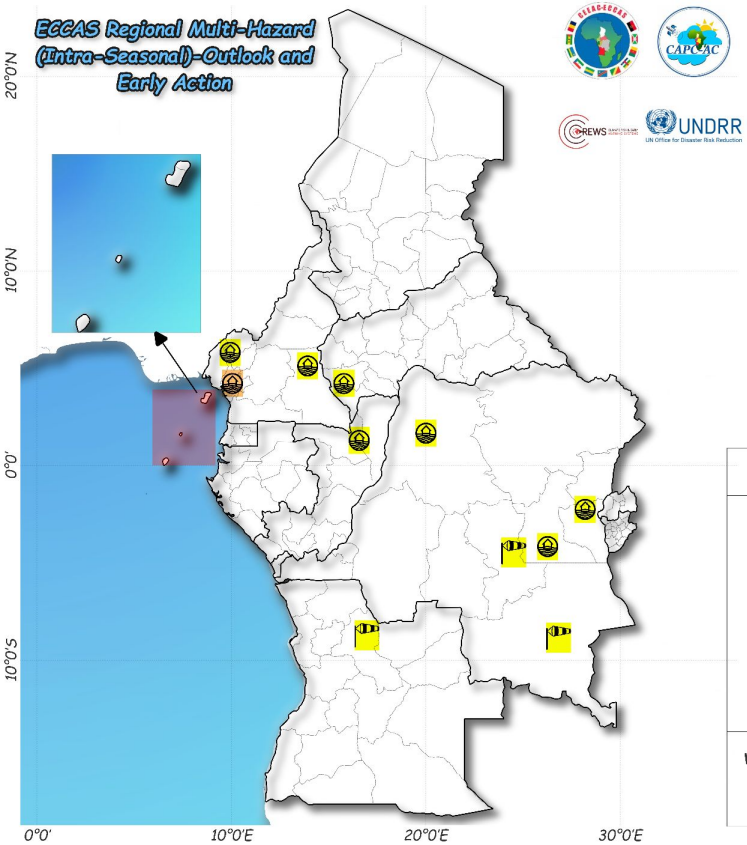
Salle de Veille Multirisque

REWS CLIMATE RISK & EARLY WARNING SYSTEMS

UNDRR UN Office for Disaster Risk Reduction

WORLD METEOROLOGICAL ORGANIZATION

Multi-Hazard Outlook and Early Action



Diffusion : 02/10/2025
Validité: 06/10/2025 - 10/10/2025

Pas de Phénomènes Hydrométéorologiques Dangereux	Soyez Préparés
Soyez Conscients du Risque	Prenez des Mesures

Inondation

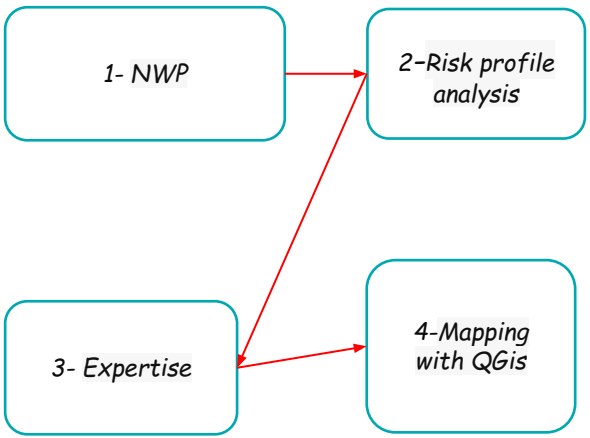
Glissement de terrain

Vent violent

Interprétation

Nature du Risque	Pays Affectés
Inondation Possible	Cameroun (Littoral)
	Cameroun (Est, Nord-Ouest, Ouest)
	Congo (Nord)
	RCA (Ouest)
	RDC (Nord, Est)
Vent Violent Possible	Angola(Nord)
	RDC (Sud-Est)

Methodology



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Salle de Veille Multirisque

Capc-ac .net

Spells indices

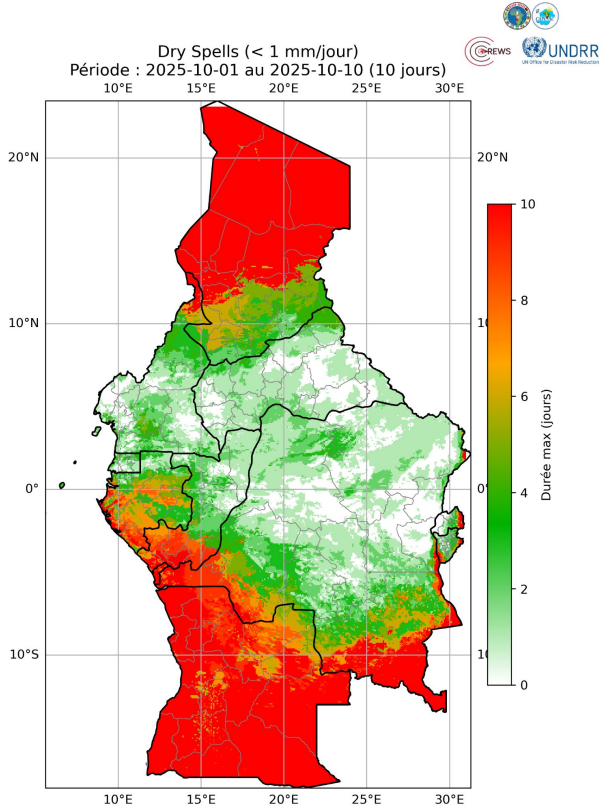
Variables:

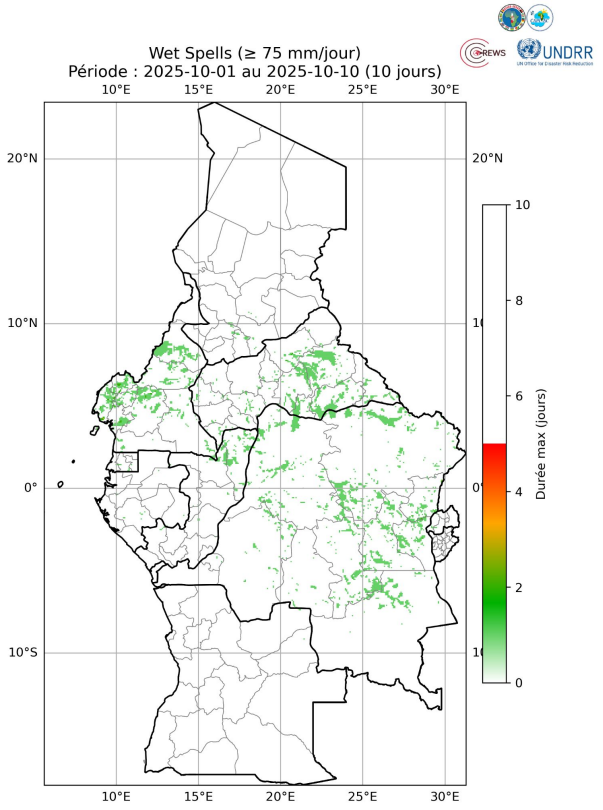
- WRF Output Variables : **Rainfall, T2m**

