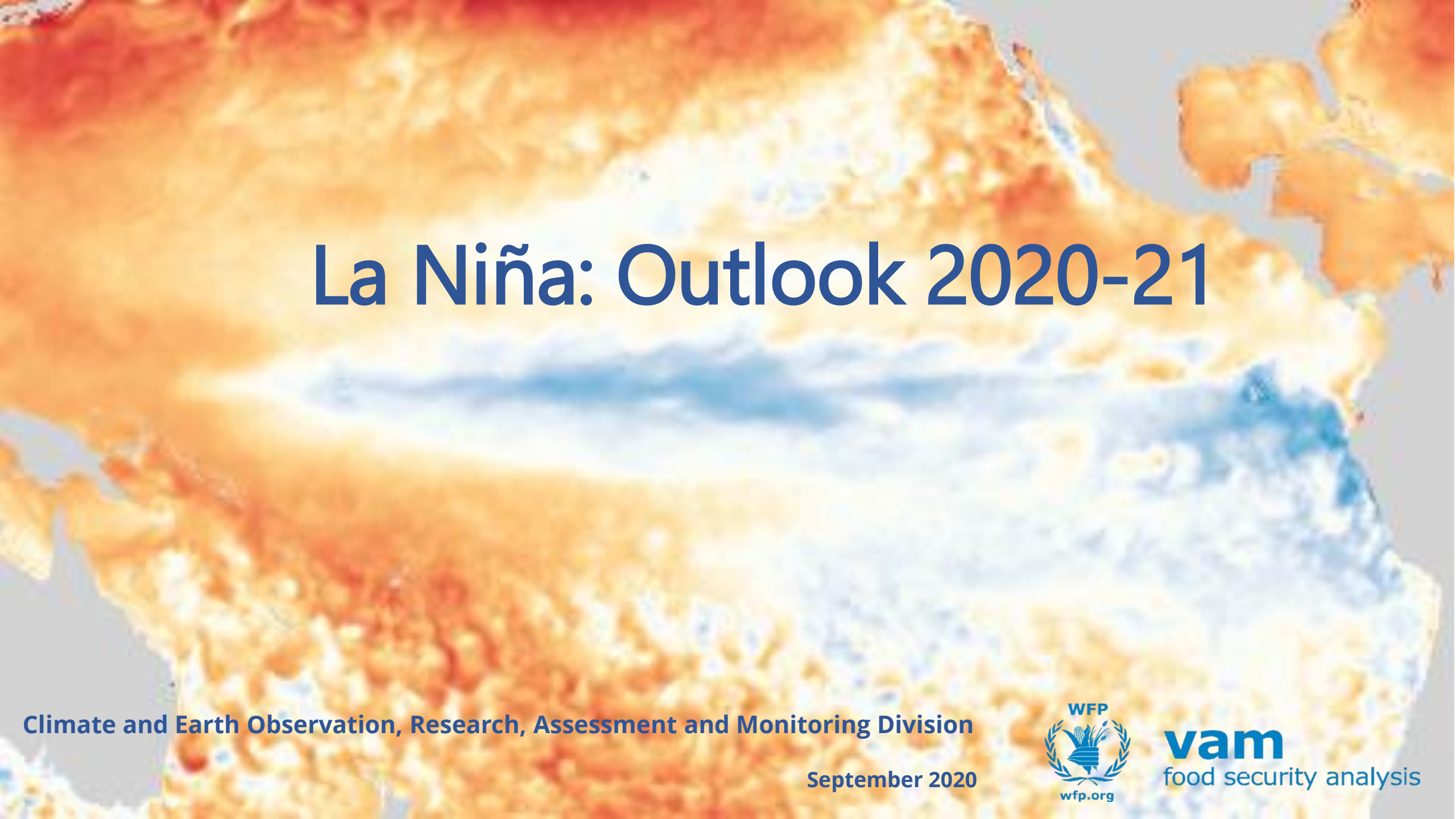

La Niña: Outlook 2020-21

Climate and Earth Observation, Research, Assessment and Monitoring Division

September 2020

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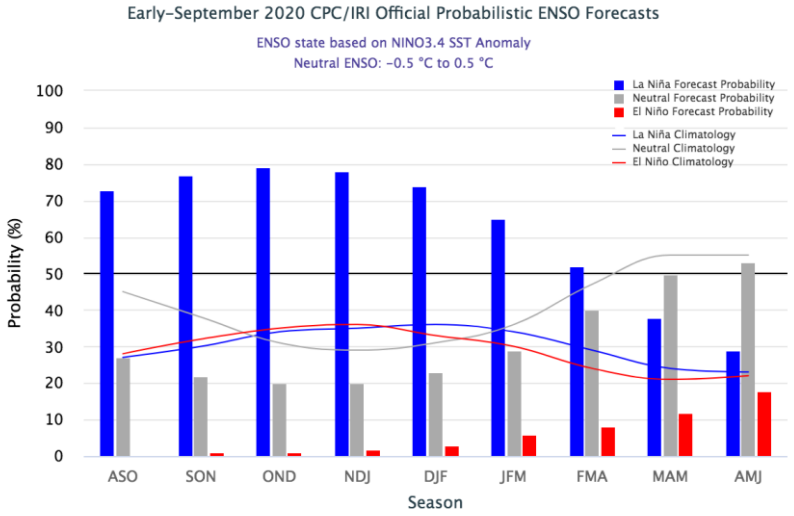
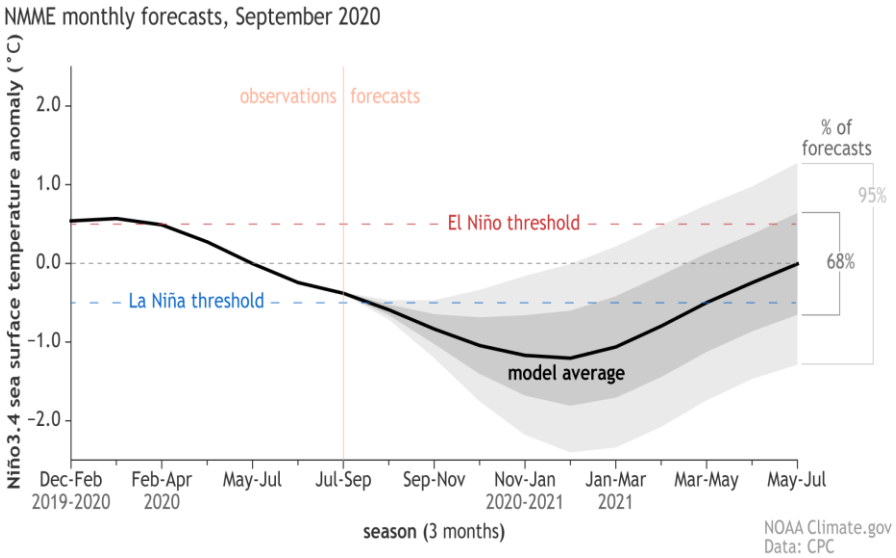
La Niña Outlook – Summary

- La Niña conditions are currently active and expected to last until the first quarter of 2021. While forecasts indicate that it is expected to remain weak to moderate, La Nina intensity is not a good guide to the magnitude of possible impacts.
- This assessment includes historical data from previous La Nina seasons and current seasonal forecasts. Areas where La Nina impacts may be expected include the growing seasons of Southern Africa, Eastern Africa, SE Asia (wider Indonesian region) as well as Central America and the Caribbean to a lesser degree.
- Perspectives for the Southern Africa growing season are optimistic given typical enhancement of seasonal rainfall during La Nina events, and indications from current forecasts. Regional maize production tends to be favourable in La Nina seasons.
- In contrast, for East Africa perspectives are quite poor: the coming Short Rains (Oct-Dec) will most likely be drier than average, which will follow a poor harvest in 2020 due to floods and locust impacts. Indicative preliminary forecasts and historical data raise the possibility of drier than average conditions for the Long Rains season of March-May 2021. If realized, very considerable impacts on the food security of already vulnerable populations can be expected throughout 2021.
- For the Indonesian region, wetter than average conditions are expected, balancing favourable agricultural perspectives with enhanced flood risks. For Central America and the Caribbean, following an intense hurricane season, wetter conditions are expected for the last phases of the Postrera season.

La Niña Outlook – September 2020



CPC/IRI ENSO Forecast from September. Blue bars denote probability of a La Niña developing in the near future



Evolution of a La Niña indicator (Pacific sea surface temperature anomaly) until mid 2021, generated by the CPC models.

Black line is the consolidation of all models. Dark grey and light grey shades contain results from 68% and 95% of the models respectively and provide an idea of the model's uncertainty. From: NASA ENSO Blog: https://www.climate.gov/news-features/blogs/enso/september-2020-enso-update-la-ni%C3%B1a-here

Is a La Niña taking place and for how long?

Yes. La Niña conditions are now present across the equatorial Pacific with a 75% chance of remaining in place during late 2020 and early 2021.

