HimawariCast Newsletter

No. 6, 6 February 2018

Japan Meteorological Agency

Contents of this issue

Maintenance of Himawari-8

Maintenance of the Himawari-8 satellite is scheduled to take place over a two-day period from 02:30 UTC on 13 February to 07:20 UTC on 14 February 2018. All products during this time will be created using data from the operational Himawari-9 satellite.

As the file name conventions and file format of Himawari-9 data disseminated via HimawariCast are the same as those of Himawari-8, HimawariCast reception systems can process data from both satellites.

This maintenance is for the Advanced Himawari Imager (AHI) on Himawari-8, and will encompass the following:

1) Scanner calibration

2) Update of best detector select (BDS) map

For information on Himawari-9 product performance see JMA (2017), which reports on validation results from a period of Himawari-9 in-orbit testing (IOT).

Scanner calibration

The Himawari-8/AHI (AHI-8) has two scan mirrors (Fig. 1). One rotates on the X axis and the other on the Z axis to scan the earth's surface. The mirrors are commanded using the angle of the X/Z axis to fix the line of sight. There are differences between the commanded and actual mirror angles, and these discrepancies gradually increase with operation. This could in turn cause image navigation and registration (INR) errors.

Annual scanner calibration is recommended to reduce these differences and maintain INR performance.

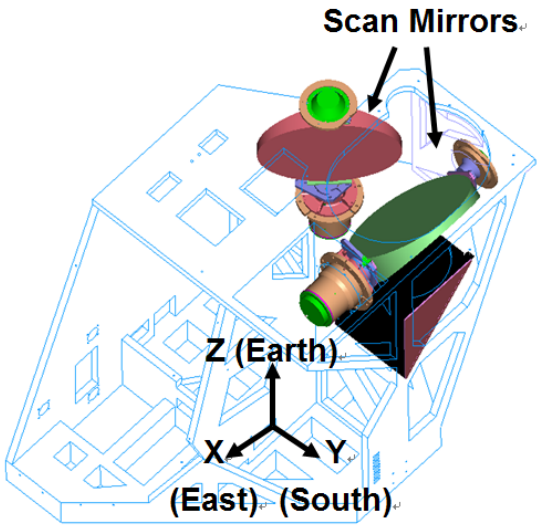

Fig. 1. NS and EW scan drive assemblies of the Advanced Himawari Imager (Griffith 2015)

BDS map update

AHI-8 has several redundant detector columns for each band (three for Bands 1 to 3 and six for the other bands), and the best detector in each row is selected.

The performance of all detectors was evaluated during IOT in December 2014 and the best detectors were chosen, but the characteristics of several AHI-8 detectors have become unstable in orbit, resulting in stripe noise in the E-W direction on Himawari-8 imagery.

Fig. 2 shows two examples of such noise. (a) and (b) show an infrared differential image and a Band8 image, respectively, with

very clear stripe noise in the E-W direction. This can degrade the quality of geophysical products (e.g., the number of valid grid-point data) and affect the qualitative use of satellite imagery (e.g., for volcanic ash monitoring).

To eliminate this noise, the use of around 15 unstable detectors in infrared bands will be switched to redundant detectors. Table 1 shows the number of detectors to be changed for each band.

Fig. 3 shows the impacts of the BDS map update on Himawari-9 imagery. The clear black and grey stripe noise in the E-W direction in (a) is effectively removed in (b). The map update is expected to eliminate such striping (including that shown in Fig. 2).

