HimawariCast Newsletter

No. 10, 15 February 2019

Japan Meteorological Agency

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Utilization of HimawariCast data by the Viet Nam Meteorological and Hydrological Administration (VNMHA)

Himawari data and prior MTSAT data serve as an important resource in the forecasting activities of VNMHA.

These data have been constantly used by the organization in collaboration with the Information and Data Center (IDC) and Aero Meteorological Observation (AMO) since its HimawariCast receiving system was installed in 2016 with assistance from JMA experts.

IDC administers the acquisition of HimawariCast data in SATAID format and HimawariCloud data in standard format. The HimawariCast system plays a leading role in securing the provision of this information against the background of Vietnam's unstable Internet service.

The satellite receiver (made by Novra Technologies Inc.) is located on the roof of the organization's 15-floor HQ. Data received are transferred to a server at AMO, then to IDC and the National Forecasting Center via a LAN connection. AMO converts SATAID data into JPEG format to enable the composition of various overlay images for display on its website (amo.gov.vn). The original SATAID data are sent to nine regional centers via IDC's FTP server.

Staff from the national forecasting center and regional centers report that HimawariCast data are stable and reflective of the relevant conditions, and that the SATAID display program is easy to use and has good functionality for overlay image composition and multiband image display.

Fig. 1: Himawari images displayed at a forecasting discussion

Fig. 2: HimawariCast Satellite receiver on the roof of VNMHA HQ (lower right: satellite converter at AMO)

Fig. 3: Nine VNMHA regional centers utilizing Himawari data provided via the AMO website the IDC FTP server

(IDC - Hydro- Meteorological Data and Information and Data Center)

Small void in Himawari-8 image data

Question from an NMHS user:

- Why is there a void in the upper-right part of this Himawari-8 image? (Figure 4)

The void is caused by the Advanced Himawari Imager (AHI) automatic sun avoidance function. Around midnight during the spring and autumn eclipse periods, sunlight can directly enter the AHI sensor when the sun and the earth occasionally lie in an approximate line with the satellite. To avoid this, the AHI has a function by which part of the observation area can be skipped based on prediction of the sun's position and potentially affected areas.

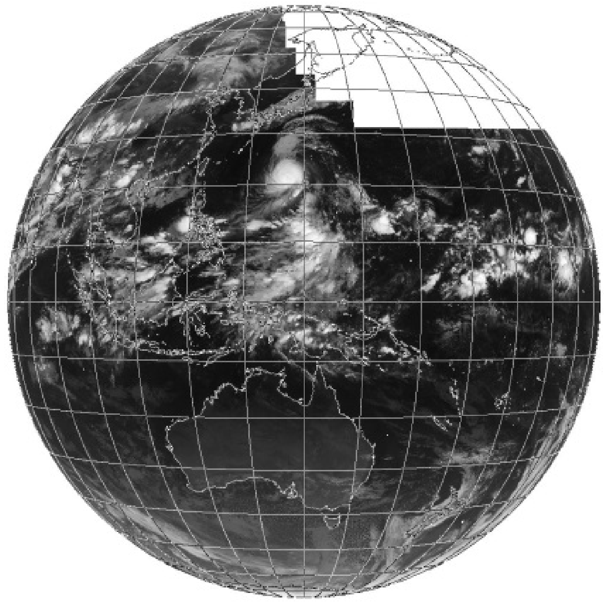


Fig. 4 Band 13 image taken at 15:00 UTC on 1 September 2018

This operation is performed not only in Full Disk observation but also in Japan Area and Target Area observation, resulting in the output image with a partial lack. When the skipped area is expected to cover the whole domain of Target Area observation, the observation will not be performed.

JMA's Meteorological Satellite Center provides information on sun avoidance prediction for the forthcoming eclipse period at https://www.data.jma.go.jp/mscweb/en/operation8/equinox/plan.html#002.

Table 1 details predicted positions of the sun and potential areas of solar interference with an outline of related interpretations.

