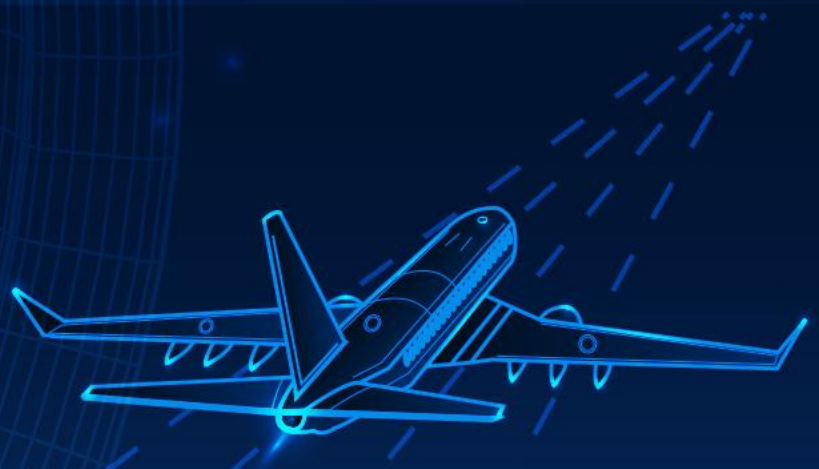
Modernization of Aeronautical MET Services



INTERNATIONAL CIVIL AVIATION ORGANIZATION

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Presentation Overview

01 Evolution of MET Services

02 ICAO GANP

03 Future MET Information Services

04 Key Takeways

05 Further Information

1. Evolution of MET services

From static products to dynamic services

Traditional approach	Future approach
Static, text-based products (e.g., METAR, TAF)	Dynamic, machine-readable data (e.g. IWXXM)
Point to point circuits for distributing products	Mesh networks allowing access from anywhere
Limited integration with automated systems	Seamless integration with ATM and airline systems and decision aids

