

Operational Capacity Guidelines

linked to

Weather Forecasts

MET/ATM Seminar and ATFM/SG/15

> Contents

- Need for ATFM and Proactive Decision-Making
- Development of Operational Capacity Guidelines
- MET-CDM Process and Real-World Example
- Implications





Need for ATFM during Snowfall

During runway snow removal

→ Runway closure reduces capacity



Waiting for de-icing/anti-icing pads

→ Ground congestion → Apron capacity reduction





Need for Proactive Decision-Making

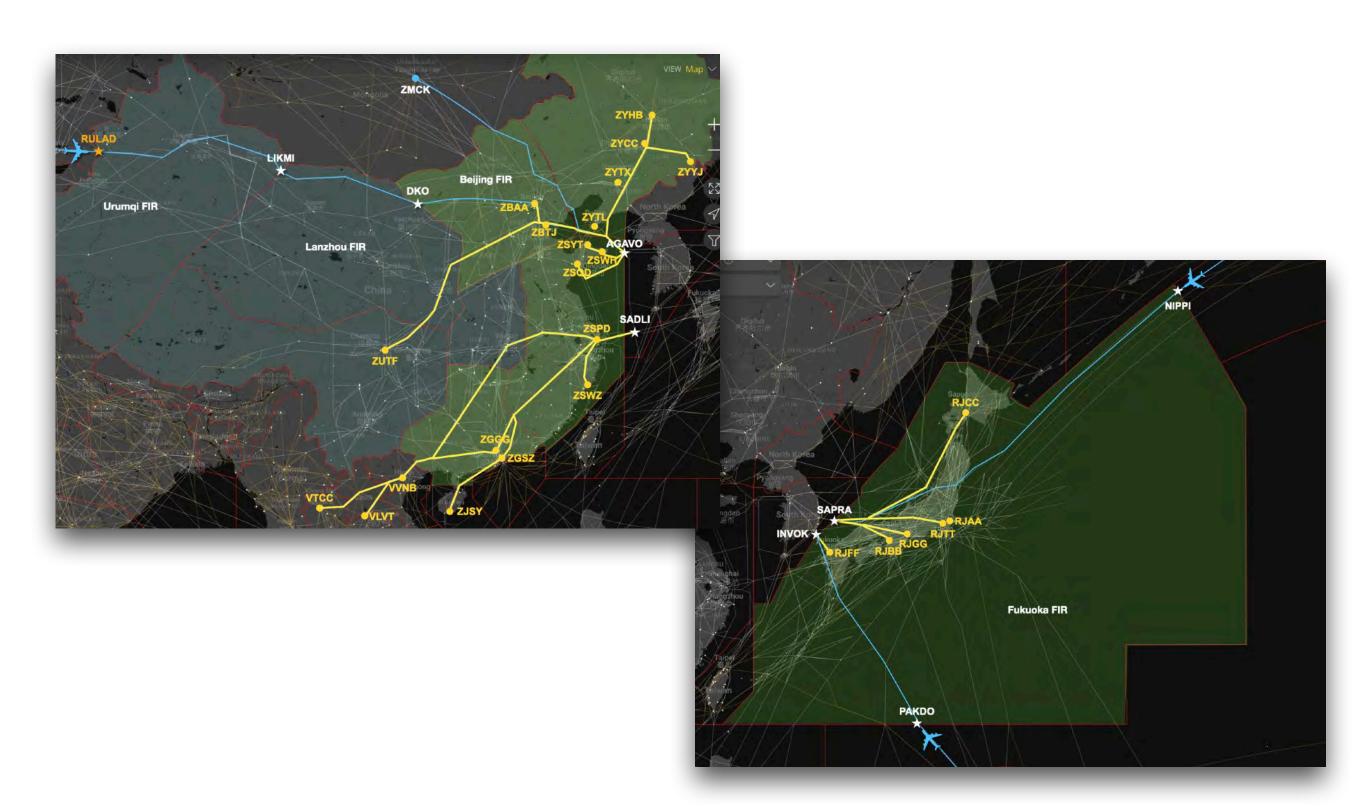
To issue ATFM measures 2 hours before subject flight's EOBT

Flights from Southeast Asia (about 5 hours of duration)

