



METEOROLOGY PANEL



ICAO APAC SWIM Workshop, 25-27 August 2026

Meteorological SWIM Services

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Rapporteur of METP WG-MIE
Chair of ICAO APAC MET-IE WG*





Outline



- ✈ Introduction
- ✈ Transition from products to information services
- ✈ Requirements for MET-SWIM
 - ✈ GANP ASBUs
 - ✈ Annex 3 and PANS-MET
- ✈ Current and Future MET-SWIM Services
- ✈ Stakeholder Impacts
 - ✈ Benefits
 - ✈ Challenges
- ✈ Key Takeaways



Introduction



- ✈ SWIM enables interoperability across the entire global air traffic management (ATM) system
- ✈ Meteorology in SWIM (MET-SWIM) applies the global SWIM framework to the aeronautical meteorological (MET) domain
- ✈ MET-SWIM is intended to replace the Aeronautical Fixed Service (AFS), the legacy point-to-point message exchange paradigm

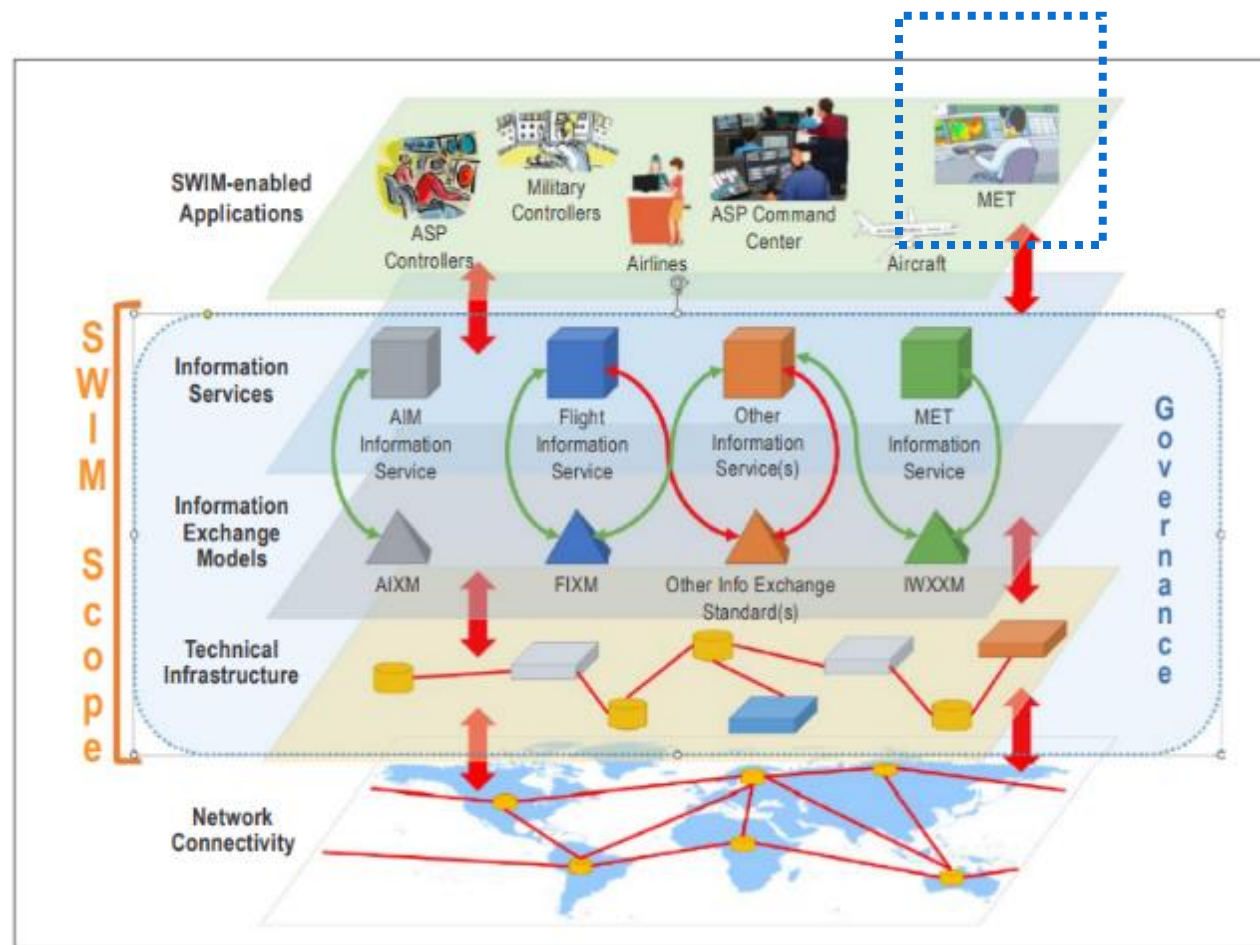


Figure 1-1 from ICAO Doc 10203, *Manual on SWIM Implementation*



✈ AMET Module – AMET Bx/4 - Dissemination

AMET B0/4: Dissemination of Meteorological Products

Commencement of IWXXM, being the conversion of TAC using an IWXXM schema into XML/GML.

AMET B1/4: Dissemination of Meteorological Information

IWXXM form starts to replace TAC products. Human-readable products start to be derived from the IWXXM information (rather than the other way around). The introduction of web services allows for progressive replacement of fixed line dissemination systems.

AMET B2/4: Dissemination of Information Services in SWIM

