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APAC User Requirements for SWIM-Based MET Information Services Supporting ATFM

MET/R WG Ad-hoc Group

MET/R WG/14 & ATFM/SG/15

Background

- MET/R WG (in consultation with ATFM SG) designated an ad hoc group to identify and document use cases and user requirements for SWIM-based MET information services supporting ATFM in the APAC region.
- The ad-hoc group consists of MET and ATFM subject matter experts.

State / Administration / IO	Name	Position and/or Organization	Expertise
Australia	Jesper Bronsvoort	Airservices Australia	ATFM
Australia	Ashwin Naidu (Co-Rapporteur)	Bureau of Meteorology	MET
CANSO	Stuart Ratcliffe	CANSO	ATFM
Hong Kong, China	Marco Kok (Co-Rapporteur)	HKO	MET/SWIM
Hong Kong, China	Anfernee Poon	HKCAD	ATFM
Hong Kong, China	Ira Chan	HKO	MET
IATA	John Moore	IATA	ATFM/MET
Japan	ITOU Miho	JCAB	ATFM
Japan	IKEDA Michiko	JMA	MET
Pakistan	Fazal Ur Rehman	PCAA	ATFM
Pakistan	Syed Ali Baqadar Shah	PCAA	MET
Republic of Korea	Dong-won LEE	KMA	MET
Republic of Korea	Jiwon LEE	KMA	MET
Singapore	Zhang HuanBin	CAAS	ATFM
Singapore	Aw Ying Kit	CAAS	ATFM
Singapore	Yeo Cheng Xun	MSS	MET
Thailand	Amornrat Jirattigalachote, Amo	AEROTHAI	ATFM/SWIM
Thailand	Dudsadee Sungthong	AEROTHAI	ATFM
Vietnam	Nguyen Van Dung	VATM	MET/ATFM

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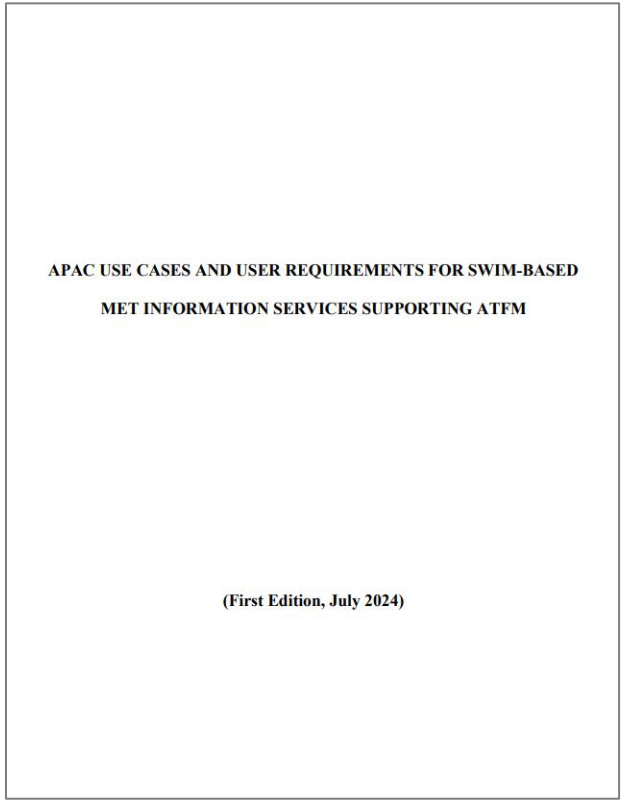
Purpose of the document

- The reference document aims to increase awareness and understanding among MET service providers and ATFM users in the APAC Region regarding the operational benefits of information exchange in the SWIM environment.

- Includes conceptual use cases to illustrate and publicise how SWIM-based MET information services and the associated SWIM-enabled MET applications could to benefit regional ATFM operations in the future.

- This document does not infer any obligation on States to implement the SWIM-based MET Information Services described.



