# Practical Training on the utilization of Himawari-8 Imagery using SATAID

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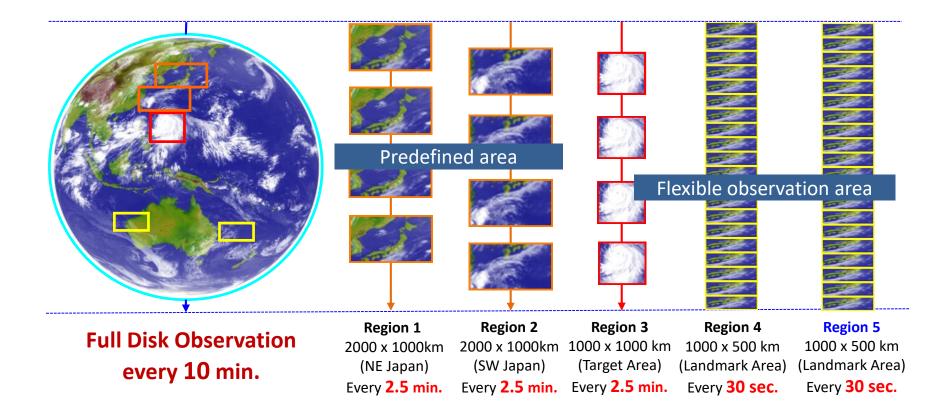


2014 Himawari-8

2016

Himawari-9

## **Overview of the Himawari-8 observation** (10 minutes Repeat Cycle)



- AHI (Advanced Himawari Imager) on Himawari-8 has the ability of various scans during 10 minutes Full Disk observation.
- AHI can flexibly change the scan range of "Target Area" for observation of phenomena such as **typhoons** and active volcanoes.
- Lunar observation: performed using Landmark Area (Region 5)

# AHI Spectral Bands (5 bands -> 16bands)



	Hi							
cf. MTSAT-2 Bands	Band		Spatial Resolution	Central Wavelength	Physical Properties			
Danus	1		1 km	0.47 µm	vegetation, aerosol			
~~	2	Visible (VIS)	1 KIII	0.51 µm	vegetation, aerosol	3 Visible Bands		
VIS	3	()	0.5 km	0.64 µm	Vegetation, low cloud, fog			
0.68 μm	4	Near	1 km	0.86 µm				
	5	Infrared	2 km	1.6 µm	cloud phase/particle size	Addition of NIR Bands		
	6 ·	(NIR)	Z KIII	2.3 µm	cloud particle size			
IR4 3.7 μm	7			3.9 µm	low cloud, fog, forest fire			
	8	Infrared		6.2 µm	<b>)</b>			
IR3 6.8 μm	9			6.9 µm	mid- and upper-level moisture	Increase of WV Bands		
	10			7.3 µm				
	11		2 km	8.6 µm	cloud phase, SO <sub>2</sub>	ĺ í		
	12		Z KIII	9.6 µm	Ozone content			
IR1 10.8 μm	13			10.4 µm	cloud imagery, information of cloud top	Increase of		
	14			11.2 µm	cloud imagery, sea surface temperature	TIR Bands		
IR2 12.0 μm	15			12.4 µm	cloud imagery, sea surface temperature			
	16			13.3 µm	cloud top height	J		

# Too many bands!



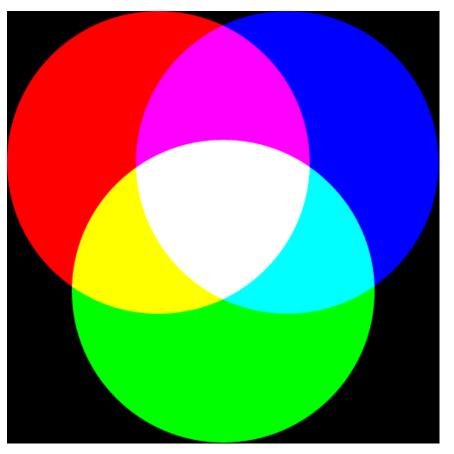
- 16 bands' images contain a lot of information about
  - Cloud thickness, top temperature
  - Cloud particle size, cloud phase (ice/liquid)
  - Humidity
  - Volcanic ash
  - Vegetation
    - etc.

### Solution -> RGB image

- Can illustrate multiple information on one image.
- Can be composed by simple process.
- "SATAID" can compose RGB image easily.

# What's RGB?

- Red (R), green (G) and blue (B), which are the three primary colors of light, constitute color space expressing additive color composite
- RGB compositing is a technique to display a color using this property of the three primary colors of light



three primary colors **RGB** 

## **Application to Satellite Imageries**

## **RGB composite**

# Thick and high cloud (Cb) areas appear yellow!

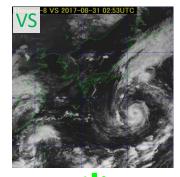
#### "High" cloud

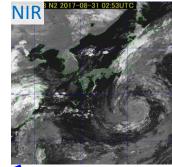
IR

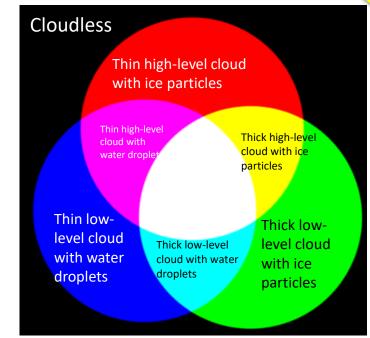
08-31 02:53UTC

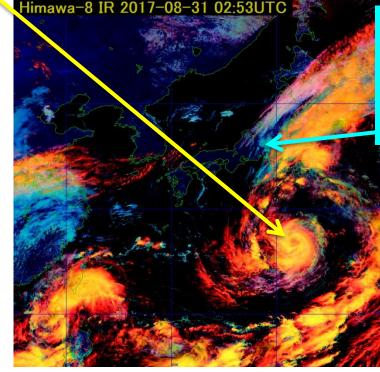






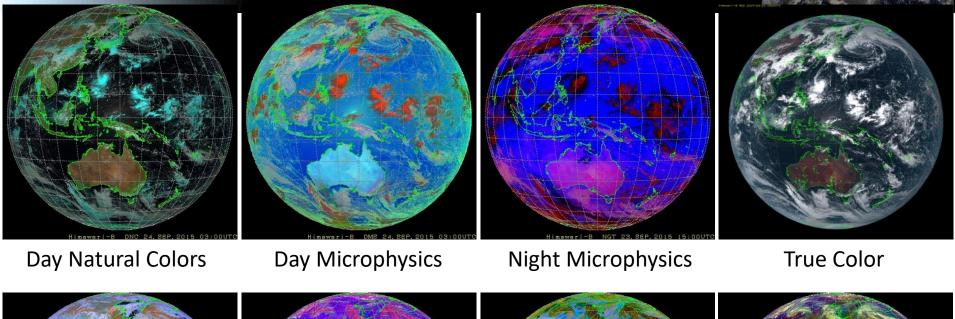


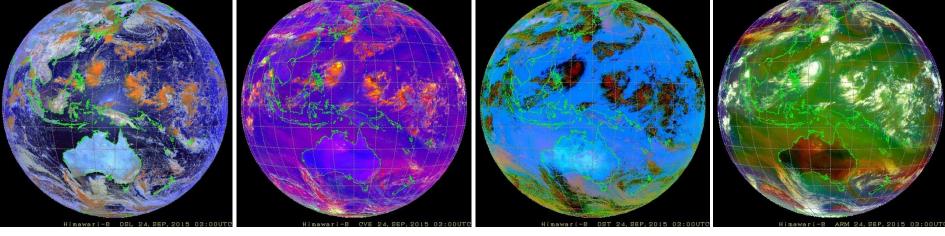




If you want to focus on the low level clouds, look at cyan area.