Resolution

- spatial: 8 km x 8 km
- Temporal: daily

Dry-Wet Spells





Salle de Veille Multirisque

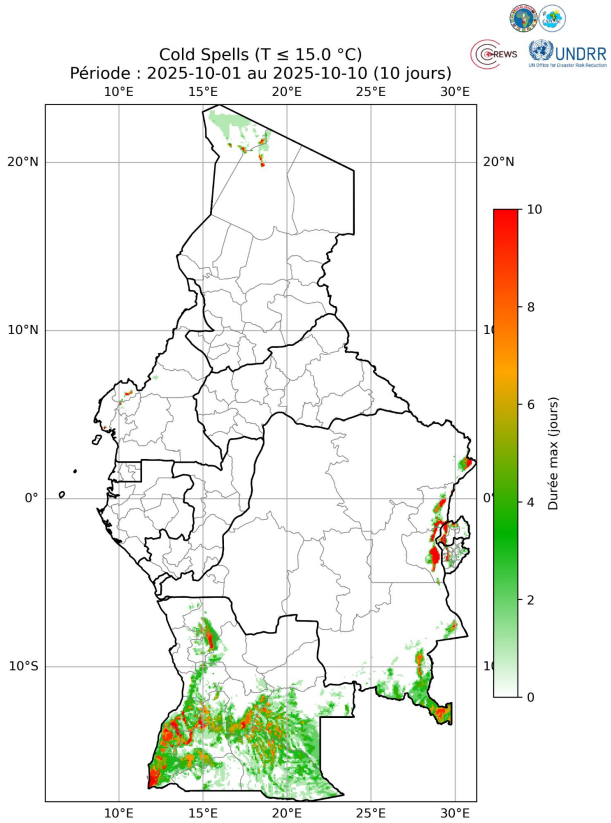
CREWS CLIMATE RISK & EARLY WARNING SYSTEMS

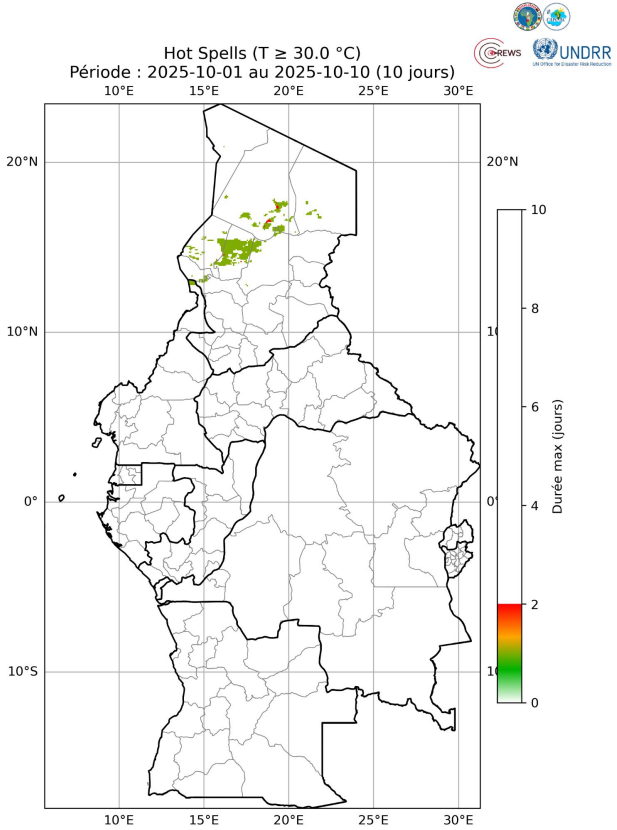
UNDRR UN Office for Disaster Risk Reduction

WORLD METEOROLOGICAL ORGANIZATION

Capc-ac.net

Hot-Cold Spells





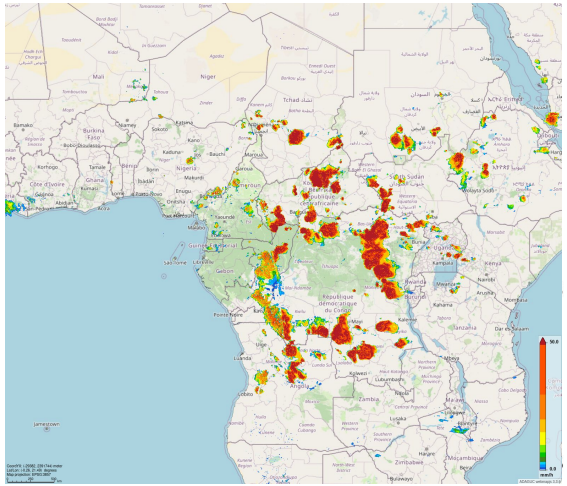
Convection Risk

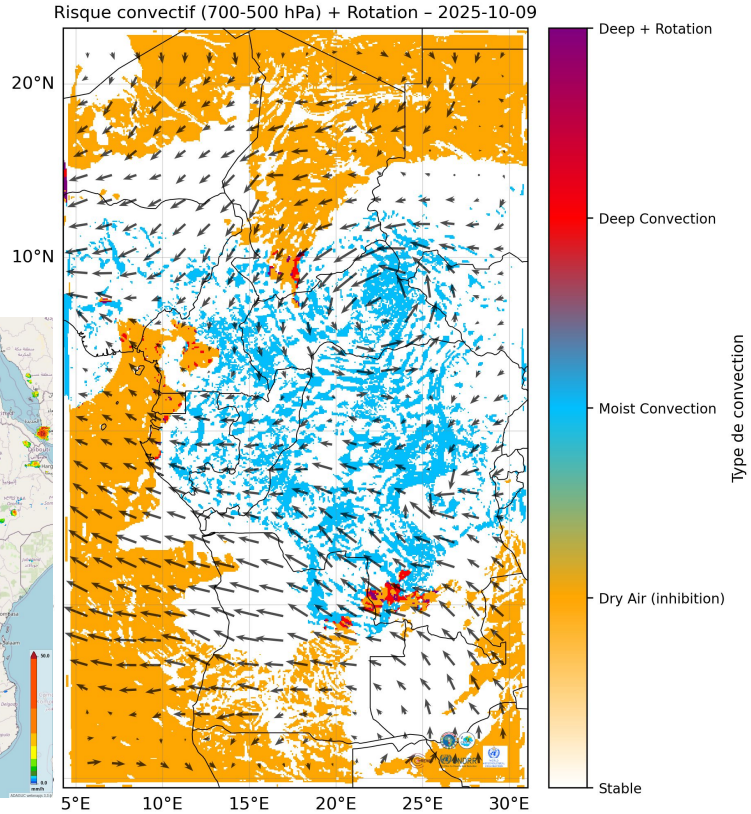
Variables:

- WRF Output Variables : **ua, va, omega, theta_e, rh**
- **Vorticity is derived from wind**

Resolution

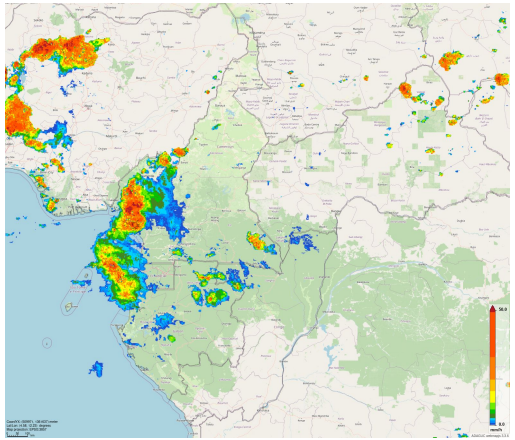
- spatial: 8 km x 8 km
- Temporal: daily

