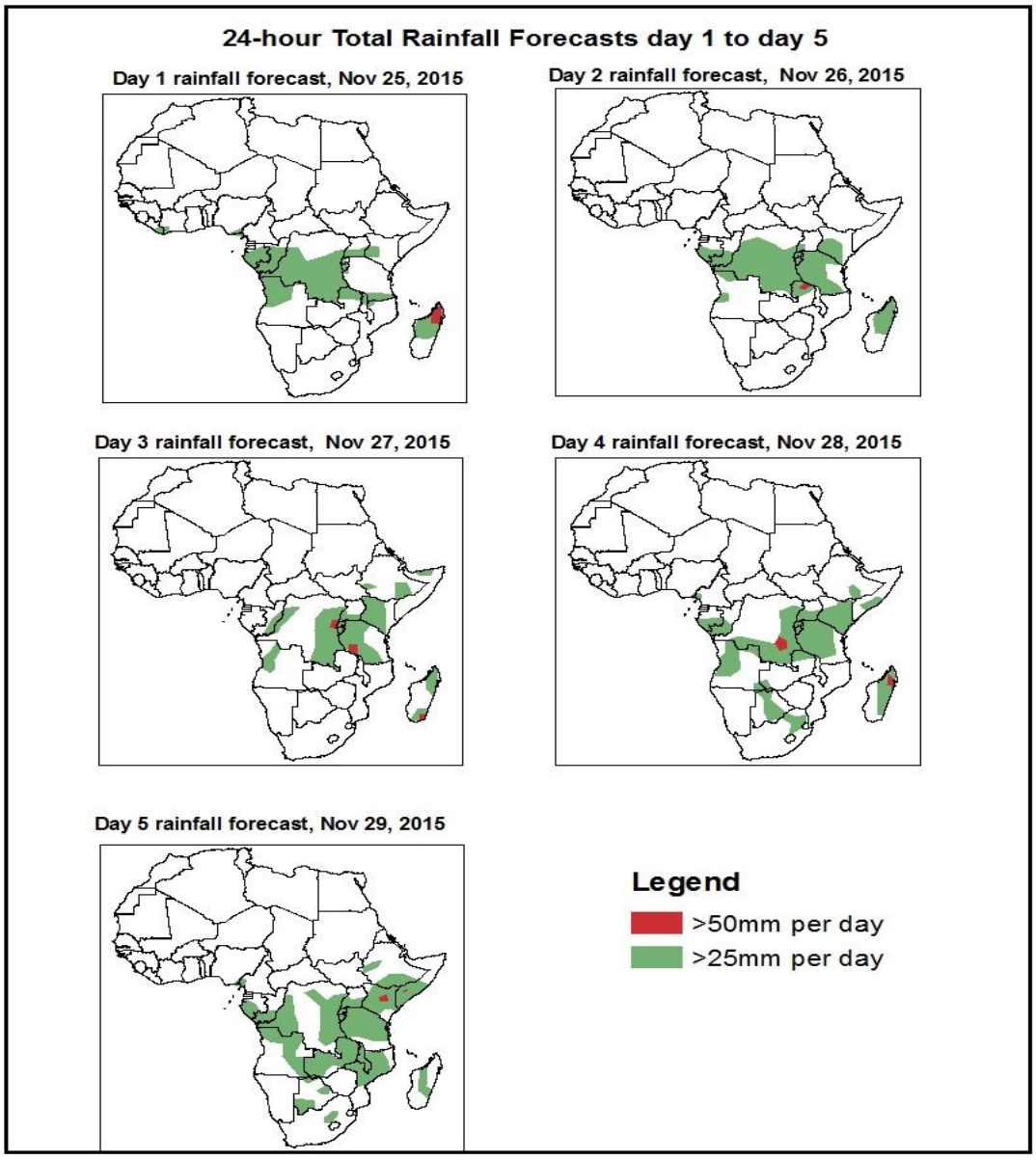
NCEP Contributions to the WMO Severe Weather Forecasting Demonstration Project (SWFDP) and to the African Monsoon Multidisciplinary Analysis (AMMA) Initiative

