

AHI Yonsei Aerosol Retrieval algorithm Version 1 description

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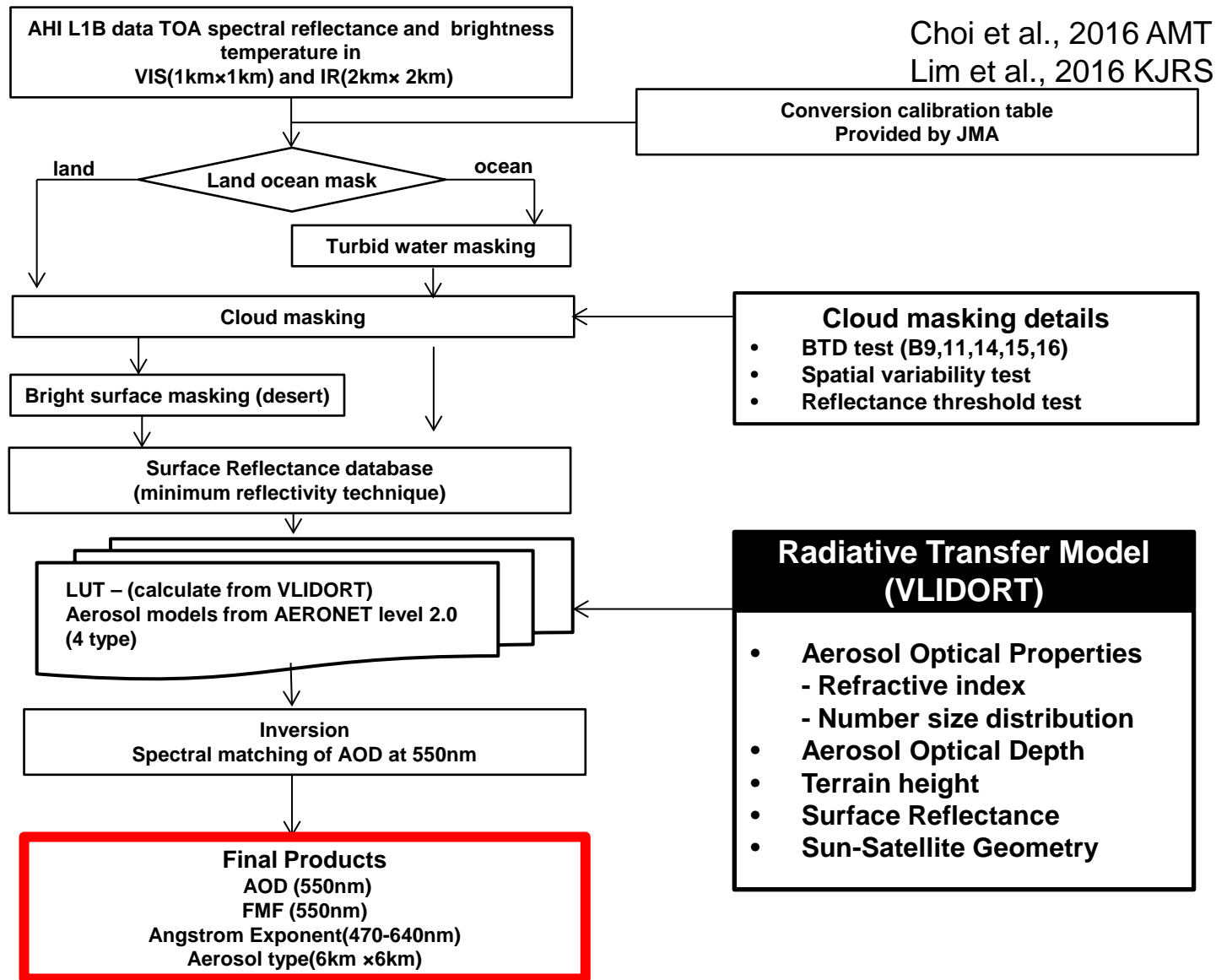
2017.02.08

