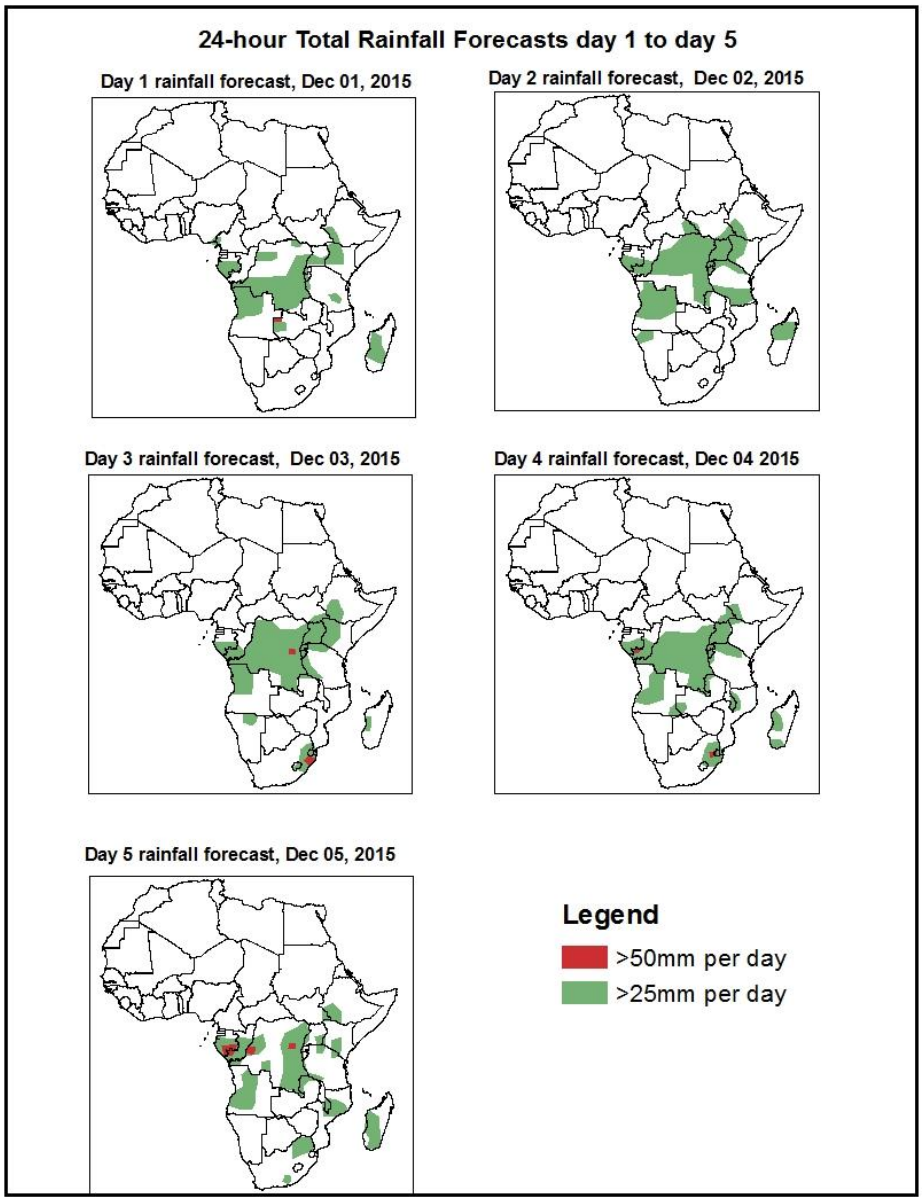
NCEP Contributions to the WMO Severe Weather Forecasting Demonstration Project (SWFDP) and to the African Monsoon Multidisciplinary Analysis (AMMA) Initiative

