AvRDP in Shanghai

Hongkong，China · Oct 2018

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III. Next Steps

I Introduction of SHA

Location	2 Runways	Adverse Weather
 In the west of Shanghai City	18L/36R 18R/36L	Convection Low visibility Low Ceiling Gale

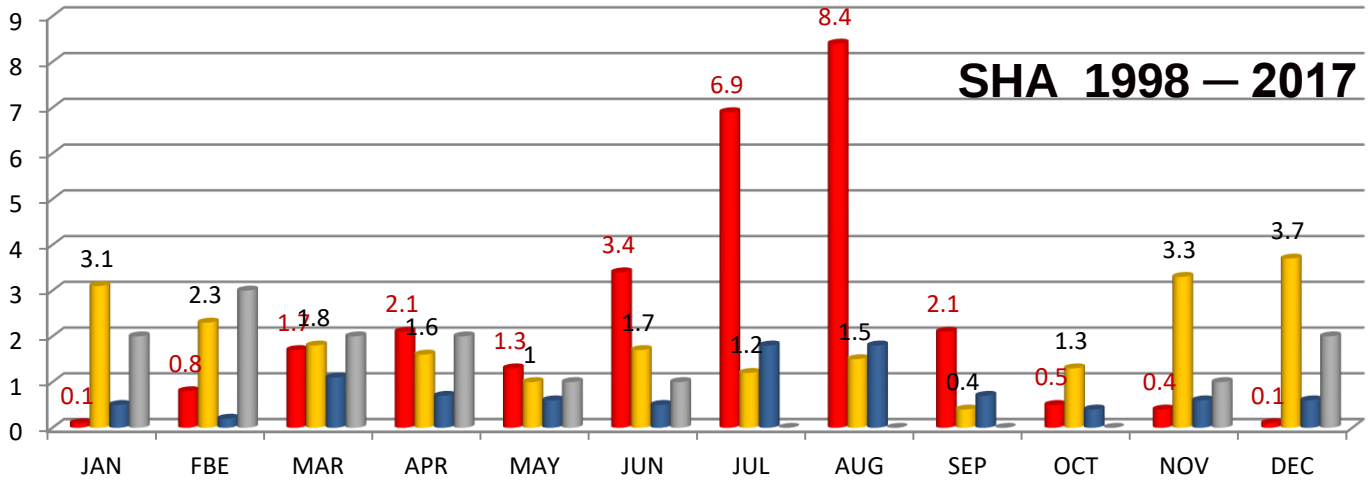
SHA

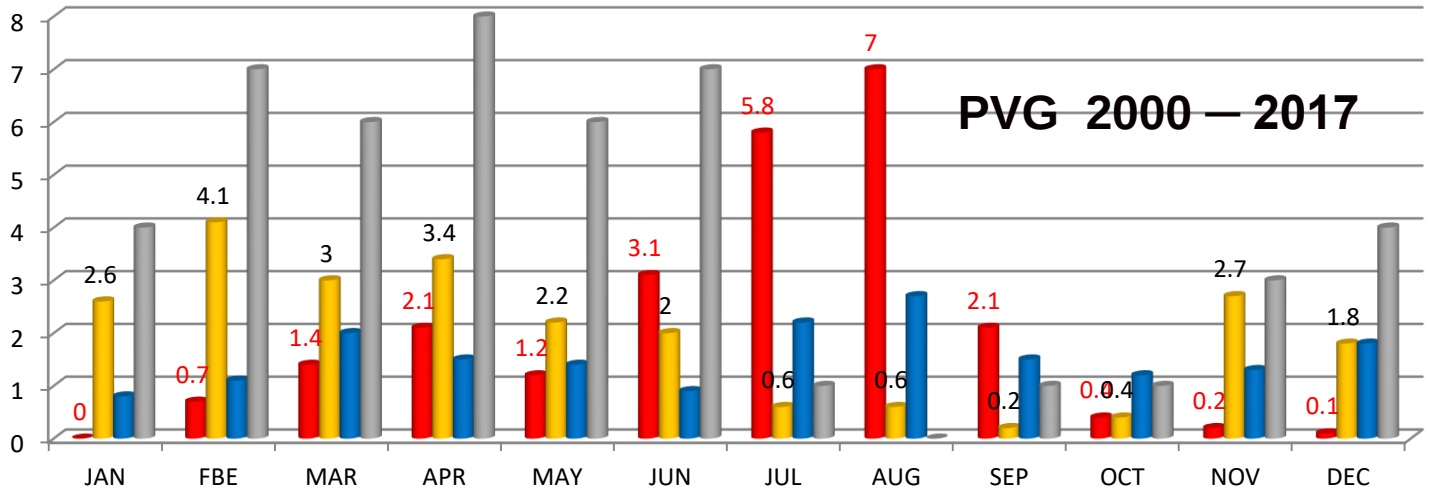
PVG

Location	5 Runways	Adverse Weather
 By the East China Sea	16L/34R 16R/34L 17L/35R 17R/35L 15/33	Low Ceiling Convection Low visibility Gale

Adverse weather in Shanghai (past 20years)

- Thunder
- Low VIS
- GALE
- Ceiling





II. AvRDP Progress in SHA

AvRDP Schedule

May 2015 – July 2017

***Phase I* – MET capacity research**

- **IOP for convective weather**
- **NWP & Nowcasting research**

July 2016 – June 2018

***Phase II* – MET-ATM impacts research**

- **Research on MET-ATM impacts translation**
- **MET-ATM impacts Assessment**

Schedule & Progress

Phase I – MET capacity research

May 2015 – July 2017

- **Research on highRes-NWP & nowcasting technique**
  - **Regional Rapid Refresh system**
  - **Thunderstorm Initiation Based on Satellite Images**
  - **MET information translation, etc.**

Phase II – MET-ATM impacts research

July 2016 – June 2018

- **Research on MET-ATM impacts translation**
  - **Capacity algorithm design (preliminary)**
  - **Forecasts / warnings issuing, refer to TRACON / Aerodrome operation rules**
- **MET-ATM impacts Assessment**
- **CDM & MET-ATM CONJOINT ANALYSIS**

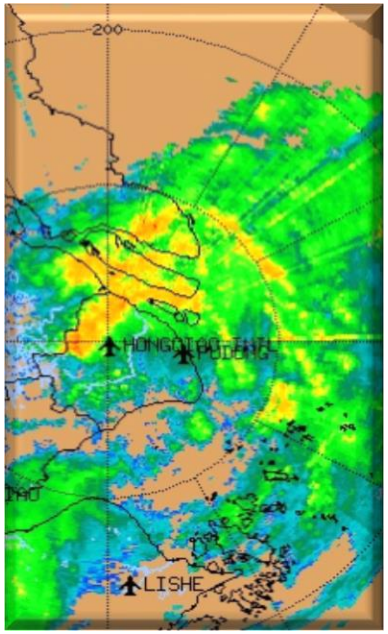
Outlines

1. **Data**
   - MET Data
   - ATM Data
2. **System Update / Development**
   - Regional Airspace & Enroute Forecast System
   - Nowcasting (Radar & Satellite blending Extrapolation)
3. **MET-ATM Impacts Translation**
   - SHA TRACON Area Pre-Warning System
   - Operation Situation Display
4. **MET-ATM cooperation**
   - CDM & MET-ATM Conjoint Analysis
   - Cross-training