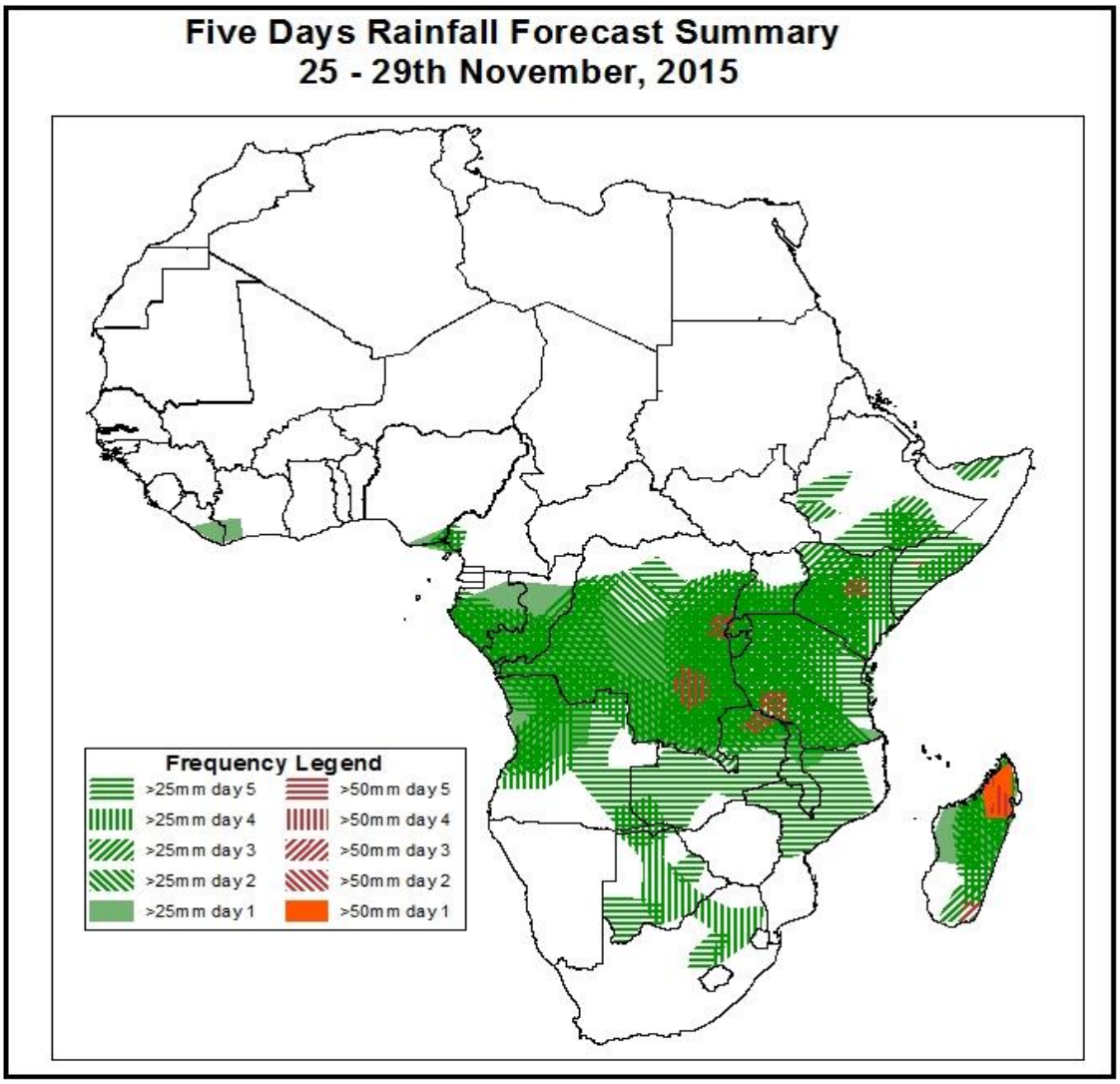
1. Rainfall and Dust Concentration Forecasts

Valid: 06Z of Nov 25 – 06Z of Nov 29, 2015. (Issued on November 24, 2015)

1.1. 24-hour Cumulative Rainfall Forecasts

The forecasts are expressed in terms of high probability of precipitation (POP), based on the NCEP/GFS, ECMWF and the NCEP Global Ensemble Forecasts System (GEFS) and expert assessment.



