Daily Report (2021/08/03)

▶AEROSOL analysis

AOD from Sky radiometer & MAX-DOAS

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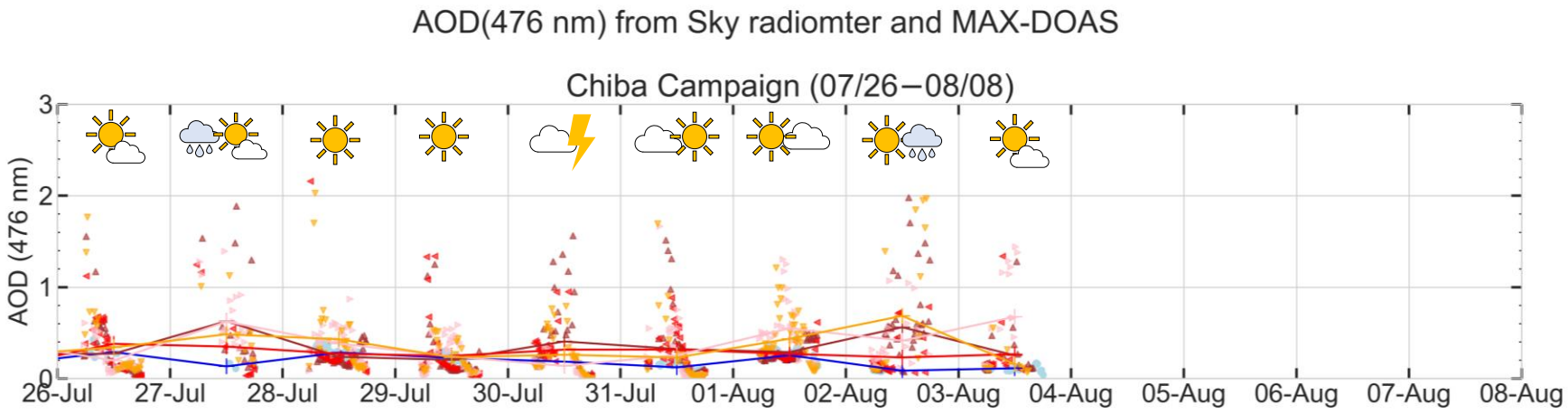
MAX-DOAS
Measurement Directions

Irie et al., 2017

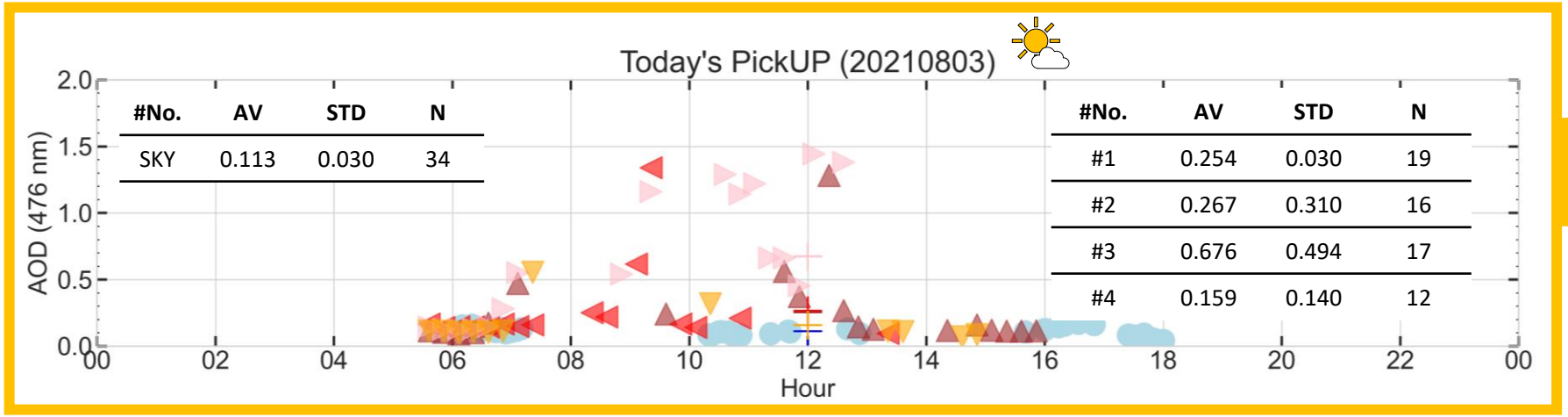
AOD from Sky radiometer(476 nm) & MAX-DOAS(476 nm)



