Vol. 12 No. 1, May 2021

RA II WIGOS Project Newsletter

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

Contents of this issue

Marine Weather Broadcast Service by GK2A Satellite

Introduction

The Korea Meteorological Administration (KMA) has started marine weather broadcast service by GK2A satellite from July 23, 2020, which provides high-quality digital marine weather information to ships operating at sea.

The KMA's new marine weather broadcast service is a cutting-edge service that uses GK2A, Korea's second geostationary meteorological satellite, to offer high-quality digital marine meteorological information.

Marine Weather Information

Since 1966 KMA has been providing marine weather information by radiofax (Weather Fax), such as significant weather alerts, typhoon track information and weather charts, that are necessary to ensure the safety of maritime activities.

Radiofax broadcast, however, has gradually become less useful because of the low quality of printed fax data, difficulties with providing new and more information, a limited distance of data transmission, and low data quality resulted from radio-frequency interference.

To increase the quality and usability of data and information, the satellite broadcast service now offers marine weather information in digital format such as video, texts and voice so that users can more easily utilize them on their smartphones, tablets and screens.

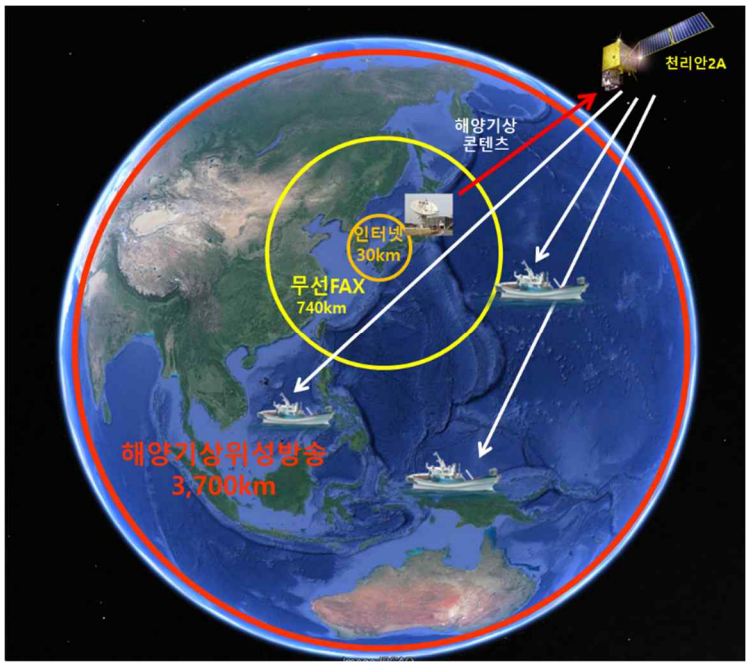


Figure 1 Marine Weather Broadcast Range Comparison (Internet(orange), Radiofax(yellow), and Marine Weather Broadcast Service by GK2A (red))

KMA's marine weather broadcast service by GK2A

KMA's marine weather broadcast service by GK2A is the world's only public satellite service dedicated to providing weather information free of charge with an aim of ensuring the safety of ships. It transmits marine meteorological information to ships not only in coastal and offshore but in high seas where they could have difficulties maintaining maritime communication network.

The broadcast service is available for ships located within a 3,700 km radius of GK2A Full Disk (East Asia and West Pacific) measurement domain. And it provides 15 types of 360 products, including surface analysis and forecast charts, wave analysis and forecast charts, and satellite images.

Sea wind and ocean wave forecasts especially provide forecasts 4 days ahead in East Asia at 3-hours interval and 12 days ahead over the globe at 6-hours interval. This will allow ships operating not only in coastal and offshore waters but in high seas to use the forecasts for their safety and activities.

Through this new service, various domestic and overseas users are expected to easily receive and use marine weather information provided by KMA. Users can be equipped with a domestically-produced Small-scale Data Utilization Station(SDUS) with more affordable prices for receiving information. In addition, KMA plans to provide financial support for users who want to install the SDUS.

During the past year, KMA has tested the service cooperating with Korea Coast Guard, Korea-China Ferry, and Gisang 1 (KMA's marine observation ship). It now plans to expand the supply of SDUS to fishing and leisure ships, as well as East Asia.

More detailed information:
http://www.kma.go.kr/eng/aboutkma/notice.jsp?bid=eng_notice&mode=view&num=114

(Soyoung LEE, Dong Kee SHIN, KMA)

Geo-KOMPSAT-2A (GK2A) Proxy Visible Images at Night

GK2A RGB images for weather monitoring

The GK2A has been currently providing more information with 16 channels. Specially, GK2A has 4 visible channels (0.47 μm, 0.51 μm, 0.64 μm, 0.86 μm), which are very beneficial to

monitor and detect disastrous weather phenomena such as rapidly developing local convective cloud, typhoon cloud system, dust, fire and volcanic ash events. To improve the weather monitoring, a variety of RGB images such as true color, natural color and day-night RGB images are used, and the RGB images are generated by combining several visible channel and infrared channel images. Among the RGB images, the true color RGB (R: 0.64 μm, G: 0.51 μm, B: 0.47 μm) and day-night RGB (R: 0.64 μm at daytime, 3.8 μm at nighttime, G: 10.5 μm, B: 12.3 μm) images are only available at daytime.

