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# RA II WIGOS Project Newsletter

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

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## Geo-KOMPSAT-2A Rapid-Scan Observation for Monitoring Natural Disasters over Asia/Oceania

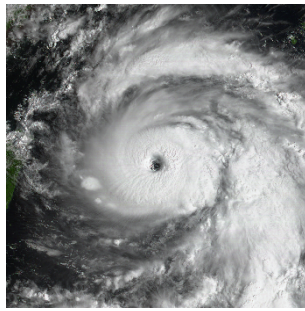
### Introduction

The Geostationary Korea Multi-Purpose Satellite-2A (Geo-KOMPSAT-2A, GK2A) was launched successfully in December 2018. After launch, we conducted in-orbit test until June 2019, and have been in formality operation since July 2019. GK2A operates the Advanced Meteorological Imager (AMI) payload used for meteorological observations and the Korean

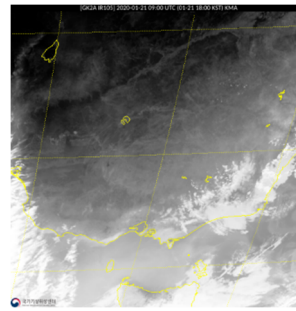
Space wEather Monitor (KSEM) payload used for space meteorological observations.

### Rapid-Scan Observations

KMA (Korea Meteorological Administration) performs special observation missions to preemptively monitor dangerous weather such as typhoons, forest fire and volcanic ash, using GK2A meteorological observation data. Request-based rapid-scan observation imagery will be provided: Area: 1,000km × 1,000km, Observation interval: 2 minutes, Observation Method: Fixed or Tracking



Typhoon Observation  
(Typhoon No. 13 Ring-Ring)



Wildfire in Australia  
(January 20, 2020 09:00 UTC)

Figure 1 Rapid-Scan Observation Examples

**Rapid-Scan Observation of Forest Fire in Australia**

KMA performed Australian wildfire rapid-scan observation in February 2020. Base images (3 types) were shown in Fig. 2; visible image with 0.5 km resolution and infrared/water vapor images with 2 km resolution. The analysis products of 6 types were also presented in Fig. 3

(see the solid red circles) including fire spot, the level of risk of forest fires, and fire radiative power displayed the amount of energy released from forest fires. The different RGB images such as true color (smoke in gray), RGB ash (smoke in light green color), RGB dust (smoke in purple to pink) are also shown in Fig.3.

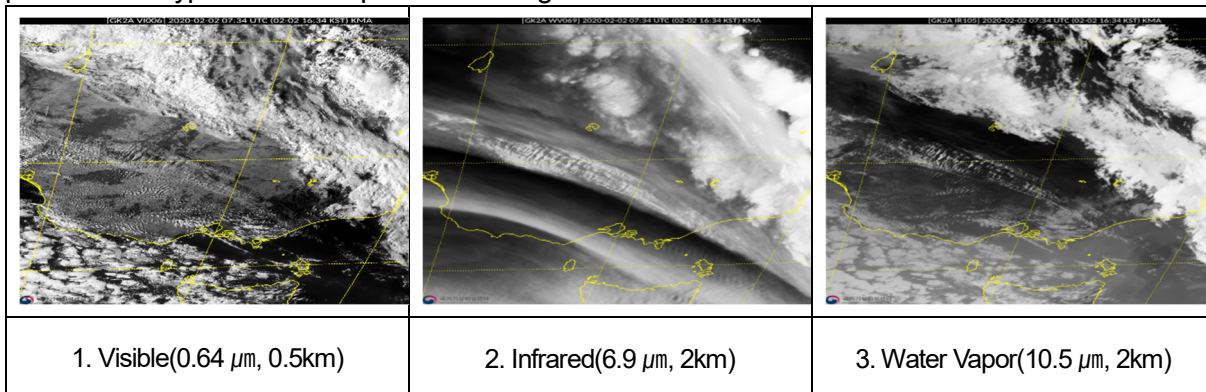


Figure 2 Basic Images Example (February 2, 2020 07:34 UTC)

