

# ACMAD Continental Multi-Hazard Advisory Centre Rôle and Functions



• 30 – 31 JANUARY, 2024

• REIZ CONTINENTAL HOTEL

• ABUJA – NIGERIA

## USE OF THE RISK INFORMATION FOR THE HUMANITARIAN ACTION WORKSHOP

PREPARED BY ACMAD-CMHAC Team

PRESENTED By: Mr. Godefroid NSHIMIRIMANA



INTRA-ACP CLIMATE SERVICES AND RELATED APPLICATIONS PROGRAMME

An initiative of the Organisation of African, Caribbean



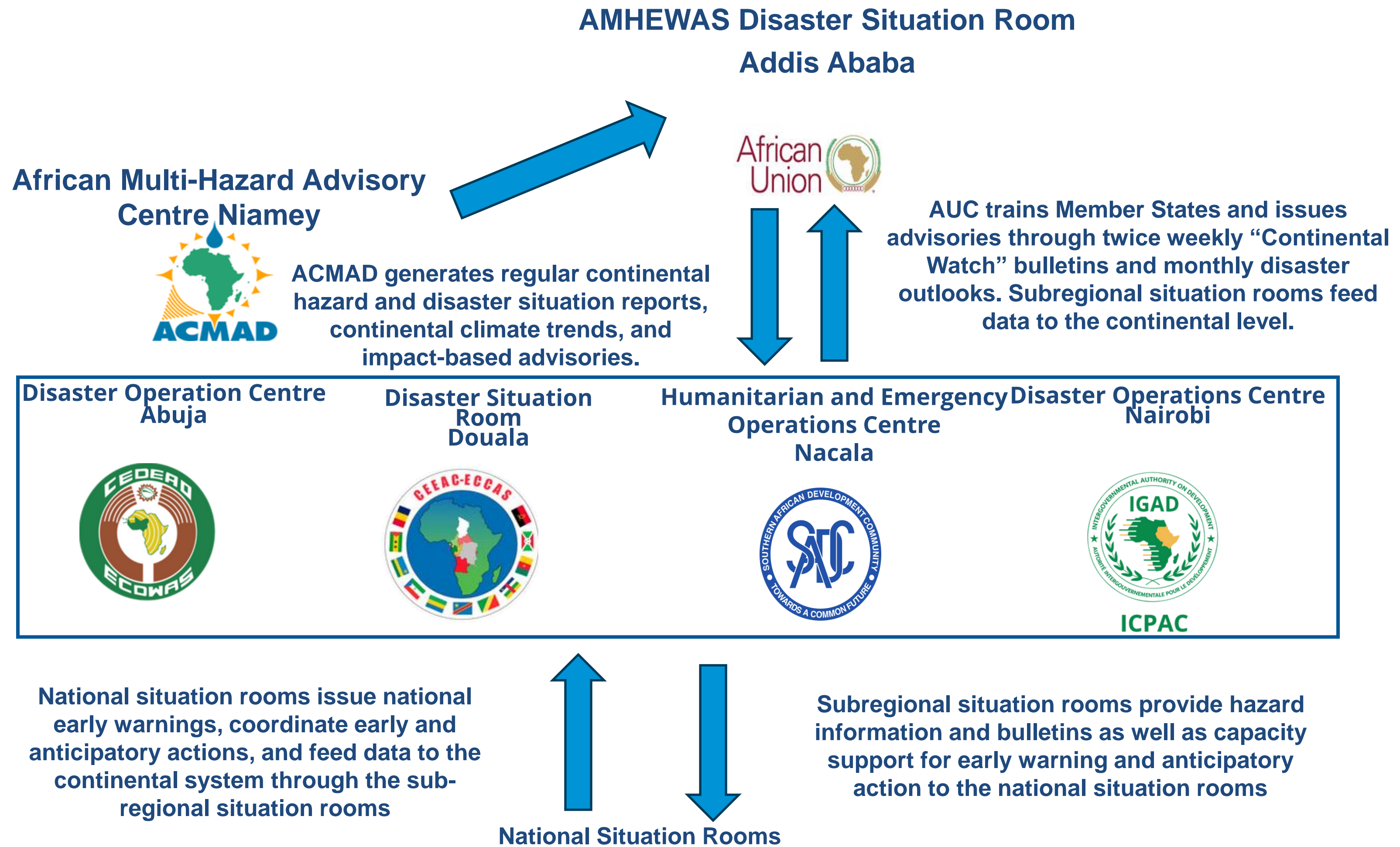
UNDP

# •01 • ACMAD PRESENTATION

## •02 • PRODUCTS & SERVICES

## •03 • SOME EXTREMES EVENTS





# •ACMAD'S PRESENTATION



## ACMAD CORES MISSIONS

**Created through resolution 540 of the UNECA Conference of Ministers in April 1985 following the droughts of the 70s and 80s , ACMAD is established in Niamey-Niger since October 1992**

- Continental Weather and Climate Watch Centre for Africa with Monitoring, *forecasting* and *early warning* for droughts, floods, tropical cyclones and other extreme events as functions
- Institution of excellence for the Applications of meteorology for sustainable development with capacity building, methods, tools and products development, contribution to global weather and climate programs, database , research and innovation as functions



# •ACMAD'S PRESENTATION

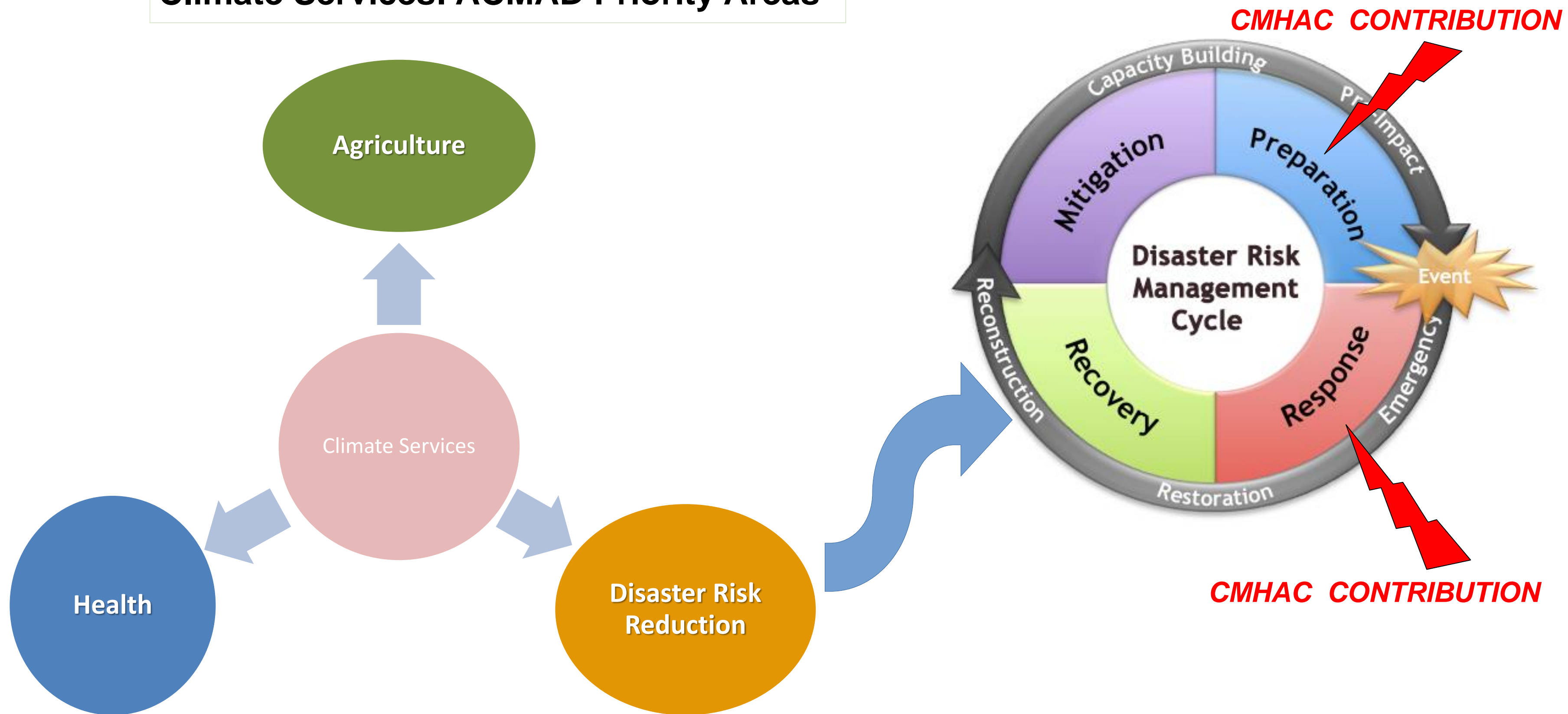


- **Enhance** African countries / SNMHscapability to understand, anticipate and manage the impacts of weather and climate fluctuations to support the achievement of sustainable development and poverty reduction (provide user oriented information & products);
- **Consolidate** weather / climate monitoring efforts in Africa, better understand the African weather systems (monsoon) systems and Improve forecasts;
- **Facilitate** exchange of information, experience and expertise; and strength sustainable institutional mechanisms;
- **Provide** advanced notice on potential weather and climate related hazards and information for the implementation of policies for vulnerability reduction and adaptation to climate variability and change



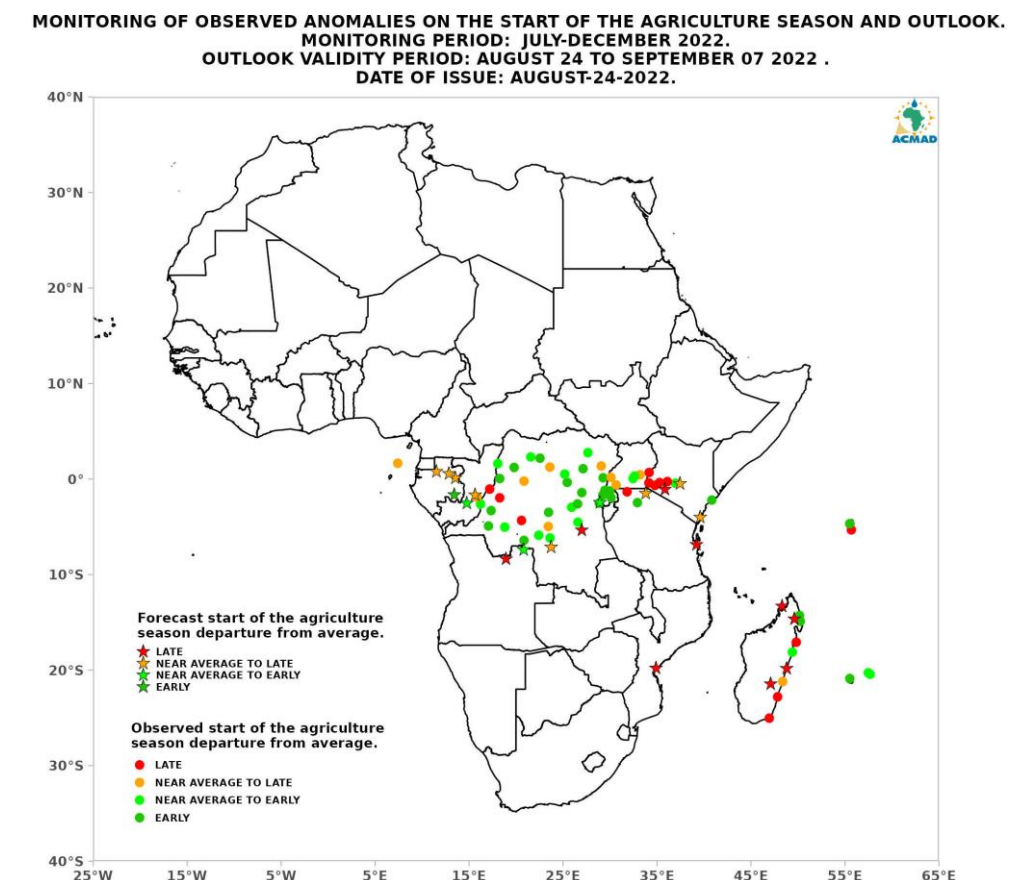
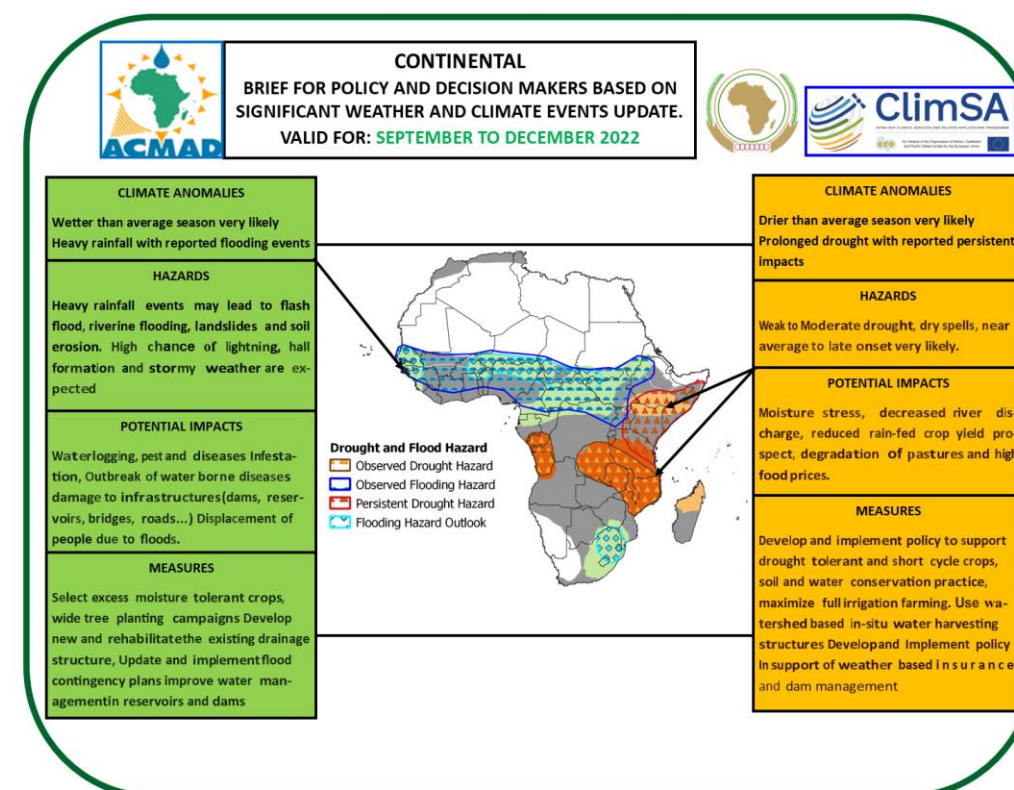
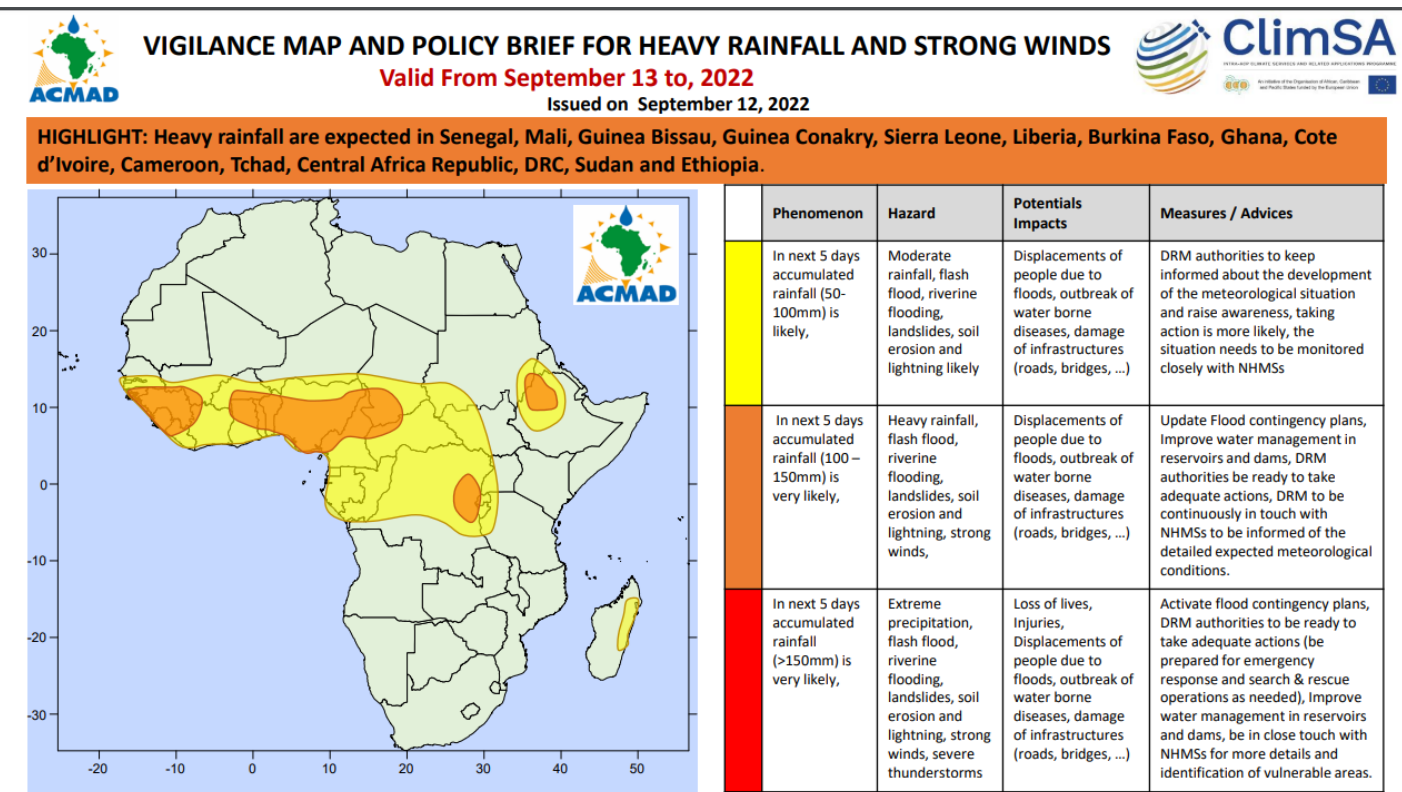
- Provision of climate information

### Climate Services: ACMAD Priority Areas



***ACMAD provide DRM service tailored with significant weather and climate phenomena, related hazards, potentials impacts, responses measures***

## • 2. Provision of climate information



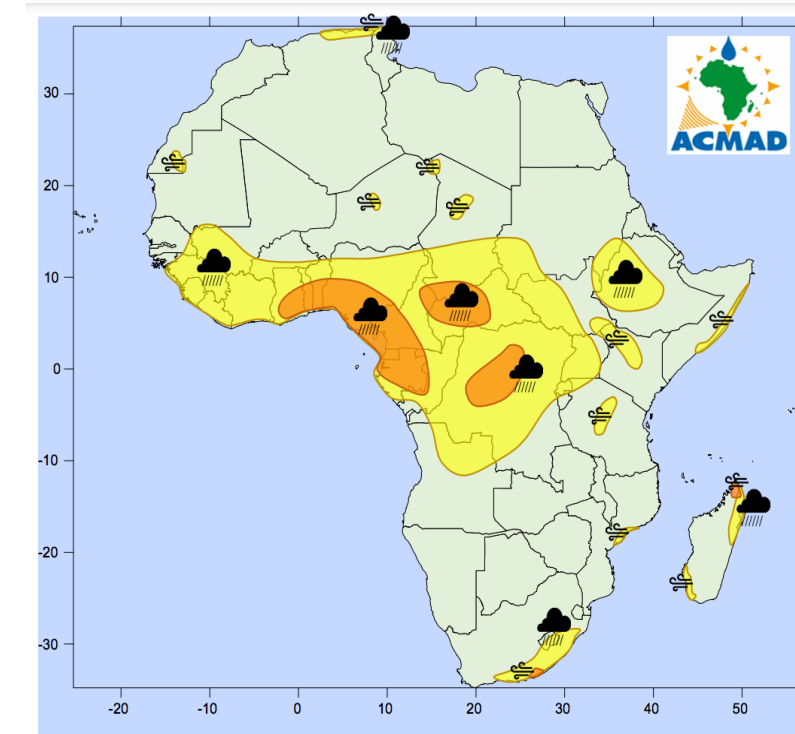
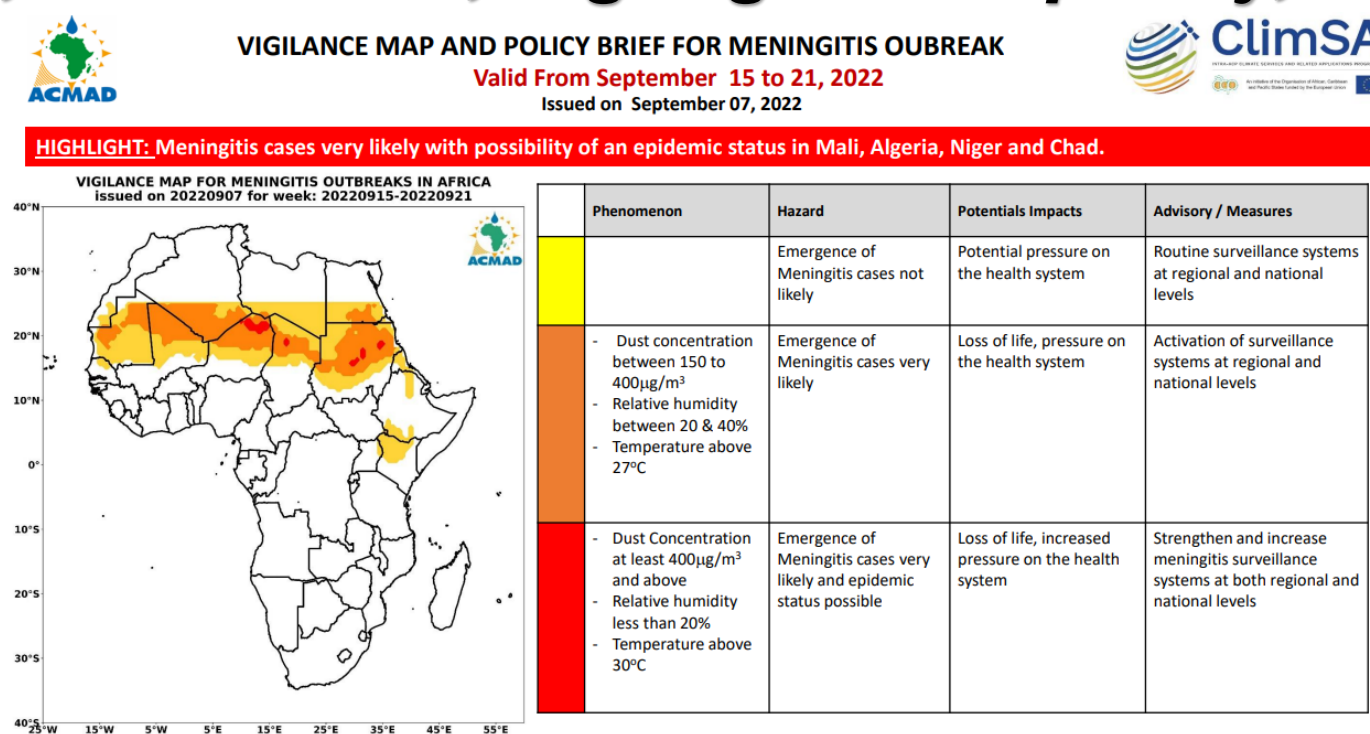
Agriculture

- **Technical notes to support NMHSs and RCCs forecasts briefings and climate fora**
- **Bulletins, and reports for intermediaries in agriculture, water, DRR and health sectors**
- **Statements, summaries, highlights for policy, decision makers**

Climate Services

Health

Disaster Risk Reduction, Water

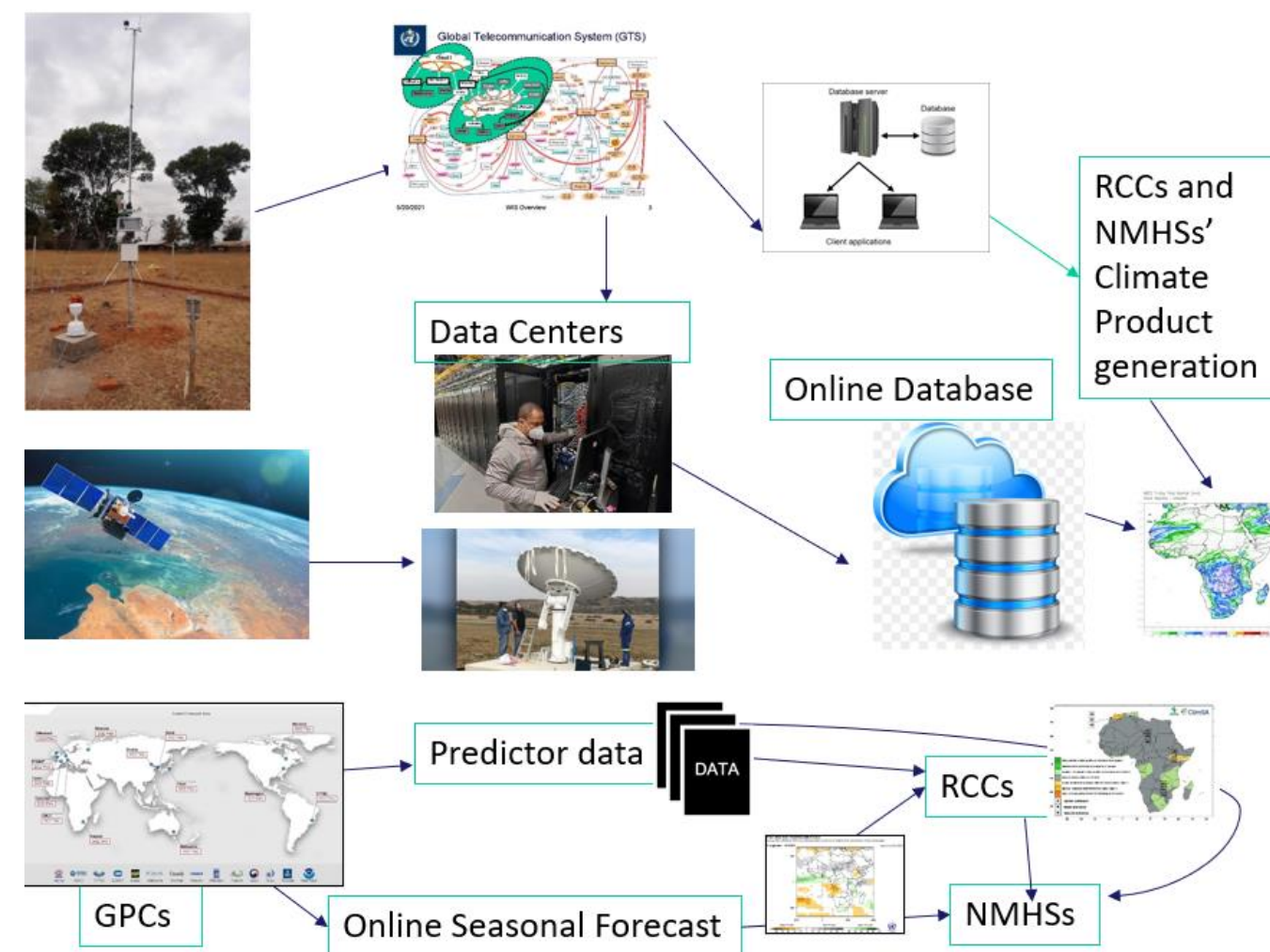
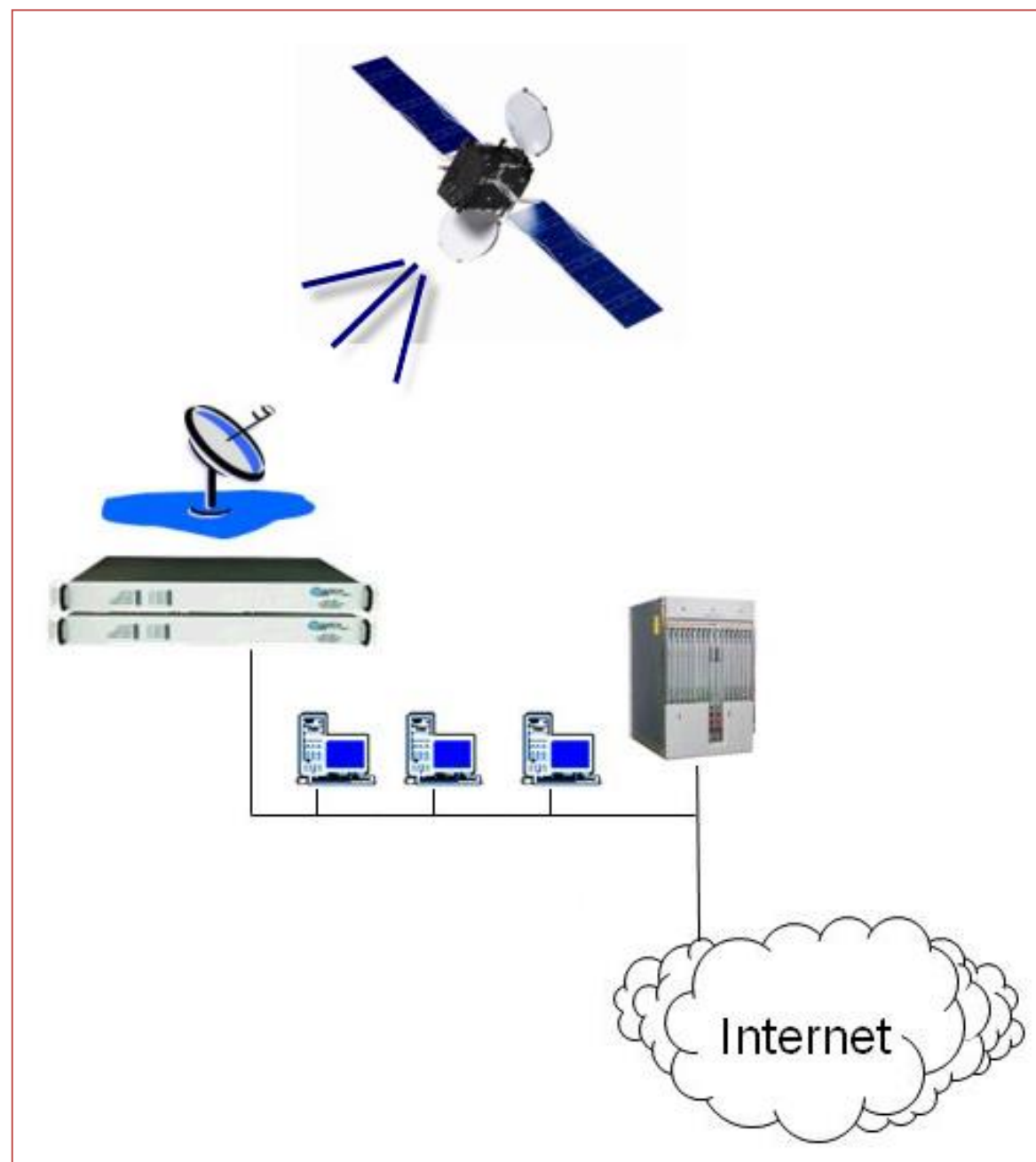


