

# KMA/KARI Report on Status of the current and future satellite systems

Presented to CGMS-47 plenary session, agenda item [4]

# Meteorological and Environmental Geo-Satellites

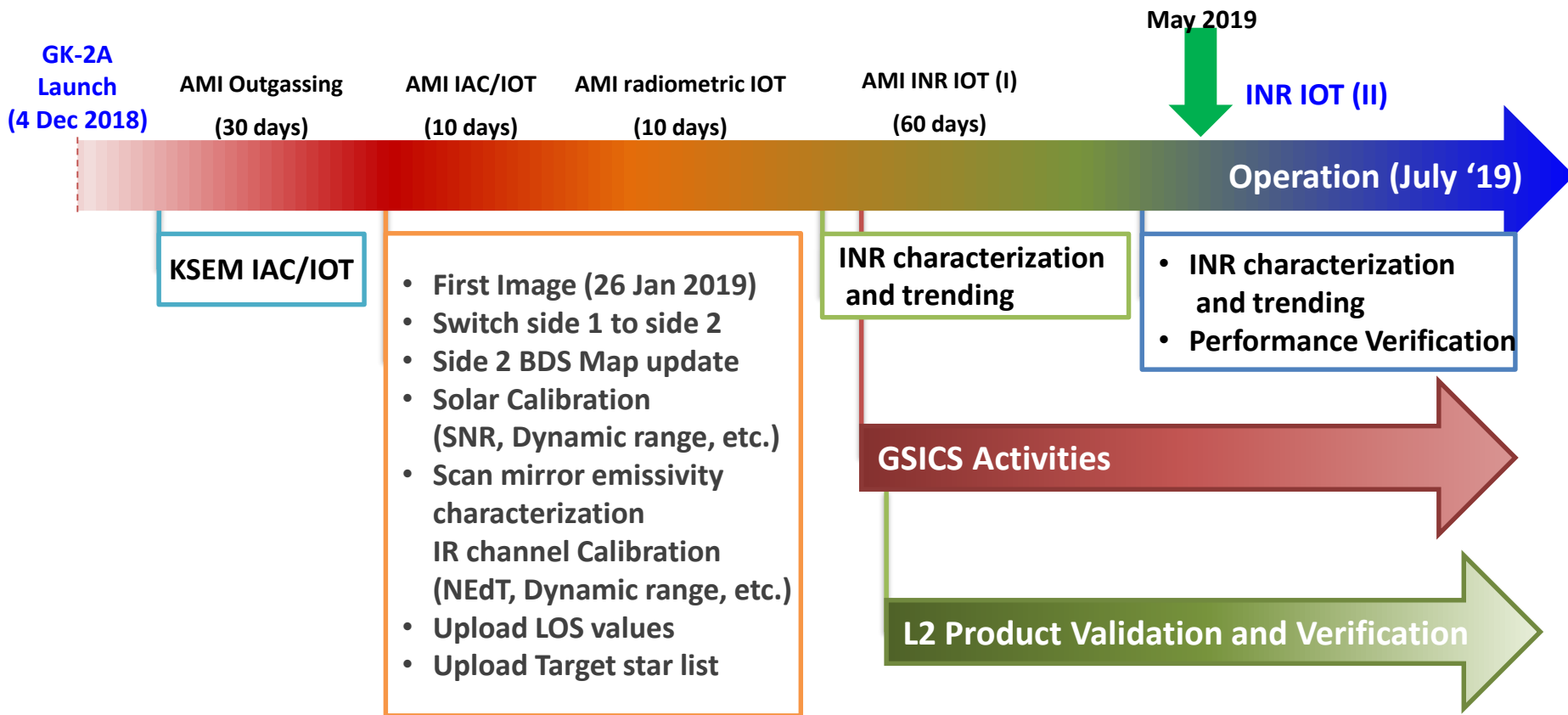
Sector	Satellite in Orbit	Operator	Location	Launch date	Environmental payload and status
West Pacific	COMS	KMA	128.2°E	Jun 26, 2010	Meteorological Imager (AMI), Geostationary Ocean Colour Imager(GOCI)
	GEO-KOMPSAT-2A	KMA	128.2°E	Dec. 4 2018	Advanced Meteorological Imager (AMI), Space Environmental monitoring payload Direct broadcast via UHRIT/HRIT/LRIT
	GEO-KOMPSAT-2B	MOF(Ministry of Ocean and Fisheries), ME(Ministry of Environment)	128.2°E	1 <sup>st</sup> Quarter 2020	Advanced Geostationary Ocean Colour Imager(GOCI-II), Geostationary Environmental Monitoring Spectrometer(GEMS)