APAC USE CASES AND USER REQUIREMENTS FOR SWIM-BASED MET INFORMATION SERVICES SUPPORTING ATFM

(First Edition, July 2024)

SWIM-based MET Information Services and Examples of use cases to support ATFM

SWIM-based MET information services

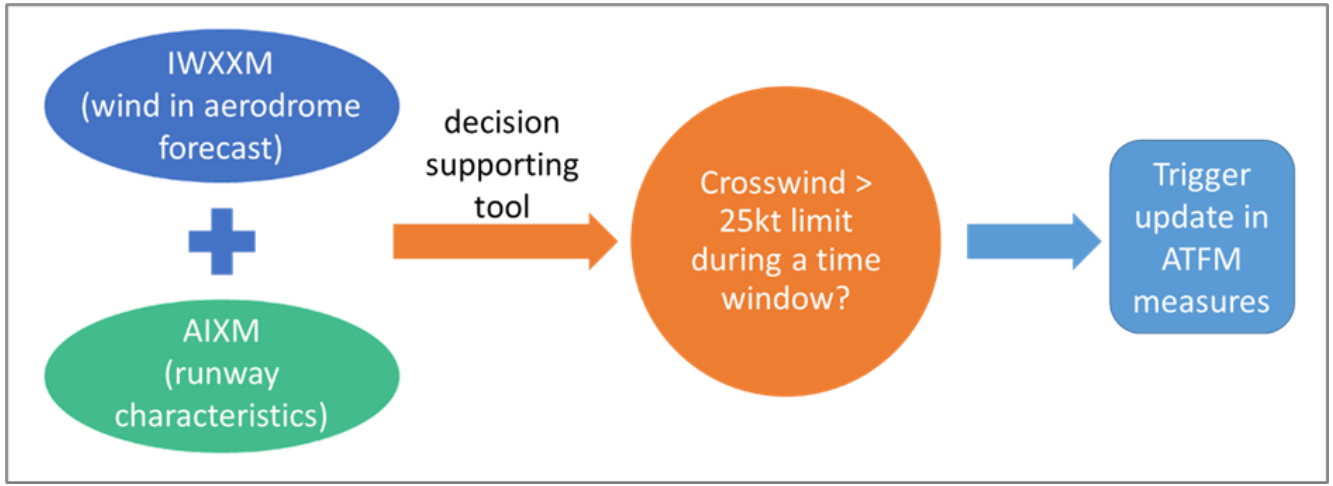
- capable to geospatially and/or temporally filter a data set to provide the users' system only the tailored information required by the user

MET data catalogue (draft)	ATFM data catalogue (draft)
Aerodrome • Cloud amount and type • Lightning/thunderstorm • QNH • RVR • Surface wind and wind gusts • Temperature and dew point • Turbulence • Visibility • Windshear **Enroute** • Wind • Temperature • Tropopause height • Volcanic ash • Tropical cyclone • Space weather • Thunderstorm • Turbulence (including clear air turbulence and in-cloud turbulence) • Icing • Mountain waves • Dust / sand storms • Radioactive clouds	• Global Unified Flight Identifier (GUFI) • Departure aerodrome • Destination aerodrome • Flight identification • Planned route/trajectory • Estimated Off-Block Time (EOBT) • Estimated Take-Off Time (ETOT) • Estimated Landing Time (ELDT) • Estimated Elapsed Time (EET) • Calculated Take-Off Time (CTOT) • Calculated Landing Time (CLDT) • Target Off-Block Time (TOBT) • Target Start Up Approval Time (TSAT) • Target Take-Off Time (TTOT) • Actual Off-Block Time (AOBT) • Estimated Time Over (ETO) • Calculated Time Over (CTO) • Actual Time Over (ATO)

Sample data to be exchanged via SWIM-based MET Information Services, together with the Flight Information Services, to support ATFM operations

Use Case 1

- Integration of MET information in IWXXM with aerodrome information in AIXM to assess the crosswind at destination within a requested time period

