The 4th Asia-Oceania Meteorological Satellite Users' Conference(2012. 10. 9)

Current Status and Future Plan of KMA Satellite Program

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Korea Meteorological Administration
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국가기상위성센터
National Meteorological Satellite Center

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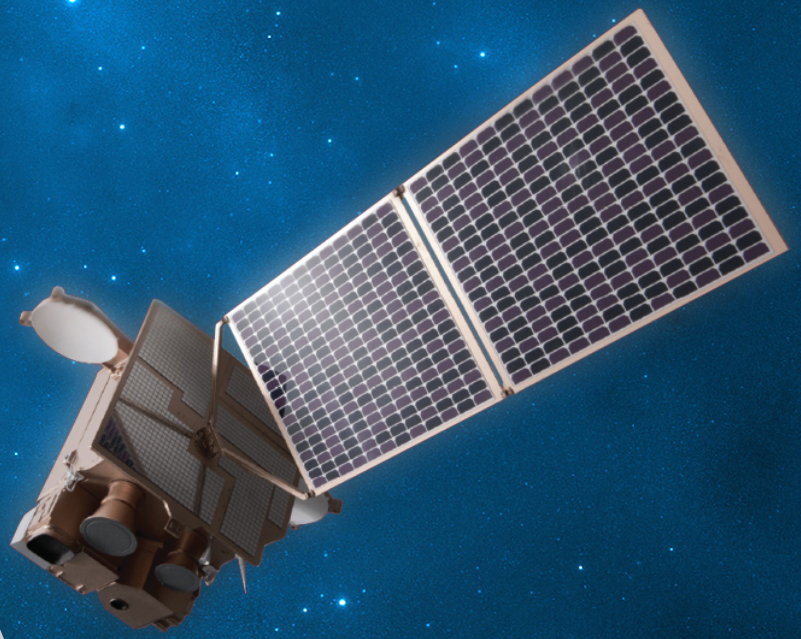

1. Current Status of COMS
2. Utilization of COMS data
3. Plan for Geo-KOMPSAT-2A

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National Meteorological Satellite Center

Current Status of COMS

NMSC

National Meteorological Satellite Center

국가기상위성센터
National Meteorological Satellite Center

1. Location

- Jincheon (100km from SEOUL to the south)

2. Organization & Personnel

- Established in April 2009
- 3 divisions and 43 employees

	Satellite planning division	Satellite operation division	Satellite analysis division
Quota(43) Current(43)	16/16	14/14	13/13

3. Major missions

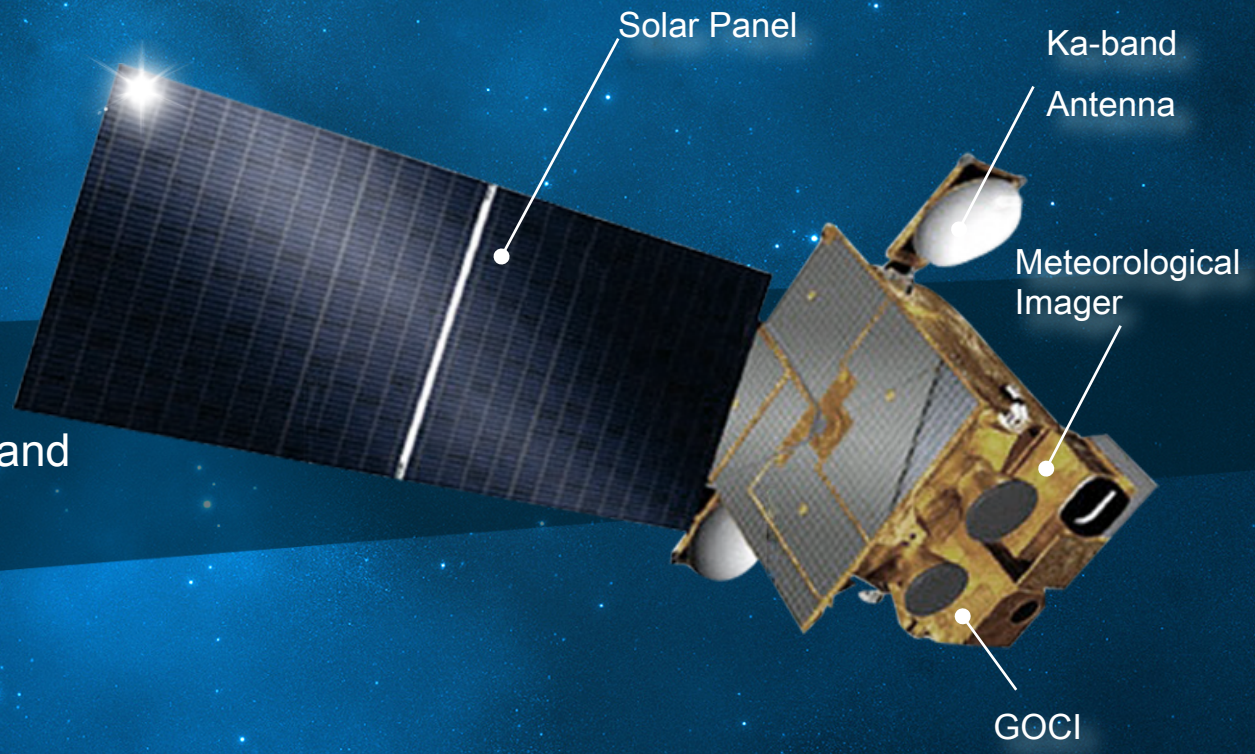
- Meteorological Satellite Operation
- Satellite Data Reception / Processing / Analysis / Distribution to support forecasts
- Maintaining meteorological satellites
- International Cooperation
- User support activities

COMS

국가기상위성센터
National Meteorological Satellite Center

The first multi-purpose geostationary satellite for Korea in the application of Meteorology, Ocean and Communication

- Meteorological Mission : Continuous Meteorological Observation to support weather forecasting and early detection of severe weather phenomena
- Orbit : 128.2°E
- Design life : 7 years



