Validation study of GCOM-C atmosphere products based on SKYNET for success criterion evaluation

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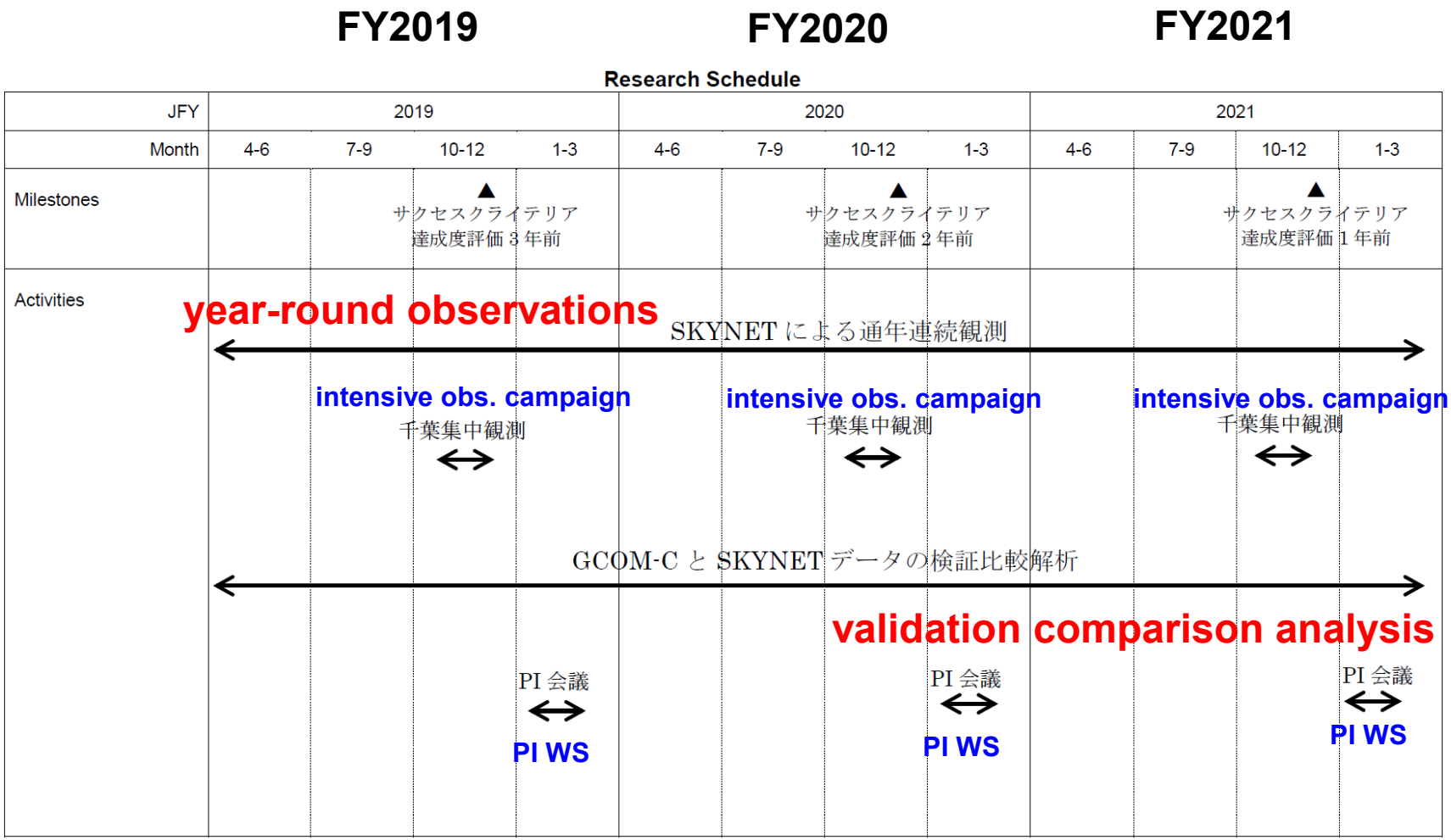
Purposes of this RA

- To acquire high-quality validation data based on SKYNET for the period of 1.5-4.5 years after the launch of GCOM-C.
- To contribute to the success criterion evaluation (atmosphere products) through validation comparison analysis.

