

**CENTRE AFRICAÏN POUR LES APPLICATIONS
DE LA METEOROLOGIE AU DEVELOPPEMENT**

Institution Africaine parrainée par la CEA et l'OMM



**AFRICAN CENTRE OF METEOROLOGICAL
APPLICATIONS FOR DEVELOPMENT**

African Institution under the aegis of UNECA and WMO



HIGHLIGHTS OF ACMAD'S ACHIEVEMENTS

FOR 2019-2022

ACMAD'S MISSION

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 to act as:

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..**

The continental **Climate Watch Centre** was achieved with ACMAD designated by the World Meteorological Organization (WMO) Congress after a successful demonstration phase as a Regional Climate Centre for all Africa in **May 2015**.

The Continental **Weather Watch Centre** was achieved with the Continental MultiHazards Advisory Centre inaugurated at ACMAD providing contributions to disaster situation reports and continental watches to the situation room operations at the African Union Commission Headquarters in Addis Ababa.

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, promotion of database, research and innovation as functions**

VISION FOR 2030

An African continent where all nations are benefiting from a **world class operational continental meteorological centre** to become *resilient to extremes events and empowered to support their sustainable development* with better meteorological services

ACMAD's strategy for 2020-2023 included **filling capacity gaps, improving quality of services, facilitating access to data, research and innovation, modernizing governance and management** as key **long-term goals**. To achieve these goals, ACMAD and partners undertook activities leading to results presented below.

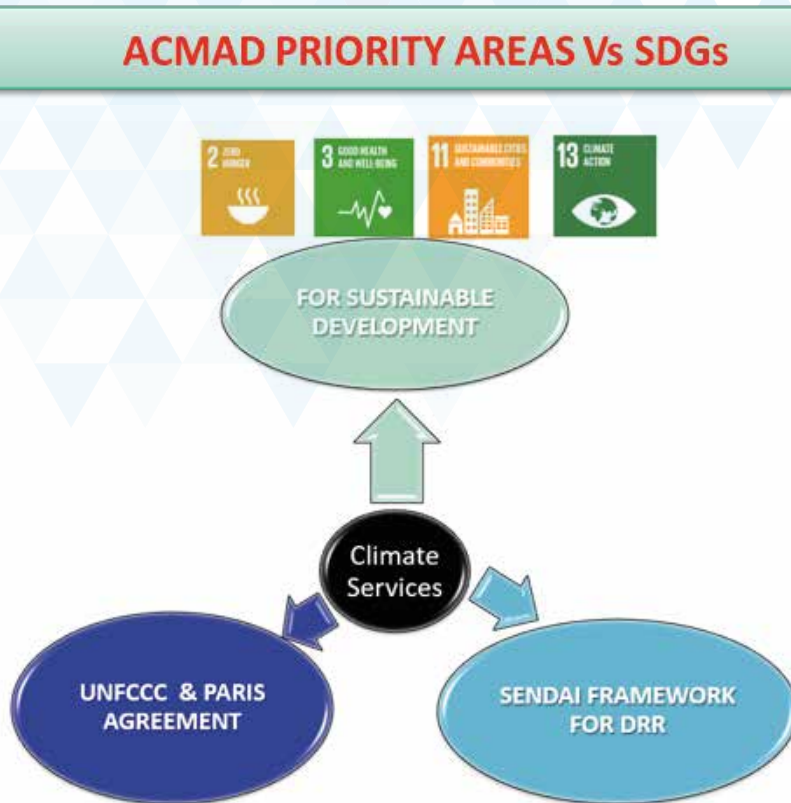


Figure 1: Priority areas of intervention supporting global frameworks

- ★ **To reduce the known significant capacity gaps** in Africa, **Standard Operating Procedures** for forecasting developed and available for optimal operations and **support to quality management systems in NMHSs**.

The African **Continental Multi Hazards Advisory Centre** is established and was inaugurated on October 31,2022.

<https://www.undrr.org/news/heeding-call-early-warnings-all-african-multi-hazard-advisory-centre-established-niger>



Figure 2 : Niger's Minister of Foreign Affairs and Cooperation, **Hassoumi Massaoudou** and Italian Ambassador to Niger, her Excellency **Emilia Gatto**



Figure 3_: Tree planting by the Belgian Minister of Development Cooperation and Urban Policy

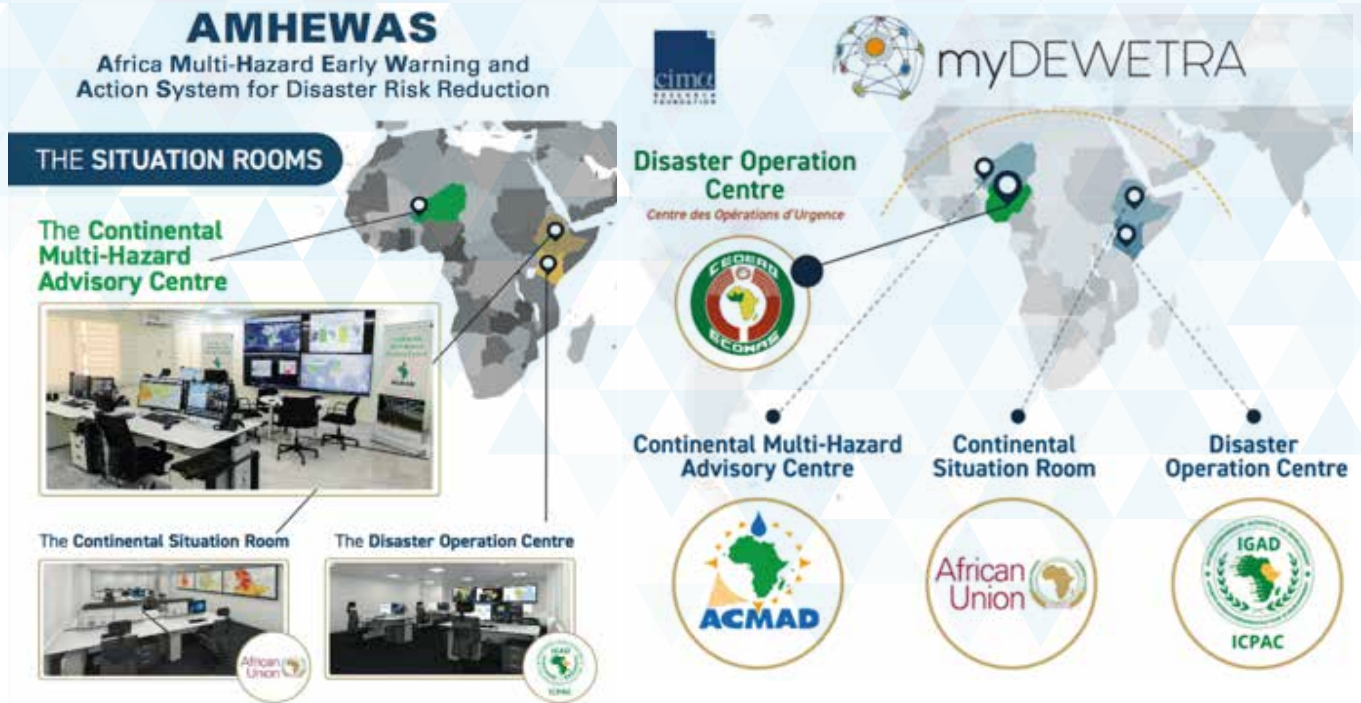


Figure 4 : African Multi-Hazard Early Warning Action System for Disaster Risk Reduction Network

One of the Continental Multihazards advisory centre products is available at : <http://sgbd.acmad.org:8080/thredds/fileServer/FIT/BRIEFING/briefing.pdf>

ACMAD has organized on the job training, secondments, internships and fellowships for a minimum of **twenty-two countries** during the period with up to **15 experts** attending per year.



