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
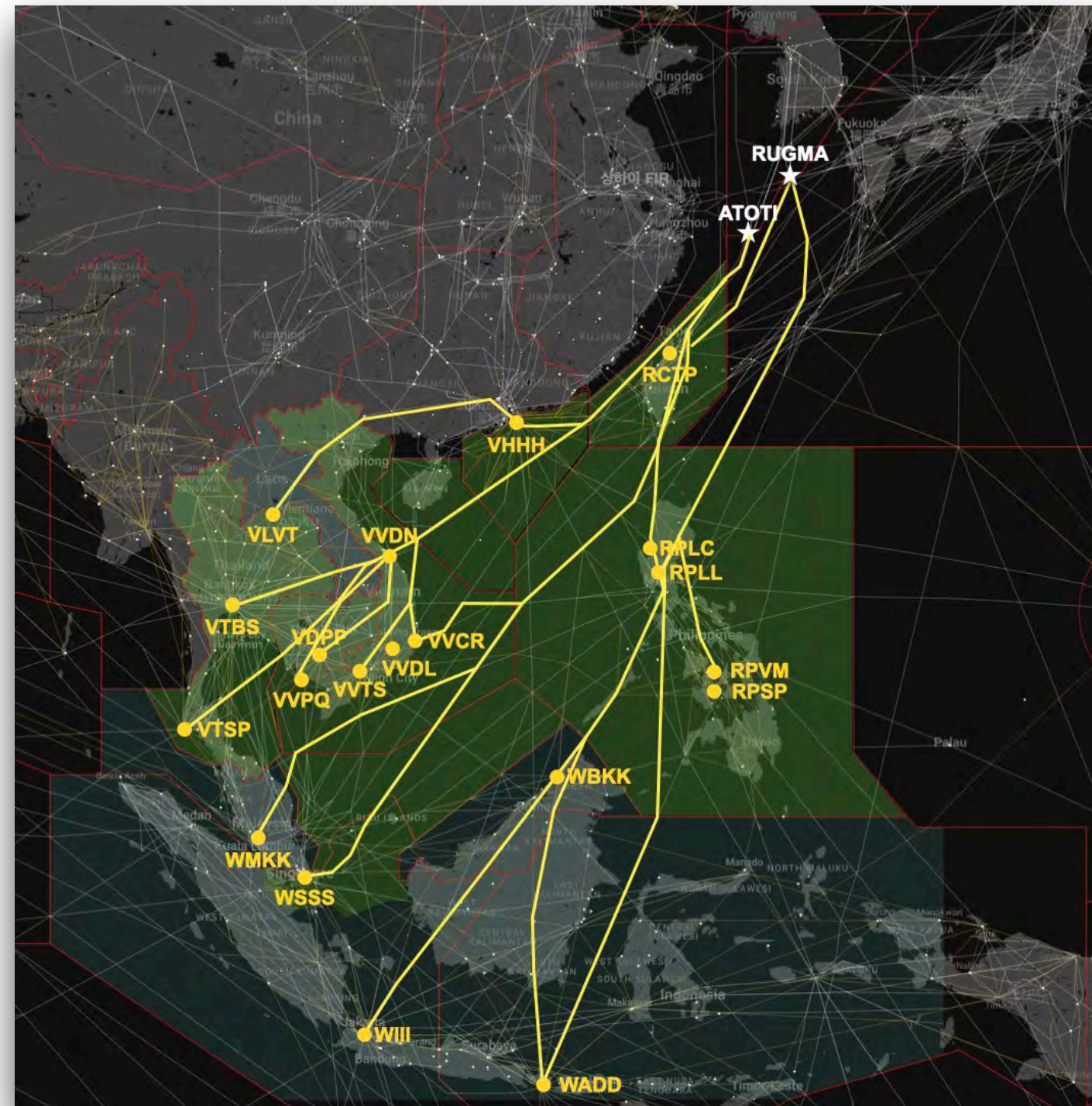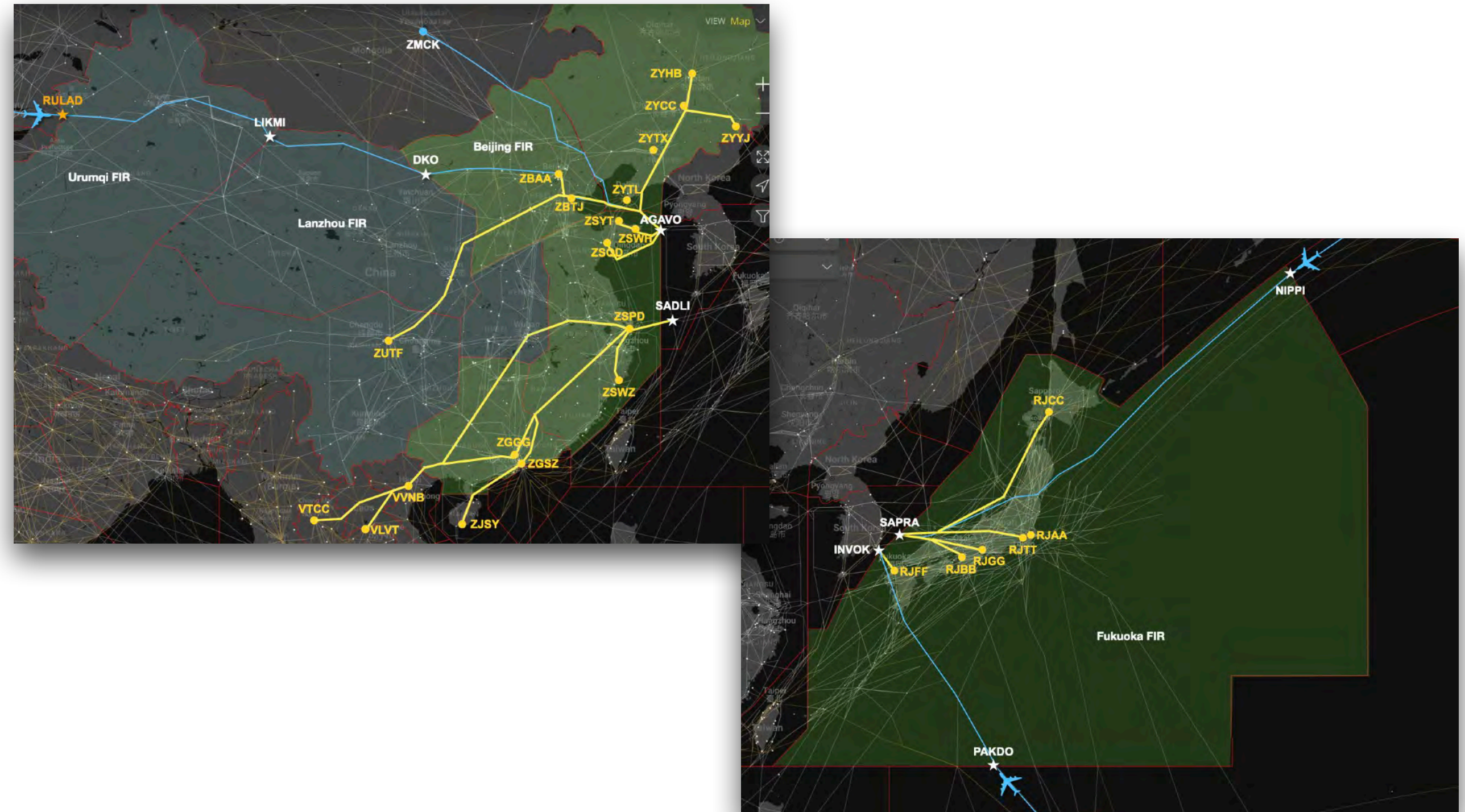
→ Ground congestion → Apron capacity reduction

