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

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HIGHLIGHT: The Azores high strengthened while the Mascarene high weakened significantly. High amounts of rainfall were observed over some parts of GHA, Southern Africa and Indian Ocean countries while countries in the northern hemisphere remained generally dry. The highest mean maximum temperature was observed in the Sahel while the lowest mean minimum temperature was observed in Northern Africa countries.

GENERAL SITUATION

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

1.1 SURFACE

1.1.1. Pressure Systems

- **Azores high** of 1034hPa strengthened significantly by 4hPa and shifted north-east compared to the past dekad. The centre of the high was located at about 40°N/15°W over North Atlantic Ocean, extending a ridge over north-western part of Northern Africa.

- **St. Helena high** of 1025hPa strengthened by 3hPa and maintained its position compared to the past dekad. The centre was located at 30°S/12°W over South Atlantic Ocean.

- **Saharan Thermal Low** of 1010hPa was located at 09°N/30°E over southern Sudan.

- **Mascarene high** of 1021hPa weakened significantly by 4hPa and shifted north-east compared to the previous dekad. The mean position was at about 34°S/75°E extending a ridge over Madagascar and extreme south-eastern part of southern Africa.

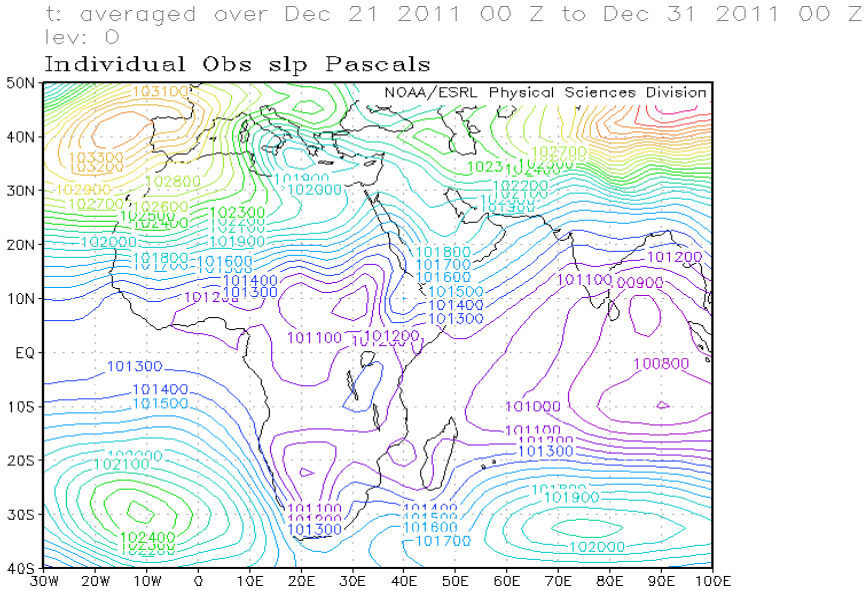

Figure 1: Mean Sea Level Pressure (Source: NOAA/NCEP/ESRL/PSD)

1.1.2 Inter-Tropical Discontinuity (ITD)

Between the third dekad (black line) and the second dekad (blue line) of December, 2011, the ITD continued its southward movement at about 1 degree of latitude over the western part while its fluctuated northwards with about 2 degrees of latitude over central and eastern parts of the domain (Figure2).

