

# East Africa: The 2016 Season

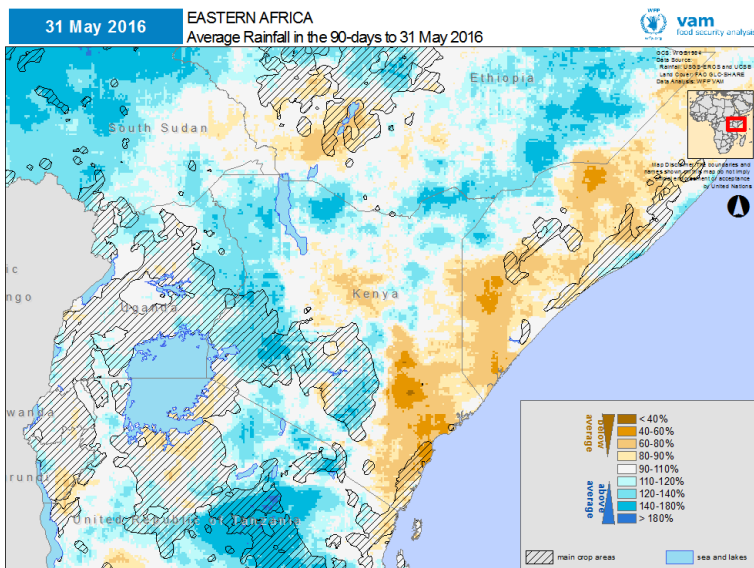


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# HIGHLIGHTS

- The **first growing season** of 2016 (March-May, **Long Rains** in Kenya, **Belg** in Ethiopia) brought good rainfall across Ethiopia, Eritrea and Somaliland. This was a welcome reprieve for many regions hit hard by drought in 2015. In **Somalia** and coastal regions of **Kenya**, however, poor rainfall has impacted vegetation cover and crop production.
- The early stages of the **main seasons** in South Sudan, Sudan, Ethiopia and Eritrea benefited from **wetter than average** conditions, resulting in above average vegetation cover across the region and early start of the growing season. Northern pastoral areas of Sudan fared especially well.
- **Drier than average** conditions were observed across central and SW **Ethiopia** (Oromia and SNNPR) and into SE **South Sudan** between **July to mid September**. **Uganda** was also affected resulting in **poor first harvests** and significant delays in the start of the second season.
- **Forecasts** for the October-December period, indicate **lower than average rainfall** for **Kenya and Somalia**, raising the possibility of **two consecutive poor seasons**. The outlook is less certain for Uganda and SE South Sudan where drier than average conditions now will further exacerbate the dryness observed during July-September.

# Areas of Concern: Kenya, Somalia, Uganda



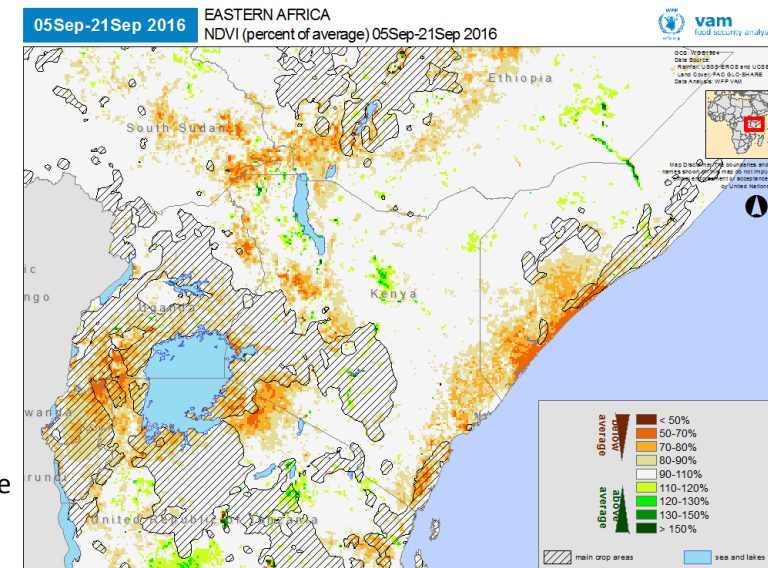
March to May 2016 rainfall as a percentage of the average. Blues for wetter than average, orange and browns for below average conditions

## March-May: KENYA, SOMALIA

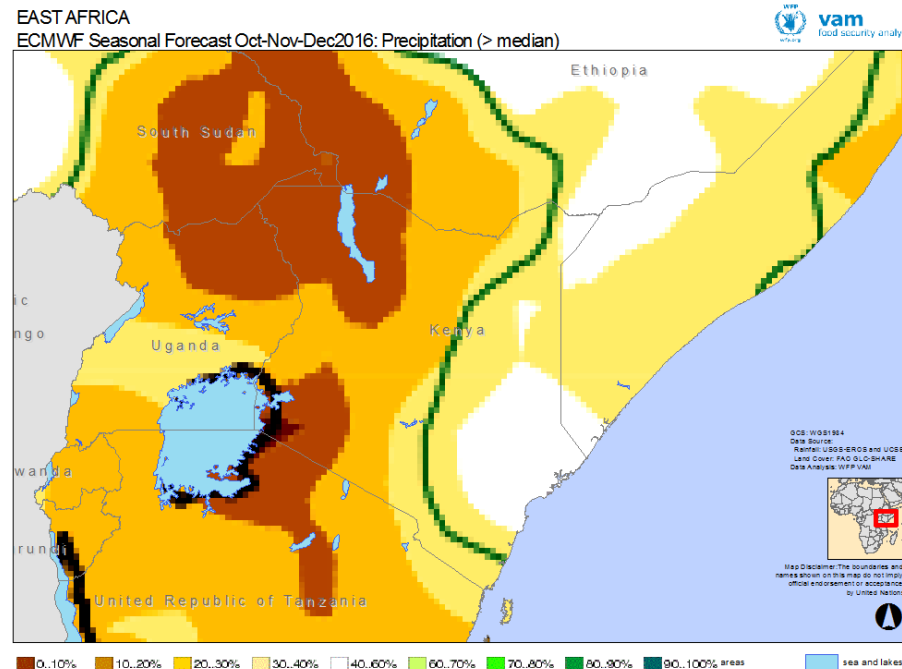
A late starting and shorter first rainfall season (March-May) affected coastal and eastern Kenya and southern Somalia. This led to lower crop production and poor pasture conditions.

## August-September: UGANDA, TANZANIA

Poor rainfall in early 2016 coupled with pronounced dryness since July led to poor crop performance in the first season and to a very late start to the second season in bimodal western areas of Uganda. Poor conditions also extend to Tanzania.



September NDVI as a percentage of the average. Greens for wetter than average, orange shades for below average conditions.



## October-December: PESSIMISTIC RAINFALL FORECASTS

Forecasts indicate drier than average condition for the upcoming growing season in south Somalia, coastal Kenya and Uganda (October-December 2016). Likely outcomes:

- Back to back poorly performing seasons in southern Somalia and parts of Kenya.
- Continued impacts on crop production in bimodal areas of Uganda (south and southwestern) and potential impacts in northern Tanzania.

ECMWF rainfall forecast for October-December 2016. Green shades = wetter than average conditions. Yellow and brown shades drier than average conditions.

# The 2016 Season(s) So Far...



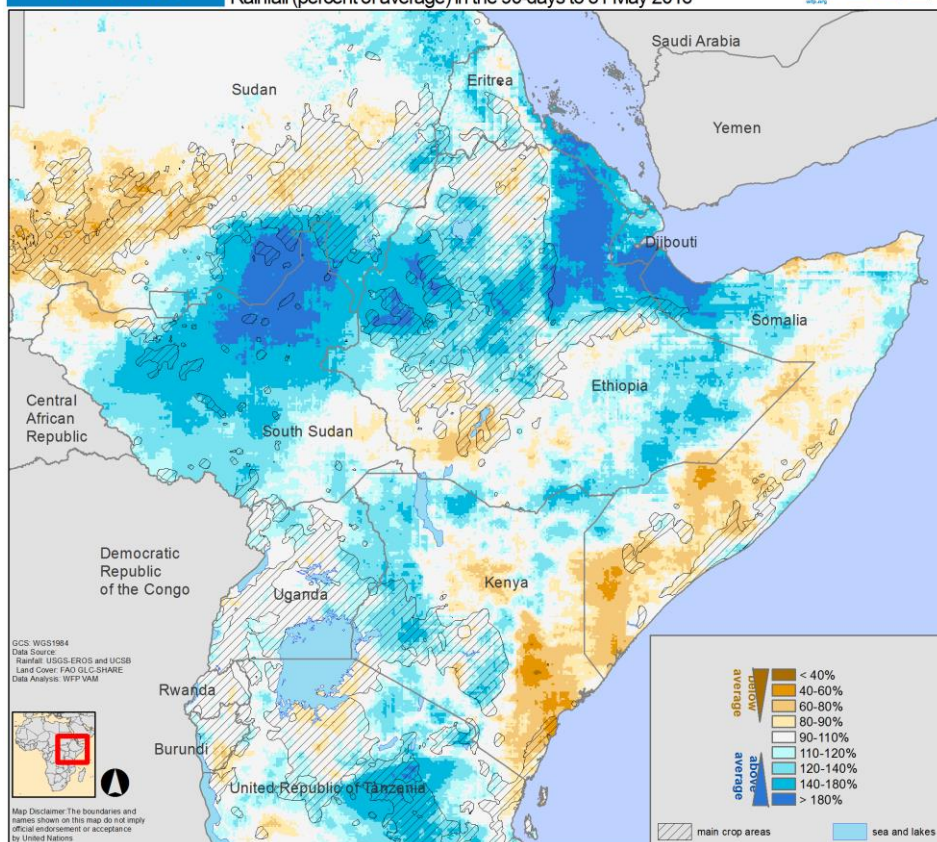
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# Earlier Developments in 2016