Implementation of a data-centric MET information into a SWIM environment. User-defined products derived from meteorological information in IWXXM. Wider use of secure web services and decommissioning of fixed line and satellite dissemination systems. Commencement of the use of business-to-business services, allowing integration of MET information into ATM systems. Increased use of air-to-air datalink for transmission of upper air meteorological observation in near real-time.

AMET B3/4: Dissemination of Information Services in SWIM

Continued implementation of a data-centric meteorological information service into SWIM. Enhancement of IWXXM with further schemas and formats for meteorological information exchange. User-defined products automatically derived from meteorological information IWXXM form. Extensive use of secure web services, in particular business-to-business services that allows full integration of meteorological information.



- ✈ Amendment 81 to ICAO Annex 3, *Meteorological Service for International Air Navigation*, included the following provision (ref. para. 2.2.10):

2.2.10 Recommendation.— *Contracting States should ensure that the meteorological information supplied to the users listed in 2.1.2 is provided through information services.*

Note 1.— In the context of system-wide information management (SWIM), the notion of information service addresses machine-to-machine interaction in a service-oriented architecture.

Note 2.— Procedures on information services are contained in the Procedures for Air Navigation Services – Information Management (PANS-IM, Doc 10199).

Note 3.— Guidance material on information services can be found in the Manual on System-wide Information Management Implementation (Doc 10203).

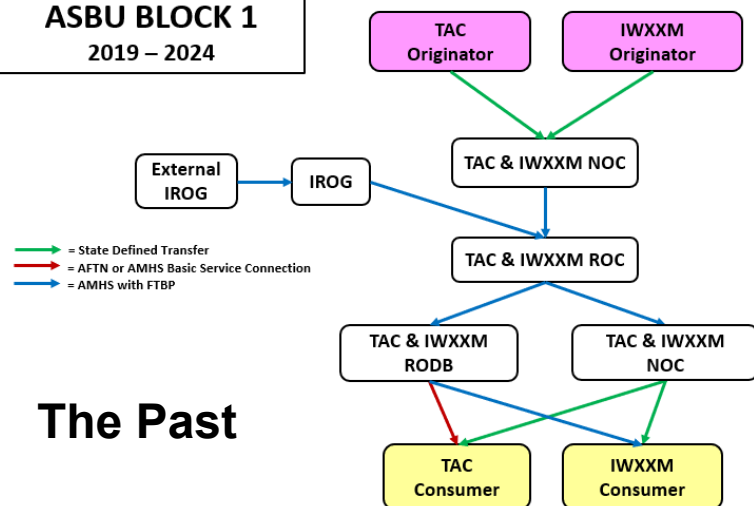
- ✈ ICAO METP is developing SARPs to enable information services for MET information



