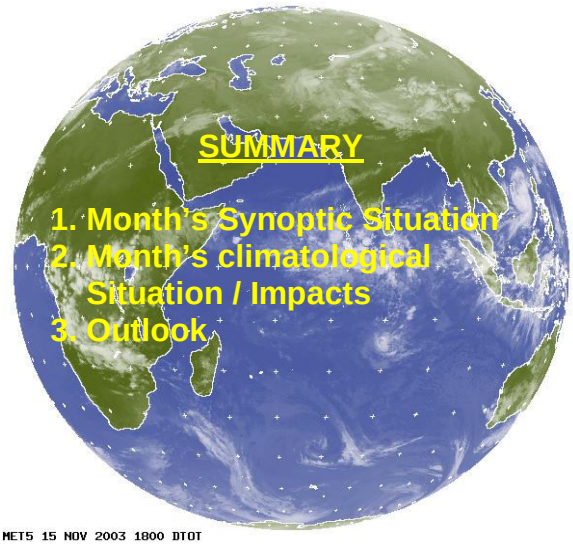
AFRICAN CENTRE OF METEOROLOGICAL APPLICATIONS FOR DEVELOPMENT
CENTRE AFRICAIN POUR LES APPLICATIONS DE LA METEOROLOGIE AU DEVELOPPEMENT

CLIMATE WATCH AFRICA BULLETIN

N° 12
DECEMBER 2011



SUMMARY

HIGHLIGHTS: *The Azores high strengthened while the St. Helena high weakened significantly. Most of the Sahel, the northern Africa countries, northern part of the central Africa and of the Gulf of Guinea countries were dry while the rest of the continent had significant amounts of rainfall. Increase in temperature anomalies was observed in the Northern Africa and Madagascar.*

1. SYNOPTIC SITUATION DURING THE MONTH OF DECEMBER 2011

This section provides the strengths of the surface pressure systems; the 850hPa general circulation anomalies; upper troposphere thermal regimes; relative humidity; sea surface temperature (SST) and El Nino/Southern Oscillation (ENSO).

1.1 Centres of Surface Pressure Systems

The Figure 1 shows surface pressure systems compared to the past month as described below:

The Azores high of 1030hPa strengthened significantly by 9hPa and shifted north-east. Its centre was located over north Atlantic ocean at about 38°N/20°W extending a ridge over Northern Africa.

The St. Helena high of 1024hPa weakened significantly by 4hPa and shifted north-east. Its centre was located at about 30°S/10°W over south Atlantic Ocean.

The thermal low of 1011hPa had Its centre in the coastal zone of the Gulf of Guinea.

The Mascarene high of 1020hPa strengthened slightly by 1hPa and shifted north-west. Its centre was located at about 35°S/75°E with an extended ridge over Madagascar and extreme south-eastern part of South Africa.

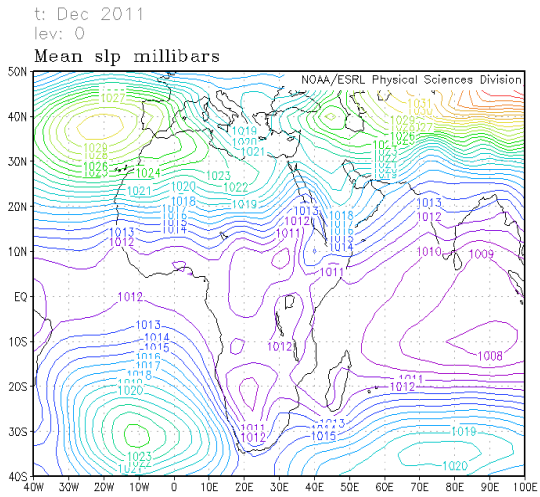


Figure 1 : Mean Surface Pressure during December 2011 (Source: NOAA/NCEP)

1.2 The 850hPa wind anomaly

The Figure 2 shows wind anomalies at 850hPa derived from reference period 1971-2000.

Strong westerly wind anomalies from equatorial Atlantic Ocean were observed over western part of the Gulf of Guinea.

In Northern Africa and northern part of the Sahel strong wind anomalies from Mediterranean sea, turning into easterlies prevailed.