2017.02.08. AHI YAER algorithm note

- HDF file details
 - Longitude (covered from 70° E to 150° E)
 - Latitude (covered from 5° S to 50° N)
 - AOD at 550 nm
 - reliable AOD at 550 nm (“HQ_AOD_550nm”)
 - Fine Mode Fraction at 550 nm
 - Angstrom Exponent between 470-640 nm
 - Aerosol Type (Black Carbon, Non-Absorbing, Mixture, Dust)
 - File size ~ 31MB
- Temporal coverage: 00:00~07:50 (UTC)
- Temporal resolution: 10 minute
- No. of files during the KORUS-AQ campaign (May 1 – June 12, 2016) = 2064 (~62GB)
- File name: AHI_YAER_V1_AOPs_YYYYXXDDhhmm.hdf
 - YYYY: year
 - XX: month
 - DD: day
 - hh: hour (UTC)
 - mm: minute (UTC)



Algorithm - flow chart



Cloud masking details

References

Remer et al., 2005
 Levy et al., 2007
 Kim et al., 2012
 Hsu et al., 2013
 Choi et al., 2016
 Iwabuchi et al., 2016
 Lim et al., 2016
 Yang et al., 2016
 VIIRS cloud masking ATBD

Cloud masking details for AHI		
steps	Conditions	Classifications
IR - Brightness temperature (BT) and BT difference (BTD) test		
1	BTD between Ch14 and Ch15 Land: BTD < 1.5 K High latitude ocean: < -1.0 K Mid-low latitude ocean: < 0.5 K	Cloud over land and ocean
2	BTD between Ch15 and Ch16 Land and ocean: < 11 K	High level cloud over land and ocean
3	BTD between Ch11 and Ch9 Land and ocean: < -10 K	Low level cloud land and ocean
4	BTD between Ch14 and Ch11 Land and ocean: < 0 K	Cirrus cloud land and ocean
5	BT at Ch14 and BTD between Ch14 and Ch15 Land : BT < 277 K 277 K < BT ≤ 288 K and BTD > 6K	Cloud over land
VIS – spatial variability and reflectance threshold test		
1	STD test at Ch4 > 0.0025	Cloud over ocean
2	Mean weighted STD test at Ch1 > 0.0025	Cloud over land
3	The ratio of max and min TOA reflectance at Ch1 in 3 × 3 pixels > 1.15	Cloud over land
4	Pseudo GEMI index at Ch3 and Ch4 < 1.87	Cloud over land
5	TOA reflectance test at Ch1 > 0.35	Cloud over land and ocean
6	Pixel Constrain(36 pixels) < 3	Cloud over land and ocean

Table 1. Imager specifications.

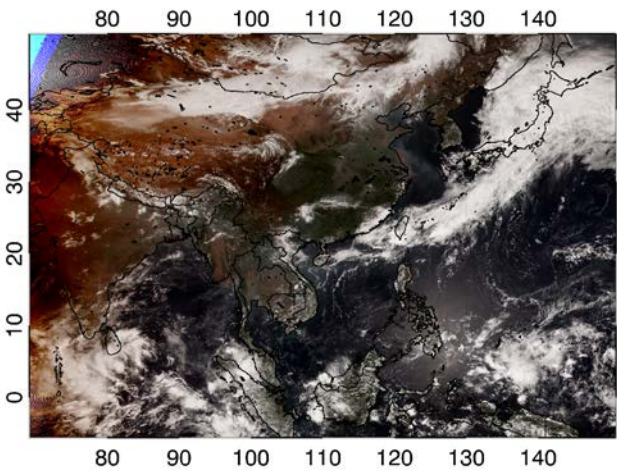
Wave length [μm]	Himawari-8/9				MTSAT-1R/2	
	Band number	Spatial resolution at SSP [km]	Central wave length [μm]		Channel name	Spatial resolution at SSP [km]
			AHI-8 (Himawari-8)	AHI-9 (Himawari-9)		
0.47	1	1	0.47063	0.47059	-	-
0.51	2	1	0.51000	0.50993	-	-
0.64	3	0.5	0.63914	0.63972	VIS	1
0.86	4	1	0.85670	0.85668	-	-
1.6	5	2	1.6101	1.6065	-	-
2.3	6	2	2.2568	2.2570	-	-
3.9	7	2	3.8853	3.8289	IR4	4
6.2	8	2	6.2429	6.2479	IR3	4
6.9	9	2	6.9410	6.9555	-	-
7.3	10	2	7.3467	7.3437	-	-
8.6	11	2	8.5926	8.5936	-	-
9.6	12	2	9.6372	9.6274	-	-
10.4	13	2	10.4073	10.4074	IR1	4
11.2	14	2	11.2395	11.2080	-	-
12.4	15	2	12.3806	12.3648	IR2	4
13.3	16	2	13.2807	13.3107	-	-

