El Nino: Outlook 2018

World Food Programme

WFP VAM | Food Security Analysis
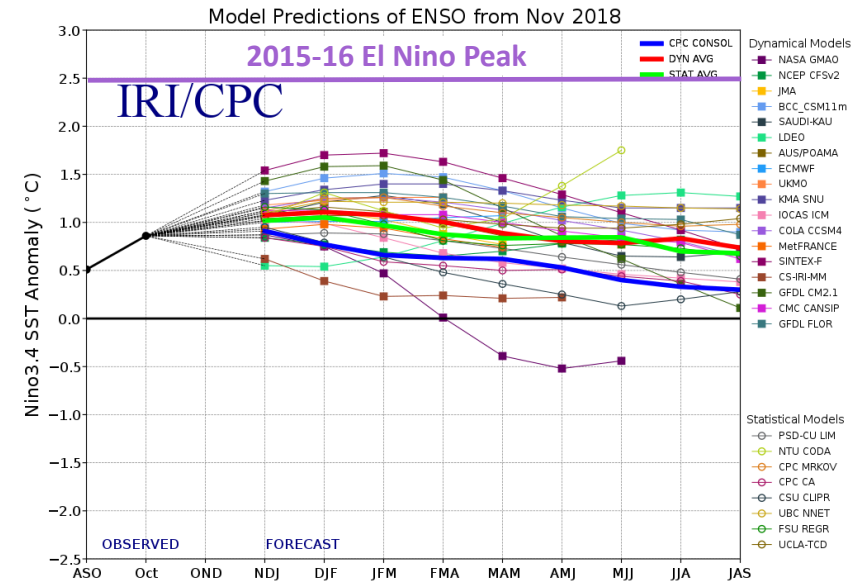
El Nino Outlook – December 2018
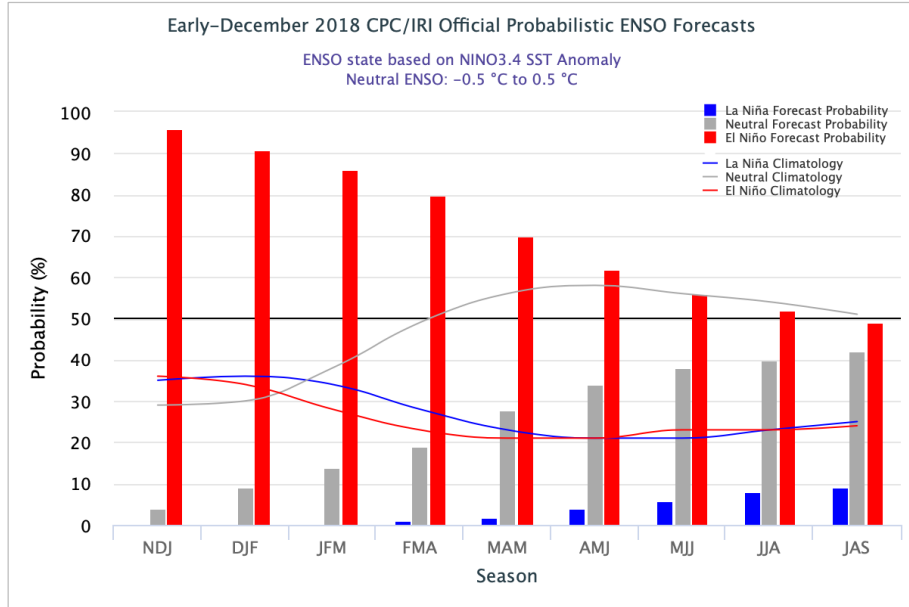
CPC/IRI ENSO Forecast from early December.
Red bars denote probability of an El Nino developing in the near future

Possible evolution of an El Nino indicator (Pacific sea surface temperature anomaly) generated by a diverse number and types of forecast models.
Red line shows the average of dynamical forecasts, green line shows the average of the statistical models
The maximum level of this indicator for the last El Nino of 2015-16 is shown as purple line (near the top of the plot)

Will an El Nino take place?

Current forecasts of Eastern Pacific sea surface temperatures (SST) and expert judgement point to a significant likelihood of an El Nino materializing: currently this stands at over 90% chance of it happening by early 2019.

How long is it likely to last and how intense is it likely to get?

Judging from the forecasts for how SST are likely to evolve, this El Nino, should it materialize, is likely to be relatively short and over by mid 2019. Based on the same evidence, and other features of the Pacific ocean circulation, it is likely to remain a weak to moderate El Nino, much weaker than the 2014-16 event.
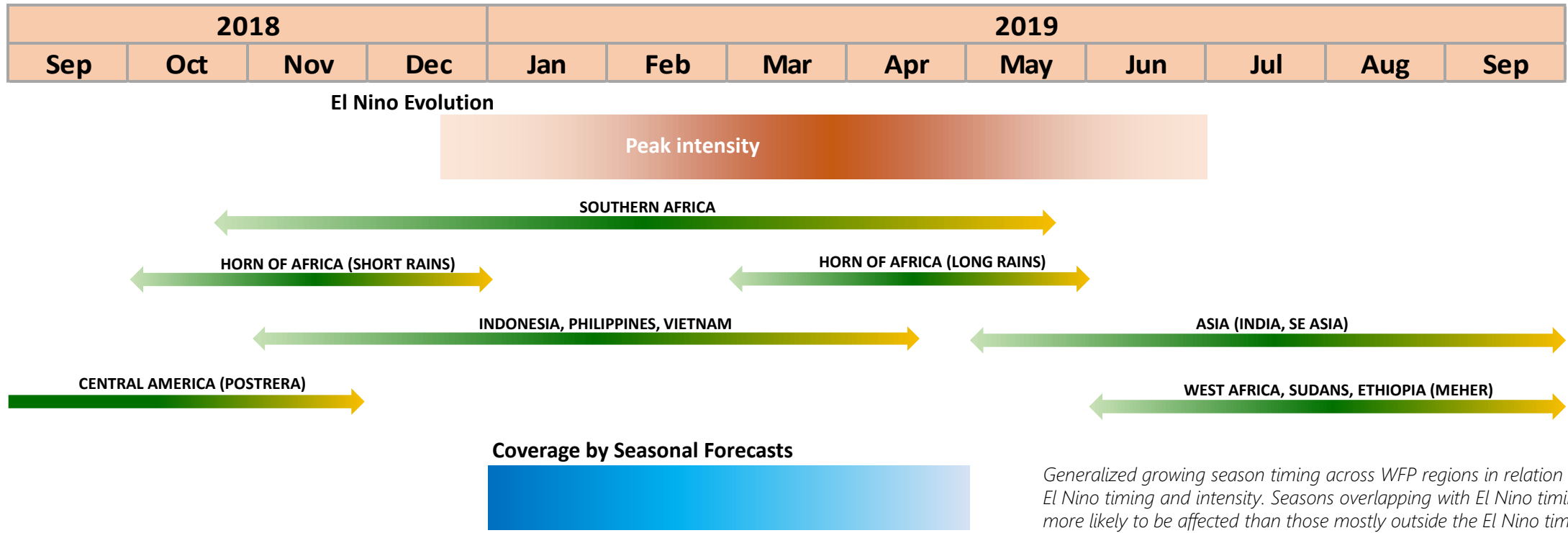
Is it possible it won't happen at all?

This remains a possibility. So far, although the Pacific Sea Surface Temperature patterns are in place, these have not yet "connected" properly to the atmosphere and the circulation patterns typical of El Ninos have not picked up enough for an El Nino to be declared.

If an El Nino is not declared, does it mean its impacts will not happen?

No. El Nino events are not on-off phenomena. An El Nino declaration is made based on a number of ocean and atmospheric features being in place. Even if these are not fully met and no El Nino is declared, you will be very close to it and therefore some areas of the globe may well experience impacts typical of "official" El Ninos.

We see this being played out in Southern Africa (typical El Nino-like situation), Indonesia (El Nino-lite features) and East Africa (outcomes opposite to typical El Nino). See ahead for details.

El Nino and Growing Seasons

2018				2019								
Sep	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**

El Nino Evolution

Peak intensity

SOUTHERN AFRICA

HORN OF AFRICA (SHORT RAINS)   HORN OF AFRICA (LONG RAINS)

INDONESIA, PHILIPPINES, VIETNAM   ASIA (INDIA, SE ASIA)

CENTRAL AMERICA (POSTRERA)   WEST AFRICA, SUDANS, ETHIOPIA (MEHER)

Coverage by Seasonal Forecasts

Generalized growing season timing across WFP regions in relation to likely El Nino timing and intensity. Seasons overlapping with El Nino timing are more likely to be affected than those mostly outside the El Nino timing.

Which regions will be impacted by a possible El Nino?

Current forecasts provide a tentative sketch of a likely El Nino timing: a start towards early 2019 and petering out by mid 2019, with peak intensity likely around February 2019.

