

Environment Week

Detection of Asian dust using Satellite

2016.4.14

National Meteorological Satellite Center/KMA
Yunho Park(csat3@korea.kr)





Seoul



Yunho Park

NMSC/KMA

National
Meteorological
Satellite
Center

1. Building for NMSC

- Area: 33,058m²
- Construction duration: 2005~2008(4yrs)

2. Organization & Personnel

- 3 divisions (Satellite Planning division, Satellite Operation division, Satellite Analysis division, 2009.4) with more than 110 staffs and researchers

3. Major missions

- Meteorological Satellite Development & Operation
- Satellite Data Application
Data Reception/Processing/Analysis/
Distribution for Users
- International and Internal Cooperation regarding Meteorological Satellite

Observation Schedule of COMS

FD

ENH

Every 30 min → 15 min
Early detection of severe weather

ENH every 15 min

FD every 3 hour

LA

Korean Peninsula 8 times an hour

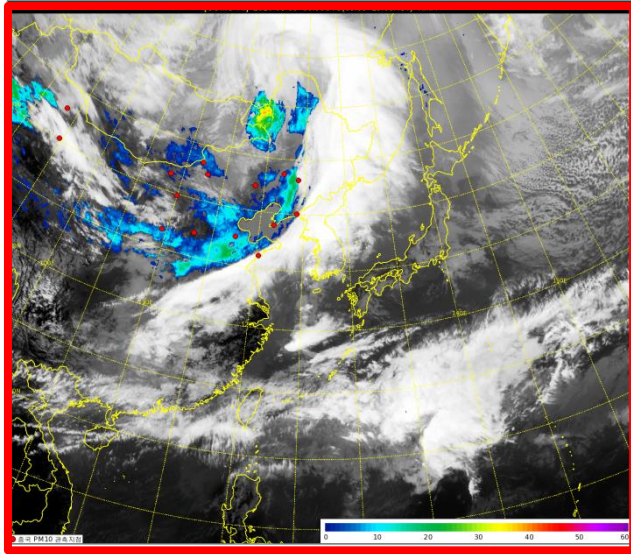
COMS VIS 2014. 3. 24 23:45 UTC[02. 14 08:45 KST] KMA

COMS Products

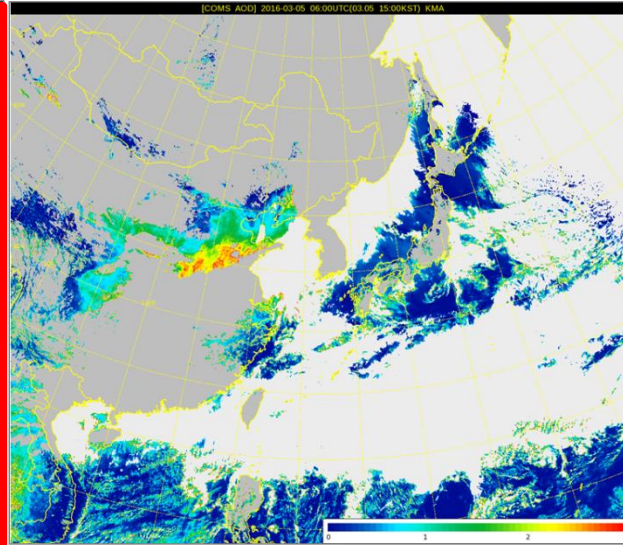
16 Baseline Products : Development (2003-2010) and Operation (2011~)



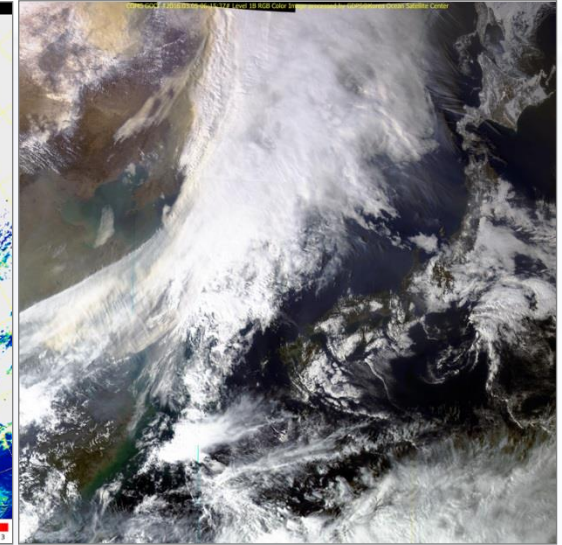
☼ Satellite product for Asian dust



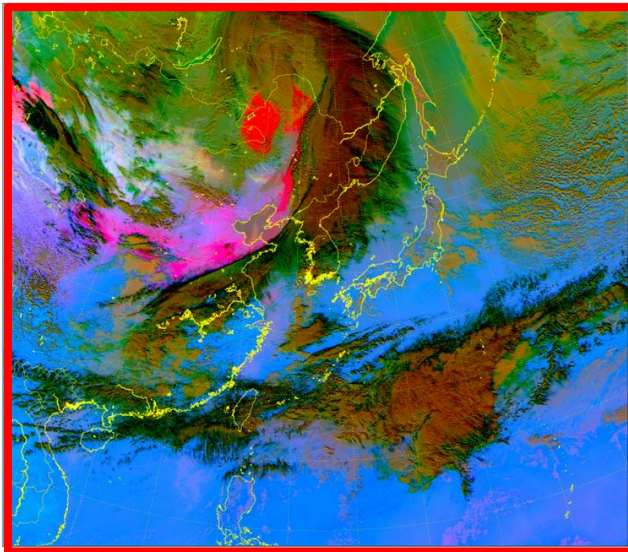
COMS MI Aerosol Index
(2016.3.5.15:00KST)



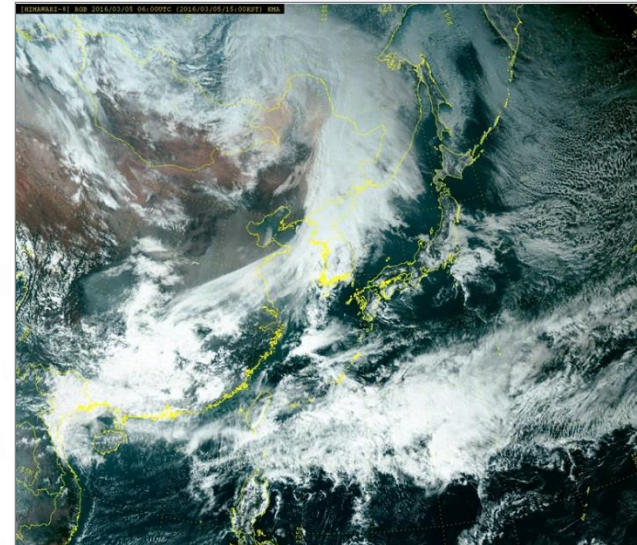
COMS MI Aerosol Optical Thickness)
(2016.3.5.15:00KST)



COMS GOCI RGB
(2016.3.5.15:00KST)

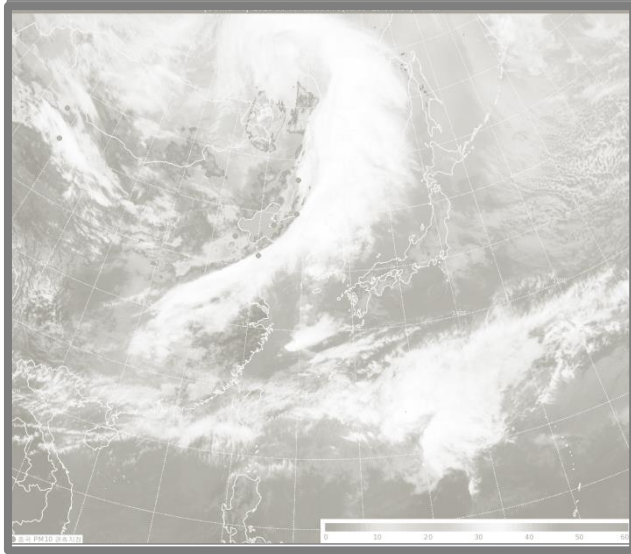


Himawari8 Asian dust RGB (2016.3.5.15:00KST)

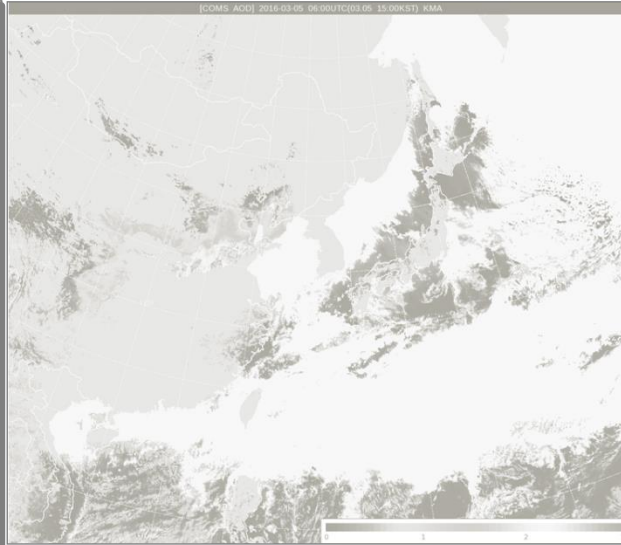


Himawari8 True Color (2016.3.5.15:00KST)

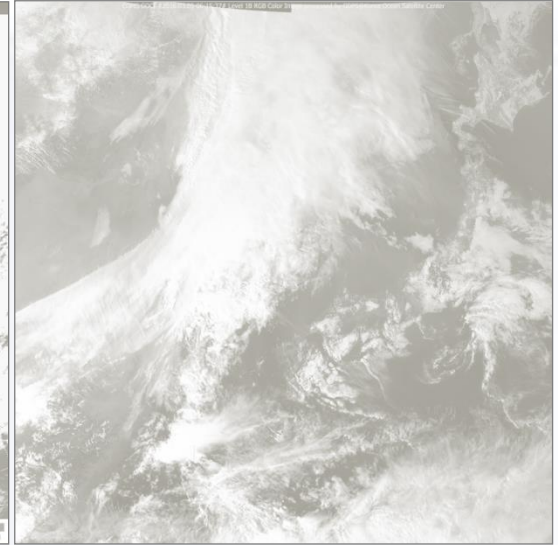
☼ Satellite product for Asian dust



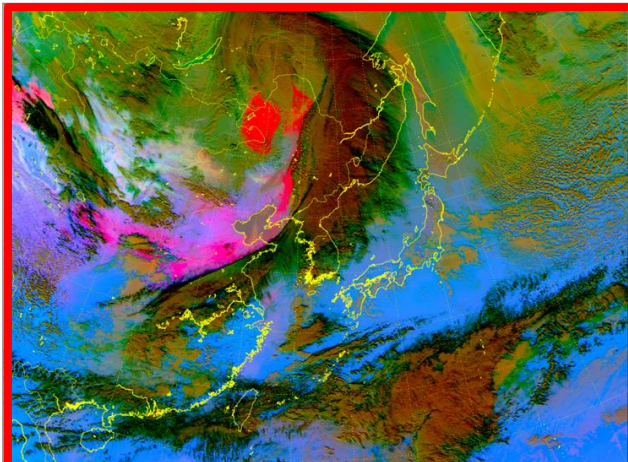
COMS MI Aerosol Index
(2016.3.5.15:00KST)



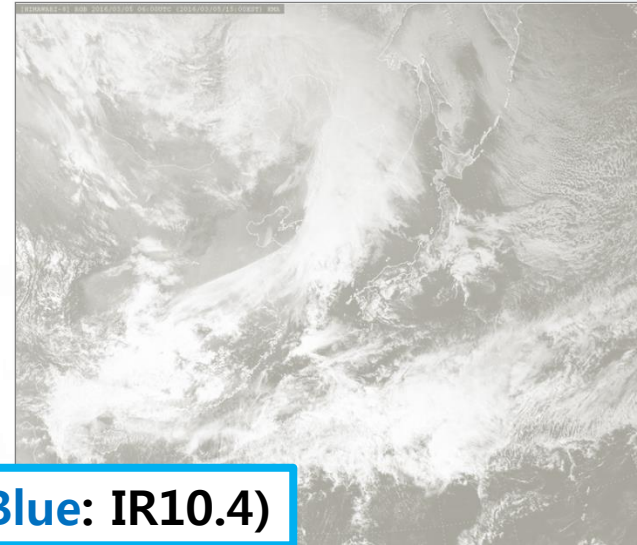
COMS MI Aerosol Optical Thickness)
(2016.3.5.15:00KST)



COMS GOCI RGB
(2016.3.5.15:00KST)



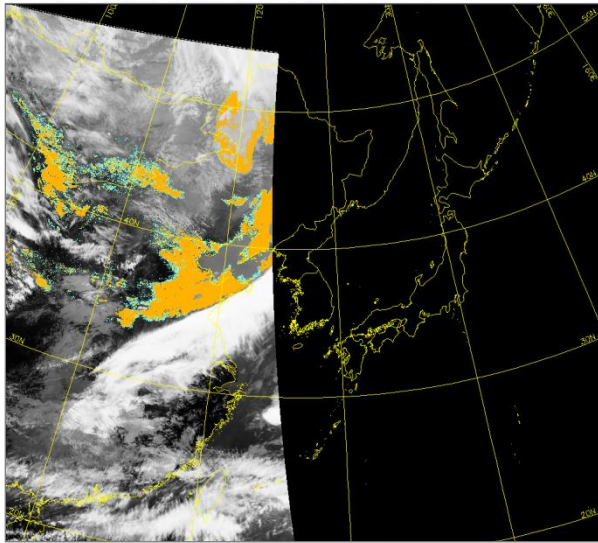
Himawari8 Asian dust RGB (2016.3.5.15:00KST)



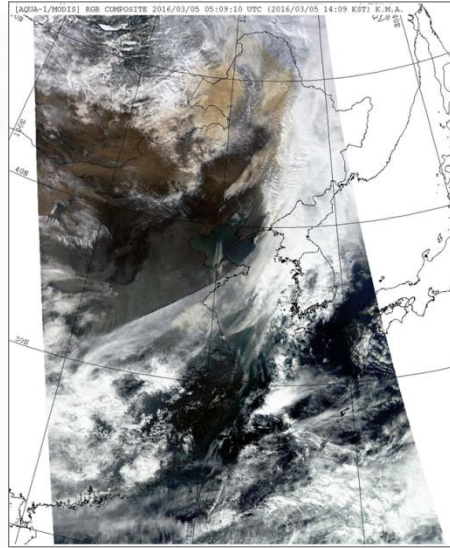
Himawari8 True Color (2016.3.5.15:00KST)

Red: IR12.4-IR10.4, **Green:** IR10.4-IR8.6, **Blue:** IR10.4)

