



Characteristics of satellite products for the detection of Asian dust compared to surface observations

31 July 2018

Dr. HyeSook PARK

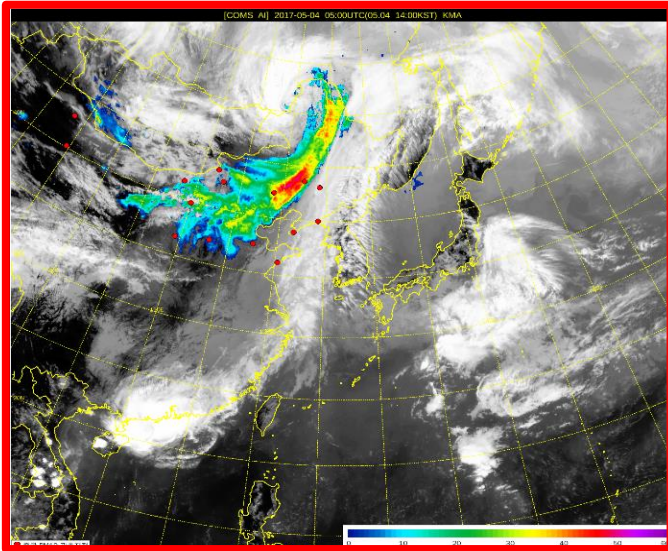
**National Meteorological Satellite Center (NMSC)
Korea Meteorological Administration (KMA)**

* KMA VLab CoE Point of Contact : Dr. Hye-Sook Park (hyesookpark@korea.kr)

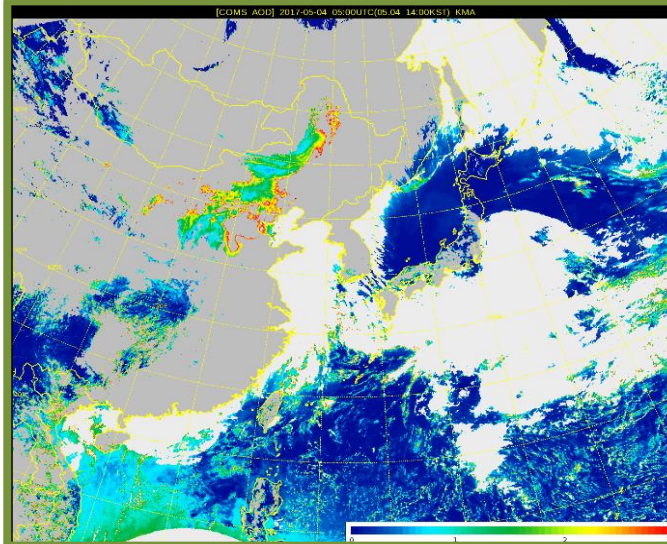


Dust related products based on GEO satellite(05:00 UTC 4th May, 2017)

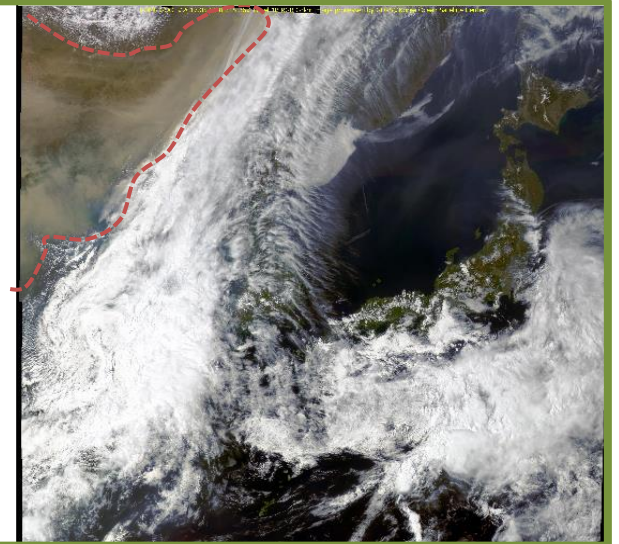
COMS AI(Aerosol Index)



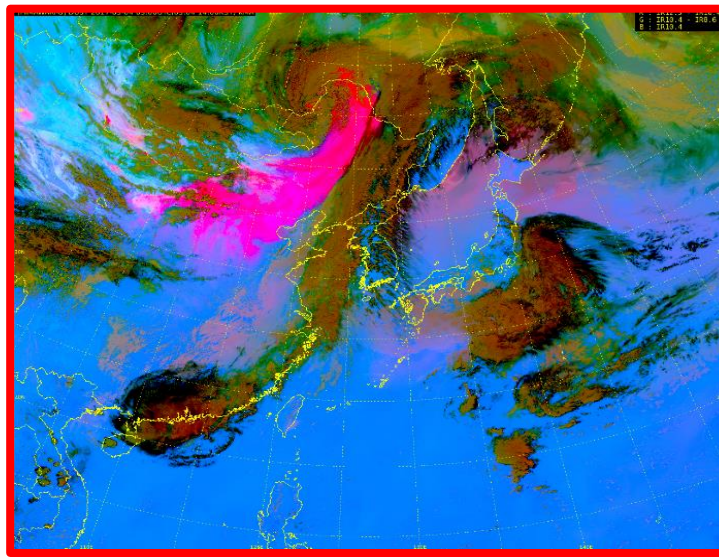
COMS AOD(Aerosol Optical Depth)



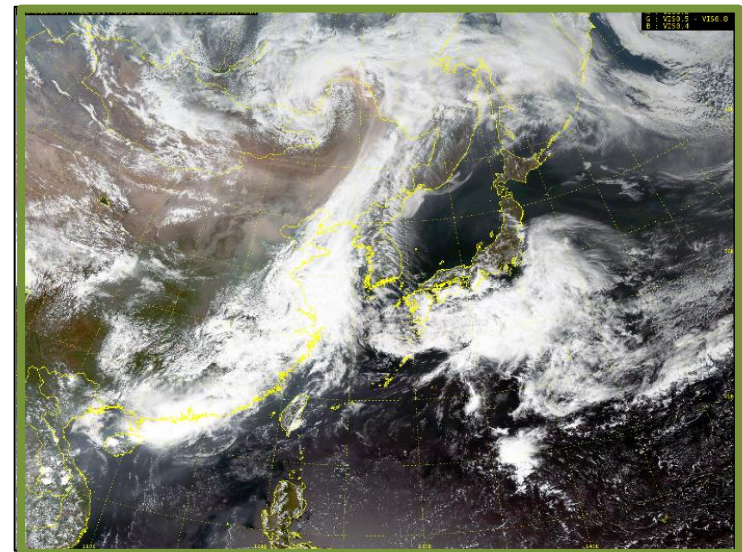
COMS/GOCI True Color RGB(500m)



24hours(IR)



