

**Concluding Meeting of AvRDP/SSC and Aviation Seminar**

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## FINAL REPORT OF TOKYO AND NARITA INTERNATIONAL AIRPORTS

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**Summary**

Major outcomes ... (100 words)

JMA have provided ATM-Tailored forecast of significant weather to ATM Center of Japan Civil Aviation Bureau (JCAB) and other relevant aeronautical users, based on nowcast and very short-range forecast. It facilitates ATM officers to better estimate airspace capacity and airport departure/arrival rate, to appropriately execute ATFM measures such as ground delay programme or airspace capacity restrictions and to coordinate flight routes to avoid hazardous weather. It is proven that forecast for not just weather condition and with certain thresholds in line with ATM officer's operational decision-making criteria (e.g. weather minima values) is more useful for ATM to proactively manage capacity settings.

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**I. Introduction****(1) Airport information**

- Target airports, Tokyo int'l airport (Haneda) and Narita int'l airport, are Japan's most major airports located in the Tokyo metropolitan area and within 60 km distance.
- According to increasing air traffic demand, airspace above these two airports is the most congestive area in Japan. To address heavy air traffic volume, air traffic over these two airports is managed as in a single air space.

**(2) Impacting weather**

- Airport: thunderstorm, strong cross-wind, strong gusty wind (especially in Narita), snow, fog
- Surrounding Airspace: convective cloud (even not developed to CB), change in head wind (especially for arrival at Haneda)

**(3) ATM/Airline/Pilot/Aviation Community Needs**

- According to the survey in 2013 through 2015, strong wind and convective cloud were the most frequent weather phenomenon when air traffic flow management (ATFM) measures were applied due to adverse weather condition.
  - Also, these two phenomena were the most frequent weather phenomenon when ATM officers requested forecasters for weather briefings.
  - Although the number of ATFM measures executed due to snow was relatively small, all the relevant users requested detailed weather information on snow condition because the impact was quite large (i.e. closure of the airport).
- (4) Study approach / techniques
- The 'fit-for-purpose' information and services were designed in close consultation with ATM stakeholders.
  - Such ATM-tailored meteorological information is calculated with certain threshold reflecting ATM decision-making criteria, using existing nowcast products and short-range forecast output.
- (5) Timeline
- Feb 2006 ATMetC (Air Traffic Meteorology Center) started its operation to directly support ATMC (Air Traffic Management Center) of the Japan Civil Aviation Bureau (JCAB). The first ATM-tailored meteorological information named "ATMet Category Forecast" was developed to provide ATM officers of sequential forecast of possibility of weather events which would have an impact on air traffic flow in each ATC Sector and at major airports in colour codes.
- Apr 2014 TMAT (Tokyo Metropolitan Area Team), branch office of ATMetC (Air Traffic Meteorology Center, JMA), in charge of Tokyo metropolitan airspace was established. TMAT started to provide ATM Categorized Impact of weather ELEMENT prediction (ATM CIEL). ATM CIEL is an ATM-tailored meteorological product and indicates the impact of significant weather on ATM operational procedures such as setting ATC capacity value within the Tokyo metropolitan area.
- Feb 2018 JMA changed the criteria used for the colour-codes in the ATM CIEL in consultation with the Japan Civil Aviation Bureau (JCAB).

## II. Outcomes

- (1) Phase I achievements (MET Capability)
- JMA developed ATM-Tailored forecasts based on nowcast and very short range forecast for identified weather phenomena which may have an impact on aircraft operations at each target airport.
- (2) Phase II achievements (MET-ATM MET-ATM Integration)
- JMA researched past cases of significant weather-induced air traffic flow disturbance. Based on the result, possibility of the weather impact is categorized into four level with colour codes in the ATM-CIEL, which has been provided since 2014 as an operational product.
- (3) Verification (if any)

- JMA implements comparison of observation and restricted airspace capacity when ATFM measures executed due to meteorological phenomena.

### III. Summary

#### (1) Benefits to local ATM

- The ATM-Tailored forecast of significant weather impact would facilitate ATM officers to better estimate airspace capacity and airport departure/arrival rates, appropriately apply ground delay programme or airspace capacity restrictions and coordinate flight routes to avoid hazardous weather.
- The forecast with thresholds in line with ATM officer's operational decision-making criteria (e.g. weather minima values) is more useful for ATM officers in proactively setting airspace/airport capacity, than normal type of forecast of weather conditions.

#### (2) Contributions to ASBU

- ASBU AMET includes the development of advanced weather information to support ATM/ATFM around terminal area and the integration of meteorological data into ATM decision-making process to support future TBO environment.
- JMA's expertise on the development of ATM impact-based forecasts will contribute to the above development to meet GANP/ASBU requirement.

#### (3) Gap identified

- Quantitative translation methodology of MET information into ATC capacity value is yet to be developed.

#### (4) Resources for sharing (website, software, document, data, ..., if any)

Those ATM-tailored forecasts are provided to aviation users via dedicated website maintained by JMA.

Those products are also introduced at the following meetings:

- ICAO APAC MET/R WG/8 SP/09
- ICAO APAC MET/R WG/8 SP/10
- ICAO APAC MET SG/22
- ICAO APAC MET/R WG/7 IP/04
- ICAO APAC MET/R WG/5 IP/10
- ICAO APAC MET SG/19 IP/22
- ICAO APAC MET/ATM Seminar 2015
- ICAO APAC MET SG/18 IP/31

Technical background is introduced on the following JMA's website:

- [https://www.jma.go.jp/jma/en/Activities/highres\\_nowcast.html](https://www.jma.go.jp/jma/en/Activities/highres_nowcast.html)
- <https://www.jma.go.jp/jma/jma-eng/jma-center/nowcasting/>
- [https://www.jma.go.jp/jma/en/Activities/qmws\\_2018/Presentation/3.1/Very-short-range%20Forecast%20of%20Precipitation.pdf](https://www.jma.go.jp/jma/en/Activities/qmws_2018/Presentation/3.1/Very-short-range%20Forecast%20of%20Precipitation.pdf)
- <https://www.jma.go.jp/jma/en/Activities/nwp.html>
- <https://www.jma.go.jp/jma/jma-eng/jma-center/nwp/nwp-top.htm>

IV. Recommendation

(1) Future Studies

- Even small - scale CBs (or convective clouds not developed to CB) can impact on air traffic flow significantly in the approach control area. Impact of air traffic flow was reduced by route change. Forecast for air route affected by convective cloud may required in the future.

(2) Plans (if any)

V. References

Appendix (including the details of the following but not limited to)

ATM CIEL (tabular format and map format)

ATM Categorized Impact of weather ELEMENT prediction Issued at 1930UTC 20 May 2015  
ATMetC Tokyo Metropolitan Area TEAM, JMA

Sector/Times(UTC)	19					20					21					22					23					00							
	30	40	50	0	10	20	30	40	50	0	10	20	30	40	50	0	10	20	30	40	50	0	10	20	30	40	50	0	10	20	30	40	50
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