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Discussion Topics 3: Use of meteorological information by ATM

AIR TRAFFIC METEOROLOGICAL CATEGORY FORECAST

(Presented by Japan)

SUMMARY

This paper introduces the "Air Traffic Meteorological category forecast（ATMet category forecast）" issued by Air Traffic Meteorology Center (ATMetC) for the Air Traffic Management Center (ATMC) of the Japan Civil Aviation Bureau (JCAB).

1. INTRODUCTION

1.1 The Air Traffic Meteorology Center (ATMetC) issues Air Traffic Meteorological category forecast（ATMet category forecast）to the Air Traffic Management Center (ATMC) of JCAB.

1.2 ATMet category forecast is a product for the purpose of supporting Air Traffic Management. ATMC gets informed of the weather conditions of airports and airspace, mainly through ATMet category forecast, and judges whether air traffic capacity should be changed (or not), and controls the air traffic flow, if necessary.

2. SPECIFICATION

2.1 The specification of ATMet category forecast is as follows.

Valid: 6 hour later (hourly)
Target areas: ATC sectors in the domestic airspace and 7 major airports
Update: By 15min every hour (except 14~16UTC）
Contents: Probability which weather conditions impact on air traffic management.

The Probability is shown in four ranks (no color, blue, yellow, red) with the abbreviation for weather element.

The classification is defined by various criteria of weather conditions.

- ATC Sector – CB, Turbulence
- Major Airports – Wind, Visibility, Snow fall rate ,,,etc

Inform: ATMC, some ATC centers, Airlines and aviation weather offices
Form: Form that can be easily understood by a person who doesn't know the weather in detail (refer to Figure1)

・Table format ・・・Notice in the ATMC operations room
・Tabular format ・・・Notice to the organization out of the ATMC
・Map-type format・・・Notice to the organization out of the ATMC

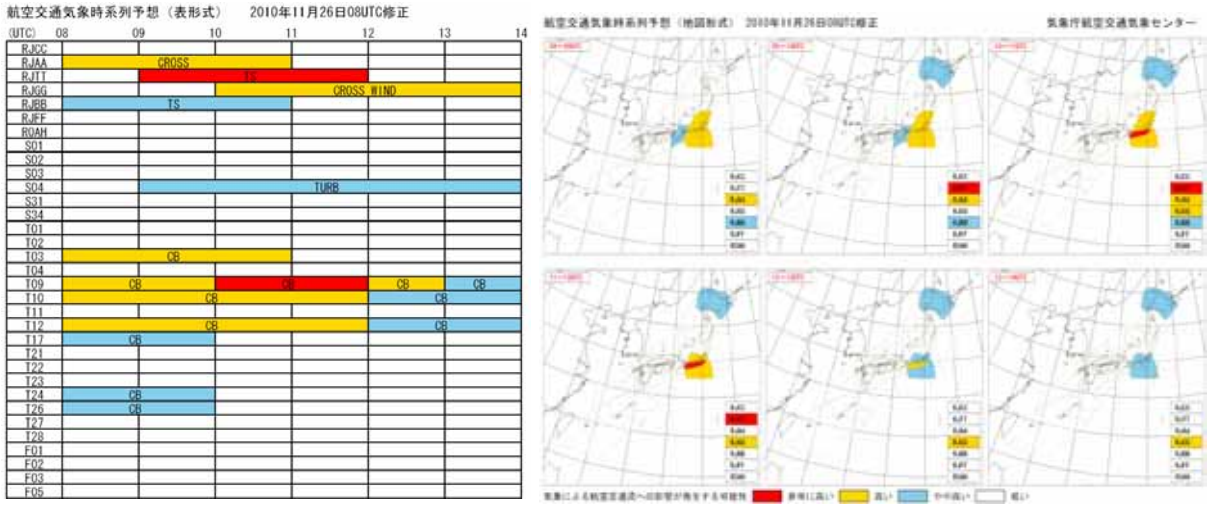

Figure 1. Air Traffic Meteorological category forecast (0800z 26 November 2010): tabular format (left), map-type format (right)

3. ATMet category forecast criteria

3.1 ATMet category forecast criteria (the weather conditions are converted into color code, refer to Table1) are decided by referring to investigations on the past significant weather cases, service rules of airlines and flight operations manuals, adjusting the opinion with ATM officers. The investigations on past significant weather cases are done by collating weather conditions with actual results of air traffic flow control.

3.2 In case main airways or rules of airports are revised by making an amendment to the AIP, the criteria are every time re-defined by adjusting the opinion with ATM officers.