Growing seasons whose timing overlaps with the El Nino timing are more likely to display typical El Nino impacts.
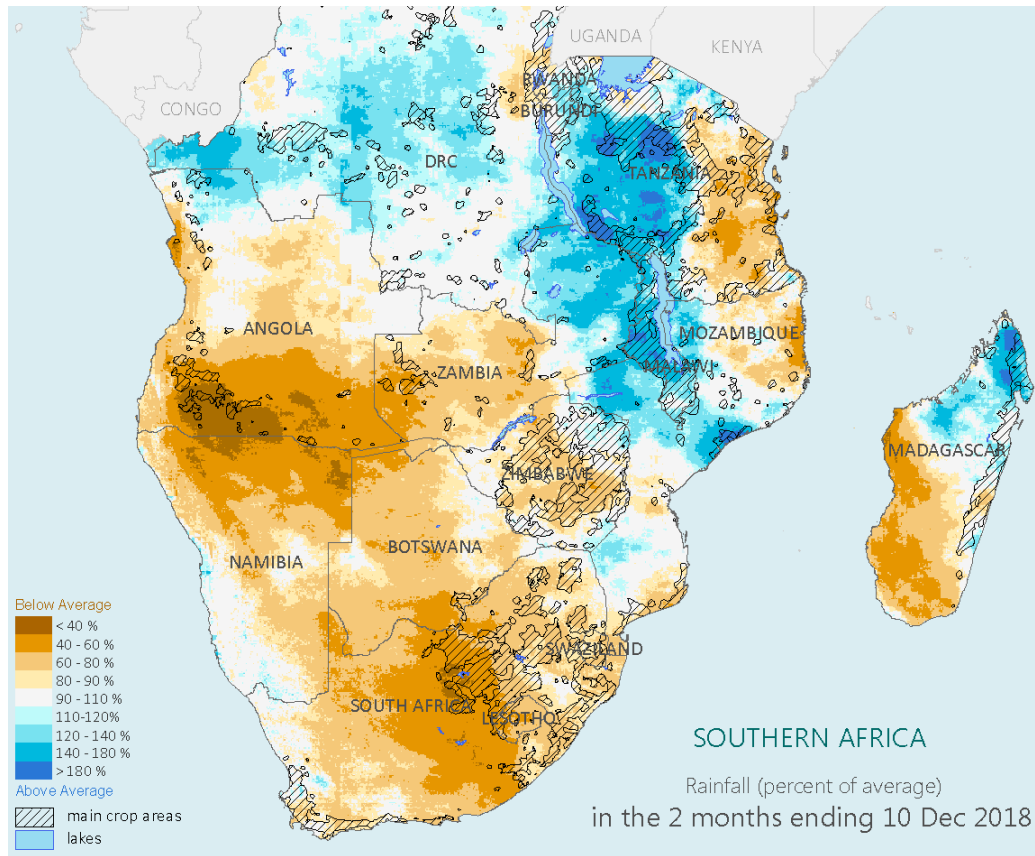
Based on these broad timings, the growing seasons most likely to be affected are:

- Southern Africa
- Indonesia and Philippines
- East Africa (Long Rains to a lesser degree)

Depending on exact timings and how the El Nino intensity develops, early stages of the monsoon season in SE Asia and possibly West Africa might be affected. Further impacts are only likely in case the situation evolves in ways not described by the current forecasts
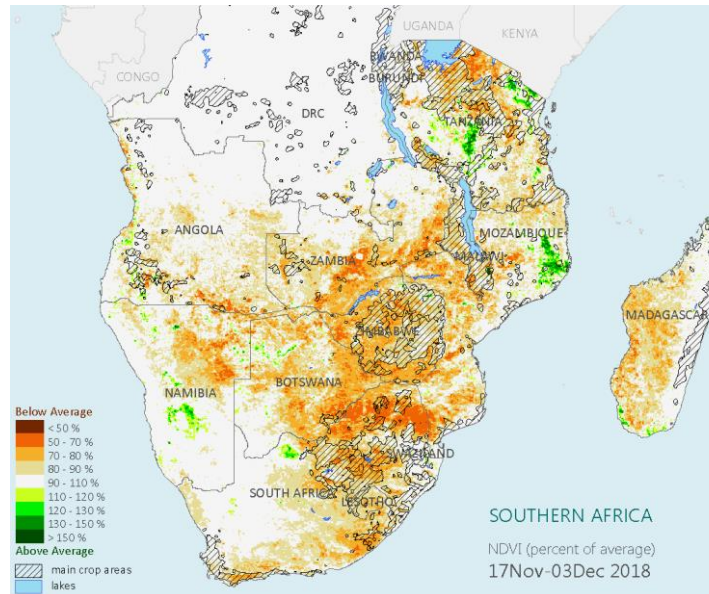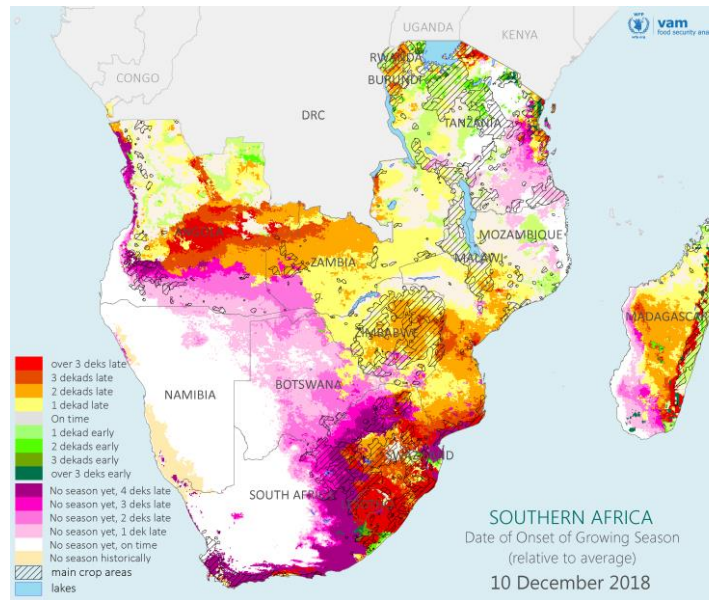
Southern Africa

Southern Africa: The Season So Far

SOUTHERN AFRICA

Rainfall (percent of average)
in the 2 months ending 10 Dec 2018

Below Average
- < 40 %
- 40 - 60 %
- 60 - 80 %
- 80 - 90 %
- 90 - 110 %
- 110-120%
- 120 - 140 %
- 140 - 180 %
- > 180 %

Above Average
- main crop areas
- lakes

SOUTHERN AFRICA
Date of Onset of Growing Season
(relative to average)
10 December 2018

- over 3 deks late
- 3 dekads late
- 2 dekads late
- 1 dekad late
- On time
- 1 dekad early
- 2 dekads early
- 3 dekads early
- over 3 deks early
- No season yet, 4 deks late
- No season yet, 3 deks late
- No season yet, 2 deks late
- No season yet, 1 dek late
- No season yet, on time
- No season yet, historically
- main crop areas
- lakes

SOUTHERN AFRICA

NDVI (percent of average)
17Nov-03Dec 2018

Below Average
- < 50 %
- 50 - 70 %
- 70 - 80 %
- 80 - 90 %
- 90 - 110 %
- 110 - 120 %
- 120 - 130 %
- 130 - 150 %
- > 150 %

Above Average
- main crop areas
- lakes

Above: Rainfall in the 2 months ending December 10 2018 as a percent of average. Brown shades for drier than average conditions, blue shades for wetter than average.

Upper Right : Start of season compared to average. Pinks and reds to yellows delayed season, green shades for seasons ahead of time

Lower Right: Vegetation in late November 2018 as a percent of average. Orange shades for lower than average, green shades for above average.

Current Situation: Drier than average conditions prevailed across the whole Southern Africa region until mid November. However, in the past three weeks broad areas from western Tanzania, Malawi, NE Zambia and central Mozambique have received regular and abundant rains, wiping out early season moisture deficits.

In contrast, drier than average conditions remain from Namibia and southern Angola, across western Zambia, southern Zimbabwe and Botswana and into South Africa. Most of Madagascar is similarly affected: *see leftmost map.*

These regions are seeing widespread delays in the start of the growing season of up to 5-6 weeks in places (*map left above*), and severely affected vegetation development (*map lower left*).

Areas with recent good rainfall have seen only modest delays in planting and vegetation will make a significant recovery as a result.

Southern Africa: Outlook to the End of 2018

19 to 25/12/2018

26 to 31/12/2018
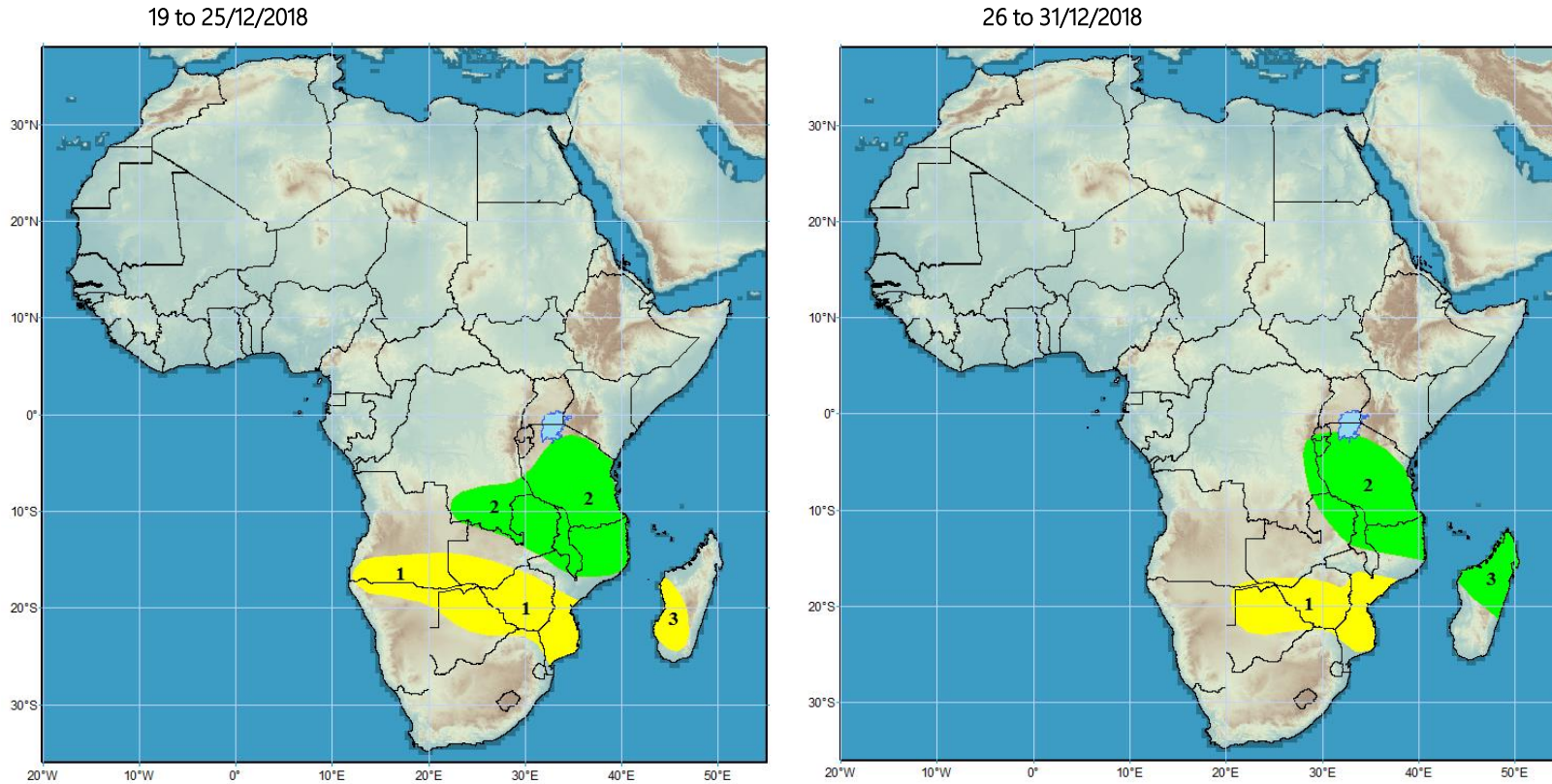
Summary Forecast for one week rainfall, 19 to 25/12 (left) and 26 to 31/12 (right)