1. Data

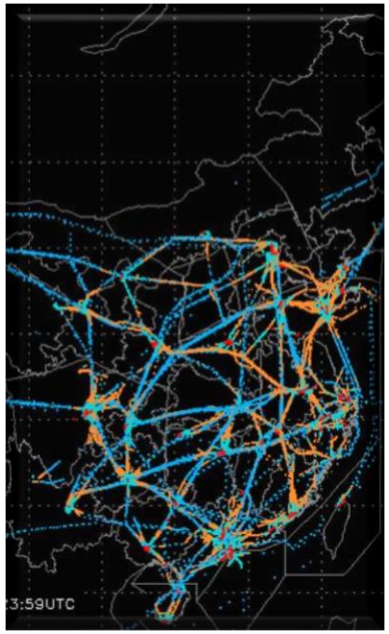
Observation

- AWOS
- METER/SPECI
- …



Remote Sensing

- Radar
- Lightning
- …



Airbone

- AMDAR
- PIREP
- …

ATM

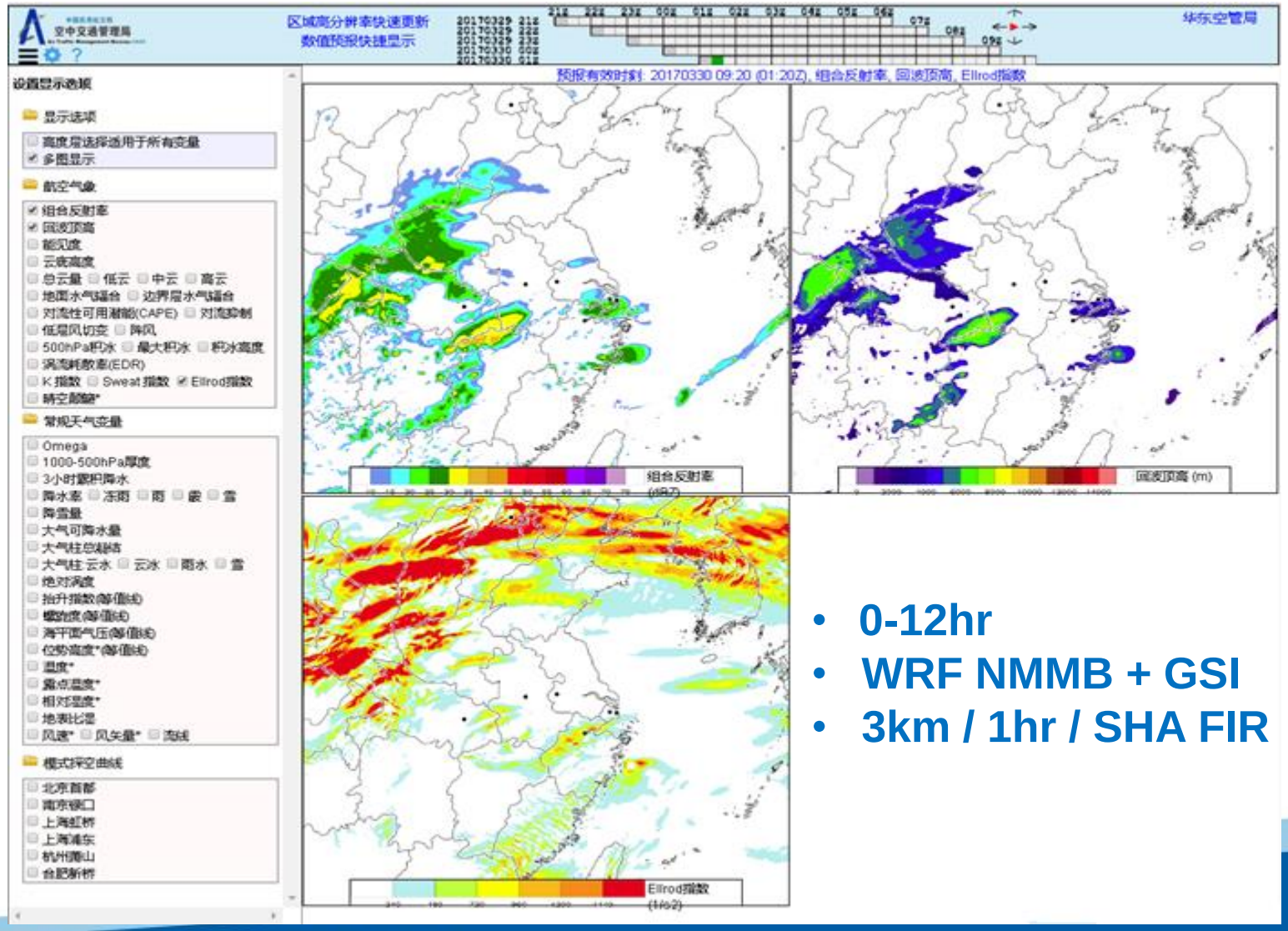
- Static ATM data
- Flight trajectory
- Capacity
- …