Daily Mean
- SKY Daily
- MAX D #1
- MAX D #2
- MAX D #3
- MAX D #4

Original
- SKY Original
- MAX O #1
- MAX O #2
- MAX O #3
- MAX O #4

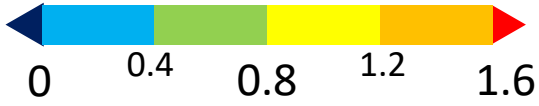
Sky Cloud Flag=0



#No.	AV	STD	N
SKY	0.113	0.030	34

#No.	AV	STD	N
#1	0.254	0.030	19
#2	0.267	0.310	16
#3	0.676	0.494	17
#4	0.159	0.140	12

Today's AOD

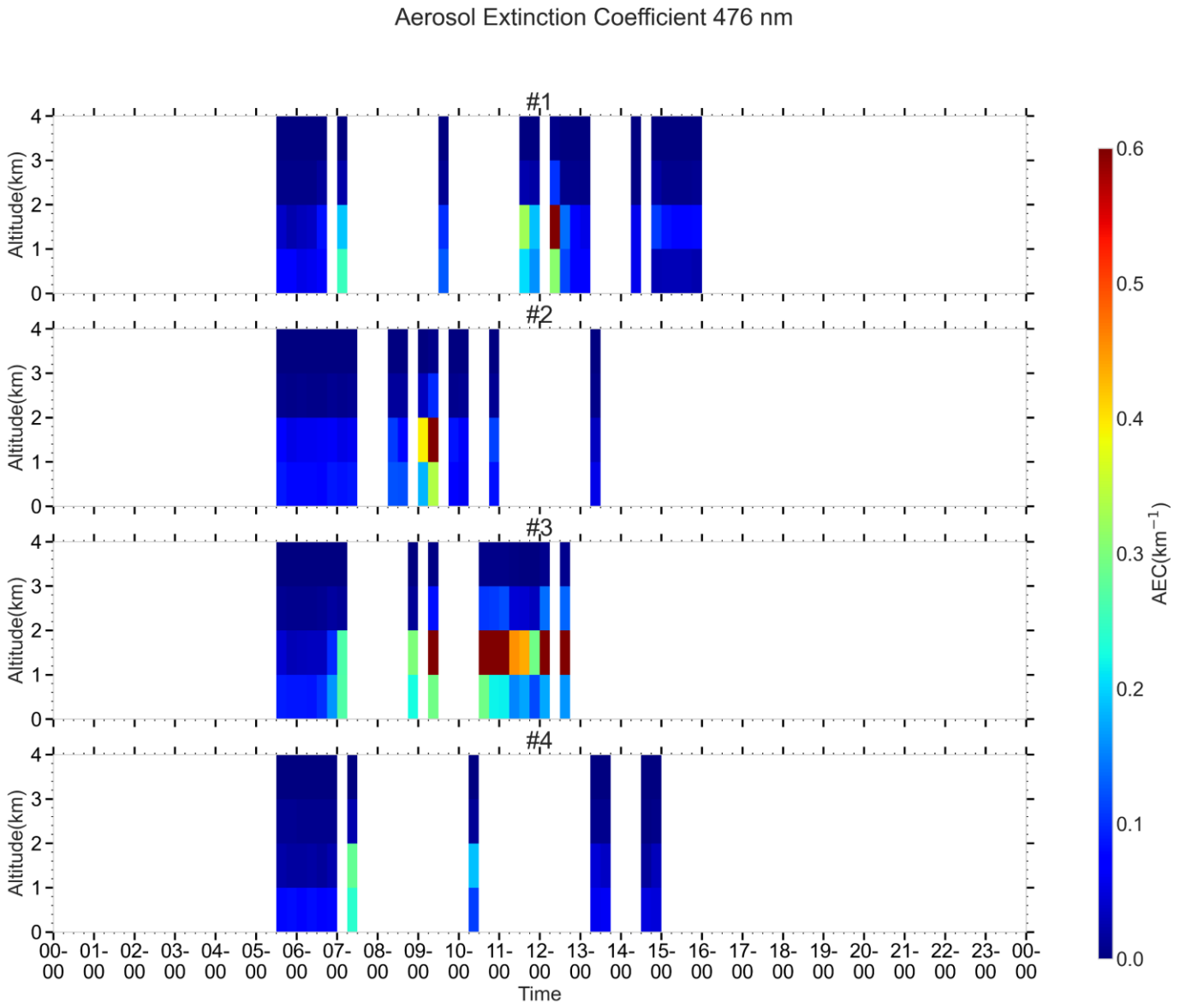


※Wavelength interpolation of Sky radiometer AOD from 500 nm to 476 nm

$$\tau_{476} = \tau_{500}\left(\frac{476}{500}\right)^{-AE}$$

(Fig. Irie et al., 2017)

AEC (MAX-DOAS)



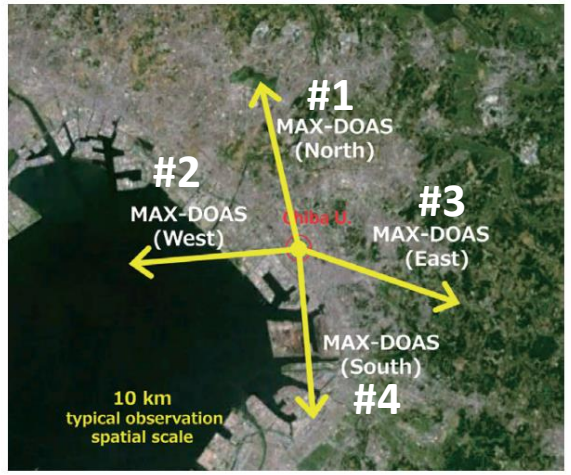