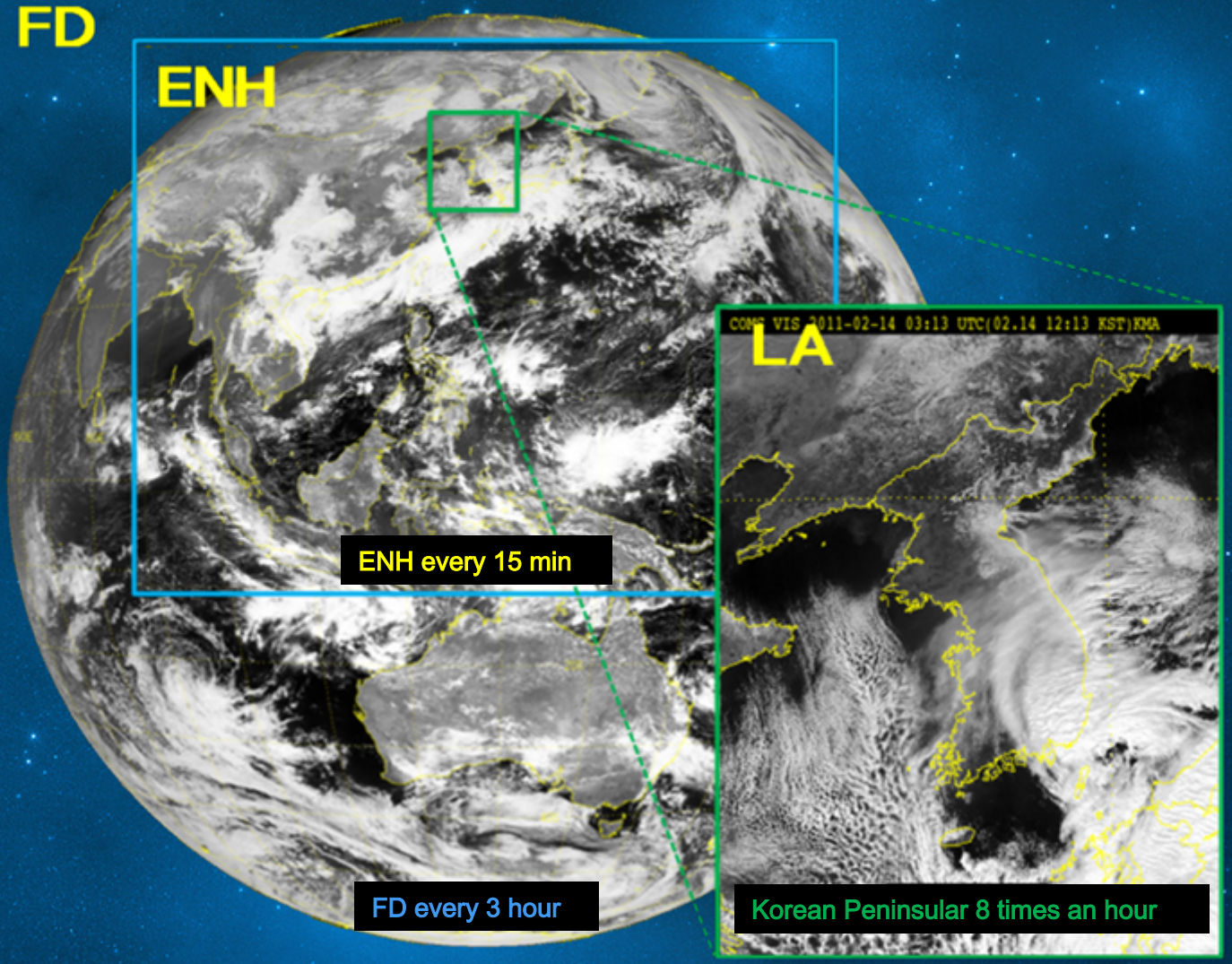
Communication, Ocean and
Meteorological Satellite

COMS Ground Segment

HRIT (High Rate Information Transmission)
LRIT (Low Rate Information Transmission)

COMS Observation mode

국가기상위성센터
National Meteorological Satellite Center



COMS VIS 2011. 2. 14 02:45 UTC[02. 14 11:45 KST] KMA

COMS observation data quality management
(Radiometric calibration)

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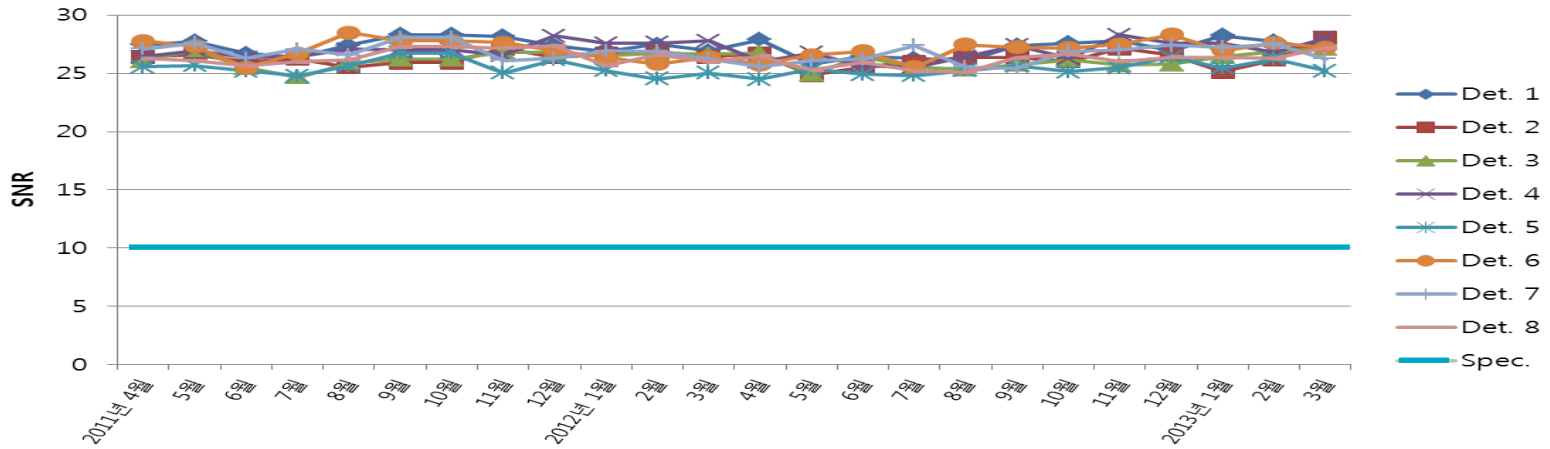
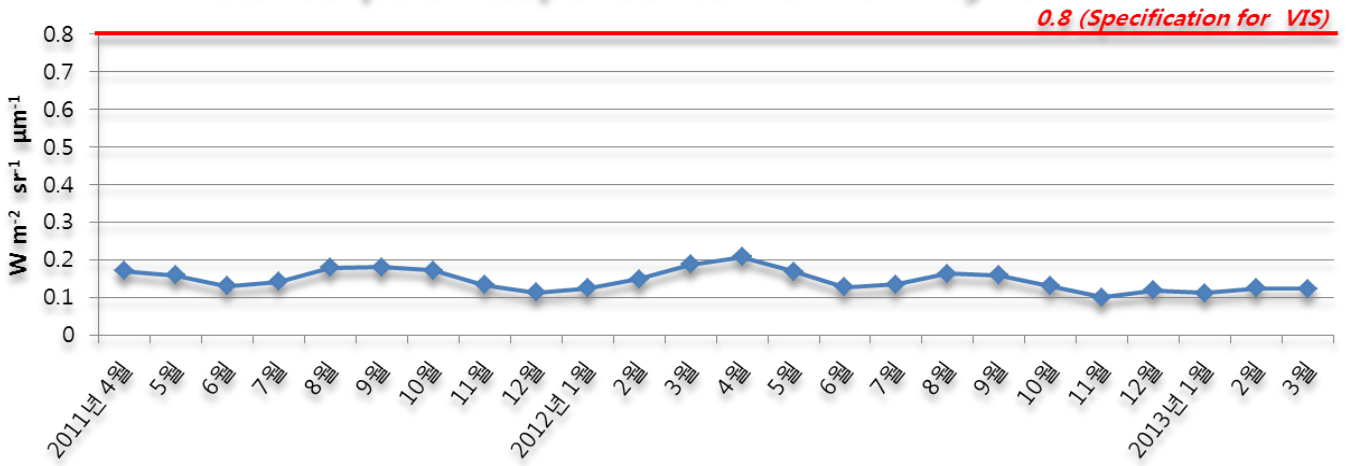
SNR (Signal to Noise Ratio)