Central wavelengths of the AHIs are "Moment center wavelength" (provided by Exelis).
 SSP : sub satellite point

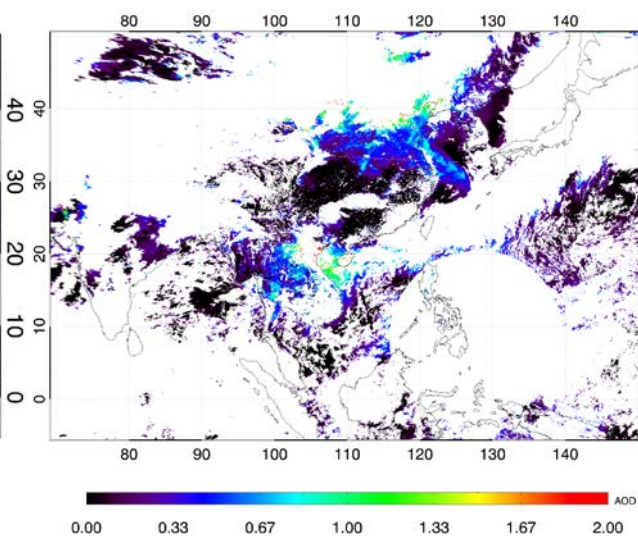
<http://www.data.jma.go.jp/mscweb/en/himawari89/>