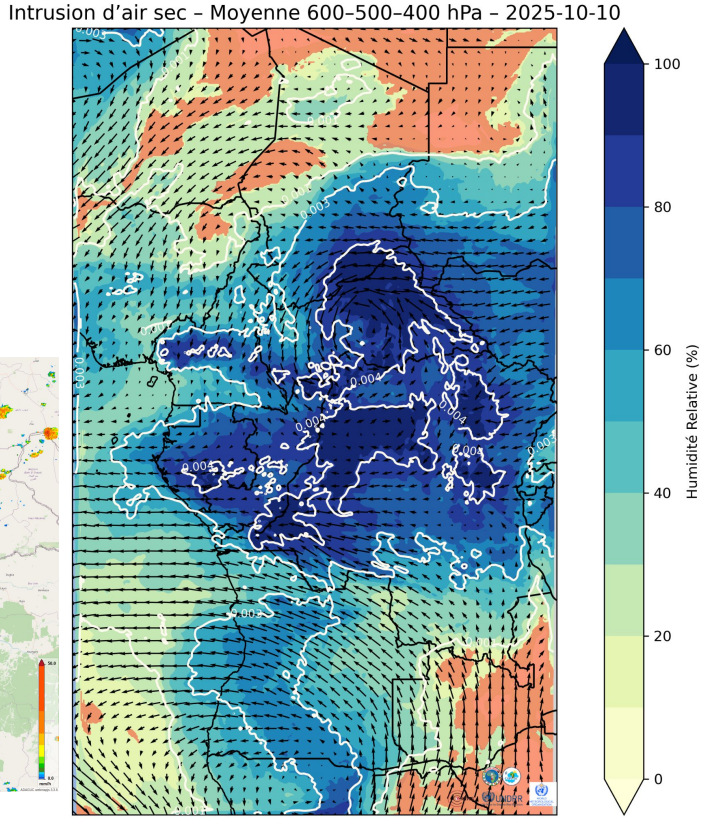




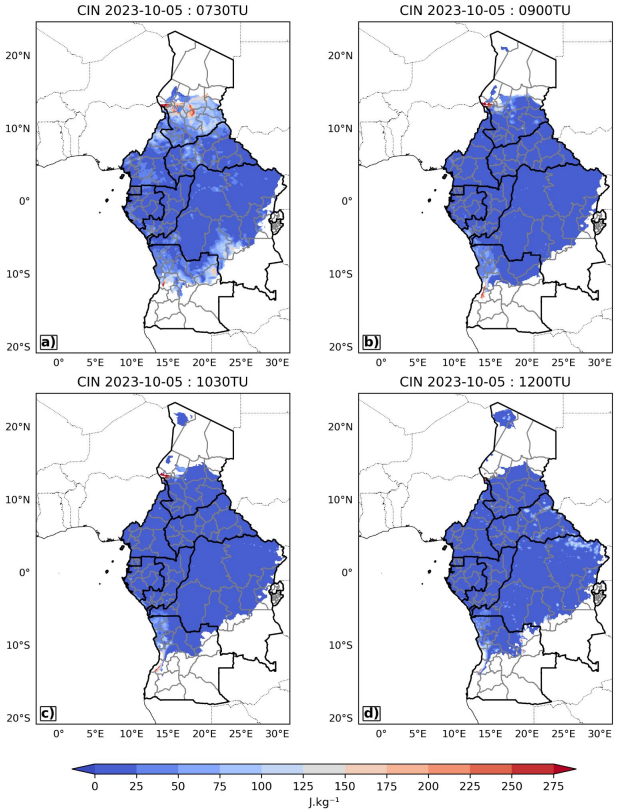
Mid-Atmosphere Dry air Intrusion

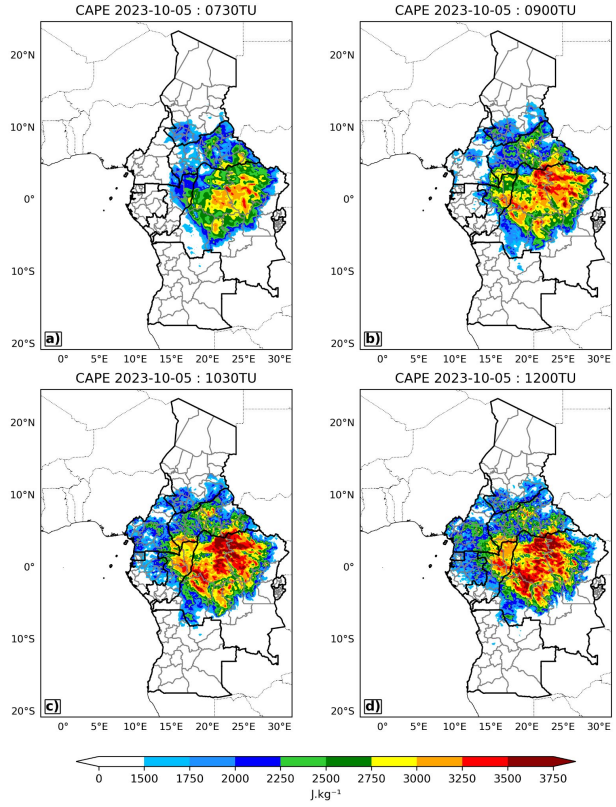
- **Variables:**
  - RH, QVAPOR,Wind
- Yellow to Red areas represent Dry air where RH<40% and Qvapor< 1.0 g/kg
- **Resolution**
  - spatial: 8 km x 8 km
  - Temporal: daily



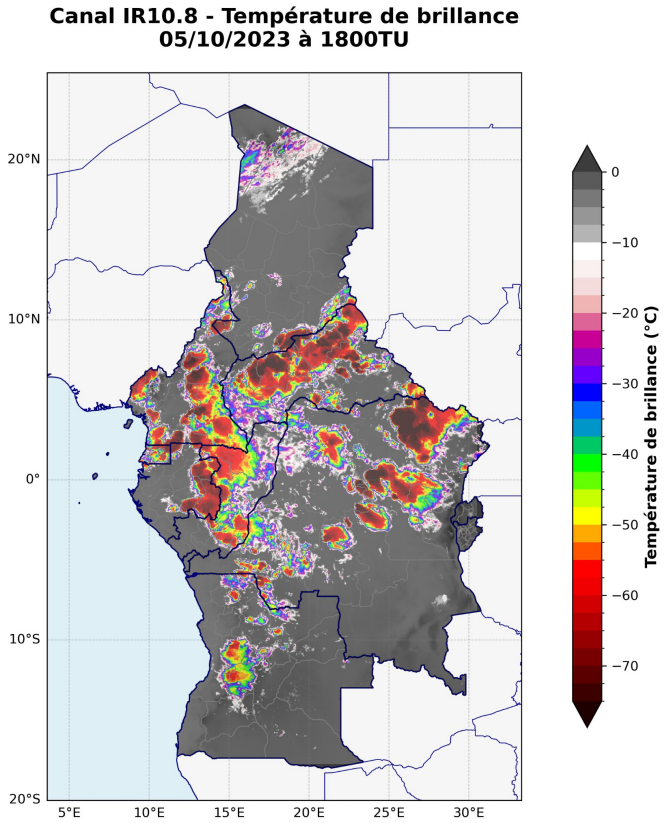


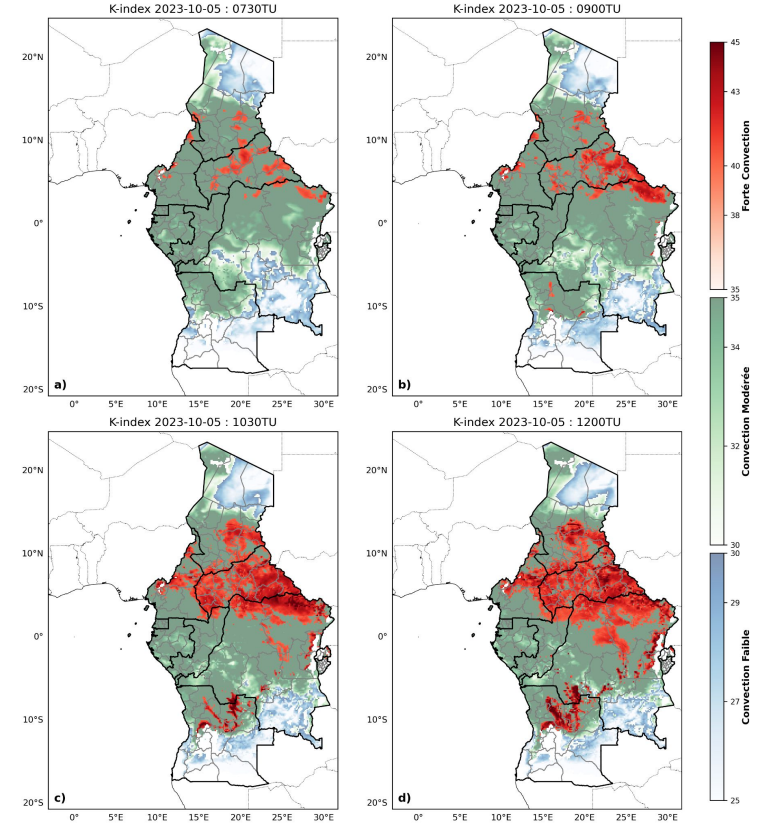
Convection analysis based on WRF Outputs