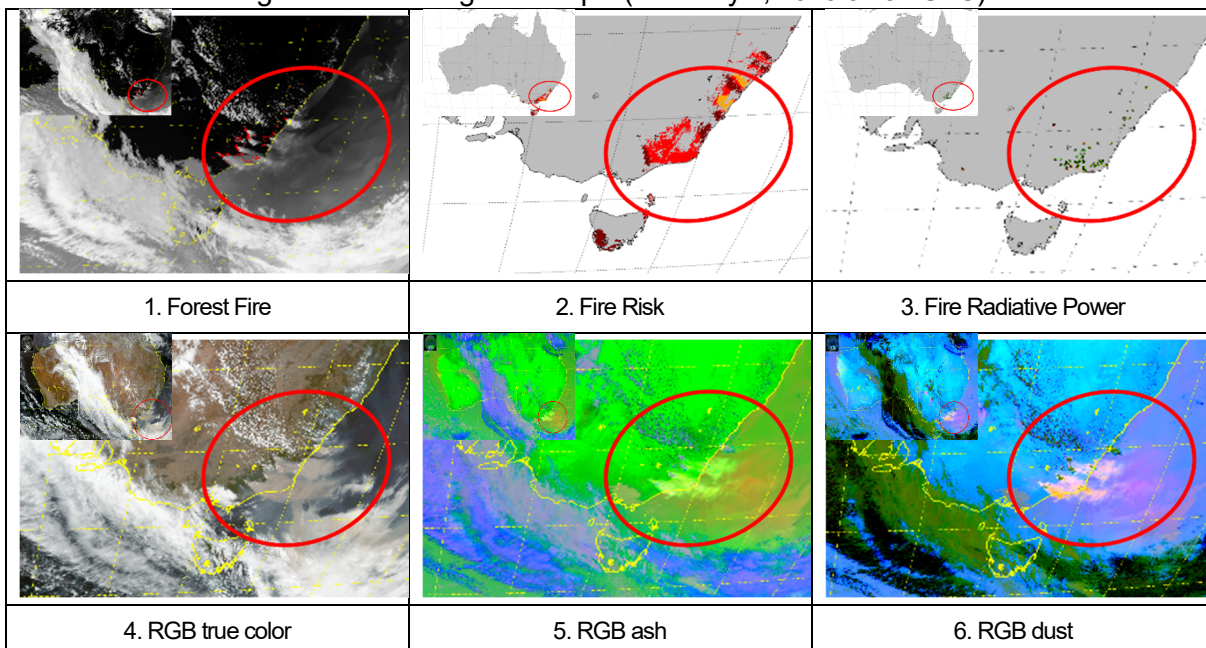


Figure 3 Analysis Images Example (January 4, 2020 04:00 UTC)

## **Future Plan**

KMA will build a dedicated webpage for users to request rapid-scan observations on the NMSC (National Meteorological Satellite Center) homepage for its efficient operation by June 2020. In near future, GK2A rapid-scan observation can be used for early warning and resilience of extreme weather events over RA II and RA V region.

(Junghun Choi, Dongkee Shin, Cheolwoo Lee, Jungseop Lee, Daehyun Kim, NMSC/KMA)

## **Report of the 10th Asia-Oceania Meteorological Conference (AOMSUC-10) and Training Events**

### **Report of the AOMSUC-10**

The tenth Asia-Oceania Meteorological Satellite Users' Conference (AOMSUC-10) was held in Melbourne, Australia from 2-7 December 2019. AOMSUC-10 was hosted and sponsored by the Australian Bureau of Meteorology (AuBOM), and was co-sponsored by the China Meteorological Administration (CMA), the Japan Meteorological Agency (JMA), the Korea Meteorological Administration (KMA), the Indonesian Agency for Meteorological, Climatological and Geophysics (BMKG), Roshydromet and Roscosmos of the Russian Federation, the India Meteorological Department (IMD), the India Space Research Organization (ISRO), the World Meteorological Organization (WMO), and the Group on Earth Observations (GEO).

