NiMet
Nigerian Meteorological Agency

HARNESSING ARTIFICIAL INTELLIGENCE TO TRANSFORM METEOROLOGICAL OPERATIONS IN NIGERIA AND BEYOND

OKANLAWON ABIOLA ABAYOMI

OUTLINES

- Introduction
- Embracing AI/ML
  - Artificial Intelligence (AI) in Action
- Collaborative projects
- AI for Good

Professor Charles Anosike

The Director General and Chief Executive Officer of NiMet,
Permanent Representative of Nigeria with WMO

"My appreciation to the organizers of this conference for creating a platform where global minds can converge to explore how Artificial Intelligence can be harnessed for the greater good particularly in the face of the climate crisis"

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The Director General and Chief Executive Officer of NiMet,
Permanent Representative of Nigeria with WMO

Today, I speak from the frontline of climate vulnerability. In Nigeria, and across much of Africa, we are witnessing a climate reality that threatens agriculture, displaces communities, and endangers lives. Yet we are also standing on the threshold of unprecedented opportunity powered by data, digital tools, and AI.

❖ United Nations Secretary-General António Guterres launched the **“Early Warnings for All”** initiative, with a bold target: that every person on Earth should be protected by early warning systems within five years

EMBRACING AI/ML

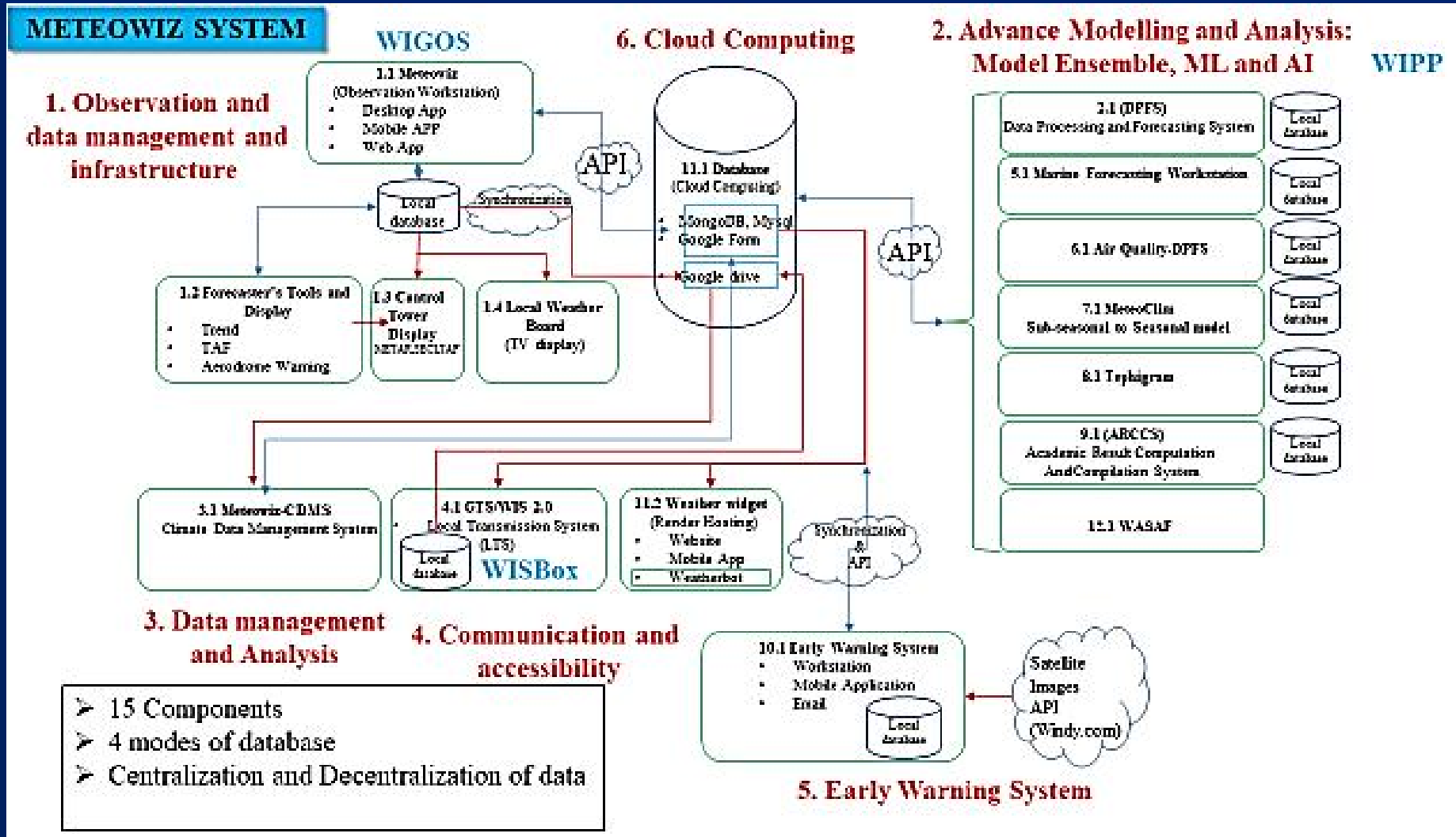
To close the **early warning gap**, especially in vulnerable regions, we must embrace **intelligent systems** that can:

- Analyze high-volume, high-velocity atmospheric data in real time;
- Forecast not just what the weather will be, but tell us the impact on the environment which affects the populace;
- Translate complex meteorological signals into **clear, actionable insights** for decision-makers and communities.

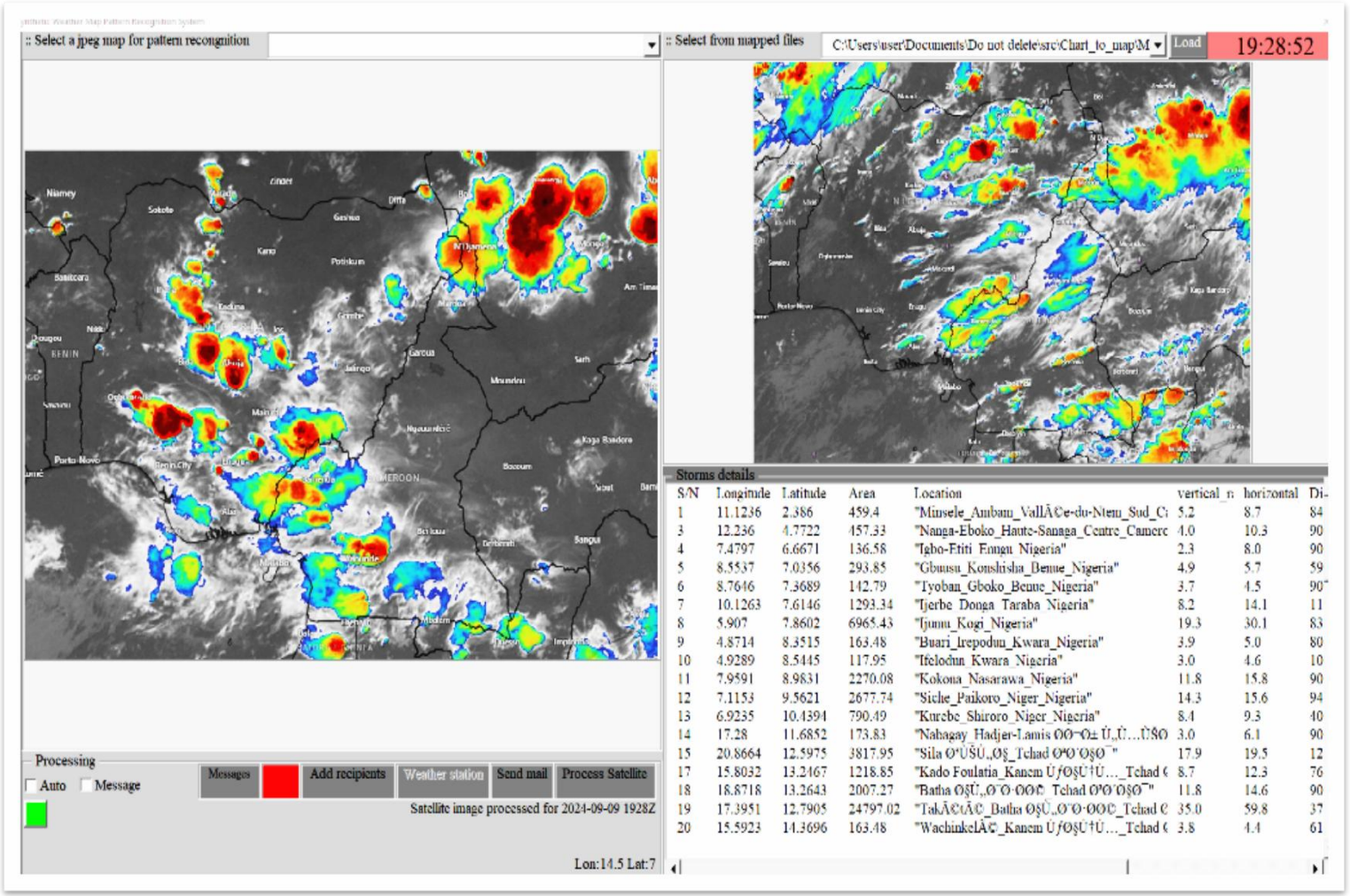
This is where **Artificial Intelligence (AI) becomes indispensable.**