Current and future MET-SWIM services

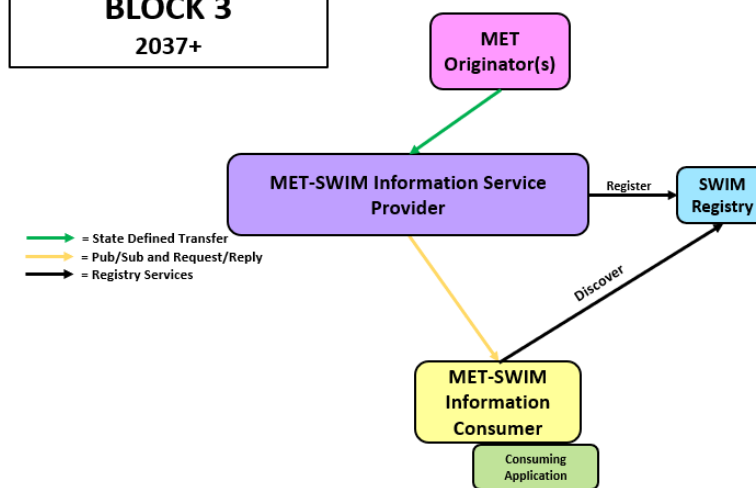


ASBU BLOCK 1 2019 – 2024



The Past

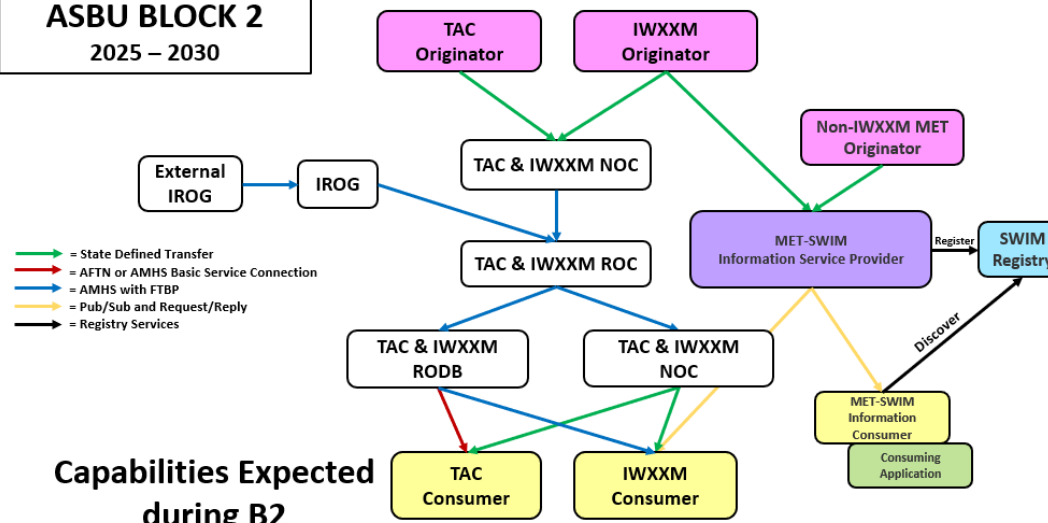
BEYOND ASBU BLOCK 3 2037+



The Future

The Present

ASBU BLOCK 2 2025 – 2030



Capabilities Expected during B2



Change from sparse, low-resolution products to dense, high-resolution, machine-readable datasets



Users can access as much data as required, creating custom dataset specific to user needs