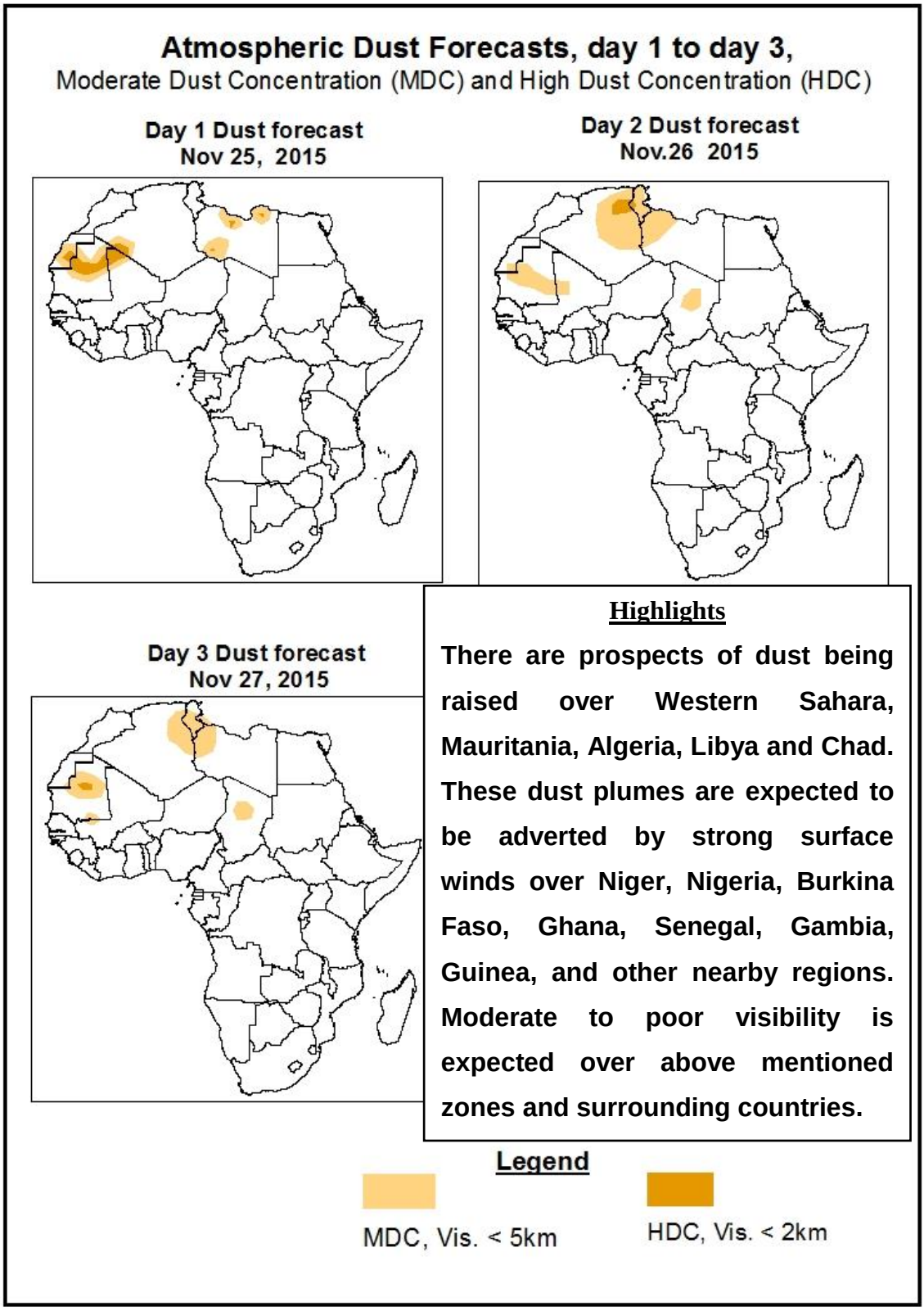


Forecast study of rainfall extent and spread for the subsequent five days over West, central. East and Southern Africa reveals that the Intertropical Discontinuity (ITD) is expected to resume propagating temporarily Northwards thereby pulling up more moisture into the inland areas, due to of the presence and influence of the Mid latitude trough (cold front). The North east trade wind is expected to still remain dominant over its counterpart the south west trade wind over most of West Africa, Chad, CAR and Sudan. In view of above, few cases of rainfall are expected over the Coastlines, Mountain ranges or high grounds and high weather trigger zones of West Africa, and CAR. Like the previous days, the meridional convergence over DRC and the East African monsoon are still expected be active; therefore rainfall is expected to continue over most part of Central, Eastern and the Horn of Africa. Convection, influx of Maritime winds and low level moisture convergence from the Indian Ocean has prompted rainfall over the Eastern part of Southern Africa. Therefore the following places are expected to have moderate to heavy rainfall; Ivory Coast, Ghana, Cameroun, Gabon, Equatorial Guinea, Congo, DRC, Kenya, Uganda, Rwanda, Burundi, Tanzania, Angola. Ethiopia, East part of South Africa, Mozambique, Botswana, Lesotho, and Swaziland. Moderate to heavy amount of rainfall is also expected over the island of Madagascar.

1.2. Atmospheric Dust Concentration Forecasts

Valid: 12Z of Nov 25– 12Z of Nov 27, 2015

The forecasts are expressed in terms of high probability of dust concentration, based on the Navy Aerosol Analysis and Prediction System, NCEP/GFS lower-level wind forecasts and expert assessment.



1.3. Model Discussion, Valid: 25 – 29 November, 2015

The Azores high pressure system is expected to intensify in the next 48 hours, its central value will increase from 1037 mb to 1042 mb. This High pressure system will weaken by 2 mb in the next 72 hours; thereby having a central pressure value of 1040 mb. It will again intensify from 1040 to 1038 mb in the next 96 hours. This pressure system will weaken again by 2 mb, thereby having a central valve of 1036 mb by the end of the forecast period according to GFS models.