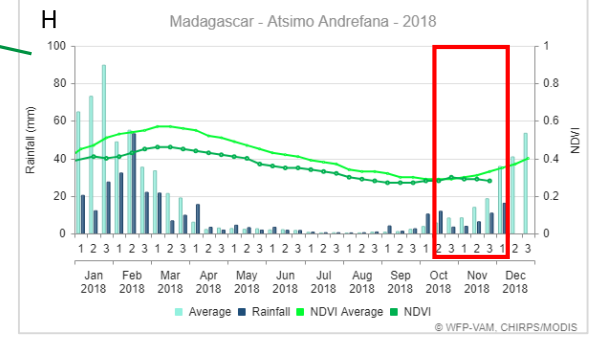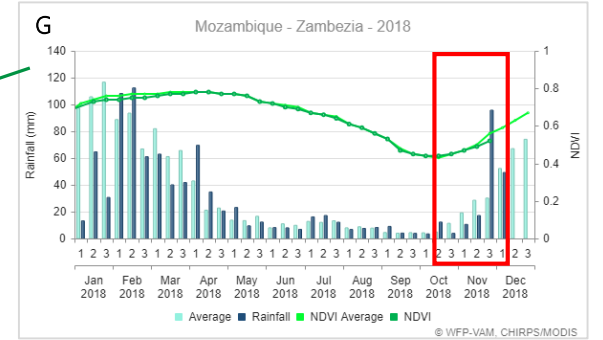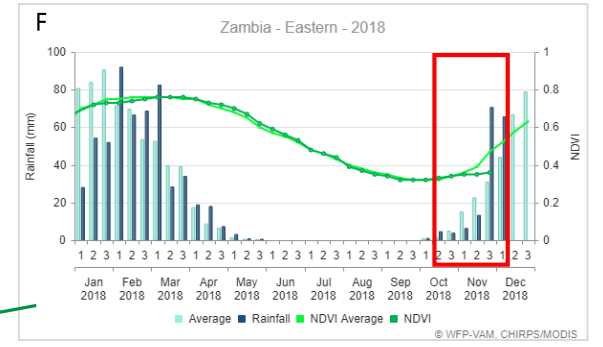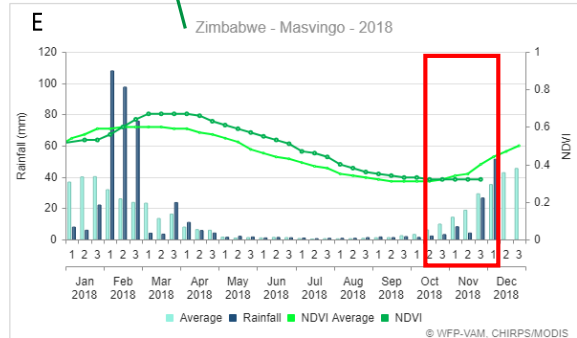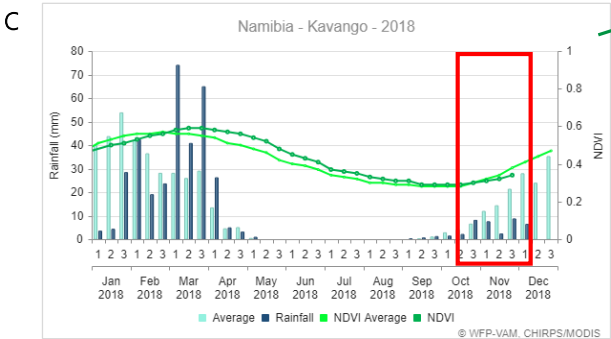*Green shades in the map denote areas under a tendency for wetter than average rainfall*
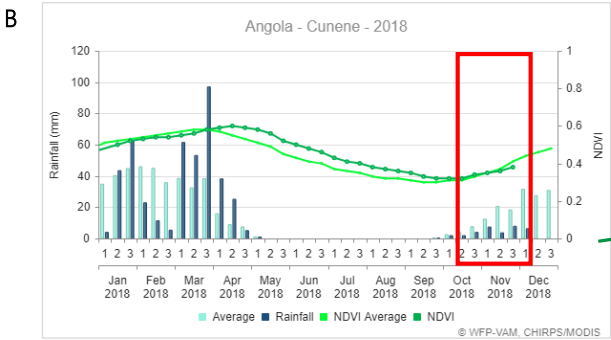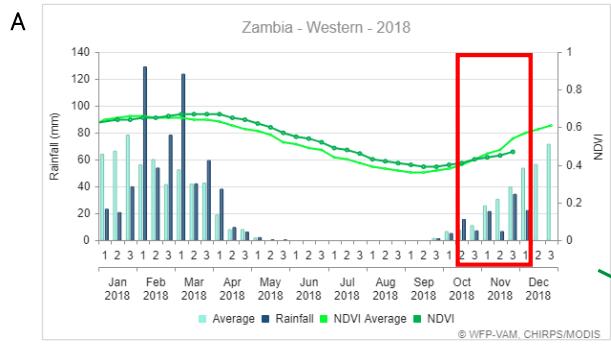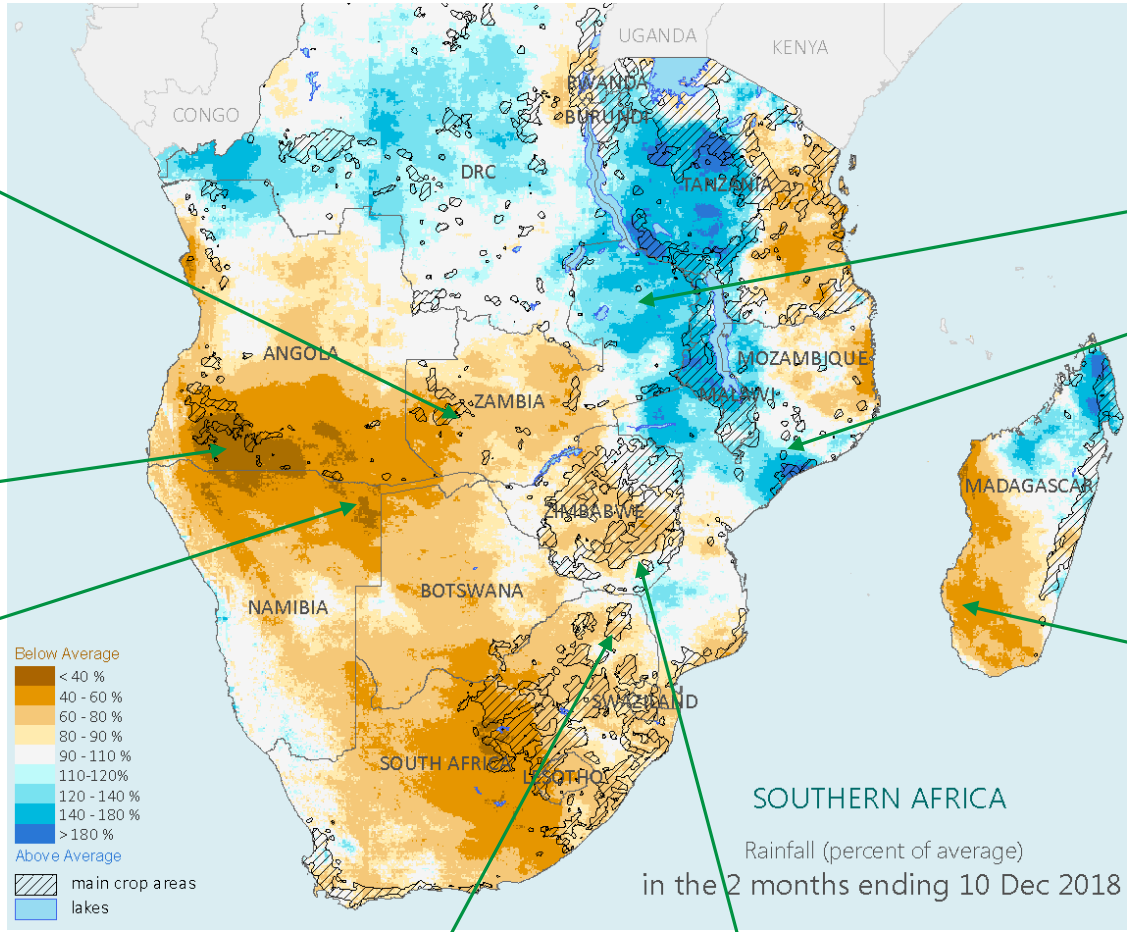
Yellow shades denote areas under a tendency for below average rainfall

Forecasts for the next 2 weeks, (source NOAA-CPC Africa Desk), indicate a reinforcement of the current patterns:

Wetter than average conditions continuing until the end of 2018 in Tanzania, northern Zambia, Malawi and Mozambique: This should provide continued good conditions for planting and early crop development.

Drier than average conditions continuing until the end of 2018 across Namibia, southern Angola, Botswana, southern Zimbabwe, southern Mozambique and NE South Africa, leading to further delays in the start of the growing season, failed plantings and worsening of pasture conditions.

Southern Africa: Main HotSpots

A Zambia - Western - 2018

B Angola - Cunene - 2018

C Namibia - Kavango - 2018

D South Africa - Limpopo - Cropland - 2018

E Zimbabwe - Masvingo - 2018

F Zambia - Eastern - 2018

G Mozambique - Zambezia - 2018

H Madagascar - Atsimo Andrefana - 2018

SOUTHERN AFRICA

Rainfall (percent of average)

in the 2 months ending 10 Dec 2018

Below Average
- < 40 %
- 40 - 60 %
- 60 - 80 %
- 80 - 90 %
- 90 - 110 %
- 110 - 120 %
- 120 - 140 %
- 140 - 180 %
- > 180 %

Above Average

- main crop areas
- lakes

A.B.C: Drier than average conditions since October, reduced vegetation cover, no sign of rainfall recovery

D.E: Drier than average conditions since October, poor and delayed early cropping season. Recent rainfall improvements in Zimbabwe may improve matters.

