The KMA Operational and Future Satellite Program

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Al-based day-night RGB simulated images with GK2A observation data (TY 2022-11 Hinnamnor)

0510 UTC 29 Aug. ~ 0110 UTC 31 Aug. 2022

Operational day-night RGB images

AI simulated day-night RGB images
Application of Simulated GK2A images (2022. 03. 19)

19 March 2022 00:00 UTC
Forecast: +01h~+18h

Korea Integrated Model (KIM) Unified Model (UM) and ECMWF variables are used as input for RTTOV v13 to estimate radiance

- To be helpful for forecaster to decide the now-casting and very short-range forecasting
- NWP-based night-time VI images useful for the low-cloud analysis
Ground based SSI measurement
• Averaged spatial resolution: about 67 km

AI generated 1hr accumulated SSI
• Spatial resolution: 2 km x 2 km

* Method: Convolutional Neural Network (CNN)
Collaborative Area for Fusion between GK2A and GK2B

◆ GK2A/AMI, GK2B/GOCI-II & GEMS
Strengthening aerosol monitoring

Monitoring over bright surfaces (GEMS UV AI, AOD)

Dust monitoring (AMI+GOCI-2 Vis + NIR)

High resolution aerosol (GOCI-2)

Sea Fog detection in high resolution

AMI Fog (2021.3.25, 12 KST)

GOCI2 marine fog : 2021032501

Collaborative research to provide high quality product
KMA provides targeted area observation services to users of the Asia-Pacific region

- NMHSs in RA-II and RA-V regions are able to register and request for their own purpose of GK2A observations on the KMA/NMSC website (http://datasvc.nmsc.kma.go.kr/datasvc/html/special/specialReqMain.do)
- Currently, 35 domestic/international requests since the commencement of the service
- Targets have included tropical cyclones in the South Pacific, extreme weather and wildfires in Australia, and volcanic activity in Indonesia
- Now, 7 countries had completed preparations for request submission
- In 2022, KMA has improved and service utilization manuals will be provided so that users can conveniently use the Rapid Scan service
GK2A Target Observation (2021 Chantu)

2-min Visible (red)
2021. 9. 6. 2100 ~ 9. 18. 0900 UTC

10-min Color enhanced IR
2021. 9. 7. 0900 ~ 9.13. 0900 UTC
KMA/NMSC Website
KMA has operated **GK2A marine weather broadcast service via SDUS** from July 23, 2020.

- This is high-quality digital marine weather information service using antenna and reception system connects with smartphone and tablet for ships and remote area within RA-II and RA-V regions.

- The information includes:
  - GK2A satellite images
  - Surface and wave analysis and forecast charts
  - Emergency message: severe weather and disaster information such as typhoon, storm, earthquake and tsunami warning.
### GK2A Marine Weather Broadcast Service

#### Advantages of broadcasting using GK2A
- Wide service area including Western Pacific, Oceania, and Indian Ocean
- Various display media available such as PC monitor, tablet, mobile, etc.
- Large capacity and variety of information over 360/day with image, text, etc.
- Sending urgent information by alarming and pop-up message

#### International services
- Establish a web page for service (2022)
- Start the international broadcast service for BMKG Indonesia (2023)
- Provide receivers (2024-2025)
The Vision of KMA/NMSC

**Vision**

Meteorological Satellites services for leading a safe and prosperous society

**Goal**

Provision of high value-added meteorological satellites information

**Stereoscopic satellite observation system**

- Meteorological observations using multi-satellites (GEO-LEO)
- Smart integrated satellite operating system

**Smart satellite information service**

- Big data service cloud platform
- Establish real-time global satellite data hub

**Enhancing climate change monitoring**

- AI-based real-time severe weather detection technology
- Satellite-based decision-making information service

**Strengthening global leadership**

- Expand leadership through global cooperation
- Activate industrial ecosystem through public and private cooperation
### The Korea Geo-KOMPSAT Series

**GK2A**
- **launched on December 4, 2018**
- AMI (Advanced Meteorological Imager)

**GK5**
- **scheduled on 1st Q, 2031**

**KSEM** (Korean Space Weather Monitor)

**AMI** (Advanced Meteorological Imager)

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<td><strong>In-operation (ocean &amp; environment)</strong></td>
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**GOCI**: Geostationary Ocean Color Imager
**GEMS**: Geostationary Environmental Monitoring Spectrometer
**GEO-LEO satellite program**

- The KMA GEO satellite program will continue based on CGMS baseline and WIGOS vision 2040.
  - VIS/IR Imager, hyperspectral IR sounder, space weather mission
- KMA’s long-term satellite development plan (2022) introduced the multi-GEO program; one is Imager and another is Hyperspectral IR Sounder.
- LEO satellite with MW sounder will be considered after multi-GEO program feasibility studies.

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The Future Core Activities for New Climate Regime

**GEO Hyperspectral Sounder**
- Support nowcasting with 3D weather field (T, Q, wind)
- Monitoring Greenhouse Gas
- Support data assimilation for NWP

**Data Fusion**
- 4-D cube weather data based on observation with high temporal and spatial resolution

**Application of AI**
- Predict severe weather
- Support short-range forecasting
- Produce super-resolution and proxy-data

**Simulation**
- Nowcasting and very short-range forecasting
- NWP model validation
Thank you