HimawariCast Newsletter

No. 15, 31 October 2022

Japan Meteorological Agency

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Operational Satellite Switchover from Himawari-8 to Himawari-9

The Japan Meteorological Agency plans to switch operation from its Himawari-8 satellite to its Himawari-9 unit on 13th December 2022. Himawari-9 carries the same Advanced Himawari Imager (AHI) sensor equipment as Himawari-8, and will conduct observations from the same orbital position (140.7°E) with the same observation sequence. HimawariCast users will not need to modify receiver system settings (data format/quality or antenna orientation) in relation to the switch.

For technical details, see
https://www.data.jma.go.jp/mscweb/en/oper/switchover.html

AOMSUC-12 to be held in November

JMA will host the 12th Asia-Oceania Meteorological Satellite Users' Conference (AOMSUC-12) online from 11th to 18th November 2022.

The event will involve training workshop sessions focusing on current satellite data usage in meteorological and climatological applications (11th and 14th November), an AOMSUC plenary session (15th - 17th November) and a Joint Meeting of RA II WIGOS Project and RA V TT-SU for RA II and RA V NMHSs (18th November).

The plenary session will cover:

(1) Space program and data access updates
(2) JAXA's coordinated efforts for the earth observation for environmental monitoring
(3) Space weather
(4) Application for weather analysis and nowcasting
(5) Application for land surface, sea surface, and climate monitoring
(6) Application for numerical weather prediction

For details, see
https://www.data.jma.go.jp/mscweb/en/aomsuc12/index.html

Day Microphysics RGB based on Himawari Observation Imagery

Day Microphysics RGB (WMO standard composite imagery proposed by EUMETSAT) is used for detailed daytime cloud analysis based on a combination of red/green/blue beams (Table 1).

Red imagery from Band 4 (0.86 μm) indicates cloud optical thickness based on reflectivity, while green imagery for solar components from Band 7 (3.9 μm) indicates the particle size and phase of the cloud top. The Band 7 data incorporate both emitted thermal radiation and reflected solar radiation, making Band 7 imagery itself suboptimal for daytime monitoring. However, reflected solar radiation (i.e., the solar component) has notable reflective properties in terms of cloud particle size and phase (with small water droplet pixels increasing the contribution of green to RGB imagery). Band 7 solar component imagery can be derived via complex calculation with other band data, but this component and Day Microphysics RGB can be viewed immediately in SATAID. The Band 7 solar component (I4S in SATAID) is used as blue-beam data in Day Snow-Fog RGB as specified in Newsletter No. 4.

The inverted Band 13, which is assigned to the blue beam of RGB, shows surface and cloud-top temperatures (with warm-colored pixels increasing the blue contribution) in the same way as 24-hour Microphysics RGB, Dust RGB, Ash RGB and Night Microphysics RGB.

Color interpretation for Day Microphysics RGB is shown in Figure 1. As the combinations of these contributions produce varied color indications and interpretations, these data can be used in detailed cloud analysis and interpretation of imagery containing a wide range of colors.

Figure 2 compares Day Microphysics RGB (left) and sandwich image (right) created by overlapping overlaying visible (Band 3, 0.64 µm) and infrared (Band 13, 10.4 µm) images. Orange and light-brownish areas (B) in the RGB image correspond to deep precipitating cloud with small ice particles, such as developing cumulonimbus (Cb) cloud tops. The Band 4 image contribution makes the rough textures of Cb cloud tops more distinct. Media reports indicate that Kaiyuan in China (dashed circle) was hit by a tornado on the afternoon corresponding to this image.

Figure 3 compares Day Microphysics RGB and visible (Band 3) image. The green-beam thresholds (i.e., the range of reflectivity for Band 7) here are tuned for winter. In this case, dense fog was causing flight delays at Adelaide Airport in Australia. Figure 3 shows widespread low-level cloud with fog (A and B) along the coast. For Adelaide and the surrounding countryside, thick low-level cloud or fog are clearly seen in pink.

Figure 4 compares Day Microphysics RGB and visible image with radar precipitation intensity data. Red areas (A) correspond to deep precipitating cloud with large ice particles such as Cb, and light-green areas (D) correspond to low-level water cloud with large droplets. Thus, discrimination between thick Cb cloud and low-level cloud is achieved. The shade of the greenish area (F) is somewhat similar to that of low-level water cloud (D), but observation along with other image such as infrared (omitted) may suggest the presence of supercooled thick water cloud.

