Aerosol Optical Depth retrieval over the snow from GOCI in winter season

Hyunkwang Lim[1], J. Kim[1], M.Choi[1], M. Kim[1], J. lee[2], S.Ryu[3], H.Lee[3]

[1] Department of Atmospheric Sciences, Yonsei University, Seoul, Republic of Korea
[2] NASA Goddard Space Flight Center,
[3] NATIONAL INSTITUTE of METEOROLOGICAL RESEARCH

Introduction

Geostationary Ocean Color Imager(GOCI) sensor has provided real-time, hourly monitoring of aerosol properties the East Asian region. However, aerosol retrieval of aerosol properties over bright surface in the winter has been very difficult thus have not performed. So this study attempted the retrieval of aerosol properties over the snow cover from GOCI.

Satellite Description & Data selection

MI
Wavelength : VIS,IR1,IR2,watervapor, NIR
Spatial resolution : 1km × 1km, 4 km×4km
Temporal resolution : 15min

GOCI
Wavelength : **412, 443**, 490, 555, **660**, 680, 745, 865 nm
Spatial resolution : 500m × 500m
Temporal resolution : 1hr
Target area : East Asia

COMS (Chollian), the first Korean multi-function geostationary satellite (Communication, Ocean and Meteorological Satellite).
Launched on 27/6/2010, Operational at 138° East.

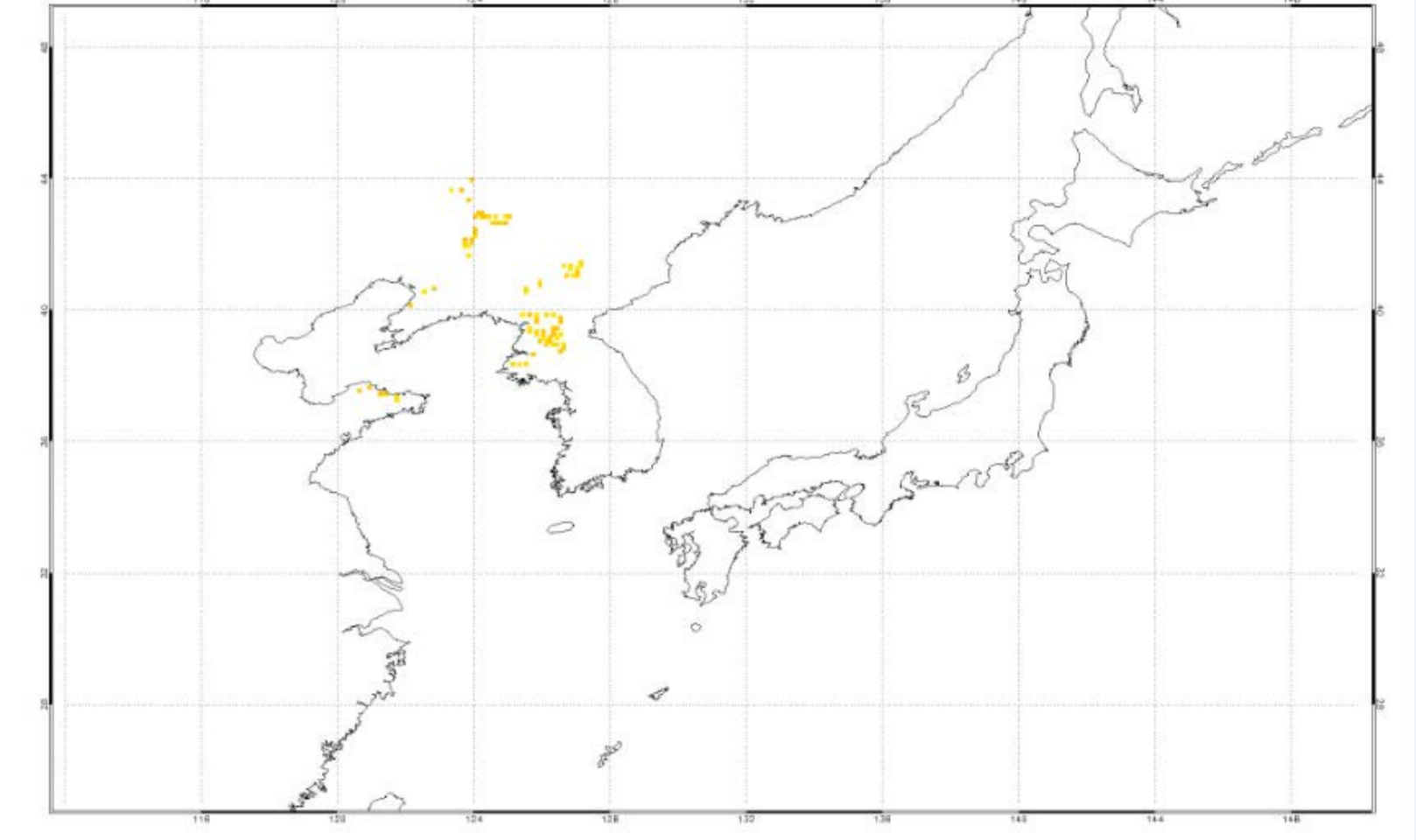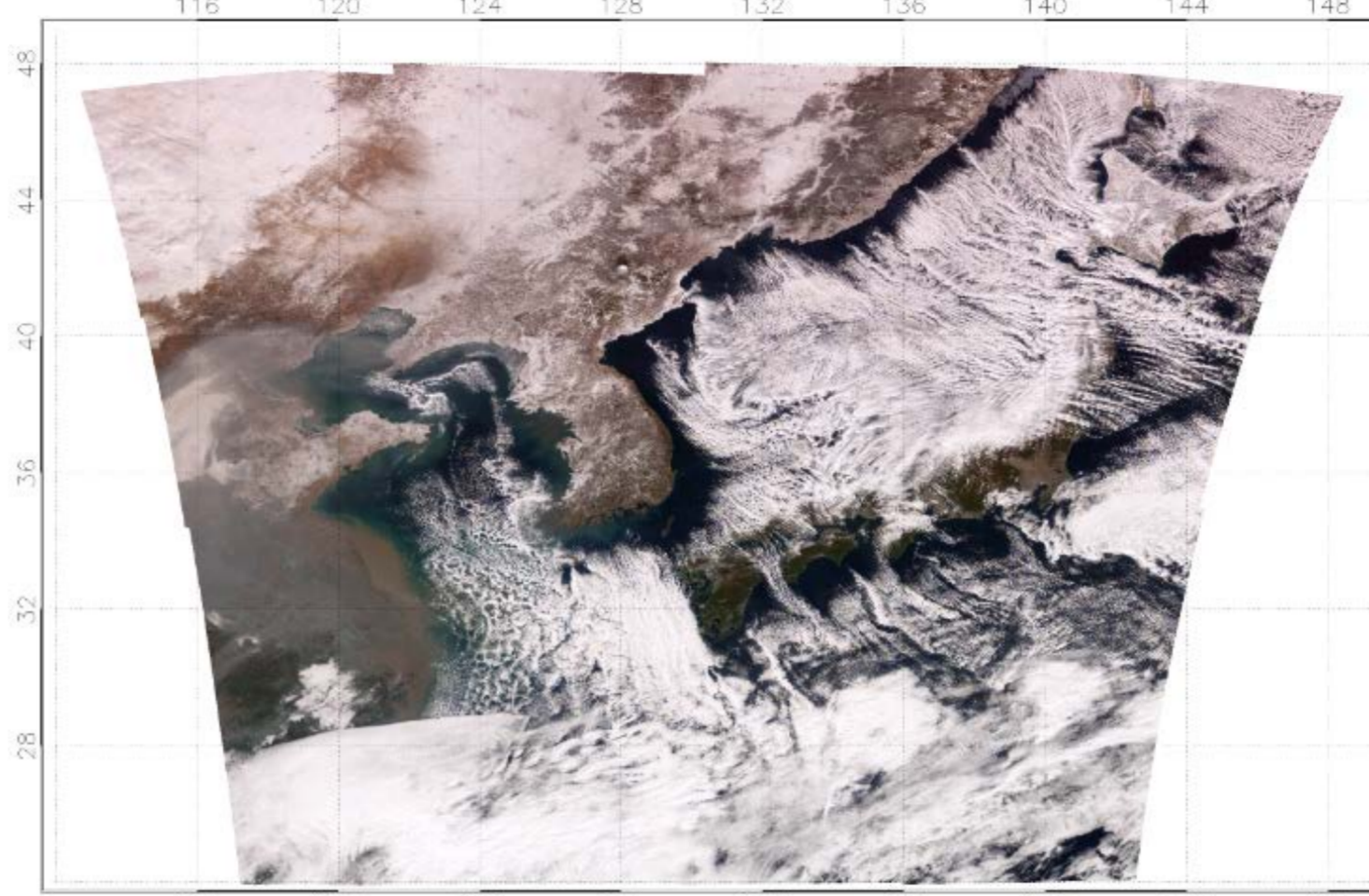Selected Data : GOCI L1B
2013.12.27~ 2013.01.16
Select the above snow aerosol case using UVAI(OMI) and VISAI(GOCI)