PRNU (Pixel-to-pixel Response Non-uniformity for VIS)♪



COMS observation data quality management
(Image Navigation and Registration, INR)

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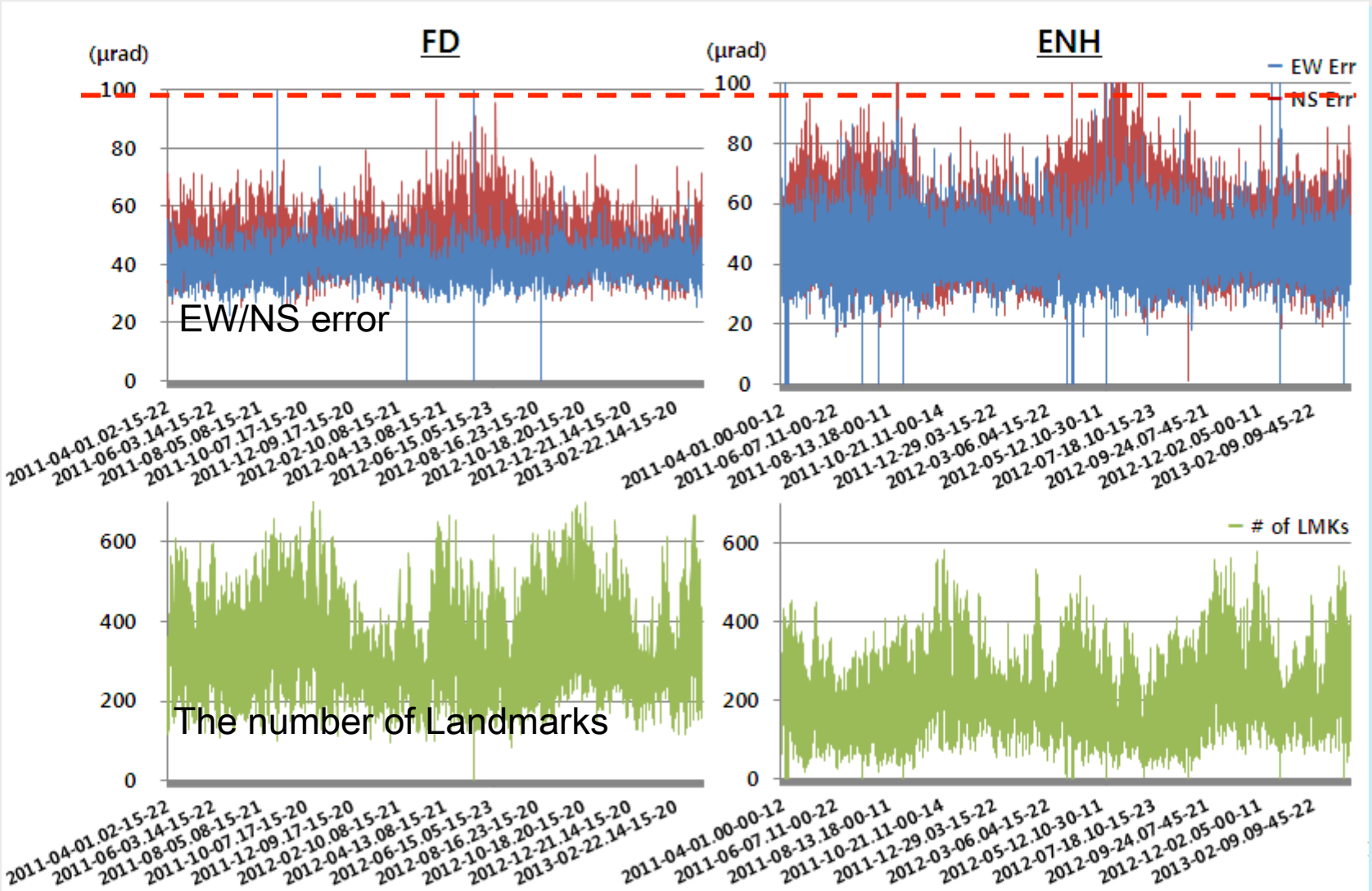
Requirement: 87.5μrad



COMS Data Services (via ground network)

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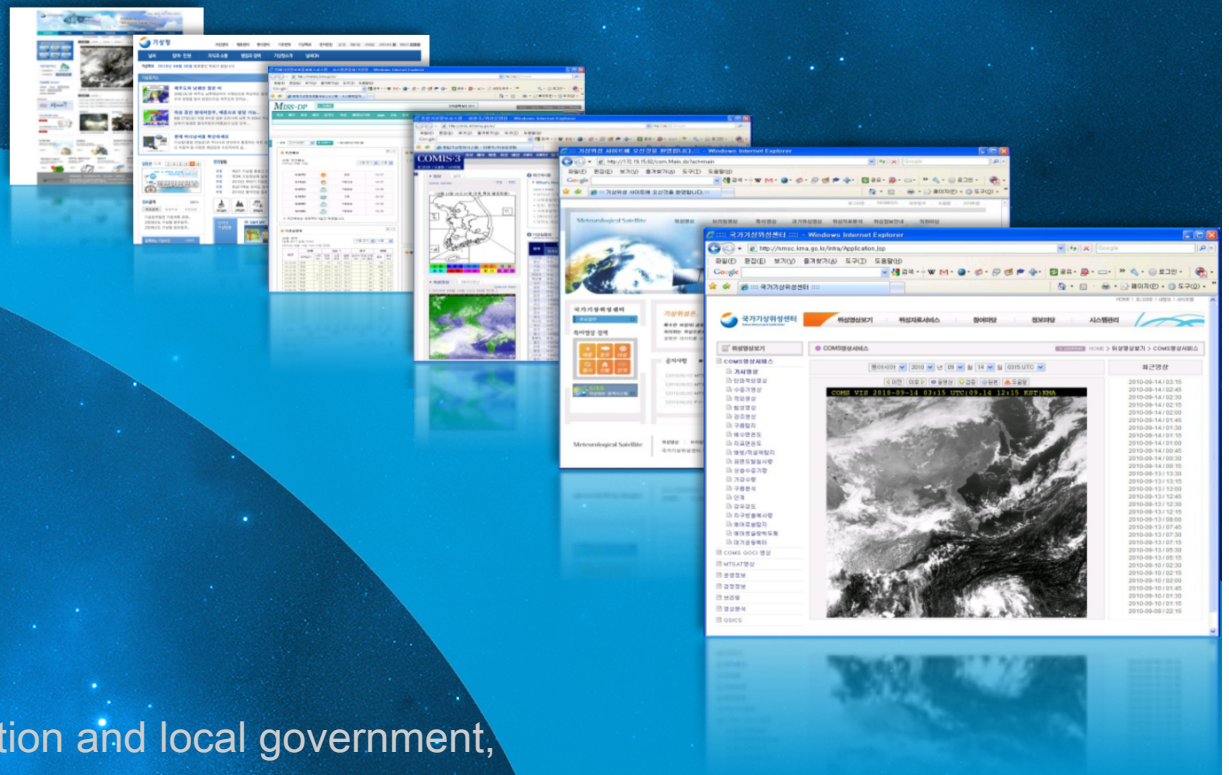
National Meteorological Satellite Center

Service via Internet

- NMSC provides COMS Level 1B data of all five channels and Level 2 products to users by posting the processed data on NMSC Website http://nmsc.kma.go.kr/jsp/eng/contents/main/main.jsp



Service via FTP

- Domestic
  - disaster management organization and local government, military, broadcasting companies,
- International
  - Eumetsat, CIMSS(US) etc.