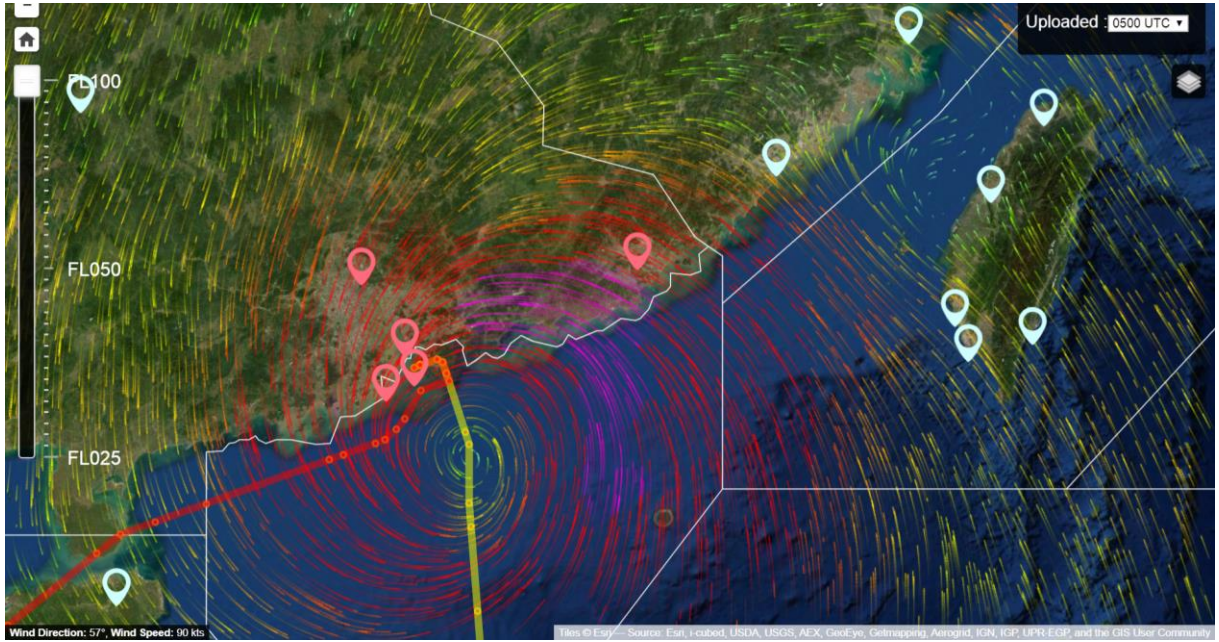


Use case 1: Ground Delay Program

- SWIM-enabled MET-ATM graphical display – Landing weather thresholds of aerodromes
- for ATC and airline to monitor the landing condition at alternate aerodromes

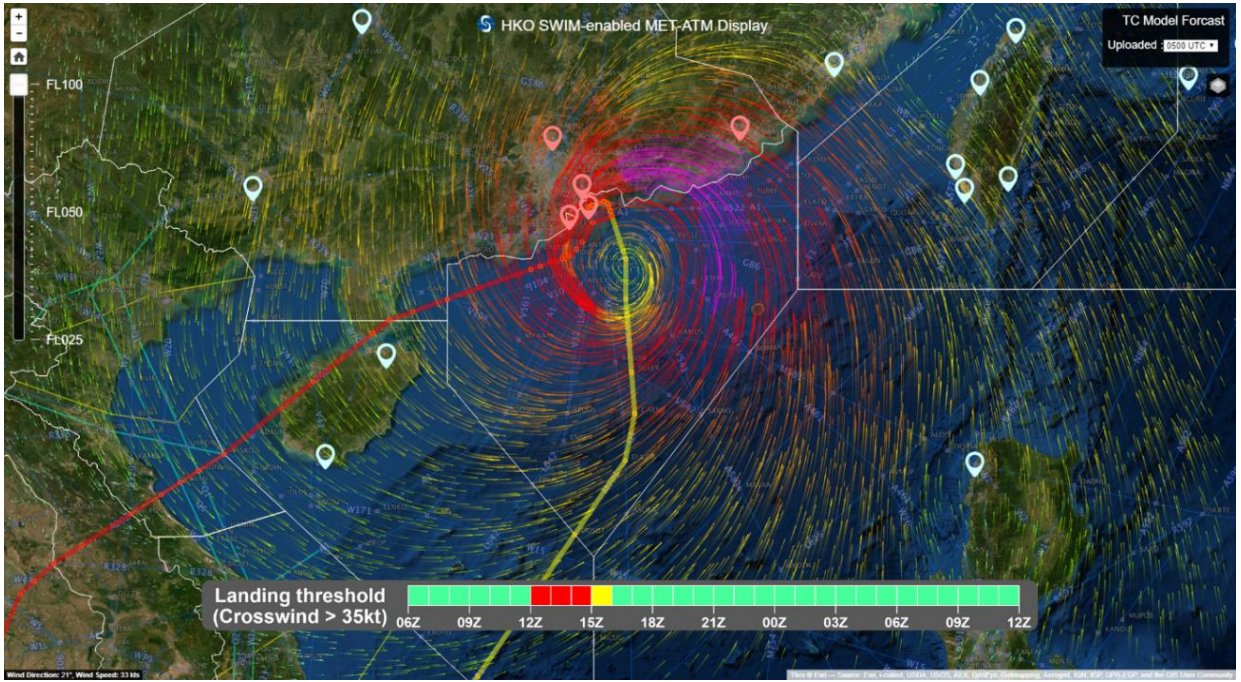
Based on user-specified operation thresholds