# Well-known RGBs from Himawari-8



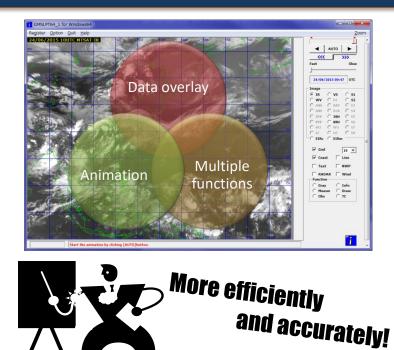


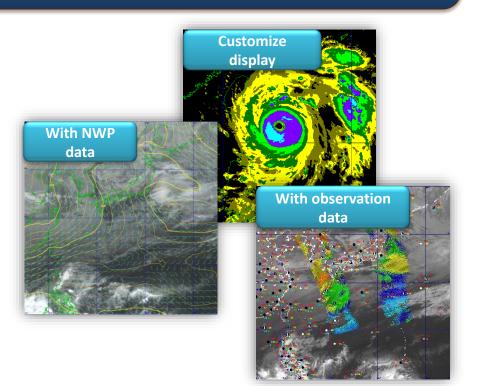
Day Snow-FogDay Convective StormDustAirmass

http://www.data.jma.go.jp/mscweb/data/himawari/sat\_img.php?area=fd\_

# What is SATAID?

SATAID (**SAT**ellite Animation and Interactive Diagnosis) is a sophisticated display software visualizing meteorological information in multiple dimensions (spatial and temporal), which assists forecasters to analyze and monitor continually weather parameters and phenomena for better meteorological services.





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# What can we do by using SATAID?

- With SATAID, you can ...
  - Display (and overlay) satellite imagery and NWP data

(and various observations i.e. SYNOP, SHIP, TEMP, Radar, Wind Profiler, ASCAT etc. if its format prepared)

Use many functions

vertical cross-sectional chart, time-series chart, digital data output to CSV file.....

- Save as a file including a package of all data your drawings and comments, which will be useful for trainings and case study archives
- Analyze position and intensity of tropical cyclones

# **RGB** composite imagery on SATAID

1.2 1.0 1.0 1.0

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Title Pick Pick Tropical Day Convert Tropical Airmass Tropical Airmass Tropical Airmass Tropical Airmass Day Natural Colors Day Natural Colors Day Convective Stat Z4hour Microphysics -9 Day Microphysics -9 Day Microphysics -9 Day Microphysics -9 Airmass Dust Airmass David	Modify           ImageR           scti         S4(W3           s31(R-12)         S3           vs         S3(IR-12)           vs         S3(IR-12)           sum         N1           s1(IR-12)         S1(IR-12)           sum         S1(IR-12)           s1(IR-12)         S1(IR-12)           S1(IR-12	Insert ImageG \$2(14-1 \$2(14-1 \$2(14-1 \$5(1R \$5(1R \$5(1R \$5(1R \$5(1R \$5(1R \$5(1R \$0(1-1))) \$1000000000000000000000000000000000000	Delete ImageB 57(N2 WV IR- IR- IR- IR- IR- IR- I45 WV IR- WV IR- WV IR- I45 WV IR- IR- IR- IA5 WV IR- IA5 WV IR- IA5 IA5 IA5 IA5 IA5 IA5 IA5 IA5	MinR -5.0 -4.7 -3.0 0 0 -5.0 -3.0 0 -3.0 -3.0 202.29 -3 219.619 0.0	36.0 25.8 7.5 1 0.99 36.0 7.5 1.02 1.02 1.02 25.8 7.5 278.96 30 280.6707 0.5 1.0	-1.0 -25.5 -2.2 0 0 -1.0 0.8 0.02 0.02 0.02 -7.0 0 -4.3 0.9 -1.6 213.15 -0.0346 0.0 0.0	76.0 31.2 2.9 1 1.02 61.0 5.8 0.82 0.38 2.9 0.68 41.5 12.5 4.9 242.67 278.15 0.7792 0.5	MinB           -0.8           190.2           273.3           0           -0.75           248.6           203.5           203.5           243.7           0.02           261.5           243.6           208           261.5           245.12           208.0.0119           0.0           0.200	MaxB 0.25 242.6 300.1 1 1 0.25 303.2 303.2 303.2 203.2 203.2 242.6 242.6 249.2 242.6 249.2 242.6 249.2 243.90 0.5932 1.0 0.5932 1.0	GammaR 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	GammaG 0.33 0.5 1.3 0.5 1.3 2.6 1.3 2.6 1.8 1.0 1.7 1.0 2.5 2.5 2.5 1.0 1.0 1.0 1.0	Close GammaB 0.95 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	•	easily by us dropdown Select the r -> Apply
RGB recipe da     Pick     Pick     Tropical Day Conve     Tropical Airmass     Day Natural Colors     Day Natural Colors     Day Natural Colors     Day Natural Colors     Day Microphysics -3     Day Microphysics     Day Microphysics     Day Microphysics     Day Snow-Fog     Airmass     Dust     Ash     [new]Differential     [new]Cloud Phase     [new]Cloud Phase	Modify           ImageR           sctin	Insert ImageG \$2[14-I \$6(IR \$2[14-IR \$5(IR) \$5(IR)	Delete ImageB 57(N2 WV IR- V1 V5 57(N2 IR- IR- IR- IR- IR- IR- IR- IR- IR- IR-	MinR -5.0 -4.7 -3.0 0 -3.0 0 -3.0 0 -3.0 0 -3.0 -3.0 0 -3.0 -3.	36.0 25.8 7.5 1 0.99 36.0 7.5 1.02 7.5 1.02 7.5 1.02 25.8 7.5 25.8 7.5 278.96 30 280.6707 0.5	-1.0 -25.5 -2.2 0 0 0.8 0.02 0.02 0.02 -7.0 0 -4.3 0.9 -4.3 0.9 -1.6 214.66 213.15 -0.0346 0.0	76.0 31.2 2.9 1 1.02 61.0 5.8 0.82 0.38 2.9 0.68 41.5 12.5 2.42.67 278.15 0.7792 0.5	MinB           -0.8           190.2           273.3           0           -0.75           248.6           203.5           243.7           0.02           208           261.5           243.6           243.7           0.02           208           208.50           0.0119           0.0	MaxB           0.25           242.6           300.1           1           0.25           303.2           303.2           293.2           0.45           242.6           293.2           0.45           242.6           0.293.2           0.45           243.90           0.9932           1.0	GammaR 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	GammaG 0.33 0.5 1.3 2.6 1.8 1.0 1.7 1.0 2.5 1.2 2.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	Close 0.95 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	•	easily by us dropdown Select the r -> Apply
Title Tropical Day Convertient Tropical Day Convertient Tropical Day Convertient Tropical Night Micro True Color Day Natural Colors Day Convective Stc Day Microphysics	Modify           ImageR           stim	Insert ImageG S2(14-I S6(1R S2(14-IR) V2 N1 S2(14-IR) S2(14-IR) S2(14-IR) S5(IR S5(IR WV W3 V5 N3 N3 N3 N1	Delete ImageB 57(N2 WV VI IR- IR- IR- IR- IR- IR- IR- IR	MinR -5.0 -4.7 -3.0 0 -5.0 -3.0 0 -3.0 0 -3.0 202.29 -3 219.619 0.0 0.0 0.0 0.0 213.229 -3 219.619 0.0 0.0 0.0 0.0 0.0 0.0 213.2287.02	36.0 25.8 7.5 1 0.99 36.0 7.5 1.02 1.02 25.8 7.5 7.5 7.5 7.5 278.96 30 280.6707 0.5 1.0 9.95 330	-1.0 -25.5 -2.2 0 0 -1.0 0.02 -7.0 0 -4.3 0.9 -4.3 0.9 -4.3 213.15 213.466 213.15 213.466 0.0 0.0 0.0 0.0 0.0 0.0 0.0	76.0 31.2 2.9 1 1.02 61.0 5.8 0.82 0.38 2.9 0.68 41.5 12.5 4.9 242.67 278.15 0.7792 0.5 0.5 0.5 0.5 1.0	MinB -0.8 190.2 273.3 0 -0.75 248.6 203.5 203.5 203.5 203.5 203.5 203.5 203.5 203.5 203.5 203.5 203.5 203.5 203.5 204.6 205.2 208 261.5 243.6 208 261.5 243.6 208 261.5 243.6 209 200 200 200 158.15 0.0	MaxB           0.25           242.6           300.1           1           0.25           303.2           303.2           293.2           0.42.6           289.2           303.2           303.2           303.2           303.2           303.2           303.2           303.2           303.2           303.2           303.2           303.2           303.2           303.2           303.2           300           323.15           0.5           1.0	GammaR 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	GammaG 0.33 0.5 1.3 1.0 0.95 0.5 1.3 2.6 1.8 1.0 1.7 1.0 2.5 1.2 5.5 2.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0	Close GammaB 0.95 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	•	easily by us dropdown Select the r
Title Tropical Day Conve Tropical Airmass Tropical Airmass Tropical Airmass Day Microphysics -= Day Microphysics -= Microphysics -= Day Microphysics -= Microphysics -= Day Microphysics -= Microphysics -= Day Microphysics -= Microphysics -= Microphysic	Modify           ImageR           stdward           S3(R-R)           op           S1(R-R2)           S3(R-R)           orms           S4(W3           S5           S1(R-R2)           Sum           Mi           S1(R-R2)           S1(R-R2)           S1(R-R2)           S1(R-R2)           Pr           R           Multical           S1(R-R2)           Pr           R           Multical           S4(W3           S1(R-R2)           Pr           R           Multical           S4(W3           S1(R-R2)           Pr<	Insert ImageG 52(14-1 56(1R 52(14-1R) V2 N1 55(1R 145 145 52(14-1R) N2 56(1R 55(1R 55(1R 55(1R 55(1R 55(1R 55(1R 55(1R 55(1R 145 145 145 145 145 145 145 145	Delete ImageB 57(N2 WV IR- V1 S5(N2 IR- IR- IR- IR- IR- IR- IR- IR-	MinR -5.0 -4.7 -3.0 0 -3.0 0 -3.0 -3.0 -3.0 -3.0 -3.0	36.0 25.8 7.5 1 0.99 36.0 7.5 1.02 1.02 1.02 25.8 7.5 7.5 7.5 7.5 7.5 278.96 30 280.6707 0.95 3350	-1.0 -25.5 -2.2 0 0 0.8 0.02 -7.0 0 -4.3 0.9 -1.6 214.66 213.15 -0.0346 0.0 0.0 0.0 0.0	76.0 31.2 2.9 1 1.02 61.0 5.8 0.38 2.9 0.68 41.5 12.5 4.9 242.67 278.15 0.7792 0.5 0.5 0.5 0.5	MinB -0.8 190.2 273.3 0 0 -0.75 248.6 203.5 203.5 243.7 0.02 208 261.5 243.6 243.6 243.6 243.6 243.6 243.6 243.6 243.5 0.0119 0.0 200 158.15 0.0	MaxB           0.25           242.6           300.1           1           0.25           303.2           300           323.15           0.5	GammaR 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	GammaG 0.33 0.5 1.3 1.0 0.5 1.3 2.6 1.8 1.0 1.3 2.5 1.2 2.5 1.2 2.5 1.0 1.0 1.0 1.0 1.0	Close GammaB 0.95 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	•	easily by us dropdown Select the r -> Apply

