ICAO BANGKOK

Meteorological Phenomena affecting ATM operations

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Bangkok, Thailand, 25 – 27 June 2024

Outline

- Impact of MET on aviation (statistics)
- Impact of MET on aviation (VA and TC)
- ICAO SARPs and guidance

Meteorological Phenomena affecting ATM operations

Weather impacts on air traffic management

In Europe, **“adverse weather”** is attributed as the 2nd biggest delay category amongst en-route ATFM Delays; just ahead of “ATC Staffing” and behind only “ATC Capacity”.

[Source: EUROCONTROL – Performance Review Report 2018]

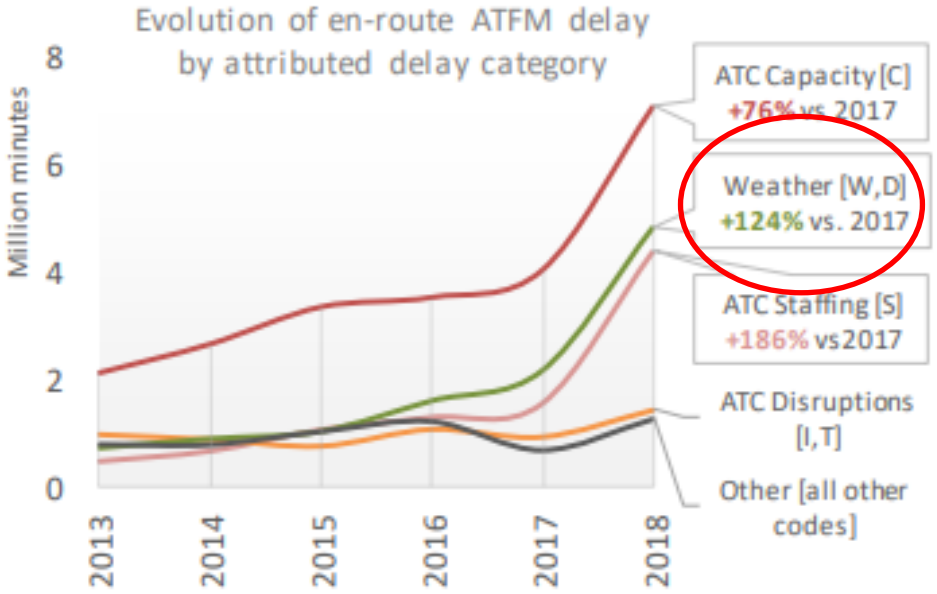
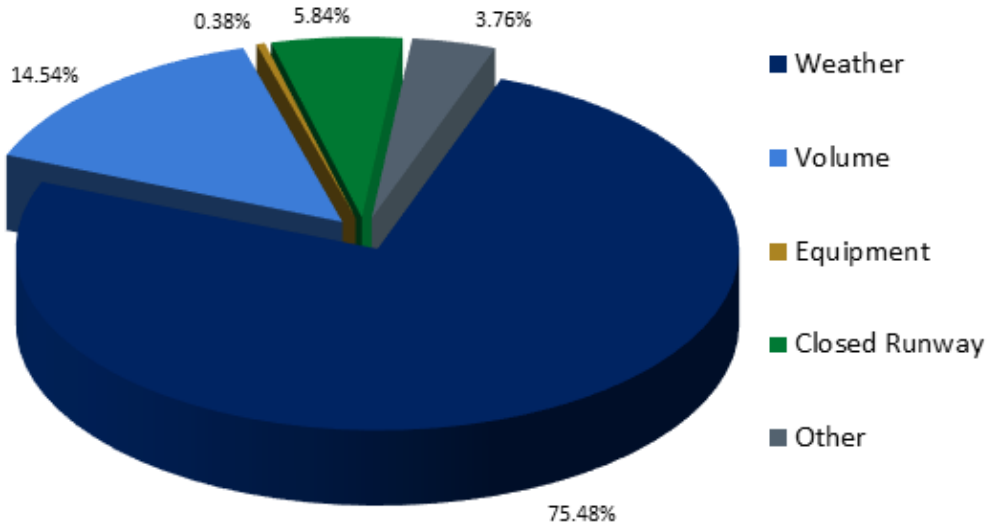


Figure 3-4: En-route ATFM delay by attributed delay category

Weather is the largest cause for flight delays

The largest cause of air traffic delay in the US National Airspace System is the weather.