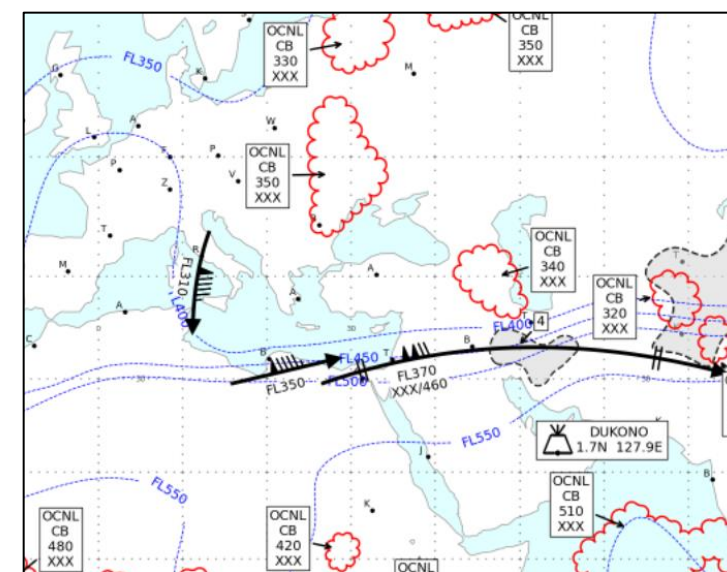
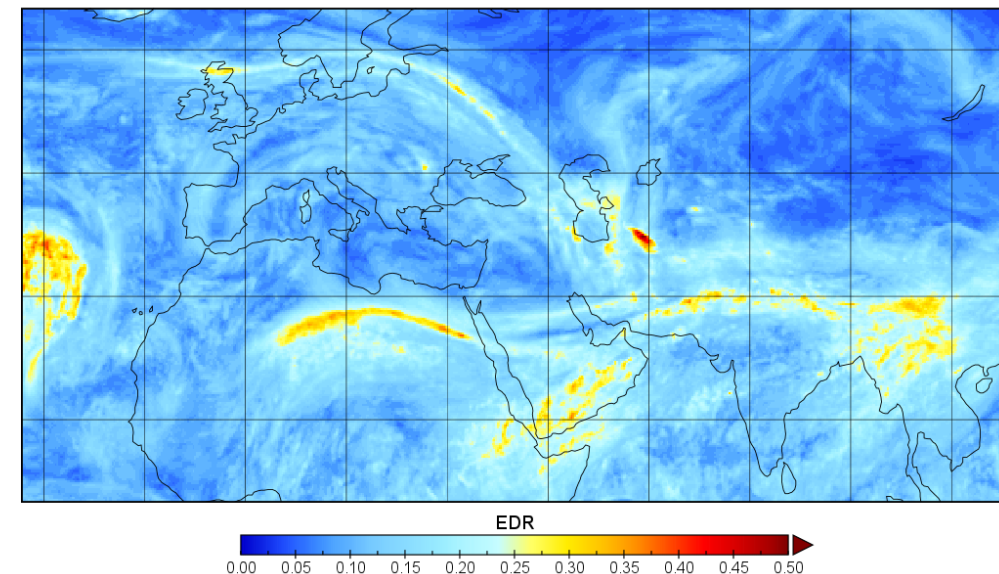


Flexible, adaptable, ensures users receiving only pertinent data



- ➔ **World Area Forecast System (WAFS) APIs**
 - ➔ SWIM compliant global weather data, provided by World Area Forecast Centres (WAFCs) London and Washington became operational in Nov 2025
 - ➔ Uses the Open Geospatial Consortium (OGC) Environmental Data Retrieval (EDR) API framework
 - ➔ Provides access to
 - ➔ upgraded WAFS gridded data sets
 - ➔ multi-timestep WAFS SIGWX forecasts,
 - ➔ global METARs, TAFs, SIGMETs and other advisories
 - ➔ National Met Services, ANSP's, Flight planning companies, Airlines, and other WAFS users must transition to these WAFS SWIM APIs by Nov 2028