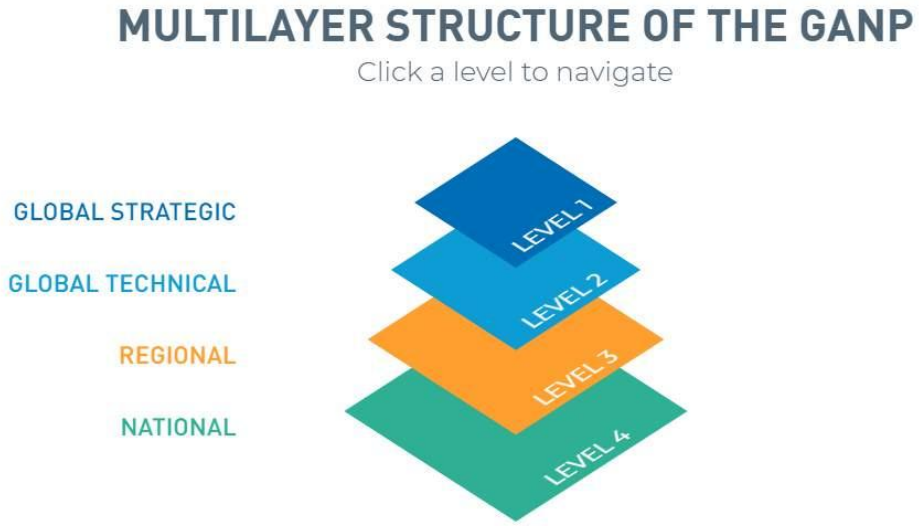
Teletype Machines

Aviation Weather Display

2. ICAO Global Air Navigation Plan (GANP, Doc 9750)

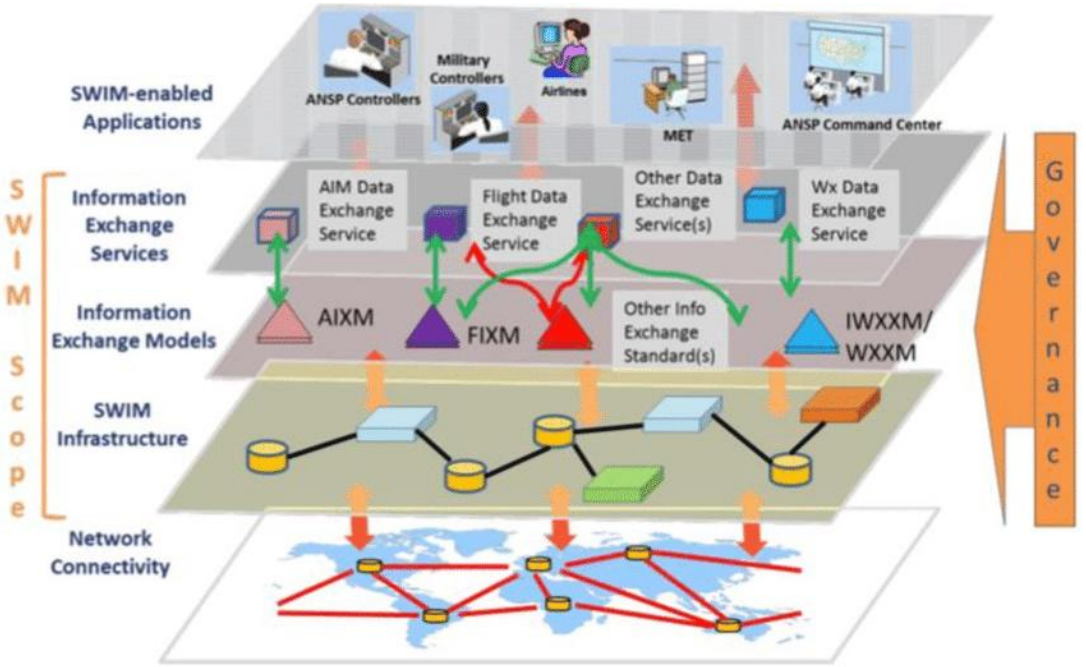
- The GANP is an important planning tool for setting global priorities to drive the evolution of the global air navigation system
- Ensure that the vision of an integrated, harmonized, globally interoperable and seamless system becomes a reality.
- Multi-layer structure of air navigation plans, from global (GANP), regional (RANP) to national (NANP) levels.

URL: https://www4.icao.int/ganpportal/



SWIM – The digital backbone of Future MET Services Provision

- System Wide Information Management (SWIM) is the foundation of a global, interoperable, and data-centric aviation ecosystem.
- Key requirements for MET:
  - Met data in IWXXM format
  - Delivery via web services
  - Supports automation and decision aiding systems
  - Ensures global and cross-domain interoperability



SWIM Global Interoperability Framework
ICAO Manual on SWIM (Doc 10039)

MET-SWIM

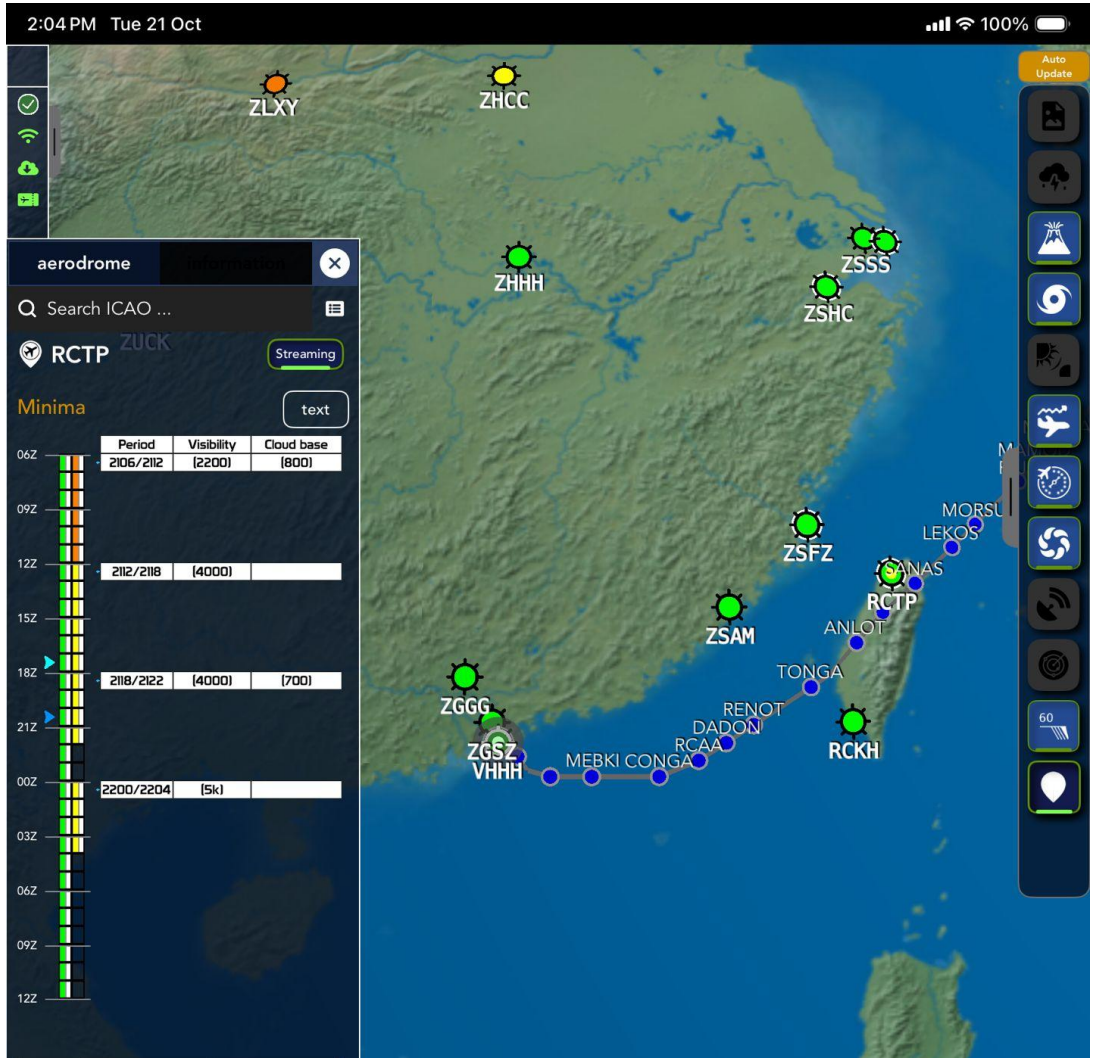
- ICAO GANP defines information service provision and consumption should commence within Aviation System Block Upgrade (ASBU) 2 (2025-2030)
- Roadmap for Meteorology in System Wide Information Management (MET-SWIM Roadmap) describes the transition plan and associated timelines for implementing MET-SWIM, including TAC cessation in 2030
- MET-SWIM Roadmap describes change across ASBUs 1-4, including
  - communication protocols
  - information exchange services
  - data types
  - data addressing