The evidence indicates that this La Niña is likely to be over around March-April 2021: see likelihoods dropping significantly (chart left) and the forecast indicator crossing back the La Niña threshold around March-May (chart right).

How intense will it be?

The event is expected to remain weak to moderate: the chart above right shows the indicator barely going below the -1C threshold of a moderate La Niña. However, the intensity of the event is not a good guide to the magnitude of possible impacts. Seasonal forecasts are a better source of guidance as they produce geographically specific information for the periods under the likely La Niña lifetime.

How does it compare with previous events?

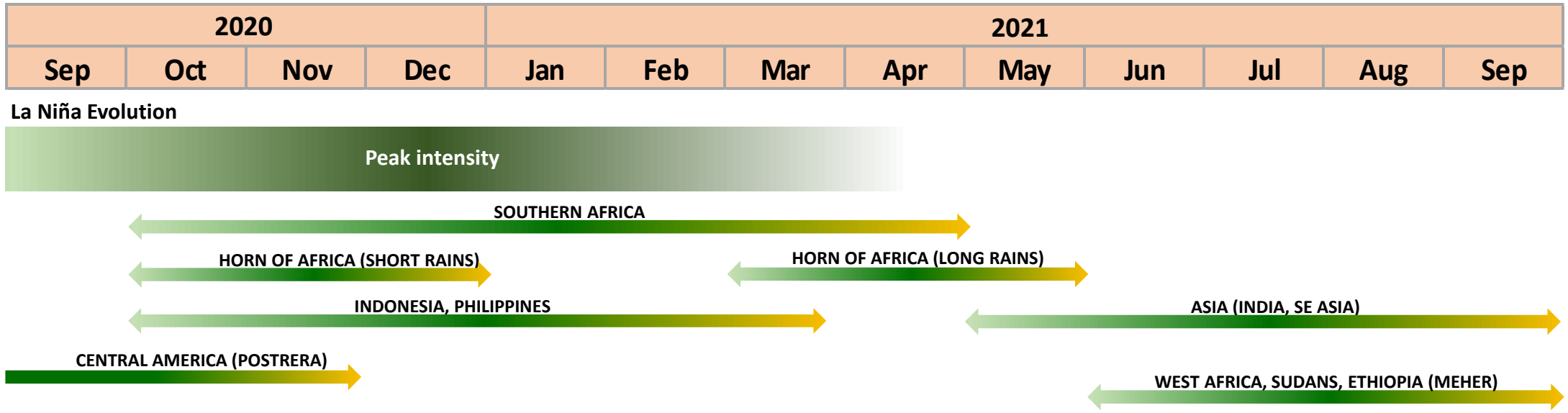
The last intense La Niñas took place back to back from late 2010 to early 2012. Since then, there have only been short and weak-borderline La Niñas in 2016-17 and 2017-2018. Weak as it was, the first of these episodes led to drought in Somalia and the wettest season in Zimbabwe for more than 35 years.

What can we expect?

Impacts, their intensity and timing are varied across the globe. This report presents an outlook for each WFP region based on:

- Latest seasonal forecast information
- Expectations based on 40 years of data records

La Niña Timeline and Growing Seasons



Generalized growing season timing across WFP regions in relation to likely La Niña timing and intensity. Seasons overlapping with the La Niña event are more likely to be affected than those with little or no overlap.

Which regions will be impacted by a possible La Niña ?

Current forecasts offer a tentative timing for the current La Niña event: a start in August 2020 and a likely end towards March-April of 2021, with a peak around December 2020.

The greater concern is with regions where the coming growing season overlaps with the La Niña event, enabling it to influence seasonal outcomes.

Considering the broad timings of La Niña and of growing seasons around the world in the next 12 months, this event is most likely to be affected the following growing seasons:

- **Southern Africa**
- **East Africa (Short Rains and Long Rains to a lesser degree)**
- **Indonesia and Philippines (to a lesser degree)**
- **Latin America and Caribbean (late stages and hurricane season)**

If La Niña is prolonged beyond what is currently expected, early stages of the season in SE Asia and possibly West Africa might be affected.

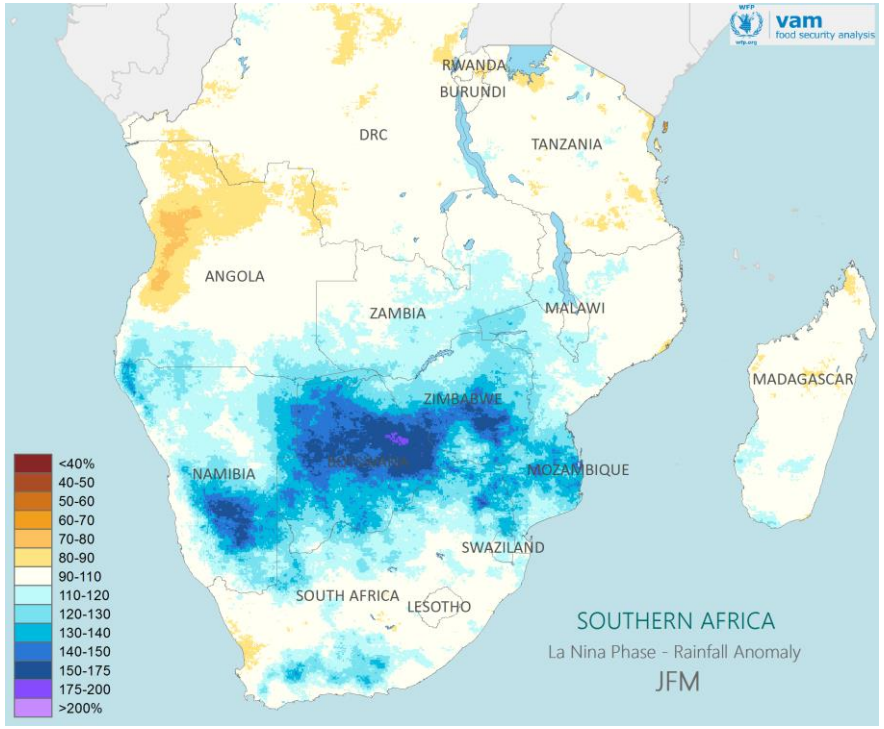
La Niña Effects: Sources of Evidence

Evidence : Rainfall and NDVI long term records

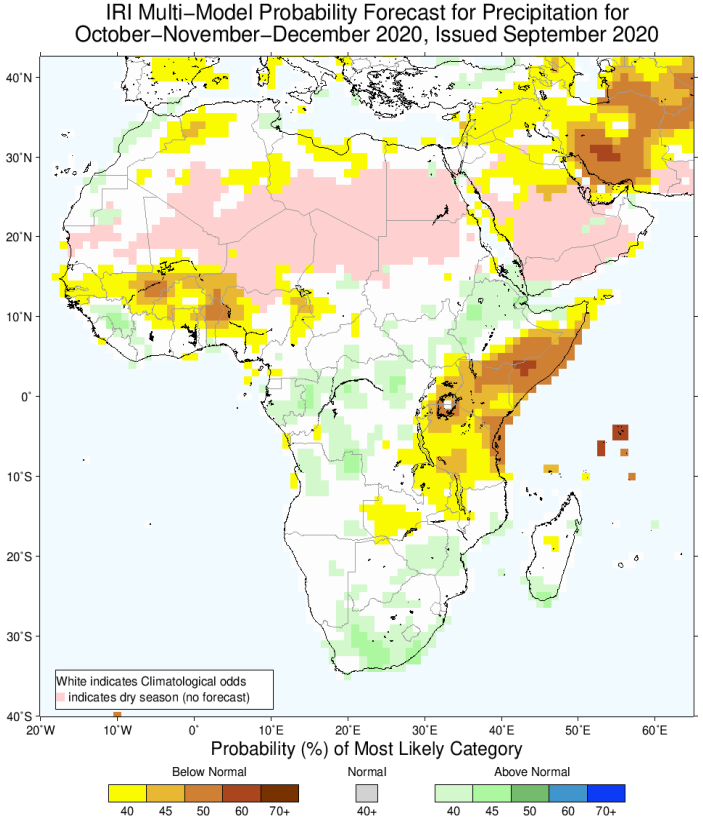
Long term (30-40 years) records of rainfall estimates and vegetation indices (NDVI) offer a simple way to map likely ENSO influences: the record is split into groups corresponding to the two ENSO phases (El Nino, La Nina) and Neutral. For each group, a long term average is derived.

An ENSO Anomaly is formed by comparing (ratio) the mean rainfall / NDVI in a given ENSO phase with the mean rainfall in Neutral seasons. When mapped, these anomalies highlight areas where there is an ENSO effect and the sign of the effect:

Below [above] 100%, the ENSO phase will decrease [increase] rainfall / NDVI relative to those of neutral seasons. The further away from 100% the more intense is the effect. The map below shows a strong increase in rainfall in Jan-March during La Niña seasons across Botswana and Zimbabwe and some reduction in NW Angola.



