



AGRHYMET RCC-WAS

Regional Climate Center for West Africa and the Sahel



Seasonal outlook of the agro-hydro-climatic characteristics of the 2023 rainy season for the **Sudan and Sahel zones of West Africa a Sahel**

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The **PRESASS 2023** was organized by AGRHYMET Regional Climate Centre for West Africa and the Sahel (AGRHYMET RCC-WAS) of the CILSS, the African Centre for Meteorological Application for Development (ACMAD), the National Meteorological and Hydrological Services (NMHS), the Rivers Basin Organizations with the collaboration of World Meteorological Organization (WMO) and other global centers.

An overall average to wet 2023 rainy season is expected in the Sahel, with early to normal onset dates, late to normal cessation dates, average dry spell durations in the western part and longer durations in the eastern part, and overall above average to average flows in the main river basins of the Sahel.

I. Current status and outlook for sea surface temperatures

1.1. Current sea temperature status

In March 2023, Sea Surface Temperatures (SSTs) in the east-central equatorial Pacific Ocean showed an ENSO neutral condition (with a NINO3.4 area index value of -0.01 °C). Weekly SST anomalies in the same region remained very low over the past four weeks (in the first week of April, the NINO3.4 index was 0.0 °C). Over the North Atlantic Ocean, slightly above average

conditions prevailed, while over the Gulf of Guinea region, a neutral state was observed with cooling developing over the Central African coasts. Over the Mediterranean Sea, warming conditions persisted, while over the Indian Ocean a neutral situation was observed. (Figure 1).

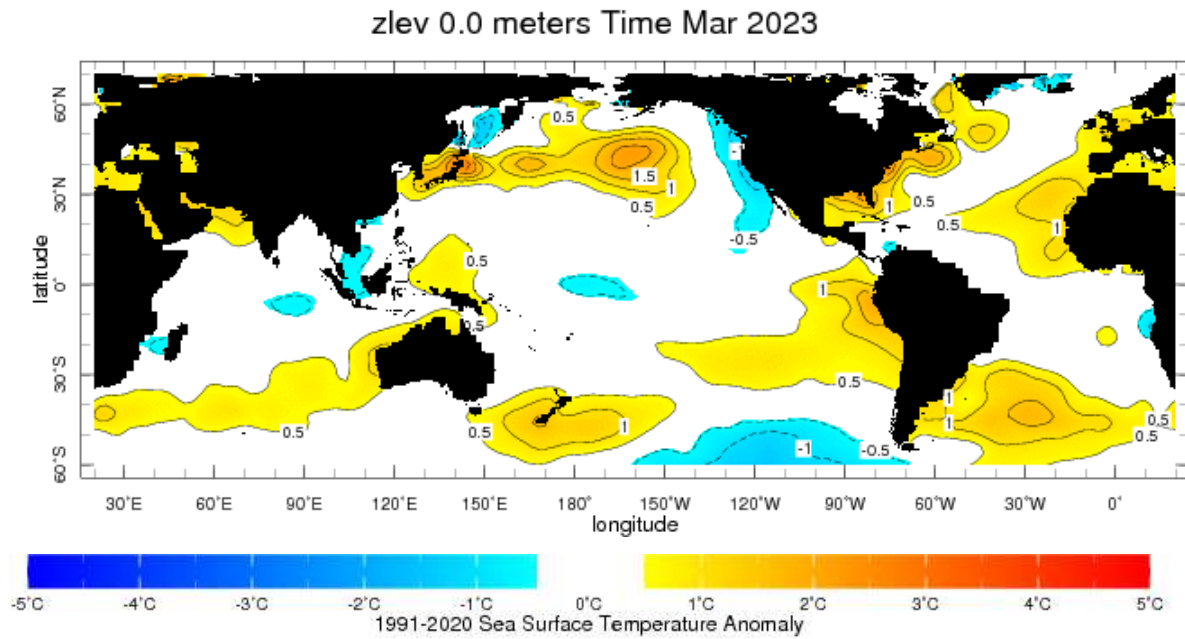


Figure 1 : Sea surface temperature (SST) anomalies for March 2023, compared to the average of the 1991-2020 baseline period (Source: NOAA)..

1.2. Outlook for sea surface temperatures

According to the ENSO forecast in early April, the tropical Pacific will continue to experience a neutral ENSO state (neither El Niño nor La Niña, with temperature anomalies between $-0.5\text{ }^{\circ}\text{C}$ and $0.5\text{ }^{\circ}\text{C}$) until the end of 2023. Therefore, an El Niño monitoring needs to be strengthened. Model predictions indicate slightly warm SST anomalies in the Atlantic Ocean, and a development of a positive dipole in the Indian Ocean for the May-July 2023 period.