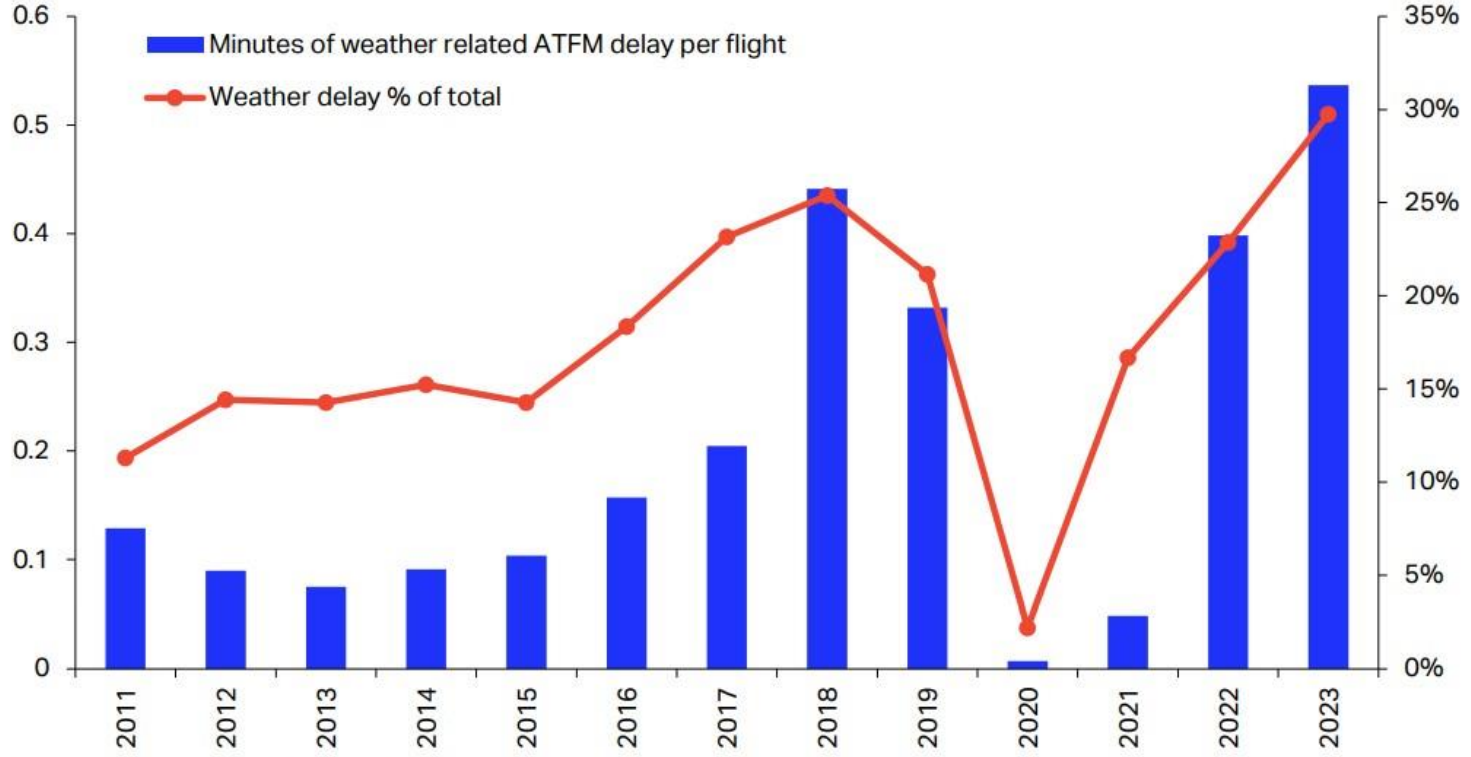
The pie chart shows that weather caused 75.48 percent of system-impacting delays of greater than 15 minutes over the six years from June 2017 to May 2022



Text and graphics originally presented by the Finnish Meteorological Institute

Weather-related operational disruptions are rising

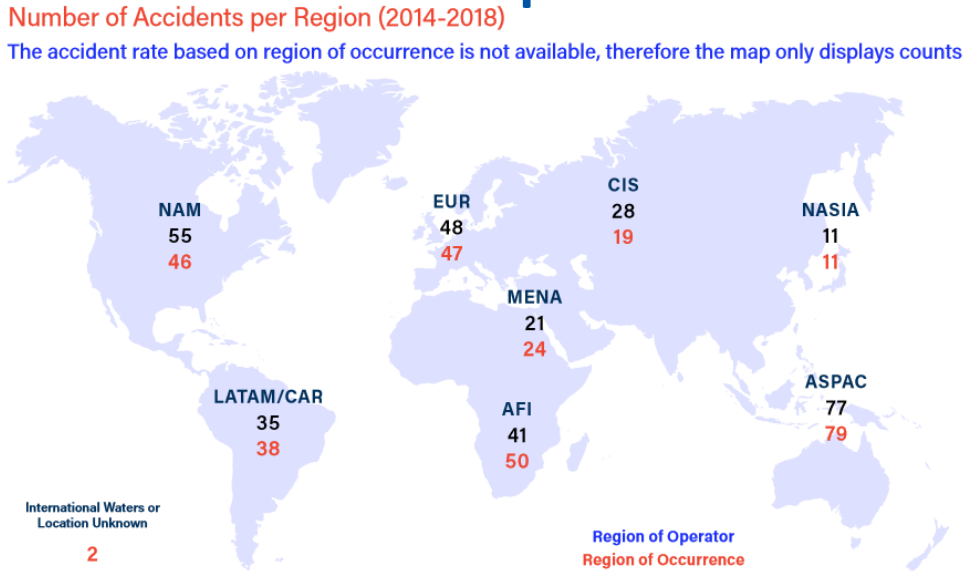
Impact of weather events on flight delays in Europe: Minutes of weather-related air traffic flow management (ATFM) delay per flight (left) & weather delay in % of total ATFM delay (right)



Source: IATA Sustainability and Economics, Eurocontrol

Text and graphics originally presented by the Finnish Meteorological Institute

Weather impacts on aviation safety



2014-2018 Aircraft Accidents – Accident Count

[Source: IATA SAFETY REPORT 2018, Edition 55]