IR-IR-

-6 -5 5 35 -4 0.7 5

1.0

243

243.6

303

292.6

1.0

1.0

S5(IR-...

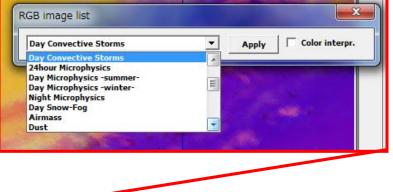
VS

59(W2-...

53(IR-...

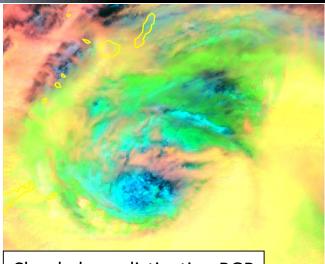
new]SO2

[new]Deep Clouds/D...



- SATAID can show RGB imagery easily by using RGB image list dropdown menu.
- Select the name of RGB imagery
   -> Apply
- The RGB list file can edit and you can add new RGB recipe.

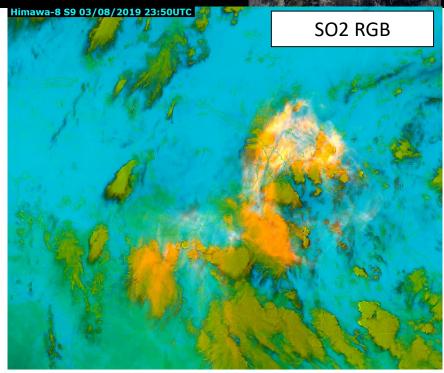
# **JMA original RGB recipes**



Cloud phase distinction RGB

Himawa-8 30/01/2017 14:52UTC





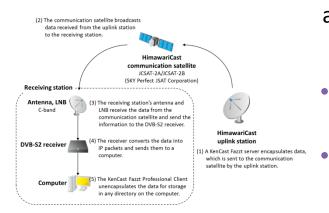
 RGB list file for SATAID includes some JMA original RGB recipes

# How can we get SATAID?

## ■ <u>WIS Website</u>







http://www.wis-jma.go.jp/cms/sataid/

- Internet Environment is required
- 5 channels are available every 10 minutes
- ID and Password are required (wis-jma at met.kishou.go.jp)

http://www.data.jma.go.jp/mscweb/en/himaw ari89/himawari\_cast/himawari\_cast.html

- Dedicated antenna and computers are required
  - 14 channels are available every 10 minutes

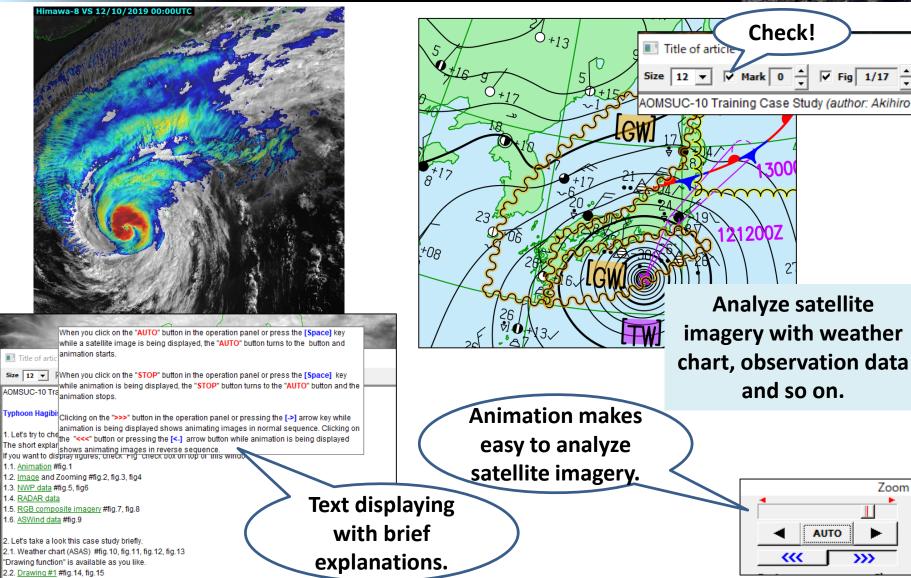
## Hands-on training on basic SATAID functions and displaying RGBs / ASWind data

It's time to practice using main SATAID functions in order to get used to its basic operations!