II. Seasonal forecasts of Agro-Hydro-Climatic characteristics

The 2023 forecast of the agro-hydro-climatic conditions during the rainy season in Sudan and Sahel areas of West Africa and the Sahel is based on the analysis of the current climate situation, the expected evolution of the sea surface temperatures (SST), statistical models derived from NMHSs data, experts' knowledge on climate characteristics in the region and outlooks of major world climate centers. The analyses are based on the comparison with the average values of the different characteristics of the season over the reference period 1991-2020 (WMO climatological normal).

2.1. Onset of the season

This year, it is expected that the starting dates of the agricultural season will be globally early to normal in the western Sahel (southern Mauritania, Mali, southwestern Niger, Senegal, Guinea Bissau, and the northern half of the Guinea, including the Cape Verde islands), and the central Sahel (Burkina Faso, extreme north Benin, and extreme northwestern Nigeria). Over the eastern Sahel (southeastern Niger and Chad) and the Sudanian band (extreme southern Mali, southern Burkina Faso), they would be generally normal to early and some localized areas in the southern parts of Sierra Leone, Guinea, Mali, Burkina Faso, Chad, extreme eastern Niger, and the northern parts of Liberia, Côte d'Ivoire, Ghana, Togo, Benin and Nigeria (Figure 2).

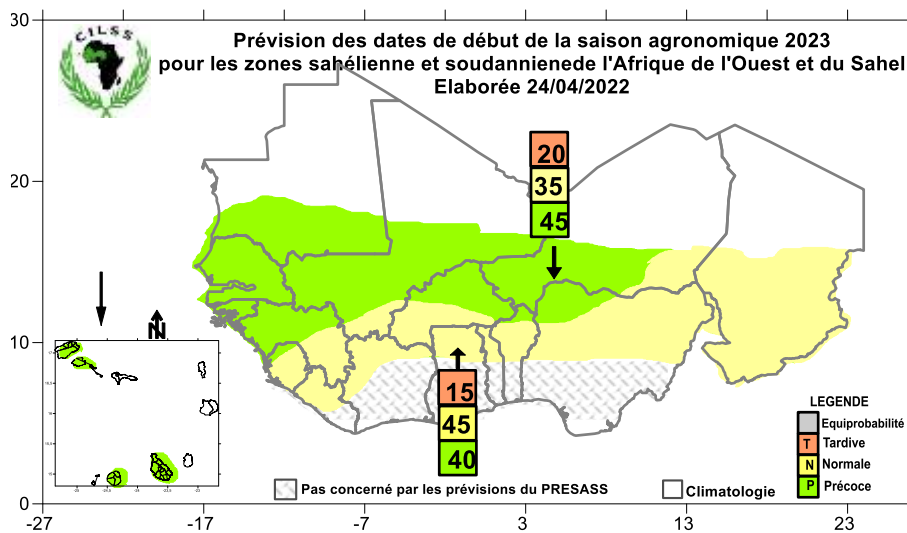


Figure 2 : Forecast of the onset dates for the 2023 agricultural season in the Sudanian and Sahelian zones of West Africa.

2.2. Cumulative rainfall

With regard to the expected rainfall amounts for the period from May to June 2023, it is forecasted to be

- Excessive rainfall with equivalent trends to the averages over the Cabo Verde Islands, the extreme west of the Sahel (southwest Mauritania, Senegal, Gambia, Guinea Bissau and western Guinea);
- equivalent to the averages with surplus trends over southern Chad, northern Cameroon, coastal areas of Côte d'Ivoire and western Ghana;

- equivalent to the average with deficit tendencies over the eastern coast of Nigeria and the northeastern coast of Cameroon are expected. Elsewhere, climatologic situation is expected..