Exciting times are underway with satellite meteorology, oceanography and ecology across AsiaOceania with the new generation of international meteorological/environmental satellites. An exceptionally robust constellation of geostationary satellites provides digital data from instruments that include lighting mappers, hyperspectral atmospheric sounders and high resolution multispectral visible/infrared imagers; many of those imagers scan the full Earth disc as

frequently as every 10 minutes, and for special weather events as frequently as every two minutes. A fleet of advanced international polar orbiting satellites provide high resolution digital data from multichannel visible, infrared and microwave imagers, microwave sounders and hyperspectral high-resolution infrared sounders. This robust constellation of polar orbiting and geostationary satellites are providing data for a range of environmental, meteorological, ocean and climate related applications. The satellite operators are meeting their commitment as we introduce this new era of the Space Based Component of the WMO Integrated Global Observing System (WIGOS). Participants welcomed the efforts being undertaken to introduce and utilize this unprecedented stream of new data. Numerical weather prediction accuracy out to ten days or more has especially profited from these core and new generation satellite data sets. The future for meteorological, oceanographic and environmental services using those satellite data and products are bright. New and sophisticated applications are serving a variety of users across the Asia-Oceania region. The prospects for young scientists entering the field of satellite meteorology and environmental applications is exceptionally promising, particularly when coupled with the growth in computer and communications technology. Exciting times are here, and exceptional times await humankind as we, the Asia-Oceania Meteorological Satellite Users Community move forward and exploit the potential presented to us from these new data sets.

AOMSUC-10 began with a two-day training event that brought together participants from WMO Regions II and V. Including lecturers and attendees, 45 people from 26 countries throughout the Asia-Oceania region participated in the training event. The training event (summarized later in this document) was held the Royal Melbourne Institute of Technology (RMIT University) in Melbourne: the training area was exceptionally suited for such a training event and technical computing and network support was exceptional. The next three days of AOMSUC-10

were the Conference portion consisting of 62 oral, 20 poster presentations and a closing panel session. The Conference was attended by over 138 people from 28 countries. The final activity associated with the AOMSUC-10, held on December 7 was a smaller, focused meeting: "The 2nd Joint Meeting of the WMO RA II WIGOS Project and RA V TT-SU for RA II and RA V NMHSs."

The Conference portion of AOMSUC-10 was divided into six oral sessions with a seventh wrap-up (question/answer) session. Posters were conveniently set up in the coffee break area, which allowed for their viewing during break times. The six oral presentation sessions each was co-chaired by two ICSC members and an expert from AuBOM, covered the following topical areas:

- Session 1: Current and Future Meteorological Satellite Programs and User Activities/Plans within Asia/Oceania
- Session 2: Facilitation of Data Access and Utilization, including Training Activity
- Session 3: Application of satellite data to Numerical Weather Prediction and derivation of atmospheric parameters
- Session 4: Application of satellite data to weather forecasting
- Session 5: Application of satellite data to the derivation of surface parameters and phenomena
- Session 6: Performance and calibration of satellite instruments

The AOMSUC-10 venue was exceptionally well suited for a major international gathering; audio visual support was outstanding, and staff was always on hand when needed. It was evident to all that an exceptional effort had been put forth by the staffs of the AuBOM in the planning and organizing of AOMSUC-10. Both oral and poster presentations were of the highest quality without exception.

### **Report of the AOMSUC-10 Training Event**

The AOMSUC-10 Training Event was conducted on the Royal Melbourne Institute of Technology (RMIT) University Campus,

Melbourne Victoria 2-3 December 2019.

There were 45 attendees as well as presenters from 17 countries throughout the Asia-Oceania region and also including some attendees from the USA and Europe.

For this AOMSUC-10 we attempted a number of ground breaking initiatives. Firstly, the two days were divided into a predominantly interactive teaching session on the Monday utilising the Socratic cloud based learner response system. Audience interaction was further enhanced by panel and group discussions conducted during Tuesday morning's sessions. The Training Event also hosted a Regional Focus Group meeting as conducted by the Australian VLab Centre of Excellence.

The opening address was presented jointly by the AOMSUC-10 Chair Dr Jim Purdom, RMIT University representative Dr Ronald Maj, Australian Bureau of Meteorology (BOM) representative Dr John Le Marshall and Bureau of Meteorology Training Centre (BMTC) representative Mr. Bodo Zeschke.

