

USING NWP MODELS AND SATELLITE IMAGERY AS TOOLS FOR NOWCASTING HIGH-IMPACT WEATHER EVENTS OVER WESTERN SAHEL (AFRICA).

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ABSTRACT

1. INTRODUCTION:

The main objective of this work is to study the pressure and wind flow patterns during Severe Rain and Thunderstorm events over Western Sahel. Widespread floods as a result of Rain and Thunderstorms were reported over much of Western Sahel and parts of Central Sahel (IRIN News) particularly from the second half of August to the end of the first dekad of September, 2009. Similarly, scenarios with days of Torrential Rain and Thunderstorm occurred during the first half of September, 2010 particularly over The Gambia.

2. DATA AND METHODS:

The data used includes Eastern Tropical Atlantic Surface Analysis courtesy of Tropical Prediction Center (TPC / TAFB) of the National Hurricane Center in collaboration with Ocean Prediction Center (OPC) and Hydrometeorological Prediction Center (HPC). NCEP GFS High Resolution Analysis and Forecasts Isobaric and Isotachs/ wind vectors in 800 x 600 plot resolutions obtained and generated using the interactive data viewer and quick plots Web Plotter from NOAA's National Climatic Data Center - National Operational Model Archive & Distribution System (NCDC-NOMADS). Whereas, the Satellite cloud images used are those of EUMETSAT and NEXSAT. The different data and products were collated and analyzed subjectively.

3. RESULTS:

During the period of study, the Surface isobaric charts depicts a tropical - extra tropical interface of a dynamic

low pressure system over the northern hemisphere featuring a blocking pattern with a frontal depression centred over the Northeast Atlantic Ocean off the coast of western Europe and the northwards bulging of the doldrums (equatorial Trough) over Northwestern Africa occasionally extending onto the northern fringes of the Maghreb States. On the contrary, the Azores high pressure Cell remained quasi-stationary mainly over the central-north Tropical Atlantic Ocean; whereas, featured over the South Tropical Atlantic Ocean is the intensification of the St. Helena high pressure cell, with its associated ridge extending onto the western sectors of the Gulf of Guinea Countries. However, a series of thermal lows frequently develop over the fringes of the eastern sectors of western Sahel which propagates westwards onto the Tropical East Atlantic Ocean. At the lower levels 925hPa, an influx of moist south/ southwesterly winds from the ocean penetrates deep onto the continent reaching ~20°N latitude where they meet with the continental north/ northeasterly winds at the axis of convergence ITD/ ITF during this period. A well pronounced cyclonic vortex centred over SW Niger/ NW Nigeria was featured aloft onto the 850hPa level on 31st August, 2009 which propagates westwards reaching The Gambia's coast on 4th September, 2009 whilst another developed on its wake over southwestern Mali on 5th September moving slowly west-northwestwards reaching The Gambia/ Guinea Bissau's coast on 6th 1200Z. However, at the Mid-levels most especially 700hPa, the passage of

Tropical Easterly waves over the sub-region are well delineated. Evident at this level also, on the crest of troughs are traces of the African Easterly Jet (AEJ). Finally at the upper levels, more so the 200hPa level areas of Confluent/ diffluent flows including strong convergence/ divergence were identified.

4. CONCLUSION:

Despite the shortfalls for current GCM to resolve mesoscale systems well; the study has identified some unique space-time characteristic of Rain and Thunderstorm over Western Sahel most especially over The Gambia that is quite useful for the monitoring and Nowcasting of the weather.

REFERENCE:

George N.E. Stafford
Atmospheric Circulation features associated with Wet and Dry Spells over Western Sahel during the Rainfall Seasons. July, 2007.

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