Method

TOA	snow	
MODIS	88 pixel	
GOCI	snow	other
%	62.5	28.5

LER	snow	
MODIS	88 pixel	
GOCI	snow	other
%	64.7	25.3

| Variables	Value
SZA (15)	0.01, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70
VZA (15)	0.01, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70
RAA (19)	0.01, 10, 20, 30, 40, 50, 60, 70, ..., 180
AOD (7)	0, 0.25, 0.50, 1.0, 1.5, 2.0, 3.0
Aerosol Type	HA,MA,SA,NA,MIX,DU,UN
Albedo (7)	0.20, 0.30, 0.40, 0.50, 0.60, 0.70, 0.80
Height (3)	0, 2, 4km
Band(4)	2(443nm),3(490nm), 4(555nm), 5(660nm)
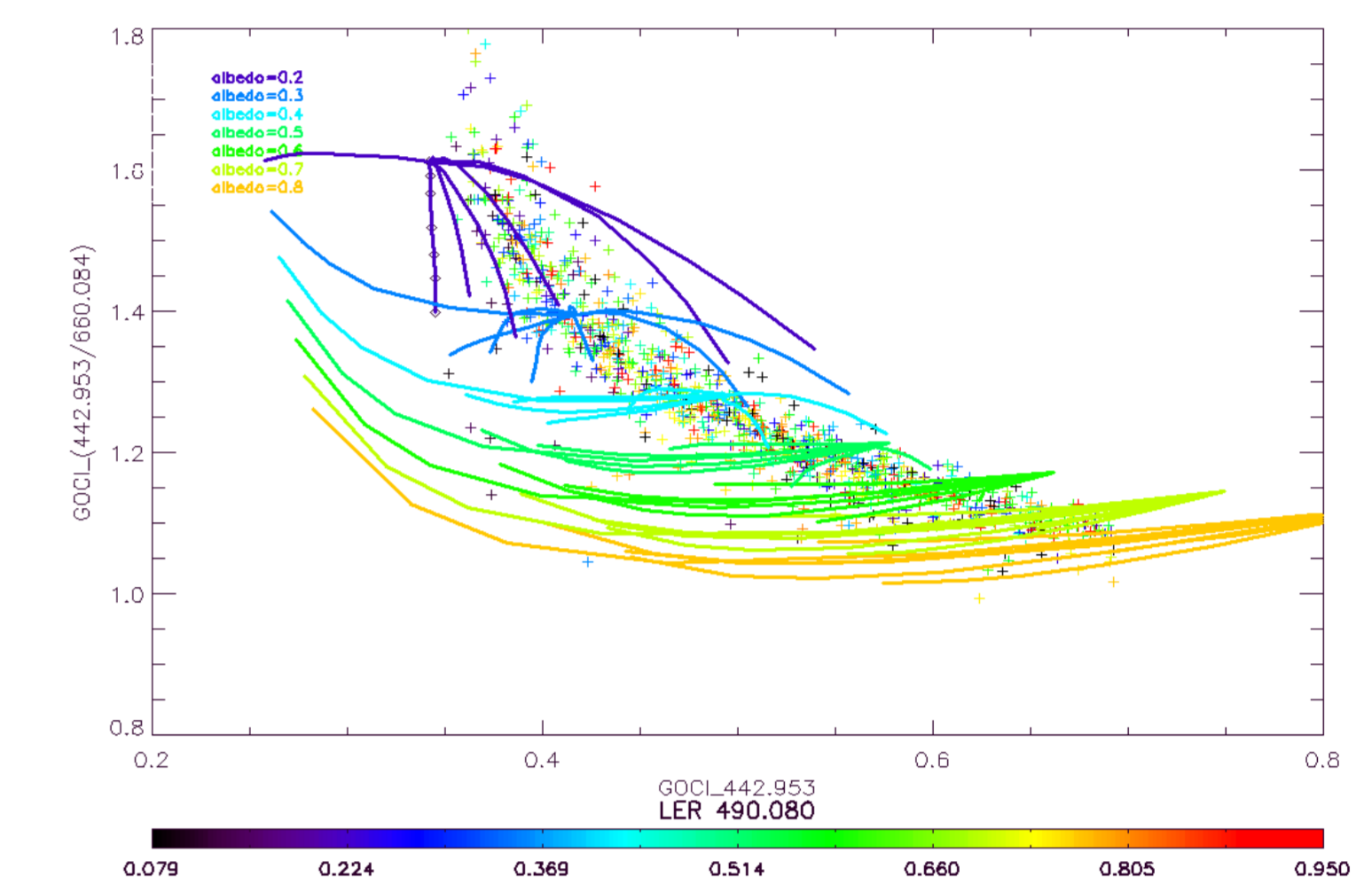
➤ Solid line show the Aerosol Type
➤ When the reflectivity is high, aerosol