- Visibility
- Cloud base
- Wind gust
- Crosswind



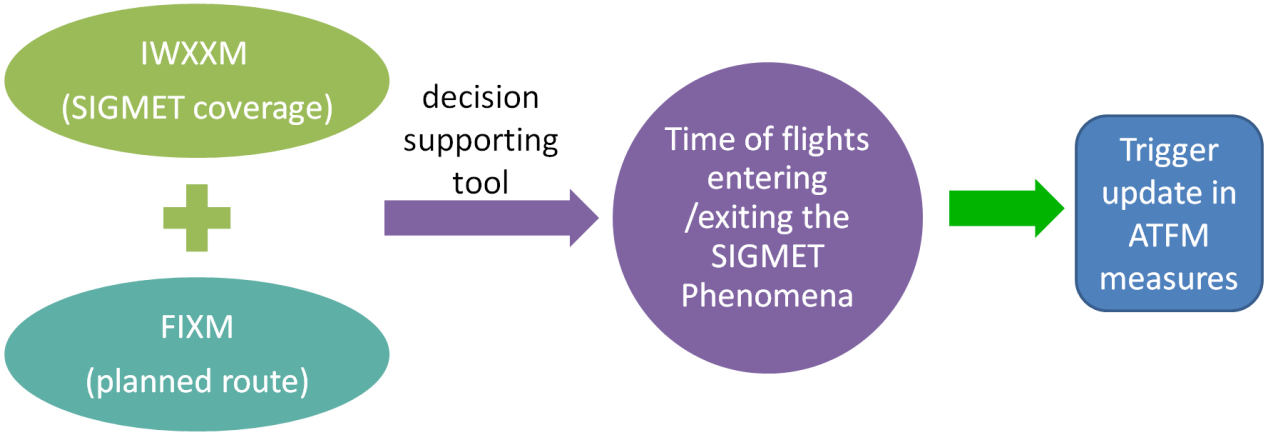
Use case 1: Ground Delay Program

- Based on weather elements extracted in digital TAF (received in IWXXM format)
- To support ATC's decision-making on when the airport arrival rate should be reduced and resumed normal



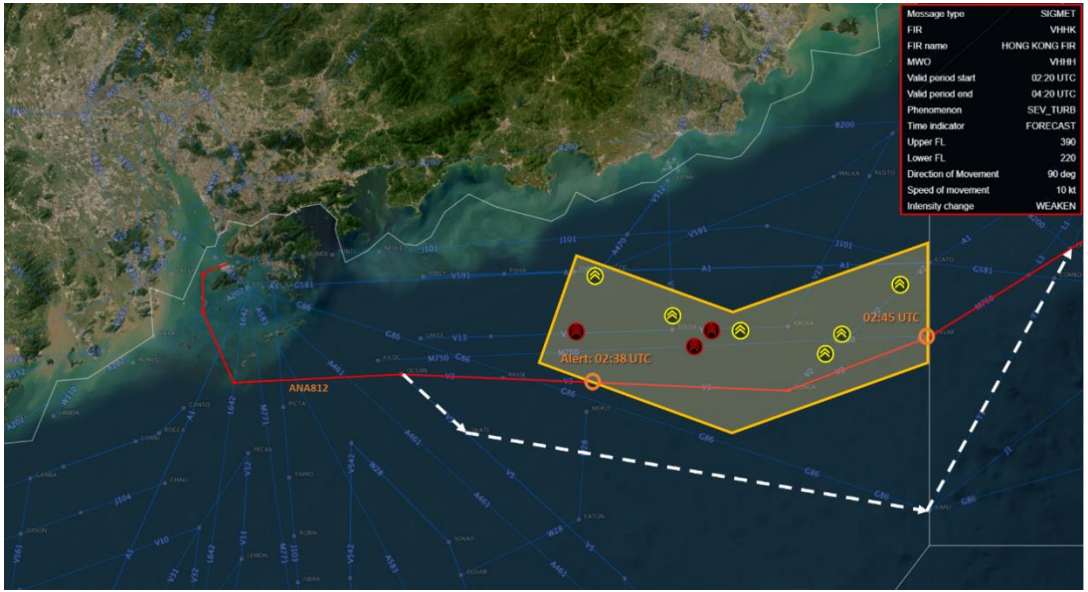
Use case 2

- Integration of MET information in IWXXM with flight information in (FIXM) to assess the number of flights crossing areas of significant weather phenomena mentioned in SIGMET reports (such as SEV TURB) within a requested time period

