Outcomes from MET-ATM Seminar 2023

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Introduction

Key objectives of the seminar:

- An opportunity for States and Organizations to share information, experiences and ideas on planning and implementing meteorological services to support ATM and ATFM operations

- An opportunity to focus on collaborative arrangements and the integration of MET information into ATM.

Session 1: ICAO Provisions

Framework of ICAO provisions supporting the integration of MET information into ATM

SP/01: Development of future aeronautical meteorological services to better meet ATM requirements

SP/02: ICAO Annex 3 Amendment

SP/03: MET Requirements in Regional Framework for Collaborative ATFM

SP/01:

Key areas of work Global ICAO Perspective:

- Annex 3 and PANS-MET - development and implementation
- Trajectory-based operations support / ASBU support
- IWXXM and SWIM development and implementation
- World Area Forecast system (WAFS) - further development
- Space weather information service - implementation and further development
- Volcanic ash information service - further development (IAVW)
- Hazardous Weather information service - concepts and development of HWIS
- Cost recovery and governance work – SWX cost recovery guidance, etc

- Further development on Quantitively Volcanic ash information service
- HWIS- concepts developments in process with initial draft of SARPS in Nov 2029 (Annex 3 AMD 82)
- Space Weather cost recovery guidance being developed
- Digitalization of Meteorological information - Removal of legacy TAC format by using IWXXM and grids, allow further MET information exchange in IWXXM – planned in 2029
- Migration from “product-centric” to “information-based” environment - Future MET integration into ATM decision making to be developed in close coordination with ATM-related Panels.
- **Future work** - Addressing additional requirements for MET information for aerodrome domain, Ultra long-haul/High altitude flight support and High altitude Ice Crystal information, Aircraft De-icing support

SP/02

State letter Ref.: AN 10/1-23/1, 26 January 2023 defining the following

- Restructured Annex 3 and new PANS-MET
- Further development of Space weather information services
- Updates to Quantitative volcanic ash information and IAVW
- Further development of IWXXM
- Further developments of WAFS
- Improved definition of meteorological authority and met service provider

Comments not later than 26 July 2023 with the applicability – 28 November 2024

Referred to State letter Ref.: AN 2/36-23/6, 13 February 2023 defining the following

- Proposed amendment related to system-wide information management and information security
  - referring to Manuals under development (to be published before the envisaged applicability date)

Comments no later than 14 August 2023 with applicability – 28 November 2024

SP/03:

- Development of Framework Version 4.0, including Asia/Pacific Seamless ATM Plan 2019 update, Doc 9971, Regional ATFM framework.
- MET Requirements in Regional ATFM Framework Version 4.0 -
  - MET Information supporting enhanced efficiency and safety
  - Enhanced operational decisions through integrated MET information (planning and near-term services)
  - Integrated meteorological observation information in support of enhanced operational ground and air decision- making processes, for all flight phases and corresponding air traffic control operations, allowing gate-to-gate seamless operations.

SP/03:

- Doc 9971 - weather is one of the key components in
  - Determining Airport Capacity
  - Determining Enroute Capacity
- MET Products for ATFM -
  - Requirement for including MET information and services in Post Operations Analysis
  - Reference to APAC- Regional Guidance for Tailored MET Information to Support ATM
  - Emphasis on accuracy of pre- tactical and tactical demand and capacity assessment is reliant on predictability of events that will impact capacity (e.g. Met)

SP/03:

- Future expectation - For system-to-system interoperability.
  - Highlighted the importance of Met information, especially for Cross Border ATFM
    - Airport and terminal Area; Airspace; and Weather Forecast for seasonal MET phenomenon (Typhoons, Monsoon, Fog..)