Fig. 5 Schematic illustration of observations by the North-, West-, East-, and South-viewing MAX-DOAS instruments (this set is called the 4AZ-MAXDOAS system) located at the SKYNET Chiba site (Chiba University).

Irie et al., 2017

Color Ratio from Sky radiometer

天頂方向のcloud screening方法のテスト

- **方法**

①8/1～8/3でcloud condition (zenith)の閾値を設定（以下の2つの指標を使用）
閾値設定にはsky radiometerのcloud flag(CF)の時刻を参考にし、SKYVIEWカメラを元に設定
②そして、上で設定した閾値を、7/26~7/31で検証

Color Ratio(CR)

$$\mathrm{CR} = \frac{R_{\mathrm{Longwave}}}{R_{\mathrm{shortwave}}} = \frac{R_{500}}{R_{400}}$$

R: radiance
$R_{500}=F_0(500)\times V$
$R_{400}= F_0(400)\times V$
where,
F_0(400nm)=1.23e-04,
F_0(500nm)=2.34e-04

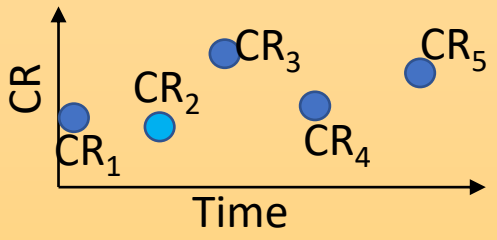
Coefficient of Variation (CV)