- Small circles represent the predicted position of the sun at the beginning and the end of the timeline.
- Large circles represent 3 degrees of angular distance from the center of small circles at the beginning and end of the timeline. (Angular distance is measured as observed from the satellite.)
- Small/large circles are shown in white when no need for sun avoidance is predicted.
- Small/large circles are shown in red when a need for sun avoidance is predicted. Overlaps with large

circles can be considered solar interference areas.

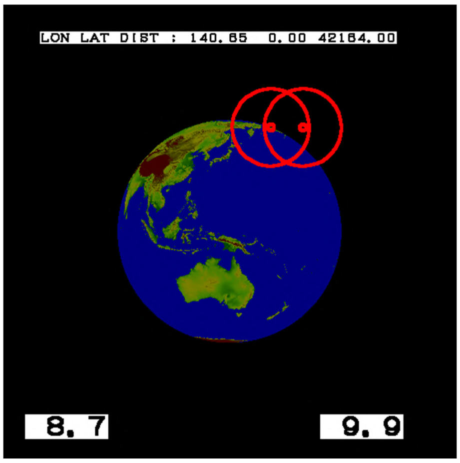
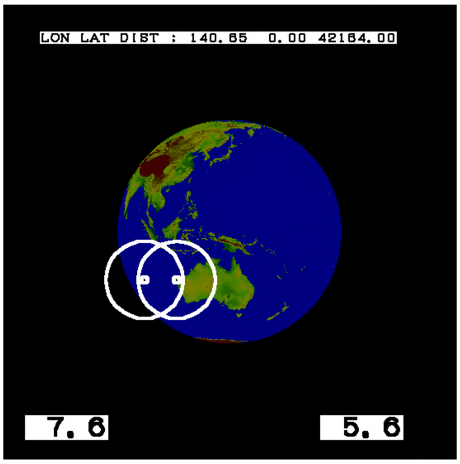
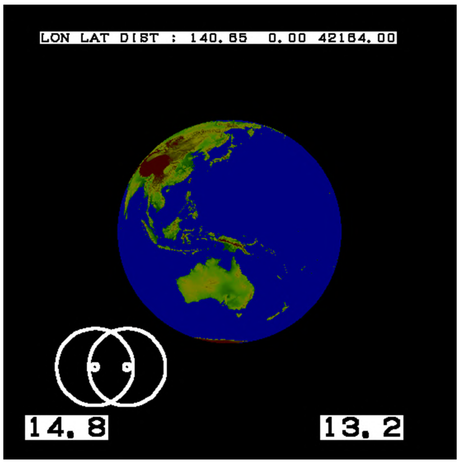
- Angular distances between the center of the sun and the geocenter at the beginning and end of the timeline are shown at the lower left and lower right, respectively.

Thank you for your inquiry.

JMA welcomes questions and feedback on HimawariCast and other aspects of the Himawari program.

(Akiyoshi ANDOU)

Table 1: Predicted solar positions

 15:00 UTC on 1 September 2018	- The predicted position of the sun is north-east of the earth. - The need for sun avoidance is expected (Prediction). - The sun is 9.9 degrees from the geocenter at the beginning of the timeline. - The sun is 8.7 degrees from the geocenter at the end of the timeline.
 14:10 UTC on 2 October 2018	- The predicted position of the sun is behind the earth. - The need for sun avoidance is not expected (Prediction). - The sun is 7.6 degrees from the geocenter at the beginning of the timeline. - The sun is 5.6 degrees from the geocenter at the end of the timeline.
 13:50 UTC on 20 October 2018	- The predicted position of the sun is south-west of the earth. - The need for sun avoidance is not expected (Prediction). - The sun is 14.8 degrees from the geocenter at the beginning of the timeline. - The sun is 13.2 degrees from the geocenter at the end of the timeline.

24-hour Microphysics RGB based on Himawari observation imagery

WMO standard RGB composite imagery shows surface and atmospheric conditions/phenomena with effective focus on subjects of interest such as cloud types. However, the availability of certain standard RGB image types, including Natural Color RGB and Night Microphysics RGB (highlighted in newsletters 8 and 9) is limited to only daytime or nighttime.

