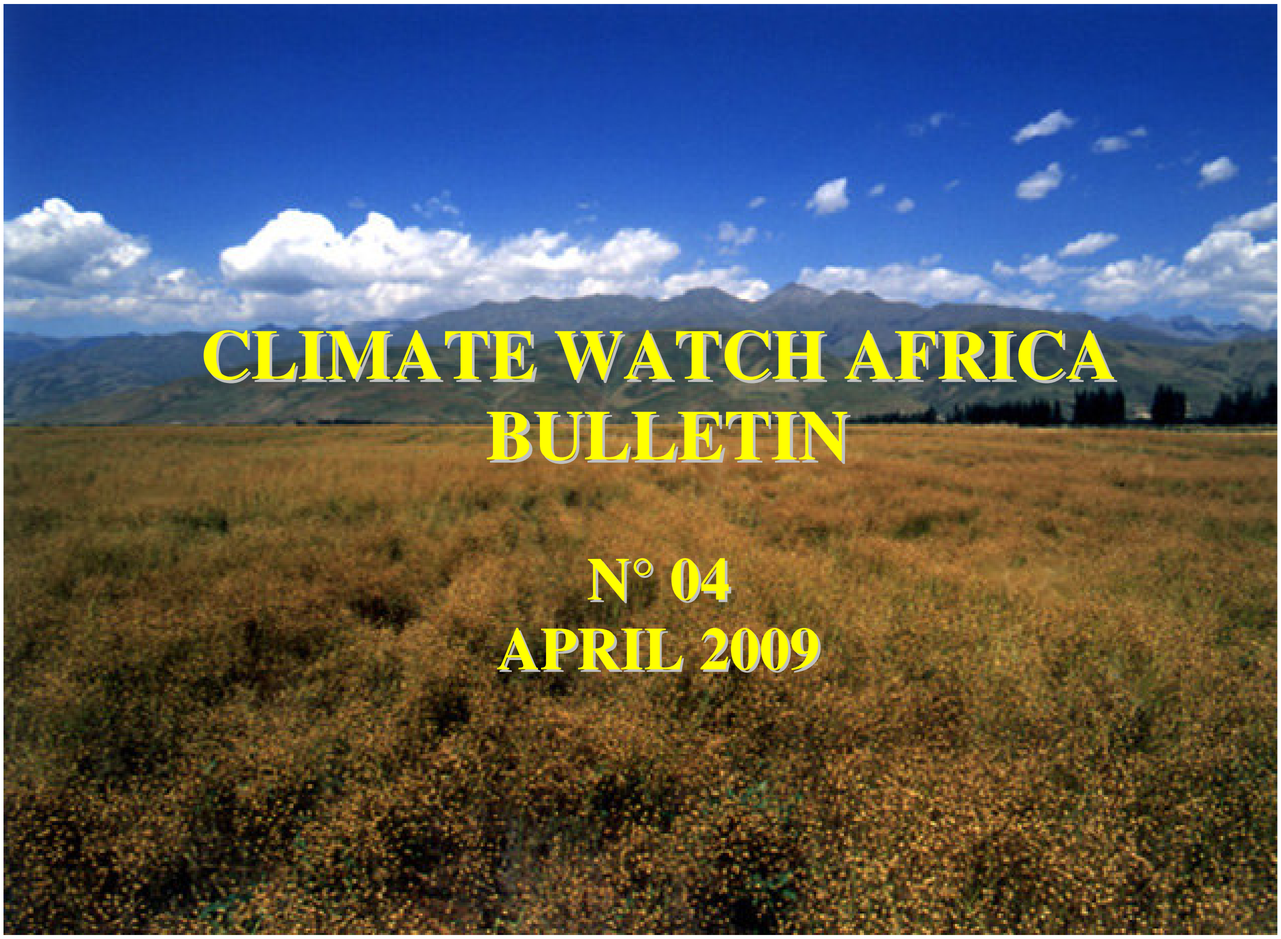
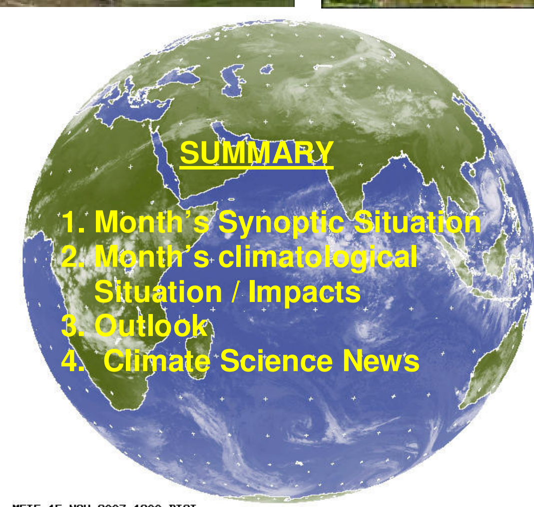
AFRICAN CENTRE OF METEOROLOGICAL APPLICATIONS FOR DEVELOPMENT
CENTRE AFRICAIN POUR LES APPLICATIONS DE LA METEOROLOGIE AU DEVELOPPEMENT