TWELFTH AFRICAN CONTINENTAL CLIMATE OUTLOOK FORUM (ACCOF-12)

**A Mechanism to provide Continental Climate Outlook Services
and improve coordination and harmonization on data, methods,
tools, products and services for all Africa**

**THEME : «THE FUTURE OF WEATHER, CLIMATE AND WATER
FOR EARLY WARNING AND EARLY ACTION ACROSS GENERATIONS»**

**APRIL 27, 2023
NIAMEY - NIGER**

TARGET SEASON : MAY-SEPTEMBER 2023

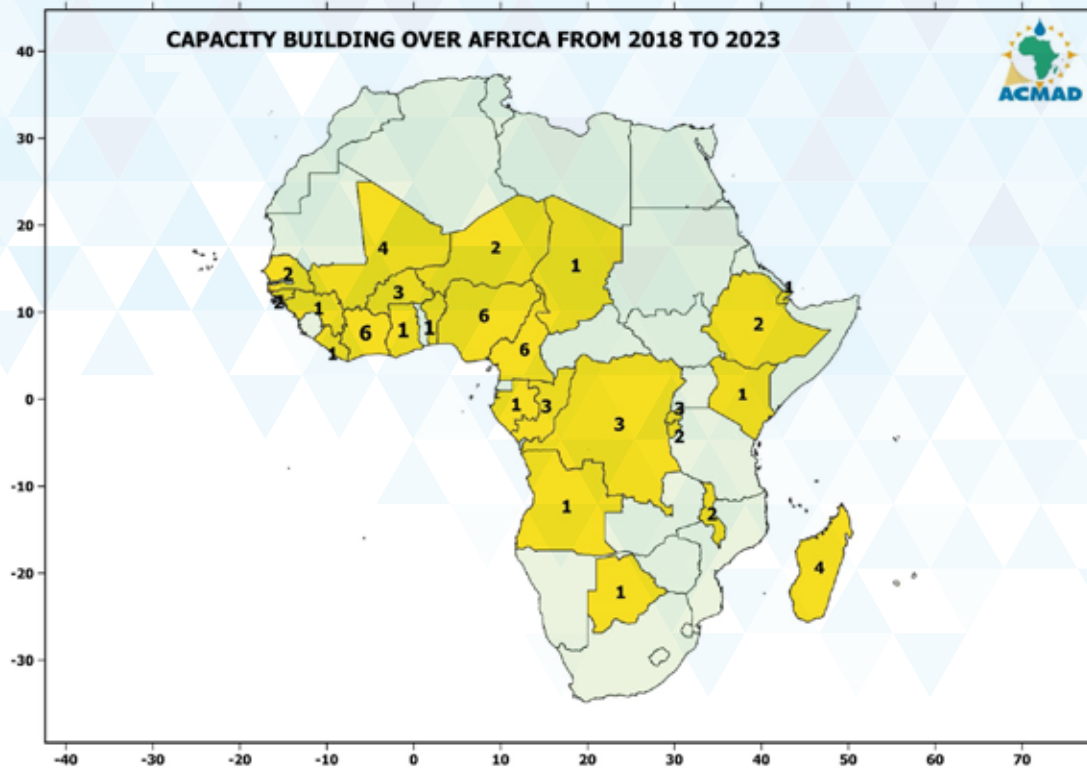


Figure 5: Number of experts per country trained at ACMAD from 2019 to 2022. A total of 59 were trained across Africa

Based on WMO competency framework for climate services and survey questionnaire responses, ACMAD undertook gap analysis on capacity for delivering climate information in Southern Africa including an action plan to address the gaps. This plan is being implemented with development of training materials.

A new mechanism (ACCOF) to coordinate and harmonize methods, tools and climate outlooks products at continental level in collaboration with RCCs and NMHSs is operational since January 2022. 12 ACCOFs have so far been organized.