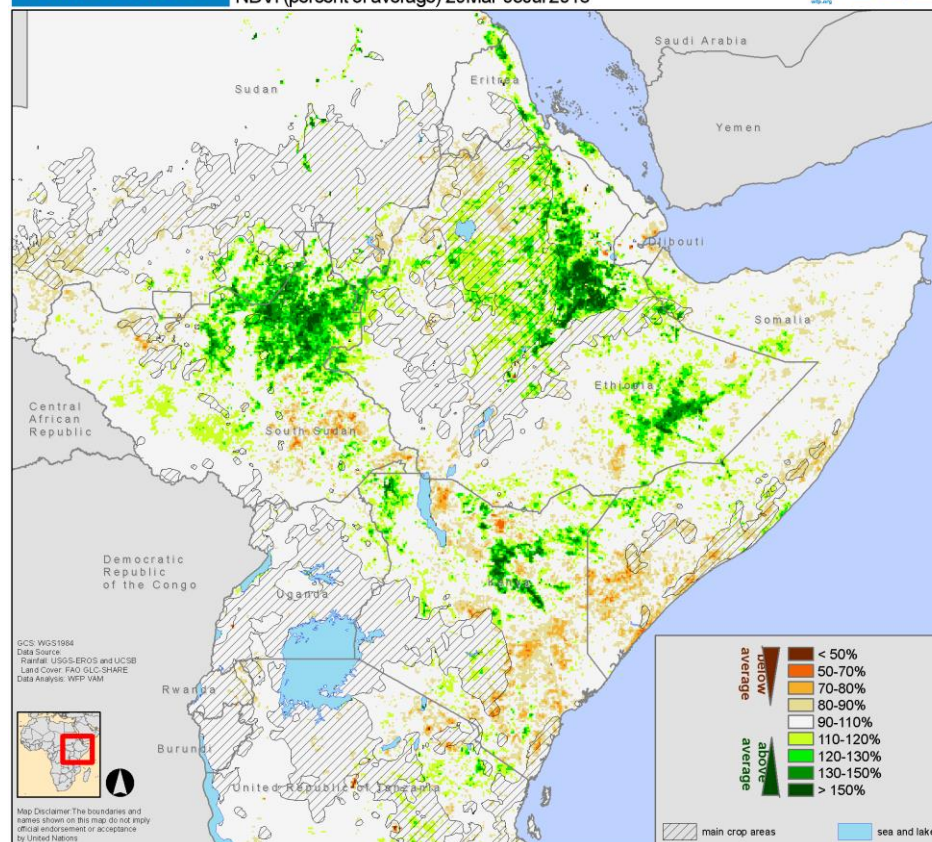
Mar-Apr-May

**EASTERN AFRICA**  
Rainfall (percent of average) in the 90-days to 31 May 2016



29Mar-03Jul 2016

**EASTERN AFRICA**  
NDVI (percent of average) 29Mar-03Jul 2016



**March-May 2016**

March to May 2016 rainfall (left) as a percentage of the average. Blues for wetter than average, orange and browns for below average conditions.

April to June average NDVI (right) as a percentage of the average. Greens for wetter than average, orange shades for below average conditions.

## Kenya, Somalia, Eritrea, Djibouti, Ethiopia (Afar, Somali, Oromia, SNPPR)

Very dry conditions across Afar, SE Ethiopia and Somaliland were observed until March. This was followed by intensely heavy rainfall (more than twice the usual amounts) that continued up to early May. These very wet conditions also extended to South Sudan, Uganda and western Kenya.

Vegetation cover in pastoral areas reached record levels, allowing recovery to pastoralist livelihoods devastated by last year's droughts. Some *Belg* agricultural areas also benefitted from the above average rainfall.

The coastal areas of Kenya and most of south and central Somalia endured significantly drier than average conditions between March and June. Agricultural production areas were affected, leading to below average crop production. SW Ethiopia also had a less than favourable early season as dryness persisted longer than in other areas of the country.

# Seasonal Profiles: March to May Highlights

The plots for Ethiopia/Afar and Somalia/Woqooy Galbeed (top centre and right) clearly show how the initially drier than average conditions up to March remarkably turned into wetter than average conditions between April and mid May. Vegetation cover shows a corresponding increase to above average levels.

This will go a long way to alleviate the impacts of the intense drought of 2015, though pastoralists' assets will require longer recovery times. In Afar, favourable conditions continued during July to September, but Somaliland is facing drier conditions since late August.

Plots for Somalia/Hiraan and Juba Hoose and Kenya/Malindi show early season rainfall deficits extending into mid April. After a short lived improvement, significantly drier than average conditions returned from mid May onwards: these marked seasonal rainfall deficits have had a significant impact on local crop production and pasture.

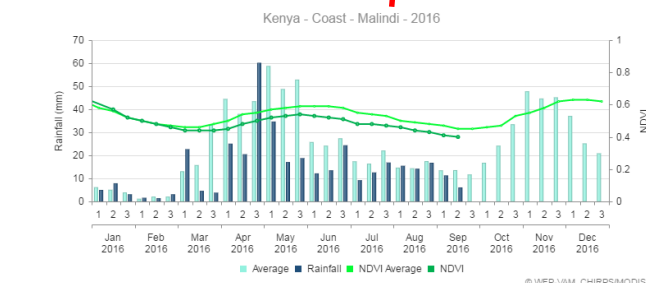
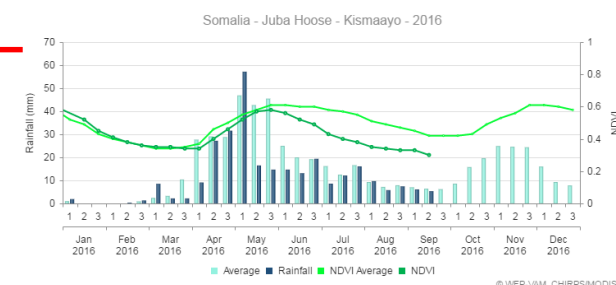
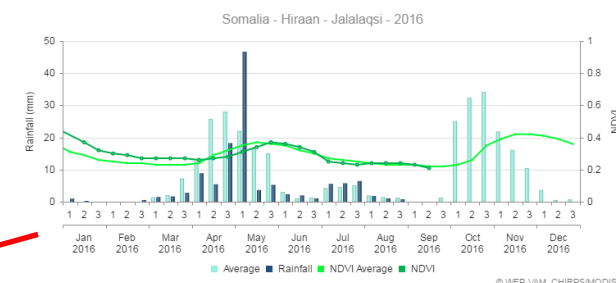
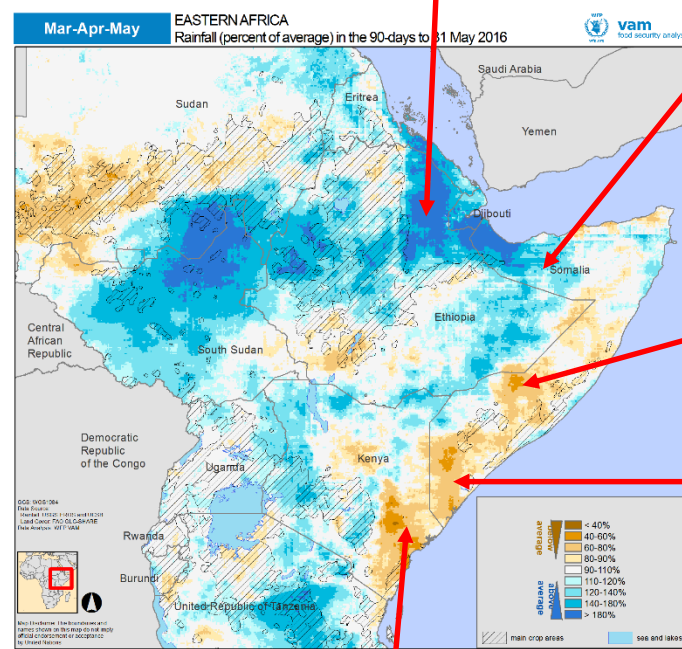
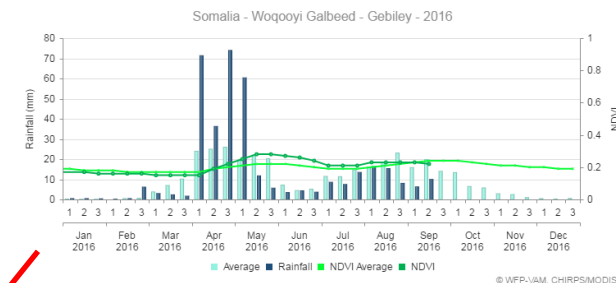
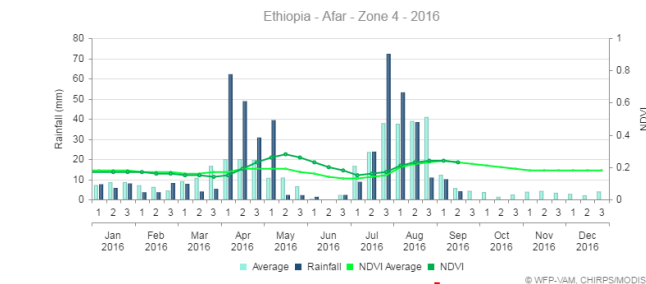
Rainfall improved after June, but it was only a small relief as the next rainfall season is from October to December. This season is forecast to be drier than average.

Use the bars and lines of the average series to get a sense of the seasonality of the region (start, end and peak of the season).

Look out for extended periods (e.g. 3 or more time steps) when the current rainfall is below (above) the average, in particular if followed by the current NDVI line dipping below (moving above) the LTA NDVI.

Explore with your own plots at:

<http://dataviz.vam.org/>



Central map: March to May 2016 rainfall (as percent of average)

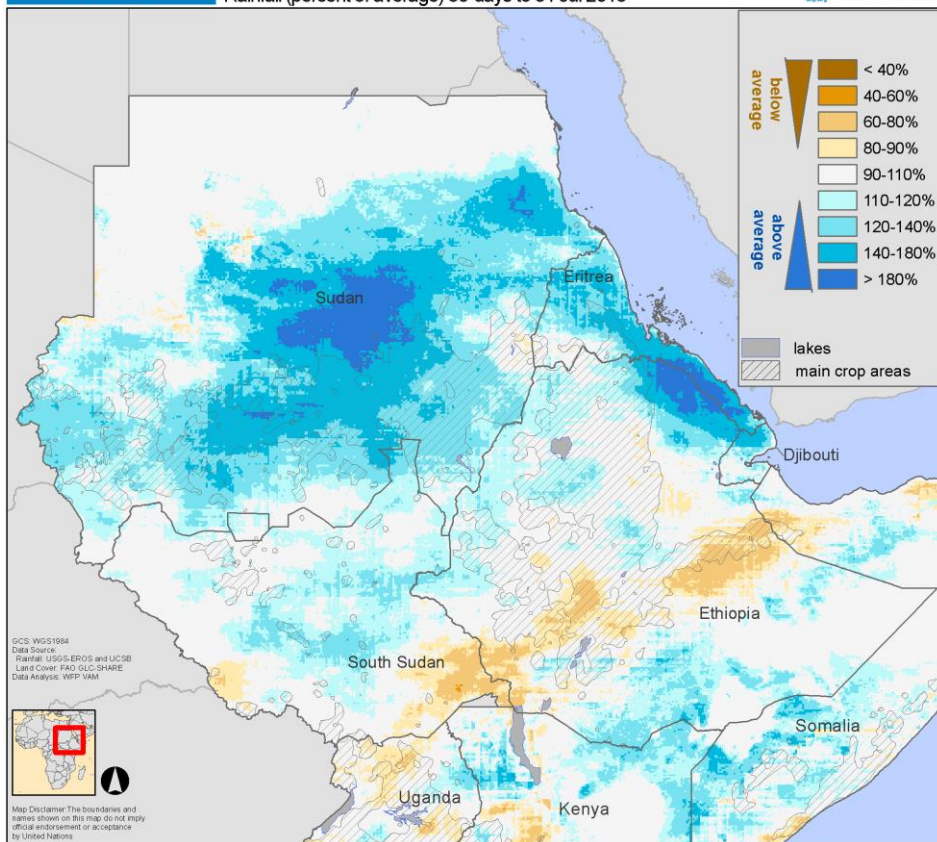
- **Dark blue bars:** current rainfall season
- **Light blue bars:** long term average (LTA) rainfall
- **Dark green line:** current vegetation index
- **Light green line:** long term average (LTA) NDVI