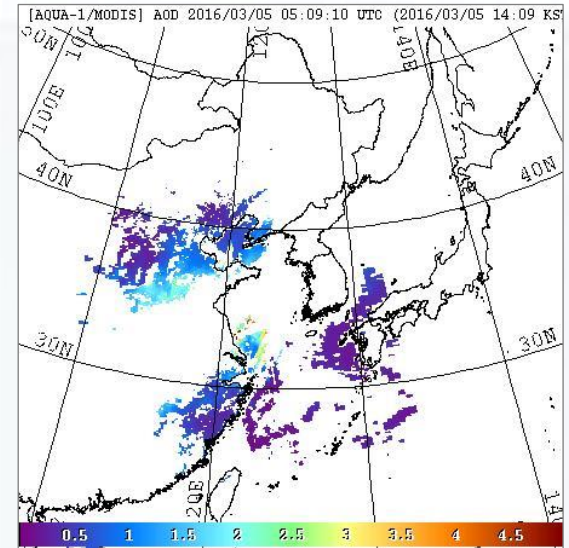
LEO Satellite Asian dust products (2~3/day, limited area)



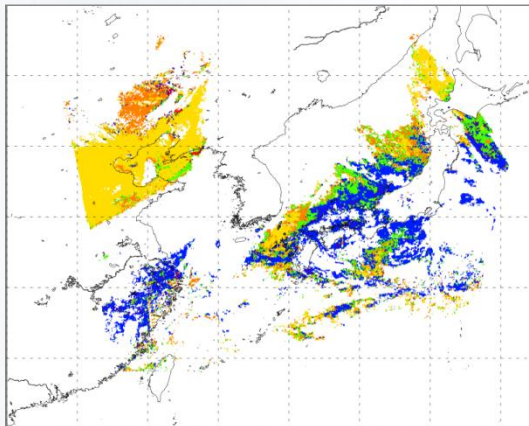
Asian dust from NOAA
(2016.3.5.14:06KST)



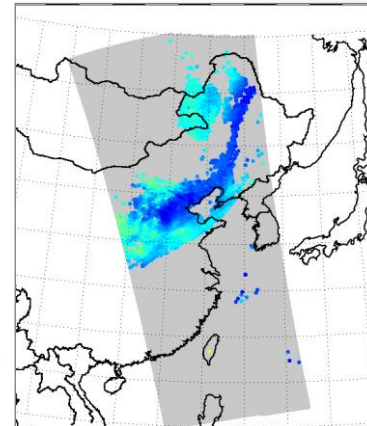
Aqua/Terra_MODIS RGB
(2016.3.5.14:09KST)



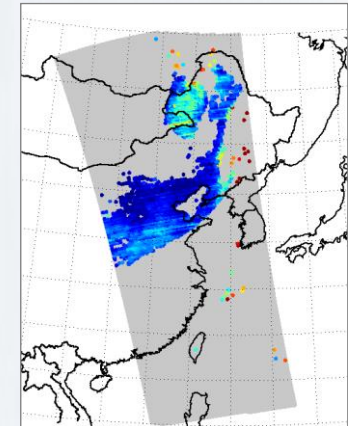
Aqua/Terra MODIS AOD
(2016.3.5.14:09KST)



COMS GOCI Aerosol type
(2016.3.5.15:00KST)

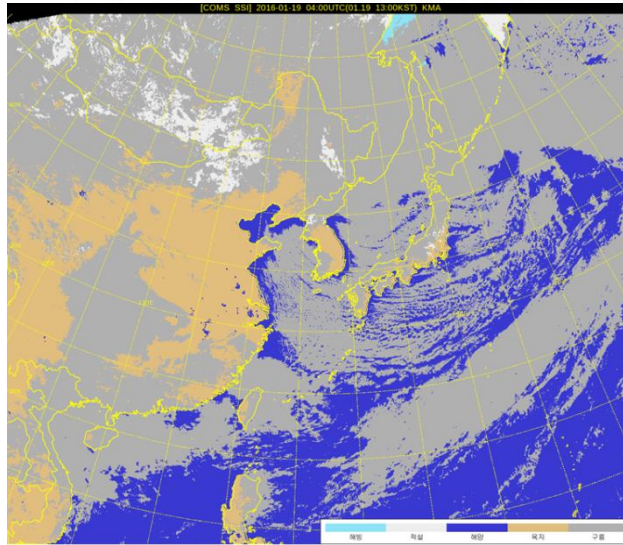


Aqua AIRS AOT
(2016.3.5.14:24KST)

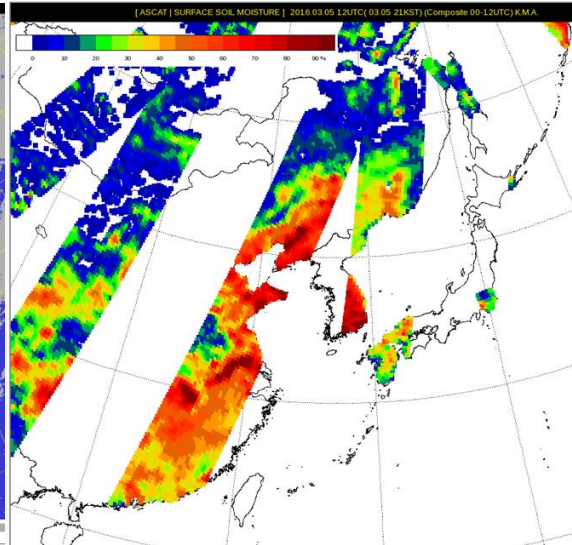


Aqua AIRS AOD
(2016.3.5.14:24KST)

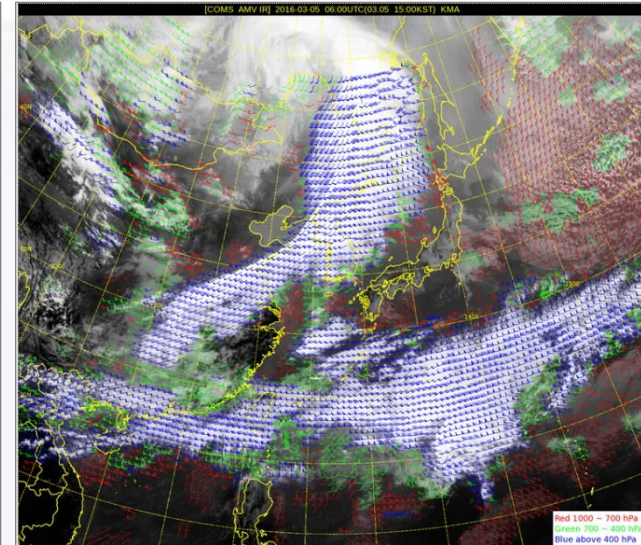
❁ Products from satellite (Condition of Asian dust source area)



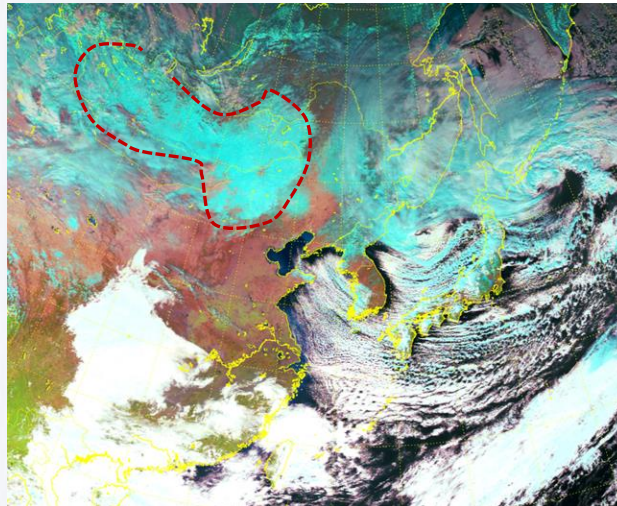
COMS MI sea-ice/snow cover
(2016.1.19.13:00KST)



METOP ASCAT Soil moisture
(2016.3.5.21:00KST)

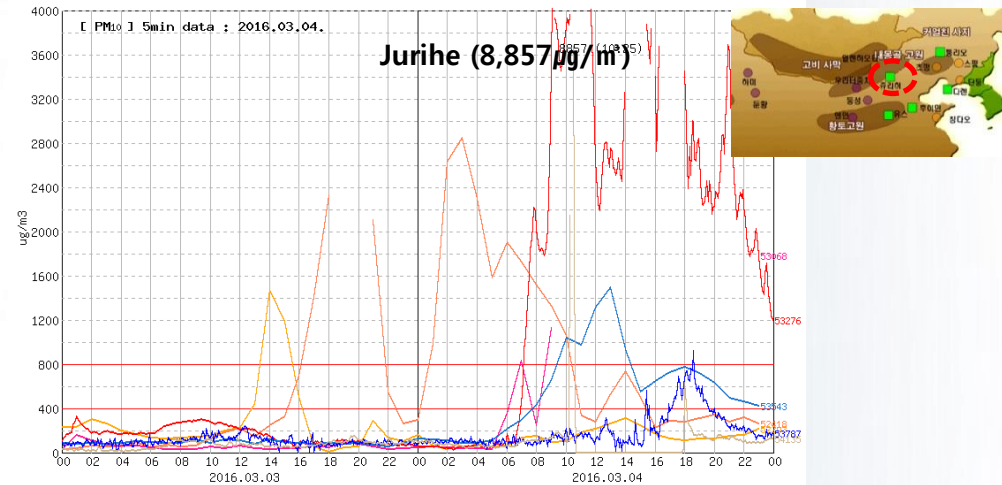
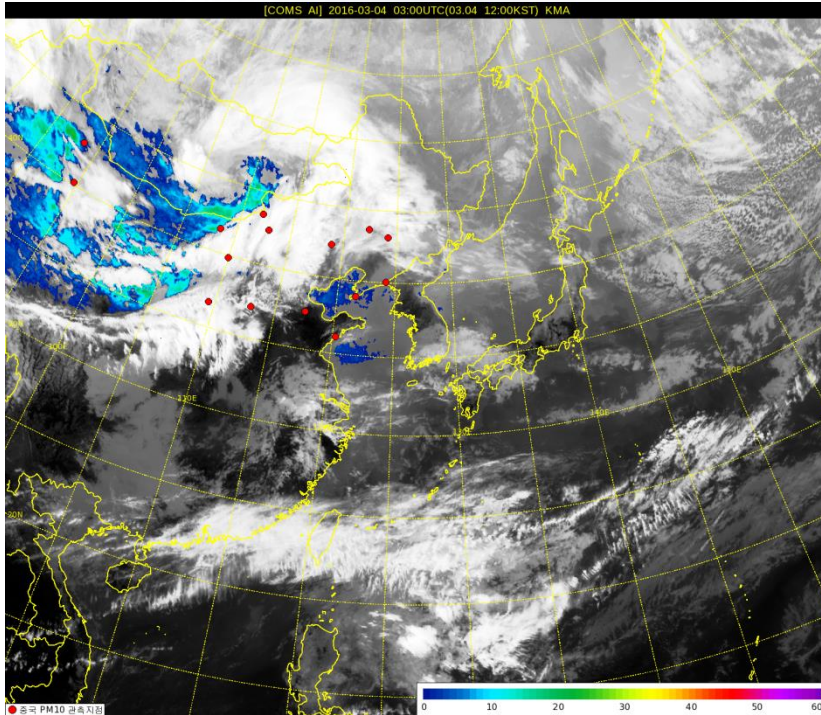


COMS MI AMV
(2016.3.5.15:00KST)

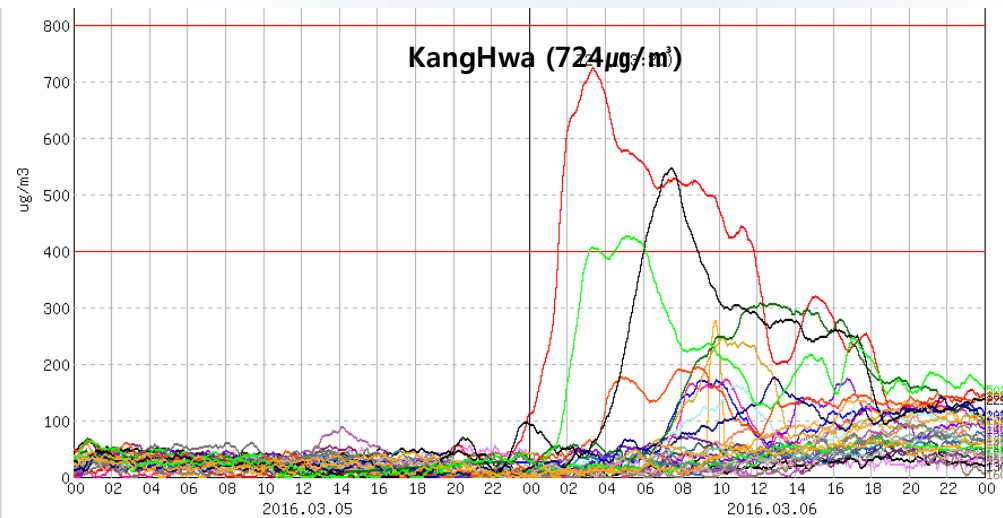


HW8 Natural Color
(2016.1.19.13:00KST)

☼ Asian dust Case 1. (2016.3.5.~3.6.)



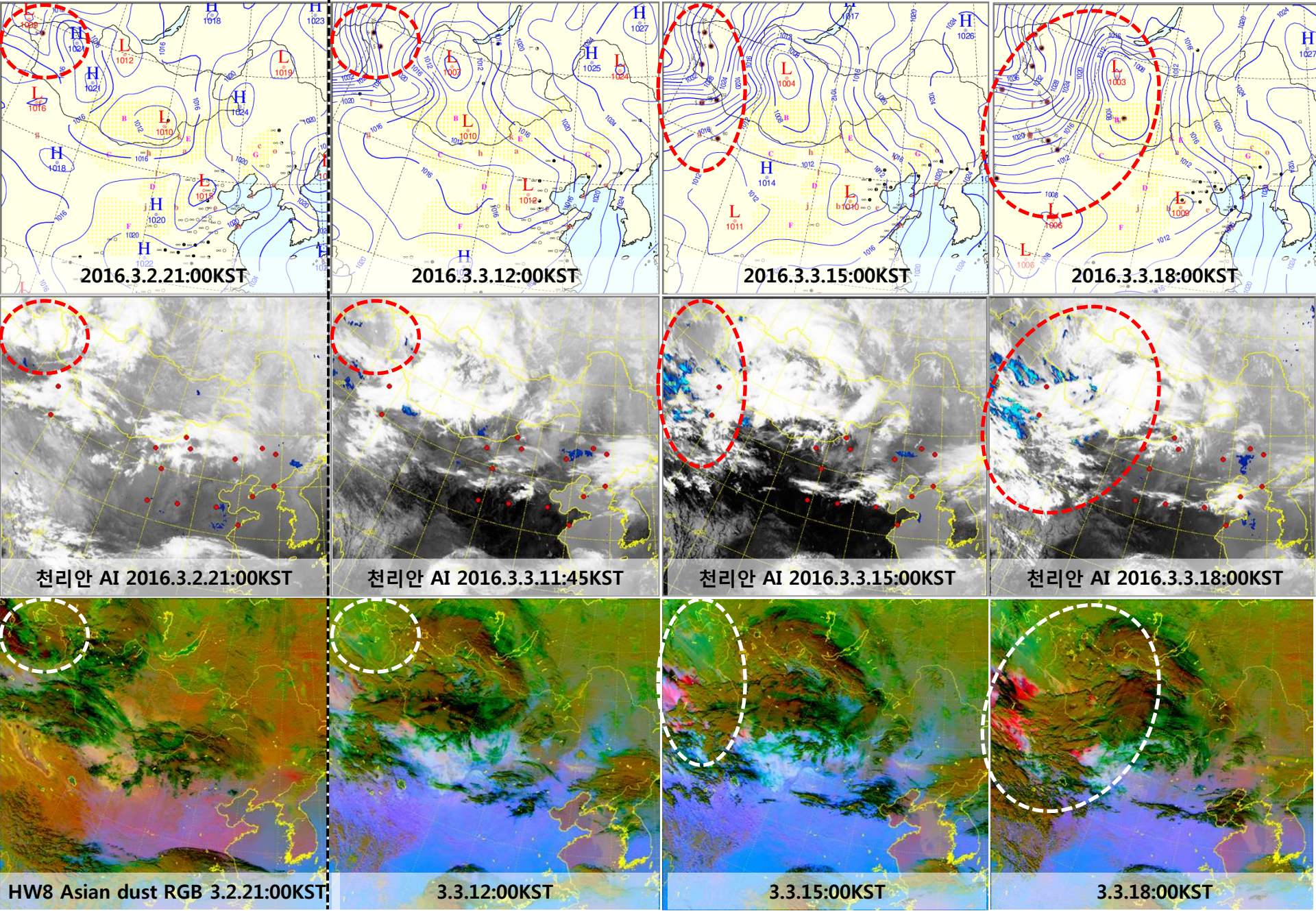
China PM10 (2016.3.3.~3.4.)