ASBU Element	ASBU Element Description	ASBU	Timeline
AMET-B1/4	Dissemination of MET Information	1	2019 – 2024
AMET-B2/4	MET Information Service in SWIM	2	2025 – 2030
AMET-B3/4	MET Information Service in SWIM	3	2031 – 2036
AMET-B4/4	MET Information Service in SWIM	4	2037 – 2042

Source: *MET-SWIM Roadmap*, Table 1

Consuming IWXXM reports

- IWXXM is consumed by systems (not humans!)
- IWXXM is consumed by automated processes & visualized for users
- TAC is one form of visualization



The gap between IWXXM and TAC is widening

- Some IWXXM reports has more information than their TAC counterparts:
  - IWXXM METAR can report more than 4 RVRs if necessary
  - IWXXM METAR can report temperature in tenth of a degree
  - Polygons in IWXXM SIGMET can have more than 7 points
- New reports are having IWXXM versions only
  - WAFS Significant Weather Forecast
  - Quantitative Volcanic Ash Concentration Information (QVA)

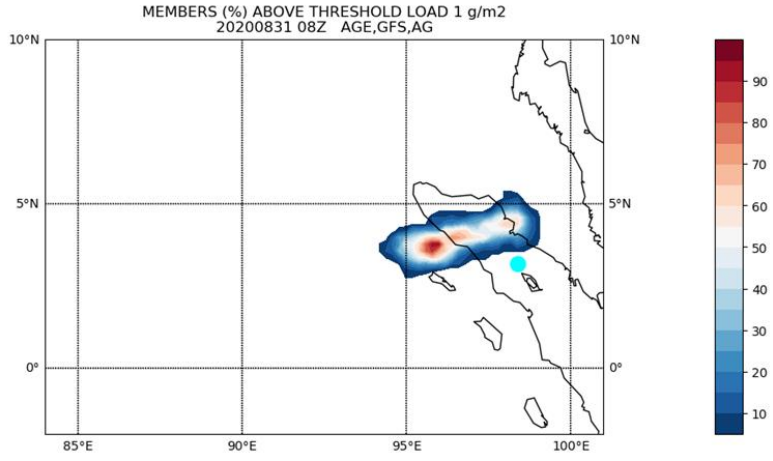
Expected Initial MET-SWIM Services

SADIS & WIFS API: Enhancing Aviation Data Services

- **Operational in 2024**:
  - **SADIS** (WAFC London) & **WIFS API** (WAFC Washington) provide access to global aviation met data
  - Both are SWIM-compliant, based on the OGC Environmental Data Retrieval (EDR) API framework
- **Key Data Provided**:
  - Upgraded WAFS gridded data, METARs, TAFs, SIGMETs, WAFS SIGWX forecasts

Quantitative Volcanic Ash Concentration Information (QVA)

- Introduced in Amendment 82 to Annex 3 (effective 27 Nov 2025)



Expected Initial MET-SWIM Services (Cont.)