Session 2: Collaboration within States:

Benefits and challenges of collaboration between MET and ATM communities and integrating MET information within States' ATM systems

SP/04: Improvement of impact-based MET INFO to support ATM operations (Adverse Weather in Airspace)

SP/05: Diurnal wind variation study for runway capacity optimisation at HK Airport

SP/06: 3-hourly updates to TAF for Hong Kong Airport

SP/07: Met support for operations of runway condition report system

SP/08: Survey of State MET INFO supporting ATM

SP/04 - Improvement of impact-based MET INFO to support ATM operations (Adverse Weather in Airspace

- Target phenomena:
  - Airports: Thunderstorm, Visibility, Ceiling, Wind, etc.
  - Approach control area: CBs, Convective clouds and Wind
  - ATC sectors: CBs, Convective clouds
- Methodology:
  - Procedure of creating category forecast;
  - Improvement of CB detection for color-coding – based on the request from JCAB:
    - ✓ More focus on high traffic volume area for appropriate estimation of impacts on ATFM
    - ✓ Earlier notification of expected convective clouds' impact
  - Improvement of the product in coordination with JCAB through
  - Create sample criteria → Provide trial product→ Review by JCAB → Implementation

- Additional criteria:
  - 2 altitudes selected for the trial FL300 and FL240;
  - Based on the correlation of CB coverage and frequency of ATFM measures or deviation
  - Reviews provided by ATM officer
- Challenges in assessing forecast of adverse weather impact on ATFM
  - CB coverage does not necessarily correspond to ATC capacity
  - ATC capacity is not determined only by meteorological condition
  - Detour of CB area in other ATC sectors can cause reduction of airspace capacity.
  - How could we measure the “impact of adverse weather” on air traffic flow?
- Future work:
  - Evolve the current product to be suitable for the future operations.
  - Calculate degree of impacts of adverse weather - more dynamic, flexible and phenomenon based
  - Integration of adverse weather distributions and trajectories

SP/05 - Diurnal Wind Variation Study for Runway Capacity Optimization at HKIA

- As highlighted in the ICAO Regional Framework, close collaboration between ATM & MET units essential in all phases of ATFM –
  - the seminar was informed of the runway capacity optimization efforts and its tangible benefits achieved through collaboration between the Hong Kong Civil Aviation Department and Hong Kong Observatory.

- Historical daily wind data from anemometers located at various locations - identify the hours in a day when runway change is most likely to happen and placing the firebreaks at the right position to optimize operational efficiency and minimize traffic delay

  .

- Inserting firebreaks at appropriate intervals of the winter 2022 and summer 2023 schedule, which tied in with the wind change patterns and corresponded with higher runway change probability,

SP/05 - Diurnal Wind Variation Study for Runway Capacity Optimization at HKIA

- Operational benefits:
  - The delay minimized by adjusting the schedule strategically is tangible
  - Highlight the importance of collaboration between ANSP and MET agency

SP/06 - Three-hourly Updates of TAF for Hong Kong International Airport

- 3-hourly TAFs was developed based on the feedback from the airline operators and pilots through customer surveys and liaison group meetings to boost capacity of VHHH and facilitate flight planning.
- 3-hourly update of TAF was provided by other States also, such as Australia, Canada,
- New Zealand, Switzerland and the USA. In India, 3-hourly 9 Hours TAFs are issued to capture similar requirements
- First official 3-hourly TAF at VHHH was issued for 03Z on 8 September 2022.
- Benefits include ability to provide subtle changes;
  - provide an ability to provide re-assessment of rapidly changing weather;
  - ability to forecast of high-impact weather in TAF has indications of the weather conditions in the vicinity, including the arrival and departure corridors;
  - provide an ability to ATFM unit will be able to implement or lift flow control with better estimation in capacity and precision in time

SP/06 - Three-hourly Updates of TAF for Hong Kong International Airport

- Minimize impact of adverse weather brought to air traffic
- Airlines can make use of more updated TAF for pre-flight and in-flight planning
- Various examples were presented to validate the benefits.
- It was noted by Australia that implementing 3 hourly TAF has caused a lot of challenges and one of them were identified as increased workload for ATC as they had to broadcast the changes in TAFs more often.

SP/07 - MET Support for the Runway Condition Report System

- ICAO Doc 9981-
  assessing and reporting the runway condition is necessary in order to provide the flight crew with the information needed for safe operation of the aeroplane.