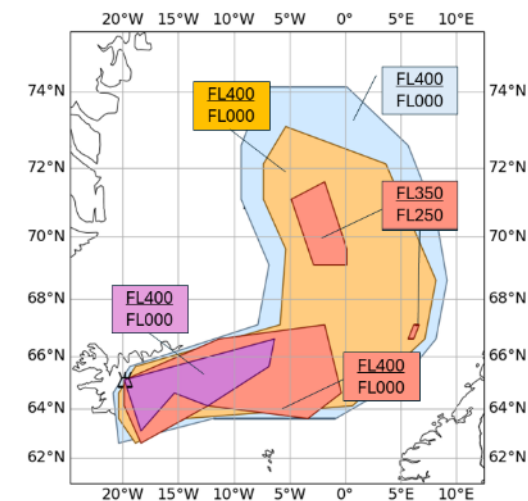
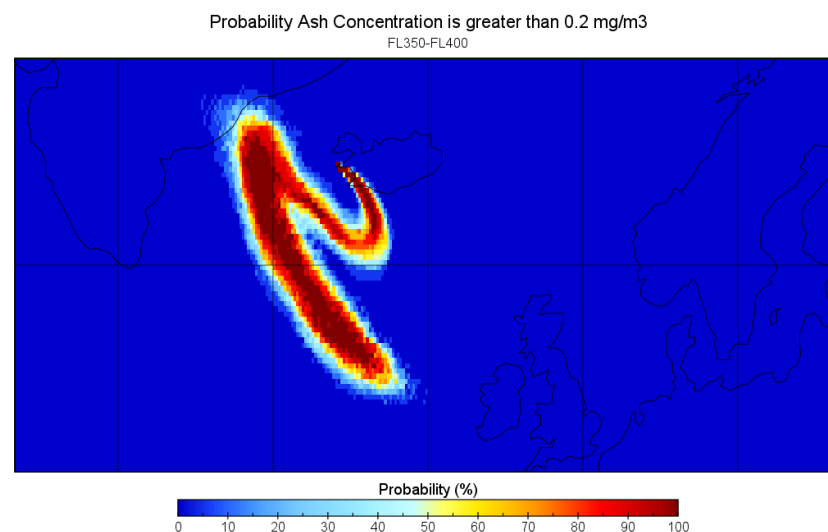
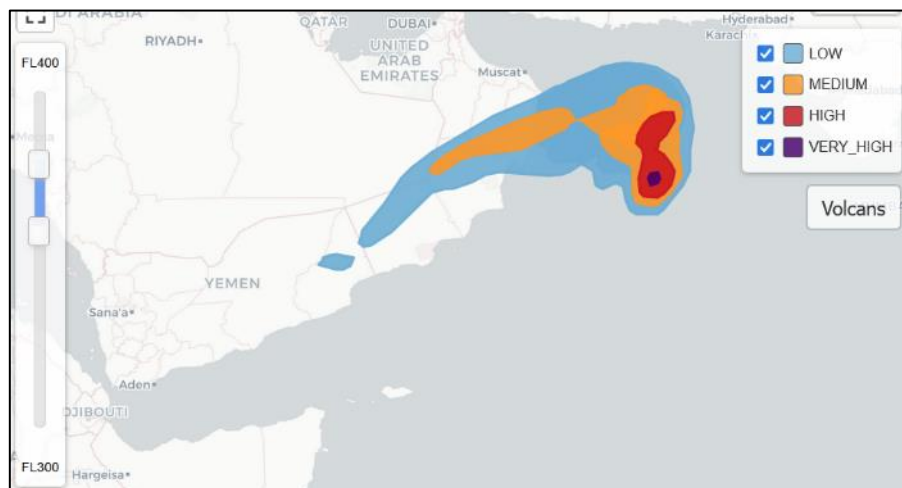
WAFS Turbulence
FL340





✈ Quantitative Volcanic Ash (QVA)