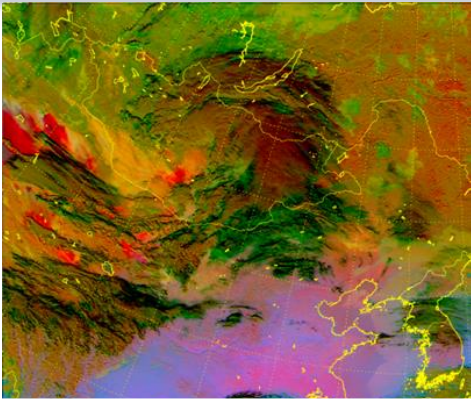


Korea PM10 (2016.3.5.~3.6.)

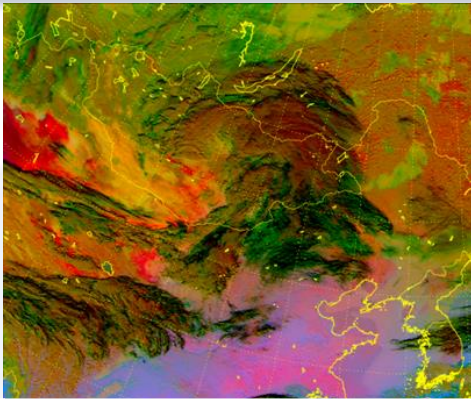
- ◆ Asian dust was rised during 3~4 of March.
- ◆ Korean peninsula was affected at 5 March night.
- Asian dust warning was issued at early in the morning 6 of March

Asian dust rise

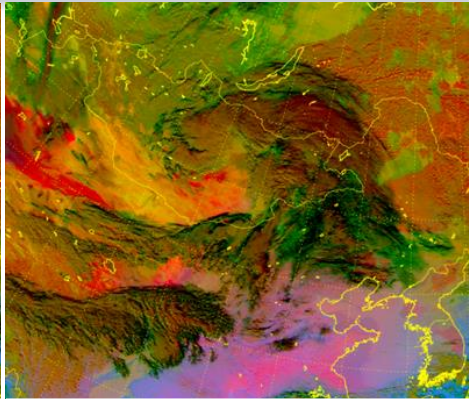




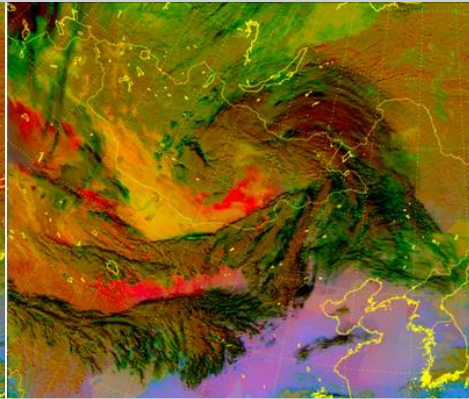
2016.3.4. 00:00KST



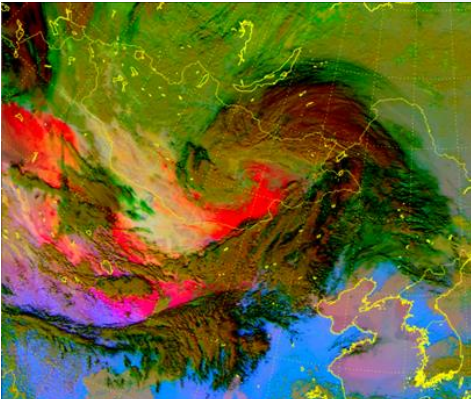
2016.3.4. 03:00KST



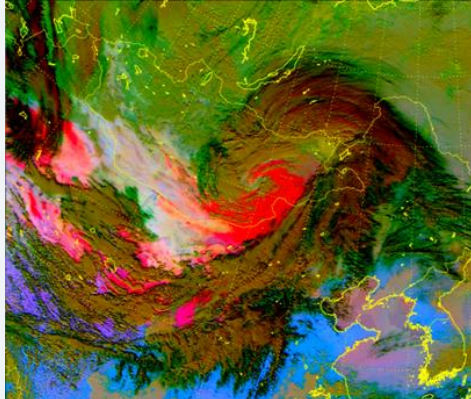
2016.3.4. 06:00KST



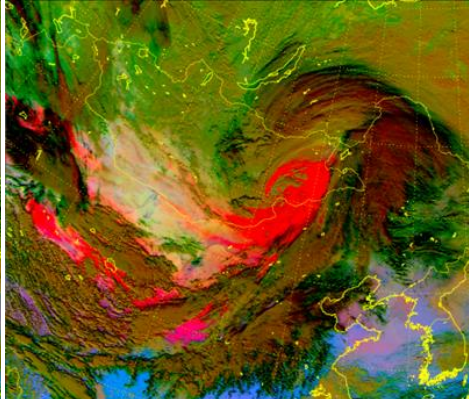
2016.3.4. 09:00KST



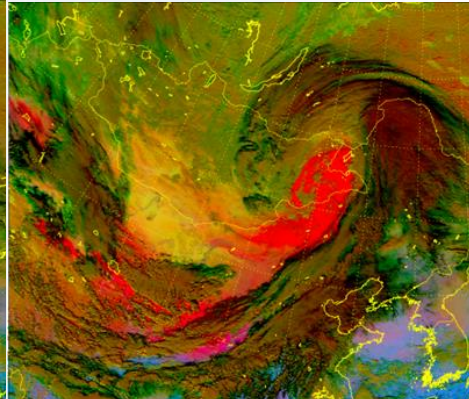
2016.3.4. 12:00KST



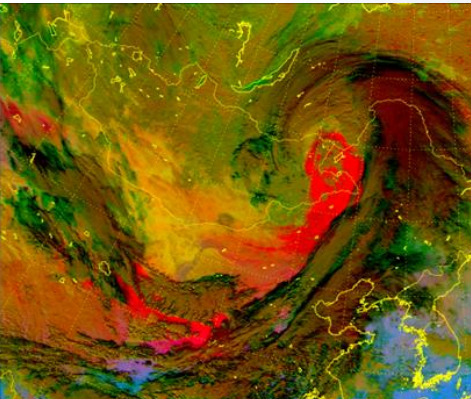
2016.3.4. 15:00KST



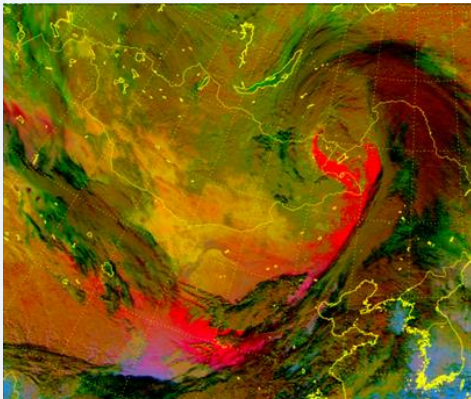
2016.3.4. 18:00KST



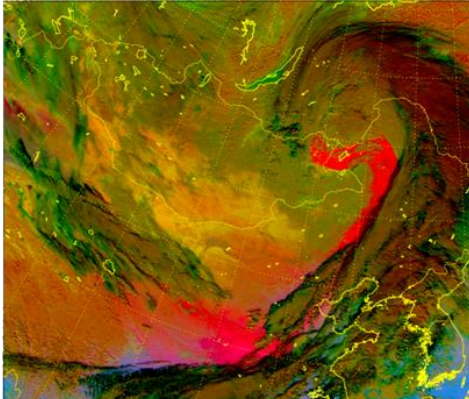
2016.3.4. 21:00KST



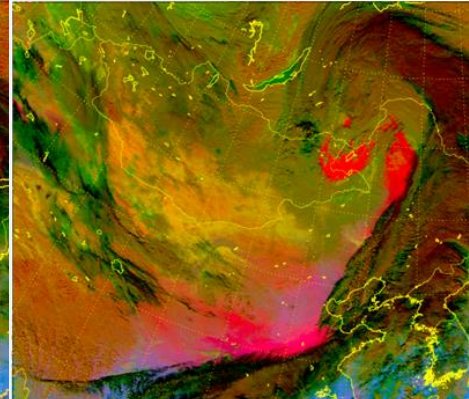
2016.3.5. 00:00KST



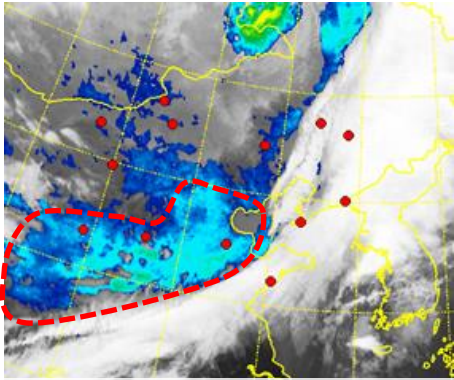
2016.3.5. 03:00KST



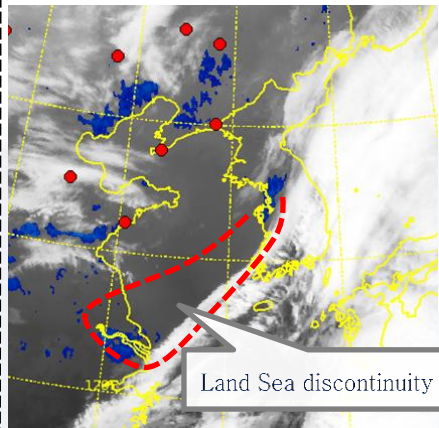
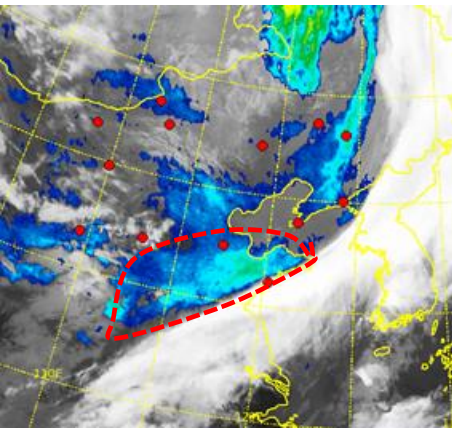
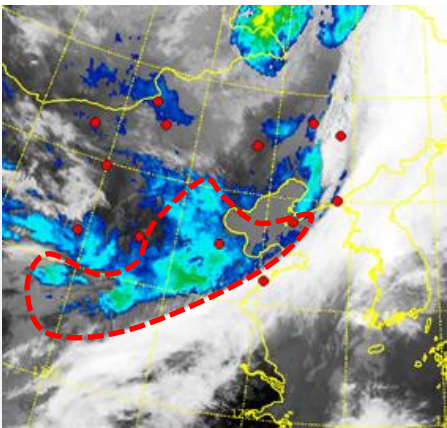
2016.3.5. 06:00KST



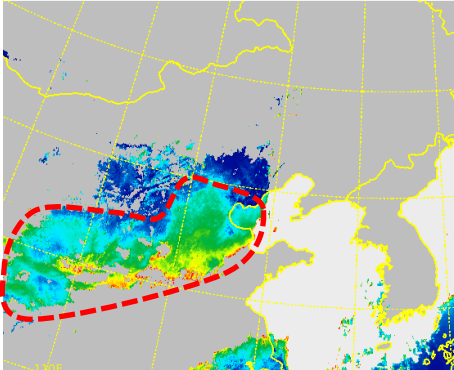
2016.3.5. 09:00KST



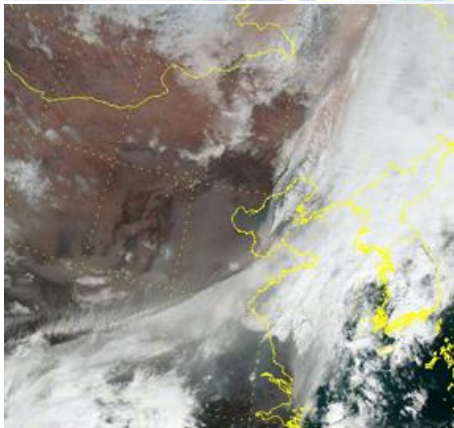
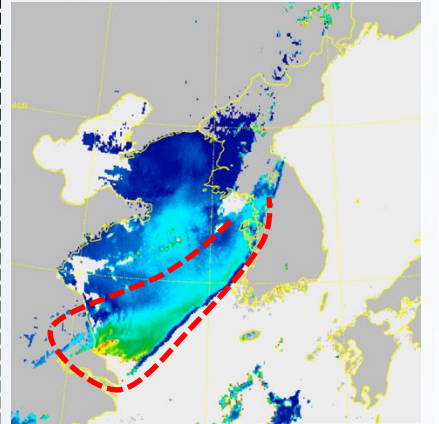
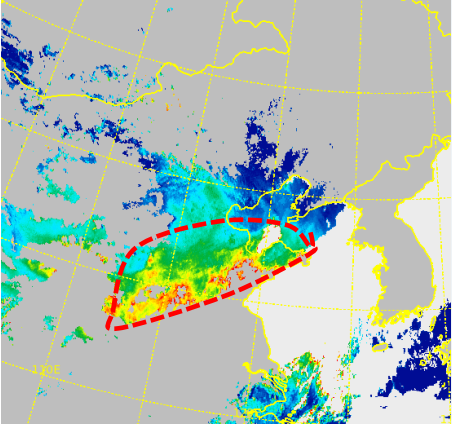
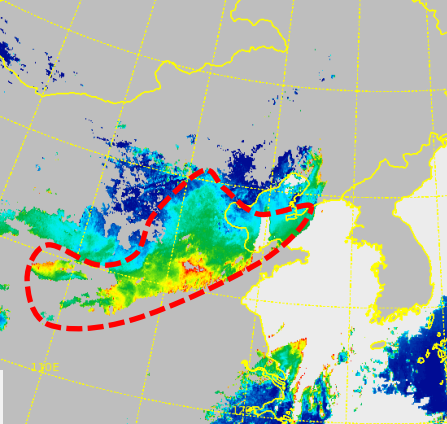
COMS AI 2016.3.5. 11:00KST



