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Predicting weather changes

Abstract

Weather changes are things that can be devastating due to the sharp difference in weather conditions that may occur. It is most of the times advisable to seek information from the National Meteorological Services on weather conditions when it has been realized, especially that the weather is changing. In this 21st century, Climate Change has been the order of the day, and specific weather phenomena are on the increase, both in frequency and intensity. The Meteorological community has made several efforts through the use of Satellite and Radar information, as well as ground based human observations to monitor the atmosphere and come out with accurate weather predictions in order to save life and property.

Keywords: hurricane, haze, squalls, satellite, radar, frequency, climate change, intensity, weather predictions, atmosphere, monitor, capacity, direction

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Abbreviations: RGB, red green and blue; ECMWF european centre for medium range weather forecasting; NOAA national oceanic and atmospheric administration; UKMO, united kingdom met office

Introduction

The weather over a place can change when the wind changes its direction, and intensity.[1] Wind that blows over a very large area, termed as an air mass has the capacity to influence the atmospheric conditions when it affects an area. A place that was previously warm could become cold when the weather changes. The direction of the wind can change and it will bring rain or dust. An air mass can be continental or maritime, and they all have their respective effects on a place. For this matter, RGB satellite imageries have been made available to identify particular elements present in the atmosphere, other than the usual clouds and moisture that was previously available. Dust, Volcanic eruption and thunderstorm activities are those that bring about sudden changes in weather conditions. Weather changes are mostly rapid. Rain can just start over a place within a very short time and destroy a lot of things. For this reason the atmosphere needs to be monitored and weather forecasts made available for preparations for safety. Weather related accidents can be avoided or its effects can be reduced if weather systems are carefully studied, and the results communicated well to end-users. Dissemination of weather information should be paramount because weather products are mostly technical, and it is important to need a professional to interpret weather products to the general public.[2,3]

Weather change can have effect on people when they find themselves in deferent environments. It can occur when one travels from the tropics to the temperate regions. Weather conditions in these two defined areas are strictly different from one another. It is therefore important to know the weather conditions of a destination before a journey is embarked on. Advice on dress code is very necessary, especially when one is moving into a new environment that has distinct weather change.[6,7] If the weather would be cold, then jackets and thick pull over's are needed to be prescribed. Failure to comply with such practices would result in serious health issues like catarrh, colds and flu. Weather changes can bring about the invasion of certain insects that can give certain diseases like malaria and fever. Crops do suffer from these insects, maize farms are usually damaged by these insects in most parts of Africa, like in Ghana and Tanzania. Dress codes must be studied and complied with in order to prevent insect bites and be able to adapt with these changes in weather situations. It is important to get education on weather changes over a place in order to cope with them. It is also important to know the intensity of the change in the weather condition that is expected so that relocation could be made, if and only if that is the only way to survival. To be able to predict rain during the dry hazy period is a very important meteorological practice. During that time the probability of rain occurring is very low. All that could be thought of, at that time is the continues haziness. First rains can be torrential and are mostly on localized basis, they normally occur over small areas. These conditions mostly occur during the weather transition periods where one set of weather conditions change completely to the other.

It is important to be able to predict the beginning of the hazy conditions over a place before it starts or to predict the return of hazy conditions in rains after the haze has gone. Pressure systems around the continent of Africa, and around the globe helps in predicting weather conditions and changes in weather over the lands. Meteorologists over every country have studied pressure systems around them and developed strategies in analysing them in order to come out with weather predictions. Continuous examination of satellite products, like the satellite imagery is another strategy of monitoring the atmosphere and predicting weather changes. Human activities can have serious effects on models that are setup for the production of certain synoptic features. For this reason human effects are considered in certain models that are used in predicting the state of the atmosphere.[2] Certain atmospheric constituents that might affect the production of clouds could be injected into the atmosphere by human beings and if not considered, would give a different output from the models. Imagine that a forecast is made from models for a particular place, and a farmer over that area decides to seed clouds so that there could be rain on his farm; the forecast could then be wrong because the seeding has not been factored into the models.[3] Seriously, it would be an attack on the forecast. For a model to be a good one, it should be able to understand the behaviour and contents in the atmosphere. Its greenhouse effects has to be included in the algorithms. Satellite measurements of certain trace gases has to be considered so that changes could be effected in the preparation of the model. NOAA, ECMWF, UKMO, and Meteo France are examples of model producers that have served the meteorological community over the years. EUMETSAT has been able to monitor the atmosphere over Africa and Europe, and produced near real-time products that have helped in tracking tropical storms. When fair weather changes to stormy weather it then becomes an issue where people would lament on. Normal activities and schedules are most of the times

affected when weather changes. Flight plans change and most people are disappointed in these kind of situations. Weather can change and would result to intensification of hazy conditions, where visibilities will deteriorate; the changes can also be the other way round where it can bring about comfort (Figure 1).

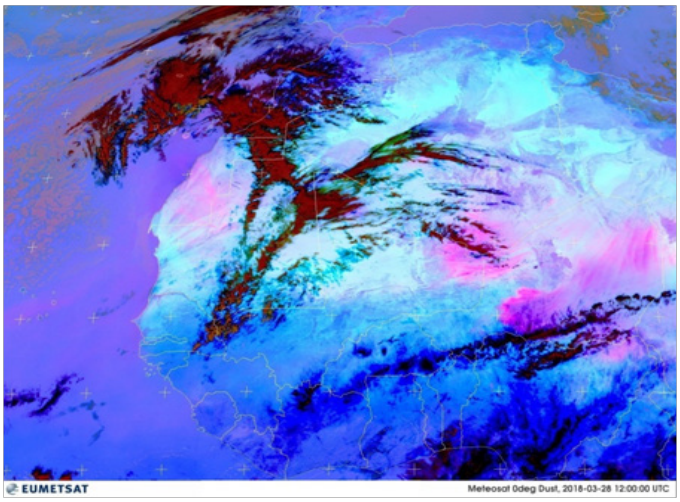

Figure 1 Satellite imagery showing the approach of dust storm (magenta colour) from the Sahara Desert towards Nigeria, and then to Ghana[4] on the 28th March, 2018 at mid-day which caused changes in weather conditions.

