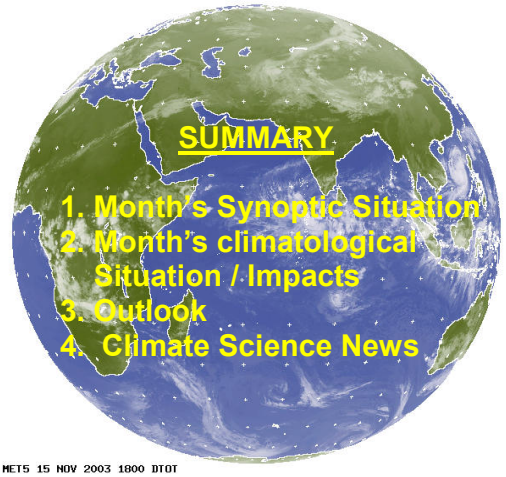
AFRICAN CENTRE OF METEOROLOGICAL APPLICATIONS FOR DEVELOPMENT
CENTRE AFRICAIN POUR LES APPLICATIONS DE LA METEOROLOGIE AU DEVELOPPEMENT

CLIMATE WATCH AFRICA BULLETIN

N° 06
June 2009



5, Avenue des Ministères BP : 13184 Niamey- Niger
Tel: (227) 20 73 49 92 -- Fax: (227) 20 72 36 27 -- email: dgacmad@acmad.ne -- Web: http//www.acmad.org

HIGHLIGHTS: The Gulf of Guinea and northern parts of central Africa countries experienced heavy rainfall with floods where the worst hit were the coastal settlements. The heavy rains with floods are expected to intensify over the Gulf of Guinea countries affecting coastal settlements. The rainfall over the Sahel continues to be suppressed.

1. SITUATION DURING THE MONTH OF JUNE, 2009

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

1.1 Centres of Anticyclone

The Figure1 shows surface pressure systems as described below:

The Azores high pressure at 1022hPa weakened by 2hPa compared to the previous month and shifted southwest at about 30°N/40°W.

The St Helena high pressure at 1022hPa strengthened significantly by 4hPa compared to the past month and shifted southwest at 30°S/10°W.

The Saharan thermal lows of 1008hPa maintained its depth compared to the past month, but covered limited areas in eastern Niger and central Chad and Sudan.

The Mascarene high pressure at 1022hPa strengthened by 2hPa and shifted southwest at 32°S/65°E with a ridge over eastern Africa.

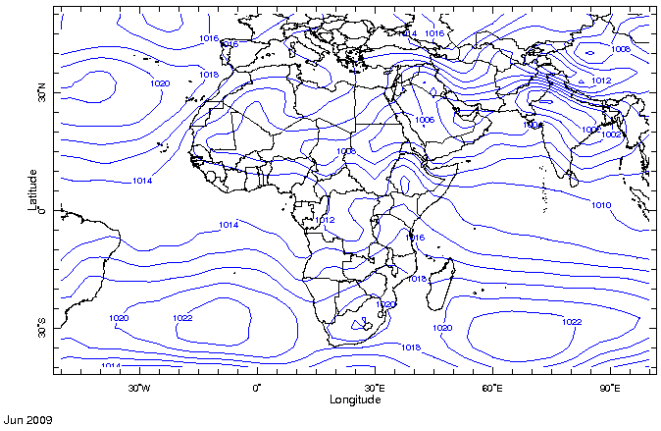


Figure 1 : Mean surface pressure during the Month of June, 2009 (Source : IRI/NOAA/NCEP)

1.2 Low level wind anomaly flow at 850hPa

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

Strong north-westerly wind anomalies were observed over northern Tunisia and Libya.

Over Atlantic Ocean strong south westerly wind anomalies were observed off coast of Morocco.

Over northern Namibia strong westerlies prevailed while over Somalia and Ethiopia strong easterly wind anomalies from Indian Ocean becoming south-easterly over Djibouti and Eritrea caused moisture influx.

The average wind anomaly speed (shaded) was observed at about 08 m/s and above.