$$\mathrm{CV} = \frac{\sigma}{\bar{x}}$$

σ : standard deviation
$\bar{x}$: average

▶平均値に対するデータのばらつきを示す（無次元）

(e.g.)CR_2におけるCVは、



$$\mathrm{CV}_2 = \frac{STD(CR_1, CR_2, CR_3)}{AV(CR_1, CR_2, CR_3)}$$

- SKYVIEWカメラ
- Cloud Flag from sky radiometer

Color Ratio from Sky radiometer

➢ **結果**

①Findings from 8/1 to 8/3（p5～p7）

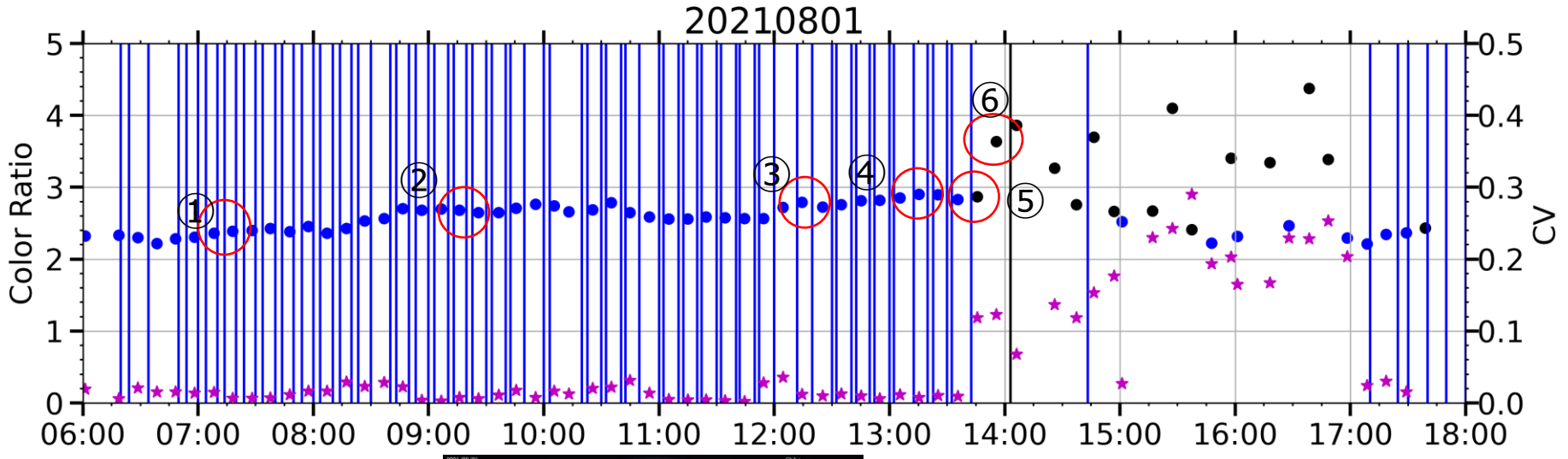
- CRが大きく(CR~3程度～それ以上)、cvが比較的大きいとき(0.1以上)は雲（ 8/1 14:43, 8/2 8:10, 8/3 15:40）
- CRが2.5程度で、変動係数(cv)が0.2~0.25のとき、天頂方向に雲がかかっていない（8/3 11時台）

①より、以下の閾値をCRベースで設定

- CR>3.0→Cloud
- CR≦2.5＆cv≦0.25→Cloud Screened
- CR≦3.0&cv≦0.10→Cloud Screened
- ELSE→cloud

②Findings from 7/26 to 7/31
本日は7/31のみに適用

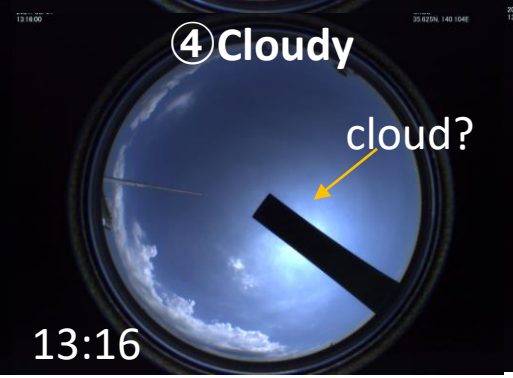
8/1 Color Ratio, Cloud Frag, and Coefficient of Variation (Sky radiometer)



Color Ratio(CR)
→Screened(閾値内)
→cloud (閾値外)