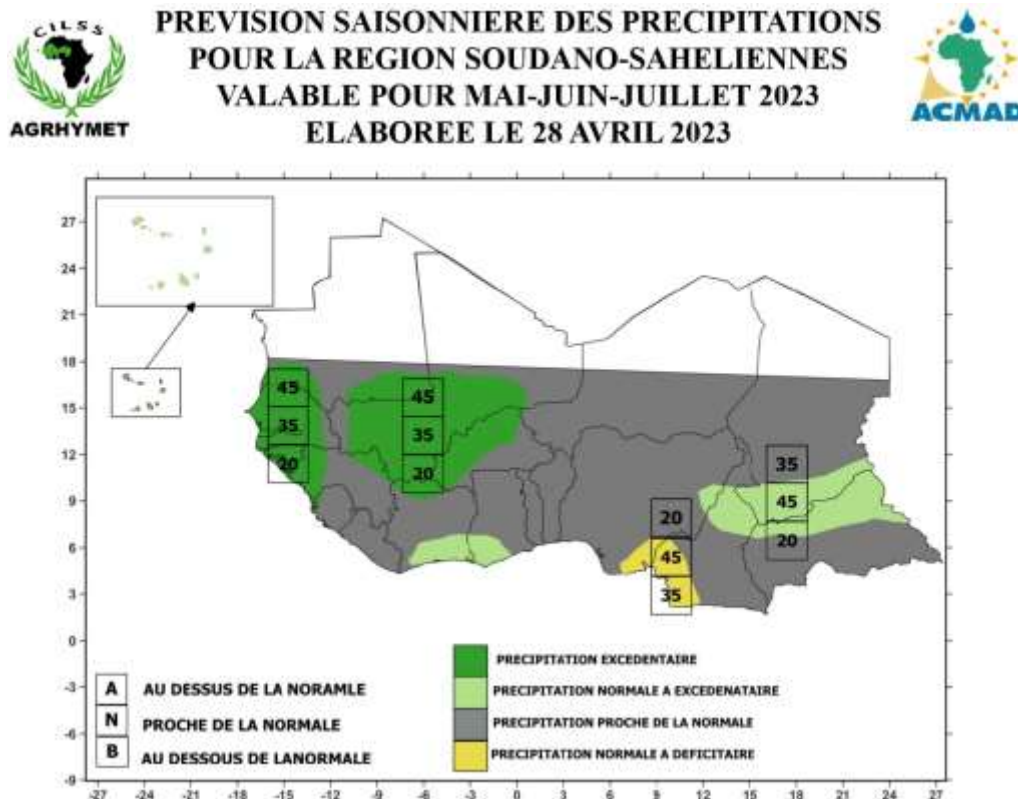


Figure 3 : Forecast of cumulative rainfall for the period March-April-May 2023 over Sudan and Sahel areas of West Africa

For the period of **June to August 2023**, the Sahel and northern part of the Gulf of Guinea countries are expected to be generally wet during this period. Specifically, cumulative rainfall is expected to be:

- equivalent to the averages with surplus trends are expected over the Cabo Verde islands, the extreme west of the Sahel (Senegal, the Gambia, Guinea Bissau, the western part of Guinea and southwest Mauritania), the east of the Sahel (Niger, Chad), the north of Togo, Benin, Nigeria and the extreme north of Cameroon, as well as over the eastern coast of Côte d'Ivoire, the coast of Ghana, Benin and Togo;

- excessive to average trends is expected over the central Sahel (central and western Mali, almost all of Burkina Faso);
- equivalent to the average with deficit trends are expected over the eastern coast of Guinea, Sierra Leone, Liberia, the coast of Nigeria and northeastern Cameroon.
- Elsewhere, cumulative rainfall is expected.



**PREVISION SAISONNIERE DES PRECIPITATIONS
POUR LA REGION SOUDANO-SAHELIENNES
VALABLE POUR JUIN-JUILLET-AOUT 2023
ELABOREE LE 28 AVRIL 2023**

