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RA II WIGOS Project Newsletter

DEVELOPING SUPPORT FOR NATIONAL METEOROLOGICAL AND HYDROLOGICAL SERVICES IN SATELLITE DATA, PRODUCTS AND TRAINING

Contents of this issue

The 44th meeting of the Coordination Group for Meteorological Satellites (CGMS-44), in Biot, France, 6-10 June 2016

Background

CGMS provides an international forum for the exchange of technical information on geostationary and polar orbiting meteorological satellite systems.

The 44th CGMS was held on 6-10 June 2016 in Biot, France. The meeting was hosted by EUMETSAT.

The meeting was chaired by Mr. Alain Ratier, EUMETSAT Director-General and Head of the CGMS Secretariat.

The Plenary session in the period 9-10 June 2016 was preceded by the four CGMS Working Groups (WGI Global issues on satellite systems and telecommunication coordination, WGII Satellite data and products, WGIII Operational continuity and contingency planning, and WGIV Global data dissemination) as well as the meeting on space weather in 5 June 2016.

In addition, there was Joint CGMS-CEOS side event on non-meteorological applications for the next generation of geostationary satellites.

Objectives of CGMS

The main objectives of CGMS are:

- To have a clear focus on coordination of long-term and sustainable satellite systems relevant to weather and climate to which both operational and R&D agencies contribute;

- To give a *technical* focus to the discussions handled by the group; and
- Through a close interaction with WMO, to respond as far as possible to requirements from WMO and related programmes (e.g. WIGOS, IOC, GCOS).

Working Group I: Global Issues on Satellite Systems and Telecommunication Coordination

WG I mainly discussed to simplify the global specification of formats used for product deliver to users for future missions and instruments (based on use of existing standards) and as much as possible. And when data volume is critical for dissemination, instrument dependant formats may be developed, such as JMA's HSD format for Himawari-8/9 data. Software tools supporting the conversion of these data to one or more of the standard data formats should be made available to users.

International Science Working Groups and initiatives (WG II)

International Cloud WG

Cloud information is very important to the work of other ISWGs, especially for severe weather analysis, height assignments of winds, improved cloud detection in hyperspectral sounding.

Inter-comparison of cloud products, with focus on new-gen imagers: Golden Day (19 Aug 2015), 10 min full-disc scan, 2 km horizonal resolution if possible.

International Radio-Occultation WG

Recent impact studies confirmed the value of 20 000 occultations per day, recognizing the highest impact from good coverage of RO in horizontal and vertical, and particularly extending into the troposphere. CGMS recognized the impact of polar RO to be provided through COSMIC-2B or a similar programme, and also recommended experiments to confirm the impact of RO measurements, especially down to troposphere above the boundary layer, and the related cost. CGMS recommended a strong dialogue between IROWG and NOAA regarding the Commercial Weather Data Pilot.

International Precipitation WG

IPWG expressed concern over the health of the operational constellation of conically-scanning MW platforms, given the uncertainty around GCOM-W follow-on, SSMIS F20 and DMSP follow-on, and GMI-2. IPWG identified the need for better agency coordination for better monitoring of distinct aspects of precipitation processes, such as cloud phase, microphysics, and liquid/ice

water path. Regarding a precipitation validation site in India, raingauge or radar data (24h accumulated), or merged data, would be required.

International TOVS WG

ITGW recommended that CGMS agencies to maintain the constellation of at least three polar orbits (early morning, morning, and afternoon), each with full sounding capabilities (IR and MW). The overpass times of operational satellites with sounding capability (IR and MW) should be coordinated between agencies to maximize their value.

It also recommended future satellite programmes of CGMS members should include the provision of high temporal frequency MW humidity sounding radiances (alongside cloud and precipitation sensitive observations).

International Wind WG

IWWG planned the 3rd Intercomparison, using same Golden Day as ICWG, use H-8 full-disc, and significant improvements in winds would be expected, if coupled with improved clouds.

Working Group IV Global Data Dissemination

The WMO WP "Best Practices for Achieving User Readiness for New Meteorological Satellites" presents, in an integrated manner, Best Practices for User Readiness Projects performed by user organisations (e.g. NHMSs) as well as for satellite development programmes in support to user readiness.

