INTERNATIONAL CIVIL AVIATION ORGANISATION

AFI PLANNING AND IMPLEMENTATION REGIONAL GROUP (APIRG)

FIRST MEETING OF THE ATM/MET TASK FORCE (ATM/MET/1)
(Nairobi, 10 – 11 June 2013)

Agenda Item: 5 FUTURE WORK PROGRAMME

CURRENT METEOROLOGICAL APPLICATION AND LIMITATIONS.

(Presented by South Africa ATNS Central Airspace Management Unit (CAMU))

SUMMARY

This Information Paper Discusses current meteorological application and limitations within the ATNS CAMU to assist the Task Force with Future Plans.

Conclusion is at paragraph 3.

1. INTRODUCTION

1.1 The Effective management of air traffic during periods of convective weather avoidance is essential to ensure minimum disruption to the network. Convective clouds present a serious hazard to aviation. Aircraft entering a Cumulonimbus (Cb) cloud may experience severe turbulence, icing, lightning, precipitation (especially Hail), and strong winds (both vertical and horizontal). These hazards, individually and collectively can lead to structural damage, injuries to crew and passengers, loss of separation/level bust as a result of an inability to maintain assigned height, and loss of control.

1.2 Where possible, flight crews wish to avoid passing within 20 nm of a cumulonimbus cloud. Particularly intense Cbs, often associated with squall lines, may also present related phenomena such as Tornados, Gust Fronts, and Microbursts, all of which can have an impact on air traffic management and airport infrastructure.

1.3 Aircraft equipped with Weather Radar are able to identify the areas of cloud with the greatest vertical wind shear and navigate through (or if not possible around) areas of convective activity.
Controllers are aware that flight crew workload increases significantly in a weather avoidance scenario not just because of the decision making associated with weather avoidance but also because of Turbulence, management of In-Flight Icing, and increased communications. Particularly dense cells, or groups of cells, can attenuate radar and radio signals thereby causing loss of radar contact and poor quality or lost communications.

2. DISCUSSION

2.1 ATNS' Central Airspace Management Unit (CAMU) in Johannesburg works closely with the South African Weather Services (SAWS) and Air Traffic Services Units (ATSU) nationally to minimize disruptions caused by weather. The Task Force will be urged to discuss these procedures during close border operations as well

2.2 Air Traffic Flow Management Specialists (ATFMS) will adjust the number of aircraft movements per hour to match the operating conditions at each airport. Low Visibility Operations (LVO) is usually due to heavy dense fog and low cloud and occurs mostly during the early hours of the mornings.

2.3 During extended LVO periods, the disruption has a knock-on effect for the rest of the day as the airlines struggle to catch up. The problem is compounded as some flights do missed approaches, only to retry later and even reduce the arrival rates further. Thunderstorms and lightning strikes will also see aircraft re-routed around a storm cell or diverted. Ground operations at airports may also be stopped when thunderstorms are in the area.

2.4 ATNS CAMU does not have the authority or ability to close an airport. This decision can only be made by an airport operator, but would only occur in extreme weather circumstances. Weather, in particular, wind speed and direction, is generally the main factor in determining which runways are in use at an airport, in which direction aircraft will take off and land and which flight paths are used. Wind shear is a sudden change in wind direction or speed and is usually associated with thunderstorm activity. Wind shear can be either vertical or horizontal and can have a significant impact on the control of aircraft during take-off and landing. The CAMU relies on the National weather services for input which is used to make decisions on air traffic flow rates and periodically routings.

2.5 When air traffic is avoiding Cumulonimbus cells, particularly in congested airspace, the workload of the controller increases significantly and an Air Traffic Flow management solution is required. In such scenarios the increase in workload is caused by:

- **Non standard traffic flow** – the traffic flow is irregular and not easy to anticipate because of the changing intensity of cells, both vertically and horizontally, the situational awareness of the flight crew and routing decisions they take based on the display on their weather radar.
- **Reduction in available airspace** – controllers will have less airspace volume available for conflict resolution tasks with a consequent impact on sector capacity;
- **New conflict points** – new random crossing points are likely to occur as a result of the disrupted and non-standard traffic patterns;
- **Increased frequency occupancy time** – radio-communication is usually prolonged due to the necessity to clarify the details associated with the avoidance actions as well as revised onward routing clearances resulting in the usage of non standard Radio Telephony (RT).
- **Increased manual (telephone) coordination** – telephone coordination with adjacent sectors or ATSU is likely to increase due to the necessity to coordinate the details associated with the avoidance actions (change of routes and flight levels);
- **Rapidly changing situation** – isolated Cb cells can quickly evolve into a squall line and make navigation through the line of Cbs increasingly challenging for the pilots;
- **Degradation of RVSM capability** – convective weather conditions are associated with moderate to severe turbulence, hence it might be advisable to downgrade the RVSM airspace and introduce 2000 ft vertical separation in areas with reported severe turbulence;
- **Lack of information about traffic in own sector (not on frequency)** – situations may arise when traffic deviating from its planned/cleared flight route, due to bad weather, penetrates (or flies close to the boundary of) another sector's airspace without prior notification of the controller in charge of that sector who is not aware of crew's intentions;
- **Limited applicability of radar vectoring -** use of radar vectoring to resolve potential traffic conflicts might be limited due to crew inability to maintain the required headings. This is a very significant factor in busy environments where controllers rely heavily on radar vectoring to provide separation;

- **Airspace constraints** - ATC sector overloads can be aggravated by the combination of weather factors (majority of these are Cb-related) and airspace constraints in particular in busy TMAs. heavily on radar vectoring to provide separation;

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3. CONCLUSION

Closer collaboration is needed between weather services providers and Air Navigation Services Providers (ANSP) in order to achieve better results where forecasting is concerned which in turn has an effect on traffic flows. The Task Force should contribute to this process with inputs from all role players.

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