## ❏ COMS (Communication, Ocean, and Meteorological Satellite)

\* [Two years extended operation \(1 April 2018~ 31 March 2020\)](#)

## ❏ GEO-KOMPSAT-2A, AMI(Advanced Meteorological Imager)

- Multi-channel capacity: 16 channels
- Temporal resolution: within 10 minutes for Full Disk observation
- Flexibility for the regional area selection and scheduling
- Lifetime of meteorological mission: 10 years



- ❏ Verification of AMI Radiometric Performance
  - Outliers have subsequently been eliminated through updates to the BDS maps
- ❏ Stripping removed from the L0 & L1A data after the BDS MAP update
- ❏ Scan Mirror Coefficient Update showed Spec-compliant radiometric performance, but new scan mirror coefficients were generated and uploaded to remove the slightly angle-dependent characteristics

# GEO-KOMPSAT-2A AMI Radiometric IOT Results

Side 2 SNR

SNR - Side 2:		PSR (EOL)			IOT (BOL)		
Channel	Specification	Min	Mean	Max	Min	Mean	Max
VIS0.4_A047	261	586	713	752	791	910	1033
VIS0.5_A086	299	417	607	643	671	758	887
VIS0.6_A064	130	272	436	468	395	488	567
VIS0.8_A161	300	461	495	517	331	562	631
NIR1.3_A138	300	615	672	718	515	790	944
NIR1.6_A225	300	1165	1233	1299	1128	1369	1593

Side 2 Dynamic Range (W/m<sup>2</sup>/sr/μm)

Dynamic Range - Side 2:		PSR (EOL)	IOT (BOL)		
Channel	Specification	Min	Min	Mean	Max
VIS0.4_A047	720	756	897	907	922
VIS0.5_A086	710	996	1075	1096	1124
VIS0.6_A064	620	857	1215	1245	1302
VIS0.8_A161	320	357	753	770	796
NIR1.3_A138	114	623	343	354	366
NIR1.6_A225	77	77	94	95	96

