

## Meteorological Contribution to the Aviation Industry in Ghana

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### Abstract

As part of the preparations toward the WMO day celebration 2018, the Ghana Meteorological Agency (GMet) feels that the general public must be much more aware of the duties it plays in the Aviation industry. As the theme goes: "Weather-Ready, Climate Smart", it has become a concern for the Agency to spell out the activities of Meteorology that goes into flight operations. Sometimes, GMet feels like the general public does not know that it even has a hand in the flight activities in the country. This is also to show the effective efforts played by the Aviation Industry in Ghana, the sprouting number of international airports in the country, and how best they are trying to put flying to safety.

**Keywords:** Pilots; Meteorological agency; Aeronautical; Headwinds; Tail winds

### Abbreviations:

TAF: Terminal Aerodrome Forecast; SIGMET: Significant Meteorological Information; METAR: Meteorological Terminal Aviation Routine Weather Report; SPECI: Aviation Selected Special Weather Report Meteorology; GMet: Ghana Meteorological Agency;

### Introduction

Meteorological contribution to the Aviation sector can never be exempted or ignored because of how helpful it is to flight operations. Pilots have depended so much on meteorological information over the years, and have declared the service as very helpful to the extent that they cannot operate without the service. Pilots have been very grateful to the Ghana Meteorological Agency (GMet) in Ghana over the years, for the safety role they play in the aviation industry. Due to this fact, it has been agreed by the two global institutions, the World Meteorological Organization (WMO) and the International Civil Aviation Organization (ICAO) that services must continue without break.

For this reason the Aeronautical Meteorological Offices does not close, they run shift duties such that there must always be someone on duty at the Airport Meteorological Office. This Airport Meteorological Office has two categories of officers, the Aeronautical Meteorological Observers (AMO) and the Aeronautical Meteorological Forecasters (AMF). The AMO is someone who is continually watching into the atmosphere, and would provide documented report for every 30 minutes to the Air Traffic Controller, who in turn relays the information to any pilot that is flying to the aerodrome.

The AMF is someone who has been allocated an area called the Flight Information Region (FIR) for which he/she is supposed to keep watch, in case of any occurrence of adverse weather conditions that would affect flight operations. He/she then issue warnings to predict the situation or weather occurrences to the Air Traffic Controller, who

then conveys the message to the pilot so that they can avoid those areas for safety.

In Ghana, GMet is responsible for the Accra FIR which covers the whole of Ghana, Togo, and Benin, as well as a portion deep into the Atlantic Ocean, south of these three countries. AMOs and AMFs of GMet have served the aviation industry satisfactorily with little or no blame in terms of weather production across the country. Accra, Takoradi, Tamale, Kumasi, Sunyani, including some air strips like those at Wa, Navrongo, Ho, among others are stations where Aeronautical Meteorological Services are provided [1].

Thick cloudy conditions, among others are things that make flying very uncomfortable. Aircrafts always like to avoid clouds when flying, especially the thunder cloud. Meteorologists are very particular about reports on these clouds, and other things that affect flying, like strong turbulent wind. Clouds can produce turbulence in flights, and can be experienced by passengers on board as it is in vehicles on ground when they enter into pot-holes. Visibility is another form of weather conditions that affects flight, especially when it is on the low side, because pilots may not be able to see the runway when landing. For these reasons meteorologists measure or estimate these parameters for the aviation sector for safe flight planning and operations (Figure 1). Services provided by the Aeronautical Meteorological Office technically include TAF, METAR, SPECI, and SIGMET and are reported in codes. Aerodrome Warnings are reported in plain languages. These codes are languages designed for communication between the Aeronautical Meteorologists and Pilots only. Aerodrome warnings are in this way because they could be used by crews on ground like the loaders, and other flight planners at the airport so it should be less technical [2].

SIGMET is purposely for the surveillance of the FIR which and it is consumed internationally by flights that may use the local FIR. For the Accra FIR, things that are mostly reported are thunderstorms. This is due to the geographical location of the region where temperatures are mostly on the high side [3]. The region falls within the tropics and convection is a common phenomenon where Cumulonimbus (CB) clouds form mostly on daily basis (Figures 2 and 3).



**Figure 1:** Aircrafts on the ground during rainfall at the Kotoka International Airport in Accra, Ghana.



**Figure 2:** Aircraft in flight trying to avoid a CB cloud.

METAR is a routine atmospheric observations made by the AMO at regular intervals of 30 minutes, and relayed into the international network, making it accessible worldwide. For this reasons, practicing meteorologists on duty have no excuse to abandon the office. Weather elements included in the METAR helps the pilot to land and take off safely. Even though this METAR is generated by the AMO, it is shown to the duty AMF to investigate whether the information is right, then after which the AMF appends a TREND forecast before transmission. The TREND forecast is a concise description of what is expected in the next 2 hours after the time of observation at the aerodrome [4].