- ✈ Provides deterministic and probabilistic gridded ash concentration forecasts as well as QVA ash polygons
- ✈ Uses the AMQP and OGC-EDR API framework
- ✈ Supplies data to National Met Services, ANSP's, Flight planning companies, Airlines, and other aviation specific software suppliers across the globe
- ✈ Most VAACs commence operations in Nov 2026

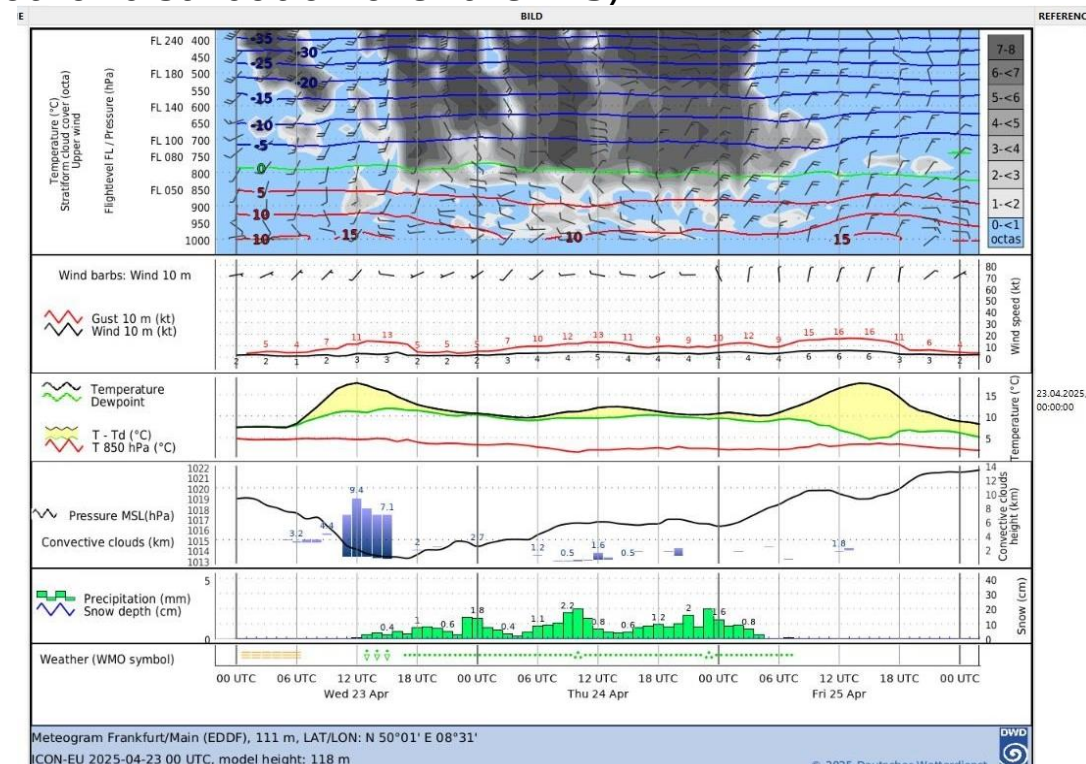




✈ Aerodrome Meteorological Observation Information Service (AMOIS) and Aerodrome Meteorological Forecast Information Service (AMFIS)