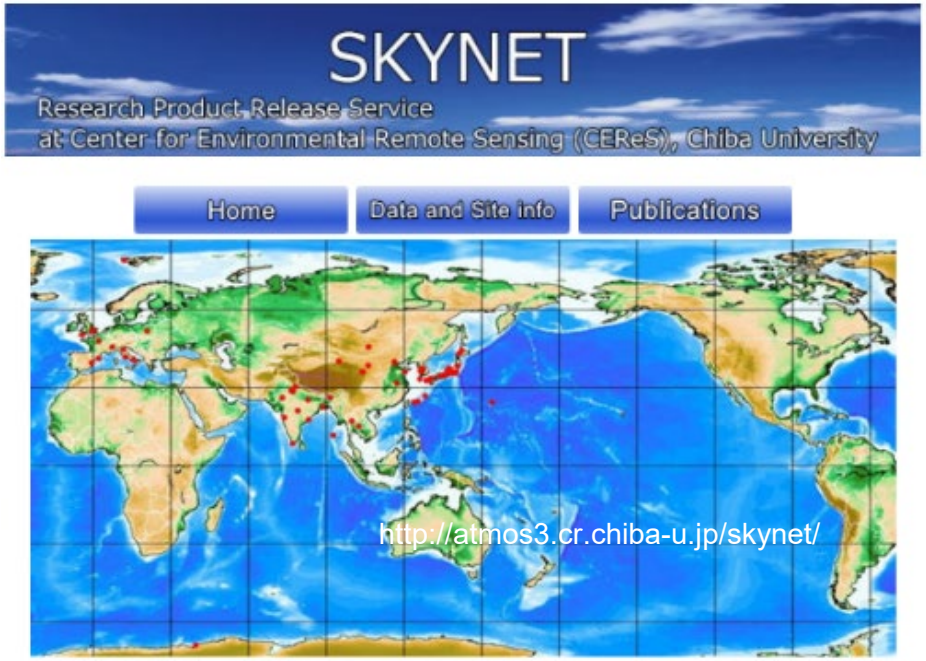
Research schedule

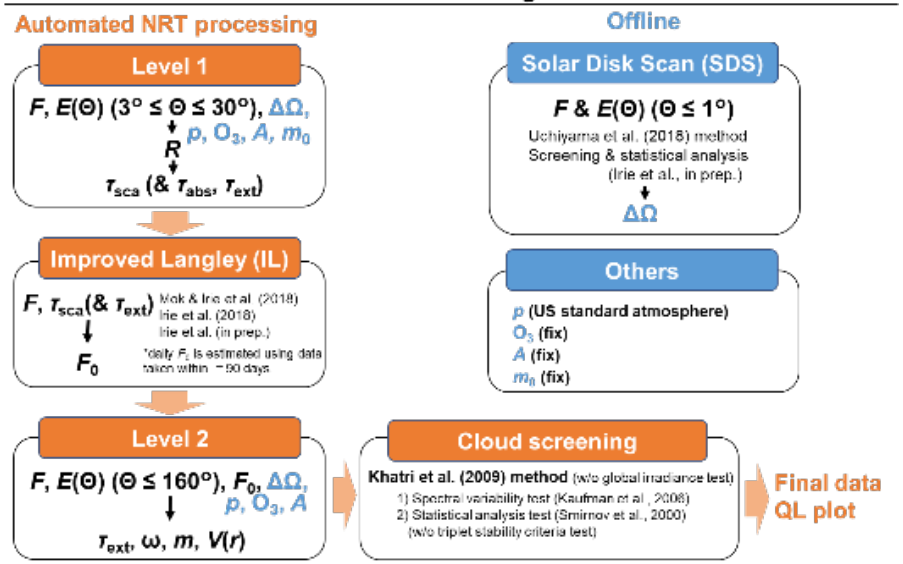


Continuous observation & NRT data delivery with SR-CEReS※

※a common automated retrieval package for skyradiometer

(Mok and Irie et al., 2018; Irie et al., 2019; Irie and Nakajima, 2022)





NRT system

obs→data transfer→analysis→visualization→release”

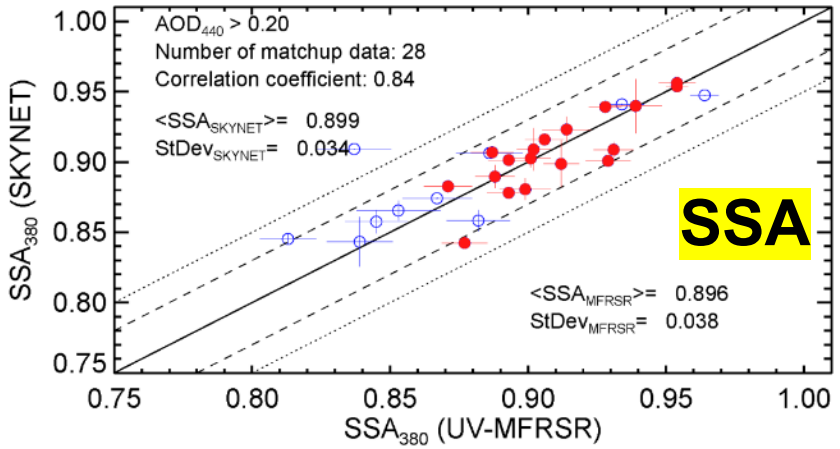
→JAXA

together with other data
(MWR LWP data, etc.)

QA/QC study of skyradiometer data

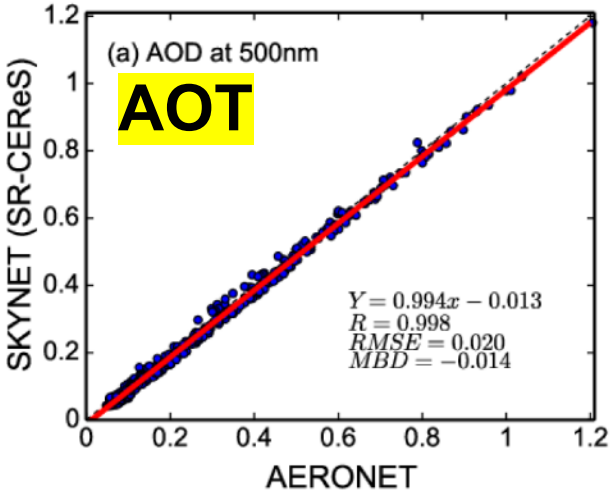
① Observations at Yonsei U (Seoul, South Korea)