F.G: Recent abundant rainfall in E Zambia and central Mozambique will greatly improve conditions on the ground.

H: Very poor conditions in SW Madagascar

Seasonal rainfall plots for 2018 for Southern Africa).
Dark blue bars: actual rainfall, light blue bars: average rainfall.
Dark green lines: current NDVI, light green lines: average NDVI

Southern Africa: January-March Forecasts and El Nino Expectations

IRI Multi–Model Probability Forecast for Precipitation for January–February–March 2019, Issued December 2018

Probability (%) of Most Likely Category

White indicates Climatological odds
pink indicates dry season (no forecast)
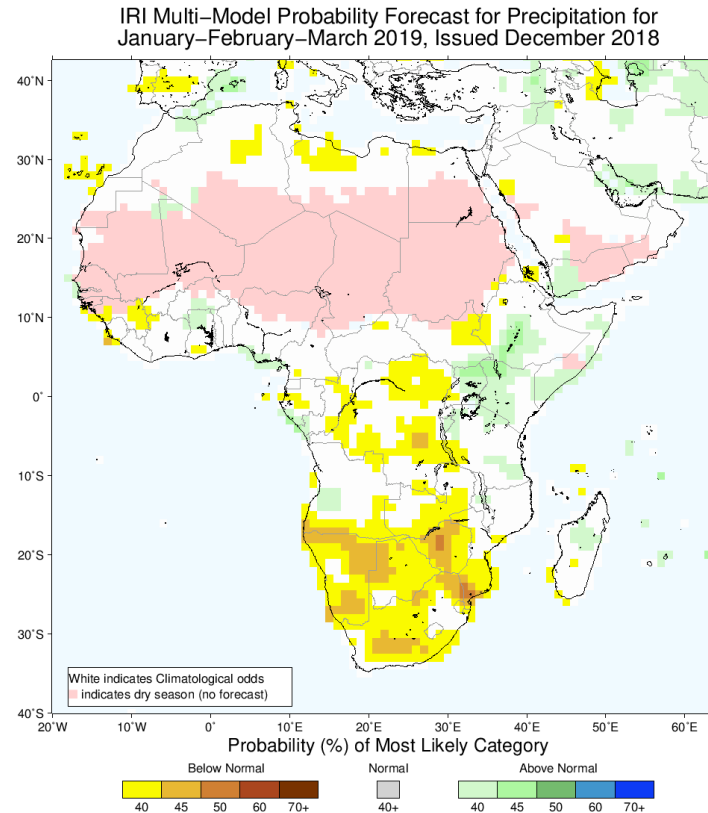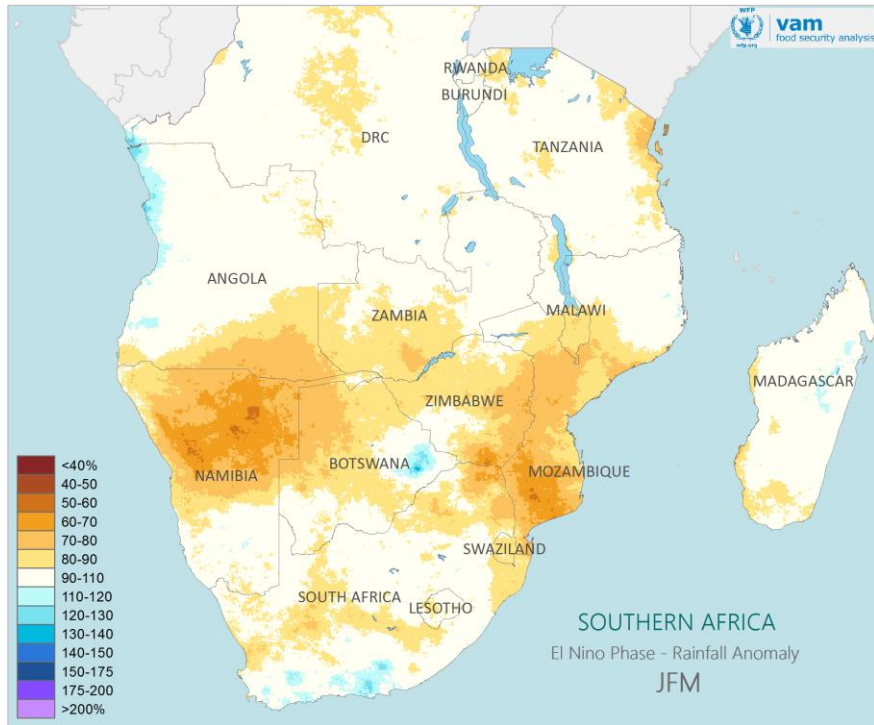
Left: Average January-March (left) total rainfall during El Nino seasons as a percent of the average in neutral seasons. Blue shades for El Nino wetter than neutral, orange shades for El Nino drier than neutral

Right: Seasonal forecast for January-March 2019 rainfall. Green and blue shades for wetter than usual conditions, orange shades for drier than usual conditions

January-March is the most sensitive period for staple crop development. Even moderate rainfall deficits if coincident with the flowering and grain filling stage of maize can have a disproportionate impact on crop production.

Expectations for Jan-Mar rainfall under El Nino conditions can be obtained by comparing the typical rainfall during El Nino seasons with that of neutral seasons. The map above left shows the result of such an analysis – El Nino events, on average, lead to extensive regional scale rainfall deficits, mostly affecting NE South Africa, south and central Mozambique, southern Malawi, most of Zimbabwe, SW Zambia as well as northern Namibia, southern Angola and western Botswana.

Besides the expectations based on historical data, current seasonal forecasts also point to drier than average conditions across most of the region for Jan to March 2019. This tendency is consistent across forecasts from a wide variety of sources (CPC, IRI, ECMWF) in spite of differences in the details.

Broadly speaking, areas currently under unfavourable conditions (Namibia, South Africa, parts of Zimbabwe and Mozambique) are likely to see these continue through the first quarter of 2019. Areas currently under favourable conditions (Tanzania, Malawi, NE Zambia and northern Mozambique) are expected to remain under close to average conditions.

Southern Africa: Regional Crop Production and El Nino

El Nino events have a well defined impact on crop production, even at regional scale.

The plot above shows variations in regional maize production from the 5 year mean colour coded according to the ENSO phase affecting the growing season: El Nino seasons are coded in orange, while La Nina seasons are coded in blue.

We see that negative variations are mostly associated with El Nino events (the majority are colour coded in orange), while positive variations with either neutral or La Nina seasons (grey and blue bars).

Out of the countries that contribute to the regional total, South Africa and Zimbabwe are the ones for which production variations are more closely tied to ENSO phase.

Depending on the impact on regional production and existing stocks, staple food prices in the following lean season (from late 2019) may rise enough to become a concern for food security of poor and vulnerable populations.

Information from FAO-GIEWS shows that in spite of production shortfalls in 2018, the 2017 record crop allowed countries to build high opening stocks for the 2018/19 marketing year. Hence there is capacity at regional level to buffer likely shortfalls in the 2019 crop production.
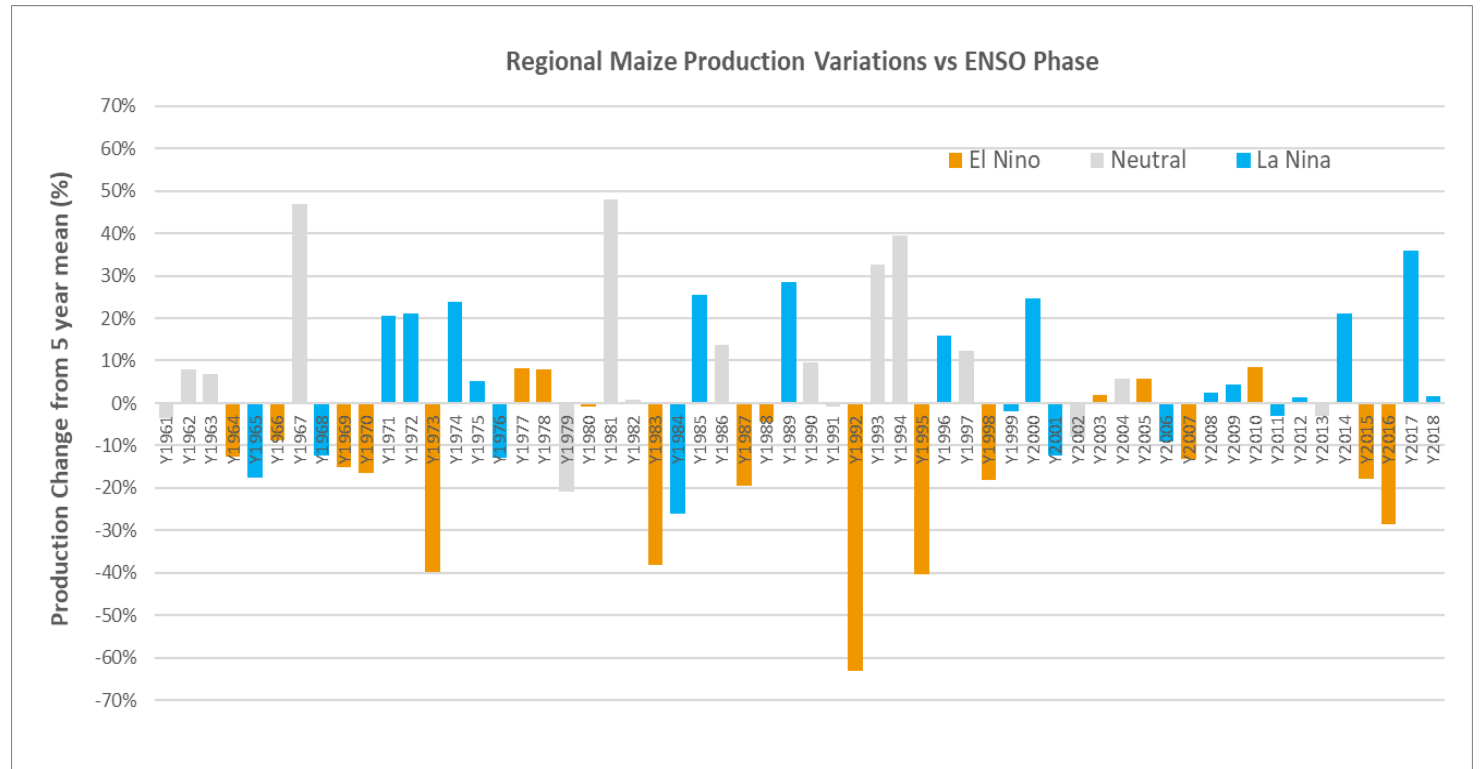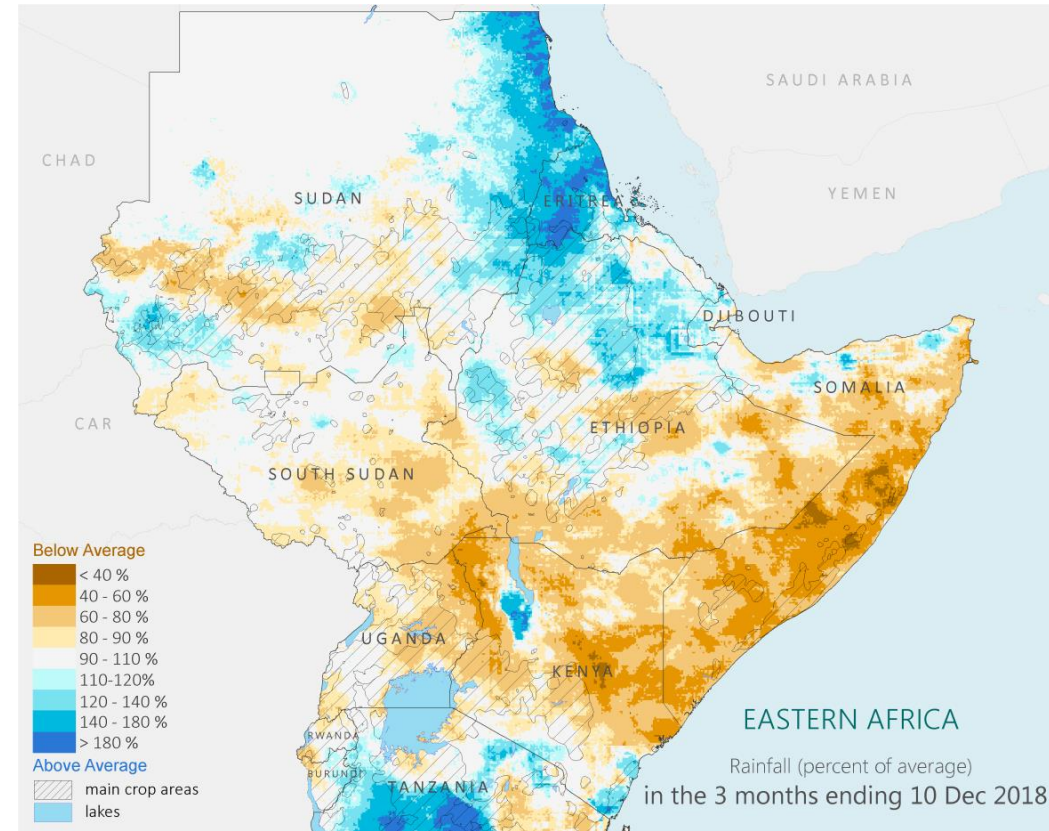

