HimawariCast Newsletter

No. 9, 17 December 2018

Japan Meteorological Agency

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JICA's training program for reinforcement of meteorological services

From 27 September to 7 December, the 2018 JICA Knowledge Co-Creation Program for Reinforcement of Meteorological Services was held in Tokyo with six invited attendees from Bangladesh, Fiji, Pakistan, the Philippines, Sri Lanka and Thailand. This training program is designed to equip National Meteorological and Hydrological Service (NMHS) staff with basic expertise and key techniques for use in numerical weather prediction, satellite meteorology and climate information for advanced meteorological services. It is also designed to build capacity for the application of these resources to the production and delivery of meteorological and climatological information for disaster prevention authorities and other users.

Between 9 and 11 October, the attendees visited the JMA Meteorological Satellite Center (MSC) in Kiyose and JMA HQ for training on the basics of satellite observation, cloud image interpretation and geophysical products derived from Himawari-8/9 data. The trainees were given presentations by JMA satellite experts and a technical tour of the MSC's Himawari-8/9 operating room.

(Meteorological Satellite Center)

Figure 1: Tour of MSC operating room

Figure 2: Seminars at MSC/JMA

Past, current and planned Himawari-8 Target Area observation locations

Question from an NMHS user:
- Could JMA provide information on Himawari-8 Target Area observation locations?

Information on past, current and planned

observation location is available online:

- Past
  https://www.data.jma.go.jp/mscweb/data/himawari/obs_info_tg_en.html,
- Current
  https://www.data.jma.go.jp/mscweb/data/himawari/sat_tga.php, and
- Planned
  https://www.jma-net.go.jp/sat/data/Request/RequestStatus.html.

Target Area observation provides imagery covering 1,000 x 1,000 km regional area every 2.5 minutes with flexibility in location change to support JMA's national and international services. The observation is normally focused on the area of active volcanoes in the domain of the Tokyo Volcanic Ash Advisory Center (VAAC), and is adapted to encompass typhoons within the responsibility area of the Regional Specialized Meteorological Center (RSMC) Tokyo Typhoon Center.

The HimawariRequest service, which allows National Meteorological and Hydrological Services (NMHSs) to request Target Area observation, enables registered NMHS users to request particular Target Area observations in order to leverage this flexibility on an international scale. The service stems from the RA II (Asia) WIGOS Project to develop support for NMHSs in satellite data, products and training in collaboration with the RA V (South-West Pacific) Task Team on Satellite Utilization.

The web page for past Target Area observation (Figure 3) provides information on locations and observation targets (such as tropical cyclones and volcanic ash); that for current Target Area observation (Figure 4) provides real-time visual representation of observation locations; and that for planned Target Area observation (Figure 5) provides the schedule for observation locations 10 days in advance and information on the availability of the HimawariRequest service in each time slot. Users should be sure to refer to the web page before submitting HimawariRequest service applications.

JMA expects the HimawariRequest service to support disaster risk reduction activities in the region based on the monitoring of extreme events such as tropical cyclones and volcanic eruptions.
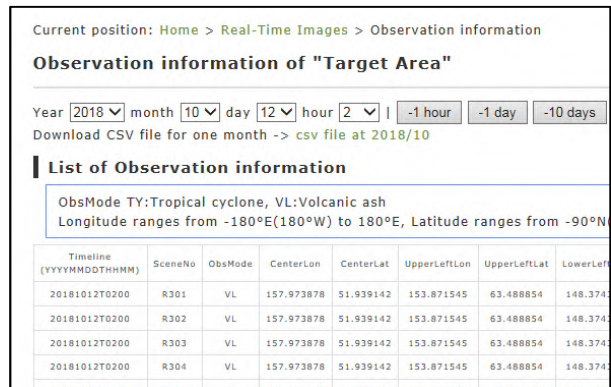
(Akiyoshi ANDOU)
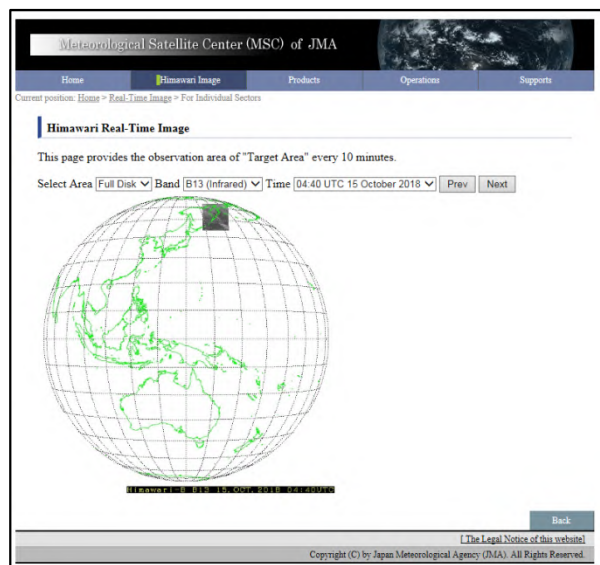