EUMETSAT MTG dissemination standard and data formats Preliminary and high level information was provided. And action to provide a timeline for the users preparation information for MTG, in accordance with "Best Practices for Achieving User Readiness for New Meteorological Satellites"

Space Weather Task Team

The objective of SWTT is To define the methodology by which we would implement space weather into CGMS in line with the CGMS Space Weather Activities Terms of Reference: "The overarching goal of CGMS Space Weather activities is to support the continuity and integration of space-based observing capabilities for operational Space Weather products and services."

The first main outcome is validated that the current CGMS construct is wellsuited to allow implementation of space weather objectives

- Identified and proposed Space Weather Task Team priorities for High Level Priority Plan (HLPP)

The second one is determined that engaging CGMS in Space Weather requires communication and integration internally and with various international groups

- Identified need for buy-in from leadership and colleagues across the space weather community
- Propose workshop to engage expert leadership and community

WMO RAII/V Pilot Activity on Satellites for Disaster Risk Reduction

The WMO Integrated Global Observing System (WIGOS) Joint Workshop for Region II (Asia) and Region V (South-West Pacific) for Disaster Risk Reduction (DRR) was held in Jakarta, Indonesia, from 12 to 14 October 2015. The Workshop was aimed at enhancing the exchange of observations across the Southeast Asia region and to improve the availability and quality, of those observations that have significant applications in DRR, e.g. in early warning systems for severe weather events. Representatives from eight RA II and six RA V WMO Members participated in the Workshop which major outcome is contained in the "Jakarta declaration".

The declaration proposes the development of two Joint RA II/RA V WIGOS projects: one on Satellite Data and another one on Radar Data. The Satellite Data project aims at (i) strengthening the capabilities of all Members to use geostationary satellite images and derived products in support of DRR and (ii) developing a protocol for the National Meteorological and Hydrological Services (NMHSs) in the project countries to request eventdriven rapid-scan imagery for their

respective national areas of interest.
After approval by RA II and RA V Management Groups, a joint RA II/V Coordination Group should be established for each project.

SCOPE-NOWCASTING PROGRESS

The four pilot projects of the Sustained Coordinated Processing of Environmental Satellite Data for Nowcasting (SCOPE-Nowcasting) initiative have made steady progress since their inception in 2013:

Pilot Project 1: Basic satellite imagery for Severe Weather Forecasting Demonstration Project (SWFDP) focus regions in Asia and South-West Pacific, including RGBs from Himawari-8, with key focus on consistent and agreed products across satellites from multiple operators.

Pilot Project 2: Intercomparison of satellite-based volcanic ash retrieval algorithms, to inform operationalization of such algorithms for aviation services and ICAO.

Pilot Project 3: Blended global satellite rainfall product for nowcasting and severe weather risk reduction using webmapping services.

Pilot Project 4: Sand and dust monitoring in Asia using different data sources, exchange of ground-based validation data, and intercomparison of JMA and CMA algorithms.

A meeting of the SCOPE-Nowcasting Steering Group is envisaged for early 2017 to advise on the way forward into the pre-operational phase of the initiative. The Steering Group will be formalized by WMO in the course of 2016, including invitations to the satellite operators currently contributing to SCOPE-Nowcasting (EUMETSAT, JMA, CMA, KMA, and NOAA).

RA II WIGOS project

JMA and KMA provided a progress report on the RA II WIGOS project to develop support for NHMSs in satellite data, products and training. The Project serves as a bridge between the six satellite operators in RA II and users through the Coordinating Group, representing a number of RA II member countries.

- Newsletters to RA II Members: Quarterly newsletters have been issued to share recent satellite-related information on topics such as imagery data, products and training.
- 6th Asia/Oceania Meteorological Satellite Users' Conference and VLab training event in Tokyo, Japan.
- The conference involved two days of training for RA II and RA V. Presentations highlighted new-generation geostationary meteorological satellites such as Himawari-8 and applications for RGB satellite imagery. RGB products are easy to composite, and their further use in weather analysis is expected.
- The Third Meeting of the Coordinating Group of the WMO RA II (Asia) WIGOS Project was held in Tokyo, Japan. A number of RA V was attended as member observers. The questionnaire was designed for users' requirements, expectations and challenges and a more comprehensive questionnaire should be developed under the project to more accurately assess user needs.
- 7th Asia/Oceania Meteorological Satellite Users' Conference and training event: KMA is host in Korea in 24-28 October 2016 (http://nmsc.kma.go.kr/aomsuc7/main.jsp). There will be a two day training event is also planned at the time of the meeting. It is suggested to continue such a cooperative training event in conjunction with future AOMSUC sessions.