Top Primary Contributing factors

Latent Conditions

Regulatory Oversight: 31%

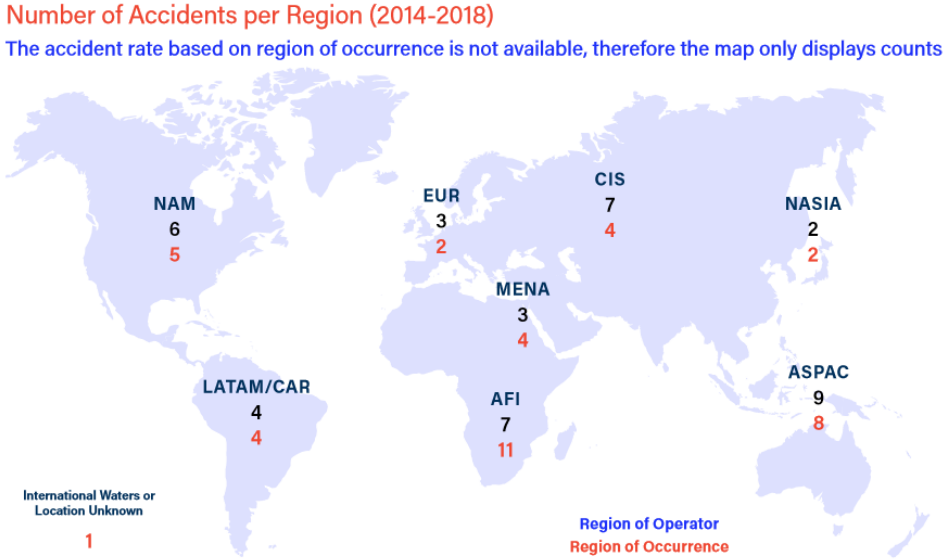
Threats

Meteorology: 33%

Flight Crew Errors

Manual Handling/Flight Controls: 37%

Weather impacts on aviation safety



2014-2018 Fatal Aircraft Accidents – Accident Count

[Source: IATA SAFETY REPORT 2018, Edition 55]

Top Primary Contributing factors

Latent Conditions

Safety Management: 54%

Threats

Meteorology: 46%

Flight Crew Errors

SOP Adherence / SOP Cross-verification: 61%

Weather impacts on aviation safety

2. THREATS

Definition: An event or error that occurs outside the influence of the flight crew, but which requires crew attention and management if safety margins are to be maintained.

Mismanaged threat: A threat that is linked to or induces a flight crew error.

Environmental Threats	Examples
Meteorology	See the following breakdown
	↗ Thunderstorms
	↗ Poor visibility/Instrument Meteorological Conditions
	↗ Wind/wind shear/gusty wind
	↗ Icing conditions
	↗ Hail

[Source: IATA SAFETY REPORT 2018, Edition 55]

- Tropical cyclone impacts
  - safety, regularity and efficiency of air traffic
- Hurricane Sandy, United States (October 2012)
  - negative impact on air traffic capacity
- Typhoon Vicente, Hong Kong, China (July 2012)
  - deflated airline's traffic growth
- Typhoon Jebi, Kansai, Japan (September 2018)
  - storm surge, flooding, extreme wind

- Volcanic ash impacts
  - safety, regularity and efficiency of air traffic
- BA 09, “Jakarta incident” (June 1982)
  - failure of all four engines
- Eyjafjallajökull, Iceland (April 2010)
  - airspace closed to air traffic (Europe)
- Puyehue-Cordón Caulle, Chile (June 2011)
  - airlines cancelled hundreds of flights

ICAO Annex 3

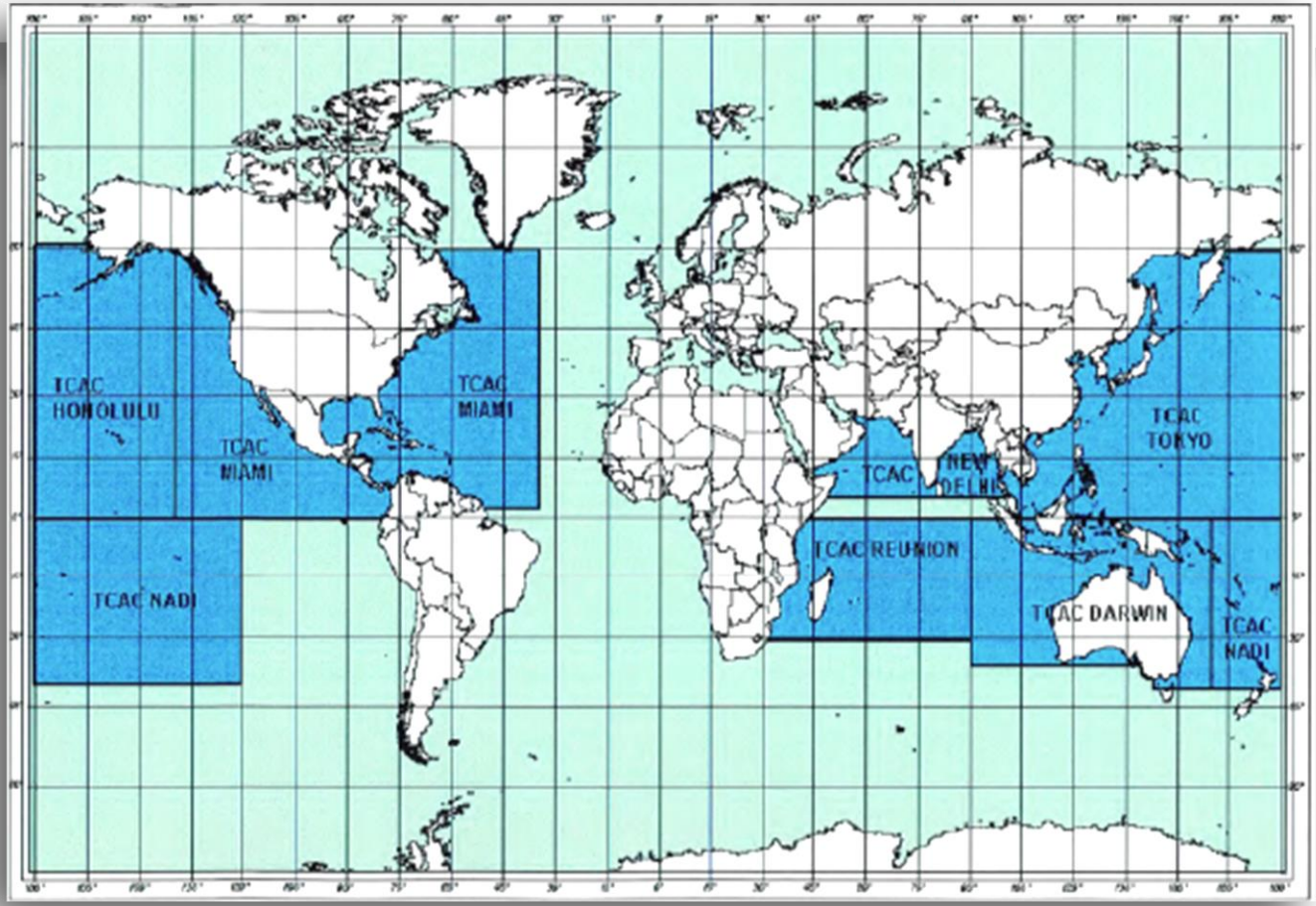
- Meteorological Service for International Air Navigation
- Standards and Recommended Practices relating to meteorology