The Azores high and its extension the Libyan High is expected to retreats remarkably into the Atlantic Ocean paving way for the passage of the Mid latitude trough. This behavior by Azores and Libyan high has been previously observed some days ago. Therefore, this temporary change in the arrangement of these systems is expected to bring about a break in the continuous cycle of dust being raised over Chad and Niger as seen during these past few days. The presence and passage of the Mid latitude trough(cold front) is expected to influence the Intertropical Discontinuity (ITD) to temporarily propagate Northwards remarkably thereby causing Maritime winds to move more into the inland arears of West Africa. The presence and influence of the Azores high pressure system will be greater felt over Western Sahara, Algeria and Mauritania as Dust is expected to still be raised over those areas. The dust raised will be propagated by relatively moderate to strong Northerly winds towards areas and zones along their trajectory.

The St Helena high pressure system at the beginning of the forecast period had a central pressure value of 1024 mb. This high pressure system is expected to intensify in the next 48 hours, by 5 mb with its central pressure value increasing from 1024 to 1029 mb. It will intensify again from 1029 to 1031 mb in the next 72 hours. By the end of the forecast period, it is expected that this high pressure system will weaken to 1020. mb according to GFS Models. This pressure system was observed throughout the forecast period to have moved over Southern Africa and is expected to remain on that position during the next 48 hours and later moves out of southern Africa by the next 48 hours.

St Helena high pressure system was also observed to have moved closer remarkably to the coast of West Africa and remained on that position within the next 72 hours. This high pressure system presence over South Africa within the next 48 hours as earlier described will most likely cut of convection from the surface and enhance the formation of more stratiform clouds over the South African region, although afterwards convection is expected to resume and aid rainfall.

The Mascarene high pressure system is expected to intensify from 1028 to 1029 mb in the next 24 hours. It will weaken in the next 48 hours by 2 mb. Its central pressure values decreasing from 1029 mb to 1027 mb. This pressure system will then intensify by 2 mb, having a central pressure of 1029 mb .At the end of the forecast period according to the GFS model, it is expected that the Mascarene high pressure system will intensify by 1 mb, thereby having a central pressure value of 1030 mb. This high pressure system was observed to have moved away remarkably from the coastline of southern African and Inland of Madagascar, positioning itself deeper into the Indian Ocean. Its current position has given room for maritime winds and active convection to start taking over Madagascar and that region.