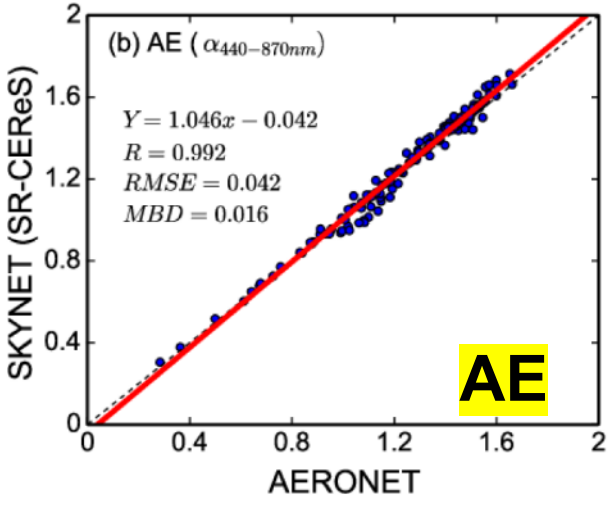
Period: May 4 to September 8, 2016

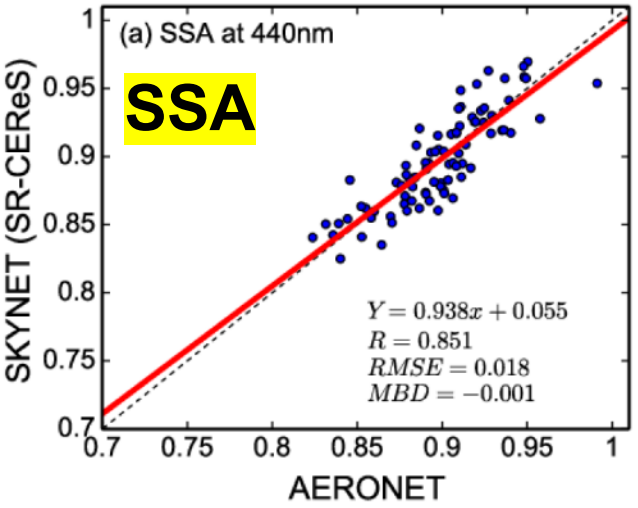


(Mok and Irie et al., 2018; Irie et al., 2019)

② Observations at Beijing (2016-2017)

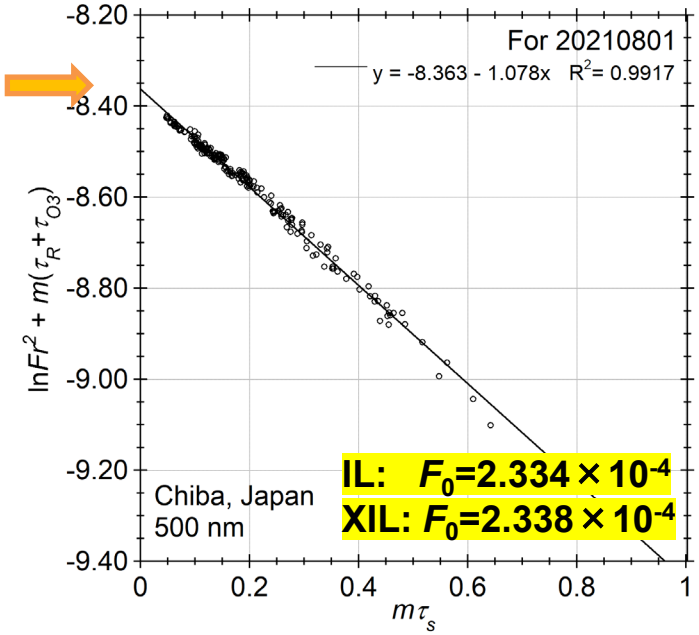






(Yang and Irie et al., 2021)

Calibration for long-term skyradiometer obs.



$$\ln F = \ln \frac{F_0}{r^2} - m\tau$$

$$\ln Fr^2 = \ln F_0 - m(\tau_{\text{non-aerosol}} + \tau_{\text{aerosol}})$$

$$\ln Fr^2 = \ln F_0 - m\tau_{\text{non-aerosol}} - m\tau_{\text{aerosol}}$$

$$\ln Fr^2 = \ln F_0 - m\tau_{\text{non-aerosol}} - m\frac{\tau_s}{\omega}$$

$$\underbrace{\ln Fr^2 + m\tau_{\text{non-aerosol}}}_{y} = \ln F_0 - \frac{1}{\omega}\underbrace{m\tau_s}_{x},$$

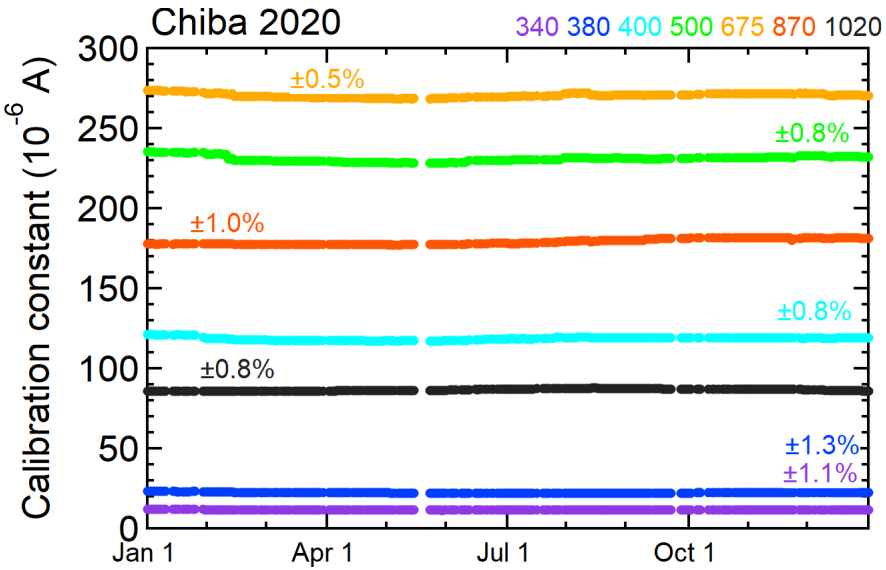
IL method

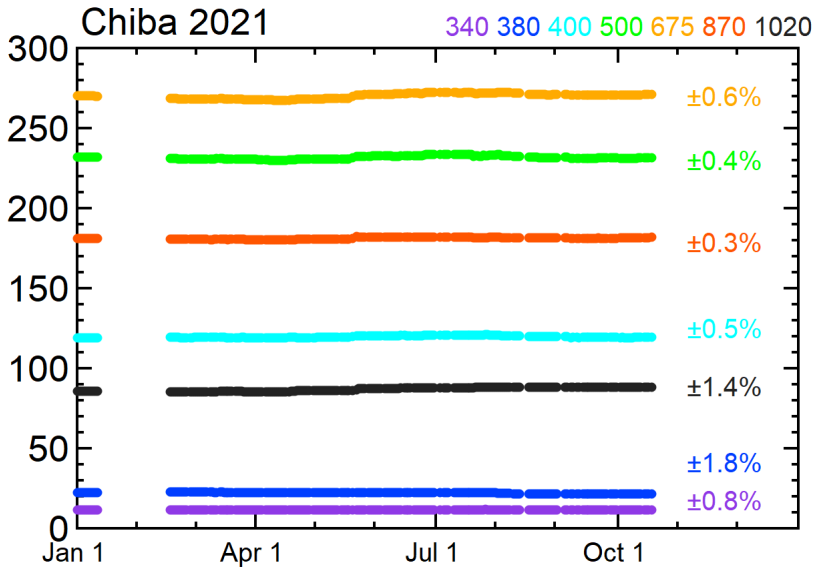
$$\frac{y}{x}$$

XIL method

$$\frac{x}{y}$$

Nakajima et al.(2020)