The fourth meeting of the Coordinating Group of the RA II WIGOS Project will be held in 2016 in Korea on the occasion of AOMSUC-7.

(Dohyeong Kim/KMA)

The 7th Asia-Oceania / 2nd AMS-Asia / 2nd KMA Satellite Users' Conference

The KMA is pleased to announce the 7th Asia-Oceania / 2nd AMS-Asia / 2nd KMA Meteorological Satellite Users' Conference to take place **from 24 to 28 October 2016 in Songdo City, Incheon, Korea.**

Background

The Asia and Oceania regions are frequently affected by severe natural phenomena such as tropical cyclones, torrential monsoons, volcanic eruptions, yellow sand storms, floods, sea ice and wildfires. The importance of monitoring the climate and the environment is also increasing, which has prompted enhanced global interest in the field. In this area, meteorological and earth observation satellites provide frequent and extensive observational information for use in disaster prevention and climate monitoring/diagnostics, and are indispensable in today's world.

Since the first launch of Japan's meteorological satellites over Asia and Oceania in 1977, now Korea, China, Europe, India, Japan, the Russian Federation and the United States all have operational meteorological and climate monitoring satellites over Asia and Oceania as part of the Global Observing System (GOS) promoted by the World Meteorological Organization (WMO), which contributes to the Global Earth Observation System of Systems (GEOSS) coordinated by the Group on Earth Observations (GEO).

Objectives

With the start of Japan's next generation meteorological satellite, Himawari-8 in 2015, there will be followed by FY-4 of China, Geo-KOMPSAT-2A of Korea over Asia and Oceania. To further enhance the exchanges on application techniques among satellite data users in Asia/Oceania, as well as to advance satellite observation technologies, and to promote synergetic development related to meteorological satellites in this region, the 7th Asia-Oceania/2nd AMS-Asia/ 2nd KMA Meteorological Satellite Users' Conference will be held in Songdo City, Incheon, Korea

Daily Schedule

- 21~22 October : Training on meteorological satellite data usage
- 24~27 October : The 7th Asia-Oceania / 2nd AMS-Asia / 2nd KMA Meteorological Satellite Users' Conference
- 28 October : The 4th meeting of the Coordinating Group of the RA II WIGOS Project

Conference Topics

- Current and future meteorological satellite programs
- Geo-KOMPSAT-2A related status and application
- New development of applications and innovative methods of processing, combining, assimilating and blending/fusing satellite data
- Satellite data calibration/validation and climate/environmental monitoring [GSICS and ECV(Essential Climate Variables)]
- Atmospheric parameters derived from satellite observations
- Application of satellite data to data assimilation and numerical weather prediction(NWP)
- Application of satellite data to weather analysis, disaster monitoring (Water and energy cycle), nowcasting and forecasting
- Land surface and ocean parameters derived from satellite observations
- Space-based space weather measurements, analyses and prediction models
- Facilitation of data access and utilization [International sharing of software tools, documents, algorithms, and best practices]
- Capacity building and training activities [coordination/interaction of satellite testbeds/proving grounds, and joint development of new satellite products, satellite training and education, services and dissemination]

Call for Papers

Those whose professional fields relate to the above themes and who wish to present at the conference are invited to register. The registration abstract submission page is open and the registration/abstract form (MS Word form) can also be downloaded from the web page at http://nmsc.kma.go.kr/aomsuc7/main.jsp.

The form should include author information, title, abstract and presentation type (verbal or poster), and should be e-mailed to the Local Organizing Committee (LOC) at

Jeong-Sic Yun (Mr): tot100@korea.kr
Tae-Hyeong Oh (Mr): hyoung0203@korea.kr

The language of the conference is English. The abstracts should be no longer than one page (A4). In cases where there are multiple authors, we kindly ask for a single coordinated response. To register more than one author, please fill out and submit a form for each.