Isolated cut off low pressure systems were observed over West, Central, Eastern and Southern Africa. The central pressure values of these thermal Lows that were observed over West and Eastern Africa responded remarkably to thermal heating, thereby causing their central pressure valves to deepen. Their center values deepen from 1011 mb to 1008 mb over East and Western Africa. At the end of the forecast period, the center pressure values of these isolated thermal low were observed to fill back from 1008 to 1011 mb at the end of the forecast period. Thermal low pressure systems were also observed over Southern Africa and the deepen remarkably within the forecast period.

At 925 mb streamlines; as expected, maritime winds from the Atlantic Ocean were still observed streaming into some countries in West Africa namely Sierra Leone, Liberia, Ivory Coast, Ghana, Togo, Benin Republic, and Southern part of Nigeria within the forecast period. Maritime winds were also observed streaming into Southern Cameroun, Equatorial Guinea, Gabon and into the inlands of central Africa like, Angola, CAR and DRC. Maritime wind flow patterns from the Indian Ocean were also observed streaming into the inlands of Kenya, Uganda, Tanzania, Malawi, Zambia, thereby instituting the Congo boundary convergence. Indian Ocean monsoon was also observed over Mozambique, Malawi, Botswana, Swaziland and Lesotho in Southern Africa. Whereas The Northeasterly continental wind flow pattern was observed over Senegal, Guinea, Burkina Faso, Mali, Chad, Niger, Northern and central Nigeria, Northern Cameroun, Central African Republic and Sudan.

At 850 mb streamlines; continental flows, predominant North easterly trade winds were observed over most parts of West Africa namely Senegal, Gambia, Mauritania, Sierra Leone, Liberia, Burkina Faso, Ghana, Togo, Niger, Chad, Nigeria, CAR and Cameroun. A high pressure system was also observed over the Indian Ocean, this induced maritime wind flows patterns to stream into Congo, Southern Sudan and DRC in Central Africa and Kenya. Burundi, Rwanda, Uganda, Ethiopia and Somalia in East Africa. The winds at this level were observed to converge over DRC within the forecast period.. Maritime winds from the Indian Ocean were also observed over Mozambique, Zimbabwe, Swaziland and Lesotho in Southern Africa.

At 700 mb streamlines; a wet ridge was still observed over east part of South Africa. High pressure systems observed over Mauritania and Northern chad, establishing an anticyclonic flow patterns over Mauritania, Senegal, Guinea, Sierra Leone, Ghana, Benin, Burkina Faso, chad, Niger, Nigeria, Sudan, and Central African Republic. The winds were observed at this level to converge over Tanzania and DRC. Anticyclonic wind flow patterns were observed over Zambia, Namibia, Zimbabwe, Swaziland, Botswana, South Africa and Lesotho. The easterly jets are expected to propagate westwards from Sudan toward the gulf of Guinea during the forecast period. Strong maritime winds flow pattern were also observed streaming into East and central Africa from the Indian Ocean.

At 200 mb streamlines; Anticyclonic flow patterns were observed over West, central and Eastern Africa. Over South Africa Zonal flow patterns was also observed within the next 72 hours and afterwards the flows reversed to divergent flow patterns. The jets associated with this flow pattern had moderate to strong wind speeds.

Forecast study of rainfall extent and spread for the subsequent five days over West, central. East and Southern Africa reveals that the Intertropical Discontinuity (ITD) is expected to resume propagating temporarily Northwards thereby pulling up more moisture into the inland areas, due to of the presence and influence of the Mid latitude trough (cold front). The North east trade wind is expected to still remain dominant over its counterpart the south west trade wind over most of West Africa, Chad, CAR and Sudan. In view of above, few cases of rainfall are expected over the Coastlines, Mountain ranges or high grounds and high weather trigger zones of West Africa, and CAR. Like the previous days, the meridional convergence over DRC and the East African monsoon are still expected be active; therefore rainfall is expected to continue over most part of Central, Eastern and the Horn of Africa. Convection, influx of Maritime winds and low level moisture convergence from the Indian Ocean has prompted rainfall over the Eastern part of Southern Africa. Therefore the following places are expected to have moderate to heavy rainfall; Ivory Coast, Ghana, Cameroun, Gabon, Equatorial Guinea, Congo, DRC, Kenya, Uganda, Rwanda, Burundi, Tanzania, Angola. Ethiopia, East part of South Africa, Mozambique, Botswana, Lesotho, and Swaziland. Moderate to heavy amount of rainfall is also expected over the island of Madagascar