Figure 3: Past Target Area observation web page

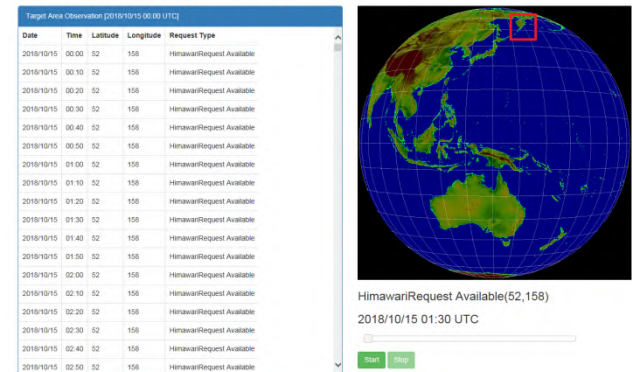Figure 4: Current Target Area observation web page

Figure 5: Planned Target Area observation web page

Night Microphysics RGB based on Himawari observation imagery

It is important to be able to distinguish fog/low cloud from cloud-free areas at nighttime in the interests of traffic security. This article highlights the Night Microphysics RGB product as a tool designed for this purpose.

This RGB product incorporates a WMO standard type of RGB composite imagery initially proposed by EUMETSAT. Table 1 shows the formation of red-green-blue beams assigned.

Differential imagery of Band 15 – Band 13, assigned for the red-beam part of the RGB product, facilitates differentiation between thick and thin cloud. For the green-beam part, differential imagery of Band 13 – Band 7 is effective in identifying fog or low cloud (water cloud). Band 13 assigned to the blue-beam part facilitates identification of warm cloud (e.g., fog/low cloud) based on thermal information.

Figure 6 shows fog/low-level cloud spreading in the area of the East China Sea and the Yellow Sea at nighttime. This dense fog event caused closures in the port of Shanghai and other ports in northern and eastern China. The part on the left shows Band 13 infrared imagery laid over SYNOP/SHIP observation data on visibility, weather and wind. Low-visibility conditions are observed along the coast, and differentiation between fog/low cloud areas and cloud-free areas using Band 13 data alone is impractical due to the minimal brightness temperature difference between fog/low-cloud areas and the surface (particularly that of the sea) in thermal infrared information. In Night Microphysics RGB imagery

(Figure 6, right), a bright-greenish area (marked "A") is clearly observed over the sea. This represents fog or low cloud (at high latitudes) containing water cloud particles based on the color interpretation of Figure 7. Although some parts of the area appear pinkish or purple, these are considered to be low water clouds with somewhat larger particles because of the smaller contribution of the RGB green beam to the low-cloud area.

In the other case shown in Figure 8, enlarged areas of fog and low-level (water) clouds over the surrounding terrain (in bright-greenish, marked "A") on the inland sea caused ferry cancellations due to a temporary stoppage advisory relating to fog. Figure 8 also shows thin cirrus clouds in dark-bluish or purple (marked "B"). Successive satellite images show cirrus clouds moving quickly from west to east. Meanwhile, steady darkish pixels indicated by red arrows are seen around the coastal area. These are considered to be hotspots corresponding to artificial heat sources (e.g., factories and industrial areas).

As detailed above, the Night Microphysics RGB product is highly useful in discriminating fog and low cloud from cloud-free areas at nighttime. However, this RGB composite is available only for nighttime observation because the Band 7 imagery assigned to the green-beam component is affected by sunlight during daytime hours. In daytime analysis, other RGB products such as Natural Colors and Day Snow-Fog (as detailed in previous newsletters) are recommended for fog/low cloud detection.

(Akihiro Shimizu)

