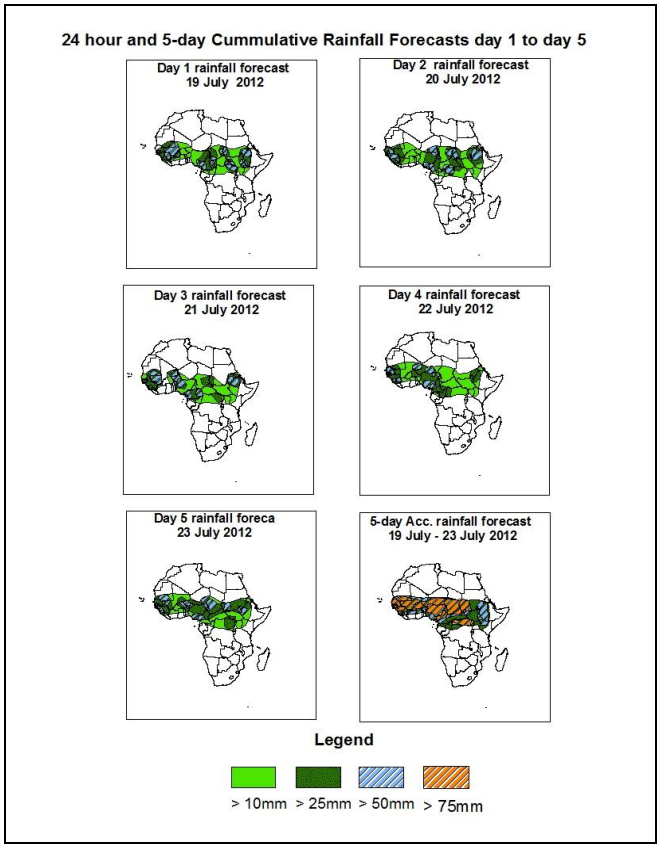
NCEP Contributions to the WMO Severe Weather Forecasting Demonstration Project (SWFDP) and to the African Monsoon Multidisciplinary Analysis (AMMA) Initiative

1.0. Rainfall Forecast: Valid 06Z of July, 19th – 06Z of July, 23rd 2012. (Issued at 13:00Z of July, 18th 2012)

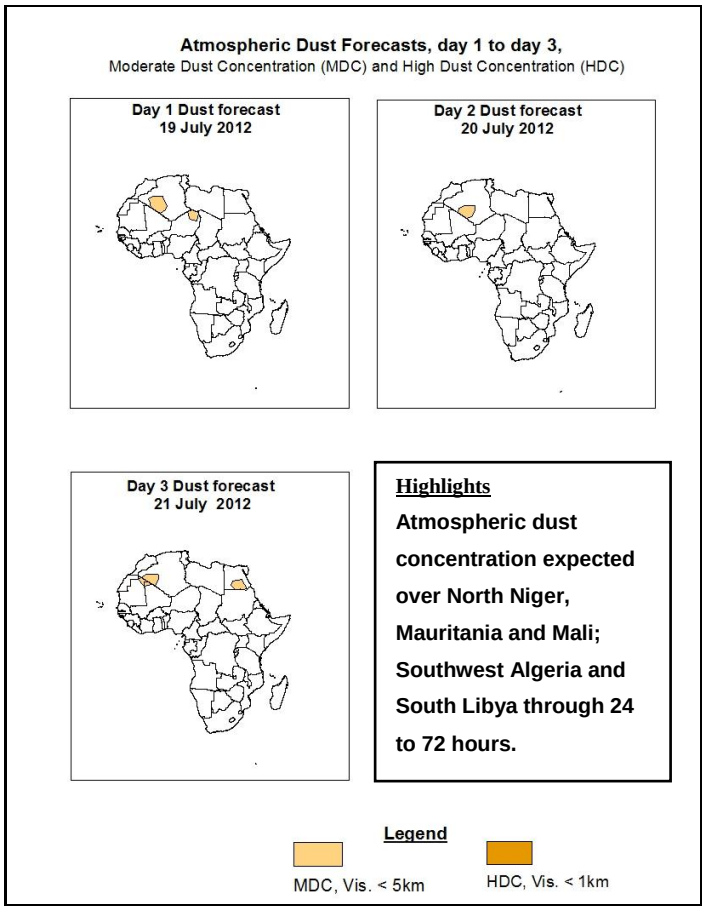
1.1. Twenty Four Hour Cumulative Rainfall Forecasts

The forecasts are expressed in terms of 75% probability of precipitation (POP) exceeded, based on the NCEP, UK Met Office and the ECMWF NWP outputs, the NCEP global ensemble forecasts system (GEFS) and expert assessment.