Development of proxy visible image at nighttime

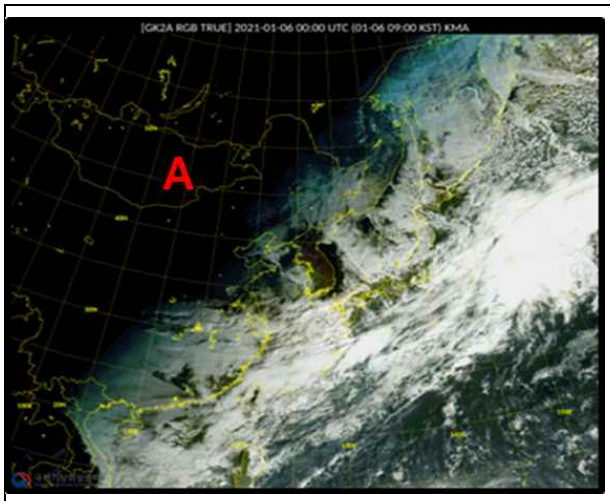
The GK2A proxy visible data are generated by using AI (Artificial Intelligence) technique, i.e. Conditional Generative Adversarial Networks (CGAN). The main characteristics of CGAN is to make model learning by competition of two kinds of objects which can generate accurate results.

As shown in Figure 2, the GK2A AI-based true color RGB image can identify cloud and surface type in 'A' area in nighttime, which was impossible with original true color RGB image.

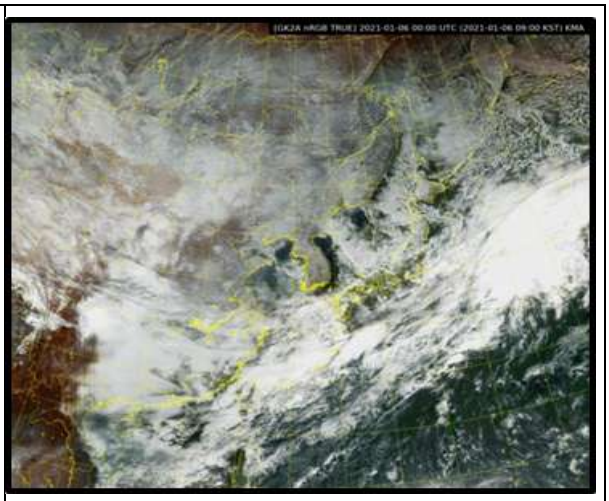
Also AI-based day-night RGB images which are basically used for weather status analysis by forecasters can identify low-level cloud in 'B' area with distinct red color, while it is difficult with original day-night RGB image which has no nighttime visible data.

KMA started to provide the true color RGB images and day-night RGB images at nighttime in public since 24th March, 2021.

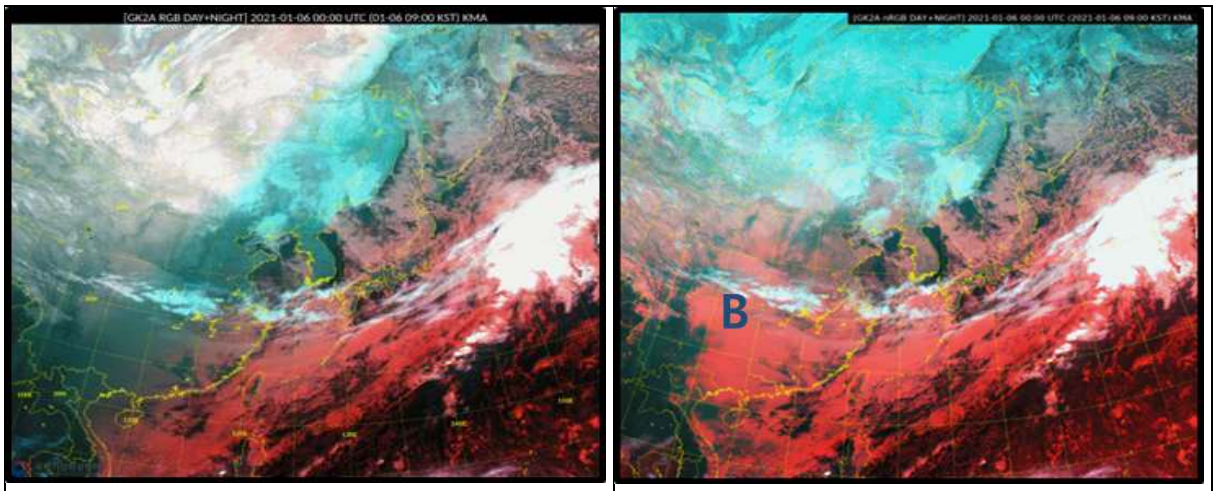
(Eun-Ha SOHN, KMA)



(a) Original true color RGB image



(b) AI-based true color image



(c) Original day-night RGB image | (d) AI-based day-night RGB image

Figure 2. The GK2A true color RGB images (a, b) and GK2A day-night RGB images (c, d). (b) and (d) represent the AI-based RGB images using proxy nighttime visible data.