2. System Update / Development

- NWP (Regional Rapid Refresh System)
- Nowcasting

2. System Update / Development

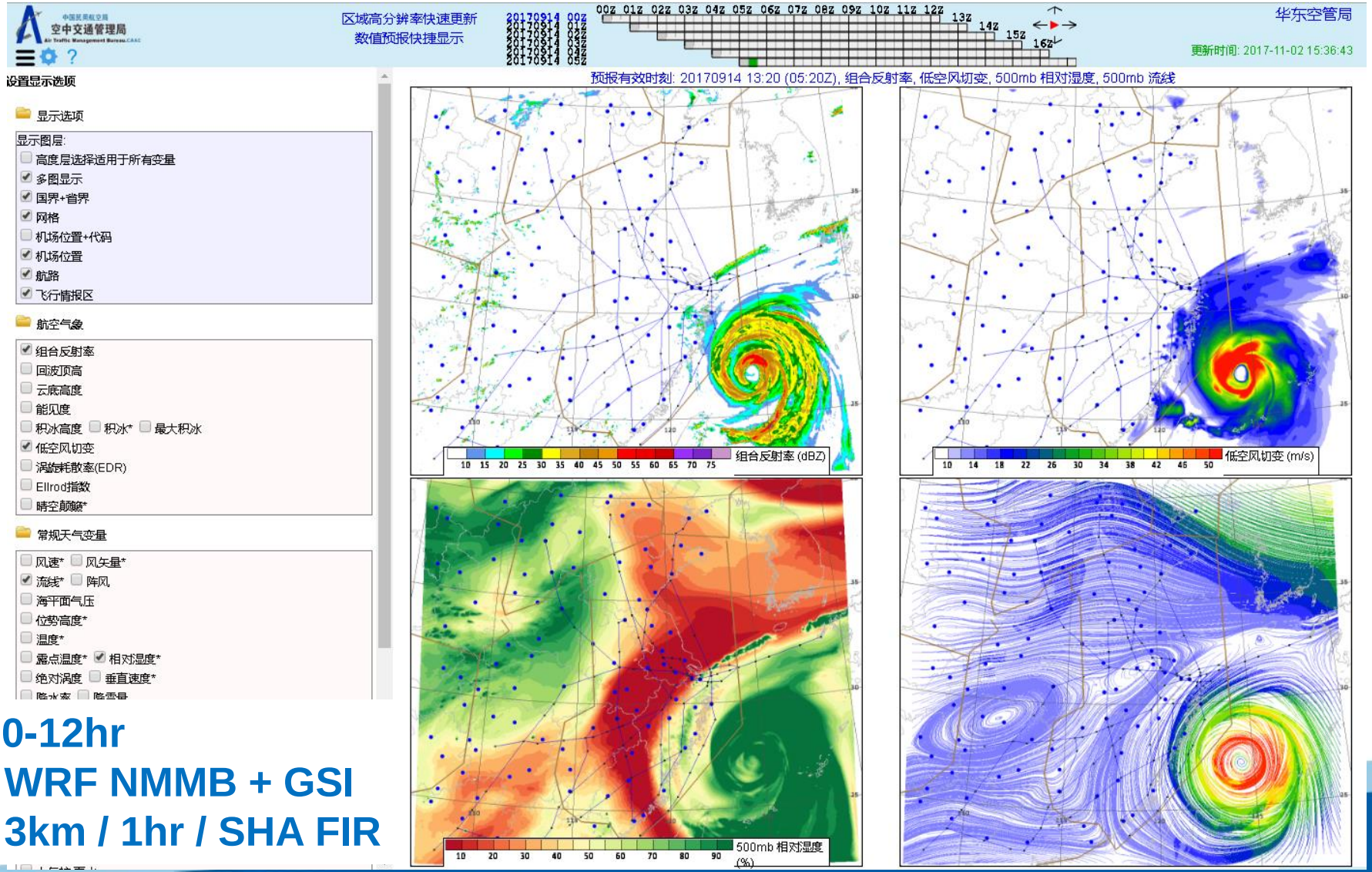
Regional Rapid Refresh System



- 0-12hr
- WRF NMMB + GSI
- 3km / 1hr / SHA FIR

2. System Update / Development

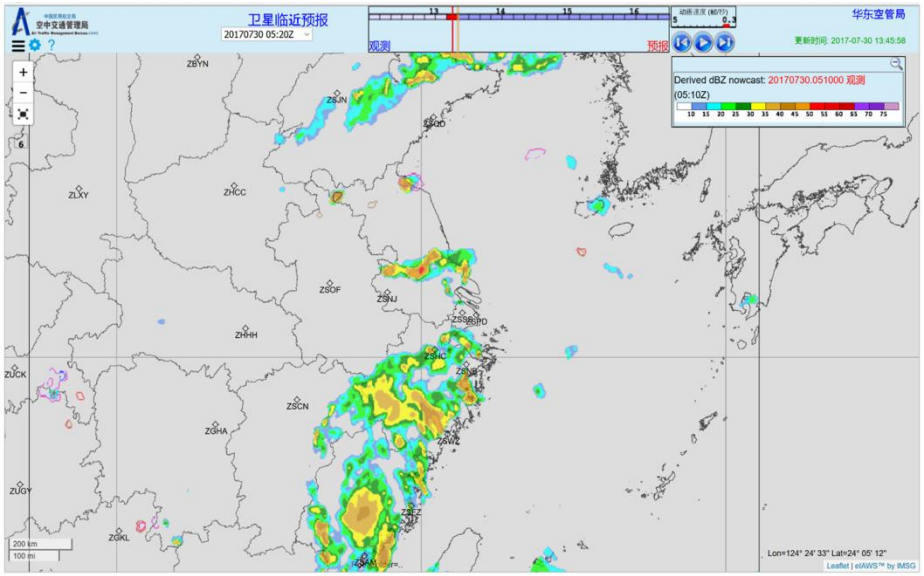
Regional Rapid Refresh System

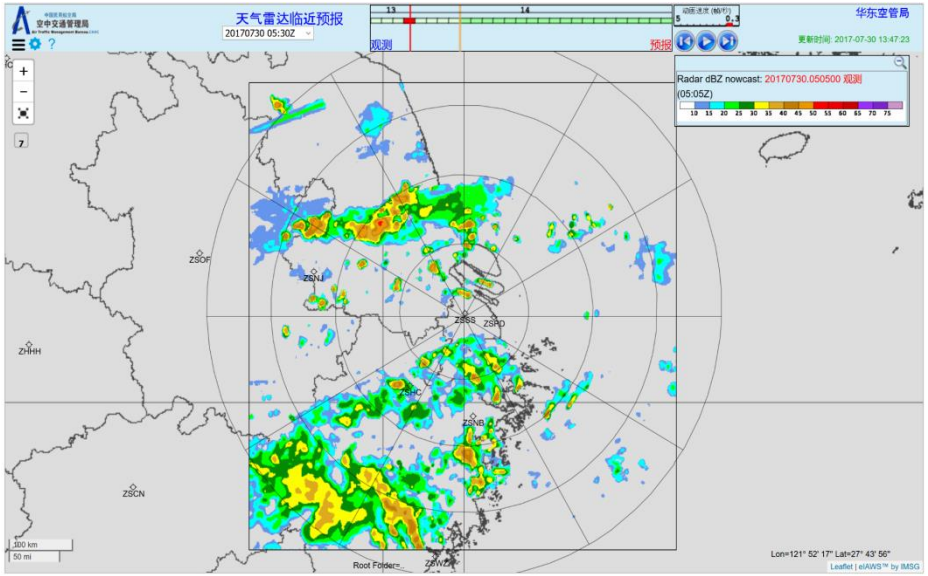


- 0-12hr
- WRF NMMB + GSI
- 3km / 1hr / SHA FIR

2. System Update / Development

Radar & Satelltie Blending Extrapolation Tools

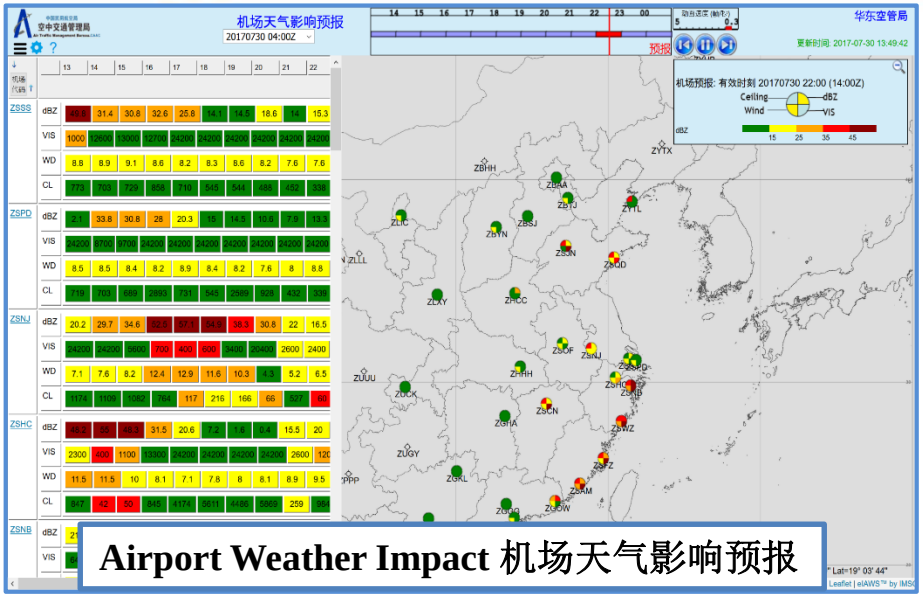




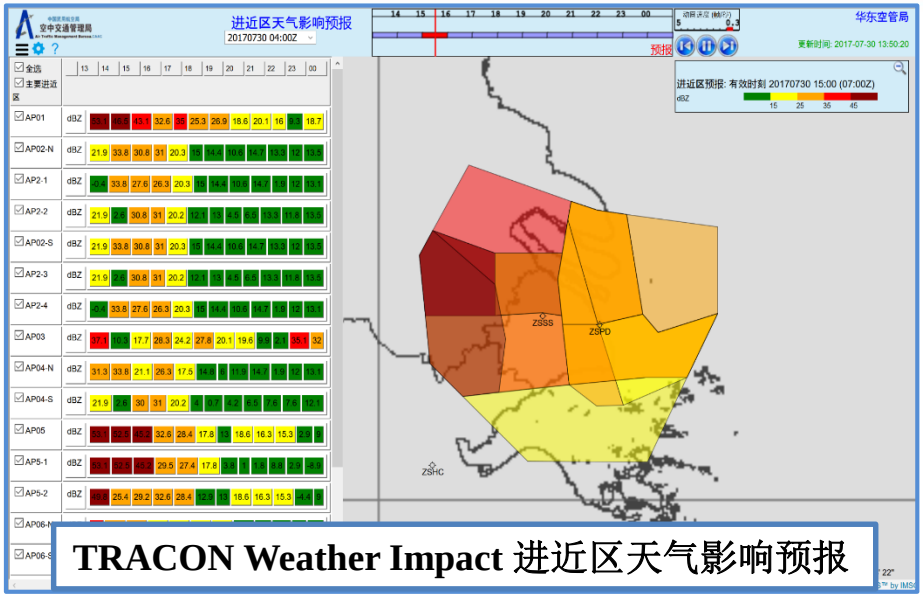
5km / 10min / SHA FIR or En route
Res：5km
Intl: 10min