Retrieval results

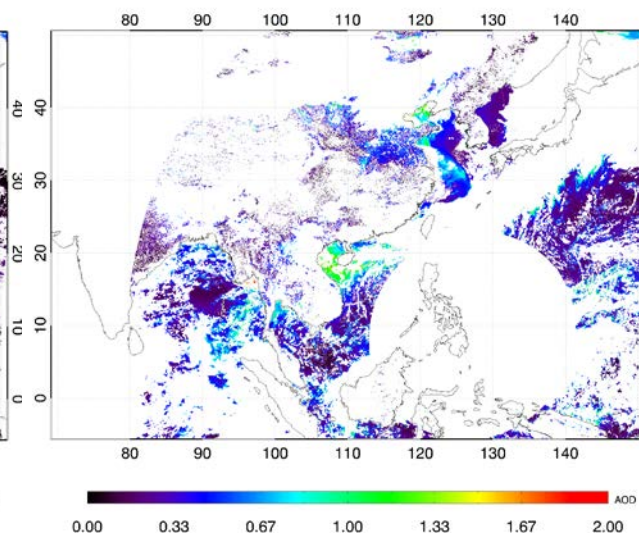
AHI True color - 201605110430



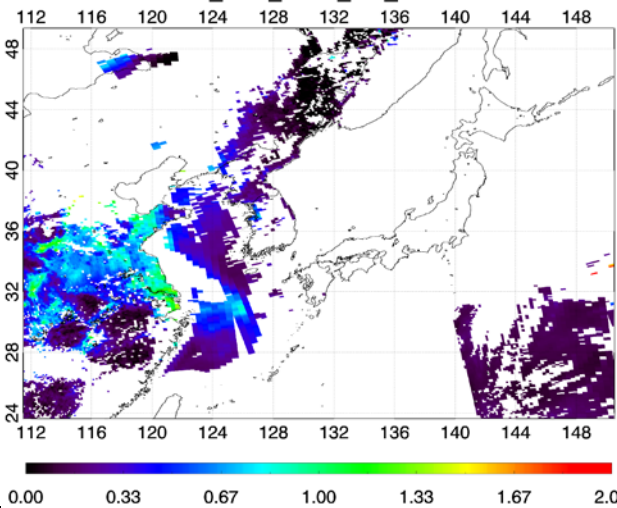
YONSEI AHI AOD - 201605110430



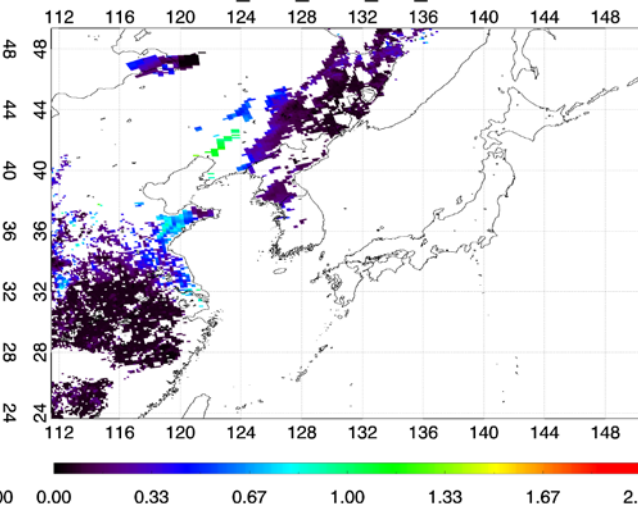
AHI AOD - 201605110430 JAXA product



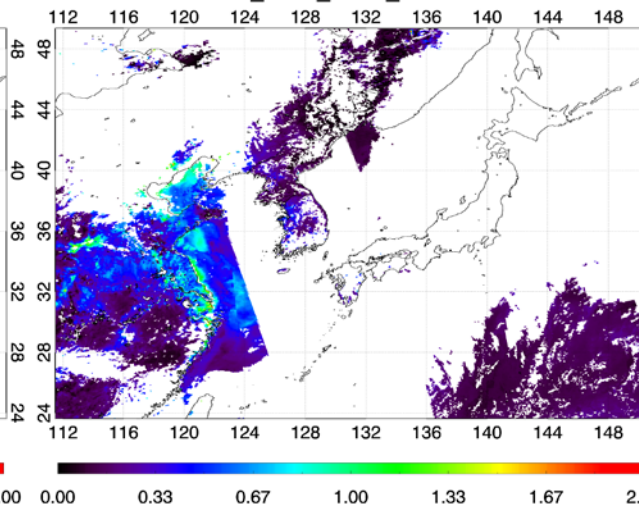
MYD04_10K_AOD_DT_20160511



MYD04_10K_AOD_DB_20160511

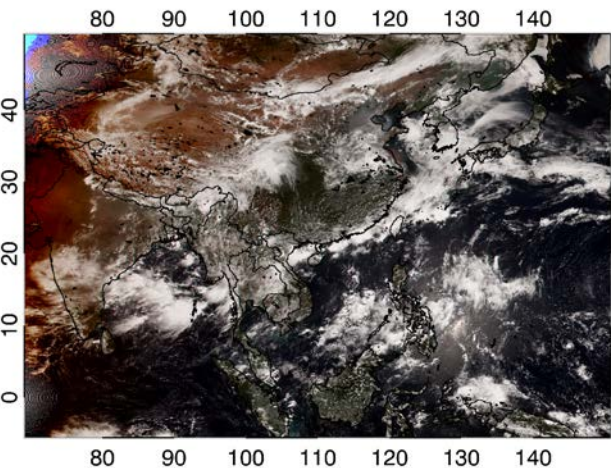


VIIRS_EDR_AOD_20160511