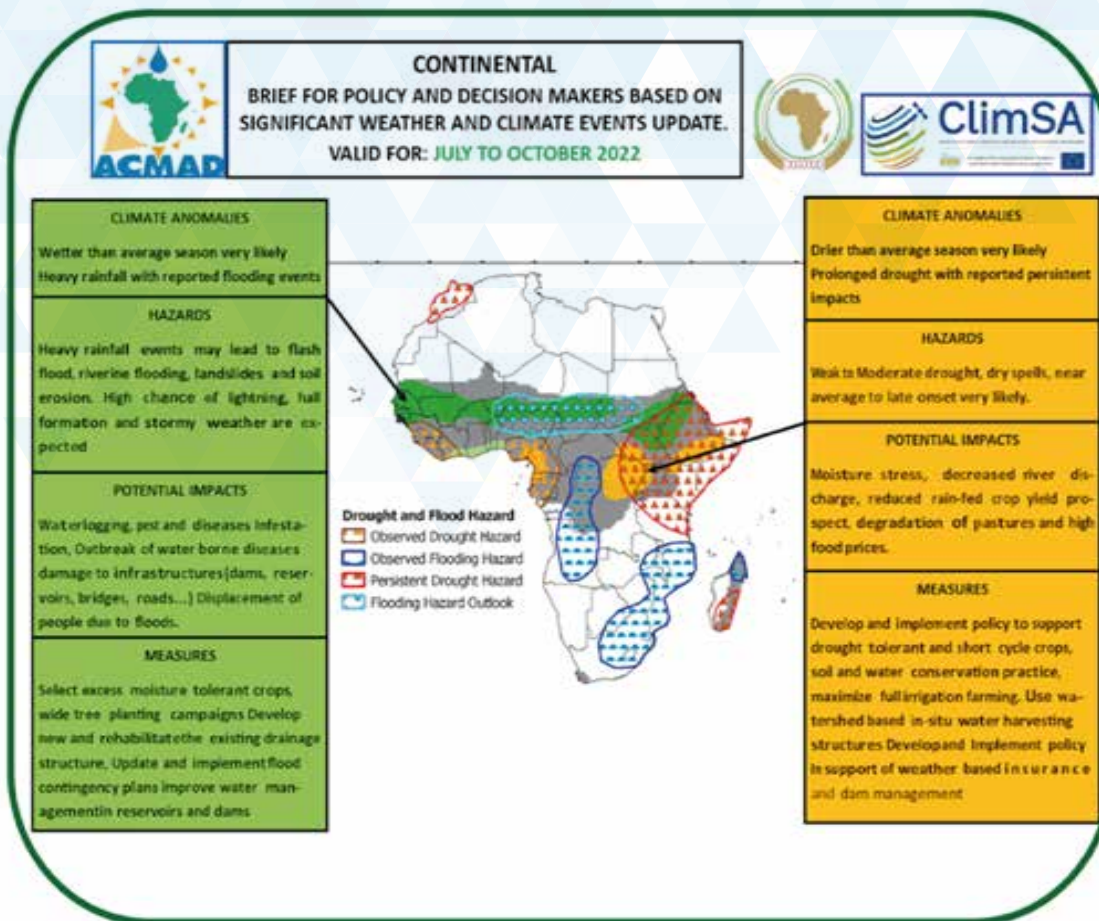


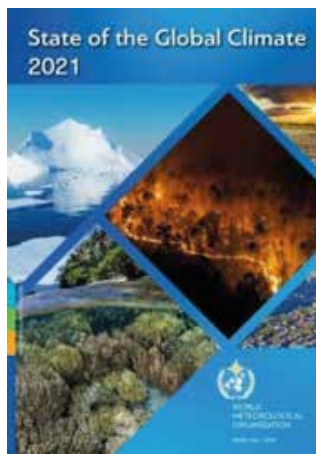
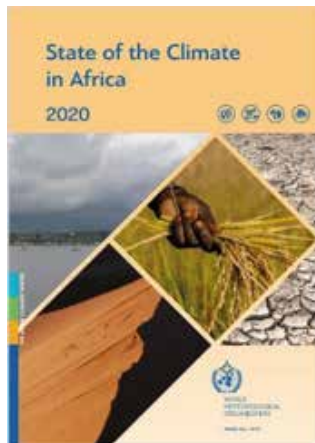
Figure 6 : Continental brief for policy and decision makers based on significant weather and climate events updated valid for July to October 2022

During the 2021/22 cyclone season, **twinning exercises with NMHS, RSMC La Reunion, ACMAD and World Meteorological Centres** demonstrated the operational cascading process delivering better advisories and warnings at national level. Products are available through ACMAD website at : <https://acmad.org/>

4 capacity gap studies available to guide RCC demonstration in ECCAS and ECOWAS as well as better use of ACMAD/RCC and ECCAS RCC products.

4 Continental User Interface Platforms (<https://acmad.org/index.php/workshop/>) on Climate-DRR, Climate-water, Climate-agriculture and Climate-health to accelerate co-design, co-development of bespoke services. Moving operating procedures and integrating those into quality management system is a future effort.

- ★ **To support quality services**, two synoptic/mesoscale forecast briefings per week, three sub-seasonal forecast and one seasonal forecast discussions per month are organized with RCCs, RSMCs and NMHSs to provide inputs to the continental advisory centre.



2 annual states of climate reports for Africa were prepared and published with AUC and WMO.

12 ACCOFs continental climate outlook statements were published.

7 RCOFs regional climate outlook statements were published each year with ACMAD contribution on the continental perspectives and/or regional climate forecasts in regions with RCCs in developing stage



Figure 7 : Examples of Co-Production conducted by ACMAD

During these sessions, ACMAD provides the seasonal Outlook and the DRM experts together with climate experts analyze the potential impacts of the Outlook on the disaster management sector and generate advice and mitigation measures.

The four mandatory functions of the **continental RCC have been operational. Briefings/Debriefings** for high impact weather and climate events opened to all NMHSs and regional centres online have been opportunities for wider exchanges on new products and awareness raising on advisories and vigilance services.

Case studies and debriefings post high impact events are included in preparatory activities leading **to disasters situation reports and continental watches generated by the Africa Continental Multi Hazards Advisory Centre (ACMHAC).**

Climate trends and impacts study report was prepared by ACMAD at the request of the UNECA Subregional Office for Africa as a contribution to the mainstreaming of climate information in the formulation the 2050 vision commissioned by ECOWAS. Such services for policy and planning are expected to be extended to other Regional Economic Communities supporting climate resilient and sustainable development planning.

ACMAD collaborated with the African Climate Policy Centre for the review of the report on the impacts of climate change on Agriculture in pilot countries in Eastern, Southern and Western Africa. Strengthening of meteorological services for agriculture and extensions services was highlighted as a concluding priority policy in addition to investments in fertilisers and new crop varieties to address climate change adaptation and support mitigation efforts. The two initiatives with UNECA demonstrated operational collaborations to be strengthened for sustainable development planning well informed by climate knowledge in Africa.

- ★ **To support access to data, four Regional Advanced Retransmission Systems (RARS)** for Low earth orbiting satellite data, a High-Performance Computing system, a data server and a power generator to stabilize energy supply **were procured and installed.**

The PUMA **station** is operational and support to NMHSs for maintenance have been provided upon request.

The **climate station** continued to be tested in collaboration with EU JRC under ClimSA project. Data rescue for Africa made progress with images generated from microfiches by Copernicus programme.

More than 10 trainings including sessions for research on predictability are organized each year as part of ACCOFs, RCOFs, on the job training, secondments and workshops covering African NMHSs and RCCs.

More than 10 countries were exposed to training and forecast verification research **each year.** New products, methods and tools updates, training materials, procedures and instruction manuals are deliverables of research projects. New products for meningitis surveillance and control is available

<https://www.sciencedirect.com/science/article/pii/S2405880722000449>

Predictability research on the potential for improving use of dynamical model forecasts in the regional climate outlook forums, to improve the reliability of seasonal forecasts in the regions and the objectivity of the seasonal forecasting process used in the PRESASS regional climate outlook forum generated findings published in the American Meteorological Society's weather and forecasting journal. The paper is available at <https://doi.org/10.1175/WAF-D-19-0168.1>.

Standard Operating Procedures operationalized at ACMAD. An example of procedure is available at https://eprints.whiterose.ac.uk/185379/1/SWIFT_nowcasting_operating_procedure.pdf.

Innovations on tools delivered U-CLIP and CLIMTAG platforms, SAF Nowcasting, MYDEWETRA, MUKAU, TEAL, Vignette, AQUABEHER for city resilience and adaptation to climate change, calibration and verification of seasonal forecasts, agriculture calendar updates, early warnings. Future efforts towards high resolution NWP for impact-based forecasting is planned.

- ★ **To support governance and management modernization**, the 4th session of AMCOMET declaration in Cairo called for ACMAD to become **the technical arm of AUC on climate matters**. A briefing was organized for the AU Permanent Representative Committee of Ambassadors' Sub-Committee on environment to raise awareness on ACMAD mission, vision and main achievements supporting understanding of the centre's role as technical arm of AUC on climate matters. Contacts maintained with UNECA with a **draft relationship agreement** between ACMAD and AUC implementing the AMCOMET Cairo Declaration submitted to **UNECA legal office**. **A letter from the ACMAD Board Chairperson** was sent to UNECA Executive Secretary to request for a meeting on the improvements needed on the governance of ACMAD and the implementation of the relevant provisions in the Cairo declaration.

The formulation of the **ACMAD 2020-2023 strategic plan and related operating plan including the budget** was completed after review by the Scientific Advisory Committee and approval by the board. **7 financial reports and external audits** were carried out covering years from 2015 to 2021.