Artificial Intelligence (AI) in Action: Nigeria's Meteorological Transformation

- In Nigeria, we have begun integrating Artificial Intelligence and machine learning into our national meteorological strategies. Here's how:

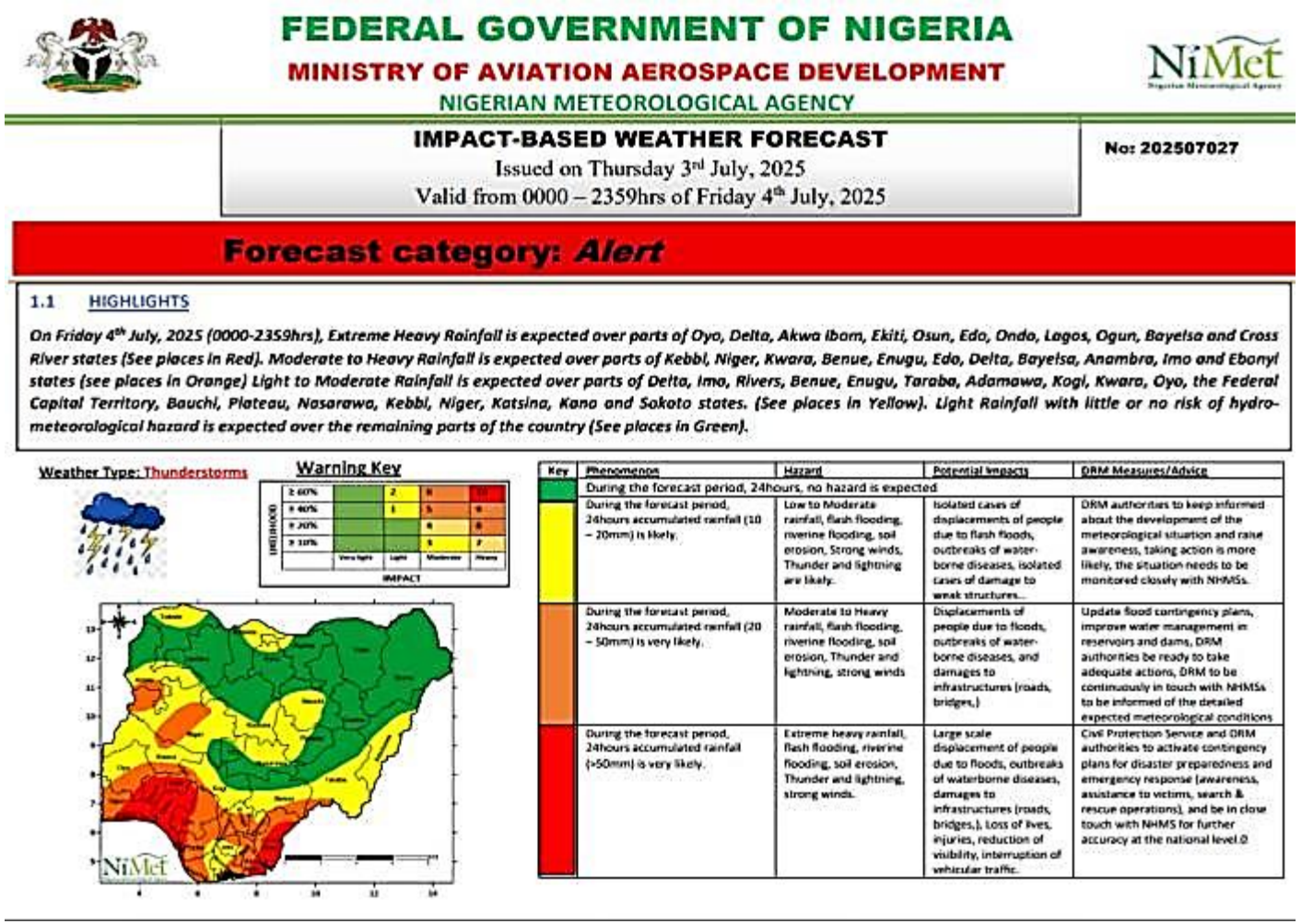


Nowcasting using AI-powered satellite data



- **CNN for Storm Detection:** CNNs are used to process satellite images and identify key features such as storm area size, intensity, location and direction. The deep learning network is trained on historical storm images to recognize patterns.
- **KNN for Image Classification:** KNN is used to compare current images with historical storm data, classifying the new storm based on similarities with past storms. This allows the system to predict the storm's trajectory and potential impact.