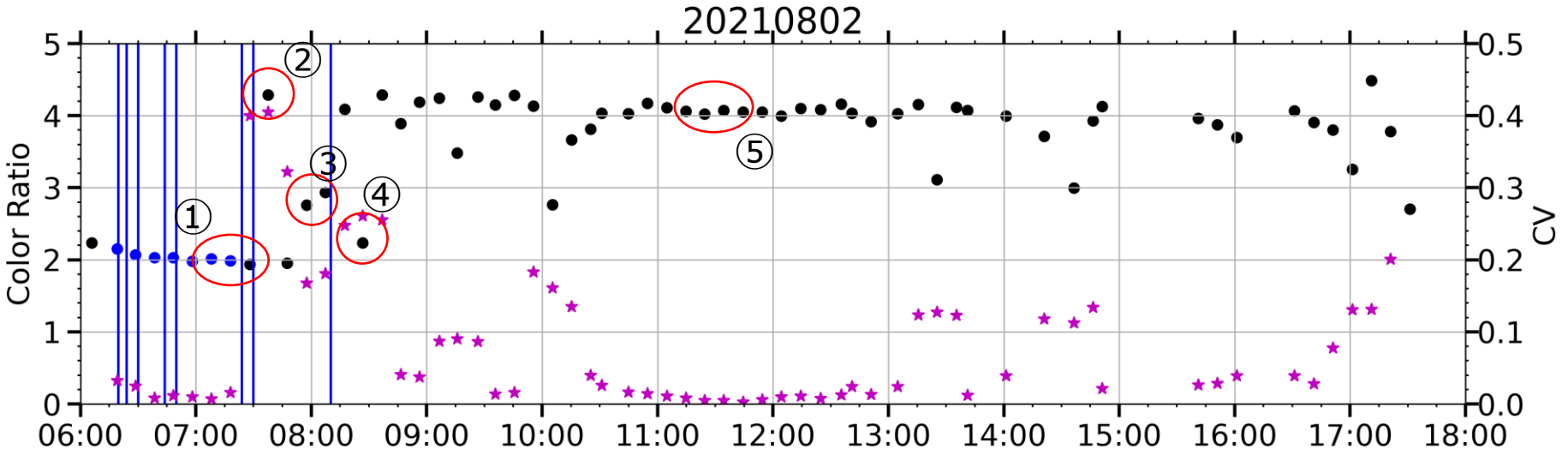
Coefficient of Variation(CV)

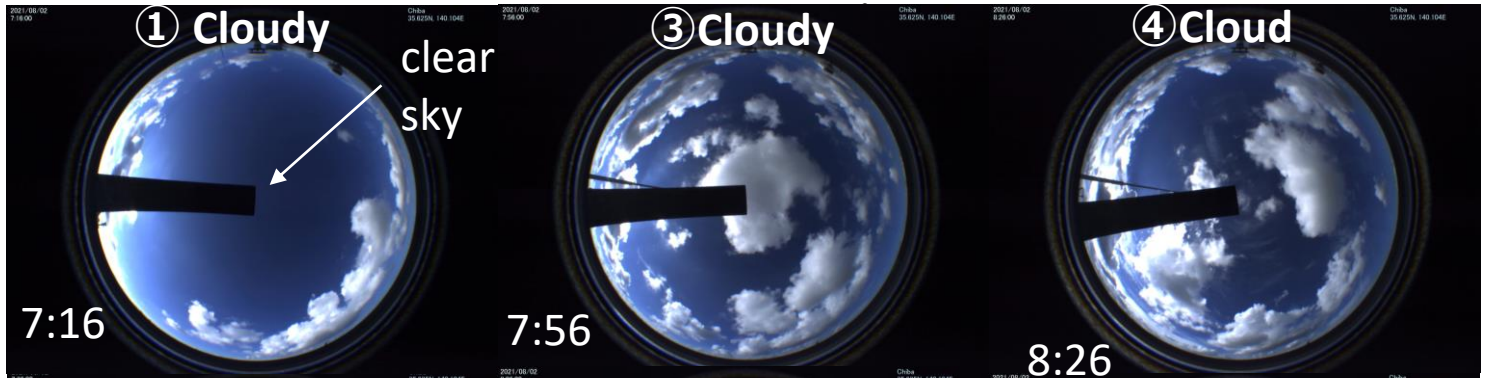
Cloud Flag
→ =0 (screened)
→ =1 (cloud)



※Time gap (e.g.)
sky radiometer skyradio:7:17
=skyview+1min skyview:7:16

8/2 Color Ratio, Cloud Frag, and Coefficient of Variation (Sky radiometer)