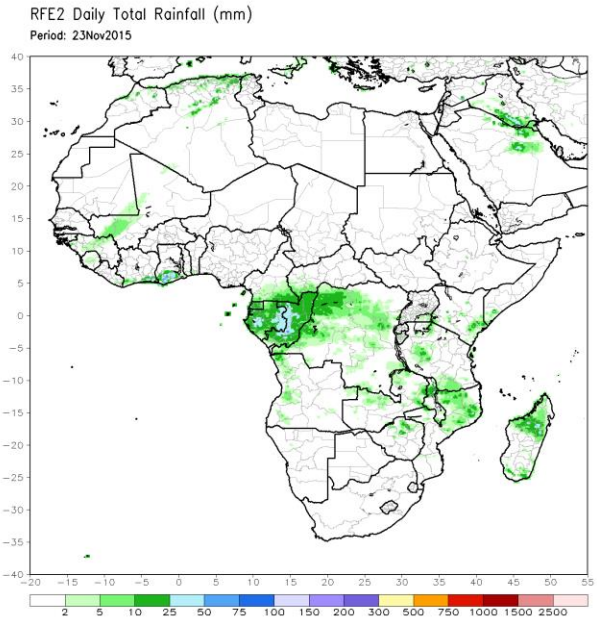
2.0. Previous and Current Day Weather over Africa

2.1. Weather assessment for the previous day (November 23, 2015)

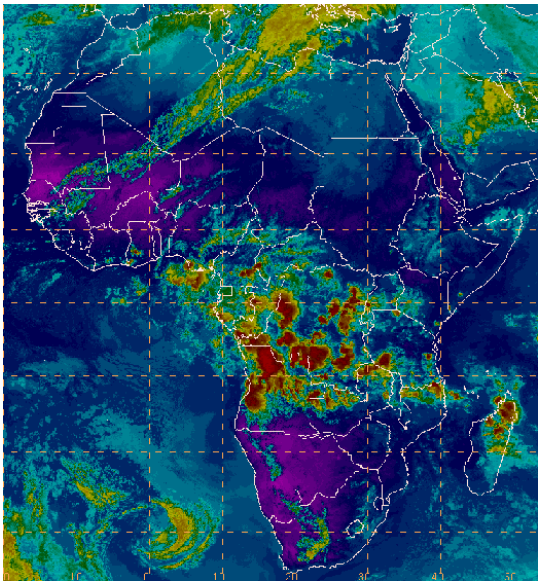
Review of rainfall total for the previous day over Africa revealed that only Ivory Coast and Ghana recorded cases of moderate to heavy rainfall over West Africa. This is due to the fact that this is almost the end of rainfall season in that part of the continent. In central Africa, Equatorial Guinea, Gabon, Congo, and DRC recorded moderate to heavy rainfall. Also Somalia, Kenya, Tanzania, and Zambia recorded cases of rainfall but below moderate and heavy aggregates. Over Southern Africa; only Malawi and Mozambique. Madagascar also recorded the same.

2.2. Weather assessment for the current day (November 24, 2015)

Convective, dense clouds with small and large ice particles observed over Ghana, Nigeria, Cameroon, Equatorial Guinea, Gabon, Congo, Angola, DRC, in central Africa. Same convective cloudy were observed over Kenya, Uganda, Tanzania, and Somalia in East Africa. Likewise Zambia, Zimbabwe, Mozambique, South Africa in Southern Africa and Madagascar. Significant presence of Dust particles suspended in the atmosphere were observed over Senegal, Gambia, Western Sahara, Algeria, Mauritania, Guinea, Mali, Burkina Faso, Ghana, Niger, Benin, Togo, Northern Nigeria, Chad and Sudan.



IR Satellite Image (valid 1630z of November 24, 2015)



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

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