



International Civil Aviation Organization

**ICAO ASIA/PAC METEOROLOGY / AIR TRAFFIC MANAGEMENT
(MET/ATM) SEMINAR**

29 June – 1 July 2015, Tokyo, Japan

Agenda Item 3 : ATM-tailored meteorological services

**AERONAUTICAL METEOROLOGICAL SERVICE PROVISION IN SUPPORT OF
FUTURE ONE SKY CONCEPT AND
THE WMO AVIATION RESEARCH DEMONSTRATION PROJECT INITIATIVE**

(Presented by Hong Kong, China)

SUMMARY

ICAO endorsed the new (fourth) edition of the Global Air Navigation Plan (GANP) in 2013 and the associated Aviation System Block Upgrades (ASBU) methodology to enhance the safety and efficiency in the next 15+ years. The ICAO Meteorology Divisional Meeting (2014) (MET/14) held in Montreal from 7 to 18 July 2014 discussed the new or improved aeronautical meteorological (MET) services under the ASBU methodology. In line with the working arrangements between ICAO and the World Meteorological Organization (WMO), WMO will undertake an Aviation Research Demonstration Project (AvRDP) initiative to demonstrate the capability of nowcasting and mesoscale modelling techniques in support of ASBU.

This paper relates to –

Strategic Objectives:

- A: **Safety** – Enhance global civil aviation safety
- C: **Environmental Protection and Sustainable Development of Air Transport** – Foster harmonized and economically viable development of international civil aviation that does not unduly harm the environment

Global Plan Initiatives:

- GPI-6 Air traffic flow management
- GPI-9 Situational awareness
- GPI-16 Decision support systems and alerting systems
- GPI-19 Meteorological Systems

1. Introduction

1.1 The ICAO Meteorology Divisional Meeting (2014) (MET/14) was held in part conjointly with the Fifteenth Session of the Commission for Aeronautical Meteorology (CAeM) of the World Meteorological Organization (WMO) from 7 to 18 July 2014 to map out an upgrade plan of aeronautical meteorology (MET) for the next 15 years or more. Noting that MET will be a key enabler to the realization of “One Sky” concept and the emerging information needs of the air traffic

management (ATM) systems, some States have already embarked on MET enhancement projects in collaboration with ATM community, e.g. SESAR, NextGen and CARATS.

1.2 Apart from these State and regional efforts to enhance the MET services, WMO will undertake an initiative to demonstrate the benefits of MET services beyond existing ICAO Annex 3 requirements in support of the development of the next generation aviation initiative as per the Working Arrangements between ICAO and WMO. This paper presents the Aviation Research Demonstration Project (AvRDP) initiative and invites support from the ATM community, airlines and pilots in validation and evaluation of these new services.

2. Discussion

2.1 In line with the new (fourth) edition of the Global Air Navigation Plan (GANP) approved by ICAO Council in 2013 and the associated Aviation System Block Upgrades (ASBU) methodology, the overarching outcome of MET/14 is that the future development of MET services shall be fully aligned and integrated into the future ATM system.

2.2 With growing air traffic and further development of the aviation industry, the impact of adverse weather in the terminal area on its operation is becoming more serious. Noting that weather forecast products for the terminal area would be highly effective in meeting the pressing need from air navigation services provider (ANSP), pilots and other ATM users, some States have developed some experimental/operational MET products with a view to filling the gap between TAF and en-route forecast and providing better services to support ATM. For example, the Hong Kong Observatory (HKO), as the MET authority of Hong Kong, China has developed a suite of significant convection forecast products to support air traffic flow management. The traditional convection nowcasting product has been translated into various impact levels on aircraft operation for ATFM to forecast the airport and airspace capacity (MET/R TF/3 – WP/07).

2.3 MET/14 meeting recommended that ICAO, in close collaboration with WMO, be tasked to include meteorological service for the terminal area and other relevant operational requirements in ASBU methodology; to develop ATM-tailored meteorological service for the terminal area to meet future ATM requirements; and to develop guidance on verification methodology toward the continuous improvement of meteorological information to ATM.

2.4 To support the development effort, the WMO Commission for Aeronautical Meteorology (CAeM) and its sister commissions are jointly taking forward AvRDP which has been endorsed and being implemented under the leadership of HKO. The purpose of the AvRDP includes consolidation of efforts by a number of States such as Canada, China, France, Hong Kong, China and South Africa in developing new aviation meteorological products for terminal area; demonstration of the capability of the latest forecasting techniques in support of the development of the next generation aviation initiative under GANP; and provision of a more systematic assessment of the benefits to the aviation community.

2.5 To cater for different high impact weather at different locale, projects would be conducted at a number of airports with high air density over different parts of the world with different climatological conditions. Currently, the following airports participate in the Project: Charles de Gaulle Airport (CDG), Hong Kong International Airport (HKG), O.R. Tambo International Airport (JNB), Shanghai Hongqiao Airport (SHA) and Toronto Pearson International Airport (YYZ) (Figure 1). The AvRDP will be conducted in 2 phases. Phase I will be conducted from summer 2015 till summer 2017 and focus mainly on the scientific aspect. This will be followed by Phase II from summer 2016 till summer 2018 which will focus on the MET/ATM integration and operational issues.