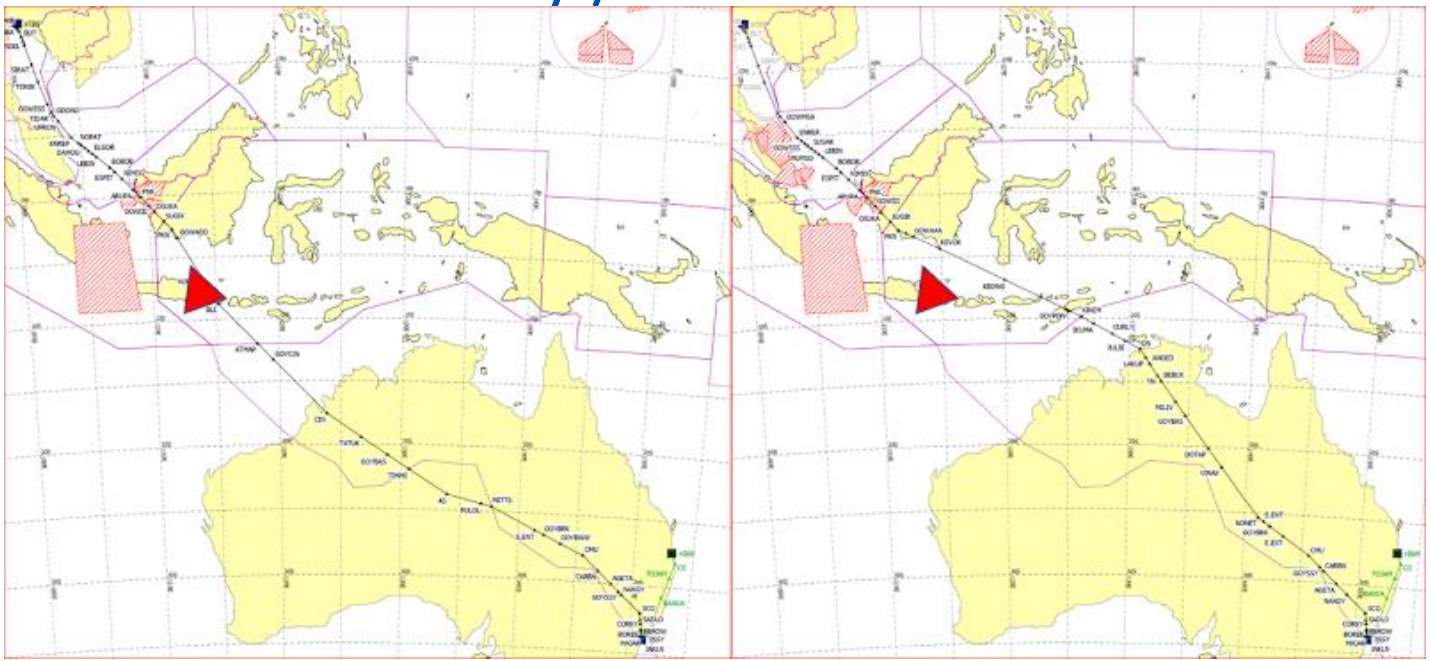


Use case 2: Airborne rerouting

- FPL and SIGMET exchanged in SWIM format
  - integrate flight and MET information in the automatic decision-supporting tool
  - better support the timely tactical decision making by the ATC and airlines