**MULTI-HAZARD OUTLOOK**  
Validity: 2022-09-27  
Issued on 2022-09-26

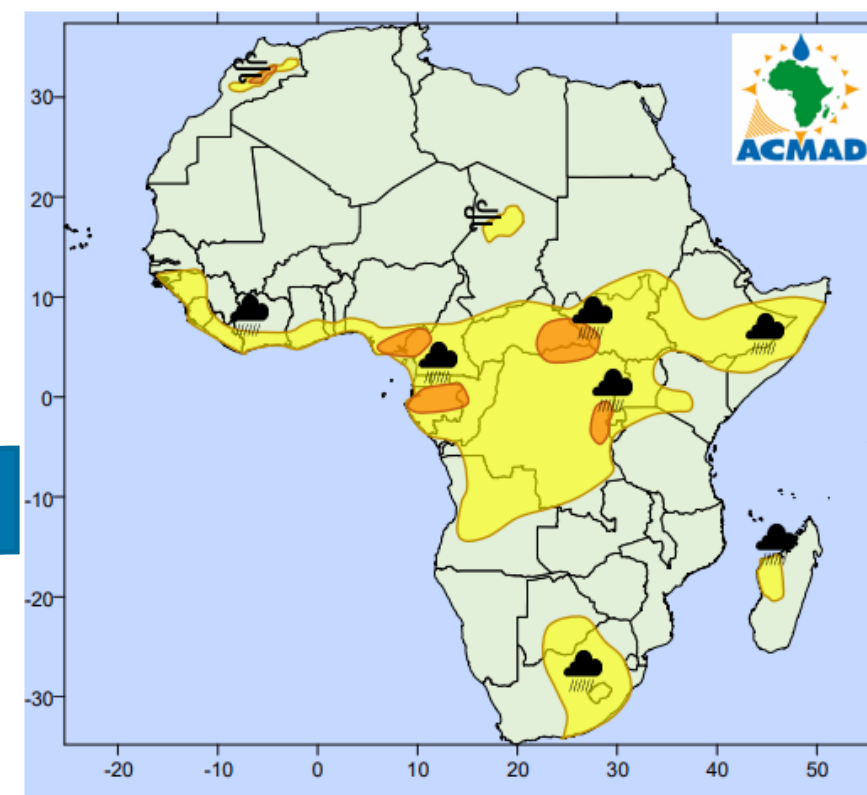
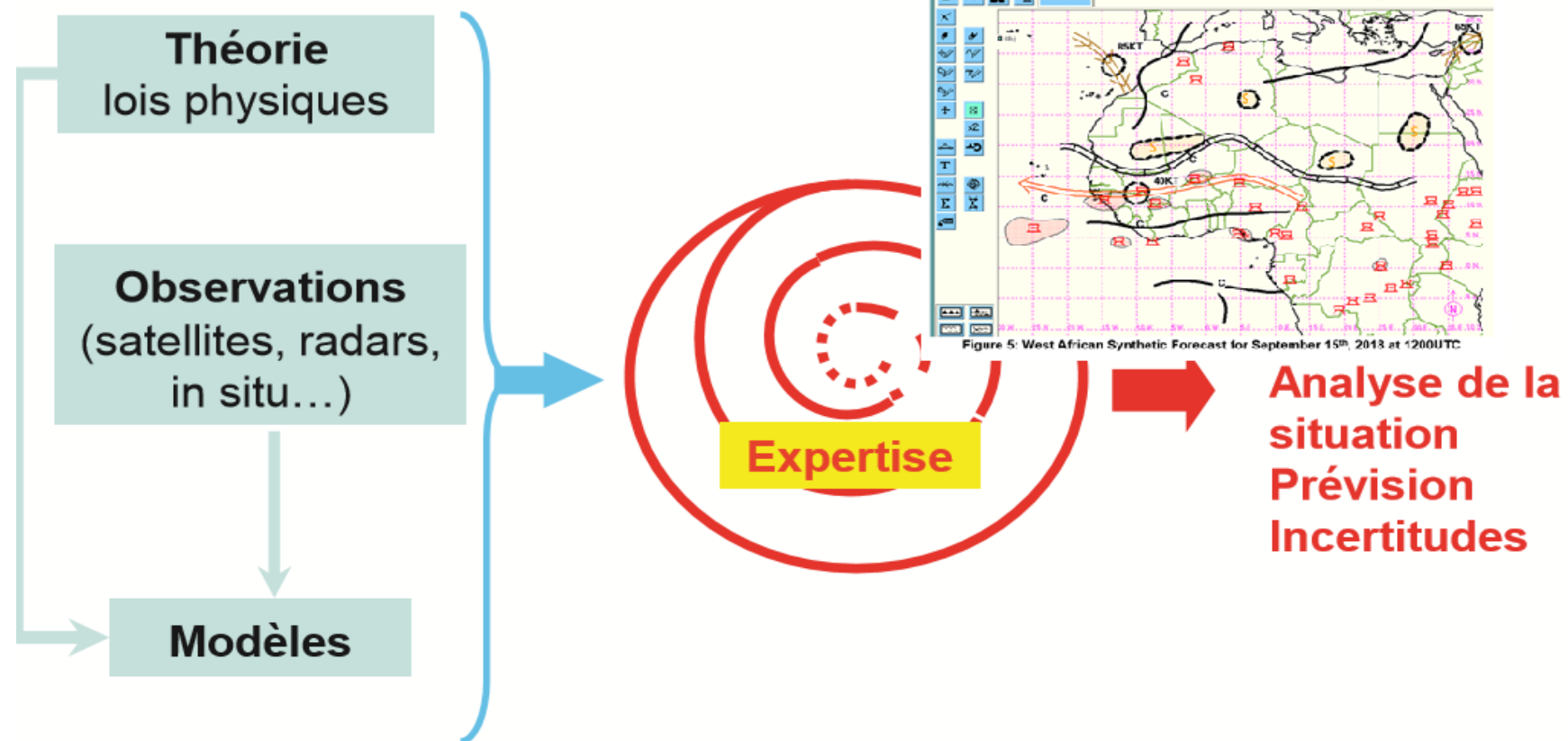
Rain	Wind	Dust	Meningitis
Very heavy >100mm	Very strong >80kmh <sup>-1</sup>	Very heavy >1000µg m <sup>-3</sup>	Very likely
Heavy 50-100mm	Strong >65kmh <sup>-1</sup>	Heavy >600µg m <sup>-3</sup>	Likely
Moderate 10 - 49mm	Moderate >50kmh <sup>-1</sup>	Moderate >400µg m <sup>-3</sup>	Less likely
Light 1 - 10mm	Light <50kmh <sup>-1</sup>	Light <200µg m <sup>-3</sup>	

# ACMAD PRODUCTION PROCESS

## ACCESS TO DATA AND PROCESSING



## METHODOLOGY



**MULTI-HAZARD OUTLOOK**  
**Validity: 2022-10-17**  
 issued on 2022-10-13

Rain	Wind	Dust	Meningitis
Very heavy >100mm	Very strong >80kmh <sup>-1</sup>	Very heavy >1000µg m <sup>-3</sup>	Very likely
Heavy 50-100mm	Strong >65kmh <sup>-1</sup>	Heavy >600µg m <sup>-3</sup>	Likely
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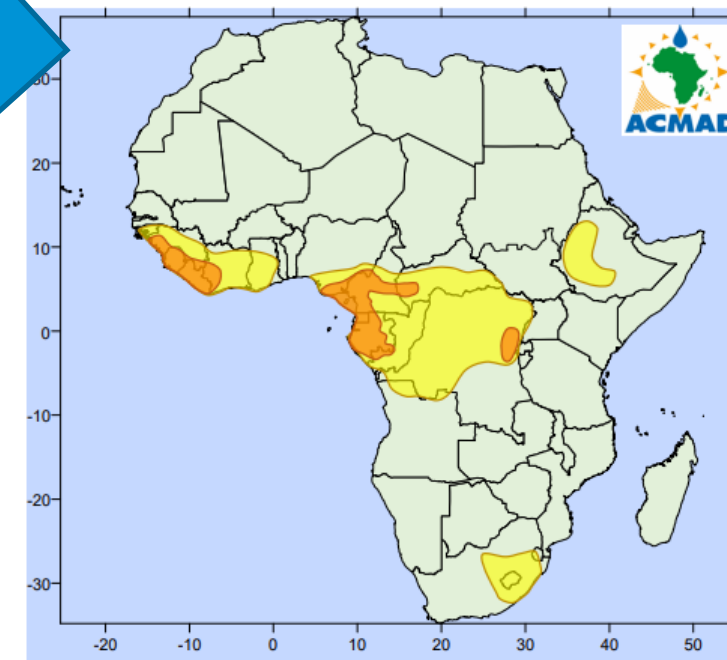
D1 to D5



**VIGILANCE MAP AND POLICY BRIEF FOR HEAVY RAINFALL AND STRONG WINDS**  
 Valid From October 14 to 18, 2022  
 Issued on October 13, 2022

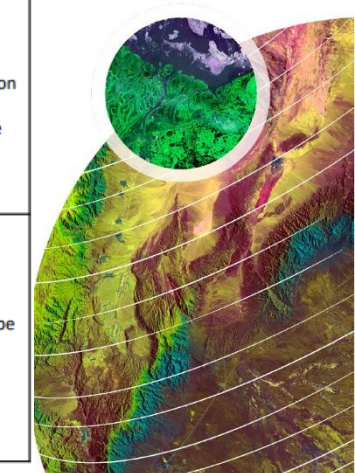


**HIGHLIGHT:** Heavy rainfall is expected over Guinea, Sierra Leone, Liberia, Cote d'Ivoire, Nigeria, Cameroon, Equatorial Guinea, Gabon, CAR, and DRC



Disclaimer: The presentation of country boundaries on the map does not imply any opinion whatsoever on the part of ACMAD concerning the legal status of any country, territory or area, or concerning the delimitation of frontiers or boundaries.

Phenomenon	Hazard	Potentials Impacts	DRM Measures / Advices
In next 5 days accumulated rainfall (50-100mm) is likely,	Moderate rainfall, flash flood, riverine flooding, landslides, soil erosion and lightning likely	Displacements of people due to floods, outbreak of water borne diseases, damage of infrastructures (roads, bridges, ...).	Civil Protection services in west and central Africa and DRM authorities in Ethiopia and South Africa to monitor closely the situation with NHMSs.
In next 5 days accumulated rainfall (100 - 150mm) is very likely,	Heavy rainfall, flash flood, riverine flooding, landslides, soil erosion and lightning, strong winds,	Displacements of people due to floods, outbreak of water borne diseases, damage of infrastructures (roads, bridges, ...).	Civil Protection and Humanitarian services in Ivory Coast, Cameroon, Equatorial Guinea, Gabon, CAR and DRC to update Flood contingency plans, monitor the water level in river basin, reservoirs and dams, assess vulnerabilities and evacuation areas and take preparedness measures. Liberia and Sierra Leone to reinforce their DRM Policy framework with a multi-hazard contingency plan.
In next 5 days accumulated rainfall (>150mm) is very likely,	Extreme heavy precipitation, flash flood, riverine flooding, landslides, soil erosion and lightning, strong winds, severe thunderstorms	Loss of lives, injuries, Displacements of people due to floods, outbreak of water borne diseases, damage of infrastructures (roads, bridges, ...).	Civil Protection services and DRM authorities to activate flood contingency plans for emergency response (assistance to victims, search & rescue operations), and be in close touch with NHMS, in this type of situation.



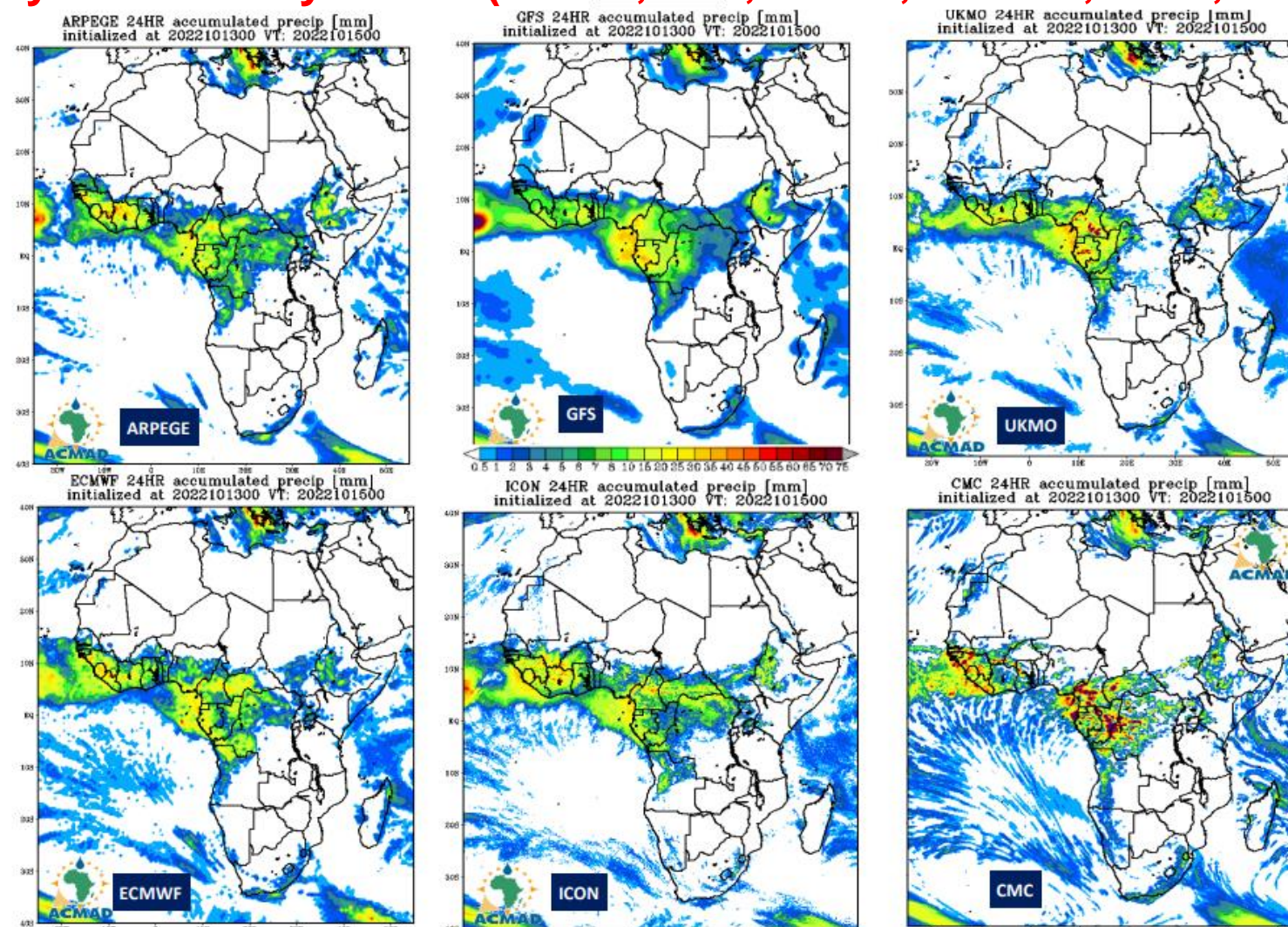
**@ACMAD Weather forecasting is developed in three basic steps: *Observation*, *Simulation of the evolution of the atmosphere using numerical models* and *Analysis of the results by forecasters***

## APPROACH

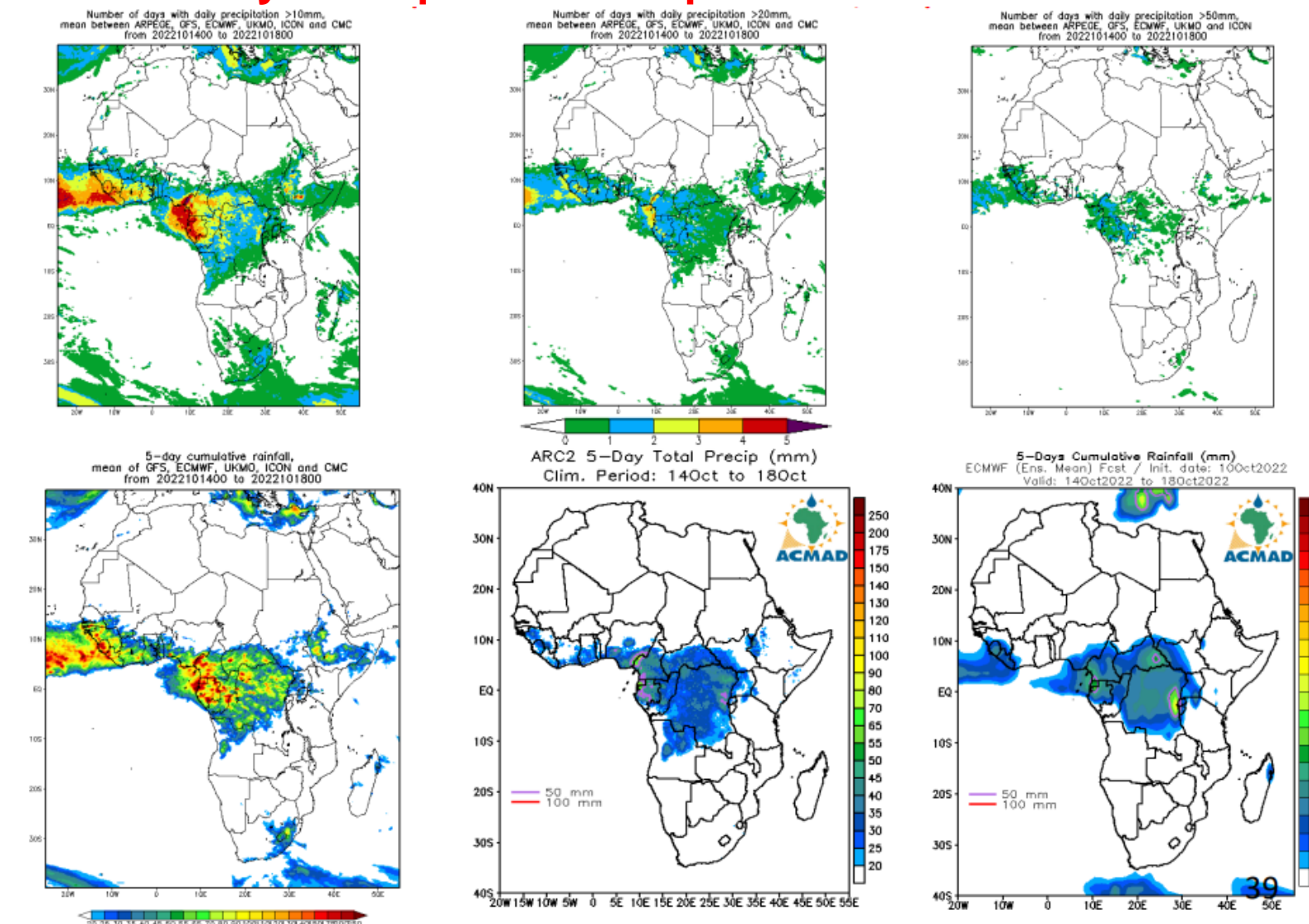
# ACMAD PRODUCTION PROCESS



### Daily Forecast by Model (ARPG,GFS,UKMO,ECMWF,ICON,CMC)



### Nbre Of Days Computed with Operational Model Ensemble



<http://sgbd.acmad.org:8080/thredds/fileServer/FIT/BRIEFING/technote.pdf>

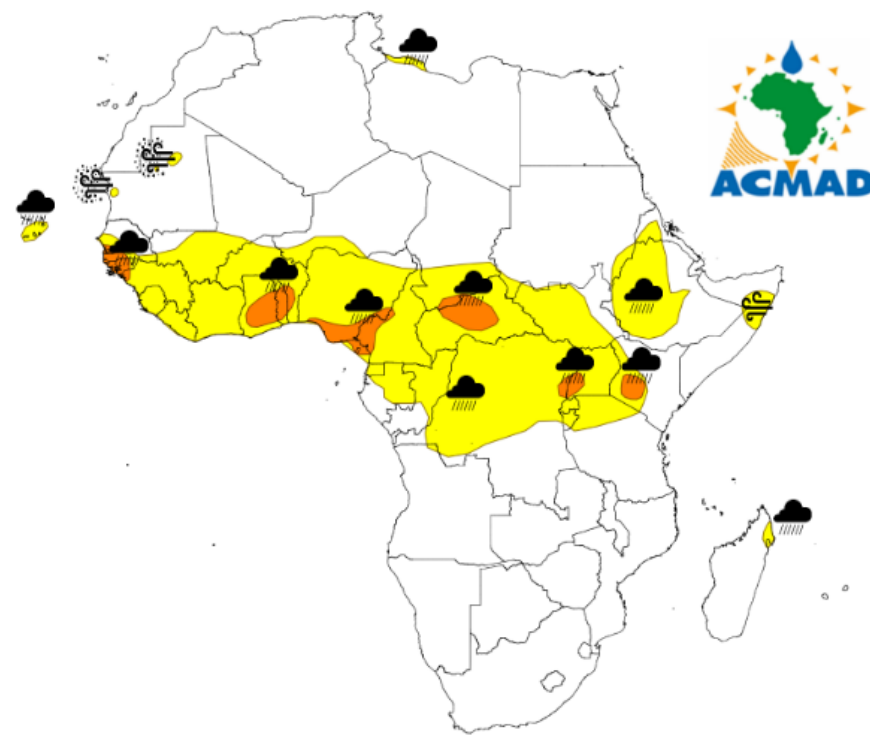
### "Poor's Man Ensemble" approach:

A poor man's ensemble is a set of independent numerical weather prediction (NWP) model forecasts from multiple operational centers.

Because it samples uncertainties in both the initial conditions and the model formulation through variation in the input data, analysis, and forecasting methodologies of its component members, it is less prone to the systematic biases and errors that cause under-dispersive behavior in single-model ensemble prediction systems (PSEs).

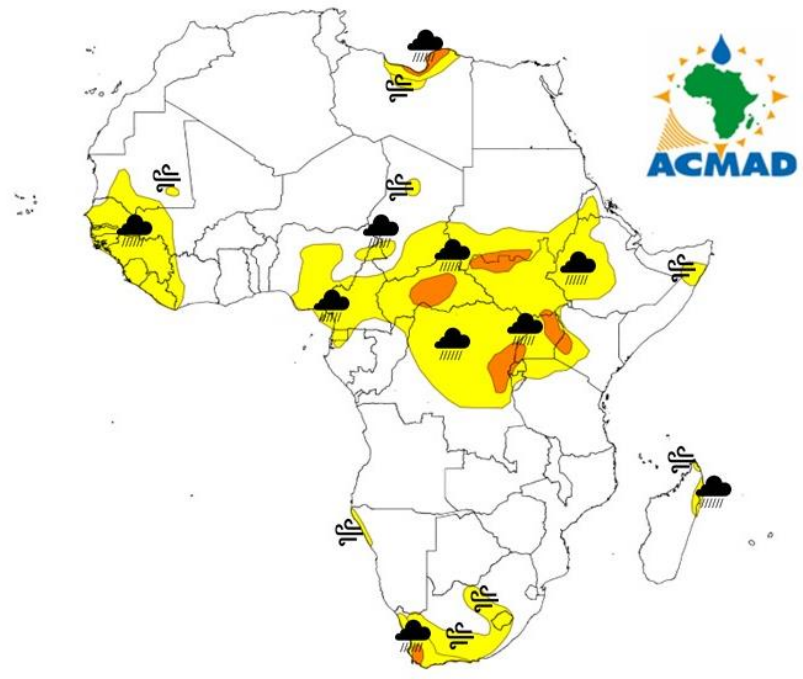


# FORMAT OF THE BULLETIN



MULTI-HAZARD OUTLOOK  
**Validity: 2023-09-08**  
issued on 2023-09-07

Rain	Wind	Dust	Meningitis
Very heavy >100mm	Very strong >80kmh <sup>-1</sup>	Very heavy >1000µg m <sup>-3</sup>	Very likely
Heavy 50-100mm	Strong >65kmh <sup>-1</sup>	Heavy >600µg m <sup>-3</sup>	Likely
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Light 1 - 10mm	Light <50kmh <sup>-1</sup>	Light <200µg m <sup>-3</sup>	



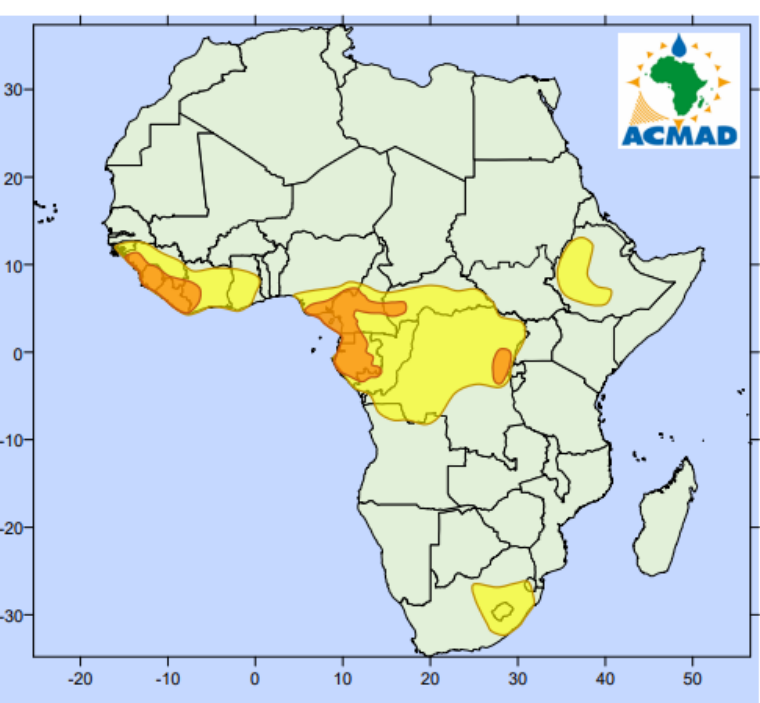
MULTI-HAZARD OUTLOOK  
**Validity: 2023-09-10**  
issued on 2023-09-07

Rain	Wind	Dust	Meningitis
Very heavy >100mm	Very strong >80kmh <sup>-1</sup>	Very heavy >1000µg m <sup>-3</sup>	Very likely
Heavy 50-100mm	Strong >65kmh <sup>-1</sup>	Heavy >600µg m <sup>-3</sup>	Likely
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## Brief Message

**VIGILANCE MAP AND POLICY BRIEF FOR HEAVY RAINFALL AND STRONG WINDS**  
**Valid From October 14 to 18, 2022**  
Issued on October 13, 2029

**HIGHLIGHT:** Heavy rainfall is expected over Guinea, Sierra Leone, Liberia, Cote d'Ivoire, Nigeria, Cameroon, Equatorial Guinea, Gabon, CAR, and DRC



Phenomenon	Hazard	Potentials Impacts	DRM Measures / Advices
In next 5 days accumulated rainfall (50-100mm) is likely,	Moderate rainfall, flash flood, riverine flooding, landslides, soil erosion and lightning likely	Displacements of people due to floods, outbreak of water borne diseases, damage of infrastructures (roads, bridges, ...).	Civil Protection services in west and central Africa and DRM authorities in Ethiopia and South Africa to monitor closely the situation with NHMSs.
In next 5 days accumulated rainfall (100 – 150mm) is very likely,	Heavy rainfall, flash flood, riverine flooding, landslides, soil erosion and lightning, strong winds,	Displacements of people due to floods, outbreak of water borne diseases, damage of infrastructures (roads, bridges, ...)	Civil Protection and Humanitarian services in Ivory Coast, Cameroon, Equatorial Guinea, Gabon, CAR and DRC to update Flood contingency plans, monitor the water level in river basin, reservoirs and dams, assess vulnerabilities and evacuation areas and take preparedness measures. Liberia and Sierra Leone to reinforce their DRM Policy framework with a multi-hazard contingency plan.
In next 5 days accumulated rainfall (>150mm) is very likely,	Extreme heavy precipitation, flash flood, riverine flooding, landslides, soil erosion and lightning, strong winds, severe thunderstorms	Loss of lives, injuries, Displacements of people due to floods, outbreak of water borne diseases, damage of infrastructures (roads, bridges, ...)	Civil Protection services and DRM authorities to activate flood contingency plans for emergency response (assistance to victims, search & rescue operations ), and be in close touch with NHMS, in this type of situation.