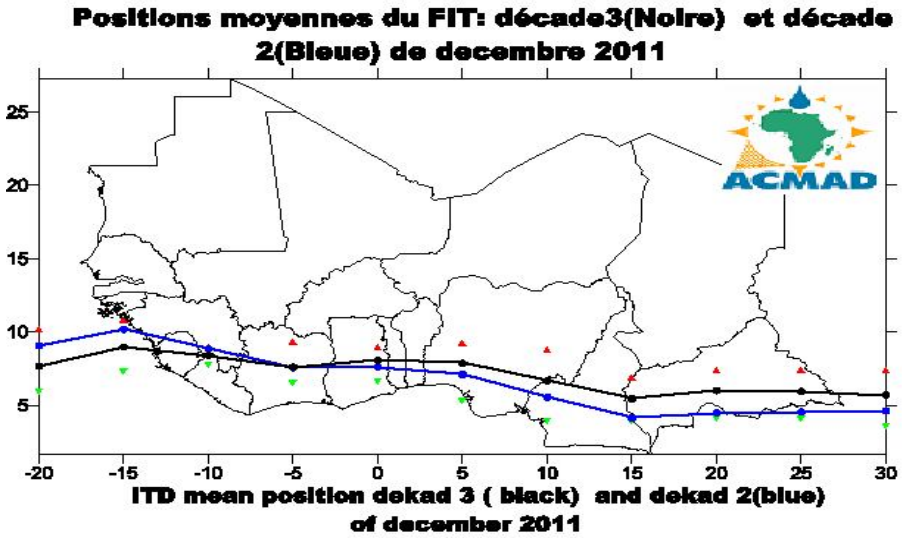

Figure 2: The red and green triangles represent the max. and min. displacements of the ITD respectively

1.2 TROPOSPHERE

1.2.1 African Monsoon

At 925hPa level, the intensity of the monsoon winds was weak (1 to 5m/s) only over extreme southern part of the Gulf of Guinea countries and northwestern part of central Africa countries.

1.2.2 Dust loading particles

The map below (Figure 3) shows light concentration of dust (0.1 to 0.4g/m^2) over some parts of the Sahel, Eastern and Northern Africa countries while moderate concentrations ranging from 0.4 to 0.8g/m^2 were observed over the north.

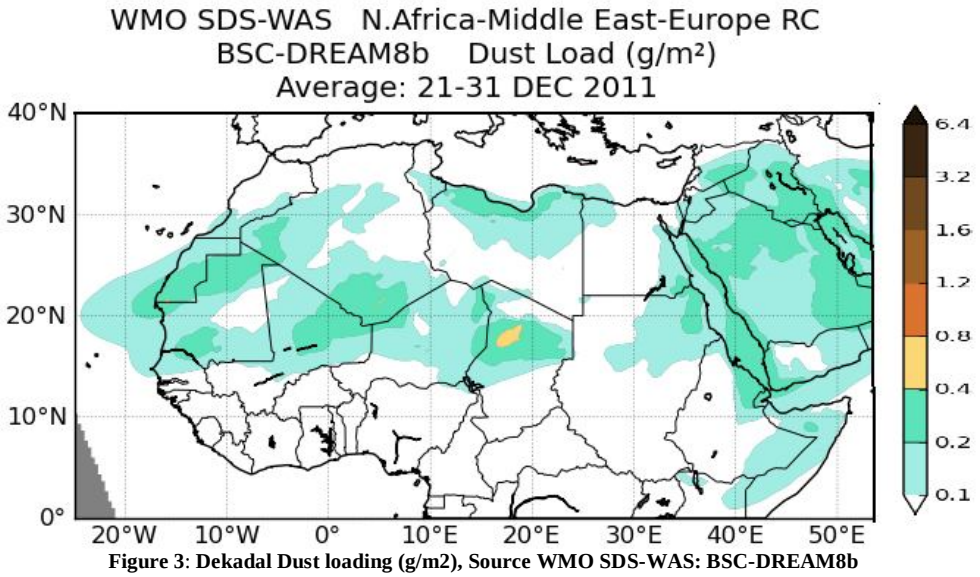

Figure 3: Dekadal Dust loading (g/m2), Source WMO SDS-WAS: BSC-DREAM8b

1.2.3 Thermal lndex (TI)

In the third dekad of December, 2011, thermal index (TI) regime at 300hPa in (Figure 4) had value of 242°K zone 10°N extending to about 25°S covering southern part of the Gulf of Guinea countries, central Africa countries, major part of GHA countries and southern Africa countries. The highest TI value of 243°K covered southern part of central Africa countries and northern part of Southern Africa. The high TI regime with attendant high relative humidity (≥70%), triggered heavy rainfall which might have caused flooding over some parts while areas with TI value ≤ 241°K experienced dry conditions.