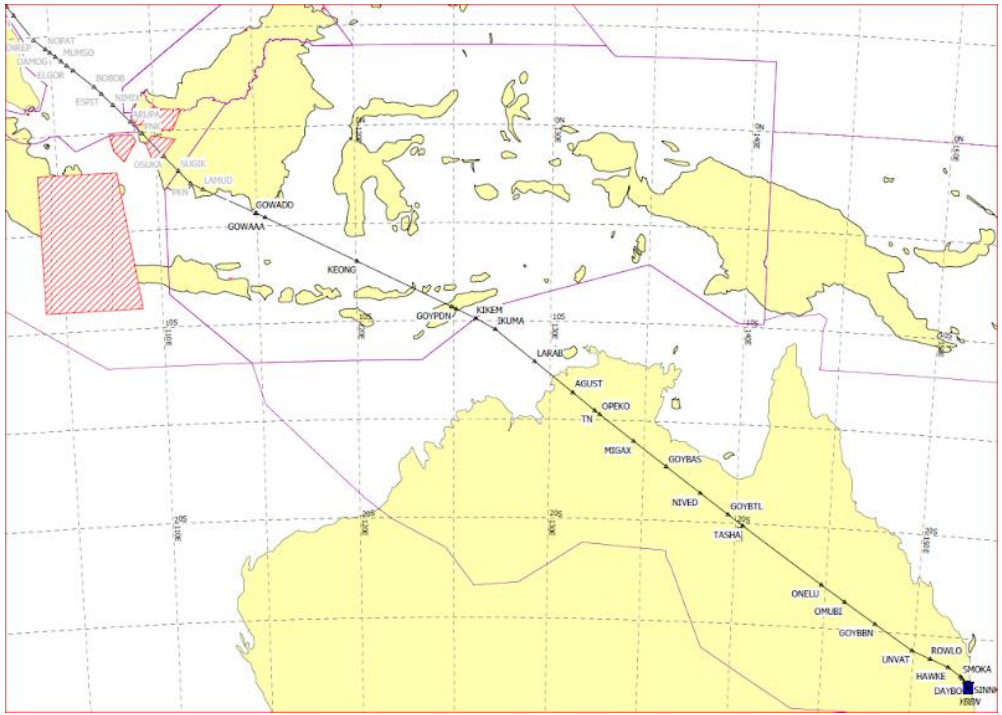


Use case 3: Volcanic ash avoidance based on digital Volcanic Ash Advisory / SIGMET



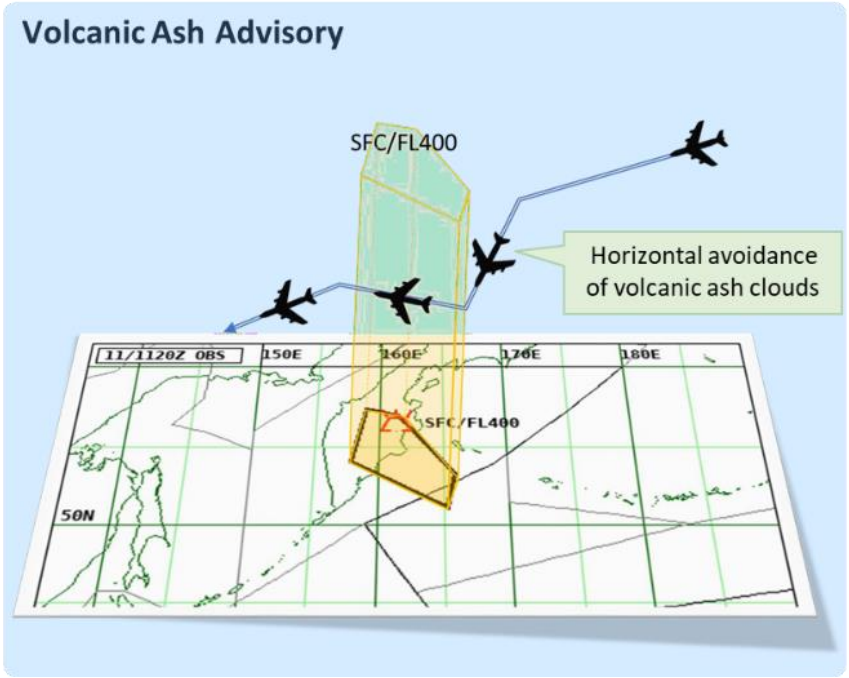
Route diversion for volcanic ash avoidance