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Continental Multi-Hazard & Advisory Bulletin

Continental Multi-Hazard Advisory Centre <cmhac@acmad.org>  
Cc : Continental Multi-Hazard Advisory Centre

Dear All,

Please find here below the highlights of the ACMAD Continental Multi-Hazard & Advisory Bulletin for the next five days (14<sup>th</sup> - 18<sup>th</sup> October 2022; also attached).

**HIGHLIGHTS:**

Heavy rainfall is expected over Guinea, Sierra Leone, Liberia, Cote d'Ivoire, Nigeria, Cameroon, Equatorial Guinea, Gabon, CAR, and DRC.

High temperatures are expected to trigger elevated Discomfort levels over Mauritania, Senegal, Mali, Burkina Faso, Niger, Nigeria, Cameroon, and Chad

**Expected Extreme Rainfall (accumulated over the next 5-days):**

Heavy rainfall (100-150mm): is very likely over, coastal and southern parts of Guinea, Sierra Leone, Liberia, south-western Cote d'Ivoire, south-eastern Nigeria, Cameroon, Equatorial Guinea, Gabon, western CAR, and north-eastern DRC.

**Expected Winds in next 5-days:**

Strong Winds are very likely over Morocco, Chad, Lesotho and South Africa.

Moderate Winds are very likely over Mauritania, Morocco, Algeria, Libya, Niger, Chad, Sudan, Namibia, Zambia, Zimbabwe, Botswana, Lesotho, South Africa and Madagascar.

**Meningitis Outbreak**

Meningitis cases are very likely and epidemic status is possible over Mauritania, Mali, Niger, and Chad.

Meningitis cases are likely over Mauritania, northern Senegal, Mali, northern Burkina Faso, southern Algeria, Niger, Chad, southern Egypt and Sudan

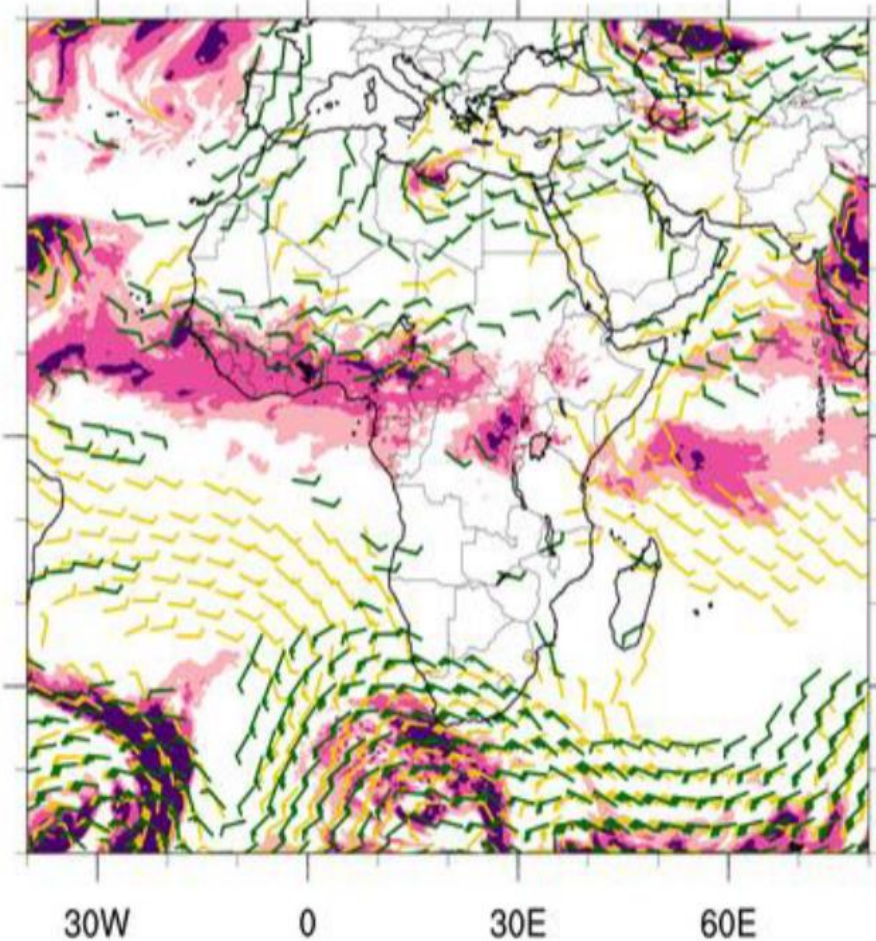
**Thermal Discomfort Index:**

It is expected to be generally safe over the southern parts of the continent. However, >50% of the population is expected to feel heat discomfort in West, East, Central and northern African cities. Furthermore, most of the population is expected to experience heat discomfort in southern Mauritania, northern Senegal, southern Mali, northern Burkina, southern Chad, southern Niger, north-eastern Nigeria and northern Cameroon.





For Climate/ Meteorological Experts Please find the related Technical Note at: <http://154.66.220.45.8080/threadsfilerServer/FIT/BRIFIN/Gitechnote.pdf>

Best Regards,

Continental Multi-Hazard Advisory Centre (ACMAD/CMHAC)  
African Centre for Meteorological Applications for Development (ACMAD)  
55, Avenue des Ministères PL6  
P.O. Box 13 184  
Niamey-Plateau  
Niger  
Phone : +227 20 73 49 92  
E-mail : [cmhac@acmad.org](mailto:cmhac@acmad.org), [contact@acmad.org](mailto:contact@acmad.org)  
Website: [www.acmad.org](http://www.acmad.org)



issued on 2023-09-07

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Light 1 - 10mm	Light <50kmh <sup>-1</sup>	Light <200µg m <sup>-3</sup>	

**VIGILANCE FOR HEAVY PRECIPITATION  
AND OTHER HAZARDS UP TO 5 DAYS  
AHEAD SUPPORTING PREPARATION  
AND EARLY RESPONSE TO DISASTERS**



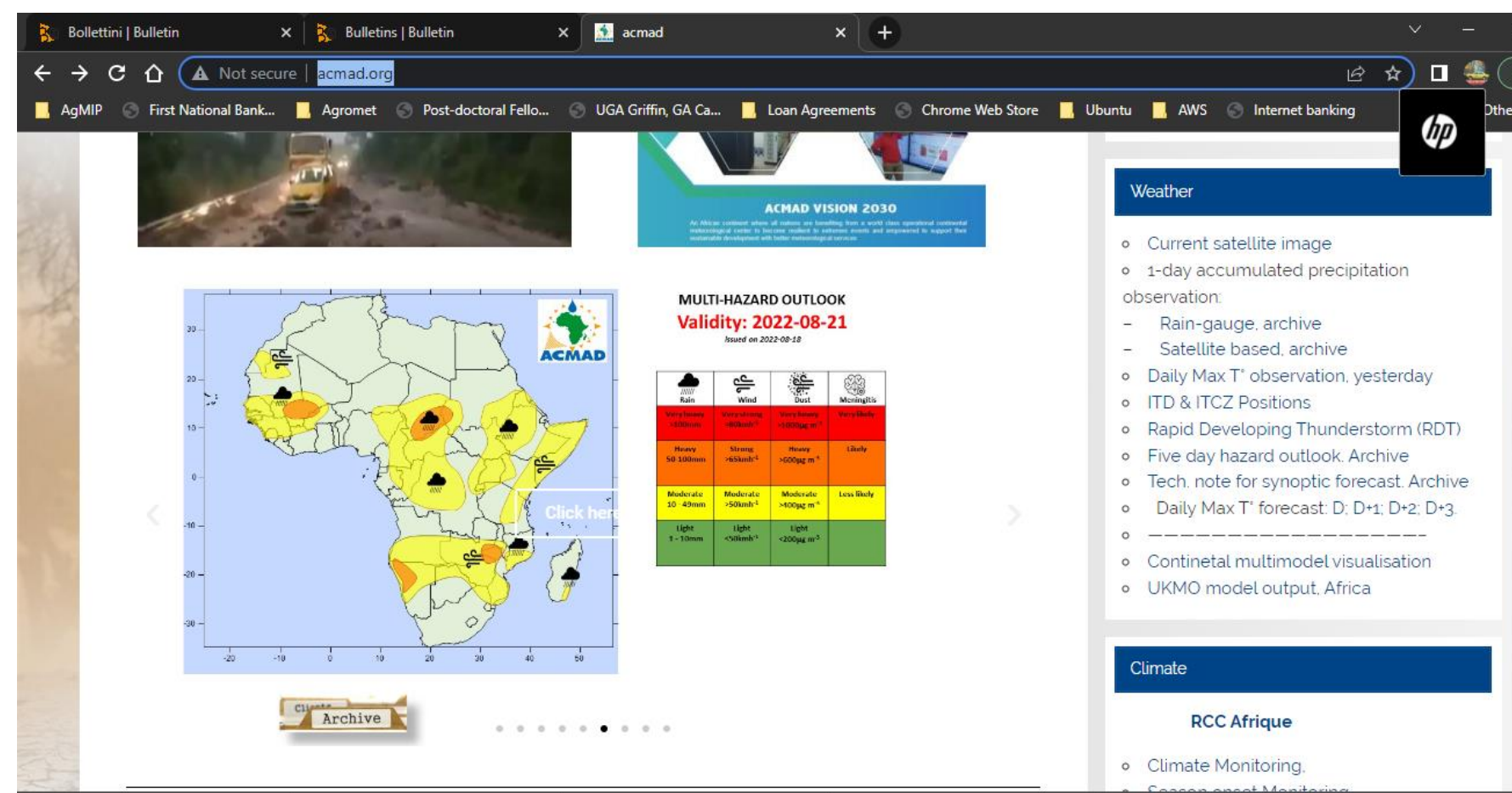
The top graph displays speed (m/s) on the right y-axis (4 to 10) against time (ms) on the x-axis (-150 to 0). The speed starts at approximately 4.5 m/s at -150 ms, rises to a peak of about 10.5 m/s at -60 ms, and then decreases to about 6 m/s at 0 ms.

The bottom graph displays pitch contour (Hz) on the right y-axis (50 to 100) against time (ms) on the x-axis (-150 to 0). The pitch contour starts at approximately 100 Hz at -150 ms, decreases steadily to about 45 Hz at -50 ms, and then remains relatively flat around 45 Hz until 0 ms.



[jbd.acmad.org:8080/thredds/fileServer/RDT/20230910/202309100615/index.html#close](http://jbd.acmad.org:8080/thredds/fileServer/RDT/20230910/202309100615/index.html#close)

[www.acmad.org](http://www.acmad.org)



**ACMAD VISION 2030**  
An African continent where all citizens are benefiting from a world class operational continental meteorological centre to become a hub for weather, climate and environment to support the sustainable development and socio-economic growth.

**MULTI-HAZARD OUTLOOK**  
Validity: 2022-08-21  
Issued on 2022-08-18

Rain	Wind	Dust	Thunderstorm
Very Heavy >100mm	Very Heavy >100km/h	Very Heavy >100g/m²	Very Heavy >100g/m²
Heavy 50-100mm	Strong 50-100km/h	Heavy 50-100g/m²	Heavy 50-100g/m²
Moderate 10-50mm	Moderate 10-50km/h	Moderate 10-50g/m²	Moderate 10-50g/m²
Light 1-10mm	Light 1-10km/h	Light 1-10g/m²	Light 1-10g/m²

**Weather**

- Current satellite image
- 1-day accumulated precipitation observation:
  - Rain-gauge, archive
  - Satellite based, archive
- Daily Max T° observation, yesterday
- ITD & ITCZ Positions
- Rapid Developing Thunderstorm (RDT)
- Five day hazard outlook, Archive
- Tech. note for synoptic forecast, Archive
- Daily Max T° forecast: D; D+1; D+2; D+3
- 
- Continental multimodel visualisation
- UKMO model output, Africa

**Climate**

**RCC Afrique**

- Climate Monitoring,

- Daily Max T° observation, yesterday
- ITD & ITCZ Positions
- Rapid Developing Thunderstorm (RDT)
- **Five day hazard outlook, Archive**
- Tech. note for synoptic forecast, Archive
- Daily Max T° forecast: D; D+1; D+2; D+3
- -----

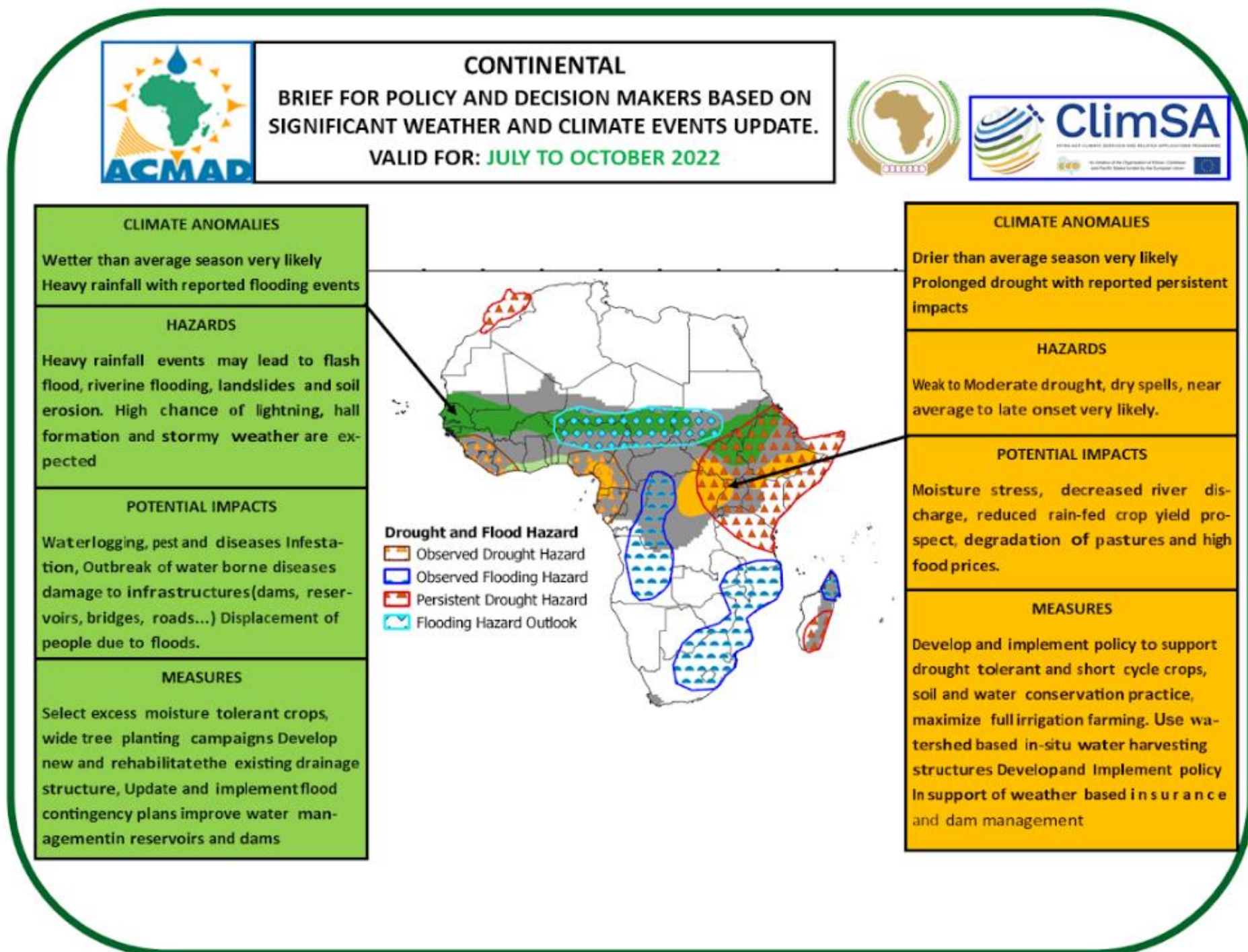


**ClimSA**  
African Centre of Meteorological Applications for Development (ACMAD)

**Continental Multi Hazard & Advisory Bulletin**

Issued on: August 18th, 2022

## INTERACTION WITH HUMANITARIAN



### WEST AND CENTRAL AFRICA Flooding Situation: Hotspot Countries

As of 9 September 2022

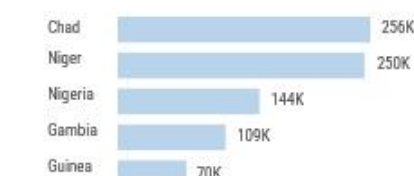
#### OUTLOOK

Countries with the highest risks of floodings based on the rainfall forecast for July to October 2022 include Chad, Côte d'Ivoire, The Gambia, Ghana, Guinea, Guinea Bissau, Mali, Niger, Nigeria, Senegal, and Sierra Leone<sup>1</sup>. Hotspot countries have a significant number of people residing in areas with high floods exposure and are thus expected to receive "normal to above average rainfall" or "above average rainfall" during the 2022 rainy season<sup>2,3</sup>.

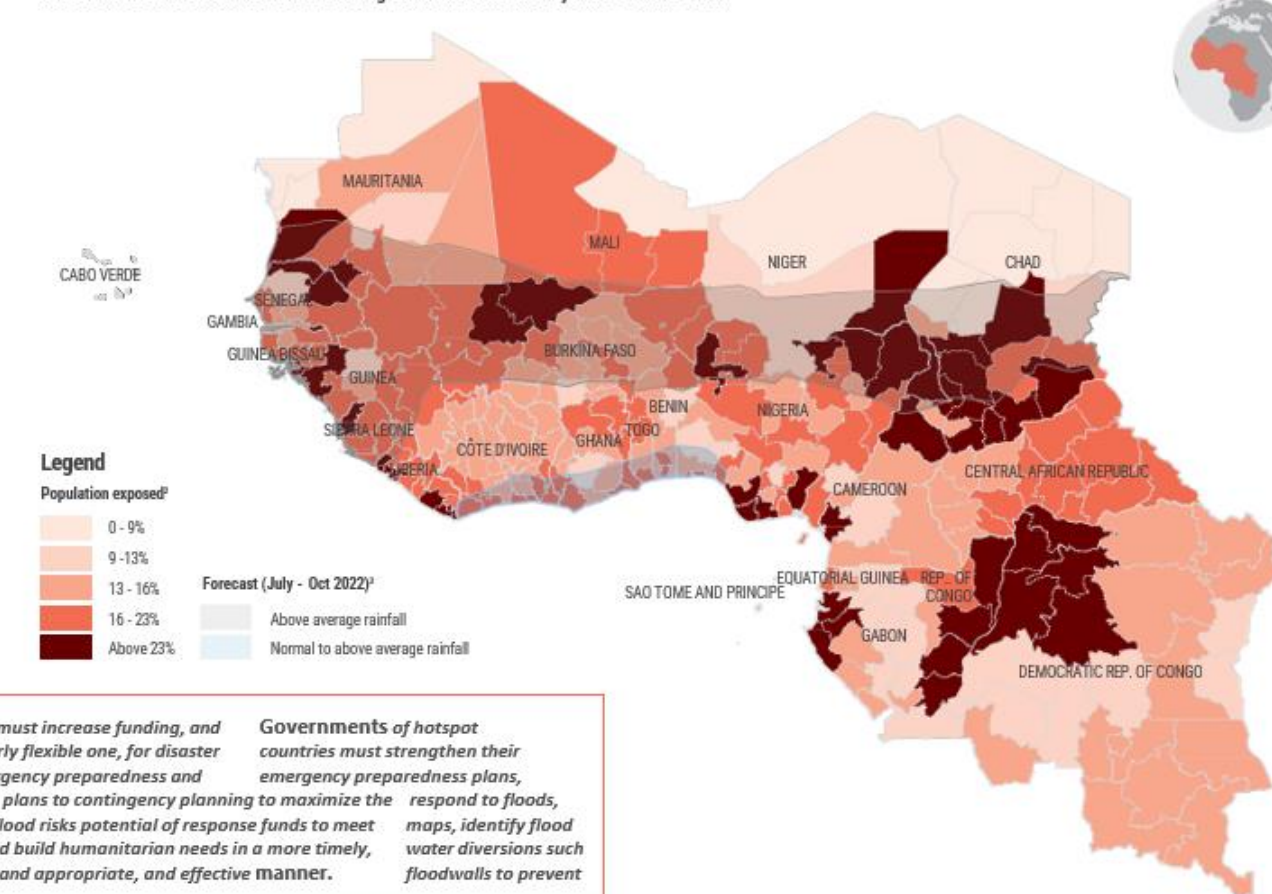
In 2021, hotspot countries included Chad, Niger, Nigeria, The Gambia, and Guinea, with floods killing 172 persons, affecting 828,000, and displacing 311,000.

<sup>1</sup> Analysis was carried out by OCHA  
<sup>2</sup> Flood risk exposure map was created by World Bank (<https://www.nature.com/articles/s41467-022-30727-4>)  
<sup>3</sup> Forecast was done by according to African Centre of Meteorological Application for Development (ACMAD)

#### Countries most affected by floods between July and October 2021



Percentage of populations exposed to high flood risks overlaid with regions forecasted to have normal or above average rainfall between July and October 2022.



Humanitarian and development organizations must develop and implement emergency preparedness and contingency plans as these are critical to mitigate the risk of humanitarian impact of floods in "at-risk" countries.

Donors must increase funding, and particularly flexible one, for disaster and emergency preparedness and including plans to contingency planning to maximize the response funds to meet flood risks potential of response funds to meet as dams, and appropriate, and effective manner.

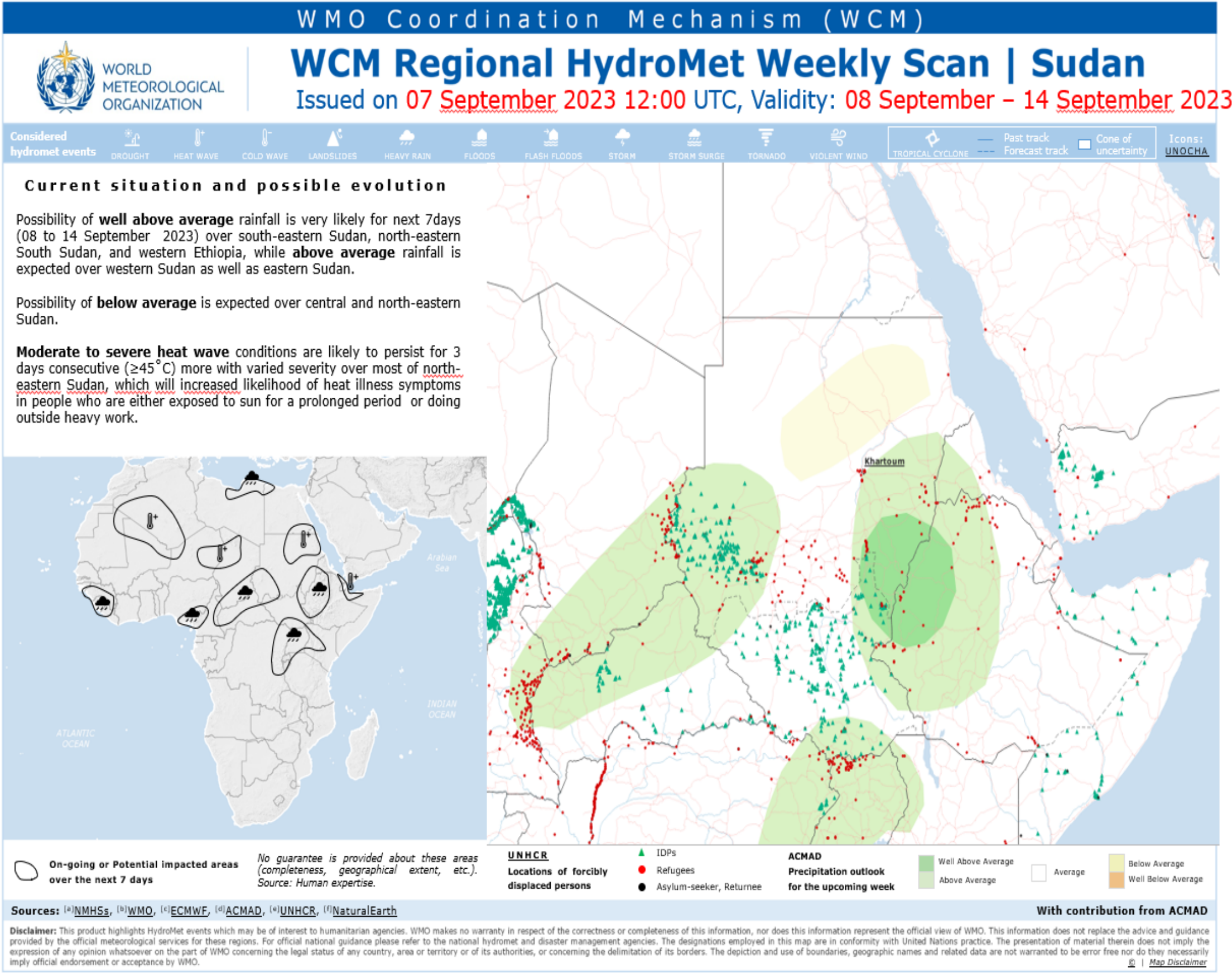
Governments of hotspot countries must strengthen their emergency preparedness plans, respond to floods, maps, identify flood water diversions such floodwalls to prevent floods.