Standard satellite data service for WIS system

국가기상위성센터
National Meteorological Satellite Center

Users

Internet

Global Information System Center(GISC)

Searching / Require

Download / FTP service / E-mail service

Currently, approved by seven centers
(Korea, China, Japan, Germany, France, England, Australia, Brazil)

Metadata / Required data

Global exchange data

DCPC
(about 120 centers)

Local exchange data

189 WMO members
(about 217 centers)

Data Collection or Production Centre (DCPC)

National Center (NC)

❖ NMSC : WIS(WMO Information System) DCPC operation (after 2013. 3)

Utilization of COMS Data

Nowcasting & Short-range Weather Forecasting

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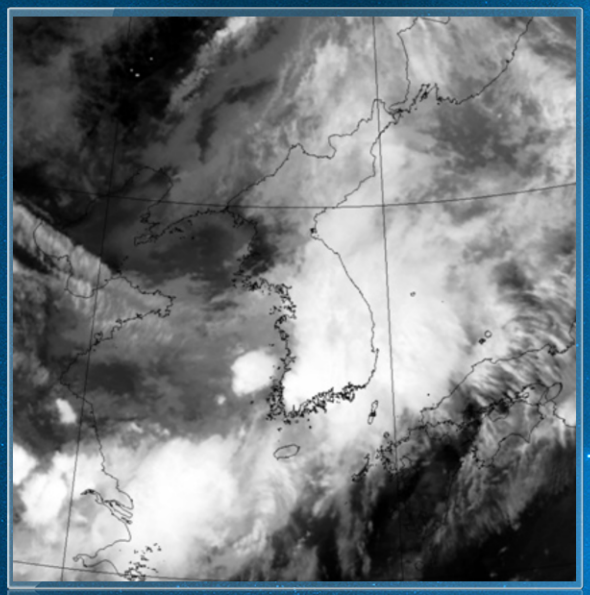
National Meteorological Satellite Center

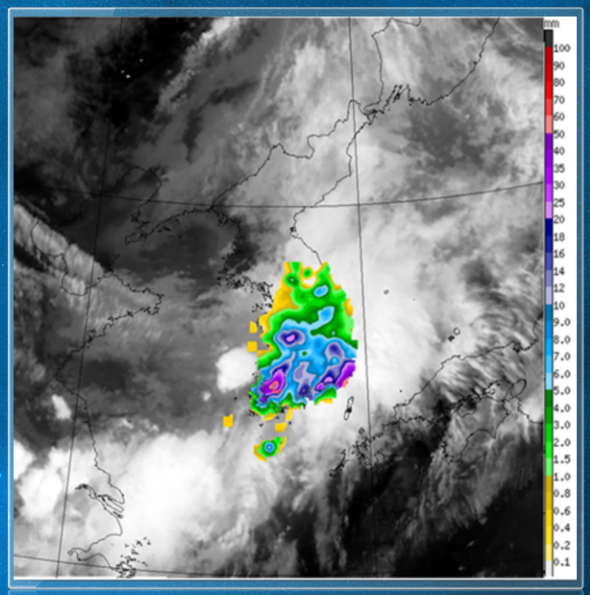
Synchronizing with COMS 10 minutes data in temporal and spatial

Integration between COMS and ground-based observation data

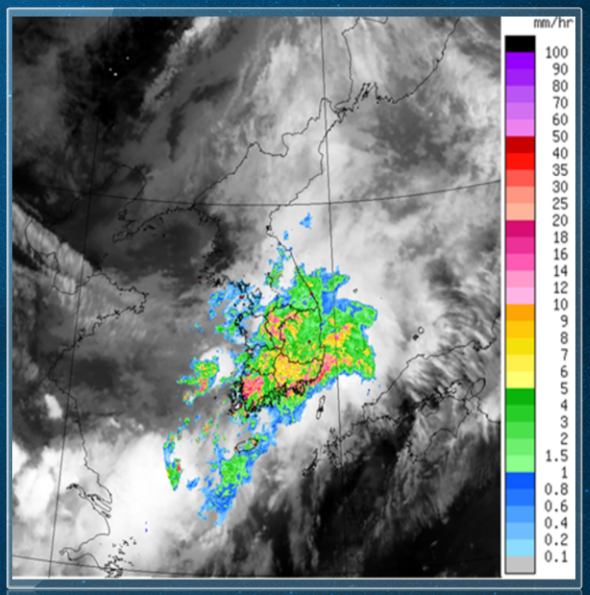
Infrared image



Infrared image + AWS



Infrared image + Radar



Nephanalysis

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Cloud Information Chart (4times/day)

기상청

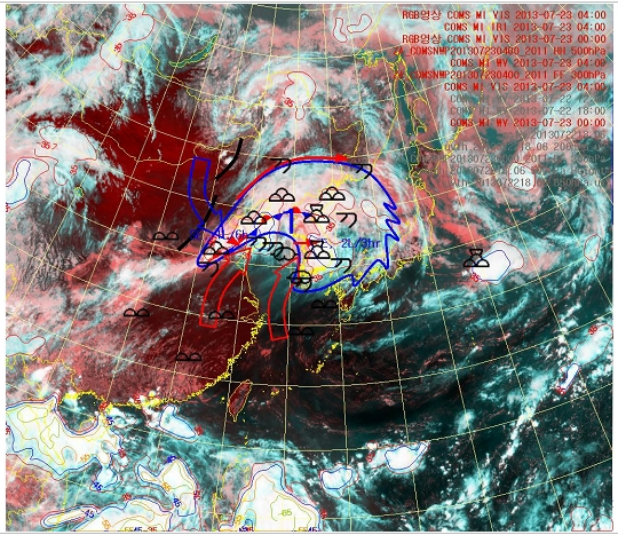
통보 : 2013. 07. 23. 0535 UTC (2013. 07. 23. 1435 KST)

2013-07-23-01-003

구름분석정보

Tel. 070-7850-5803

위성	사용채널	관측시각	분석자
천리안	IR1, WV, RGB	2013. 07. 23. 0400 UTC (2013. 07. 23. 1300 KST)	김옥희