CLIMATE WATCH AFRICA BULLETIN

N° 04
APRIL 2009



SUMMARY

1. Month's Synoptic Situation
2. Month's climatological Situation / Impacts
3. Outlook
4. Climate Science News

HIGHLIGHTS: *The tropical storm Jade hit Madagascar causing life lost and destroying properties, whiles excessive rainfall with floods caused damages in Burundi, Namibia, Zambia, Angola, Mozambique, Botswana and Zimbabwe.*

1. SITUATION DURING THE MONTH OF APRIL, 2009

This section provides the strengths of the surface pressure systems, the 850hPa general circulation anomalies, and middle and upper troposphere zonal winds.

1.1 Centres of Anticyclone

The Figure1 shows surface pressure systems as described below:

The Azores high pressure at 1026hPa strengthened by 2hPa compared to the previous month and shifted southwest at about 30°N/30°W.

The St Helena high pressure at 1020hPa maintained its intensity compared to the past month and shifted northward at 30°S/00°.

The Saharan thermal lows of 1006hPa maintained their depths compared to the past month, but covered limited areas over extreme east Niger, west Chad and central Sudan.

The Mascarene high pressure at 1024hPa strengthened by 2hPa and shifted northeast at 35°S/95°E with a ridge over eastern part of Southern African countries.

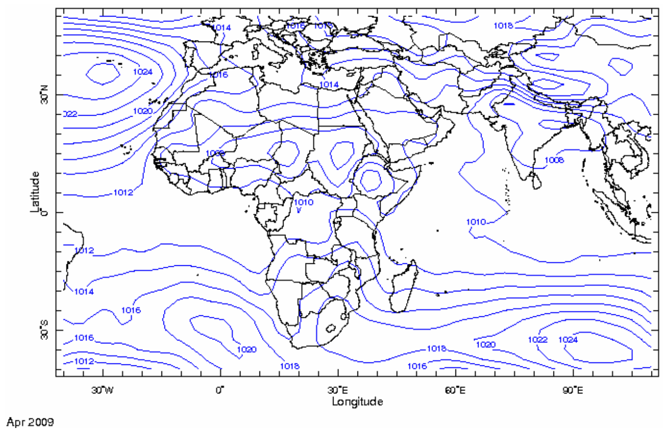


Figure 1 : Mean surface pressure during the Month of April, 2009

(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 northerly wind anomalies over North Atlantic Ocean were observed along the coast of Morocco while westerly wind anomalies prevailed over northern Morocco and Algeria.

Strong continental westerly wind anomalies were observed over east Mali, Niger Chad backing to southwesterlies/southerlies over Sudan and easterlies over south Egypt and eastern Libya.

Over the Gulf of Guinea strong westerly wind anomalies prevailed veering to northerlies off coast of Angola and Namibia.

Over southwestern Indian Ocean strong southerly winds anomalies were observed.

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

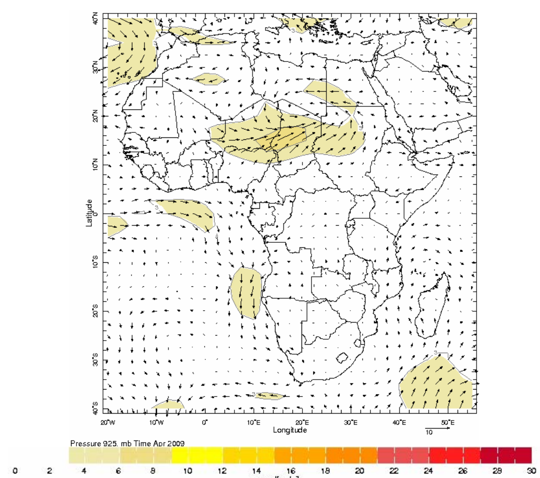


Figure 2 : April 2009, Wind Anomalies at 850hPa
(Source : IRI/NOAA/NCEP)

1.3 Mid and upper troposphere winds

At the 600hPa (Figure 3), over coastal part of Gulf of Guinea countries and northern part of central Africa countries, the observed easterly wind core of 10 m/s was associated with the African Easterly (AEJ)

The Figure 4 shows, the westerly wind mean maximum of 48m/s at 150hPa over eastern part northern Africa, with equatorial easterly wind of 8 m/s over western part of central Africa countries.