Hazy condition is expected and experienced mostly in December over West Africa, so when it is December and it has still been raining instead of the usual haze, it then raises a lot of alarm. The return of the haze over West Africa is usually in April, but now in 2018, it has come in March. This raised a lot of concern to people about climate change. Unusual weather conditions could sometimes be favourable but scientists would like to think of the consequences that it may bring in future. Some consequences could be whether the coming Haze or rains would be severe or mild, its duration before it stops, and other climatic influences that it may have on places. Convective activities can be violent and devastating, they can occur over small areas without attracting much attention of weather observers (Figure 2). Weather changes are mostly seasonal, and occur at regular times over places, for instance, hurricanes have seasons that they affect the Caribbean. Within August and October, 2017 four severe hurricanes affected and devastated the Caribbean. Harvey, Nate, Irma, and Maria are highly intensed hurricanes, and are attributed to climate change. Weather services are mostly for safety purposes. When one finds him or herself in a dry environment with high temperatures, as it is in the northern sector of Ghana, then drinking more water and staying in flooded rooms, by pouring water on the grounds would be a form of remedy since it would prevent dehydration. Burnings in the nose is another form of health changes that accompany changes in atmospheric conditions, especially the dry season. During and after hurricane periods the general public is advised to keep listening to radio and TV for weather advice. They are advised to wait until an area is declared safe before entering, watch out for closed roads in order to prevent drowning. They are also advised to stay on firm, dry grounds since moving water of about only 6 inches can sweep off the feet of human beings. Standing water may be electrically charged from power lines and that could be very dangerous. Do not drink or prepare food with tap water until officials say it is safe, then wear proper shoes to prevent cutting of feet on sharp debris. Any locality has its peculiar type of climate that dictates its weather conditions. Squalls and thunderstorms are forms of weather changes that are devastating in Ghana. Weather changes affect people's attitude and turn to influence the devastating effect. People tend to throw rubbish into gutters whenever it is raining. The rubbish get stocks in front of someone's house and water cannot flow, flooding would then start from that locality and spread into the community.

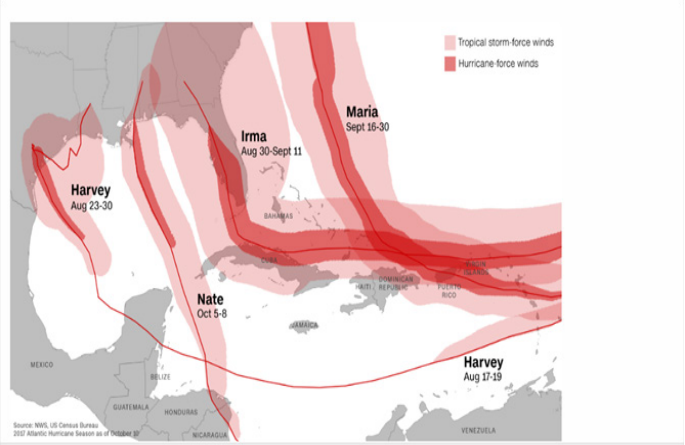

Figure 2 A look at four storms from one brutal hurricane season5 that affected the Caribbean in 2017.

Materials and methods

Computers and other devices like android phones, connected to the internet are most materials used in this project. Colour pencils and markers are used to identify high and low pressure systems on pressure charts. Analysis of weather charts, including pressure systems, wind direction and speeds, as well as satellite imagery of different types across the globe are some of the products used. Monitoring news about the weather from social media, including radio and television, and the internet are some of the methods. Communication with other meteorological offices and officers, through weekly and daily 'chart discussions' are key methods in monitoring and predicting weather changes.

Results

It has been realised that monitoring of the atmosphere is very important, and it is not difficult to achieve. It can be done by using simple gadgets like hand held mobile phones and simple computers that has access to the internet. Even though there are sophisticated gadgets like the PUMA and MESA products that give comprehensive information about the atmosphere. These can only be found in the Meteorological offices, but the individuals can also make use of the satellites in monitoring the atmosphere privately with little education on their interpretation.

Discussion

Weather changes can be devastating, especially when the changed weather is harsh. It is important for the public to be aware of how weather changes can affect the health of humans. For this reason, the public is advised to find means of getting information from the Met Offices in their respective countries in order to get daily and seasonal weather predictions. Weather forecasts would help save lives and property, including time. Farmers and traders are advised to seek

weather information before planting and displaying their wares in the open. Weather lovers are advised to connect to the social media, join dedicated Met offices and get daily weather predictions.

Conclusions

The Meteorological community has, over the years served the general public, especially the Aviation industry, and areas that are usually affected by severe weathers like hurricanes and tropical storms. Information from the Met Offices has been quite good and lifesaving. It is therefore recommended that every individual gets access to weather information in one way or the other. Weather services are now available in local languages and readily available in many localities. It can be statistically proven that weather related catastrophes have reduced significantly over recent years due to accurate weather predictions from the meteorological community.

Acknowledgements

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Conflict of interest

The author declares there is no conflict of interest.

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