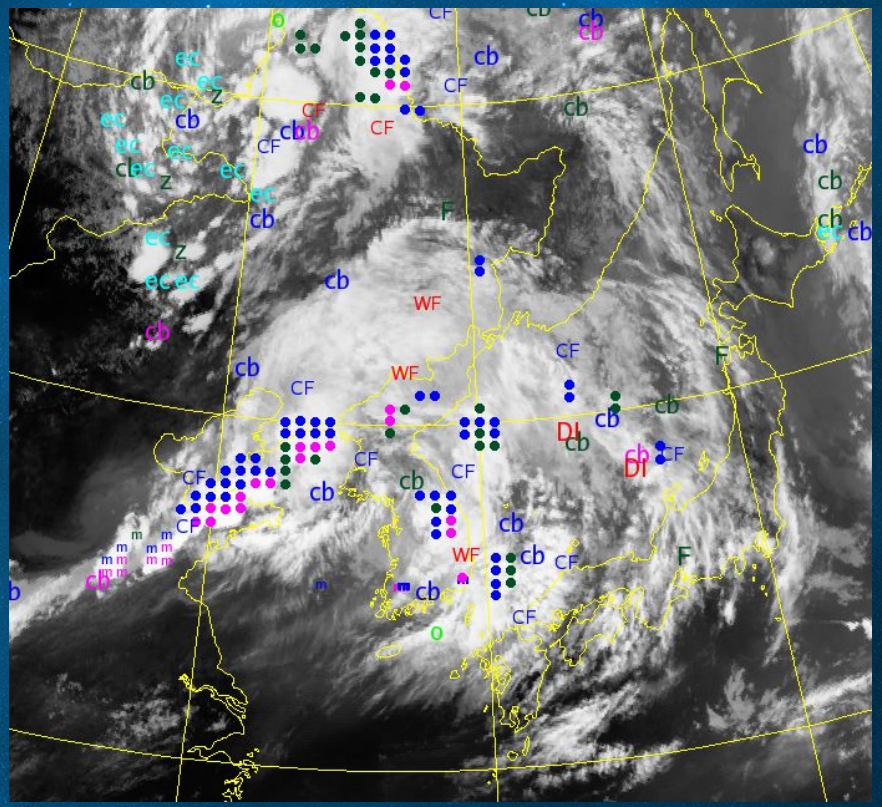


o 실황: 발달한 구름이 강원도,충청도 남부, 경상도지방에 영향 주고 있음.

1 영역 : 남서기류가 강하게 유입되면서 우리나라 동부지방에서 발달한 대류운 띠가 남북으로 영향주고 있고, 대류운 발생지점은 2도/3시간 동진하고 있어 오후 늦게 동해상으로 접차 이동할 것으로 판단됨. 남서~서풍이 내륙으로 유입되면서 서해상의 하층운이 지속적으로 내륙으로 유입되고 있고, 국지적으로 대류셀이 발달하는 경향임.

o 산동반도 서쪽 두 건조영역의 경계에서 발달하는 대류운 띠의 발생라인이 1도/6시간 남동진하고 있어 이 구름대의 이동경향을 계속 감시 및 분석이 필요함.

Automatic Satellite Interpretation Information (ASII)



C : Cold front
W : Warm front
cb : Cumulonimbus
M : Mesoscale convective system
● : Convective sell

ji : Front strengthening by jet
ec : Intensified cumulus
z : Cold move
dl : Dry air injection

(Bi-lateral Cooperation with EUMETSAT)

COMS baseline Products from CMDPS

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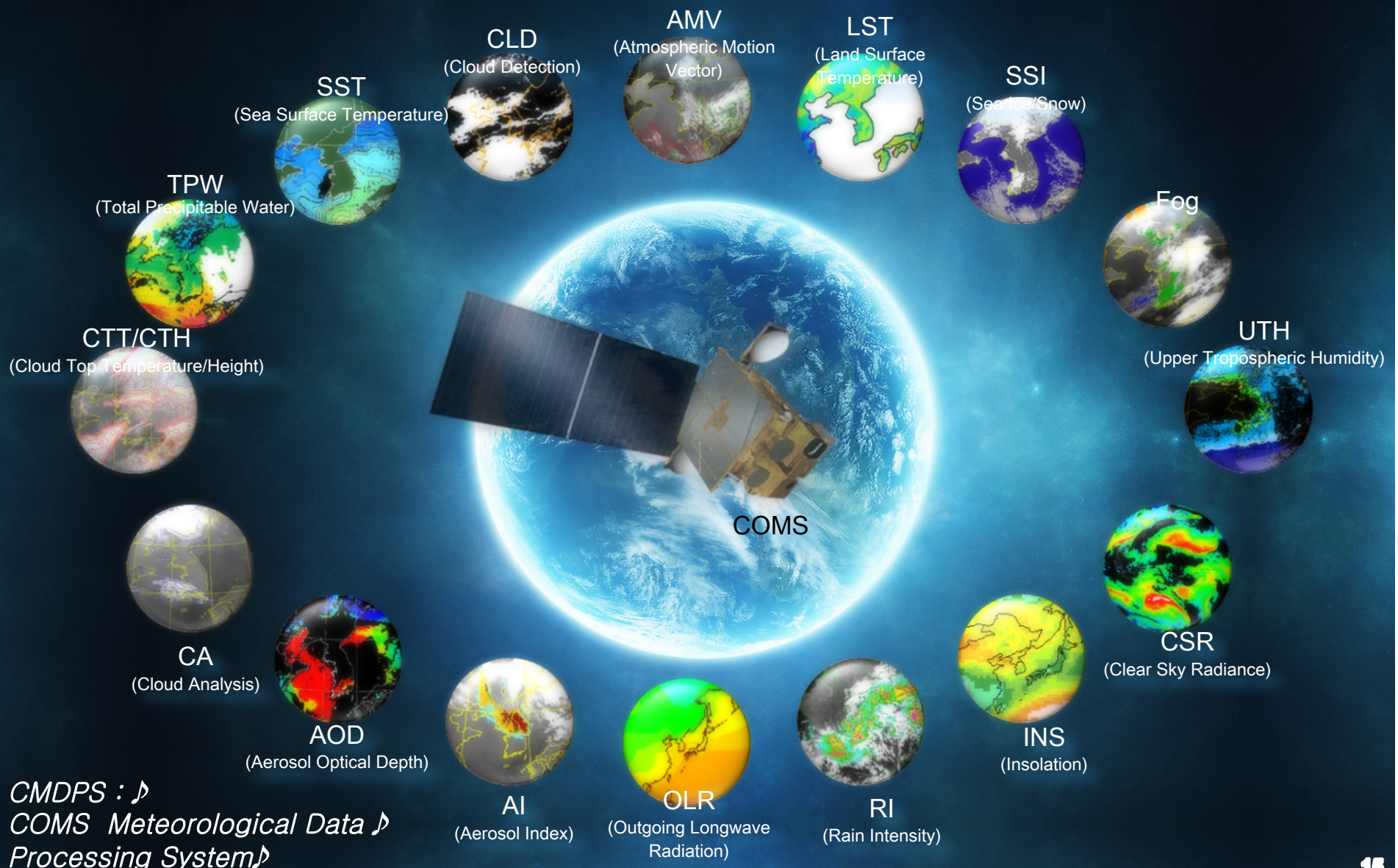
16 Baseline Products : Development (2003-2010) and operation (2011~)