→ Morning arrival peak

Flights from Northeast Asia (about 2 hours of duration)

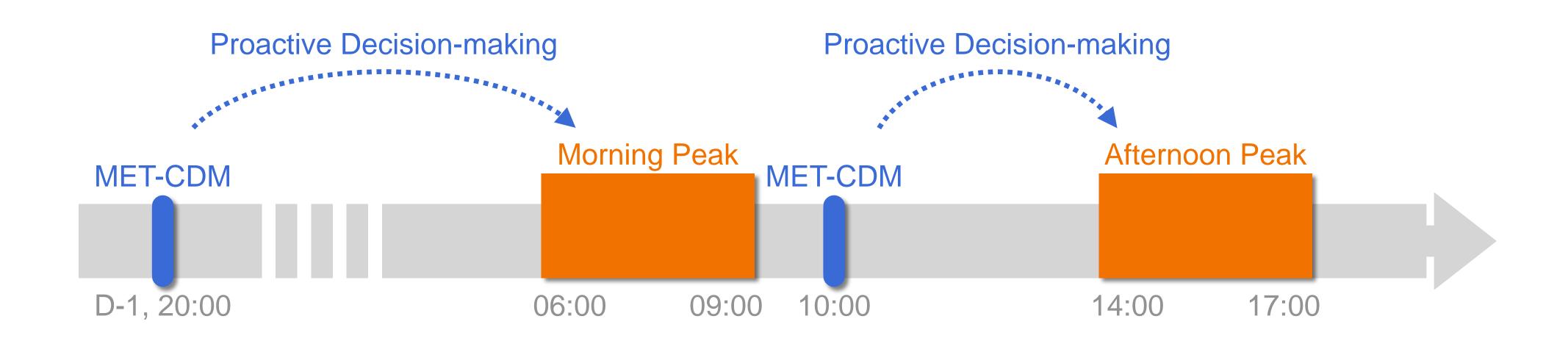
→ Afternoon arrival peak





MET-CDM meeting cycles

Setting MET-CDM meeting cycles based on flight durations by traffic flow



- < RKSI Arrival Traffic patterns >
- Morning peak: depart from Southeast Asia (about 5 hours of duration)
- Afternoon peak : depart from Northeast Asia (about 2 hours of duration)

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Need for Operational Capacity Guidelines linked to MET

Establishing a Data-Driven Decision-Making Procedure



MET-CDM Online Meeting

Decision-Making Limitation

- Meteorologists lack ATM expertise
 Controllers/Flow managers lack meteorological knowledge
- Even with MET-CDM online meetings, prompt and accurate capacity decisions based on weather forecasts are difficult

Solution

- Collaborative development of Operational Capacity Guidelines linked to Meteorological Data

Data Integration and Collaborative Research by Agencies

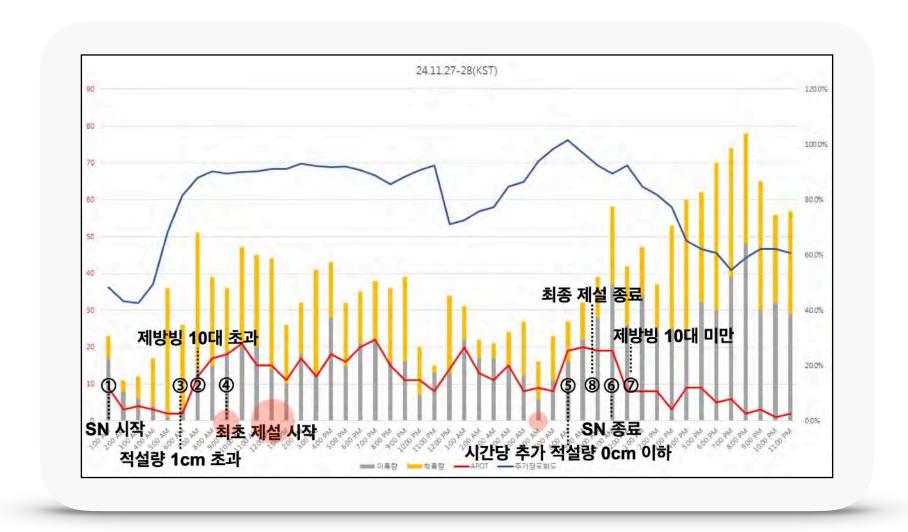
Consolidated data from relevant agencies