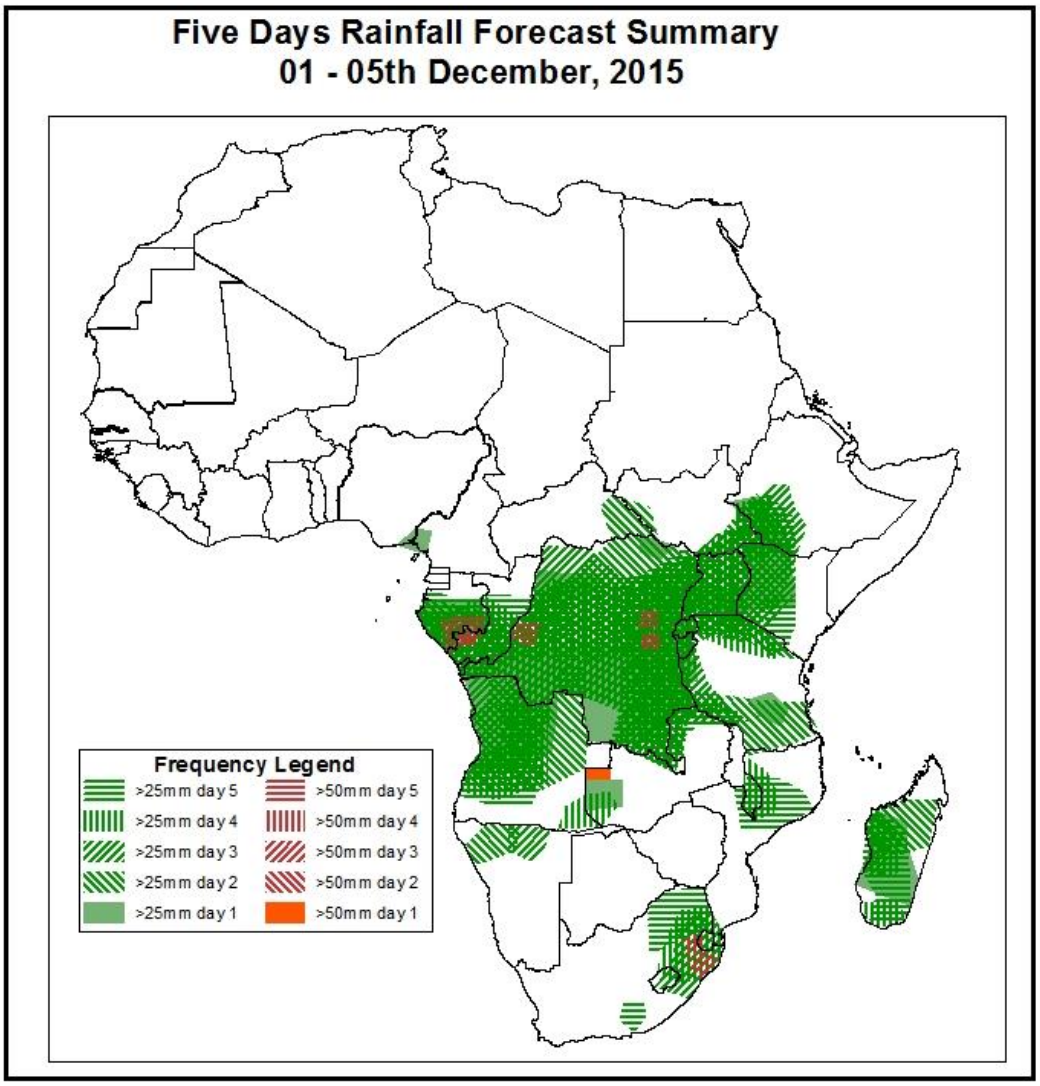
1. Rainfall and Dust Concentration Forecasts

Valid: 06Z of Dec 01 – 06Z of Dec 05, 2015. (Issued on November 30, 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.



