International Civil Aviation Organization

Fifteenth Meeting of the Asia/Pacific Air Traffic Flow Management Steering Group (ATFM/SG/15)

Bangkok, Thailand, 28 April – 02 May 2025

Agenda Item 2: Review Outcomes of Related Meetings

MET/ATM SEMINAR REPORT

(Presented by the Secretariat)

SUMMARY

This paper presents the summary of MET/ATM Seminar conducted with joint effort from MET domain and ATM domain.

1. INTRODUCTION

1.1 A seminar in conjunction with the Meteorological Requirements Working Group (MET/R SG) was held on 28 April 2025 at ICAO Asia/Pacific Regional Office in Bangkok, Thailand.

1.2 The seminar was conducted in hybrid mode and was attended by 162 in-person participants from 20 States/ Administrations and four International organizations including Australia, Bhutan, Brunei Darussalam, Cambodia, China, Hong Kong China, India, Indonesia, Japan, Lao PDR, Malaysia, Mongolia, Pakistan, Papua New Guinea, Philippines, Republic of Korea, Singapore, Solomon Island, Thailand, Viet Nam, CANSO, IATA, ICCAIA and ICAO. In addition, 73 participants from 14 States/ Administrations and International organizations attended online through MS Teams portal.

2. DISCUSSION

2.1 Thirteen (13) presentations were conducted in three sessions.

Session 1

2.2 This session consisted of five presentations and was moderated by Mr. Piyawut Tantimekabut, the Chairperson of the ATFM/SG.

2.3 Mr. John Wagstaff, Asia-Pacific Regional Representative of IFATCA, presented on the topic of “15 Years of Progress – Can We Do Better?”.

2.4 The presentation began with a recap of work progress of collaboration between MET and ATM. It highlighted the importance of MET products for ATM, based on surveys conducted among Air Navigation Service Providers (ANSPs) and controllers at Air Traffic Flow Management (ATFM) units. It also discussed the progress in meteorological forecasting and ATFM facilities, and the need for improved communication, coordination, cooperation, and collaboration between MET, ATFM, ATM, aircraft operators, and airport operators to enhance safety and efficiency.

2.5 Mr. Manjunath Krishna Nelli, Regional Officer (ATM) of ICAO Asia/Pacific Regional Sub-Office, presented on the topic of "ATM and ATFM Requirements".

2.6 The presentation outlined the priority elements of the Asia/Pacific Seamless ANS Plan, emphasizing the importance of MET information (AMET) with priority 1, and its relation to various ATM and ATFM elements. It detailed the MET B0 elements (priority 1) such as meteorological observations, forecast and warning products, climatological and historical meteorological products, and the dissemination of meteorological products.

2.7 Mr. Ashwin Naidu presented on behalf of the ICAO Meteorology Panel on the topic "Future meteorological Information Service".

2.8 The presentation discussed the evolution of MET services from static products to dynamic services, emphasizing the transition from traditional text-based products like METAR and TAF to machine-readable data in ICAO Meteorological Information Exchange Model (IWXXM) format. It highlighted ICAO's Global Air Navigation Plan (GANP) requirements for integrated MET observations and forecasts to support enhanced ATM, airport decision-making, and optimized flight trajectory.

2.9 The presentation introduced future Meteorological Information Services aimed at providing real-time, user-defined, and automated MET information. It also underscored the significance of System Wide Information Management (SWIM) as the digital backbone for future MET services, ensuring global and cross-domain interoperability.

2.10 Ms. NISHIMORI Shiho and IKEDA Michiko, representing Japan Civil Aviation Bureau (JCAB) and the Japan Meteorological Agency (JMA), delivered on the topic of "Impact-based Meteorological Information to Support ATM Operation".

2.11 The presentation focused on the collaboration between JCAB and JMA in addressing the growing demand for air traffic and the necessity of tailored MET services to mitigate the impact of adverse weather conditions on air traffic flow. It outlined the development of ATM-tailored MET services in Japan, introduced the ATM Categorized Impact of weather Element prediction (ATM CIEL).