Figure 8 : ACMAD Audits and Reports from 2015 to 2019



Figure 9: ACMA Audits and Reports from 2020 to 2021

Administrative, financial and accounting procedure manual (http://sgbd.acmad.org:8080/thredds/fileServer/ACMAD/admin/5_1MANUEL_REVISE_DES_PROCEDURES_DE_L_ACMAD_DU_11_03_2020VF.pdf) **completed and organogram revised.** The last **3 years of audited accounting and financial reports are available in IFRS format.** Future effort would be to consider **EU pillar assessment** to progressively become a partner of the EU for implementing its external actions. As an EU partner for implementation, the centre is expected to mobilize the substantial investments required for NMHSs modernization programmes. Regular progress or annual reports and projects audits have been provided to relevant bodies and donors.

197 staffs were mobilized with support of partners to implement activities and projects. Future efforts to raise the countries contributions reducing heavy reliance on project staff is expected with the formulation of the 2024-27 strategy and related four years' operating plan. These documents would support resource mobilization with presentations at high level events.

MOUs and agreements facilitated formulation and implementation of projects. Main projects at the Centre includes ClimSA, FOCUS-Africa, SWIFT, GSTIC, UCLIP, KIM-PALA, MUKAU, AMHEWAS, CVM3. Key organizations operate partnerships and consortia for implementation of these projects including the African Union Commission, the World Meteorological Organization, the African Development Bank, the Climate Vulnerable Forum with the V20 group of states, the global centre on adaptation, the University of Leeds, the Belgium and Flemish government through VITO Institute, the Joint Research Centre of the EU, EUMETSAT, the African institute for Mathematical Studies, the UN Economic Commission for Africa, the UNOCHA, IFRC and UNHCR.

Partnerships, **meetings, dialogue days** and visits during the period involved high level officials including :

- His excellency M. Minister of state for foreign affairs and cooperation of Niger
- The Belgium development cooperation Minister

<https://www.wehubit.be/en/node/260>

- The UK ambassador in Niger
- The Italian ambassador in Niger
- The Belgium ambassador in Niger
- The US Department of State

During UN Framework Convention on Climate Change, meetings and events were organized or attended to strengthen and further expansion of partnerships during UNFCCC and DRR fora.

The EU green deal adaptation strategy, the President Biden's emergency plan for resilience (PREPARE), The Climate Vulnerability Monitor of the Climate Vulnerable Forum, the METEOSAT Third Generation and African Meteorological Satellite Applications Facility, the African Multi-Hazards Early Warning and Early Action System are key frameworks and programmes supporting future activities.

Key web references are provided in the table below.

Projects	Web links
ClimSA	https://acmad.org/index.php/climsa-activities/
FOCUS Africa	https://focus-africaproject.eu/context/
SWIFT	https://eprints.whiterose.ac.uk/174093/
UCLIP	https://www.wehubit.be/en/node/97 https://vito.be/nl/urban-climate-information-platform-niger-u-clip
CVM3	https://www.v-20.org/climate-vulnerability-monitor%3A-climate-change-causes-loss-and-damage%2C-unequally-impacts-vulnerable-nations-and-indiscriminately-creates-global-crises
MUKAU	https://edo.jrc.ec.europa.eu/gdo/php/index.php?id=1004
GSTIC	https://www.climate-action-programme.be/project/increasing-urban-tree-density/
KIMPALA	https://climtag.vito.be/en https://climtag.vito.be/en/expertise/agro-sector
AMHEWAS	https://www.undrr.org/news/heeding-call-early-warnings-all-african-multi-hazard-advisory-centre-established-niger
SAWIDRA	https://www.preventionweb.net/news/african-development-bank-supports-development-satellite-observations-african-early-warning

With the fast-moving extreme temperatures and heavy precipitation, losses and damages due to extreme events are threatening different facets of the **African economy and society**. **Operationalizing Multi-hazards Early Warning System in Africa** and the **COP 27 landmark agreement on losses and damages** are key priorities.

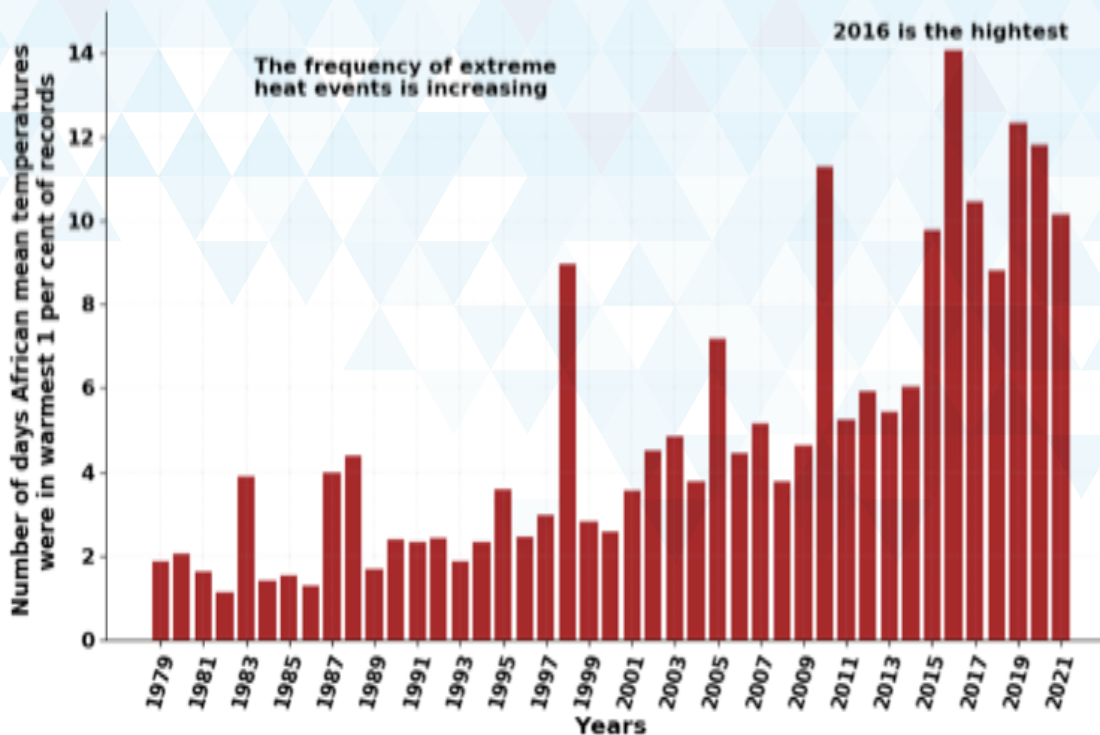


Figure 10: Number of days per year with extreme mean temperature in Africa. 5 times increase on the number of days with extreme temperature over a 40 years period from the 80s to the 2010s.