- MET(AMO) : Weather data
- Airport Operator(IIAC): Snow removal logs, A-CDM data
- ATFM(ATMO): ATFM logs, Runway snow removal NOTAMs

1			인천분	발공사 자!						_	항공기성	청자료		-		-		항공교통본부 자료				인한국제공항	당사(명취 자료	2000	
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Inductive Approach

- Inductive analysis of snowfall events over past 3 years
- Analyzed snow removal start/end times with concurrent weather data to identify patterns
- Applied observed patterns to predict future outcomes



> Key Findings

Key relationships between snow removal and weather data from real-case observations

No snowfall when surface temperature > 0°C

Snow removal rare when hourly snowfall < 1 cm

Snow removal consistent when hourly snowfall > 1 cm



Operational Capacity Guidelines -

Incheon Airport Operational Capacity Guidelines for Snow ATFM (version 1.1)

Stage	Surface temp	Hourly snowfall	Runway snow removal	Ground congestion due to de-icing	Hourly arrival capacity
1	Above 0°C	Any	Very low prob (Regardless of snowfall)	Very low prob (Regardless of snowfall)	44 aircraft
2	Below 0°C	0 cm	Very low prob	Smooth	40 ~ 44 aircraft
3	Below 0°C	0.1 ~ 0.9 cm	Low prob	Moderate	30 ~ 35 aircraft
4	Below 0°C	1 cm or more	High prob	Moderate	26 aircraft
5	Below 0°C	1 cm or more	High prob	Severe	20 or fewer aircraft



Operational Capacity Guidelines

Detailed Guide for Intuitive Understanding and Easy Application by All Stakeholders

- **Stage 1**: when surface temperature is above 0°C, regardless of hourly snowfall, the probability of snow removal and deicing is very low, allowing normal capacity.
- **Stage 2**: when surface temperature is below 0°C and hourly snowfall is 0 cm, snow removal probability is very low, and the scale of de-icing requests is at a manageable level, enabling smooth processing with a capacity of 40 ~ 44 aircraft.
- **Stage 3**: when surface temperature is below 0°C and hourly snowfall is 0.1 ~ 0.9 cm, snow removal probability is low, but increased de-icing requests require routine management, setting capacity at 30 ~ 35 aircraft.
- Stage 4: when surface temperature is below 0°C and hourly snowfall is 1 cm or more, snow removal probability is high, requiring a capacity of 26 aircraft based on single-runway arrival operations (if snow removal begins, this capacity must be maintained until the final snow removal is completed, regardless of subsequent forecasts).
- **Stage 5**: with intensified snowfall, ground handler de-icing capacity decreases, de-icing wait times increase, and apron/taxiway congestion rises, necessitating a capacity of 20 aircraft or fewer based on ground congestion levels.

> MET-CDM Process

MET-CDM Online meeting Process

- Receive weather forecast data from meteorologists
- Use guidelines to decide capacity
- Incorporate real-time site conditions and stakeholder input
- All stakeholders participate in capacity decisions