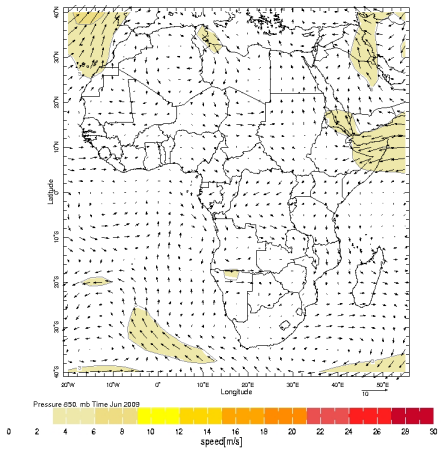


Figure 2 : June 2009, Wind Anomalies at 850hPa (Source : IRI/NOAA/NCEP)

1.3 Mid and upper troposphere winds

At the 600hPa (Figure 3), a wind core associated with the African Easterly Jet (AEJ) of about 12m/s were observed at about 10°N of latitude over Guinea, Côte d'Ivoire, south Mali and Burkina Faso, north Ghana, Togo and Benin.
The Figure 4 shows, the westerly wind mean maximum (STJ) of 24m/s at 150hPa over northern Africa, while,

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equatorial easterly wind primary and secondary maxima of 22 m/s and 8 m/s were observed over eastern Indian Ocean and central part of central Africa and northern parts of GHA countries respectively.

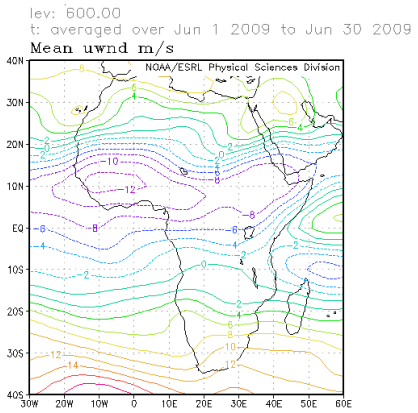

Figure 3 : U - Winds velocity at 600hPa (Source : NOAA/NCEP)

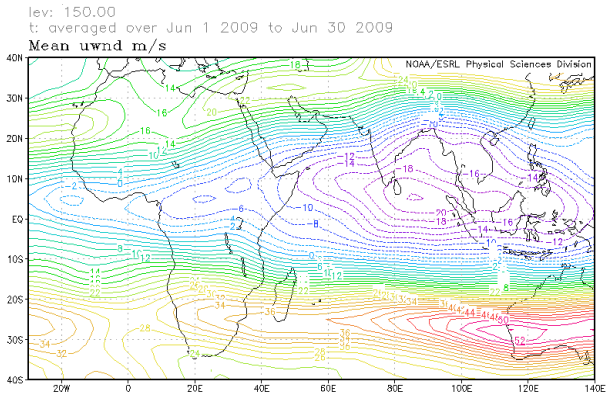

Figure 4 : U - Winds velocity at 150hPa (Source : NOAA/NCEP)

1.4 Thermal index

In the month of June, 2009, the thermal index (TI) regime at 300hPa, Figure 5, had a near-threshold value of 242°K isotherm over Africa covering extreme southern part of the Sahel, Gulf of Guinea, eastern and northern parts of central Africa and GHA countries maintaining reasonable conditional instability associated with heavy rainfall. The threshold value of 243°K and above with epicenter of 247°K over northeastern Asia maintained the highest conditional instability associated with heavy convective rainfall with floods. The low TI regime value of 241°K and below was associated with suppressed convection over most of the Sahel and the Sahara countries.