The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.  
 Sources: Media, UN reports, Red Cross and Red Crescent Movement and NGO reports, Government data. Data on displacement was provided by IOM. Source of data available upon request

N. B : This document contains evolving data which will be continuously updated.

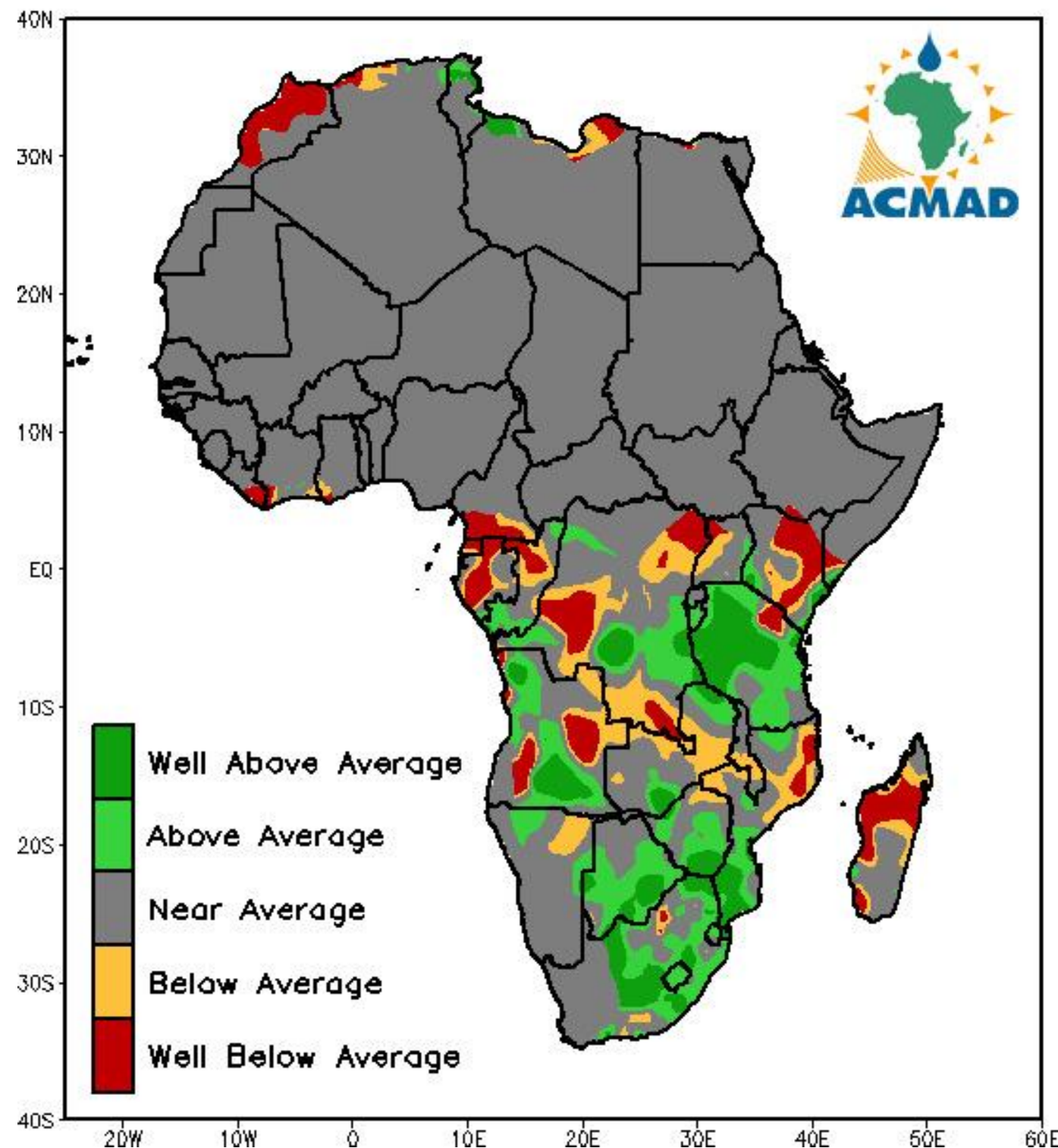
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## INTERACTION WITH HUMANITARIAN

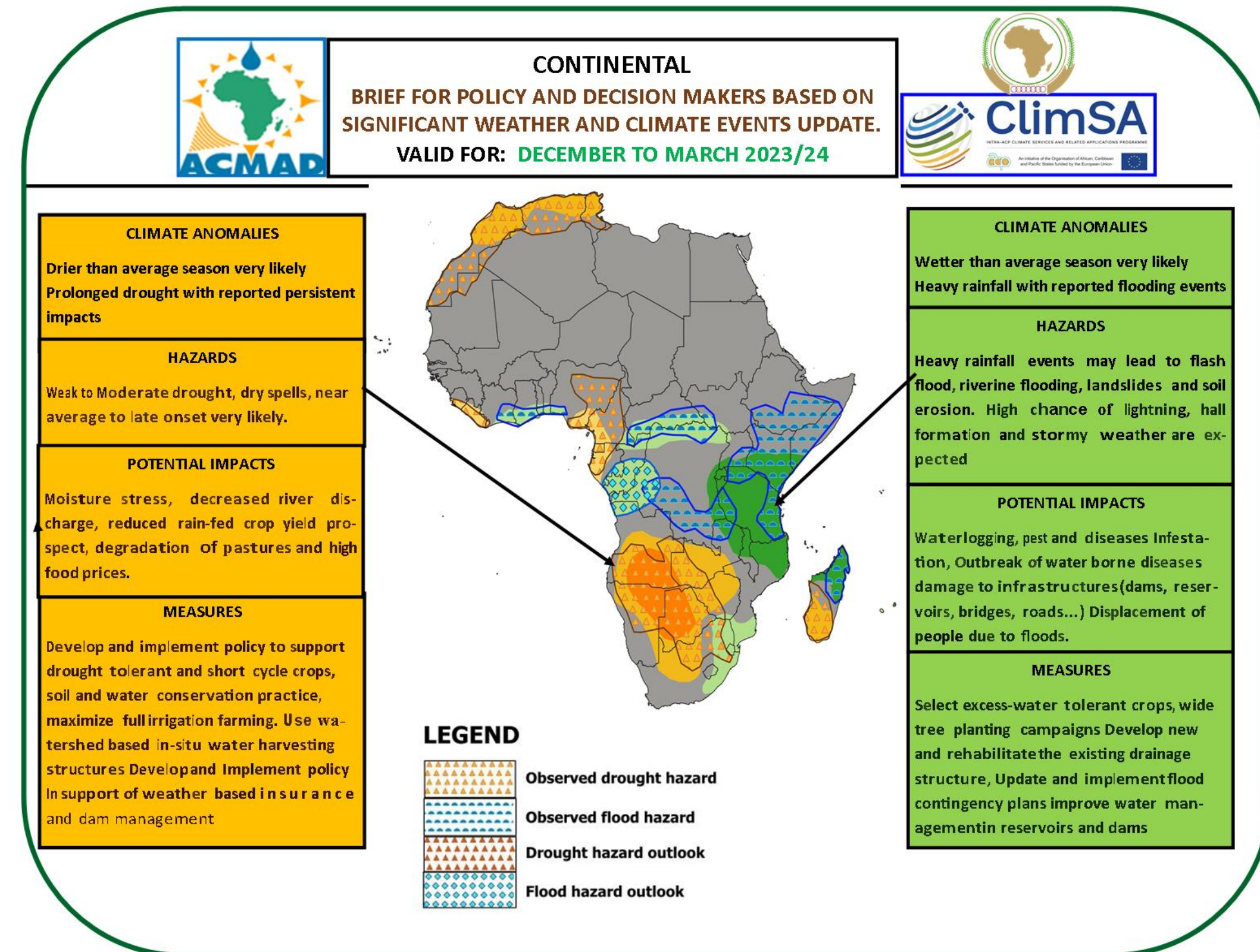


# PRODUITS POUR LE SUIVI CLIMATIQUE

CPC-Uni 31-Day Precipitation in Percent of Average (%)  
Period: 01Dec2023 to 31Dec2023

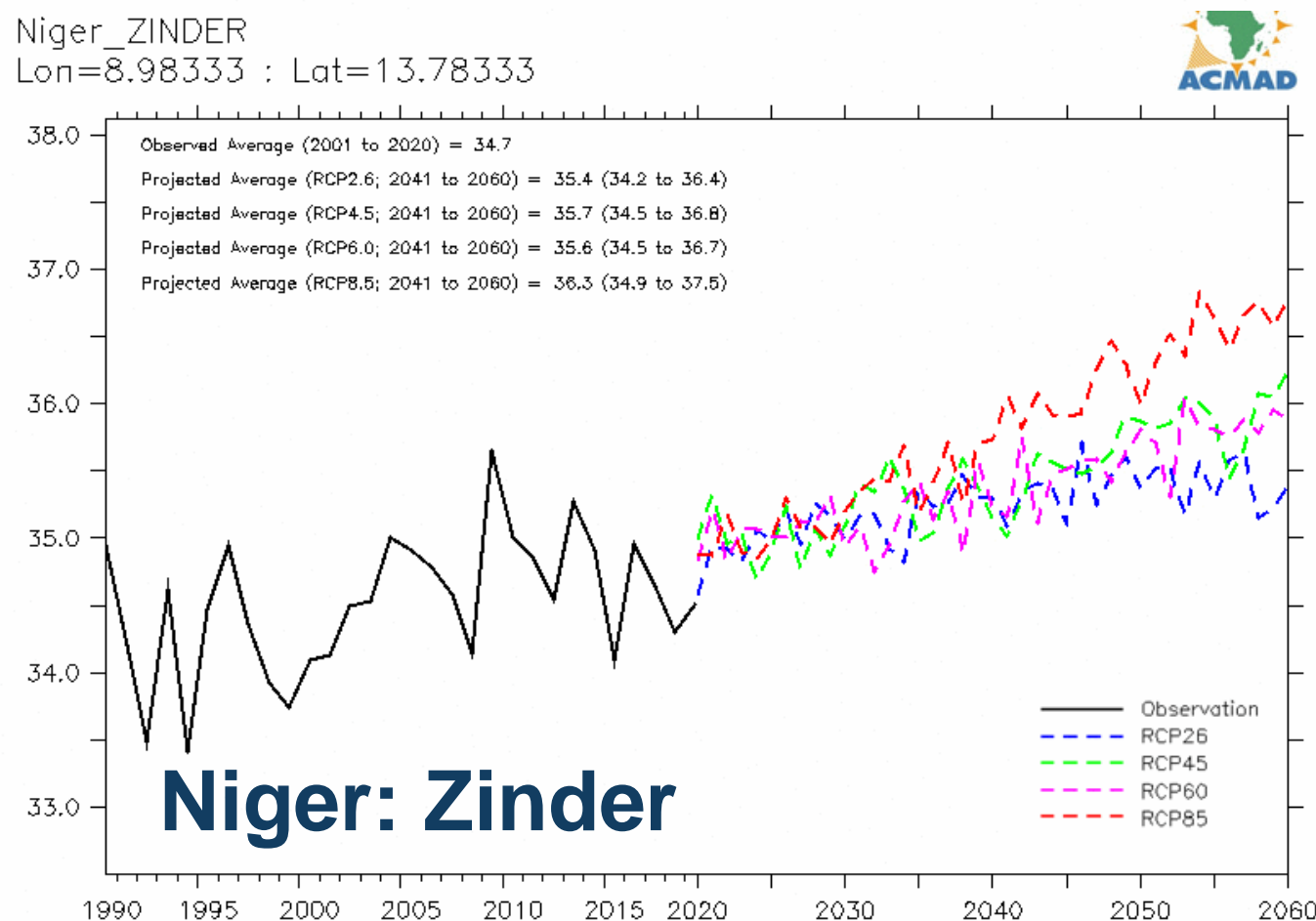
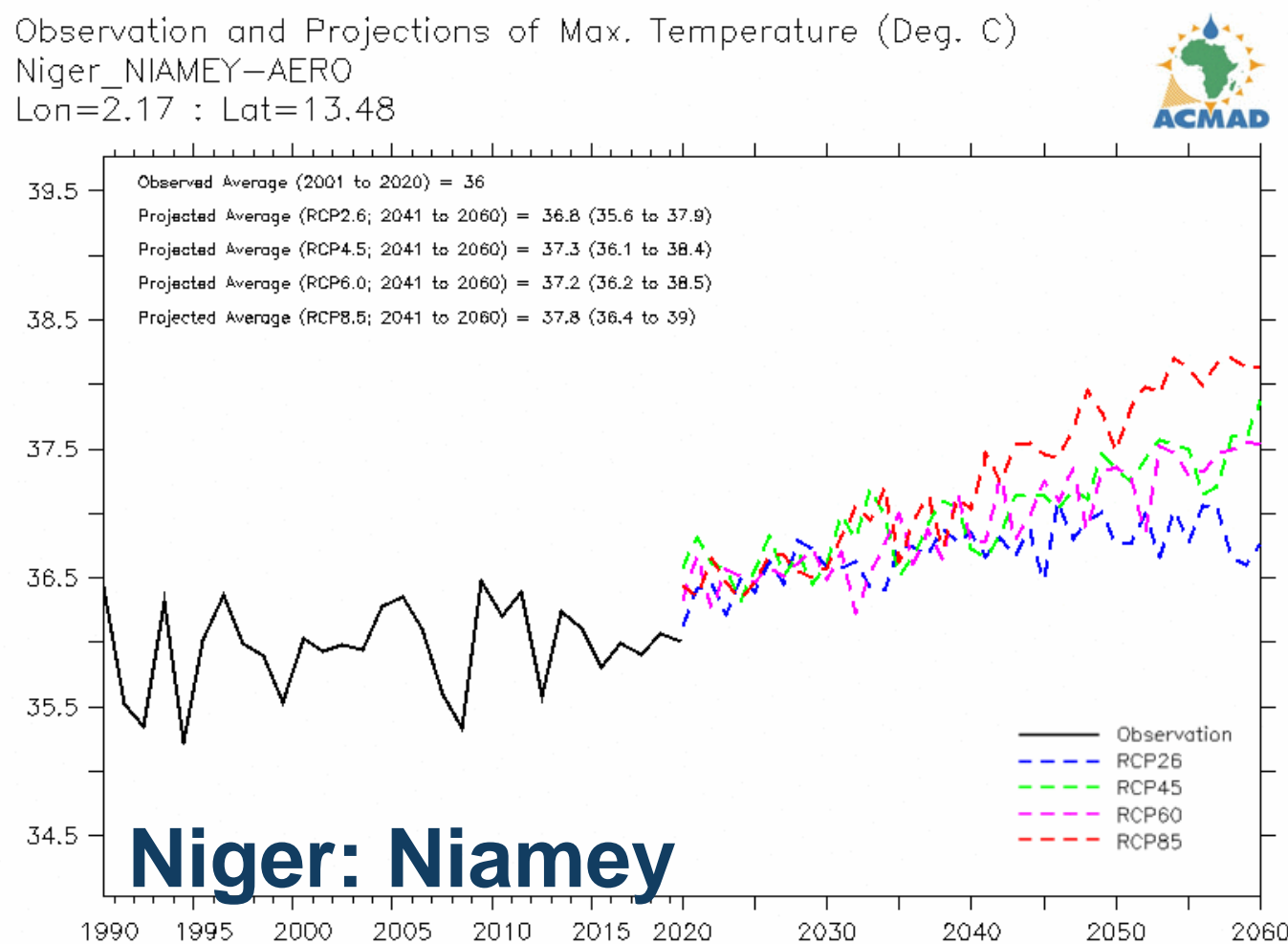


# PRODUITS POUR LA PRISE DE DECISION

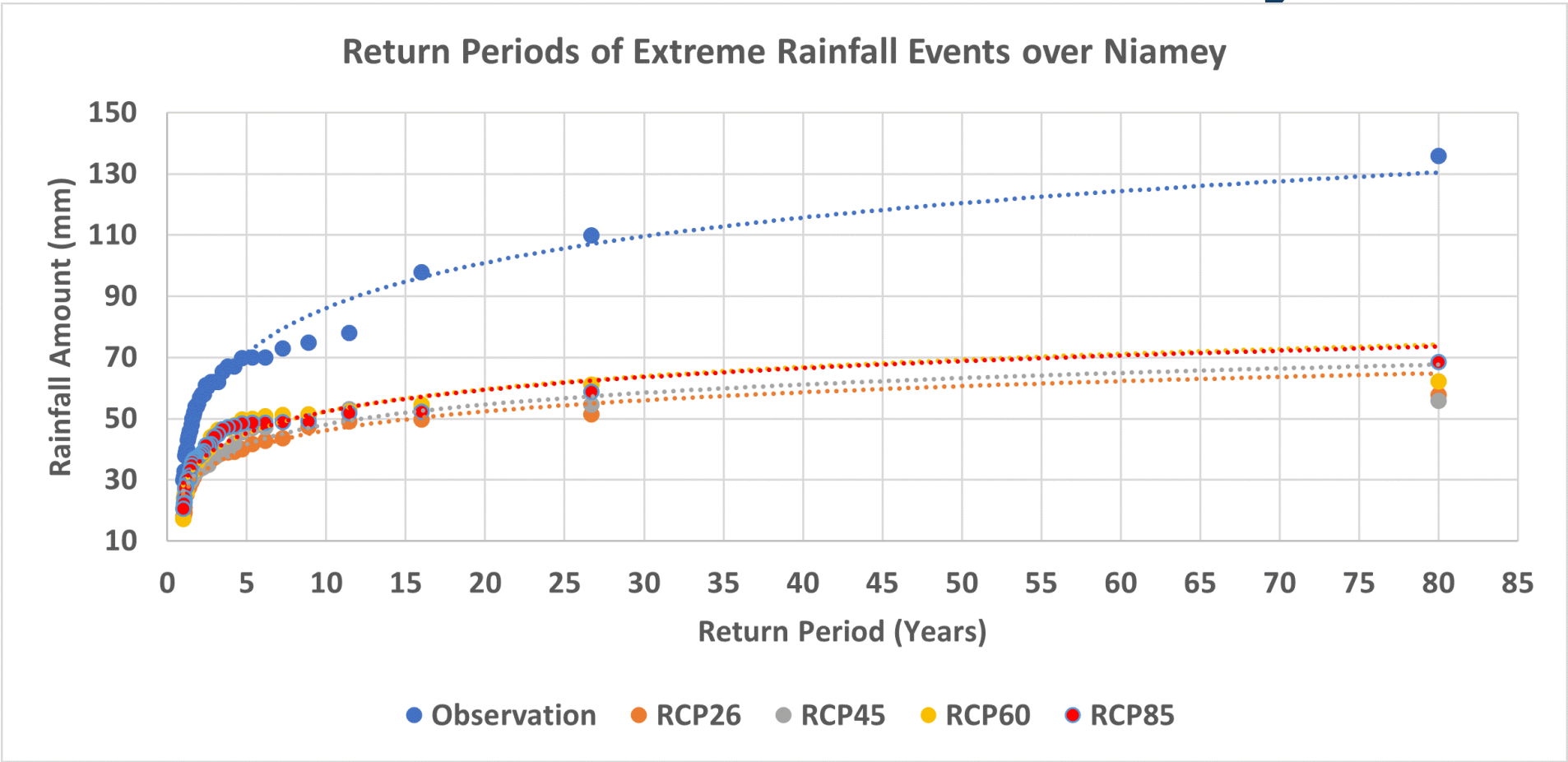


*Disponible: Chaque Mois*

## Observed and Projected of surface maximum temperatures over Niamey



## Return Periods: Niamey



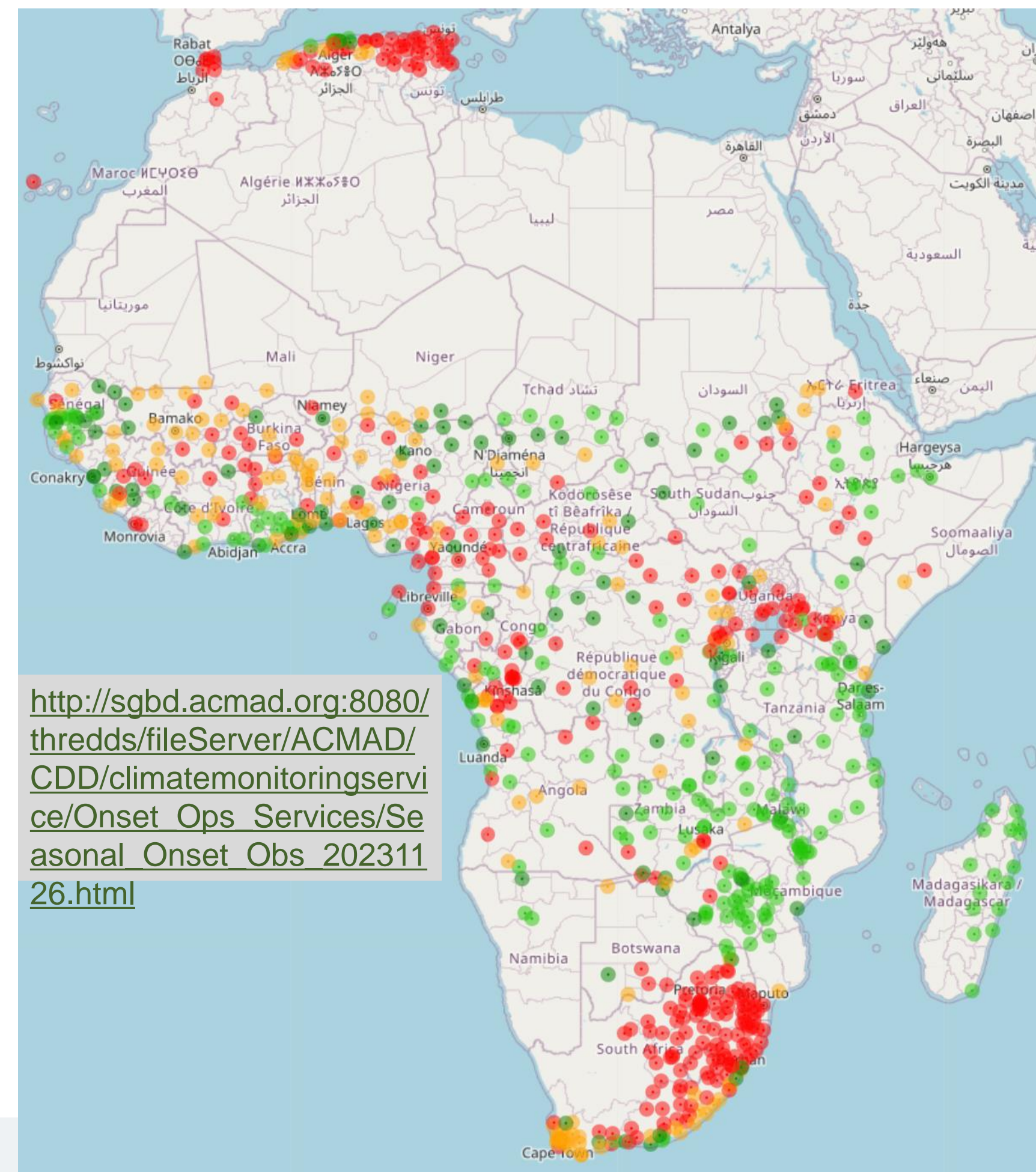
**Extreme temperatures of > 40degC will in the near future be more frequent every 1 to 3 years contrary to 37 – 39degC that are presently frequent.**

# Contribution to the Food Security Value Chain – Monitoring and forecasting of the start of the agricultural season

Prediction of the start of the agricultural season, dry and wet periods to support farmers in planning their activities

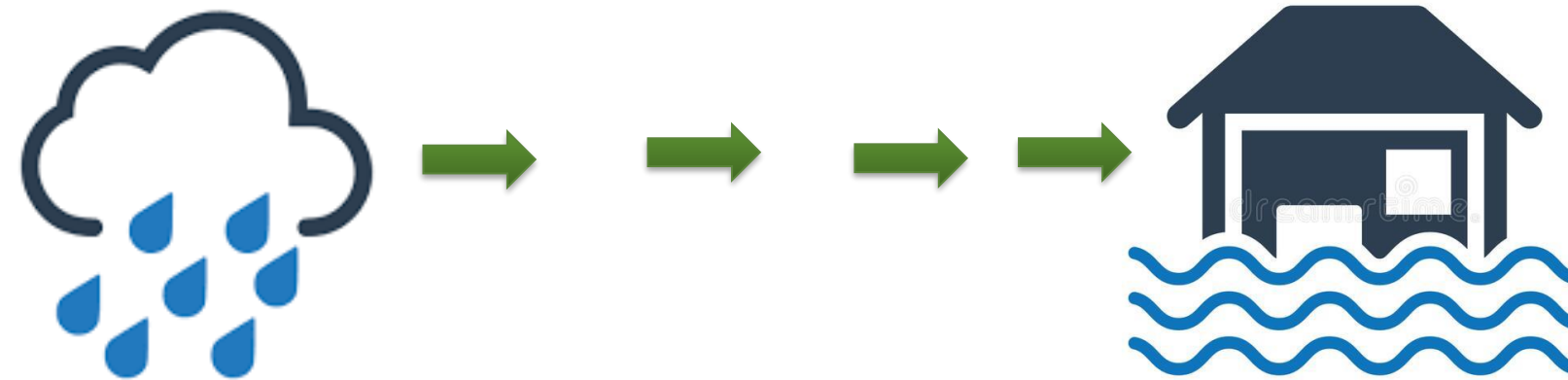
*Future development projects should integrate the production and dissemination of this information in real time to rural areas.*

MONITORING OF OBSERVED ANOMALIES ON THE START OF THE AGRICULTURE SEASON AND OUTLOOK. MONITORING PERIOD: JANUARY-NOVEMBER 2023. OUTLOOK VALIDITY PERIOD: NOVEMBER 26 TO DECEMBER 10 2023 . DATE OF ISSUE: NOVEMBER-26-2023.



[http://sgbd.acmad.org:8080/thredds/fileServer/ACMAD/CDD/climatemonitoringservice/season\\_onset\\_monitoring.html](http://sgbd.acmad.org:8080/thredds/fileServer/ACMAD/CDD/climatemonitoringservice/season_onset_monitoring.html)

# *From the forecast to impact-based warning level classification*

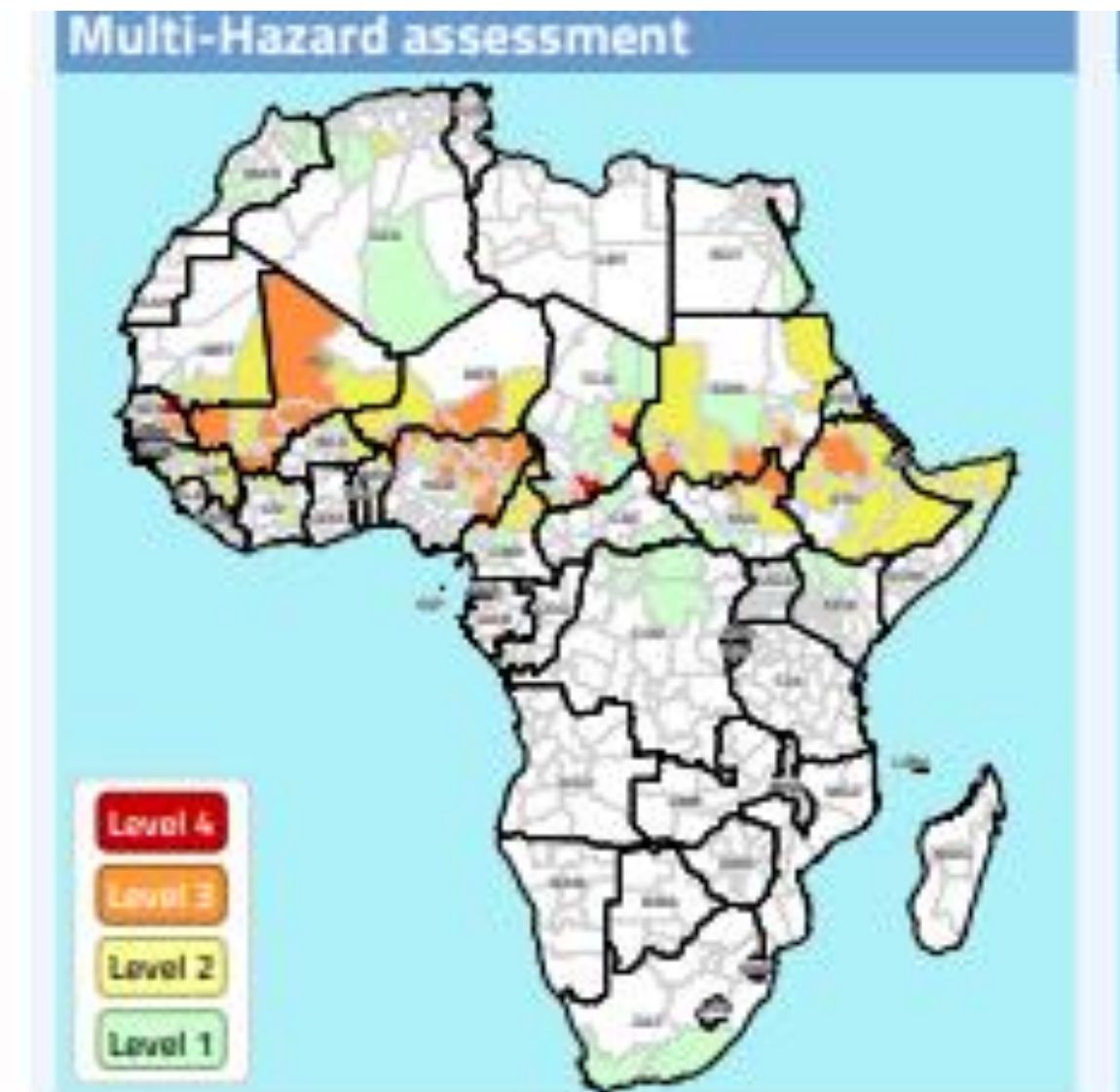


HAZARD BASED



IMPACT BASED

- Identification of the thresholds;
- Hazard classification;
- Exposure and vulnerability;
- Risk level classification;



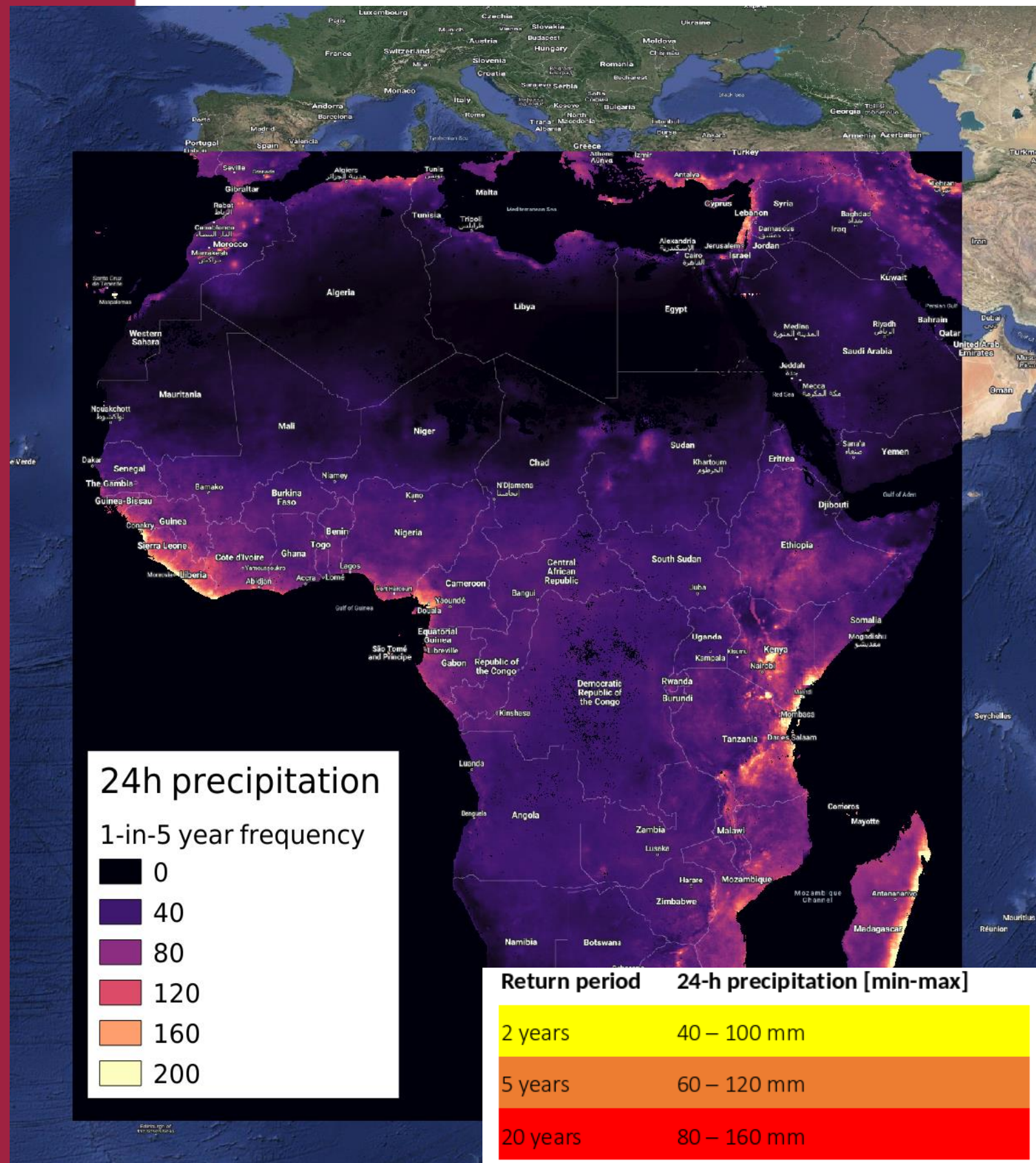
# Why classify warning levels?