(Kenji Date and Akiyoshi Andou)

Table 1. Number of detectors to be changed for each band

Band	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Number	0	0	0	0	0	0	0	2	0	7	0	0	3	0	2	2

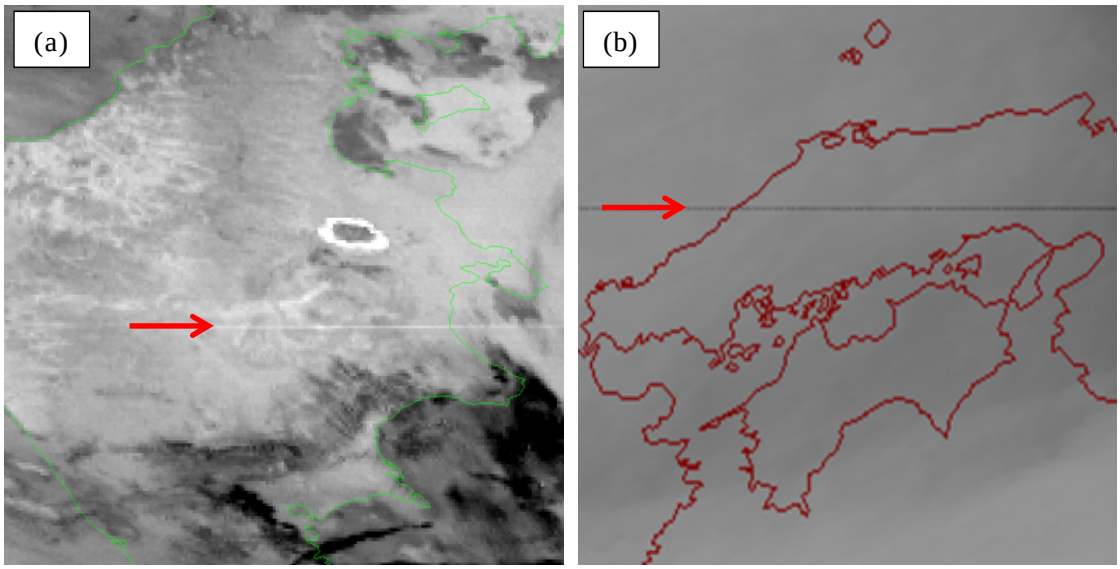

Fig. 2. Stripe noise in Himawari-8 imagery
(a) Infrared differential image (Band13 – Band15), 17:10 UTC, 14 June 2017.
(b) Band8 image, 19:00 UTC, 6 January 2017.

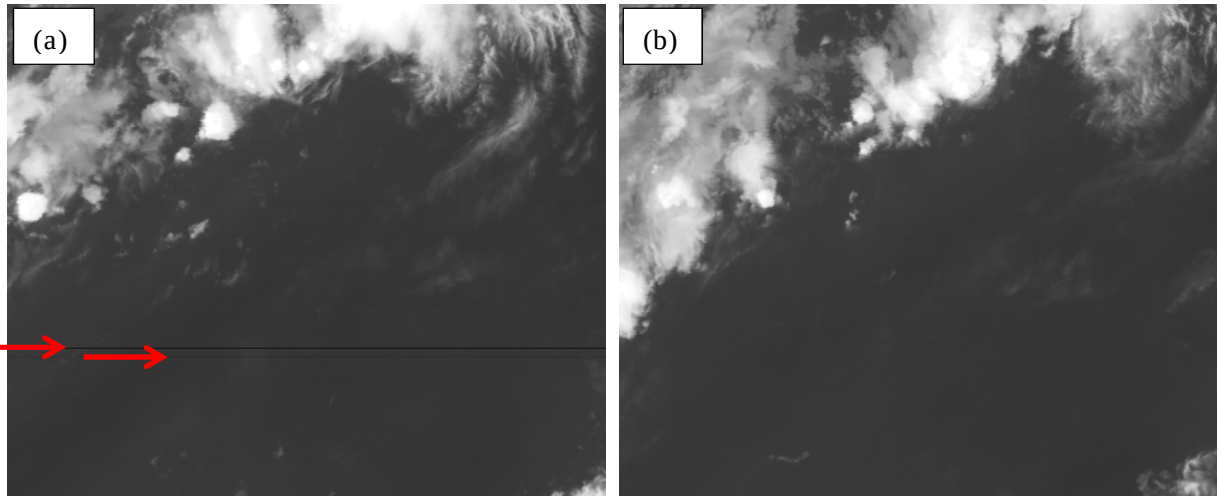

Fig. 3. Band15 imagery from Himawari-9, 8 September, 2017
(a) Before BDS map update, 00:50 UTC. (b) After BDS map update, 02:50 UTC.

