African Centre of Meteorological Application for Development
Centre Africain pour les Applications de la Météorologie au Développement

Ten Day Climate Bulletin

N° 26 Year 2009

Dekad of 11 to 20 September, 2009

HIGHLIGHT: Heaviest rainfall amounts were experienced over western parts of the Sahel, parts of Gulf of Guinea and central Africa countries.

1. GENERAL SITUATION

Subsection 1.1 provides the strengths of the surface pressure systems, the ITD displacement while the subsection 1.2 in the Troposphere gives a brief on monsoon, thermal index regimes and relative humidity.

1.1 SURFACE

- **Azores high:** Pressure of 1027hPa with an SW-NE axis weakened slightly by 1hPa and shifted west compared to the past dekad. Its mean position was located at about 36°N/29°W, extending a ridge over south Morocco.
- **St. Helena high:** Pressure of 1031hPa with an WNW-ESE axis weakened by 4hPa and shifted north at 28°S/10°W with an extended ridge over south Atlantic Ocean.
- **Mascarene high:** Pressure of 1029hPa with an W-E axis weakened by 6hPa compared to the past dekad and shifted east. Its mean position was located at 31°S/67°E with an extended ridge over Indian Ocean.
- **Saharan Thermal Low:** Pressure at 1007hPa deepened slightly by 1hPa and shifted south compared to the previous dekad. Its mean position was located at 15°N/18°E with an extended trough over east Mali, central Niger and Chad.

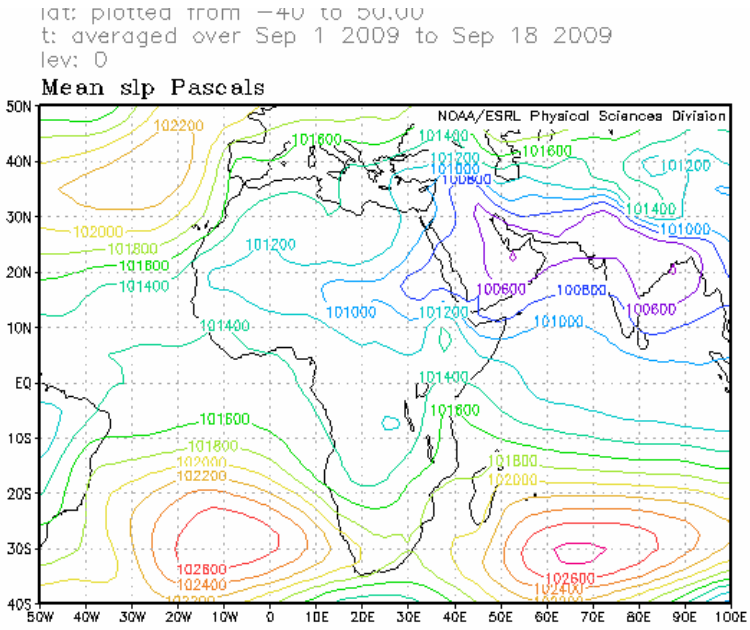

Figure 1: Mean Sea Level Pressure (Source: NOAA/NCEP/ESRL: PSD)

- **Inter -Tropical Discontinuity (ITD):** Between the first (blue) and the second dekad (black) of September, 2009, the ITD (Figure 2) continued its southwards migration over the Sahel, particularly over Mali where it had a mean displacement between 300km and 400km. The actual ITD position was south of that of the same dekad in 2008 (pink line) except over extreme west of Mauritania where the ITD was quasi-stationary.