1km / 5min / SHA TRACON area
Res：1km
Intl: 10min

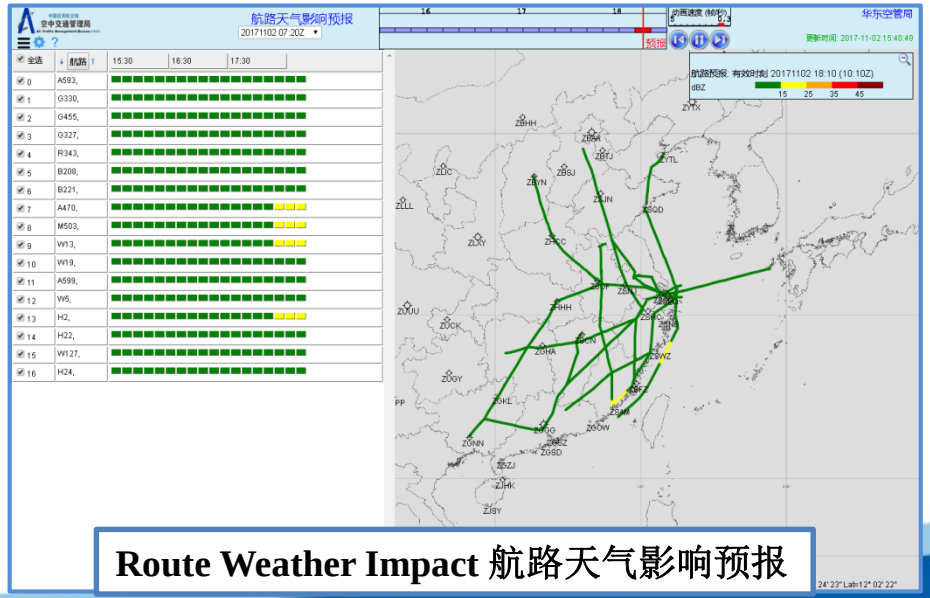
3. MET-ATM Impacts Translation



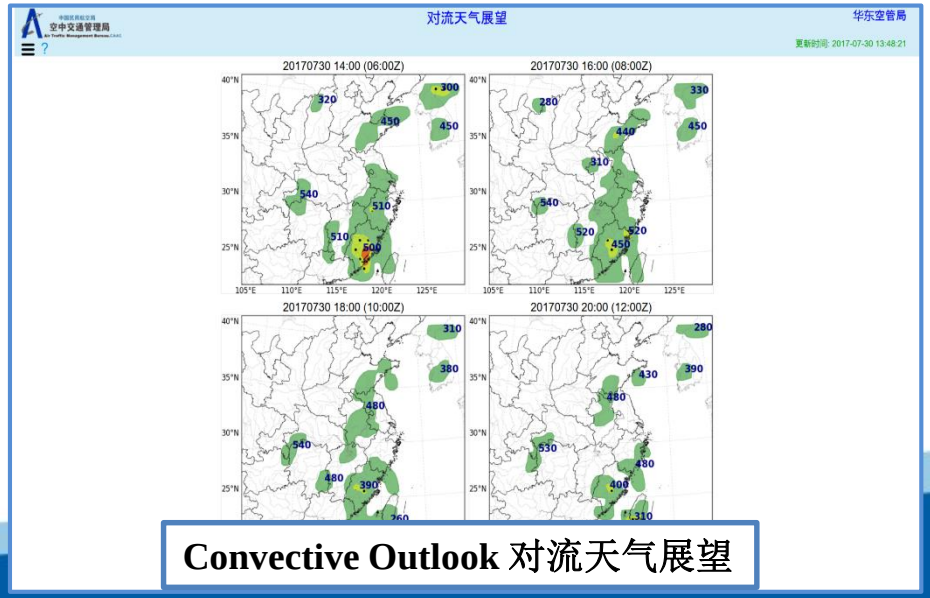
Airport Weather Impact 机场天气影响预报



TRACON Weather Impact 进近区天气影响预报



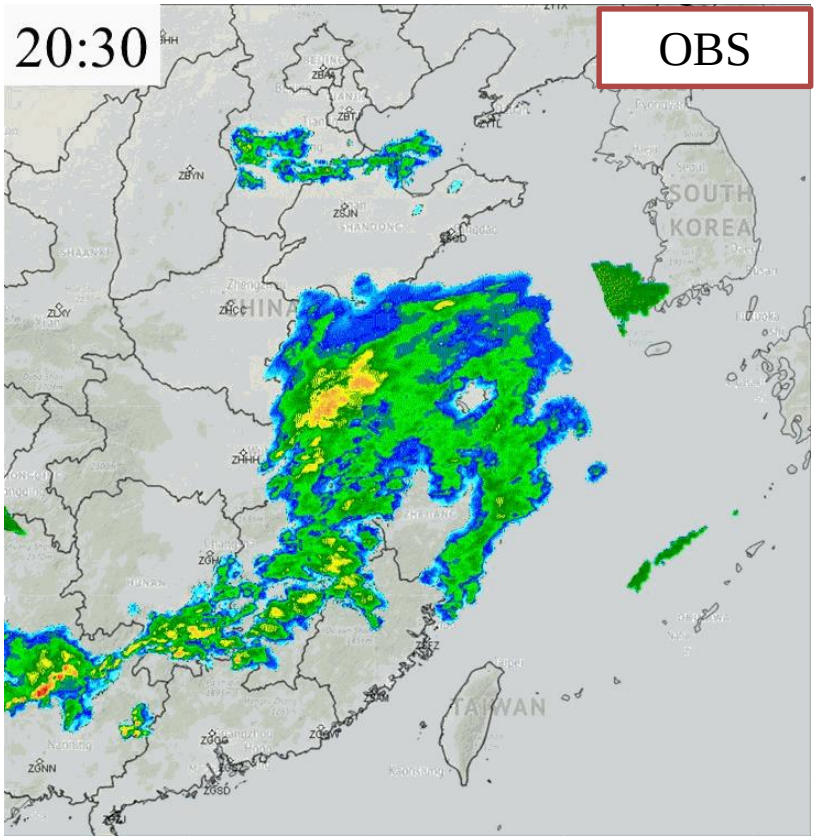
Route Weather Impact 航路天气影响预报

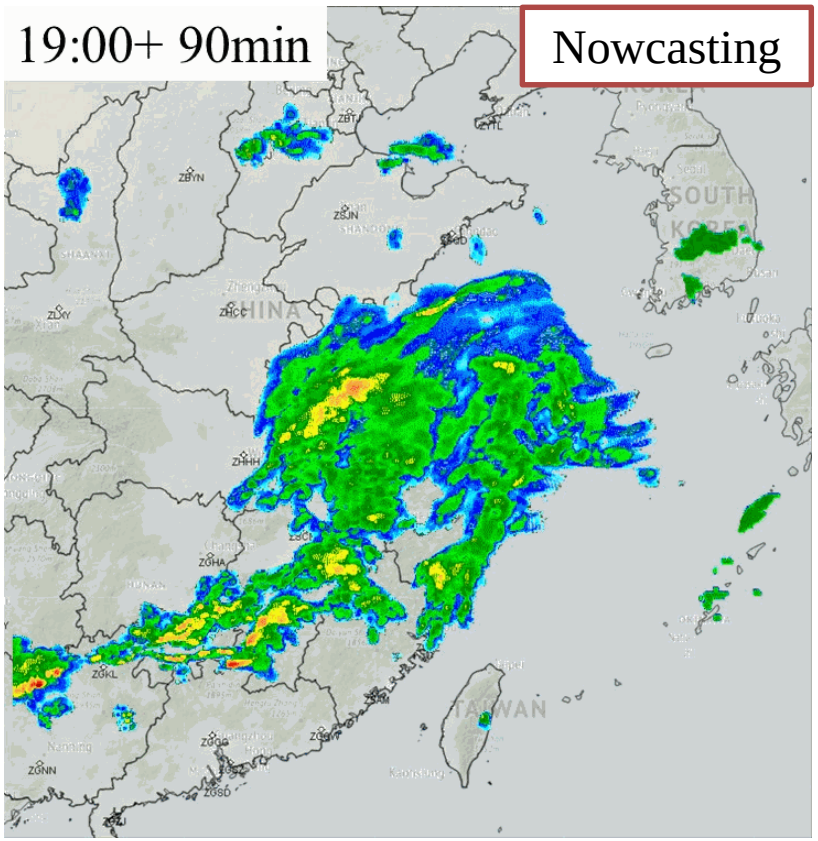


Convective Outlook 对流天气展望

3. MET-ATM Impacts Translation

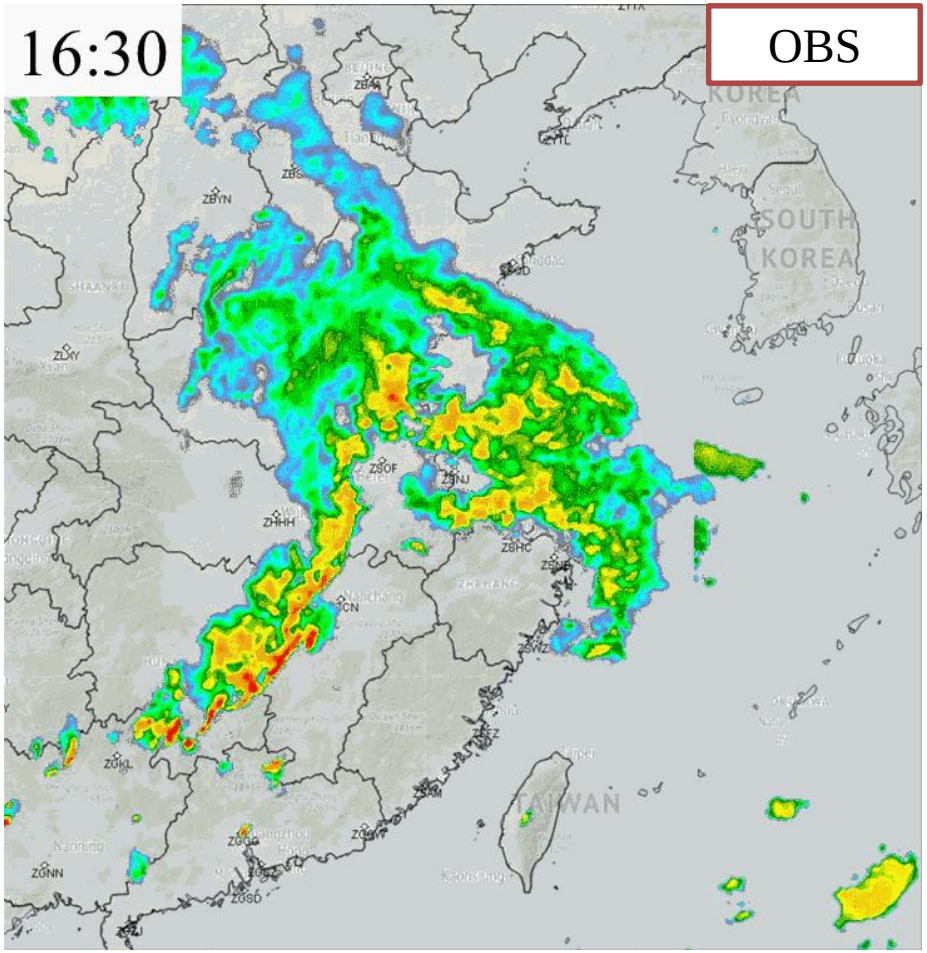
A heavy rainfall event in East China, Mar 30, 2017