# Recent Developments in 2016

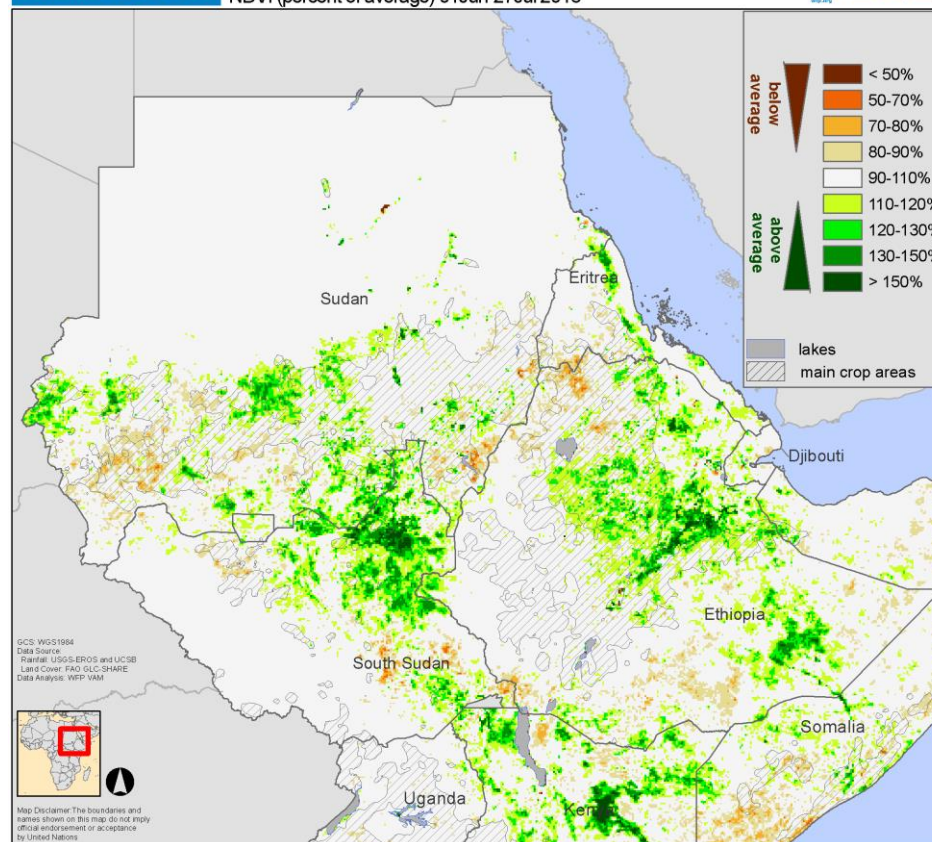
31 Jul 2016

SUDAN, SOUTH SUDAN, ERITREA, DJIBOUTI and ETHIOPIA  
Rainfall (percent of average) 60-days to 31 Jul 2016



01Jun-27Jul 2016

SUDAN, SOUTH SUDAN, ERITREA, DJIBOUTI and ETHIOPIA  
NDVI (percent of average) 01Jun-27Jul 2016



June-July 2016

June to July 2016 rainfall (left) as a percentage of the average. Blues for wetter than average, orange and browns for below average conditions.

June to July average NDVI (right) as a percentage of the average. Greens for wetter than average, orange shades for below average conditions.

## Sudan, South Sudan, Ethiopia, Uganda

June to August is the first part of the main season in South Sudan, Sudan, Ethiopia and NE Uganda (Karamoja). During this period, heavy and above average rainfall was observed in Eritrea, northern Ethiopia and marginal areas of Sudan. These areas were substantially affected by drought in the previous season.

Meanwhile drier than average conditions spread across Uganda, South Sudan and central and south Ethiopia.

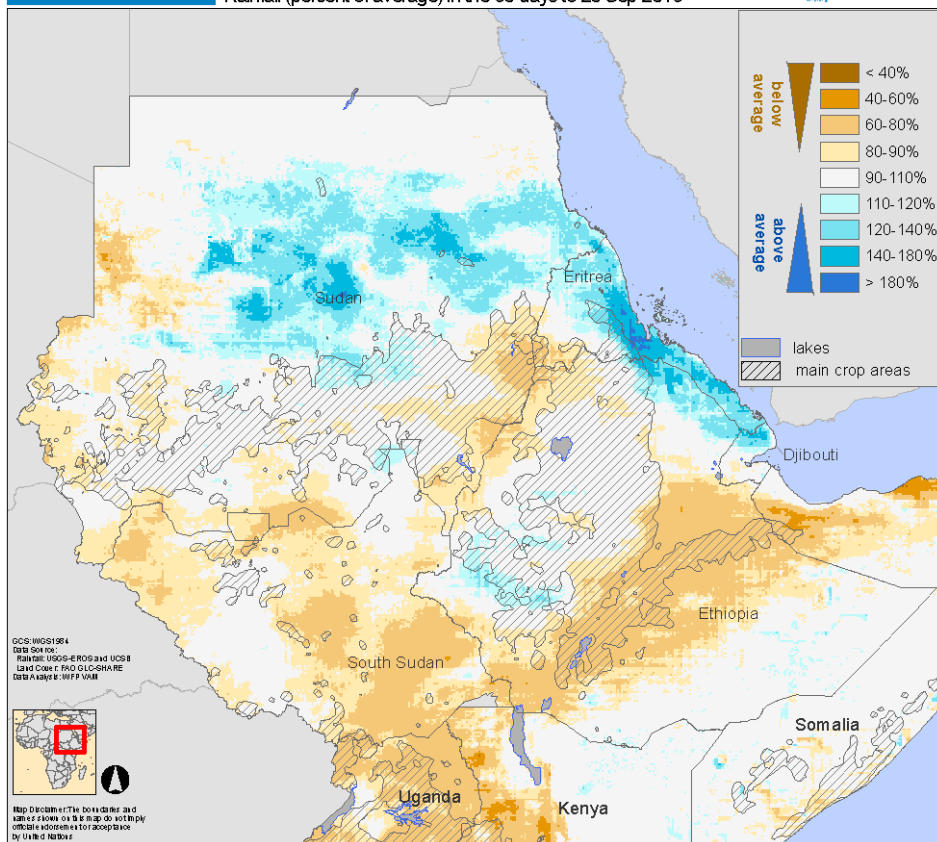
As a result of the exceptional rainfall, vegetation cover reached historically high levels across northern Sudan (Kordofan, Khartoum and Kassala states) as well as Eritrea. The Afar, Djibouti and neighbouring areas of Somalia (Somaliland) also enjoyed favourable vegetation growth. Favourable conditions in pastoral and marginal agricultural areas will help with the recovery of livelihoods strongly affected by the 2015 drought.

Above average vegetation cover in SE Ethiopia (Somali region) and along river beds extending into Somalia is the result of above normal rains during April-May.

# Current Status 2016

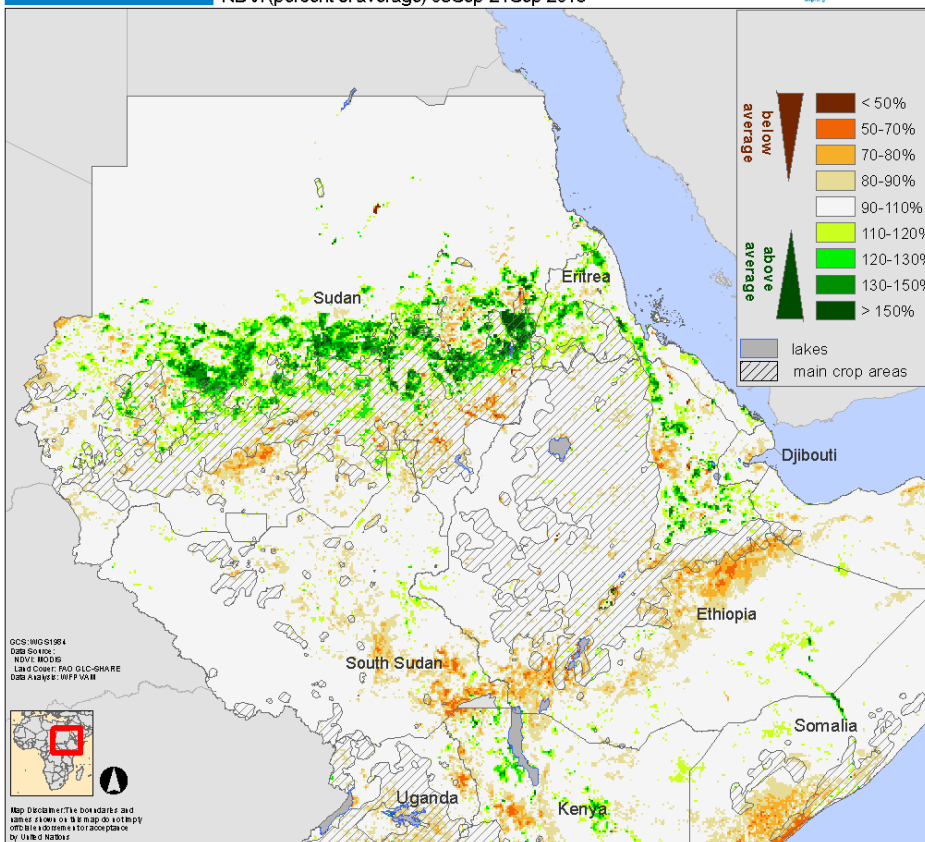
20 Sep 2016

SUDAN, SOUTH SUDAN, ERITREA, DJIBOUTI and ETHIOPIA  
Rainfall (percent of average) in the 60-days to 20 Sep 2016



05Sep-21Sep 2016

SUDAN, SOUTH SUDAN, ERITREA, DJIBOUTI and ETHIOPIA  
NDVI (percent of average) 05Sep-21Sep 2016



## August-September 2016

Mid July to mid September 2016 rainfall (left) as a percentage of the average. Blues for wetter than average, orange and browns for below average conditions.

