THE IMPACT OF WEATHER ON AIRCRAFTS ACCIDENTS

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ABSTRACT

For any aircraft accident, the first suspected cause is weather until thorough investigations reveal the true cause. Indeed different weather events pose various hazards on aircrafts significantly. Since the commercialization of some of the services rendered by the South African Weather Services (SAWS) such as the aviation weather products, there is a greater need for SAWS aviation weather forecasters to deliver quality forecasts. It is therefore necessary to identify the most dangerous and most common weather hazards which are detrimental to the aviation industry so as to enhance the expertise on addressing them. With the aid of improved forecasting tools such as Meteosat Second Generation (MSG) which provides different images of clouds every fifteen minutes and Radar network which provides images every five minutes, it becomes much easier to identify dangerous clouds and give prior warning to the aviation industry.

Hence the purpose of this study is to determine the impact of different weather hazards which pose great threat on the aviation industry by looking at different aircrafts accidents which occurred in South Africa, Africa and abroad. A study has been conducted on different aircrafts accidents based on the monthly report which is being issued by the Aviation Weather Centre of SAWS in Johannesburg International Airport, Other aircrafts accidents reports received from aviation industries across the world. Case studies on different weather events using MSG satellite images, Radar images; forecasts issued in the form of TAF’s (Terminal Aerodrome forecasts) and Significant Weather charts issued; Weather warnings in the form of Sigmets and Airmets were analysed. Analyses of MSG cloud images were done using different colour combinations (RGB) were made and was found to be an excellent tool for now-casting and forecasting. Common causes of aircrafts accidents were identified; possible ways of avoiding them were suggested and conclusions were made.
1. INTRODUCTION

It is of great significance to identify and clarify the circumstances and the causes of any aircraft accident; this will help to avoid any similar accident in the future. Weather is regarded amongst others as one of the main cause of aircraft accidents and incidents. Different weather hazards such as Thunderstorms, Microburst from Thunderstorms, Mountain Wave turbulence, Clear air turbulence (CAT), Wind shear, Poor visibility and Fog, etc. have been the cause for numerous aircraft accidents and incidents. In some instances passengers were injured, some even lost their lives and some aircrafts suffered structural damages. CAT has been the cause of numerous incidents where commercial aircraft passengers have been injured and sometimes died (De Villiers1998).

MSG satellite view with RGB colour combinations is the most useful now-casting and forecasting tool for the operational and research forecasters. With RGB colour combinations it becomes much easier to detect severe thunderstorms, microburst, gravity waves and mountain waves, fog at night and early hours of the morning which was difficult to detect using Meteosat 7.

The summer of 2005 has been named the ‘Black Summer’ for aviation; this followed the several deadly air crashes for different airlines in which close to 500 people were killed from July 2005. (News24.com, 05 September 2005).

In his annual update on air show accidents worldwide, Des Barker has established that the year 2005 was the worst for more than a decade and that the accident rate worldwide has shown a definite increasing trend during the past five years (World Airnews, February 2006, Volume 33, No.12).

2. Weather as a Primary cause of aircrafts accidents

The single most important factor in general aviation flight safety is the decision of a pilot to begin or to continue with a flight in unsuitable weather conditions (The Safety Link, Vol.1 No. 5 • Nov/Dec 2001). The weather forecaster’s role is to advice the pilot about the prevailing and expected weather conditions en-route, but the decision to fly remains to the pilot based on his knowledge, understanding and experience.

Weather has been attributed to be a major factor in most fatal accidents: over 80% of Controlled Flight into Terrain (CFIT) accidents happened when the pilot either continued flying into adverse weather or did not appreciate the actual effects of the weather conditions (The Safety Link, Vol.1 No 5, Nov/Dec 2001)

Aircrafts accidents also impact financial on the aviation industry. In its financial year 2004/2005, the South African Civil Aviation Authority (SACAA) spent R6 million on accidents and incidents Investigations (SACAA Annual financial statement, 2005)

The financial implication of the weather on aircrafts accidents is a persisting problem even in fully developed countries. Weather is a factor in roughly 23% of all aviation accidents and annually costs the US an estimated $3 billion for accident damage and injuries, delays, and unexpected operating costs (Office of the Federal Coordinator for Meteorology, 1999, p.vii).
4. International Comparison

The table below indicates the comparative estimated fatal weather related accidents for the countries, South Africa, United States of America, United Kingdom, New Zealand and Canada. The highest number observed in the USA with New Zealand and South Africa respectively.

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<tr>
<th>Country</th>
<th>% Fatal</th>
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<tbody>
<tr>
<td>SA</td>
<td>11.40%</td>
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<tr>
<td>USA</td>
<td>19.70%</td>
</tr>
<tr>
<td>UK</td>
<td>5.40%</td>
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<tr>
<td>Australia</td>
<td>7.40%</td>
</tr>
<tr>
<td>New Zealand</td>
<td>14.20%</td>
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<tr>
<td>Canada</td>
<td>10%</td>
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Table 1: International Statistical Comparison of fatal accidents

5. Case Study

A case study has been conducted of an aircraft accident which occurred in the Johannesburg International Airport (JIA) which is one of the busiest airports in Africa. It is where the South African Aviation Weather Centre is based. It is regarded as the transport hub of Southern Africa because it caters for more than 13 million passengers a year, with an average of 800 aircraft movements a day (Moloto, 2005, unpublished).

The accident occurred on the 26th Feb 2004 at 17:05Z when an aircraft attempted to land at Johannesburg International Airport (JIA), in the vicinity of a thunderstorm. The forecaster on duty used the radar and MSG satellite images as forecasting and now-casting tools, the condition was not good for take off or landing purposes. The forecaster issued a warning for severe thunderstorm with a possibility of hail and microburst from the aviation weather forecasting office. The aircraft as it attempted to land, overshoot the runway and sustained serious damages which lead to the aircraft being written off and passengers were injured, but there was no fatalities reported.
According to the met report from the SA aviation weather centre, the prevailing weather condition at the airport was: severe thunderstorm, poor visibility, and microburst out flowing from the storm (SAWS met report). Radar and Satellite images were showing evidence of severe thunderstorm clouds (CB’s) in the vicinity. Significant amount of showers occurred between 1645Z and 1715Z, where 16.4mm was reported (JS 16/7/1 0226 Aircraft accident meteorological report).

The JIA METAR report for that day was: FAJS 261700Z 24010KT 210V270 3000 R03L/1400V1500D TSRA SCT020CB BKN070 18/15 Q1021 NOSIG=.

(See the Sat and Radar images attached below)

Figure1: Radar image for severe thunderstorm over Johannesburg International Airport
6. Conclusion

It can be realised that a significant number of weather related accidents might be avoided if weather forecasters may take full advantage of the now-casting tools such as MSG Satellite, many lives and a lot of money can be saved. Weather forecasters are working under pressure and as such there is not enough time for the forecaster on duty to make different RGB combinations, so it is recommended that developers may take their time and find out the most useful RGB Combinations for easy detection of severe weather, this may save a lot of time for the forecasters.

Continuous training and workshops on MSG satellite is required for operational forecasters. Visit view lectures are also offering a good platform for the operational forecasters. Good communication between Pilots and forecasters is also necessary, since forecasters are just advisers but not decision makers for the flight. Since weather does not stay constant, doesn't always do what the forecast predicts, and it can deteriorate very fast, therefore the now-casting tools are essential for early warning of prevailing bad weather. Everyone should respect weather and the implications for flight safety (The Safety Link, Vol.1 No 5, Nov/Dec 2001)
7. References


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