Then let's take a look these case studies by SATAID modules.

- 1. Typhoon Hagibis (T1919) approaching Japan
  - 12 October, 2019 00:00 UTC 18:30 UTC
- 2. Flood in Papua New Guinea
  - 22 September, 2019 00:00 UTC- 23 September, 2019 18:30 UTC
- 3. Volcanic eruption of Raikoke, Kuril Islands
  - 21 June, 2019 18:00 UTC- 22 June, 2019 06:00 UTC
- 4. Volcanic eruption of Ulawun, Papua New Guinea
  - 3 August, 2019 00:00 UTC- 4 August, 07:00 UTC
- 5. Tropical Storm Kajiki (T1914) hitting Hainan and Vietnam
  - 2 September, 2019 00:00 UTC- 23:50 UTC

## **Overview of SATAID case study modules**



2.3. Drawing #2 #fig.16, fig.17

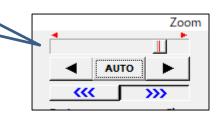
Analyze satellite imagery with weather chart, observation data and so on.

**Check!** 

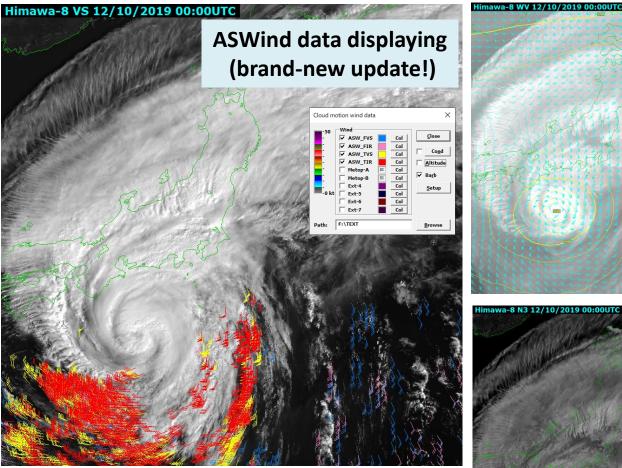
Mark

Fig 1/17

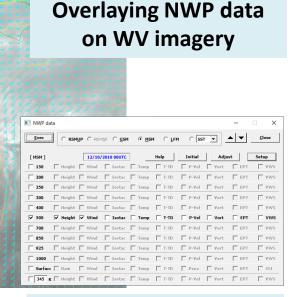
☑

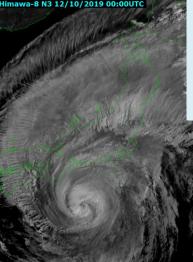


## Overview of Case 1 Typhoon Hagibis (T1919) approaching Japan



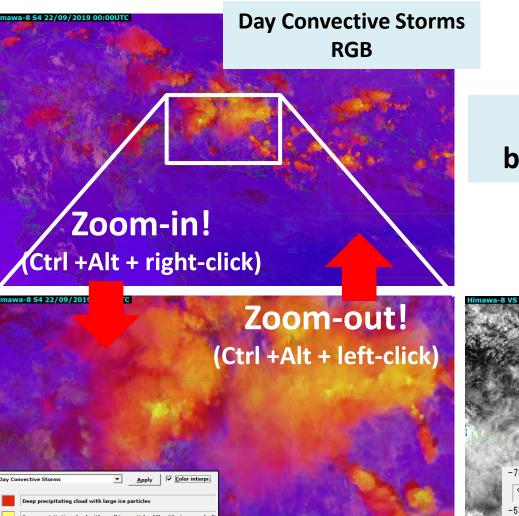
#### Let's have a familiarity with the SATAID basic operations!



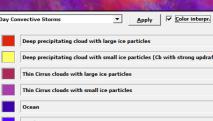


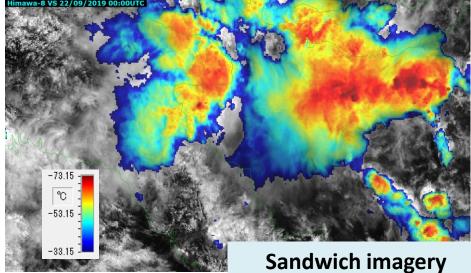
Changing and comparing multi band imagery (N3: Band 6, 2.3 μm)

## Overview of Case 2 Flood in Papua New Guinea



#### Focus on Cb clouds which brought heavy rain and flood.



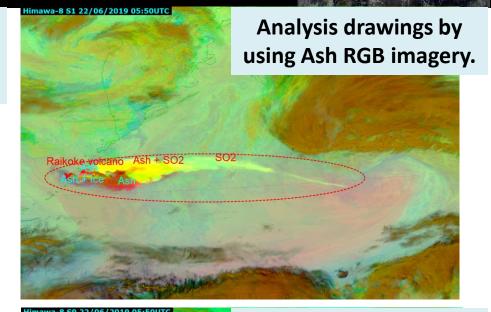


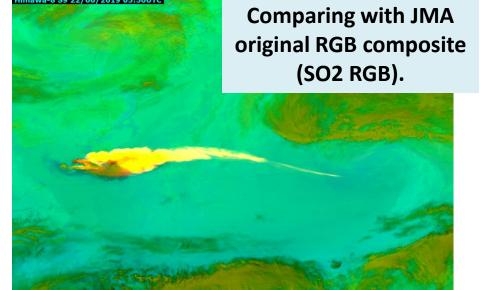
### Overview of Case 3 Volcanic eruption of Raikoke, Kuril Islands

Brownish ash plume is distinct in True Color RGB.

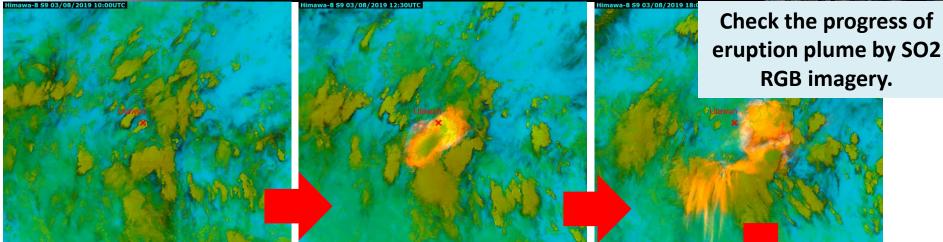


Take full advantage of multiple band imagery and RGB composites according to the purpose.





## Overview of Case 4 Volcanic eruption of Ulawun, Papua New Guinea



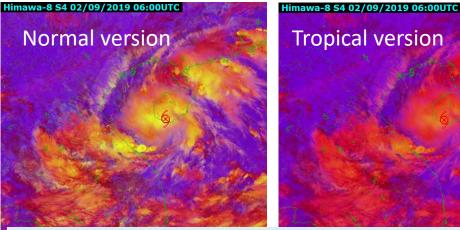
limawa-8 S9 03/08/2019 23:50UTC

Himawa-8 14 03/08/2019 07:5007 Hotspot associated with heat from volcanic crater can be seen by Fire Temperature RGB imagery.