September NDVI (right) as a percentage of the average. Greens for wetter than average, orange shades for below average conditions.

### Sudan, South Sudan, Ethiopia, Uganda

Between August and September drier than average conditions spread further across Uganda, South Sudan, central and northern Ethiopia as well as eastern and western Sudan. In many of these places, this coincides with key stages of crop development (early flowering) and may have a significant impact, even though aggregate seasonal conditions may look favourable.

The above average vegetation cover in northern areas of Sudan, Eritrea and Afar is now decreasing towards more average levels. Elsewhere, drier than average conditions has led to below average vegetation including in Ethiopia (Oromia and SNNPR) as well as SE South Sudan, signalling potential problems in seasonal crop production.



# Seasonal Profiles: Current highlights

The plot for Sudan/North Kordofan (top) shows much wetter than average conditions in these marginal areas are helping the recovery from last year's drought. Across the border in northern Ethiopia (Tigray), conditions have remained largely close to average leading to normal seasonal outcomes.

In parts of Ethiopia/Oromia after some initial dryness in March and a good recovery, drier than average conditions returned mid August. These conditions extend all the way to SE South Sudan. In both cases, vegetation cover is dipping to below average levels – recovery in rainfall is required to avoid further damage.

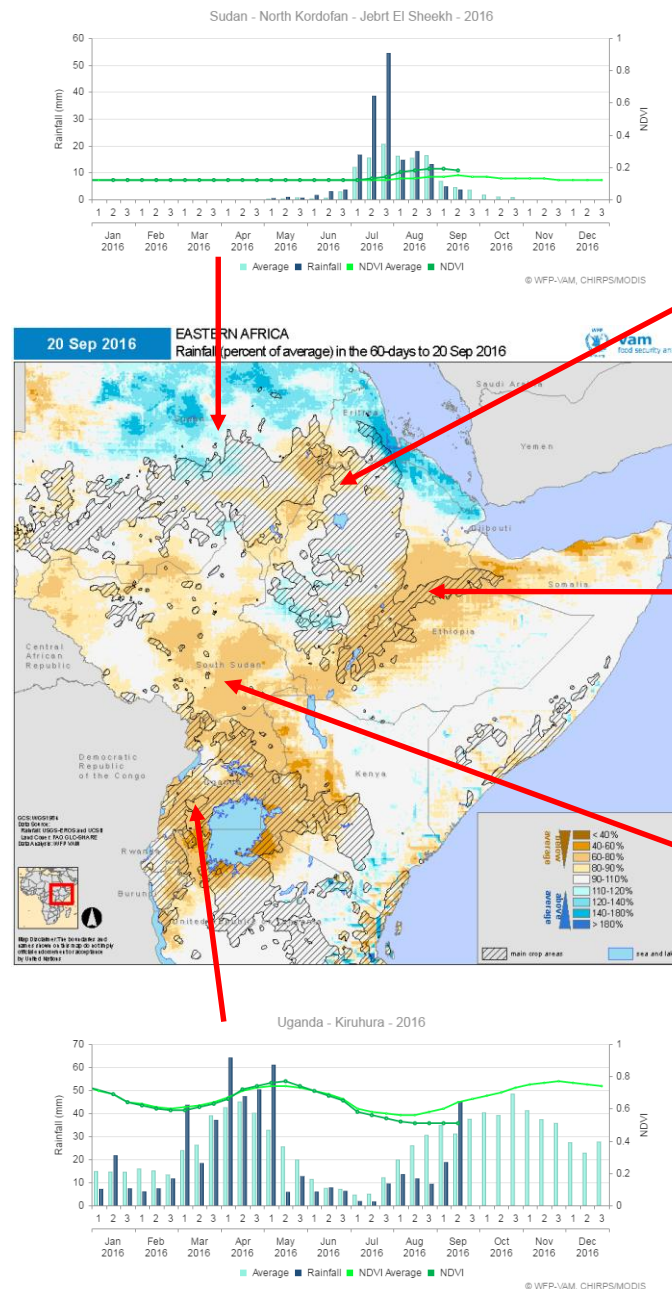
Uganda has also been affected, with southwestern areas showing significant delays in the onset of the second season due to below average rainfall – early season vegetation cover is also markedly below average. Mid September rainfall was back to normal, hopefully signaling a more sustained recovery. However, forecasts for the last quarter of 2016 seem unfavourable.

Use the bars and lines of the average series to get a sense of the seasonality of the region (start, end and peak of the season).

Look out for extended periods (e.g. 3 or more time steps) when the current rainfall is below (above) the average, in particular if followed by the current NDVI line dipping below (moving above) the LTA NDVI.

Explore with your own plots at:

<http://dataviz.vam.org/>



Central map: Two month rainfall ending mid September 2016 (as percent of average)

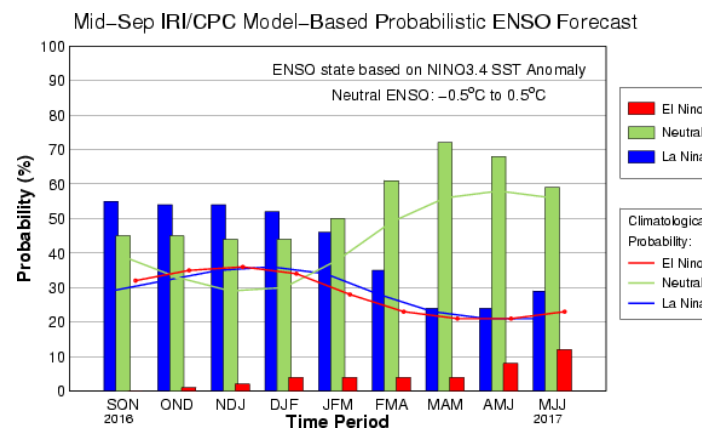
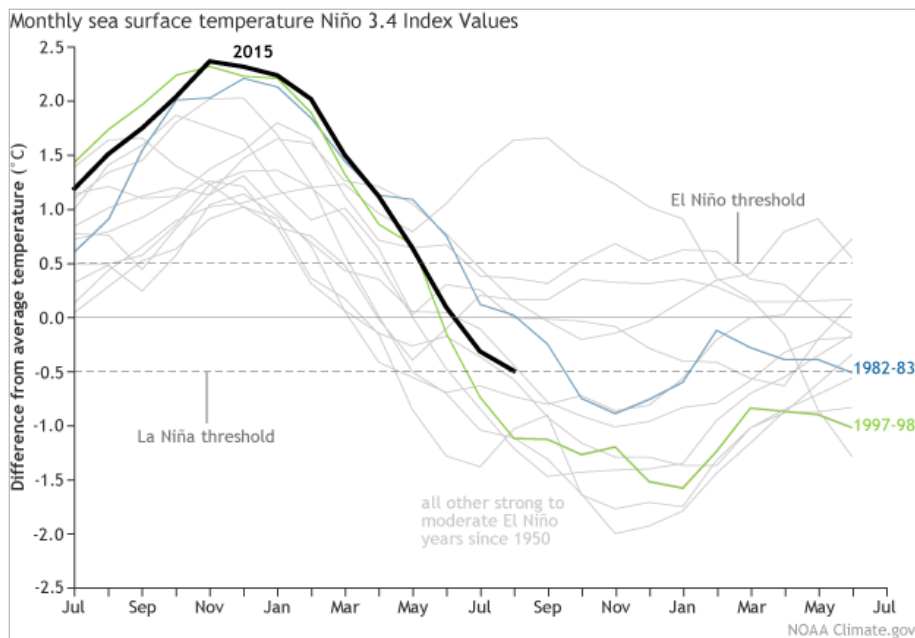
- **Dark blue bars:** current rainfall season
- **Light blue bars:** long term average (LTA) rainfall
- **Dark green line:** current vegetation index
- **Light green line:** long term average (LTA) NDVI

# Short and Medium Term Perspectives



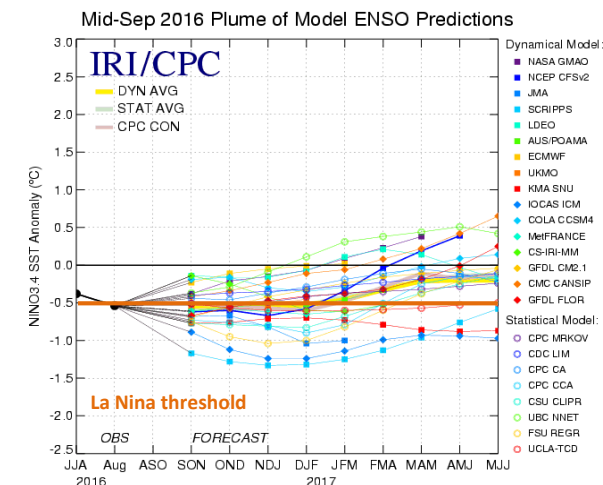
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# Latest La Nina Outlook



Left: Evolution of all strong to moderate El Niños since 1950: the most recent El Niño (2015) and the two strongest El Niños on record (1982-82 and 1997-98) are highlighted.

Centre and right: La Niña forecasts from IRI/CPC – overall probabilities of the event and ensemble model forecasts



## Likelihood of La Niña decreases...

Effectively, due to weakening signals in the tropical Pacific, a number of international monitoring and forecasting centers have recently downgraded the likelihood of a La Niña event taking place in late 2016 and early 2017. Overall current conditions are neutral and model forecasts slightly favour neutral (rather than La Niña) conditions. The chances of a La Niña event developing in late 2016 are down from 70 percent in July to 50 percent now. This is still above the climatological (long term) probability, so a La Niña event cannot be technically ruled out.

It is important to remember that just because La Niña conditions remain borderline, does not mean that La Niña like impacts will not occur – Southern Africa endured a significant drought in 2014-2015, though conditions at the time were neutral and a full blown El Niño only took off in March 2015, close to the end of the season.