**Percentage of grid points over African land masses with daily rainfall above the 90th percentile
For the period 1981-2020, from January to December**

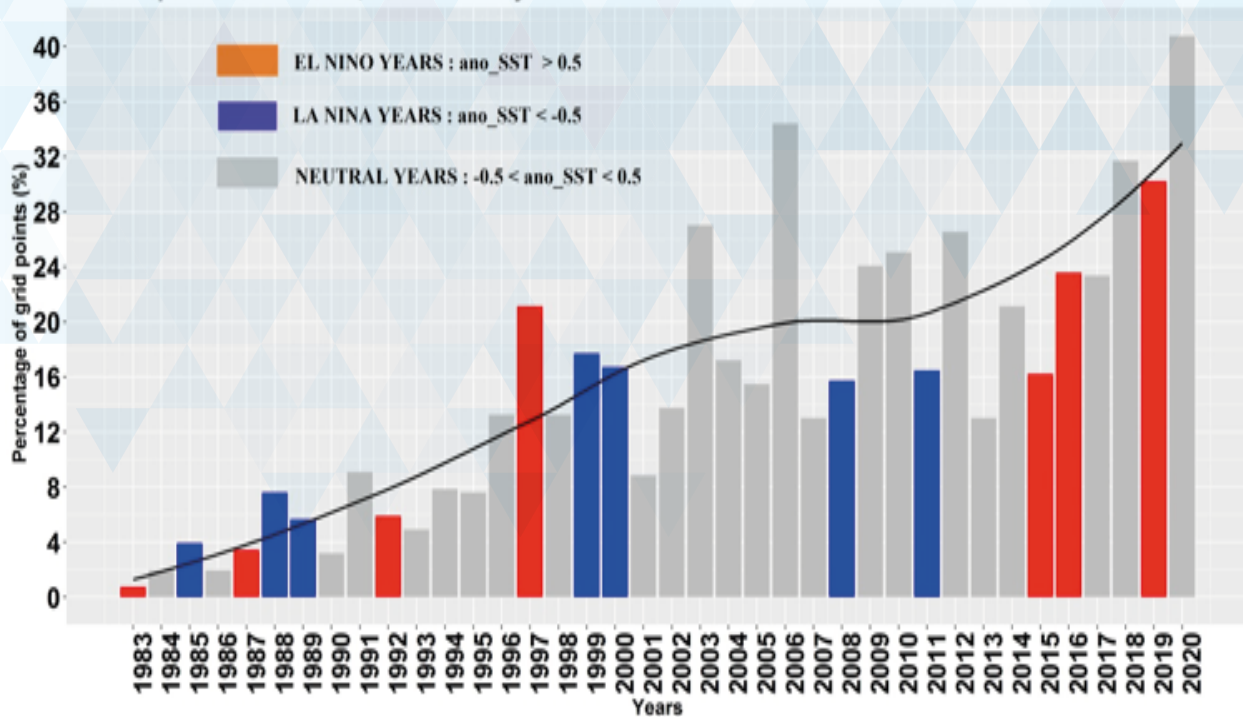


Figure 11: Percentage of African land surface hit by heavy precipitation. The African land surface hit by heavy precipitation extended from 10% to 40% with more than 2% of total population in some countries affected a single year.

Monthly monitoring of SYNOP reports for June-2023

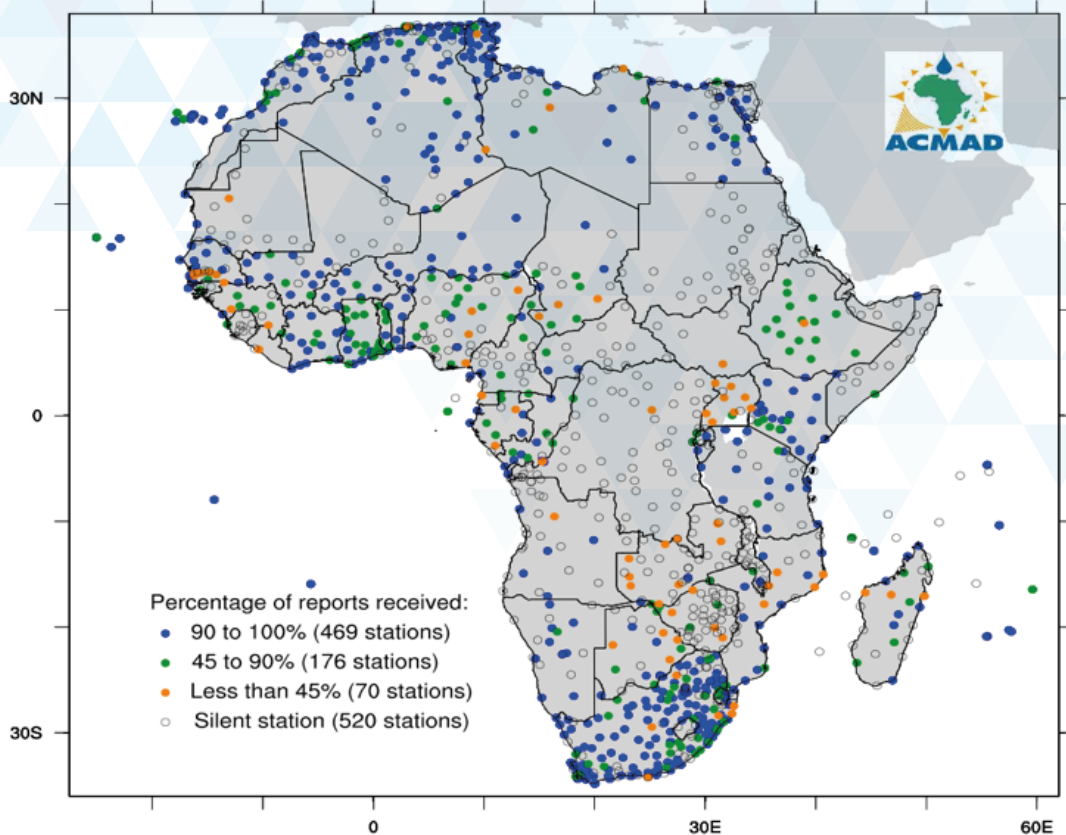


Figure 12 : Monthly monitoring of Synoptic Stations Transmitting to GTS

Observed daily rainfall (mm) on: 25-septembre-2023



Figure 13: High Impact Weather event monitoring (i.e heavy precipitation monitoring) in Africa

ACMAD SUPPORT PROVISION OF LEO DATA FOR ASSIMILATION IN HIGH RESOLUTION REGIONAL AND GLOBAL NWP

4 Regional Advanced Retransmission Systems for low earth orbiting satellite data contributing to implementation of **WMO and Africa space strategies and programmes**, RARS data may unlock source of predictability in global and limited area models.