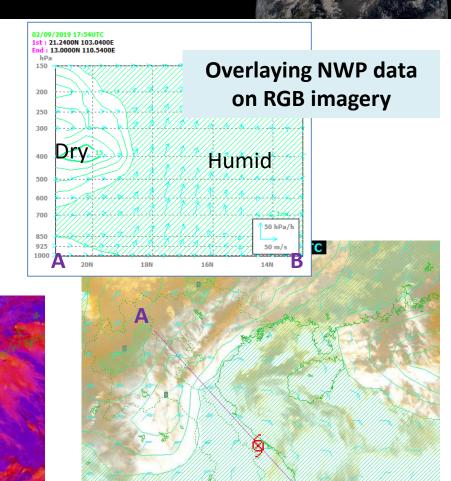
# Handle new RGB composites with recent case.

#### Overview of Case 5 Tropical Storm Kajiki (T1914) hitting Hainan and Vietnam

File name se	tting				_				etti car				
Number of Chara RGBlist_tropica		vailable up	o to 31.			UK Cancel					•		
RGB recipe data	odify	<u>I</u> nsert	Delete					<u>S</u> ave	Save <u>A</u> s	Regsi	iter	<u>C</u> lose	×
Title	ImageR	ImageG	ImageB	MinR	MaxR	MinG	MaxG	MinB	MaxB	GammaR	GammaG	Gamm	al A
						Pling	Plaxe	PIIID	PIAXD	Gamman	GaininaG	Gammin	
Fropical Day Convecti	54(W3	S2(14-I	57(N2	-5.0	36.0	-1.0	76.0	-0.8	0.25	1.0	0.33	0.95	
ropical Airmass	53(IR	S2(I4-I S6(IR			36.0 25.8		76.0 31.2	-0.8 190.2	0.25 242.6		1		
ropical Airmass			57(N2 WV IR-	-5.0	36.0	-1.0	76.0	-0.8	0.25	1.0	0.33	0.95	
Tropical Airmass Tropical Night Microp True Color	53(IR	S6(IR	57(N2 WV IR- V1	-5.0 -4.7	36.0 25.8	-1.0 -25.5	76.0 31.2	-0.8 190.2	0.25 242.6	1.0 1.0	0.33 0.5	0.95 1.0	
Fropical Airmass Fropical Night Microp Frue Color Natural Colors	S3(IR S1(IR-I2) VS N2	S6(IR S2(I4-IR) V2 N1	57(N2 WV IR- V1 V5	-5.0 -4.7 -3.0 0 0	36.0 25.8 7.5 1 0.99	-1.0 -25.5 -2.2 0 0	76.0 31.2 2.9 1 1.02	-0.8 190.2 273.3 0 0	0.25 242.6 300.1 1 1	1.0 1.0 1.0 1.0 1.0	0.33 0.5 1.3 1.0 0.95	0.95 1.0 1.0 1.0 1.0	
Tropical Day Convecti Tropical Airmass Tropical Night Microp True Color Natural Colors Day Convective Storms	53(IR 51(IR-I2) VS	S6(IR S2(I4-IR) V2	57(N2 WV IR- V1	-5.0 -4.7 -3.0 0	36.0 25.8 7.5 1	-1.0 -25.5 -2.2 0	76.0 31.2 2.9 1 1.02 61.0	-0.8 190.2 273.3 0	0.25 242.6 300.1 1 1 0.26	1.0 1.0 1.0 1.0	0.33 0.5 1.3 1.0	0.95 1.0 1.0 1.0	
Tropical Airmass Tropical Night Microp True Color Natural Colors Day Convective Storms Day Snow-Fog	53(IR 51(IR-I2) VS N2 54(W3 N1	S6(IR S2(I4-IR) V2 N1 S2(I4-I N2	57(N2 WV IR- V1 V5 57(N2 I4S	-5.0 -4.7 -3.0 0 0 -5.0 0	36.0 25.8 7.5 1 0.99 36.0 1.02	-1.0 -25.5 -2.2 0 0 -1.0 0	76.0 31.2 2.9 1 1.02 61.0 0.68	-0.8 190.2 273.3 0 0 -0.80 0.02	0.25 242.6 300.1 1 1 0.26 0.45	1.0 1.0 1.0 1.0 1.0 1.0 1.6	0.33 0.5 1.3 1.0 0.95 0.5 1.7	0.95 1.0 1.0 1.0 1.0 1.0 0.95 1.95	
Tropical Airmass Tropical Night Microp True Color Natural Colors Day Convective Storms Day Snow-Fog Day Microphysics -su	S3(IR S1(IR-I2) VS N2 S4(W3 N1 N1	56(IR 52(I4-IR) V2 N1 52(I4-I N2 I45	57(N2 WV IR- V1 VS 57(N2 I4S IR-	-5.0 -4.7 -3.0 0 0 -5.0 0 0	36.0 25.8 7.5 1 0.99 36.0 1.02 1.02	-1.0 -25.5 -2.2 0 0 -1.0 0 0.02	76.0 31.2 2.9 1 1.02 61.0 0.68 0.82	-0.8 190.2 273.3 0 0 -0.80 0.02 203.5	0.25 242.6 300.1 1 1 0.26 0.45 303.2	1.0 1.0 1.0 1.0 1.0 1.0 1.6 0.95	0.33 0.5 1.3 1.0 0.95 0.5 1.7 2.6	0.95 1.0 1.0 1.0 1.0 0.95 1.95 1.0	
Tropical Airmass Tropical Night Microp True Color Natural Colors Day Convective Storms Day Snow-Fog Day Microphysics -su Day Microphysics -svi	S3(IR S1(IR-I2) VS N2 S4(W3 N1 N1 N1	S6(IR S2(I4-IR) V2 N1 S2(I4-I N2 I4S I4S	57(N2 WV IR- V1 V5 57(N2 I4S IR- IR-	-5.0 -4.7 -3.0 0 0 -5.0 0 0 0	36.0 25.8 7.5 1 0.99 36.0 1.02 1.02 1.02	-1.0 -25.5 -2.2 0 0 -1.0 0 0.02 0.02	76.0 31.2 2.9 1 1.02 61.0 0.68 0.82 0.38	-0.8 190.2 273.3 0 -0.80 0.02 203.5 203.5	0.25 242.6 300.1 1 1 0.26 0.45 303.2 303.2	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.6 0.95 0.95	0.33 0.5 1.3 1.0 0.95 0.5 1.7 2.6 1.8	0.95 1.0 1.0 1.0 1.0 0.95 1.95 1.0 1.0	
Tropical Airmass Tropical Night Microp True Color Natural Colors Day Convective Storms Day Snov-Fog Day Microphysics su Day Microphysics wi Night Microphysics	S3(IR S1(IR-I2) VS N2 S4(W3 N1 N1 N1 S1(IR-I2)	S6(IR S2(I4-IR) V2 N1 S2(I4-I N2 I4S I4S S2(I4-IR)	57(N2 WV IR- V1 V5 57(N2 I45 IR- IR- IR- IR-	-5.0 -4.7 -3.0 0 0 -5.0 0 0 0 -3.0	36.0 25.8 7.5 1 0.99 36.0 1.02 1.02 1.02 7.5	-1.0 -25.5 -2.2 0 0 -1.0 0 0.02 0.02 -7.0	76.0 31.2 2.9 1 1.02 61.0 0.68 0.82 0.38 2.9	-0.8 190.2 273.3 0 0 -0.80 0.02 203.5 203.5 203.5 243.7	0.25 242.6 300.1 1 1 0.26 0.45 303.2 303.2 293.2	1.0 1.0 1.0 1.0 1.0 1.0 1.6 0.95 0.95 1.0	0.33 0.5 1.3 1.0 0.95 0.5 1.7 2.6 1.8 1.0	0.95 1.0 1.0 1.0 1.0 0.95 1.95 1.0 1.0 1.0	