Over southern Angola and northern Namibia strong north-westerly wind anomalies from southern Atlantic ocean were observed.

Over Eritrea and Djibouti strong northerly wind anomalies from Red sea prevailed.

The average wind anomaly speed (shaded) was observed at about 03m/s and above.

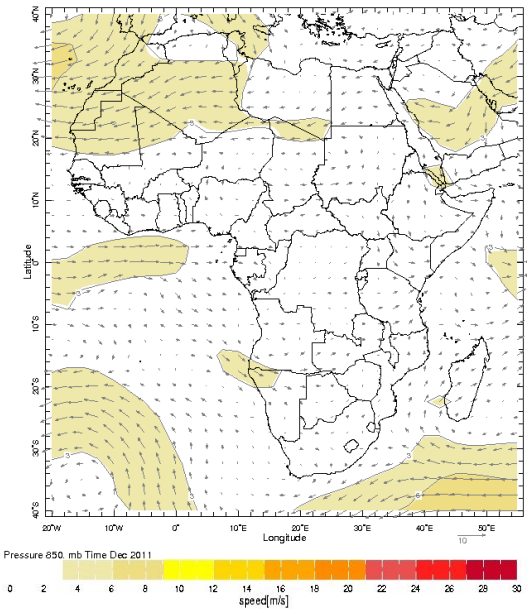


Figure 2 : December 2011, Wind Anomalies at 850hPa (Source : IRI/NOAA/NCEP)

1.3 Thermal index

In the month of December 2011, the Thermal Index (TI) regime at 300hPa, Figure 3, had an isotherm value of 242°K covered extreme southern part of the Gulf of Guinea countries, most of central Africa, most of the GHA and northern part of southern Africa. The highest TI regime of 243°K straddled over Angola, Namibia and Botswana. The highs TI (≥242°K) triggered heavy rainfall with floods over the areas characterized by high relative humidity (>60%) as shown in Figure 6 while the low TI regime ≤241°K values were associated with suppressed convection over the rest of Africa.

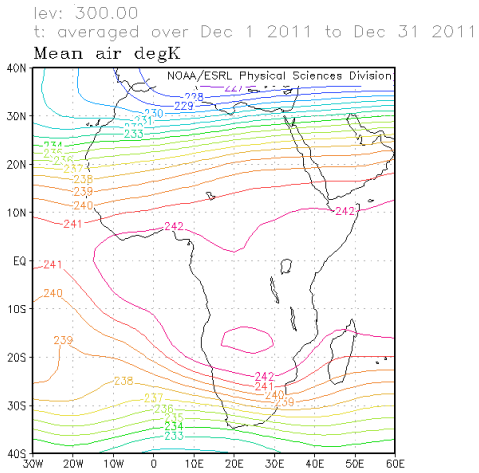


Figure 3: Thermal Regime at 300hpa (Source: NOAA/NCEP)

1.4 Relative Humidity at 850hPa

The 850hPa (Figure 4) shows high RH (>60%) in December 2011, over southern part of the Gulf of Guinea countries, Central Africa, most of GHA countries, extreme northern and eastern parts of southern Africa and Madagascar. However, the northern part of the continent above 10°N and south-western part of the continent experienced dry conditions characterized by the lowest RH (≤ 40%).

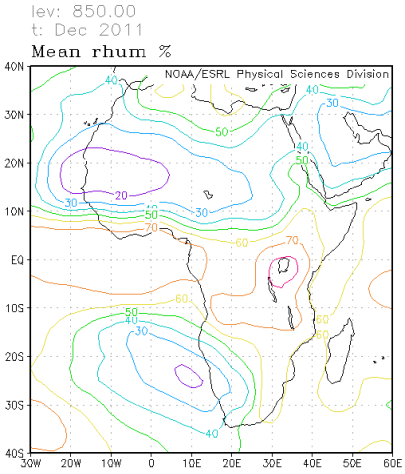


Figure 4:RH at 850 hPa (Source : NOAA/NCEP)

1.5 Sea Surface Temperature (SST) and El Nino/Southern Oscillation (ENSO)

Warming conditions persisted in most of western, north-central and south-central parts of the Pacific Ocean while in the eastern part cooling conditions continued. Neutral to warming conditions continued in north-western, north-eastern and south-western parts of the Atlantic Ocean while in most of the southern and north-central part cooling conditions continued. Neutral to warming conditions persisted in most of Indian Ocean and Mozambique Channel except in south-central part where some cooling developed.