AMOIS (Aerodrome Meteorological Observational Information Service)

- Provides aerodrome observations with higher fidelity than METAR, SPECI, etc., in terms of representation, spatial/temporal accuracy, and coverage

AMFIS (Aerodrome Meteorological Forecast Information Service)

- Delivers aerodrome forecasts beyond the specifications of TAF, TREND, and other current aerodrome forecasts

HWIS (Hazardous Weather Information Service)

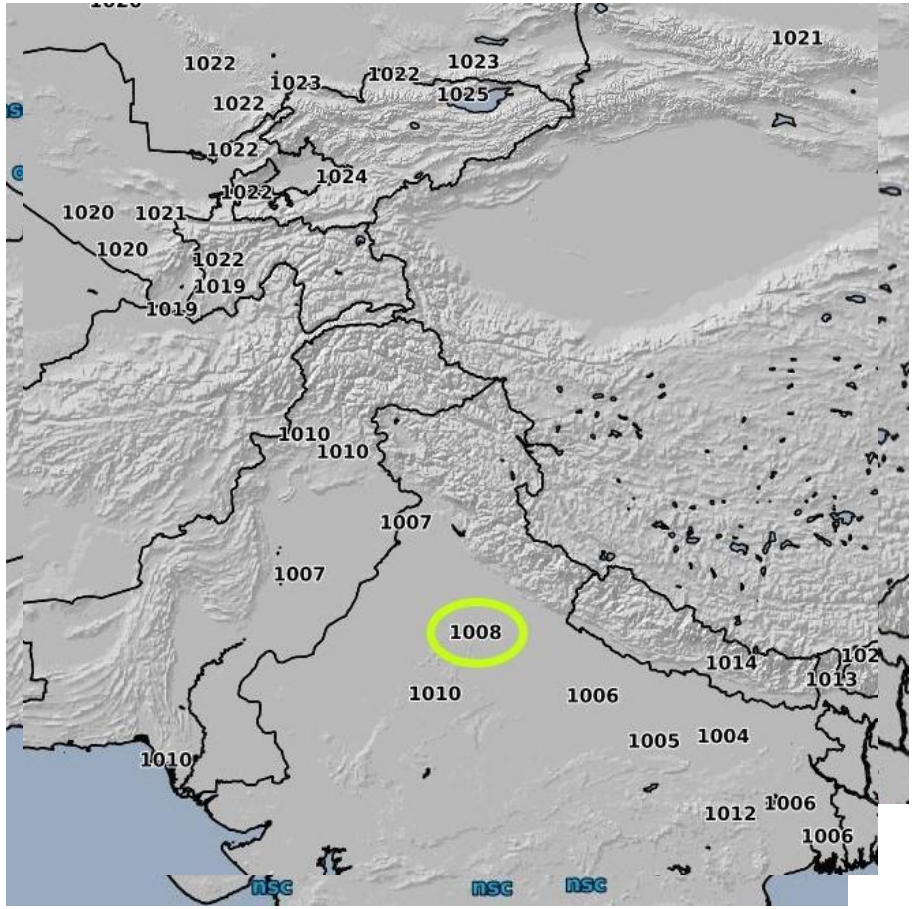
- Provides standardized, harmonized, and high-resolution information on hazardous weather—such as CB, icing, and turbulence—in gridded and object form.