Fropical Airmass Fropical Night Microp True Color Natural Colors Day Convective Storms Day Snow-Fog Day Microphysics -su Day Microphysics 24-hour Microphysics 24-hour Microphysics	S3(IR S1(IR-I2) VS N2 S4(W3 N1 N1 S1(IR-I2) S1(IR-I2)	S6(IR S2(I4-IR) V2 N1 S2(I4-I N2 I4S I4S S2(I4-IR) S5(IR	57(N2 WV IR- V1 S5(N2 I4S IR- IR- IR- IR- IR- IR-	-5.0 -4.7 -3.0 0 -5.0 0 0 0 -3.0 -3.0	36.0 25.8 7.5 1 0.99 36.0 1.02 1.02 1.02 7.5 7.5	-1.0 -25.5 -2.2 0 -1.0 0 0.02 0.02 -7.0 0.8	76.0 31.2 2.9 1 1.02 61.0 0.68 0.82 0.38 2.9 5.8	-0.8 190.2 273.3 0 -0.80 0.02 203.5 203.5 243.7 248.6	0.25 242.6 300.1 1 0.26 0.45 303.2 303.2 293.2 303.2	1.0 1.0 1.0 1.0 1.0 1.0 1.0 0.95 0.95 1.0 1.0	0.33 0.5 1.3 1.0 0.95 0.5 1.7 2.6 1.8 1.0 1.3	0.95 1.0 1.0 1.0 1.0 0.95 1.95 1.0 1.0 1.0 1.0 1.0	
Tropical Airmass Tropical Night Microp True Color Natural Colors Day Convective Storms Day Snow-Fog Day Microphysics -wi Night Microphysics 24-hour Microphysics Dust	S3(IR S1(IR-I2) VS N2 S4(W3 N1 N1 S1(IR-I2) S1(IR-I2) S1(IR-I2)	S6(IR S2(I4-IR) V2 N1 S2(I4-I N2 I4S I4S S2(I4-IR) S5(IR S5(IR	57(N2 WV IR- V5 S5(N2 I4S IR- IR- IR- IR- IR- IR- IR-	-5.0 -4.7 -3.0 0 -5.0 0 0 0 -3.0 -3.0 -3.0	36.0 25.8 7.5 1 0.99 36.0 1.02 1.02 1.02 7.5 7.5 7.5	-1.0 -25.5 -2.2 0 0 -1.0 0 0.02 0.02 -7.0 0.8 0.9	76.0 31.2 2.9 1 1.02 61.0 0.68 0.82 0.38 2.9 5.8 12.5	-0.8 190.2 273.3 0 -0.80 0.02 203.5 203.5 203.5 243.7 248.6 261.5	0.25 242.6 300.1 1 0.26 0.45 303.2 303.2 293.2 303.2 293.2 303.2 289.2	1.0 1.0 1.0 1.0 1.0 1.0 1.6 0.95 0.95 1.0 1.0 1.0	0.33 0.5 1.3 1.0 0.5 1.7 2.6 1.8 1.0 1.3 2.5	0.95 1.0 1.0 1.0 1.0 0.95 1.95 1.0 1.0 1.0 1.0 1.0 1.0	
Tropical Airmass Tropical Night Microp True Color Natural Colors Day Convective Storms Day Microphysics - su Day Microphysics - su Day Microphysics - su Night Microphysics 24-hour Microphysics Dust Ash	S3(IR S1(IR-I2) VS N2 S4(W3 N1 N1 S1(IR-I2) S1(IR-I2) S1(IR-I2)	S6(IR S2(I4-IR) V2 N1 S2(I4-I N2 I4S I4S S2(I4-IR) S5(IR S5(IR S5(IR	57(N2 WV IR- V5 S7(N2 I45 IR- IR- IR- IR- IR- IR- IR- IR- IR-	-5.0 -4.7 -3.0 0 -5.0 0 0 0 -3.0 -3.0 -3.0 -3.0	36.0 25.8 7.5 1 0.99 36.0 1.02 1.02 1.02 7.5 7.5 7.5 7.5	-1.0 -25.5 -2.2 0 0 -1.0 0 0.02 0.02 -7.0 0.8 0.9 -1.6	76.0 31.2 2.9 1 1.02 61.0 0.68 0.82 0.38 2.9 5.8 12.5 4.9	-0.8 190.2 273.3 0 0 -0.80 0.02 203.5 203.5 243.7 248.6 261.5 243.6	0.25 242.6 300.1 1 0.26 0.45 303.2 203.2 203.2 203.2 203.2 289.2 303.2	1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0	0.33 0.5 1.3 1.0 0.95 0.5 1.7 2.6 1.8 1.0 1.3 2.5 1.2	0.95 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
Tropical Airmass Tropical Night Microp True Color Day Convective Storms Day Snow-Fog Day Microphysics -su Day Microphysics Day Microphysics 24-hour Microphysics Dust Ash Airmass	S3(IR S1(IR-I2) VS S4(W3 N1 N1 S1(IR-I2) S1(IR-I2) S1(IR-I2) S4(W3	S6(IR S2(I4-IR) V2 N1 S2(I4-I N2 I4S I4S S2(I4-IR) S5(IR S5(IR S5(IR S5(IR	57(N2 WV IR- V5 S7(N2 I45 IR- IR- IR- IR- IR- IR- IR- IR- WV	-5.0 -4.7 -3.0 0 -5.0 0 0 -3.0 -3.0 -3.0 -3.0 0	36.0 25.8 7.5 1 0.99 36.0 1.02 1.02 1.02 7.5 7.5 7.5 7.5 7.5 25.8	-1.0 -25.5 -2.2 0 -1.0 0 0.02 0.02 -7.0 0.8 0.9 -1.6 -4.3	76.0 31.2 2.9 1 1.02 61.0 0.68 0.82 0.38 2.9 5.8 12.5 4.9 41.5	-0.8 190.2 273.3 0 -0.80 0.02 203.5 203.5 203.5 243.7 248.6 261.5 243.6 208	0.25 242.6 300.1 1 0.26 0.45 303.2 303.2 293.2 303.2 299.2 303.2 289.2 303.2 242.6	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	0.33 0.5 1.3 1.0 0.95 0.5 1.7 2.6 1.8 1.0 1.3 2.5 1.2 1.0	0.95 1.0 1.0 1.0 1.0 1.0 1.95 1.95 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
Tropical Airmass Tropical Night Microp True Color Natural Colors Day Convective Storms Day Microphysics - su Day Microphysics - su Day Microphysics - su Night Microphysics 24-hour Microphysics Dust Ash	S3(IR S1(IR-I2) VS N2 S4(W3 N1 N1 S1(IR-I2) S1(IR-I2) S1(IR-I2)	S6(IR S2(I4-IR) V2 N1 S2(I4-I N2 I4S I4S S2(I4-IR) S5(IR S5(IR S5(IR	57(N2 WV IR- V5 S7(N2 I45 IR- IR- IR- IR- IR- IR- IR- IR- IR-	-5.0 -4.7 -3.0 0 -5.0 0 0 0 -3.0 -3.0 -3.0 -3.0	36.0 25.8 7.5 1 0.99 36.0 1.02 1.02 1.02 7.5 7.5 7.5 7.5	-1.0 -25.5 -2.2 0 0 -1.0 0 0.02 0.02 -7.0 0.8 0.9 -1.6	76.0 31.2 2.9 1 1.02 61.0 0.68 0.82 0.38 2.9 5.8 12.5 4.9	-0.8 190.2 273.3 0 0 -0.80 0.02 203.5 203.5 243.7 248.6 261.5 243.6	0.25 242.6 300.1 1 0.26 0.45 303.2 203.2 203.2 203.2 203.2 289.2 303.2	1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0           1.0	0.33 0.5 1.3 1.0 0.95 0.5 1.7 2.6 1.8 1.0 1.3 2.5 1.2	0.95 1.0 1.0 1.0 1.0 1.0 1.95 1.95 1.0 1.0 1.0 1.0 1.0 1.0 1.0 5 5	



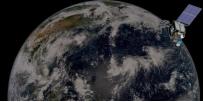
Try advanced SATAID operations by using this module!