- ✈ planned to be the future aerodrome observations and forecasts, with significantly increased temporal resolution and optional parameters
- ✈ new IWXXM schema under development
- ✈ only be available via SWIM information services (e.g., not for distribution over the AFS)
- ✈ proposed recommended practice from Nov 2030

```
EHAM 090441Z 0906/1012 27008KT 9999 FEW018
BECMG 0907/0910 25018KT TEMPO 0910/1012 6000 SHRA SCT022CB PROB30
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BECMG 0920/0923 21008KT
BECMG 1007/1010 25016KT=
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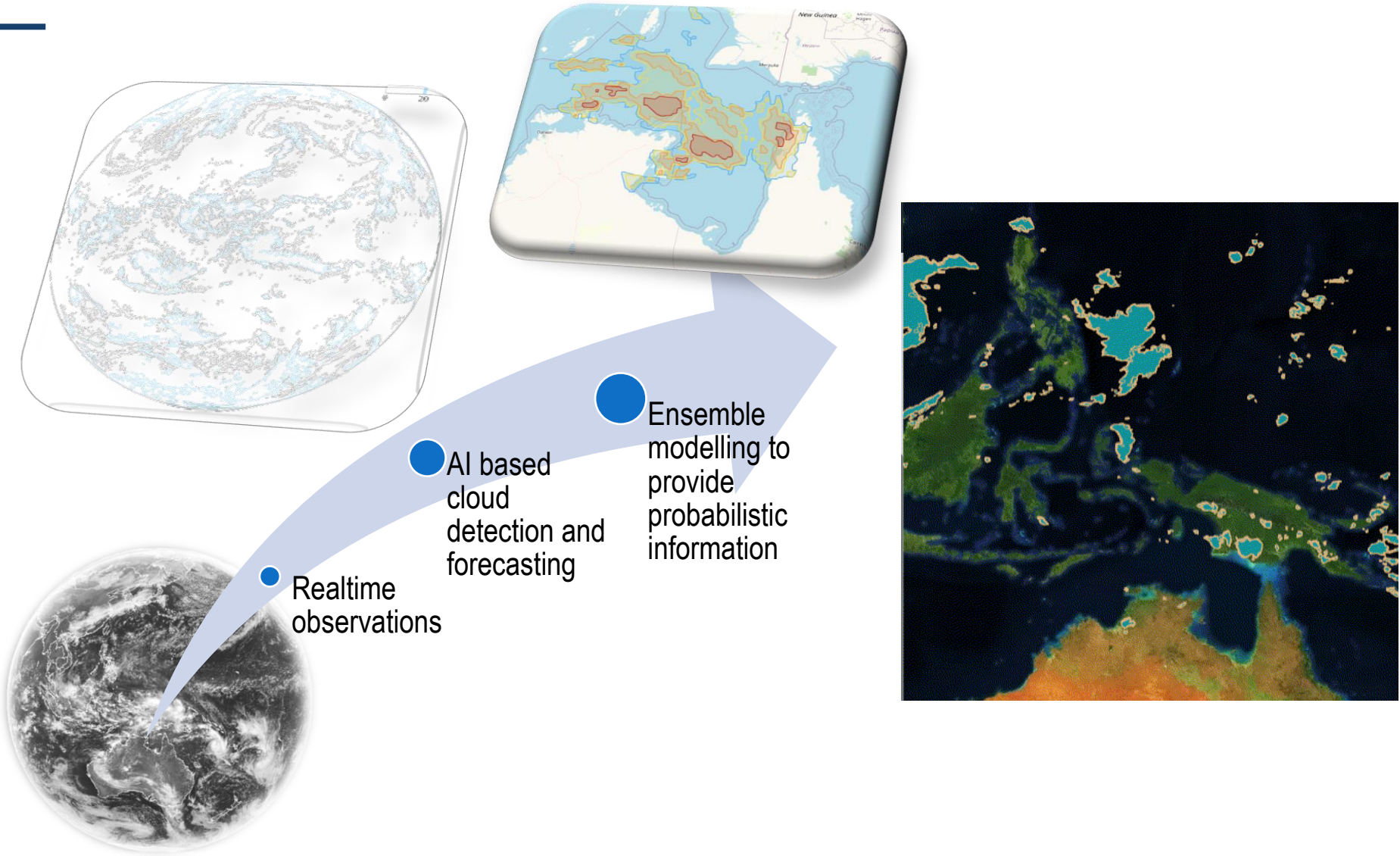
✈ **Hazardous Weather Information Service (HWIS)**

- ✈ is planned to be the future en-route warning information service, to complement SIGMETs
- ✈ Initial HWIS parameters: CB clouds, turbulence and icing
- ✈ Consists of analysis, nowcast and forecast data: T+0 to T+6 hrs
- ✈ Consolidation of state-level hazardous weather information into regional datasets by data aggregators
 - ✈ Contributors: in principle, state level data to be provided by local Met Service Providers
 - ✈ Missing data supplemented by WAFC data (as a fall-back)
- ✈ Proposed recommended practice from November 2033

✈ **Space Weather Information Service (SWIS)**

- ✈ Advises of impacts to HF COM & GNSS and radiation via SWIM services
- ✈ Proposed recommended practice from November 2030

HWIS (Hazardous Weather Information Service)





Legacy TAC data creation

EHAM 091925Z 24014KT 9999 FEW022 15/09 Q1014 TEMPO 6000 TSRA S
EHAM 091955Z 25013KT 210V270 9999 -SHRA FEW019 FEW028CB 15/10
TEMPO 27020G32KT 6000 TSRA=

End user interpretation



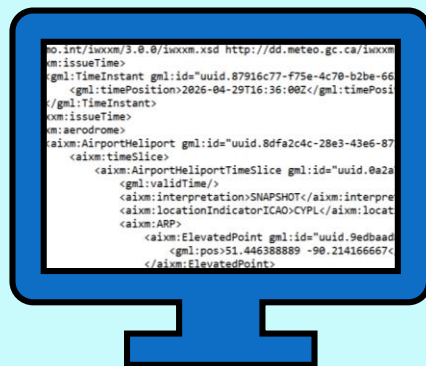
IWXXM data creation