The deadline for submission: 31 August 2016
Conference Fee: none

Abstracts will be reviewed for inclusion in the conference programme. Authors may be asked to switch verbal presentations to poster presentations, or vice versa, if considered more appropriate. Selected authors will be notified via e-mail around August 2016, and their abstracts will be posted on the conference web-site.

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World Meteorological Organization (WMO)
Group on Earth Observation (GEO)

Second Announcement
The second announcement will be posted on this web-site around July 2016. The preliminary program, details of VISA support and general information will be provided with the second announcement.

(Tae-Hyeong Oh, NMSC/KMA)

Replacement of communication satellite for HimawariCast

The Japan Meteorological Agency (JMA) provides Himawari-8 data via the HimawariCast service using a private communication satellite (currently JCSAT-2A). Data are issued every 10 minutes using 14 of Himawari-8's 16 bands for HRIT files. Numerical weather prediction (NWP) products (GPV: grid point values) and meteorological observation data are also provided via the HimawariCast service. These multi-band high-frequency observation data and other data are expected to contribute to disaster risk reduction in the East Asia and Western Pacific regions.
Figure 1 provides an overview of the HimawariCast system structure. The JCSAT-2A (or JCSAT-2B) communication satellite located at 154°E is used to broadcast data for the service.
The JCSAT-2B satellite launched in May 2016 is scheduled to replace JCSAT-2A as the HimawariCast service communication satellite. The polarization directions of the two satellites intersect at right angles. HimawariCast users should complete the necessary transition work during the period between 03 UTC on 6 July and 03 UTC on 20 July 2016 to enable receipt of HimawariCast data via JCSAT-2B.
(See http://www.data.jma.go.jp/mscweb/en/himawari89/himawari_cast/transition.html for information on HimawariCast transition work.)

Up-to-date information, including the specifications of equipment needed to receive data via HimawariCast, is available at: http://www.data.jma.go.jp/mscweb/en/himawari89/himawari_cast/himawari_cast.html.

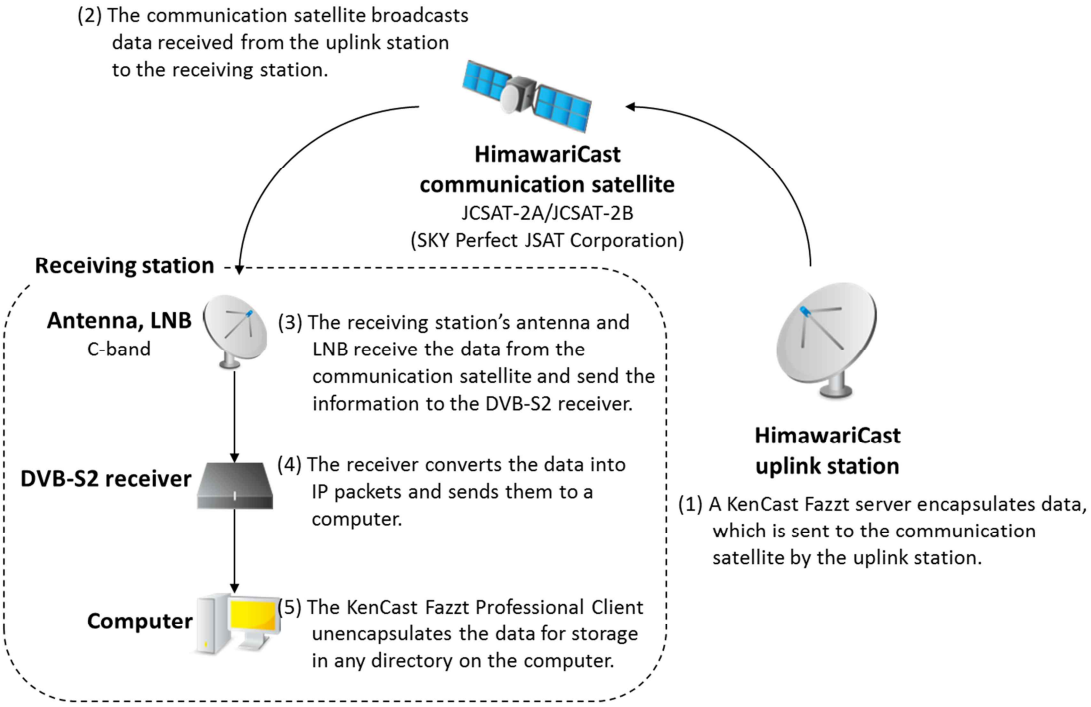


Figure 1. Overview of the HimawariCast system structure

(Takeshi Otomo/JMA)