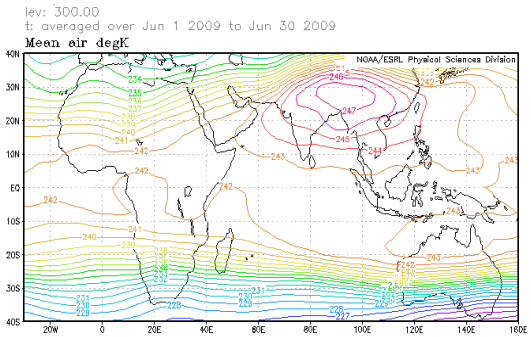

Figure 5 : Thermal regime at 300hPa (Data Source: NOAA/NCEP)

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

A neutral to warming conditions prevailed in most of the Pacific Ocean except in the southern and northern parts where some cooling conditions prevailed. Neutral to warming conditions were observed in most of the Atlantic Ocean except in the equatorial, northern, south central and northern parts where some cooling conditions were observed. Neutral to warming condition were observed in most of the Indian Ocean except the cooling conditions observed in the Bay of Bengal and southern Indian Ocean.

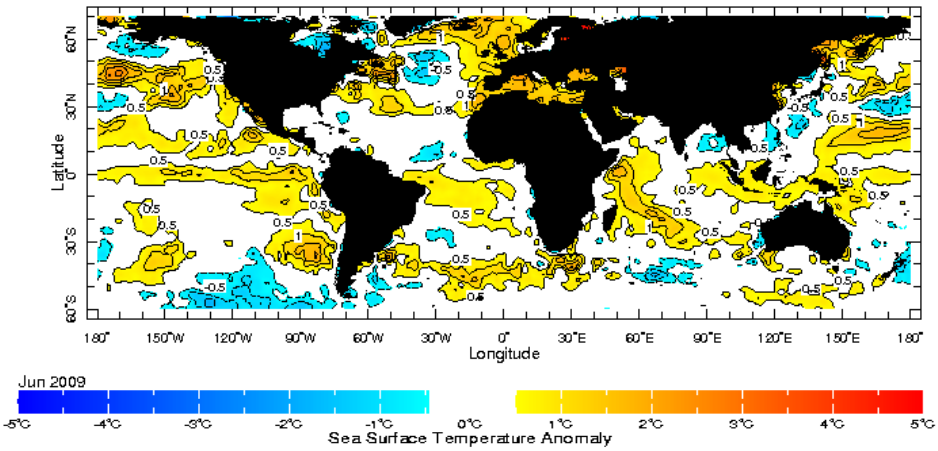

Figure 6: Sea Surface Temperature Anomalies (Source: IRI)

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2. CLIMATOLOGICAL SITUATION AND IMPACTS DURING THE MONTH OF JUNE, 2009

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

2.1 Rainfall

Compared to the last month, the estimated rainfall for June 2009 in Figure 7, shows rainfall increase over the Sahel, the Gulf of Guinea, Greater Horn of Africa (GHA) countries and over central, northern and southern Africa countries. In detail**:**

- **North Africa:** had spatial rainfall distribution increase observing rainfall amounts ranging from 10mm to 50mm and above over Morocco and Algeria.

- **The Sahel** :had spatial rainfall distribution and amounts increase observing amounts ranging from 10mm to 100mm with maximum rainfall amounts of above 150mm over southern parts.

- **Gulf of Guinea** :countries experienced rainfall amounts increase, ranging from 10mm to 300mm with heaviest amounts ranging from about 400mm to 500mm over the coastal zones, southern Guinea Conakry, south-eastern Nigeria and central Cameroon.

- **Central Africa** :countries experienced significant rainfall amounts increase observing 10mm to 250mm with peaks ranging from about 300mm to 500mm over Central Africa Republic, northern Democratic Republic of Congo and northern Gabon.

- **GHA** :northern countries experienced spatial rainfall distribution and amounts increase observing amounts ranging from 10mm to 250mm with peaks of about 300mm to 400mm over western Ethiopia and southeastern Sudan.

- **Southern Africa :** countries experienced spatial rainfall distribution increase recording amounts ranging from 10mm to 80mm with maximum amounts ranging from about 100mm to about 200mm observed over Botswana and western South Africa.