(SHIMIZU Akihiro)

Color	AHI bands	Central wavelength [μm]	Physical relation to	Lesser contribution to signals for	Greater contribution to signals for
Red	B04	0.86	Cloud optical thickness	Thin cloud	Thick cloud
Green	B07refl	3.9	Cloud phase and size	Ice cloud with large ice crystals	Water cloud with small droplets
Blue	B13 (inverse)	10.4	Snow and ice	Cold thick cloud	Warm cloud

Table 1 Band components and related specifications for Day Microphysics RGB

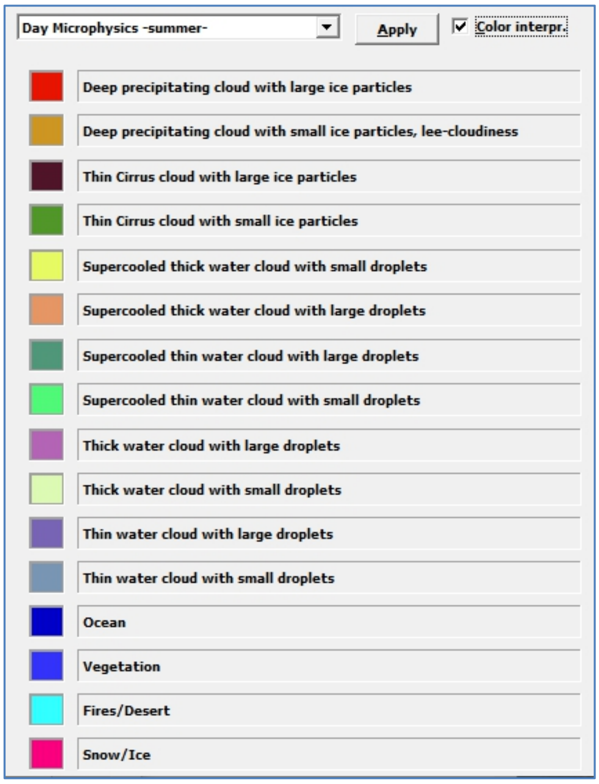

Figure 1 Day Microphysics RGB interpretation in SATAID

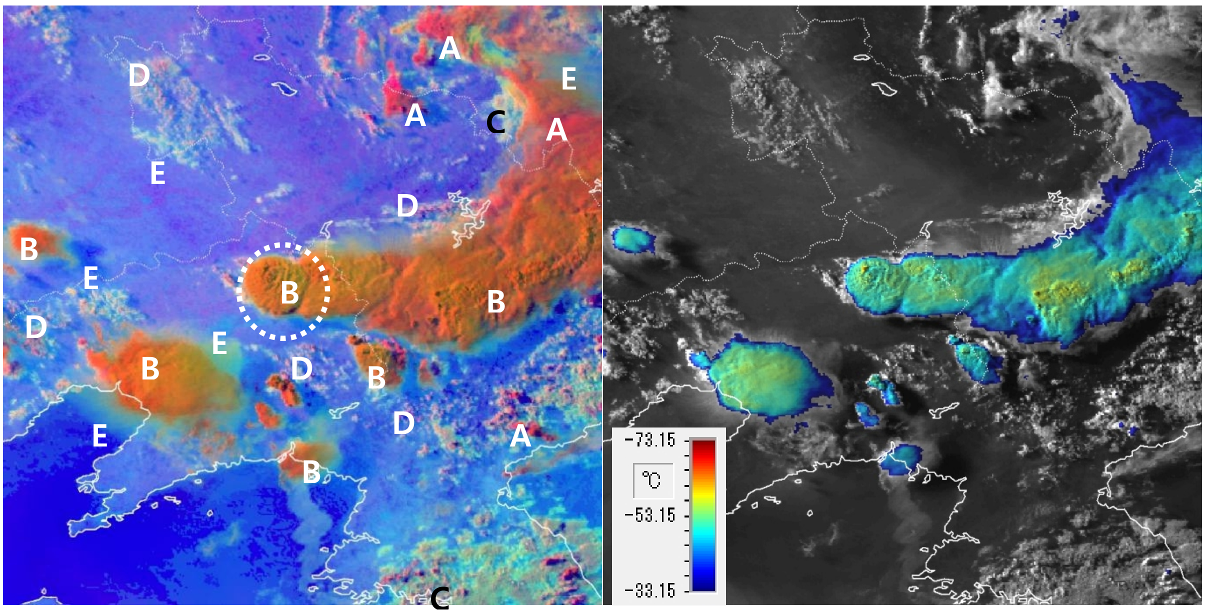

Figure 2 Developing Cb cloud around northeastern China (09:50 UTC, 3 July 2019)
Left: Day Microphysics RGB showing thick ice cloud with small particles (B) in orange or light brown; right: sandwich image. Media reports indicate that Kaiyuan in China (dashed circle) was hit by a tornado.

A: deep precipitating cloud with large ice particles
B: deep precipitating cloud with small ice particles
C: thick mid/low-level (supercooled) water cloud with small droplets
D: thick low-level water cloud with large droplets
E: thin cirrus cloud (with small ice particles)