Side 2 NEdT @ 300K

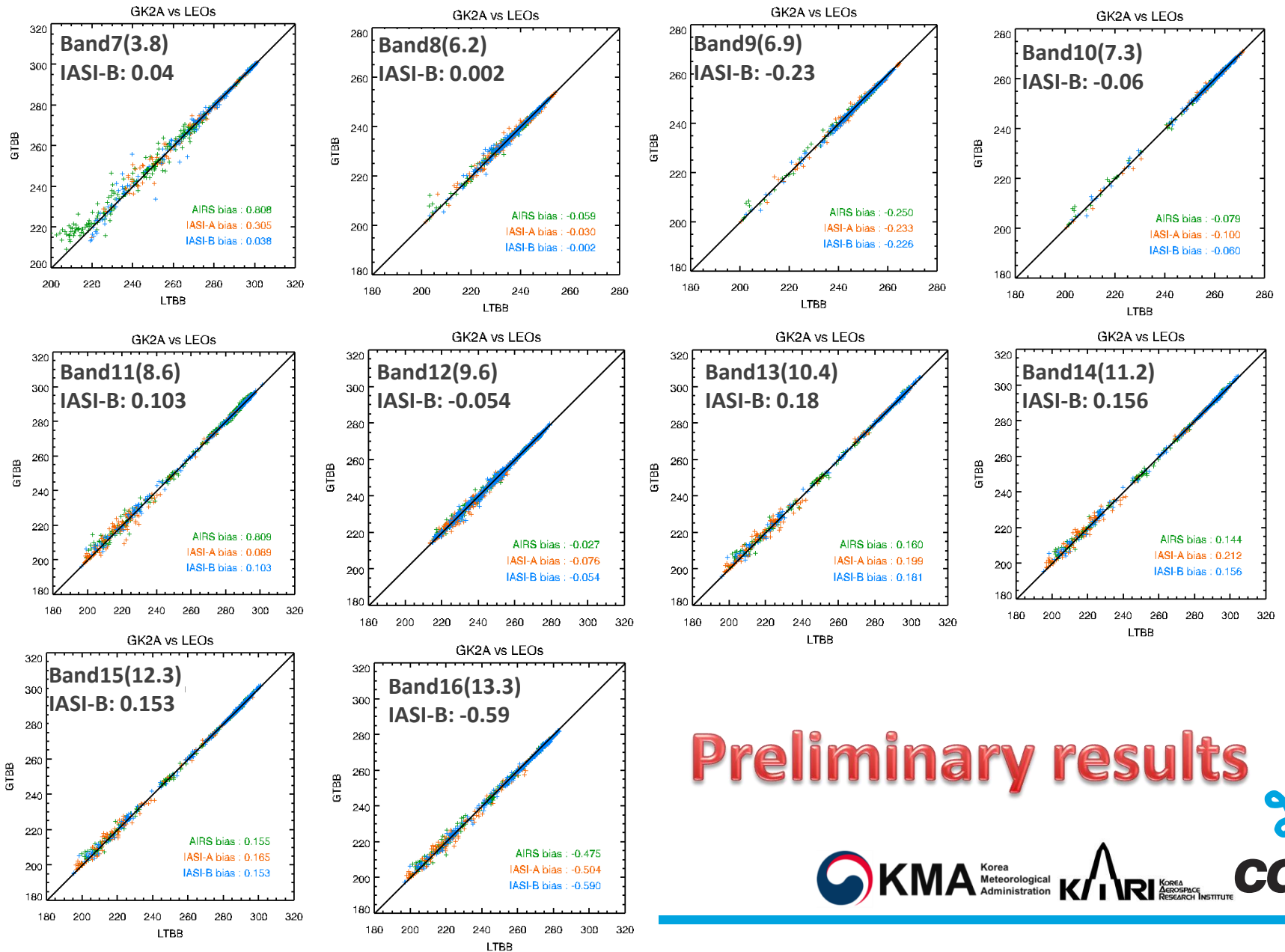
NEdT @ 300K - Side 2:		PSR (EOL)	IOT (BOL)		
Channel	Specification	Max	Max	Mean	Min
IR3.8_A390	0.18K	0.14K	0.2K	0.1K	0.1K
IR6.3_A618	0.10K	0.016K	0.017K	0.012K	0.011K
IR6.9_A695	0.10K	0.018K	0.021K	0.015K	0.014K
IR7.3_A734	0.10K	0.028K	0.029K	0.023K	0.021K
IR8.7_A850	0.10K	0.024K	0.024K	0.019K	0.017K
IR9.6_A961	0.10K	0.024K	0.023K	0.020K	0.018K
IR10.5_A1035	0.10K	0.025K	0.037K	0.021K	0.019K
IR11.2_A1120	0.10K	0.029K	0.078K	0.020K	0.018K
IR12.3_A1230	0.12K	0.044K	0.022K	0.020K	0.017K
IR13.3_A1333	0.30K	0.062K	0.079K	0.040K	0.036K

Side 2 Dynamic Range

Dynamic Range - Side 2:		PSR (EOL)	IOT (BOL)		
Channel	Specification	Max	Min	Mean	Max
IR3.8_A390	400K	410K*	435K	436K	439K
IR6.3_A618	300K	328K	332K	333K	335K
IR6.9_A695	300K	331K	335K	337K	339K
IR7.3_A734	320K	363K	366K	370K	373K
IR8.7_A850	330K	390K	398K	404K	409K
IR9.6_A961	300K	356K	359K	365K	371K
IR10.5_A1035	330K	375K	378K	380K	383K
IR11.2_A1120	330K	395K	397K	401K	403K
IR12.3_A1230	330K	402K	379K	410K	414K
IR13.3_A1333	305K	410K*	508K	615K	627K