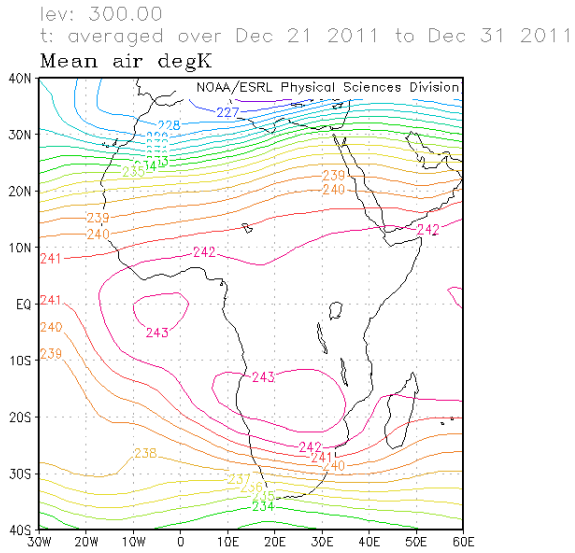

Figure 4: TI at 300hPa (Source: NOAA/NCEP)

1.2.4 Relative Humidity (RH)

The 850hPa (Figure 5) shows high RH (≥70%) in the third dekad of December 2011 over extreme southern part of the Gulf of Guinea countries, extreme north-western, southern and eastern parts of Central Africa, southern parts of GHA countries, and eastern part of southern Africa. However, most of the Sahel, the Sahara, northern part of the Gulf of Guinea countries, southern part of Northern Africa and western part of the southern Africa continued to experience the lowest RH (< 40%).

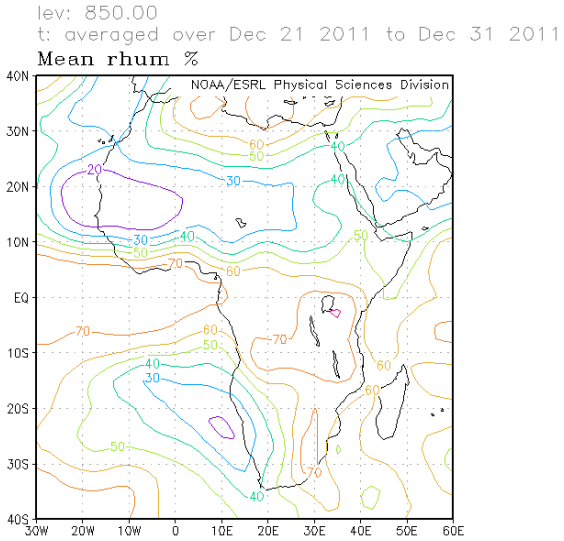

Figure 5 : RH at 850hPa (Source: NOAA/NCEP)

2 RAINFALL AND TEMPERATURE SITUATION

Subsection 2.1 provides a summary on estimated rainfall amounts and distribution while subsection 2.2 provides a table showing stations' observed rainfall, number of rainy days, mean maximum and mean minimum temperatures.

2.1 RAINFALL

The rainfall estimate based on satellite and rain gauge observations in Figure 6, shows no significant rainfall amounts over southern part of Northern Africa, the Sahel, the Sahara, most of the Gulf of Guinea countries, northern part of Central Africa and northern part of GHA countries. Some increase in rainfall activities was observed over southern part of GHA and southern Africa countries compared to the past dekad.
In detail**:**

- **Northern Africa countries:** had slight increase in rainfall distribution and amounts with some amounts ranging from 10mm to 100mm observed over extreme western Algeria, Tunisia and Libya with localized peaks ranging from 100mm to 250mm.

- **The Sahel:** remained under the effect of the Harmattan, characterised by cool, dry and localised dust events.

- **Gulf of Guinea countries:** most part was under the influence of the Harmattan with no significant amounts of rainfall recorded. However, extreme southern part of Côte d'Ivoire and Ghana had light amounts of rainfall between 10mm to 50mm.

- **Central Africa countries:** the northern part remained dry while the southern part had rainfall amounts ranging from 10mm to 100mm, intensifying locally with maximum peaks ranging from 100mm to 500mm over Democratic Republic of Congo.

- **GHA countries:** had slight decrease in rainfall distribution over the northern part, while the southern part had amounts ranging from 10mm to 150mm with localized peaks of about 250mm over Ethiopia.

- **Southern Africa countries:** experienced increase in rainfall distribution and amounts, ranging between 10mm to 200mm intensifying northwards to a maxima ranging from 200mm to above 300mm over Zimbabwe and Zambia.