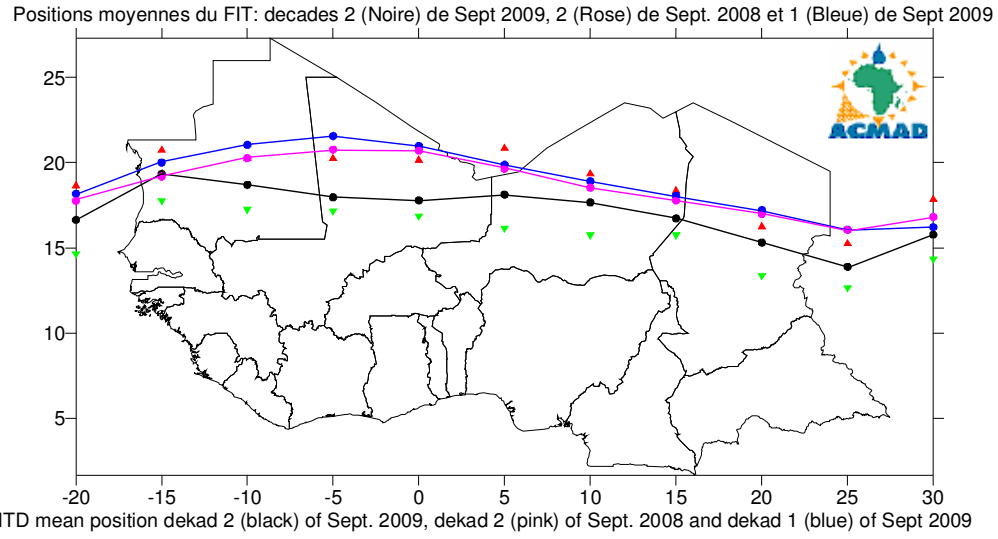

Figure 2: The red and green triangles represent the max. and min. displacements of the ITD respectively

1.2 TROPOSPHERE

- **Monsoon:** Monsoon influx at 925hPa level was moderate (5.5 to 11.5m/s) over Liberia, north Ghana, Togo and Benin, Burkina Faso, south Niger and Nigeria.

- **African Easterly Jet (AEJ):** The mean speed of the AEJ (figure 3) at 700hPa level was about 14m/s during the dekad with an axis located at about 13°N, stretching from central Chad, south Niger, north Burkina Faso, south Mali and Senegal (Figure 3).

- **Tropical Easterly Jet (TEJ):** The core value of the TEJ at 150hPa level was 24m/s at about 07°N of latitude over off coast India extending its axis over north-eastern GHA countries, with secondary core of 16m/s at about 8°N over eastern equatorial Atlantic/ western Gulf of Guinea countries (Figure 4).

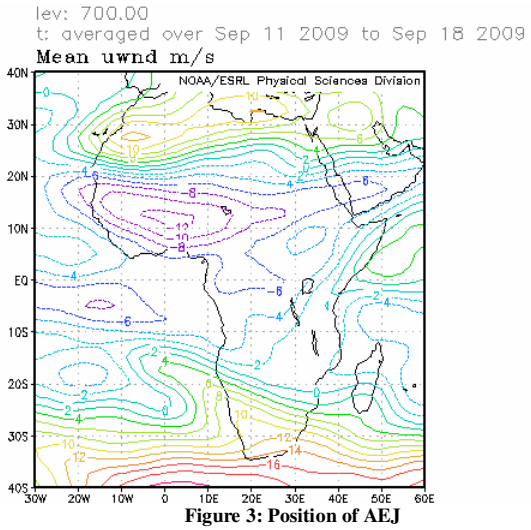

Figure 3: Position of AEJ
(Source: NOAA/NCEP/ESRL: PSD)

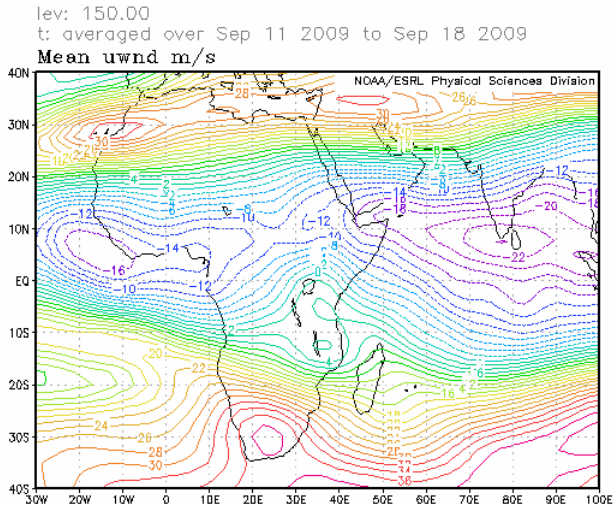

Figure 4: Position of the TEJ
(Source: NOAA/NCEP/ESRL: PSD)