Example of ENSO anomaly: Jan-March rainfall for Southern Africa during La Niña seasons as a percent of the average in neutral seasons. Blues for La Niña wetter than neutral, oranges for La Niña drier than neutral.



Example of a seasonal forecast from IRI for Oct-Dec 2020 rainfall. Map shows most likely rainfall category. Browns for below average, greens for above average.

Evidence : Seasonal Forecasts

Seasonal forecasts are available from a number of international and regional centres, as probabilities of 3 month rainfall amounts being below, on or above average or of rainfall being above a long term reference.

Most look ahead for up to four overlapping 3-month periods. So forecasts issued in September provide users with information up to the Dec-Feb period.

Southern Africa:

Hopes of Improvements

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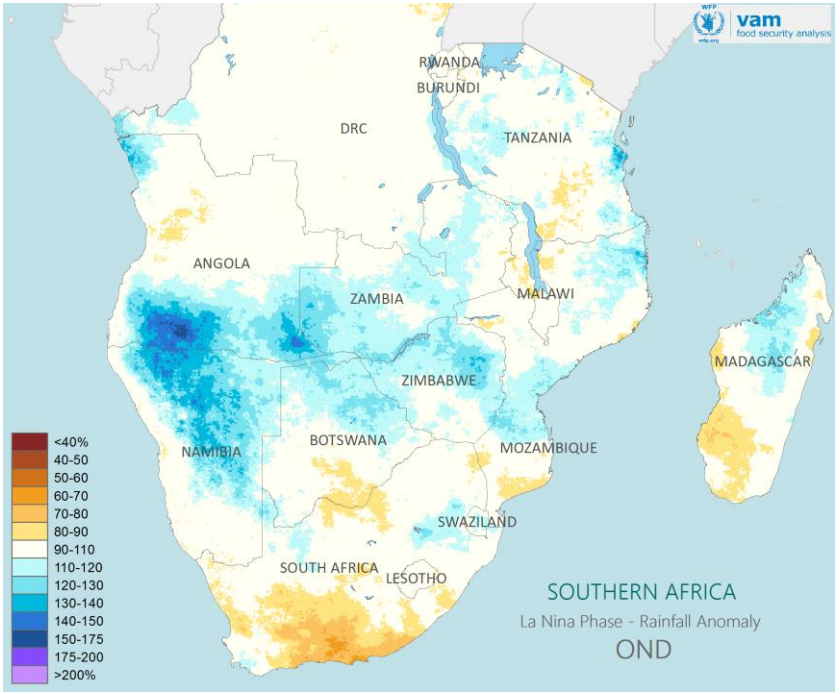
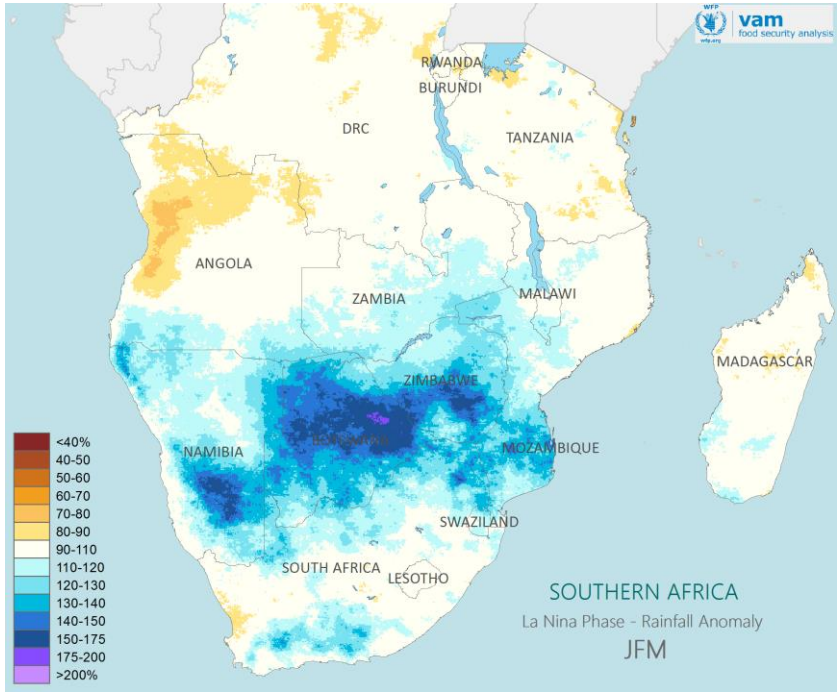
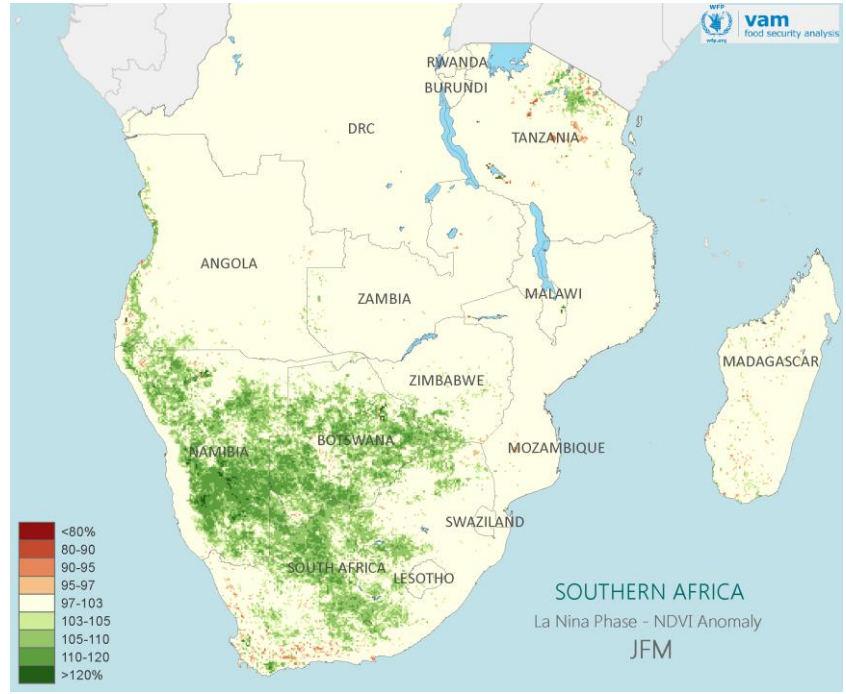
Southern Africa: Historical La Niña Effects



October-December rainfall during La Niña seasons as a percent of the average in neutral seasons.



January-March rainfall during La Niña seasons as a percent of the average in neutral seasons.



January-March NDVI during La Niña seasons as a percent of the average in neutral seasons.

Blues or Greens for La Niña above neutral, yellows or browns for La Niña below neutral.

Expectations from the historical record:

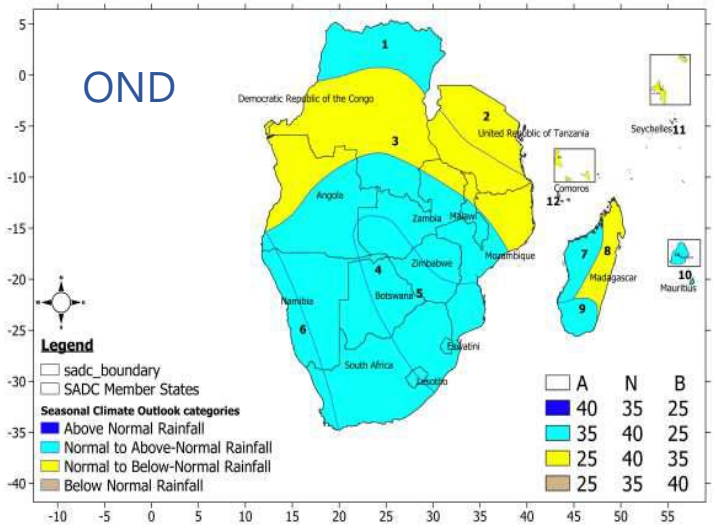
Based on analysis of long term rainfall and vegetation data records, the general effect of La Niña in this region is to enhance rainfall throughout the season, relative to neutral seasons. In the early season (Oct-Dec, map above left), the effect extends from Namibia, southern Angola and into Zambia, Zimbabwe and Mozambique. In South Africa, there is a tendency for drier than average conditions in the south of the country.