CMDPS : ♪
COMS Meteorological Data ♪
Processing System♪

COMS baseline Products

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Group	Product Name		Area	Alg. Dev.	Remarks
Scene Analysis	Cloud Detection (CLD)		FD / ENH / LA	NIMR	Apr 2011
	Fog Detection (FOG)		East Asia	NIMR	Apr 2011
	Snow/Sea Ice (SSI)		FD / ENH + comp.	NIMR	Jan 2012
	Aerosol Index (AI)		East Asia	Pusan NU	Apr 2011
	Aerosol Optical Depth (AOD)		East Asia	YSU	Jan 2012
Cloud Information	Cloud Analysis (CLA)	Cloud Type (CT)	FD / ENH / LA	SNU	Apr 2011
		Cloud Amount (CA)	FD / ENH / LA		
		Cloud Phase (CP)	FD / ENH / LA		Jan 2012
		Cloud Optical Thickness (COT)	FD / ENH / LA		Jan 2012
	Cloud Top Temp./Height (CTTH)		FD / ENH / LA	SNU	Apr 2011
	Rainfall Intensity (RI)		East Asia / LA	Kangnung NU	Aug 2011
Water vapor Information	Total Precipitable Water (TPW)		East Asia	Kyoungpook NU	Jan 2012
	Upper Tropospheric Humidity (UTH)		East Asia	Kyoungpook NU	Aug 2011
Surface Information	Sea Surface Temperature (SST)		FD / ENH + comp.	SNU	Aug 2011
	Land Surface Temperature (LST)		East Asia	Kongju NU	Jan 2012
Radiation Information	Clear Sky Radiance (CSR)		FD / ENH	NIMR	Jan 2012
	Insolation (INS)		FD / ENH	Pukyoung NU	Jan 2012
	Outgoing Longwave Radiation (OLR)		FD / ENH + comp.	SNU	Aug 2011
Wind	Atmospheric Motion Vector (AMV)		Enhanced Northern Hemi.	NIMR	Apr 2011

Utilization of CMDPS: Asian dust analysis

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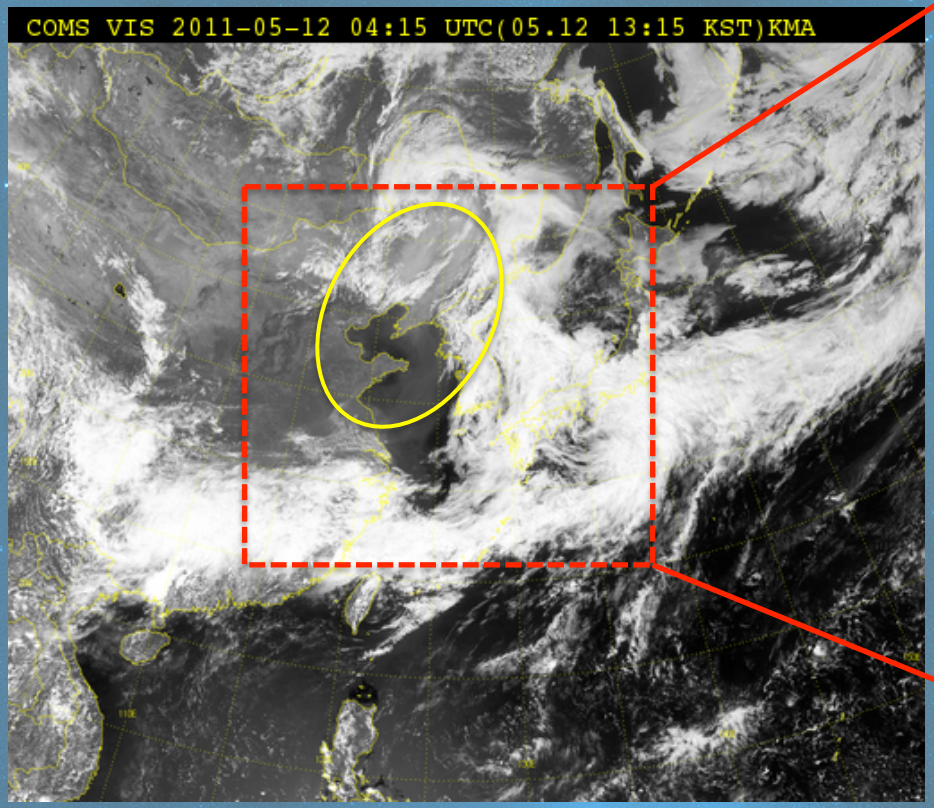
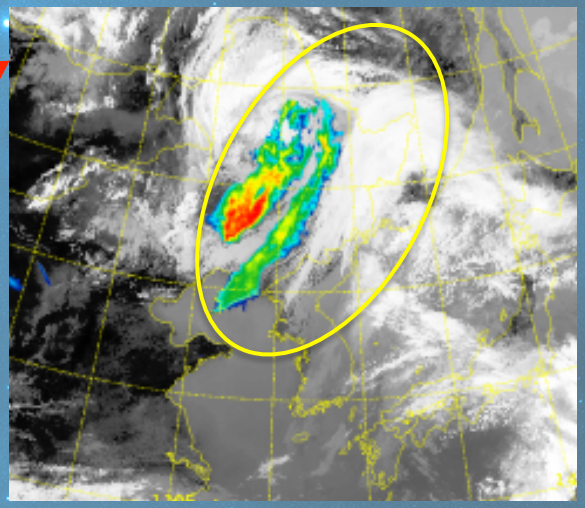
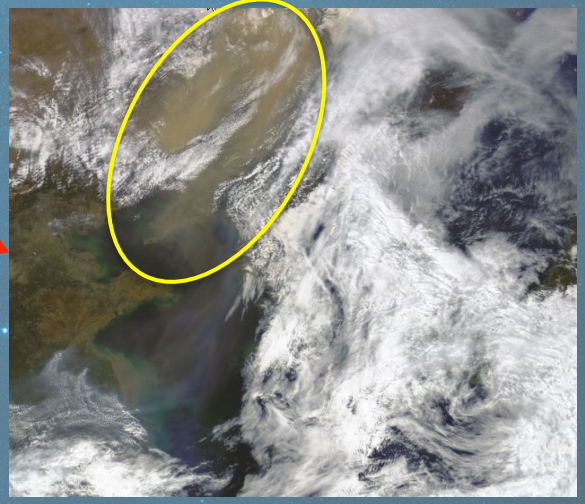