## Pourquoi classer les niveaux d'alerte ?



Level	Criteria for Activation	Continental Level Action
<b>Level 1</b>	<ul style="list-style-type: none"> <li>Very localized Sub-National Warning triggered by National EWS Service or community based EWS targeting specific geographical areas within a MS.</li> <li>Warnings issued for relatively low impact, routine, events which can be managed by local authorities or communities with no major risk of escalation or transboundary spread.</li> </ul>	<ul style="list-style-type: none"> <li>No action required.</li> <li>General monitoring by Situation Room.</li> </ul>
<b>Level 2</b>	<ul style="list-style-type: none"> <li>National warning triggered by National MHEWS facility for significant events which may escalate, impacting/ potential to impact multiple administrative areas within MS or more localized events with potential of very significant consequences which requires national hazard monitoring and forecasting and may potentially require intervention of National resources in support of the local level depending on the organization of the MS.</li> </ul>	<ul style="list-style-type: none"> <li>No formal action required.</li> <li>General monitoring by Situation Room and provision of advice or guidance on request.</li> </ul>
<b>Level 3</b>	<ul style="list-style-type: none"> <li>Regional Warning triggered when the REC MHEWS Situation Room identifies the potential for significant impact that can exceed the coping capacity of the MS and may require international support and related supranational coordination. These events are likely to determine transboundary impacts/ anticipated impacts even from a single hazard event affected more than 1 MS. This may be triggered by information received from regional hazard monitoring services, or from information received from a MS.</li> <li>Regional Warning may be issued to all impacted/ potentially impacted MS within same REC. Where neighbouring MS from another REC may be impacted, transboundary warnings may be issued through the Continental MHEWS Situation Room.</li> </ul>	<ul style="list-style-type: none"> <li>Partial activation of the Situation Room.</li> <li>Monitor the situation with the involved REC(s).</li> <li>Evaluate the situation and escalate to Level 4 Warning if required.</li> <li>Issue Situation Reports to impacted REC Situation Rooms to monitor the situation.</li> <li>Inform so that they may initiate pre-emptive Early Actions as required.</li> </ul>
<b>Level 4</b>	<ul style="list-style-type: none"> <li>Continental Warning issued by the AMHEWS Situation Room for the most significant events that may potentially exceed the coping capacity of the affected MS by a large amount and require international support and related supranational coordination. These events are extremely likely to result in regional transboundary impacts.</li> <li>Warnings for significant hazards with potential for continental impacts, likely affecting multiple MSs and RECs with significant consequences.</li> </ul>	<ul style="list-style-type: none"> <li>Full activation of the Situation Room to coordinate information from multiple sources, liaison with RECs on transboundary impacts or anticipated impacts.</li> <li>If a disaster occurs, ensure data and information on hazards being monitored continues to be provided to the Continental Disaster Coordination Centre.</li> <li>Issue regular Situation Reports on hazards and early warnings issued, and on Early Actions taken, for AUC Bodies, AUC Senior Decision Makers and International Partners.</li> </ul>

# Threshold: rainfall - Seuil : précipitations



Maximum 24h cumulations estimated with a GEV distribution from a long term rain gauge-satellite dataset (CHIRPS 1980-2020). Thresholds linked to annual probability of exceedance (**2, 5, 20 years**). Thresholds **are bounded** with upper and lower limits.

Cumuls maximaux sur 24h estimés avec une distribution GEV à partir d'un ensemble de données pluviométriques par satellite à long terme (CHIRPS 1980-2020). Seuils liés à la probabilité annuelle de dépassement (**2, 5, 20 ans**). Les seuils **sont délimités** par des limites supérieures et inférieures

# Threshold: wind - Seuil : vent

Level Niveau	Wind speed Vitesse du vent	Effects Effet
Medium Moyen	14.3 m/s	Average speed for wind advisory by NOAA-NWS Vitesse moyenne pour l'alerte du vent par NOAA-NWS
High Élevé	17.9 m/s	Breaking or uprooting of trees Casser ou arracher des arbres
Very high Très élevé	22.3 m/s	Peak of the distribution of fatal and injury-causing accidents Pic de la distribution des accidents mortels et corporels

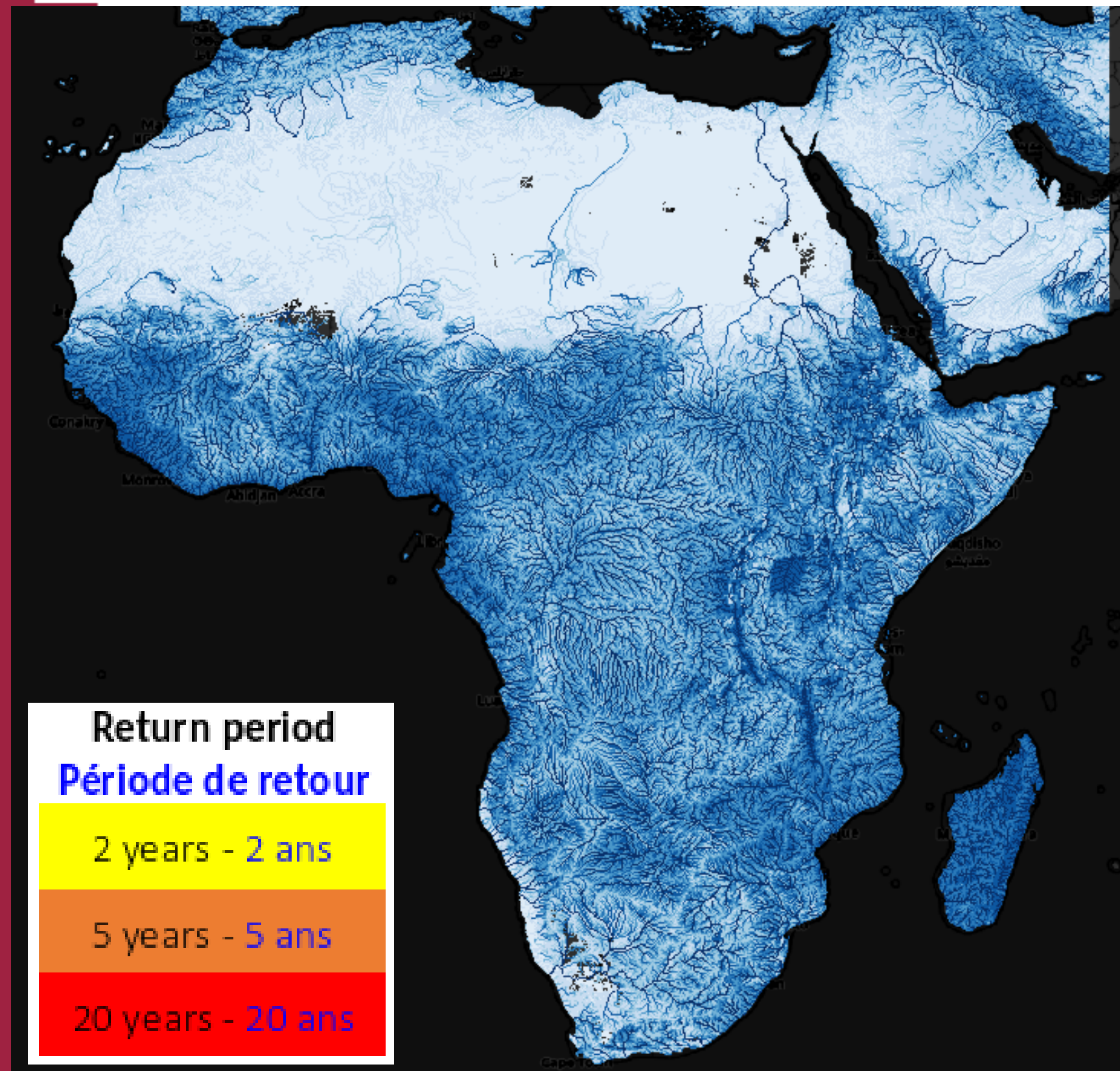


Unique thresholds based on published research  
Des seuils uniques basés sur des recherches publiées

# Threshold: flood - **Seuil : inondation**

Discharge magnitudes corresponding to the **2-, 5- and 20-year return period** floods generated by JRC by fitting a Gumbel extreme value distribution to the annual maxima series extracted from GloFAS discharge timeseries of the hydrological reanalysis 1979-2019.

Crues avec périodes de retour de **2, 5 et 20 ans** générées par le JRC en ajustant une distribution de valeurs extrêmes de Gumbel aux séries de maxima annuels extraites des séries temporelles de débit GloFAS de la réanalyse hydrologique 1979-2019.



## Representative value identification - Identification des valeurs représentatives

For each pixel a representative value is considered for the forecast:

Pour chaque pixel, une valeur représentative est considérée pour la prévision :



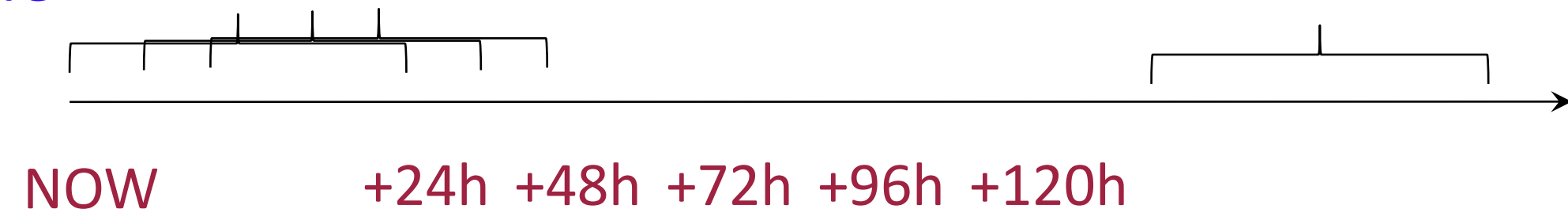
The absolute max in the next 5 days

Le maximum absolu dans les 5 prochains jours

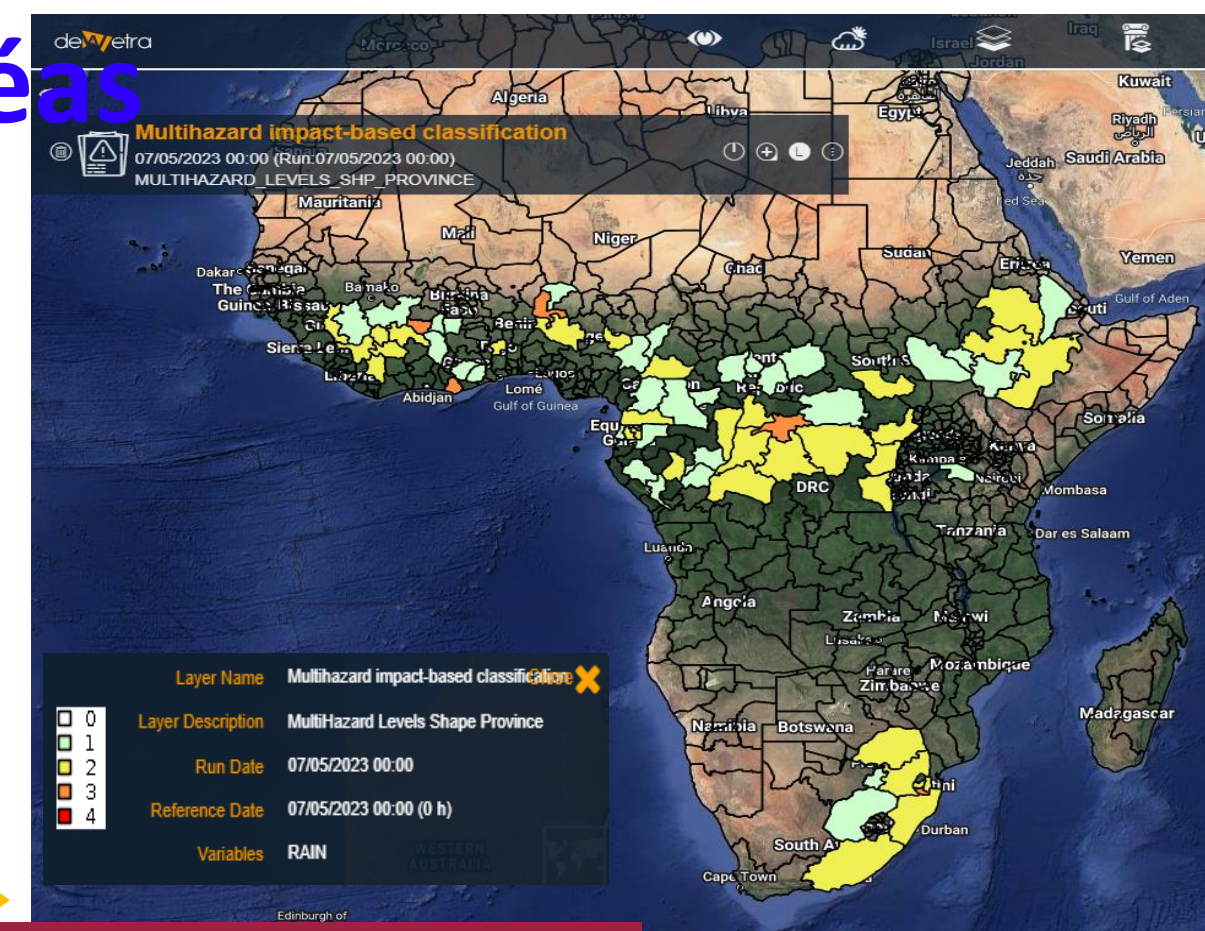
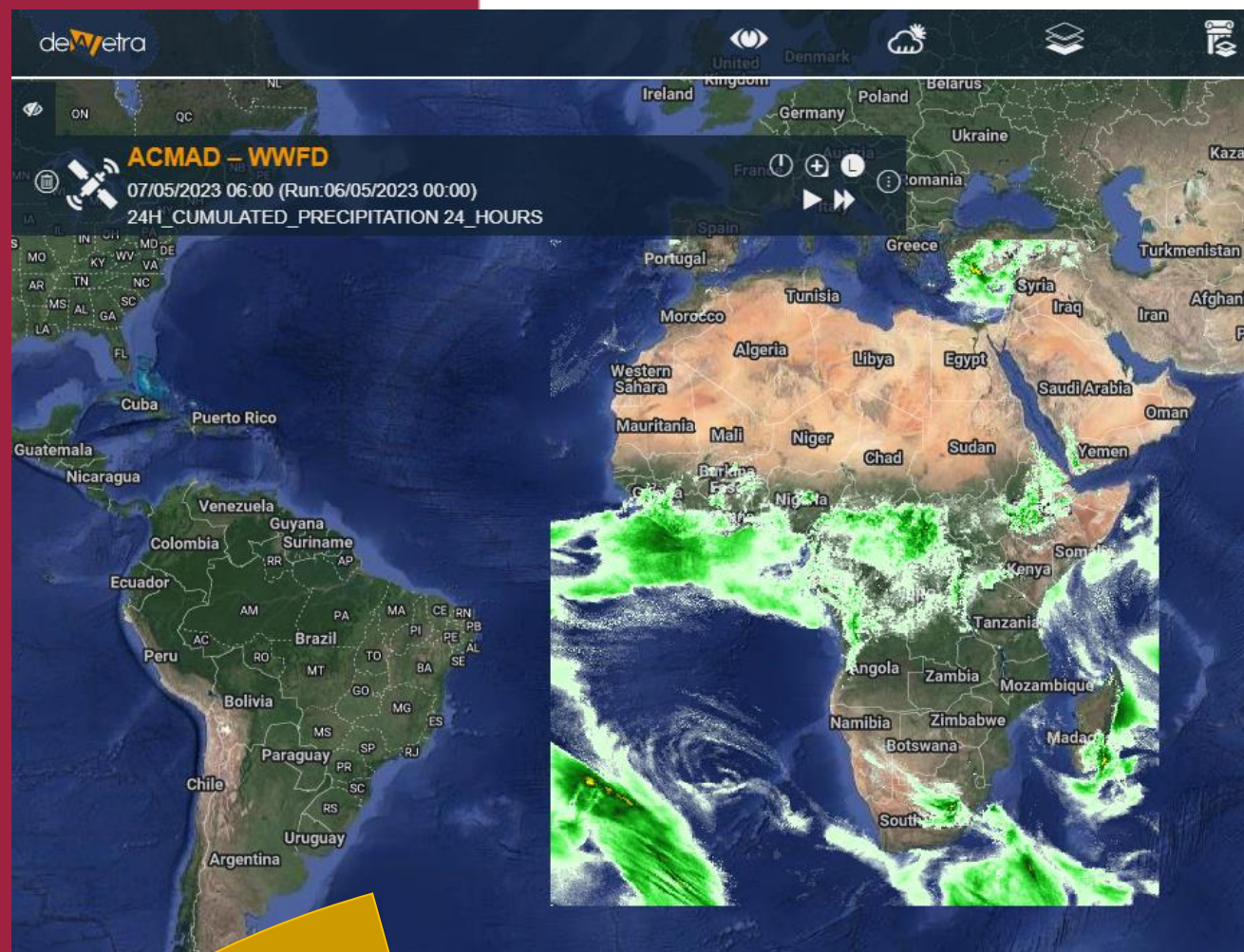


Max 24h in next 5 days calculated with moving sum window

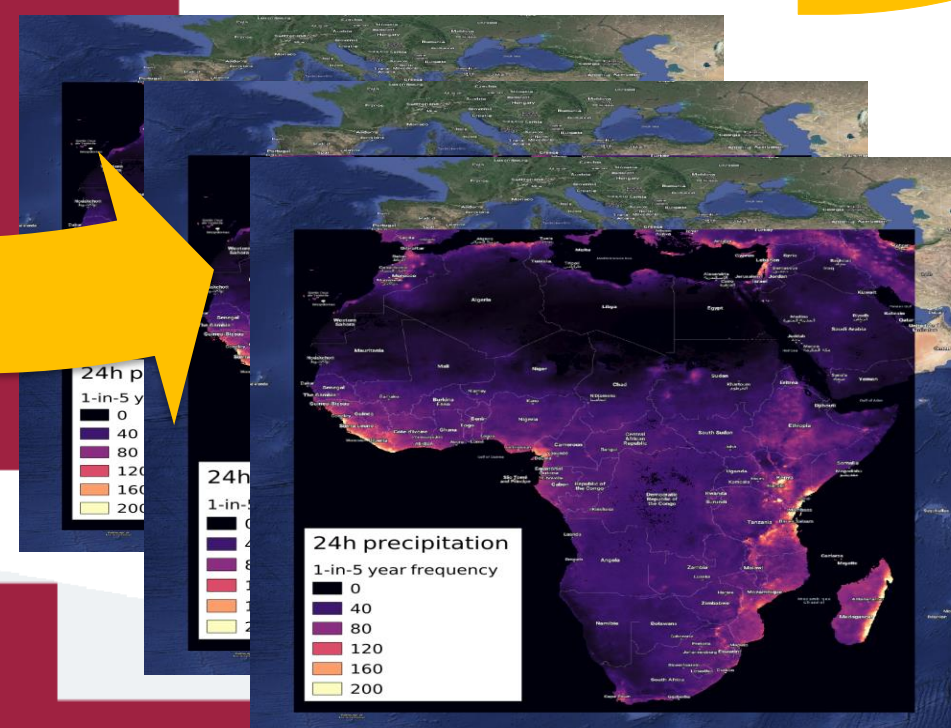
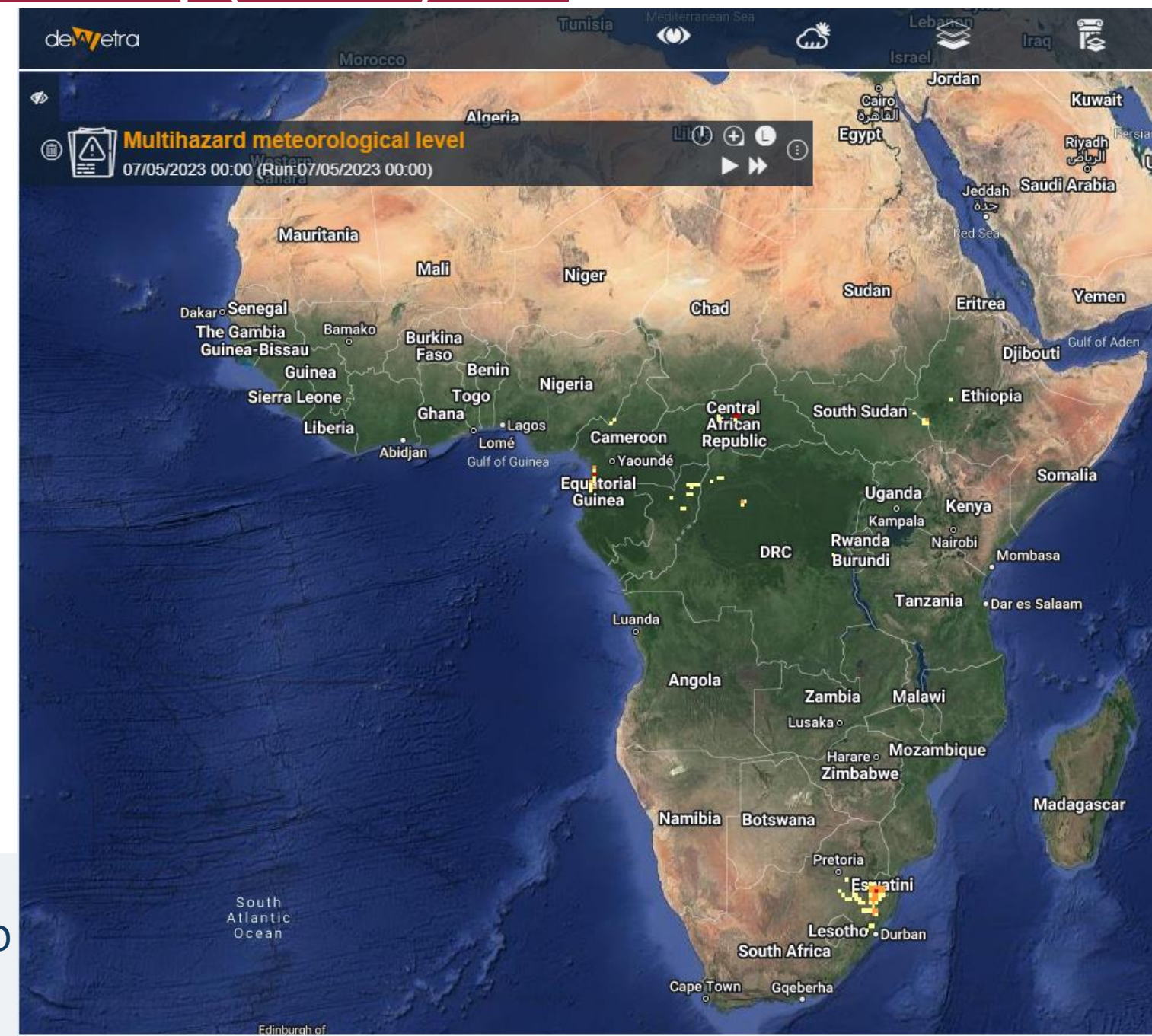
Max 24h dans les 5 prochains jours calculé avec une fenêtre de somme mobile



# Hazard classification - Classification des aléas



Hazard classified map (4 levels)



Thresholds

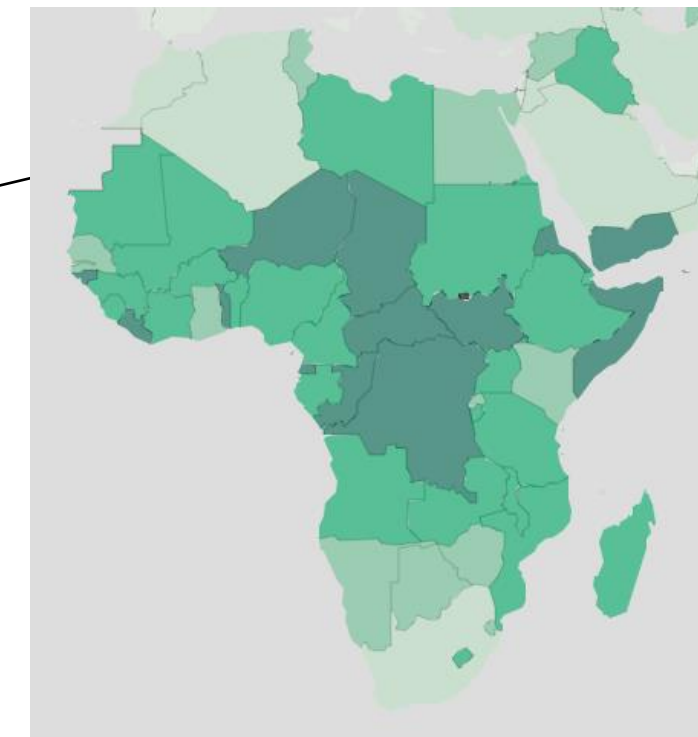
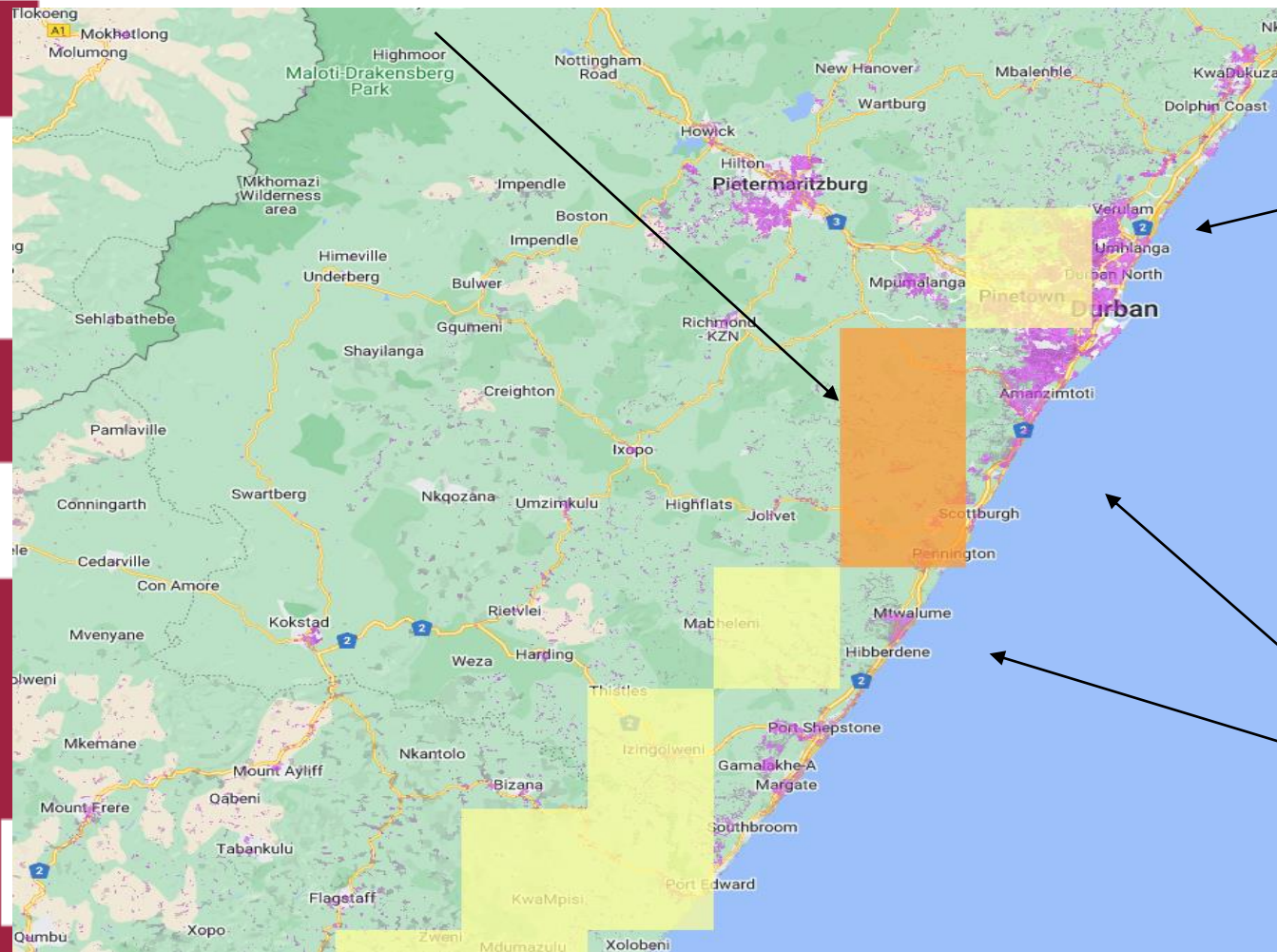
ACP CLIMATE SERVICES AND RELATED