Implementation

- Expected introduction as Recommended Practices in **Amendment 84** to Annex 3 and **Amendment 2** to PANS-MET, with applicability in **November 2030**
- Service providers must register and publish their services in a standardized format

AMOIS (Aerodrome Meteorological Observational Information Service

STATION-ID	OBSERVATION TIME	METAR
VIDP	23.04.25, 01:30	SAIN32 VIDP 230130 METAR VIDP 230130Z VRB02KT 3000 HZ NSC 24/03 Q1008 NOSIG=



AMFIS (Aerodrome Meteorological Forecast Information Service)

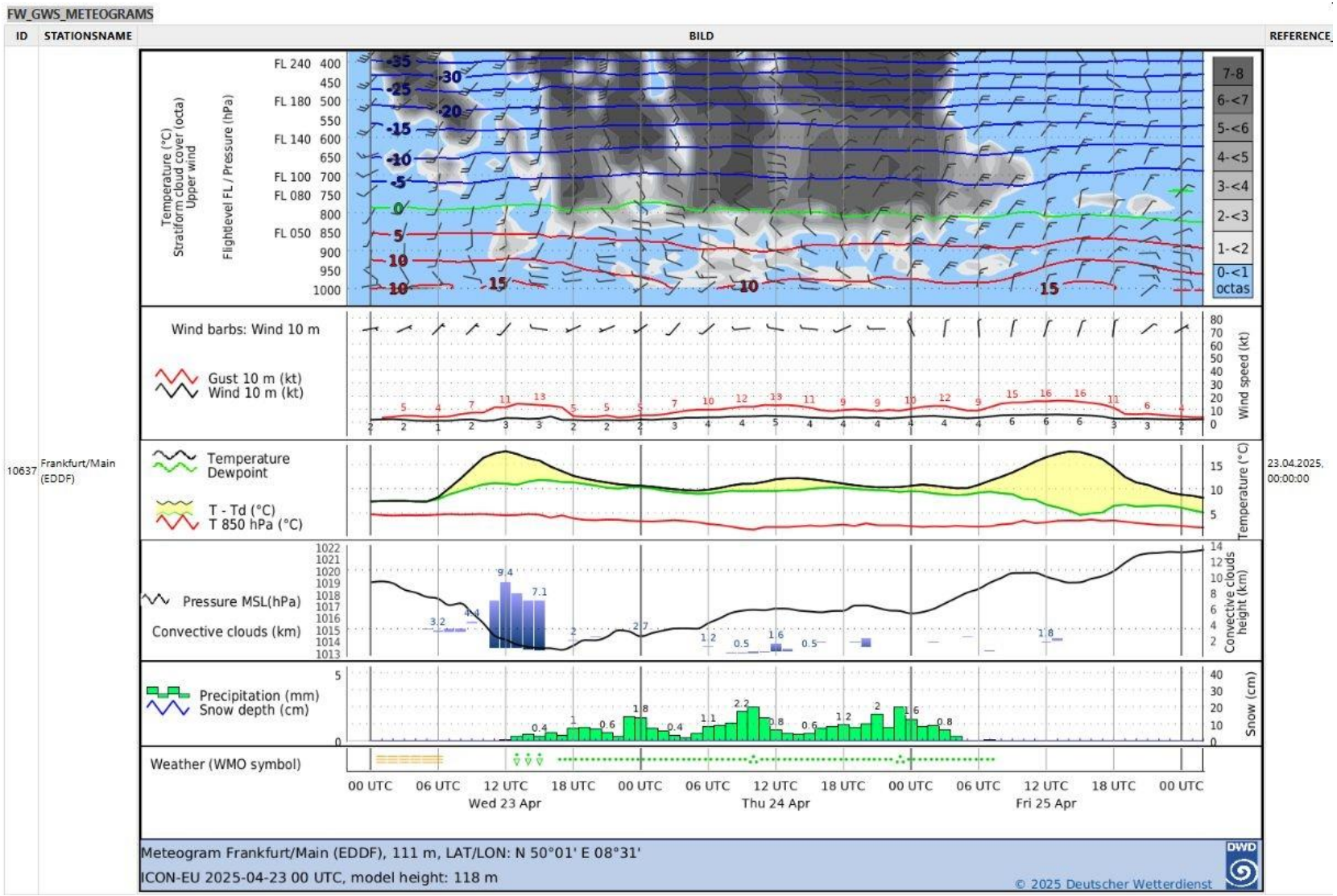
TAF EDDF 230500Z 2306/2412
05004KT CAVOK