ICAO Annex 3

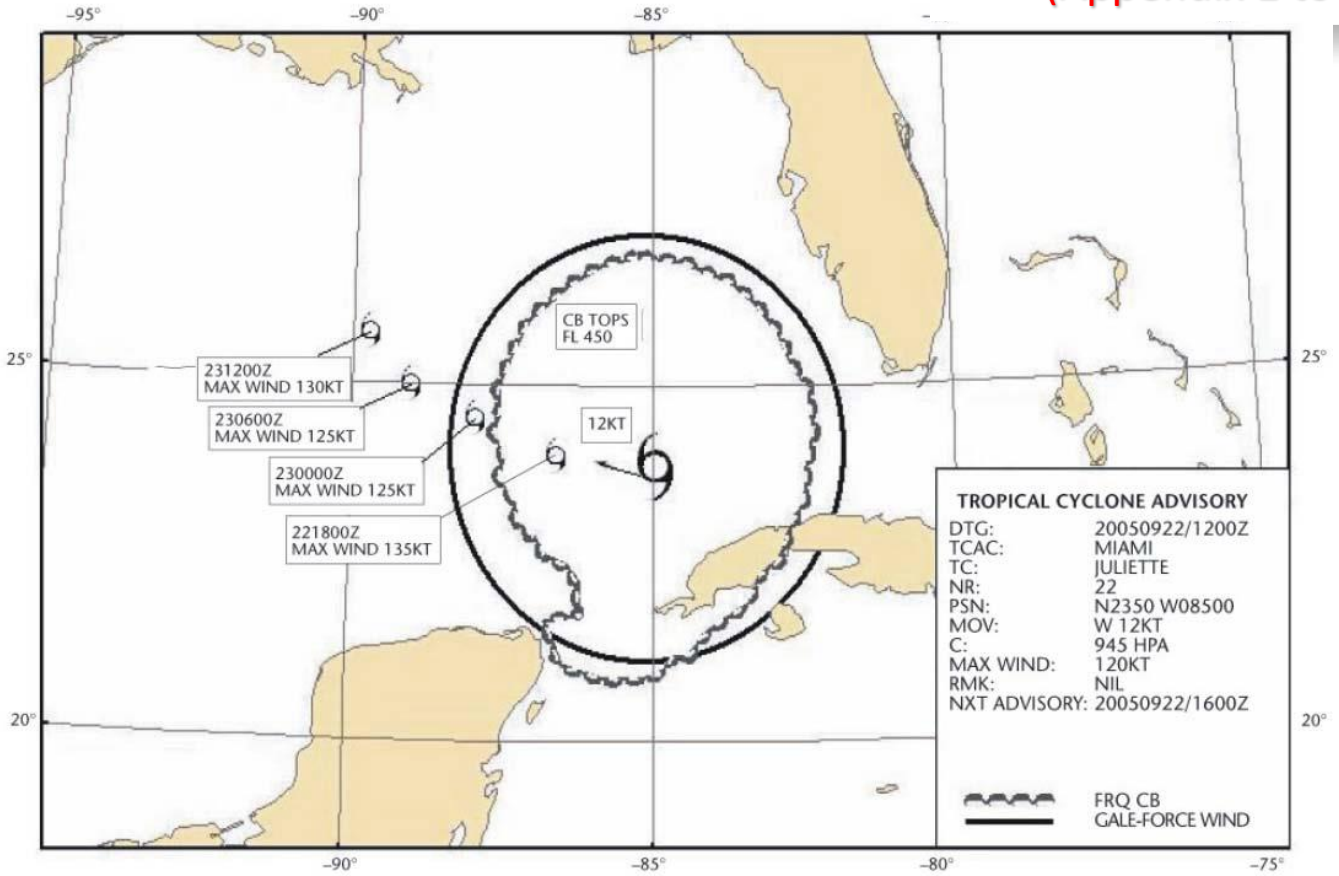
- Part I (Core SARPs)
  - Definitions and General Provisions
  - Requirements for MET services
- Part II (Appendices and attachments)
  - Technical specifications for MET services