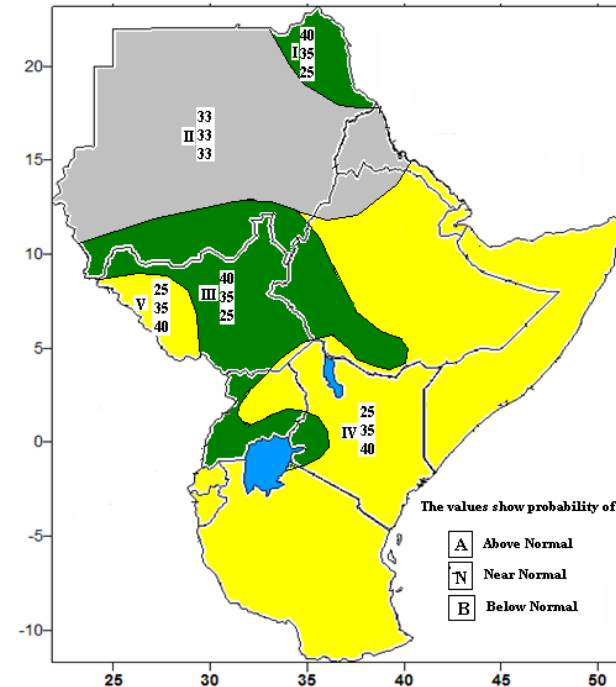
## Perspectives for October-December 2016

Forecasts from the GHACOF for the period from September to December 2016 indicate below average rainfall for a broad region extending from Ethiopia and Somalia to Kenya and Tanzania. This period covers the next growing season ("Long Rains" in Kenya) as well as the early stages of the longer growing season in most of Tanzania. More favourable conditions are forecast for western Uganda and most of South Sudan (where this period corresponds to the late stages of the season).

More recent forecasts from ECMWF (as well as UK Met Office and CPC) for October-December 2016 are broadly consistent but more pessimistic with no indication of above average rainfall across the region.

The overall outlook for October-December rainfall in the region is as follows:

- Generalized drier than average conditions in Tanzania affecting both the first short season in bimodal regions and the early stages of the main season elsewhere.
- Drier than average conditions across Kenya and possibly Somalia and SE Ethiopia. This is likely to affect the upcoming season ("Short Rains" or "Gu").
- Drier than average conditions in Uganda and South Sudan – this would affect late stages of the season in Central and East Equatoria and in Karamoja (NE Uganda); elsewhere in Uganda it may affect the upcoming first season.

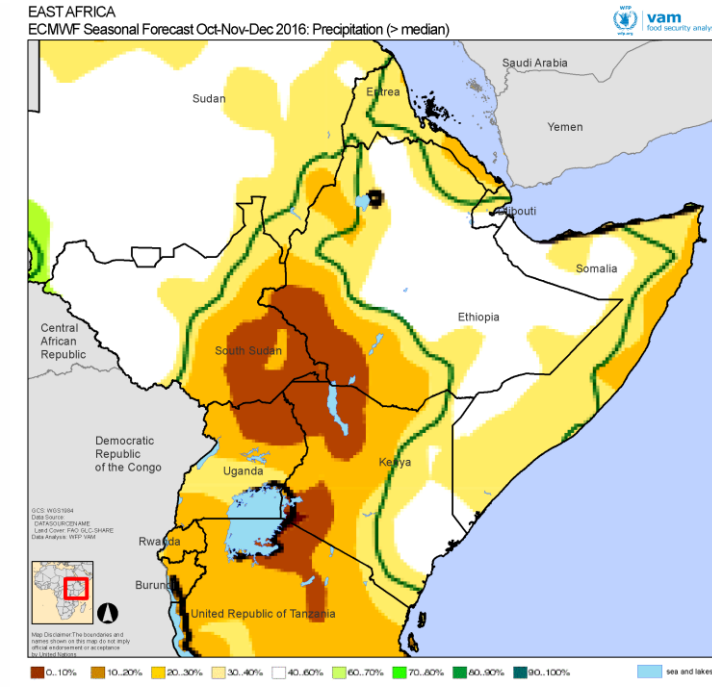


Left: GHACOF climate outlook for September-December 2016.

Yellow, areas of below average rainfall, Green, areas of above average rainfall.

Right: ECMWF rainfall forecast for October-December 2016.

Green shades = wetter than average conditions. Yellow and brown shades drier than average conditions.



It is important to consider that recent rainfall patterns (August and early September) have been fairly unfavourable across the region, particularly in Uganda and parts of South Sudan and Ethiopia. A drier than average next season may further exacerbate the dry conditions and lead to significant moisture deficits during sensitive phases of crop development.

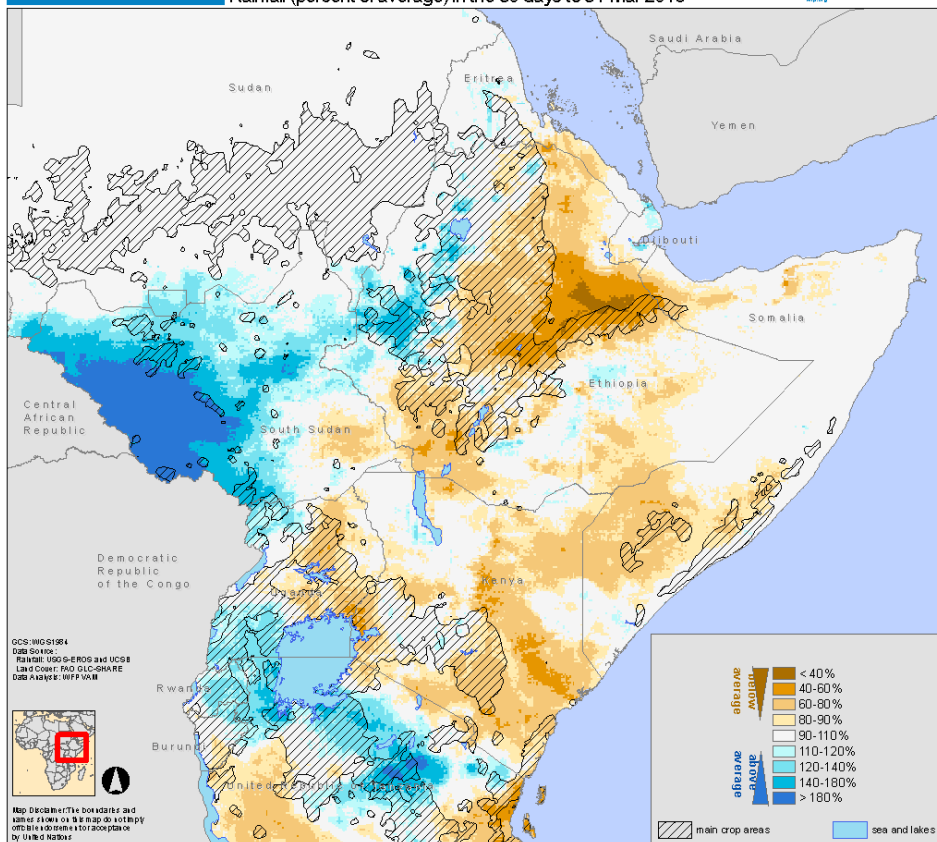
# The Season: Month by Month



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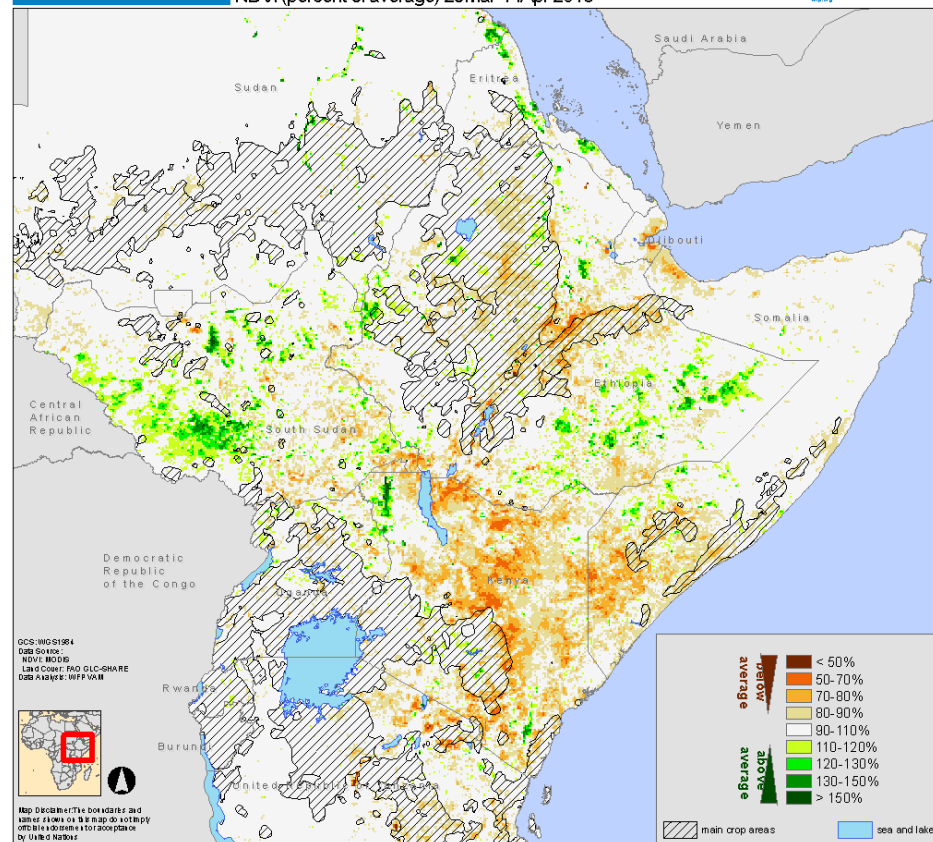
31 Mar 2016

EASTERN AFRICA  
Rainfall (percent of average) in the 30 days to 31 Mar 2016



29Mar-14Apr 2016

EASTERN AFRICA  
NDVI (percent of average) 29Mar-14Apr 2016



March 2016 rainfall as a percentage of the 20-year average (left).

Brown shades for drier than average, blue shades for wetter than average conditions.

Early April 2016 vegetation index as a percentage of the 12-year average (right).

Orange shades for below-average, green shades for above-average vegetation.