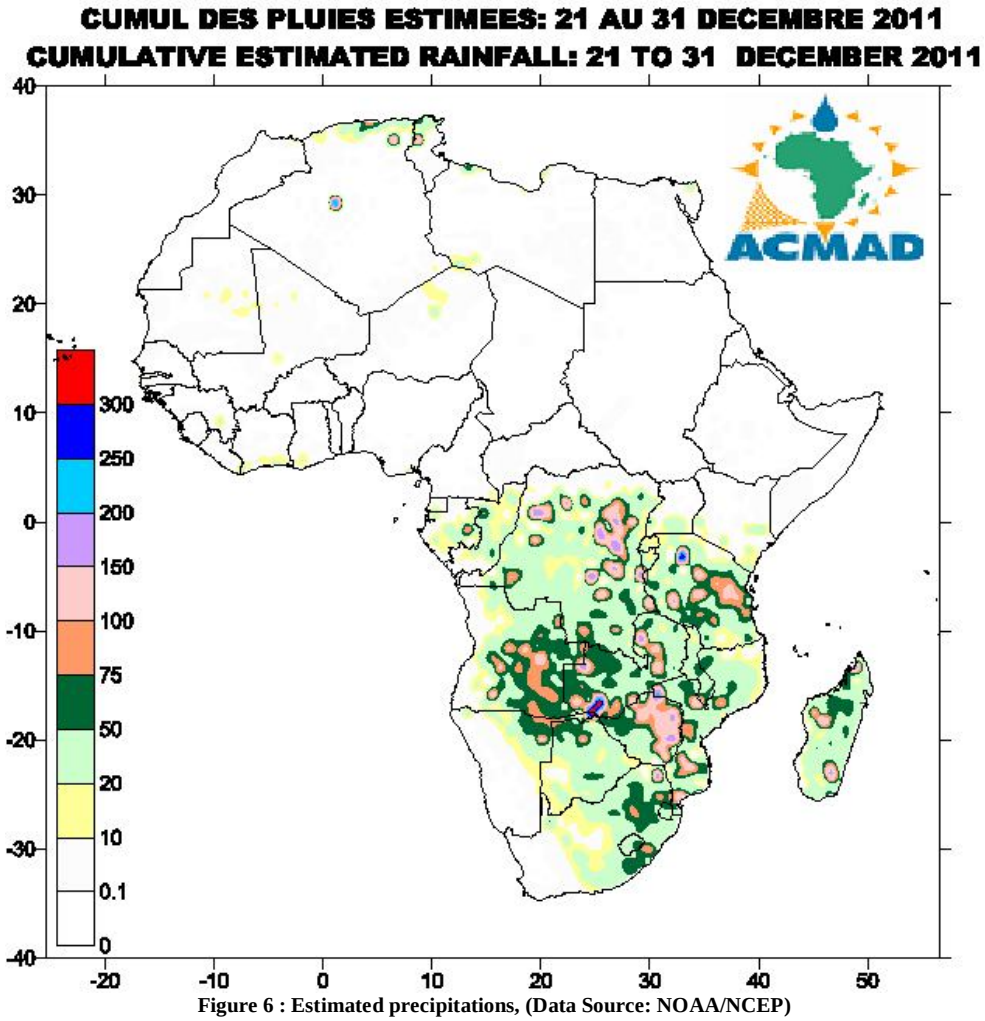

Figure 6 : Estimated precipitations, (Data Source: NOAA/NCEP)

2.2 OBSERVED DATA

The Table below shows that high rainfall amounts were observed in GHA countries (Dar-Es-Salam (260mm) and Mbeya (150mm) in Tanzania, Harare (127mm) in Zimbabwe; in South Africa countries (Johannesburg (106mm) and Cap Town (191mm) and Indian Ocean (IO) countries: Seychelles (105mm) in Seychelles and Plaisance (112.7mm) in Mauritius. The highest mean maximum temperature of 34.8°C was observed at Khartoum in Sudan while the lowest mean minimum temperature of 3.7°C was observed at Tamanrasset in Algeria.