The basics of satellite spectral bands and their uses as well as application of these bands into the generation of RGB composites was presented by Dr Purdom and Mr Zeschke respectively during the first two sessions of the training. Mr Zeschke also introduced the participants to the Socratic cloud based learner response system as the interactive tool for this Training Event.

The introduction to nowcasting using satellite data and products to Tropical Cyclones, thunderstorms and heavy precipitation was presented by Joe Courtney and Dean Narramore of BOM and Mr Andersen Panjaitan of BMKG Indonesia respectively. According to the results of a recent WMO survey of 33 countries across RAIL and RAV these types of hazardous weather were found to be of greatest importance.

The afternoon sessions concluding the first day included presentations demonstrating the SATAID and SLIDER satellite image rendering tools by Mr Akihiro Shimizu of the Japan Meteorological Agency (JMA) and Dr Curtis Seaman of the Cooperative Institute for

Research in the Atmosphere (CIRA). Nowcasting applications using GEO-KOMPSAT-2A data was presented by Dr Hyesook Park of the Korea Meteorological Administration (KMA).

Tuesday morning's session commenced with representatives from the China Meteorological Administration (CMA), JMA, KMA and the National Oceanic and Atmospheric Administration (NOAA) showcasing how to access their respective satellite data in a panel led discussion.

This was followed by a presentation by Dr Jim Purdom demonstrating the versatility of the SLIDER satellite data visualisation tool, reinforcing the corresponding presentation of the previous day.

Mr Toshiyuki Kurino of WMO and Professor Yuriy Kuleshov (BOM) introduced the WMO Space-Based Weather and Climate Extremes Monitoring Demonstration Project (SEM DP) showing many examples to the audience.

After morning break the attendees divided into smaller groups and consulted with experts in consolidating the content of the previous sessions. It was gratifying to see the great engagement across these groups.

After lunch Mr Zeschke hosted the 75th Regional Focus Group (RFG) meeting as conducted by the Australian VLab Centre of Excellence. This was followed by a Socratic question and answer session asking for feedback and giving participants the opportunity to recommend useful topics for future RFG meetings.

Finally, it was time for the attendees to do their Anaglyph 3D glasses as we all took a peek into what the future would hold. Mr Zeschke presented a session pertaining to the effective utilisation of satellite data from multiple satellite platforms, including useful earth limb case studies as well as three dimensional stereo satellite imagery.

During the final session of the Training Event participants were asked to offer feedback on the effectiveness of the training and this was summarised by the AOMSUC-10 Chair during the concluding address. During this address Dr

Purdom mentioned that this had been a very interesting two days training with good interaction. Dr Purdom observed that all attendees were engaged during the training event. He noted that clearly the attendees had come away from the training with new knowledge and understanding. Overall the Chair was happy with what had happened during the event. He reflected that there are very few training events that last for just two days. For future AOMSUC Training Events a duration of three days was recommended, with an alternative of two day event consisting of 12 hours of training per day. In particular, such a training event should be composed of "blocks" of training in which interactive lectures were followed by corresponding practical sessions that further explore the topic of the lecture. There is also the possibility to cover additional topics such as satellite derived products in greater depth.

In the summary addresses the coordinators of the Training Event Mr Jeff Wilson and Mr Bodo Zeschke thanked the organisers, presenters and participants for a very enjoyable two days of satellite meteorology. Mr Zeschke reminded the audience that the feedback provided during the summary session was indeed only "the tip of the iceberg" and that the information contained in the audience response to the Socratic questions would be forwarded to relevant parties for future follow up action.

(Bodo Zeschke, AuBOM)

## **Report of the Second Joint Meeting of RA II WIGOS Project and RA V TT-SU for RA II and RA V NMHSs**

The Second Joint Meeting of RA II WIGOS Project and RA V TT-SU for RA II and RA V National Meteorological and Hydrological Services (NMHSs) in Satellite Data, Products and Training was held in Melbourne, Australia, on 7 December 2019, attended by 44 representatives from 29 countries of RA II and RA V member, and representatives from EUMETSAT and WMO.