[www.climsa.org](http://www.climsa.org)

# From hazard to impacts - De l'aléa aux impacts

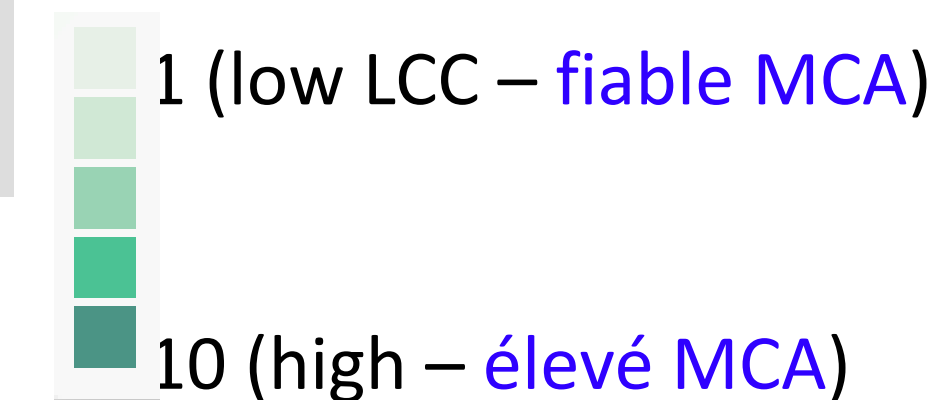
## Population density - Densité de population (GHS-POP 2019)

[https://ghsl.jrc.ec.europa.eu/datasets.php#inline-nav-ghs\\_pop2019](https://ghsl.jrc.ec.europa.eu/datasets.php#inline-nav-ghs_pop2019)



## Lack of Coping Capacity - Manque de Capacité d'Adaptation (INFORM)

<https://drmkc.jrc.ec.europa.eu/inform-index/INFORM-Risk/Map>



## Hazard level - Niveau d'aléa (Hc)

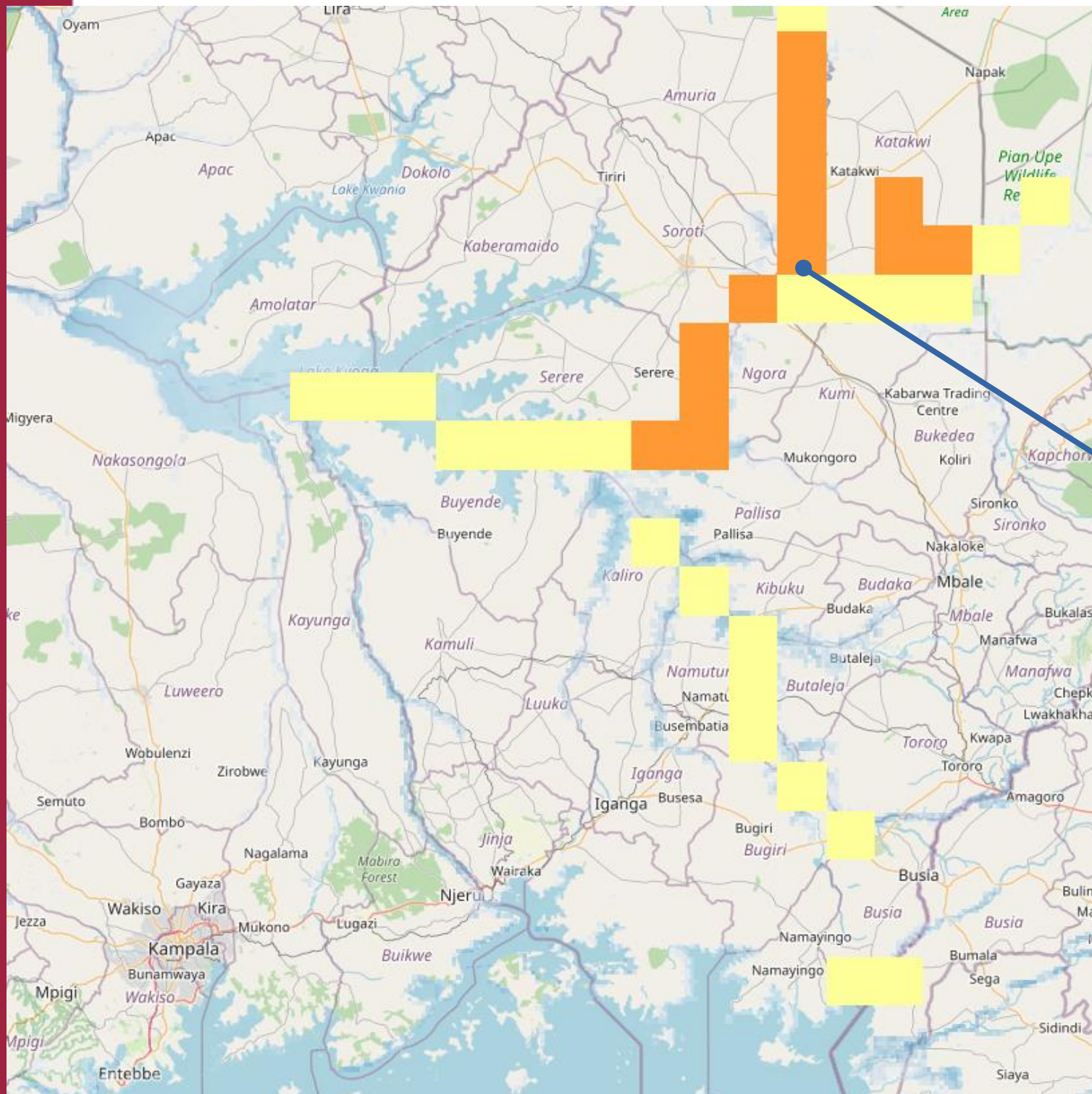
Hazard level Niveau d'aléa	Hc
Level 1- Niveau 1	0.02
Level 2- Niveau 2	0.2
Level 3- Niveau 3	0.5

Empirical severity coefficients based on 5062 disasters occurred in 1990-2021

Coefficients de sévérité empiriques basés sur 5062 catastrophes survenues en 1990-2021

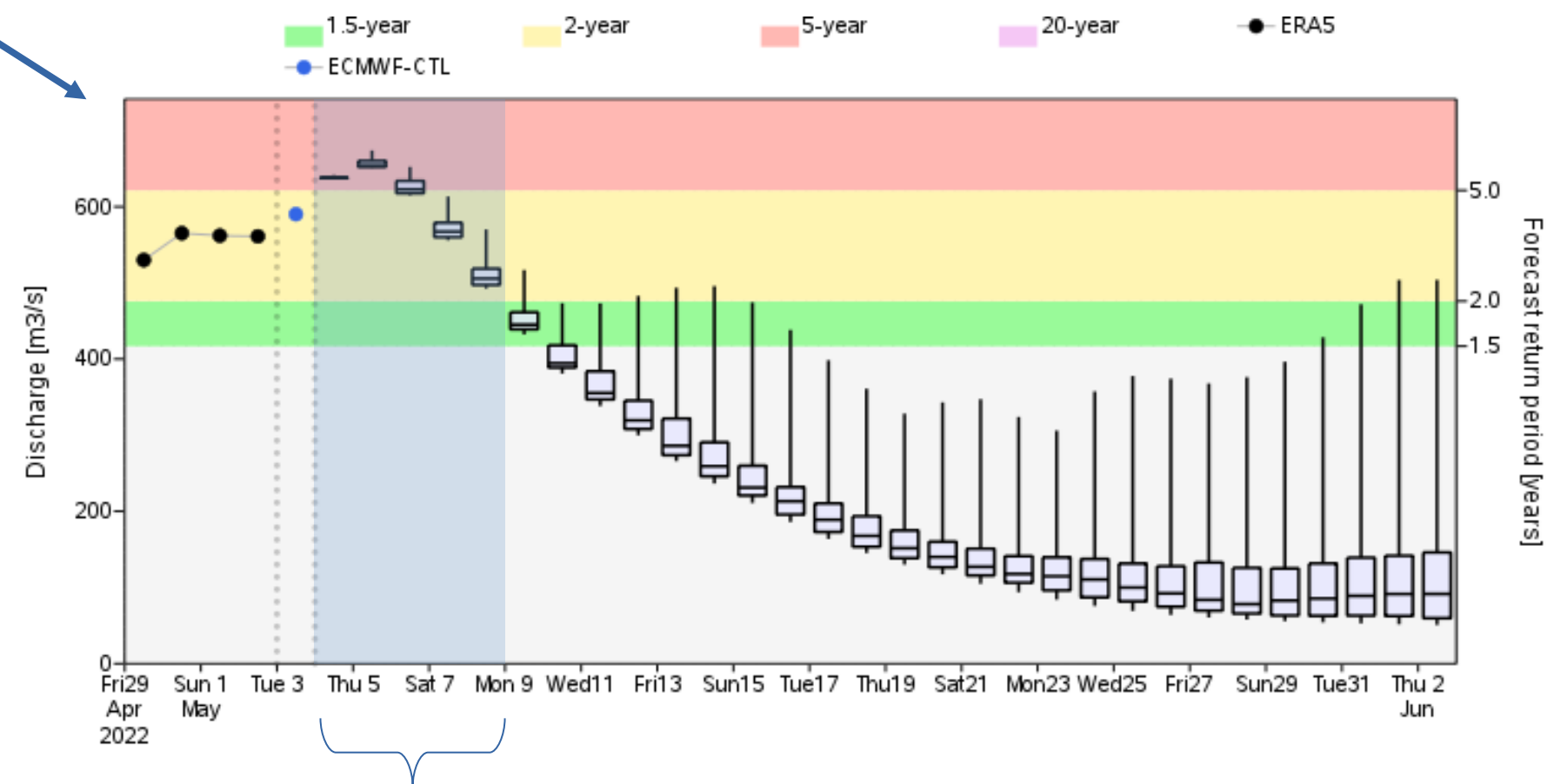
(EM-DAT)

# From hazard to impacts - De l'aléa aux impacts



For flood the JRC flood inundation maps (1 km) associated to each sub-basin are activated if the related return period threshold is exceeded in the following 5 days.

Pour les inondations, les cartes d'inondation du JRC (1 km) associées à chaque bassin sont activées si le seuil de période de retour correspondant est dépassé dans les 5 jours suivants.



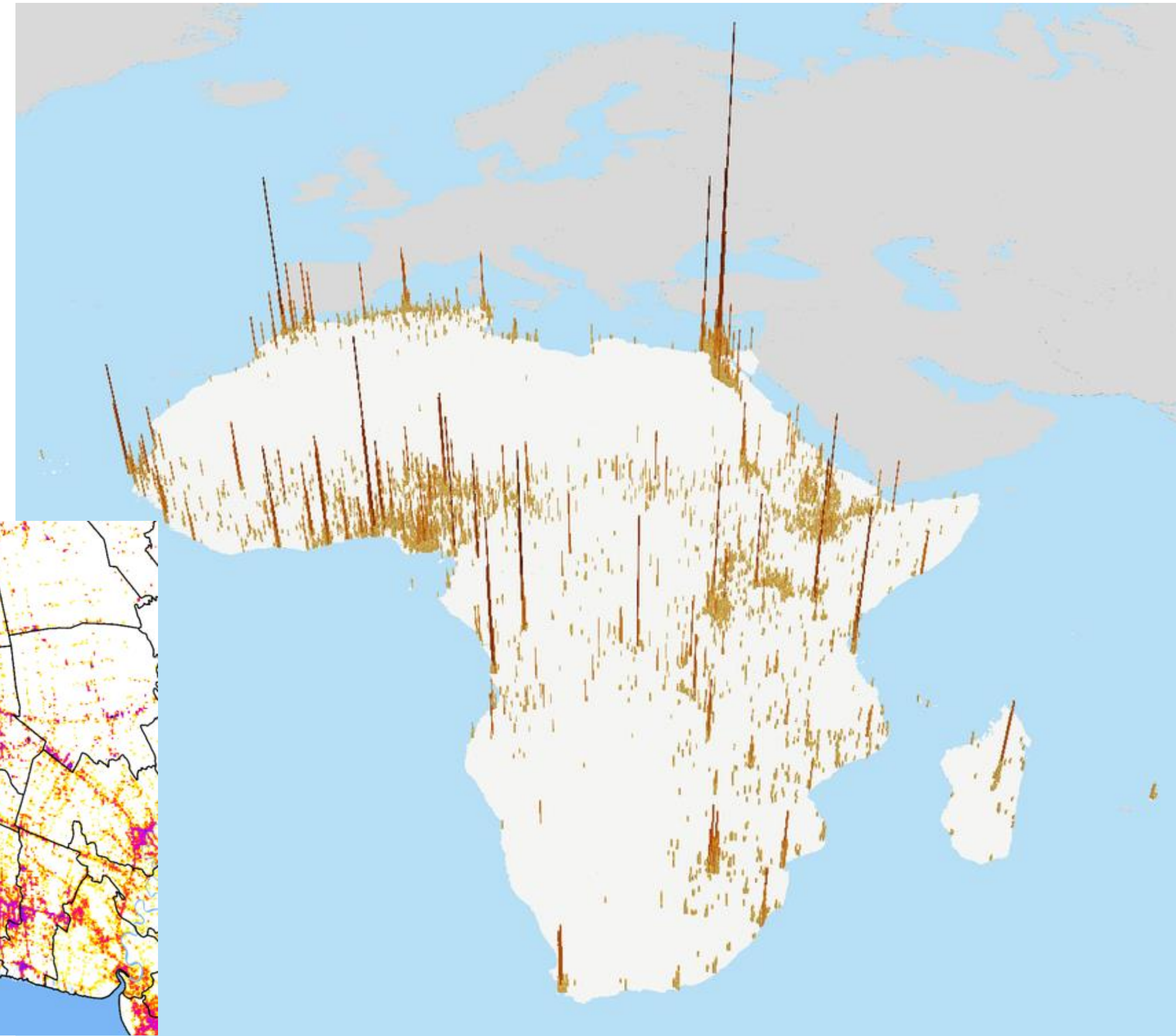
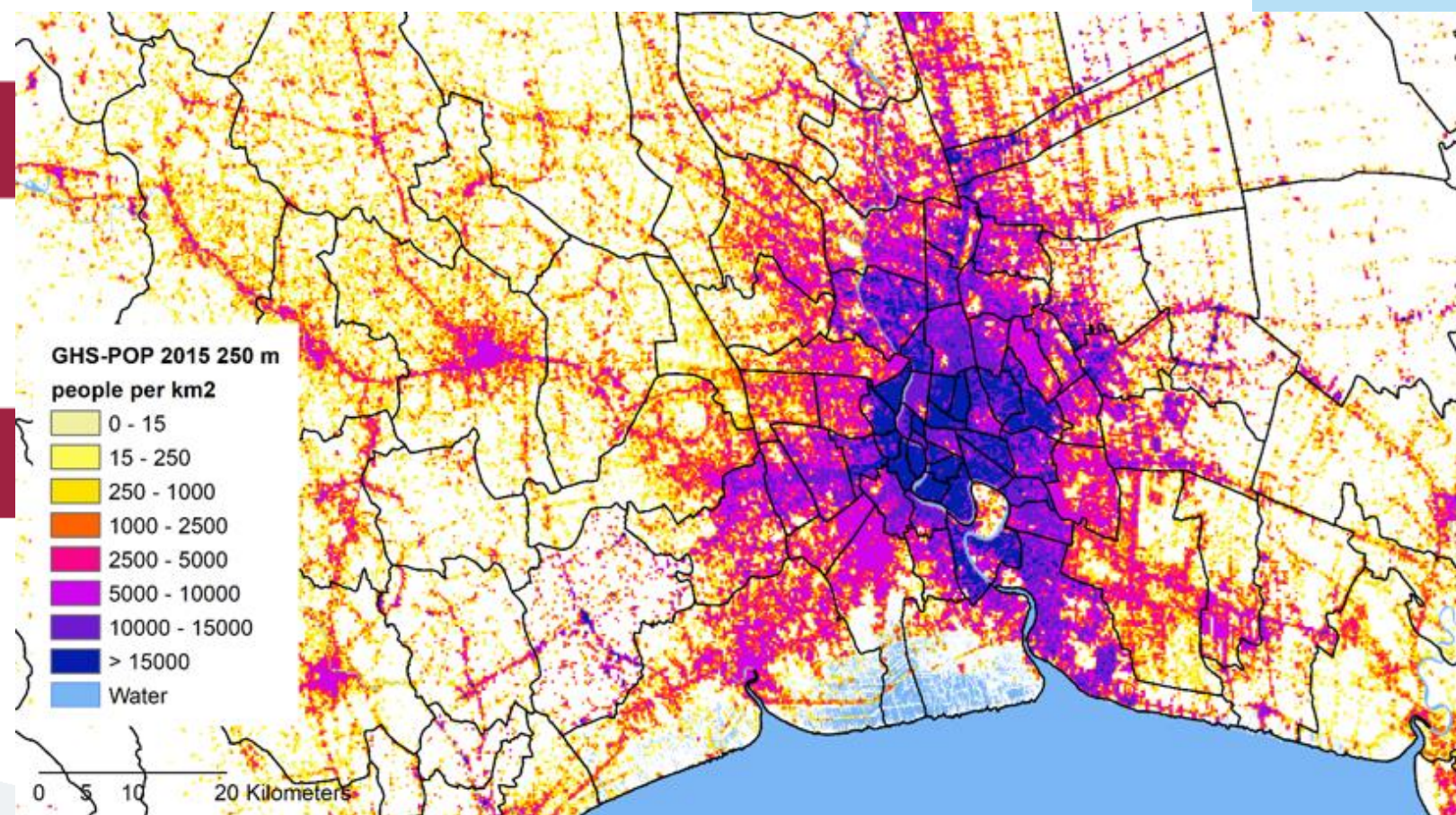
5-day forecast - Prévisions à 5 jours

GloFAS run 2022-05-04

Exécution de GloFAS 2022-05-04

# Exposure

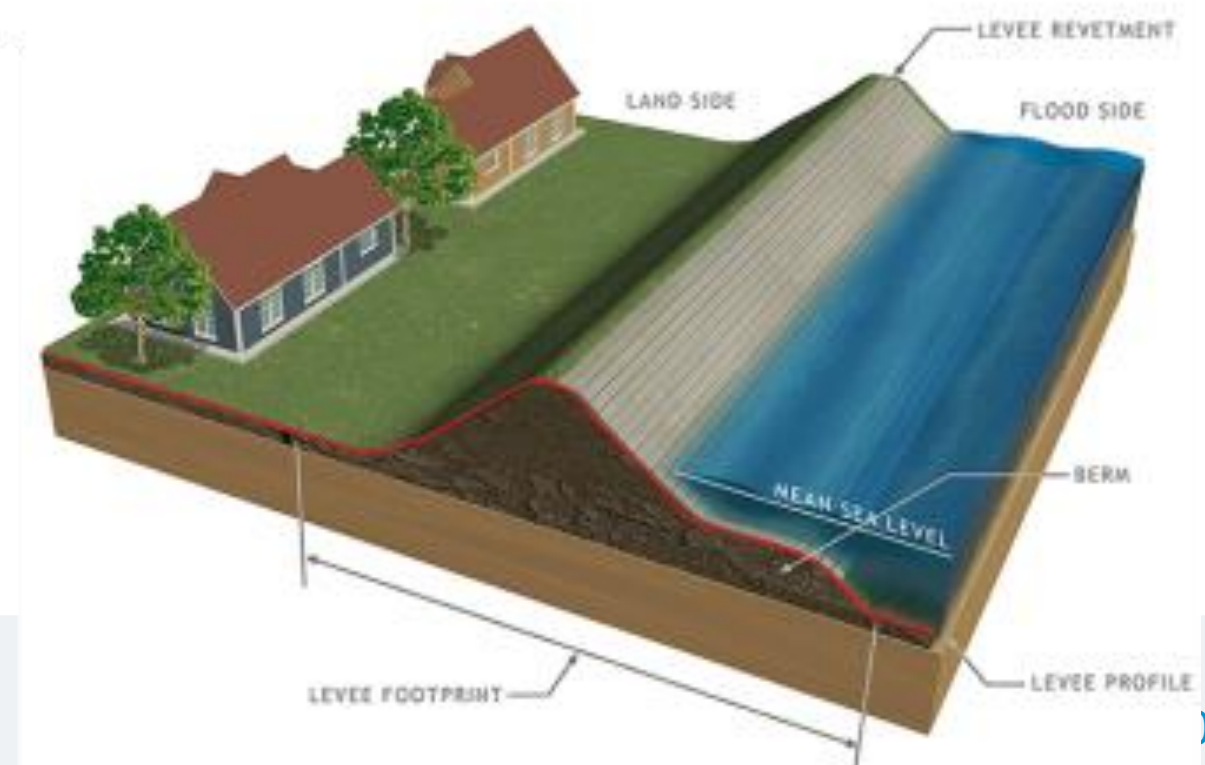
Population density data from the  
Global Human Settlement (GHS)



# Vulnerability

*“the condition determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards” (UNDRR glossary)*

- Coefficients between (0 and 1) linked to the event magnitude
- Linked to the probability of being affected by the flood in the flood-prone areas (depending of the flood protection level, probability of a levee failure, early warning systems, other impact-reduction measures)
- Tuning parameters to obtain realistic impact estimates



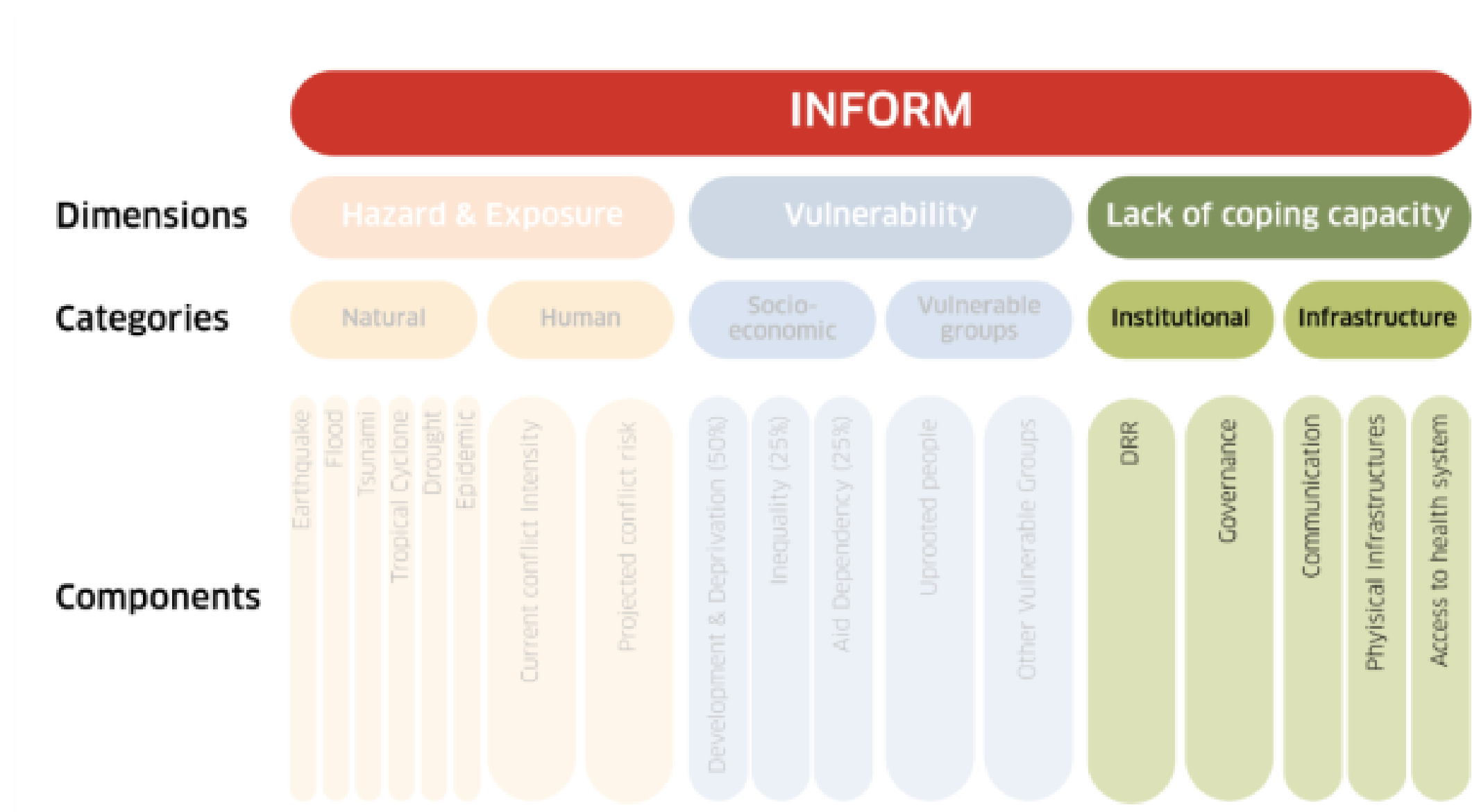
# Capacity



## DRMKC

**Coping capacity** measures the ability of a country to cope with disasters in terms of formal, organized activities and the effort of the country's government as well as the existing infrastructure which contribute to the reduction of disaster risk

The **INFORM Risk Index** is a global, open-source risk assessment for humanitarian crises and disasters. It can support decisions about prevention, preparedness and response.