type Classification can see that there is no sensitivity
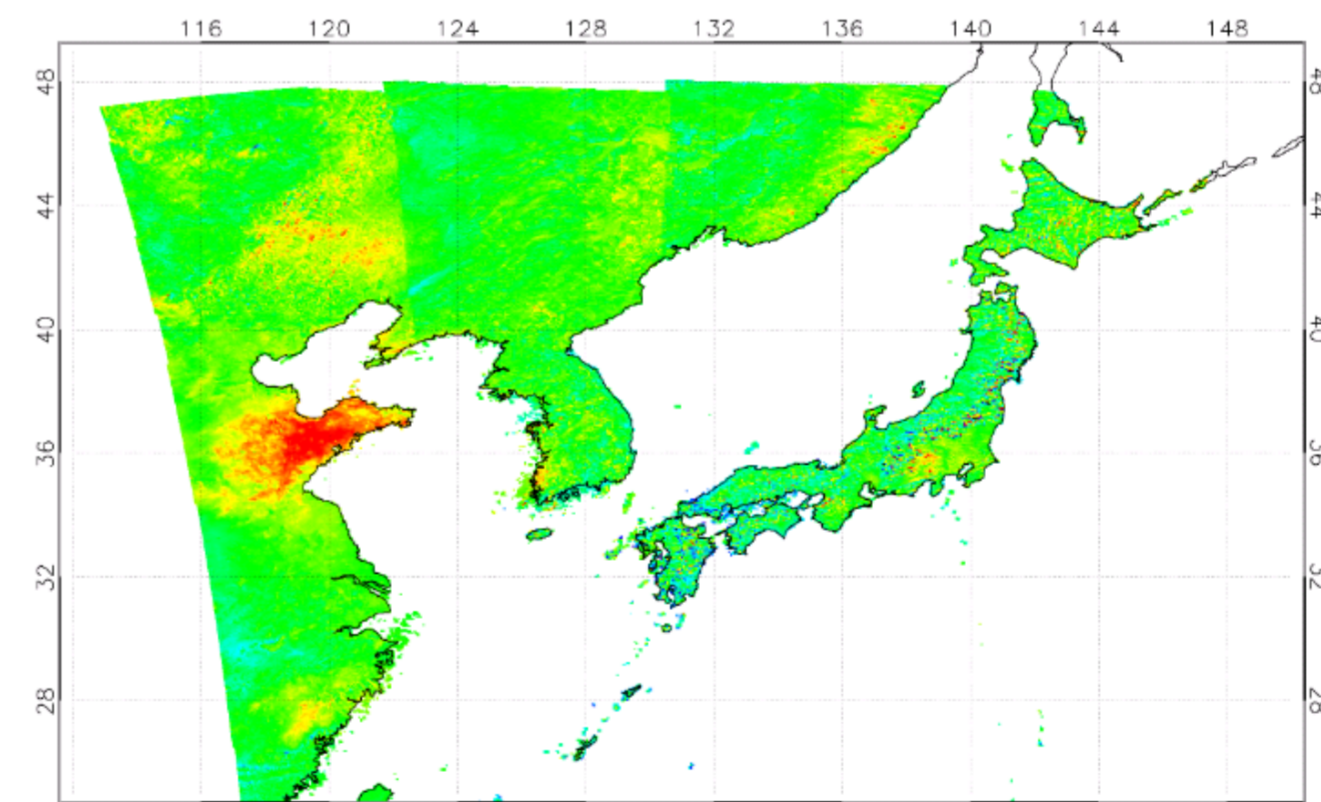
Retrieval results and validation
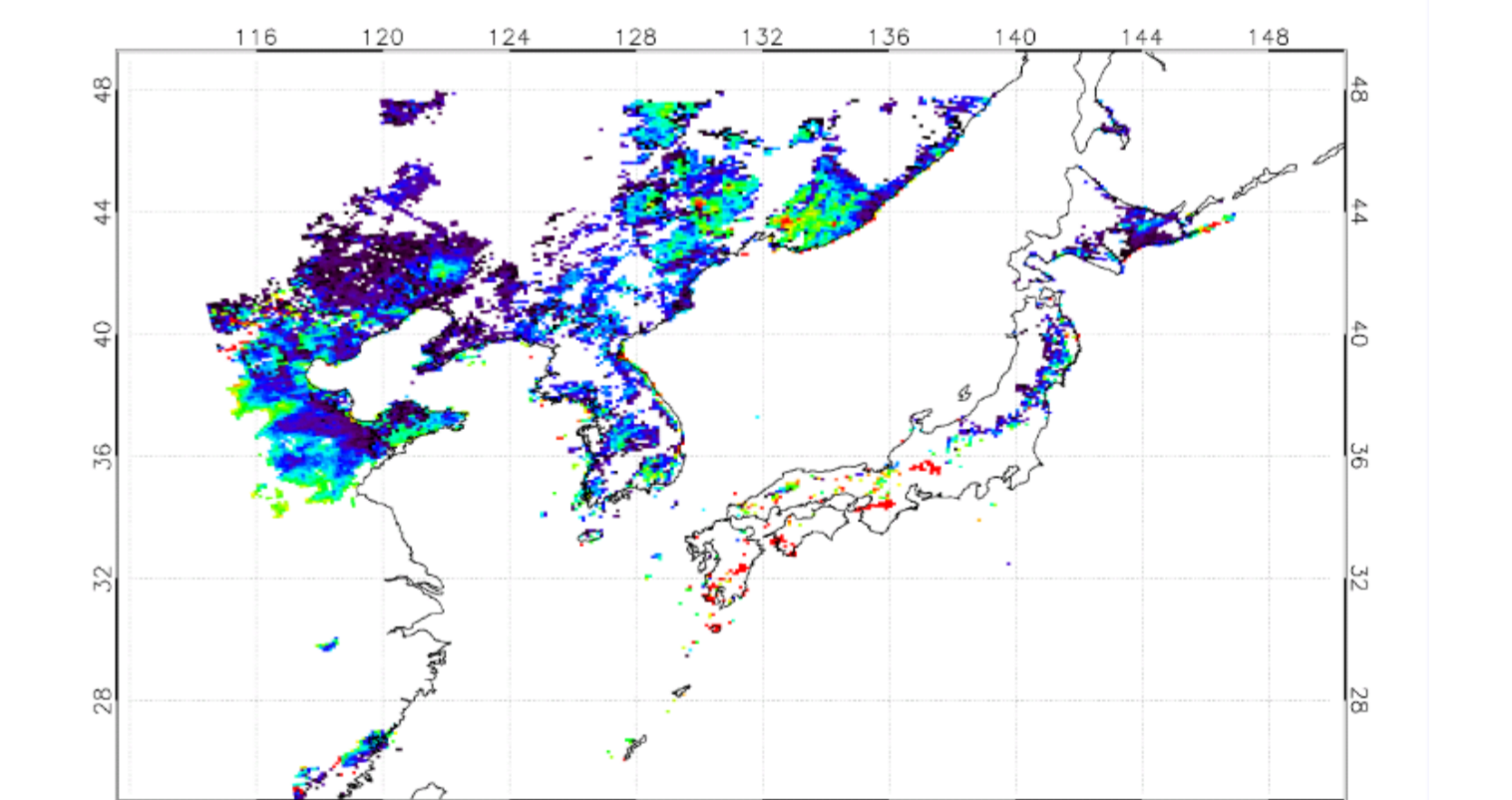
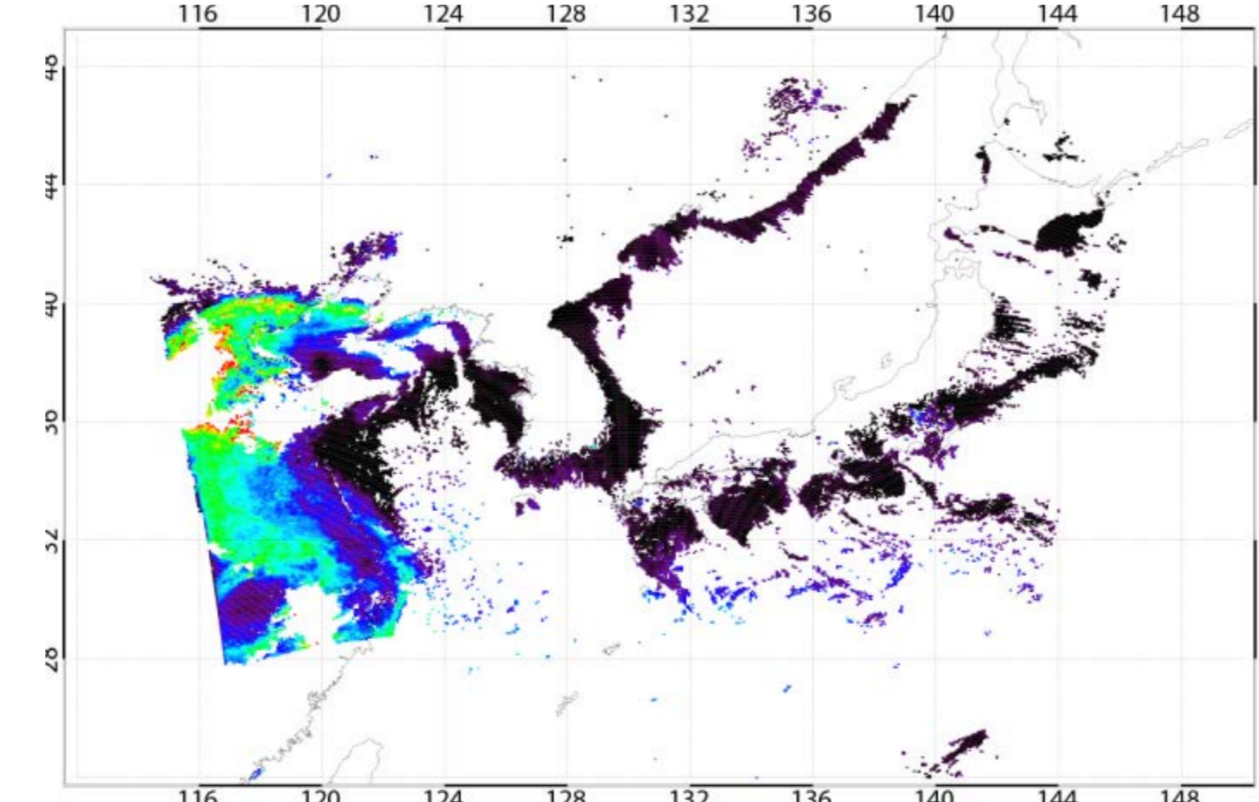