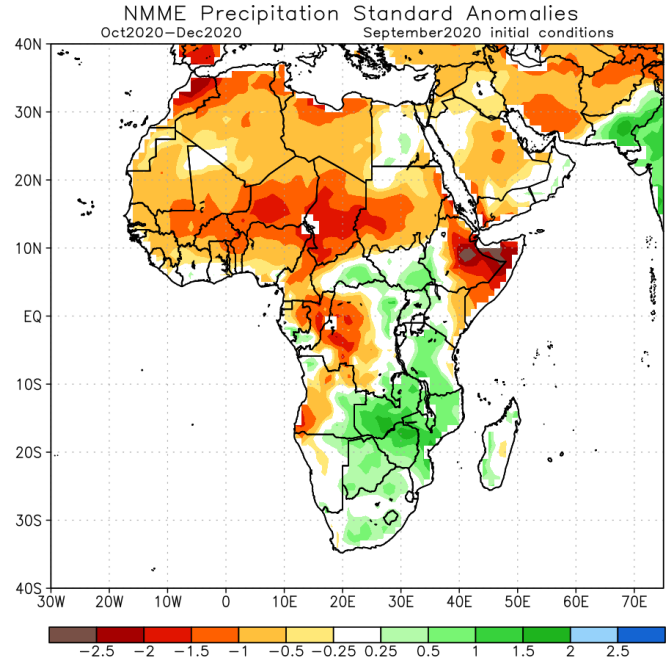
This tendency for enhanced rainfall becomes stronger in the mid stages of the season (Jan-March, map above middle) when wetter than average conditions expand across a wider area and intensify. Only in NW Angola there are some signs of drier conditions.

These historical tendencies for wetter than average conditions during La Niña seasons are clearly reflected in the historical vegetation response: areas of enhanced rainfall also show denser than usual vegetation cover (areas in green, map above right).

Hence, based on historical data, the expectation is for a favourable growing season with abundant and timely rainfall, leading to optimistic perspectives for crop production and pastoral resources. This is balanced by an enhanced flood risk across major river basins of the region.

Southern Africa: Seasonal Forecasts





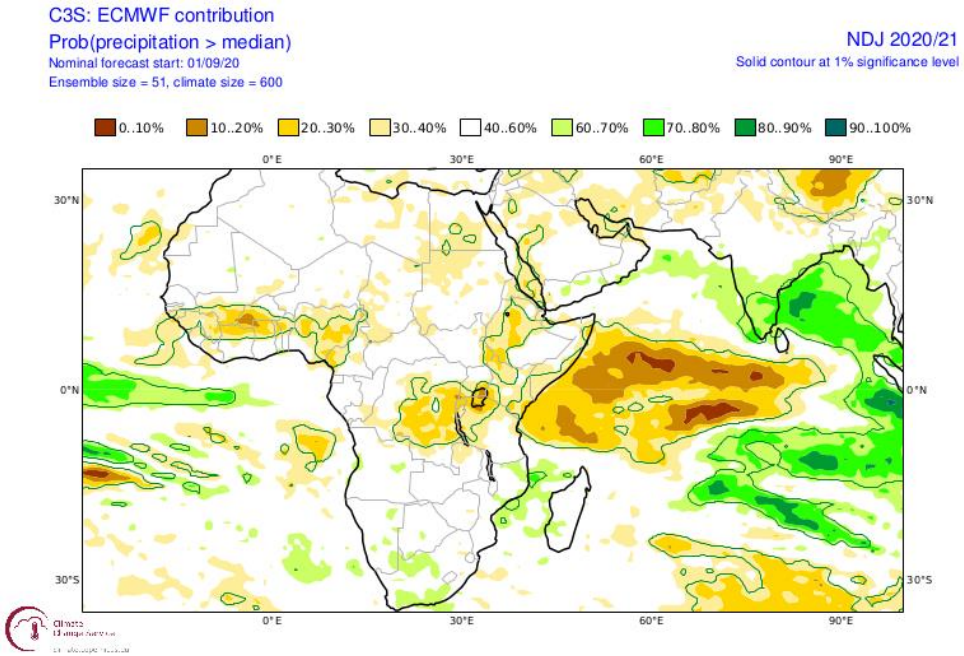
Early Season: October-January

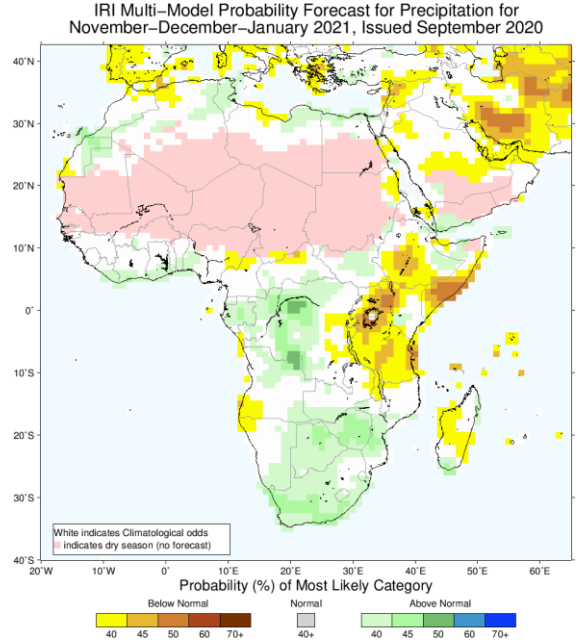
Available seasonal forecasts overall indicate average or moderately above average rainfall for the first half of the Southern Africa rainfall season. ECMWF (and other models) and SADC consensus outlook indicate average conditions, while models from IRI and CPC point to above average rainfall.

Outlook:

The outlook for the early stages of the agricultural season is moderately favourable with suitable conditions for planting and early crop development.

A similar outlook applies to pastoral resources; areas affected by drought in the previous season should now see a degree of recovery.





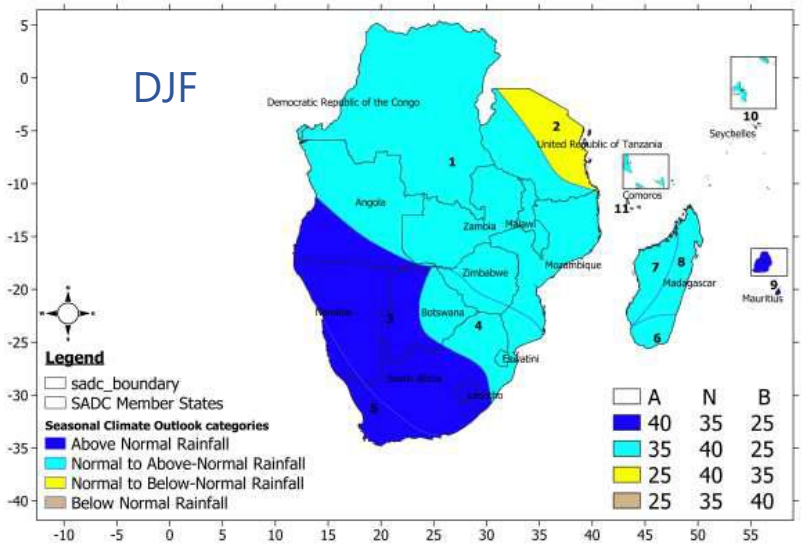
Above left: SADC Consensus Outlook for Oct-Dec rainfall in southern Africa. Drier than average conditions expected in yellow areas, wetter than or close to average in blue areas.

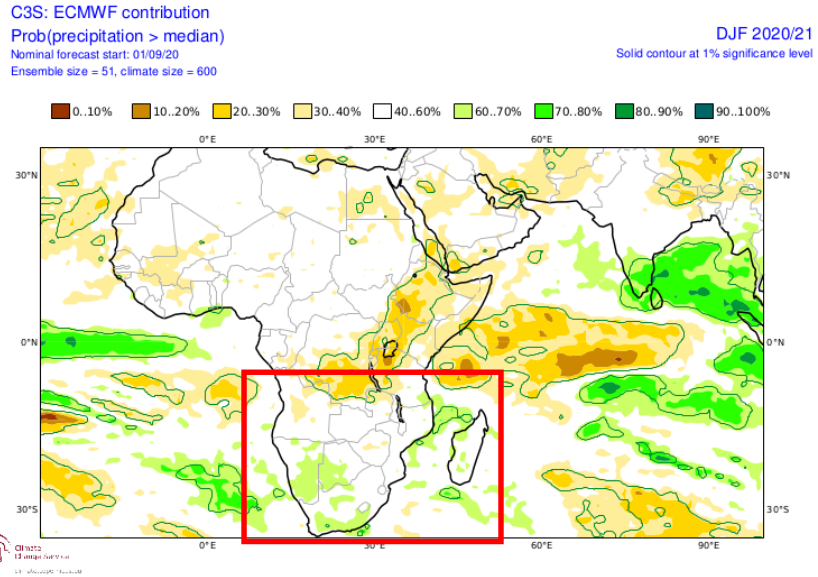
Below left: NMME Oct-Dec rainfall anomaly – green for wetter than average, browns for drier than average.

Above right: ECMWF, Likelihood of Nov-Jan rainfall being above median – green for wetter than median, reds for drier than median.

Below right: IRI, Most likely Category for Nov-Jan rainfall – green for wetter than average, browns for drier than normal.

Southern Africa: Seasonal Forecasts





Mid Season: December to March

Available seasonal forecasts indicate overall moderately above to close to average rainfall for the core (mid) period of the Southern Africa rainfall season. All models are in broad agreement with each other.