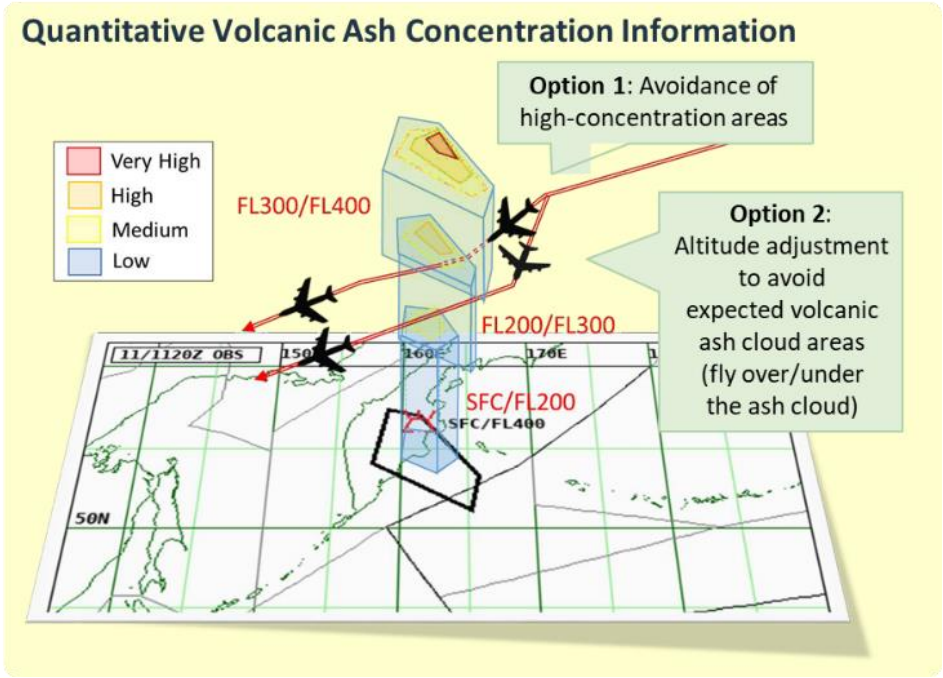
Use case 4: Early flight diversion due to fog



Early flight diversion from Sydney to Brisbane due to fog

Use case 5: Use of Quantitative Volcanic Ash Concentration Information in Trajectory-based Operation





How 4-D QVA quantitative / probabilistic forecast could support TBO

Use case 6: Weather impact assessment based on actual air traffic volume over Standard Terminal Arrival Routes

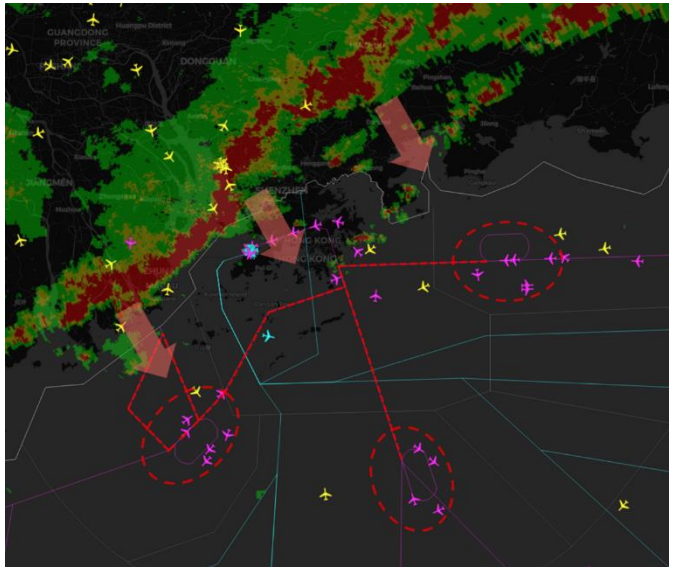


Illustration of severe thunderstorms approaching and posing potential impact on Standard Terminal Arrival Routes (dotted lines) and associated critical airspace (dotted ellipses) with high air traffic volume

From shared surveillance data

From MET information

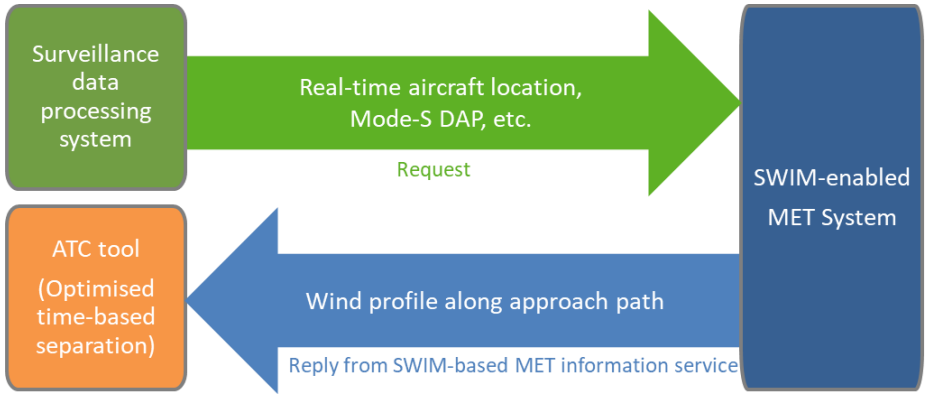
Forecast timing of Severe Thunderstorms	Air traffic volume over STARs and associated airspace			
	0-25%	25-50%	50-75%	75-100%
In 10 mins				
In 10-20 mins				
In 20-30 mins			✓	