taken by Ohno

Instruments and observation parameters

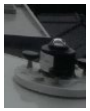


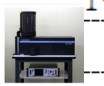








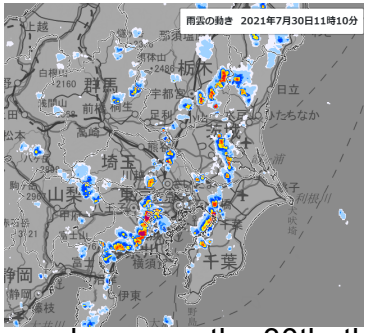


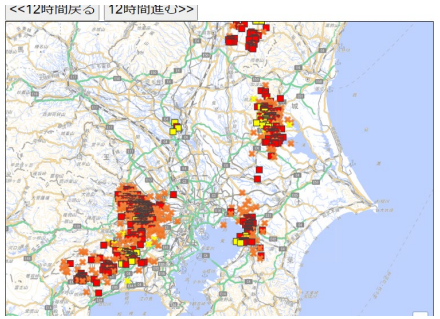




Instruments	Parameters	Remarks
SKYNET/Skyradiometer (POM-02)	AOD, SSA, AE, k size distribution, PWV, COD, Re	340, 380, 400, 500, 675 870, and 1020 nm
AERONET/CIMEL	AOD, SSA, AE, k size distribution, PWV	340, 380, 440, 500, 675 870, 1020, and 1640 nm observation in both day and night
PENTA-MAXDOAS	AEC, NO_2, H_2O (RH) HCHO, CHOCHO, SO_2, O_3	3D distributions using 5 azimuth angles
MWR	PWV, LWC	Rain sensor equipped
$PM_{2.5}$ sensor	$PM_{2.5}$	-
BCM3130 (COSMOS)	BC	-
NIES FRM × 2	$PM_{2.5}$, EC	Quartz and Teflon filters used
Skyview	whole-sky imagery cloud fraction	-
Pyranometer	global solar irradiance	-
MS-700	solar radiation spectrum	-
PAR-01D	PAR	-
MaxiMet GMX 600	Wind speed/direction T, p, RH, precipitation	-
NIES FTS (EM27/SUN)	XCO_2, XCH_4, XCO, XH_2O	-
NIES lidar	AEC	-
Time-lapse camera	RGB video	5 azimuth angles

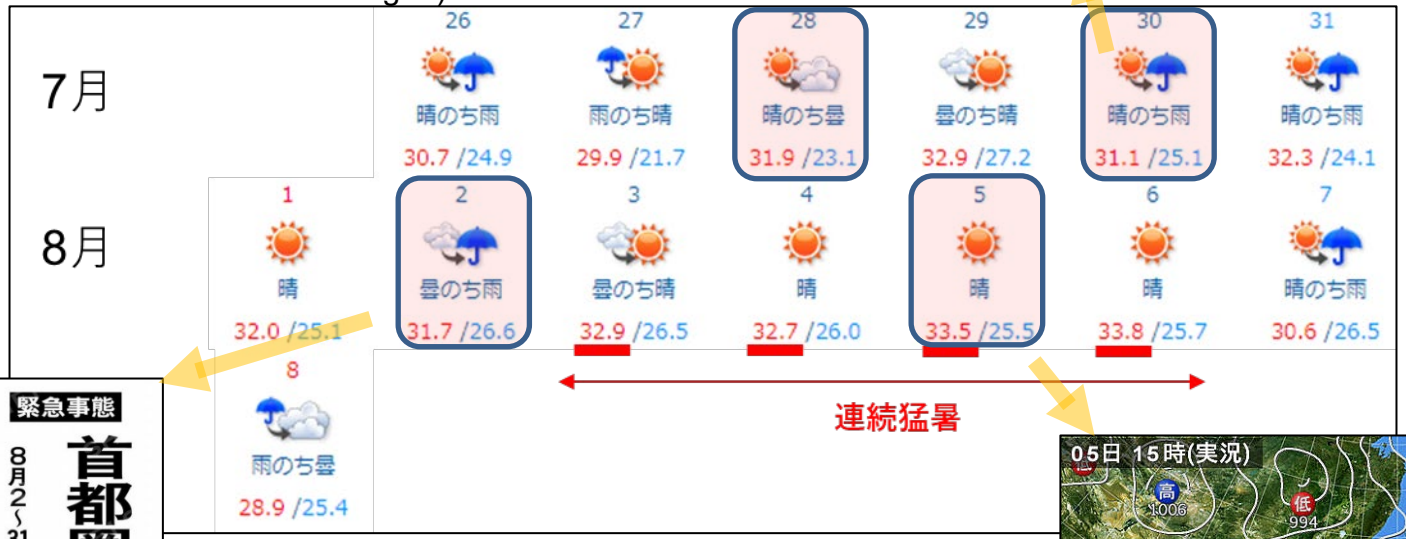
Events during the Chiba Campaign 2021

Typhoon No. 8 made landfall in Miyagi Prefecture (for the first time since statistics began).





Around noon on the 30th, there was a storm with thunder. Chiba University's Nishi-Chiba campus lost power.