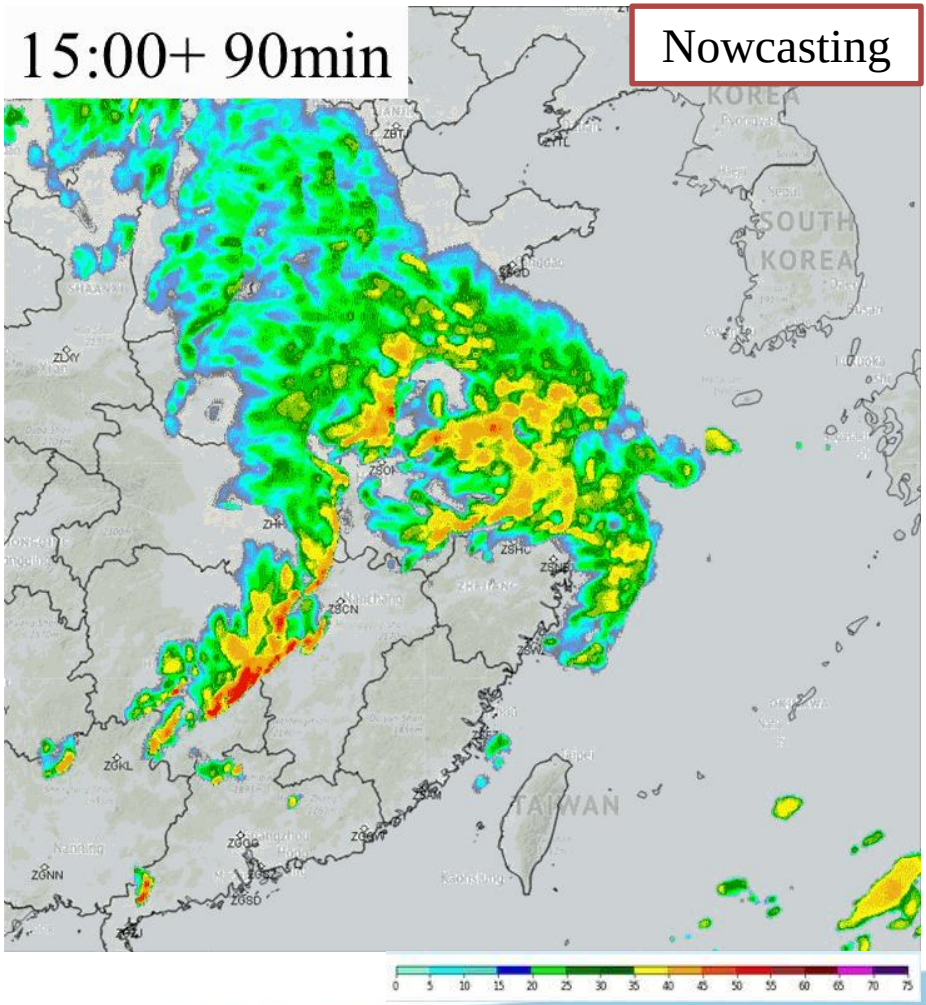




3. MET-ATM Impacts Translation

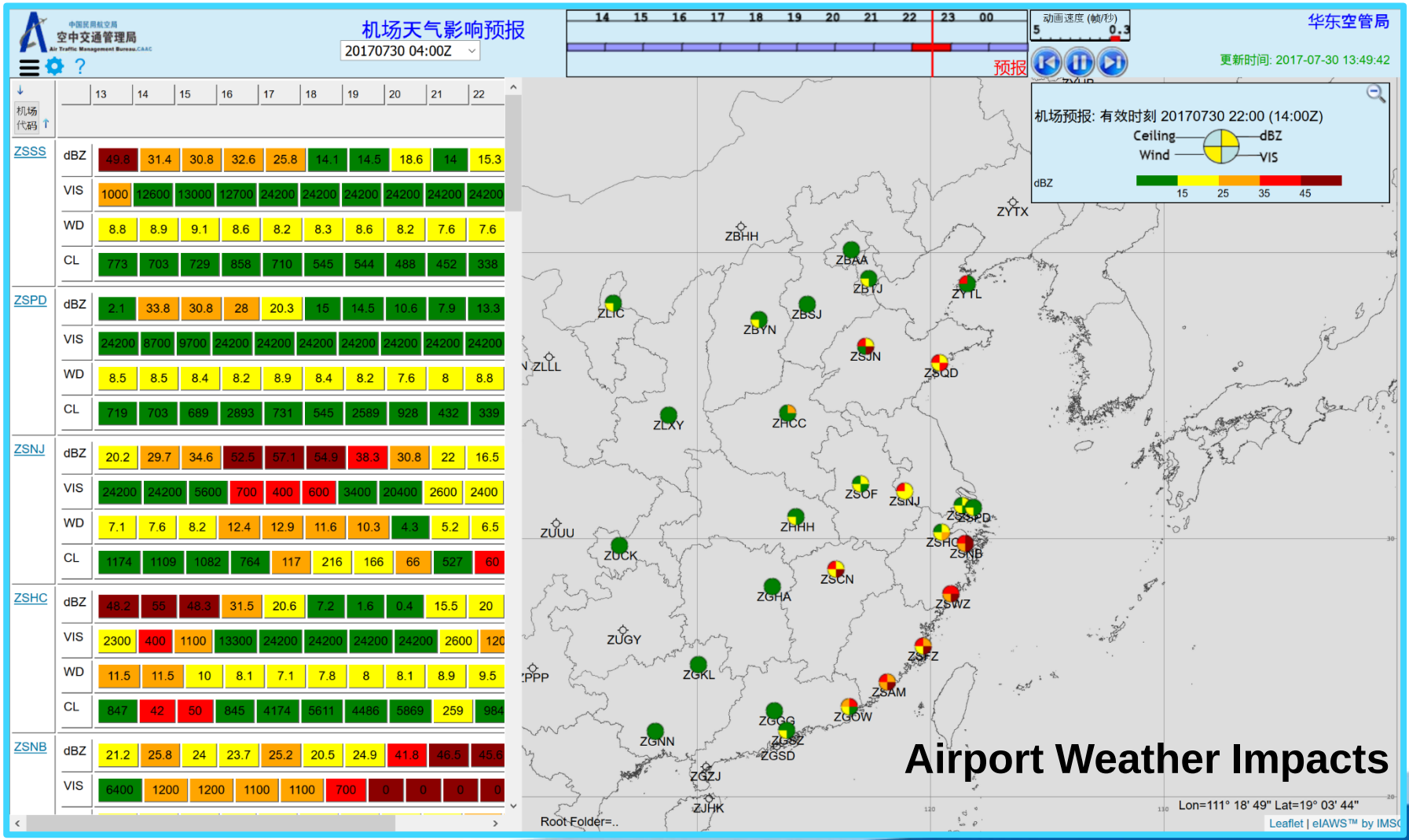
A thunderstorm event in East China, Jun 5, 2017