Chart showing variations in regional maize production from a 5 year mean, colour coded according to the ENSO phase of the producing season. Regional production is based on data from South Africa, Zambia, Zimbabwe, Mozambique and Malawi (data from FAO, processing by WFP-VAM).

East Africa

East Africa: The Short Rains Season of 2018 So Far
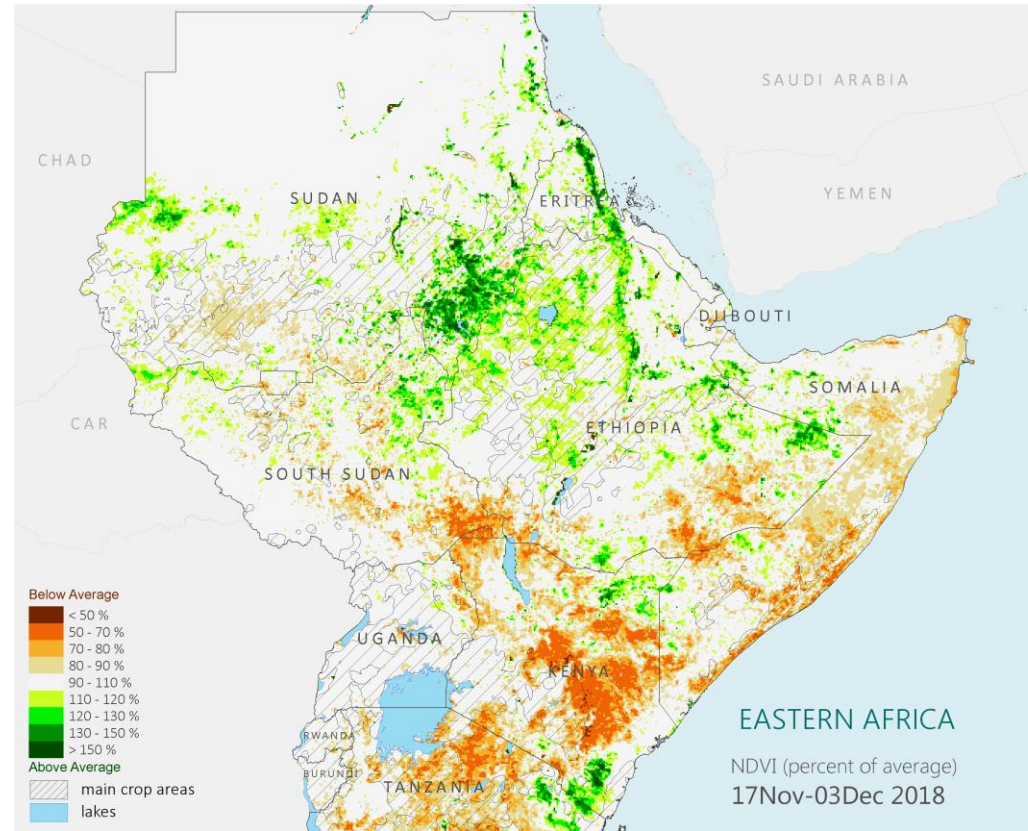
Left: Rainfall in the 3 months ending in December 10, 2018 as a percent of average. Brown shades for drier than average conditions, blue shades for wetter than average.

Right: Vegetation in late November 2018 as a percent of average. Orange shades for lower than average, green shades for above average.
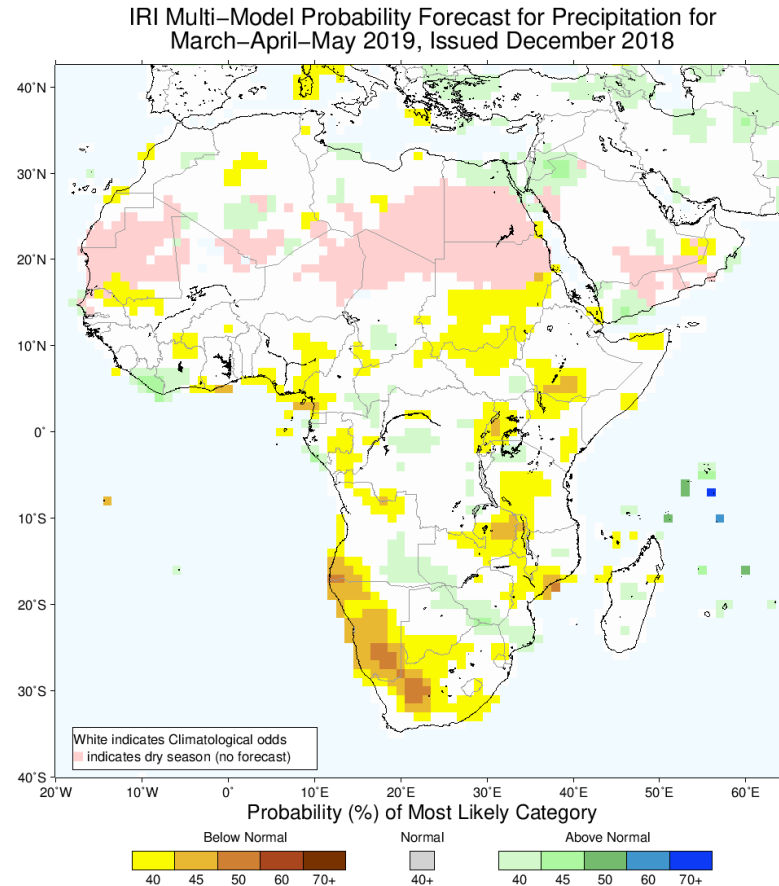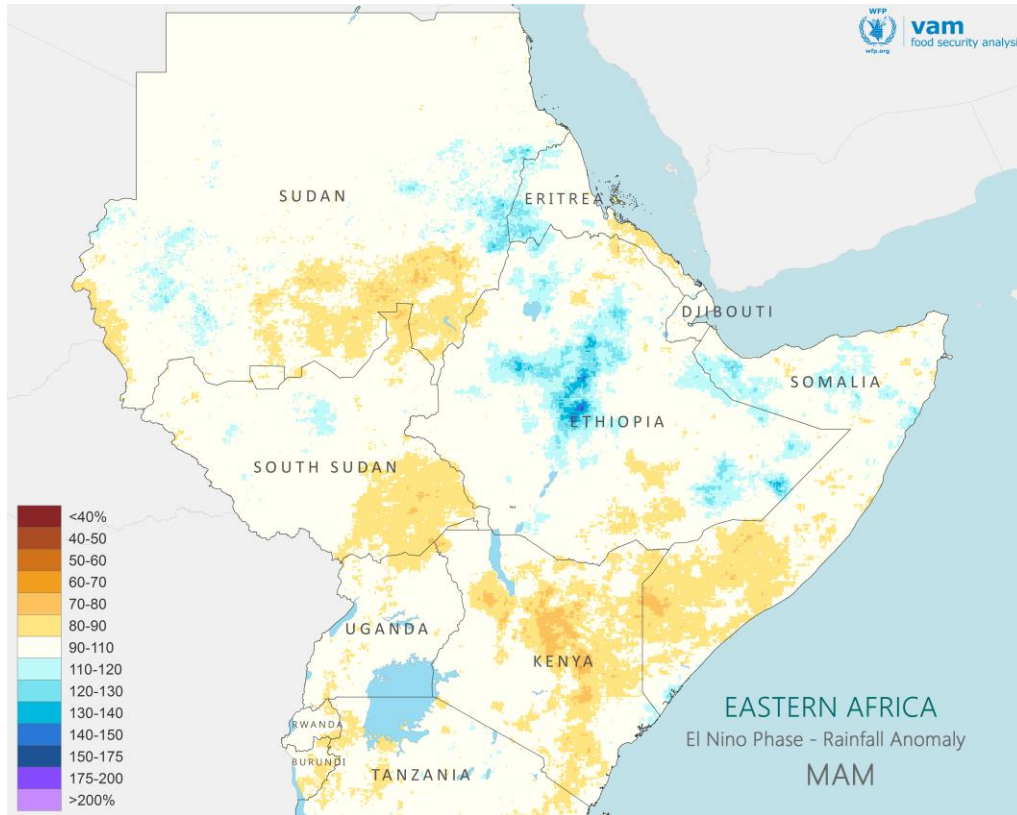
Markedly drier than average conditions have characterized the current Short Rains / Dyer growing season in East Africa, affecting mainly Kenya, Somalia and SE Ethiopia. This led to delays or failures of the cropping season in these regions and very poor pasture and water availability in pastoral areas.