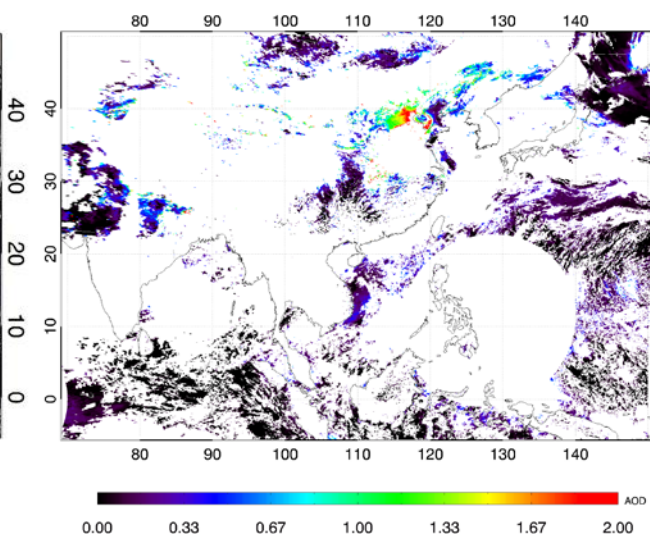


Retrieval results

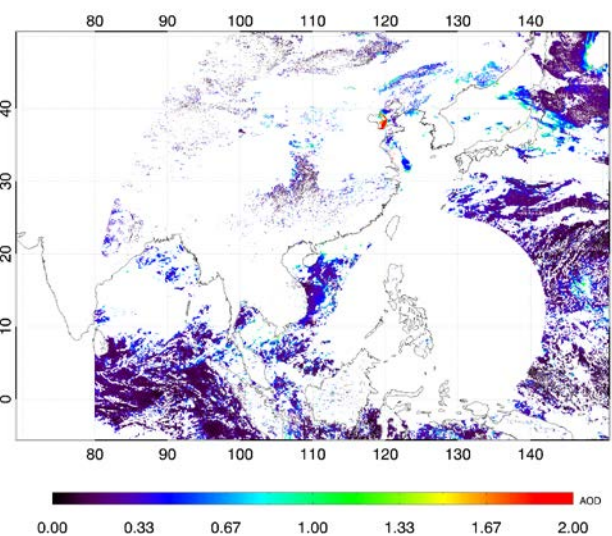
AHI True color - 201606060430



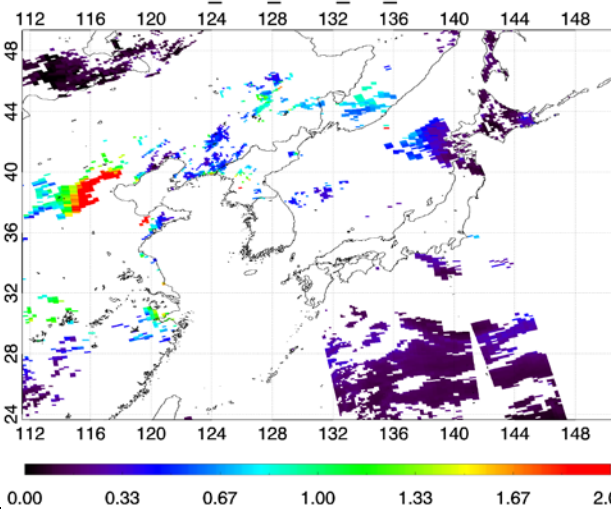
YONSEI AHI AOD - 201606060430



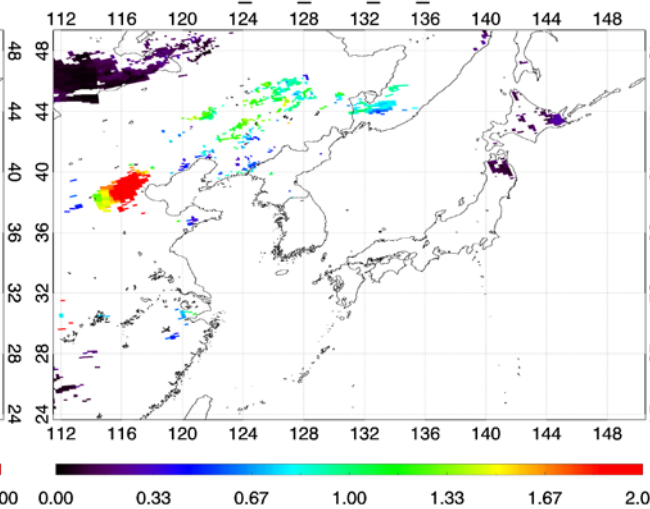
AHI AOD - 201606060430 JAXA product



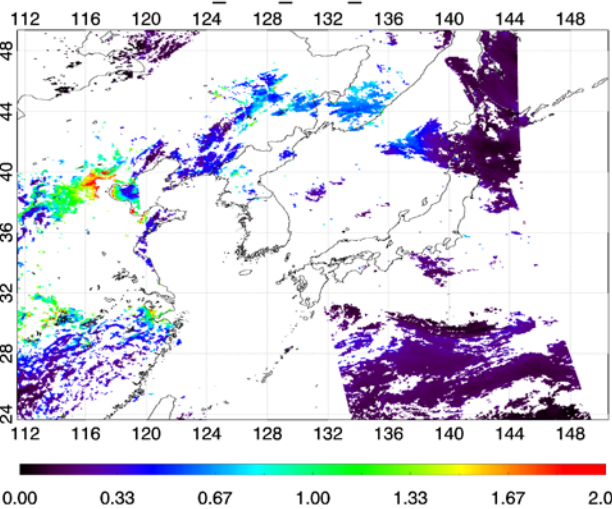
MYD04_10K_AOD_DT_20160606



MYD04_10K_AOD_DB_20160606

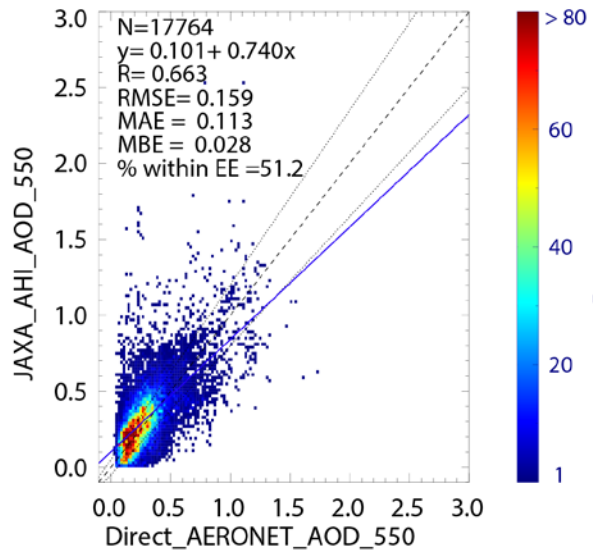


VIIRS_EDR_AOD_20160606