Himawari-8 True Color Reproduction Image

The Himawari-8 AHI (Advanced Himawari Imager) features a combination of three visible bands (blue: band 1 (0.47 μm); green: band 2 (0.51 μm); red: band 3 (0.64 μm)), enabling the production of true color images. The term true color image is often used to describe images with colors similar to those seen by the human eye. Such images help to clarify qualitative surface characteristics and atmospheric features such as vegetation, ocean color, haze (smoke), Asian dust (yellow sand) and volcanic ash. The simplest way to create a true color image on a computer screen is to mix red, green and blue band data as RGB primary colors. The simplest true color images give realistic colors to a certain extent, but such colors may not be accurate because the RGB primary colors of output devices (e.g., liquid crystal displays) differ from those of the input devices (i.e., satellite sensors). Additionally, the spectral response functions (SRF) of the satellite sensor may not provide sufficient coverage to support the constitution of primary colors. True Color Reproduction Image is developed for better reproduction of original colors in consideration of input/output device characteristics.

For color reproduction, the inherent RGB values of the AHI are converted by using a 3 x 3 matrix to sRGB (an international standard for RGB color space) via CIE (International Commission on Illumination) XYZ tristimulus values which are device-independent color representation. Color conversion is quantitatively evaluated in terms of chromaticity using hyperspectral reflectance spectra (USGS Digital Spectral Library, Clark et al. 2007), which are used to provide accurate data on chromaticity and expected observations corresponding to sensor SRF for various earth surface types such as vegetation, soil, water and snow. The evaluation showed that green-band shifting (to around 0.55 μm) improved color reproduction, and the green band was then optimally adjusted using bands 2, 3 and 4 (0.86 μm).

To make the image more vivid, atmospheric correction (Rayleigh correction, Miller et al.,

2016) is applied. A computer program for this purpose is provided by the Cooperative Institute for Research in the Atmosphere (CIRA) established by NOAA/NESDIS and Colorado State University in the United States of America. Log-linear scaling is also applied using this program to mimic the non-linear response of human vision, and the image is then generally brightened.

The Meteorological Satellite Center (MSC) added the True Color Reproduction Image to the Himawari Real-Time Image website on 10 May, 2016.

http://www.data.jma.go.jp/mscweb/data/himawari/index.html

Figure 2 shows Himawari-8 AHI full-disk true color images available on the MSC website. Colors generally differ somewhat for sea and land, and are more vivid in particular in (b) True Color Reproduction Image for cloud-free areas.

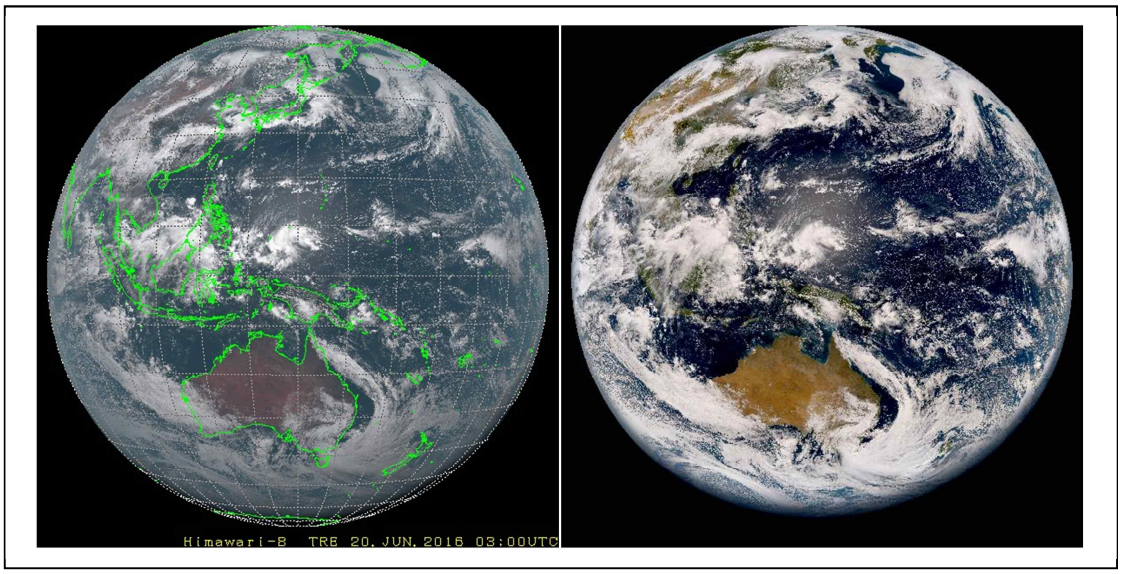
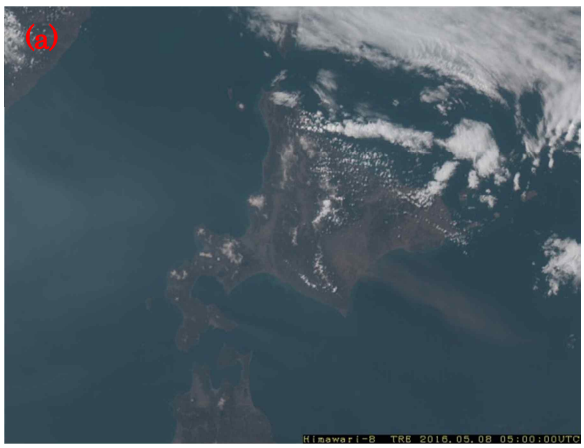