Convection analysis based on WRF Outputs





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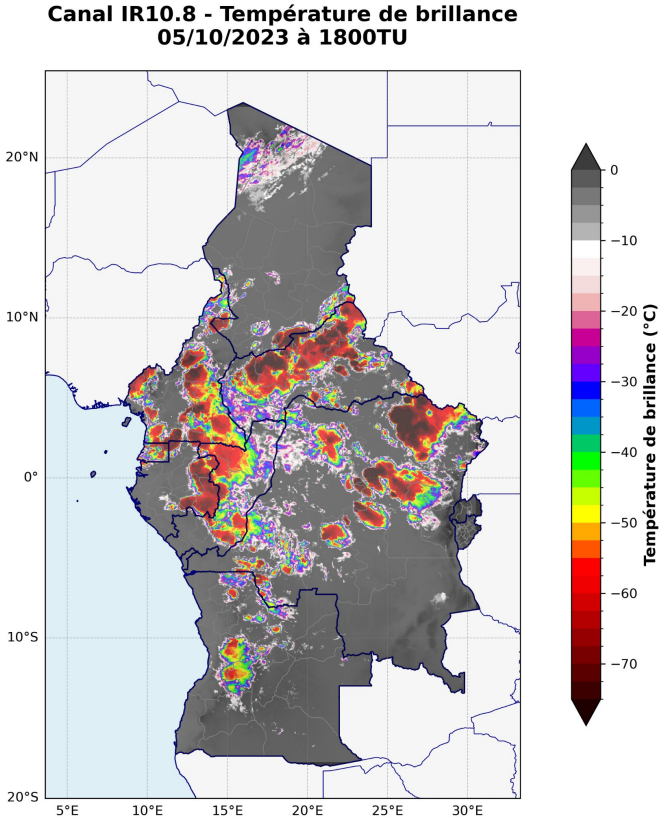
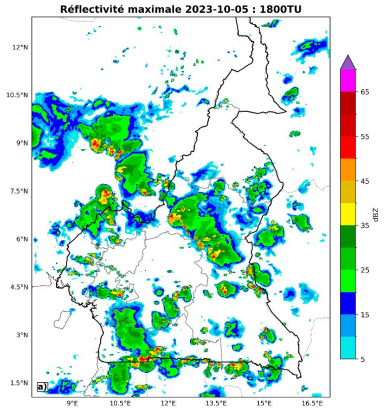
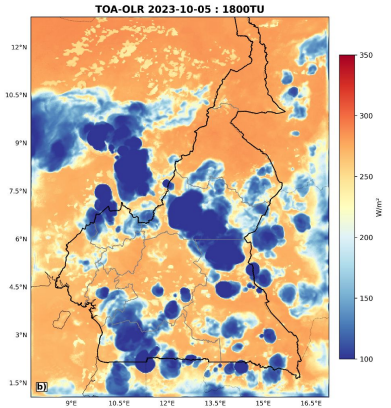
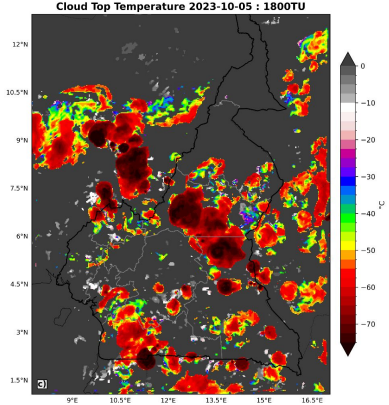
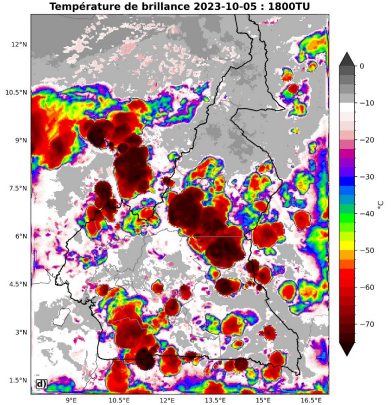
Convection analysis based on WRF Outputs











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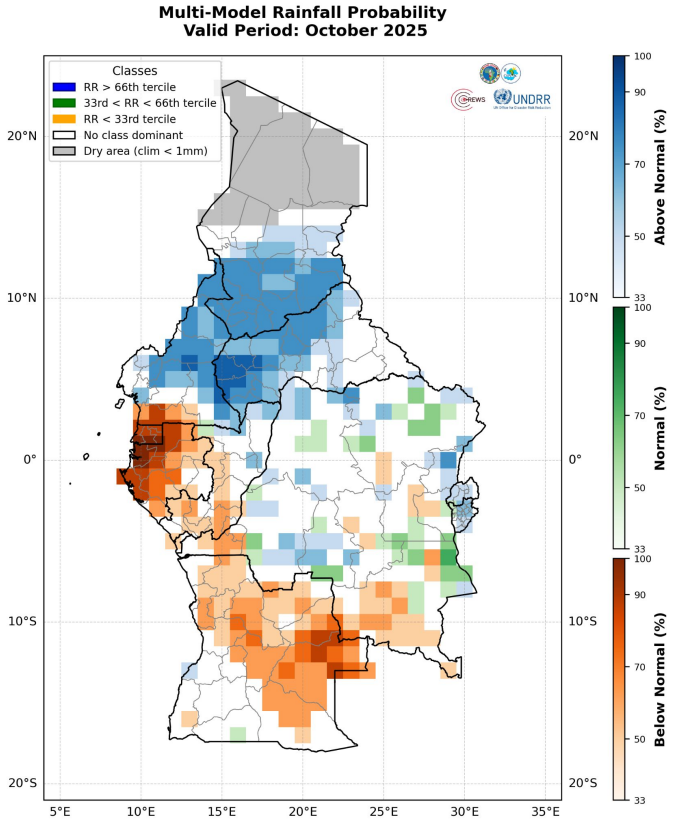
Multi-Model Rainfall Seasonal Forecasts

- **Inputs:**
  - Precipitation data from Copernicus C3S Database
  - Hindcasts and Forecasts of 8 models: BOM, CMCC, DWD, ECCC, ECMWF, Météo-France, NCEP, UKMO.
- **Initialisation** : Each Month
- **Resolution**
  - spatial: 1.0°x 1.0°
  - Temporal: decadal, monthly, seasonal



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Onset-Retreat Trends

Onset-Retreat Periods

Objective :

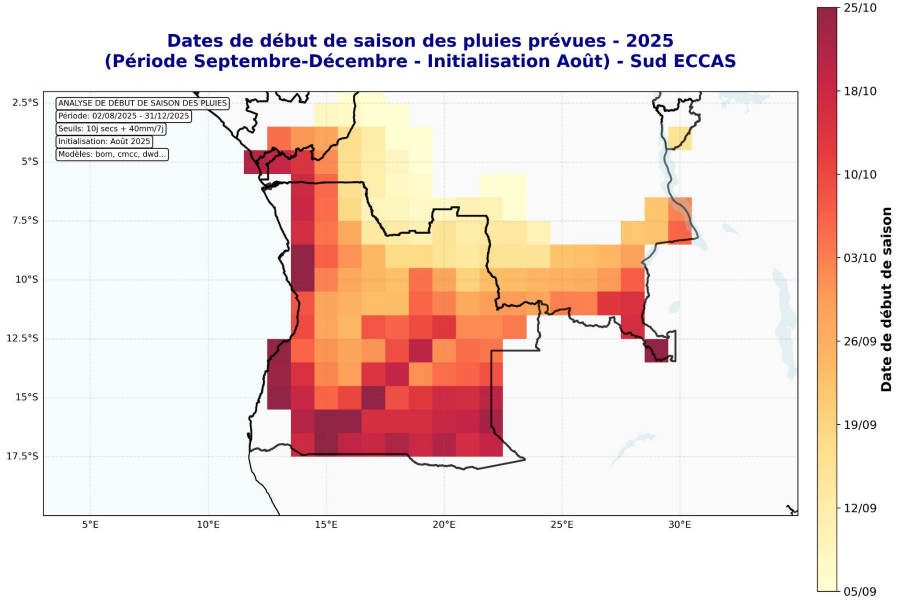
Identify the onset and retreat dates of the rainy season in the ECCAS region in order to anticipate risks associated with seasonal variability: agricultural drought, excessive rainfall, health impacts.