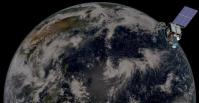
19

B

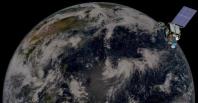
# Summary



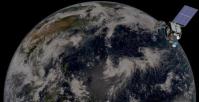
- SATAID can display satellite imagery with other observation (ex.in-situ, radar) and NWP datasets.
- SATAID can display RGB composite imagery by simple operation.
- RGB composite imagery is useful tool for using AHI multi bands efficiently.
- SATAID can show WMO standard RGB recipes and JMA original recipes.
- We challenged hands-on practical training of RGB case studies by using SATAID.



# Thank you for your participation!



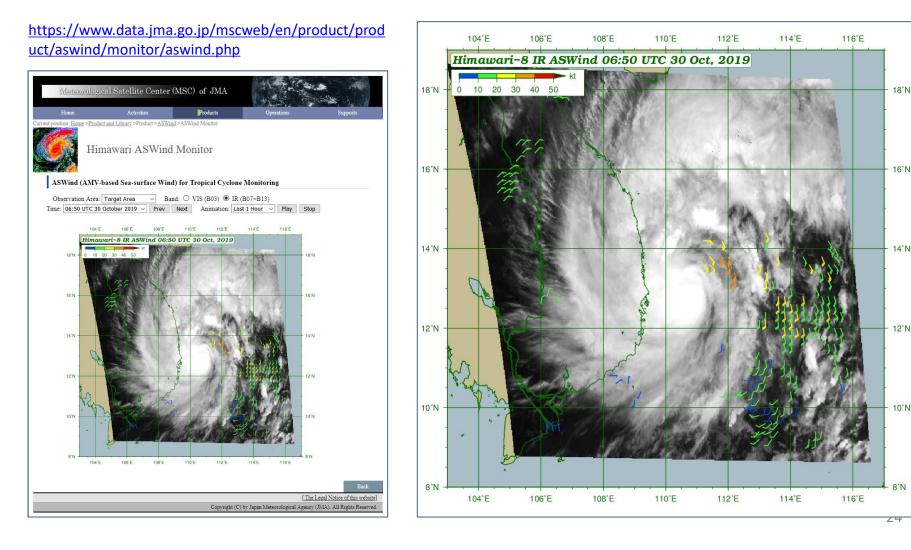
# Appendices



# Himawari satellite imagery & products on websites

# **Himawari ASWind Monitor**

#### ASWind (AMV-based Sea-surface Wind) for Tropical Cyclone Monitoring



#### **Imagery products for Asia-Oceania Region**

#### Anyone can get these products by Real-time JPEG imagery service through MSC website for Asia-Oceania region via the Internet.

http://www.data.jma.go.jp/mscweb/data/himawari/index.html

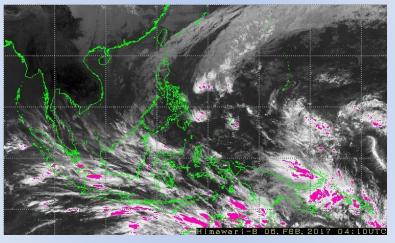
#### Providing imagery on MSC website

- Easy access to Himawari imagery
- Processed into sectored images in JPEG format for
  - Australia
  - Central Asia
  - Pacific Islands
  - Southeast Asia

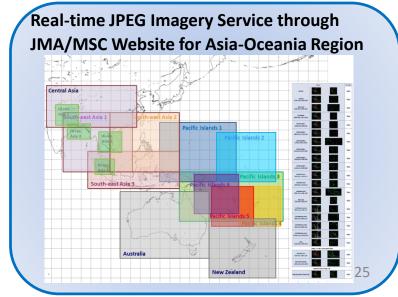
#### and more ....

on real-time basis with animation in the last 23 hours

#### Imagery with heavy rainfall potential areas

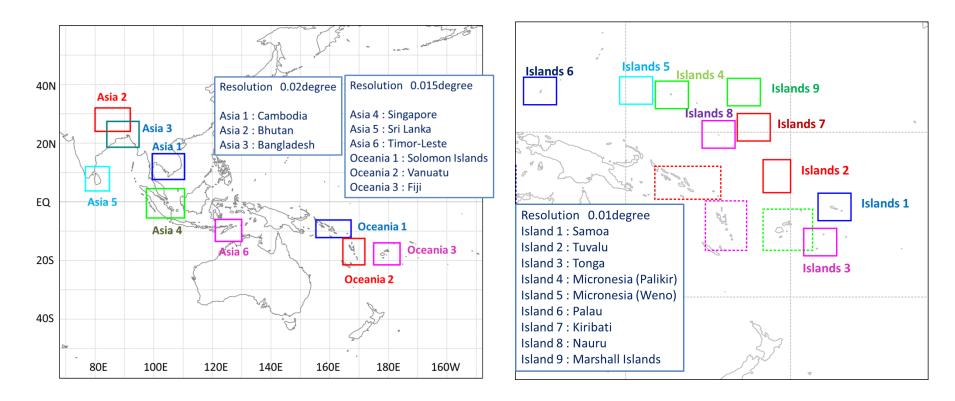


# <section-header>

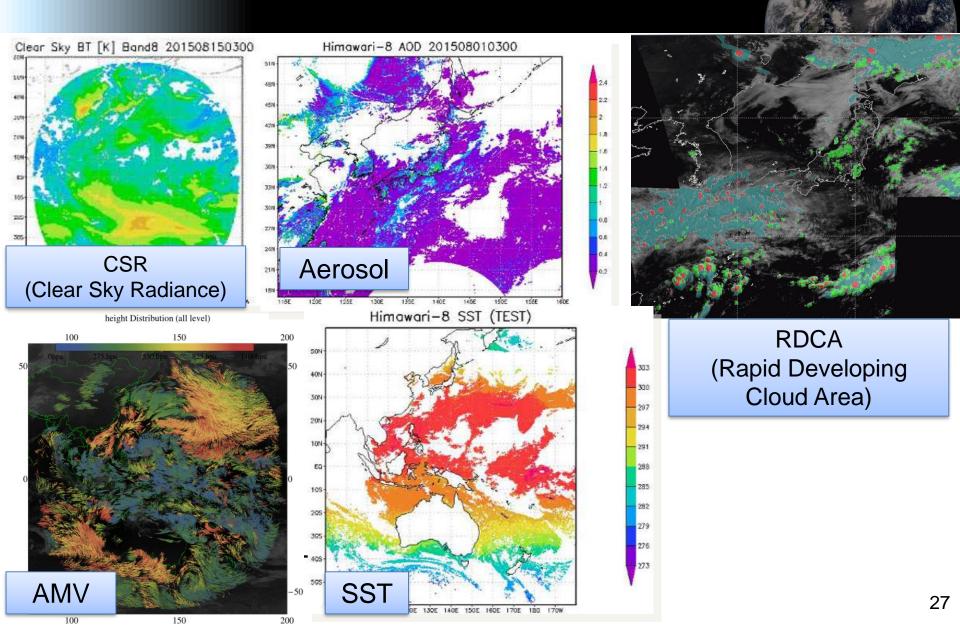


## Real-time JPEG Imagery Service on JMA/MSC Website for Oceania Region

JMA/MSC provide high resolution imagery with tiny file size via the Internet to be able to get even under an unstable Internet environment.