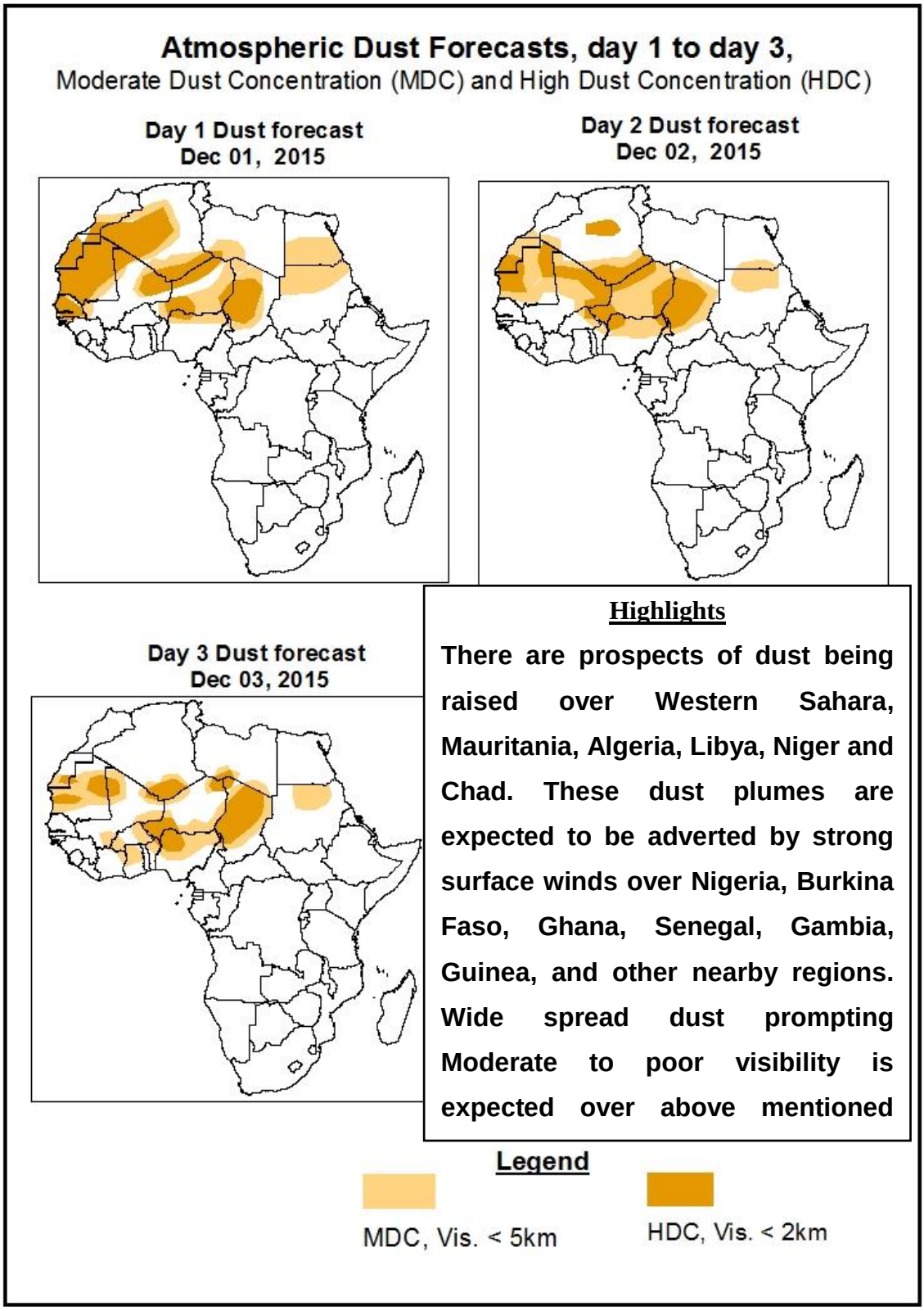


Forecast review of rainfall aggregate and distribution for the upcoming five days over West, central. East and Southern Africa reveals that the Intertropical Discontinuity (ITD) is expected to continue propagating towards its minimum position. The ITD is expected to propagate approximately between 5 and 7 degree north of the Equator. The North east trade wind is expected to still remain dominant over its counterpart the south west trade wind over Northern and central parts of countries in West Africa, Niger, CAR and Sudan. In view of above, very little chances of isolated rainfall of below moderate amount are expected over the above mentioned Zones. Over East, Central Africa and the Horn of Africa, the meridional convergence over DRC and the East African monsoon are expected to be active; therefore enhanced rainfall is expected to continue over those regions. Convection, influx of Maritime winds and low level moisture convergence from the Indian Ocean has sustained rainfall over the Eastern part of Southern Africa. Therefore the following places are expected to have moderate to heavy rainfall; Cameroun, Gabon, Congo, DRC, Kenya, Uganda, Rwanda, Burundi, Tanzania, Malawi, Angola. Ethiopia, Angola, Namibia, Zambia, 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 Dec 01– 12Z of Dec 05, 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: 01 – 05 December, 2015

The Azores high pressure system is expected to weaken in the next 48 hours, its central value will decrease from 1036 mb to 1031 mb. This High pressure system will intensify by 3 mb in the next 72 hours; thereby having a central pressure value of 1034 mb. It will again intensify from 1034 to 1038 mb in the next 96 hours. This pressure system will weaken by 2 mb, thereby having a central valve of 1036 mb by the end of the forecast period according to GFS models.