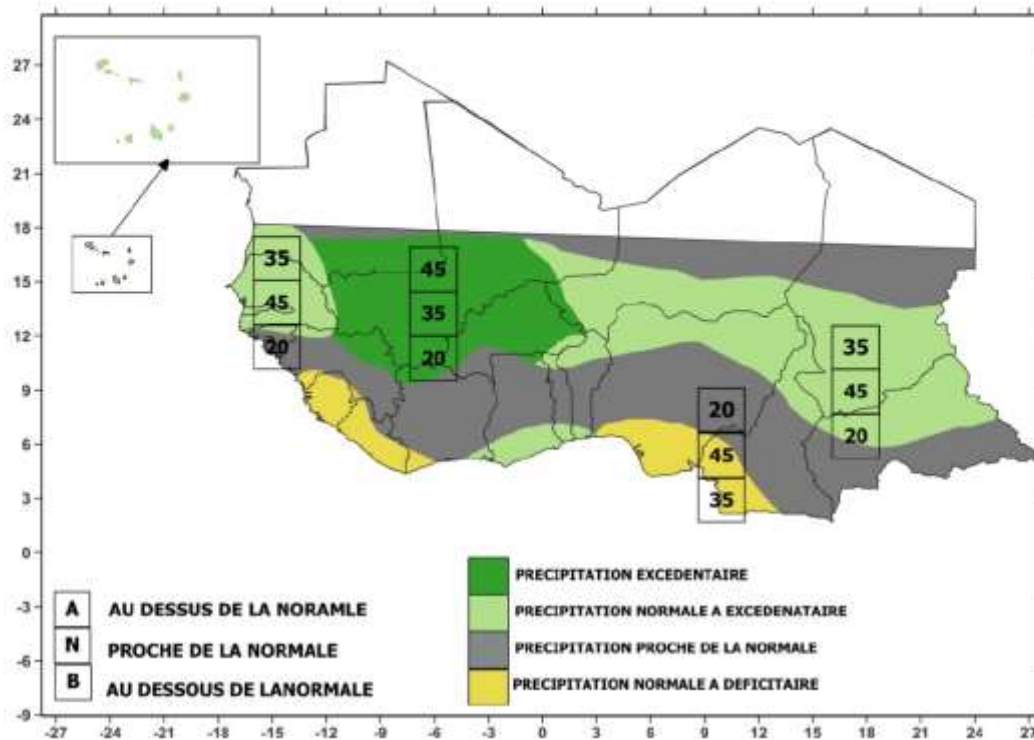


Figure 4 : Forecast of cumulative rainfall for the period June-July-August 2023 over Sudan and Sahel areas of West Africa..

For the period **July to September 2023**, the prevailing wet conditions are expected to continue over the Sahel and northern Gulf of Guinea countries. More specifically, the cumulative rainfall is expected to be :

- equivalent to the averages with surplus trends, over the Cape Verde Islands, the extreme west of the Sahel (Senegal, the western part of Guinea and southwest Mauritania), the central and eastern Sahel (Niger, Chad), northern Nigeria and Cameroon and in places over the coastlines of the Gulf of Guinea countries (western Côte d'Ivoire, Ghana, Benin, Togo and extreme west of Nigeria).
- excessive to normal trends, over the central Sahel (central and western Mali, almost all of Burkina Faso, extreme western Niger), the extreme north of Côte d'Ivoire, Ghana and Togo and northern Benin;
- equivalent to the average to deficit trend, on the eastern coast of Guinea, Sierra Leone, Liberia, the coast of Nigeria and northeast Cameroon.
- Elsewhere, cumulative rainfall is expected to be close to normal.