# Impact-based classification - Classification basée sur l'impact



## Step 1:

Calculate absolute impacts for each pixel of the forecast grid:

Calculer les impacts absolus pour chaque pixel de la grille de prévision :

$$\text{Impacts}_{\text{pixel}} = H_c \times \text{Pop}_{\text{pixel}} \times V \times (L_{cc}/10)$$

Calculate the total impacts at the admin level:

Calculez les impacts totaux au niveau de l'unité administrative:

$$\text{Impacts}_{\text{admin}} =$$

$$\Sigma(\text{Impacts}_{\text{pixel\_in}})$$

And the relative impact by dividing for the total population of the admin level:

Et l'impact relatif en divisant par la population totale de l'unité administrative:

$$\text{Relative Impacts}_{\text{admin}} = \frac{\Sigma(\text{Impacts}_{\text{pixel\_in}})}{\text{PopTot}}$$

# Impact-based classification - Classification basée sur l'impact



## Step 2:

Compare absolute and relative impacts with the thresholds to identify the warning class of the considered admin level:

Comparer les impacts absolus et relatifs avec les seuils pour identifier la classe d'alerte de l'unité administrative considéré :

Index threshold Seuil	Lev Niv	Warning class Niveau d'alerte
<10 people (personnes)	0	None - Nul
<500 people (personnes)	1	Local / Sub-National
<0.5% of Admin pop	2	National
<5% of Admin pop or >10k people (personnes)	3	Regional
>5% of Admin1 pop or >50k people (personnes)	4	Continental

**Admin pop** is the population of the considered administrative unit

**Admin pop** est la population de l'unité administrative considérée

Empirical thresholds based on 5062 disasters occurred in 1990-2021

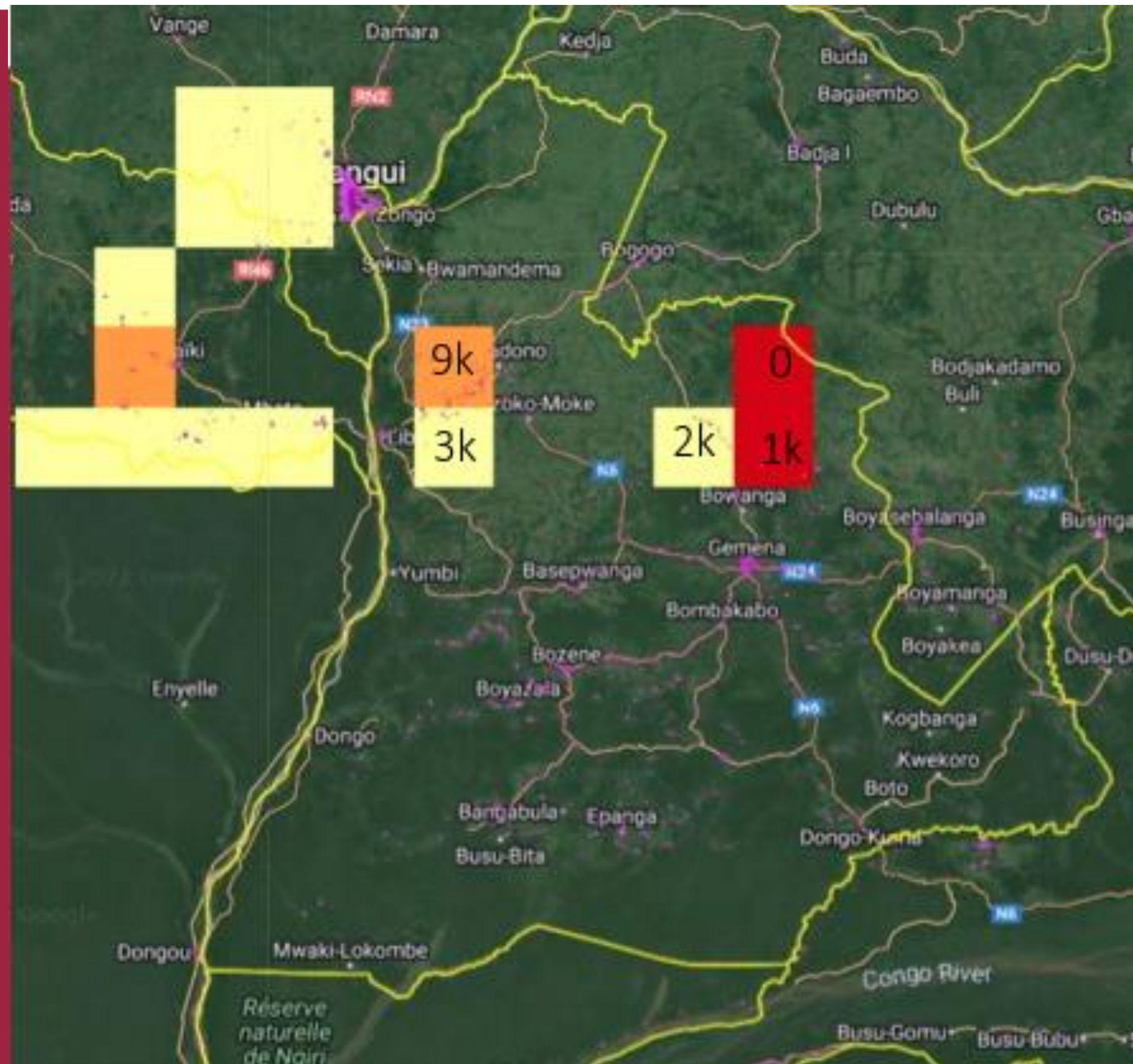
Seuils empiriques basés sur 5062 catastrophes survenues en 1990-

2021 (EM-DAT)



# Impact-based classification - Classification basée sur l'impact

## Example



**South Ubangi province, RDC**  
**Population: 2.8 million**  
**INFORM Lcc for RDC: 8.2**  
*Forecasts, 19 July 2022*

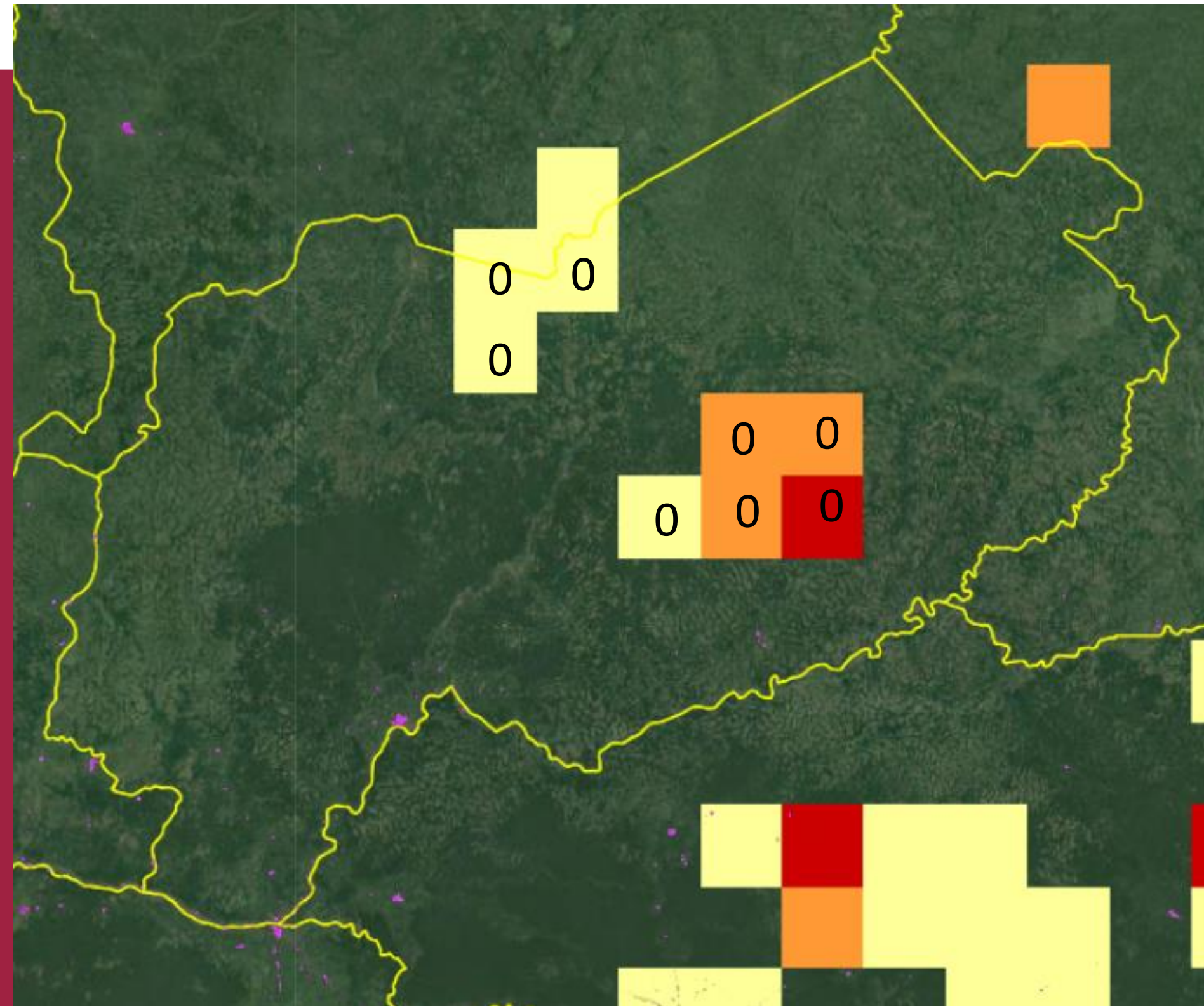
**Province du Sud-Ubangi, RDC**  
**Population : 2,8 millions**  
**INFORM MCA pour RDC : 8.2**  
*Prévisions, 19 juillet 2022*

Hazard level	Hc	Pop pixel in	Lcc/10	Hc*Pop*(Lcc/10)
3	0.5	1k + 0	8.2/10	1230
2	0.2	9k	8.2/10	1476
1	0.02	3k + 2k	8.2/10	82
Impacts Admin				2788
Impacts Relative		$(2788/2800000) * 100 = 0.1\%$		

**JELLOW LEVEL**  
**NIVEAU JAUNE**

# Impact-based classification - Classification basée sur l'impact

## Example



**Mbomou Prefecture, CAF**  
**Population: 132740**  
**INFORM Lcc RDC: 8.7**  
*Forecasts, 27 June 2022*

**Mbomou Prefecture, CAF**  
**Population: 132740**  
**INFORM MCA pour CAF: 8.7**  
*Prévisions, 27 juin 2022*

Hazard level	Hc	Pop pixel in	Lcc/10	Hc*Pop*(Lcc/10)
3	0.5	0	8.7/10	0
2	0.2	0	8.7/10	0
1	0.02	0	8.7/10	0
Impacts Admin				0
Impacts Relative		0		

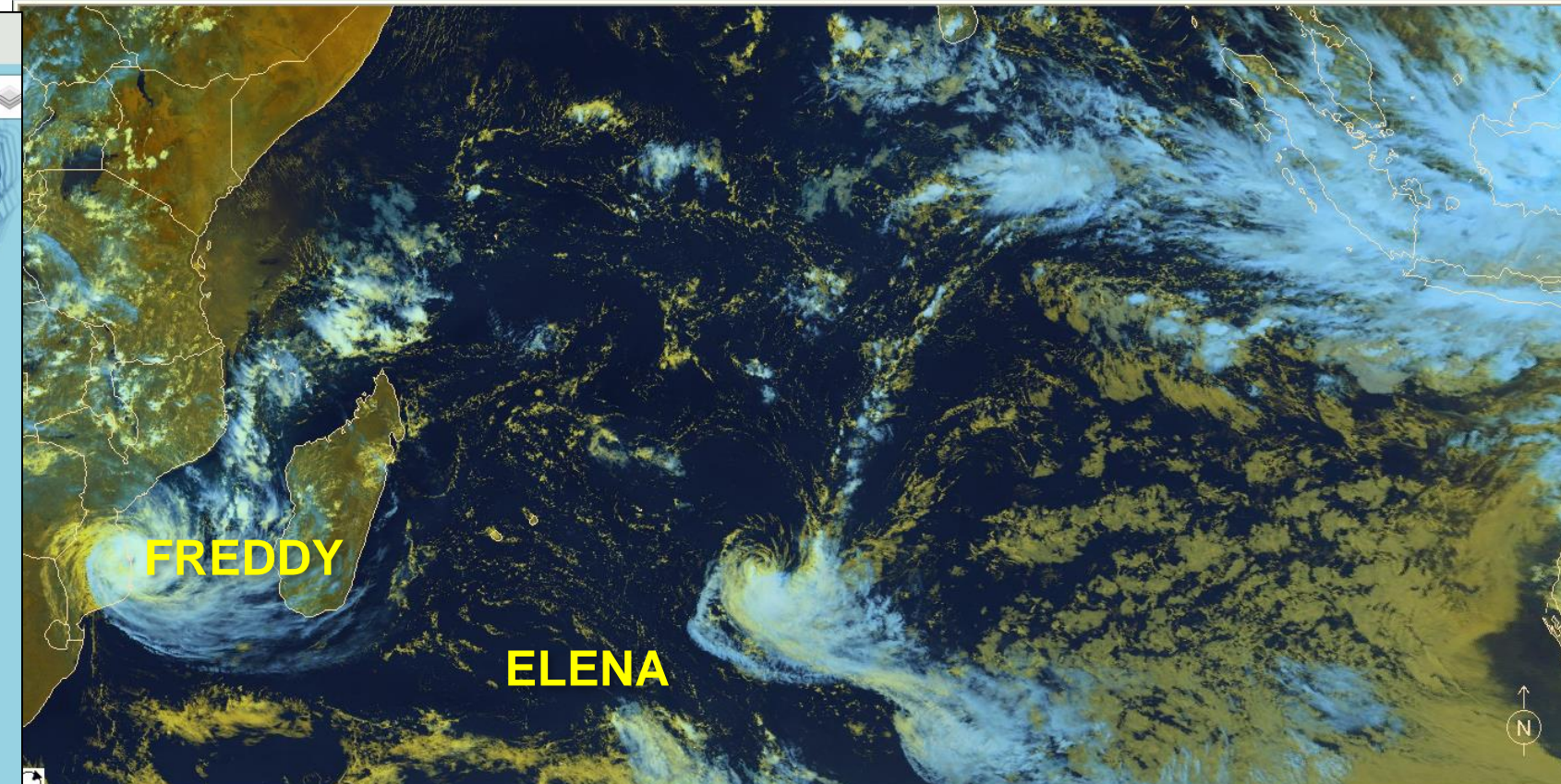
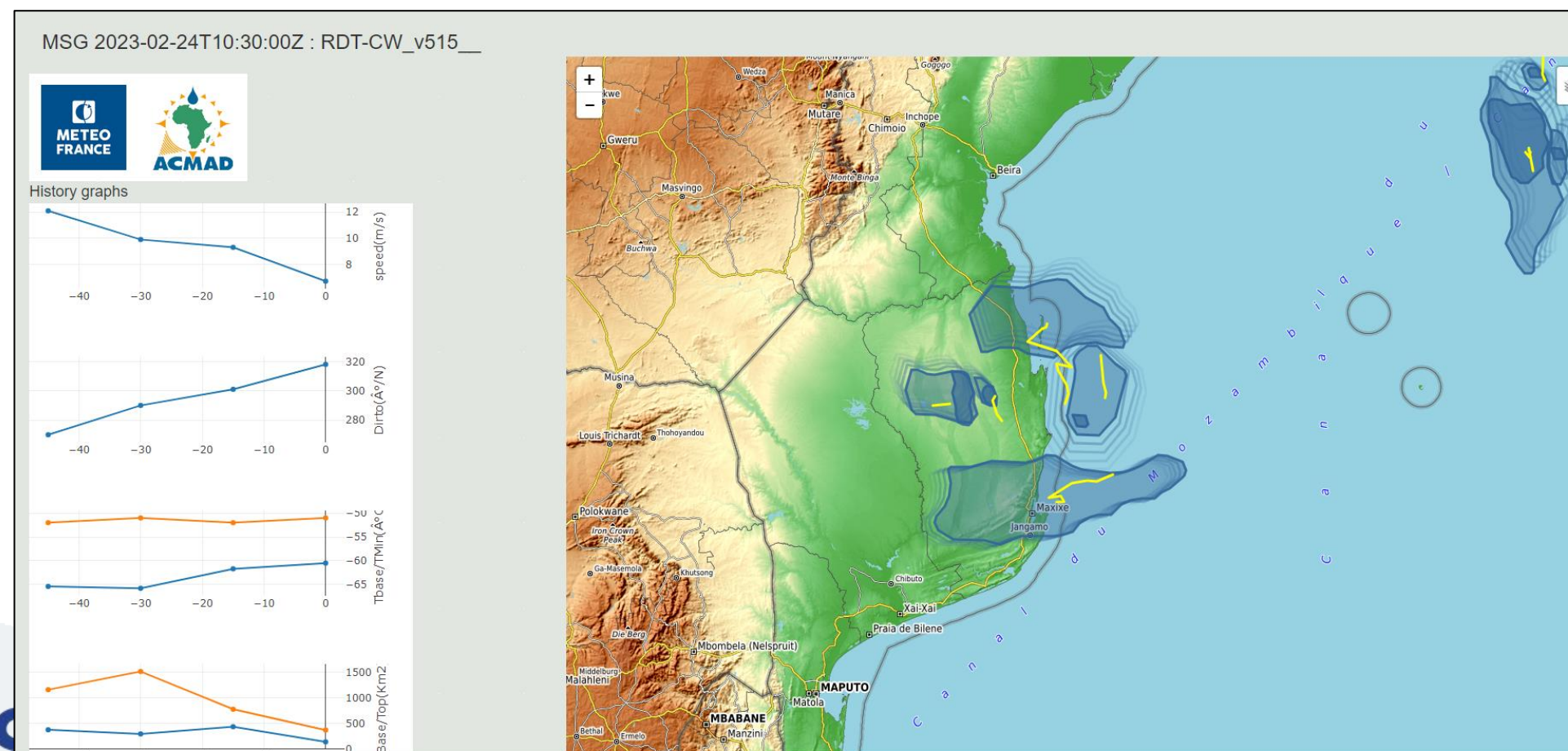
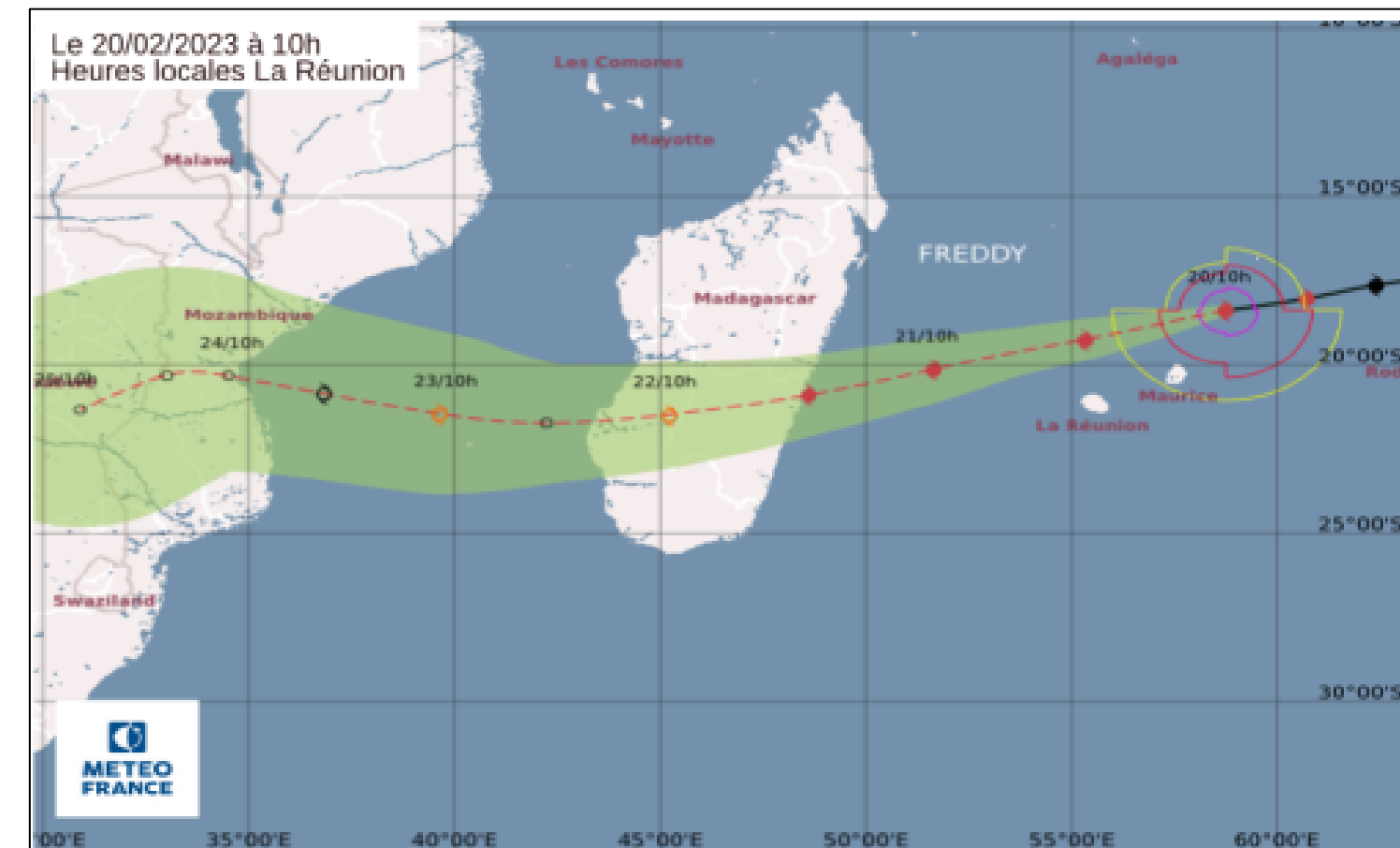
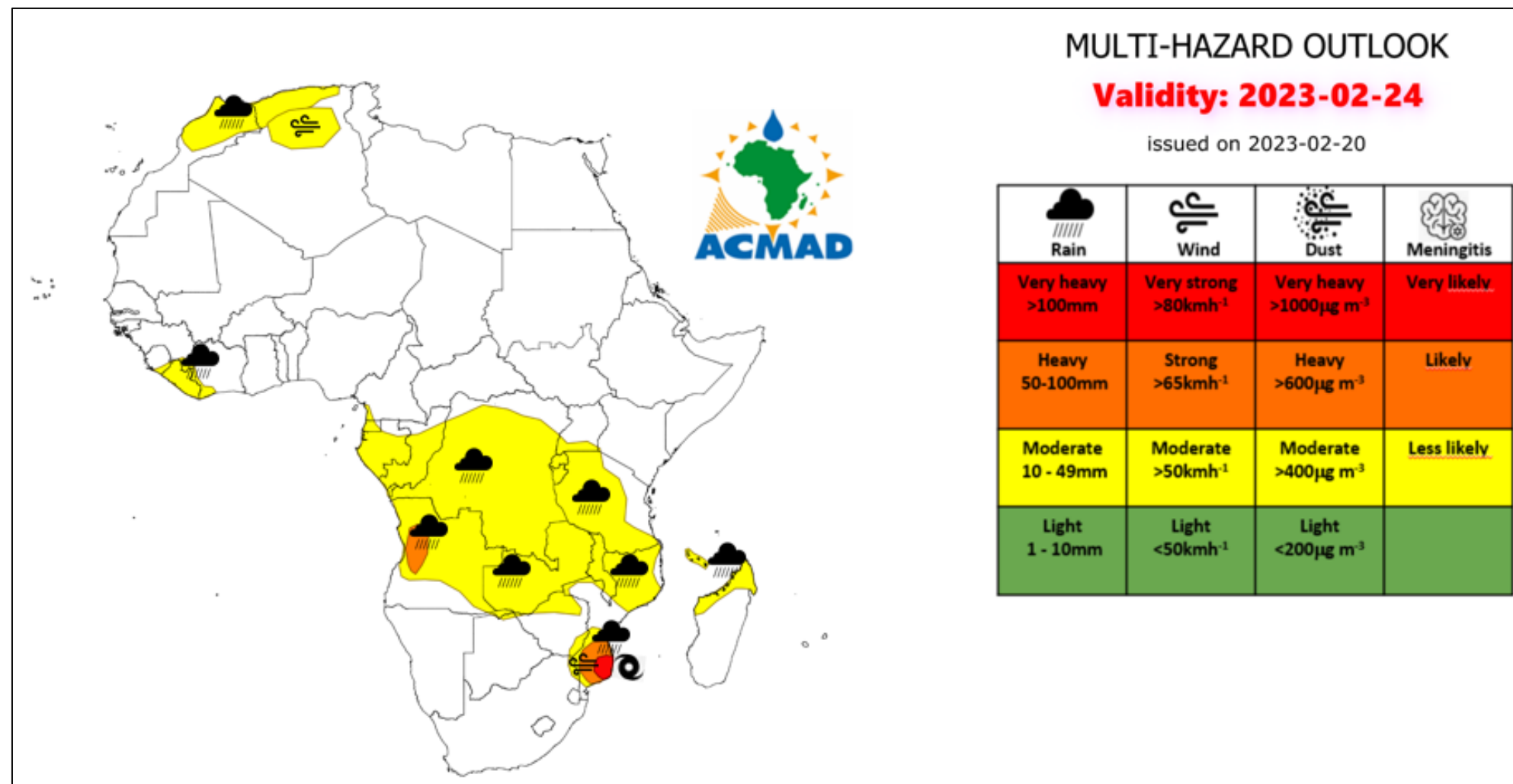
**No WARNING**

•03

# SOME EXTREMES EVENTS

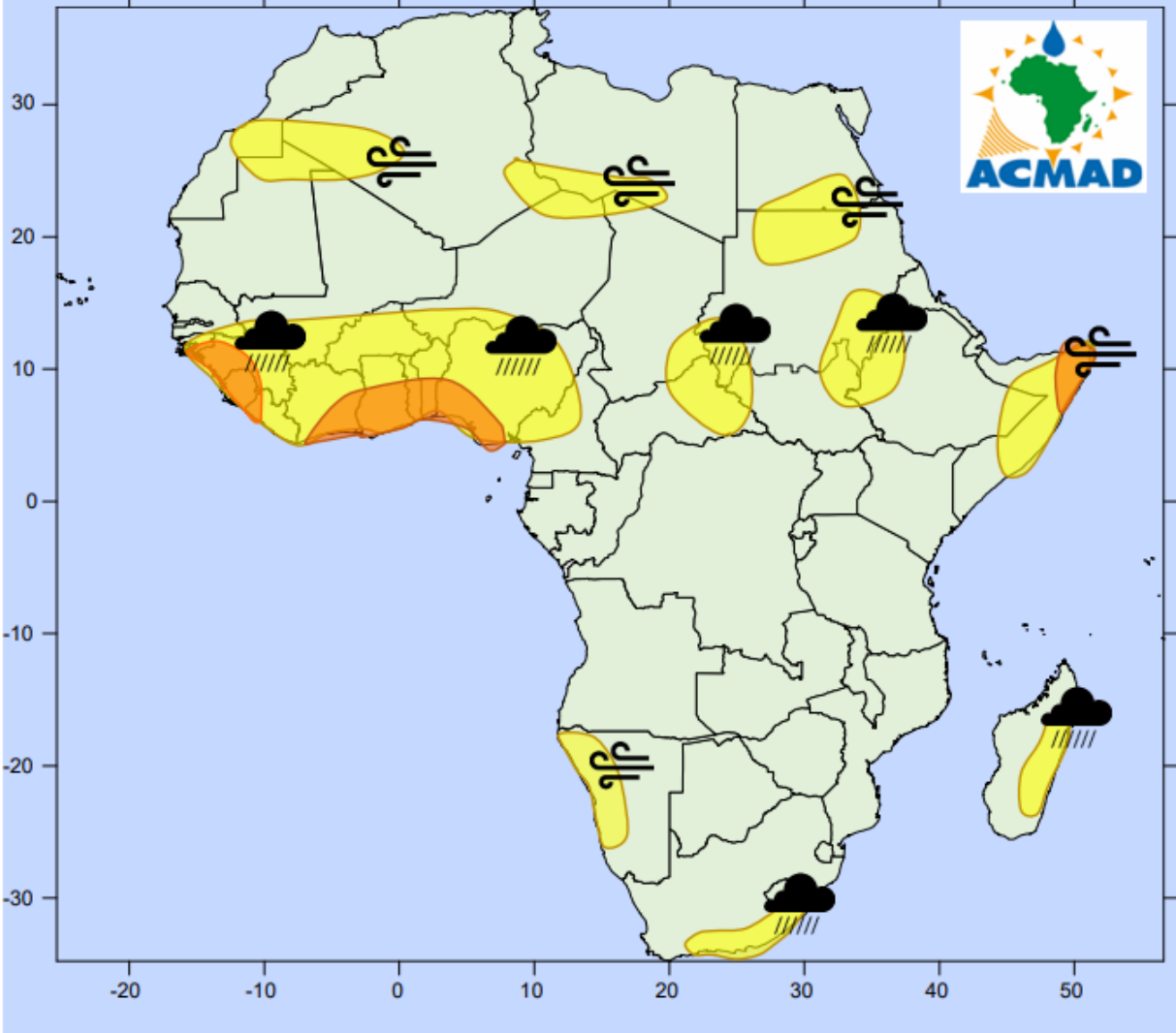
# PRODUITS POUR ACTION ANTICIPATOIRE cas du Cyclone FREDDY

## ACMAD ADVISORY VERIFICATION FOR D+4 FROM 20 FEBRUARY 2023



RDT FOR 24-02-2023 , 1030UTC





24-02-2023 , 1030UTC



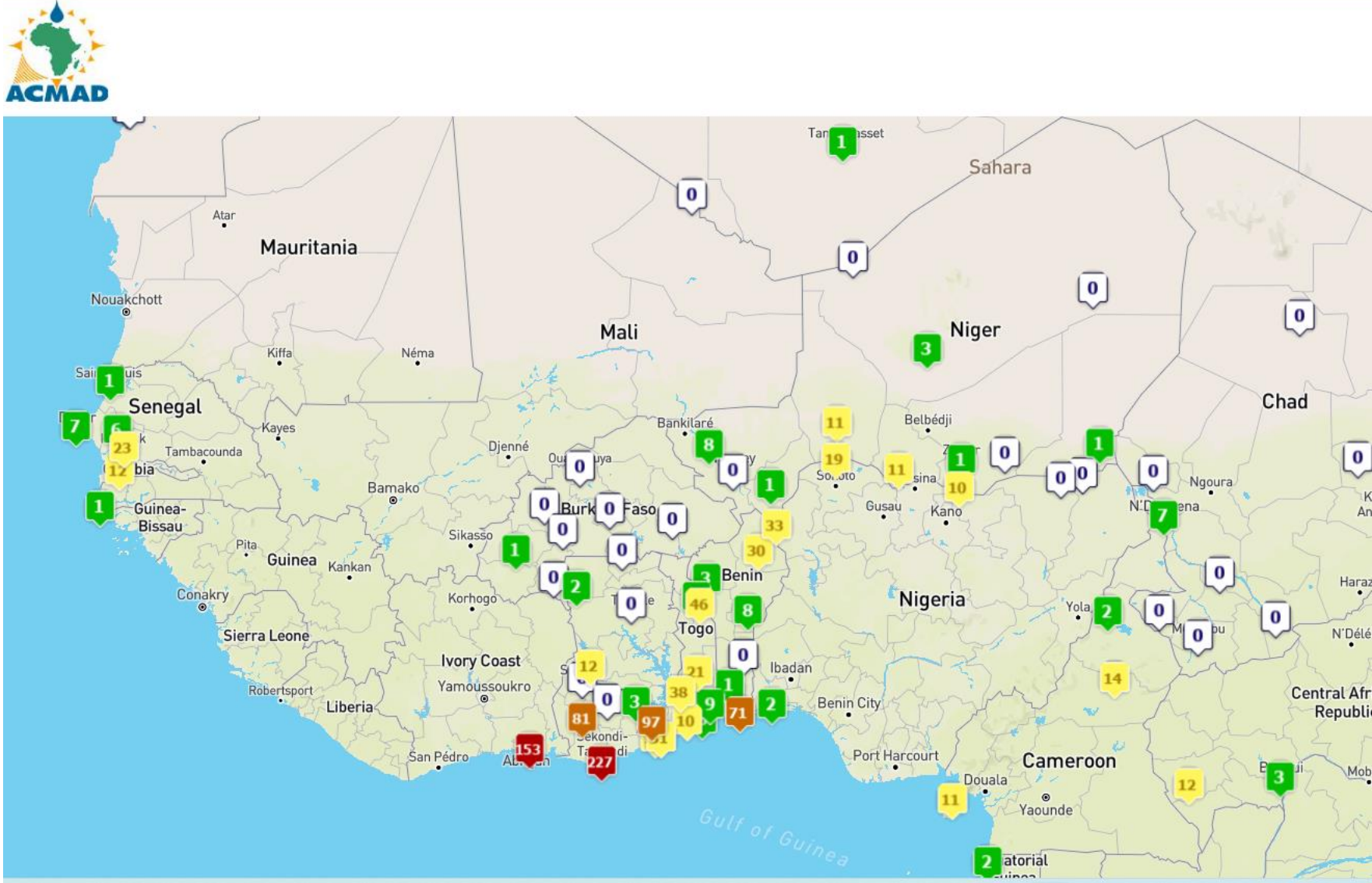
MULTI-HAZARD OUTLOOK

Validity: 2022-06-15

issued on 2022-06-13

 Rain	 Wind	 Dust	 Meningitis
Very heavy >100mm	Very strong >80kmh <sup>-1</sup>	Very heavy >1000µg m <sup>-3</sup>	Very likely
Heavy 50-100mm	Strong >65kmh <sup>-1</sup>	Heavy >600µg m <sup>-3</sup>	Likely
Moderate 10 - 49mm	Moderate >50kmh <sup>-1</sup>	Moderate >400µg m <sup>-3</sup>	Less likely
Light 1 - 10mm	Light <50kmh <sup>-1</sup>	Light <200µg m <sup>-3</sup>	