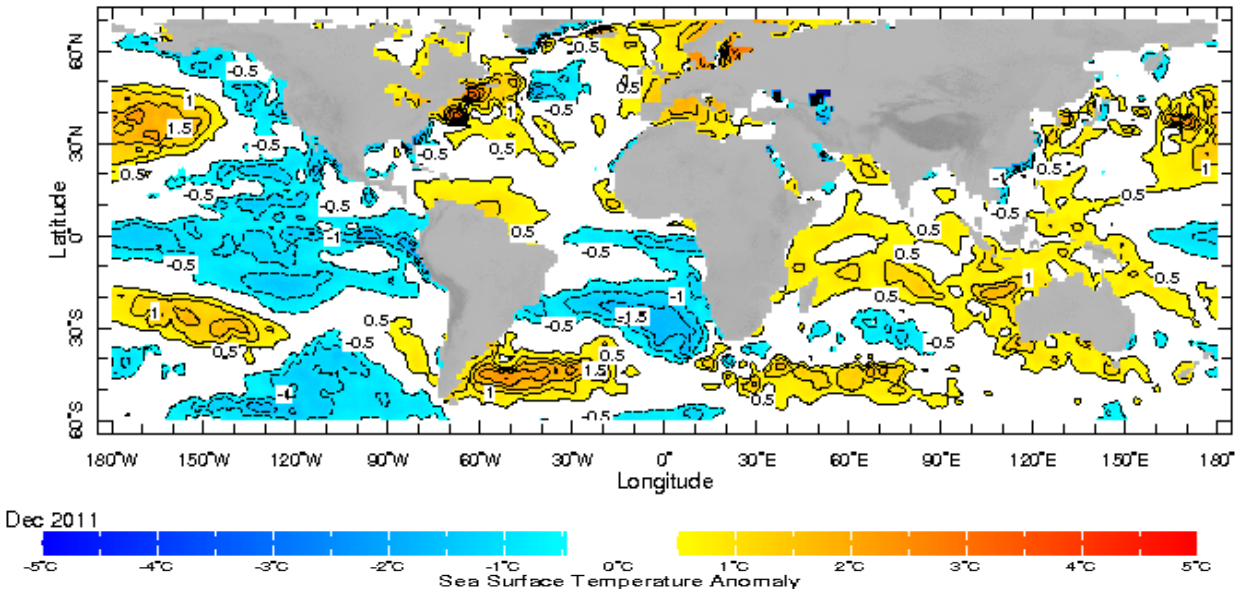


Figure 5: Sea Surface Temperature (Source IRI).

2. CLIMATOLOGICAL SITUATION AND IMPACTS DURING DECEMBER

The section provides the general climatological situation covering two major parameters, the rainfall and temperature.

2.1 Rainfall

The estimated rainfall for December, 2011 in Figure 6, shows dry conditions over most countries located in the northern hemisphere. Some decrease in rainfall pattern was observed over the GHA, while Southern Africa had an increase. In detail**:**

- **North Africa:** Most of the parts remained dry. However, some localized amounts ranging from 20mm to 100mm over northern Algeria and Tunisia were observed.
- **The Sahel:** The region was under the influence of the Harmattan characterised by cool, dry and dusty wind from the Sahara.
- **Gulf of Guinea countries**: The influence of the Harmattan was visible over the region. Only the coastal zones of Côte d'Ivoire had rainfall amounts ranging from 20mm to 100mm.
- **Central Africa**: The northern part was dry while the southern part had amounts ranging from 10mm to 300mm increasing to the maximum amount of about 600mm over Democratic republic of Congo.
- **GHA**: countries had decrease rainfall distribution with amounts ranging from 20mm to 400mm over most southern part with localized high amounts between 400mm to 600mm over Tanzania.
- **Southern Africa** had increase in rainfall distribution and amounts recording 10mm to 400mm with maximum of above 800mm over Zambia, Namibia and Botswana.

