



*International Civil Aviation Organization*

**EIGHTEENTH MEETING OF THE METEOROLOGY  
SUB-GROUP (MET SG/18) OF APANPIRG**

ICAO Regional Sub-Office, Beijing, China  
18 – 21 August 2014

**Agenda Item 7: Research, development and implementation issues in the MET field**

**7.9 Other**

**HIMAWARI-8/9 — JAPAN'S NEXT GENERATION OF GEOSTATIONARY  
METEOROLOGICAL SATELLITES**

(Presented by Japan)

**SUMMARY**

This paper presents the overview of Japan's next generation of geostationary meteorological satellites, Himawari-8 and -9, and the current status on their imagery distribution/dissemination.

**1. Introduction**

1.1 The Japan Meteorological Agency (JMA) plans to launch the world's first next-generation geostationary satellite, Himawari-8, in October 2014 and to start its operation in the middle of 2015 as a replacement for MTSAT-2 (also called Himawari-7). Himawari-9 will also be launched in 2016 as a backup and successor satellite. Both satellites will be located at around 140 degrees east, and will observe the East Asia and Western Pacific regions for a period of 15 years.

1.2 Himawari-8/9 will have 16 bands, which is more than three times the 5 bands of the current MTSAT series. Three of these will be visible bands corresponding to red, green and blue to enable the creation of true-color images. Full-disk imagery will be obtained every 10 minutes, and rapid scanning at 2.5-minute intervals will be conducted in several regions. Furthermore, the horizontal resolution will be double that of the MTSAT series. These significant improvements will bring unprecedented levels of precision in monitoring the motion of tropical cyclones and developed cumulonimbus clouds.

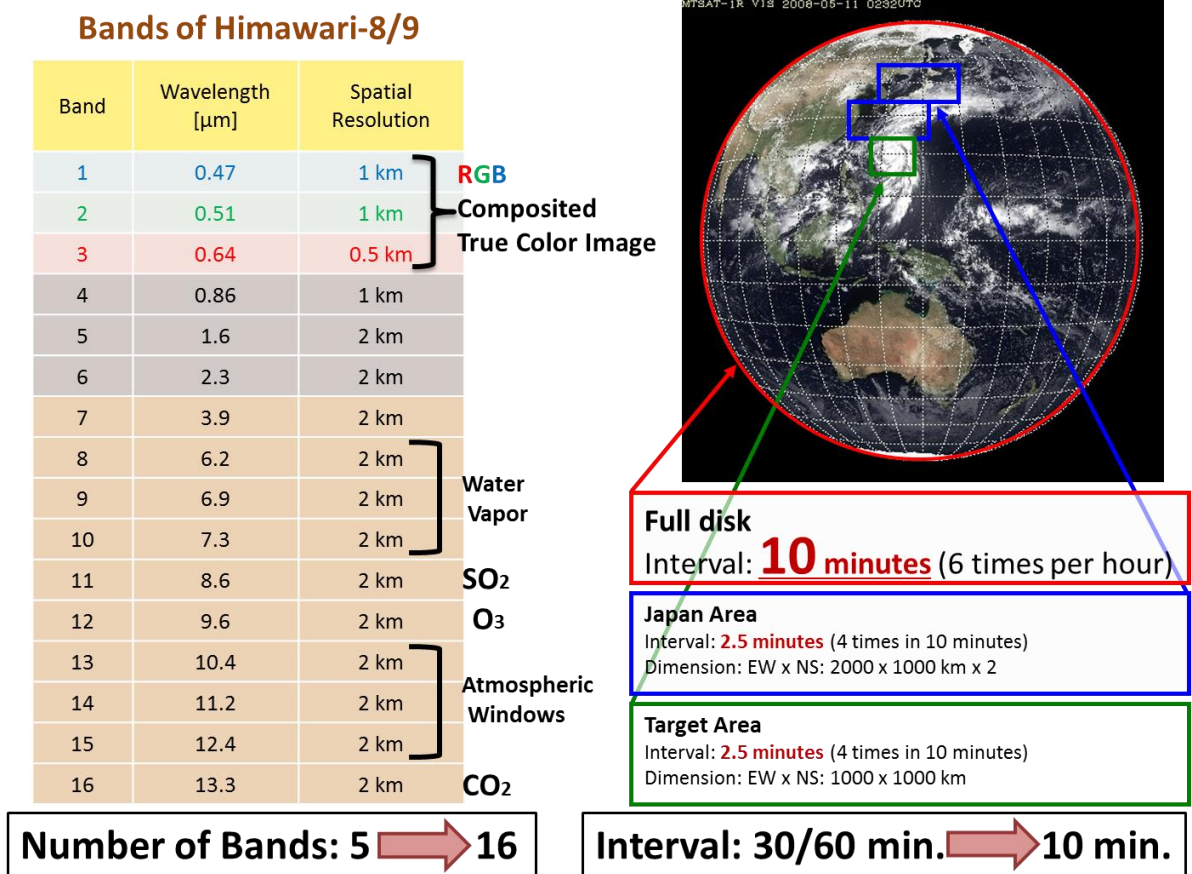
1.3 Satellite imagery is also indispensable for operations of volcanic ash advisory centres (VAACs), which monitor volcanic eruptions and provide information on the locations and movement of volcanic ash clouds as well as an outlook for their regions of responsibility. Himawari-8/9 are to upgrade the capability of the VAAC Tokyo in JMA. It goes without saying that the higher spatial resolution of Himawari-8/9 will be beneficial for the volcanic ash monitoring and their rapid scanning will enable quicker detection of eruptions, which will lead more timely information issuance.