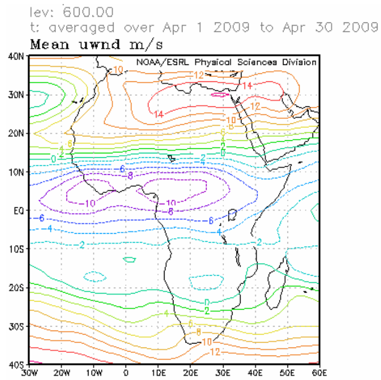


Figure 3 : U - Winds velocity at 600hPa (Source : NOAA/NCEP)

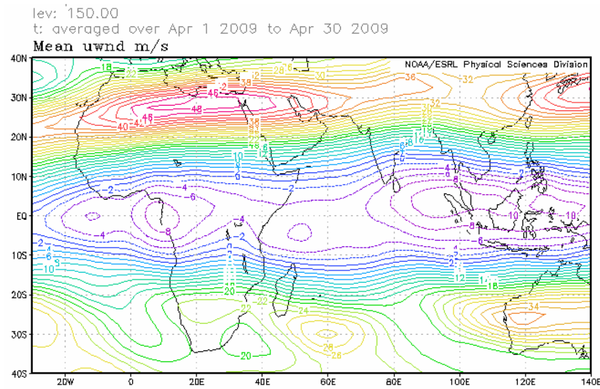


Figure 4 : U - Winds velocity at 150hPa (Source : NOAA/NCEP)

1.4 Thermal index

In the month of April, 2009, the thermal index (TI) regime at 300hPa, Figure 5, had a near-threshold value of 242°K isotherm over equatorial Africa extending about 12°N to 15°S covering Gulf of Guinea, central, GHA countries and northern part of southern African countries maintaining reasonable conditional instability associated with heavy rainfall. The threshold value of 243°K and above maintained the highest conditional instability associated with heavy convective rainfall with floods over southern part of GHA countries. The low TI regime value of 241°K and below was associated with suppressed convection over the Sahel, the Sahara countries.

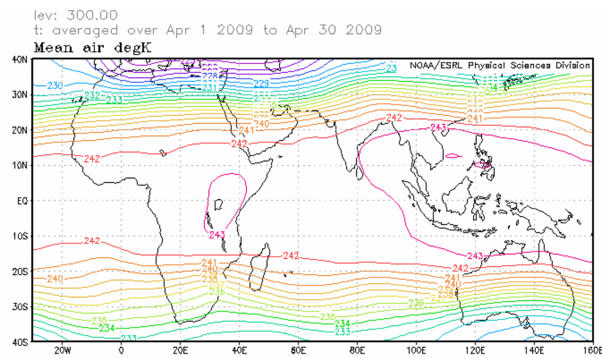


***Figure* 5 : Monthly Mean Temperature at 300hPa (Data Source: NOAA/NCEP)**

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

A neutral to cooling conditions prevailed in the central, eastern and South Pacific Ocean, while warming condition prevailed over the rest of the ocean. Neutral to warming conditions were observed over most of the Atlantic Ocean except in the central eastern and north-west parts where some cooling conditions were observed. Neutral to warming condition were observed over most of the Indian Ocean except over the central part. Cooling conditions were observed over Mozambique Channel and south of Madagascar.