Summary

In the next five days, ITD is expected to fluctuate between 17°E and 23°N with moderate to strong monsoon depth within 24 to 120 hours; Also the TEJ, AEJ and the AEW propagation with 850 to 700hpa vortices are expected to enhance rainfall activities over Southwest Sudan; East, West and South Chad; North and Southwest Cameroon; North and Southeast Nigeria; Part of Central, West and South Sahel; portion of North Guinea Gulf Countries, Sierra Leone, South Sudan Republic, Central African Republic and Guinea Conakry.



1.3. Model Discussion: Valid from 00Z of July, 18th 2012.

According to the GFS, ECMWF and UKMET models the heat lows are expected to deepen, remain quasi-stationary, and then fill up and vice versa through 24 to 120 hours over Mauritania, Mali, Algeria, Niger, Chad and Sudan.

According to GFS model, a thermal low over North Mauritania (1006hpa) in 24 hours is expected to slightly decrease its core value to 1005hpa in 48 hours and tends to gradually increase from 1007 to 1010hpa within 72 to 120 hours. The second low over North Mali and South Algeria (1006hpa) in 24 hours is also expected to decrease its core value 1005hpa in 48 hours, then increases from 1007hpa to 1009hpa through 72 to 96 hours and tends to decrease to 1006hpa in 120 hours. The third low over North Chad and Niger (1006hpa) within 24 to 96 hours is expected to decrease its core value to 1004hpa in 120 hours; while the low over North Sudan (1004hpa) in 24 hours is

expected to increase its core value to 1006hpa through 48 to 96 hours and tends to decrease to 1004hpa in 120 hours.

The ECMWF model shows a thermal low over North Mauritania (1008hpa) within 24 to 72 hours is expected to increase its core value to 1010hpa through 96 to 120 hours. The second low over North Mali and South Algeria (1008hpa) within 24 to 48 hours is also expected to increase its core value to 1010hpa through 72 to 96 hours, and then decrease to 1006hpa in 120 hours. The third low over North Chad and Niger (1008hpa) in 24 hours is expected to decrease its core value to 1010hpa within 48 to96 hours and tends to decrease to 1006hpa in 120 hours; while the low over North Sudan (1006hpa) in 24 hours is expected to maintain almost its core value through 48 to 120 hours.

The UKMET model shows a thermal low over North Mauritania (1005hpa) in 24 hours is expected to decrease its core value to 1003hpa in 48 hours and tends to increase from 1005hpa to 1008hpa within 72 to 96 hours, then decrease to 1006hpa in 120 hours. The second low over North Mali and South Algeria (1006hpa) in 24 hours is expected to gradually decrease its core value from 1005hpa to 1004hpa through 48 to 72 hours and tends to slightly increase to 1005hpa in 96 hours, and then decrease to 1003hpa in 120 hours. The third low over North Chad and Niger (1005hpa) within 24 to 48 hours is expected to slightly increase its core value to 1006hpa through 72 to120 hours; while the low over North Sudan (1004hpa) in 24 hours is expected to maintain almost its core value within 48 to 120 hours.

According to the UKMET model, the St. Helena High pressure system over South Atlantic Ocean with a core value of 1034hpa in 24 hours locates at latitude 50^{o}S is expected to gradually decrease from 1028hpa to 1024hpa through 48 to 72 hours by shifting northwards from latitude 50^{o}S to 45^{o}S and tends to increase from 1025hpa to 1027hpa within 96 to 120 hours by moving to the north from latitude 40^{o}S to 30^{o}S.

According to the ECMWF model, the central pressure value of 1034hpa in 24 hours locates at latitude 50^{o}S is expected to gradually decrease from 1028hpa to 1024hpa through 48 to 72 hours by shifting northwards from latitude 50^{o}S to 30^{o}S and tends to increase from 1027hpa to 1028hpa within 96 to 120 hours by maintaining almost the same position around latitude 30^{o}S.