緊急事態

8月2～31日 東京・沖縄は延長

首都圏3県・大阪も

政府は30日夕、新型コロナウイルス感染症対策本部（本部長・菅義偉首相）を開き、埼玉、千葉、神奈川、大阪の4府県を緊急事態宣言の対象に加えることを決めた。北海道、石川、京都、兵庫、福岡の5道府県には宣言に準じる「まん延防止等重点措置」を適用する。いずれも期間は8月2日から31日まで。東京都と沖縄県に発令中の宣言の期限も8月22日から31日に延長した。

緊急事態宣言と重点措置

	現在	8月2日～31日
東京	緊急事態宣言	緊急事態宣言
沖縄	緊急事態宣言	緊急事態宣言
埼玉	まん延防止等重点措置	まん延防止等重点措置
千葉	まん延防止等重点措置	まん延防止等重点措置
神奈川	まん延防止等重点措置	まん延防止等重点措置
大阪	まん延防止等重点措置	まん延防止等重点措置
北海道	発令なし	まん延防止等重点措置
石川	発令なし	まん延防止等重点措置
京都	発令なし	まん延防止等重点措置
兵庫	発令なし	まん延防止等重点措置
福岡	発令なし	まん延防止等重点措置

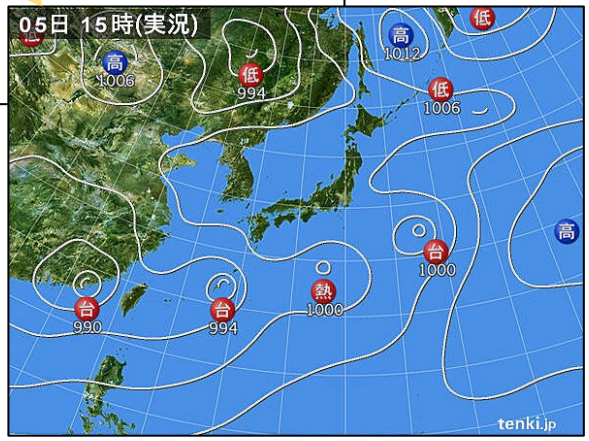
（8月2日以降）

State of Declaration issued

TOKYO 2020

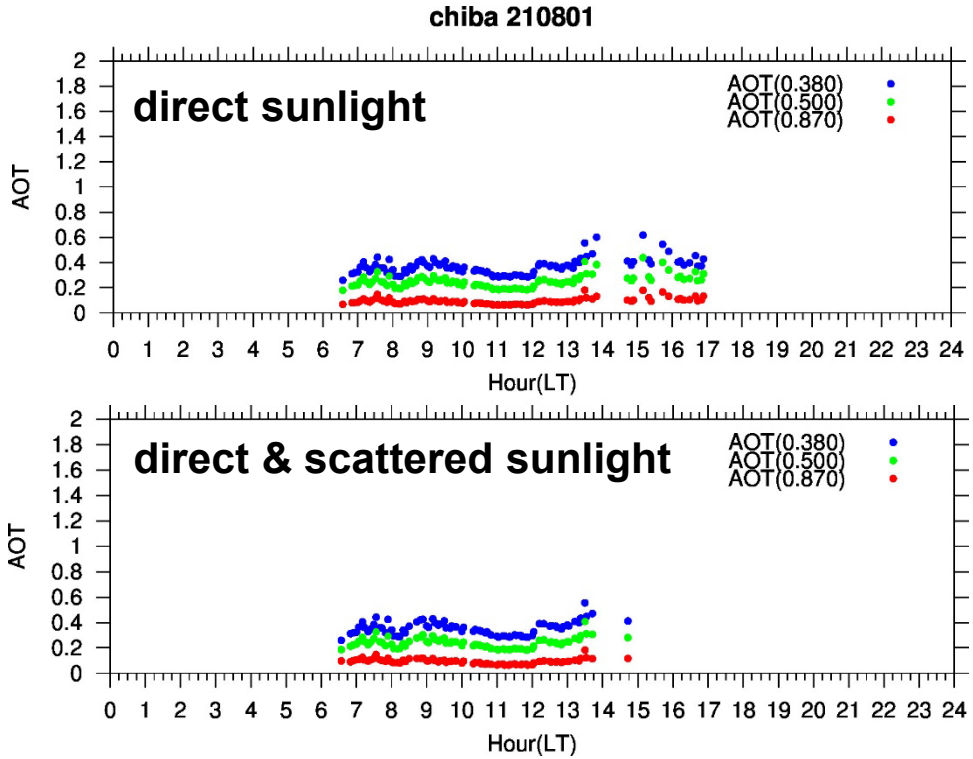
July 24 – August 9

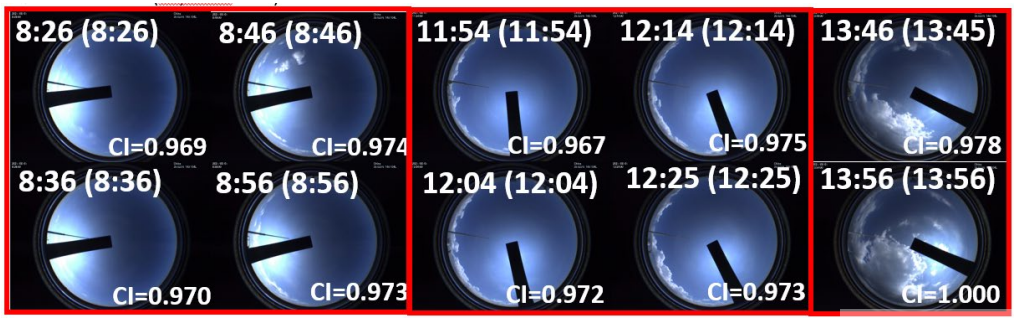
Three typhoons (No. 9, 10, and 11)