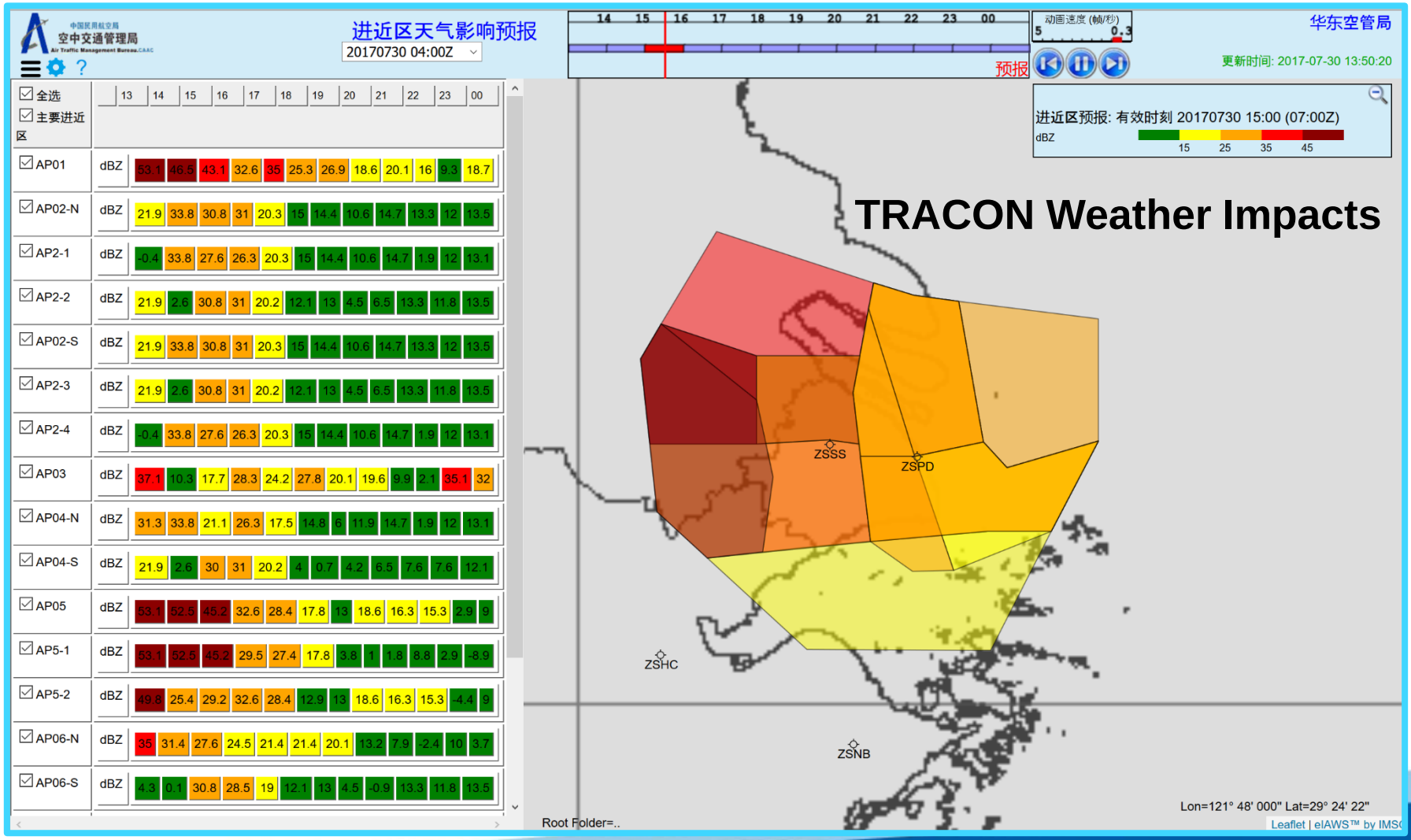
3. MET-ATM Impacts Translation

A thunderstorm event in East China, Jul 30, 2017



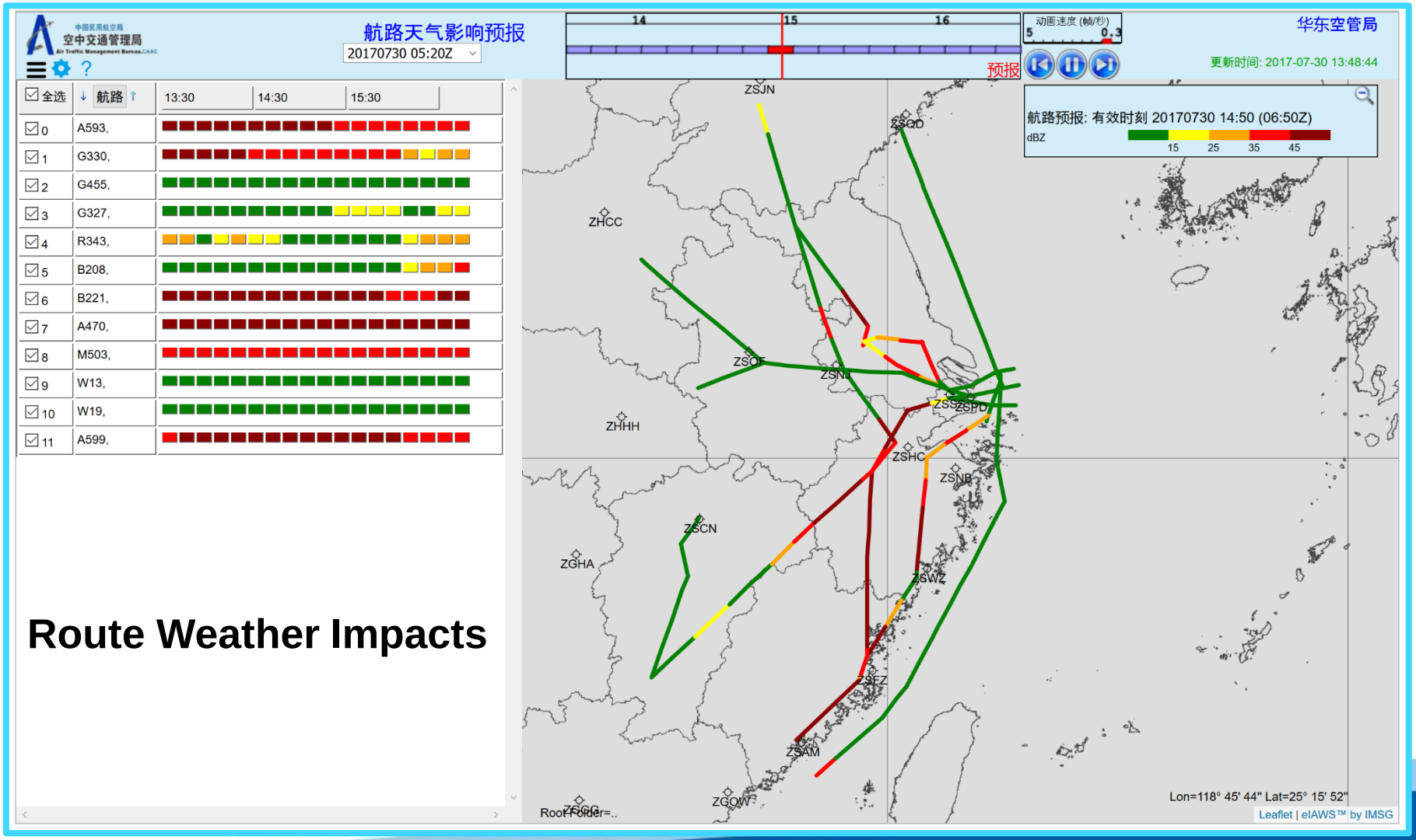
3. MET-ATM Impacts Translation

A thunderstorm event in East China, Jul 30, 2017



3. MET-ATM Impacts Translation

