# HimawariCast Newsletter

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Japan Meteorological Agency


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## JMA Himawari-8/9 training event in collaboration with FMS

JMA dispatched experts to the Fiji Meteorological Service (FMS) from May 21st to 26th 2018 to provide training on effective application of Himawari data with SATAID toward operational use (Figure 1). Run by JMA and FMS with the support of the Japan International Cooperation Agency (JICA), the course hosted 14 forecasters from Oceania (the Cook Islands, Kiribati, Fiji, Nauru, Niue, Samoa, the Solomon Islands, Tonga, Tuvalu and Vanuatu). The attendees practiced satellite image analysis and forecast scenario development for the actual cases of Tropical Cyclones Keni, Hola and Gita. FMS highlighted its system for the archiving and sharing of Himawari data based on Network Attached Storage (NAS), which enables access to current and historical data via multiple PCs. JMA's staff very much appreciated the opportunity to collaborate with FMS on the course.

(Shuji Nishimura, Junya Fukuda, Takumi Maruyama)

Figure 1 Training event in Fiji

## JMA supercomputer system upgrade

JMA began the operation of its new supercomputer system on 5 June 2018. The system has 10 times more capacity in terms of meteorological numerical calculation than its predecessor, and can also process larger amounts of data at higher speeds.

JMA leverages its supercomputer for a variety of numerical calculations in monitoring and prediction of weather and climate conditions over periods ranging from the short term to several months ahead, and utilizes the results to support the output of meteorological information for use in disaster prevention, daily life, socio-economic activity and a variety of other areas.

The Agency plans to utilize the new supercomputer for precise early prediction of typhoons and localized torrential rain and for improvements in various types of information, including sequential prediction on scales ranging from weeks to months.

The set-up involves a master system and a subsystem in which Himawari-8 imagery is used (Figure 2).

Satellite products derived from Himawari-8/9 data are also created via the new system, which will also be used to enhance JMA satellite products such as High-resolution Cloud Analysis Information (HCAI). JMA plans to shorten the periodicity of HCAI provision from 60 minutes to 10 minutes.

(Akiyoshi Andou)


Figure 2 Subsystem of JMA's new super computer set-up

## Natural color RGB based on Himawari observation imagery

Natural color RGB (a type of WMO standard composite imagery proposed by EUMETSAT) is created by assigning the three primary colors (red, green and blue) to AHI/Himawari imagery from observation Bands 5 (1.6 μm), Band 4 (0.86 μm) and Band 3 (0.64 μm) with a compositing approach. Band 5 and Band 4 have near-infrared observation band, and Band 3 is a visible band. All imagery components require solar zenith angle correction for clear display even in high-latitude areas. These observation bands have characteristic reflection properties for the distinction of ice/water clouds and for surface conditions such as coverage with snow/ice and vegetation (Table 1).

The left part of Figure 3 shows a situation with sea ice (in cyan, marked "A") and low-level cloud (whitish, marked "B") over the northern Sea of Okhotsk. Due to Band 5's lesser contribution to pixels for sea ice, the sea ice area appears in cyan (as a result of contribution from green and blue). Surface snow cover and high-level cloud with ice crystals are also shown in cyan for the same reason (see Figure 4). Distinction between sea ice and low-level cloud can be challenging with conventional visible band imagery (Band 3) for inexperienced viewers (Figure 3, right).

Figure 5 illustrates the referential case of Typhoon Noru (T1705) approaching southwestern Japan. The detailed structure with whitish low-level clouds (indicated by red arrows) is seen inside the eyewall.

In this way, natural color RGB facilitates distinction between ice/water cloud and areas of snow cover and vegetation. RGB composite data are available only from daytime observation due to dependence on visible and near-infrared band imagery.

(Akihiro Shimizu)

Table 1 Band components and related specifications for natural color RGB data

| Color | AHI Bands | Central wave length [μm] | Physically relates to | Smaller contribution to the signal of | Larger contribution to the signal of |
|---|---|---|---|---|---|
| Red | B05 | 1.6 | Cloud phase<br>Snow cover | Ice clouds<br>Snow covered land/sea ice | Water clouds |
| Green | B04 | 0.86 | Cloud optical thickness<br>Green vegetation | Thin clouds | Thick clouds<br>Snow covered land<br>Vegetation |
| Blue | B03 | 0.64 | Cloud optical thickness | Thin clouds | Thick clouds<br>Snow covered land<br>Sea ice |