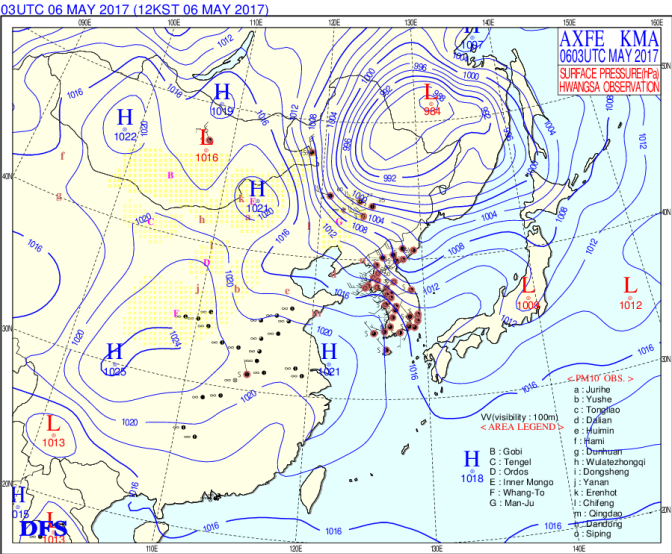
Himawari-8 Dust RGB



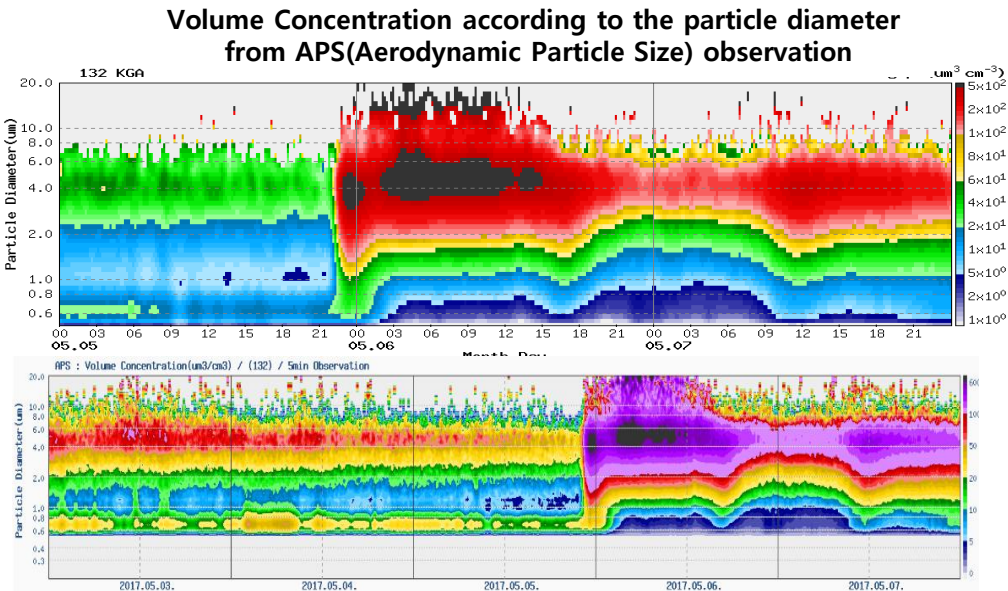
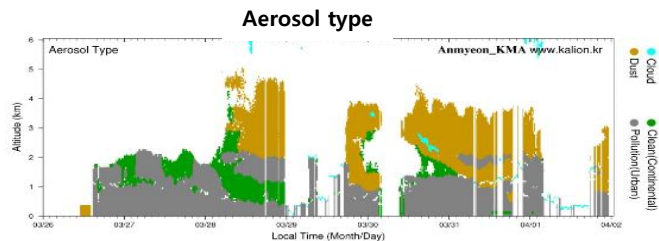
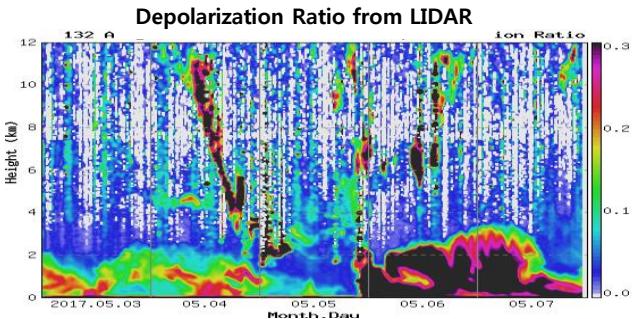
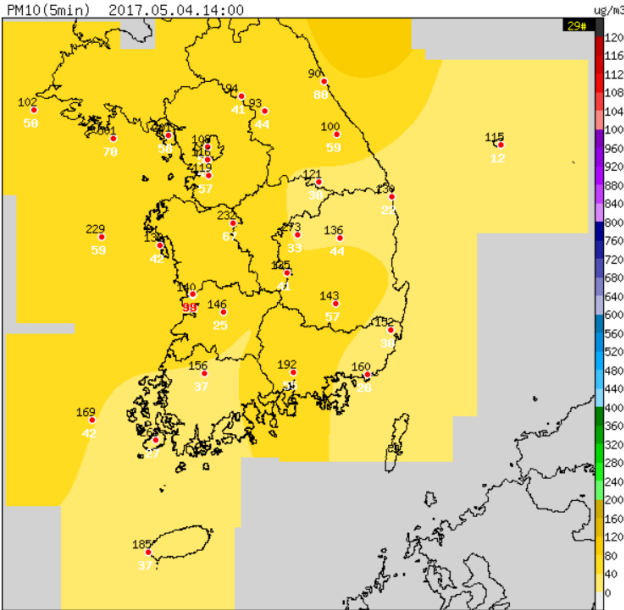
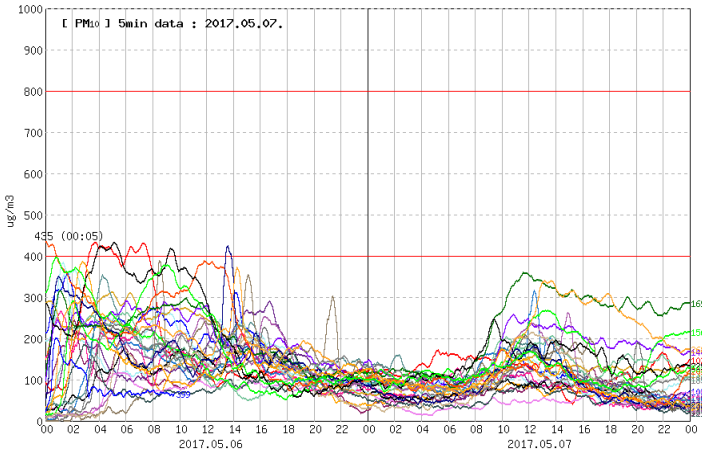
Himawari-8 True Color RGB

Only for daytime
(VIS)

Surface observations for the detection of Dust/Haze(05.00 UTC 4th May, 2017)