COMS visible image



Application of Asian dust detection algorithm

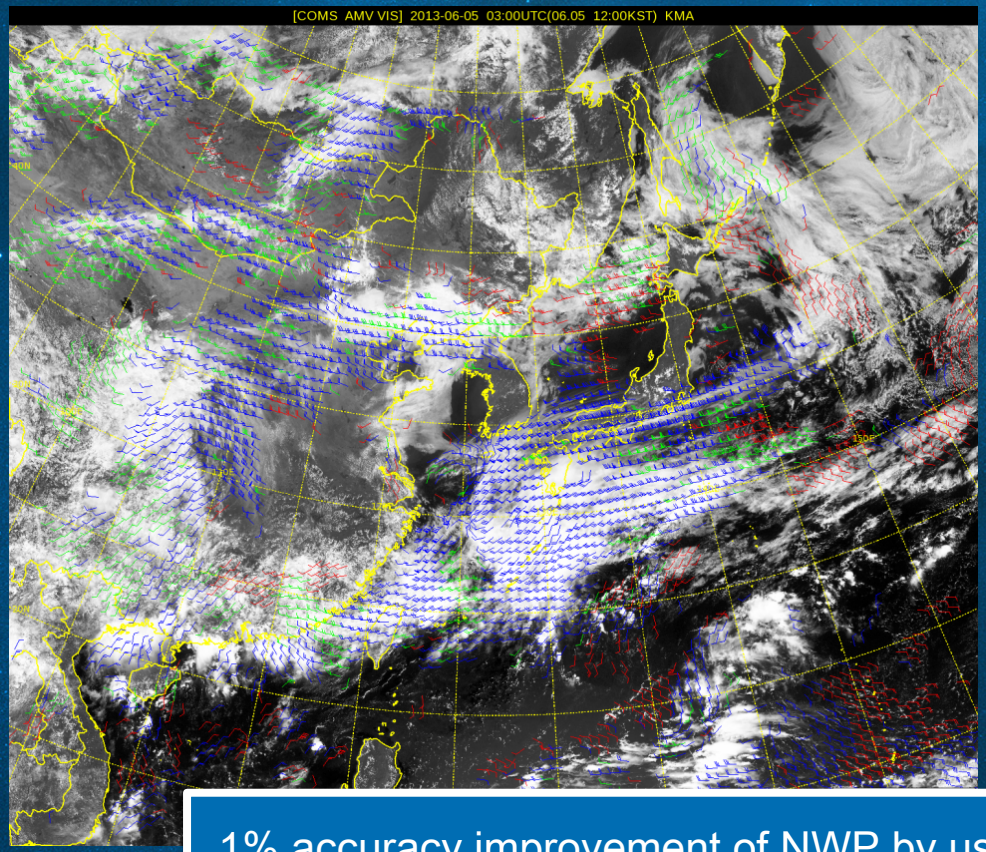


GOCI Color composition image

CMDPS : COMS Meteorological Data Processing System♪

Supporting numerical weather prediction

- COMS products quality management(AMV, CSR, sea ice, snow etc.)
- NWP sensitivity test
- Analysis of characteristic of satellite data utilized in NWP
- Improving RTM simulation



1% accuracy improvement of NWP by using COMS AMV data

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Plan of Geo-KOMPSAT-2A

Geo-KOMPSAT-2A Program

국가기상위성센터
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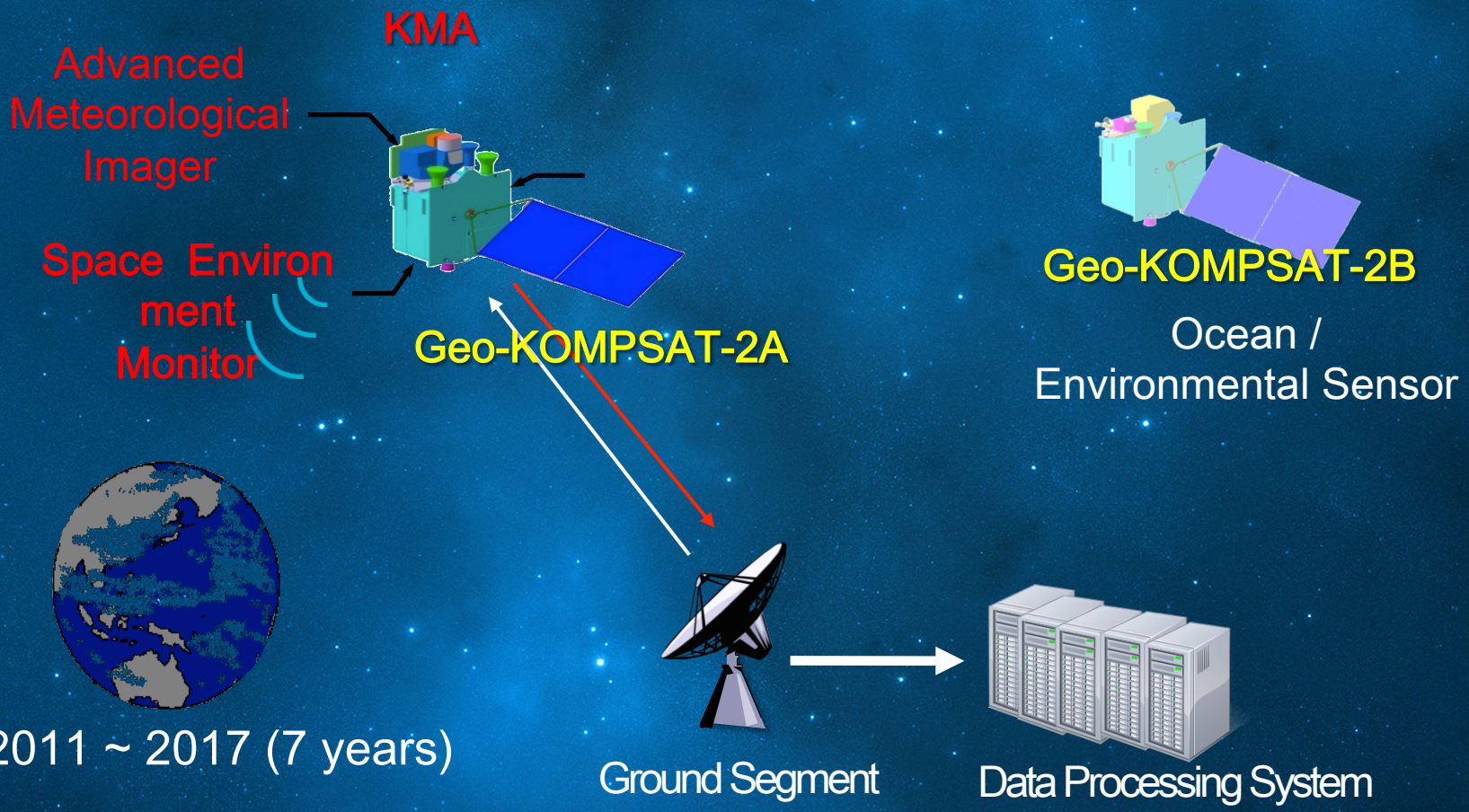
→ One for the next generation Meteorological Imager
→ The other for the Ocean and Atmospheric Trace Gas monitoring



GEO-KOMPSAT-2A Payload(1)

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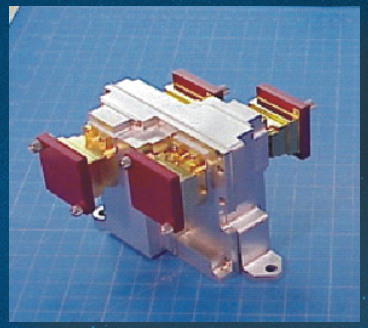
	MI(COMS)		AMI(GEO-KOMPSAT-2A)	
Channels	5		16	
Spatial resolution(km)	1/4(VIS/IR)		0.5,1/2(VIS/IR)	
True color image	Unable		Able	
Temporal resolution(min)	30(Full Disk)		10(Full Disk)	
Products	16		52	
Data rates(Mbps)	2.6		~70	
Design life(year)	7		10	
Utilization	Weather forecasting		+ NWP + Climate model	
Loaded satellites	U.S.A.	GOES-8~15	GOES-R(ABI)	2015
	Japan	MTSAT-2	Himawari-8/9(AHI)	2014/2016