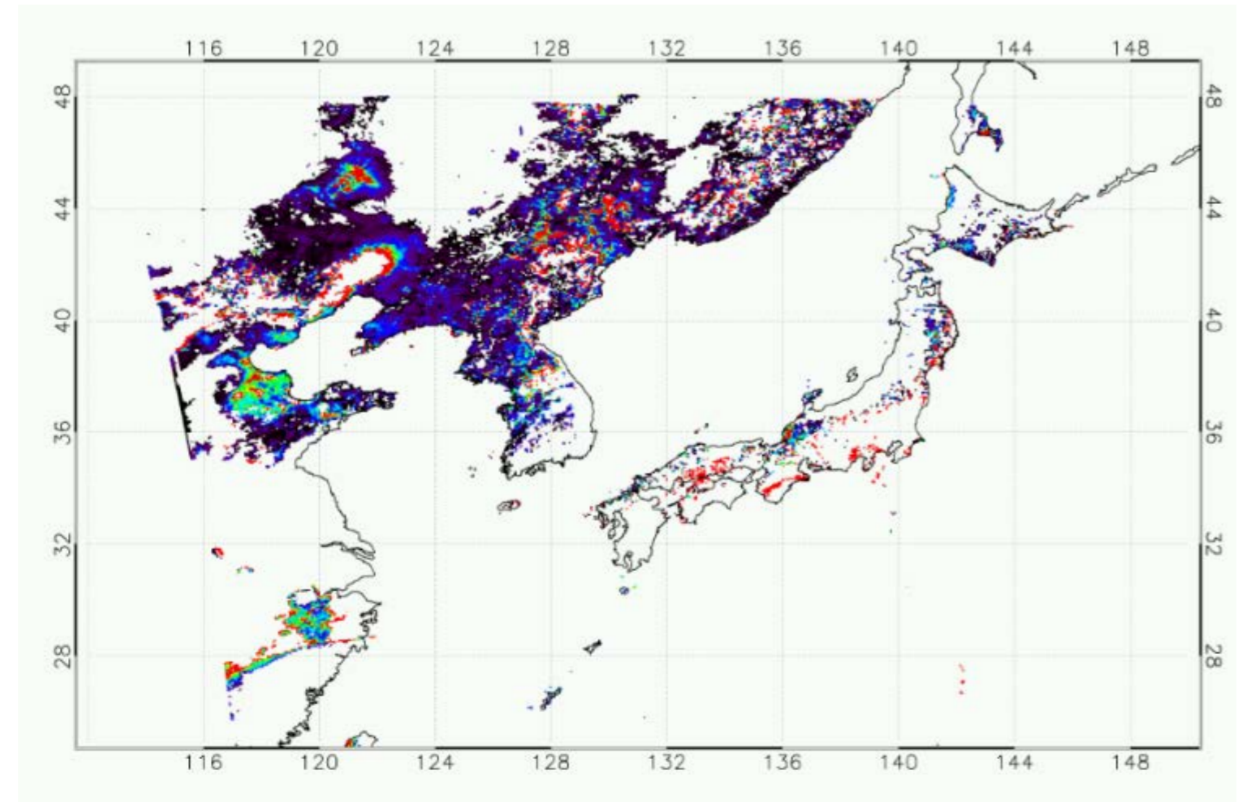### Absorbing aerosol case (2013.01.01 03utc)
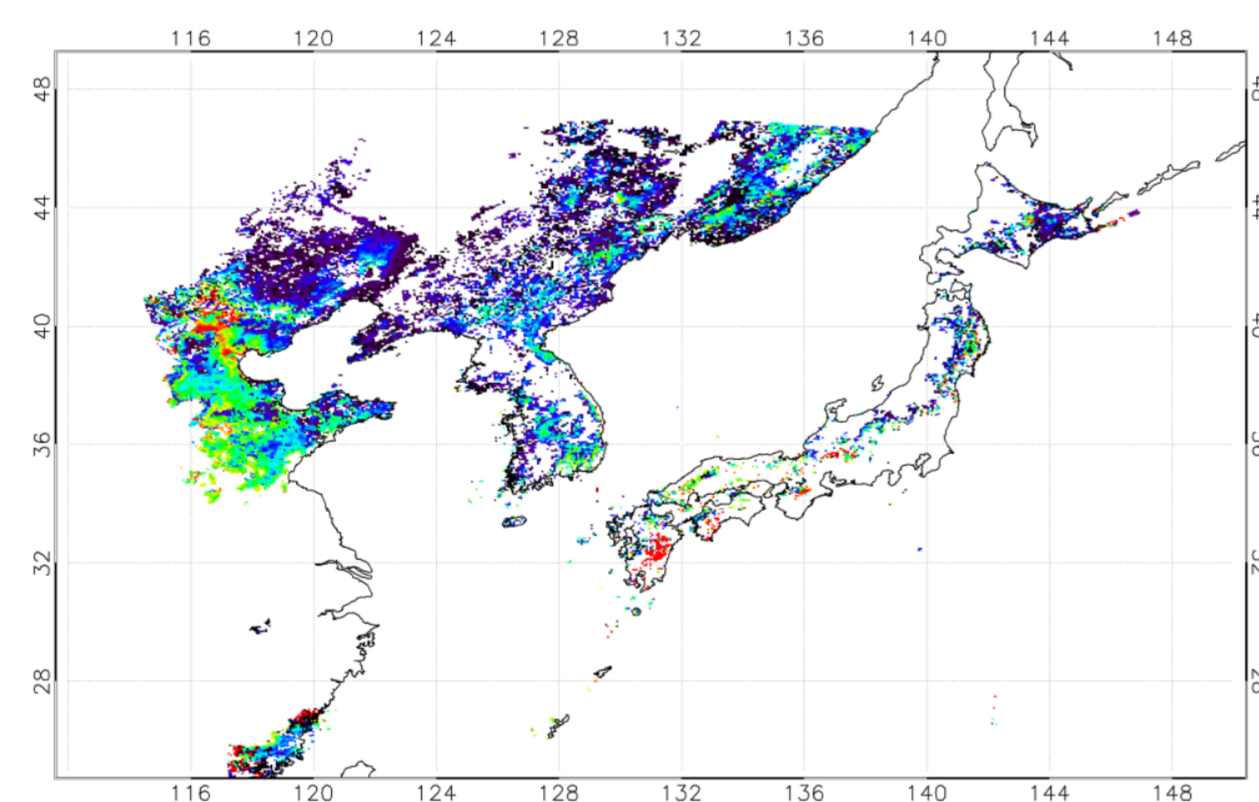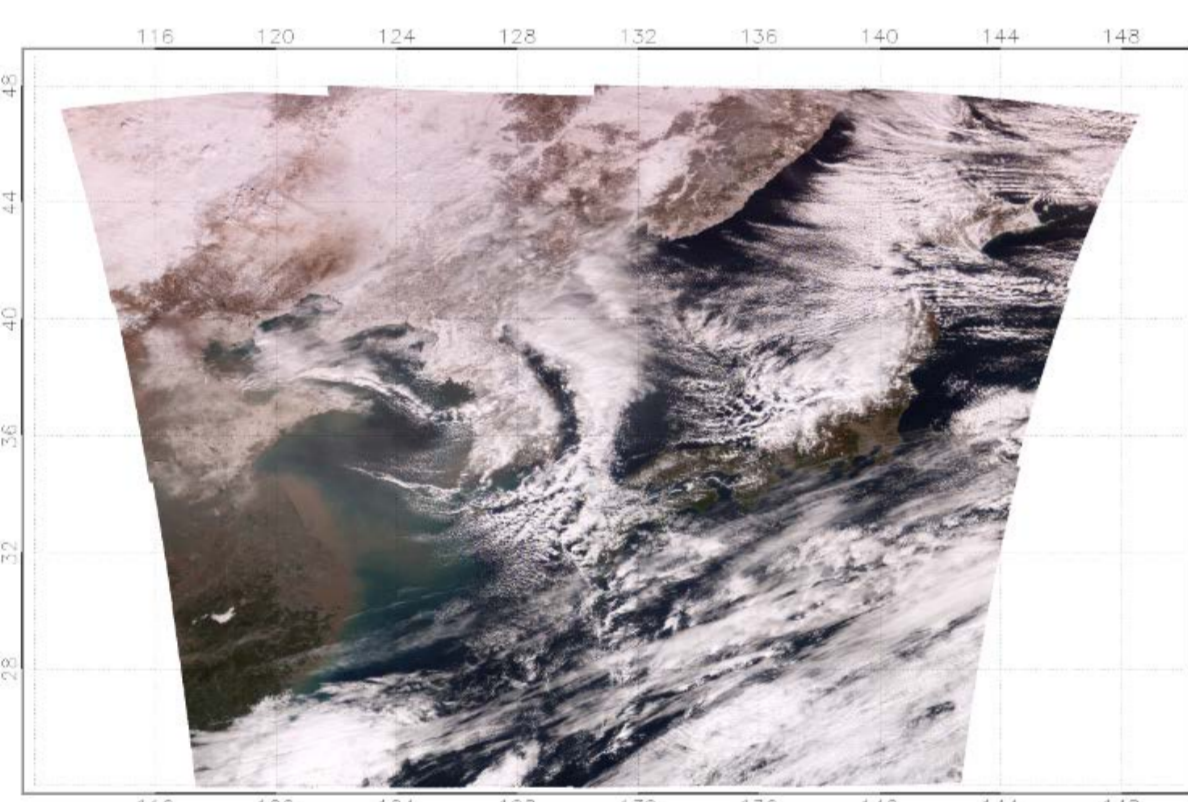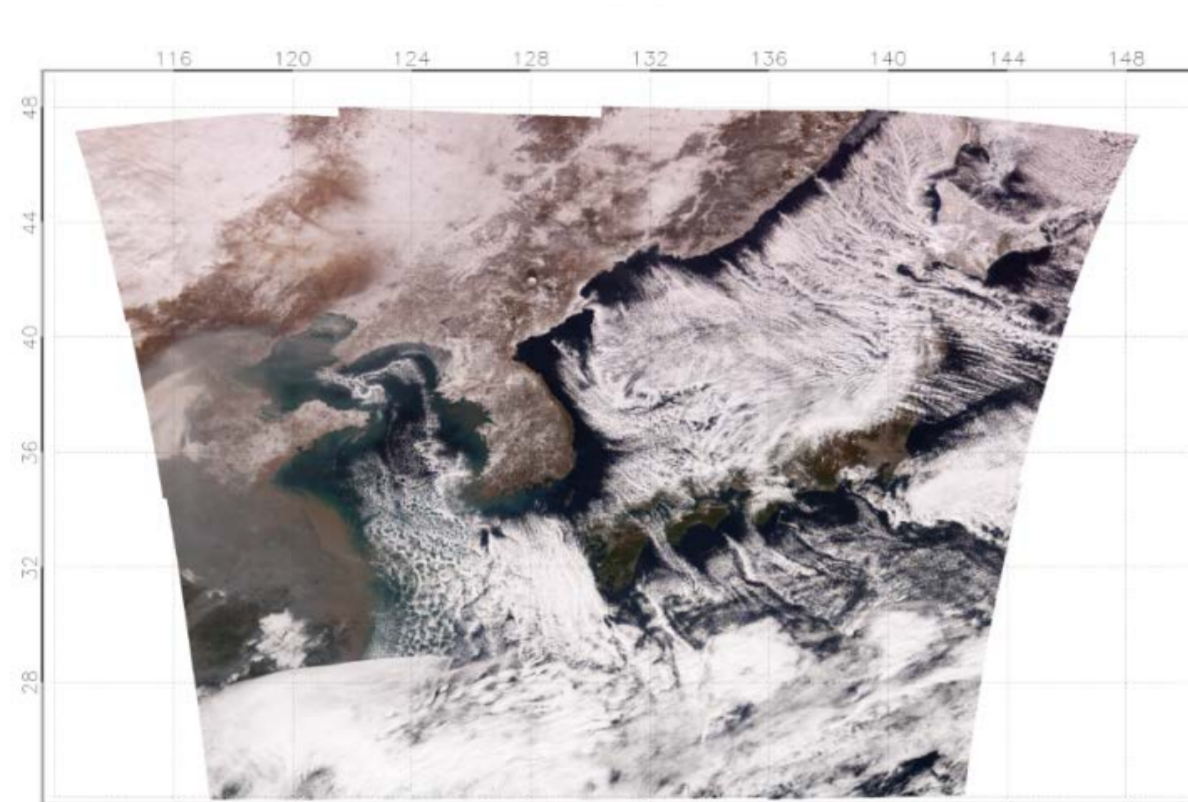