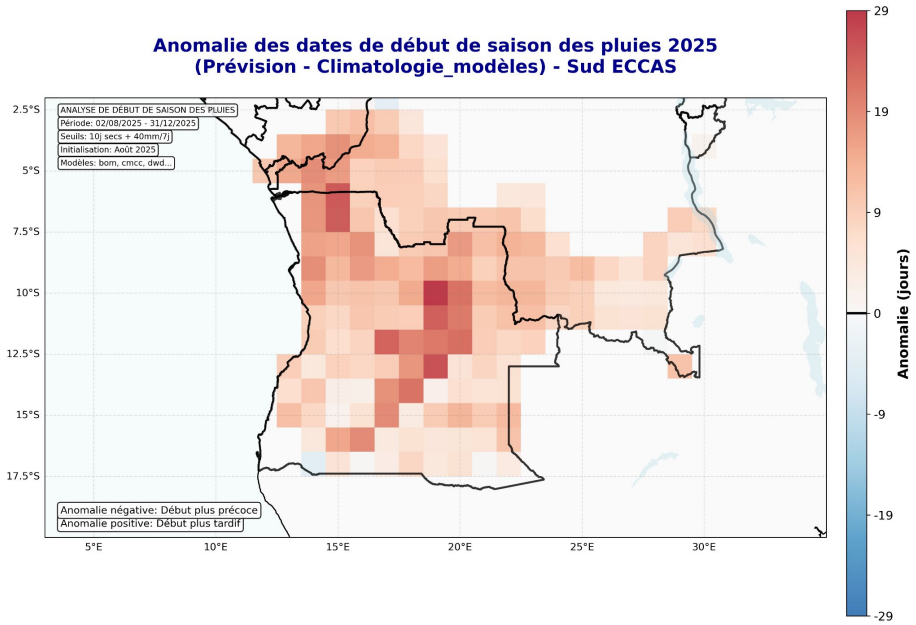
- Methodological approach:
- Climate models used: bom, cmcc, dwd, eccc, ecmwf, meteo_france, ncep, ukmo;

Analysis parameters:

Onset	**Retreat**
Minimum dry period: ≥ 10 days	Withdrawal threshold: Drought index ≥ 0.95
Post-onset rainfall threshold: ≥ 100 mm over 7 days	Minimum duration of dry conditions: ≥ 10 consecutive days

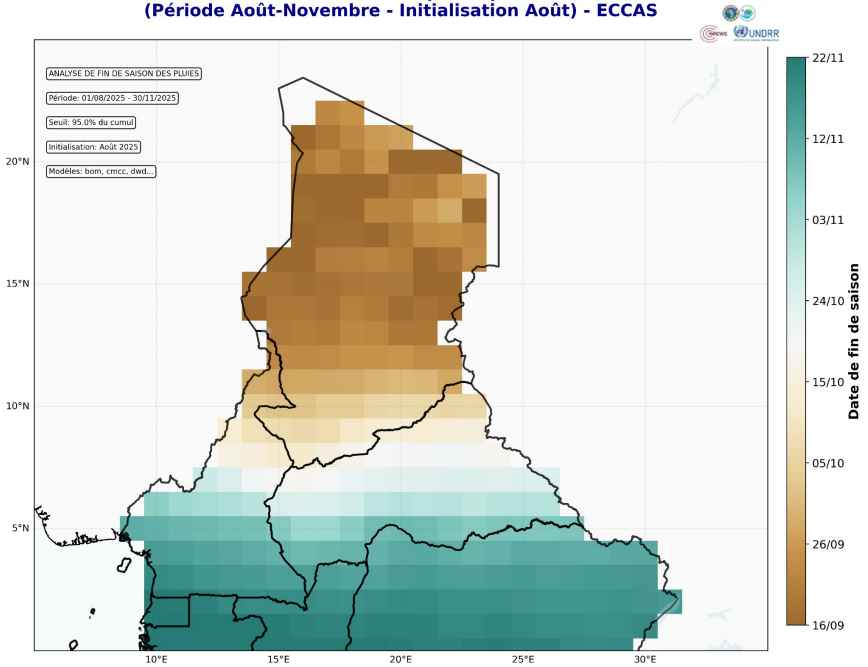
Onset-Retreat Periods



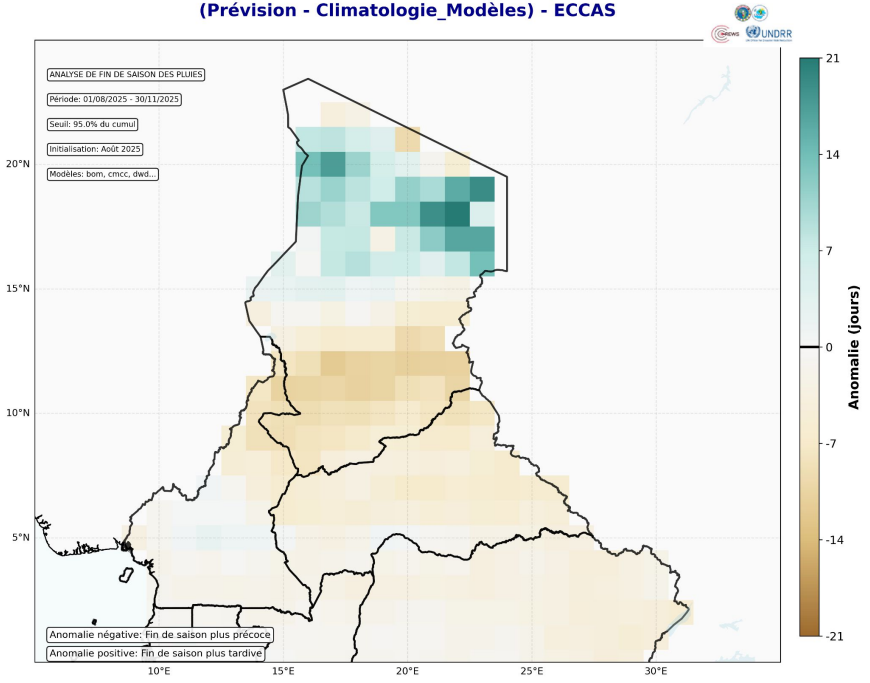


Onset-Retreat Periods

Dates de fin de saison des pluies prévues - 2025
(Période Août-Novembre - Initialisation Août) - ECCAS



Anomalie des dates de fin de saison des pluies 2025
(Prévision - Climatologie_Modèles) - ECCAS



Regional Monitoring Agricultural Drought : Composite Drought Index - CDI

Overview

The **CDI-A** is a composite agricultural drought indicator that incorporates multiple environmental variables to provide a comprehensive assessment of agricultural drought conditions.

Main Objectives

- Early detection of agricultural drought conditions;
- Continuous monitoring of agricultural drought developments;
- Map production for decision-making;
- Support for early warnings for the ECCAS region.

The Problem of Agricultural Drought

The **ECCAS** (**Economic Community of Central African States**) region is facing increasing climate variability, with drought events having significant impacts on food security, water resources, and ecosystems.

The **CDI** was developed to provide an integrated tool for monitoring and early warning of agricultural drought, combining multiple environmental indicators in a holistic approach.