The season is now coming to an end and there is little or no prospect of recovery from the poor ground conditions across the region.

Although the likelihood of an El Niño forming by end of 2018 is very high, this seasonal rainfall performance in East Africa has been much worse than what would be expected for an El Nino season – for the Short Rains, El Nino typically leads to enhanced rainfall across East Africa.

Rainfed crop production in marginal areas and pasture availability are expected to be significantly below average. However, irrigated crop production in Somalia may compensate losses in the rainfed sector, given suitable river levels.

Eastern Africa: March-May Forecasts and El Nino Expectations

EASTERN AFRICA
El Nino Phase - Rainfall Anomaly
MAM

IRI Multi–Model Probability Forecast for Precipitation for
March–April–May 2019, Issued December 2018

White indicates Climatological odds
indicates dry season (no forecast)

Probability (%) of Most Likely Category

Below Normal — 40 45 50 60 70+
Normal — 40+
Above Normal — 40 45 50 60 70+

Left: Average March-May (left) total rainfall during El Nino seasons as a percent of the average in neutral seasons. Blue shades for El Nino wetter than neutral, orange shades for El Nino drier than neutral

Right: Seasonal forecast for March-May 2019 rainfall. Green and blue shades for wetter than usual conditions, orange shades for drier than usual conditions

The next rainfall season in the Greater Horn of Africa will take place from March to May 2019.

Expectations based on analysis of historical data point to moderately below or close to average rainfall during this period across southern Somalia, eastern Kenya (see map above left) and some areas of southeast South Sudan.

Current seasonal forecasts for the same period point to close to average conditions or at most moderately below average rainfall for the region during March to May 2019.

Given the long lead time of the forecasts, there is not much consistency between different sources.

Eastern Africa: Main HotSpots
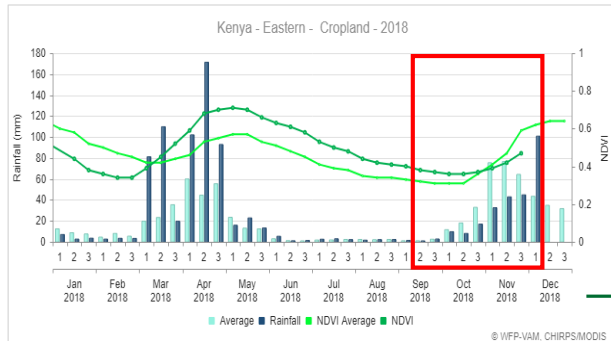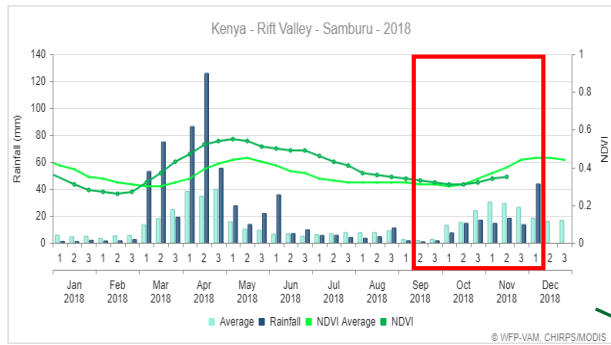
Generally a period dominated by below average rainfall.

Charts show the season has very little left to run, hence recovery in moisture conditions is very unlikely.

Vegetation cover is also below average and unlikely to recover as a result of poor moisture conditions.

Seasonal rainfall plots for 2018 for Southern Africa).
Dark blue bars: actual rainfall, light blue bars: average rainfall.
Dark green lines: current NDVI, light green lines: average NDVI
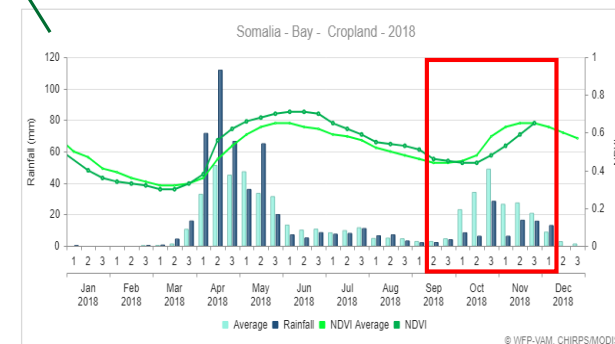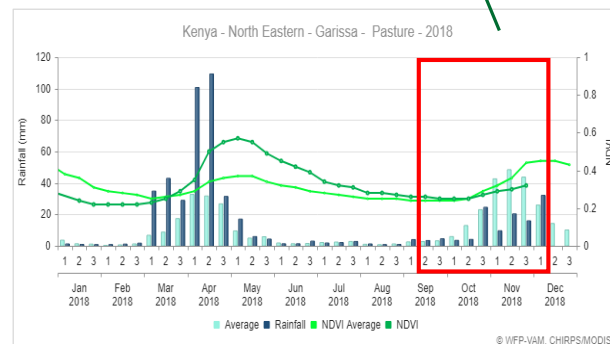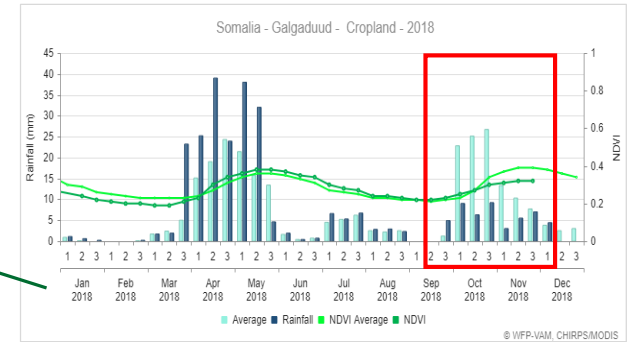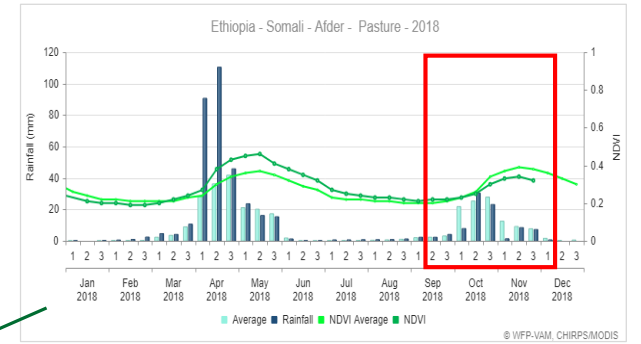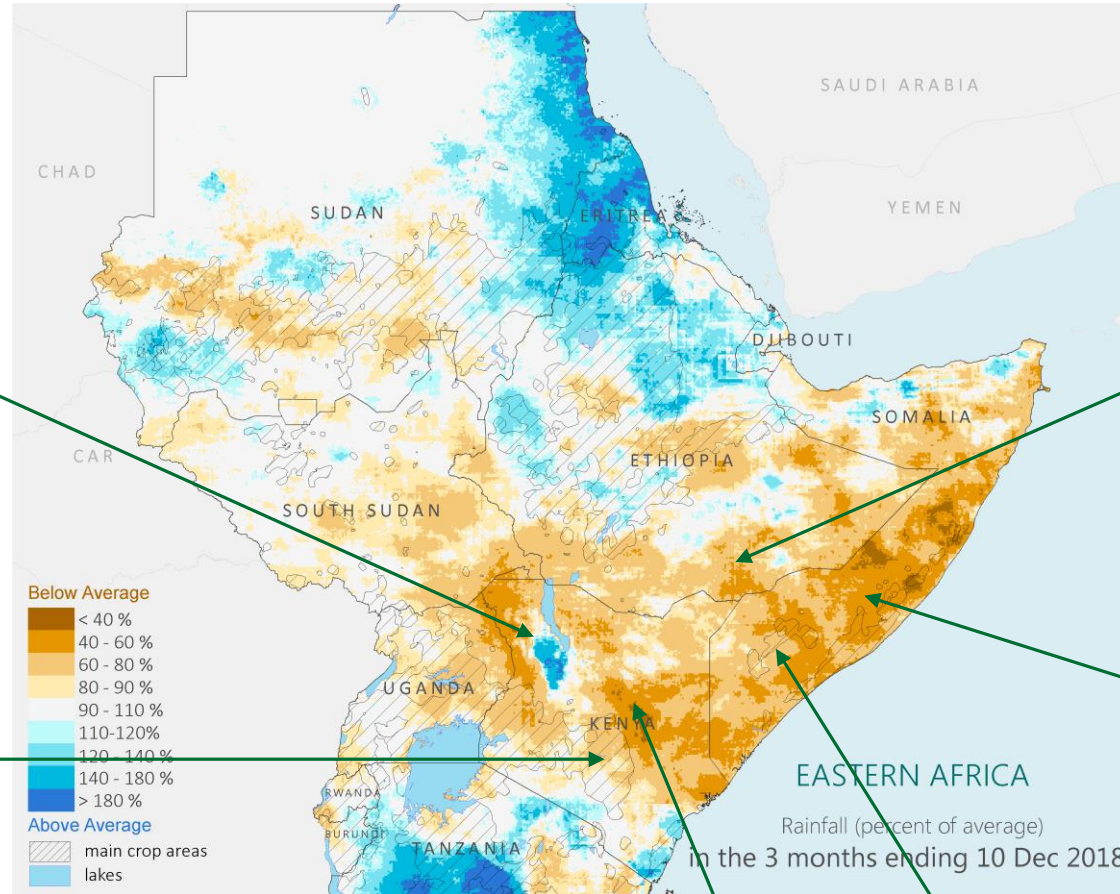
South East Asia and Indonesia