BECMG 2309/2312 25005KT

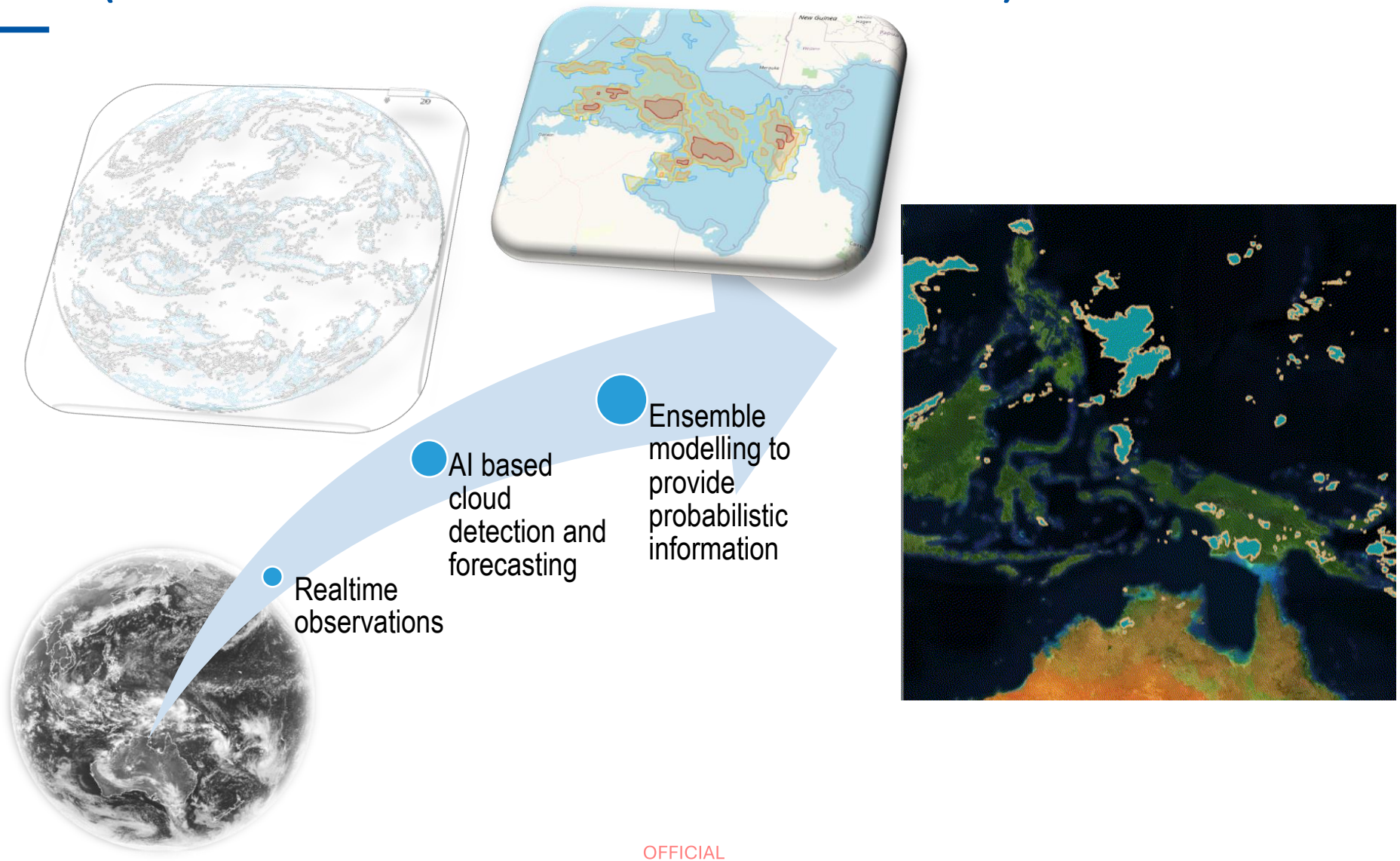
TEMPO 2311/2318 SHRA BKN030CB
PROB30 TEMPO 2313/2317 3000
TSRA

BECMG 2318/2320 FEW012 BKN030

PROB40 TEMPO 2318/2408 RA
PROB30 TEMPO 2405/2410 BKN012=



HWIS (Hazardous Weather Information Service)



4. Key Takeaways

- ICAO has endorsed the shift to data-centric MET services
- ICAO is consulting States on the removal of the requirement to exchange OPMET in TAC form from 2030
- Generating IWXXM is the first step (preferably from source)
- Transitioning from METAR, TAF, SIGMETs to digital, automated services (quality data is essential)
- AMOIS, AMFIS, HWIS define the next generation aviation weather data
- Final requirements and timelines are still under review by the ICAO MET Panel
- Start thinking and preparing for future MET information services
- IWXXM via SWIM will not be in bulletins, meaning data available sooner.

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

Thank You

ICAO