

JMA report on the status of current and future satellite systems

This document summarizes the status of JMA's current and future GEO satellite systems. JMA operates two geostationary satellites named Himawari-8 and -9. Both satellites have identical specifications, and these twin satellites are expected to support JMA's operation of robust satellite observation services to the Asia-Oceania region until 2029.

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1 INTRODUCTION

The Japan Meteorological Agency (JMA) operates two geostationary meteorological satellites, Himawari-8 and -9, equipped with Advanced Himawari Imager (AHI) units. JMA has established a satellite observation system with redundancy based on twin satellite operation, which is expected to contribute to disaster risk reduction in Asia and the western Pacific until 2029. Himawari-8 will chiefly be used for observation during the early part of this period, with Himawari-9 in a back-up role. Their operation will be switched in 2022 to place Himawari-9 in the main observation role with Himawari-8 as back-up.



Figure 1: Himawari-8/-9 timeline

2 CURRENT SATELLITE SYSTEMS

JMA's current GEO satellites

Sector	Satellite	Location	Launch date DD/MM/YYYY	Data Access	Payload and status
East Asia and Western Pacific	Himawari-8	140.7°E	07/10/2014	HimawariCast HimawariCloud	16-channel AHI, DCS, SEDA; operational
	Himawari-9	140.7°E	02/11/2016	HimawariCast HimawariCloud	16-channel AHI, DCS, SEDA; in-orbit standby

2.1 Status of spacecraft

2.1.1 Himawari-8

The status of Himawari-8 is normal, with no significant anomalies since CGMS-45. The following webpage provides information on irregular events, processing events and data outages of the satellite:

https://www.data.jma.go.jp/mscweb/en/operation8/event_H8.html

Maintenance of the Himawari-8 was took 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

were created using data from the operational Himawari-9 satellite. Similar maintenance for Himawari-8 is scheduled over a period of a few days in February 2019.

2.1.2 Himawari-9

The status of Himawari-9 is normal, with no significant anomalies since CGMS-45. The following webpage provides information of irregular events, processing events and data outages of the satellite.

https://www.data.jma.go.jp/mscweb/en/operation8/event_H9.html

In the event of a critical Himawari-8 malfunction, Himawari-9 will begin back-up observation.

JMA has conducted four health checks on Himawari-9 since the commencement of its back-up operation in March 2017 to verify the integrity of its AHI function. Further checks are planned in September 2018 and February 2019 to ensure intended operation.

See JMA-WP-04 for information on validation of Himawari-9/AHI Level-1 and -2 data during the previous health check operations.

2.2 Data Collection System

Himawari-8 currently supports the Data Collection Service. Monthly reports on Himawari-8's IDCS is available at

https://www.data.jma.go.jp/mscweb/en/operation8/opr_report.html

See the JMA-WP-03 for more information on Himawari-DCS.

2.3 Space Environment Data Acquisition

Himawari-8 and -9 have instruments to sense proton and electron flux for satellite housekeeping known as SEDA (Space Environment Data Acquisition). SEDA text data acquired from the satellites are provided to the National Institute of Information and Communications Technology (NICT) to support near-real-time space environment monitoring and forecasting. For more information, see the NICT Space Weather Information Center Web page at http://swc.nict.go.jp/contents/index_e.php.

See also NICT-WP-02 for more on near-real-time access to SEDA data.

2.4 Data distribution/dissemination

JMA mainly distributes Himawari-8/9 data in two ways. One is the HimawariCast service, by which primary sets of imagery are disseminated as operational

meteorological services via a commercial communication satellite. The other is the HimawariCloud service, by which full sets of imagery are delivered to National Meteorological and Hydrological Services (NMHSs) via a private Internet cloud service. JMA also distributes Himawari-8/9 data to NMHSs via JDDS (the JMA Data Dissemination System) and, in conjunction with four other Japanese institutions, provides Himawari-8/9 data distribution/archive services for research, development and education purposes.