CMA Observation Quality Management System passed ISO9001 Certification

In December, 2020, meteorological observation quality management system of China Meteorological Administration (CMA) passed the overall certification audit of China Quality Certificate Centre (CQC), and obtained ISO9001 certificate on December 29, 2020.

This system was established on the basis of Guide to the Implementation of Quality Management Systems for National Meteorological and Hydrological Services and Other Relevant Service Providers rolled out by World Meteorological Organization (WMO).

The scope of the certification covers 31 provincial (autonomous regions, municipalities) meteorological departments, and 35 institutions like National Satellite Meteorological Center (NSMC), CMA Meteorological Observation Center, and Department of Integrated Observations.

As a formal member of the International Certification Network (IQNet), CQC is a third-party professional certification body approved by the Chinese government and recognized by many governments and international organizations.

(Xuebao WU, CMA)

Himawari RGB Quick Guides

RGB composite imagery from meteorological satellites is widely used in today's multi-spectral imaging era, and is promoted by JMA for various purposes. In this context, the Agency's Quick Guides to satellite products covering RGB composites published by satellite operators/trainers such as EUMeTrain/EUMETSAT and NOAA/NASA facilitate access to essential information for regular forecasters and other users of satellite data and imagery. The JMA Japanese-language versions of RGB Quick Guides released on 29th September 2020 are generally well received, and are provided online along with the English-language versions. The guides were also translated into Russian for a training event conducted jointly by Roshydromet, RSHU (the Russian State Hydrometeorological University) and EUMETSAT. The content supports the

usage of RGB composite imagery, and can be accessed at:
https://www.jma.go.jp/jma/jma-eng/satellite/VLab/RGB_QG.html

JMA online satellite imagery update

JMA updated its online satellite imagery disaster mitigation content and other information on 24 February 2021. New satellite imagery was provided to facilitate scrolling and zooming via a new URL and true-color reproduction imagery developed via collaboration between the JMA Meteorological Satellite Center and the NOAA/NESDIS/STAR GOES-R Algorithm Working Group imagery team. The real-time JMA Meteorological Satellite Center imagery remains the same.

New JMA satellite imagery:
https://www.jma.go.jp/bosai/map.html#contents=himawari&lang=en

JMA Meteorological Satellite Center real-time imagery (no change):
https://www.data.jma.go.jp/mscweb/data/himawari/index.html

(Takuya SAKASHITA, JMA)

Members of the Coordination Group

JAPAN (Co-coordinator)
Mr Kotaro BESSHO
Senior Coordinator for Satellite Systems
Satellite Program Division
Japan Meteorological Agency

REPUBLIC OF KOREA (Co-coordinator)
Dr Dohyeong KIM
Director of Satellite Operation Division,
National Meteorological Satellite Center
Korea Meteorological Administration

CHINA
Mr Xiang FANG
Director, Remote Sensing Data Application
National Satellite Meteorological Center
China Meteorological Administration

INDIA
Dr. Sunil Kumar PESHIN
Head of Satellite Division
India Meteorological Department

RUSSIAN FEDERATION
Ms Tatiana BOURTSEVA
Chief, Information Department

Dr Oleg POKROVSKIY
Principal Scientist, Main Geophysical Observatory
ROSHYDROMET

EUMETSAT (Observer)
Dr Kenneth HOLMLUND
Chief Scientist
EUMETSAT

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

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

Editorials and Inquiries

Kotaro BESSHO (Mr.)
Senior Coordinator for Satellite Systems
Satellite Program Division
Observation Department
Japan Meteorological Agency
1-3-4 Otemachi, Chiyoda-ku
Tokyo 100-8122, Japan

Tel: +81-3-3212-8341
Fax: +81-3-3217-1036
Email: kbessho@met.kishou.go.jp

Dohyeong KIM (Dr.)
Director of Satellite Operation Division,
National Meteorological Satellite Center
Korea Meteorological Administration
64-18 Guam-gil, Gwanghyewon, Jincheon,
Chungbuk, 365-830, Republic of Korea

Tel: +82-43-717-0251
Fax: +82-43-717-0240
Email: dkim@kma.go.kr

(Editor-in-chief of this issue: Dohyeong KIM)