Compared to the reference period 1979-2000, the June, 2009, rainfall anomalies, Figure 8 shows significant rainfall deficits over extreme western part of West Africa, northern Nigeria, most part of GHA countries and Madagascar while excessive rainfall was observed over southern Morocco/northern Mauritania, Southern Algeria/Mali, coastal West Africa, southern Chad, east Congo/Democratic Republic of Congo and Botswana.

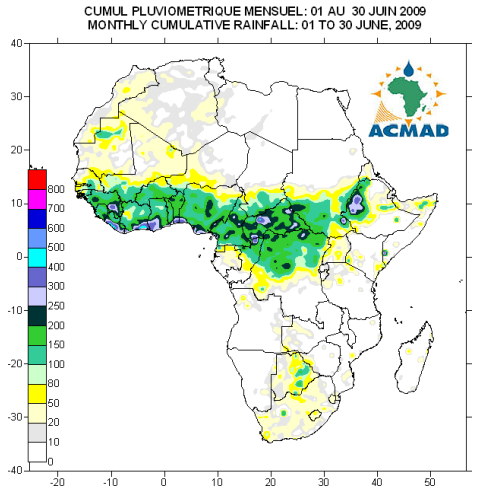

Figure 7: Monthly cumulative rainfall (Data Source: NOAA/NCEP)

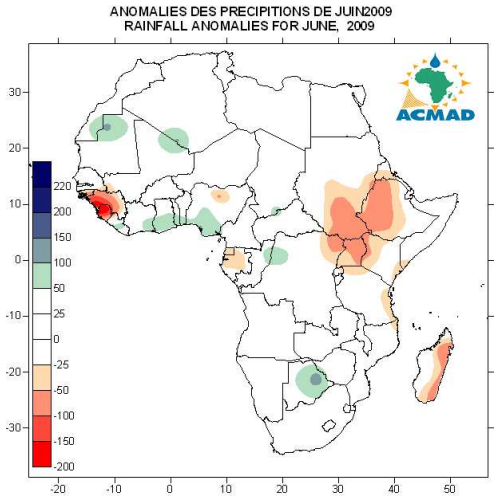

Figure 8: Monthly Precipitations Anomalies (Data Source: NOAA/NCEP)

2.2 Surface Temperature Anomalies

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In June 2009, the temperature anomalies (Figure 9) compared to 1971-2000 base period, in most of African countries were generally normal (1°C to –1°C). However, positive temperature anomalies (>1.5°C) were observed over some eastern Africa, northern Africa, Gulf of Guinea and the Sahel countries with the highest positive temperature anomalies epicenter (>2.5°C) covering northern Morocco.

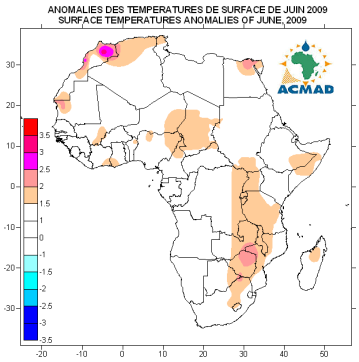

Figure 9 : Monthly Temperatures Anomalies (Data Source: NOAA/NCEP)

3. OUTLOOK

The subsections provide the expected SSTs and ENSO characteristics and evolution of events based on Figures 10 and 11 respectively with rainfall outlook in July.

3.1 Forecast Sea Surface Temperature (SST)

The figure 10 shows the forecast Sea Surface Temperature Anomalies from May 2009 for the period June-July-August.

Pacific Ocean: Neutral to warming conditions will continue over most of Pacific ocean except in the south-eastern, north-eastern and equatorial north-western parts where cooling will prevail.

Atlantic Ocean: A neutral to warming condition is expected over most of Atlantic Ocean except around coastal Senegal/Sierra Leone, western parts, south-central and south-western parts of the Ocean.

Indian Ocean: Neutral to warming condition are expected over most of the Indian Ocean except over the south-western part where cooling conditions will persist.
Over Mozambique Channel, neutral condition will prevail.