2.12 The presentation was enriched with case study on operational capacity management. It illustrated how statistical assessments, operational impact considerations, and aircraft operational thresholds are utilized to forecast weather impacts on ATC sectors, approach control areas, and airports.

2.13 The last presentation for Session 1 was conducted by Mr. Simon Godsmark from Airservices Australia on the topic of "Airport-Collaborative Decision Making (A-CDM) Implementation in Australia".

2.14 The presentation provided an overview on how Airservices Australia, airlines and airports collaborated to implement A-CDM in Australia's four major airports: Brisbane, Perth, Sydney, and Melbourne in stages. A-CDM for all four airports were expected to be operational by the end of 2025.

2.15 The implementation of A-CDM was envisioned to bring upon benefits such as enhanced situational awareness, operational efficiency, elevate recovery towards adverse conditions, better asset and resource utilization, improved customer experience, cost savings, and environmental benefits through reduced emissions.

Session 2

2.16 Session 2 of the seminar consisted of four presentations and was moderated by Mr. Ashwin Naidu, Chairperson of the MET/R WG.

2.17 Mr. Ira Chan and Mr. Anfernee Poon, representing Hong Kong Observatory (HKO) and Civil Aviation Department (CAD) delivered the presentation titled "Probabilistic Forecast of Runway Headwind Changes on Supporting Estimation of Airport Acceptance Rate".

2.18 The presentation introduced the mechanism developed by joint effort of HKO and CAD to predict sea breeze and severity of westerly wind, the key factor in deciding runway direction, using machine learning model for historic data and real-time observations.

2.19 The probabilistic forecasts, generated hourly, demonstrated good alignment with actual observations and provided early information to aid decision-making process in air traffic operations that could reduce the chance of capacity reduction due to change in runway-in-use direction during peak hour.

2.20 Mr. Woojin Kim, on behalf of MOLIT, Republic of Korea presented on the topic "Operational Capacity Guidelines Linked to Weather Forecasts".

2.21 The presentation shared Incheon Airport's experience of the challenges and solutions for ATFM during snowfall events. The development of operational capacity guidelines linked to weather forecasts provided a proactive decision-making and data-driven procedure to mitigate the impact of snowfall on airport operations.

2.22 The operational capacity guidelines categorized airport capacity into five stages based on surface temperature and hourly snowfall rates, enabled stakeholders to make informed and timely decisions to adjust arrival capacities, implement ATFM measures, and maintain efficient operations by enhancing predictability, reduce delays, and foster collaboration among aviation stakeholders.

2.23 Mr. Dudsadee Sungthong, ATM Network Manager from AEROTHAI delivered the presentation titled "Use of Meteorology Information in Bangkok ATFMU".

2.24 The presentation discussed the use of MET information in Bangkok ATFMU to anticipate and mitigate the impact of adverse weather conditions, such as summer thunderstorms and the southwest monsoon, which can complicate ATC operations. By integrating MET information, AEROTHAI aimed to improve the predictability of operations, allowing for more effective ATFM measures like Ground Delay Programs (GDP) to manage traffic flow and reduce air delay.

2.25 AEROTHAI collaborated with Thai Meteorological Department to develop more sophisticated forecast models and composite RADAR overlays in the flight live system to provide air traffic controllers and ATFM operators with a clear understanding of weather conditions, ultimately to provide tailored MET data suitable for ATFM up to 6 hours in advance.

2.26 The last presentation for Session 2 was presented by Ms. CHEN Ran from Civil Aviation Administration of China (CAAC) on the topic of "Development of User-Centric Engagement Strategies and Fit-For-Purpose Products in South-West China".

2.27 The initiative focused on bridging the gap between MET and ATM needs by implementing a closed-loop user demand mechanism, dynamic capture of user demands, collaborative optimization, and result feedback. This approach aimed to provide tailored meteorological products and services to ATC units, ATFM teams, and airlines, enhancing safety and efficiency in the Southwest region of China.