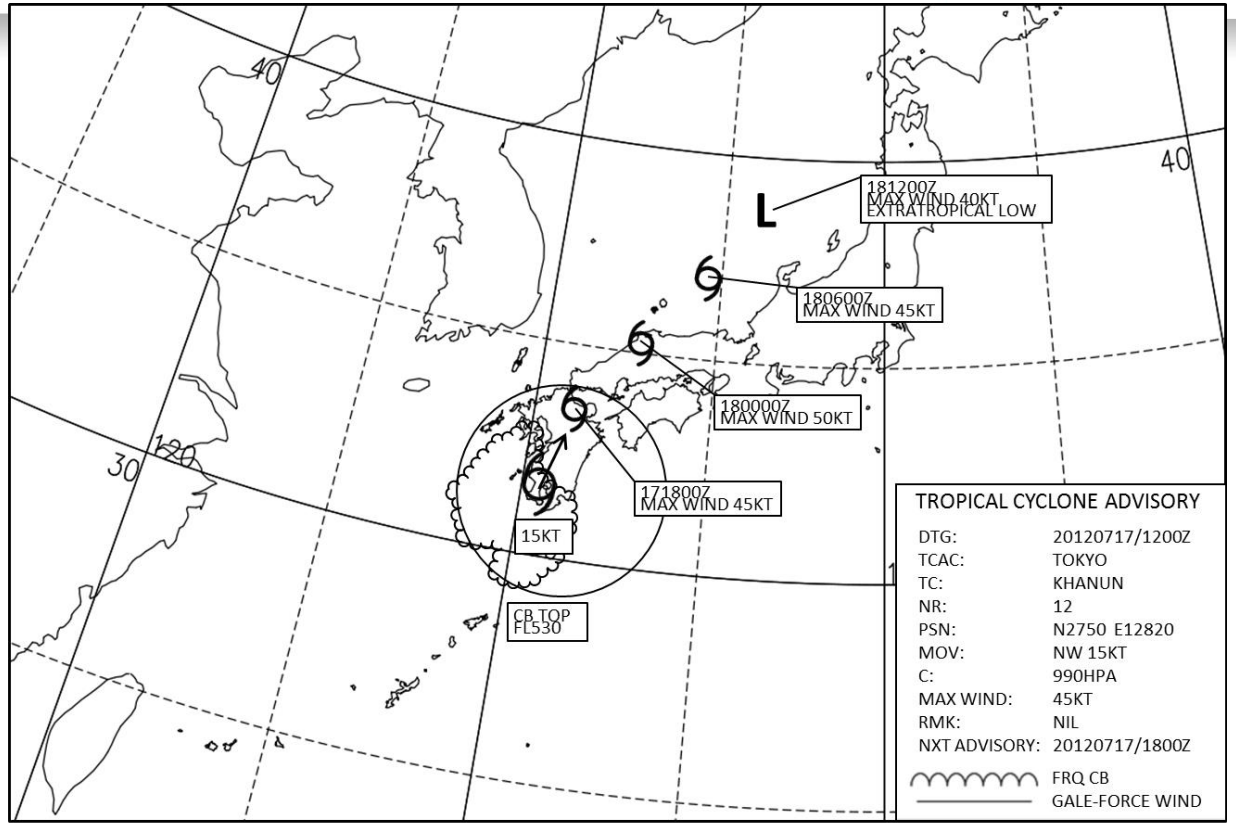
ICAO Annex 3, Chapter 2. General Provisions

- Objective of MET service: contribute towards safety, regularity and efficiency [2.1.1]; States shall:
  - Supply users with MET information necessary [2.1.2]
  - Determine the MET service to meet the needs [2.1.3]
  - Designate the MET authority to provide or arrange for provision [2.1.4]
  - Ensure the qualifications/competencies/education/training [2.1.5]
  - Maintain close liaison between suppliers/users [2.2.1]
  - Ensure the quality management of the MET [2.2.2]


TCAC HONOLULU
TCAC MIAMI
TCAC MIAMI
TCAC NADI
TCAC REUNION
TCAC NEW DELHI
TCAC TOKYO
TCAC DARWIN
TCAC NADI

TC advisory in graphical format (Appendix 1 to Annex 3)