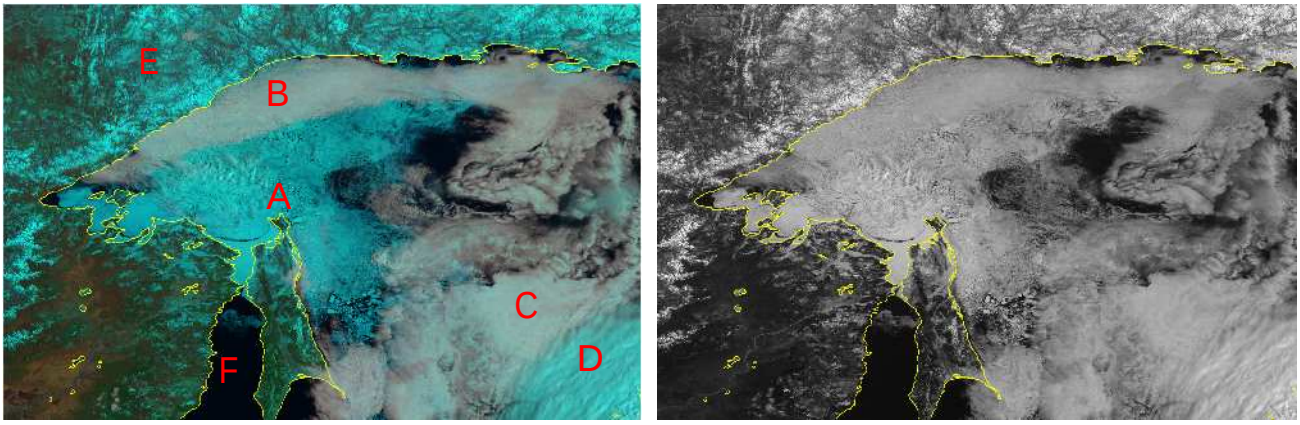


Figure 3 Sea ice and low-level cloud with natural color RGB (left) and visible imagery (Band 3; right) at 2300 UTC on 15 April 2018. A: sea ice; B: low-level cloud; C: thick low-level cloud; D: high-level cloud; E: snow/ice cover; F: ocean

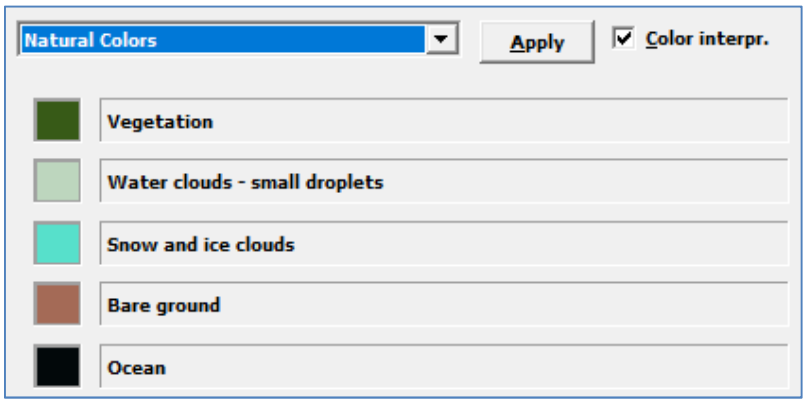


Figure 4 Natural color RGB interpretation in SATAID

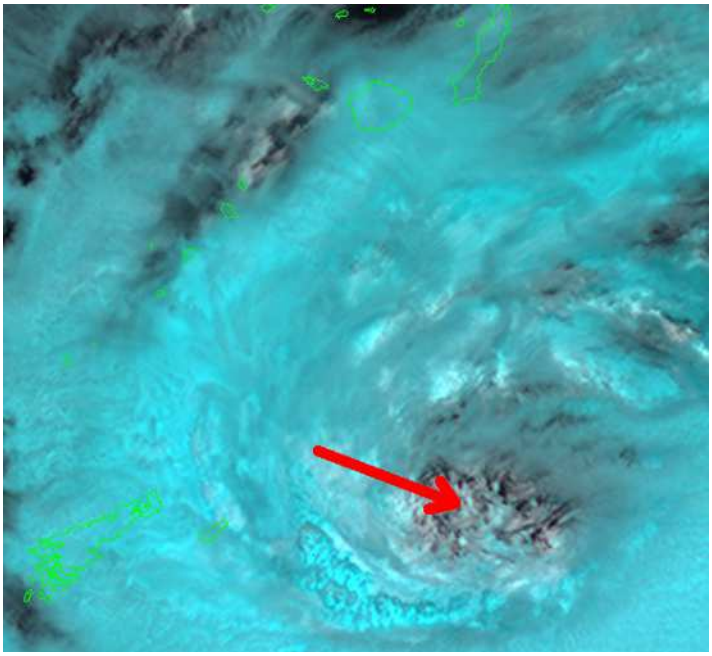

Figure 5 Typhoon Noru with natural color RGB display at 0238 UTC on 4 August 2017