Figure 2: Himawari-8 AHI full-disk images available on the MSC website (20 June 2016, 0300 UTC). (a) True color image consisting of a simple RGB composite (enhanced using Gamma correction, gamma = 2). (b) True Color Reproduction Image (newly added).

Figure 3 shows true color images of northern Japan's Hokkaido area for May 8, 2016. A haze (smoke) cloud can be seen approaching from the west over the Sea of Japan. A dust cloud stirred up by strong winds blowing over dried fields in southeastern Hokkaido also blows in an east-southeasterly direction. Both phenomena are clearer in the (b) True Color Reproduction Image. The dust cloud is likely to be soil-colored, making it easy to identify in (b). (c) shows a Dust RGB image, which picks up well on mineral particles such as Asian dust (yellow sand) and volcanic ash (shown in a pinkish color). There is a pinkish area corresponding to the dust cloud over land, but it is unclear over the sea. In this case, the True Color Reproduction Image is more useful for identifying the dust cloud.



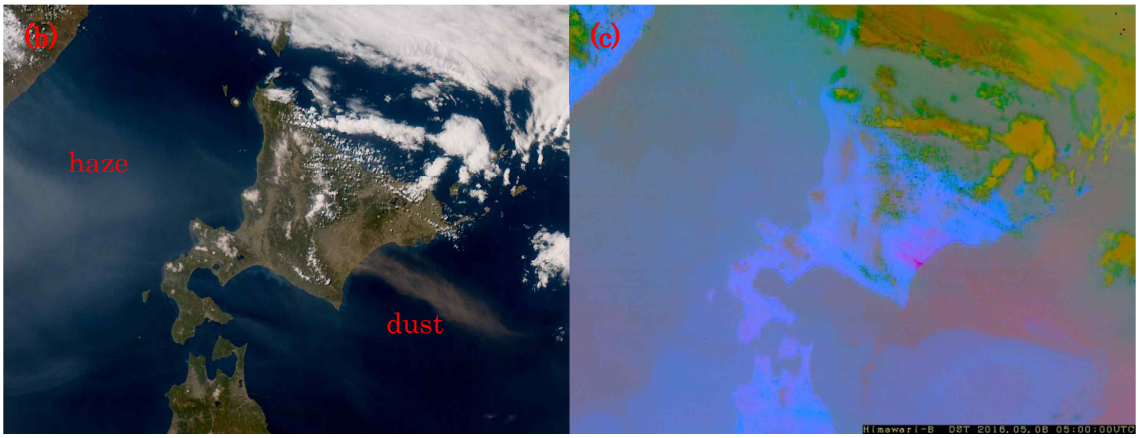


Figure 3: True color images of northern Japan's Hokkaido area (08 May 2016, 0500 UTC). (a) and (b) are as per Figure 1. (c) is a Dust RGB image (a color composite for dust identification consisting of: red: band 15 (12.4 μm) – band 13 (10.4 μm); green: band 13 – band 11 (8.6 μm); and blue: band 13).