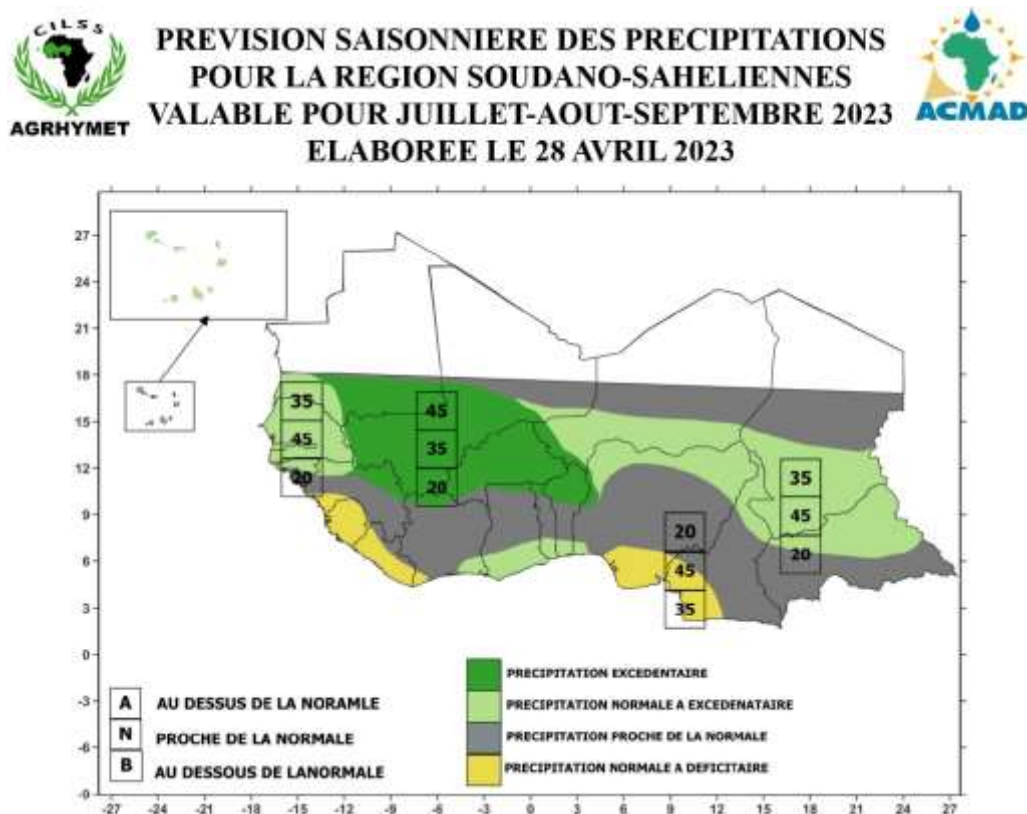


Figure 5 : Forecast of rainfall accumulation for the period July-August-September 2023 over Sudan and Sahel areas of West Africa

2.3. Coastal basin runoff

The seasonal hydrological forecasts for the Sahelian and Sudanian zones of the West African and Sahelian countries cover the following main river basins: Niger, Senegal, Gambia, Volta, Comoé, Bandama, Sassandra, Cavally, Mono, Ouémé and Lake Chad system (Chari, Logone and Komadougou Yobé) basins. For the 2023 season, runoff is expected to be equivalent to or higher than the average for the 1991-2020 reference period in the upper Sahelian basins and equivalent to or lower than average runoff is expected in the lower parts of these basins.

Specifically, excess runoff is expected in the Gambia basin, the Falémé basin (tributary of the Senegal River), the Inner Niger Delta in Mali, the Middle Niger River basin, the Komadougou Yobé, the Middle Chari, and the Lower Chari-Logone basin. The Upper Niger River Basin (in Guinea, Côte d'Ivoire and Mali), the Upper Chari Basin, the Lower Niger, the Bafing and Bakoye sub-basins (Senegal basin), the Mono (Togo and Benin) and Ouémé (Benin) basins, and the upper and western part of the Volta basin, would experience average to surplus flows. Average to deficit runoff would be observed in the Sassandra and Bandama basins (in Côte d'Ivoire), the Lower Comoé, the upper Logone basin and the eastern part of the Volta (Togo and Ghana). Finally, in the Cavally basin (Côte d'Ivoire), the Liberian portion of the Mano basin, and the St. John and St. Paul basins (in Liberia), due to the weakness of the signals, no trend is apparent and, consequently, a climatological situation is expected (Figure 6).

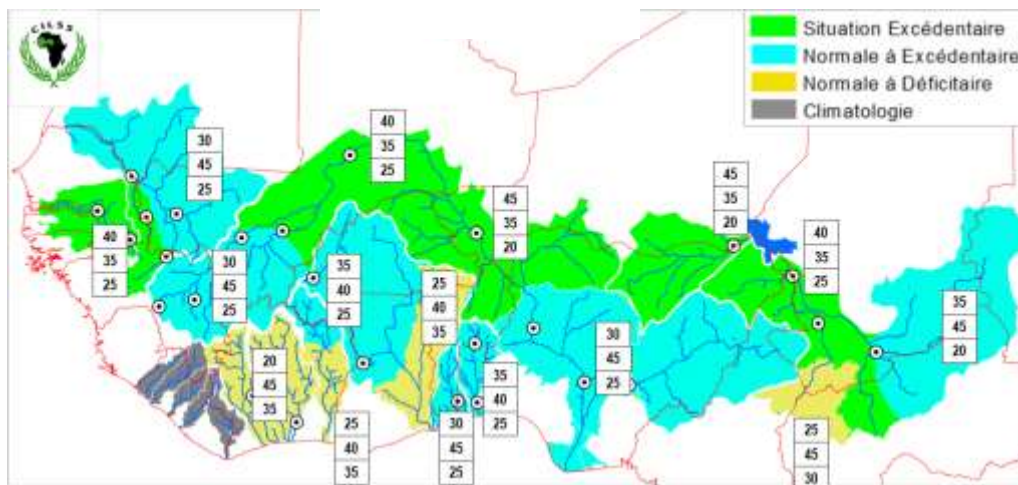


Figure 6: Forecast of 2023 runoff of the river's basins in the Sudanian and Sahelian zones of West Africa

Thus, if these forecasts are confirmed, they could have the following impacts

- In the **Gambia basin**, the Falémé basin (tributary of the Senegal), the Inner Niger River Delta in Mali, the middle Niger River basin, the Komadougou Yobé, the middle Chari, and the lower

Chari-Logone basin: in view of the expected surplus forecasts, high levels of flooding risk are to be considered. To this end, it is recommended that alert thresholds be closely monitored and, above all, that there be strong collaboration between the hydrological and meteorological services in order to enable the anticipatory management of floods in the areas concerned.