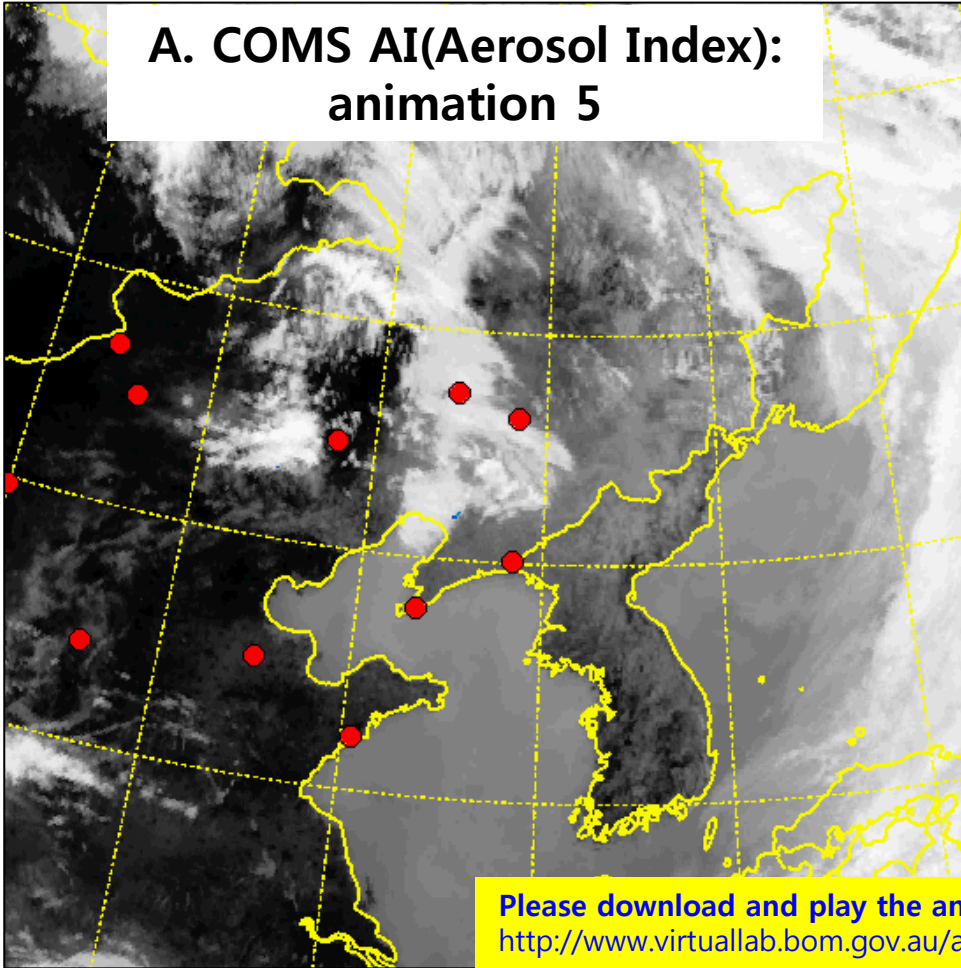
Dust weather charts



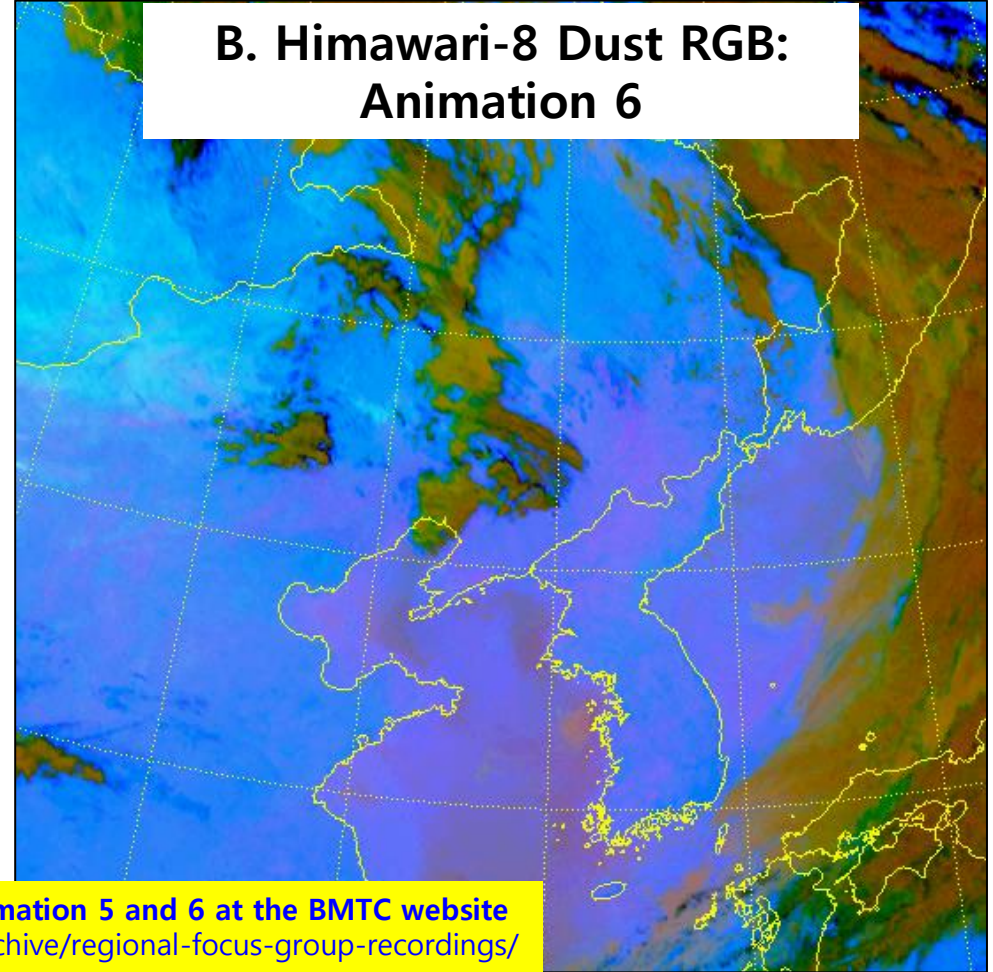
Detection of Asian Dust using 24hrs satellite products

(Case study : 03UTC 23~ 03TC 24, May 2018, **animation**)

**A. COMS AI(Aerosol Index):
animation 5**



**B. Himawari-8 Dust RGB:
Animation 6**

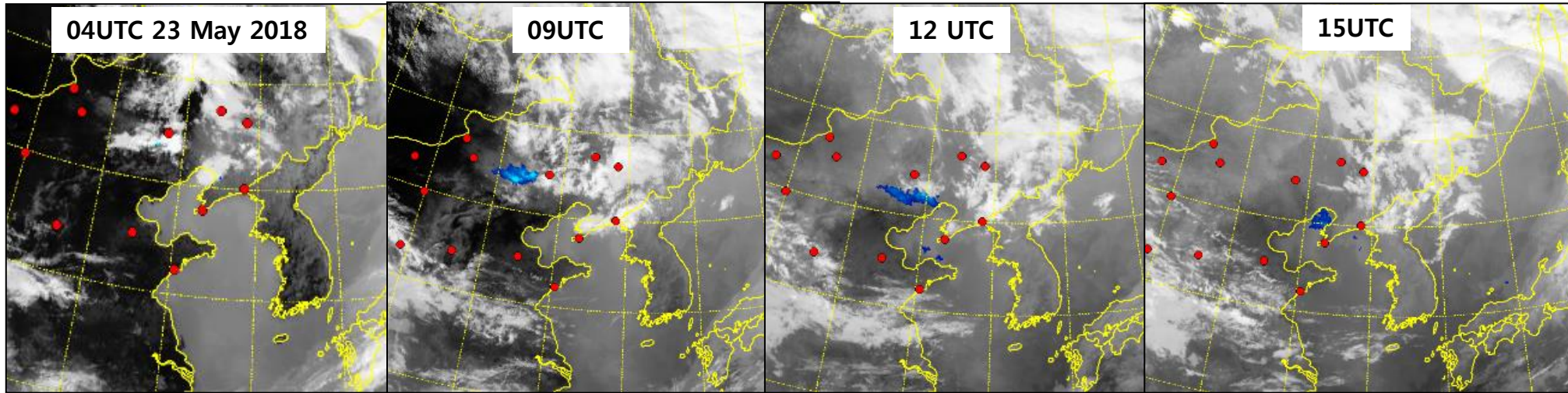


Please download and play the animation 5 and 6 at the BMTC website
<http://www.virtuallab.bom.gov.au/archive/regional-focus-group-recordings/>

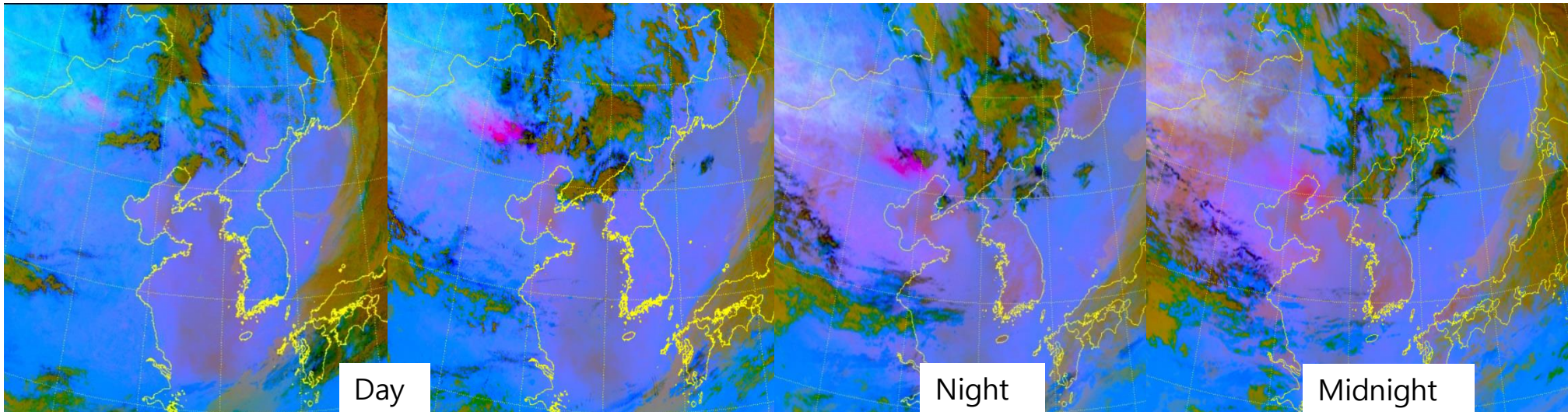
Q1. Which one do you prefer for the detection of Dust between A and B?

Comparison COMS AI and Himawari-8 Dust RGB images (04UTC 23 May ~ 00UTC 24 May, 2018)