The Libyan high pressure system which is an extension or a cut off High from Azores high pressure system is expected to propagate southwards bodily, having its 1018 isobar move as low as 10 degrees north of the Equator approximately. This feature is different when compared to the previous days but it is expected within this season. Therefore, widespread dust is expected over the dust source regions, affected regions in North Africa and Northern parts of some countries in West Africa like Nigeria, Benin, Ghana and Burkina Faso. The dust raised will be propagated by relatively moderate to strong Northeasterly trade winds towards areas and zones along their trajectory. This development is a strong indication that active rainfall and weather activities are moving towards the southern hemisphere.

The Arabian high pressure system is expected to intensify in the next 48 hours; its central value will increase from 1023 mb to 1028 mb. This High pressure system will later weaken by 3 mb in the next 72 hours; thereby having a central pressure value of 1025 mb. It will intensify from 1025 to 1027 mb in the next 96 hours. This pressure system will intensify again by 3 mb, thereby having a central valve of 1030 mb by the end of the forecast period according to GFS models. This high pressure system was observed to have moved closer to Africa, causing dust to be raised over the desert area of Egypt and Sudan.

The St Helena high pressure system at the beginning of the forecast period had a central pressure value of 1022 mb. This high pressure system is expected to intensify in the next 48 hours, by 3 mb with its central pressure value increasing from 1022 to 1025 mb. It will intensify again from 1025 to 1027 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 to have positioned itself over Southern Africa and endured on that position throughout the forecast period.

St Helena high pressure system was also observed to have moved remarkably away from the coast of West Africa and remained on that position throughout the forecast period. This high pressure system current position, with respect to South Africa as earlier described will most likely inhibit convection from the surface and weaken weather activities over the South African region.

The Mascarene high pressure system is expected to intensify from 1024 to 1026 mb in the next 24 hours. It will intensify again in the next 48 hours by 3 mb. Its central pressure values increasing from 1026 mb to 1029 mb. This high pressure system will weaken by 2 mb, having a central pressure of 1027 mb .At the end of the forecast period according to the GFS model, it is expected that the Mascarene high pressure system will weaken by 3 mb, thereby having a central pressure value of 1024 mb. This high pressure system was still observed to have moved away remarkably from the coastline of southern African and Island 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 did not responded remarkably to thermal heating, thereby causing their central pressure valves to fill up. Their center values filled from 1009 mb to 1011 mb over Western Africa. At the end of the forecast period, the center pressure values of these isolated thermal low were observed to fill back from 1007 to 1011 mb at the end of the forecast period.

At 925 mb streamlines; as expected, maritime winds from the Atlantic Ocean were still observed streaming into southern parts of 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 still 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 Southern Africa thereby inducing an anticyclonic flow over that region. This High pressure system observed is expected to move away in the next 48 hours and be replaced by a wet ridge. Maritime winds were also observed to converge over DRC and stream into Congo, Angola, Southern Sudan and DRC in Central Africa and Kenya. Burundi, Rwanda, Uganda, Ethiopia and Somalia in East Africa.

At 700 mb streamlines; a high pressure system was still observed over South Africa throughout the forecast period thereby inducing an anticyclonic flow over Namibia, Botswana, Zimbabwe, Mozambique, Swaziland and South Africa. High pressure systems was also 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. Maritime winds were observed at this level streaming into East Africa, DRC, Angola and parts of Namibia. The easterly jets are still 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 Divergent flow patterns were current observed but is expected to be replaced by zonal flow patterns in the next 48 hours. The jets associated with this flow pattern had moderate to strong wind speeds.