results(choi et al.,2015)
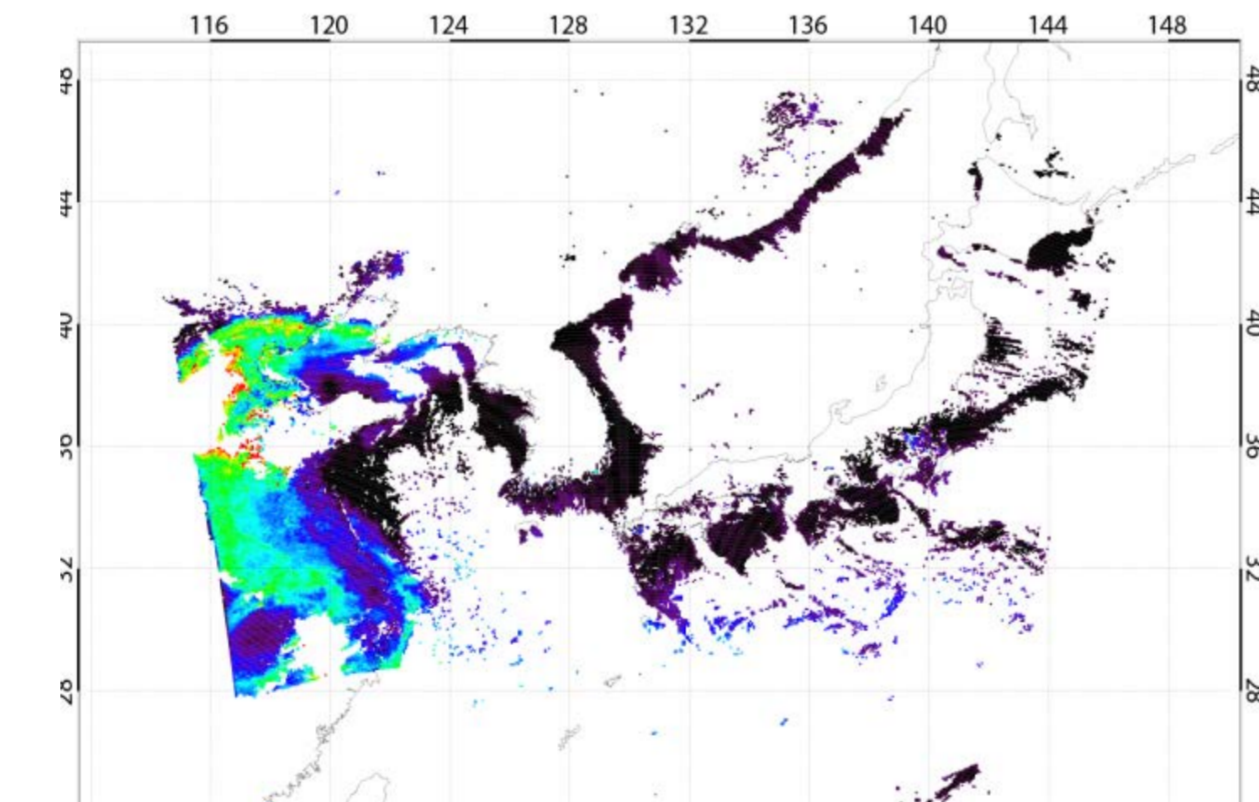
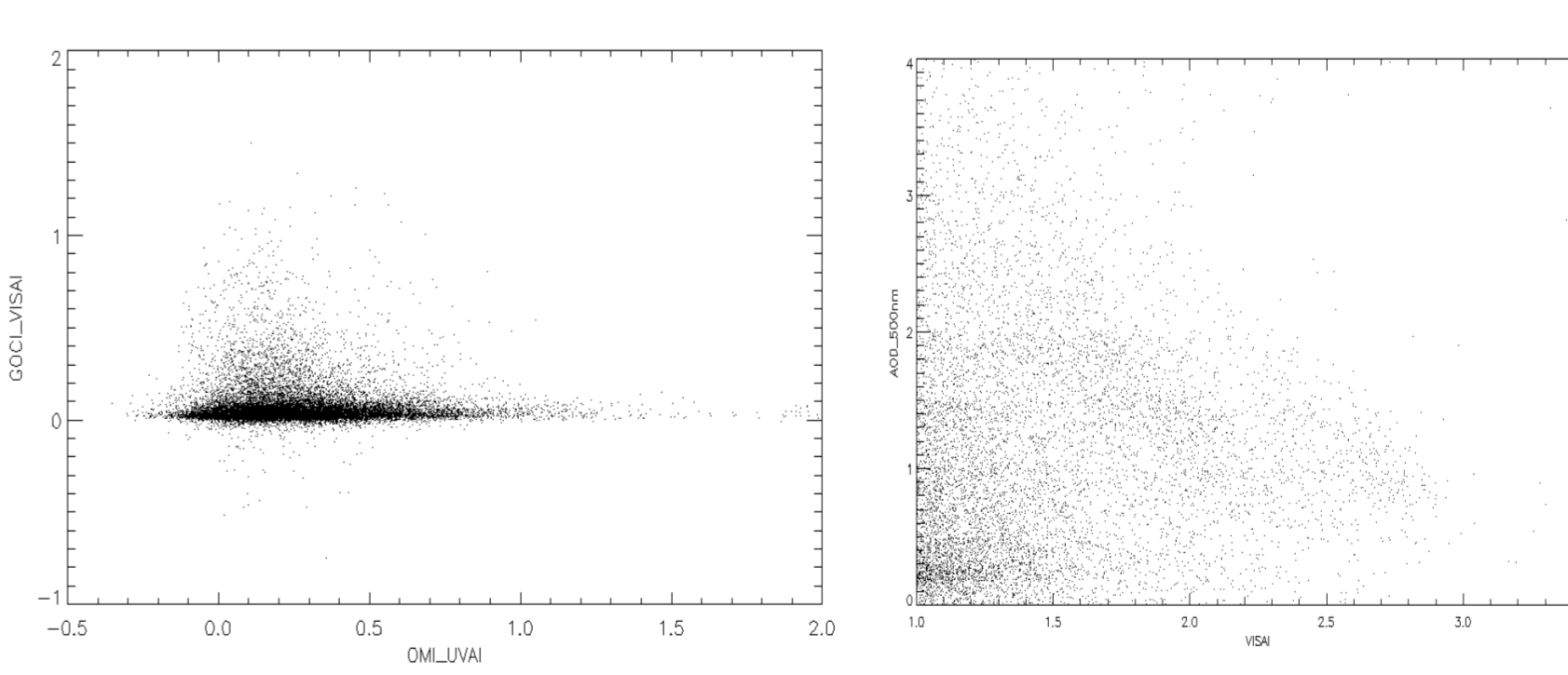### VISAI from GOCI

