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

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Agenda Item 1: Review of MET and ATM coordination in States

**RECENT ACTIVITIES ON AERONAUTICAL METEOROLOGY IN THE CARATS
PROJECT OF JAPAN**

(Presented by Japan)

SUMMARY

This paper presents overview of the long-term vision for the future air traffic systems in Japan (CARATS) and recent activities of the CARATS related to aeronautical meteorology.

1. Introduction

1.1 Amid an anticipated global increase in air traffic demand, especially in the Asia-Pacific region, Japan expects air traffic volume to increase in the long term with improvement of hub airports in metropolitan areas, economic progress of neighboring states, promotion of tourism-based country and growth of low-cost carriers (LCCs). However, under the current air traffic systems, it is estimated that the number of aircraft will exceed the limit of air traffic control capacity by 2025.

1.2 Therefore, Japan Civil Aviation Bureau (JCAB) established “Study Group for the Future Air Traffic Systems” in 2009 to deal with increasing air traffic flow and to meet the various needs from operators and users with realizing efficient services and further improvement of aircraft safety, and the long-term vision for the future air traffic systems, called “Collaborative Actions for the Renovation of Air Traffic Systems” (CARATS), was developed in 2010.

2. CARATS overview and the activities relating aeronautical meteorology

2.1 JCAB established Committee for Promoting Renovation of the Air Traffic System consist of industry, academia and government, to improve the air traffic system in accordance with CARATS and its roadmap (initially developed in 2011).

2.2 Under the committee, there are four working groups (ATM, PBN, MET, and Information Management) and relevant ad-hoc groups and sub groups. The groups carry out collaborative activities between airlines, research institutes, manufacturers, JCAB, Japan Meteorological Agency (JMA) and other government organizations, and are required assessment with cost-benefit analysis before the implementation of each measure.

2.3 CARATS has seven objectives and specific numerical targets toward 2025 as below.

- 1) Enhancing safety (Increase safety level by 5 times)
- 2) Responding to the increase in air traffic volume (Double the air traffic control capacity in congested airspace)
- 3) Improving user conveniences (Improve services level by 10%)
- 4) Improving operational efficiency (Reduce fuel consumption per flight by 10%)
- 5) Improving productivity of air traffics services (Improve productivity of air traffic services by 50% or more)
- 6) Responding to environmental issues (Reduce CO2 emissions per flight by 10%)
- 7) Enhancing the international presence of Japan in the aviation field

2.4 One of the main directions of renovation in CARATS is to migrate from traditional airspace-based ATM operations to strategic trajectory-based ATM operations, which will minimize operational restrictions, optimize performance of whole air traffic and realize flexible and efficient flights.

2.5 The roadmap of CARATS includes measures related to operational improvements (OIs) and supporting technologies (enablers (ENs)). The measures relating aeronautical meteorology are as below.

- 1) Improved weather observation capabilities
 - Provision of weather observation information to aircraft via data uplink system
 - Integration of weather observation data around aerodrome and air spaces
- 2) Improved weather forecast capabilities
 - Development of NWP model with high frequency and resolution
 - Expansion of forecast elements
- 3) Quantification of the impact of severe weather on capacity and other aircraft operations
 - Estimation of impact on ATM using MET information
 - Translation from MET data to airport/airspace capacity
- 4) MET information sharing infrastructure
 - Sharing of weather information with standardized format on SWIM environment
 - Development of Common Meteorological Database which includes weather observation and forecast information

2.6 The examples of recent activities on aeronautical meteorology in CARATS are shown in the following.

- 1) Development of information system to inform aircraft of wind information along taking off and landing path calculated from observation data of Doppler RADAR and LIDAR
- 2) Development of NWP model with high frequency (24 times/day) and high resolution (2-km horizontal grid)

2.7 The measures relating aeronautical meteorology are effective for a number of OIs such as flexible airspace operation, high density of operations, and cooperative trajectory generation.

3. Summary

3.1 In the CARATS project of Japan, renovation of Air Traffic System has been discussed among various stakeholders, such as government organizations, research institutes, manufacturers and airlines.

3.2 The measures relating aeronautical meteorology will be effective to address increase of air traffic, to improve safety and efficiency on aircraft operations, and to realize Trajectory-based Operation (TBO) which is one of the main directions of renovation in CARATS.