Forecast review of rainfall aggregate and distribution for the upcoming five days over West, central. East and Southern Africa reveals that the Intertropical Discontinuity (ITD) is expected to continue propagating towards its minimum position. The ITD is expected to propagate approximately between 5 and 7 degree north of the Equator. The North east trade wind is expected to still remain dominant over its counterpart the south west trade wind over Northern and central parts of countries in West Africa, Niger, CAR and Sudan. In view of above, very little chances of isolated rainfall of below moderate amount are expected over the above mentioned Zones. Over East, Central Africa and the Horn of Africa, the meridional convergence over DRC and the East African monsoon are expected to be active; therefore enhanced rainfall is expected to continue over those regions. Convection, influx of Maritime winds and low level moisture convergence from the Indian Ocean has sustained rainfall over the Eastern part of Southern Africa. Therefore the following places are expected to have moderate to heavy rainfall; Cameroun, Gabon, Congo, DRC, Kenya, Uganda, Rwanda, Burundi, Tanzania, Malawi, Angola. Ethiopia, Angola, Namibia, Zambia, East part of South Africa, Mozambique, Botswana, Lesotho, and Swaziland. Moderate to heavy amount of rainfall is also expected over the island of Madagascar.

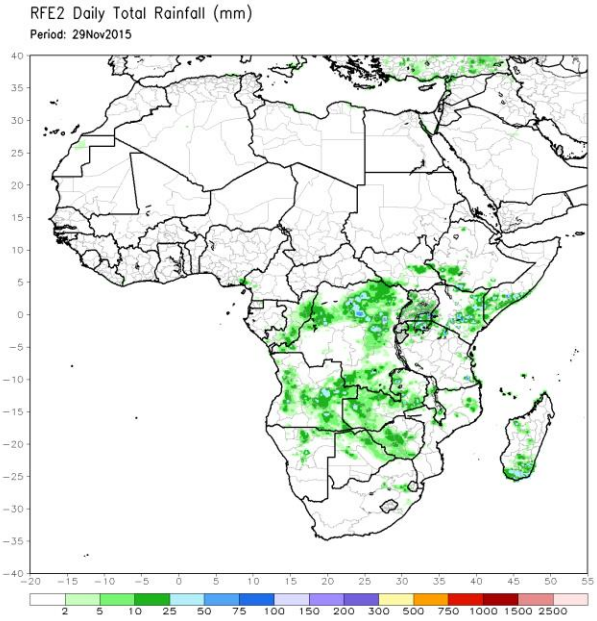
2.0. Previous and Current Day Weather over Africa

2.1. Weather assessment for the previous day (November 29, 2015)

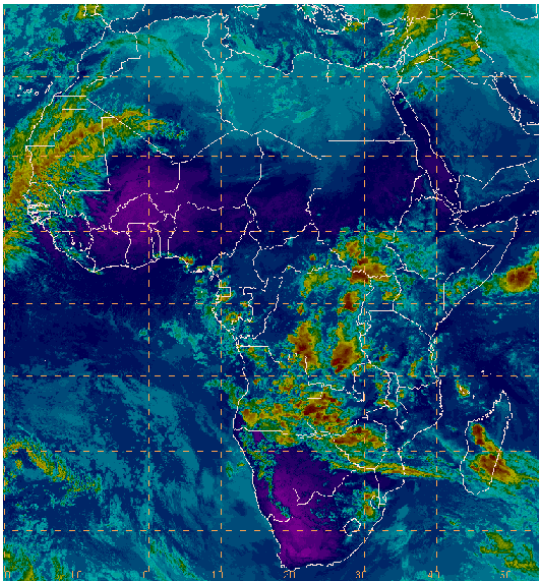
Latest assessment of rainfall extent for yesterday over Africa revealed that there wasn't any country in West Africa that recorded cases of moderate to heavy rainfall. Although few occurrence of rainfall was reported over the Southeastern part of Nigeria. This is due to the fact that raining season in that part of the continent is about to end. In central Africa, DRC and Angola, recorded moderate to heavy rainfall. Also Uganda, Rwanda, Burundi, Kenya, Tanzania, Zambia, Ethiopia and Somalia recorded cases of moderate to heavy aggregates of rainfall. Over Southern Africa; Malawi, Zimbabwe and Namibia. Madagascar also recorded the same.

2.2. Weather assessment for the current day (November 30, 2015)

Convective, dense clouds with small and large ice particles observed over Nigeria, Cameroon, Equatorial Guinea, Gabon, Congo, Angola, CAR, DRC, in central Africa. Same convective cloudy were observed over Kenya, Uganda, Tanzania, South Sudan and Ethiopia in East Africa. Likewise Zambia, Zimbabwe, Malawi, South Africa, 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 1700z of November 30, 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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