Results of 10km resolution

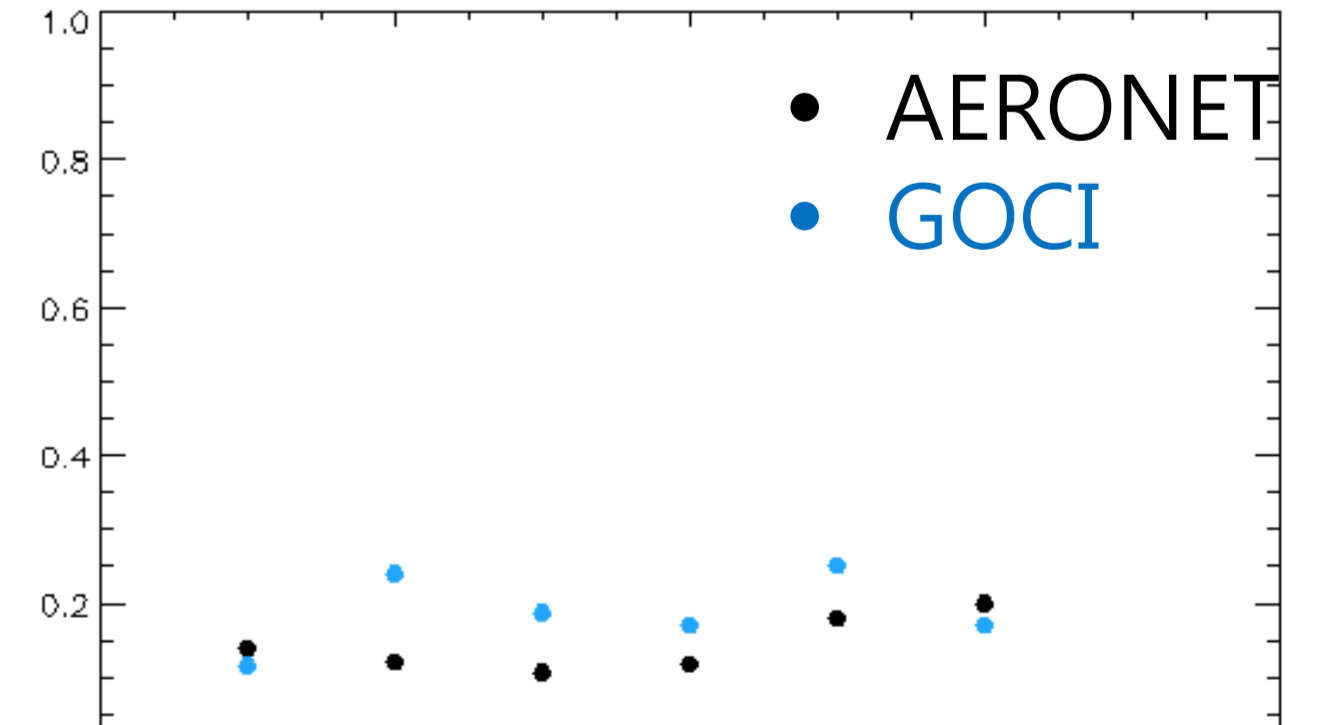
Non-Absorbing aerosol case (2013.01.10 03utc)

6km resolution results

AERONET_SNU site Level 2.0 6km_resolution

● AERONET
● GOCI

Summary

➤ As a result, we can see a part which is not retrieved using the Yonsei aerosol retrieval(YAER) algorithm from the retrieved AOD in this study. These are looks like a smooth, but retrieved AOD show discontinuous. Because the snow reflectivity uncertain problems.
➤ It is difficult to assume the reflectance of snow, because snow removal work of the urban area, and polluted over the snow surface. In addition high latitude area have to considering BRDF reflectance.

Reference & Acknowledgement