In December, 2011 the rainfall anomalies compared to the reference period 1971-2000, Figure 7 showed rainfall deficits over northern part of central Africa countries, South-eastern part of GHA, eastern part of southern Africa and extreme north-western and north-eastern parts of Northern Africa countries. Excessive rainfall was observed over the extreme southern part GHA and northern part of southern Africa countries.

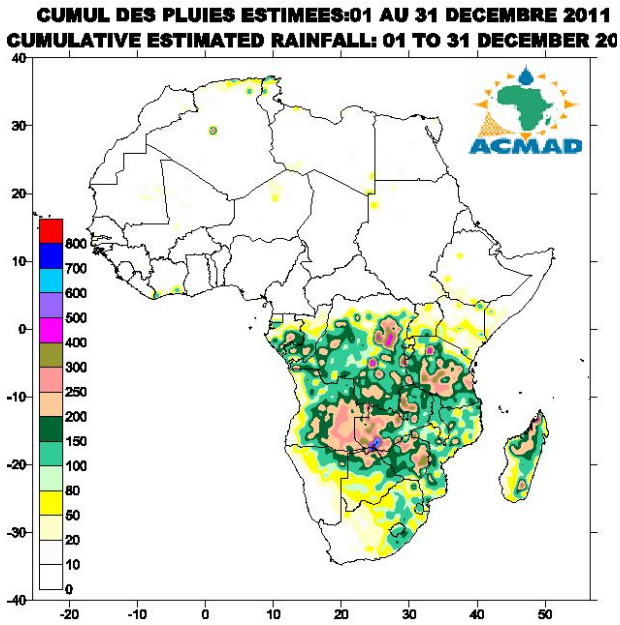


Figure 6: Monthly cumulative rainfall (Data Source: NOAA/NCEP)

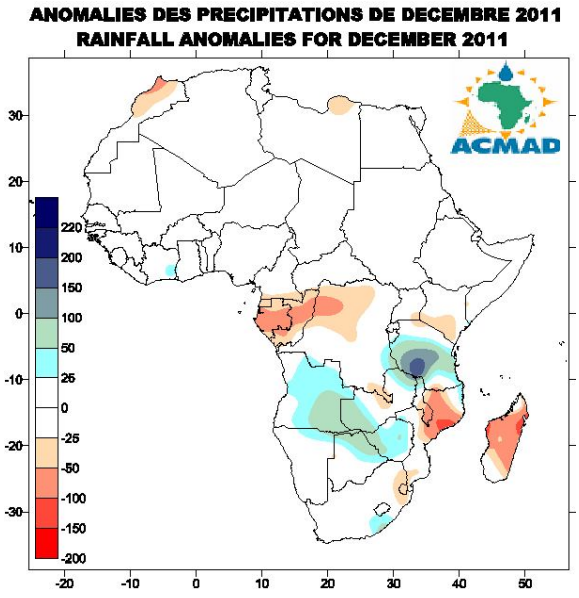


Figure 7: Monthly Precipitations Anomalies (Data Source: NOAA/NCEP)

2.2 Surface Temperature Anomalies

In December, 2011, the temperature anomalies (Figure 8) compared to 1971-2000 base period, were generally normal over the continent. Warmer temperatures by 1.5°C were observed over extreme northern part of northern Africa and northern part of Madagascar with the maximum temperature anomalies above 2.5°C over northern Algeria. However, low temperature anomalies of –1°C were observed over northern part of South Africa.

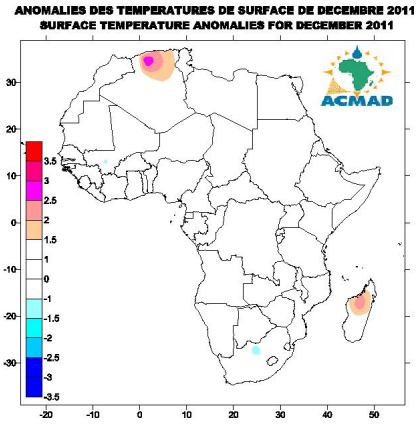


Figure 8 : Monthly Temperatures Anomalies (Data Source: NOAA/NCEP)

3. OUTLOOK

The subsections provide the expected SSTs and ENSO characteristics and evolution of events based on Figures 9 and 10 respectively and expected rainfall outlook.