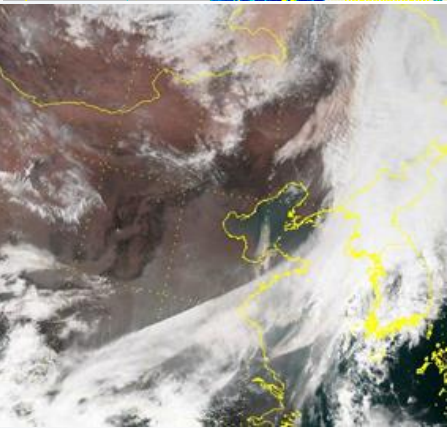
Land Sea discontinuity



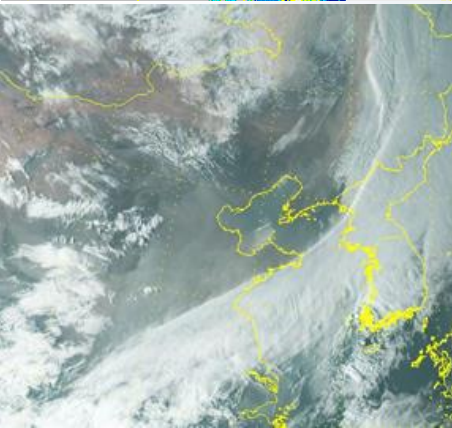
COMS AOD 11:00KST



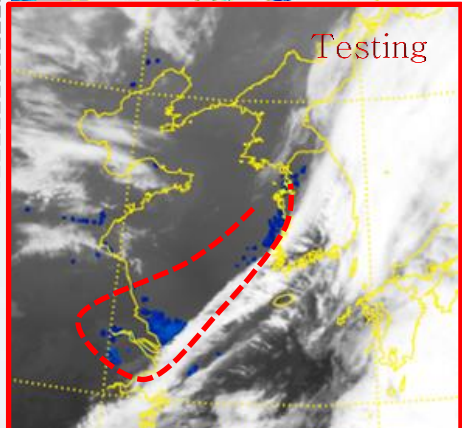
HW8 True Color 11:00KST



2016.3.5. 14:00KST

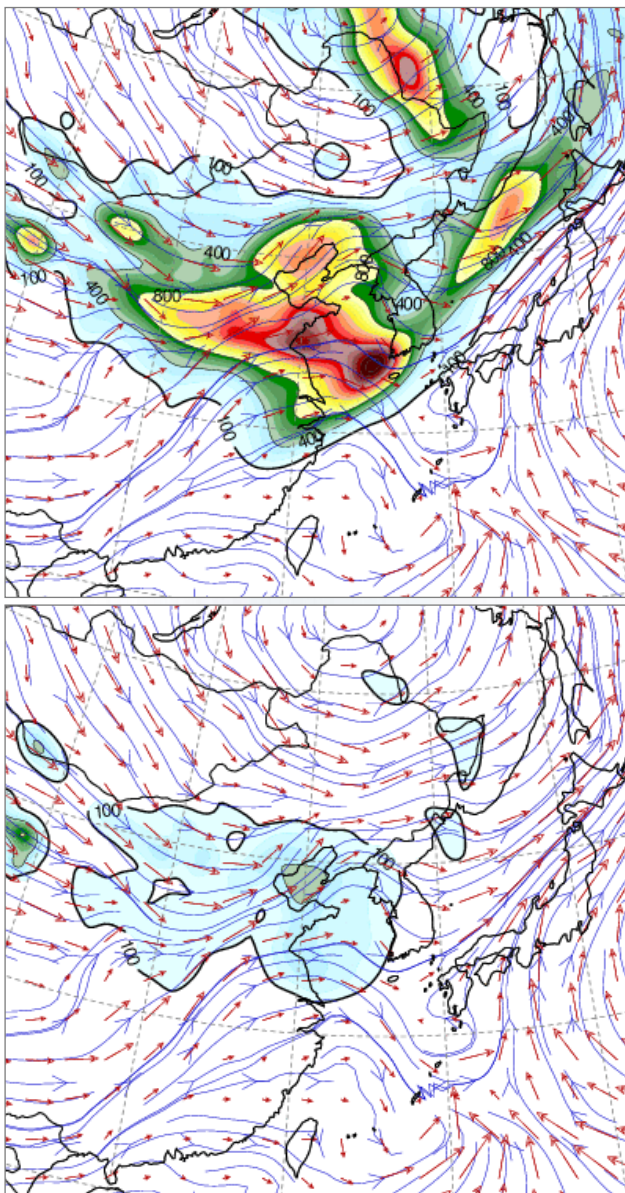


2016.3.5. 17:00KST

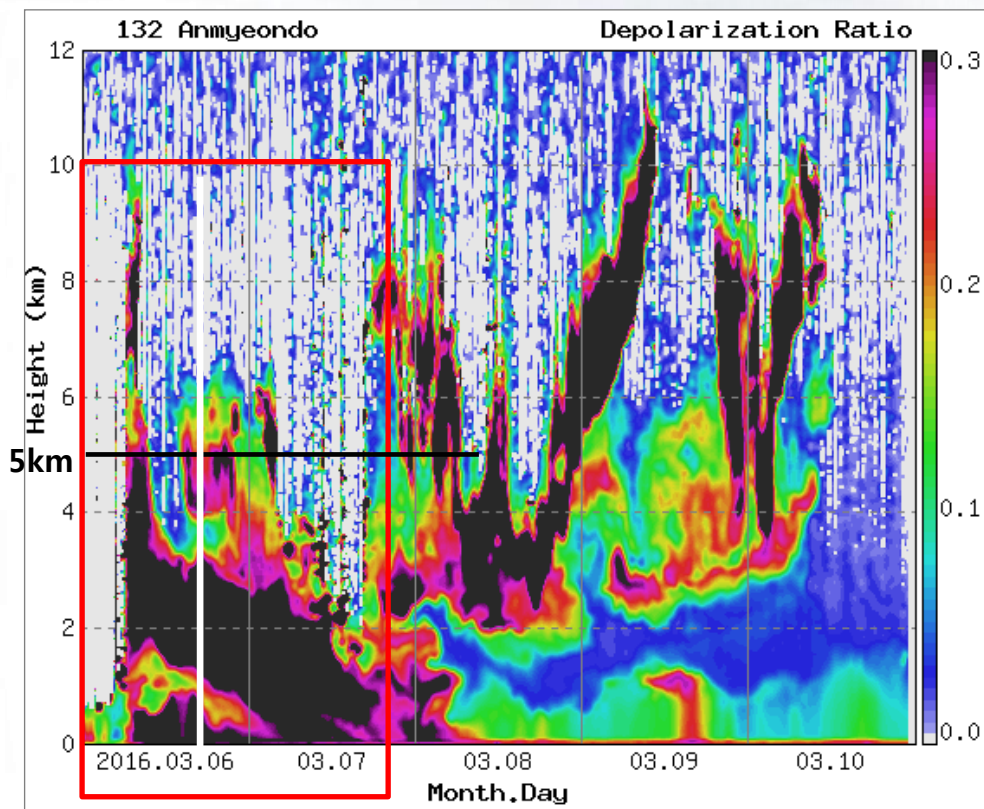


Testing

2016.3.6. 09:00KST

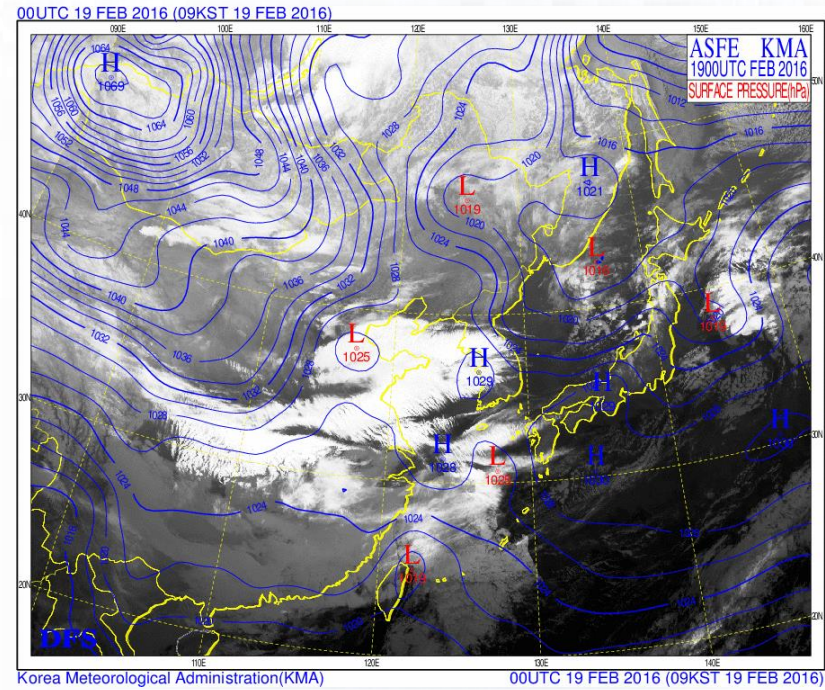
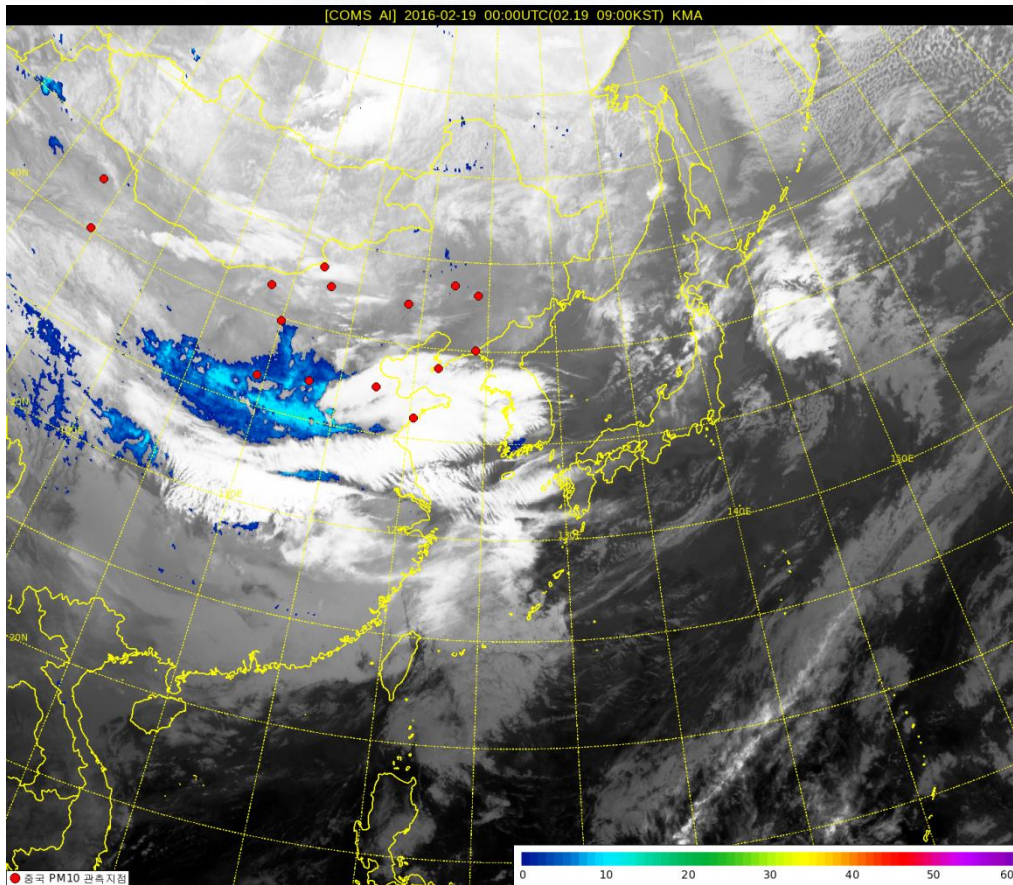


ADAM_(Up) Vertical accumulate TSP density,
(Down) Surf. PM10 (2016.3.6.15:00KST)