# Access to Himawari archive Data via the NICT Science Cloud Himawari Satellite Project

Question from an NMHS user:

- If it's possible to get historical Himawari data, please advise of the related procedure and provide contact details

JMA engages in real-time distribution for NMHSs via the HimawariCast and HimawariCloud services. A number of Japanese science institutions also operate online data archive and distribution services to provide Himawari data for research, development and education (see "Distribution service for research, development and education" at http://www.jma.go.jp/jma/jma-eng/satellite/dissemination.html#archive). Commercial use of the data provided via these services is prohibited.

Among the services, the NICT Science Cloud Himawari Satellite Project supports the online provision of historical Himawari archive data. The resource requires no registration and can be freely used immediately.

The first Geostationary Meteorological Satellite (GMS) was launched in July 1977, and JMA began to provide meteorological products operationally on April 6 1978. JMA has conducted meteorological satellite observation for over 40 years since then.

Table 2 details the archive data and provides file format information. GMS-series and GOES-9 data are in VISSR archive format as described in the GMS User's Guide (Third Edition).

http://www.jma-net.go.jp/msc/en/support/index.html

MTSAT data is in HRIT format, and Himawari-8/9 data is in Himawari Standard Data format (see the Table 2 footnotes).

Data may have been influenced by numerous satellite switchovers between MTSAT-1R and MTSAT-2.

## NICT online usage

1 Access the NICT Science Cloud Himawari Satellite Project website (http://sc-web.nict.go.jp/himawari/himawari-data-archive.html) and click the blue button marked "Go to download page" (Figure 6).

2 Choose "English" as the language at the bottom of the page.

3 Historical Himawari series data can be explored by clicking folders or selecting folders from a tree form such as the list in the panel to the top left.

4 Multiple files/folders can be selected and downloaded as compressed files up to 2 GB.

Thank you for your inquiry.

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

Akiyoshi Andou


Figure 6 NICT Science Cloud Himawari Satellite Project

Table 2 Data format and period of JMA meteorological satellite data

| Satellite name | Data format | archive period |
|---|---|---|
| GMS | VISSR Archive Data (*1) | March 1, 1981 - December 20, 1981<br>January 21, 1984 - June 29, 1984 |
| GMS-2 | VISSR Archive Data (*1) | December 21, 1981 - January 20, 1984<br>June 29, 1984 - September 26, 1984 |
| GMS-3 | VISSR Archive Data (*1) | September 27, 1984 - December 2, 1989 |
| GMS-4 | VISSR Archive Data (*1) | December 4, 1989 - June 12, 1995 |
| GMS-5 | VISSR Archive Data (*2) | June 13, 1995 - May 21, 2003 |
| GOES-9 | VISSR Archive Data (*2) | May 22, 2003 - June 27, 2005 |
| MTSAT-1R | HRIT format data (*3) | June 28, 2005 - June 31, 2010 |
| MTSAT-2 | HRIT format data (*3) | July 1, 2010 - July 6, 2015 |
| Himawari-8 | Himawari Standard Data (*4)<br>netCDF format Data<br>PNG file | July 7, 2015 - |
| Himawari-9 | | |

*1Format of VISSR Archive Data (GMS, GMS-2, GMS-3 and GMS-4):
http://www.data.jma.go.jp/mscweb/en/operation/docs/VISSR_FORMAT_GMS-4.pdf
*2 Format of VISSR Archive Data (GMS-5 and GVAR-VISSR):
http://www.data.jma.go.jp/mscweb/en/operation/docs/VISSR_FORMAT_GMS-5.pdf
*3 JMA HRIT Mission Specific Implementation:
http://www.data.jma.go.jp/mscweb/en/operation/type/HRIT/JMA_HRIT_Issue1.2.pdf
*4 Himawari Standard Data User's Guide (v1.3, 3 July 2017):
http://www.data.jma.go.jp/mscweb/en/himawari89/space_segment/hsd_sample/HS_D_users_guide_en_v13.pdf

## 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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