Himawari-8 and 9 image differences

Himawari-8 and -9 both carry Advanced Himawari Imagers (AHIs) with identical observation specifications but slightly different SRFs (spectral response functions). SRFs characterize the sensitivity of individual sensor spectral bands. Fig. 4 shows the SRFs of Band 7 (3.9 μm) for both satellites as an example.

SRF differences lead to slight differences in images as shown in Fig. 5. Although these discrepancies may not be immediately discernible, they can be seen in the histograms of observed brightness temperature in Fig. 6.

End users of imagery do not necessarily need to be aware of the differences between Himawari-8 and -9, but these should be taken into account in detailed case studies and calculations involving quantitative information using data from both satellites.

(Akihiro Shimizu)

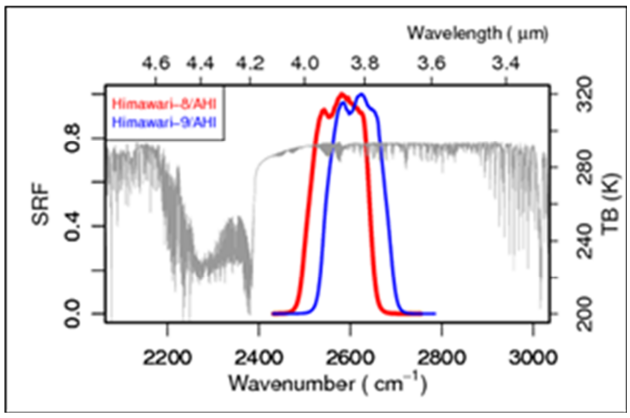

Fig. 4 Spectral response functions (SRFs) of the AHIs on Himawari-8 and -9. ("Imager (AHI): Spectral Response Functions," MSC/ JMA, http://www.data.jma.go.jp/mscweb/en/himawari89/space_segment/spsg_ahi.html#srf)

