International Civil Aviation Organization

ICAO/WMO ASIA/PACIFIC METEOROLOGY/AIR TRAFFIC MANAGEMENT (MET/ATM) SEMINAR

Fukuoka, Japan, 24 – 26 January 2011

Discussion Topic 2: Meteorological impacts on ATM and MET information required for Air Traffic Flow Management:

2) Terminal Area – weather impact on capacity

IMPACT OF THE 23 SEPTEMBER 2009 SYDNEY DUST STORM

(Presented by Australia)

SUMMARY

On 23 September 2009 a significant, continental-scale dust storm over eastern Australia resulted in major impacts for ATM at a number of airports including Sydney, Australia's busiest international Airport.

1. INTRODUCTION

1.1 "In the week of 21 to 27 September 2009 Australia experienced two continental-scale dust storms, three days apart. The dust storms were high impact events causing a spectacular bright red haze and low visibility at dawn in Sydney and airport closures in both Sydney and Canberra." (Wain 2009).

1.2 From an aviation perspective, these events and consequent impacts on airport capacity resulted in hundreds of flight diversions, numerous flight cancellations and major air traffic management problems, and highlighted a number of dust storm detection, monitoring and forecasting issues.

1.3 This paper will briefly examine the MET and ATM information and impacts of the dust storm at Sydney Airport, which reduced horizontal visibility to between 1000 metres and 400 metres for at least 3 hours on the morning of 23 September 2009.

2. EVOLUTION OF THE DUST STORM

2.1 Dust storms are a relatively common feature of the Australian climate, especially over the dry interior of the continent and during cycles of drought.

2.2 Less frequently, significant winds such as those associated with strong cold fronts that penetrate far inland, combined with widespread antecedent drought conditions, cause dust storms to affect the high population zones around the coast. And on rare occasions, dust storms significantly impact ATM at one or more of Australia's major international airports.

2.3 The continental-scale dust storms in the week of 21 to 27 September 2009 were caused by a series of cold fronts with strong, dry post frontal winds that lifted dust from the interior of South Australia, a normally arid region that was parched by months of very much below average rainfall and record high temperature.

2.4 Strong winds (30-40 knots) drove the dust storms east across much of the continent causing significant reductions in the horizontal visibility reported at many locations including the major airports at Canberra (2000 metres, 22nd and 23rd), Sydney (400 metres, 23rd), Brisbane (200 metres, 23rd) and Cairns (4000 metres, 24th and 25th).

3. MET INFORMATION

3.1 Dust was reported continuously at Sydney Airport for approximately 9 hours from 4 am to 1 pm on the 23rd with dust storm conditions (horizontal visibility <= 1000 m) for 3 hours from 5:30 am to 8:30 am. Minimum reported visibility was 400 m at around 6 am.

3.2 Aerodrome forecasts issued for Sydney indicated strong, gusty winds (before and after a significant change in wind direction) and moderate to severe turbulence.
3.3 Blowing dust (BLDU) with visibility 3000 metres was included in the aerodrome forecast issued at 2:30 am giving approximately 2 hours forecast lead time for visibility conditions below 5000 m.

3.4 Blowing dust (BLDU) with visibility 1000 m was later included in the aerodrome forecast and the trend forecast, just after 5 am, providing minimal forecast lead time for visibility conditions 1000 m.

3.5 Dust storm (DS) was not included in the aerodrome forecast.

3.6 A low level SIGMET for heavy dust storm (visibility < 200 m) was valid covering a broad region just west of Sydney Airport for several hours prior and was updated to include areas further east (including Sydney Airport) just after 6 am.

3.7 An aerodrome warning for strong wind was issued for Sydney Airport but no aerodrome warning for dust storm was issued.

4. ATM IMPACTS

4.1 Based on the aerodrome weather forecast available 12-15 hours prior to 5 am on the 23rd, ATC would have planned an Airport Acceptance Rate (AAR) of 34/hour reducing to 24/hour – dependent on when the strong, gusty, cross winds actually commenced at the airport.

4.2 ATC does not run an Airport Departure Rate (ADR) program at Sydney.

4.3 During the dust storm the actual arrival rate varied between 14-18/hour.

4.4 ATC suggest that if the dust storm was predicted early with anticipated visibility below 800 m, which is the trigger point for Low Visibility Operations at Sydney Airport, the AAR would have been planned at 12-16/hour.

4.5 To best manage this type of event, ATC would require as much detail as possible, as far ahead as possible, however the critical forecast elements are the timing of onset (and cessation) and minimum visibility. This information would be used for contingency re-routing, re-calculation of AAR, re-run of the ground delay program, etc.

5. FUTURE DIRECTIONS

5.1 As indicated in the introduction, this event has highlighted a number of dust storm detection, monitoring and forecasting problems.

5.2 Issues concerning the criteria for reporting dust storm (and sand storm) are being addressed by the Aerodrome Meteorological Observation and Forecast Study Group and the Meteorological Warnings Study Group (see AMOFSG/9 and METWSG/3).

5.3 Some of the forecasting problems will be addressed through training and forecaster competency initiatives. The Bureau of Meteorology's Aeronautical Forecasters Handbook – chapter on Dust Storms (under development) – should provide forecasters with a resource to improve the Bureau's dust storm forecasting service.

6. ACTION BY THE MEETING

6.1 The meeting is invited to note the information provided in this paper.

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