New development toward SR-CEReS-2

① Direct sunlight data analysis and ② Cloud screening method





provided by Ohno

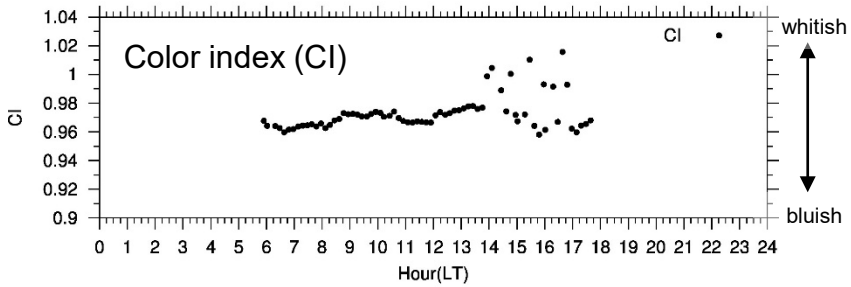
provided by Kobayashi

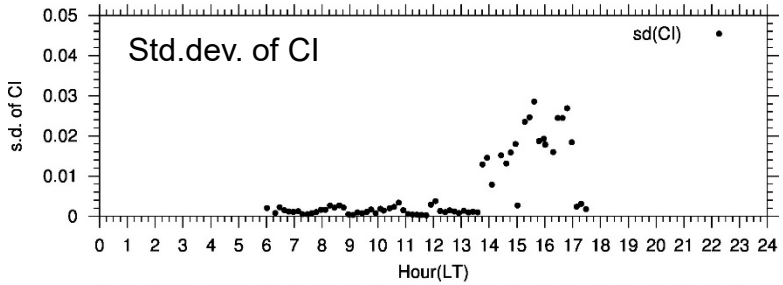
Zenith-sky UV-Vis data
CI approach based on MAX-DOAS
(※CI: color index)