- **Thermal Index (TI):** In the second dekad of September, 2009, the thermal index (TI) regime at 300hPa in (figure 5), had TI regime value of 242°K covering parts of Central Africa countries, GHA countries and the Sahel triggered heavy rainfall with floods over the areas characterized by high relative humidity (>60%) as observed in Figure 6. The highest thermal index regime of 247°K was located over northeastern Asia extending into northeastern Africa and north western Pacific Ocean associated with heavy rainfall with floods.

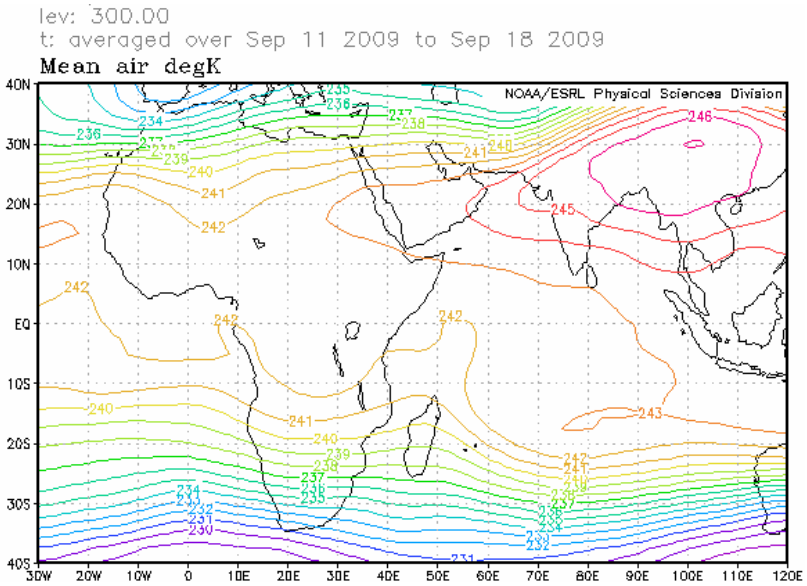

Figure 5: Thermal regimes at 300hPa (Source: NOAA/NCEP/ESRL: PSD)

- **Relative Humidity (RH):** The 850hPa (Figure 6) shows high RH (>70%) in the second dekad of September, 2009 over Gulf of Guinea countries, southern part of the Sahel countries, northern part of Central Africa countries, western part of GHA countries and Madagascar. The Sahara, northern parts of the Sahel, Southern Africa and southern part of Central Africa countries experienced dry conditions characterized by the lowest RH (<40%).