2.28 CAAC created a co-design web platform that allows users to access customized products based on their specific needs. The platform offered scenario-based access and phased support products such as strategic forecasts for route optimization for tactical decision-making which led to faster

warnings and reduction in weather-related diversions, demonstrating the value of user-centric MET services.

Session 3

2.29 This session consisted of four presentations and was moderated by Mr. Peter Dunda, Regional Officer (MET/ ENV), ICAO Asia/Pacific Regional Office.

2.30 Mr. Ashwin Naidu presented on the topic of "Importance of Special Air-Reports (AIREPS)" as the first presentation of this session.

2.31 The presentation emphasized in particular the importance of special AIREPs which provide real-time, actionable weather data, support hazard alerts for nearby aircraft, and would validate/improve weather forecasts, contributing to aviation safety by providing crucial information on weather conditions such as turbulence.

2.32 To address the issues of data accuracy, completeness, and under-reporting, there was a push for automation and the integration of artificial intelligence (AI), along with fostering a stronger reporting culture and improved collaboration among pilots, ATS units, and meteorological agencies. In addition, the 2024 Air Navigation Conference acknowledged turbulence encounters as a global operational safety risk, highlighting the need for timely special AIREPs and international cooperation to monitor and mitigate turbulence risks.

2.33 Ms. Rebecca Holman, Senior manager of IATA, delivered a presentation titled "Facilitating Industry Shift to Data-driven Turbulence Mitigation".

2.34 The presentation discussed data-driven turbulence management through the use of real-time turbulence data. Recent technological advancements have enabled aircraft to accurately calculate the turbulence state of the atmosphere in flight, using the Eddy Dissipation Rate (EDR) as the standard metric.

2.35 IATA's Turbulence Aware programme would facilitate the collection and utilization of real-time turbulence data, providing benefits such as improved flight planning, more accurate advisories and warnings, and enhanced coordination between airlines, ATS, and ATFM units. This data would support various use cases, including turbulence modeling validation, weather research, and proactive management of air traffic flow, ultimately contributing to safer journeys for passengers.

2.36 Ms. Christy Leung, Scientific Officer from HKO, presented on the topic of "En-route Turbulence Detection Using ADS-B Data and Special Air Reports".

2.37 HKO has been using ADS-B data along with special air reports to detect en-route turbulence within approximately 600km of range from Hong Kong China. By analyzing Vertical Acceleration (VA) and Root-Mean-Square Vertical Acceleration (RMSVA) from ADS-B data, turbulence could be detected, focusing on the cruising phase of flight using fuzzy logic to define criteria like high ground speed and low rate of climb.

2.38 The study compiled special air reports on turbulence to validate the ADS-B-derived turbulence detection method. The proposed methodology involved identifying spikes in the RMSVA time series and extracting properties like peak height and spike count to differentiate between turbulent and non-turbulent flights. Since 2024, the HKO forecasters were provided with real-time turbulence information to facilitate the production of quality MET data for ATM services.

2.39 The last presentation for the seminar was presented by Ms. CHEN Lijing from CAAC titled "Temporal and Spatial Characteristics of Aircraft Turbulence on Qinghai-Tibet Plateau Slope and Turbulence Forecasting System Based on EDR".

2.40 The research highlighted that aircraft turbulence, particularly at high altitudes, has been on the rise, with moderate to severe turbulence becoming more frequent. The study also examined the seasonal, monthly, and daily distribution of turbulence, noting that it would be more common in winter and spring, peaks in April, and would be concentrated during specific times of the day.

2.41 The analysis of turbulence intensity revealed that a significant portion of turbulence events on the Qinghai-Tibet Plateau Slope were of moderate intensity or higher, with severe turbulence more likely at higher altitudes. The primary causes of turbulence in this region were identified as convective clouds, jet streams, and atmospheric turbulence. In response to these findings, the CAAC developed a turbulence forecasting system using EDR, which aimed to provide more accurate and timely predictions to enhance aviation safety and operational efficiency.