CDI Model Architecture

Variable	Product/Source	Acronym	Weight	Spatial/Temporal Resolution	Scientific Justification
Water Deficit	LSASAF MSG	DHI	35%	3–5 km, monthly average	Direct indicator of soil moisture
Precipitation	NASA IMERG	P	20%	0.1°, monthly	Main input to the hydrological system
Evapotranspiration Ratio	LSASAF MSG	EVAP	20%	3–5 km, monthly sum	Water stress on vegetation
Leaf Area Index	LSASAF MSG-LAI	LAI	15%	3–5 km, monthly average	State of the vegetation cover
Sunshine Duration	LSASAF SDU	SUN	10%	3–5 km, monthly sum	Radiative and energetic forcing

Methodology

Data Preprocessing

- **Winsorization**

  Objective : Reduce the influence of extreme values

- **Parameters :**
  - Lower limit: 2.5th percentile
  - Upper limit: 97.5th percentile

  Advantage: Increased statistical robustness

Normalization

Z_score = (Current_value - Climatological_mean) / Climatological_standard_deviation

Calculation of the EVAP Ratio

EVAP = ETP / ETA (Water demand/satisfaction ratio)

Calculation Methodology

Aggregation and Combination

- **Weighted Linear Combination**

  Application of specific weights to each normalized variable.

- **Final Normalization**

  Adjustment of the CDI scale for standardized interpretation.

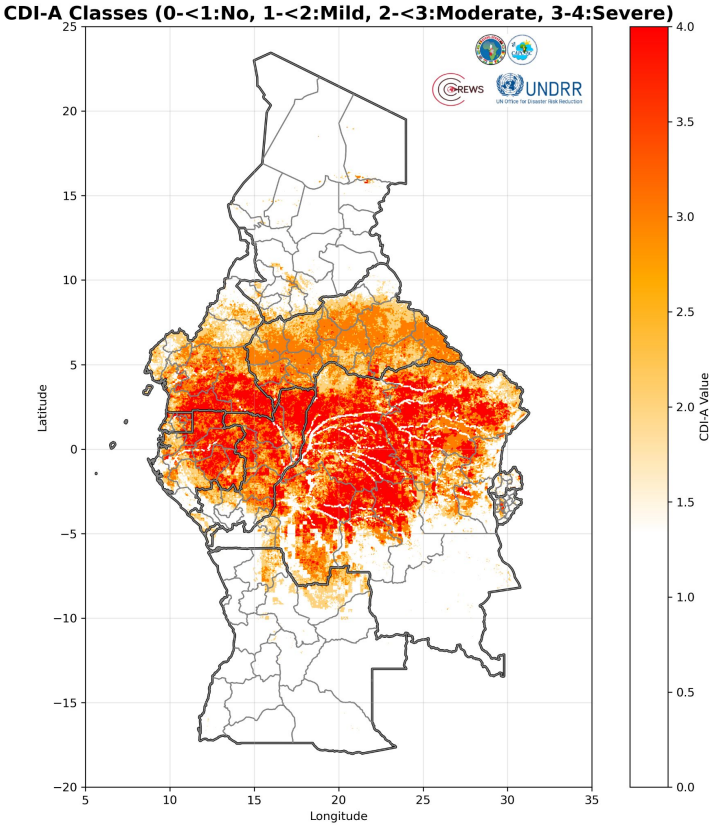
Generated Products

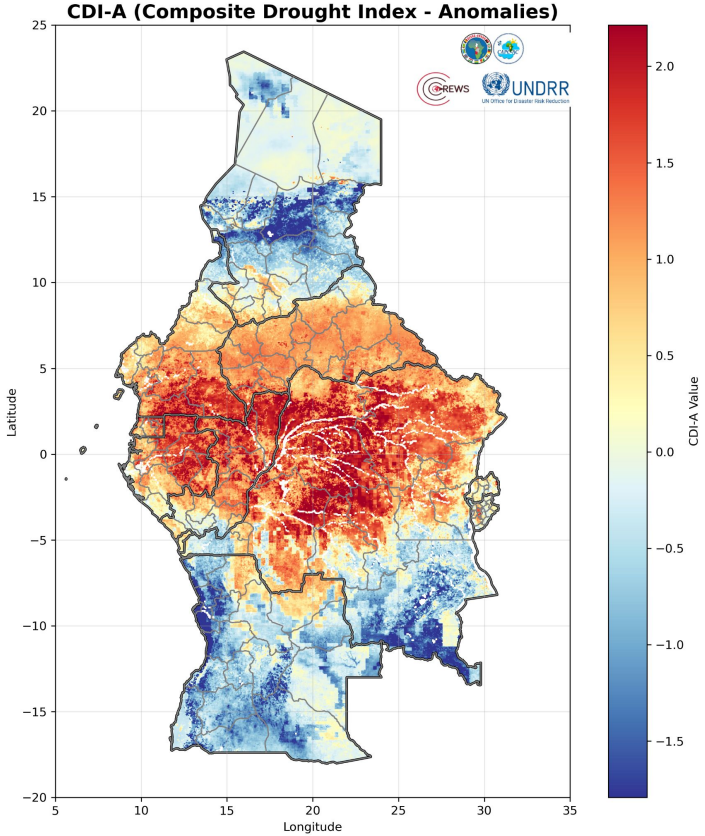
- **Agricultural Drought**

Final CDI: Normalized composite index

- **Drought classes:**
  - **False** (Abnormally Dry): CDI > 0.0;
  - **Mild**: CDI > 0.5;
  - **Moderate** : CDI > 1.0;
  - **Severe** : CDI > 1.5

Agro-climatic Monitoring Map – Drought September 2025





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Multi-Variable Climate Monitoring and Applications

Innovations

- Multi-variable approach for a holistic view;
- Regularly updated dynamic climatology;
- Robust method for managing missing data;
- Adaptability to different areas of the sub-region;

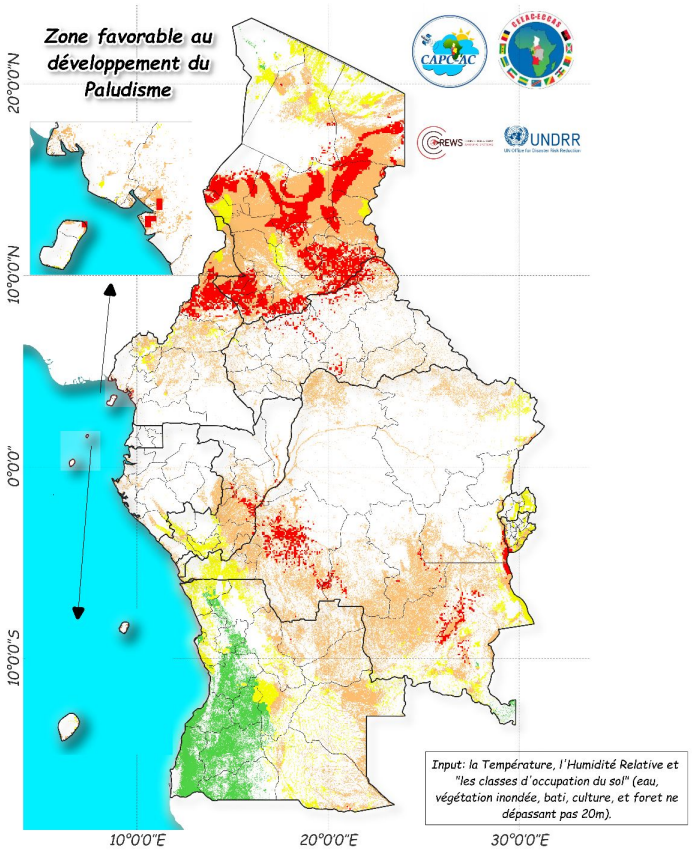
Applications

- Early warnings for food security;
- Water resource planning;
- Agricultural and pastoral monitoring;
- Decision support for governments;

Malaria Advisories

Malaria is a parasitic disease transmitted by Anopheles mosquitoes. Its prevention involves Digital Surveillance, which entails the use of digital and geospatial technologies to collect, analyze, and disseminate epidemiological data in real time.