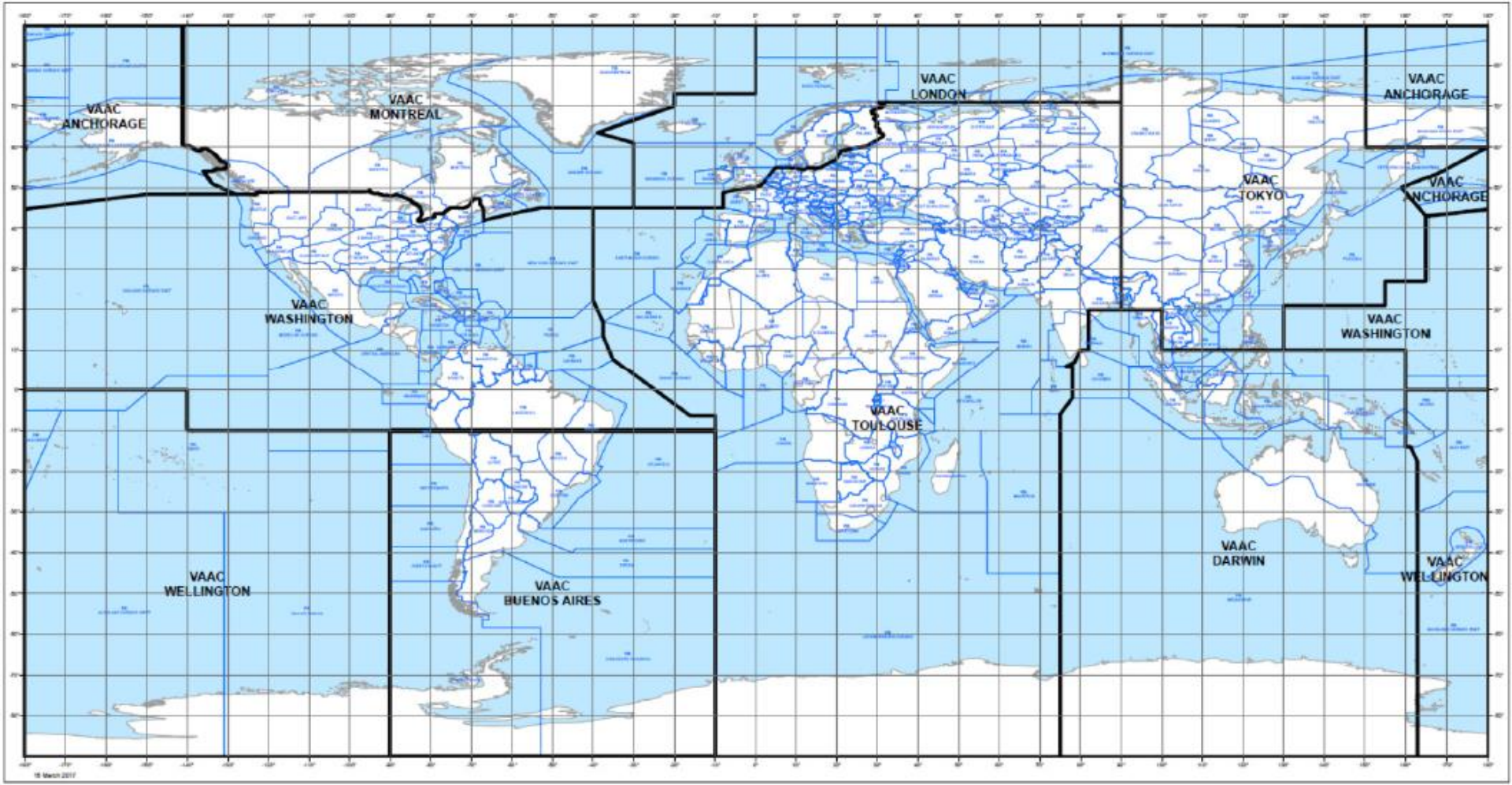




RSMC TOKYO – TYPHOON CENTER

Tropical Cyclone Advisories

- Standard format must be followed – Table A2-2 (TCA) and Appendix 1 (TCG)
  - including use of (ICAO) abbreviations
- To be issued to:
  - MWOs in area of responsibility
  - Other TCACs whose areas of responsibility may be affected
  - WAFCs, international OPMET databanks, SADIS and WIFS


VAAC
ANCHORAGE
VAAC
MONTREAL
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LONDON
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TOKYO
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WASHINGTON
VAAC
WASHINGTON
VAAC
TOULOUSE
VAAC
DARWIN
VAAC
WELLINGTON
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WELLINGTON
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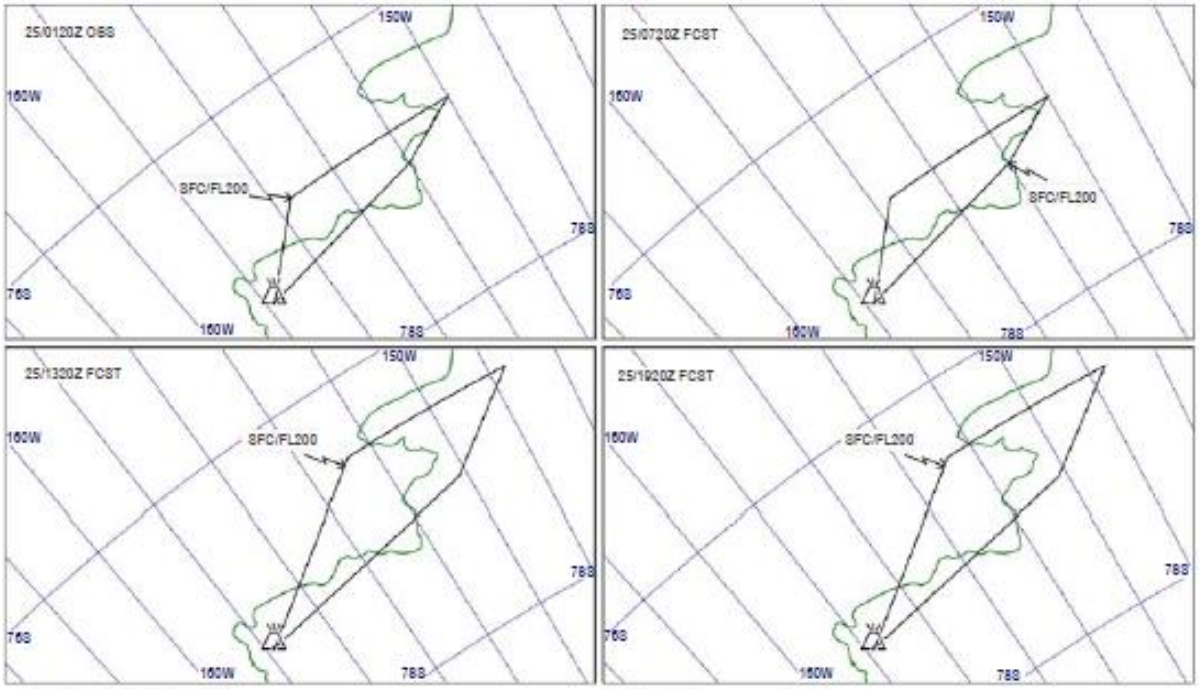
BUENOS AIRES