Conclusion

2.42 The seminar was conducted with active participation from the audience. More than 50 questions were raised during the seminar. However, due to time limitations, not all the questions were discussed openly during the Question-and-Answer session. Yet presenters provided feedback and answers to the questions via the Pigeonhole Comment section.

2.43 The participants were reminded of the close relationship between MET services and ATFM. Participants were advised to strengthen the relationship between MET services provider and the ATFM Unit in providing quality services for safe and efficient conduct of civil aviation.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matters as appropriate.

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Questions & Answers for MET/ATM Seminar on 22 April 2024

SP/01 - 15 Years of Progress – Can We Do Better? (IFTACA)

	Originator	Question	Answered?
1	Anonymous	Are the products from Asian Aviation MET Center available publicly, or at least to the regional aviation/ATM community, somehow (e.g. a webpage or regular reports)? Anonymous replied: Yes, you may access it via https://www.aamets.com/ For more information, you may refer to MET SG/21−IP/15 (https://www.icao.int/APAC/Meetings/2017%20METSG21/IP15_AI.6.1_CHN_Development-of-MET-centre.pdf) Peter Dunda replied: Reminder: the following presentations/flyers provide information on recent upgrades implemented by the World Area Forecast Centres (WAFCs), which are the ICAO designated units to prepare and issue significant weather forecasts and upper-air forecasts in digital form on a global basis direct to States using the aeronautical fixed service Internet-based services: (1) https://www.icao.int/APAC/Meetings/2024%20MET%20SG%2028/SP01_WAFS%20SIGWX%20Presentation.pd(2) https://www.icao.int/APAC/Meetings/2023%20MET%20SG%2027/SP03_WAFC_IMPROVEMENTS-TO-THE-WAFS-2023-and-2024.pdf, (3) https://www.metoffice.gov.uk/services/transport/aviation/regulated/international-aviation/wafc/upcoming-changes	Y
2	Anonymous	can IFATCA help in collaborating with ICAO and ANSPs to adopt more efficient procedures, potentially involving improved weather forecasting and Network ATFM operations? John Wagstaff replied: IFATCA actively participates in the ICAO regional meetings and is also on the ICAO Panels in Montreal. I will be presenting a paper based on today's work at the ICAO Regional ATM Subgroup Meeting in September.	Y
3	Ashwin Naidu	Is the problem unpredictive convective activity and turbulence or the provision of making these products available to the partners.	Y

	Originator	Question	Answered?
		John Wagstaff replied: As I mentioned, at the moment in the en-route airspace the pilot has to rely on pilot reports of significant convective activity and moderate/severe turbulence encounters. Reliable forecasts are not available over the South China Sea airspace.	
4	Anonymous	How is Europe Met info network different from APAC? Anonymous/India replied: Can we provision of establishing a small working group of country who is having Tailored meteorological decision support tool. This SWG can help or guide other country who are developing such tool John Wagstaff replied: Seminars like this and the Joint sessions of ICAO ATM and MET meetings are a starting point. The next step is for the ANSP/ATM to talk directly to the MET provider. Communicate, coordinate and cooperate is the way progress can be made. Examples of MET displays for ATC have been shown today and other ANSP or MET providers will gladly share information on their support tools.	Y
5	Hong Kong China, Christy Leung (HKO)	I would like to ask apart from the missed convective activity, how is overforecast contributes to ATFM frustration? Met authorities always strive a balance Hong Kong China, Christy Leung (HKO) replied: between the two and to find the perfect tipping point. Do you think probability forecast is the way to find the balance? John Wagstaff replied: Predictive forecasts would be a good start. However we all know convective activity is very unpredictable!	Y

SP/02 - ATM and ATFM Requirements (ICAO)

	Originator	Question	Answered?
1	Anonymous	ICAO: what are the incentives for Air Traffic Management (ATM) units and MET service providers to invest resources in developing & implementing systems for enhanced MET-ATM integration? Peter Dunda replied:	Y