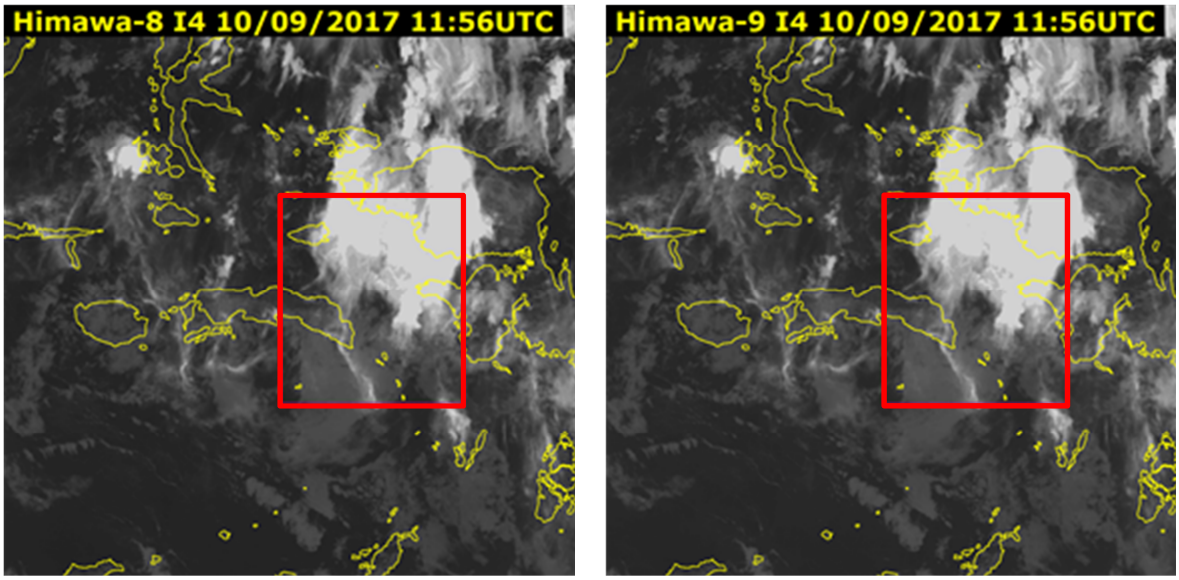

Fig. 5 3.9 μm infrared images (referred to as "I4" in SATAID application) from Himawari-8 (left) and -9 (right) (11:56 UTC, 10 September 2017). The squares mark the data ranges of the histograms in Fig. 6.

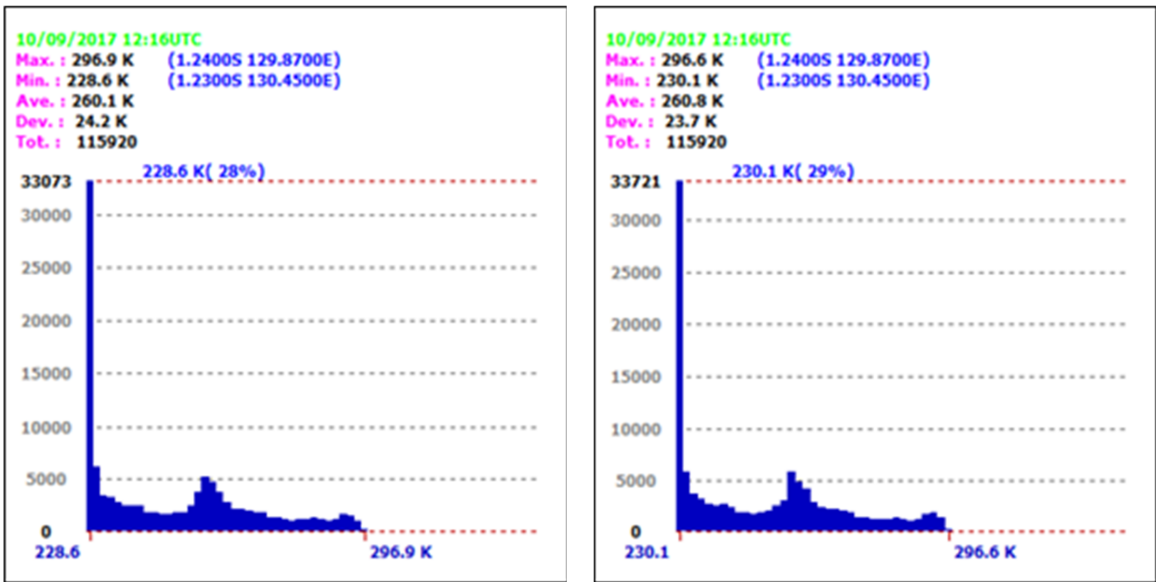

Fig. 6 Brightness temperature histograms for 3.9 μm infrared images (I4) from Himawari-8 (left) and -9 (right) (11:56 UTC, 10 September 2017)

Reference

JMA, 2017: Validation of Himawari-9/AHI Level-1 and -2 data during In-orbit Test. Working Paper of the 45th Meeting of the Coordination Group for Meteorological Satellites, Jeju, Republic of Korea, 11-16 June, 2017. The paper is available at: https://www.cgms-info.org/Agendas/WP/CGMS-45-JMA-WP-04

Griffith, P. C., 2015: Advanced Himawari Imager (AHI) Design and Operational Flexibility. Sixth Asia/Oceania Meteorological Satellite User's Conference, Tokyo, Japan, November 9-13, 2015. The material is available at: http://www.data.jma.go.jp/mscweb/en/aomsuc6_data/oral/s02-01.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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