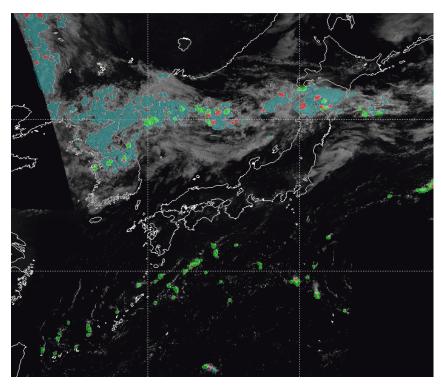


# **Satellite Products**



## Rapidly Developing Cumulus Area(RDCA)

• RDCA product detects **rapidly developing cumulus** with thunder and **area of disturbance to occur in near future**.



#### **Rapidly Developing Cumulus Area (RDCA)**

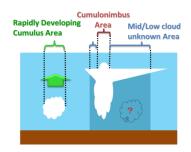
- ✓ Developing cumulus
- ✓ Current/Future disturbance is expected

#### **Cumulonimbus Area**

- ✓ A round top, except for anvil cirrus
- ✓ Strong upward flow is expected

#### Mid/Low Cloud Unknown Area

- ✓ Anvil cirrus
- Anvil cirrus hides clouds below



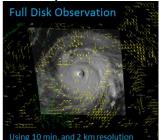
This product is provided to aviation users.

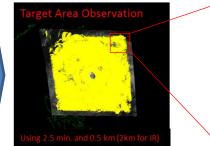
## **Atmospheric Motion Vectors (AMVs)**

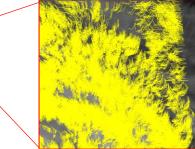
AMV is a satellite-derived product that is to estimate the altitude and motion vector of clouds from satellite imagery. It is already used for typhoon analysis , and be used as initial value by numerical forecast.

Himawari-8 AMVs derived from Himawari-8 imagery with new algorithm 100 150 200 50 Resolution 2km/10min. 50 Resolution 100 150 200 50 Resolution 4 km/30min. 50 Resolution 4 km/30min. 50 Resolution 5

Calculation of AMVs using target area observation is currently under consideration.







- Improvement to temporal and spatial resolution.
- Detection of low er layer.
- Particularly, the data of the lower layer may be used for estimating the area of windstorm or strong wind.

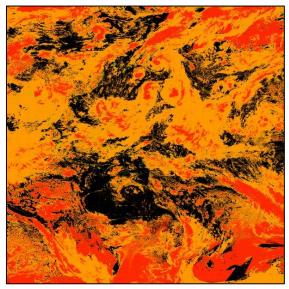
29

- In the past, AMV was calculated from the difference of images at 30-minute intervals in northern hemisphere using MTSAT-2.
- In southern hemisphere, calculated by images at 60-minute intervals.
- Now, AMV is calculated by using Himawari-8 full disk observation at 10-minute intervals.
- As not only temporal but also spatial resolution is higher than MTSAT-2, detection numbers of AMVs is increasing.

# High-resolution Cloud Analysis Information (HCAI)

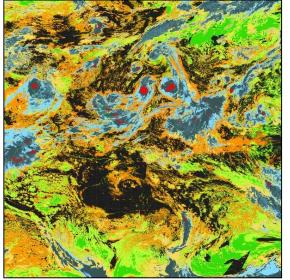
- Cloud mask, type and top height (0.02 degree latitude/longitude grids)
- Currently, MSC provides selected area data to Hong Kong, Indonesia, Kiribati, Malaysia, Mongolia, Myanmar, Singapore, Tonga and Viet Nam via the Internet.

Cloud Mask



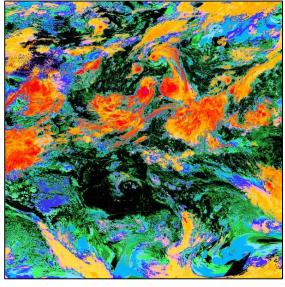
**Clr Mixed Cloudy** 

Cloud Type



Clr Cb CH CM Cu Sc St/Fg Dense

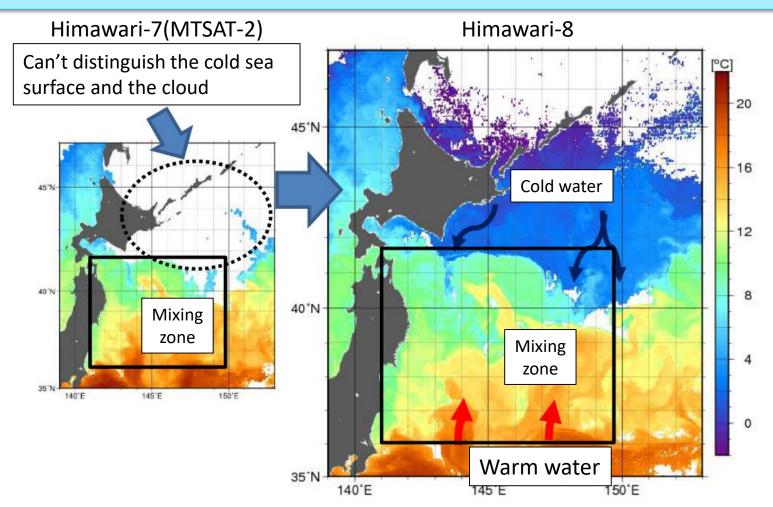
**Cloud Top Height** 

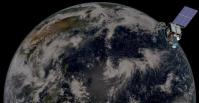


20 40 60 80 100 120 140 160 180 200 ×100m

## Sea surface temperature

- Use of multi-spectral bands leads to distinguish the cold sea surface and the cloud
- High frequency observation provides more cloud free data





# SATAID

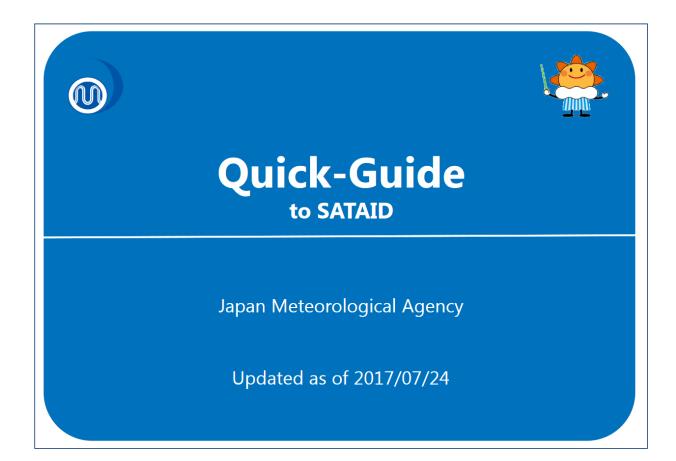
# What is SATAID?



- Originally developed by JMA's MSC (Meteorological Satellite Center) as an application software to display satellite imagery and NWP data for <u>training purposes</u>
- Provided to NMHSs as a JMA's contribution to WMO-CGMS
   Virtual Laboratory for Training in Satellite Meteorology (<u>VL</u>)
- Today, used also as an <u>operational tool</u> for daily weather analysis including tropical cyclone monitoring at JMA's HQ and local offices
- <u>Freely available</u> to NMHSs and easy to install
- Equipped with lots of functions

# Introduction to SATAID

For more information on SATAID, please see Introduction Guide for SATAID.



https://www.wis-jma.go.jp/cms/sataid/file/QuickGuide\_to\_SATAID.pdf 34