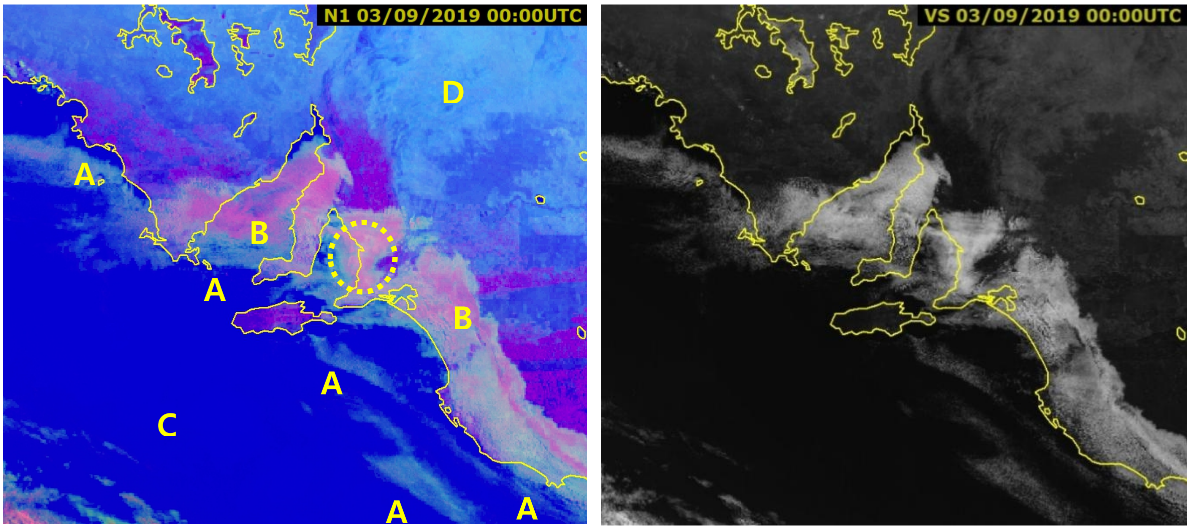

Figure 3 Low-level cloud with fog around Adelaide in Australia (00:00 UTC, 3 September 2019)
Left: Day Microphysics RGB (winter version); right: visible image (Band 3). The dashed circle indicates the area around Adelaide.

A: thick water cloud with small droplets (low-level cloud with fog)
B: thick water cloud with large droplets (low-level cloud with fog)
C: ocean
D: desert

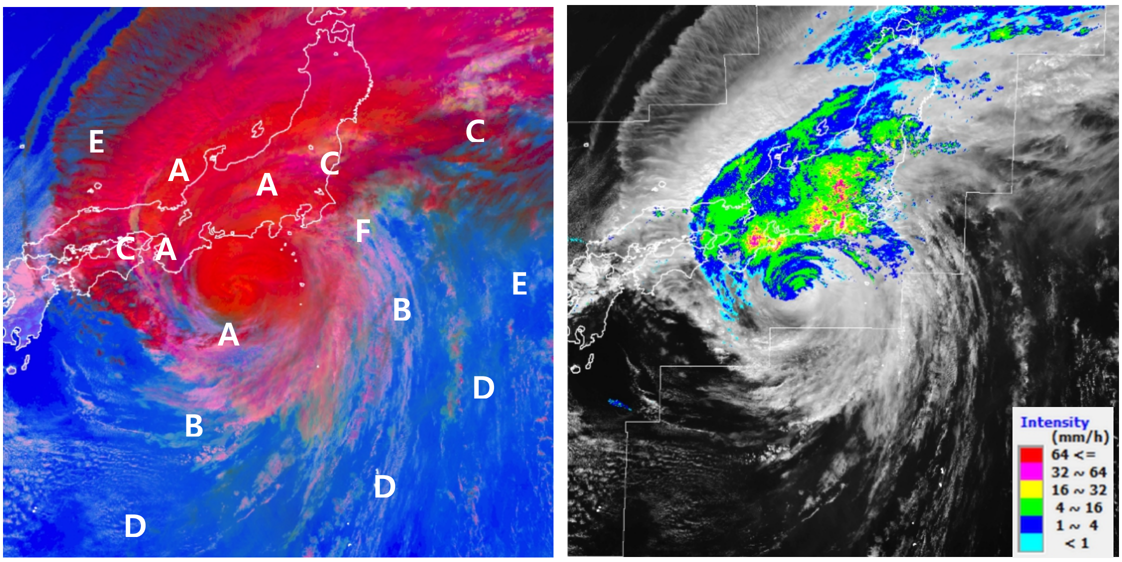

Figure 4 Typhoon Hagibis (T1919) approaching Japan (03:00 UTC, 12 October 2019)
Left: Day Microphysics RGB; right: visible image (Band 3: 0.64 μm) with radar intensity

A: deep precipitating cloud with large ice particles
B: thick mid/low-level water cloud with large droplets
C: thick mid-level water cloud with small droplets
D: low-level water cloud with small droplets
E: thin cirrus cloud
F: supercooled water cloud

Feedback

JMA welcomes feedback from users on HimawariCast data usage, and particularly invites articles to be posted in this newsletter. Such input will help other users consider new ideas for their services.

The Agency also invites questions on HimawariCast services. These may relate to the functions of the SATAID program, interpretation/analysis of multi-band imagery or other areas of interest. Feel free to send queries to be answered in this newsletter.

All articles and questions are welcomed. Your contributions are greatly appreciated.

Comments and Inquiries

Comments and inquiries on this newsletter and/or the HimawariCast Web Page are welcomed.
Back numbers of HimawariCast Newsletters:
https://www.data.jma.go.jp/mscweb/en/himawari89/himawari_cast/himawari_cast.php

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