Observed daily rainfall (mm) on: 15-juin-2022



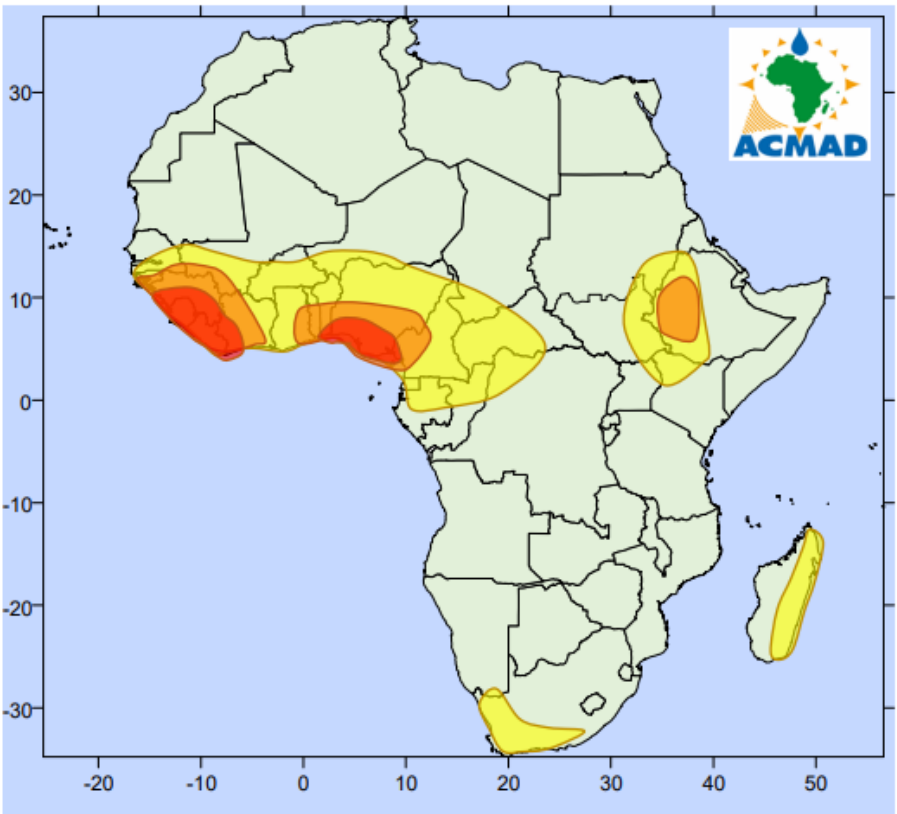
VIGILANCE MAP AND POLICY BRIEF FOR HEAVY RAINFALL AND STRONG WINDS

Valid From June 14 to 18, 2022

Issued on June 13, 2022



HIGHLIGHT: Heavy rainfall is expected Mali,Guinea-Bissau, Guinea Conakry, Sierra Leone, Liberia, Cote d'Ivoire, Ghana, Togo, Benin, Nigeria, Cameroon and Ethiopia.



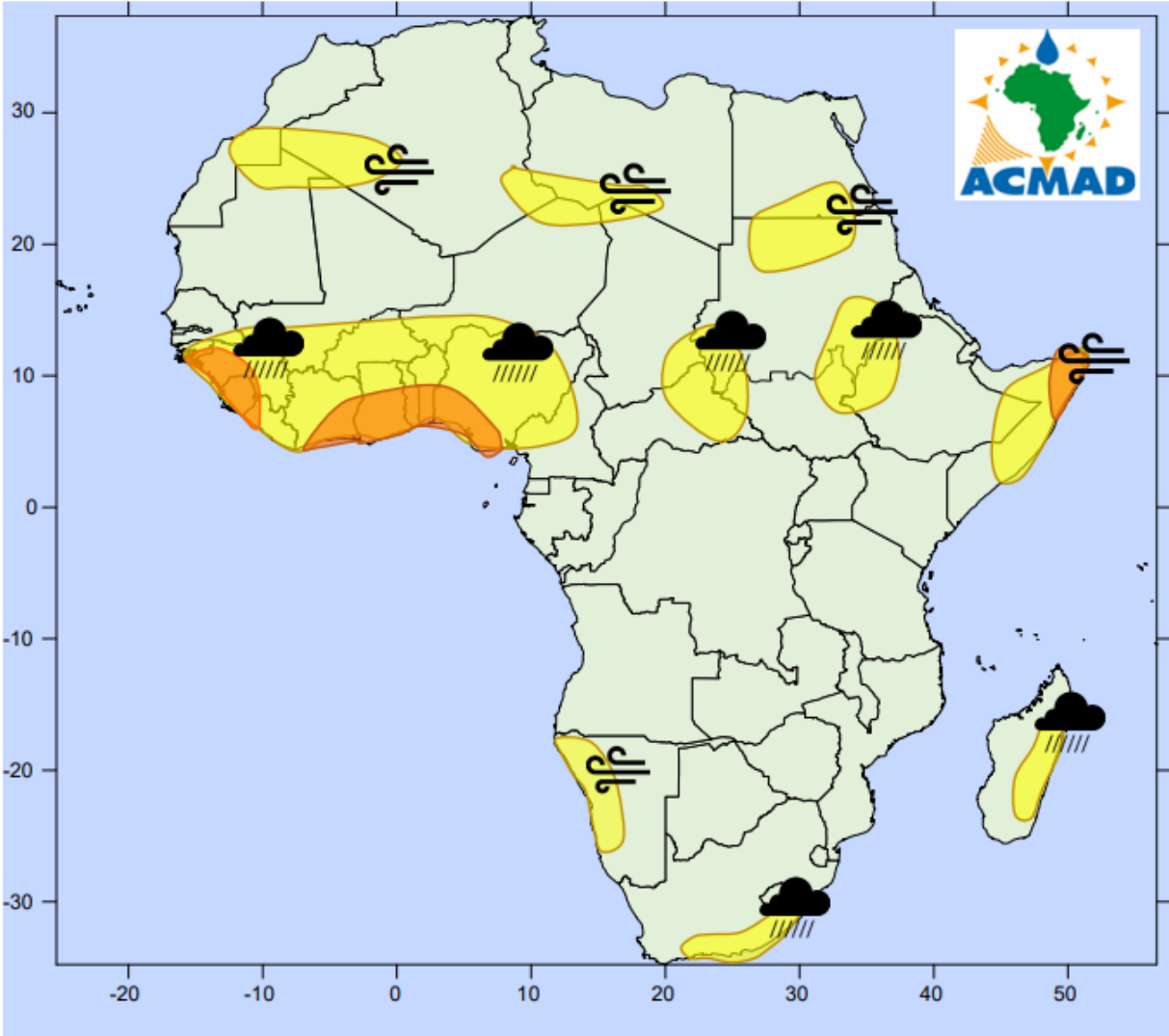
	Phenomenon	Hazard	Potentials Impacts	Measures / Advices
Yellow	In next 5 days accumulated rainfall (50-100mm) is likely,	Moderate rainfall, flash flood, riverine flooding, landslides, soil erosion and lightning likely	Displacements of people due to floods, outbreak of water borne diseases, damage of infrastructures (roads, bridges, ...)	DRM authorities to keep informed about the development of the meteorological situation and raise awareness, taking action is more likely, the situation needs to be monitored closely with NHMSs
Orange	In next 5 days accumulated rainfall (100 – 150mm) is very likely,	Heavy rainfall, flash flood, riverine flooding, landslides, soil erosion and lightning, strong winds,	Displacements of people due to floods, outbreak of water borne diseases, damage of infrastructures (roads, bridges, ...)	Update Flood contingency plans, Improve water management in reservoirs and dams, DRM authorities be ready to take adequate actions, DRM to be continuously in touch with NHMSs to be informed of the detailed expected meteorological conditions.
Red	In next 5 days accumulated rainfall (>150mm) is very likely,	Extreme precipitation, flash flood, riverine flooding, landslides, soil erosion and lightning, strong winds, severe thunderstorms	Loss of lives, Injuries, Displacements of people due to floods, outbreak of water borne diseases, damage of infrastructures (roads, bridges, ...)	Activate flood contingency plans, DRM authorities to be ready to take adequate actions (be prepared for emergency response and search & rescue operations as needed), Improve water management in reservoirs and dams, be in close touch with NHMSs for more details and identification of vulnerable areas.

Last week 6 people died in a landslide in Mossikro in the commune of Attécoubé, Abidjan after heavy rainfall on 16 June 2022.



Flood damage in Abidjan, Ivory Coast, June 2022. Photo: ONPC-Côte d'Ivoire

Disclaimer: The presentation of country boundaries on the map does not imply any opinion whatsoever on the part of ACMAD concerning the legal status of any country, territory or



# **MULTI-HAZARD OUTLOOK** **Validity: 2022-06-15** *issued on 2022-06-13*

Rain	Wind	Dust	Meningitis
Very heavy >100mm	Very strong >80kmh <sup>-1</sup>	Very heavy >1000µg m <sup>-3</sup>	Very likely
Heavy 50-100mm	Strong >65kmh <sup>-1</sup>	Heavy >600µg m <sup>-3</sup>	Likely
Moderate 10 - 49mm	Moderate >50kmh <sup>-1</sup>	Moderate >400µg m <sup>-3</sup>	Less likely
Light 1 - 10mm	Light <50kmh <sup>-1</sup>	Light <200µg m <sup>-3</sup>	

Observed daily rainfall (mm) on: 15-juin-2022



## **Ivory Coast – Landslide Kills 6 in Abidjan**

17 JUNE, 2022 BY [RICHARD DAVIES](#) IN [AFRICA, NEWS](#)



At least 6 people have died in a landslide Abidjan, Côte d'Ivoire (Ivory Coast), after heavy rainfall on 16 June 2022.



Landslide in Abidjan, Ivory Coast 16 June 2022. Photo: GSPM Sapeurs Pompiers



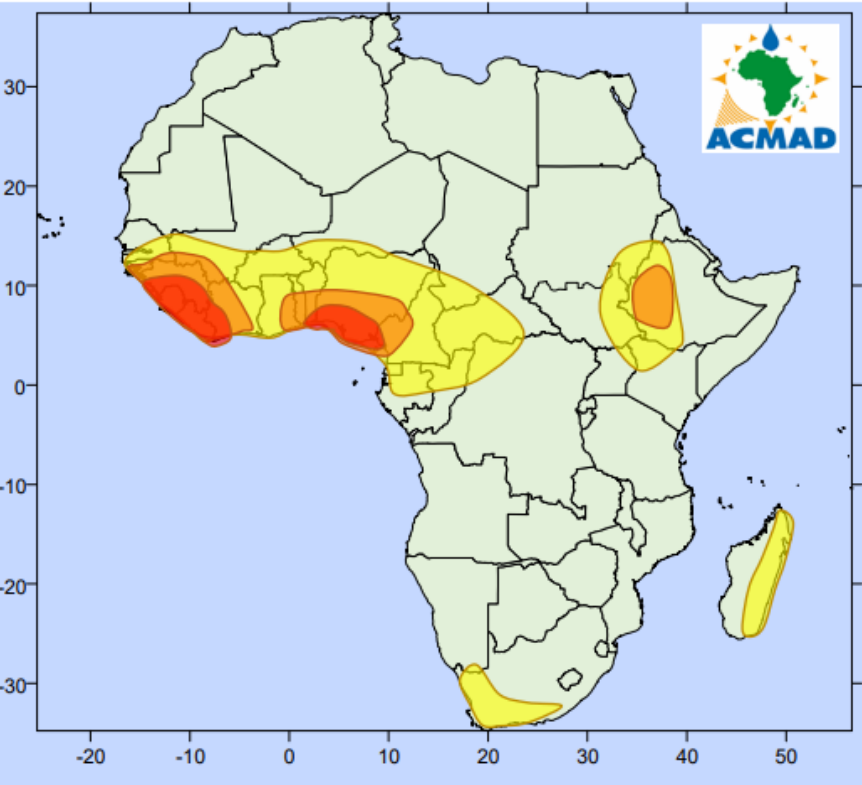
VIGILANCE MAP AND POLICY BRIEF FOR HEAVY RAINFALL AND STRONG WINDS

Valid From June 14 to 18, 2022

Issued on June 13, 2022



HIGHLIGHT: Heavy rainfall is expected Mali,Guinea-Bissau, Guinea Conakry, Sierra Leone, Liberia, Cote d'Ivoire, Ghana, Togo, Benin, Nigeria, Cameroon and Ethiopia.



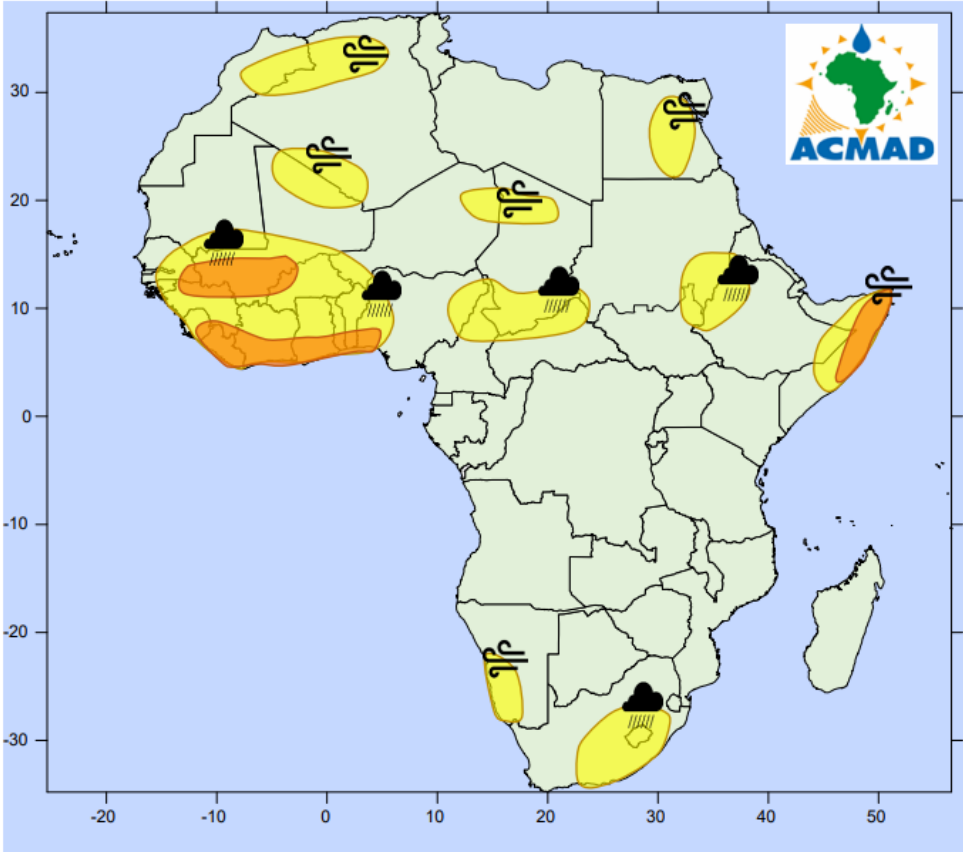
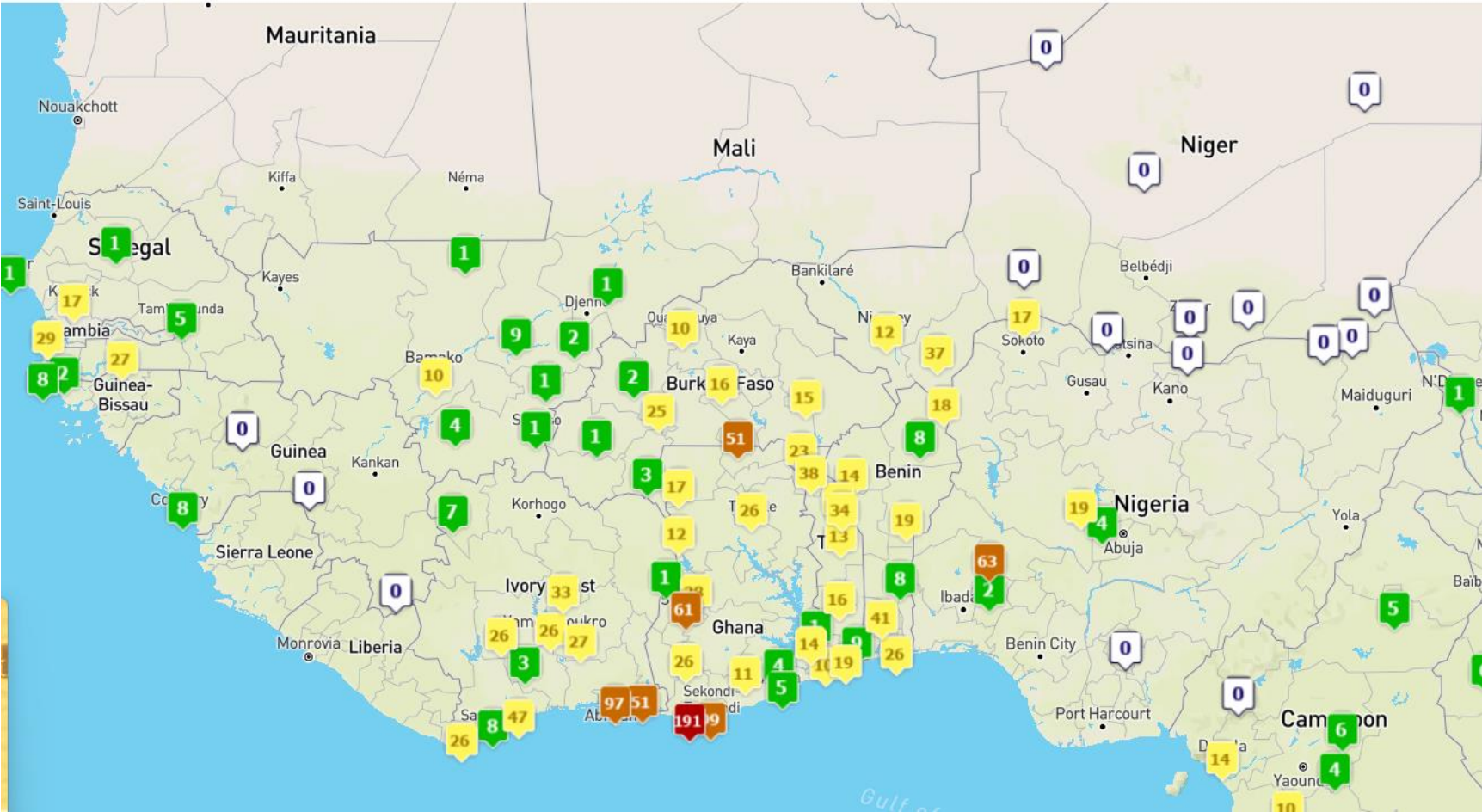
**Disclaimer:** The presentation of country boundaries on the map does not imply any opinion whatsoever on the part of ACMAD concerning the legal status of any country, territory or area, or concerning the delimitation of frontiers or boundaries.

	Phenomenon	Hazard	Potentials Impacts	Measures / Advices
	In next 5 days accumulated rainfall (50-100mm) is likely,	Moderate rainfall, flash flood, riverine flooding, landslides, soil erosion and lightning likely	Displacements of people due to floods, outbreak of water borne diseases, damage of infrastructures (roads, bridges, ...)	DRM authorities to keep informed about the development of the meteorological situation and raise awareness, taking action is more likely, the situation needs to be monitored closely with NHMSs
	In next 5 days accumulated rainfall (100 – 150mm) is very likely,	Heavy rainfall, flash flood, riverine flooding, landslides, soil erosion and lightning, strong winds,	Displacements of people due to floods, outbreak of water borne diseases, damage of infrastructures (roads, bridges, ...)	Update Flood contingency plans, Improve water management in reservoirs and dams, DRM authorities be ready to take adequate actions, DRM to be continuously in touch with NHMSs to be informed of the detailed expected meteorological conditions.
	In next 5 days accumulated rainfall (>150mm) is very likely,	Extreme precipitation, flash flood, riverine flooding, landslides, soil erosion and lightning, strong winds, severe thunderstorms	Loss of lives, Injuries, Displacements of people due to floods, outbreak of water borne diseases, damage of infrastructures (roads, bridges, ...)	Activate flood contingency plans, DRM authorities to be ready to take adequate actions (be prepared for emergency response and search & rescue operations as needed), Improve water management in reservoirs and dams, be in close touch with NHMSs for more details and identification of vulnerable areas.



La forte pluie qui s'est abattue sur le district d'Abidjan le jeudi 16 juin a fait des victimes. À Attécoubé, un éboulement qui a fait 08 victimes dont 6 décédées et 02 blessés.

Observed daily rainfall (mm) on: 21-juin-2022



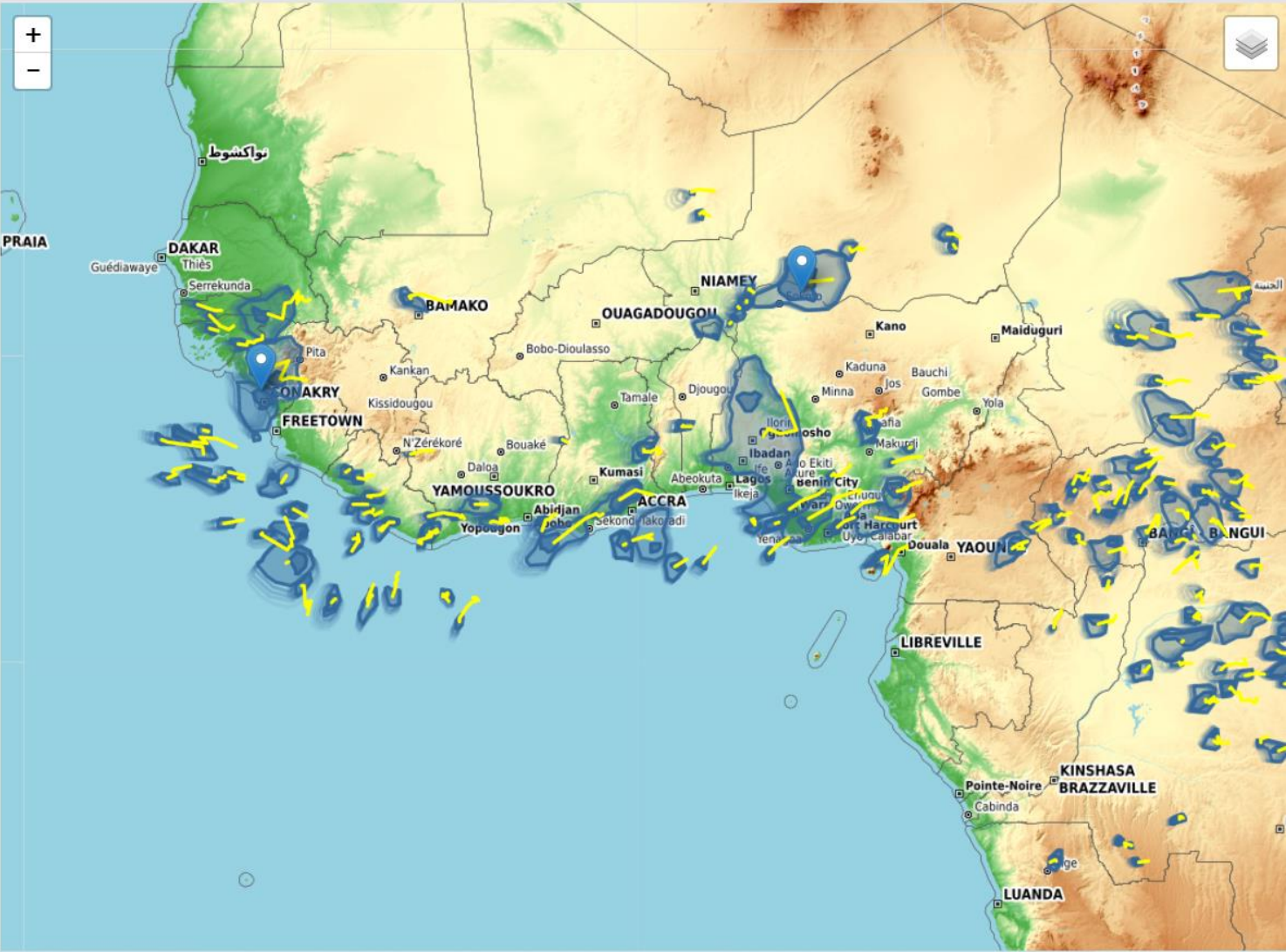
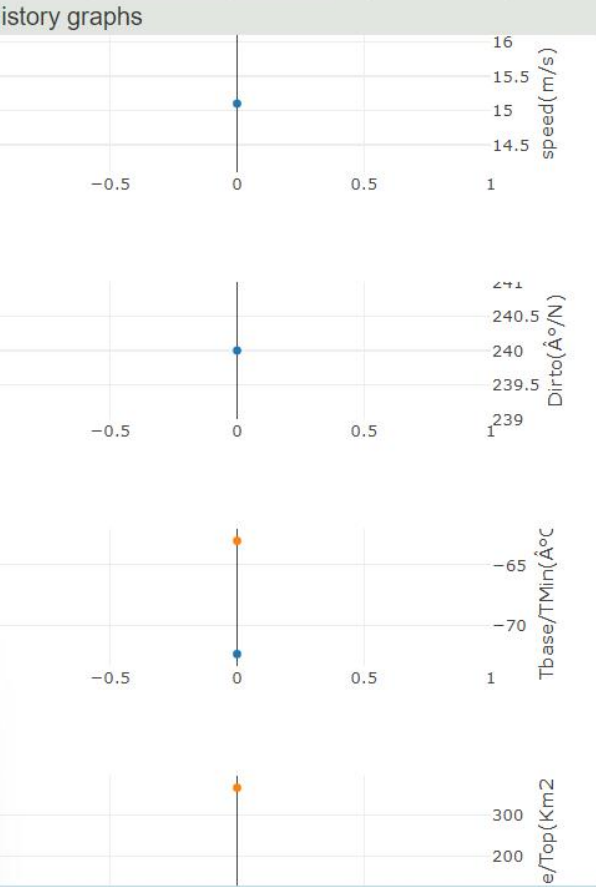
**MULTI-HAZARD OUTLOOK**  
**Validity: 2022-06-21**  
*issued on 2022-06-16*

Rain	Wind	Dust	Meningitis
Very heavy >100mm	Very strong >80kmh <sup>-1</sup>	Very heavy >1000µg m <sup>-3</sup>	Very likely
Heavy 50-100mm	Strong >65kmh <sup>-1</sup>	Heavy >600µg m <sup>-3</sup>	Likely
Moderate 10 - 49mm	Moderate >50kmh <sup>-1</sup>	Moderate >400µg m <sup>-3</sup>	Less likely
Light 1 - 10mm	Light <50kmh <sup>-1</sup>	Light <200µg m <sup>-3</sup>	



Flood damage in Abidjan, Ivory Coast, June 2022. Photo: ONPC-Côte d'Ivoire

MSG 2022-06-21T16:00:00Z : RDT and overshoot



• Thank you



# ClimSA

INTRA-ACP CLIMATE SERVICES AND RELATED APPLICATIONS PROGRAMME



An initiative of the Organisation of African, Caribbean  
and Pacific States funded by the European Union