3.1 Forecast Sea Surface Temperature (SST)

The figure 9 shows the forecast Sea Surface Temperature Anomalies from December for the period of December-January-February 2011.

- **Pacific Ocean:** warming conditions will persist over most of western part while over most of eastern and equatorial parts the cooling will continue.
- **Atlantic Ocean:** Neutral to warming condition will persist over most of the Ocean except over south-central part where some cooling is expected.
- **Indian Ocean and Mozambique Channel:** Neutral to warming conditions are expected to persist in most of the Ocean and Mozambique Channel.

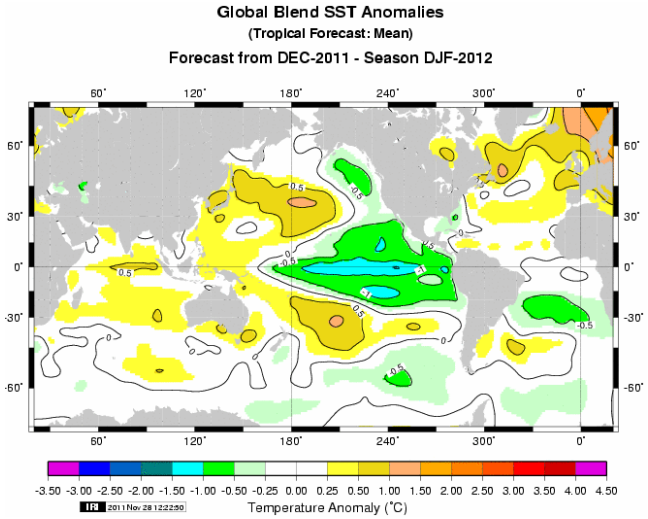


Figure 9 : Forecast Sea Surface Temperatures Anomalies (source IRI)

3.2 El Ni Niño/La Niña

The set of dynamical and statistical model forecasts of ENSO over Nino 3.4 domain (5°N – 5°S, 120°W – 170°W) are shown in Figure 10.

Most of dynamical and statistical model predictions issued during late November and early December 2011 predict La Nina conditions from the December 2011 to February 2012 season currently in progress, continuing into the early part of 2012 before transitioning back to neutral conditions during northern spring season.

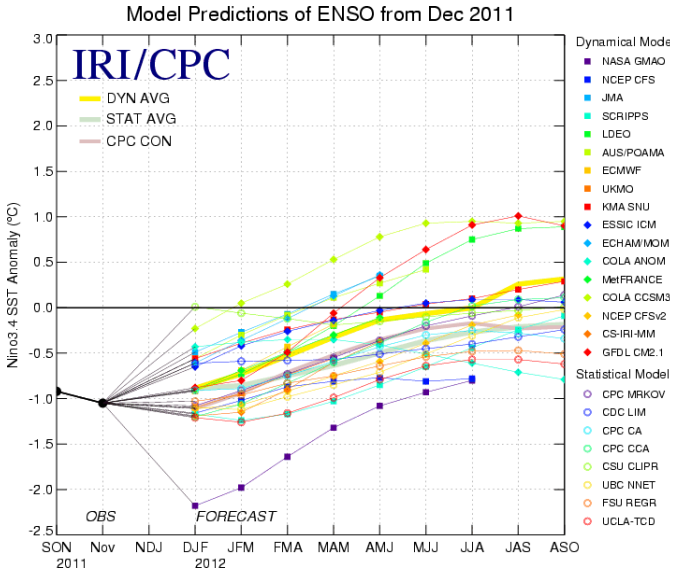


Figure 10 : Multi-model ENSO Forecast (source IRI)

3.3. Rainfall

The prevailing high relative humidity coupled with high conditional instability manifested by TI regimes at 300hPa will continue to maintain heavy rainfall with localised highest probability of flooding over southern parts of central Africa, of GHA countries and northern part of Southern Africa countries. The ITD will continue its southwards migration, leading to the reduction of rainfall activities over the Gulf of Guinea countries and the intensification of Harmattan in the Sahel, the Sahara and northern part of the Gulf of Guinea countries. In detail:

North Africa countries: will have no significant change in rainfall distribution and amounts. However, some localised light amounts ranging from 10mm to 100mm will be observed in the extreme northern part.