Impact-based forecasting



FEDERAL GOVERNMENT OF NIGERIA

MINISTRY OF AVIATION AEROSPACE DEVELOPMENT

NIGERIAN METEOROLOGICAL AGENCY

NiMet

IMPACT-BASED WEATHER FORECAST

Issued on Thursday 3rd July, 2025

Valid from 0000 – 2359hrs of Friday 4th July, 2025

No: 202507027

Forecast category: *Alert*

1.1 HIGHLIGHTS

On Friday 4th July, 2025 (0000-2359hrs), Extreme Heavy Rainfall is expected over parts of Oyo, Delta, Akwa Ibom, Ekiti, Osun, Edo, Ondo, Lagos, Ogun, Bayelsa and Cross River states (See places in Red). Moderate to Heavy Rainfall is expected over parts of Kebbi, Niger, Kwara, Benue, Enugu, Edo, Delta, Bayelsa, Anambra, Imo and Ebonyi states (see places in Orange) Light to Moderate Rainfall is expected over parts of Delta, Imo, Rivers, Benue, Enugu, Taraba, Adamawa, Kogi, Kwara, Oyo, the Federal Capital Territory, Bauchi, Plateau, Nasarawa, Kebbi, Niger, Katsina, Kano and Sokoto states. (See places in Yellow). Light Rainfall with little or no risk of hydro-meteorological hazard is expected over the remaining parts of the country (See places in Green).