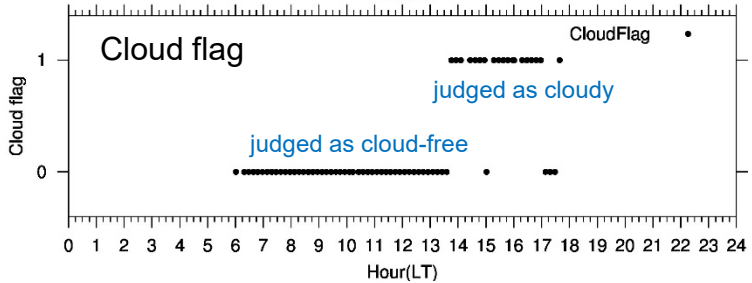
$$\mathrm{CI} = \tau_{400}/\tau_{500}$$

where

$$\tau = \ln(F_0/Vr^2)$$



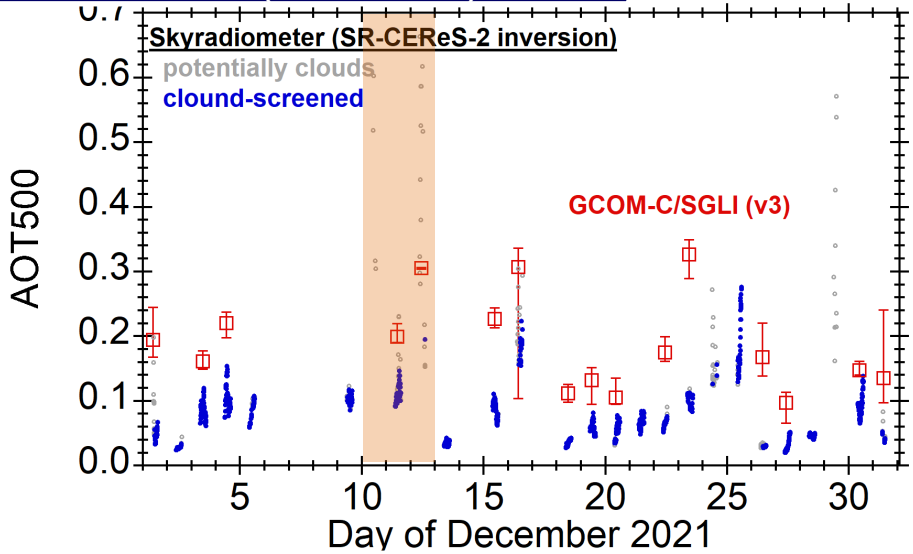


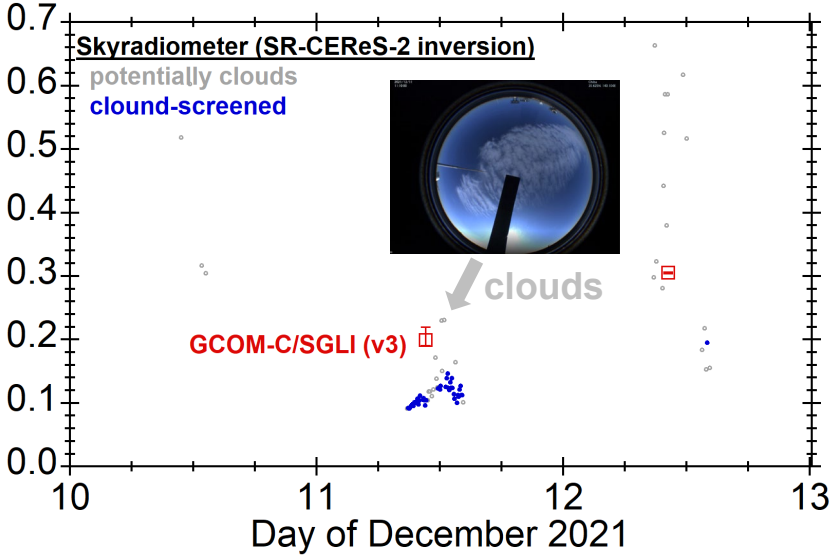


Validation comparison for v3 AOT data

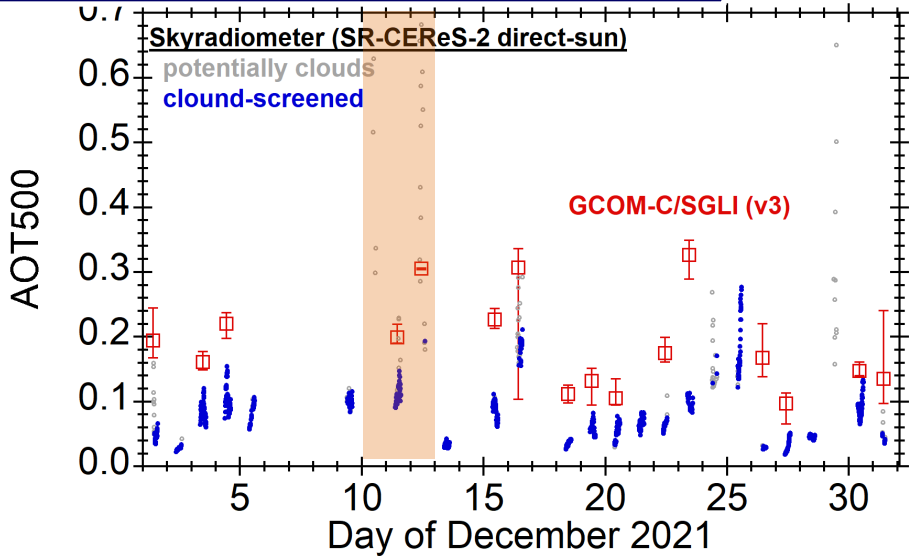
Preliminary

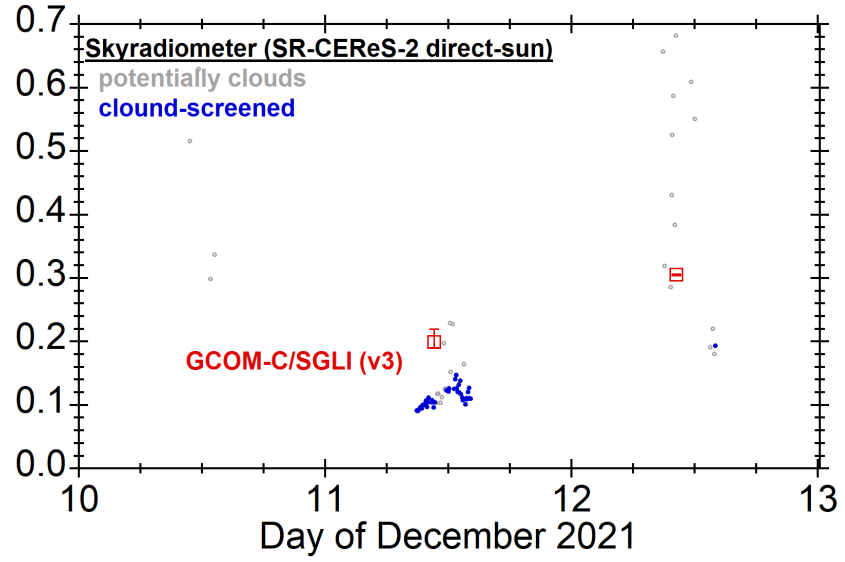
SR-CEReS-2 (inversion) data





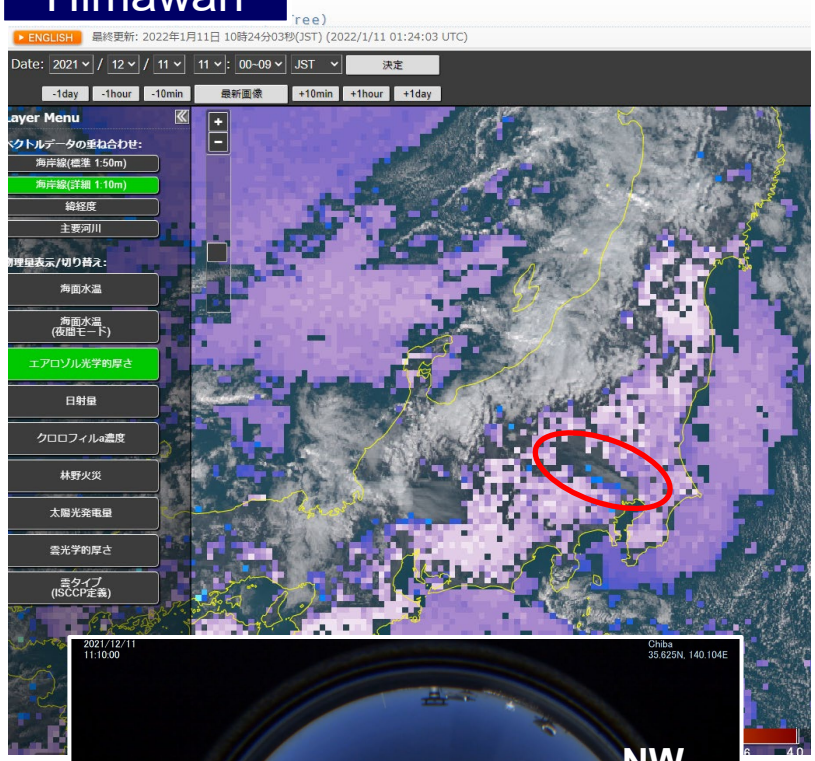