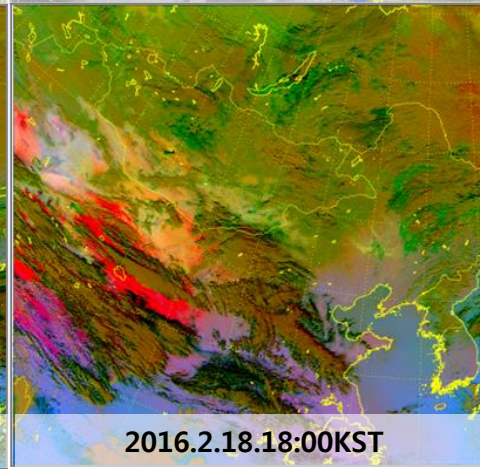
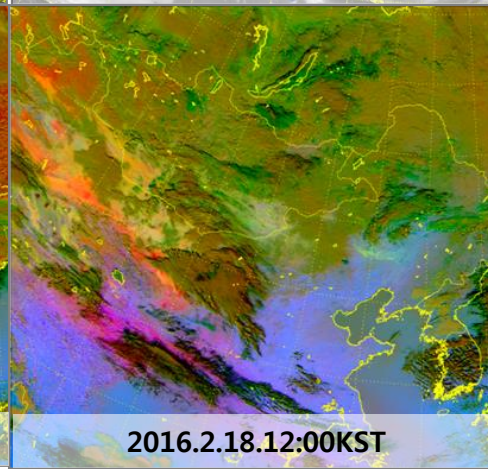
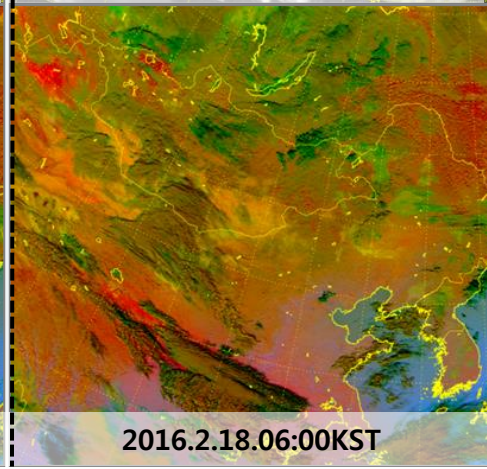
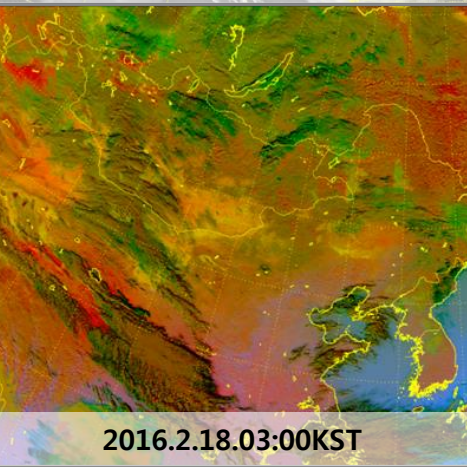
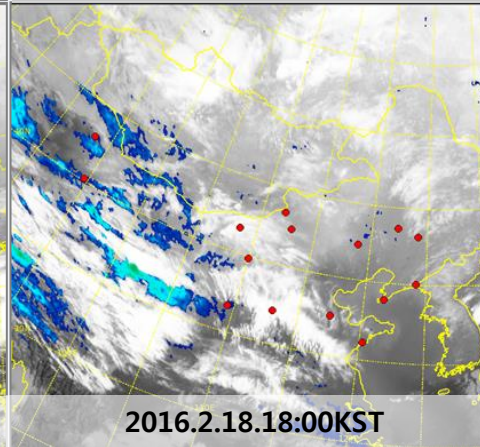
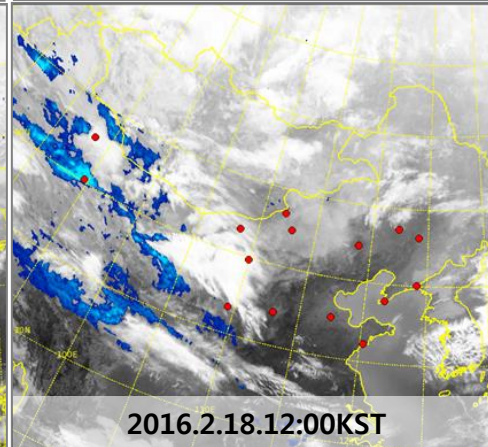
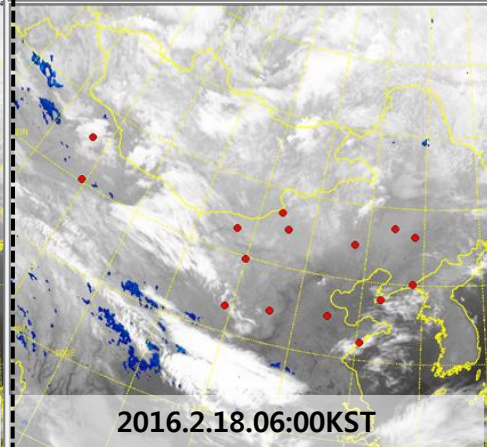
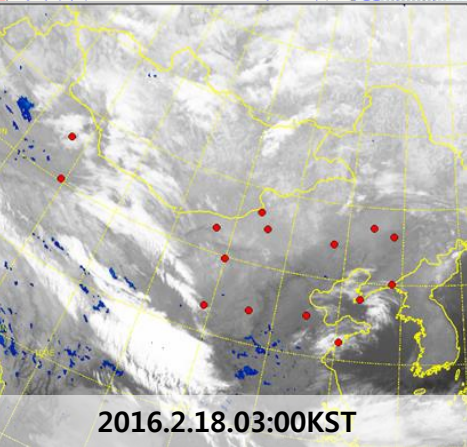
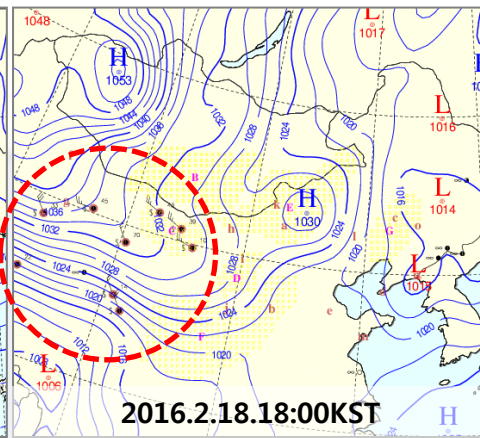
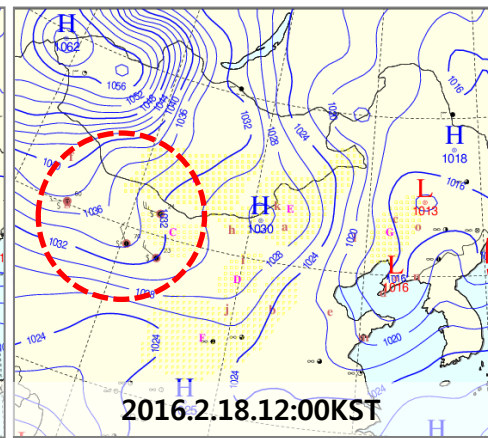
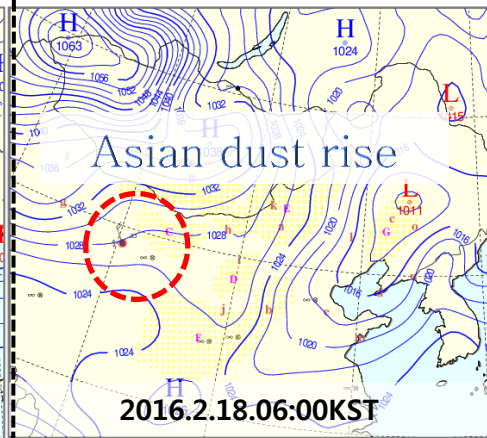
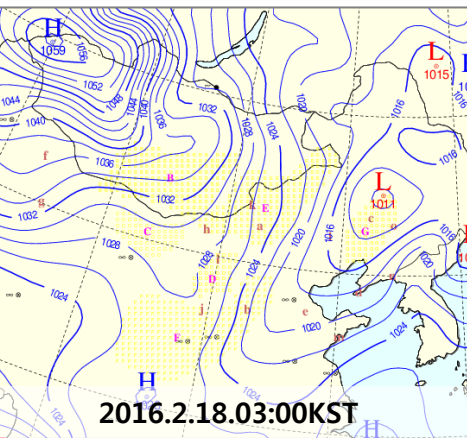


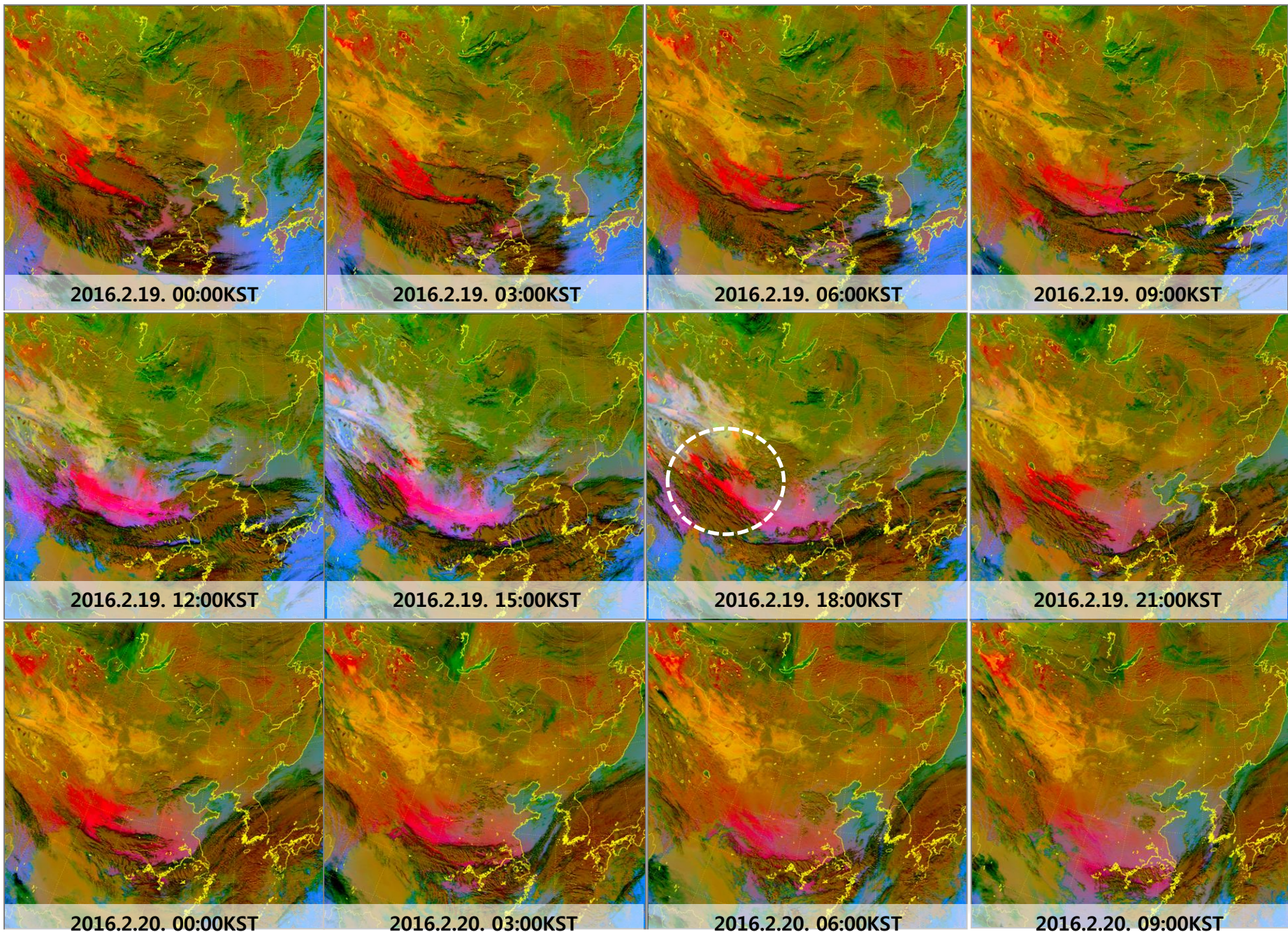
LIDAR(Anmyeondo) 2016.3.6.

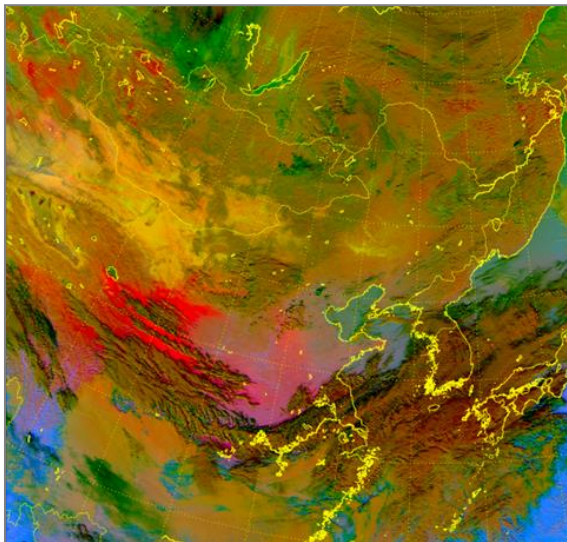
- Asian dust case 2. (2016.2.19.~2..20.)



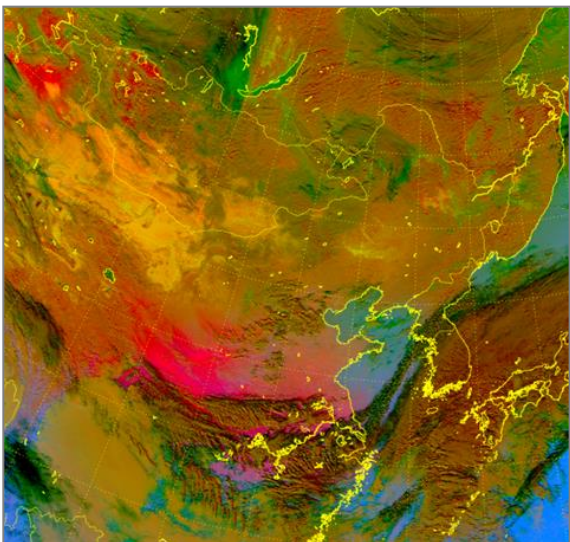
IR1 & Surf. Weather chart(2016.2.19. 09:00KST)



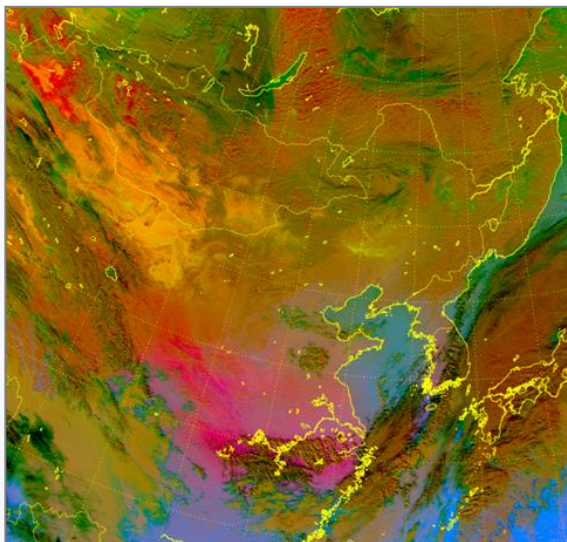




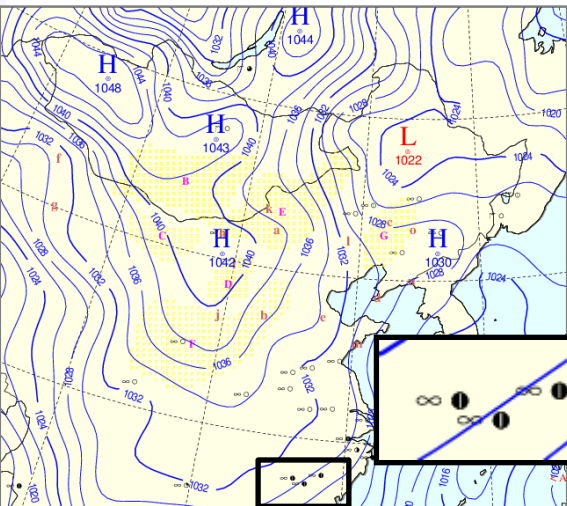
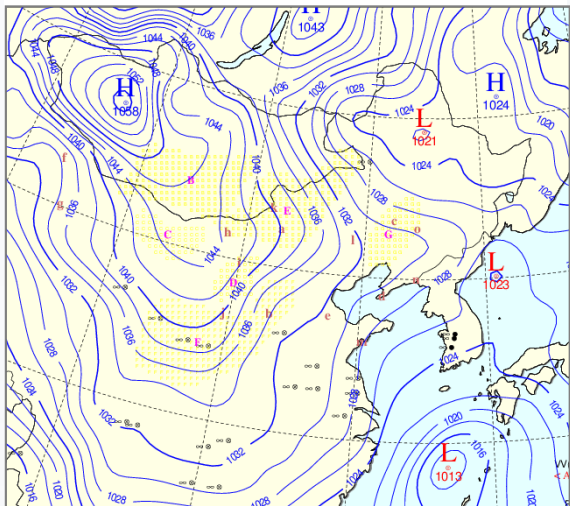
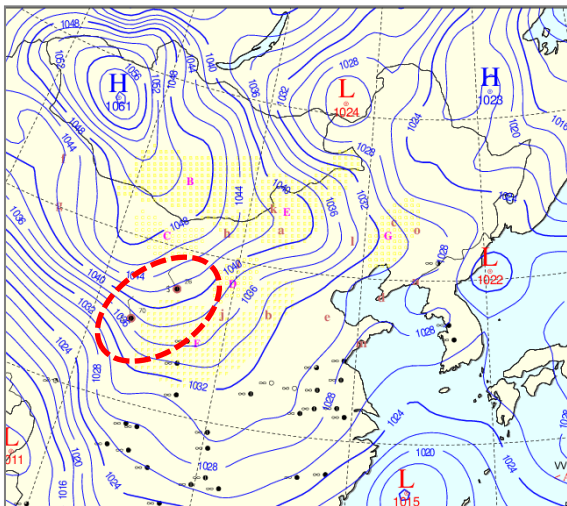
2016.2.19. 21:00KST