- In the **upper Niger River basin** (in Guinea, Côte d'Ivoire and Mali), the upper Chari basin, the lower Niger, the Bafing and Bakoye sub-basins (Senegal basin), the Mono (Togo and Benin) and Ouémé (Benin) basins, and the upper and western parts of the Volta basin: The normal to above normal forecasts expected would make it possible to meet the various water needs and allow the development of irrigated crops in the flood plains in Nigeria in the Delta area and in Senegal downstream of the Manantali dam. However, there are risks of flooding in some areas.
- In the **Logone and eastern Volta basins** (Togo and Ghana): in view of the expected average to deficit trends, rational management of water resources is necessary to satisfy the various uses. The dams located in this area will contribute to regulate the surpluses coming from the upper basins in order to support the flows during low water periods.

2.4. Duration of dry spells at the beginning of the season

The forecast indicates that at the beginning of the agronomic season, the longest breaks in rainfall (or longest dry spells) will be equivalent to or longer than the reference period averages over the Sahelian and Sudanian bands of West Africa and Chad. However, a high probability of longer dry spells is expected over the eastern half of these bands (covering southern Burkina Faso), almost the entire agricultural and pastoral band of Niger and Chad and the northern parts of Togo, Benin and Nigeria. On the other hand, in the northern parts of Ghana, Côte d'Ivoire and Liberia, they would be rather short to equivalent to average duration (Figure 7).

outlook of the onset dates for the 2023 agricultural season in the Sudanian and Sahelian zones of West Africa

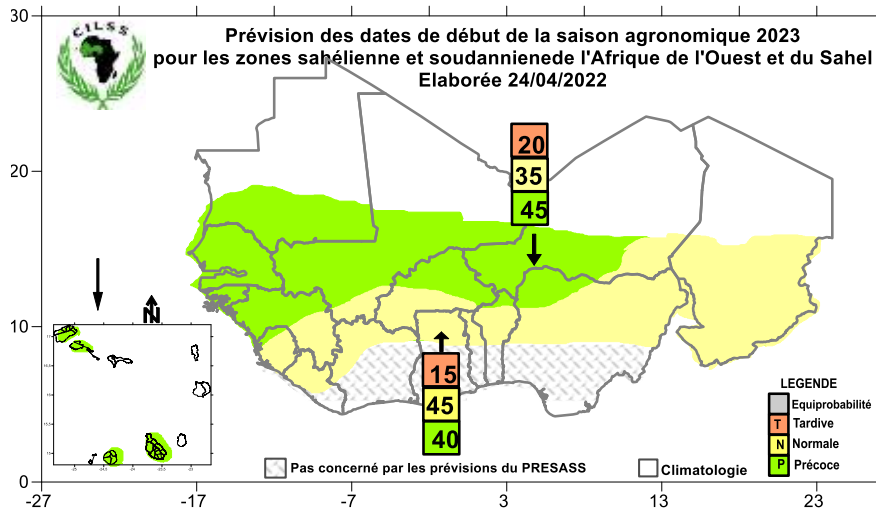


Figure 7: Outlook of the onset dates for the 2023 agricultural season in the Sudanian and Sahelian zones of West Africa.

2.5. Duration of dry spells towards the end of the season

The expected dry spells during the second half of the rainy season are likely to be equivalent to or longer than the averages for the reference period over most of the Sahelian strip and the northeastern part of the Gulf of Guinea countries and the Cabo Verde islands. On the other hand, over the northwestern part of the Gulf of Guinea countries (Sierra Leone, Liberia, southern Guinea, extreme southern Burkina Faso, northern Cote d'Ivoire, Ghana, Togo and Benin), these dry spells could be long to normal (Figure 8)..