24-hour Microphysics RGB, Dust RGB and Ash RGB all involve imagery with combinations of the three primary colors. These are applicable for both daytime and nighttime analysis because the related constituents come from infrared (i.e., mid-long wavelength IR) observation bands (Table 2).

24-hour Microphysics RGB has appropriate threshold ranges of brightness temperature and gamma values supporting three-color images suitable for cloud analysis.

Cloud type identification based on thickness is facilitated by difference images for Band 15 and Band 13 with assignment to the red of the RGB or Night Microphysics RGB (see the previous newsletter). Difference images for Band 13 and Band 11 are assigned to the green of the RGB, facilitating differentiation between water clouds and ice clouds. The blue of Band 13 shows surface and cloud-top temperatures (warm pixels contribute blue to RGB imagery) as well as Night Microphysics RGB.

The color interpretation for 24-hour Microphysics RGB is shown in Figure 5. Although Aeolian dust (e.g., yellow sand) can also be visualized in pink in RGB representation, Dust RGB displays dust plumes more clearly thanks to its suitable thresholds in dust detection.

Figure 6 shows an instance of fog or lower cloud spreading around Hainan Island and the East China Sea at dusk. At this time, visibility was affected by dense fog that persisted over the island for approximately a week. Night Microphysics RGB (top) and Natural Color RGB (bottom) are both useful in identifying fog or lower cloud at certain times, but their availability is limited to particular periods such as dusk and dawn. As a result, at other times it can be challenging to identify or follow up with this cloud type (marked “A”). 24-hour Microphysics (Figure 6, center) can also be used to identify fog and lower cloud during transition hours, albeit with less clarity than other RGBs.

The 24-hour Microphysics RGB image in Figure 7 reveals developed Cb cloud accompanied by cirrus cloud in the vicinity of northwestern Australia. As well as Night Microphysics RGB, this RGB can be used to distinguish thick cloud (marked “A”) from thin cirrus cloud (marked “B”).

(Akihiro Shimizu)

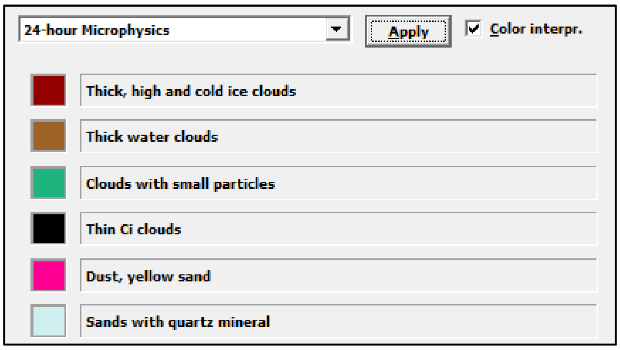


Fig. 5: Interpretation of 24-hour Microphysics RGB in SATAID

Table 2: Band components and relevant specifications for 24-hour Microphysics RGB

Color	AHI Bands	Central Wavelength [μm]	Physical Relevance	Minor Contributions	Major Contributions
Red	B15-B13	12.4-10.4	Cloud optical thickness	Thin ice clouds	Thick clouds
Green	B13-B11	10.4-8.6	Cloud phase	Ice clouds	Water clouds
Blue	B13 (inverse)	10.4	Cloud top temperature Surface temperature	Cold clouds Cold surface	Warm clouds Warm surface