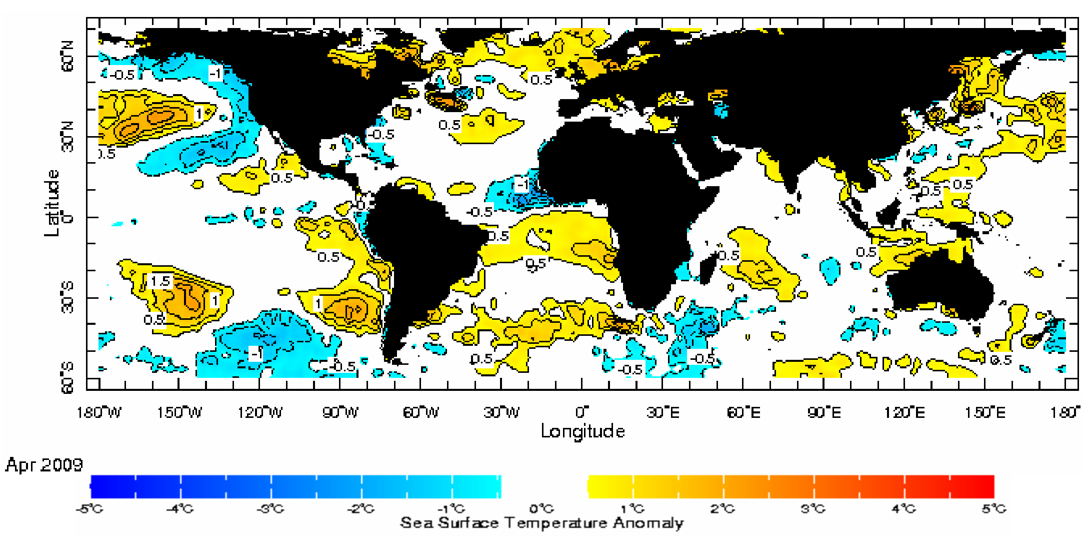


Figure 6: Sea Surface Temperature Anomalies (Source: IRI)

2. <u>CLIMATOLOGICAL SITUATION AND IMPACTS DURING THE MONTH OF APRIL, 2009</u>

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 April in Figure 7 shows spatial and amounts increase over the Sahel, Gulf of Guinea countries and the GHA countries, while central Africa countries observed spatial rainfall decrease. In summary**:**

- **North Africa** had spatial rainfall decrease with amounts increase ranging from 10mm to 250mm over extreme north Morocco, Algeria and Tunisia.

- **The Sahel** Most of central and northern parts remained generally dry and dusty. However, some significant rainfall amounts ranging from 10mm to 80mm were recorded over southern parts.

- **Gulf of Guinea** countries experienced significant spatial and amounts of rainfall increase ranging from 10mm to 300mm with heaviest amounts of about 400mm over Nigeria/Cameroon.

- **Central Africa** countries experienced spatial rainfall decrease with increased amounts ranging from 10mm to 300mm with peaks ranging from 300mm to 400mm over Gabon, Congo with heaviest rainfall peaks of about 500mm over south Democratic Republic Congo and northern Angola.

- **GHA** countries experienced spatial rainfall and amounts increase ranging from 10mm to 300mm with peaks ranging from 300mm to 500mm over Ethiopia.

- **Southern Africa** countries experienced significant spatial rainfall and amounts decrease recording amounts ranging from 10mm to 80mm over South Africa, Mozambique and Zambia. However, heaviest rainfall amounts of about 500mm were recorded over Madagascar.

Compared to the reference period 1979-2000, the April, 2009, rainfall anomalies, Figure 8 shows significant rainfall deficits over GHA countries, north and south of Democratic Republic of Congo, Angola, Zambia, north Malawi, north and south Mozambique, northeast of South Africa, north Congo, Cameroon, extreme west Central Africa Republic, Liberia, Guinea, southwest Côte d'Ivoire, south Mali and north Morocco, while, excessive rainfall was recorded over northeast Algeria, north Tunisia, east Central African Republic, southeast Ghana, south Togo and southwest Benin, eastern Democratic Republic of Congo and northeast Madagascar.

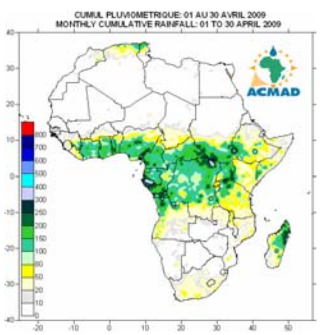


Figure 7: Monthly cumulative rainfall
(Data Source: NOAA/NCEP)

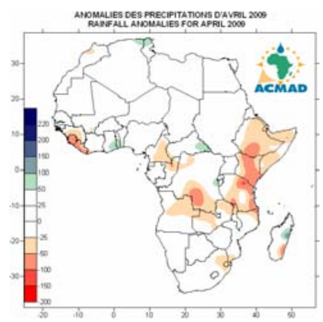


Figure 8: Monthly Precipitations Anomalies
(Data Source: NOAA/NCEP)

2.2 Surface Temperature Anomalies

In April 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 western South Africa, southeast Namibia, south Botswana and Equator north covering south Egypt, southeast Libya, north Sudan, Chad, Niger, south Algeria, north Nigeria, Côte d'Ivoire, extreme south and eastern Mali, and extreme south Morocco with the highest positive temperature anomalies epicenter (>2.5°C) covering northwestern Niger and western Mauritania.