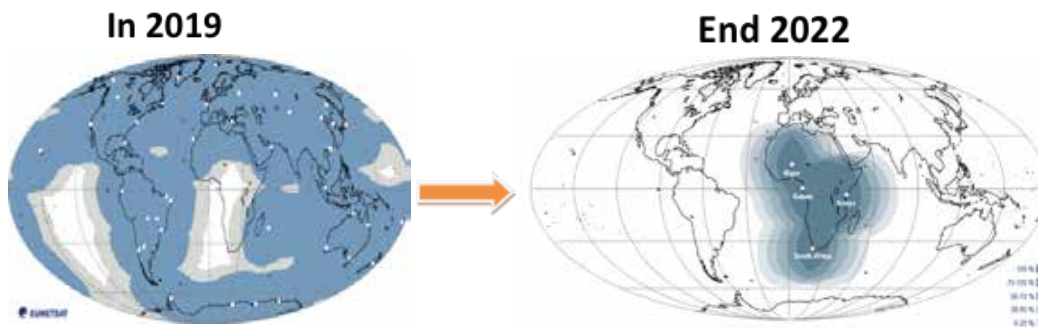
Contribute to research and development of satellite Applications products for tracking convections MCS, strong winds, heavy rain rates, severe lightening and dust storms, very low visibility, air pollution, detecting severe thunders-torms.

AMSAF and transition to MTG are key programmes in the Abidjan Declaration of the EUMETSAT User Forum for facilitating country and local warnings needed to trigger evacuation and protection of exposed assets

RARS NETWORK OVER AFRICA



Figure 14 : Regional Advanced Retransmission System for low earth orbiting satellite data Network over Africa



NEW PRODUCTS DEVELOPPED

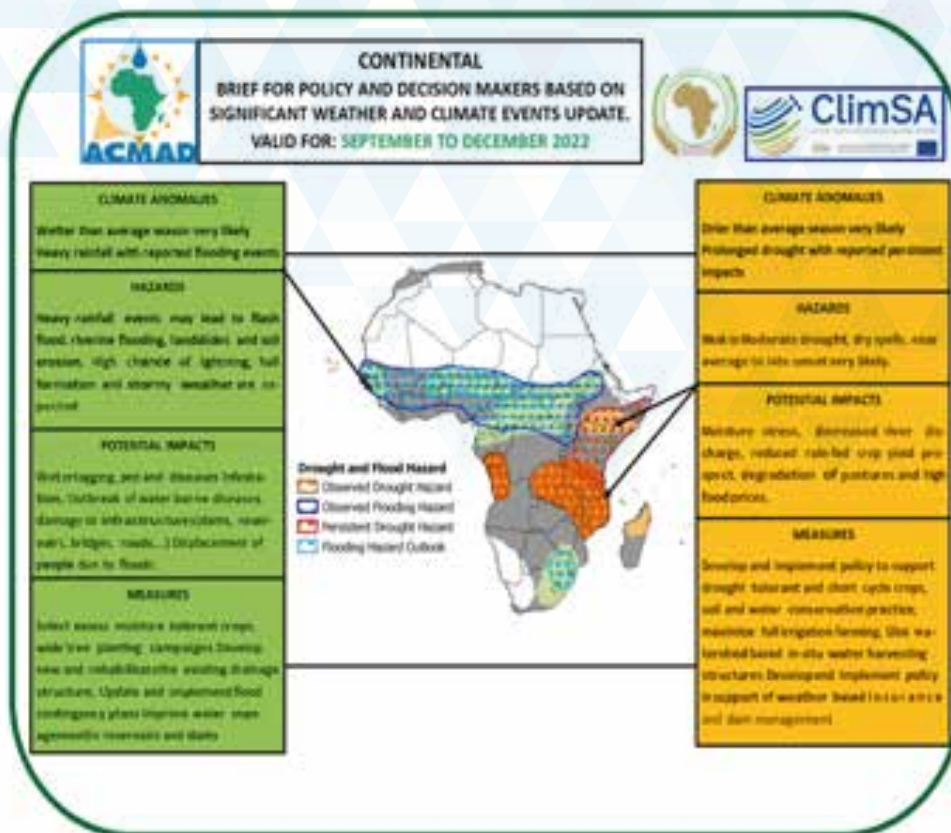


Figure 15 : Continental brief for policy and decision makers based on significant weather and climate events update valid for September to December 2022

MONITORING OF OBSERVED ANOMALIES ON THE START OF THE AGRICULTURE SEASON AND OUTLOOK.
MONITORING PERIOD: JANUARY-FEBRUARY 2023.
OUTLOOK VALIDITY PERIOD: FEBRUARY 23 TO MARCH 09 2023 .
DATE OF ISSUE: FEBRUARY-23-2023.

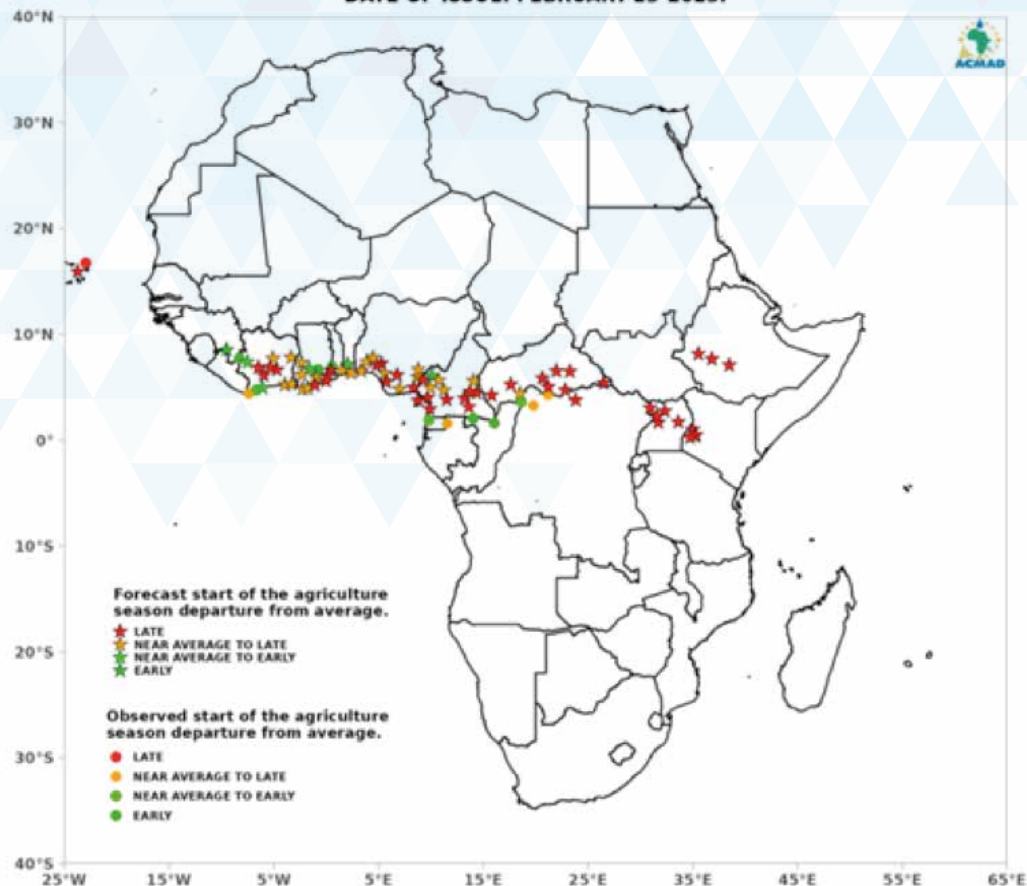


Figure 16 : Monitoring observed anomalies on the start of the agriculture season and outlook