		One incentive is to comply with ICAO SARPS. Summarizing ICAO's Annex 3 requirements on the provision of MET service: The objective of meteorological services for international air navigation is to enhance the safety, regularity, and efficiency of international air travel. This is achieved by providing necessary meteorological information to various users such as operators, flight crew, air traffic services, search and rescue units, airport management, and others involved in international air navigation. Each Contracting State is responsible for determining the meteorological services it will provide, in accordance with the provisions of the relevant Annex and regional air navigation agreements, including services for international waters and areas outside its territory. A high-level incentive is provided by the Global Air Traffic Management Operational Concept (GATMOC, Doc 9854), which presents a vision for a common operational concept of an integrated, sustainable, harmonised and globally interoperable ATM system. In addition, the Global Air Navigation Plan (GANP) is an important planning tool for setting global priorities to drive the evolution of the global air navigation system and ensure that the vision of an integrated, harmonised, globally interoperable and seamless system becomes a reality. The MET Panel leads the future development of MET service, which is for integrated MET services for international air navigation to enhance safety, efficiency, and capacity. This development provides seamless, borderless, interoperable, machine-readable aeronautical MET information to support ATM operations, particularly in the terminal area and in line with Aviation System Block Upgrades (ASBUs).	
2	Anonymous	Is there any ICAO document advising implementation guideline on ACDM.	N

SP/03 - Future meteorological Information Service (ICAO MET Panel)

	Originator	**Question**	**Answered?**
1	Anonymous	Why can the delivery of MET information via SWIM be only web services? Information provision through SWIM can also be other techniques as well. Is that the agreement in METP? Peter Dunda replied: According to the Roadmap for Aeronautical Meteorological (MET) Information in System-Wide Information Management (SWIM), ICAO has published a global SWIM concept to enhance global interoperability across information domains. SWIM will complement human-to-human communications with machine-to-machine communications and improve data distribution and accessibility. ICAO Member States are expected	Y

		to make aviation-related information available as information services across various information domains, including meteorology. According to the Future Aeronautical Meteorological Information Service Delivery - White Paper, SWIM-based information exchange will replace all of the traditional regional and global ICAO MET information exchange systems, such as OPMET data base systems, SADIS (WIFS). The structures around the traditional OPMET Databanks will, however, be transformed into the aeronautical MET-specific regional contribution to SWIM governance. Ashwin Naidu replied: Additional info - METP is defining that new SWIM services will be accessible by both request/reply (webservices) and publish/subscribe AMQP (messaging) protocols.	
2	Anonymous	Does ICAO expect individual States including small ones to implement AMOIS AMFIS HWIS? Why not take a regional collaborative sharing approach?	N
3	Anonymous	What is the main difference between IWXXM and swim? how AMOIS, AMFIS and HWIS are integrated with IWXXM?	N
4	Anonymous	Is there any conversation at the METP about an idea of how MET information provided in IWXXM via AMOIS, AMFIS, or HWIS be applied (e.g. FF-ICE templates)? Ashwin Naidu replied: METP has been refining the requirements for AMOIS/AMFIS/HWIS and these will inform the development of a new IWXXM schema's for these new services. These requirements are expected to be endorsed in METP/7 in 2027.	Y
5	Anonymous	Any expected timeline for implementation of AMOIS, AMFIS and HWIS by ICAO?	N
6	Anonymous	How much are Met agencies in APAC exchanging info with one another? Can we reduce duplication of work and get more synergy as a region?	N
7	Anonymous	Is there a training manual or installation guides for SWIM available online? Like WIS 2.0 (WMO website)	N

SP/04 Impact-based Meteorological Information to Support ATM Operation (Japan)

	Originator	**Question**	**Answered?**
1	Anonymous	How were the specific c criteria used to categorize the impact of weather phenomena at the various ATC sectors determined?	Y

	Originator	Question	Answered?
2	Anonymous	Is there any post-operation feedback mechanism between the ATM unit and JMA to discuss on the level of impact of any specific event or forecast?	N

SP/05 - Airport-Collaborative Decision Making (A-CDM) Implementation in Australia (Australia)

