Overview of “CARATS” and Recent activities related to aeronautical meteorology
Consideration of long-term vision

• 2009～2010  Development of long-term vision
  – Establishment of “Study group for Promoting Renovation of the Air Traffic System”
  – Development and promulgation of “Collaborative Actions for Renovation of Air Traffic Systems” (CARATS)

• 2010～2011  Development of roadmap for each measures
  – Establishment of “Committee for Promoting Renovation of the Air Traffic System”
  – Consideration of concrete measures and development of roadmap

• 2011～ Implementation Phase
There are four working groups (ATM, PBN, MET and IM) and relevant ad-hoc groups and sub groups.

All of the groups carry out collaborative activities between airlines, research institutes, manufactures, JCAB, JMA and other government organizations.

Assessments with cost-benefit analysis are required before implementation of each measure.
Objectives of CARATS and Development of performance indicators

Development of indicators for checking the status of implementation of the CARATS measures
Progressing CARATS measures steadily and monitoring and analyzing them continuously

<table>
<thead>
<tr>
<th>Objective and Numerical target</th>
<th>Outline of indicator</th>
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<tbody>
<tr>
<td><strong>1 Enhancing safety</strong></td>
<td>The number of aircraft accident and important incident resulting from ATC (the average number for the past five years)</td>
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<tr>
<td>(Increase safety level by 5 times)</td>
<td>Name: the number of aircraft accident and important incident resulting from ATC (the average number for the past five years)</td>
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<tr>
<td><strong>2 Responding to the increase in air traffic volume</strong></td>
<td>(Under consideration)</td>
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<tr>
<td>(Double the air traffic control capacity in congested airspace)</td>
<td><strong>Punctuality:</strong> The rate of the arrival delay flights exceeding 15 minutes</td>
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<td><strong>3 Improving user conveniences</strong></td>
<td>Actual operation rate: The flight cancellation rate by the influence of the whether (the average rate for the past three years)</td>
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<td>(Improve services level by 10%)</td>
<td>Rapidness: Flight time of Gate-to-Gate of main routes.</td>
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<td><strong>4 Improving operational efficiency</strong></td>
<td>The amount of the fuel consumption per flight in main routes</td>
</tr>
<tr>
<td>(Reduce fuel consumption per flight by 10%)</td>
<td>The flight plan operation number of each air traffic controller</td>
</tr>
<tr>
<td><strong>5 Improving productivity of air traffics services</strong></td>
<td>The flight plan operation number to the maintenance expense (the average number for the past three years)</td>
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<tr>
<td>(Improve productivity of air traffic services by 50% or more)</td>
<td>The amount of the CO2 emissions per flight in main routes</td>
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<tr>
<td><strong>6 Responding to environmental issues</strong></td>
<td>(Qualitative objective)</td>
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<tr>
<td>(Reduce CO2 emissions per flight by 10%)</td>
<td>Name: the amount of the CO2 emissions per flight in main routes</td>
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</table>
1. Realizing Trajectory-based Operation (TBO)

- Fly regularly on a pre-coordinated trajectory from departure to arrival
- Accurate time-based management

2. Improving Predictability

- The calculation of air traffic control capacity
- Estimation of traffic flow
- Improving predictability of meteorological phenomena

3. Promoting Performance-based Operation (PBO)

- Cooperation between ground and air
- Information sharing

4. Realizing Satellite-based Navigation for All Flight Phases

- Aircraft can determine position and time accurately in all FIR of Japan by Satellite-based navigation

5. Enhancing Situational Awareness on the Ground and in the Air

- Integrated ATC processing system

6. Making Maximum Use of the Capability of Human Beings and Machines

- Complete information-sharing and Collaborative Decision-Making

7. Complete information-sharing and Collaborative Decision-Making

Direction of renovation in CARATS
Measures of aviation weather in CARATS

CARATS RoadMap

operational improvements: OI (improve operation)
enablers: EN (technology for enabling OI)

Measures of aviation weather

ALL Measures of aviation weather are enablers (EN)

Improved weather observation capabilities

- Provision of weather observation information to aircraft via data uplink system
- Integration of observation data around aerodrome and air spaces

Improved weather forecast capabilities

- Development of NWP model with high frequency and resolution
- Expansion of forecast elements

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

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
Examples of the recent activities on MET in CARATS

Improved weather observation capabilities

Graphical information
- Doppler RADAR
- Doppler LIDAR

Text-based information for aircraft
- ACARS system

Graphical information for operators
- Operation system
- Airlines
Examples of the recent activities on MET in CARATS

Improved weather forecast capabilities

Development of high resolution NWP model

Probabilistic forecast using NWP

Use of aircraft data via data-link

※DAPs : Downlink Aircraft Parameters
Examples of the recent activities on MET in CARATS

**MET integration into ATM decision support system**

Current ATMet Category Forecast

Advanced product using Himawari-8