Weather Type: Thunderstorms

Warning Key

LIKELIHOOD

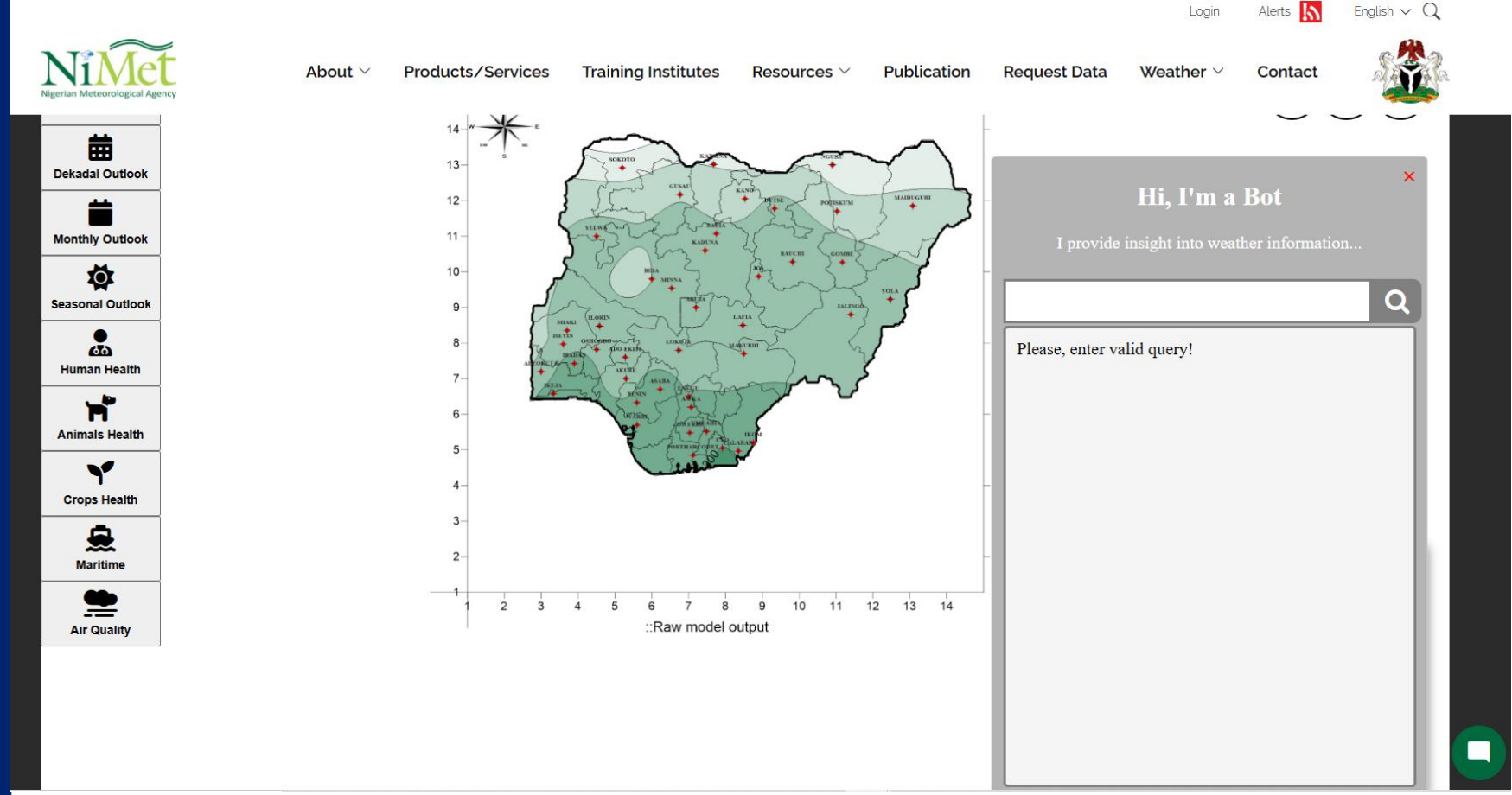
IMPACT

NiMet

Key	Phenomenon	Hazard	Potential Impacts	DRM Measures/Advice
	During the forecast period, 24hours, no hazard is expected			
	During the forecast period, 24hours accumulated rainfall (10 – 20mm) is likely.	Low to Moderate rainfall, flash flooding, riverine flooding, soil erosion, Strong winds, Thunder and lightning are likely.	Isolated cases of displacements of people due to flash floods, outbreaks of water-borne diseases, isolated cases of damage to weak structures...	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.
	During the forecast period, 24hours accumulated rainfall (20 – 50mm) is very likely.	Moderate to Heavy rainfall, flash flooding, riverine flooding, soil erosion, Thunder and lightning, strong winds	Displacements of people due to floods, outbreaks of water-borne diseases, and damages to 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
	During the forecast period, 24hours accumulated rainfall (>50mm) is very likely.	Extreme heavy rainfall, flash flooding, riverine flooding, soil erosion, Thunder and lightning, strong winds.	Large scale displacement of people due to floods, outbreaks of waterborne diseases, damages to infrastructures (roads, bridges,), Loss of lives, injuries, reduction of visibility, interruption of vehicular traffic.	Civil Protection Service and DRM authorities to activate contingency plans for disaster preparedness and emergency response (awareness, assistance to victims, search & rescue operations), and be in close touch with NHMS for further accuracy at the national level.0

- This is achieved by merging climate data with vulnerability indices predicting not just rainfall, but its consequences for flooding, road safety, and general agricultural loss.

Natural language generation (NLG) systems



- This system automatically create tailored weather bulletins for different regions, sectors, and even languages reaching fishermen in the Niger Delta, farmers in Kaduna, and city planners in Abuja, and all works of life such as sports which covers any part of the country.

Collaborative projects with regional partners and academia to train AI systems on African-specific climate data, ensuring relevance, accuracy, and cultural context.

NiMet signs MoU with Tomorrow.io

NiMet signs MoU with River State University

Call for Collaboration

- Investments in African data infrastructure,
- Joint research between global institutions and national meteorological and hydrological services,
- And policies that ensure ethical, inclusive, and transparent use of AI.

“Let us not allow the digital divide to become a disaster divide”

AI for Good: Beyond Forecasting

- The WMO Strategic Plan 2024–2027 rightly recognizes AI as a catalyst for transformation not only in forecasting, but in:
  - Optimizing disaster response,
  - Improving seasonal agricultural planning,
  - Supporting climate adaptation policies,
  - And empowering local innovations through open data and machine learning platforms.
- WAIC's vision of co-creation, shared expertise, and global governance resonates deeply with us. In that spirit, Nigeria is committed to contributing to the global AI ecosystem **not only as users, but as innovators, educators, and collaborators**.

Toward an Intelligent, Climate-Safe Future

- Let this moment mark not just the advancement of artificial intelligence, but the alignment of intelligence with purpose.
- A future where a mother in Kano gets an SMS warning her of a dust storm.
- Where a farmer in Enugu uses AI-driven apps to time his planting.
- Where a coastal community in Bayelsa knows when to evacuate, not after the flood arrives, but before.
- This is the power of meteorology guided by AI.
- This is the promise of the Early Warnings for All initiative.
- This is the future we are building together.


THANK YOU
FOR LISTENING