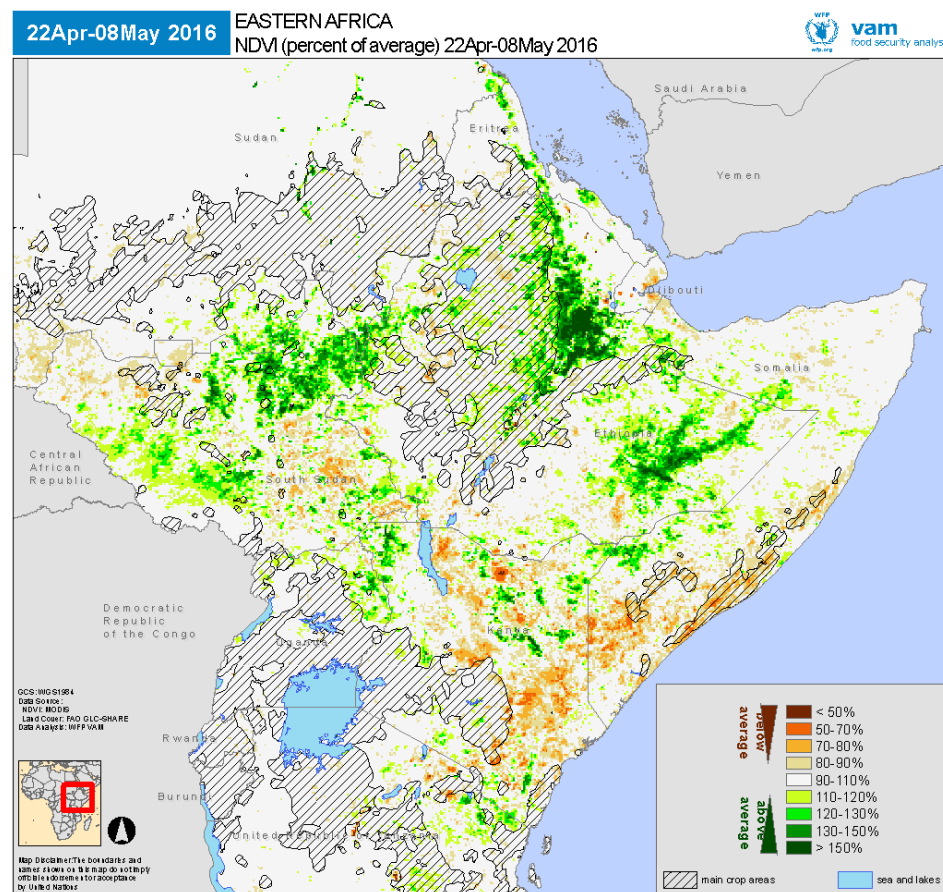
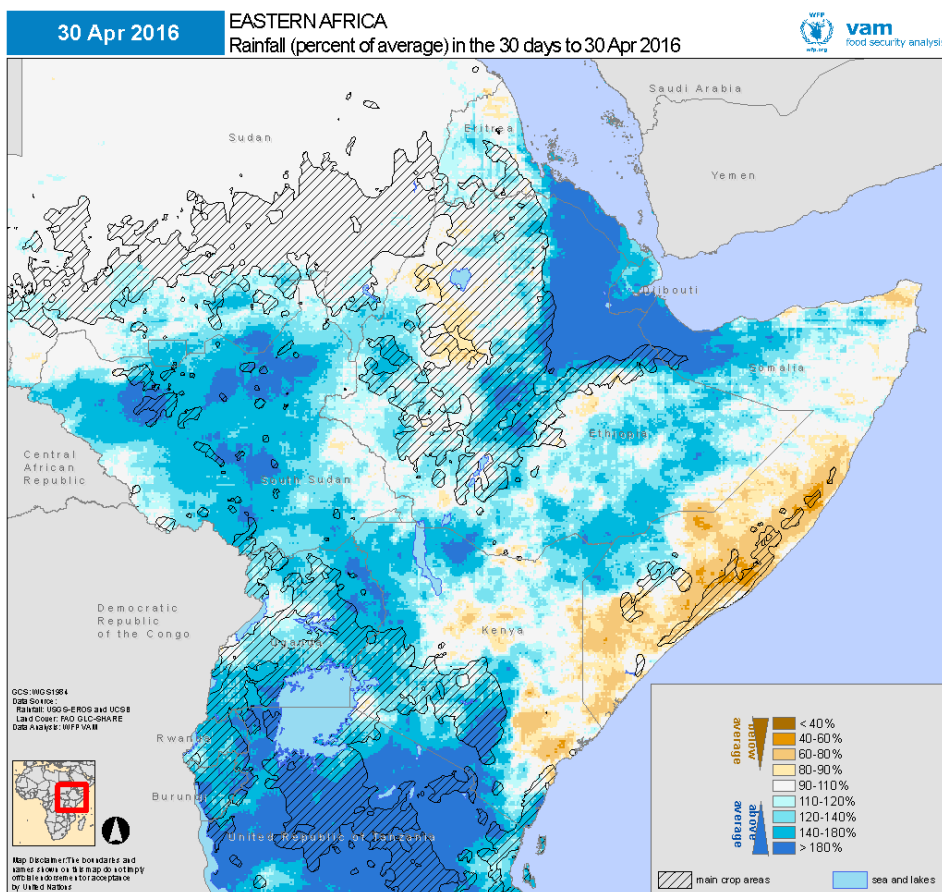
Hashed pattern indicates main agricultural areas.

March is the first month of the growing seasons that extend from Kenya (“Long Rains”) to Somalia (“Gu”) and parts of Ethiopia (Afar, Somali and “Belg” season areas).

March was generally drier than average across the region, in many areas of Ethiopia continuing the patterns that predominated throughout most of 2015 as a result of one of the most intense El Nino on record. In contrast, western areas of South Sudan enjoyed some early rains, but of little significance.

Vegetation cover patterns were still reflecting the impact of the previous year’s poor development, leading to a longer delay in its response to early rainfall.





April 2016 rainfall as a percentage of the 20-year average (left).

Brown shades for drier than average, blue shades for wetter than average conditions.

Early May 2016 vegetation index as a percentage of the 12-year average (right).

Orange shades for below-average, green shades for above-average vegetation.

Hashed pattern indicates main agricultural areas.

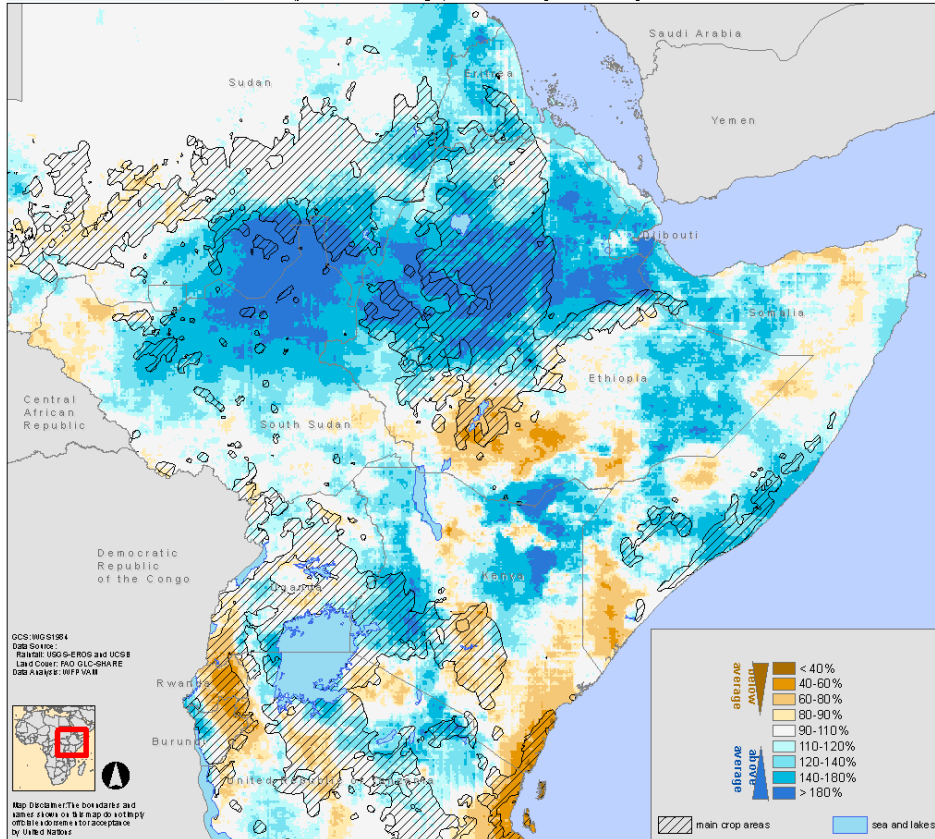
Conditions during April were in stark contrast with those in March, as most of the region enjoyed much wetter than average conditions – in particular the Afar region and neighbouring areas of Somaliland, registered close to three times the long term average rainfall, bringing much needed improvements to water and pasture availability in the region after 2015's devastating drought.

The only exception was eastern coastal Kenya and most of southern and central Somalia, where significant rainfall deficits accumulated during this period which provides the bulk of the rainfall during this season.

Vegetation cover responded strongly with some areas reaching historically high levels – the exception was Kenya and Somalia where drier than average conditions led to lower than average vegetation cover.

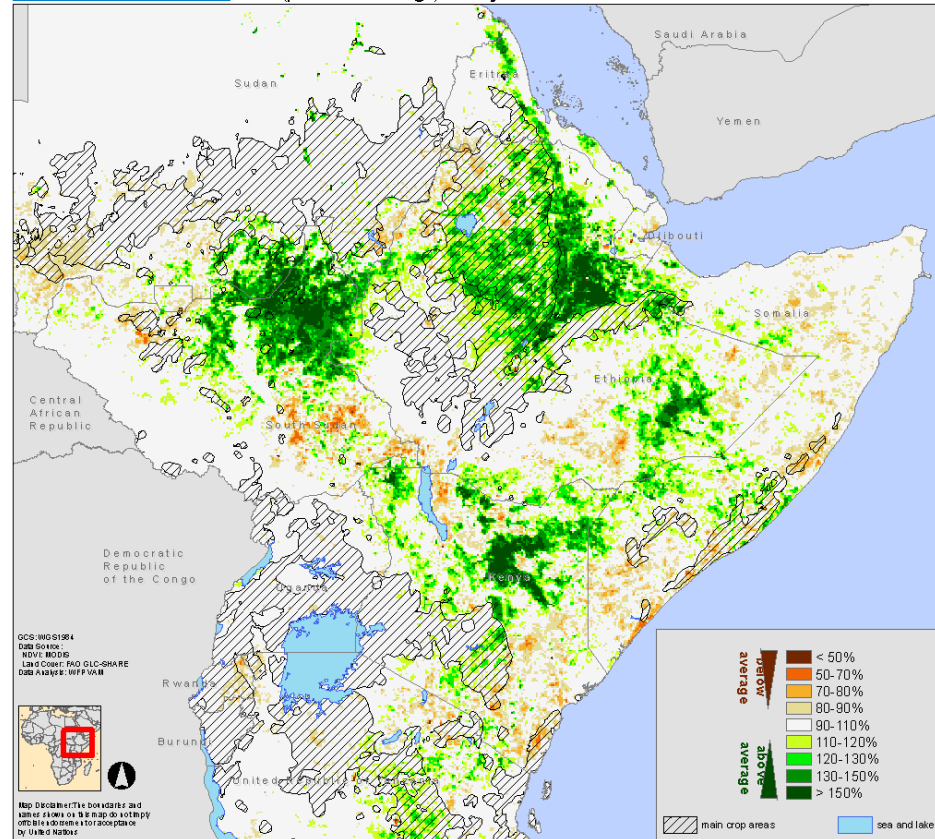
31 May 2016

**EASTERN AFRICA**  
Rainfall (percent of average) in the 30 days to 31 May 2016



24May-09Jun 2016

**EASTERN AFRICA**  
NDVI (percent of average) 24May-09Jun 2016



May 2016 rainfall as a percentage of the 20-year average (left).