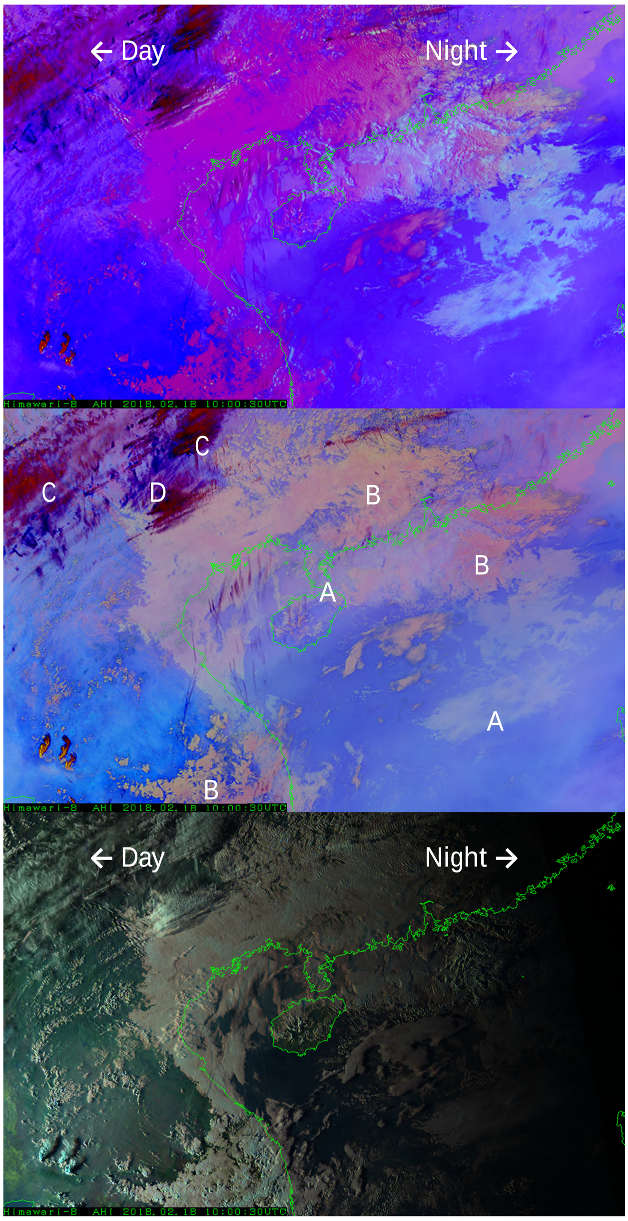


Fig. 6: Night Microphysics RGB (top), 24-hour Microphysics RGB (middle) and Natural Color RGB (bottom) images of fog or lower cloud around Hainan Island and the East China Sea at 10:00 UTC on 18 February 2018 A: fog or lower cloud; B: dense fog and lower cloud, or lower and middle cloud in a multi-layer formation; C: thick upper cloud; D: thin upper cloud

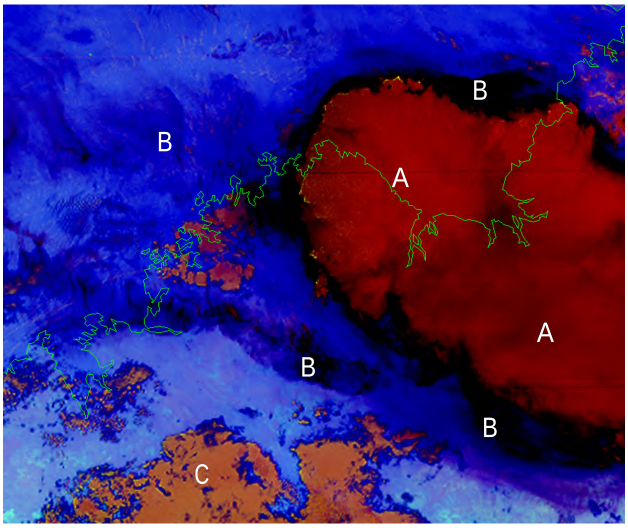


Fig. 7: 24-hour Microphysics RGB image of developed Cb accompanied by cirrus cloud in the vicinity of northwestern Australia at 20:30 UTC on 14 December 2017
A: thick cloud with raised top height (Cb); B: thin upper cloud; C: thick middle water cloud

Comments and Inquiries

Comments and inquiries on this newsletter and/or the HimawariCast Web Page are welcomed.
Back numbers of HimawariCast Newsletters:
"Dissemination via communication satellite: the HimawariCast service", MSC/JMA
http://www.data.jma.go.jp/mscweb/en/himawari89/himawari_cast/himawari_cast.html

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