Lastly, according to the GFS model, the central pressure value of 1033hpa in 24 hours locates at latitude 50^{o}S is expected to decrease from 1026hpa to 1022hpa through 48 to 72 hours by shifting northwards from latitude 50^{o}S to 30^{o}S and tends to increase from 1025hpa to 1027hpa within 96 to 120 hours by maintaining almost the same position around latitude 30^{o}S.

According to the GFS model, the Azores high pressure system over North Atlantic Ocean with its central pressure value of 1031hpa in 24 hours and locates at longitude 40^{o}W is expected to gradually decrease its core value from 1028hpa to 1025hpa within 48 to 72 hours by shifting westwards from longitude 40^{o}W to 50^{o}W, and tends to increase its core value from 1026hpa to 1027hpa by moving to east from longitude 50^{o}W to 30^{o}W through 96 to 120 hours.

According to the ECMWF model, the central pressure value of 1030hpa in 24 hours and locates at longitude 40^{o}W is also expected gradually decrease its core value from 1028hpa to 1025hpa by shifting eastwards from longitude 50^{o}W to 30^{o}W through 48 to 96 hours and tends to increase to 1027hpa by maintaining the same position around longitude 30^{o}W in 120 hours.

Lastly, according to the UKMET model, the central pressure value of 1031hpa in 24 hours and locates at longitude 40^{o}W is also expected decrease its core value from 1028hpa to 1025hpa by shifting westwards from longitude 40^{o}W to 40^{o}W through 48 to 72 hours and tends to increase from 1027hpa to 1028hpa by moving eastwards from longitude 45^{o}W to 30^{o}W within 96 to 120 hours.

At 925hpa level, zone of moderate dry Northerly and Northeasterly winds (20 to 50kts) are expected to prevail over North Niger, Mauritania and Mali; Southwest Algeria and South Libya through 24 to 72 hours.

At the 850hpa level, a lower tropospheric wind convergence associated with strong and significant West African Monsoon inflow and depth between latitude 15^{o}N 20^{o}N is expected to prevail over parts of Sudan, Cameroon, Chad, Central African Republic and

Western Africa within 24 hours to 120 hours. Vortices are expected over part of Mauritania; West Mali; Northwest Central African Republic; North and East Niger; West and East Senegal; South and West Chad; West Burkina Faso. The convergence associated with the meridional arm of the ITCZ is located over part of South Sudan Republic; North Democratic Republic of Congo; West Uganda; East and South Central African Republic through 24 hours to 120 hours.

At 700hpa level, the African Easterly Jet (AEJ) is expected to affect West Mali and Niger; East Senegal and Nigeria; The African Easterly Waves (AEW) is also expected to propagate westwards waves to affect part of Guinea Gulf Countries and West Africa; portion of Central Africa within 24 to 120 hours.

At 500hpa level, a wave is expected to affect part of Sahel Region, portion of Guinea Gulf Countries; West Sudan; East, West and South Chad through 24 to 120 hours.

At 150mb, the Tropical Easterly Jet with a maximum core of 35 to 80 Knots will affect Southern Chad and Sudan; Part of Ethiopia, Guinea Gulf Countries and Central African Republic through 24 to 120 Hours. Easterly winds flow will also continue to affect most part of West Africa.

In the next five days, ITD is expected to fluctuate between 17^{o}E and 23^{o}N with moderate to strong monsoon depth within 24 to 120 hours; Also the TEJ, AEJ and the AEW propagation with 850 to 700hpa vortices are expected to enhance rainfall activities over Southwest Sudan; East, West and South Chad; North and Southwest Cameroon; North and Southeast Nigeria; Part of Central, West and South Sahel; portion of North Guinea Gulf Countries, Sierra Leone, South Sudan Republic, Central African Republic and Guinea Conakry.

Atmospheric dust concentration expected over North Niger, Mauritania and Mali; Southwest Algeria and South Libya through 24 to 72 hours.