2.4.1 HimawariCast service

JMA started the HimawariCast service on 29 January 2015. Himawari imagery in full-disk HRIT/LRIT files is compatible with previous MTSAT HRIT/LRIT data. Files are provided every 10 minutes, and the number of bands for HRIT files is 14 out of Himawari-8/9's 16. These multi-band high-frequency observation data support the timely creation of RGB products and are expected to contribute to disaster risk reduction in the East Asia and Western Pacific regions.

JMA also disseminates meteorological data and products in Satellite Animation and Interactive Diagnosis (SATAID) format, including numerical weather prediction products and observational data. The Agency's SATAID software enables the superimposition of these data and products onto satellite imagery.

Up-to-date information, including specifications of equipment needed to receive data via HimawariCast, is available at:

https://www.data.jma.go.jp/mscweb/en/himawari89/himawari_cast/himawari_cast.html

2.4.2 HimawariCloud service

JMA launched the HimawariCloud service on 8 April 2015 with the distribution of Himawari-8 in-orbit-test imagery.

Himawari Standard Data are used as master data from all 16 bands with the finest spatial resolution to create all products related to Himawari-8/9. True-color images composed of data from three visible bands are provided in Portable Network Graphics (PNG) format. In addition, images of Target Areas observation in Network Common Data Form (NetCDF) are also created and distributed.

NMHSs in the Himawari-8/9 coverage area can access HimawariCloud and retrieve data using an HTTP 1.1 client such as a Web browser or Wget. A minimum of 20 Mbps throughput between HimawariCloud and the user client is needed to download all data provided via the HimawariCloud service. It should be noted that HimawariCloud is not a data archive service. Data can be downloaded for 72 hours after receipt by the HimawariCloud server, and are then deleted.

The following web page provides technical information on how to access/download data and other matters via HimawariCloud:

https://www.data.jma.go.jp/mscweb/en/himawari89/cloud_service/cloud_service.html

2.4.3 JMA Data Dissemination System (JDDS)

JMA provides an FTP service via JDDS for the dissemination of a variety of meteorological data to NMHSs. Satellite imagery and High-resolution Cloud Analysis Information (HCAI) derived from satellite observation are also provided via the service. Satellite imagery via JDDS intends to support users of former operational MTSAT series as an interim measure until users become ready to receive Himawari-8/9 imagery via HimawariCloud or HimawariCast.

The following web page provides the information of distribution via JDDS:

https://www.data.jma.go.jp/mscweb/en/himawari89/JDDS_service/JDDS_service.html

2.4.4 Distribution service for research, development and education

The following four Japanese institutions operate Himawari-8 data archiving and redistribution services on a best-effort basis for research, development and education:

- NICT Science Cloud <http://sc-web.nict.go.jp/himawari/> (Japanese)
- CEReS <http://www.cr.chiba-u.jp/english/>
- EDITORIA-DIAS <http://www.diasjp.net/en/>
- JAXA-EORC <http://www.eorc.jaxa.jp/ptree/index.html>

Users must register to download data from each institution and observe the individual data usage policies.

2.5 HimawariRequest Service

In January 2018, JMA launched a new international service “HimawariRequest”, in collaboration with the Australian Bureau of Meteorology. The service allows NMHS users in Himawari-8/9 coverage area to request Target Area observation covering a 1,000km x 1,000km area every 2.5 minutes.

As of 10 May 2018, JMA had taken registrations from nine NMHSs in RA II and RA V (the Solomon Islands, Myanmar, Australia, Hong Kong, Bangladesh, New Zealand, Malaysia, Samoa and Nepal), and opened the service to the four (the Solomon Islands, Hong Kong, New Zealand and Nepal) whose preparations for request submission were complete.

See JMA-WP-06 for more information on the HimawariRequest service.