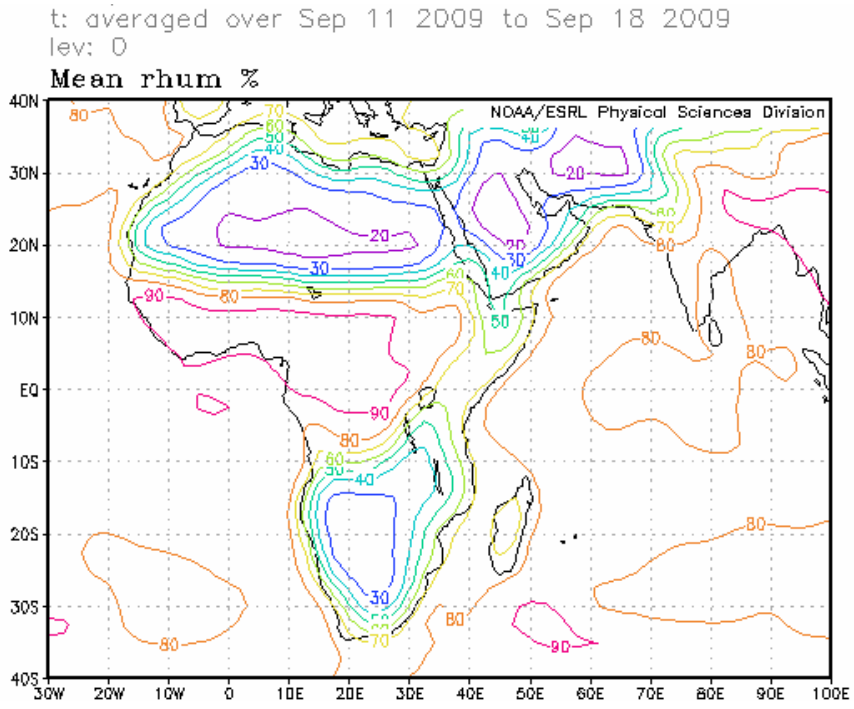

Figure 6: Relative Humidity at 850hPa (Source: NOAA/NCEP/ESRL: PSD)

2. RAINFALL AND TEMPERATURE SITUATION

Subsection 2.1 provides a summary on estimated rainfall amounts and distribution and the subsection 2.2 gives stations observed data on rainfall, mean maximum and mean minimum temperatures including number of rainy days.

2.1 RAINFALL

The rainfall estimate based on Satellite and Rain Gauge in Figure 7 below shows rainfall distribution decrease over Northern Africa, the Sahel and GHA countries, while Gulf of Guinea and Central Africa countries had slight rainfall distribution increase. Southern Africa countries had non significant change in spatial rainfall distribution and amounts. In detail:

- **North Africa countries:** rainfall distribution and amounts decrease observing 10mm to 75mm over extreme north Morocco, Algeria and Tunisia.

- **The Sahel:** had a decrease in rainfall distribution and amounts observing amounts ranging from 10mm to 100mm with heaviest amounts ranging between 100mm to 150mm over southwest Mali and extreme south Senegal.

- **Gulf of Guinea countries:** experienced slight rainfall distribution increase with amounts ranging from 10mm to 100mm of estimated rainfall, intensifying the amounts ranging between 100mm to 150mm over north Ghana, Benin, and Togo with heaviest amounts of above 200mm over Guinea Conakry.

- **Central Africa countries:** observed slight rainfall distribution increase with amounts ranging from 10mm to 100mm with maximum ranging between 100 to 150mm intensifying to about 200mm over north Democratic Republic of Congo and west Central African Republic.

- **GHA countries:** experienced slight decrease in rainfall distribution and amounts, ranging between 10mm to 100mm with maximum amounts ranging between 100mm to 150mm over Ethiopia.

- **Southern Africa countries:** remained generally dry except over extreme north Zambia and south Mozambique where rainfall amounts between 10mm to 50mm were observed.