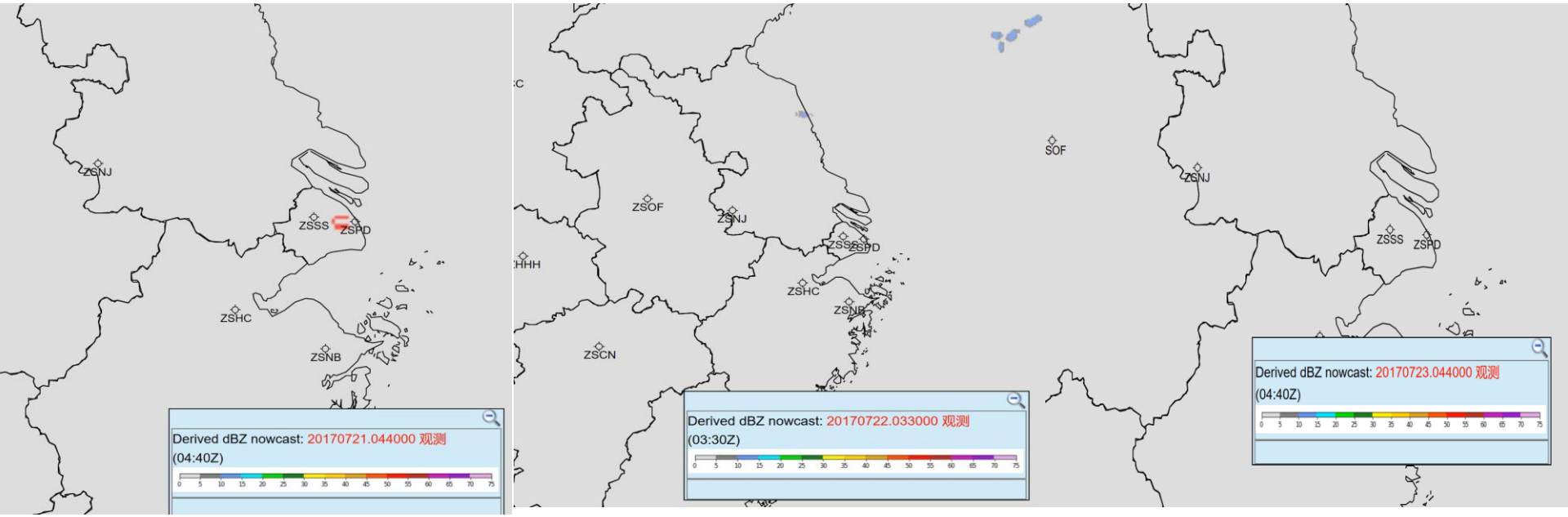
A thunderstorm event in East China, Jul 30, 2017



Route Weather Impacts

3. MET-ATM Impacts Translation

Convective initiation nowcasting



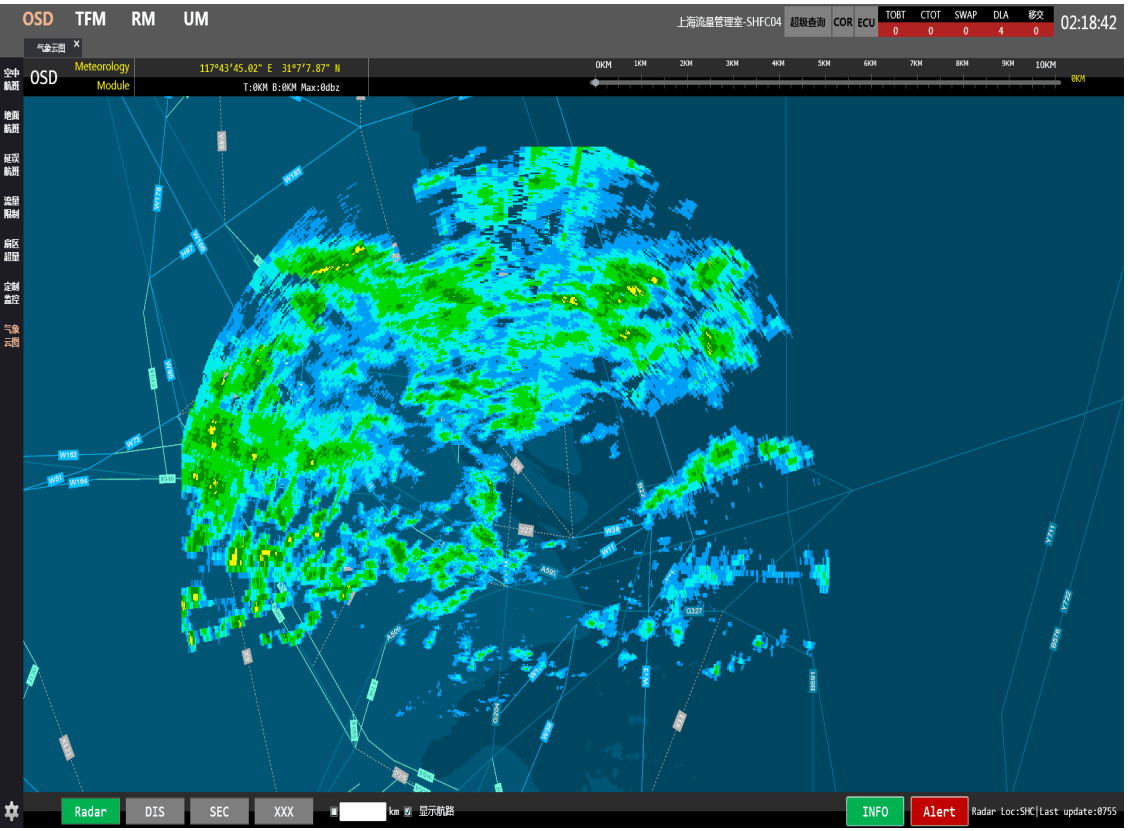
Jul 21 2017，
50 minutes leading time
Mask +50min, echo