Health Advisories



Diffusé le 25 Septembre 2025
Valide: 2 semaines (28/09 - 11/10/2025)

Surveillance Passive	Veille Sanitaire
Surveillance Renforcée	Surveillance Active

Recommandations 8

Rouge

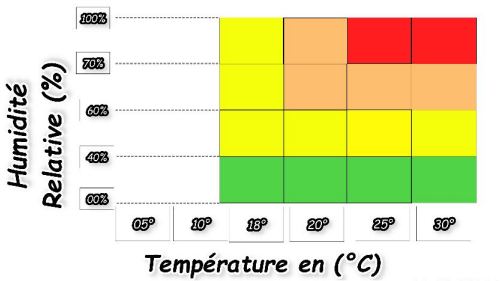
* Urgence : Activez les plans d'urgence et mobilisez les équipes sanitaires.
*Lutte vectorielle : PID + élimination des gîtes larvaires + distribution massive de MILDA.

Orange

*Préparation : Vérifiez les stocks de médicaments et insecticides.
*Lutte ciblée : Distribuez des MILDA et nettoyez les gîtes à moustiques.

Jaune

*Veille sanitaire : Surveillez les cas suspects et les données météo.
*Prévention légère : Éliminez les eaux stagnantes et rappelez l'usage des MILDA.



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Methodology

1- Temperature and Relative Humidity Forecasts with the WRF Model

2-Coupling of Temperatures, Humidity with land use data

3- Determination and Calculation of Thresholds in QGis

4-Analysis and Verification of Generated Results

Card Production

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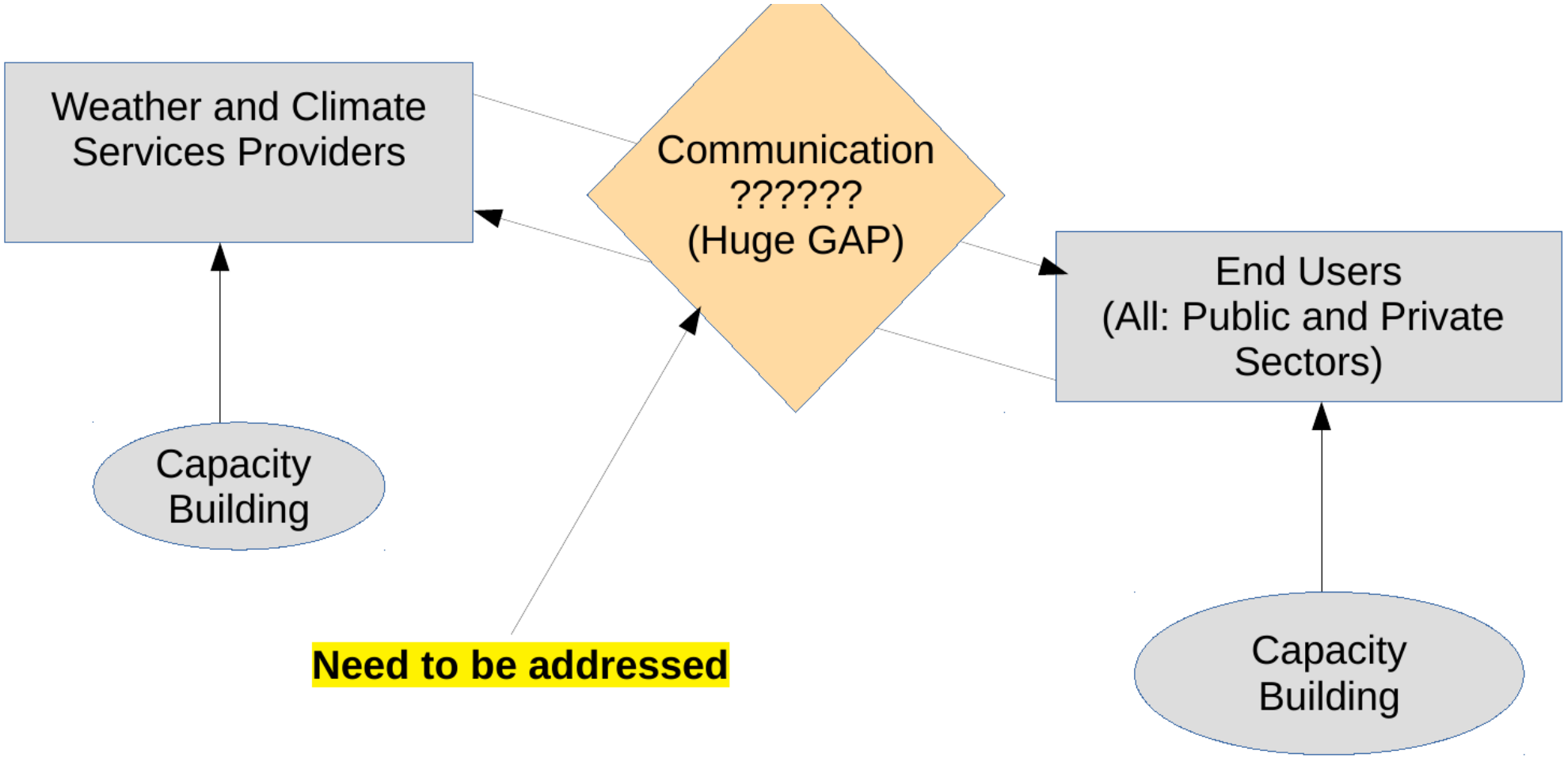
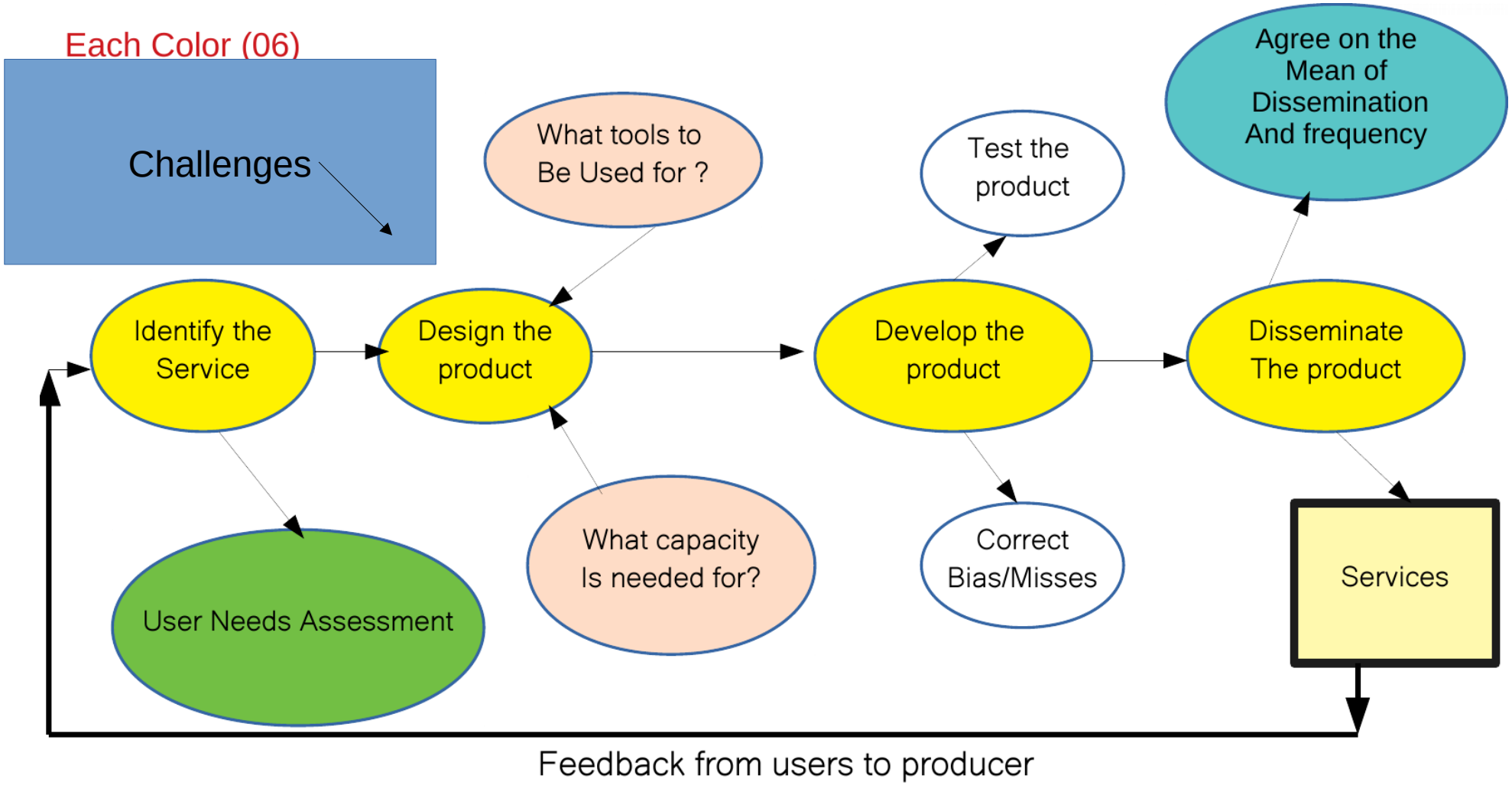
Final remarks