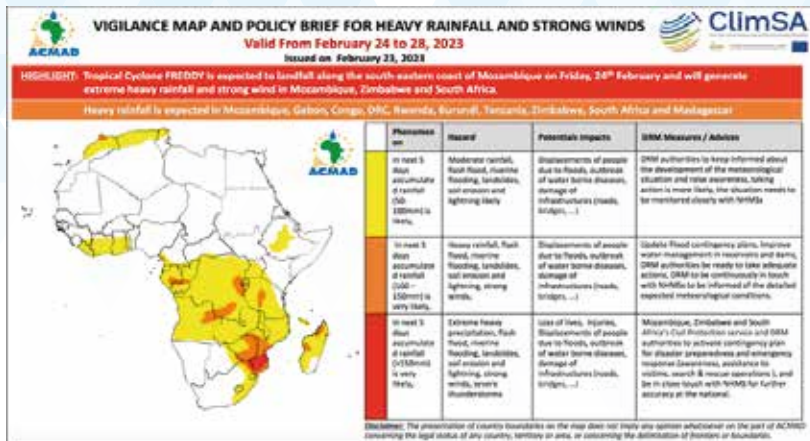


Figure 17 : Vigilance map and brief on heavy rainfall and strong wingsVigilance map and brief on heavy rainfall and strong wings

Tropical cyclone track outlook from : 17 January 2023; 00UTC to 22 January 2023
 Models : ARPEGE; CMC, ECMWF, ICON, GFS and UKMO

Figure 18 : Tropical cyclone Cheneso track outlook with the UK Met Office model showing several days ahead the observed passage of the cyclone in the Mozambican channel. This cyclone was active during the second half of January 2023.



CO-DEVELOPMENT OF BESPOKE CONTINENTAL HAZARDS OUTLOOK SERVICES FOR UNHCR

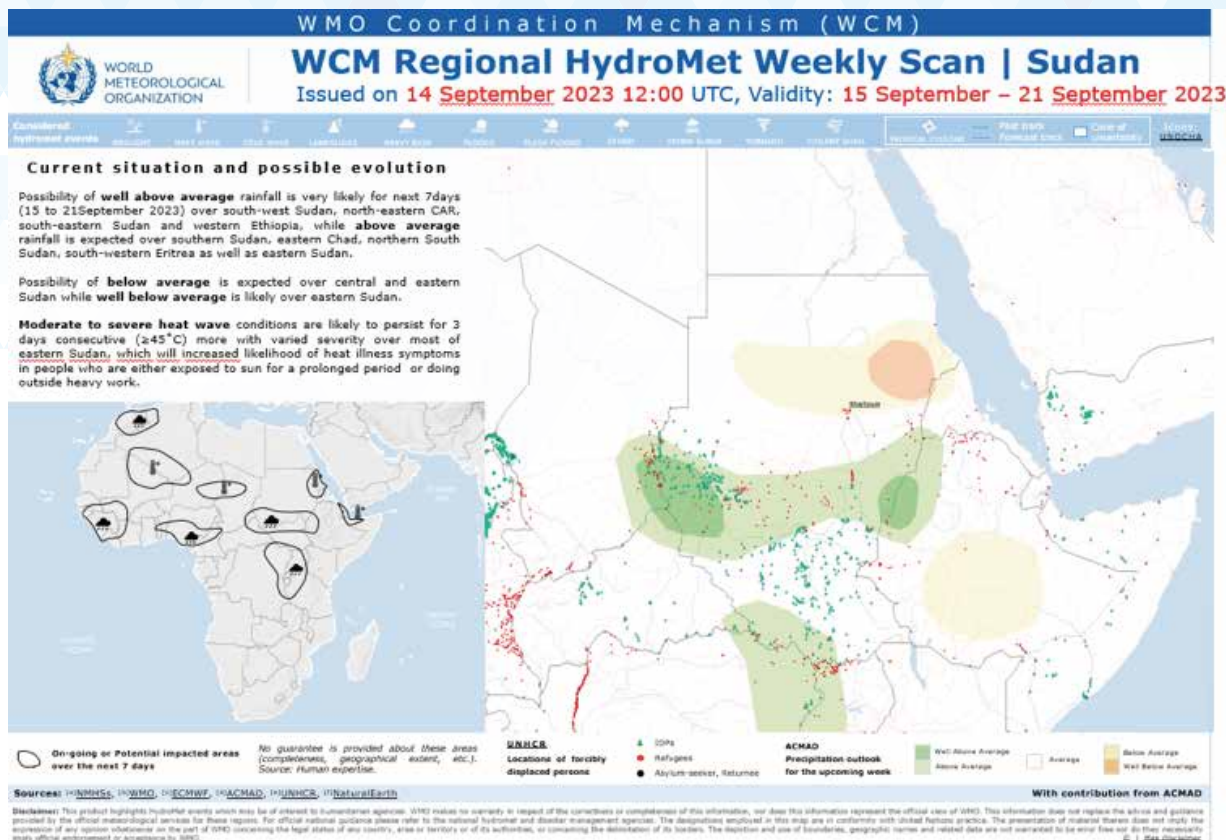


Figure 19: ACMAD contribution to WMO Coordination Mechanism (WCM)