SE Asia: The Season So Far
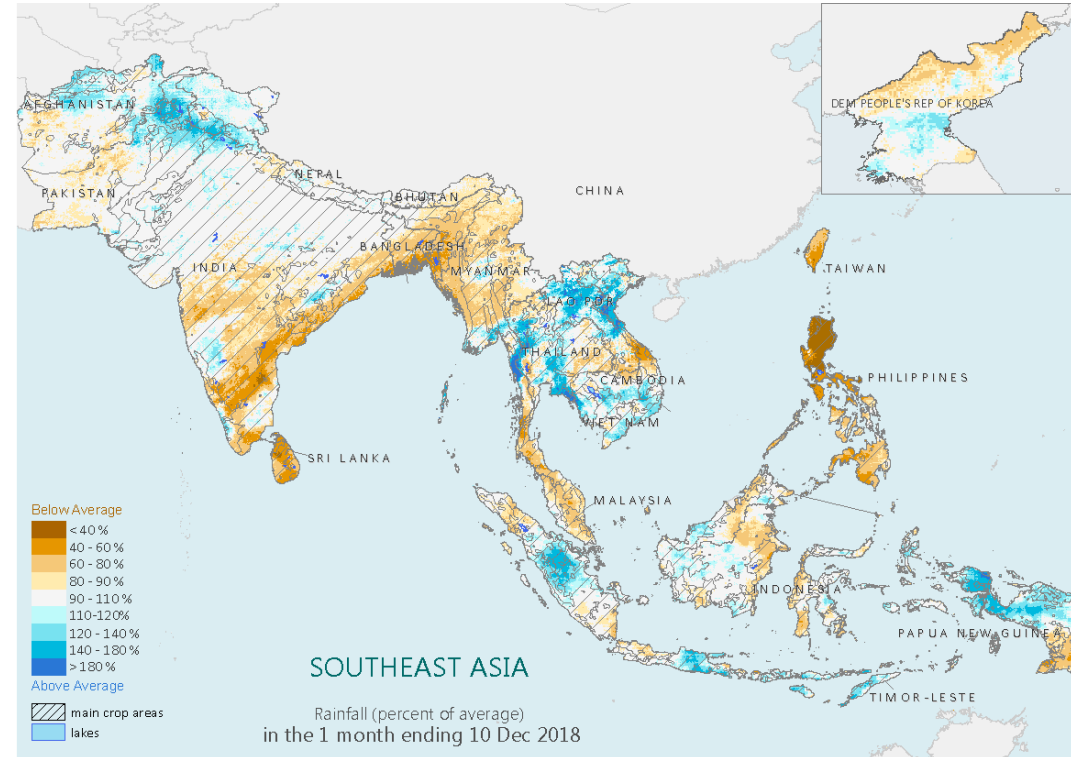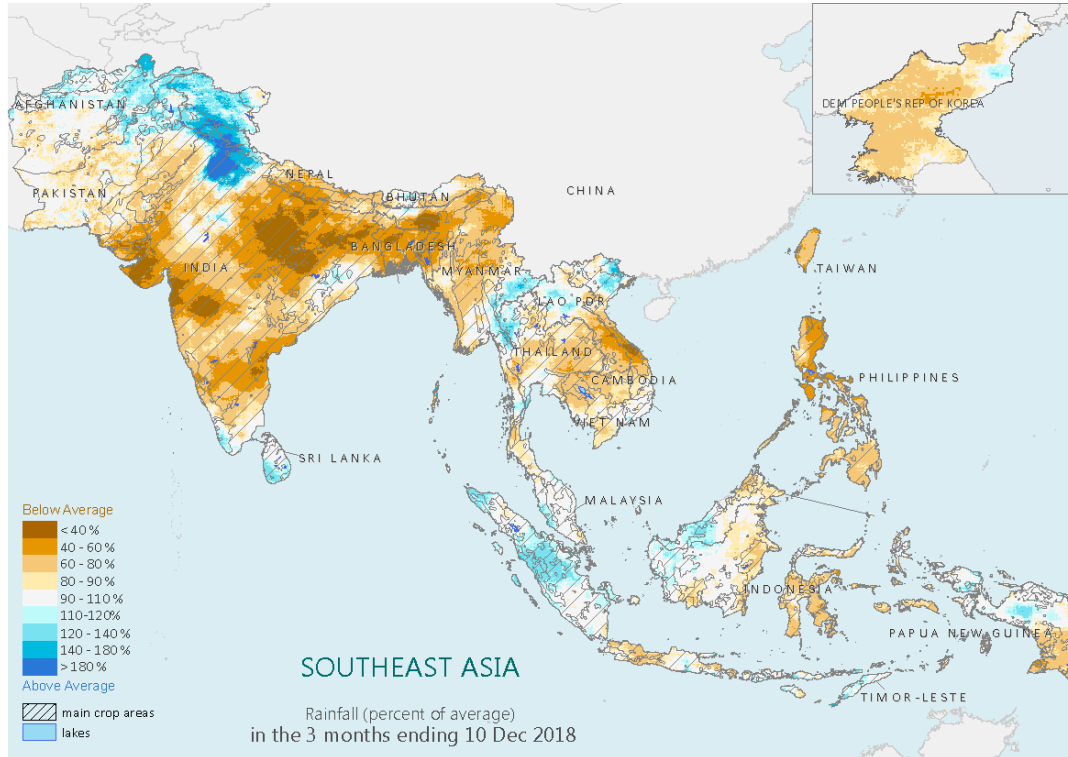
Left: Rainfall in the 3 months ending December 10 2018 and (Right) in the 1 month ending December 10 2018 as a percent of average. Browns for drier than average conditions, blue for wetter than average.

The growing season of 2018 has been marked by widespread drier than average conditions across most of the Asian continent. This dryness was particularly pronounced during the second half of the season in SE Pakistan, western and southern India and most of SE Asia. The Philippines have also endured fairly dry conditions during the second half of the main season, particularly in eastern and southern areas of the country.

While impacts on aggregated national crop production will be slight, there maybe stronger localized impacts on poor vulnerable population dependent on rainfed agriculture.

In spite of drier than average conditions in the past three weeks, Sri Lanka has enjoyed good above average rainfall in the main season now under way since August.

In Indonesia, early season drier than average conditions lasted until mid November, and were followed by regular and more abundant rains. The performance of the season depends crucially on whether El Nino conditions will materialize. If not, this improvement in conditions may last into the core rainfall season.

SE Asia: Forecasts and Expectations
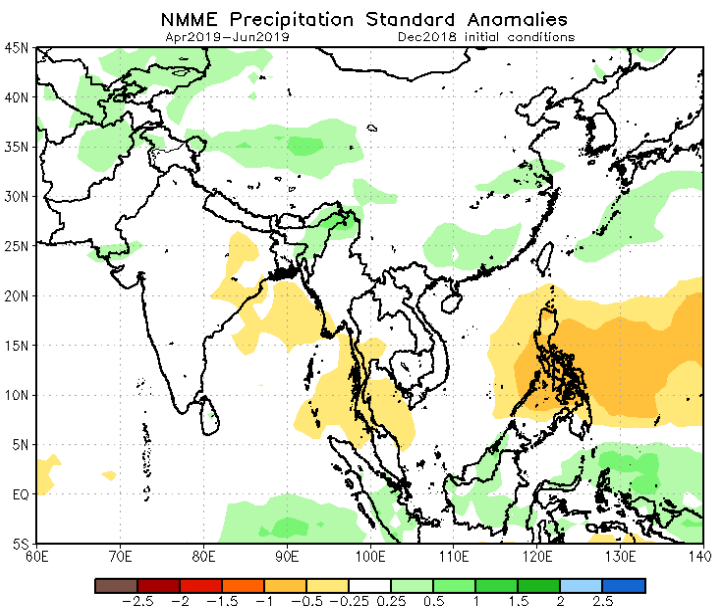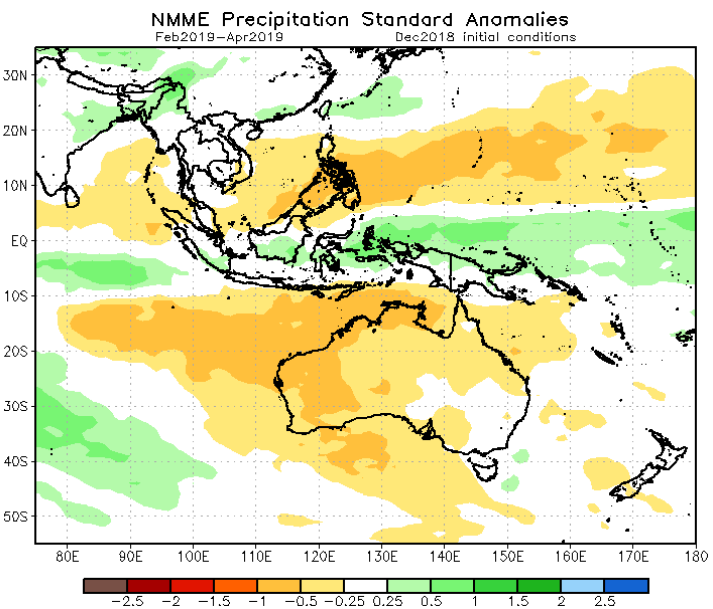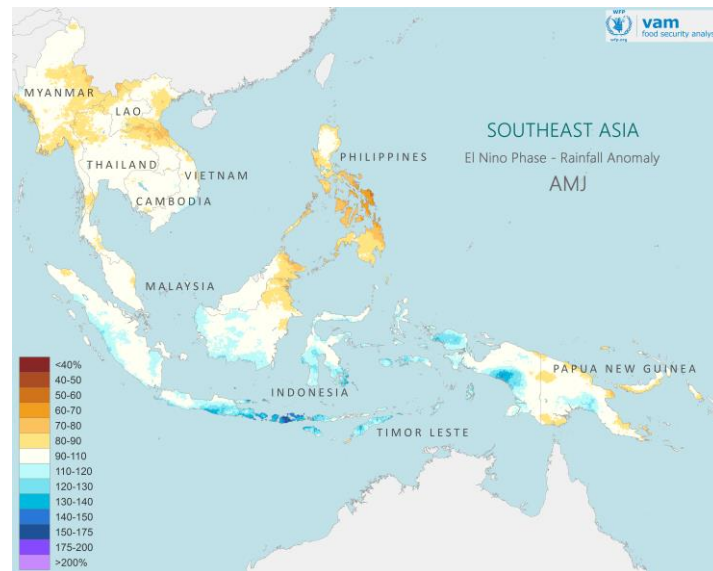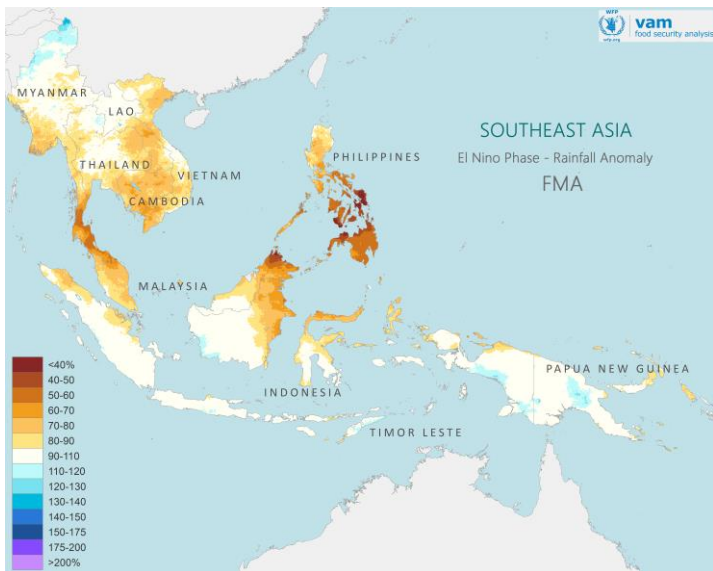
Typically, El Nino events lead to drier than average conditions across Indonesia, the Philippines, and some areas of continental SE Asia. Papua New Guinea and the Pacific Islands have been recently affected during the last major event of 2014-16.