The purpose of the code is such that it must be understood by only professional pilots, no matter what the origin or language. It should be

difficult for the one relaying the message to alter the information in order to mislead the consumer. Messages relayed to pilots in plain languages apart from the aerodrome warning would be suspicious to pilots.

The TAF (Terminal Aerodrome Forecast) is a prediction of weather conditions at the local airport, and it is amended 6 hourly by the AMFs. For safety reason provisions have been made for amendments or cancellations before the end of the validity period. These amendments and cancellations do not usually happen due to the excellence of the Aeronautical Meteorologists. The meteorological office in charge of the airport is by law expected to be well furnished with equipment in order to intercept and transmit messages. High speeds internet, and readily reliable telephones from reliable sources are provided to take care of life and property in the aviation industry.

These messages are made readily available in the World Wide Web just after transmission from the local airport, to make flight planning and weather awareness at various airports an easy task. This means that weather information can be assessed through any computer that is connected to the internet or any smart phone that has data, readily to access the web [5].

It has been agreed by the Aeronautical Meteorological Office and the Airline Operators, to provide their flight schedules for the Aeronautical Meteorological Office to provide them with flight folders before taking off from the airports. Things included in the flight folder are wind direction and speed at higher levels in the atmosphere where the aircraft is expected to cruise. Winds, depending on their directions and speed will help the pilot to plan the payload and fuel carriage. 'Headwinds' along the route will require more fuel and fewer loads, while 'tail winds' would be the other way round. Temperature at these levels as well, is no exception, since it also plays a crucial role in the flight plan.



**Figure 3:** Flight operations at the Tamale Airport during the 2017 Hajj programme in Ghana.

Significant weather conditions along the route and alternate routes are also provided in METAR and TAF for the departing and arriving airports and alternate airports along the route before the flight takes off. This is because in case of any emergency landing, the pilot would be quick in deciding where to touch down in order to prevent fatalities, should any fault be detected during the flight period.

Take off conditions are provided on the flight folder at the scheduled expected time of departure, and they are weather conditions at the ground surface at the aerodrome. If this scheduled departure time should change, the Aeronautical Meteorological Office would be notified and if necessary a new flight folder is provided. They are the wind direction and speed, temperature and atmospheric pressure at mean sea level (QNH) and at the station level (QFE). Among these conditions, the most crucial is the wind direction and speed because it aids the pilot to select the runway for landing and take-off. 'Headwinds' at the surface will require shorter runways because it aids lifting, while 'tail winds' will require a longer runway.

Ignoring Meteorological Reports, and internationally laid down rules governing flight operations can lead to disasters. The Meteorological Office will have no blame if investigations declare the Meteorological Office innocent. This would mean that the duty meteorological Officers have provided the exact observations and have issued accurate weather warnings that could prevent fatalities [6].

In the Aeronautical Meteorological Office, flight services take precedence over any other activity. It is believed that the suspended or landing aircraft will have no time to delay for Meteorological information, so information are provided at the time of request without many delays. For this reason, pilots and flight crews are advised to provide their identity when contacting and making requests from the Aeronautical Meteorological Office.

## Materials and Methods

A computer and a smart phone that have access to the internet are the most materials used in this work. Sites are visited on the internet including physical visits to the Meteorological and Aviation Offices at various airports in Ghana. Weather charts were analysed and aeronautical meteorological messages retrieved and monitored. Flight plans and schedules were also monitored and examined, and dialogues with pilots, including briefings were made for more than a decade.

Working together with safety officers and regulators in the Civil Aviation Authority for safety purposes includes the method.

## Result and Discussions

It has been realized that GMet, has over the years been very useful and successful in providing meteorological services to the Aviation industry, especially the Ghana Civil Aviation Authority (GCAA) and the Ghana Airports Company Limited (GACL). Safety was the result of the services provided, since international flights visits Ghana on daily basis, and goes back safely without complains. Landing and take-offs, as well as over-flights were made over the aerodrome and across the FIR respectively without any failures.

## Conclusion

GMet has been one of the reliable Aeronautical Meteorological service provider in the Meteorological community. It had been able to observe, and predict weather conditions that are able to support safe flight operations. Even though there could be some lapses, GMet had never been held victim of any crashes both at the airport and within the FIR due to the vigilant watch over the region by Meteorological Officers.

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