Additionally, using split images between the new bands around 7 or 8  $\mu\text{m}$  and 10  $\mu\text{m}$ ,  $\text{SO}_2$  can be detected, which enables to grasp the current volcanic activities and makes volcanic ash detection easier by combining the fact of  $\text{SO}_2$  existence and some other analysis results. These analysis results are called “volcanic ash products” in which physical quantities of aerosol optical depth, mass-loading and so on are calculated from the raw satellite data and are visualized. These products may become more useful and reliable with multi-band, high-frequency and high-resolution data of Himawari-8/9.

1.4 JMA will distribute all imagery derived from the satellites to the National Meteorological and Hydrological Services (NMHSs) via the Internet cloud service. In addition, JMA plans to start the HimawariCast service, which disseminates a primary set of imagery for operational meteorological services via a communication satellite using Digital Video Broadcasting – Satellite – Second Generation (DVB-S2).

1.5 The current status of the Internet cloud service and the HimawariCast service is described in the following sections. Besides, JMA will regularly update, and inform relevant NMHSs of, the progress on imagery distribution/dissemination by letters and emails as well as in the following websites.

<http://www.jma.go.jp/jma/jma-eng/satellite/>  
<http://mscweb.kishou.go.jp/himawari89/>



## 2. Internet cloud service

2.1 To distribute the enormous volumes of Himawari-8/9 imagery, JMA will establish an Internet cloud service mainly for NMHSs in the East Asia and Western Pacific regions.

2.2 Table 1 shows the tentative data set to be distributed via the cloud service. Himawari Standard Data will be used to create all products related to Himawari-8/9 as master data from all 16 bands with the finest spatial resolution. The above-mentioned true-color images will be provided in Portable Network Graphics (PNG) format. For rapid scanning observation, imagery in Network Common Data Form (NetCDF) will also be created and distributed.

2.3 Each NMHS will be able to access the cloud and get data using an HTTP 1.1 client such as a Web browser or Wget. It is important to note that an Internet connection with a speed of at least 25 Mbps will be required to download all Himawari Standard Data. These data will be separately created for each band and divided into 10 segments from north to south so that NMHSs can select only the files necessary for their operation.

2.4 JMA plans to start test operation of the Internet cloud service in Q1 of 2015 with distribution of Himawari-8 in-orbit-test imagery.

Table 1: The tentative data set to be distributed via the Internet cloud service

Format	Observation area	Notes
Himawari Standard Data	Full disk Target area	- Full disk: every 10 minutes - Target area: every 2.5 minutes - 16 bands - Finest-spatial-resolution data
Portable Network Graphics (PNG)	Full disk Target area	- True-color images (composites of 3 visible bands) - Full disk: every 10 minutes - Target area: every 2.5 minutes - Same spatial resolution as Himawari Standard Data
Network Common Data Form (NetCDF)	Target area	- Every 2.5 minutes - 16 bands - Same spatial resolution as Himawari Standard Data

## 3. HimawariCast service

3.1 The Internet cloud service requires high-speed Internet access, whereas the HimawariCast service is suitable for users with limited Internet access.

3.2 Table 2 shows the tentative data set to be disseminated via communication satellite. As satellite imagery, JMA will disseminate High Rate Information Transmission (HRIT) files and Low Rate Information Transmission (LRIT) files, both of which are compatible with current MTSAT data. Dissemination will further include meteorological data other than Himawari imagery in Satellite Animation and Interactive Diagnosis (SATAID) format. SATAID visualization software for satellite imagery enables the superimposition of various data and products, such as NWP information, in-situ observation data and ASCAT output, onto satellite imagery. SATAID is widely used by NMHSs in the East Asia and Western Pacific regions as an operational tool for daily weather analysis and forecasting due to its usefulness and convenience.

3.3 The HimawariCast receiving and processing system will include a C-band antenna system, a Low Noise Block Converter (LNB), a DVB-S2 receiver and a desktop PC with datacasting client software and visualization software.

3.4 JMA plans to start the HimawariCast service early in 2015 when MTSAT-2 (Himawari-7) is still in operation. MTSAT-2 imagery will be disseminated through this service until Himawari-8 becomes operational in the middle of 2015. Himawari-8 imagery will thereafter be disseminated via the HimawariCast service.

Table 2: The tentative data set to be disseminated via the HimawariCast service

Data type	Format	Notes
Himawari imagery (full disk)	HRIT files LRIT files	<ul style="list-style-type: none"> <li>- Format compatible with the current MTSAT data</li> <li>- Every 10 minutes</li> <li>- HRIT: 5 bands (VIS: 1, IR: 4)</li> <li>- LRIT: 4 bands (VIS: 1, IR: 3)</li> <li>- Coarser spatial resolution than Himawari Standard data</li> </ul>
Numerical weather prediction products (GPV)	SATAID format	<ul style="list-style-type: none"> <li>- JMA Global Model (GSM) products</li> <li>- Every 6 hours</li> </ul>
In-situ observations (surface stations, ships, radiosondes)	SATAID format	<ul style="list-style-type: none"> <li>- Observation data collected from the East Asia and Western Pacific regions</li> </ul>
ASCAT ocean surface wind (EUMETSAT)	SATAID format	<ul style="list-style-type: none"> <li>- Originally provided by the EUMETSAT Ocean and Sea Ice Satellite Application Facility (OSI SAF) and converted into SATAID format by JMA</li> </ul>

#### 4. Action by the Meeting

4.1 The meeting is invited to note the information contained in this paper.

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