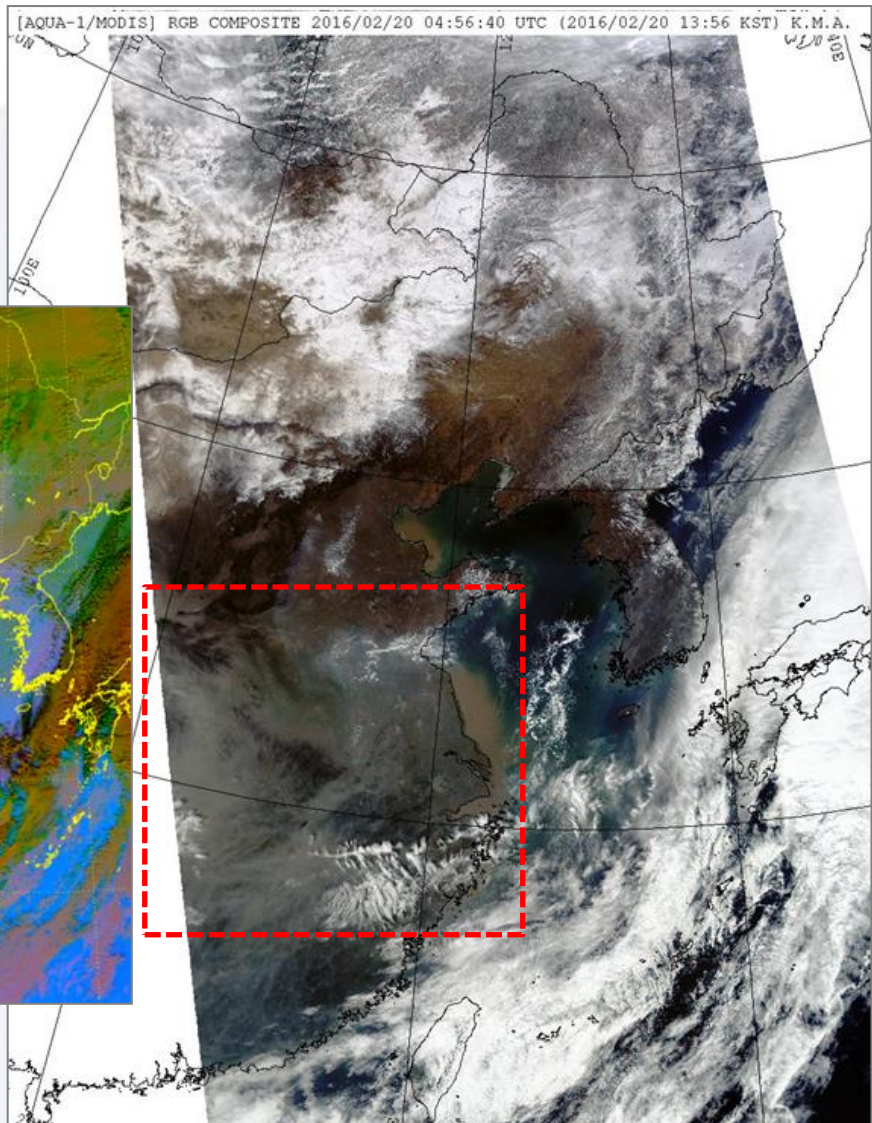


2016.2.20. 03:00KST

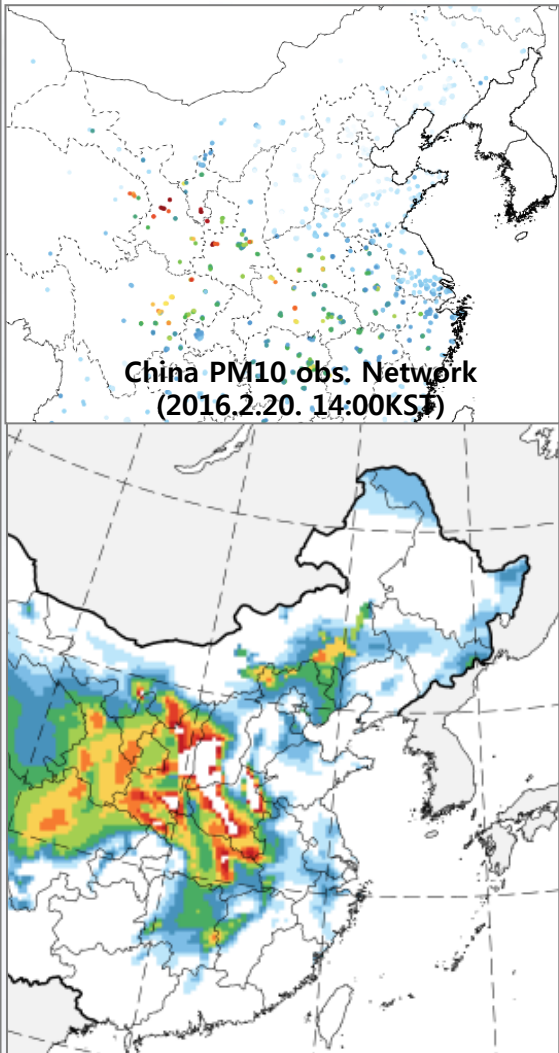


2016.2.20. 09:00KST

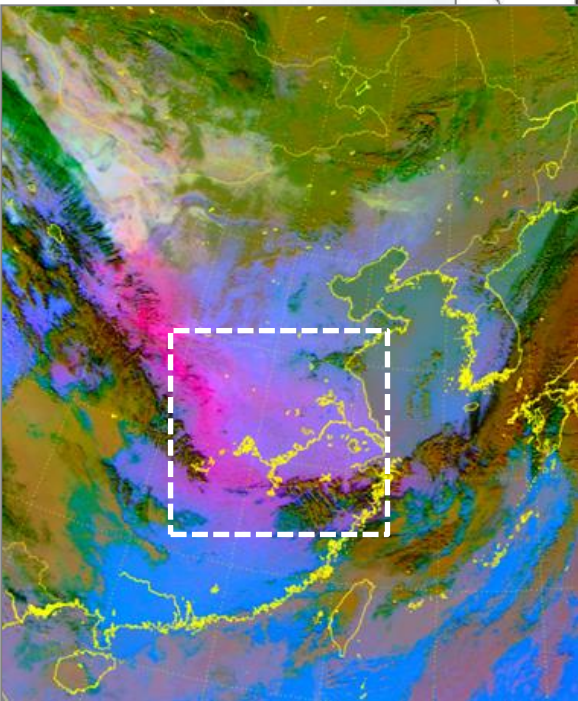




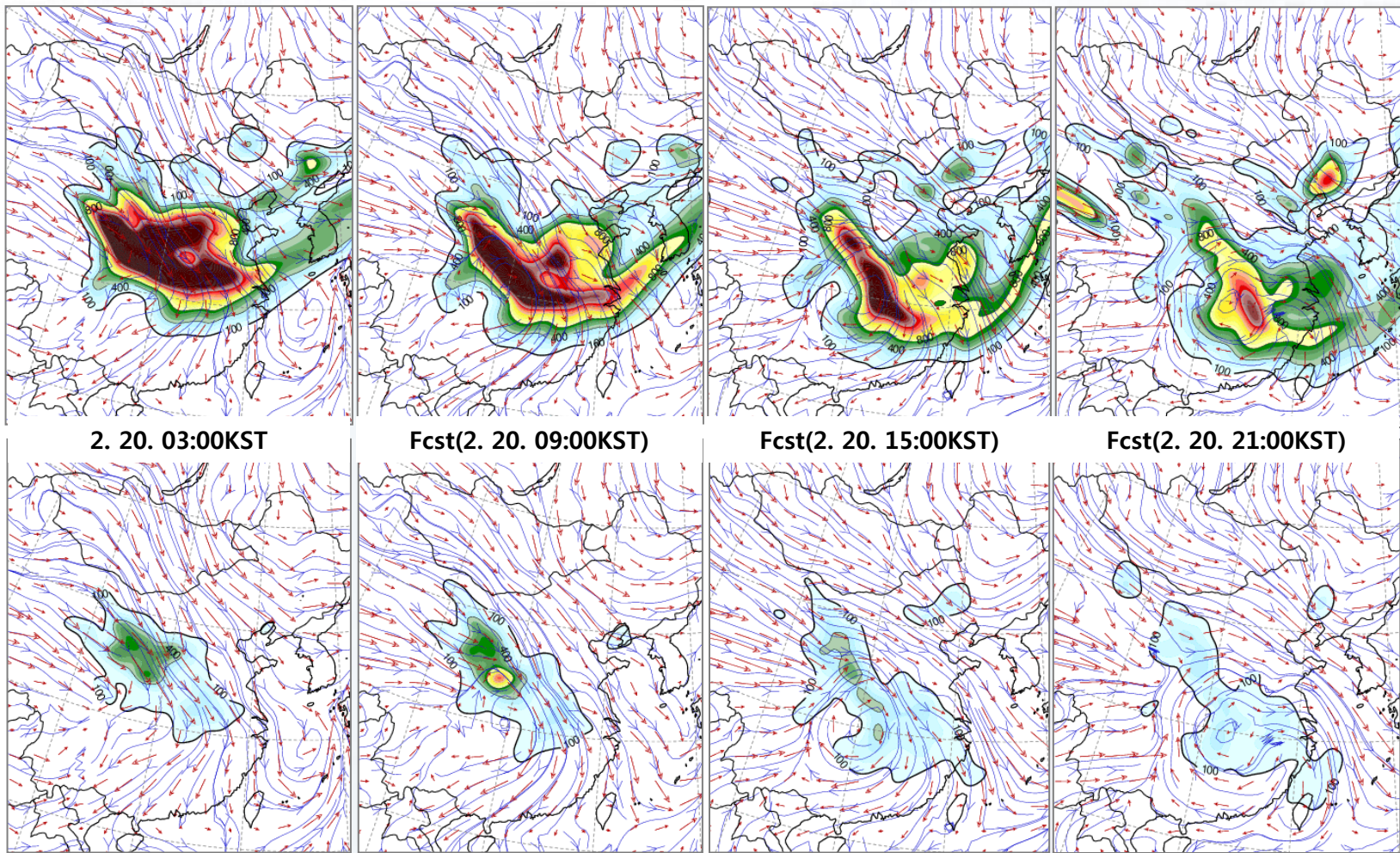
AQUA MODIS RGB 2016.2.20. 13:56KST



PM2.5/PM10(%) 2016.2.20. 14:00KST

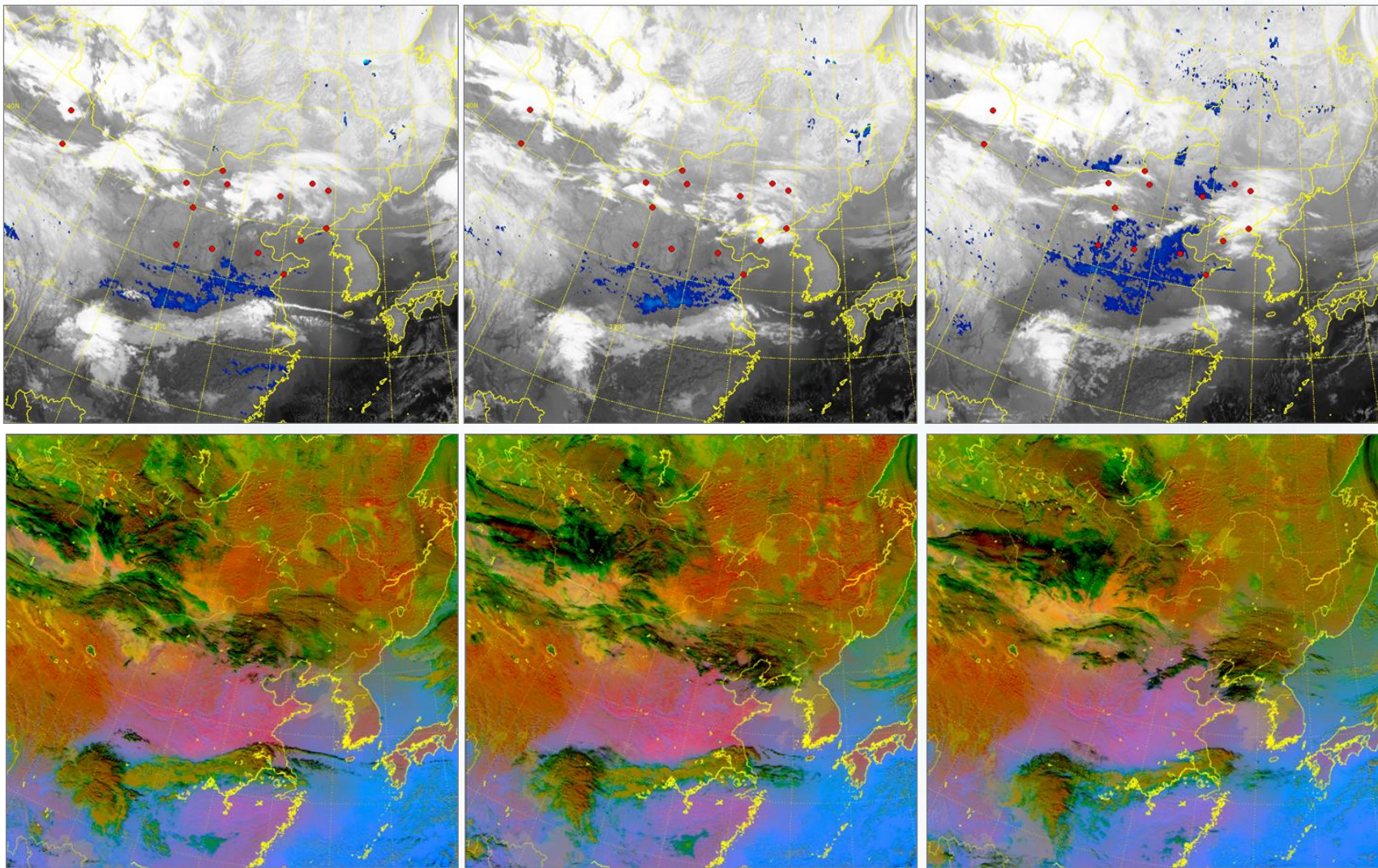


HW8 Asian dust RGB
(2016.2.20. 13:50KST)