	Originator	Question	Answered?
1	Anonymous	What criteria would Australia use to evaluate the feasibility and potential benefits of extending A-CDM to other airports beyond the initial four? Simon Godsmark replied: We assess trends and operational data of ATFM demand and airport infrastructure demand as airports become busier along current IATA WASGs. We will work with the airport to model delays and efficiencies that A-CDM can provide for the use of the gates/taxiways/apron as well as ATFM and help develop a cost benefit proposal. The proposal and any decision is managed through the governance structure as it is not just a single entity (I.e. the airport) that is impacted by the inclusion of an airport in A-CDM.	Y
2	Airports Corporation of Vietnam	Is the ACISP developed in-house or by a third provider? How do you apply the penalty in sequencing?	N
3	Anonymous	Is there a system in place to identify and analyze the cascading effect where managing arrival (ARR) capacity also partially influences departure (DEP) demand? Simon Godsmark replied: For Australia this will be the A-CDM system. As it covers different phases of flight from arrival to departure we can show the impact arrival delays have on departure planning allowing the operators to update TOBT's and help plan gate usage, organise support services etc and share with ATC the changing departure profile.	Y
4	CANSO	I is unusual for an AANSP to implement ACDM, usually done by an airport operator, why did ASA choose responsibility to implement ACDM? Anonymous replied:	Y

	Originator	Question	Answered?
		An integrated approach to ATFM in the pre-tactical planning phase and day of operations has driven our development of systems and procedures. Our Digital Twin works on a whole of network assessment and solution as restrictions at 1 port have flow on impacts to others. A-CDM is the same and provides that whole of network view and shares a common base of information and how network/disruption events are impacting the whole of network. A-CDM managed by the ANSP removes any conflict of interest between different stakeholders, shares the cost across multiple airports thereby helping with affordability, provides an integrated view for all stakeholders, ensures equal access for all operators, improved network and airport efficiencies and maximises efficient use of both airport and airspace.	

To all speakers in Session 2

	Originator	Question	Answered?
1	India	Any data on percentage when the anticipation of adverse weather and decision of reducing capacity have gone wrong? Anonymous replied: need ATFM TO answer the question	Y

SP/06 - Probabilistic Forecast of Runway Headwind Changes on Supporting Estimation of Airport Acceptance Rate (Hong Kong China)

	Originator	Question	Answered?
1	Anonymous	What is the deciding percentage for a weather phenomenon to be taken into consideration for applying ATFM MEASURES.	Y
2	Anonymous	Is the wind conditions at HKIA always favourable (I.e tailwind less than 10kts) for an advance change in runway direction based on the forecast?	Y
3	Anonymous	Have you ever evaluated the skill of different NWP model forecasts for probabilistic prediction of runway headwind changes over the airports used for your study? Ira Chan Yan Chun/ Hong Kong China replied: Yes, comparisons with the NWP model forecast had been done. The course scale NWP model always not capture correct wind direction for sea breeze circulation. The CSI score will be much lower.	Y

	Originator	Question	Answered?
4	JMA - Michiko IKEDA	Do you have any specific likelihood criteria for ATM decision making? If so, how was the criteria decided?	Y
5	Anonymous	What are the primary factors considered in the model to predict the hourly probability of westerly sea breeze for ATM? Ira Chan Yan Chun/ Hong Kong China replied: In our situation, the observation in the morning such as winds and temperatures; and the NWP model forecast were used as training data. The feature importance of different elements were illustrated in the bar chart.	Y
6	Anonymous	What are the important factors to consider for machine learning modeling? For example, How much historical data should be collected for effective machine learning? Ira Chan Yan Chun/ Hong Kong China replied: In our situation, the observation in the morning such as winds and temperatures; and the NWP model forecast were used as training data. The feature importance of different elements were quantified for illustration. Taking full year data for training could generate the model in our case, but more data will be better.	Y
7	Anonymous	What are the main drivers in the improvement in the convective warning lead time? Ira Chan Yan Chun/ Hong Kong China replied: I will try to answer the question as it may not be relevant to the presentation topics. Advancement of meteorology observation and modelling could be the most straight-forward way to enhance the weather predictions. Furthermore, good communication between the forecaster and ATM may also enhance the preparedness and hopefully having potential to reduce the impact.	Y