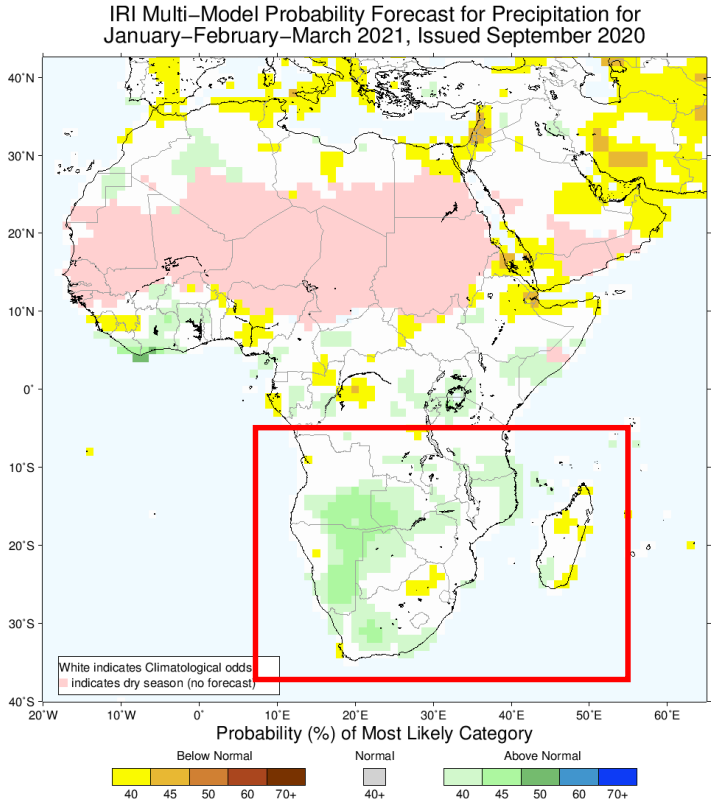
The majority of models show the most favourable tendencies happening in the western areas of the region, western South Africa, Namibia, Botswana and parts of Angola. Close to normal conditions are forecast for the rest of the region.

Outlook:

These tendencies lead to a favourable outlook for the current season: Good conditions in the early season are likely to be followed by favourable mid-season rainfall. Agricultural production should reach average levels at least and good conditions for pastoral livelihoods are expected.

These forecasts have a downside of increased flood risk in case of prolonged heavy rainfall.

Note that these are broad tendencies at 3 month scales. Favourable tendencies do not preclude the occurrence of sharply dry episodes.



Southern Africa: Crop Production vs ENSO

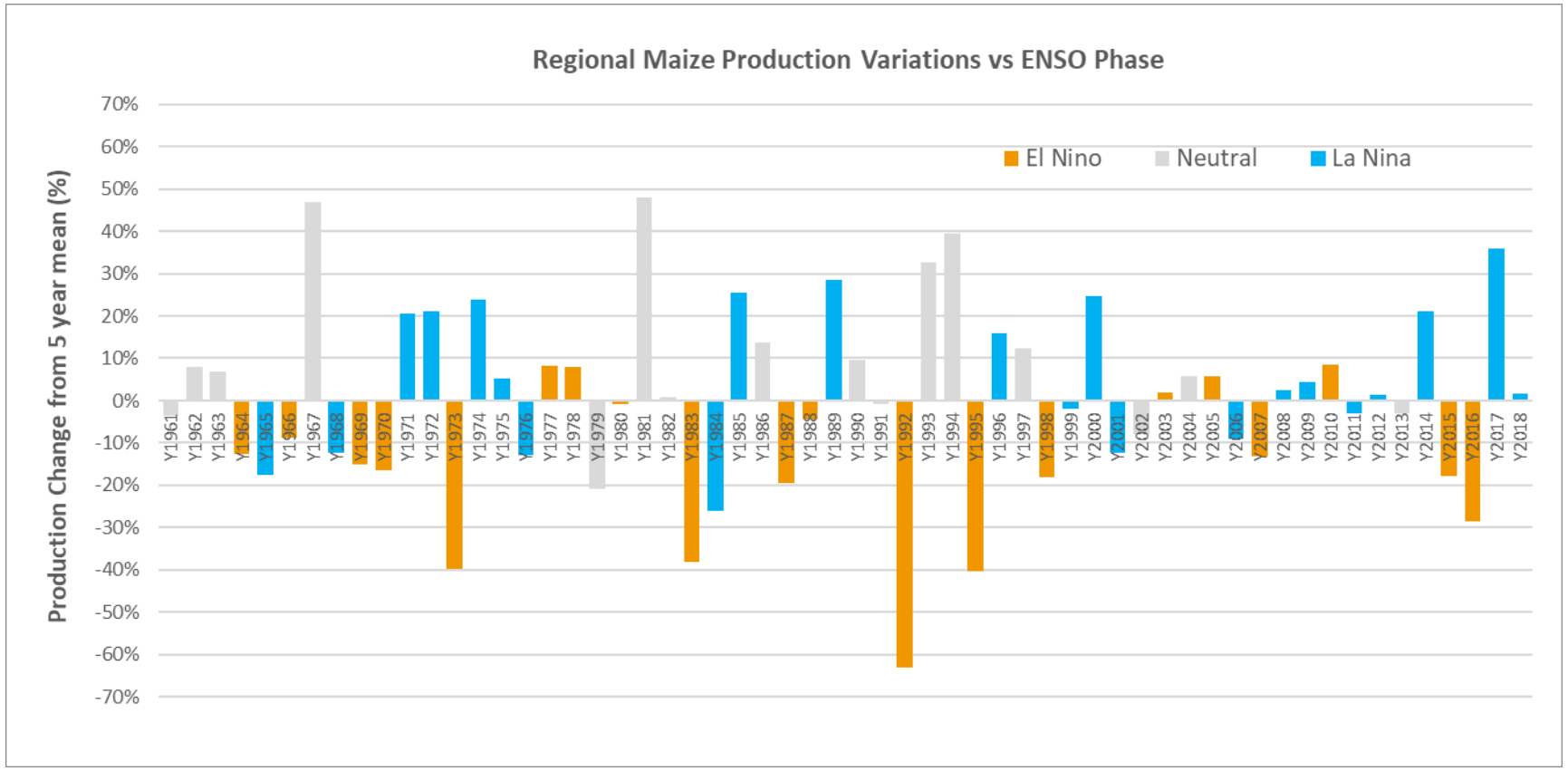


Chart showing variations in regional maize production from a 5 year mean colour coded according to the ENSO phase of the producing season. Regional production is based on data from South Africa, Zambia, Zimbabwe, Mozambique and Malawi.

ENSO events have a well defined impact on crop production at regional scale.

The chart above shows variations in regional maize production from the 5 year mean colour coded according to the ENSO phase affecting the growing season. Drops in production (negative variations in orange) are mostly associated with El Nino events. The reverse is true for increases in production (positive variations in blue) which are associated with La Nina events.

However, the magnitude of the production drops is not well related to the magnitude of the ENSO event. Out of the countries that contribute to the regional total, South Africa is the one for which production variations are more closely tied to ENSO phase.

This historical data contributes to expectations of a favourable maize production for the region as a whole and for most of the major producing countries – the link of maize production to ENSO is stronger for the major producer and for Zimbabwe.

Therefore there are better perspectives for the lean period of late 2021, given likely improvement in regional and national maize stocks.

East Africa:

Risk of Back to Back Droughts

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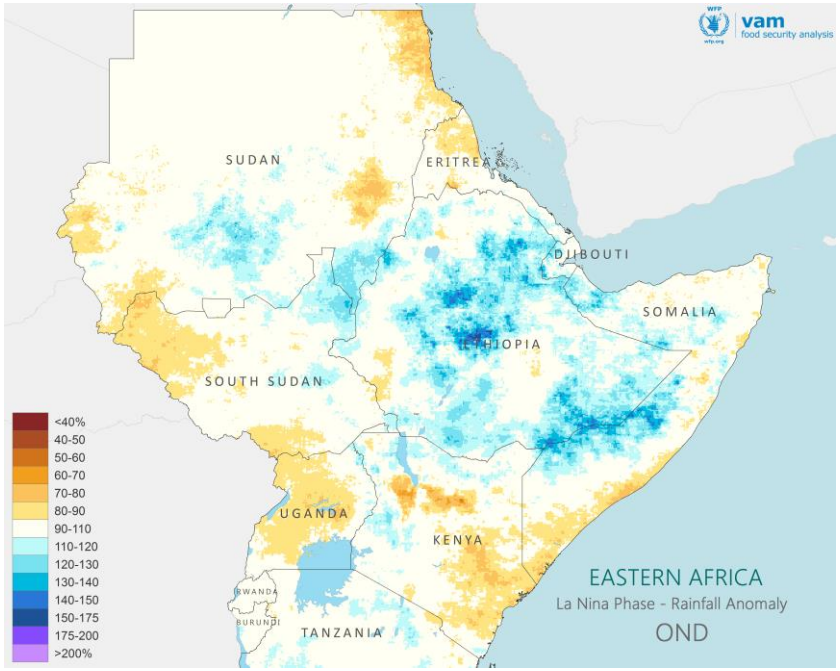
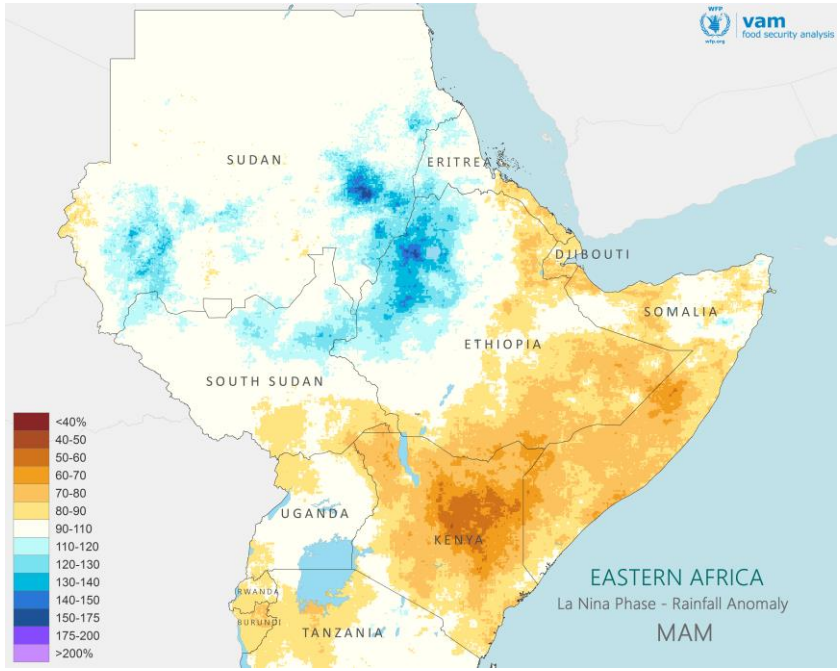
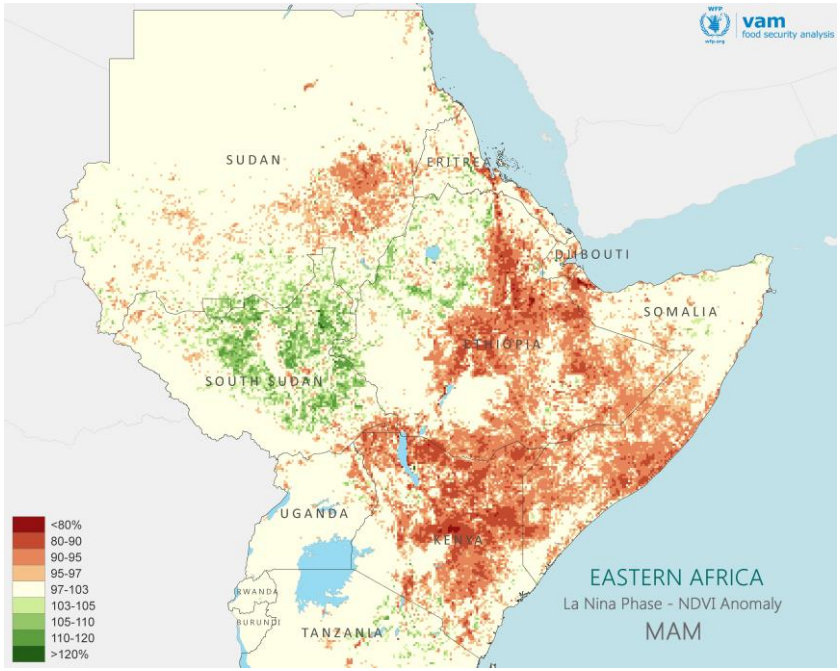
East Africa: Historical La Niña Effects



October-December rainfall during La Niña seasons as a percent of the average in neutral seasons.



March-May rainfall during La Niña seasons as a percent of the average in neutral seasons.



March-May NDVI during La Niña seasons as a percent of the average in neutral seasons.

Blues or Greens for La Niña wetter/greener than neutral, yellows or reds for La Niña drier or less green than neutral seasons.

Expectations from the historical record:

East Africa has two rainfall seasons, the Short Rains (Deyr) from October to December and the Long Rains (Gu) from March to May. In areas where rainfall is spread along the year, these remain the wettest periods of the year.

Based on long term rainfall and vegetation data records, the general effect of La Niña in this region is to decrease rainfall compared to neutral seasons. For the Short rains (Oct-Dec) the effect is most pronounced along SE Somalia and eastern Kenya, Uganda and areas of Eritrea and coastal Sudan.

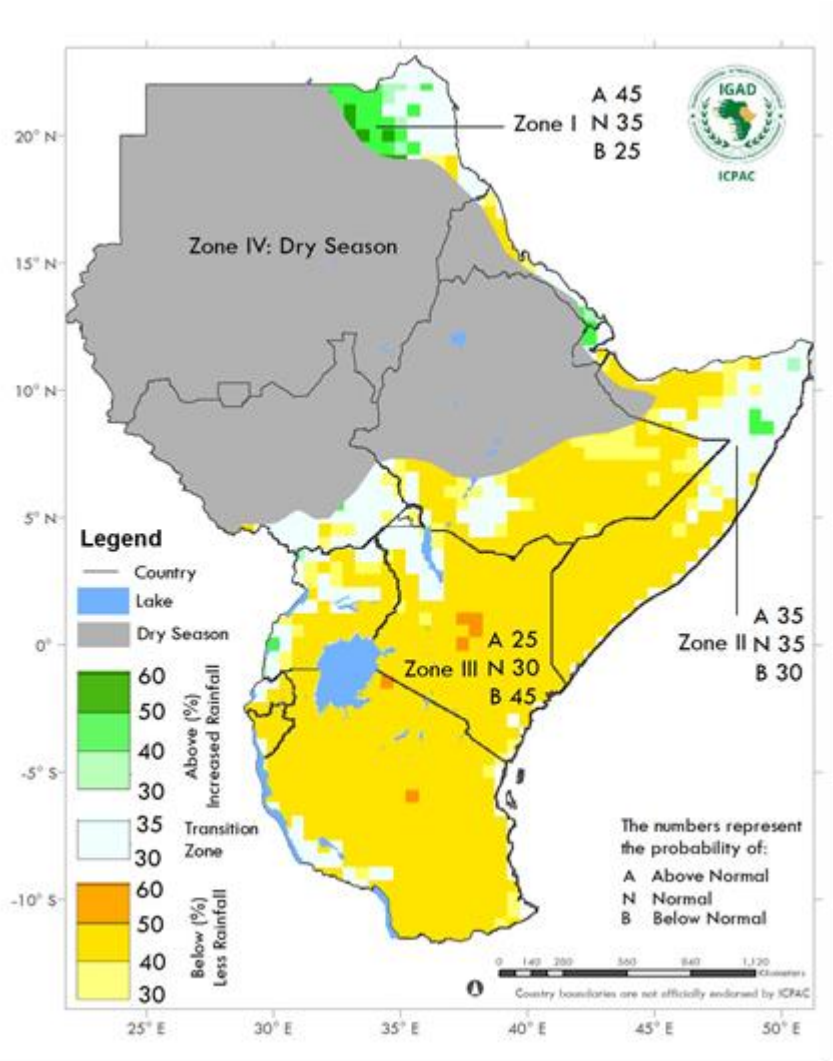
For the Long Rains (Gu) of March to May, this tendency for decreased rainfall is stronger and more widespread mainly affecting the whole of Kenya, SE Ethiopia and Afar and most of Somalia.

Vegetation levels in La Niña seasons reflect this drier tendency: NDVI during March-May is markedly depressed relative to neutral seasons (areas in red, map above right).

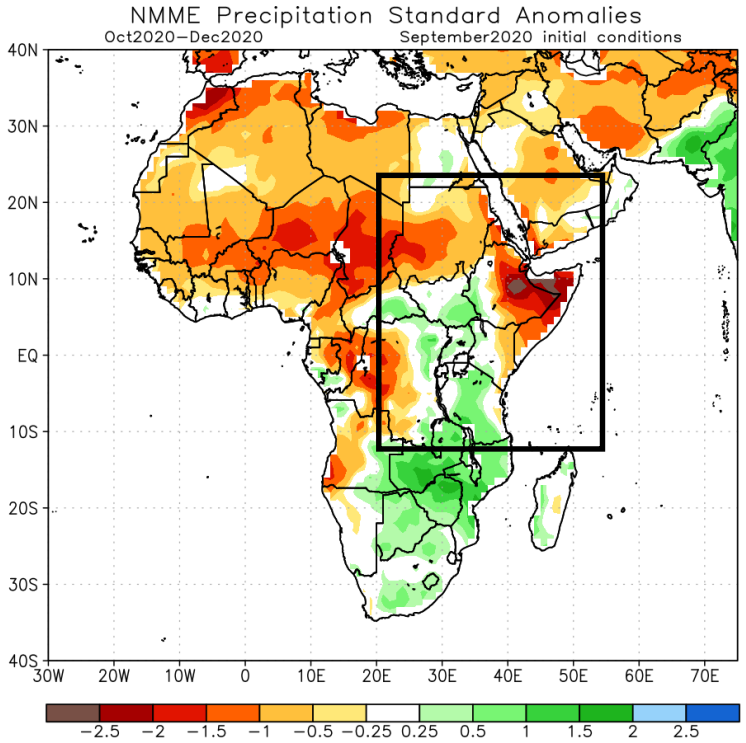
Hence, based on the historical data, the expectation for East Africa is for drier than average conditions for both rainfall seasons, with stronger tendencies in the Long Rains season (March-May).