Color Ratio(CR)
→Screened(閾値内) ●
→cloud (閾値外) ●

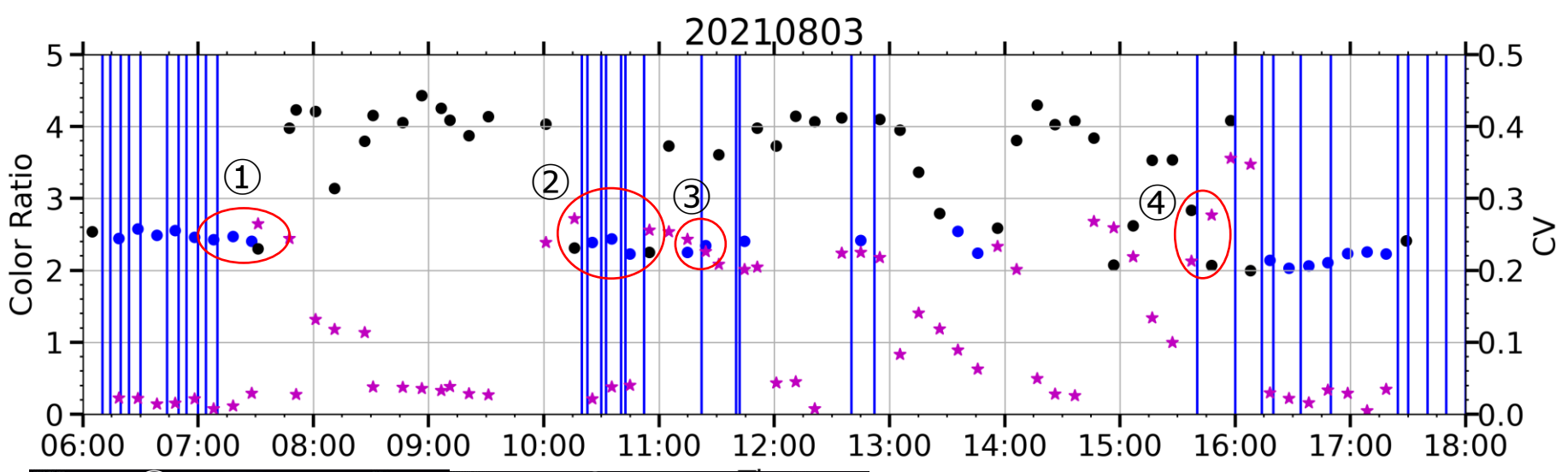
Coefficient of Variation(CV) ★

Cloud Flag
→ =0 (screened)
→ =1 (cloud)

※Time gap
sky radiometer
=skyview+1min

(e.g.)
skyradio:7:17
skyview:7:16

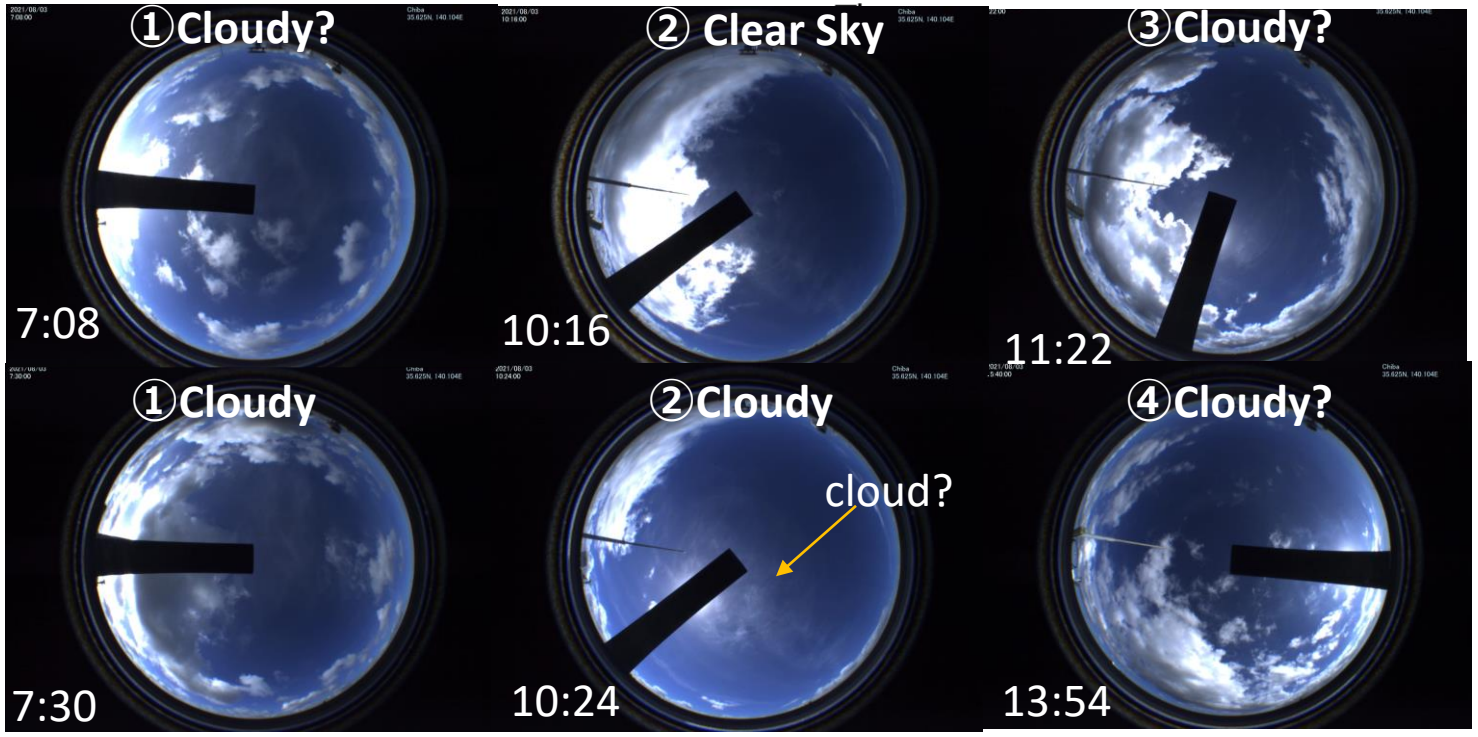
8/3 Color Ratio, Cloud Frag, and Coefficient of Variation (Sky radiometer)