The Sahel: will continue to be dry. The region will be under the influence of the Harmattan, characterized by cold, dry and dusty conditions.

Gulf of Guinea countries: The northern part will be under the influence of the Harmattan while the extreme southern part will experience rainfall amounts ranging from 10mm to 100 mm.

Central Africa countries: will continue to experience rainfall amounts ranging from 10mm to 300mm over southern part, intensifying to maxima of about 500mm over Democratic republic of Congo.

GHA countries: will have amounts ranging from 10mm to 400mm over the southern part and Ethiopian highland, intensifying over Tanzania with localized peaks ranging from about 300mm to 600mm.

Southern Africa countries: most of the region will observe some rainfall amounts ranging from 10mm to 400mm over most part intensifying to about 600mm over Angola, Zambia, Mozambique and Madagascar.

3.2 IRI seasonal Rainfall outlook for Africa issued in December 2011 for JFM

The IRI seasonal rainfall forecast issued in November for the period of December-January-February 2011 shows:

- High probability of above normal to normal rainfall over north-western part of southern Africa and extreme southern part of Central Africa countries.
- Elsewhere, the climatology will prevail.

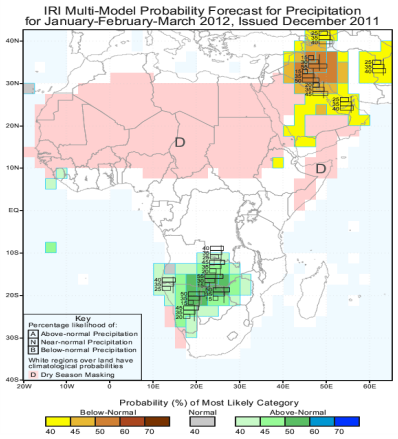


Figure 11: IRI forecast

3.3 Seasonal Rainfall Outlook of central Africa for OND 2011 by ACMAD issued in September

Zone I covering Equatorial Guinea, Sao Tome et Principe, the coastal area of Cameroun, most part of Gabon and coastal part of Congo, will have above normal rainfall.

Zone **II** including south-east Cameroun, south-west of Central African Republic, east Gabon, central and north of Congo and part of western Democratic Republic of Congo will be characterized by normal to below normal rainfall.

Zone III, covering the extreme south of Chad, central part of Cameroon, most part of Central Africa Republic and democratic Republic of Congo will be characterized by normal rainfall.

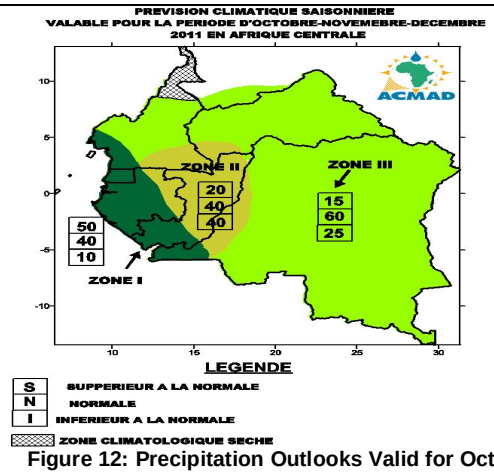


Figure 12: Precipitation Outlooks Valid for October-November-December 2011 over Central Africa.

3.4 Seasonal Rainfall Outlook for west Greater Horn of Africa for SOND 2011 by ICPAC issued in September

- **Zone I:** Increased likelihood of near to below normal rainfall over western Tanzania; southern Burundi and southwestern Rwanda.
- **Zone II:** Increased likelihood of near normal to above normal rainfall over much of Tanzania; northern Burundi; much of Rwanda; western Kenya as well as southern and central Uganda.
- **Zone III:** Increased likelihood of above to near normal over northeastern and northern coast of Tanzania; coastal, central and northeastern Kenya; extreme southern Ethiopia as well as southern and central Somalia.
- **Zone IV:** Increased likelihood of to near normal to below normal rainfall over northern Somalia; eastern and southern Ethiopia; northwestern Kenya and northern Uganda.
- **Zone V:** Increased likelihood of near normal to above normal rainfall over much of South Sudan; western, central and northern Ethiopia and Djibouti.
- **Zone VI:** Increased likelihood of generally dry conditions over Sudan; northern Ethiopia and much of Eritrea.