Figure 4 shows True Color Reproduction Images of the central part of Japan for (a) 29 March and (b) 18 May 2016. As the season progresses from winter to summer, a clear change in vegetation color from brown to green is observed, especially for mountainous areas.

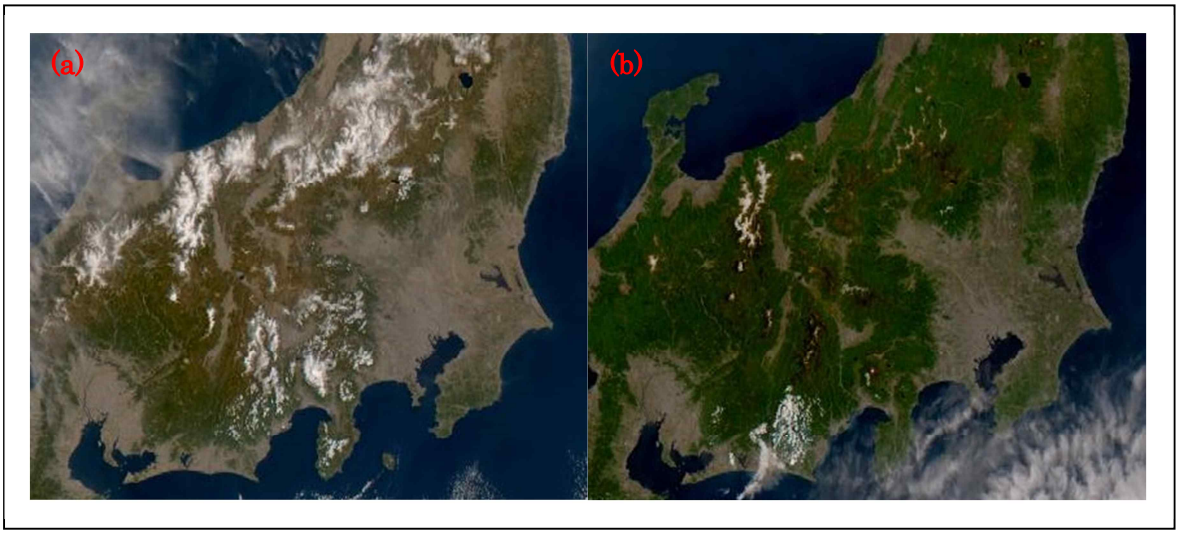


Figure 4: True Color Reproduction Images of central Japan for (a) 29 March 2016, 0100 UTC and (b) 18 May 2016, 0100 UTC

Acknowledgement

The image discussed here was developed on the basis of collaboration between the JMA Meteorological Satellite Center and the NOAA/NESDIS GOES-R Algorithm Working Group imagery team. The authors are grateful to all involved for their collaborative efforts and for the permission given to use the computer program.

References

Miller, S., T. Schmit, C. Seaman, D. Lindsey, M. Gunshor, R. Kohrs, Y. Sumida, and D. Hillger, 2016: A Sight for Sore Eyes - The Return of True Color to Geostationary Satellites. Bull. Amer. Meteor. Soc.
doi: 10.1175/BAMS-D-15-00154.1

Clark RN, Swayze GA, Wise R, Livo E, Hoefen T, Kokaly R, Sutley SJ. 2007. USGS Digital

Spectral Library splib06a', Digital Data Series 231. U.S. Geological Survey. http://speclab.cr.usgs.gov/spectral.lib06/ds231 (accessed 5 November 2015).

(Hidehiko Murata, MSC/JMA)

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From the Co-editors

The co-editors invite contributions to the newsletter. Although it is assumed that the major contributors for the time being will be satellite operators, we also welcome articles (short contributions of less than a page are fine) from all RA II Members, regardless of whether they are registered with the WMO Secretariat as members of the WIGOS Project Coordinating Group. We look forward to receiving your contributions to the newsletter.
(*Dohyeong KIM, KMA, and Takeshi OTOMO, JMA*)

RA II WIGOS Project Home Page

http://www.jma.go.jp/jma/jma-eng/satellite/ra2wigosproject/ra2wigosproject-intro_en_jma.html

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