- Instruments used in HKO RCR System - One present weather sensor installed on each of the runway thirds.
- Suggests real-time RCR based on the actual rain rates and nowcasting techniques with reporting on each of the runway thirds.
- Established the empirical relationship between rain rate and water depth.

- Simulation of standing water was conducted in partner with Hydraulics Team of University of Hong Kong.

SP/08 - Survey of State MET Information supporting ATM

- As a follow up from MET/R WG, a survey was conducted by the Asia/Pacific Regional Office in October/December 2021, via online survey monkey tool.
- The survey was completed by 50 respondents (from 24 States/Administration)
  - 23 MET;
  - 23 ATM; and
  - 4 Airspace users
- A detailed results were presented.
- Key takeaways:
  - Legislations/ regulations
    - A few States don’t have legislations
    - Many States are considering MET INFO as essential part of ATFM
    - Many States have implemented ATFM with written agreements

SP/08 - Survey of State MET Information supporting ATM

- Key MET phenomena required:
  - Aerodrome: wind, visibility, QNH and sig phenomena such as TS, TC, Turbulence.
  - Enroute - TS, including convective cloud, TC and wind factors, including turbulence.
- MET Info and exchange
  - OPMET data still considered very important, some States providing tailored info, in addition.
  - Gridded Met Info, such as WAFS, are very important.
  - Timeliness and forecast quality - extremely important for effective ATFM
  - Some States still not using standard exchange model.
- Challenge and Opportunities:
  - Many States have mutual understanding among ATM, MET and airlines.
  - Many States face technical and resources challenges.
  - Require more guidance.

Session 3: Collaboration on a bilateral or multilateral basis between States

Benefits and challenges of collaboration between MET and ATM communities and integrating MET information within bilateral and multilateral ATM systems

SP/09: Space Weather Info Service

SP/10: Space Weather exercise

SP/11: NARAHG – ATFM and MET collaboration to manage the impacts of typhoons

SP/12: State of Aviation Post Covid 19

SP/13: Can we do better?

SP/09: Space Weather Info Service (Australia)

- Space Weather may impact HF radio communication, SATCOM, GNSS, etc.
- Impacts stronger at higher altitude and higher latitude
- Australia-Canada-France-Japan Consortium provides 24/7 Global Space Weather advisory service for aviation

SP/10: Space Weather exercise (Australia)

- Solar activity is likely to increase with solar maximum in 2025
- Space Weather exercises were conducted twice in 2022 with Airlines, ANSPs and CAAs
- Future activities:
  - Space Weather webinar by ICAO APAC – TBD
  - Another Space Weather exercise by CAA NZ in 2023

SP/11: NARAHG – ATFM and MET collaboration to manage the impacts of typhoons (ROK)

- How they dealt with Typhoon detour flights through Collaborative Decision Making
  - China, Japan, and Republic of Korea
  - To accurately manage the number of detour flights
  - To organize as many detour flights as possible without affecting regular flights
- Interesting initiative/collaboration among three States
- Airspace Capacity is often reduced due to hazardous weather conditions
- The accuracy of weather forecasts is key to balancing demand and capacity. Accurate and timely MET information supports optimum ATFM

SP/12: State of Aviation Post COVID-19 (IATA)

- COVID-19 was the greatest shock to aviation in its history
- International traffic recovery in the APAC is still low, but it may be increased rapidly with China's recovery
- Traffic growth forecast over the next 20 years shows APAC would be the biggest aviation market for sure
- Airlines have been facing not only labor costs and energy costs but also geopolitical conflict and climate change costs
- One of the keys to improving efficiency would be a collaboration with MET, ATM and AUs

SP/13: Can we do better? (IFATCA)

- Back ground information how MET and ATM worked together
- An example of high level communication and coordination, and working level activities
- Communication, Coordination, Cooperation transformed into “Collaboration”
- MET information could assist ATM in providing a better ATC
  - Improved accuracy
  - Timely delivery
  - Extent and duration of event
  - Unpredicted convective activity
  - Lead time for warnings of extreme conditions
  - Colour coded graphics

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THANK YOU