Jul 22 2017，
20 minutes leading time

Jul 23 2017，
20 minutes leading time

3. MET-ATM Impacts Translation

Operation Situation Display



Radar — Open / Close radar image

DIS — Distance

SEC — Cross section

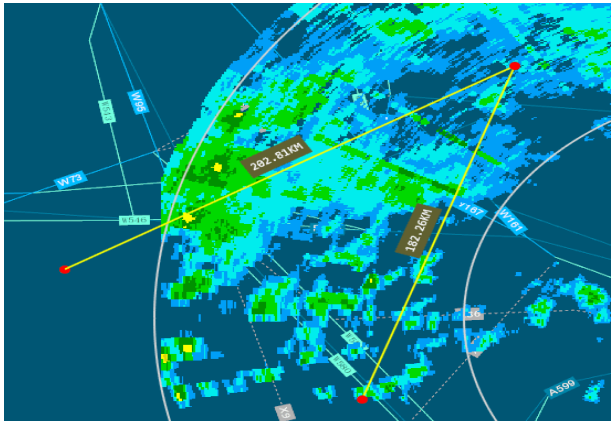
XXX — Cloud trajectory Analysis tool

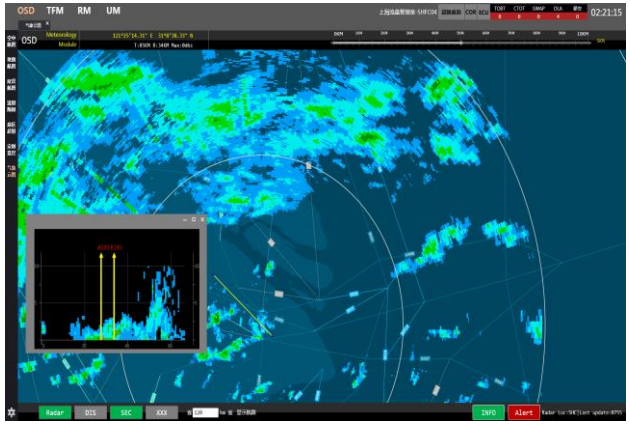
120 km — Range ring

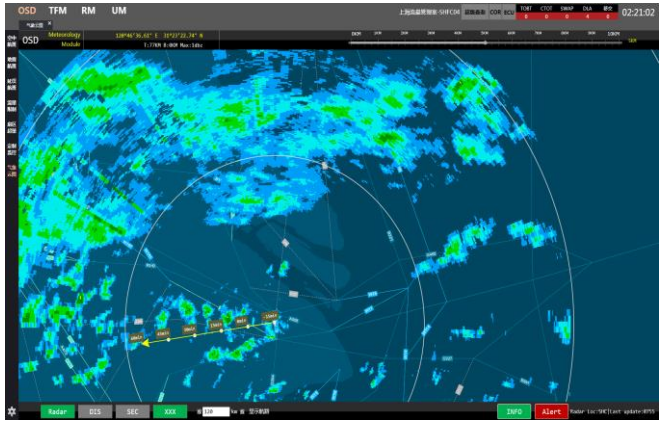
显示航路 — Air route

3. MET-ATM Impacts Translation

Operation Situation Display







3. MET-ATM Impacts Translation

Operation Situation Display

- Radar & satellite data blending extrapolation, integrated display with ATM information, including TRACON sections, air routes, approach points----adverse weather situation common awareness;
- Users: TRACON / Tower controllers, forecasters;
- An interaction platform for prewarning issues , sharing and handling;
- Intl 10min, res 1km for radar data.

4. MET-ATM Impacts Cooperation

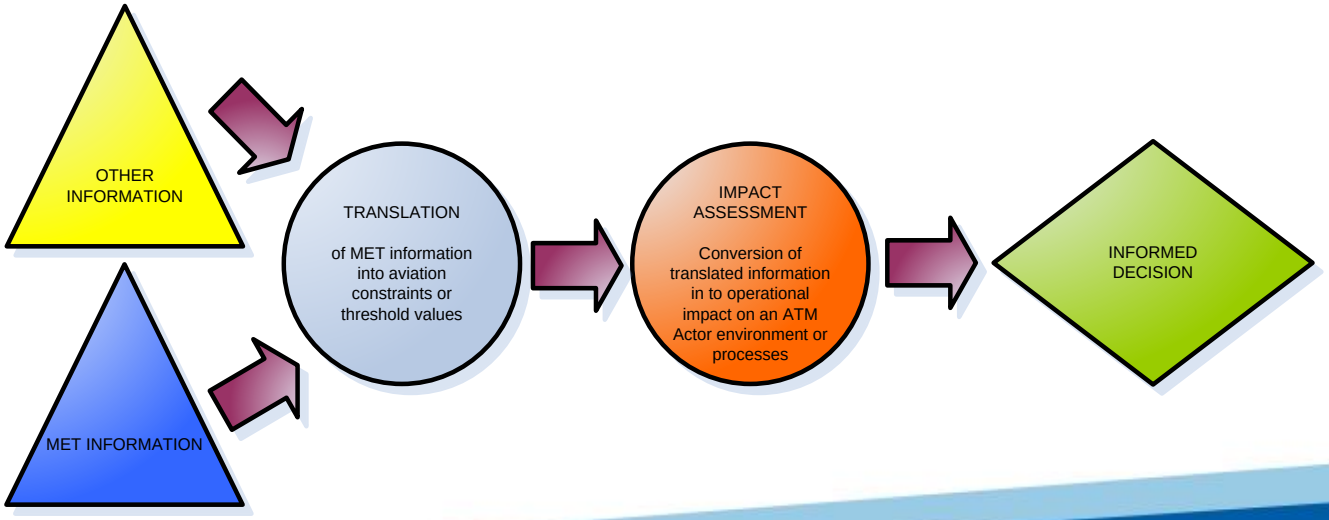
Common situational awareness

- CDM weather briefing
- Cross-training between controllers and meteorologists
- MET-ATM Conjoint Analysis

III. Next Steps

Ⅲ Next Steps

- **NWP and Nowcasting Assessment and Optimization**
- **Improvement of the integration of MET-ATM**
- **Validation of MET-ATM impacts**



Conclusions

- Accuracy and res——NWP and Nowcasting
- Translation——integration of MET-ATM，impacts
- Verification an Validation
- Optimization—— Always on the road

谢 谢!

Thank you!