- It is verified that the radiometric performance of AMI has significant margins against requirements
- The Image Navigation and Registration IOT is planned by June 2019

# AMI GSICS preliminary results (GEO-LEOs) – May 16, 2019



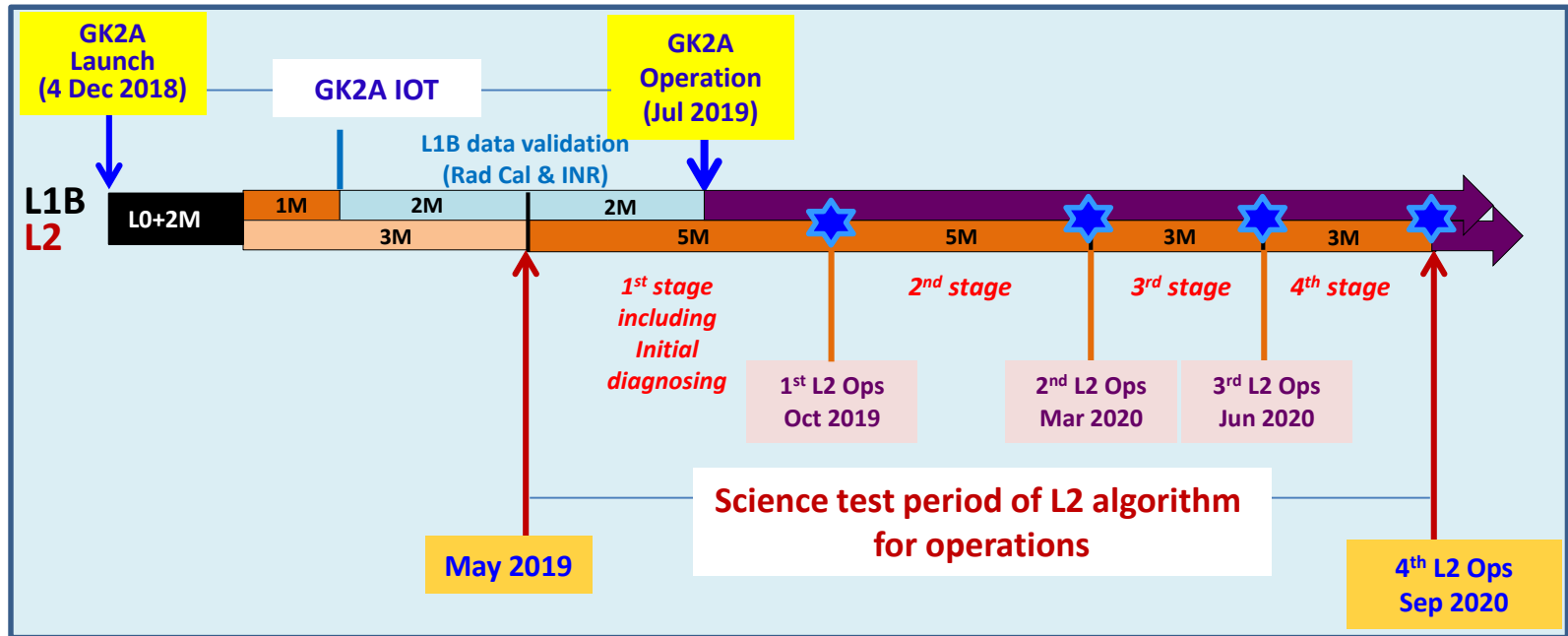
## Preliminary results



# GEO-KOMPSAT-2A: Activities of Meteorological Products

## Algorithm Development and Operation Plan

- Evaluated the pre-launch science algorithms by using Himawari-8 AHI data in 2018
- Continued the feedback process to improve the algorithms with the KMA internal users as well as algorithm developers
- Ready to implement **optimization and maturity evaluation** of the science algorithms by using the operational AMI level 1B data from June 2019 for next 15 months