SP/07 - Operational Capacity Guidelines Linked to Weather Forecasts (Republic of Korea)

	Originator	Question	Answered?
1	Anonymous	What would be the average delay under stage 5 and how the flights are informed of the delay? Woojin Kim replied:	Y

	Originator	Question	Answered?
		Since developing these guidelines, we haven't yet had to apply Stage 5. The most severe situation we've encountered was Stage 4, with a capacity of 26 aircraft, which still caused significant delays. While it varies depending on traffic flow patterns, Snowfall tends to occur primarily in the morning hours, and in such cases, it has typically resulted in an average delay of about 90 minutes. Since MET-CDM includes all domestic stakeholders, information is shared in real time. For cross-border ATFM stakeholders, as soon as the operational capacity is determined through MET-CDM, the ROK ATFMU shares the Airport Acceptance Rate (AAR) and ATFM measures via the ATFM Daily Plan.	
2	Anonymous	Would the same guidelines for Snow be applicable to other weather conditions? Woojin Kim replied: These guidelines are applied exclusively to snowfall forecasts at Incheon Airport. Separate new guidelines are needed for other airports and different weather conditions. Currently, guidelines for the operational capacity of ACC sectors are under development.	Y

SP/08 - Use of Meteorology Information in Bangkok ATFMU (Thailand)

	Originator	Question	Answered?
1	Anonymous	In tropical states, severe connective activity develop in very short period of time. How does these phenomena are factored into the proactive ATFM measures?	Y
2	Anonymous	While early MET forecast may enable better ATFM Measures but how is this going to affect accuracy of Forecast for example 6-7 hours as compared to 3-4 Hours comparatively?	N

SP/09 - Development of User-Centric Engagement Strategies And Fit-For-Purpose Products in South-West China (China)

	Originator	Question	Answered?
1	Anonymous	How do we strike a balance between tailored airport-to-airport MET information for each busy airport and standardization of special MET forecast information for higher density airports?	N
2	Anonymous	How does the network manager interpret the convective and terminal warnings? Is there a standard response towards a certain warning level?	Y

	Originator	Question	Answered?
3	Anonymous	Can you provide examples of closed- loop user demand mechanism on how user feedback leads directly to modifications or enhancements of the service?	Y
4	India	What is process, in case of prolonged adverse weather requiring cancellation or rescheduling the slots?	Y

SP/10 - Importance of Special Air-Reports (ICAO MET/R WG)

	Originator	Question	Answered?
1	Anonymous	How to deal with the problem that the AIREPs depending on every pilot's subjective feelings? Peter Dunda replied: Quantitative criteria are provided. For example, for turbulence, ICAO Annex 3 (Appendix 4, 2.6.3) provides quantitative criteria for special air-reports: i.e., Special air-reports on turbulence shall be made during any phase of the flight whenever the peak value of the cube root of EDR exceeds 0.4. .... Special air-reports shall be issued every minute until such time as the peak values of the cube root of EDR fall below 0.4. Ashwin Naidu replied: Intensity: Moderate - Appreciable changes in attitude and/or altitude (Aircraft reaction). Pilot remains in control at all times. Rapid bumps or jolts (Reaction Inside Aircraft) Intensity: Severe/Extreme: Large abrupt changes in attitude and/or altitude. Momentary loss of control. Extreme - Very difficult to control aircraft. May cause structural damage. (Aircraft reaction). Unsecured objects are tossed about. Occupants violently forced against seatbelt (Reaction Inside Aircraft)	Y
2	Anonymous	Describe the differences between a routine AIREP and a special AIREP. What are the key meteorological phenomena that require a pilot to submit a special AIREP according to ICAO Annex 3? Peter Dunda replied: According to ICAO Doc 4444, PROCEDURES FOR AIR NAVIGATION SERVICES Air Traffi c Management, Chapter 4, 4.12.3.1, Special air-reports shall be made by all aircraft whenever the following (MET-related) conditions are encountered or observed: a) moderate or severe turbulence; or b) moderate or severe icing; or c) severe mountain wave; or d) thunderstorms, without hail that are obscured, embedded, widespread or in squall lines; or e) thunderstorms, with hail that are obscured, embedded, widespread or in squall lines; or f)	Y