A. COMS AI(Aerosol Index)

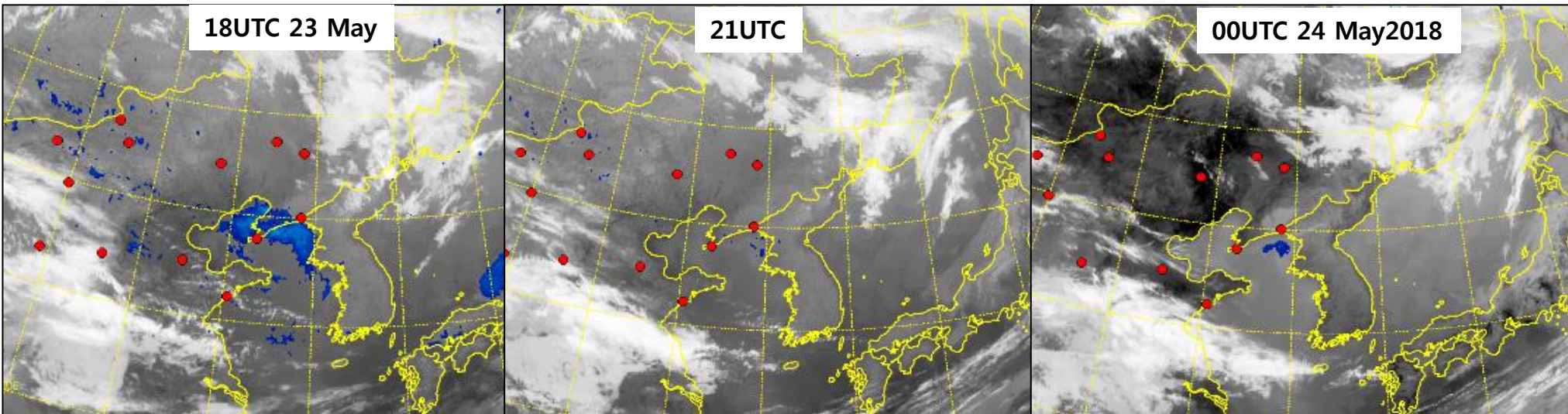


B. Himawari-8 Dust RGB

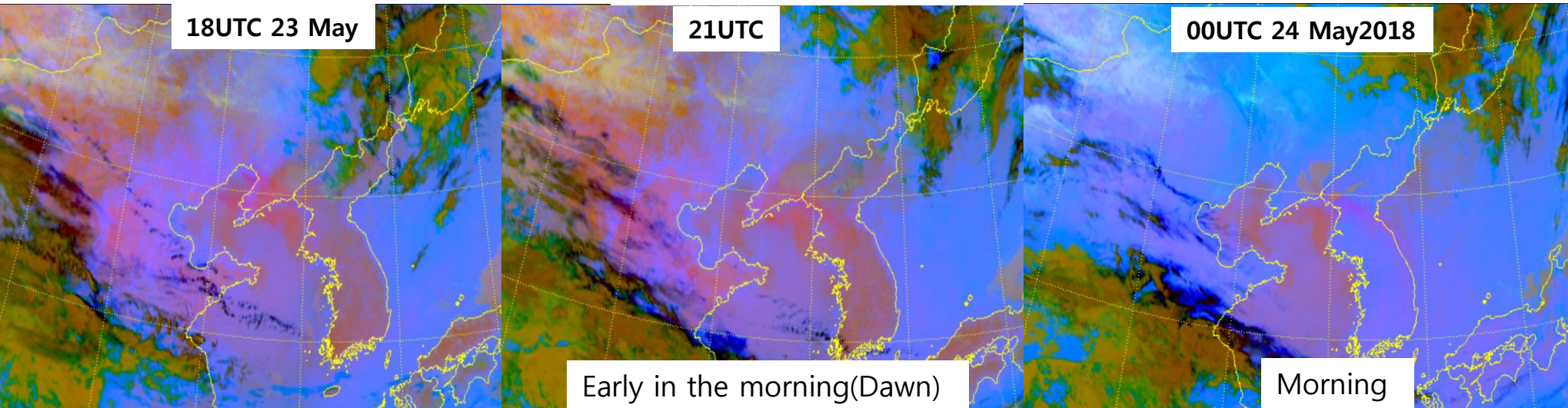


Q1. Which one do you prefer for the detection of Dust between A and B?

A. COMS AI(Aerosol Index)



B. Himawari-8 Dust RGB

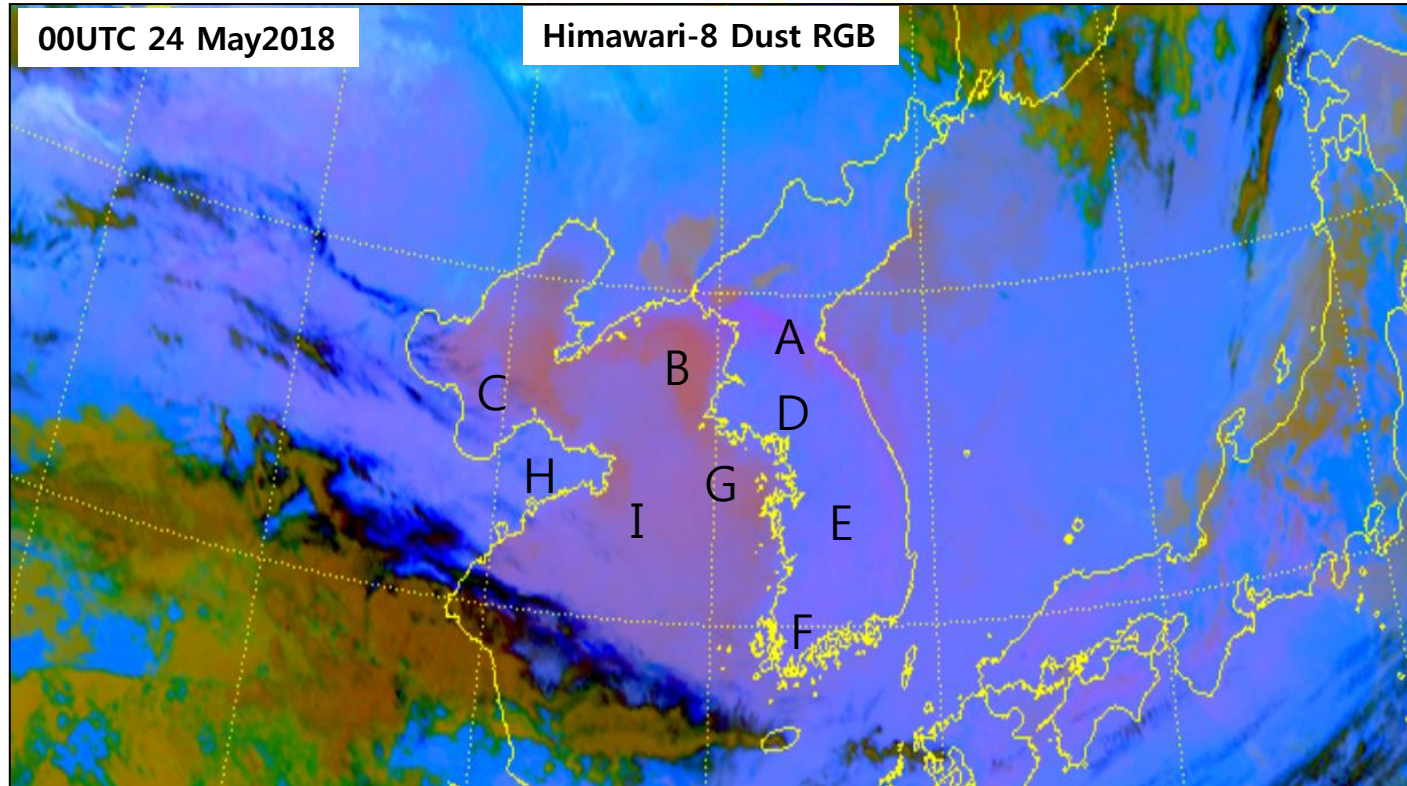


As the sun went down, surface temp was lower → the color of surface turn to redish
& As the density of dust became weaker → pinkish color turn to redish

Analysis of Dust over the Korean Peninsula

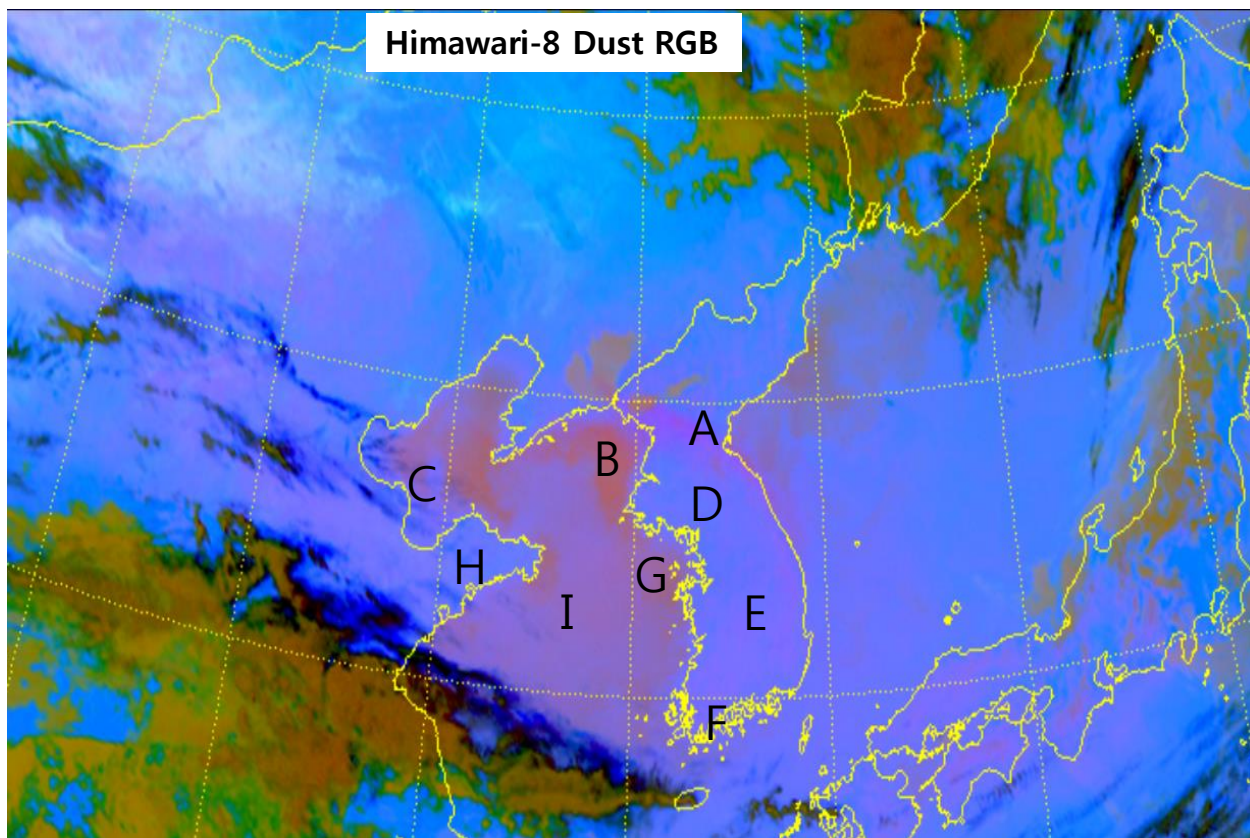
(00UTC 24 May, 2018)