Color Ratio(CR)
→Screened(閾値内)
→cloud (閾値外)

Coefficient of Variation(CV)

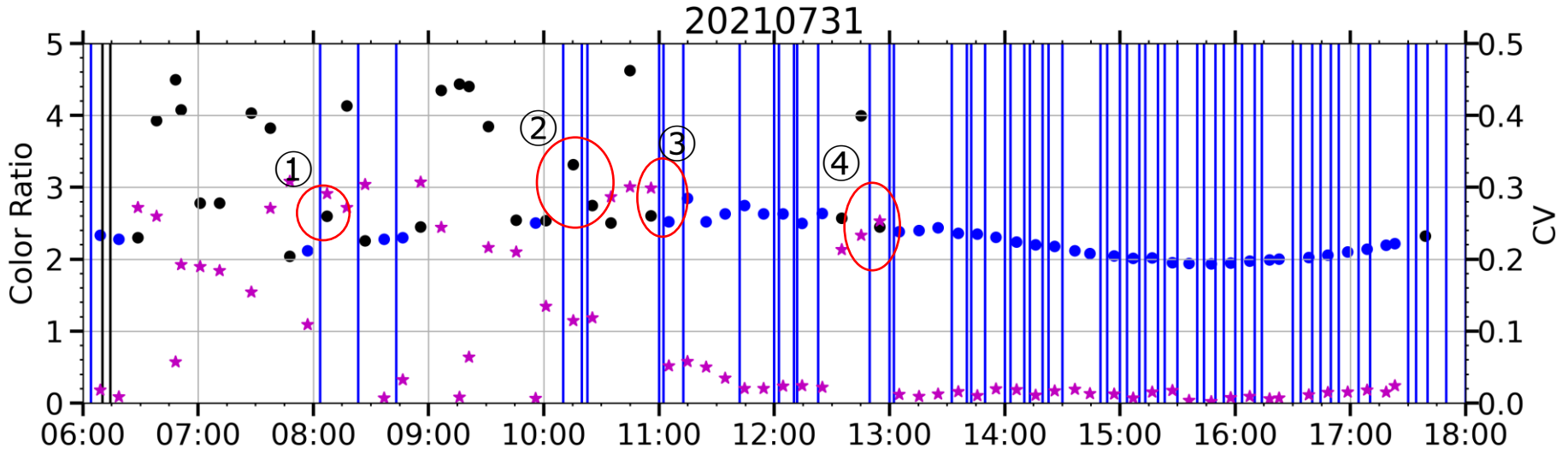
Cloud Flag
→ =0 (screened)
→ =1 (cloud)



※Time gap (e.g.)
sky radiometer skyradio:7:17
=skyview+1min skyview:7:16

- 10:24 薄い雲があり、従来の方法と今回の方法で分類が難しい
- cloudy?にしている時間は、skyviewの画像とskyradiometerの観測時刻が一致していないため、雲の流れが読めない