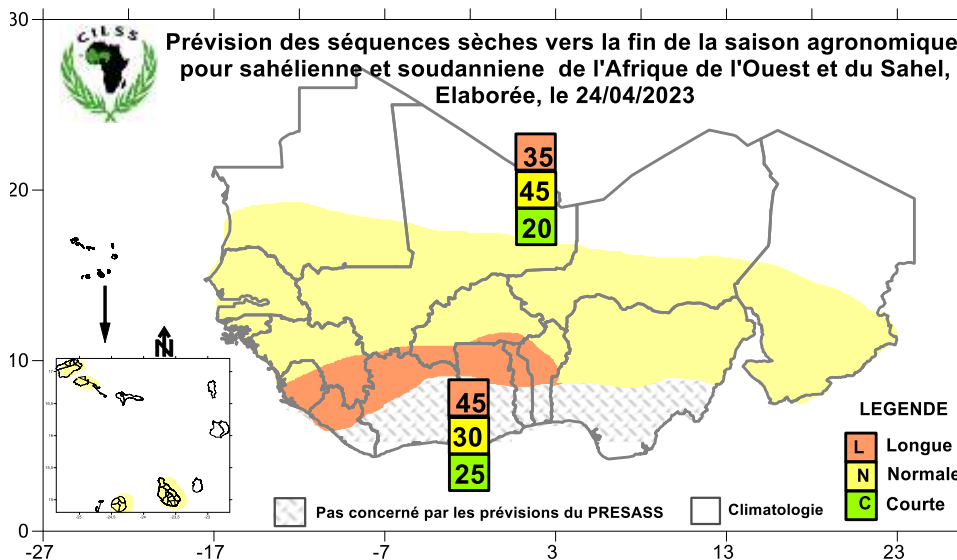


Figure 8: Outlook of the length of dry spells towards the end of the 2023 agronomic season in the Sudanian and Sahelian zones of West Africa

2.6. End of season dates

The ending dates of the agricultural season are expected to be:

- late to equivalent to average cessation in the Sahelian strip from Senegal to Chad;
- equivalent to normal to early cessation in the northwestern Gulf of Guinea countries (northern Côte d'Ivoire, northern Ghana, northern Togo, and central Benin) and in southern Guinea, Mali, and Burkina Faso;
- However, equivalent to normal to late ending dates of the season are expected over the northwest and central Sahel, including the southern halves of Mauritania, Mali, northern Senegal, and the northwestern agricultural and pastoral belt of Niger (Figure 9).

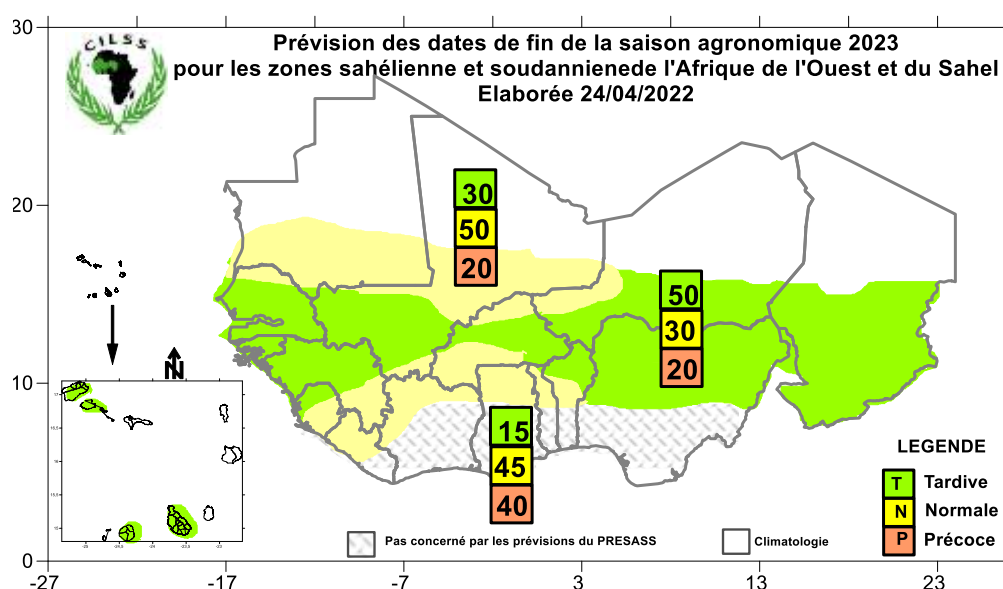


Figure 9 : Forecast of the cessation dates of the 2023 agricultural season in the Sudanian and Sahelian zones of West Africa and the Sahel

III. Recommendations

3.1. Drought Risk

In areas where long periods of dry spells are expected to cause water deficits, particularly in parts of the Sahel, crop and forage growth is likely to be affected. To remedy this, it is recommended to

- diversify agricultural practices by encouraging irrigation and vegetable crops to reduce the risk of production decrease
- Choose crop species and varieties that are tolerant of water deficit in exposed areas;
- adopt water and soil conservation techniques;
- prevent the proliferation of the millet earworm,
- Ensure rational management of surface water resources to satisfy different uses, particularly in the upper Logone basin and the eastern part of the Volta (Benin, Burkina Faso, Togo and Ghana) where deficit flows are expected,

- Interact with technical staff from national and regional meteorological, hydrological and agricultural services to obtain specific information and advice on how to proceed.