ADAM_(Up) Vertical Accu. TSP density, (Down) Surf. PM10 density / 2016.2.20.03:00KST(anal)

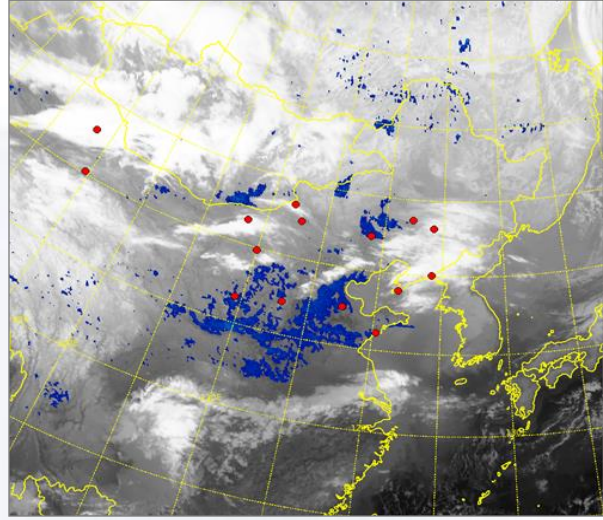
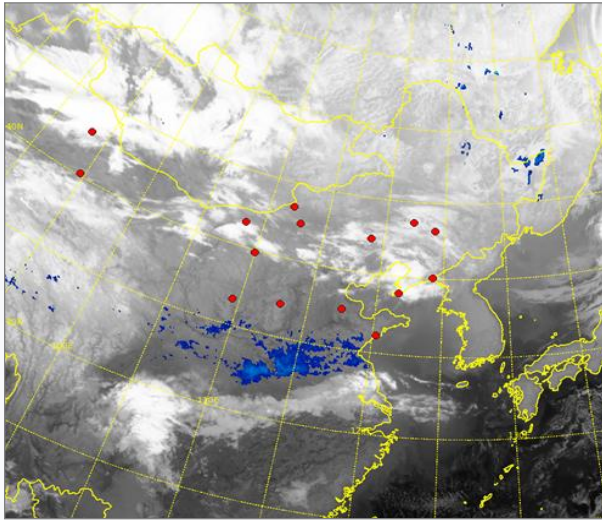
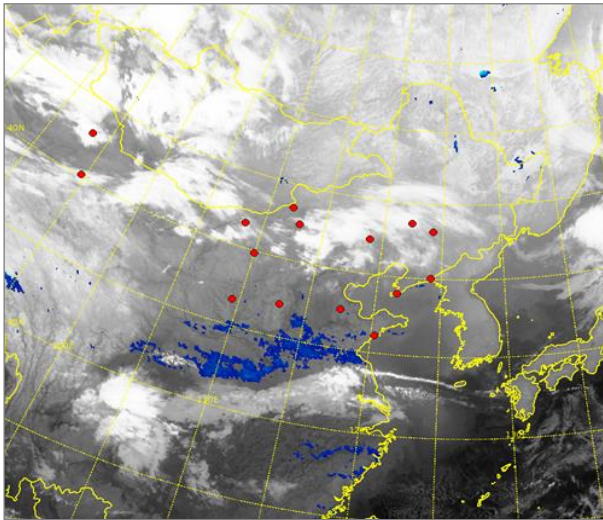
☀ Asian dust case 3. (2016.3.3.)



2016.3.3.03:00KST

2016.3.3.06:00KST

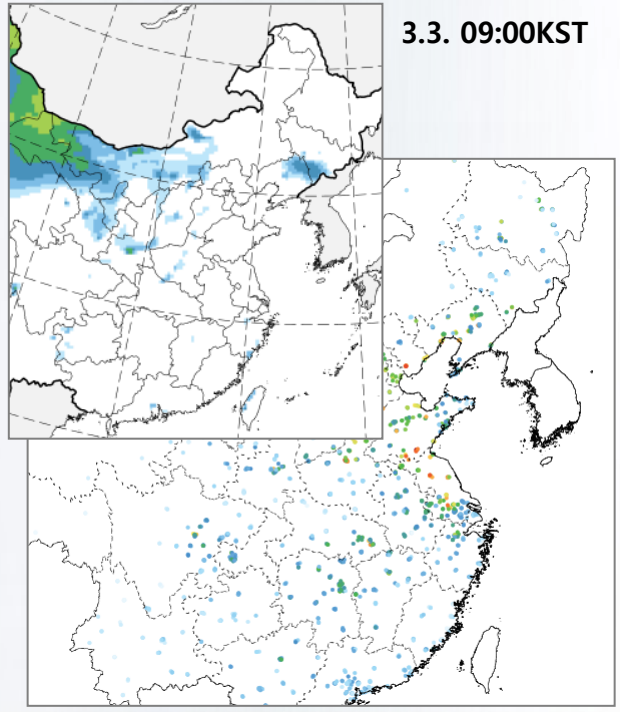
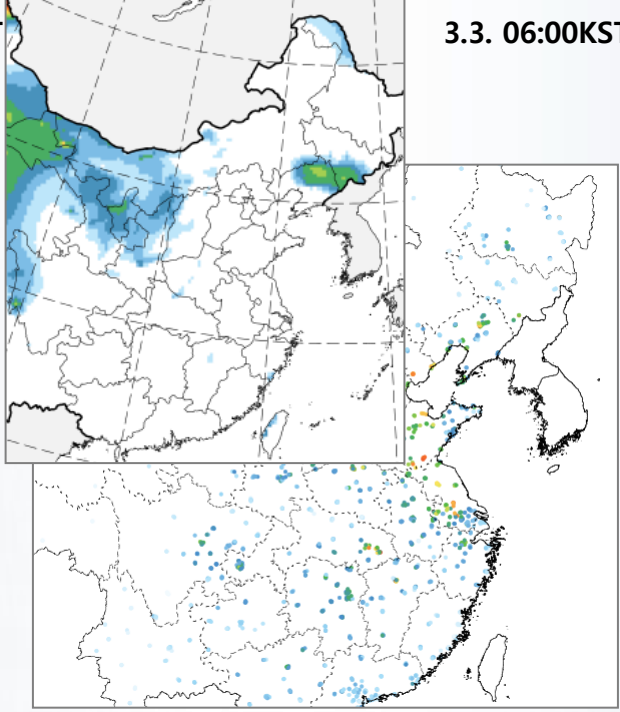
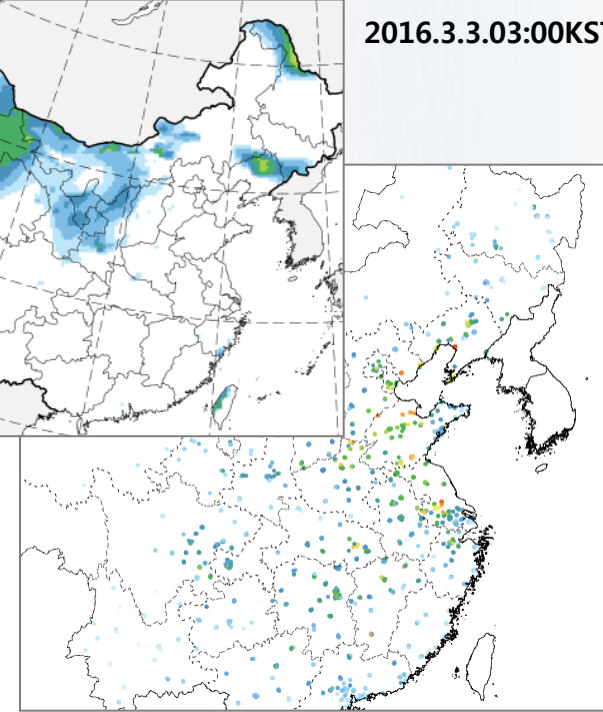
2016.3.3.09:00KST



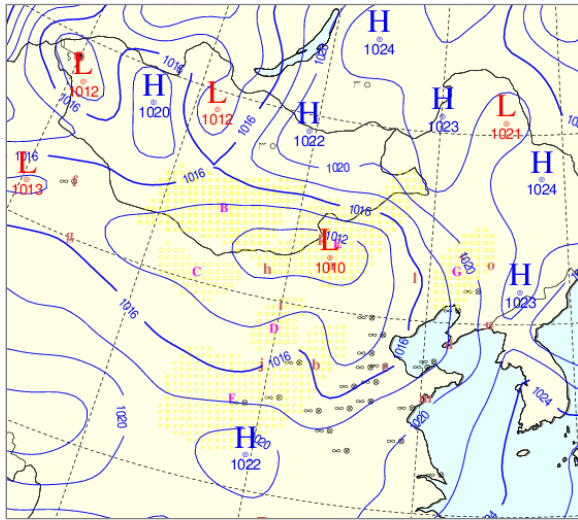
2016.3.3.03:00KST

3.3. 06:00KST

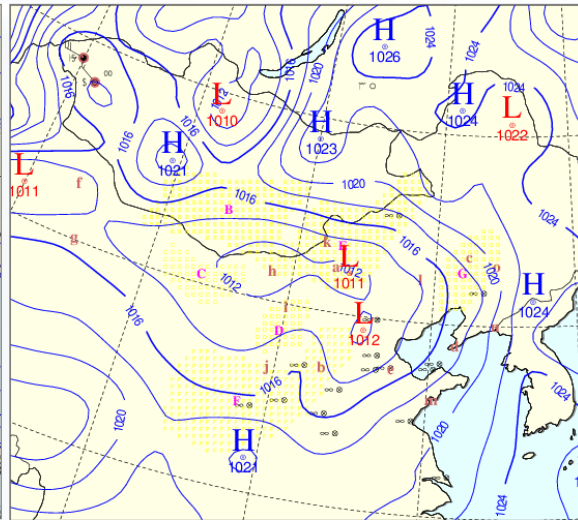
3.3. 09:00KST



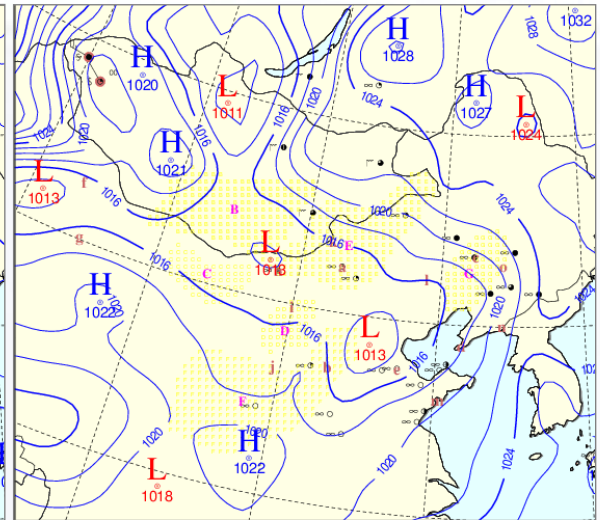
PM2.5/PM10(%) (up), China PM10 obs. Network (down)



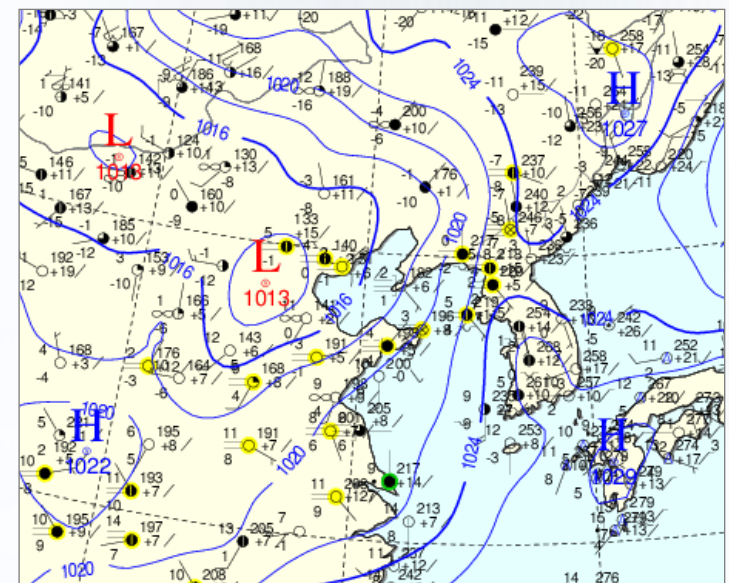
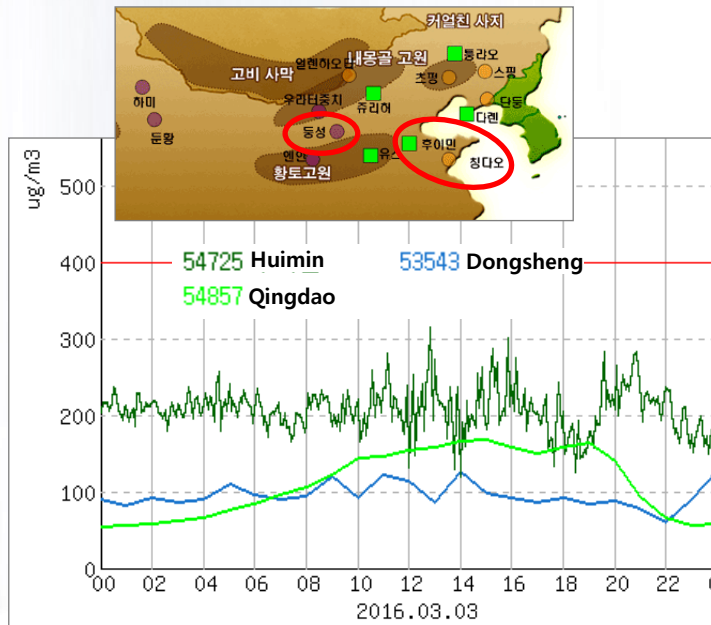
2016.3.3.00KST



2016.3.3.06:00KST



2016.3.3.09:00KST



Using **BTV**(Background Threshold Value)

Read COMS L1B data at the given time

Cloud Screening
(BTD > 0.5K)