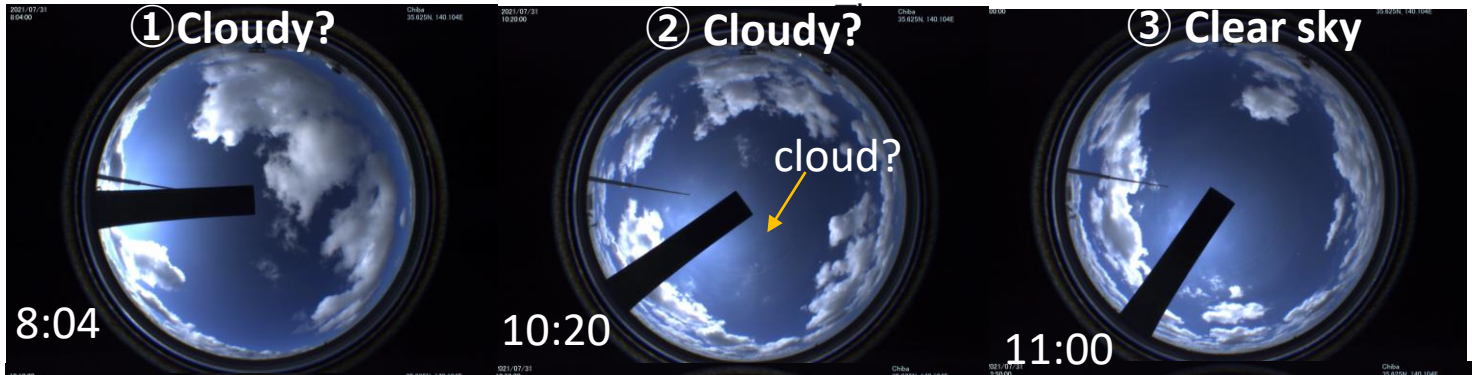
VALIDATION 7/31 Color Ratio, Cloud Frag, and Coefficient of Variation

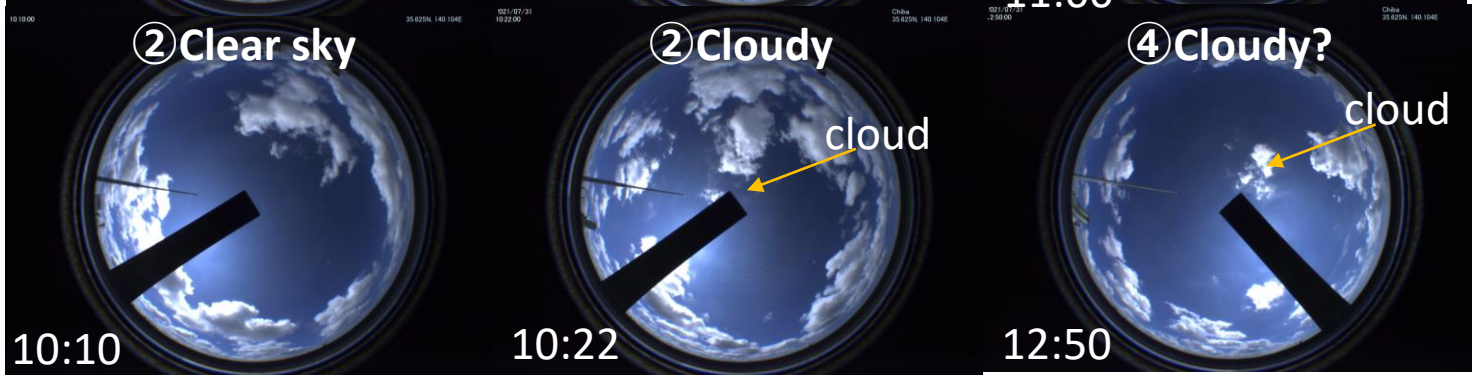


Color Ratio(CR)
→Screened(閾値内)
→cloud (閾値外)

Coefficient of Variation(CV)

Cloud Flag
→ =0 (screened)
→ =1 (cloud)





※Time gap (e.g.)
sky radiometer skyradio:7:17
=skyview+1min skyview:7:16

8/1～8/3で設定した閾値の検証

- CR&cvを元に作成した閾値を7/31日に適応したところ、ほとんどの時刻でCloud Flagと同様に分類された 。
- CR&cvとCFの違いがある時刻（①～④）を見た→薄い雲や雲の移動がわからない限り、 CR&cvの閾値検証は難しい。