This leads to pessimistic perspectives for crop production and pastoral resources, likely affecting both rainfall seasons.

Eastern Africa: Deyr/Short Rains Seasonal Forecasts



GHACOF Seasonal forecast for Oct-Dec rainfall in East Africa.
Greens denote areas of on or above average rainfall, Yellows areas of below average rainfall



NMME Oct-Dec rainfall anomaly – green for wetter than average, reds for drier than average.

Seasonal forecasts for the Short Rains are unanimously indicating drier than average conditions during this period. Differences between forecasts are only in the degree of the likely rainfall deficits.

Hence from both current forecasts and historical data, the most likely scenario is for drier than average conditions throughout the Short Rains seasons. Crop production and pastoral resources will therefore be negatively impacted.

While the Short Rains are a secondary season in terms of crop production, they play an important role of supporting agricultural and pastoral livelihoods right after the long dry season and improving soil moisture reserves.

The likely poor performance of the coming Short Rains follows a depressed crop production in the previous season of March-May 2020 as a result of flooding and desert locust infestation.

A poor Short Rains season will lead to worsening food security conditions as a result of enhanced vulnerability from the impact of poor crop production and Covid-19 related economic fallout.

Eastern Africa: Gu/Long Rains Perspectives

Available seasonal forecasts do not yet cover the Long Rains of March-May 2021, so forecast guidance is not available.

Historical data shows that low March-May (MAM) rainfall is a feature of La Nina seasons: across large parts of the region, seasonal rainfall reaches only 80-70% of the average down to only 50-60% in some hot-spots.

Another line of work offers predictive indications on the outcomes of the Long Rains season. This is based on analysis by scientists at the Climate Hazards Centre (Univ California, Sta Barbara), indicating that certain specific sea surface temperature (SST) patterns can amplify modest La Niña-like conditions and help produce droughts extending over both Short and Long Rains seasons (see links below).

The analysis indicates that March-May 2021 may also be drier than usual. This is based on a number of considerations: SST patterns around that time are forecast to be similar to those that have driven rainfall deficits in the past. MAM rainfall has been in a long term decline even if punctuated by exceptionally wet seasons arising from increasing inter-annual variability.

Note that these predictions apply only to eastern Kenya, SE Ethiopia and southern-central Somalia, **not** to the wider East Africa region.

Even if these March-May perspectives are tentative, they warrant serious consideration given the context in which a poor outcome of the Long Rains season would take place.

If indeed the March-May rains are unfavourable and assuming a poor performance of the Short Rains as given, this area of East Africa will have endured three seasons with poor agricultural and pastoral performance. This will further increase food insecurity levels in the region and place vulnerable populations in great risk at the outset of the long dry season of June-October 2021.

https://blog.chc.ucsb.edu/?p=774, https://blog.chc.ucsb.edu/?p=790, https://blog.chc.ucsb.edu/?p=868

Examining the role of unusually warm Indo-Pacific sea-surface temperatures in recent African droughts, Funk et al, 2016, Quart Journal Royal Met. Society

Other Regions

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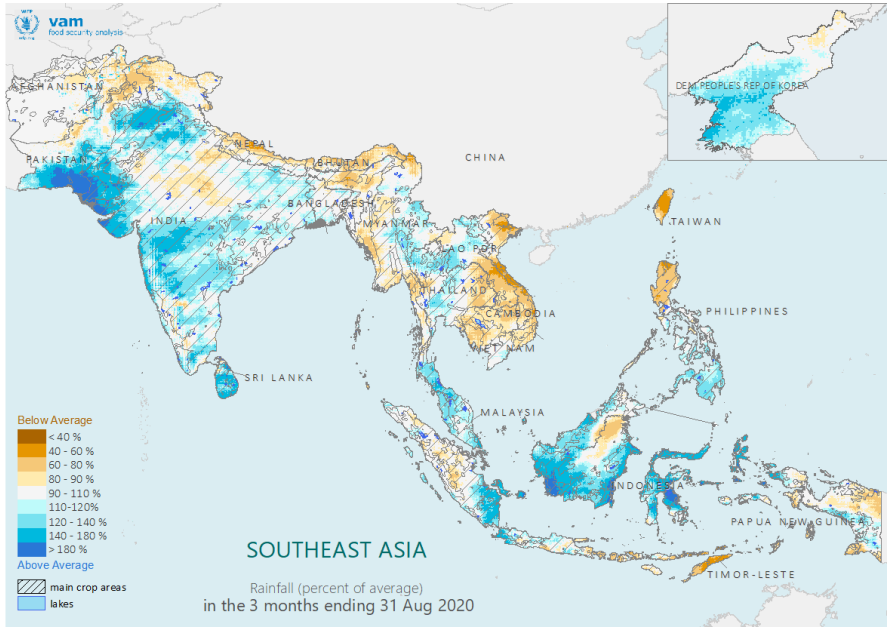
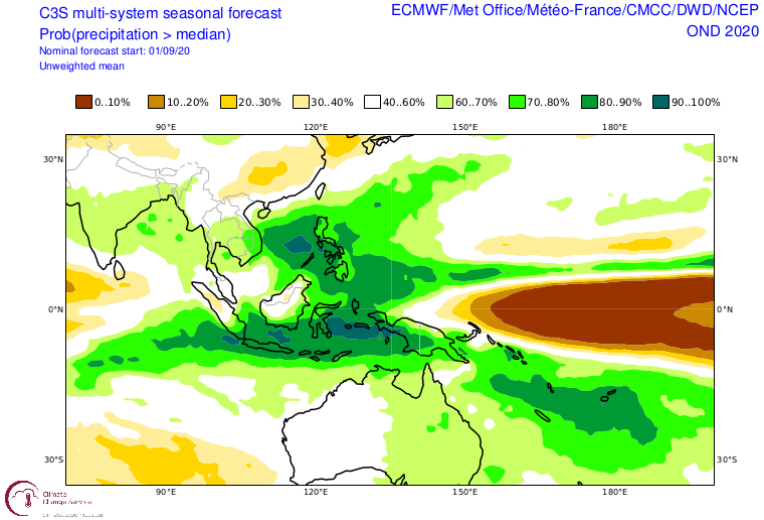
SE Asia: La Niña Summary Outlook



June-August 2020 rainfall as a percent of average. Blue shades for wetter than average, orange shades for drier than average.



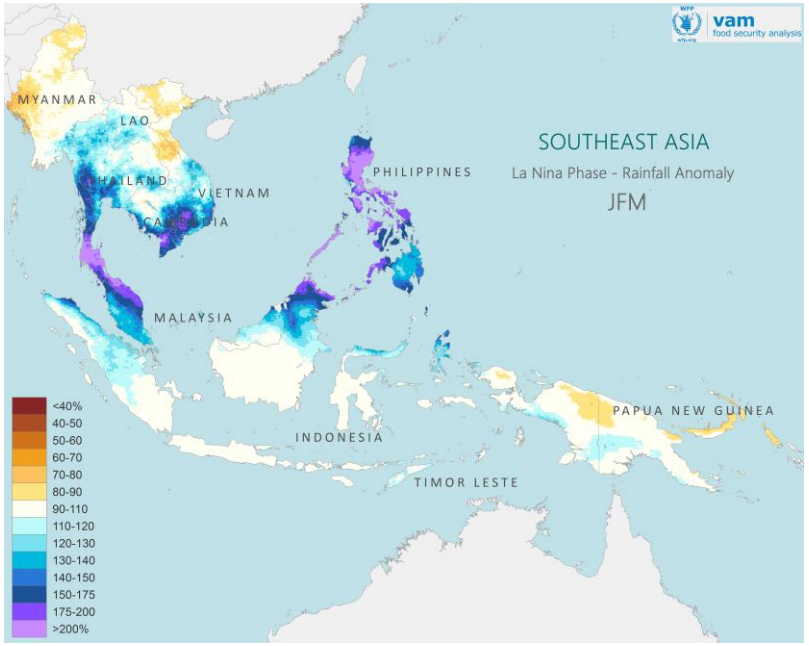
Rainfall forecasts for Oct-Dec 2020 rainfall. Orange shades for drier than average, greens for wetter than average

Typically, La Nina leads to wetter than average conditions across Indonesia, Philippines, Papua New Guinea and the Pacific Islands. Seasonal forecasts for the last quarter of 2020 are consistent with this tendency (map above right).