Q. Please Check with a ✓ where affected by the dusts among A~I on the below RGB image



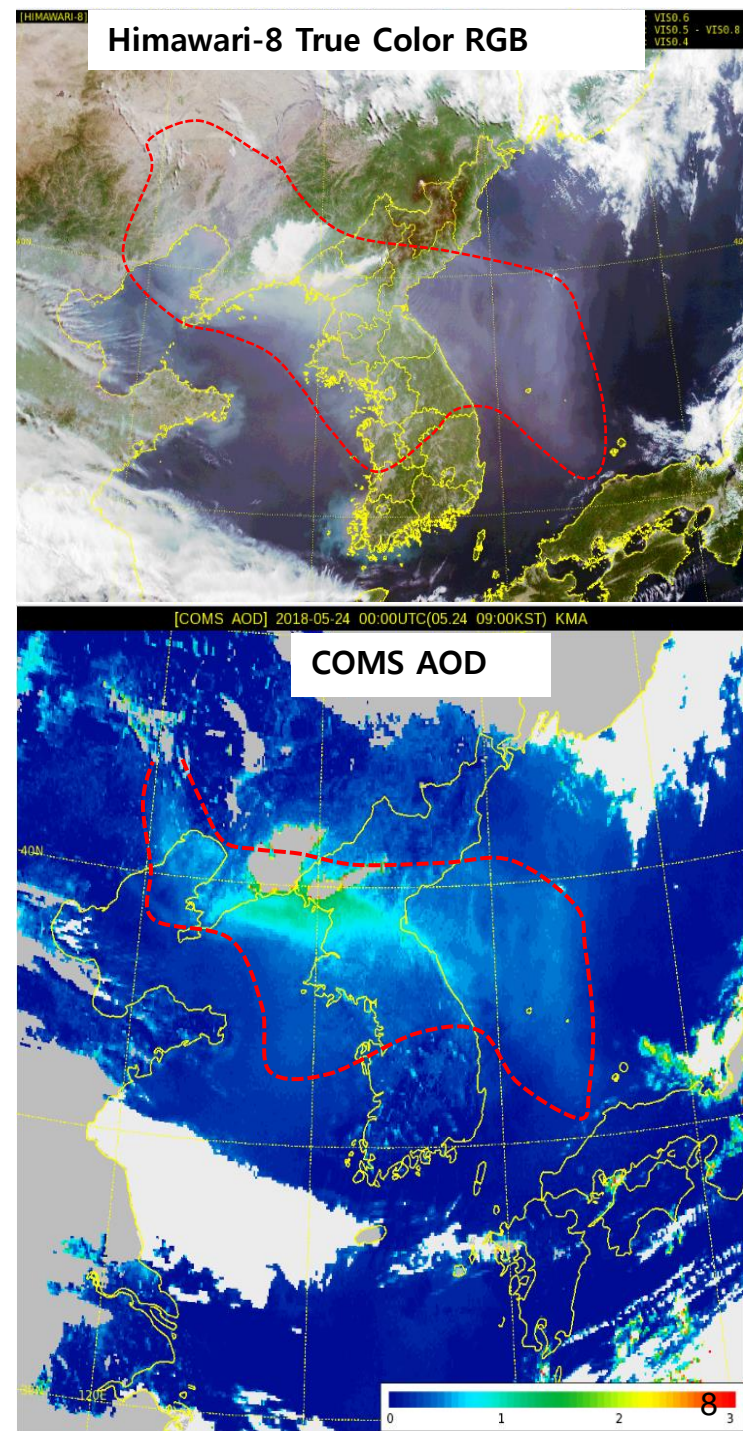
- Weak dusts and Haze areas tend to be displayed as similar color at the Dust RGB
- During the daytime, weak dusts areas over the lands tend to be not detected due to the impact of higher surface temp ,
- while during the nighttime it became hard to discriminate weak dust areas from the low surface temp.

Analysis of Dusts over the Korean Peninsula (00UTC 24 May, 2018)



During daytime,
If dusts are not detected well by the dust RGB product

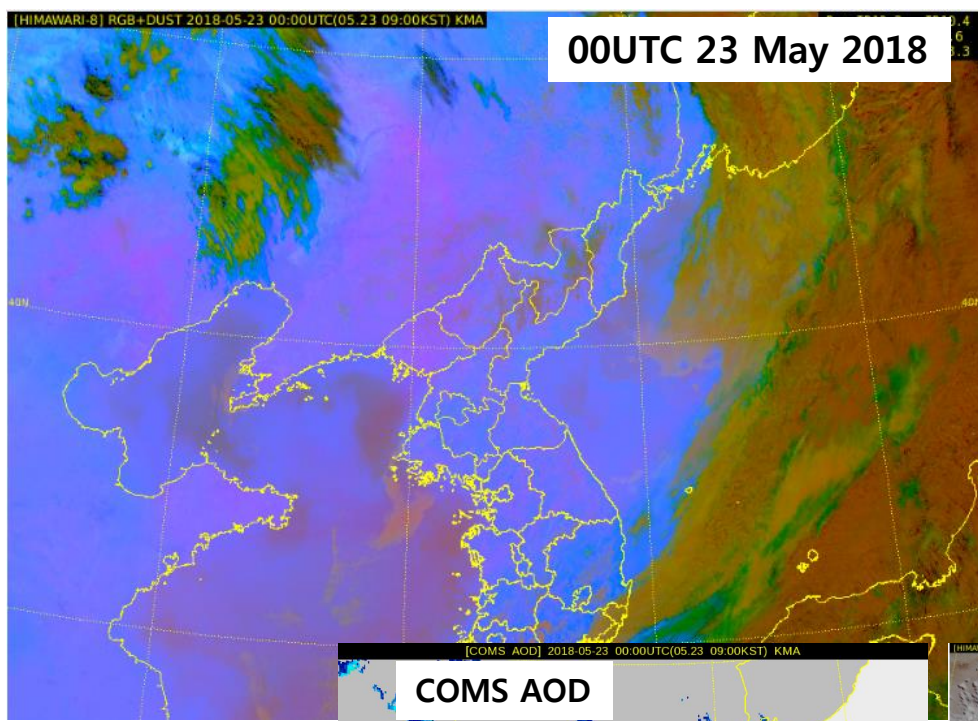
→ Compare dust RGB with Visible based products



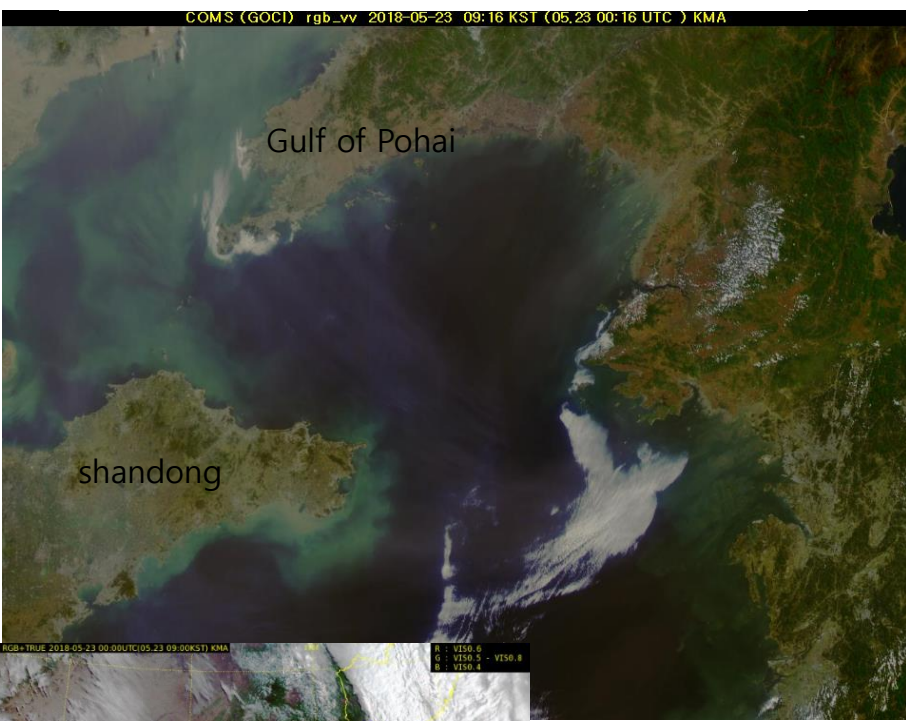
Q2) Sat. products based on visible channel always detect well the dust?