# GK2A target observations for supporting disaster risk reduction

## KMA will operate 3 different observation areas with 10-min schedule

- FD : Full Disk
- ELA : Extended Local Area centered Korean Peninsular
- LA : Target Area which can observe any area by user request

## The official request of target area observations by global users over the Asian Pacific region (RA II and RA V) will be available

- The first priority is the disasters monitoring over Korean Peninsular, such as typhoon, wild fire etc
- Global users submit official request form defining specific measurement area via designated web page (or email)
- Decision will be made before disseminating images via designated web page

➔ Provide significant improvements in the real-time monitoring of hazardous weather such as Typhoon, thunderstorm and dust events

# GK2A Data Service : AMI (meteorological data)

## [Via GK2A broadcast]

- Broadcast all 16 channels data (full resolution) of meteorological observations
- Maintain L/HRIT broadcast corresponding to COMS five channels

UHRIT	HRIT	LRIT
AMI 16 channels data Service area is same as COMS	Downscaled 5 ~ 14ch data(TBC) will be serviced by COMS compatible HRIT telemetry	LRIT service is redesigned for using on a ship mounting with an Omni directional antenna

## [Via Landline]

- Real-time cloud(ftp) service will be implemented (completed in 2018)
- GK2A data also will be available in DCPC-NMSC (<http://dcpc.nmsc.kma.go.kr>)

## [L1 Data Format]

- netCDF4(for each channels), with GSICS information

## [L2 Data Format]

- netCDF4(for each products)




# GK2A Data Service : KSEM (space weather data)

- KSEM observation data (level 1) will be disseminated to end-user within 5 min with the netCDF or plain txt format

Sensor	Particle Detector	Magnetometer	Charging Monitor
Product	Proton flux	Geomagnetic field (x, y, z)	Internal charging current
	Electron flux		

- KSEM Level 2 data will be produced within 30 min with same L1 data format

Product	Input	Output	Refresh Rate
Magnetospheric Particle Flux (MPF)	Electron flux (KSEM, GOES) Kp index	Current electron fluxes (100keV-2MeV) in the range of $L^* = 2-7$	1 hour
GEO Energetic Particle (GEP)	Electron flux (KSEM, GOES) Solar wind (DSCOVR) Kp index, Dst index	Prediction of electron fluxes at geostationary orbit every hour from the current time to 24 hours later	1 hour
Spacecraft Charging (SC)	Estimated electron flux (GEP)	Prediction of Internal Charging Current ( $\mu\text{A}/\text{cm}^2$ ) at geostationary orbit every hour from the current time to 24 hours later	1 hour
Kp Index Prediction (KIP)	Geomagnetic field (KSEM, GOES) Solar wind (DSCOVR)	Prediction of the Kp Index every hour from the current time to 24 hours later	1 hour
Dst Index Prediction (DIP)	Geomagnetic field (KSEM, GOES) Solar wind (DSCOVR) Dst index	Prediction of the Dst Index every hour from the current time to 24 hours later	1 hour 

# Summary of GK2A preparation

## GK2A/AMI commissioning:

- To verified that the radiometric performance of AMI has significant margins against requirements
- The GSICS based preliminary intercalibration results using LEOs(AIRS, IASI-A,B, CrIS) and GEO(AHI) showed reasonable bias values

## GK2A/AMI product and application services

- To develop the 52 products (23 primary) for GK2A/AMI compared with 16 products of COMS/MI
- To implement **optimization and maturity evaluation** of the science algorithms by using the operational AMI level 1B data **from June 2019 for next 15 months**

## GK2A/AMI all 16 channels data will be disseminated by broadcast(UHRIT) and real-time ftp(cloud) service

- GK2A operation will be mid-July 2019 after commissioning

# Thank you