The season so far in Asia has been variable with good conditions in Pakistan and India, Malaysia and Thailand. A drier season affected Myanmar and eastern areas of SE Asia (Cambodia and Vietnam). However, for these regions, most forecasts indicate moderately above average rainfall for the later part of 2020.

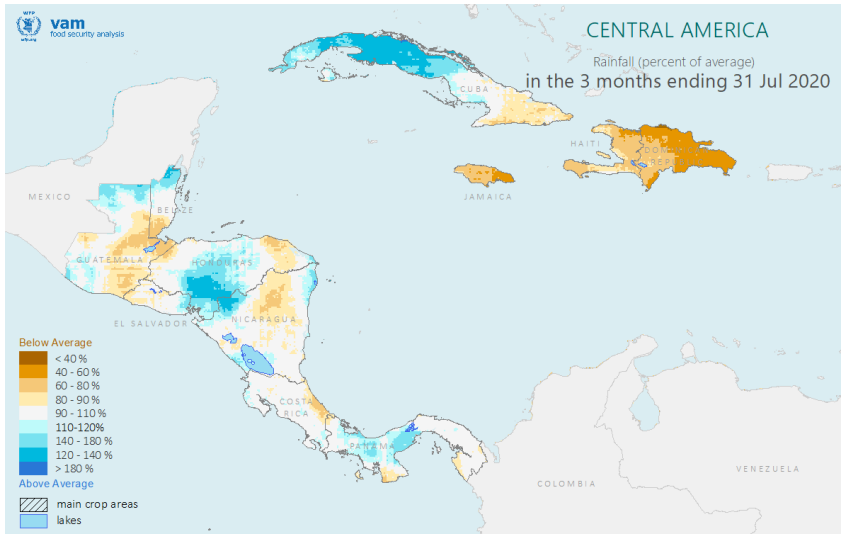
Indonesia and southern Philippines already had a wetter than average seasonal drier period in mid 2020; the main season will start in a month or so and most likely will be wetter than average throughout its duration. The historical La Nina rainfall for Oct-Dec shows rainfall enhancement around Indonesia; for early 2021, similar enhancement is seen but more towards Malaysia, northern Borneo, Philippines.

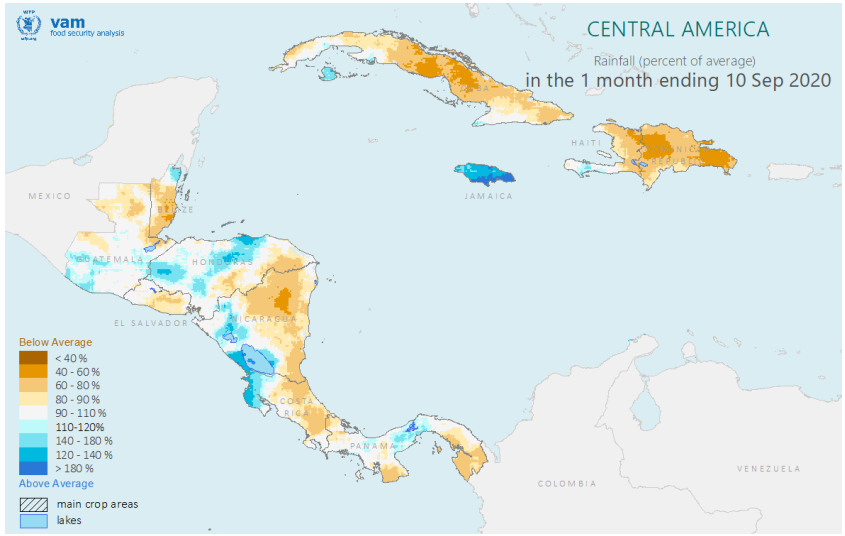
This outlook implies that good conditions for crop production but with a downside of flood and flash flood hazards being more likely in the next six to eight months.



Average Jan-March rainfall in La Nina seasons as a percent of the average in neutral seasons. Blue shades for wetter than neutral, orange shades for drier than neutral

Central America: La Niña Summary Outlook





May-July 2020 rainfall (above) and one month rainfall to Sept 10 (below) as a percent of average. Blue shades wetter than average. Browns for drier than average conditions.

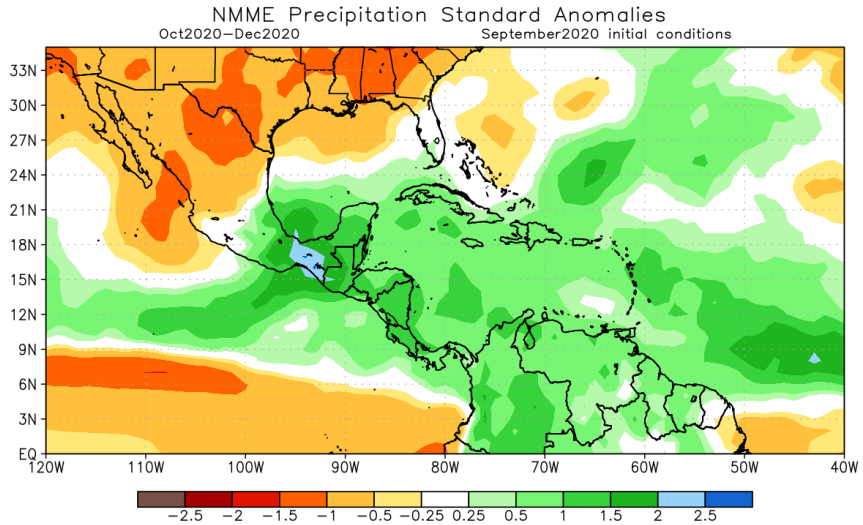
The current season has been variable across Central America and the Caribbean. For most of Central America, the Primera (first) season has developed broadly in normal terms, but significant rainfall deficits have affected Haiti (map above left).

The initial stages of the Postrera season have been generally drier than average particularly in western Nicaragua, Cuba and Haiti (map below left).

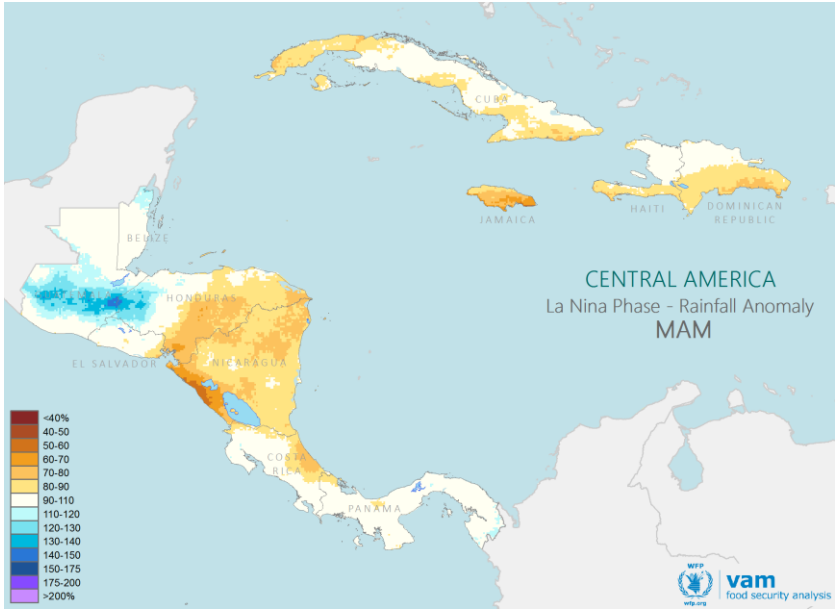
Conditions may improve soon, as nearly all seasonal forecasts indicate wetter than average conditions for the last quarter of 2020 (map above right). The main difference between forecasts is on the extent of the favourable rainfall; specifically whether it will include Cuba and Haiti, or whether these will instead be affected by the drier conditions forecast to predominate in more northern areas.

A major impact of La Nina has been a very active hurricane season with enhanced storm frequency.

In principle, the La Nina is not expected to last enough to affect the Primera season of mid 2021. In case it does, its very early stages tend to be drier than average, based on the historical data.



Rainfall forecasts for Oct-Dec 2020 rainfall. Orange shades for drier than average conditions, greens for wetter than average



Average March-May rainfall during La Nina seasons as a percent of the average in neutral seasons.
Blue shades for wetter than neutral, orange shades for drier than neutral

DATA SOURCES:

Rainfall: CHIRPS, Climate Hazards Group, UCSB
Vegetation: MODIS NDVI, EOSDIS-NASA
Land Cover: ESA CCI

PROCESSING:

VAM software components, ArcGIS

FOR FURTHER INFORMATION:

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