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)
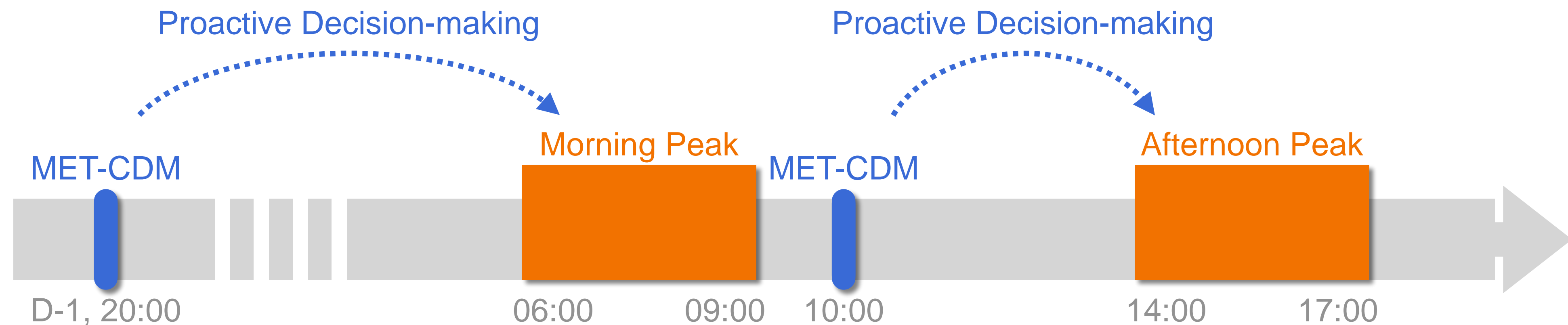→ Morning arrival peak

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)