Gaps et Défis



Gaps et Défis



Key Challenges Facing CAPC-AC

Category	Main Challenges
1. Technical & Infrastructure	• Dependence on **external project funding** for HPC maintenance and operational continuity. • Limited **integration of in-situ data** for model validation. • Lack of **stable institutional budget** for regular forecast production and dissemination.
2. Early Warning System (EWS)	• Disparities in **technical capacity and data standards** among NMHSs. • Difficulty **harmonizing thresholds and alert protocols** across the region. • Weak integration of **anticipatory action mechanisms** into national DRM systems.
3. Human & Institutional Capacity	• Shortage of qualified specialists and high staff turnover. • Uneven access to training and digital infrastructure among countries. • Institutional fragility and dependency on external technical assistance.
4. Partnerships & Finance	• Fragmented and **short-term project funding**. • Lack of **long-term financial mechanism** for sustainability. • Limited engagement of the **private sector** in climate services.
5. Coordination & Governance	• **Overlapping mandates** between regional and national institutions. • Absence of harmonized **data-sharing and warning policies**. • Weak political ownership of regional early-warning frameworks.
6. Communication & Visibility	• Low visibility of CAPC-AC's operational products and achievements. • Weak connection with end users and decision-makers. • Insufficient tools and resources for public engagement and outreach.

Major Needs of CAPC-AC

Category	Key Needs
1. Technical & Infrastructure	• Strengthen **High-Performance Computing (HPC)** capacity for high-resolution WRF modeling (Convection permitting). • Modernize **observation networks** (automatic stations, radars, IoT sensors) in Member States. • Deploy **integrated data visualization and automation systems** (Python/QGIS, web platforms).
2. Early Warning System (EWS)	• Fully implement the **EW4ALL** framework in synergy with the **SEWA Project (Space for Early Warning in Africa)**. • Ensure **interoperability** between regional and national warning systems. • Define and operationalize **forecast-based triggers** for anticipatory action.
3. Human & Institutional Capacity	• Recruit and train experts in **NWP**, **climate modeling, hydrology, GIS, data science, and communication**. • Establish a **regional pool of trainers** to support ECCAS Member States. • Strengthen institutional framework to achieve **WMO RCC accreditation**.
4. Partnerships & Finance	• Create a **regional contingency and sustainability fund** for early action and system maintenance. • Mobilize resources from **donors**. • Deepen collaboration with **Technical Partners and GPC**.
5. Coordination & Governance	• Clarify **institutional coordination** mechanisms among ECCAS bodies (CAPC-AC, CICOS, CBLT, ALG). • Develop a **legal framework for data sharing and warning dissemination**. • Strengthen **multi-sectoral governance** for integrated early warning.
6. Communication & Visibility	• Develop a **multilingual, open-access regional portal** for real-time multi-hazard monitoring. • Promote the **added value** of CAPC-AC products to policymakers and technical partners. • Disseminate knowledge through **training, outreach, and scientific publications**.

Analytical & Methodological Strengths

- **Robust modelling chain:** WRF–QGIS–Python workflow, validated against observations.
- **Composite indicators:** Integration of multiple biophysical variables (rainfall, soil moisture, vegetation, radiation).
- **Standardized classes and thresholds:** ("Abnormally dry", "Mild", "Moderate", "Severe") for drought; rainfall-trigger thresholds for flood alerts.
- **Dynamic visualization:** Automated map production in QGIS with web-based dissemination (portal, email, SMS, WhatsApp).

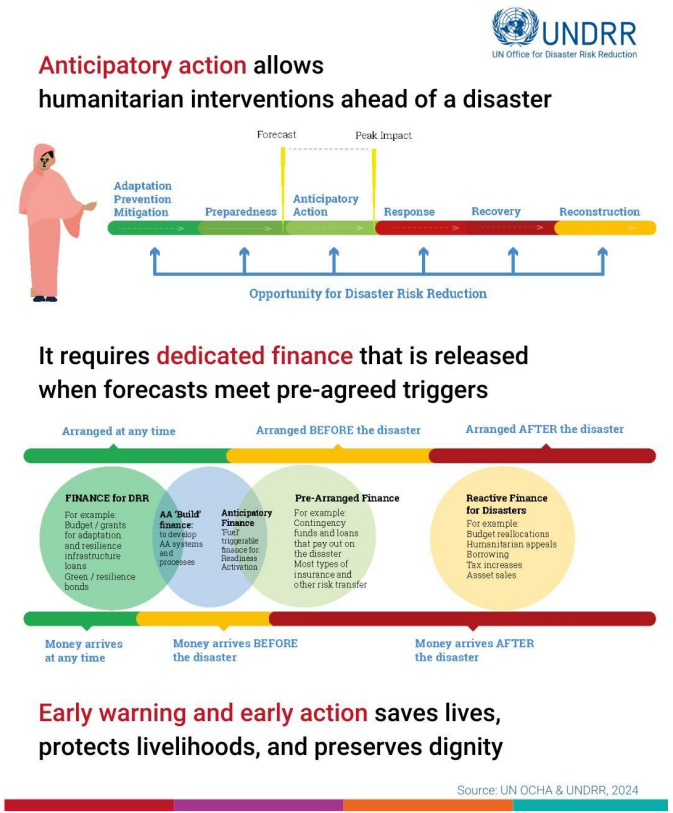
Innovation & Added Value

- **Regional ownership:** Models run locally at CAPC-AC (HPC environment), reducing dependence on external centers.
- **Interdisciplinary scope:** Bridges meteorology, hydrology, agriculture, and public health.
- **Operational relevance:** Directly supports **anticipatory action** and **decision-making** within ECCAS, UNDRR, and national civil-protection systems.
- **Replicability:** Methodologies adaptable to other African regional climate centers (RCCs).

Key Messages

- **CAPC** represents a **shift from forecasting to action** , linking scientific outputs to early decisions.
- Its **portfolio of 10+ operational products** covers the full hazard spectrum, from daily forecasts to seasonal risk outlooks.
- **Interoperability and co-production** with Member States are central to sustainability and regional integration.
- The approach positions **CAPC-AC** as both a **technical hub** and a **policy enabler** within the **Early Warning for All (EW4All)** and **AMHEWAS** frameworks.

Final Words



Anticipatory action is a smart way to provide humanitarian assistance ahead of a disaster, by putting in place pre-arranged finance and plans *that are activated by pre-agreed triggers based on forecasts.*

Final Words

Within the framework of the EW4ALL initiative, the SEWA Project (Space for Early Warning in Africa) provides a foundation for strengthening anticipatory action across the continent.

By leveraging **space-based observations, satellite data, and regional modeling systems**, SEWA enhances the availability and accuracy of early warning information that can trigger **forecast-based, pre-arranged humanitarian actions**.

Through this integration, SEWA acts as a **data and technology enabler**, ensuring that early warnings generated from space-derived products are seamlessly translated into **anticipatory measures**, reducing disaster impacts and improving preparedness across the ECCAS region.

Merci !!!

Thanks !!!

Obrigado !!!

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