3.3 Detailed example of ATMet category forecast criteria:

（1）Airport

a: red color

element	weather conditions	impact for ATFM
Wind	wind speed ≥ 40kt	The impact for takeoff and landing is large
	crosswind component to runway ≥ 30kt	Takeoff and landing are restricted by aircraft service regulations
	crosswind component to runway ≥ 25kt and moderate or heavy precipitation	When runway condition is wet, takeoff and landing are restricted by aircraft service regulations
Thunder Storm(TS)	TS OHD at the airport.	The possibility of go-around or holding rises extremely.

b: yellow color

element	weather conditions	impact for ATFM
Wind	wind speed ≥ 34kt with gust ≥ 50kt	The possibility of go-around rises.
	crosswind component to runway ≥ 25kt	When runway condition is dry, the possibility of go-around and abort a takeoff rises.
	crosswind component to runway ≥ 20kt and moderate or heavy precipitation	When runway condition is wet, the possibility of go-around and abort a takeoff rises.
TS	TS	The possibility of go-around or holding rises.

c: blue color

element	weather conditions	impact for ATFM
TS	TS in TAF but CB doesn't exist around aerodrome	The aircraft approaching the airport may deviate from the standard course.

Additionally, the criteria of visibility, ceiling and snow are set according to the characteristics - weather, climate or approach procedures etc. - of the airport (refer to table 1).

（2）Sector

a: red color

element	weather conditions	impact for ATFM
CB	The proportion occupied with CB (top≥FL300) in the sector ≥ 50%	Because of the air route adjustment before the airplane depart, the possibility of the air traffic flow disturbance is very high.

b: yellow color

element	weather conditions	impact for ATFM
CB	CB exists on the selected air ways or selected area	If CB exists on the selected airways, many aircrafts may deviate or change the route.
	The proportion occupied with CB (top≥FL300) in the sector ≥ 20%	The possibility of the air traffic flow disturbance is high, because of deviation or altitude change, and so on.

c: blue color

element	weather conditions	impact for ATFM
CB	The proportion occupied with CB (top≥FL300) in the sector ≥10%	The possibility of the air traffic flow disturbance is a little high because of deviation.
Turbulence	moderate to severe turbulence is forecasted above FL180 in the sector	The possibility of the air traffic flow disturbance is a little high because of altitude change.

4. OPERATION

4.1 The automation of the task

There are numerous criteria to check. It is difficult to do all the task by hand, in limited time. So we utilize a system that automatically checks the criteria against weather conditions, which are predicted by numerical weather prediction and Aerodrome sequential forecast issued at airports. Nevertheless, not all the criteria are checked automatically. Elements that could be checked automatically referring to Aerodrome sequential forecast is about 70% of all the criteria.

Elements that could be checked automatically referring to numerical weather prediction is about 5% of the entire criteria. In the actual operation we shall examine both elements that are checked automatically, and operated by hand by referring to various numerical weather prediction data and observation data.

4.2 Flow of task

The flow of task to make the ATMet category forecast is as follows.

1) Comes the data which are checked automatically by Aerodrome sequential forecast or numerical weather prediction on about 50min every hour.

2) Start the application.

3) Examine whether to adopt the elements which are checked automatically by Aerodrome sequential forecast or not.

4) Examine whether to adopt the elements which are checked automatically by numerical weather prediction or not and examine the elements which are checked by hand.

5) Issue until 15min every hour (except 14~16UTC)

4.3 Image of application

The image of application is shown on Figure2. The right side of the screen is checked by Aerodrome sequential forecast and numerical weather prediction. Elements issued previously remain on the left screen. If the forecast doesn't change, the officer has only to deal with the one hour that is added newly. The officer inputs the result of the examination on the left screen.