- A) Yes
- B) NO

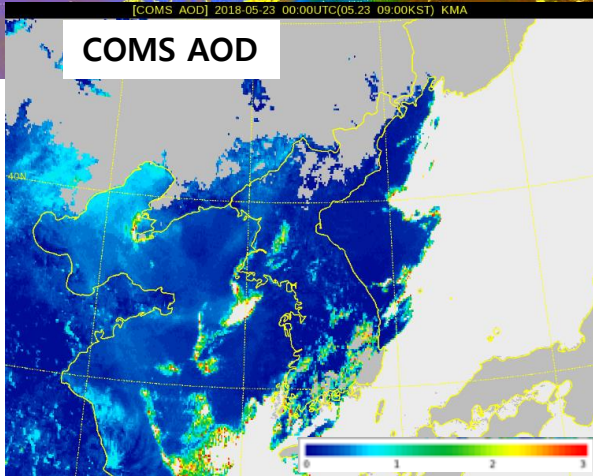
Himawari-8 Dust RGB



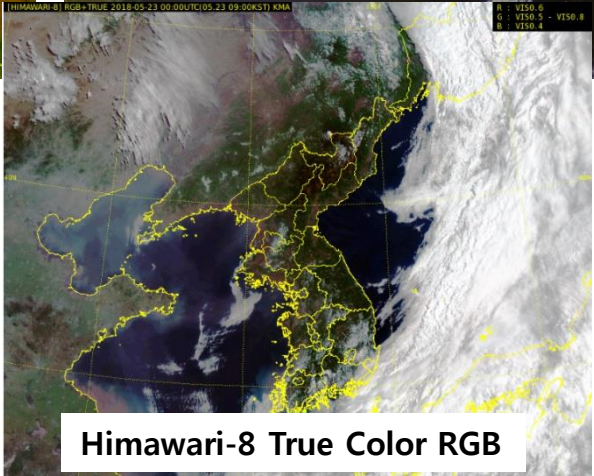
COMS/GOCI True Color RGB(500m resolution)



COMS AOD



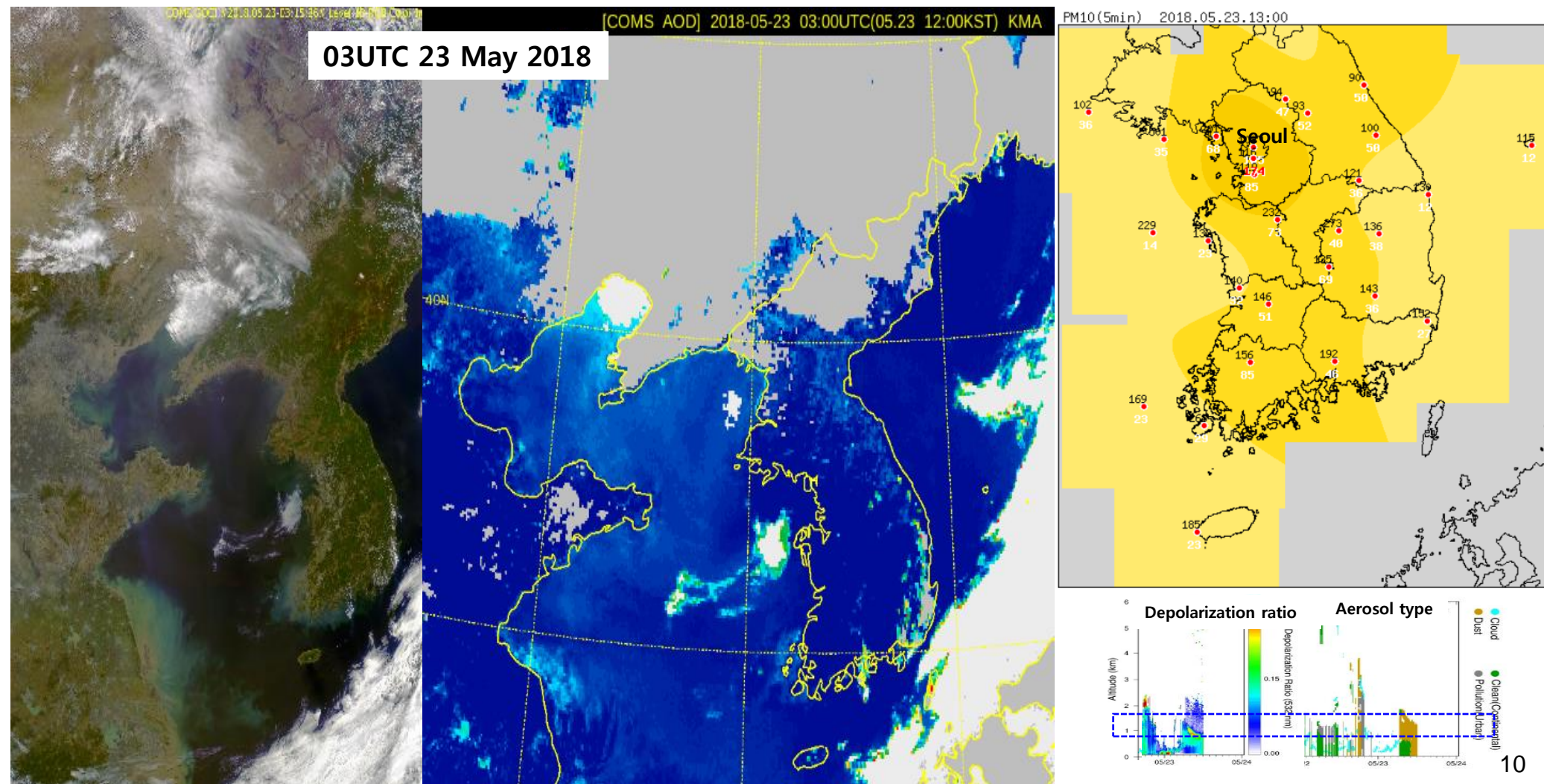
Himawari-8 True Color RGB



Q3) If satellite products don't detect the dusts, (if SAT X) dusts will not be observed at the surface, too? (then Surface X ?)

A) Yes

B) NO

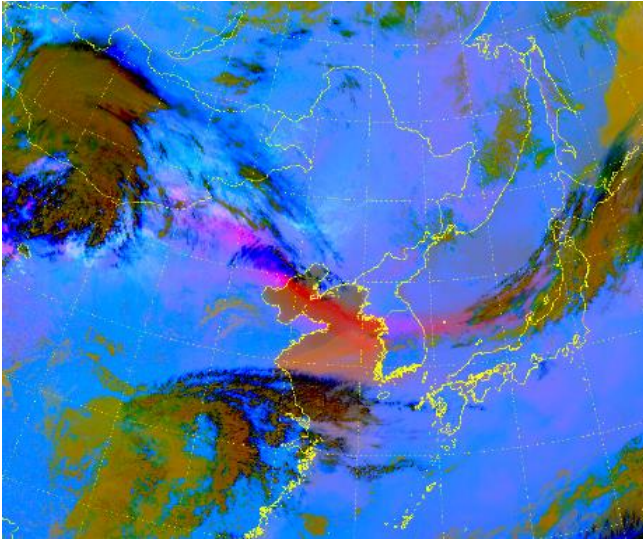


Q4) If the dusts are well detected on the satellite products, (if SAT O)
these dusts are always observed at the surface ? (then, Surface ?)