**Participants in the joint meeting of RA II WIGOS project and RA V TT-SU**

There were several reports made during the meeting, include the following:

***Accomplishments, current status and work plan of the RA II Project and the RA V Task Team [KMA, BMKG/BoM].***

Dohyeong Kim reported the support for the preparation of satellite data users in relation to the new generation of geostationary meteorological satellites, establishment of close coordination between the RA II WIGOS Project and the RA-V Task Team on Satellite Utilization, establishment of the new webpage of the RA II WIGOS Project (hosted by JMA), convening the series of Asia/Oceania Meteorological Satellite Users' Conference (AOMSUC), conducting the trainings and questionnaires on the utilization of new generation of geostationary meteorological satellites through the AOMSUCs, and issuance of quarterly newsletters for RA II Members. Agnes Lane (BoM) noted the status of WMO RA-V Task Team - Satellite User (TT-SU) for gathering satellite user requirements and

protocol for Himawari-8/9 Request-drive Rapid Scan in WMO RA-II and RA V on 2019 activities.

***Introduction of the RA II / RA V 2018 survey [JMA, BoM]***

Kotaro Bessho (JMA) reported the results of WMO RA II and RA V 2018 Survey on the use of satellite data. The Coordinating Group of the RA II WIGOS Project to Develop Support for NMHSs in Satellite Data, Products and Training and the RA V Task Team on Satellite Utilization for NMHSs in RA II and RA V conducted the RA II and RA V Survey on the Use of Satellite Data 2018 to collect up-to-date information on WMO Members' capabilities and needs regarding the use of satellite data in meteorological, climate, water and related environmental applications. The survey was developed in 2018 based on an action item from the 45th Conference of the Coordination Group for Meteorological Satellites (WG IV A45.01), and the target contributors were users in National Meteorological and Hydrological Services of WMO Member states and territories within RA II and V, as well as other satellite data users worldwide.

The survey, conducted in a spreadsheet

format from 3 December 2018 to 31 January 2019, consisted of nine questions broadly addressing (i) access to satellite data and products, (ii) use and application of satellite data and products, and (iii) education and training. A total of 33 valid and complete responses were received from RA II and RA V NMHSs in 32 WMO Member countries. In the meeting, outline of the survey was shown, and the full report of the survey can be downloaded from WMO website.

The key results are as below.

- Himawari-8/9 data are used in these regions more than data from other satellites.
- GEO satellite data are mostly used for imagery application, nowcasting and forecast verification.
- Many respondents plan to use FY-4B and -4C data.
- Most institutions access satellite data online, but broadcast facilities are also used in countries with slow and unstable Internet connections.
- The survey outcomes especially from Q4-b are expected to provide satellite derived-product developers with ideas for future development.
- A 10-minute observation frequency is sufficient for effective monitoring of extreme weather events.
- Natural Color RGB, Day Convective Storm RGB, True Color RGB and other data support work practices significantly.
- The top three hazards in the RA-II/V areas are lightning, flash floods and tropical cyclones. New-generation GEO data have improved forecasting ability to detect and monitor such events.
- More training, faster/more reliable communications, and enhanced data and processing tools would be of value.
- FengYun general-purpose polar-orbiting satellite products are well known and widely used.
- Sea surface wind data are used by more than half of all NMHSs.
- GSMaP products are the most popular among precipitation-related output in these regions.
- Most NMHSs require training in climate, public weather services, aviation services and a variety of other areas. Face-to-face training is

considered highly important.

- Many users require 10-minute multi-band data and products both online and via the satellite broadcast system.

***Alignment of project activities for the training with WMO-CGMS Virtual Laboratory activities [WMO, BoM, KMA]***

Hye Sook Park (KMA) presented the virtual laboratory for education and training updates and plans. Training was offered in 5 of the WMO official languages plus Korean and Portuguese and Participants from all WMO Regional Associations were reached from VLMG-9 2018. And she also reported results of 9th VLMG meeting in 2018 and ways to increase reusing and adaptation of training materials. JungSic Yoon (KMA) reported on training activities conducted by KMA, and Bodo Zeschke (BMTC/BoM) reported the joint Australia-BMKG Indonesia and Australia-Korea VLab Centres of Excellence Regional Focus Group meetings and exchange of subject experts between the Australia and Korea VLab Centres of Excellence, recognizing that this has previously occurred between Australia and BMKG Indonesia.