2.6 User support

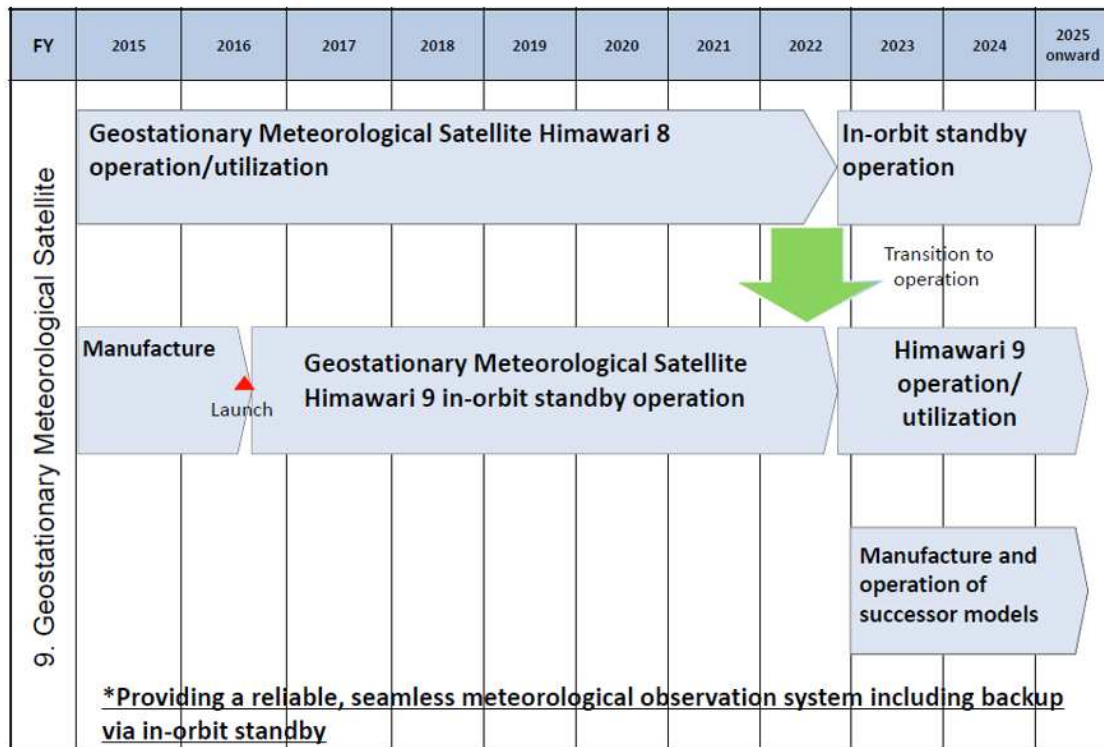
To support users preparing for Himawari-8/9 data utilization, JMA provides Himawari-8/9 information on the Himawari User's Guide web page. The information encompasses the schedule, spacecraft/AHI specifications including estimated spectral response functions (SRFs), sample data in various file formats, data distribution/dissemination methods, and reference software for data reading/conversion. JMA also posts Himawari-8/9 information on its Satellite User Readiness Navigator (SATURN) resource. See also the following web pages:

<https://www.jma-net.go.jp/msc/en/support/>
<https://www.wmo-sat.info/satellite-user-readiness/topic/satellites/himawari-8/>

3 FUTURE SATELLITE SYSTEMS

In FY 2018, JMA has started considering the next geostationary satellite program. The Implementation Plan of the Basic Plan on Space Policy, which is decided/revised by the Strategic Headquarters for National Space Policy, states that “By FY2023 Japan will start manufacturing the Geostationary Meteorological Satellites that will be the successors to Himawari-8 and -9, aiming to put them into operation in around FY2029”.

4. (2)①ii) Satellite remote sensing



*All of the above: MLIT

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Figure 2: Description of Japan's geostationary meteorological satellites in the Implementation Plan of the Basic Plan on Space Policy revised in FY2017 (Full Text (Tentative Translation): <http://www8.cao.go.jp/space/english/basicplan/2017/basicplan.pdf>)

4 CONCLUSIONS

This document summarizes the status of JMA's current and future satellite systems. CGMS is invited to take note.