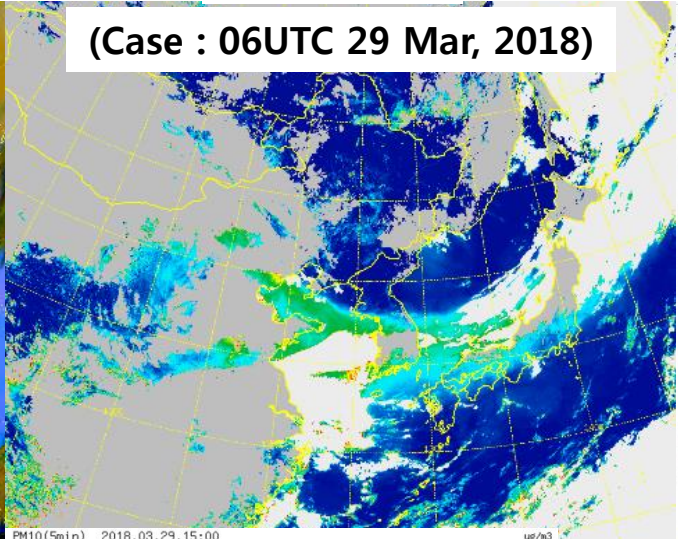
A) Yes

B) NO

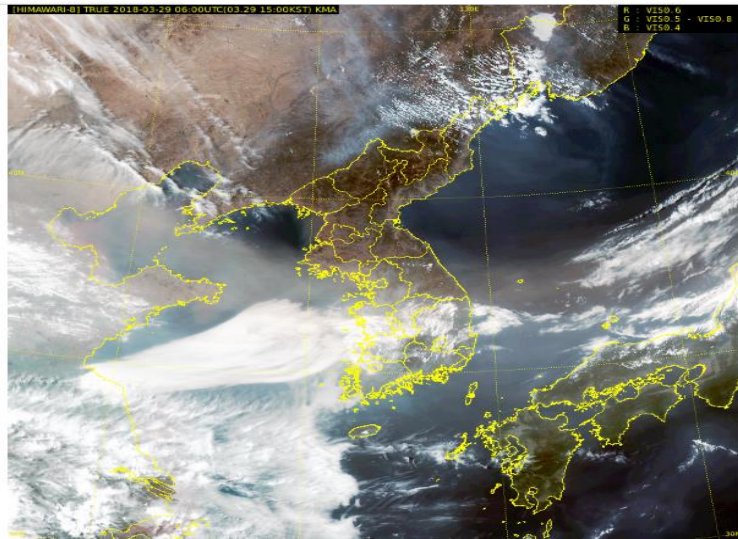
A) Himawari-8 Dust RGB



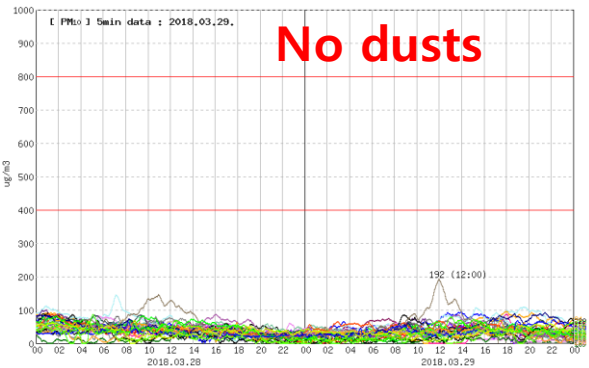
B) COMS AOD



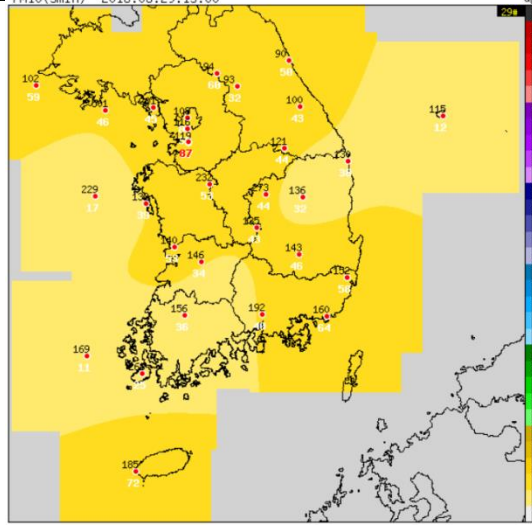
C) COMS True Color RGB



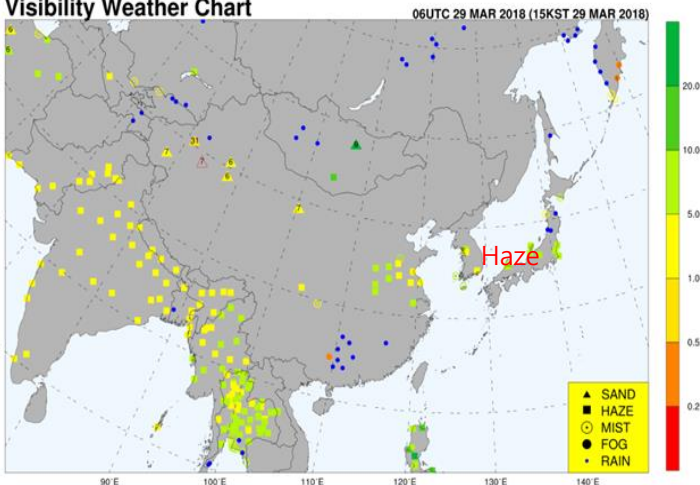
d) PM10 distribution



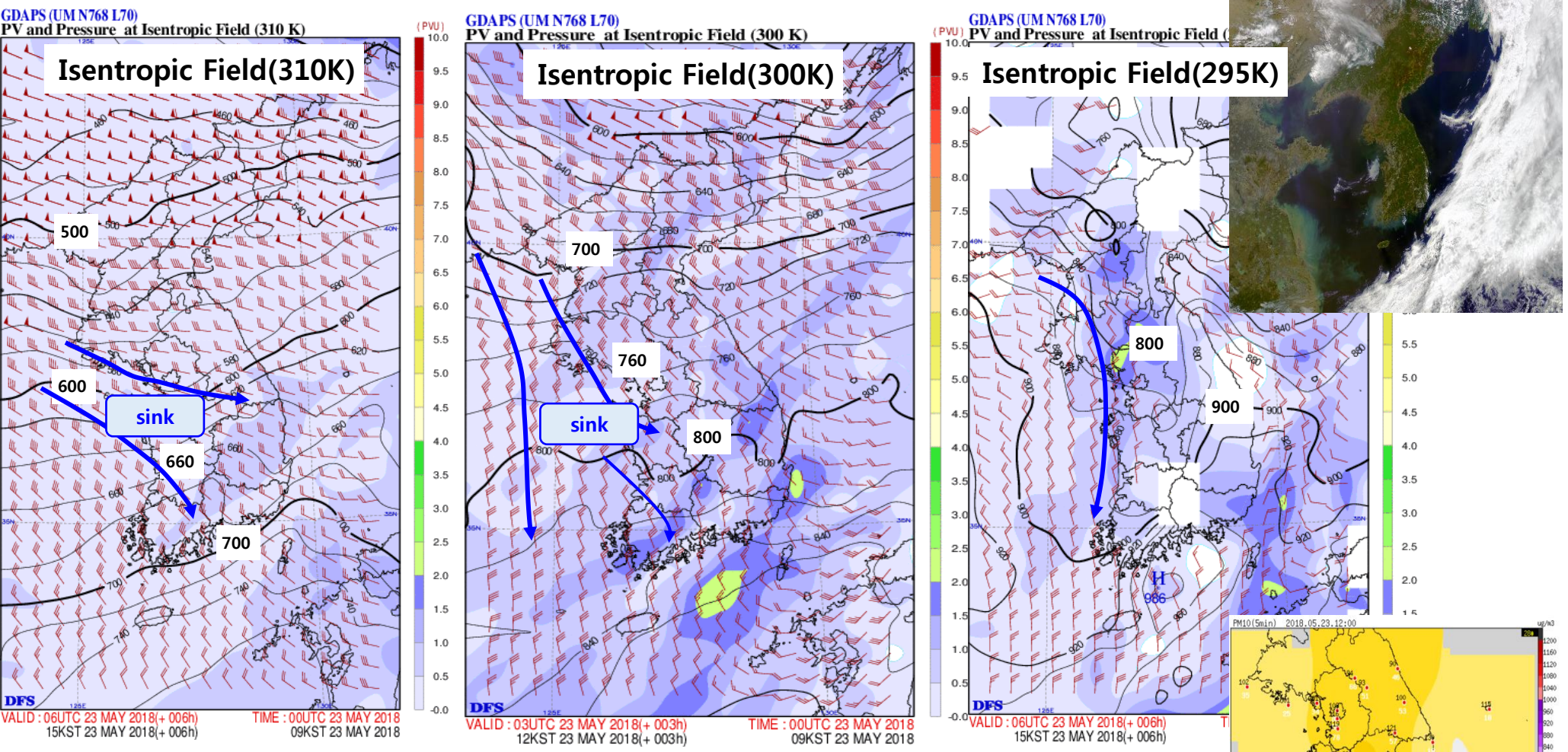
PM10 < 100 µg/m³



Visibility Weather Chart

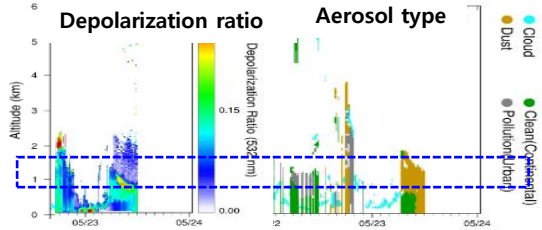


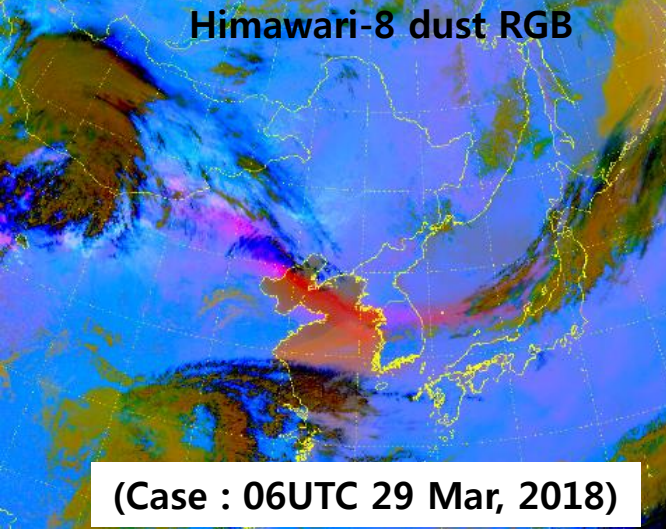
Cause analysis for the case at 03 UTC on 23 May 2018



When downdraft dominant to the surface over the Korean Peninsula, even though density of dusts are weak

➔ Dusts are observed at the surface

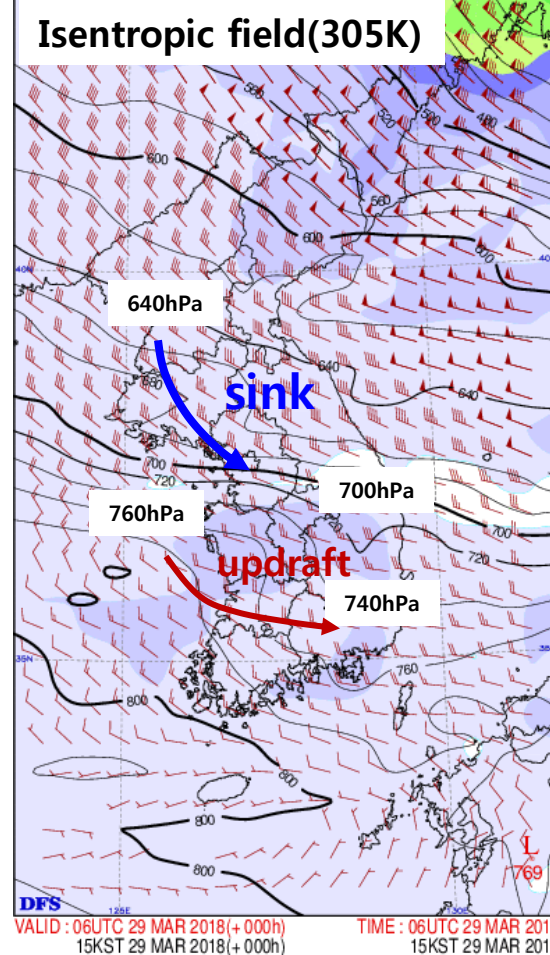




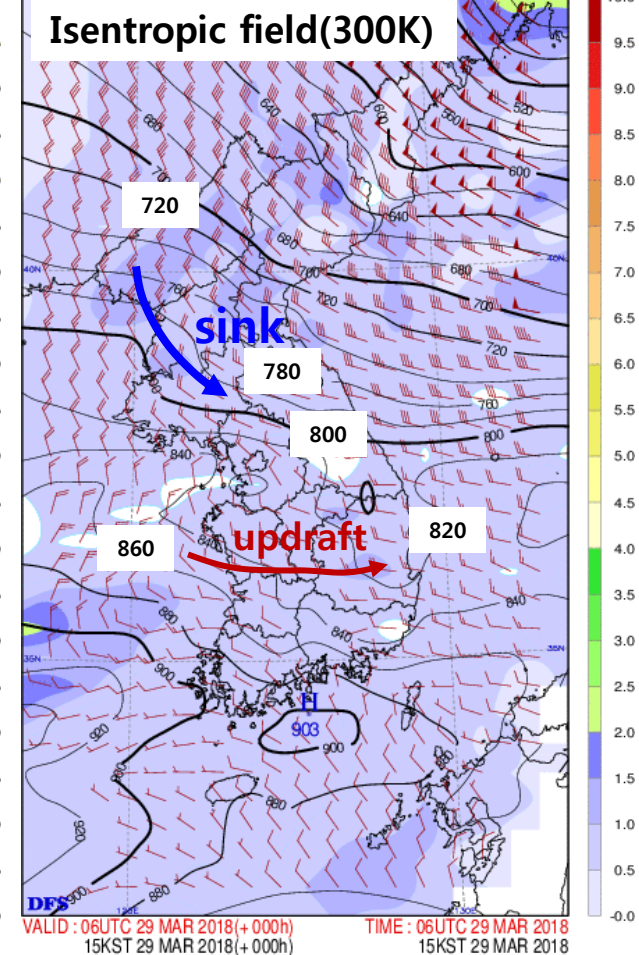
Cause analysis for the case at 06 UTC on 29 Mar, 2018

PV analysis

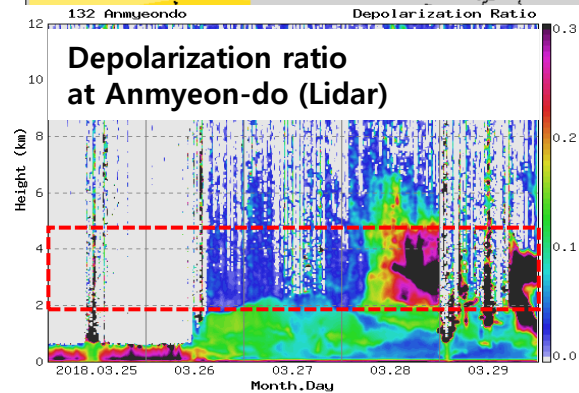
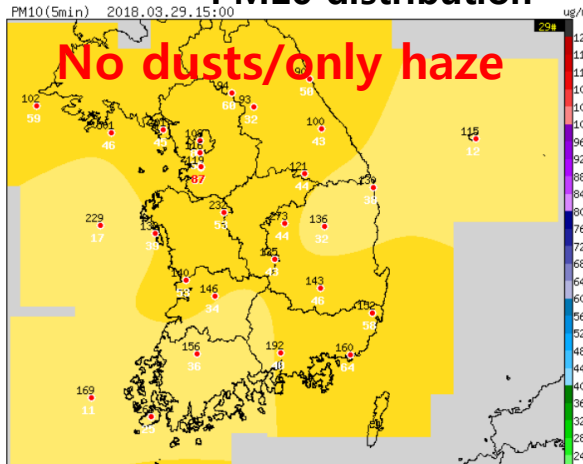
GDAPS (UM N768 L70)
PV and Pressure at Isentropic Field (300 K)



GDAPS (UM N768 L70)
PV and Pressure at Isentropic Field (295 K)



PM10 distribution



Though satellite detects the dust area clearly,
If updrafts are dominant above 2km height,

→ Dusts are not observed at the surface

Summary

- ◆ Characteristics of dust RGB images over the Korean Peninsula
 - ➔ The **color of dusts** changed **depending on the surface temp.**
 - ➔ **Weak dusts tend to be not detected** under the lower surface temp **during nighttime**
 - ➔ If visible based products(such as true color RGB, AOD etc) are available, use the VIS products in advance
- ◆ When the satellite products, including both IR and VIS based products, can't detect the dusts?
 - ➔ Very weak density of dusts concentrated on the ground **under the condition of downdraft** throughout the whole atmosphere
- ◆ What make the different distribution between satellite and surface observation
 - ➔ **satellite usually detects the floating dusts above 2~3km, while surface instrument observes the sank dusts on the ground.**
 - ➔ Examine the updraft and downdraft distribution of the airflow from the PV analysis