***SCOPE-Nowcasting and Space-based monitoring of weather and climate extremes demonstration project [WMO]***

Werner Balogh (WMO OBS/Space Programme) reviewed the workshop on Operational Space-based Weather and Climate Extremes Monitoring (SWCEM) was held in Geneva, Switzerland on 15-17 February, 2017. The Workshop provided for a dialogue amongst satellite operators, WMO Regional Climate Centres (RCCs), National Meteorological and Hydrological Services (NMHSs), and the science community to stimulate the utilization of space-based observation data and products for monitoring selected weather and climate extremes (heavy rainfall and drought in particular) on a routine basis (“in operations”), in response to current and future user requirements.

### **Updates HimawariRequest [JMA, BoM]**

Kotaro Bessho (JMA) reported for the status of the HimawariRequest Services. HimawariRequest was started from January 2018 in cooperation with Bureau of Meteorology (BoM), Australia. International service for NMHSs in Himawari-8/-9 coverage area to request Target Area observation (1,000 x 1,000 km area every 2.5 minutes). JMA expects this service to support disaster risk reduction activities in the Asia Oceania region. As of 26 Nov. 2019, HimawariRequest is attended 21 Registrations and 18 requests for TC, volcanic eruption, wild fires and etc.

CMA and JMA made a request-based high frequency regional observation portal on RA-II WIGOS Project web page as below.

[https://www.jma.go.jp/jma/jma-eng/satellite/ra2wigosproject/ra2wigosproject-intro\\_en\\_jma.html#request](https://www.jma.go.jp/jma/jma-eng/satellite/ra2wigosproject/ra2wigosproject-intro_en_jma.html#request)

The Portal has links to CMA's Emergency Support Mechanism of FENGYUN Satellite (FY ESM) information and JMA's HimawariRequest information. In addition, if information will be released from KMA, the portal will also include a link to KMA's request-based high frequency regional observation information.

Following the Action Item of CGMS-47/WG-IV/9: A47.03, CMA, KMA and JMA are considering to add the new information on the portal to improve its usability including current and planned observation locations for each service, and availability of request-based high frequency observation. If possible, the observation locations will be also visualized on map in real-time.

### **Plan on Provision of AMI Rapid Scan Imagery [KMA]**

Dohyeong Kim (KMA) introduced the current status and the future plan of the GK2A rapid scan target observation for the RA II and RA V regions to make an efficient and well-organized procedure to support GK2A target observations that is based on increasing needs for severe weathers and disasters such as typhoon, heavy rains, wild/forest fires,

volcano eruptions and etc.

Current status of the GK2A target observation, first, to predict hourly locations of the typhoon at targeted day, Target observation: 1,000×1,000 km<sup>2</sup> area and every 2 min interval, and hourly locations (i.e. centered lat. and long.) need to be delivered before 07:00 UTC of the observation day-1. Then, to execute the target observation as requested on the day. Target observation imageries are provided in real-time on a NMSC homepage. KMA has applied to five typhoon cases approaching Korean peninsula such as DANAS, LEKIMA, LINGLING and etc.

KMA will established the procedure / webtool of GK2A target observation for RA II and RA V users by June 2020 (Operational test period: 2~3 months). The user are asked to provide KMA with feedback on the target observations are provided properly and how they are used.

(Dohyeong Kim, KMA)



## Members of the Coordination Group

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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 Kotaro BESSHO, JMA)

## RA II WIGOS Project Home Page

[https://www.jma.go.jp/jma/jma-eng/satellite/ra2wigosproject/ra2wigosproject-intro\\_en\\_jma.html](https://www.jma.go.jp/jma/jma-eng/satellite/ra2wigosproject/ra2wigosproject-intro_en_jma.html)

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