Brown shades for drier than average, blue shades for wetter than average conditions.

Early June 2016 vegetation index as a percentage of the 12-year average (right).

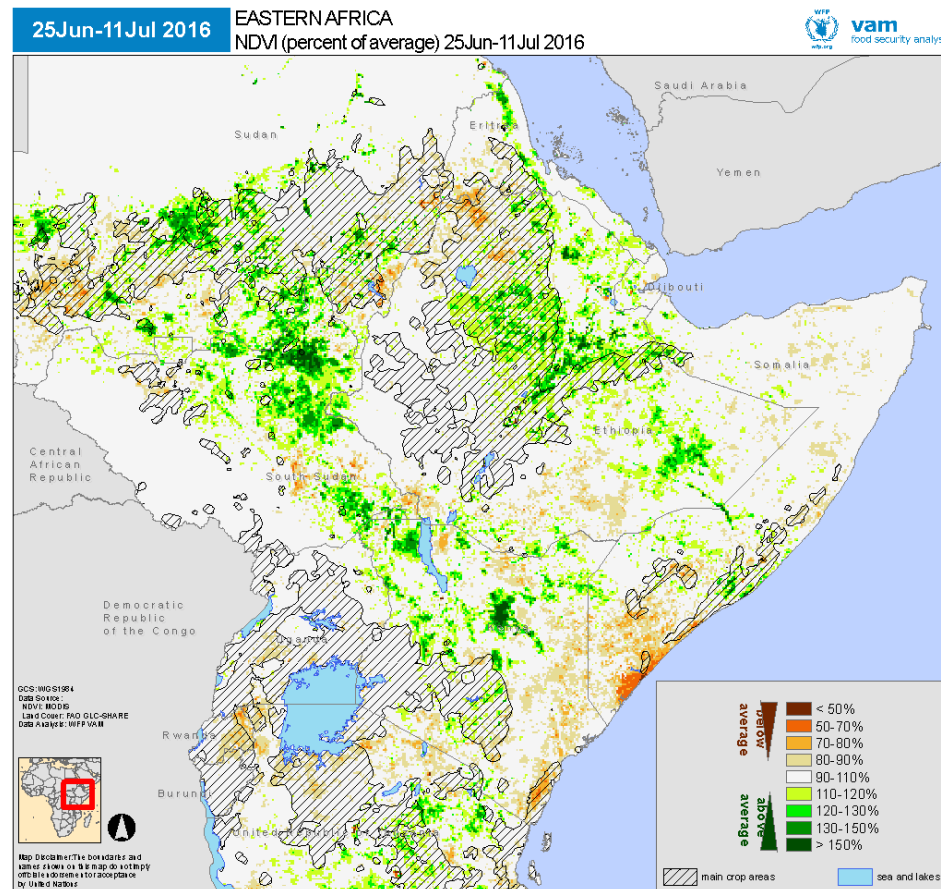
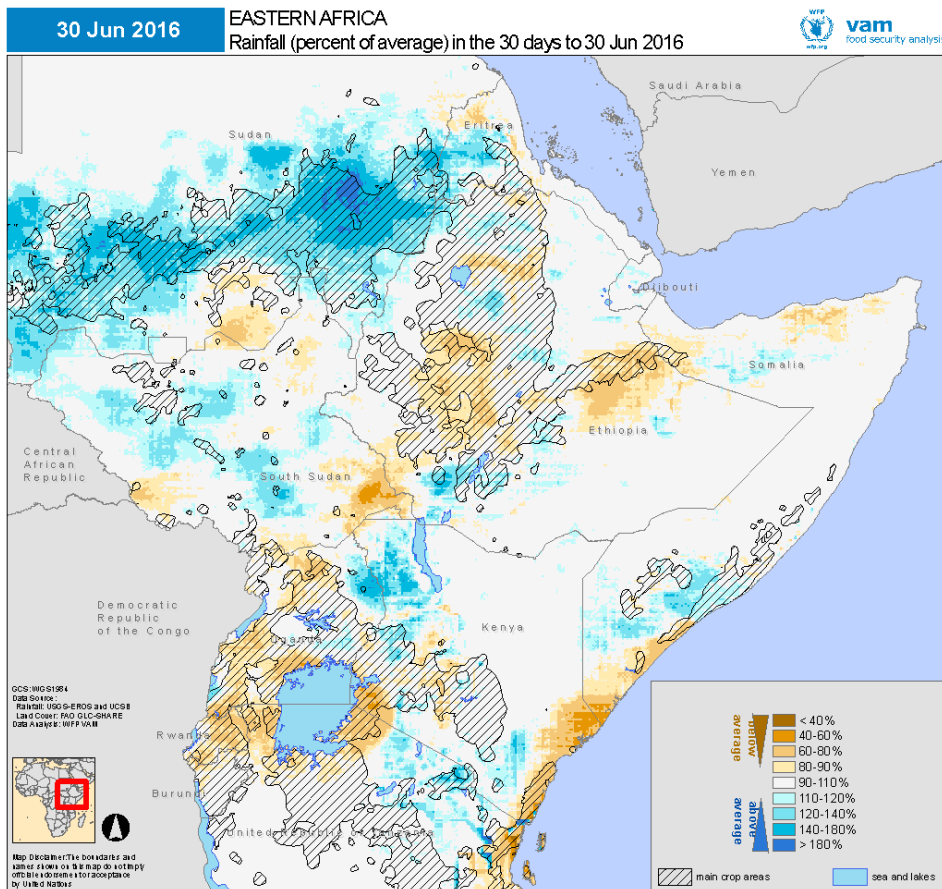
Orange shades for below-average, green shades for above-average vegetation.

Hashed pattern indicates main agricultural areas.

May was characterized by above average rainfall across most of the region, in particular with heavy early rainfall across NE South Sudan and central and northern Ethiopia. Good rainfall continued across Afar, Somaliland and SE Ethiopia. In contrast, drier than average conditions developed in southern Oromia and SNNPR in Ethiopia and continued in coastal Kenya and southern Somalia.

The continuing heavy rainfall in western South Sudan and the northern half of Ethiopia has led to vegetation cover reaching record high levels for this time of the year. Similar though more localized patterns can also be observed in northern Kenya and SE Ethiopia (Somali region).





June 2016 rainfall as a percentage of the 20-year average (left).

Brown shades for drier than average, blue shades for wetter than average conditions.

Early July 2016 vegetation index as a percentage of the 12-year average (right).

Orange shades for below-average, green shades for above-average vegetation.

Hashed pattern indicates main agricultural areas.

In June, the focus changes to more northern areas of the region – little rain is seen over Somalia (except for its coastal areas), semi-arid Kenya and SE Ethiopia, areas where the long dry season will extend into late September.

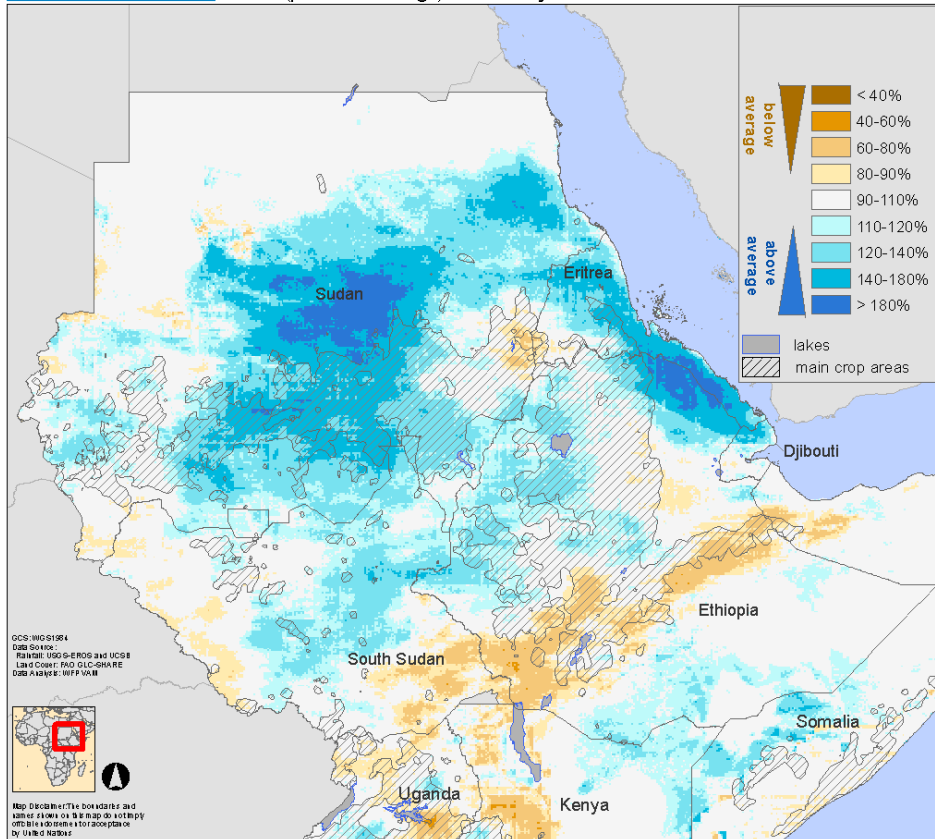
June rainfall was around average levels though dryness continued in coastal Kenya and Somalia, and developed in parts of central Ethiopia and SE South Sudan. In contrast, most of Sudan enjoyed above average rainfall extending further than usual into northern arid regions of the country, accompanied by a strong vegetation cover response.