	STATIONS	Precipitations (mm)	Number Rain day	MaximumTemp. (°C)	MinimumTemp. (°C)
NAC	Alger (Dar El Beida)	39	4	15.9	6.5
	Tunis	48.1	7	15.8	9.9
	Tripoli	41	4	15.5	8.8
	Le Caire	0	0	18.6	10.6
	Casablanca	0	0	17.4	8.8
	Tamanrasset	0	0	17.7	3.7
SC	Nouakchott	0	0	27.7	16.8
	Dakar-Yoff	0	0	27.8	21.5
	Tombouctou	0	0	27.0	11.8
	Banjul	0	0	31.0	16.5
	Bamako-Sénou	0	0	31.3	16.8
	Ouagadougou	0	0	32.3	17.8
	Bobo Dioulasso	0	0	32.5	19.2
	Bilma	0	0	25.7	10.3
	Agadez	0	0	28.6	13.3
	Niamey-Aéroport	0	0	31.6	16.1
	Zinder	0	0	29.7	16.0
	N'Djamena	0	0	34.1	15.3
GGC	Abidjan	24	3	30.8	25.4
	Accra	0	0	32.6	-
	Lomé	0	0	33.7	25.5
	Cotonou	0	0	31.6	25.4
CAC	Douala	4.6	3	32.7	24.8
	Bangui	0	0	34.3	19.1
	Libreville	10	2	28.6	23.6
	Brazzaville	0.6	3	27.8	23.0
GHAC	Khartoum	0	0	34.8	19.2
	Nairobi	11.4	2	25.4	15.9
	Dodoma	74	4	29.4	18.9
	Kigoma	10.7	4	28.9	20.5
	Dar-es-Salaam	**260**	6	32.2	23.2
	Mbeya	**150**	7	24.1	13.6
	Mtwara	11	3	31.2	23.3
SAC	Nampula	0	0	-	22.1
	Lusaka	2	1	30.1	16.9
	Harare	**127**	3	27.7	17.2
	Bulawayo	6.5	3	30.5	18.2
	Windhoek	0	0	33.5	17.1
	Maputo	0	0	29.9	20.7
	Beira	5	2	-	23.9
	Ghanzi	10	2	32.5	20.1
	Francistown	3.1	2	30.4	19.9
	Seretse Kama	66	6	29.1	19.2
	Manzini	45.8	4	-	19.2
	Johannesbourg	**106**	7	23.9	15.3
	Pretoria	45	5	27.3	18.6
	Port Elisabeth	18.2	5	24.2	16.9
	Durban	22.4	5	28.3	21.6
	Cape Town	**191**	2	25.6	16.5
IOC	Seychelles	105	5	30.1	24.8
	Antsiranana	-	-	-	-
	Antananarivo	5.1	3	29.0	15.9
	Toalagnaro	-	-	-	-
	Plaisance	**112.7**	7	28.8	22.8

Data Source: ACMAD / GTS

NOTE: **0** means no rain;
- means no temperature data available

NAC= Northern Africa Countries; **SC**=Sahel Countries; **GGC**=Gulf of Guinea Countries; **CAC**=Central Africa Countries; **GHAC**=Greater Horn of Africa Countries; **SAC**=Southern Africa Countries; **IOC**=Indian Ocean Countries.

3 OUTLOOK FOR DEKAD (11th –20th January 2012)

3.1. MONSOON

The Figure 7, shows an intrusion of Harmattan characterised by dry, cool and localized dusty conditions over most of the Sahel, Sahara and the Gulf of Guinea countries.

3.2. RAINFALL

The ITD will continue its southward migration; that will contribute to the reduction of rainfall and the enhanced dry and dusty (northerly/north-easterly winds) associated with Harmattan over Sahara, the Sahel and the Gulf of Guinea countries. The southern part of Central Africa, of GHA and most part of Southern Africa countries will continue to record significant rainfall amounts (Figure 8).

North Africa: most of the region will be generally dry. However, some localised light rainfall amounts ranging from 10mm to 80mm will be observed over the northern part.

The Sahel: will continue to be dry. The sub-region will be under the influence of the Harmattan with localized dust.

Gulf of Guinea countries: will be under the influence of the Harmattan. Only, the extreme southern part could have rainfall amounts ranging from 10mm to 50mm.

Central Africa countries: the southern part will have amounts ranging between 10mm to 80mm intensifying to 150mm over extreme southern part of Democratic Republic of Congo. The northern part will continue to be dry.

GHA countries: most of the northern part will record no significant amounts. The southern part and Ethiopian highlands will have rainfall amounts between 10mm to 100mm with peaks ranging from 100mm to above 150mm over southern Tanzania.