```

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t/iwxm/3.0.0/iwxm.xsd http://dd
sueTime>
TimeInstant gml:id="uuid.87916c77
gml:timePosition>2026-04-29T16:36
:TimeInstant>
ssueTime>
odrome>
:AirportHeliport gml:id="uuid.8df
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  <aixm:AirportHeliportTimeSlice
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```

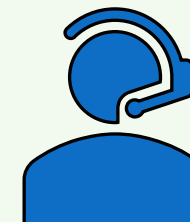
Data ingestion into digital systems



Visualisation / Decision support tools



End user interpretation





- Challenges of implementing MET-SWIM services:
 - Much larger data volumes
 - Systems must be adapted to handle influx of data
 - Users typically only select data they need
 - Not every State has the same capabilities
 - Visualization of MET data
 - As visualization will fall on the users and not be standardized
 - Investment requirements
 - Sustainability of legacy systems (end of lifecycle) and persistent use of legacy products
 - Costs associated with implementing new systems
 - Regulatory changes required



Key takeaways



- ➔ ICAO has endorsed the transition to data-centric MET services
- ➔ WAFS & QVA are current MET information services
- ➔ AMOIS, AMFIS, and HWIS define the next generation
 - ➔ Final requirements and timelines being actively developed by the ICAO MET Panel
- ➔ Stakeholders should:
 - ➔ Stay informed of progress on implementation plans
 - ➔ Participate in national, regional, and global planning
 - ➔ Collaborate with system developers to ensure SWIM and IWXXM readiness
 - ➔ Educate and prepare to adopt future MET information services





Key takeaways



SWIM INFRASTRUCTURE



DIGITAL DATA SETS (IWXXM)



DIGITAL DATA VIEWERS (MODERN
TECHNOLOGY, SOFTWARE / APPS)



5. Key Documents

- Global Air Navigation Plan <https://www4.icao.int/ganpportal/>
 - ICAO Annex 3 <https://elibrary.icao.int/product/264207>
 - ICAO PANS-MET (Doc 10157) <https://store.icao.int/en/procedures-for-air-navigation-services-meteorology-pans-met-doc-10157>
 - MET-SWIM Roadmap
 - MET-SWIM Implementation Guidelines
 - IWXXM Guidelines for OPMET Exchange
- <https://www.icao.int/APAC/apac-electronic-documents>



METEOROLOGY PANEL



ICAO EUR/NAT and MID Seminar on SWIM, 23-25 June 2026

Thank you!