The average impact is particularly noticeable during the growing season of October to April in the Indonesian region (see map above left comparing El Nino with neutral seasons for Feb-Apr rainfall).

The 2018-19 season started by conforming to El Nino expectations, but has since turned wetter than expected.

Current seasonal forecasts broadly agree with expectations from the historical data: they indicate widespread drier than average conditions across the region (see bottom row), extending until April 2019

In Indonesia, these conditions will affect the main growing season that is now starting. Elsewhere (Philippines, SE Asia), secondary main season cropping will be affected and possibly the early stages of the 2019 main season. For Sri Lanka forecasts indicate moderately dry conditions for the coming months.

There is no reliable information for the second half of 2019. While expectations are that El Nino will be over by then, detrimental climatic features may persist for longer.

Top Row: Average rainfall in El Nino seasons as a percent of the average in neutral seasons. Left: Feb-April, Right: April-June
Blue shades for El Nino wetter than neutral, orange shades for El Nino drier than neutral

Bottom Row: Forecasts of 3 month rainfall for Feb-April 2019 (left) and April-Jun 2019 (right). Blue/green shades for wetter than average conditions, orange/red shades for drier than average conditions.
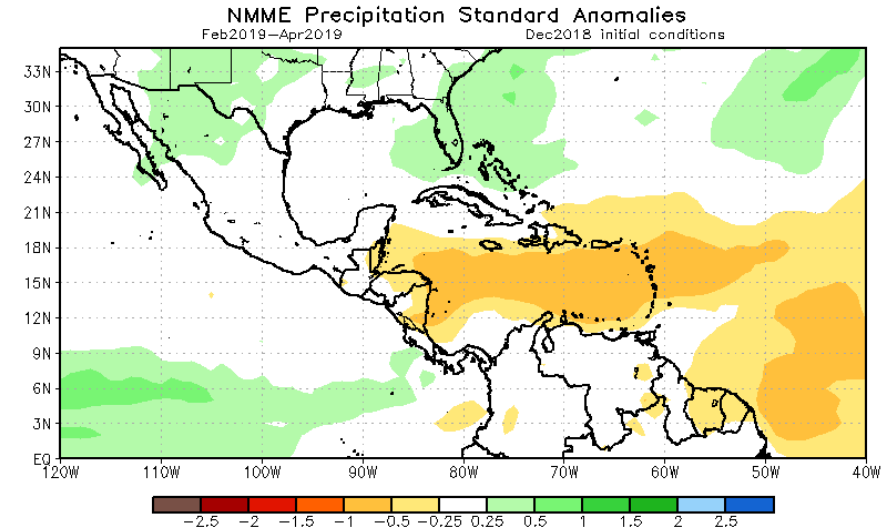
Central America

El Nino Impacts: Central America
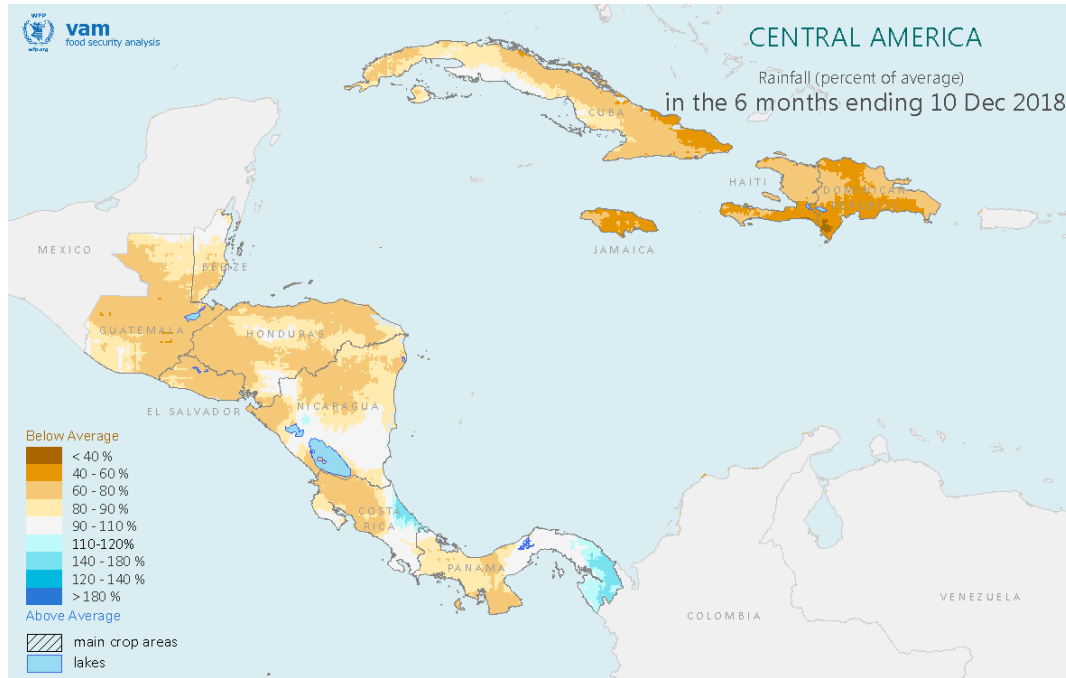
June to early December 2018 rainfall as a percent of average.
Browns for drier than average conditions., blues for wetter than average.

Rainfall forecasts for Feb-Apr 2019 rainfall. Orange shades for drier than average conditions, greens for wetter than average

Central America and the Caribbean have undergone drought conditions during the second half of 2018, affecting both the *Primera* and the *Postrera* (second) season (see map above left).

An El Nino event will make it likely that such dryness will continue through 2019, conditions which are already picked up by seasonal forecasts (map above right).

Depending on the evolution of the El Nino, these drier than average conditions may continue further into 2019, possibly leading to a delayed start and unfavourable early stages of the 2019 Primera season (map below right).

Average March-May rainfall during El Nino seasons as a percent of the average in neutral seasons.
Blue shades for El Nino wetter than neutral, orange shades for El Nino drier than neutral
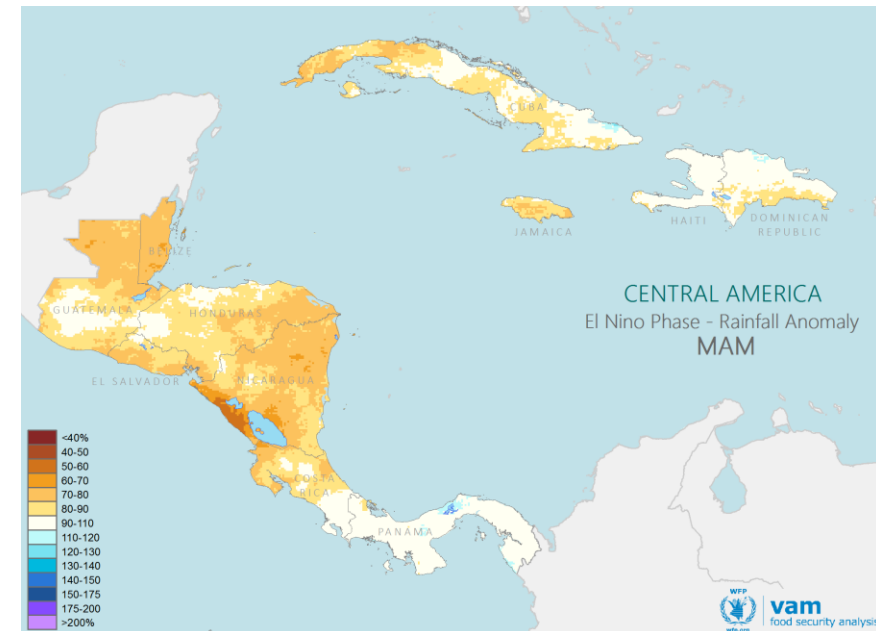
DATA SOURCES:

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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WFP World Food Programme

WFP VAM | Food Security Analysis