Southern Africa countries: will have rainfall amounts ranging from 10mm to 150mm over most parts intensifying northwards to above 200mm over Zambia, Zimbabwe, Mozambique and Madagascar.

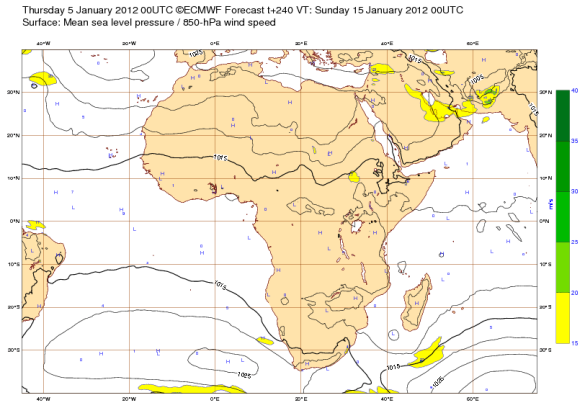

Figure 7: Mean Sea Level pressure/850hPa wind forecast (Source: CMWF)

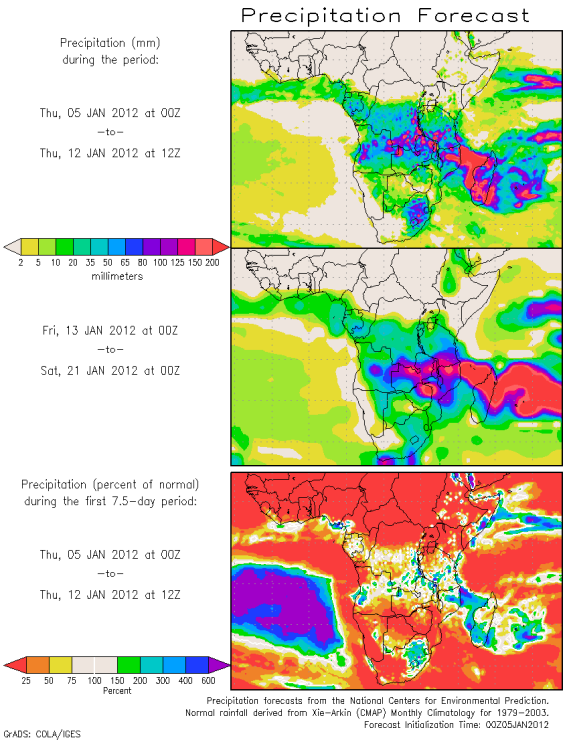

Figure 8: Precipitation forecast. Source: COLA

3.3. TEMPERATURE

The forecast in Figure 9 shows mean surface temperature will to be low over the Sahel countries recording 15°C to 30°C over the southern part decreasing to about 10°C northwards. Most part of the Gulf of Guinea countries will experience temperatures ranging from 20°C to 30°C. In central Africa countries, the temperature will range between 20°C to 30°C over most parts. The GHA countries will have temperature between 20°C to 30°C decreasing to the lowest temperature of 15°C over the Ethiopian highlands and Great lakes countries with the maximum about 35°C over southern Ethiopia/Somalia and north-eastern Kenya. In the southern Africa countries, the temperatures will range from 25°C in the western part decreasing gradually southward to the lowest of 15°C in the extreme south-western part.