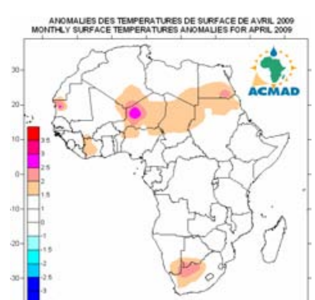


Figure 9 : Monthly Temperatures Anomalies
(Data Source: NOAA/NCEP)

3. OUTLOOK

The subsections provide the expected SSTs and ENSO characteristics and evolution of events based on Figures 10 and 11 respectively.

3.1 Forecast Sea Surface Temperature (SST)

The figure 10 shows the forecast Sea Surface Temperature Anomalies from April 2009 for the period ranging from April to June.

Pacific Ocean: Neutral to warming conditions will continue over most of Pacific ocean except in the eastern equatorial parts where cooling will prevail

Atlantic Ocean: A neutral to warming condition is expected over most of Atlantic Ocean except over central, northwestern parts of the Ocean.

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

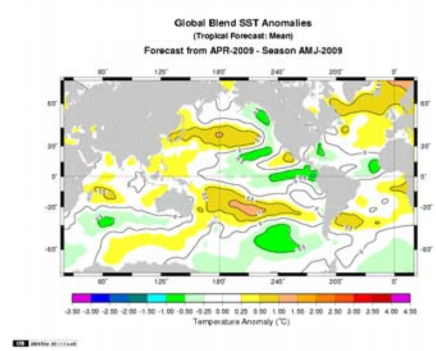


Figure 10 : Forecast Sea Surface Temperatures Anomalies (source IRI)

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, are generally in agreement regarding La Nina condition since September 2008, and since mid-December oceanic conditions have also indicated La Nina conditions. However, current forecasts and observations indicate that ENSO-neutral conditions will prevail through 2009.

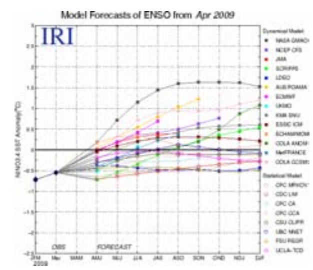


Figure 11 : Multi-model ENSO Forecast (source IRI)

3.3 Rainfall

The ITD northward displacement will lead to moisture increase over northern part of Gulf of Guinea countries and southern Sahel triggering convective rainfall increase.

IRI forecast (Figure 12) for May-June-July, 2009 indicates below normal rainfall over parts of Gulf of Guinea, central Africa, west of the Sahel, parts of south Africa while excessive rainfall were forecast over parts of GHA countries, south Democratic Republic of Congo, Angola, north Mozambique and north Madagascar.

The 23rd GHACOF forecast below (Figure13) for March-April-May, 2009 shows **Zone I:** below normal to near normal rainfall; **Zone II:** above normal to near normal rainfall; **Zone III:** below normal to near normal rainfall; Zone **IV:** Climatology.

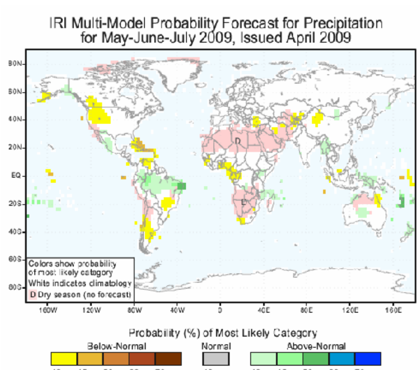


Figure 12 : Probabilistic Precipitation Forecast (source IRI)

GHACOF23 Forecast for MAM, 2009

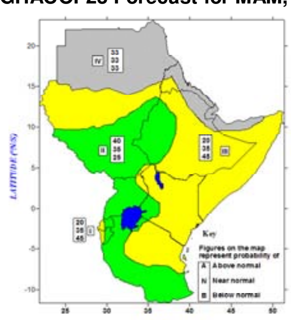


Figure 13 : Seasonal Climatic rainfall Forecast (source : ICPAC)

Climate Science News

The Predictability of equatorial Tropical Rainfall by MJO

by

Dr. Leonard N. Njau and Kone Diakaria

AFRICAN CENTRE OF METEOROLOGICAL APPLICATIONS FOR DEVELOPMENT (ACMAD)

The areas of strong SST positive anomalies in the ocean basins are the heat sources characterized by large-scale horizontal convergence at the heat source. A heat source generates strong vertical motion maintaining deep convection where the latent heat released is the main energy source with enhanced geopotential changes that are converted into kinetic energy to maintain tropospheric circulations that drive the global, regional and local tropical climate systems such as Madden-Julian-Oscillation (MJO).