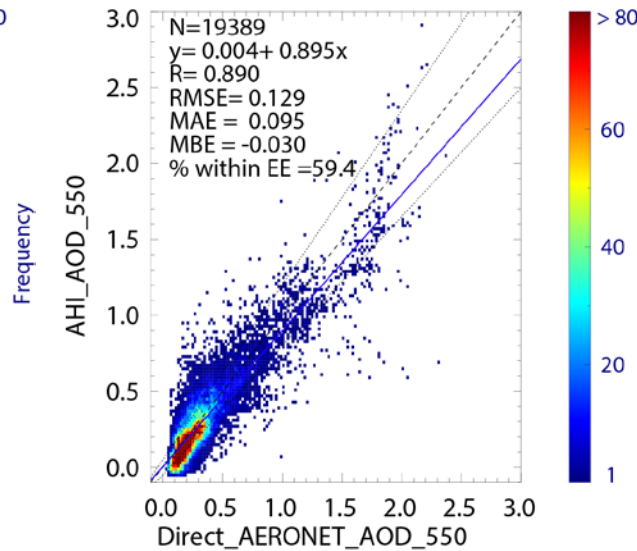


Validation results

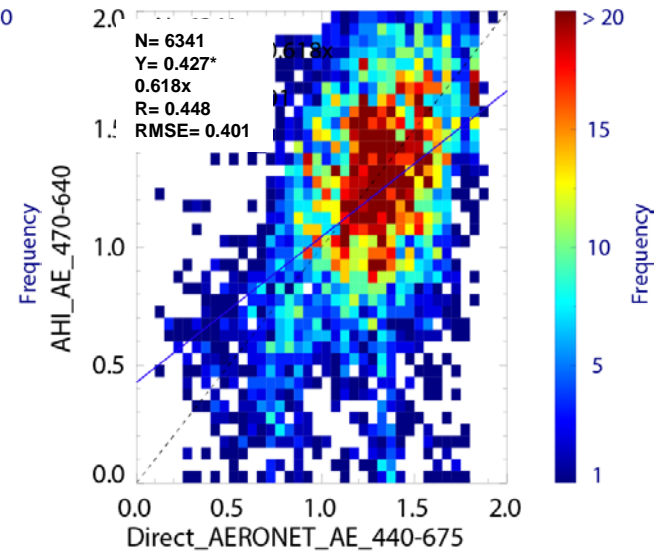
AHI JAXA



AHI YAER



The case of AOD >0.3



- Spatial collocation : average of AHI pixels within 25km at AERONET and SONET sites (Total 51sites)
- Temporal collocation : average of AERONET data within 5min at satellite measurement time
- AHI : Expected Error (EE) = $0.05 + 0.15 \cdot \text{AERONET AOD}$ (Levy et al., 2007)