SR-CEReS-2 (direct-sunlight) data





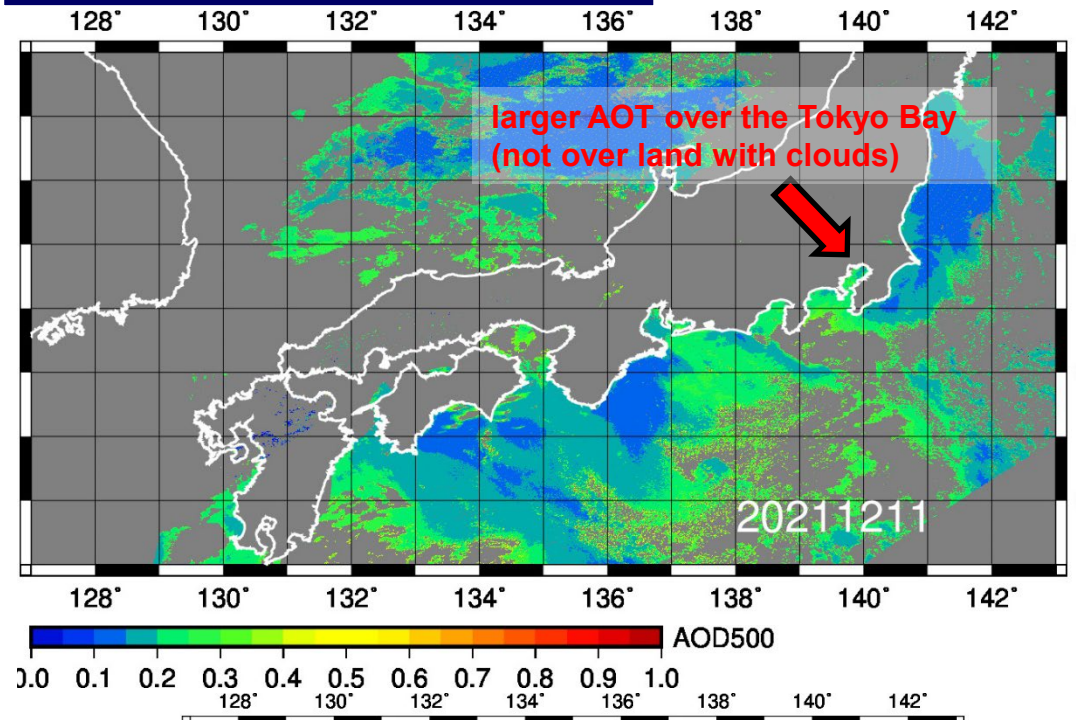
Larger AOT occurred over the Tokyo Bay

Himawari

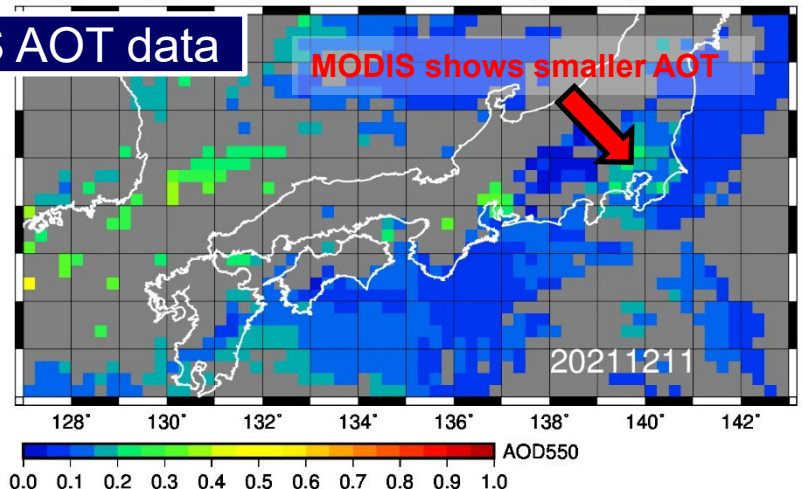


Skyview

GCOM-C/SGLI v3 AOT data

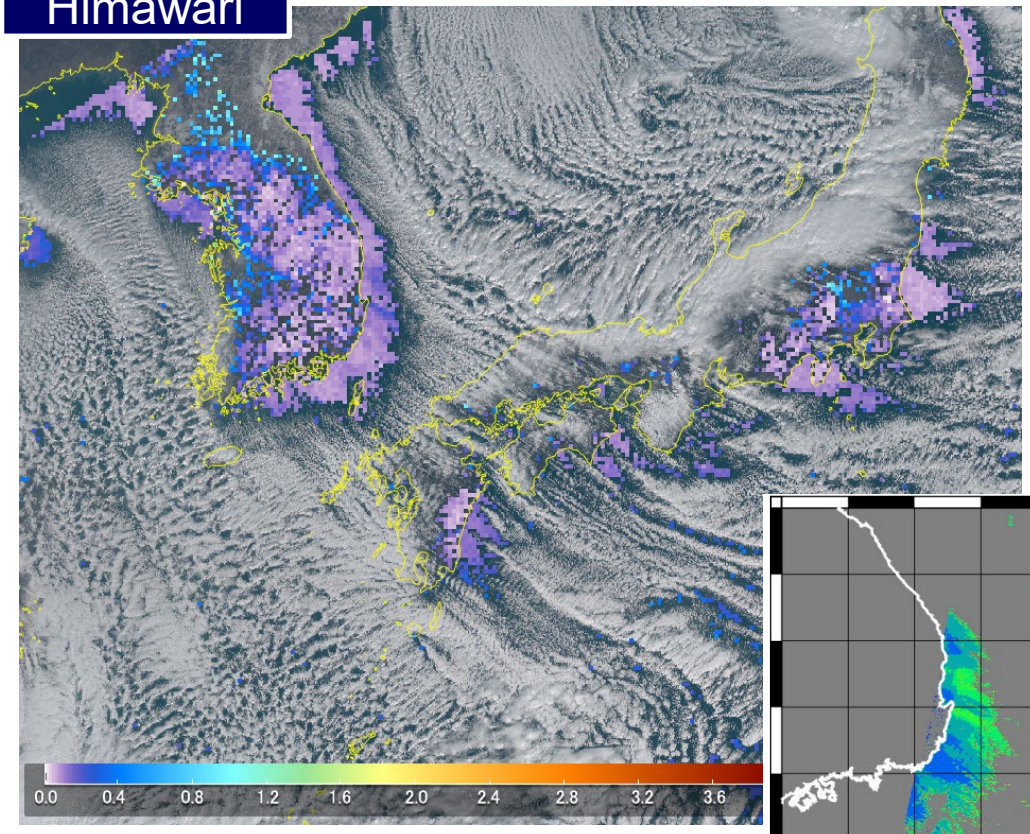


MODIS AOT data



Interesting aerosol distribution observed in small gaps between clouds

Himawari



GCOM-C/SGLI v3 AOT data