The MJO is a tropical eastward propagating pattern of anomalous rainfall that is planetary in scale also known as the 30-60 day oscillation, 30-60 day wave or intraseasonal oscillation.

The MJO is characterized by an eastward progression of large regions of both enhanced and suppressed tropical rainfall, observed mainly over the Indian and Pacific Oceans basins. Studies have shown that the anomalous rainfall usually first appear over the western Indian Ocean, and remains evident as it propagates over the very warm ocean waters of the western and central tropical Pacific. This pattern of tropical rainfall subsides as it moves over the cooler ocean waters of the eastern Pacific, manifesting later over the tropical Atlantic and Indian Oceans. According to the studies, the wet phase of enhanced convection and precipitation is followed by a dry phase with suppressed convection. Each cycle lasts approximately 30-60 days. MJO

The Figure 1 for 25 February 2008 shows the 200-hPa velocity potential anomalies (base period 1971-2000) which are proportional to divergence with green (brown) contours corresponding to regions in which convection is enhanced (suppressed) characterized by enhanced (suppressed) tropical rainfall.The Figure 2 shows the eastward progression of MJO starting from 2nd April to 11th May, 2009. The strong divergence at 200hPa level in Figure 3 was associated with heavy rainfall over Gulf of Guinea countries and northern Angola (Figure 4).

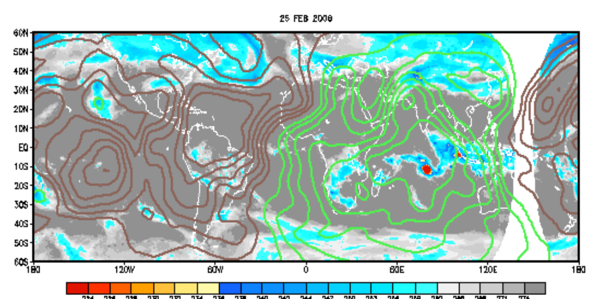


Figure1: Madden-Julian-Oscillation (MJO) on 25 February, 2008 (Source: NOAA/CPC)

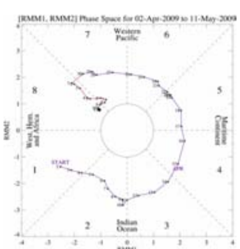


Figure 2 : MJO eastward propagation from start 2April to 11May 2009 (Source : NOAA/CPC)

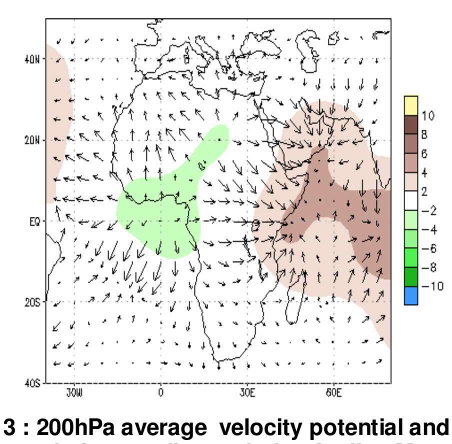


Figure 3 : 200hPa average velocity potential and divergent wind anomalies period 11April-10May 2009

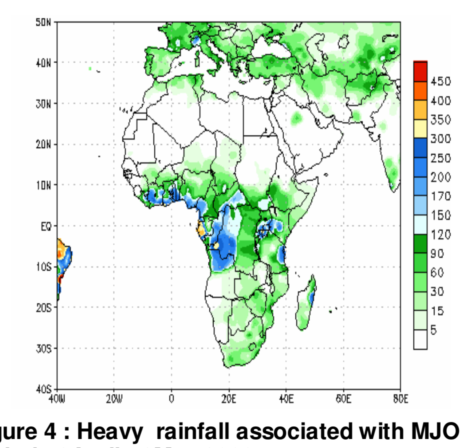


Figure 4 : Heavy rainfall associated with MJO period 13April-12May 2009