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지상기온(*C) 925hPa(*C) 850hPa(*C) 지상기온(*C) 925hPa(*C) 925hPa(*C) 850hPa(*C) 목속에보 묘소 평군풍속(kt)	-8.5 -12.3 -16.4 -18 -0.5 -7.6 -12.7	-8.4 -11.5 -15.7 19 -0.8 -7.4 -13.4	-7.9 -10.4 -14.7 -1.6 -8.6 -12.8	-6.6 -10.3 -14.5 0692 21 -2.6 -9.5 -13	-5.4 -10.8 -14.2 -22 -2.9 -9.9 -13.8	11 -4 -9.7 -13.7 23 -3.3 -10.1 -14.3	12 -2.6 -9.1 -13.4 00 -3.8 -10.5 -14	-1.8 -8.8 -13.1 01 -4.4 -11 -14.8	-0.6 -7.6 -13 -13 -14 -14.5 -14.5 -14.5	0 -6.5 -12.6 072 03 -5.4 -11.7 -14.7	0.4 -6.1 -12.4 -5.9 -12.2 -15.6	0.3 -7 -12.4 05 -6.5 -12.8 -16.3
지상기온(*C) 925hPa(*C) 850hPa(*C) 지상기온(*C) 925hPa(*C) 925hPa(*C) 850hPa(*C) 목속에보 묘소 평군풍속(kt)	-8.5 -12.3 -16.4 -18 -0.5 -7.6 -12.7	-8.4 -11.5 -15.7 19 -0.8 -7.4 -13.4	-7.9 -10.4 -14.7 -1.6 -8.6 -12.8	-6.6 -10.3 -14.5 06월 21 -2.6 -9.5 -13	-5.4 -10.8 -14.2 -22 -2.9 -9.9 -13.8	11 -4 -9.7 -13.7 -23 -3.3 -10.1 -14.3 -11 8	12 -2.6 -9.1 -13.4 -00 -3.8 -10.5 -14 -12 -14 -12 -14 -12 -14 -12 -14	-1.8 -8.8 -13.1 01 -4.4 -11 -14.8 13 18 35	-0.6 -7.6 -13 02 -4.9 -11.1 -14.5	0 -6.5 -12.6 079 03 -5.4 -11.7 -14.7	0.4 -6.1 -12.4 -04 -5.9 -12.2 -15.6	-7 -12.4 -6.5 -12.8 -16.3

Weather forecast data provided by MET team

Stage	Surface temp	Hourly snowfall	Runway snow removal	Ground congestion due to de-icing	Hourly arrival capacity
1	Above 0°C	Any	Very low prob (Regardless of snowfall)	Very low prob (Regardless of snowfall)	44 aircraft
2	Below 0°C	0 cm	Very low prob	Smooth	40 ~ 44 aircraft
3	Below 0°C	0.1 ~ 0.9 cm	Low prob	Moderate	30 ~ 35 aircraft
4	Below 0°C	1 cm or more	High prob	Moderate	26 aircraft
5	Below 0°C	1 cm or more	High prob	Severe	20 or fewer

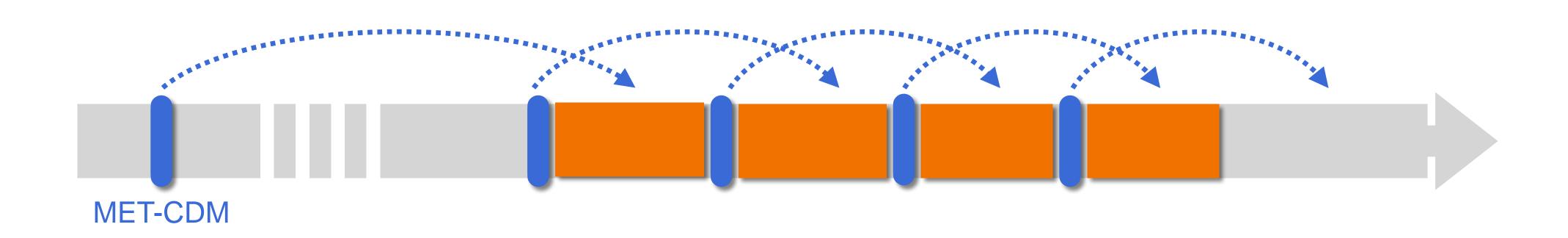
Operational Capacity Guidelines



Example of actual MET-CDM meeting schedule -

Results of the January 31, 2025 MET-CDM

CDM Meeting Time (Local Time)	Operational Capacity Determination	ATFM Application Period (Local Time)
Jan 30, 20:00	26	Jan 31, 06:00–10:00
Jan 31, 06:00	30	Jan 31, 10:00–14:00
Jan 31, 09:00	40	Jan 31, 14:00–16:00
Jan 31, 11:00	40	Jan 31, 16:00–18:00
Jan 31, 15:00	ATFM lifted	ATFM lifted



> Implications

- Swift, accurate CDM decisions enhance predictability and trust
- Proactive ATFM reduces delays and regional disruptions
- Shared guidelines foster Asia/Pacific ANSP cooperation
- Ongoing research improves congestion models and forecast accuracy





Thank you!

MET/ATM Seminar and ATFM/SG/15