For **dynamic BTV**
Extract Maximum BT_{11μm} during **10 days**

Calculate BTV at time with Maximum BT_{11μm}
BTV = 11μm - 12μm

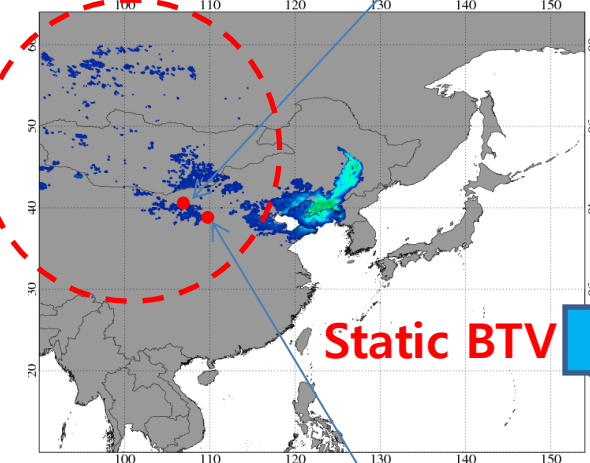
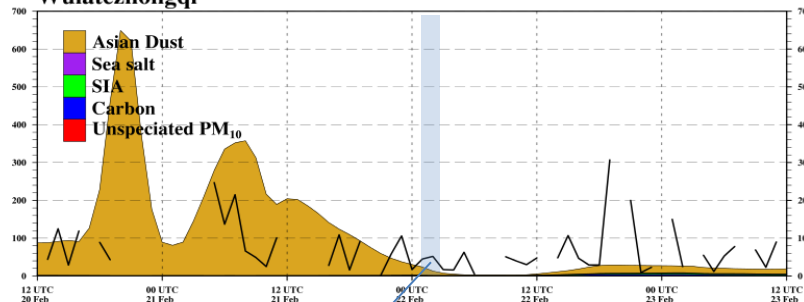
Dust if BTD - BTV < -0.5

Static BTV

Dynamic BTV

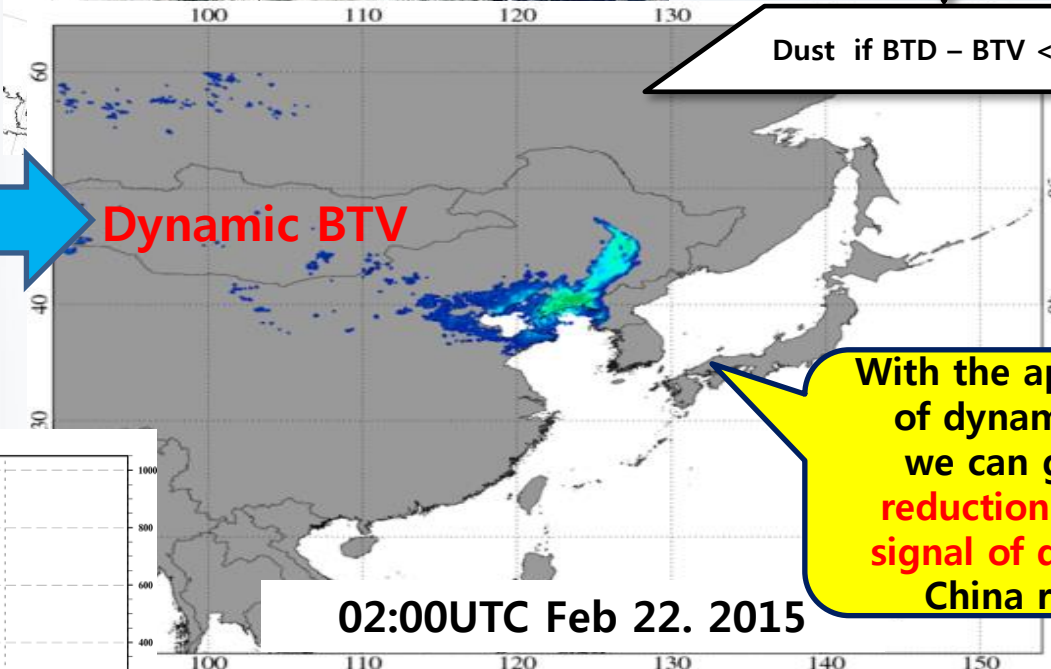
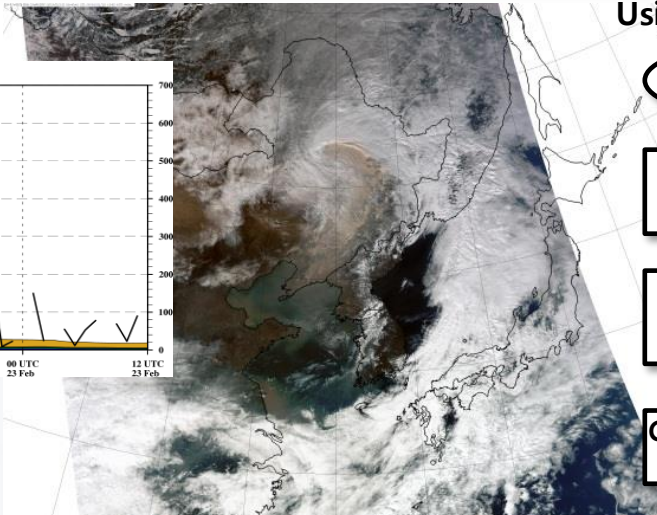
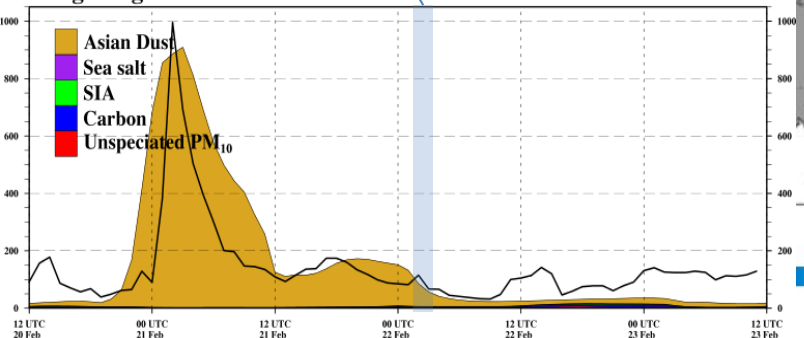
With the application
of dynamic BTV,
we can get the
**reduction of false
signal of dust over
China region**

Wulatezhongqi



COMS DUST MASK

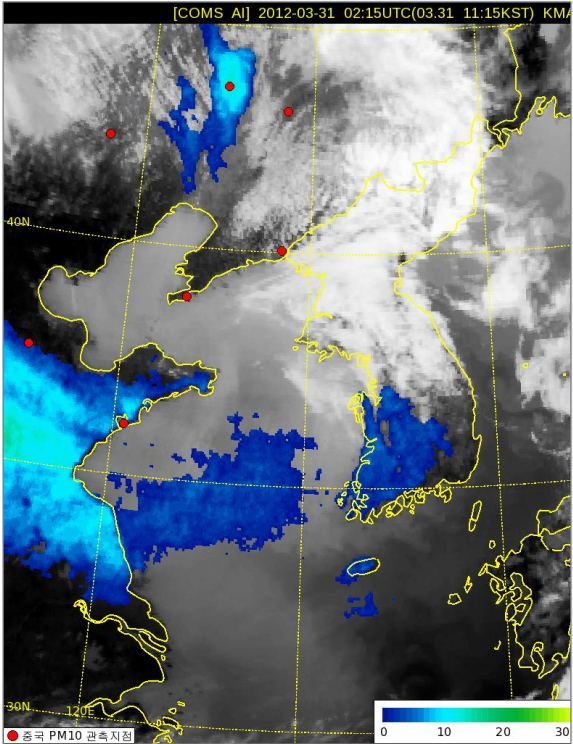
Dongsheng



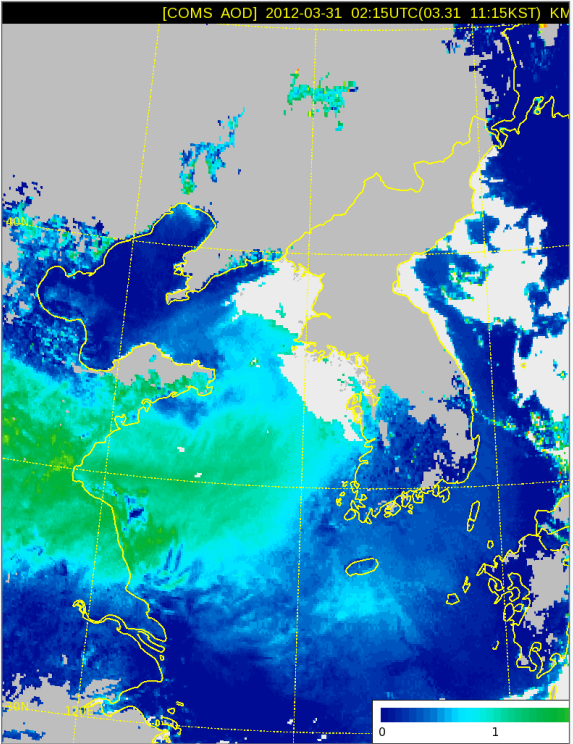
02:00UTC Feb 22. 2015

COMS DUST MASK
2015.02.22,02:00

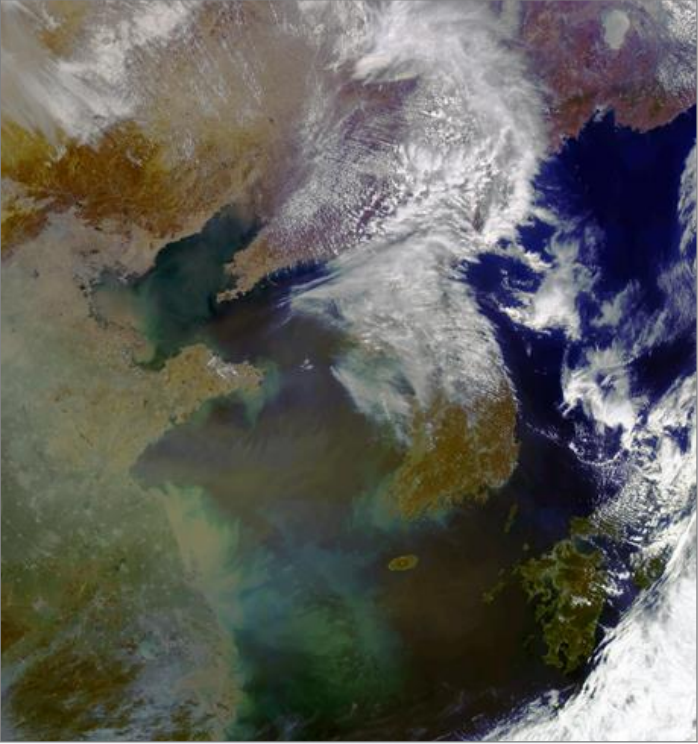
Land-Sea discontinuity



COMS MI Aerosol Index
2012.3.31.11:15KST

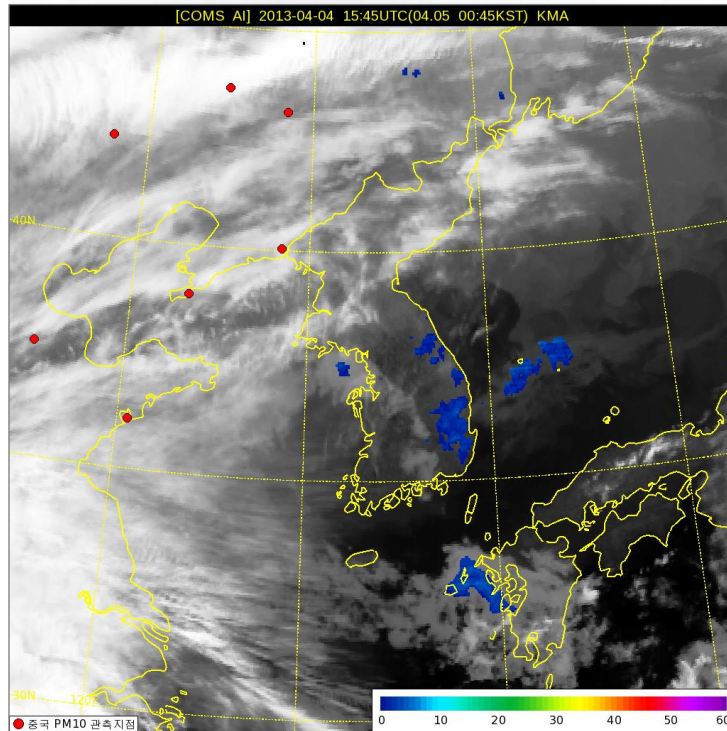


COMS MI AOD
2012.3.31.11:15KST

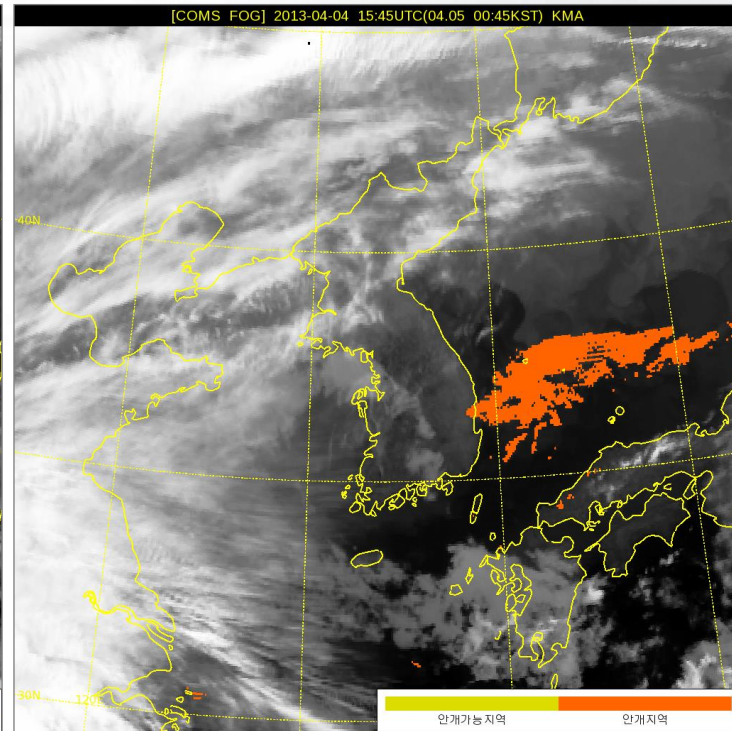


COMS GOCI
RGB2012.3.31.11:16KST

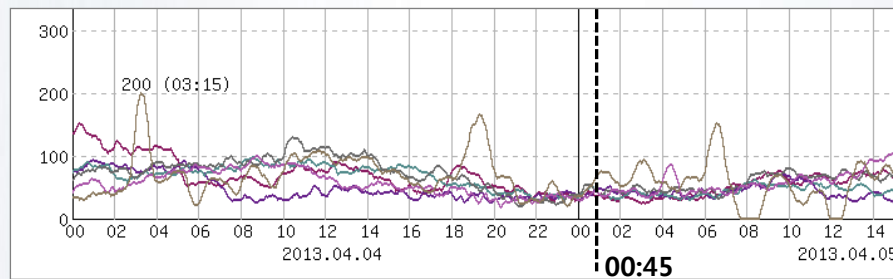
Detection of Fog area to Asian dust



COMS MI AI 2013.4.5.00:45KST



COMS MI Fog detection 2013.4.5.00:45KST



THANKS.