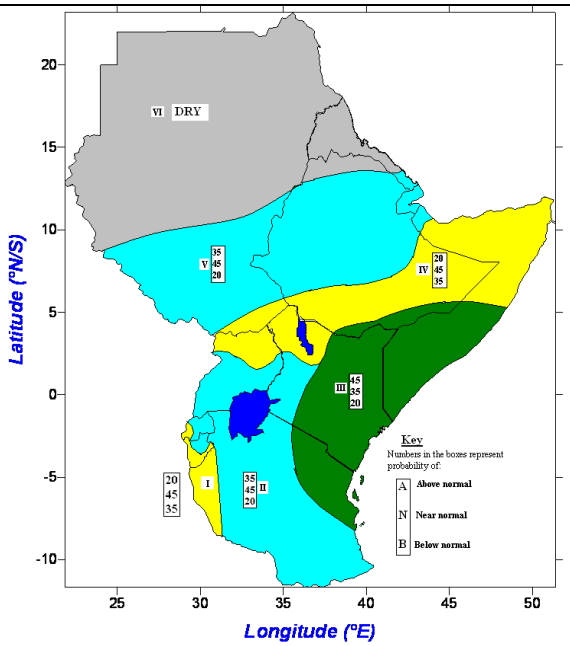


Figure 13 : GHA Climate Outlook for September to December 2011

3.5 Southern Africa Rainfall Outlook (SARCOF-15) for OND 2011 issued in September

Zone 1 (The extreme north of the DRC): Increased chances of normal to below-normal rainfall

Zone 2 (North-eastern half of Tanzania): Increased chances of above-normal rainfall

Zone 3 (North-western half of Angola, the bulk of DRC, south-western half of Tanzania, extreme north-eastern parts of Zambia, northern half of Malawi and north eastern Mozambique): Increased chances of normal to above-normal rainfall

Zone 4 (Central South Africa, south-western half of Lesotho, western half of Botswana, most of Namibia, south-eastern half of Angola, extreme south of DRC, central parts of Zambia, southern half of Malawi, north-eastern half Zimbabwe and central Mozambique): Increased chances of normal to below-normal rainfall

Zone 5 (North-eastern half of Lesotho, north-eastern parts of South Africa, Swaziland, southern parts of Mozambique, south-western half of Zimbabwe, eastern half Botswana and southwestern Zambia): Increased chances of normal to below-normal rainfall

Zone 6 (The west coastal areas of South Africa, Namibia and the extreme south-western Angola): Increased chances of normal to below-normal rainfall

Zone 7 (Western Madagascar): Increased chances of normal to below-normal rainfall

Zone 8 (Eastern Madagascar): Increased chances of normal to above-normal rainfall

Zone 9 (Southern Madagascar): Increased chances of above- normal to normal rainfall

Zone 10 (Mauritius): Increased chances of normal to above-normal rainfall

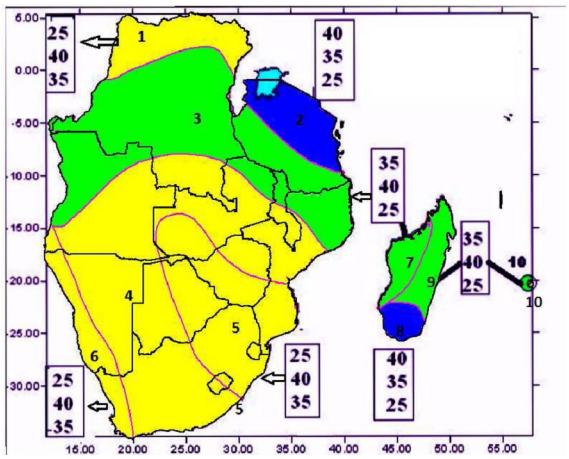


Figure14: ***Rainfall forecast for October-December 2011***

ADVICES:

- ✓ ***The high rainfall variability in the region may cause risks with adverse effects throughout the season, particularly on goods and persons (flooding) on plants (locust invasion) and Public Health (malaria epidemics and other waterborne diseases such as cholera).***
- ✓ ***Users of this product are encouraged to contact NMHSs for more detailed advices at country level.***