Weather impact

- Normal
- Immediate risk
- High risk

Risk matrix for accessing the operational risk level on a Standard Terminal Arrival Route and the associated critical airspace if surveillance data could be integrated with MET information in SWIM

Use case 7: (potential future use case): Aircraft spacing management based on MET information and real-time surveillance information shared in SWIM



Conceptual data flow diagram showing the provision of SWIM-based MET information services for wake turbulence separation via request/reply

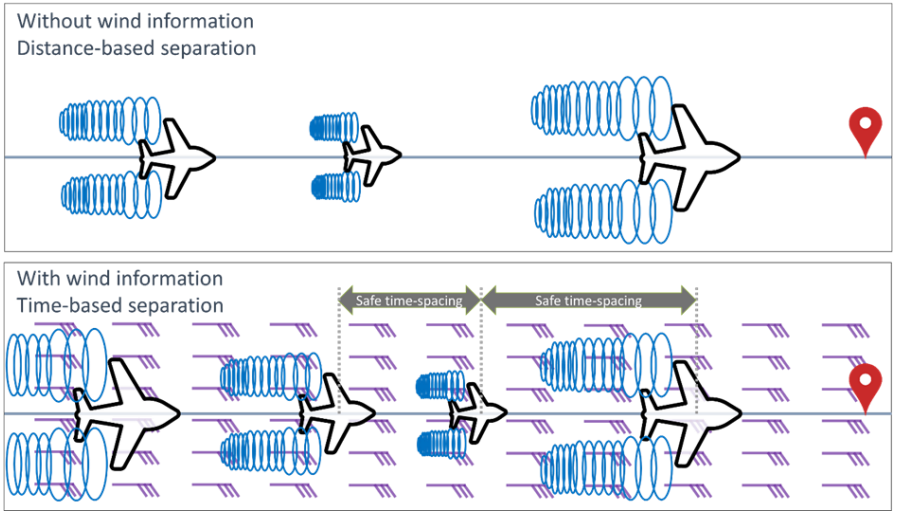


Illustration of the benefits of optimised time-based separation - if the provision of high-resolution wind profile along the approach path is made available through SWIM information service

Discussion

- This paper presents the updates on the work since ATFM/SG/14 and MET/R WG/13 in April 2024.
- SWIM TF/9 reviewed (May 2024) the draft reference document and suggested modifying the name of Use Case 7 to mention “MET information”. SWIM TF/9 noted that the document would be proposed for adoption by the MET SG/28 meeting.
- MET SG/28 (July 2024) reviewed proposed updates to the reference document developed based on the review by ATFM/SG/14, MET/R WG/13 and SWIM TF/9.

ICAO APAC MET Sub-group approved to publish the Document (July 2024)

Decision MET SG/28-08: Publishing the document on APAC Use Cases and User Requirements for SWIM-based Meteorological Information Services Supporting ATFM	
What: That, the MET SG approves to publish the proposed document on "*APAC Use Cases and User Requirements for SWIM-based Meteorological Information Services Supporting ATFM*" as a reference document on the ICAO APAC eDocument website which includes a procedure for updating the document as a living document.	Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical
Why: To collect further use cases for enhancing the document appropriately to assist in developing appropriate MET information services and the associated SWIM-enabled MET applications to meet the operational needs of ATFM in the APAC Region.	Follow-up: ☐ Required from States
When: As soon as practicable	Status: Adopted by Subgroup
Who: ☐Subgroups ☐APAC States ☒ICAO APAC RO ☐ICAO HQ ☐Other:	

- Noting the relevance of the document to global initiatives, MET SG/28 suggested the Secretariat could share the document with the other ICAO Offices for information.

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Discussion

- The first edition of the document (dated July 2024) has been published as a reference on the ICAO APAC eDocument website.
- Further changes to the document proposed by the ad hoc group are provided in Attachment A to this paper (WP/12) for consideration by the meeting.
- The document is intended to be a living reference and subject to ongoing review by the ad-hoc group. The collection of use cases could be expanded and improved over time as additional relevant events are identified.

Action by the meeting

a) note the information contained in this paper;

b) review the reference document provided in Attachment A and propose any changes for improvement;

c) discuss any relevant matters as appropriate.

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THANK YOU