VA advisory in graphical format (Appendix 1 to Annex 3)



VOLCANIC ASH ADVISORY

DTG:	20171025/0135Z
VAAC:	WELLINGTON
VOLCANO:	SAPPHIRE 999999
PSN:	S7715 W15747
AREA:	LOWLANDIA

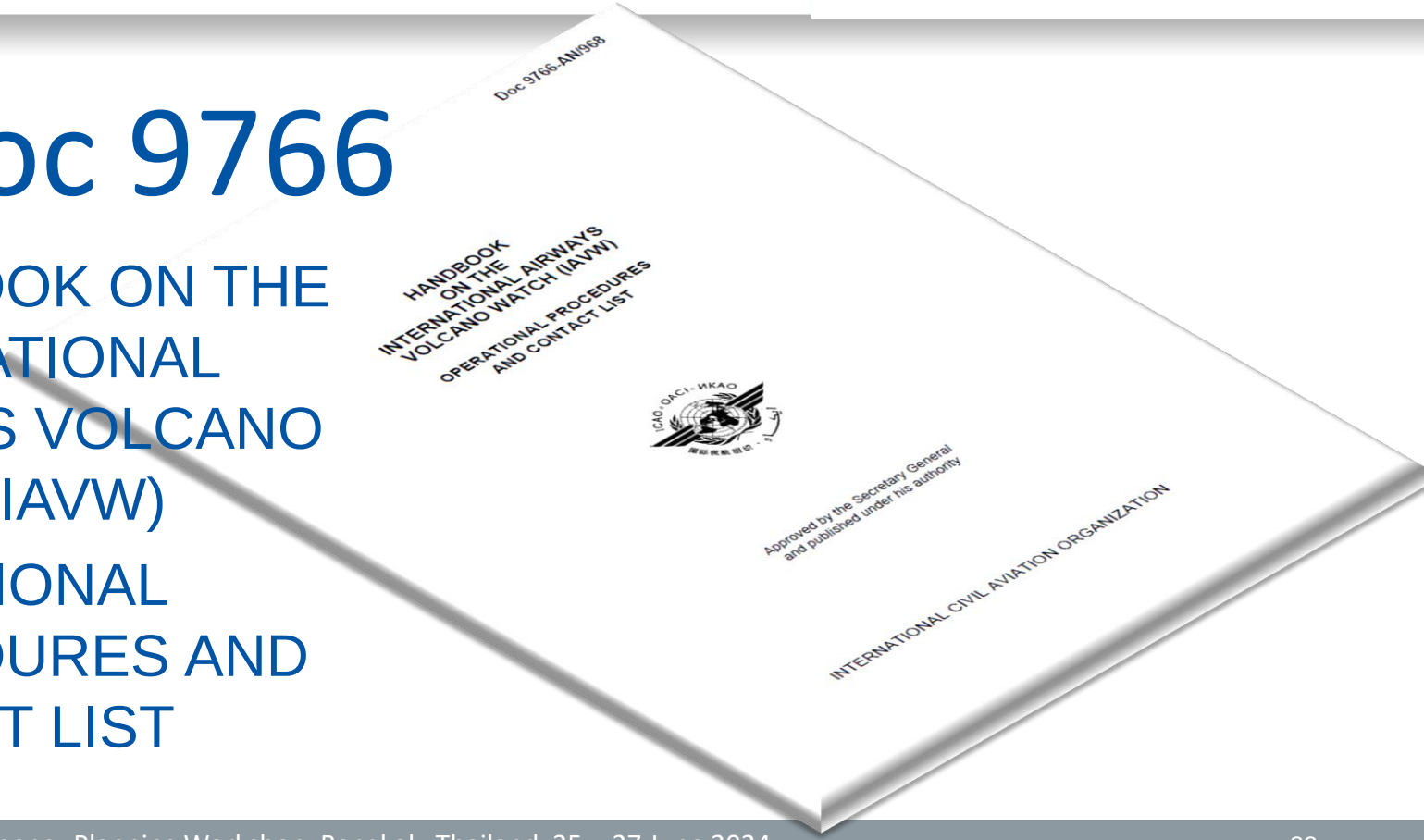
SUMMIT ELEV:	321M
ADVISORY NR:	2017/7
INFO SOURCE:	SATELLITE IMAGERY
AVIATION COLOUR CODE:	UNKNOWN
ERUPTION DETAILS:	CONTINUOUS EMISSIONS TO FL200
RMK:	VA PARTIALLY OBSCURED BY MET CLOUD ALONG SOUTHERN BOUNDARY.
NXT ADVISORY:	NO LATER THAN 20171025/0735Z