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

Development Process

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

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
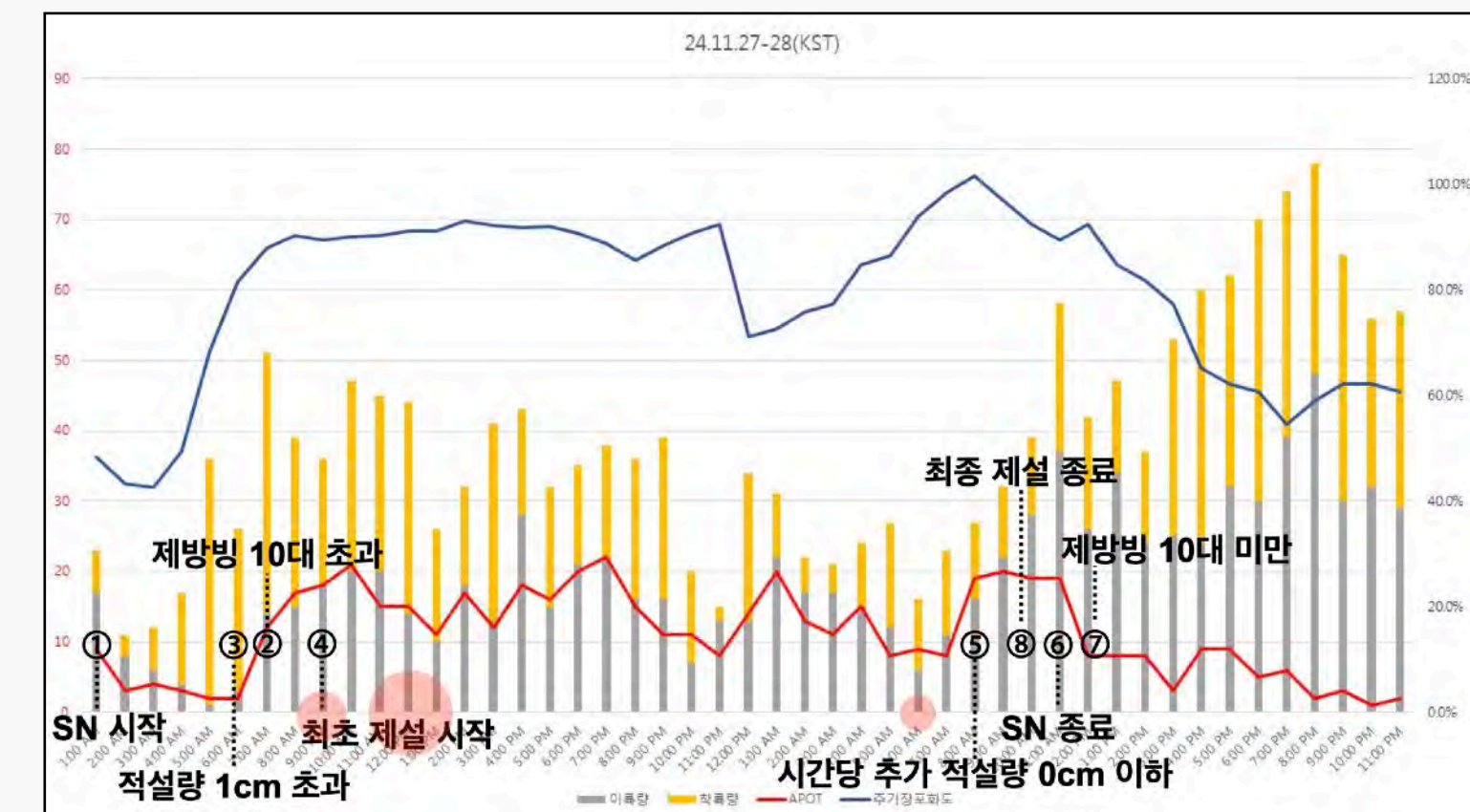
Key Findings

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 de-icing 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

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

MET-CDM
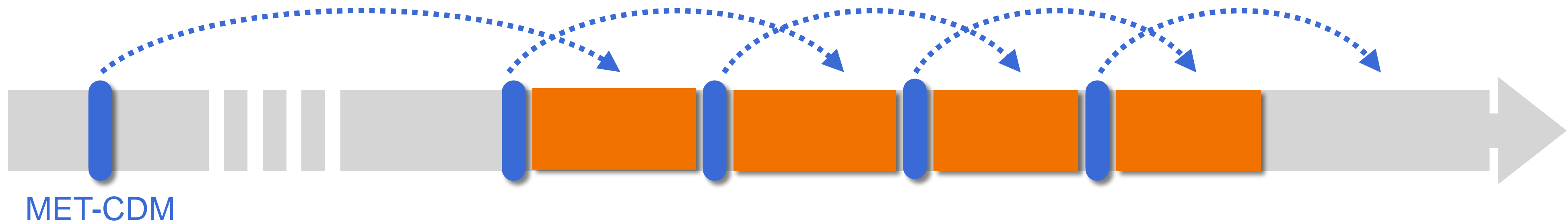
Implications

- 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

Air Traffic Management Office
MOLIT, Republic of Korea