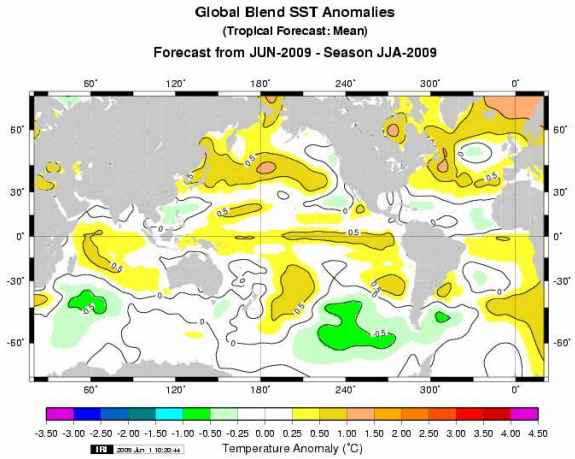

Figure 10 : Forecast Sea Surface Temperatures Anomalies (source IRI)

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) shown on Figure 11 that, current forecasts and observations indicate that development of weak to moderate El Nino conditions is the most likely scenario through 2009 (with probability just over 60% from JAS to OND seasons), but retention of neutral conditions is also possible with probabilities of approximately 35-40%.

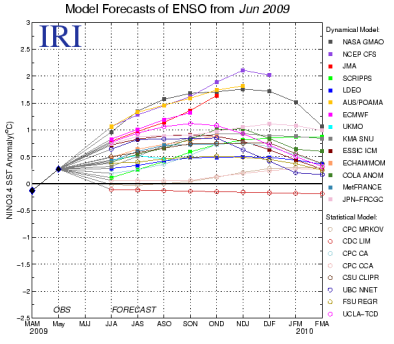

Figure 11 : Multi-model ENSO Forecast (source IRI)

3.3 Rainfall

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The ITD northward displacement will lead to moisture increase over northern part of Gulf of Guinea countries and southern Sahel triggering convective rainfall increase. The northern parts of central Africa and northern GHA countries will have rainfall increase with significant decrease over southern GHA and southern Africa countries. In detail:

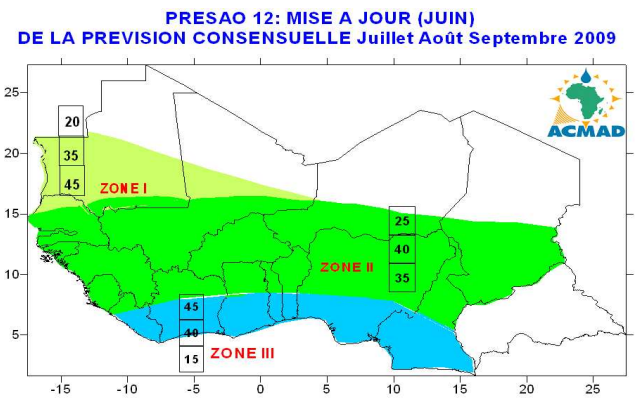
- **North Africa** countries will experience rainfall increase recording about average rainfall.
- **The Sahel** will experience rainfall increase with highest amounts over southern parts of the Sahel recording average rainfall amounts with below average over the rest of the Sahel.
- **Gulf of Guinea** countries will experience rainfall increase recording above average over several parts with maxima peaks along the coastal zone resulting in severe flooding threatening coastal populations.
- **Central Africa** countries will experience average rainfall tending to below average over southern parts.
- **GHA** countries will experience decreased rainfall amounts over southern parts recording below average rainfall with average to above average amounts over northern parts.
- **Southern Africa** countries will experience rainfall increase due to prevailing warm SSTs.

3.4 Result of PRESAO12:seasonal rainfall forecast for July-August-September 2009

i) Over zone III which covers the southern part of Gulf of Guinea countries (from Cote d'Ivoire to Cameroon), a high probability of rainfall higher than normal (Probability of 0,45)

ii) Over the zone II, which corresponds to the Central Sahel and including Sierra Leone, Guinea Conakry, Guinea Bissau, southern Senegal, the Gambia, southern Mali, Burkina Faso, Niger, Chad, North Gulf of Guinea, the probability of rain near normal (p = 0.40) with a tendency to below normal (p = 0.35) is forecast.

iii) Finally over zone I, which includes the south-west of Mauritania, northern Senegal, probability of rainfall below normal (p = 0.45) is forecast.