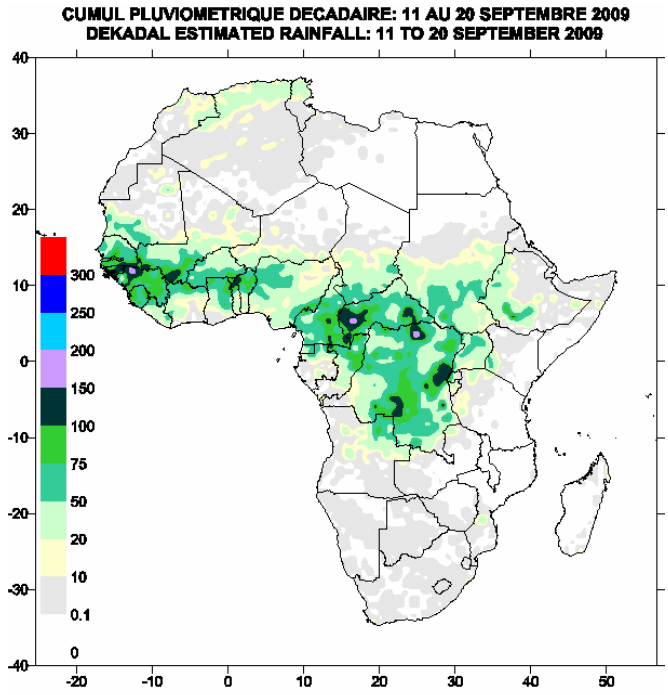

Figure 7: Estimated precipitations, (Data Source: NOAA/NCEP)

2.2 OBSERVED DATA

The Table below shows heaviest cumulative rainfall recorded over Douala in Cameroon. The lowest temperature of 10.4°C was recorded at Mbeya in Tanzania while the highest temperature of 41.5°C was recorded at Khartoum in Sudan.

N°	STATIONS	Precipitations (mm)	Number of rainy days	Temperature Max mean (°C)	Temperature Min mean (°C)
1	Abidjan	0	0	27,8	22,6
2	Abuja	9	2	31,1	21,9
3	Accra	0	0	29,9	23,2
4	Agadez	7	1	41,0	28,0
5	Alger(Dar El Beida)	38	3	26,3	16,1
6	Antananarivo	0	0	26,3	11,6
7	Antsiranana	3	1	30,9	19,9
8	Bamako-Senou	42	3	31,7	22,9
9	Bangui	5	2	32,9	21,6
10	Banjul	23	2	31,4	23,7
11	Beira	0	0	26,9	20,6
12	Bobo Dioulasso	28	5	31,0	21,4
13	Brazzaville	0	0	31,6	22,1
14	Casablanca	14	1	24,5	18,2
15	Cotonou	3	1	29,3	24,5
16	Dakar-Yoff	22	2	30,0	24,4
17	Dar-es-Salaam	2	1	30,8	20,2
18	Douala	118	3	29,4	23,0
19	Durban	9	2	22,9	14,5
20	Entebbe	3	1	-	17,7
21	Francistown	0	0	30,4	14,8
22	Johannesbourg	0	0	24,6	11,9
23	Khartoum	0	0	41,5	28,0
24	Kigali	0	0	28,8	18,0
25	Kigoma	2	1	31,4	20,2
26	Le Caire	0	0	33,4	23,5
27	Le Cap	1	1	16,5	10,5
28	Libreville	3	2	27,6	23,1
29	Lomé	0	0	30,0	23,9
30	Lusaka	0	0	32,8	16,3
31	Maputo	0	0	27,9	18,0
32	Maun	0	0	34,7	18,4
33	Mbeya	0	0	27,8	10,4
34	Nairobi	0	0	27,8	13,9
35	Nampula	0	0	32,7	17,2
36	Ndele (RCA)	11	2	30,7	18,6
37	N'Djamena	0	0	34,8	23,9
38	Niamey-Aéroport	18	1	34,7	25,4
39	Nouakchott	0	0	35,7	28,5
40	Ouagadougou	15	3	32,8	23,3
41	Plaisance	18	5	26,0	19,7
42	Seretse Khama Intl Aéro	0	0	29,6	13,3
43	Seychelles	50	5	29,8	24,5
44	Tamanrasset	0	0	34,8	23,5
45	Toalagnaro	7	1	26,8	19,1
46	Tombouctou	0	0	38,6	27,1
47	Tripoli	0	0	35,7	23,0
48	Tunis	9	3	29,9	21,3
49	Windhoek	0	0	29,4	12,0
50	Zinder	3	2	36,7	24,9

Data Source: ACMAD / GTS

NOTE : 0 mean : no precipitations
- mean : missed data ou incomplètes.
- rain : 4 days missed
- Tmax : 1 day missed
- Tmin : 3 days missed

3. OUTLOOK FOR DEKAD (01st - 10th OCTOBER, 2009)

3.1 RAINFALL

The ITD significant southward displacement will lead to reduction of moisture influx marking the cessation of JAS seasonal rainfall over the Sahel with very limited convective rainfall activities confined over extreme southern part of the Sahel, intensifying over Gulf of Guinea countries, central Africa, the northern and western parts of GHA countries. Severe rainfall deficits will continue over southern parts of GHA countries with acute dry conditions prevailing over most of southern Africa countries due to persistent low relative humidity (Figure 8). In detail**:**

- **North Africa countries:** will experience slight rainfall decrease with amounts ranging from 10mm to 75mm with few peaks of about 100mm.