3.2. Flood risk

The general rainfall pattern expected in the eastern and central parts of the Sudanian and Sahelian zones of West Africa and Chad, and the above average runoff expected in most of the Sahelian river basins, indicate a high risk of flooding that could lead to losses of goods (crops, material), animal and human life in the exposed localities. To be able to overcome these situations, it is recommended to:

- Strengthen the communication of seasonal forecasts and their updates in order to inform and sensitize communities about the risks and take measures to avoid disasters, by supporting the efforts of the press, disaster risk reduction platforms, NGOs and the countries' EWS,
- Strengthen the monitoring and response capacities of agencies in charge of flood monitoring, disaster risk reduction and humanitarian aid
- discourage and avoid the anarchic occupation of flood-prone areas by houses, crops and animals,
- Strengthen protective dykes and ensuring the maintenance of dams and road infrastructures
- clean the channels to facilitate the evacuation of rainwater
- Closely monitor alert thresholds in high-risk flooding sites, including the Gambian River basin, the Falémé River basin (a tributary of the Senegal River), the Inner Niger River Delta in Mali, the Middle Niger River basin, the Komadougou Yobé River, the Middle Chari River, and the lower Chari-Logone River basin,
- Initiate a strong collaboration between hydrological and meteorological services in order to allow the anticipatory flood risks management in the concerned areas,
- promote the farming of plants adapted to excessive soil water;
- closely monitor and to follow the updates of these seasonal forecasts and the short and medium range forecasts that the meteorological and hydrological services of the countries produce and diffuse.

3.3. Diseases spreads

Wetlands and flooded areas can be favorable to the development of disease germs (cholera, malaria, dengue, bilharzia, etc.) and epizootics (Rift Valley fever, etc.). Also, the long to average dry spells expected in some parts of the eastern Sahel could result in persistent high temperatures favorable to the proliferation of other epidemic disease germs. To this end, it is recommended to:

- Strengthen the capacities of national health systems and national disaster risk reduction platforms,
- raise awareness and disseminate warning information on climate-sensitive diseases, in collaboration with meteorological and health services;
- clean up the cities and avoid contact with contaminated water, through drainage and gutter cleaning operations;
- prevent diseases by vaccinating the population and animals;
- prevent epizootics with germs that prefer good humid conditions;
- reinforce the vigilance against the diseases and the crops pests (fall armyworm and other harmful insects).

3.4. Opportunities to be seized

Given the configuration of the 2023 rainy season, which is expected to be globally wet in the central and western parts of the country and normal in the eastern part of the Sudanian and Sahelian zones of West Africa, it is recommended that farmers, herders, water resource managers, projects staff, NGOs and the authorities

it is necessary to valorize the situations of average to excess runoff, by developing irrigated crops, mostly in the flood plains of the upper Niger River basin (in Guinea, Côte d'Ivoire and Mali), the upper Chari basin, the lower Niger, the Bafing and Bakoye sub-basins (Senegal basin), the Mono (Togo and Benin) and Ouémé (Benin) basins, and the upper and western part of the Volta basin, while avoiding the risks of flooding;

- invest more in high-yielding crops that are tolerant to wet conditions (rice, sugarcane, tubers, etc.);
- set up systems to collect and conserve runoff water for agricultural and domestic uses for dry season;

- support the deployment of climate-smart techniques to increase crop and forage yields with regard to climatic risks, particularly those related to excess rainfall and drought;
- strengthen the information, guidance and assistance systems and agro-meteorological assistance for producers;
- facilitate producers' access to improved seeds and agricultural inputs adapted to their needs,
- secure income and alleviate agricultural losses through the promotion and subscription to index-based agricultural insurance

The scrupulous implementation of these recommendations could help alleviate the difficulties currently faced by populations declared vulnerable to crises in the subregion.

Finally, it is recommended that stakeholders from different sectors be attentive to the updates that will be made by the AGRHYMET Regional Center, ACMAD and national meteorological and hydrological services throughout the season.