ADVICE:

THE POTENTIAL OF ADVERSE IMPACTS IN THE REGIONS ARE CLEAR FROM THE FORECAST PROBABILITIES. ORGANISATIONS PROVIDING EARLY WARNING AND INTERVENTION SERVICES NEED, MORE THAN EVER, TO MAINTAIN CLOSE AND PERMANENT COORDINATION.

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1. Overview

The evolution of El Niño starts after every 2 to 7 years with warming in western Pacific Ocean around March-June and spreads to the central and eastern Pacific attaining its peak late in November-December. In some years this warming is much more extreme than normal. Major El Nino events were recorded in 1877, 1918, 1925, 1940, 1941, 1957-58, 1965, 1969, 1972-73, 1976, 1982-83, 1987, 1991, 1994, 1997-98, 2002 and 2004. The dramatic climate anomalies in the El-Nino events of 1972 demonstrated through a series of simultaneous rainfall anomalies in far distant areas, the important role of this large-scale tropical circulation and rainfall teleconnections. The monitoring and forecast of the El Niño as one of the most important coupled ocean-atmosphere tropical circulation phenomenon that cause major global climate variability on interannual time scales have become of crucial importance due to its impacts on regional rainfall over several parts of the Globe

The global rainfall anomalies associated with the occurrence of El Niño include the droughts over Northern Australia, Indonesia, India, Southern Africa while wet conditions prevail over central Pacific, eastern Africa and parts of the eastern and western coasts of South America. The rainfall patterns of many parts in Africa respond in a varied manner to different phases of the El Niño cycle forcing. Studies have shown that the March-April-May (MAM) rainfall over parts of Greater Horn of Africa (GHA) countries is significantly suppressed during evolution (onset phase) of El Niño, but significantly enhanced at its mature phase in October-November-December (OND). The highest rainfall deficits were observed over major part of GHA countries resulting in poor MAM, 2009 seasonal rainfall performance confirming the onset of El Niño.

3. Forecast

The models forecasts indicate that development of weak to moderate El Niño conditions are the most likely scenario through 2009 (with probability just over 60% from JAS to OND seasons), but retention of neutral conditions is also possible with probabilities of approximately 35-40% according to IRI set of dynamical and statistical model forecasts. However, the El Niño evolution diagnostic analyses and analogues using SSTs, zonal wind, moisture convergence and thermal index regimes indicate a moderate to strong situation.

4. Impacts

The evolution of El Niño in the Pacific Ocean is presently linked to the prevailing global rainfall anomalies over several parts of the globe with expectation of the anomalies magnification as we attain the mature phase of El Niño by November-December, 2009. As observed during other major El Niño years, the following rainfall anomaly patterns are expected in 2009.

a) Heavy rainfall characterized by floods in October-November-December (OND) season over GHA countries.
b) Severe rainfall deficits and drought over southern Africa countries during the peak and post El Niño.
c) The Sahel countries will experience suppressed July-August-September (JAS) rainfall recording below average with post El Niño drought.
d) The Gulf of Guinea countries will experience heavy rainfall with floods over several parts with serious threat to the coastal settlements.

The National Meteorological and Hydrological Services (NMHSs), have documented information on how El Niño impacts on the countries' climate. The NMHSs in Africa have to advise users of climate information and prediction products to guard against risks of climate extremes during the coming months as the phenomenon moves to its maturity.

The users are advised to consult local and sub-regional climate outlooks for information during the coming months which will be characterized by extreme rainfall events such as floods and droughts. ACMAD will maintain Climate Watch and provide regular updates on El Niño evolution and expected intensity (weak, moderate or strong) including impacts as we progresses towards its mature phase by end of December, 2009.

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