- **The Sahel:** will continue to experience high temperatures with rainfall decrease over several parts of the Sahel recording amounts ranging from 10mm to 75mm with isolated peaks of about 100mm over extreme southern parts of the Sahel.

- **Gulf of Guinea countries:** will experience rainfall increase recording amounts ranging from 10mm to 150mm with peaks of about 200mm and above.

- **Central Africa countries:** will have rainfall increase recording amounts ranging from 10mm to 150mm with peaks ranging from about 200mm and above.

- **GHA countries:** will have rainfall increase over northern and western parts observing amounts ranging from 10mm to 150mm with peaks of about 200mm and above.

- **Southern Africa countries:** dry conditions will be expected to prevail over most of the countries with rainfall patches ranging from 01mm to 50mm over eastern parts with localized peaks of about 80mm.

3.2 TEMPERATURE

The forecast in Figure 9, shows that the mean surface temperature will be experienced in the Gulf of Guinea countries, the Sahel, northern parts of central Africa and parts of GHA countries. The highest forecast temperatures ranging from 20°C to 35°C will cover more than 70% of the Continent.

3.3 SOIL MOISTURE

The outlook on soil moisture change, maps shown in Figure 10 include the initial soil moisture and the forecast changes over the next 7 days. The soil moisture change and precipitation relationship is discernable on the maps below. The areas forecast to have highest increase in soil moisture change include extreme southern parts of the Sahel, northern part of Gulf of Guinea countries, parts of central Africa countries, northern part of GHA and limited parts of southern Africa countries.

3.4 IMPACTS

Health: The incidences of malaria and other climate related diseases are higher in areas with high temperatures during rainy period. The temperatures in the range of 18°C to 32°C with high rainfall and relative humidity (>60%) favour the survival of the vector and development of the parasite in the vector resulting in high incidences of malaria even in low prevalence areas. The Gulf of Guinea, the Sahel, central Africa, parts of GHA and parts of southern Africa countries with high humidity/rainfall coupled with prevailing conducive temperatures will support the survival of parasite resulting in higher incidences of malaria including other climate related diseases. The health authorities and Agencies need to continue the healthcare and humanitarian services to protect lives of the vulnerable communities.

Agriculture and food security: The integration of climate prediction products and information in agricultural production and food security is of crucial importance. We have emphasized on the importance of skillful prediction of seasonal rainfall onset dates and suitable planting dates as well as monitoring of the phenological stages of crops for crop yield assessments in our countries. It is imperative to carry out cost benefit analysis on applications of appropriate planting dates in order to take full advantage of limited soil moisture availability in a shortened crop growing season. The drought-tolerant crops can be grown in zones where the prevailing soil moisture is the major climate constraint on crop yield. The crop varieties

that are higher yielding, more drought resistant, earlier maturing, disease and pest tolerant are recommended in these moisture constrained zones for communities' sustained food security and adaptation. There is also a need to invest in higher yielding crops during a good rainy season by taking advantage of seasonal climate consensus forecasts, for example those issued by regional climate outlook fora (RCOF), the GHACOF, PRESAO, PRESAC, and SARCOF for Greater Horn of Africa (GHA), West Africa, central Africa, and southern Africa countries respectively. The prevailing protracted drought over parts of eastern African after the failure of long rains over much of the subregion has been mainly due to the evolving El Niño while at the same time the countries in the subregion have to put in place mitigation strategies to cope with heavy rains with floods expected to hit the countries in November/December, 2009 at the peak of the El Niño.