An International Symposium on Nowcasting and Very-short-range Forecast (WSN16) with an aviation theme will also be held in Hong Kong in the summer of 2016 to share the experience gained. A tentative Implementation Plan of AvRDP is provided in Table 1 for information.

2.6 An important element of the project is the final integration of the initiative into an operational component to enhance service delivery following a successful demonstration of capability. As such, the AvRDP will also look into operational issues including inter alia the translation of MET forecast into aviation impact and its validation, the integration of MET information into ATM operation/decision and quantification of the benefits of the new MET information from ATM perspective. As the expertise required extends beyond that of MET, for the success implementation of AvRDP and the realization of its benefits, close collaboration between the MET and ATM community would be required. The experience precipitated from AvRDP would then serve as the basis for defining the ATM-tailored MET service for the terminal area to meet future ATM requirements and shared with other States through technology transfer.

2.7 Support from ATM community, airlines and pilots, in particular in the form of advices in the evaluation methodology and the provision of necessary ATM and flight data for evaluation and validation, would be the key for the success of the AvRDP which will help the MET and ATM community as a whole to face the future challenges and to harness the opportunities to deliver better services to the aviation industry in the decades to come. For more information about the AvRDP, the meeting can contact Dr Peter Ping-wah LI, pwli@hko.gov.hk, the lead of the Project.

3. Action by the Meeting

3.1 The meeting is invited to:

- (a) note the information contained in this Paper;
- (b) lend its support to the AvRDP initiative;
- (c) provide suggestions to the evaluation methodology;
- (d) consider attendance at WSN16; and
- (e) consider ways to promote the close collaboration between the ATM and MET community.


AvRDP Airport		Climatological regime	Weather elements to be studied in AvRDP
Charles de Gaulle Airport (CDG) 	Mid-latitude in Northern Hemisphere Location: Inland	Winter weather - snowfall, icing, low temperature Fog	
Hong Kong International Airport (HKG) 	Subtropical in Northern Hemisphere Location: Surrounded by water Next to high mountain	Convection and Thunderstorm Low visibility and ceiling	
O.R. Tambo International Airport (Johannesburg Airport) (JNB) 	Subtropical in Southern Hemisphere Location: Inland	Convection Fog	
Shanghai Hongqiao Airport (SHA) 	Subtropical/mid-latitude in Northern Hemisphere Location: Inland not far away from River Estuary and East China Sea	Convective weather	
Toronto Pearson International Airport (YYZ) 	Mid-latitude in Northern Hemisphere Location: Inland but not far away from Lake	Winter weather - snowfall, icing, low temperature, precipitation type and amount, visibility, wind speed, direction shear, and gust, turbulence, and low ceilings	

Figure 1: AvRDP participating airports and the weather elements to be studied

Time	Description
Nov 2014	Endorsement of the AvRDP proposal
Nov 2014 – Feb 2015	Formation of AvRDP Science Steering Committee (SSC) and identification of AvRDP Participants
Jun 2015	Kick-off Meeting cum Science Meeting
May 2015 – Jul 2015	Phase I – MET capacity research (AvRDP Airports or Participants who need longer preparation time may choose to enter Phase I in late 2015 or after)
May 2015 – Oct 2015	1 st intensive observation period (IOP) for convective weather (over Airports in Northern Hemisphere)
Nov 2015 – Mar 2016	1 st IOP for winter weather, visibility and ceiling (over Airports in Northern Hemisphere)
Dec 2015 – Mar 2016	2 nd IOP for convective weather (Southern Hemisphere)
May 2016 – Jul 2016	3 rd IOP for convective weather (Northern Hemisphere)
Nov 2016 – Mar 2017	2 nd IOP for winter weather, visibility and ceiling (Northern Hemisphere)
May 2015 – Jul 2017	Nowcasting research including MET verification on convective weather
Nov 2015 – Jul 2017	Nowcasting research including MET verification on winter weather, visibility and ceiling
Aug 2016 (tentative)	Preliminary Phase I results to be presented in World Weather Research Programme (WWRP) Symposium on Nowcasting and Very-short-range Forecast (WSN16)
Aug 2016 (tentative)	AvRDP Training Workshop on aviation nowcasting and verification
Jul 2017	Concluding Meeting on Phase I
Jul 2016 – Jun 2018	Phase II – MET-ATM impact translation and validation (AvRDP Airports or Participants who started the IOP in late 2015 or later may choose to enter Phase II in late 2016)
Jul 2016 – Jun 2017	Research on MET-ATM impact translation
Jul 2017 – Jun 2018	Research and demonstration on validation of MET-ATM impact
Jul 2018 (tentative)	AvRDP Training Workshop on MET-ATM integration and validation
Jun 2018	Concluding Meeting on Phase II

Table 1: Implementation Plan of AvRDP (tentative)