2.0. Previous and Current Day Weather Discussion over Africa (July, 17th 2012– July, 18th 2012)

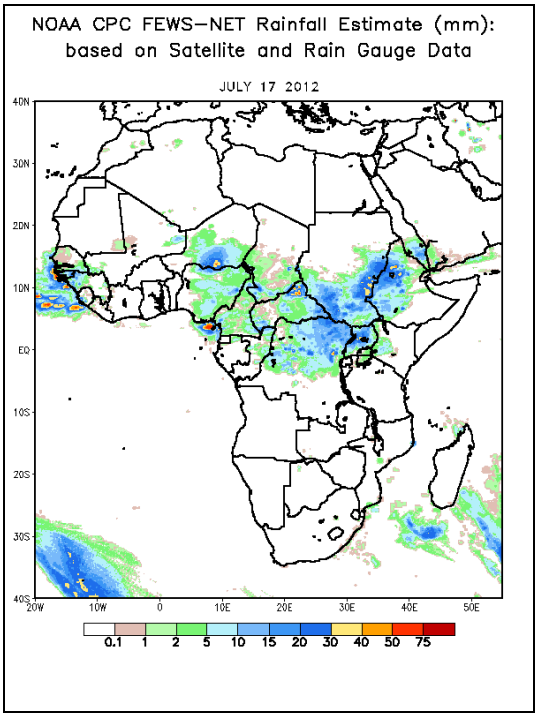
2.1. Weather assessment for the previous day (July, 17th 2012)

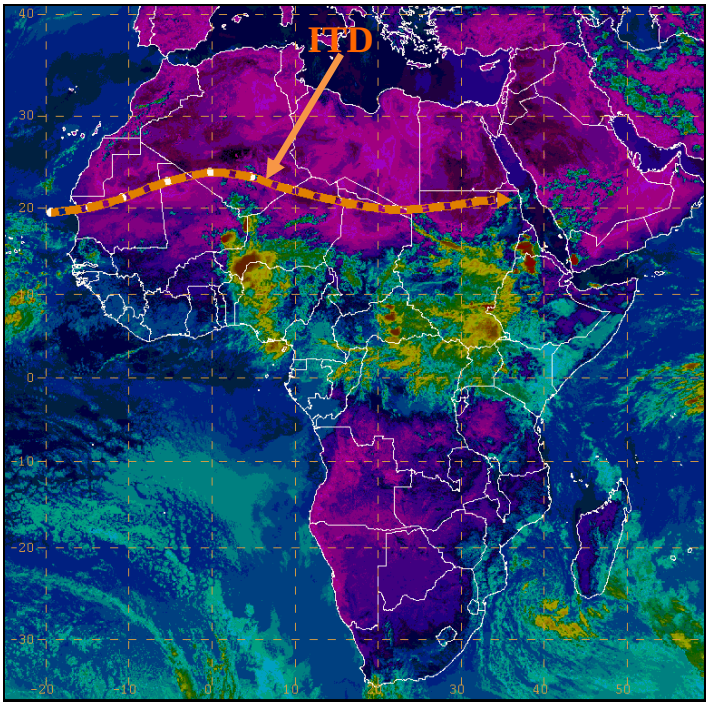
During the previous day, moderate to heavy rainfall was observed over West Guinea Conakry; South Niger; North Nigeria; East Central African Republic; North democratic Republic of Congo; East Sudan; West and Northeast South Sudan Republic; West Ethiopia and Uganda .

2.2. Weather assessment for the current day (July, 18th 2012)

Convective activities observed across Southeast Mali; West Niger; Southeast and Central west and Northwest Nigeria; Central and South Central African Republic North Ethiopia; South and East South Sudan Republic.

ITD Position and IR Satellite Image (valid 1200Z of July, 18th 2012)





Previous day rainfall condition over Africa (top Left) based on the NCEP CPCE/RFE and current day ITD Position and cloud cover (top right) based on IR Satellite image and Synoptic Plotting

Authors: **Abdou Adam Abdoul-Aziz Abebe,** (Direction de la Meteorologie Nationale du Niger/ACMAD / CPC-African Desk); abdoul.adam@noaa.gov
Eugene V. S. Gar-Glahn, (Liberia Meteorological Service / CPC-African Desk); eugene.gar-glahn@noaa.gov