Volcanic Ash Advisories

- Standard format must be followed – Table A2-1 (VAA) and Appendix 1 (VAG)
  - including use of (ICAO) abbreviations
- To be issued to:
  - MWOs, ACCs and FICs in area of responsibility
  - Other VAACs
  - WAFCs, international OPMET databanks and NOTAM offices, SADIS and WIFS
  - Operators

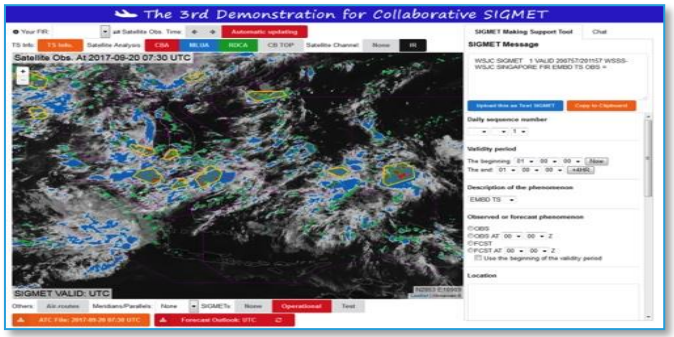
Doc 9766

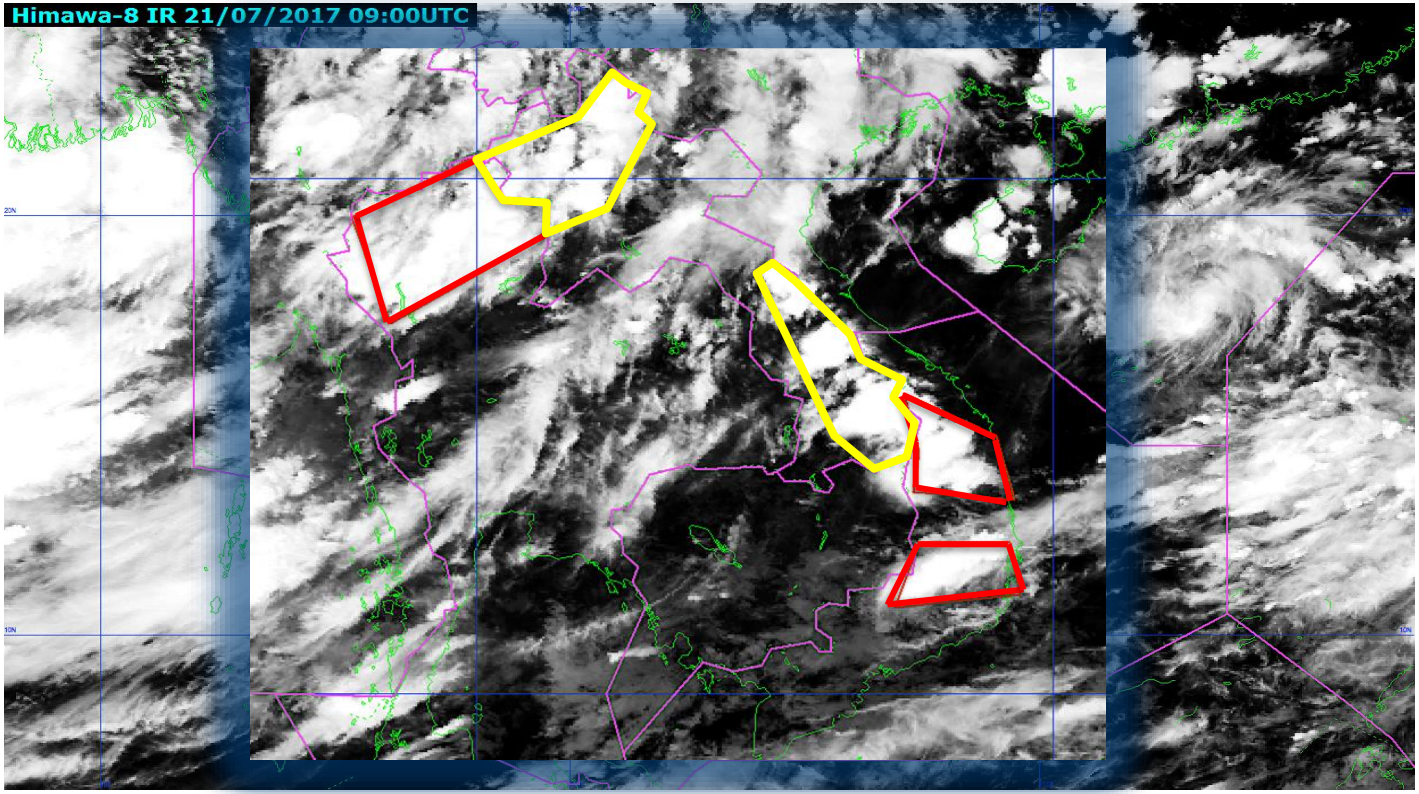
- HANDBOOK ON THE INTERNATIONAL AIRWAYS VOLCANO WATCH (IAVW)
- OPERATIONAL PROCEDURES AND CONTACT LIST



Regional coordination of SIGMET

- Multi-lateral cooperation scheme has been spreading in APAC
  - Harmonize en-route weather information (SIGMET) across FIR boundaries
  - Capacity development through training opportunities
  - Regional guidance on SIGMET coordination has been developed

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THANK YOU