NEW PRODUCTS DEVELOPPED

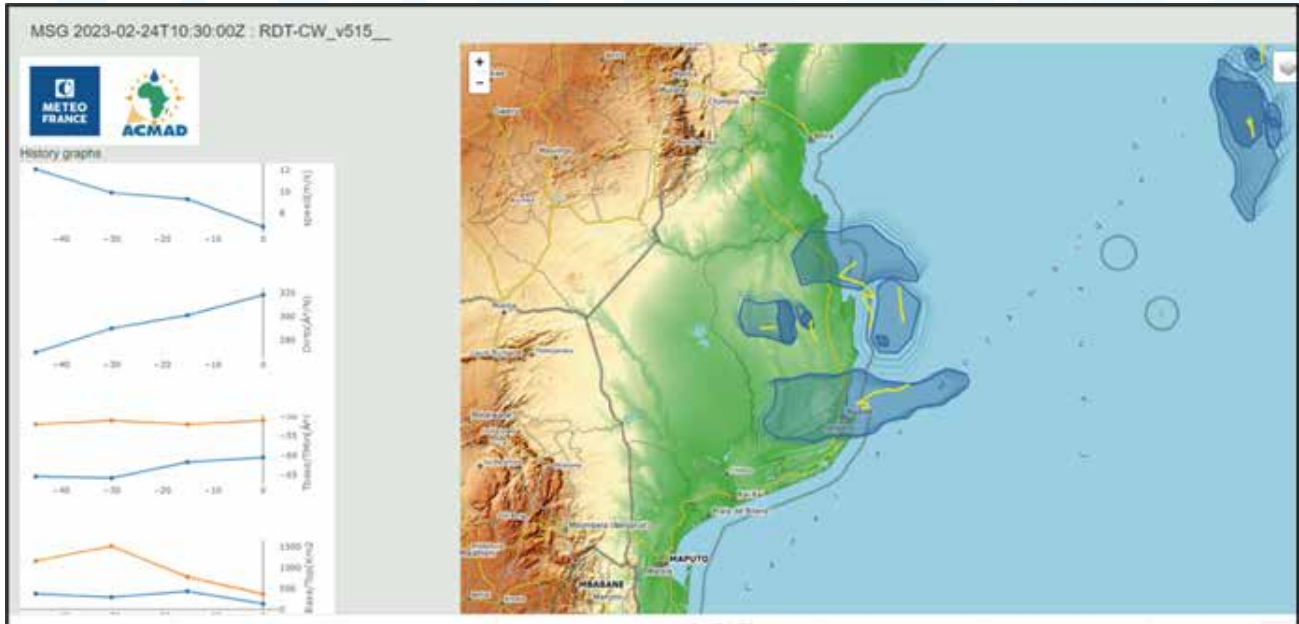


Figure 20 : Rapid Developing Thunderstorm (RDT) Track

INCREASE ON EXTEND OF OFF SEASON LAND AREAS IN SOUTHERN AFRICA DURING RECENT EL NINO YEARS

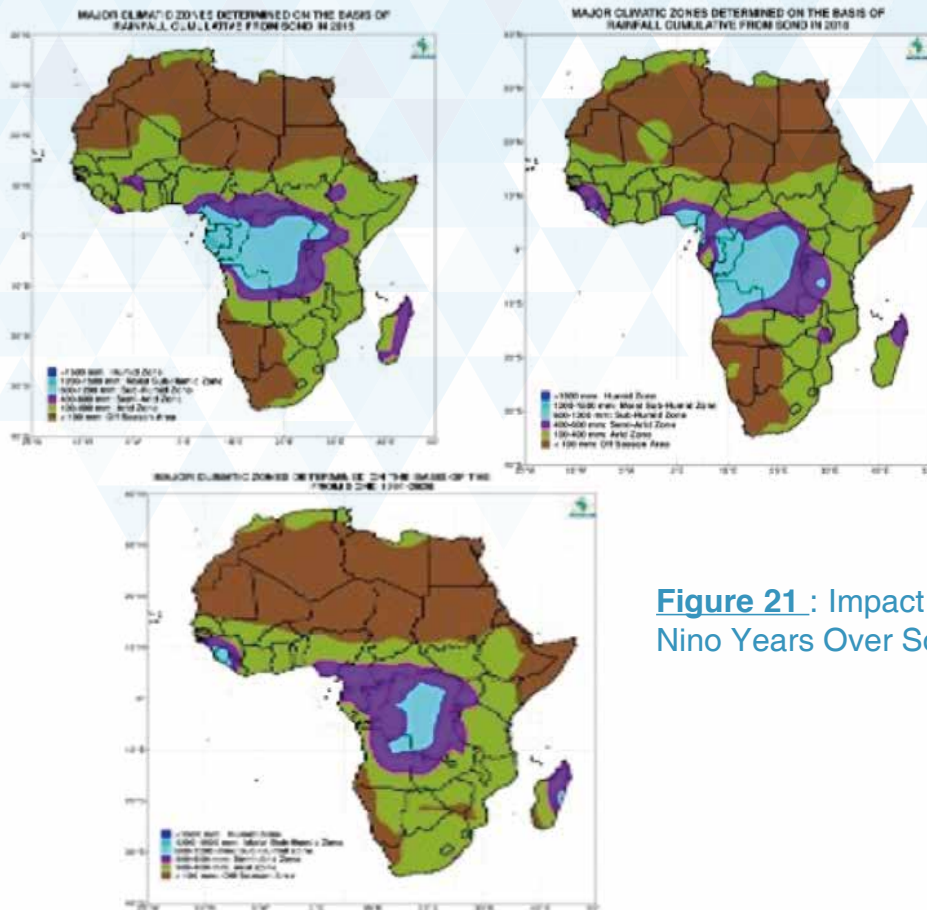
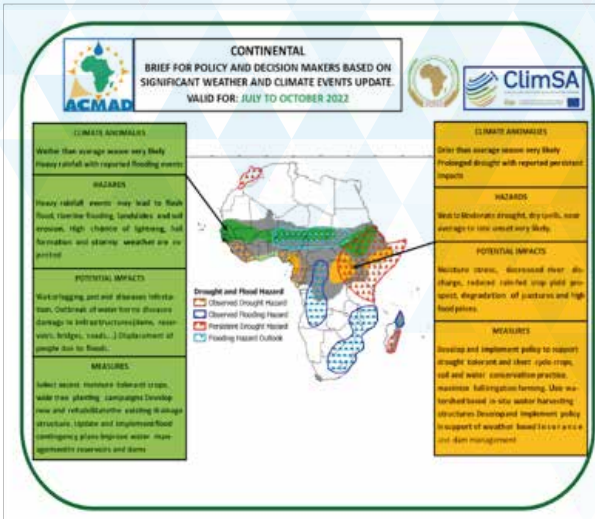


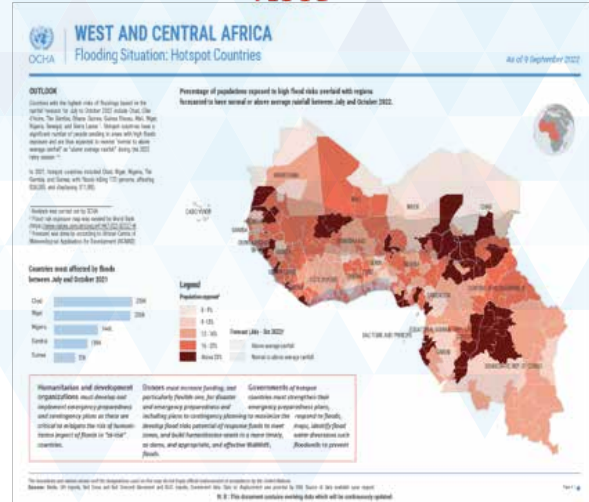
Figure 21 : Impact of the recent El Nino Years Over Southern Africa

INTERACTION WITH HUMANITARIAN FOR ANTICIPATORY ACTIONS

IMPACT BASED FORECAST



PREDICTION % OF POPULATION TO BE EXPOSED TO FLOOD



REPORTED NUMBER OF POPULATION AFFECTED BY FLOOD



Figure 22 : Examples of the use of the Impact based forecast by The Humanitarian Community

HIGHLIGHTS
OF ACMAD'S
ACHIEVEMENTS
FOR 2019-2022

PARTNERS



NMHSS



COMMISSION DE
L'OCEAN INDIEN



UNITED NATIONS
DEVELOPMENT PROGRAMME



Météo et climat



CEA



AFRICAN DEVELOPMENT BANK



UN Office for Disaster Risk Reduction



FROM THE AMERICAN PEOPLE



AFRICAN UNION



"Fostering Climate Prediction and Applications"



INTERNATIONAL
RED CROSS AND RED CRESCENT MOVEMENT



WORLD BANK GROUP



EUMETSAT



SC CSC



WEATHER CLIMATE WATER



OPERATED BY NRC



Global Facility for Disaster Reduction and Recovery



CIMA RESEARCH FOUNDATION



Centre Régional AGROSYMET



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