As Afar, SE Ethiopia, northern Kenya entered a drier stage of the season, above average vegetation cover levels converged back to normal. In southern Somalia and coastal Kenya due significant seasonal (March to May) rainfall deficits, end of season vegetation cover became more pronouncedly below average.



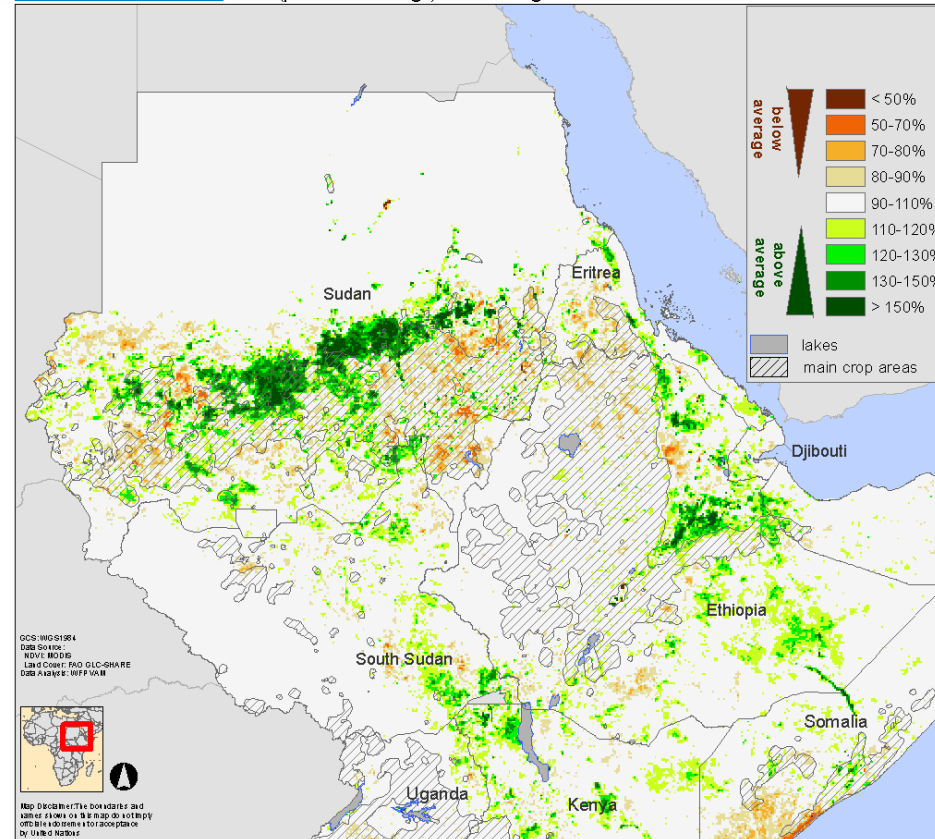
31 Jul 2016

SUDAN, SOUTH SUDAN, ERITREA, DJIBOUTI and ETHIOPIA  
Rainfall (percent of average) in the 30 days to 31 Jul 2016



27Jul-12Aug 2016

SUDAN, SOUTH SUDAN, ERITREA, DJIBOUTI and ETHIOPIA  
NDVI (percent of average) 27Jul-12Aug 2016



July 2016 rainfall as a percentage of the 20-year average (left).

Brown shades for drier than average, blue shades for wetter than average conditions.

Early August 2016 vegetation index as a percentage of the 12-year average (right).

Orange shades for below-average, green shades for above-average vegetation.

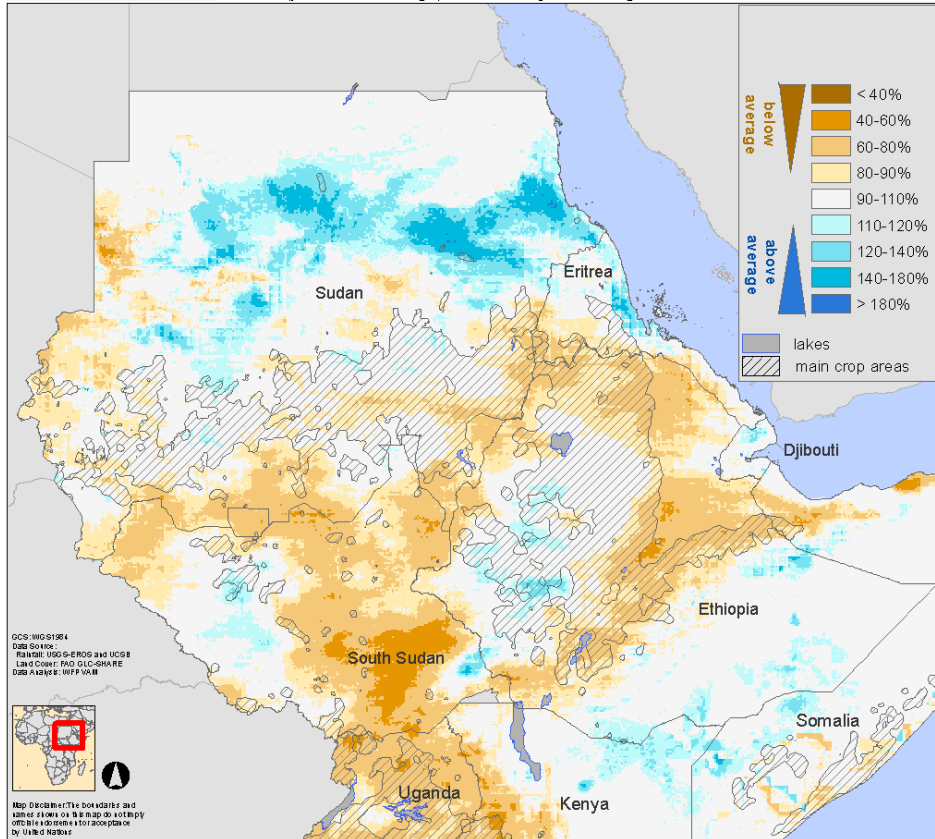
Hashed pattern indicates main agricultural areas.

In July, rainfall systems made remarkable northwards progress, bringing much above average rainfall to Sudan, from its central regions all the way to its northern arid areas. Eritrea also benefitted from wetter than average conditions. Vegetation cover in central north Sudan responded very strongly reaching exceptional levels. More irregular rainfall and localized below average vegetation cover characterized eastern Sudan areas and parts of the Darfur region.

In contrast, drier than average conditions developed further along a belt extending from SE South Sudan across south-central Ethiopia (SNNPR and Oromia). No impacts are yet felt on vegetation cover.

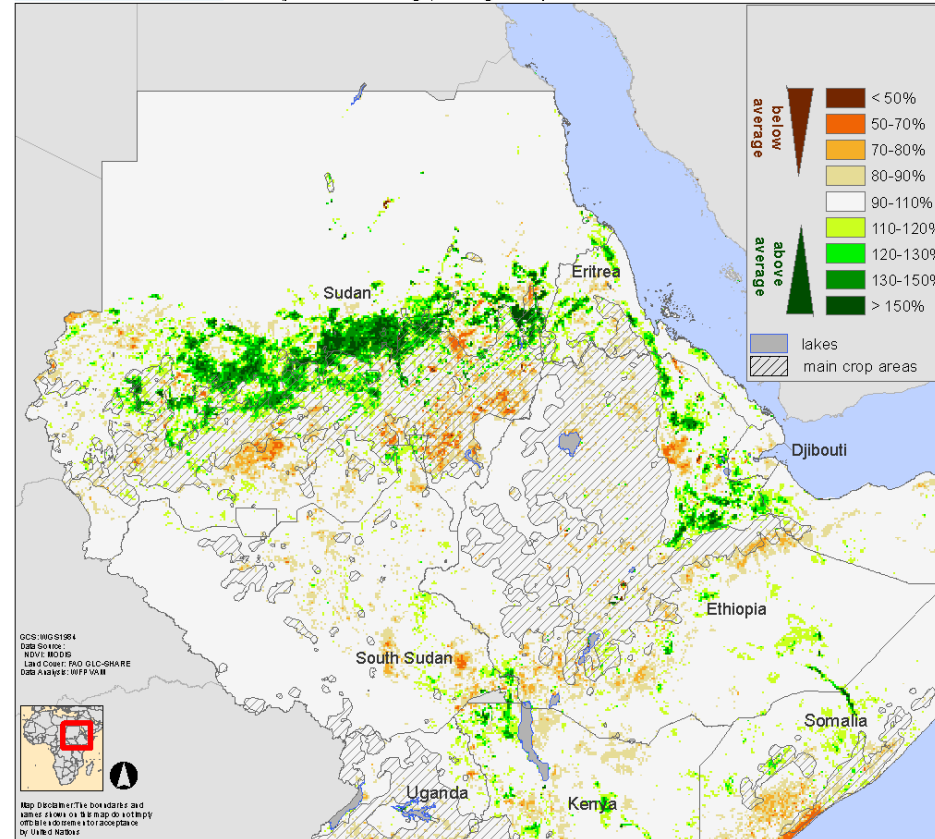
31 Aug 2016

SUDAN, SOUTH SUDAN, ERITREA, DJIBOUTI and ETHIOPIA  
Rainfall (percent of average) in the 30 days to 31 Aug 2016



20Aug-05Sep 2016

SUDAN, SOUTH SUDAN, ERITREA, DJIBOUTI and ETHIOPIA  
NDVI (percent of average) 20Aug-05Sep 2016



August 2016 rainfall as a percentage of the 20-year average (left).

Brown shades for drier than average, blue shades for wetter than average conditions.

Late August 2016 vegetation index as a percentage of the 12-year average (right).

Orange shades for below-average, green shades for above-average vegetation.

Hashed pattern indicates main agricultural areas.

In August generalized drier than average conditions spread across the whole region, with particular incidence in South Sudan, Uganda, areas of Ethiopia away from the central highlands and eastern Sudan. This is essentially a continuation and expansion of drier than average conditions that began developing from as early as June.

The first signs of impacts on vegetation cover are now being seen and may develop further in case the drier than average conditions continue further during September.

## Data Sources:

Rainfall: CHIRPS, Climate Hazards Group, UCSB

Vegetation: MODIS NDVI, EOSDIS-NASA

Land Cover: FAO GLC-Share

## Processing:

VAM software components, ArcGIS

## For more information, please contact:

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