Table 1: Band components and related specifications for Night Microphysics RGB

| Color	AHI Bands	Central wave length [μm]	Physically relates to	Smaller contribution to the signal of	Larger contribution to the signal of
Red	B15-B13	12.4-10.4	Cloud optical thickness	Thin clouds	Thick clouds
Green	B13-B07	10.4-3.9	Cloud phase and size	Thin ice clouds	Thick fog/ water clouds with small particles
Blue	B13	10.4	Cloud-top temperature Surface temperature	Cold clouds Cold surface	Warm clouds Warm surface
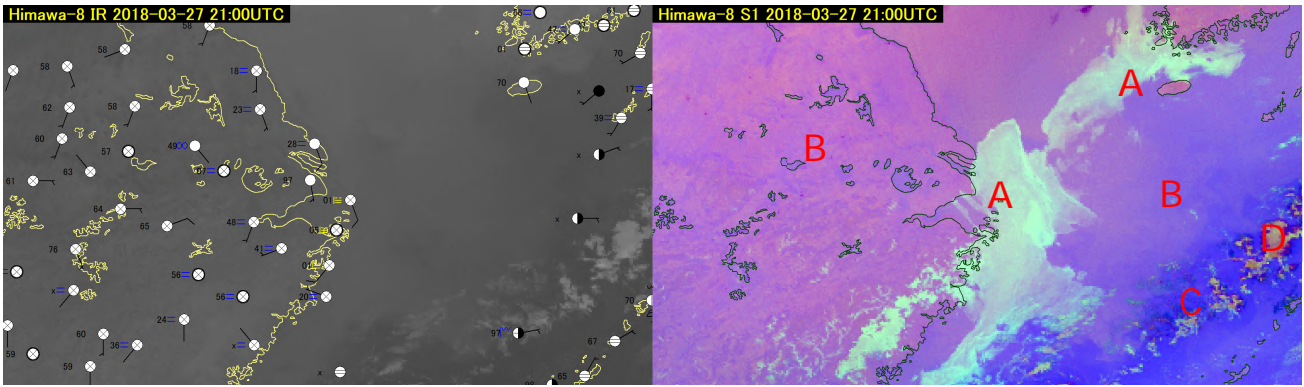
Figure 6: Fog/low-level cloud over the East China Sea and the Yellow Sea based on infrared imagery (Band 13) with SYNOP/SHIP observation (left) and Night Microphysics RGB (right). Numerical values of observation points on the left indicate visibilities (49, 59 and 60 represent 4.9, 9 and 10 km, respectively; 2100 UTC, 27 March 2018).

A: fog or low-level cloud; B: land and ocean areas (cloud-free); C: thin cirrus cloud; D: thick mid-level cloud
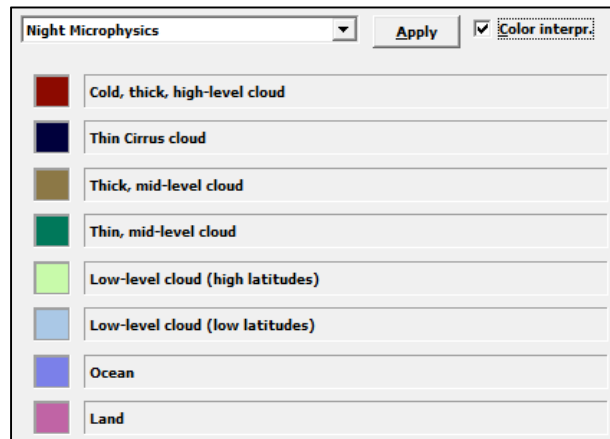

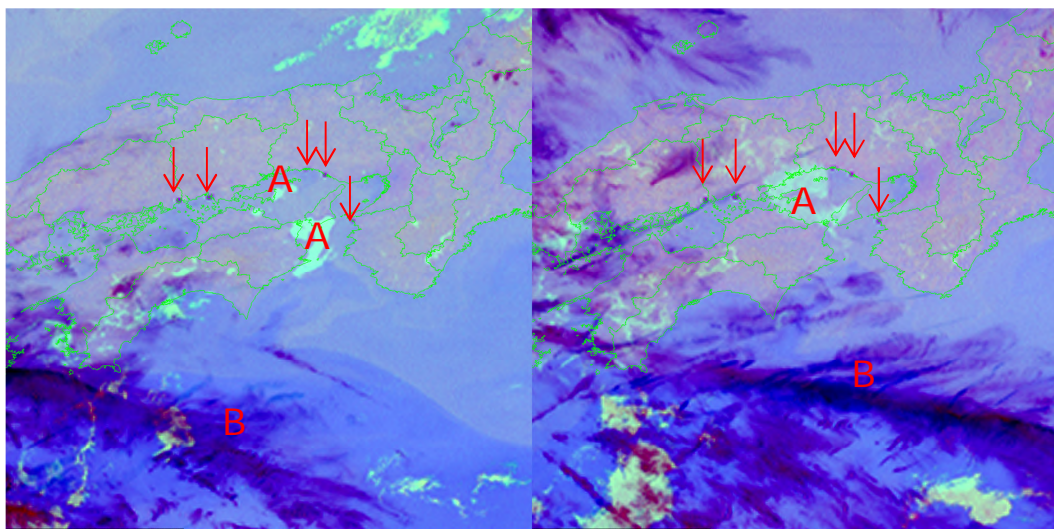Figure 7: Night Microphysics RGB interpretation in SATAID

Figure 8: Fog and thin cirrus cloud around Japan's Seto Inland Sea based on Night Microphysics RGB (1610 UTC (left) and 2045 UTC (right), 30 April 2018)

A: fog or low-level cloud; B: thin cirrus cloud; arrows indicate darkish hotspots considered to be artificial sources of heat (e.g., factories and industrial areas).

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:
"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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