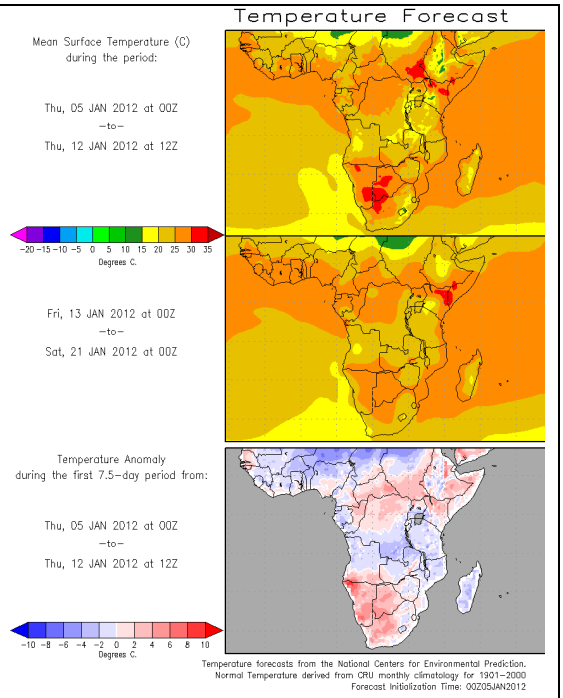

Figure 9 : Temperature forecast Source : COLA

3.4. SOIL MOISTURE

The outlook on soil moisture change in Figure10 indicates that there will be an increase in soil moisture levels in the top 2 metre layer of the soil in extreme southern part of central Africa and northern and southern parts of southern Africa countries including Madagascar while maximum soil moisture deficits will be observed in northern part of central Africa, Great Lakes countries and central part of Southern Africa.

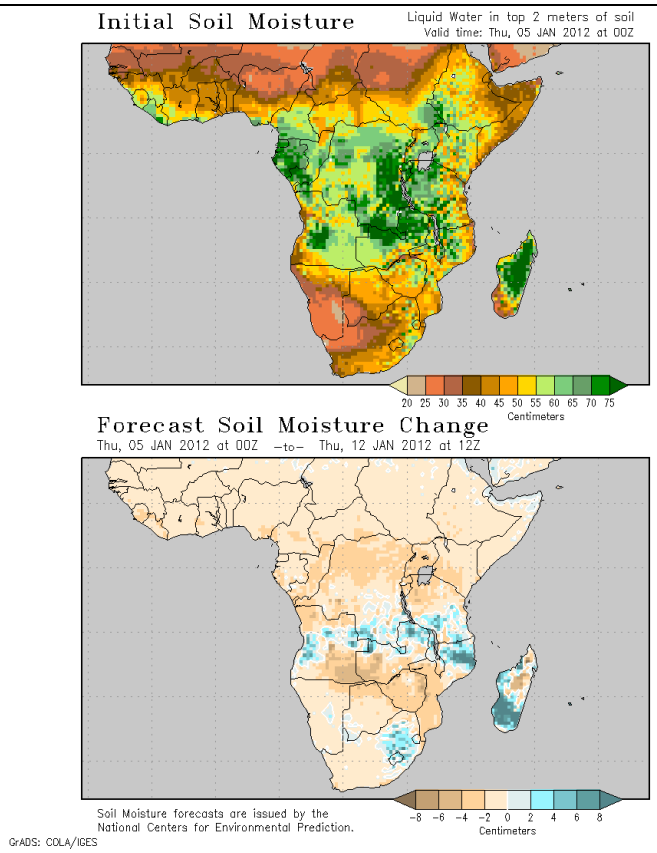

Figure 10: Soil moisture forecast. Source: COLA

3.5. 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 extreme southern parts of central Africa, southern parts of GHA and southern Africa countries will have incidences of malaria. It is imperative that necessary measures be taken combat the outbreaks of malaria.

Agriculture and food security: The integration of climate information and forecast products into agricultural production and food security is of crucial importance. We emphasize on the importance of suitable planting dates, seasonal rainfall onset dates, the amounts and length of the rainy season including monitoring of the phenological stages of crops as important components in the crop yield assessments. Good rainfall provides ample soil moisture to support top rooting zone of annual crops leading to better crop yield. The Eastern Africa has prospects for good harvest due to well distributed rainfall. The rains are over southern Africa countries. There is a need to maximise agricultural production by selecting the appropriate seed varieties based on the expected seasonal rainfall performance.

African Ecosystems: While noting that forests serve as rainfall catchment areas, the destruction of forests in Africa has been blamed for the declining water levels in the lakes, rivers and disappearance of Africa's high mountains' glaciers and wetlands as well as the encroachment of desert conditions. The seasonal rains are expected to provide sufficient moisture for rejuvenation of shrubs and increase biomass and pasture in the dry lands. We have to rehabilitate our presently degraded rainfall catchment areas and natural ecosystems through enhanced national policies and environmental reclamation strategies. Good practices in ecosystems rehabilitation and management include national tree planting during rainy season and soil conservation to minimize soil loss, land slides and flooding during rainy seasons due to heavy runoff. Riverine areas are expected to receive flooding which may lead to destruction of some existing ecosystems and human settlements especially in the southern parts of GHA and southern Africa countries.