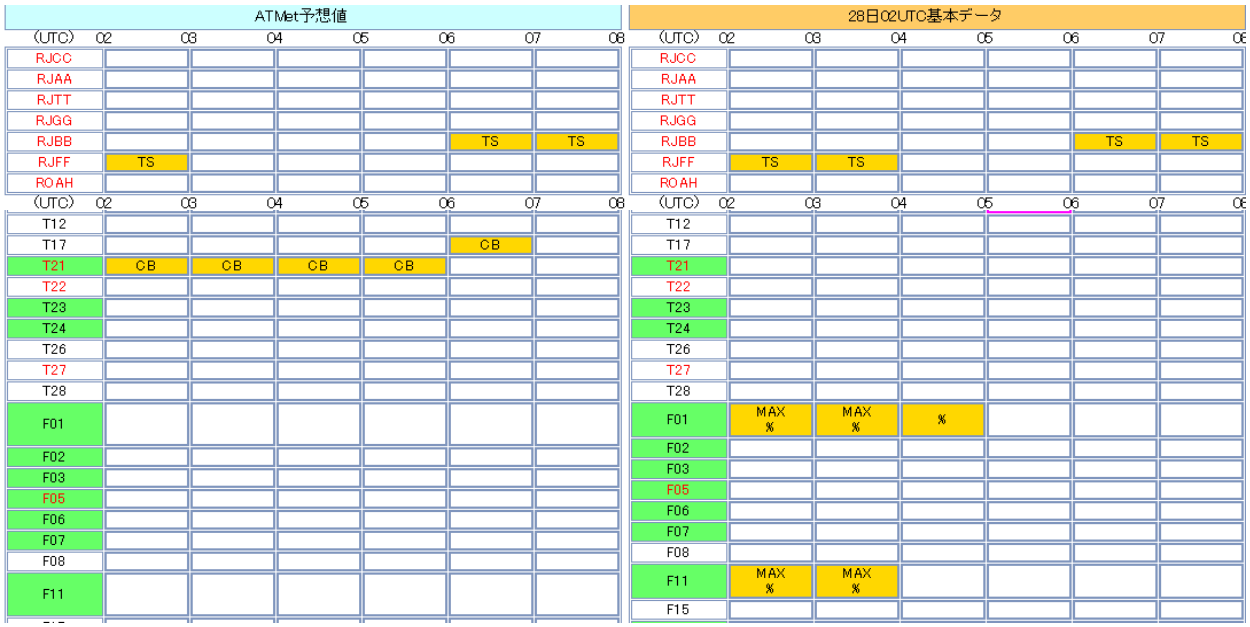

Figure 2. The image of application which makes the ATMet category forecast
Left side: input by the officer.
Right side: checked automatically by Aerodrome sequential forecast and numerical weather prediction

5. OUTLOOK

The outlook of the ATMet category forecast is as follows.

- To be free from human subjectivity, it is ideal that all weather conditions can be checked automatically by Aerodrome sequential forecast or numerical weather prediction.

- There is a problem of how to determine ATMet forecast criteria for airports that have little traffic to be managed.

  In the following airports - RJGG, RJBB, RJFF, ROAH - the amount of air traffic to be managed is little, so the same criteria as RJAA are applied.

Table1. The criteria for ATM et category forecast. The weather conditions are converted into colbr code.

colbr code \ target area	RJTT	RJAA	RJGG	RJBB	RJFF	ROAH	RJCC	ATC SECTOR
RED	wind speed ≧ 40kt							
	crosswind component to runway ≧ 30kt							
	crosswind component to runway ≧ 25kt with moderate or heavy precipitation							
	visibility < 600m	visibility < 400m					visibility < 800m with snow	the proportion occupied with CB (top ≧ FL300) in the sector ≧ 50%
	ceiling < 200ft						ceiling < 400ft with snow	
							blowing snow	
	TSOHD							
	snow fall rate ≧ 1cm/1h						snow fall rate ≧ 5cm/3h	
	wind speed at surface ≧ 30kt and wind speed below 5000ft ≧ 60kt	wind speed below 3000ft ≧ 60kt					snow fall rate ≧ 2cm/3h when wind direction 120~240°	
YELLOW	wind speed ≧ 34kt with gust ≧ 50kt							CB exists on selected airway or on selected area
	crosswind component to runway ≧ 25kt							
	crosswind component to runway ≧ 20kt with moderate or heavy precipitation							the proportion occupied with CB (top ≧ FL300) in the sector ≧ 20%
	wind speed at surface ≧ 30kt and wind speed below 5000ft ≧ 50kt	wind speed below 3000ft ≧ 50kt						
			TS					
			ceiling < 200ft				visibility < 400m	
	moderate or heavy snow						visibility < 1600m with snow	
	CB in HANEDA sector	CB in NARITA sector					ceiling < 600ft with snow	
							snow fall rate ≧ 3cm/3h when wind direction 250~110°	
BLUE	TS in TAF but CB doesn't exist in the aerodrome							the proportion occupied with CB (top ≧ FL300) in the sector ≧ 10%
							wind speed ≧ 20kt with snow	
							ceiling < 200ft	moderate to severe turbulence above FL180