African Ecosystems : While noting that forests serve as rainfall catchment areas, the destruction of forests has been blamed for the declining water levels in the African lakes and rivers. We have to rehabilitate our presently degraded rainfall catchment areas and forests ecosystems through enhanced national policies and environmental reclamation strategies. Good practice in ecosystems rehabilitation include national tree planting, afforestation and soil conservation to minimize soil loss during rainy seasons due to heavy runoff. Enhanced national strategies and policies for adaptation to Climate Change are of highest priority for States' enhanced economic growth and sustainable development. The countries have to invest in environmental conservation now for better tomorrow.

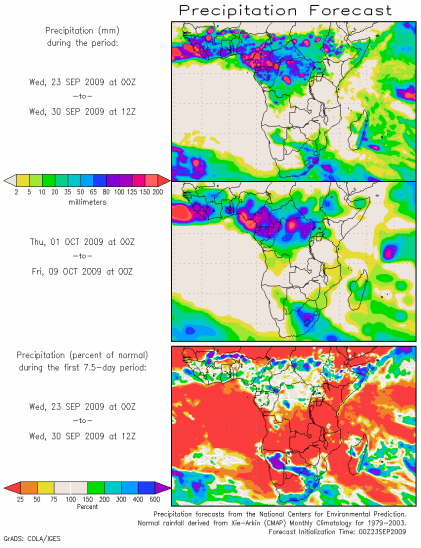

Figure 8: Precipitation forecast, Source : COLA

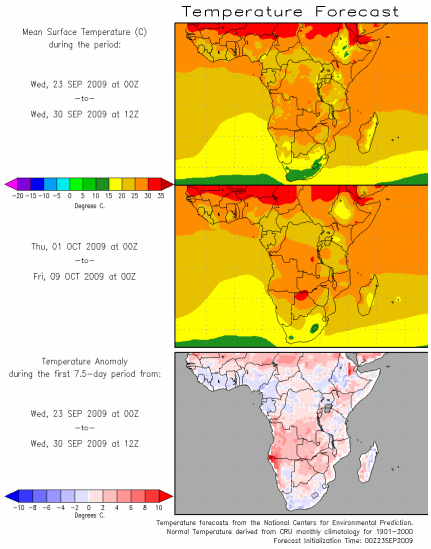

Figure 9 : Temperature forecast Source : COLA

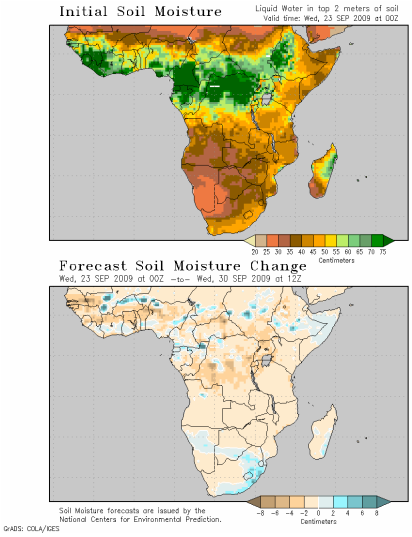

Figure 10 : Soil moisture forecast, Source: COLA

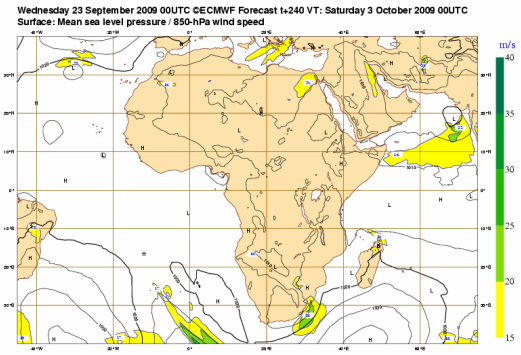

Figure 11 : Mean Sea Level pressure forecast Source : ECMWF