	Originator	Question	Answered?
		heavy duststorm or heavy sandstorm; or g) volcanic ash cloud; or h) pre-eruption volcanic activity or a volcanic eruption The criteria for special aircraft observations are also provided in ICAO Annex 3, Chapter 5, 5.5.	
3	Anonymous	Is there any provision to include in AIP to make it compulsory for pilots for AIREP at certain Way points on ATS routes other than routine AIREP & Special AIREP?	N
4	Anonymous	With the known under-reporting of turb events by all parties, is there a technological solution to extract data from aircraft via datalink to help with reporting and forecasting?	N
5	Anonymous	Should state publish the requirement of Routine and Special AIREP in AIP to bound the pilots because national regulations in transposing Annex-3 are generally directed towards Met Service Providers?	N

SP/11 - Facilitating Industry Shift to Data-driven Turbulence Mitigation (IATA)

	Originator	Question	Answered?
1	Anonymous	Will the TURB AWARE data be shared with local MET office to collaborate for enhancement of prediction model?	Y
2	India	How is en-route EDR calculated using the NCAR V2 algorithm? Is it based on NWP model analyses or satellite observations?	Y
3	Ashwin Naidu	I understand that there is currently a cost associated with accessing data from IATA Turbulence Aware. Is there any plans to make this data available free of charge to MET agencies?	Y
4	Ashwin Naidu	It appears that turbulence coverage across APAC region, particularly over the Pacific remains limited. What provisions or plans are in place to enhance data availability in these areas?	N
5	Anonymous	Is turbulence data ingested into global forecast model like other atmospheric observation?	N

SP/12 - En-route Turbulence Detection Using ADS-B data and Special Air Reports (Hong Kong China)

	Originator	Question	Answered?
1	Anonymous	How do you distinguish the large/high spike counts from potential readout errors or signal interference? Hong Kong China, Christy Leung (HKO) replied: Data quality control measures are essential to produce useful information. The challenge is that the calculations need to be	Y

	Originator	Question	Answered?
		carried out quick enough in real time (for operational use) while essential quality control measures can't be trade off.	
2	India	Can you please elaborate on how Quick Access Recorder (QAR) data is used in the calculation of EDR? Hong Kong China, Christy Leung (HKO) replied: The EDR data can be calculated from QAR data via different methodologies. Some literature references are as follows: Haverdings, H.; Chan, P.W. Quick Access Recorder Data Analysis Software for Windshear Turbulence Studies. J. Aircr. 2010, 47, 1443–1447. Kim, S.-H., Kim, J., Kim, J.-H., and Chun, H.-Y.: Characteristics of the derived energy dissipation rate using the 1 Hz commercial aircraft quick access recorder (QAR) data, Atmos. Meas. Tech., 15, 2277–2298, https://doi.org/10.5194/amt-15-2277-2022, 2022.	Y

SP/13 - Temporal and Spatial Characteristics of Aircraft Turbulence on Qinghai-Tibet Plateau Slope and Turbulence Forecasting System Based on EDR (China)

	Originator	Question	Answered?
1	Anonymous	How do the WRC calculate EDR?	Y
2	Anonymous	Do convective clouds that cause turbulence mostly develop due to synoptic effects, or are they primarily influenced by local effect such as lifting force due to topography & etc.	N
3	Anonymous	WRC could provide finer decision support. Could you elaborate on how this finer decision support has aided aviation forecasters, ATC, and pilots in managing turbulence?	N
4	Anonymous	What is the difference in algorithm between GTG and WRC?	Y

Unspecified Question(s) for Session 3

	Originator	Question	Answered?
1	India	For turbulence calculation, which method is more reliable: the one using the Ellrod Index or EDR?	N