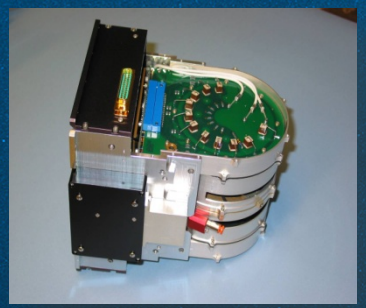
GEO-KOMPSAT-2A Payload(2)

국가기상위성센터
National Meteorological Satellite Center

Korea Space Environment Monitor(KSEM)

Measurement of electron on mid energy range and magnet ic field, and charging current





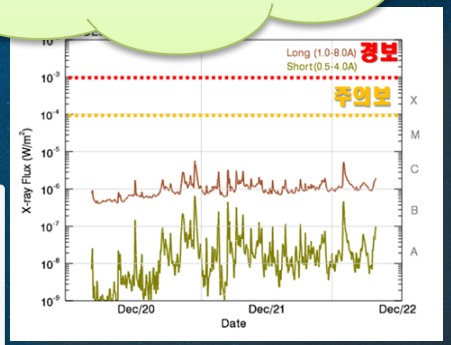
Data

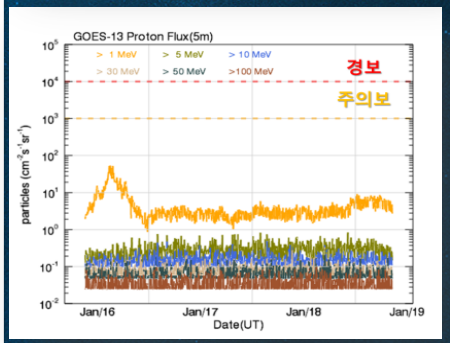
- Time(satellite position)
- Energy channel (electron)
- Particle flux (each direction)
- Magnetic field flux(3axis)
- Background flux
- Noise
- Payload monitoring data (Voltage, darkcurrent, etc.)

Products(8)

- real-time magnetospheric par ticles distribution
- deep dielectric charging pred iction index
- geomagnetic storm index
- stratospheric ozone concentr ation
- thermospheric temperature
- stratospheric temperature
- AOI(Arctic Oscillation Index)

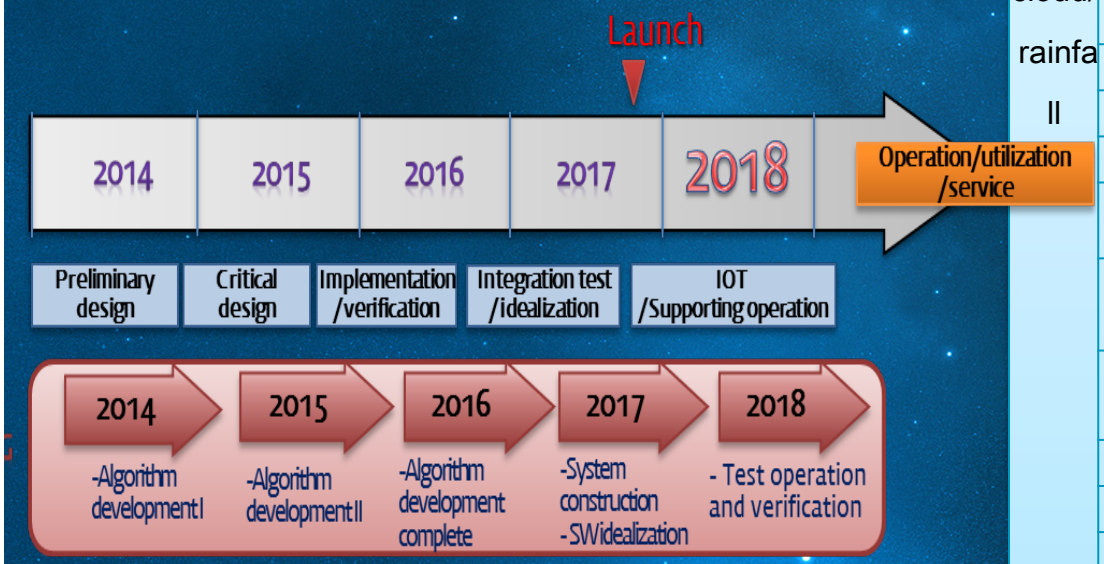
Support for stable operation of GEO-KOMPSAT-2A





GEO-KOMPSAT-2A Meteorological Products

Schedule for development of meteorological data processing system



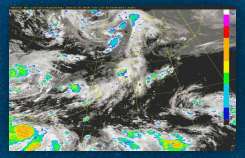
	No.	Products		No.	Products
cloud/ rainfall	1	Cloud detection	radiation/ Aerosol	27	Visibility
	2	Cloud Top Temperature		28	O3 total
	3	Cloud Top Pressure		29	Radiances
	4	Cloud Top Height		30	Upward Shortwave Radiation(TOA)
	5	Cloud type		31	Downward Shortwave Radiation(Surface)
	6	Cloud phase		32	Absorbed Shortwave Radiation(Surface)
	7	Cloud Amount		33	Downward Longwave Radiation(Surface)
	8	Cloud Optical Depth		34	Upward Longwave Radiation(Surface)
	9	Cloud Particle Size Distribution		35	Upward Longwave Radiation(TOA)
	10	Cloud Liquid Water	ATMmotion/ condition	36	Atmospheric Motion Vector
	11	Cloud Ice Water Path		37	Vertical Temp. Profile
	12	Cloud Layers/Heights		38	Vertical Moisture Profile
	13	Fog		39	Derived Stability Indices
	14	In-flight icing			Total Precipitable Water
	15	Convection initiation		40	Atmospheric Motion Vector
	16	overshooting top/enhanced thermal couplet detection		41	Tropopause folding turbulent flow
	17	Rainfall Intensity	surface	42	Sea Surface Temperature
	18	probability of rainfall		43	Land Surface Temperature
	19	rainfall potential		44	Fire/Hot Spot Characteristic
radiation/ aerosol	20	Aerosol detection		45	Vegetation Index
	21	Asian dust detection		46	Vegetation Fraction: Green
	22	Volcanic Ash: Detection and Height		47	Surface Emissivity
	23	SO2 Detection		48	Surface Albedo
	24	Aerosol Optical Depth		49	Snow Cover
	25	Asian dust Optical Depth		50	Snow Depth
	26	Aerosol Particle Size		51	Ice Cover
				52	Current

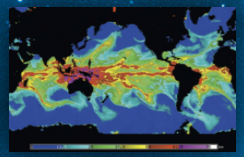
GEO-KOMPSAT-2A Applications

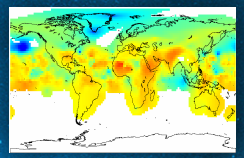
국가기상위성센터
National Meteorological Satellite Center

◆ Production of various products

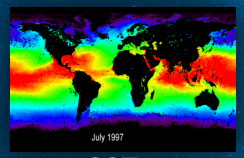
- Support for forecast/NWP(16 → 52)


Rainfall

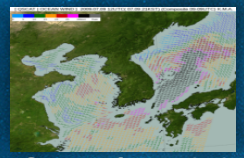

TPW

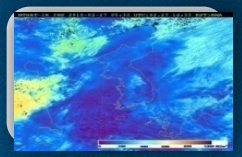

Greenhouse gases

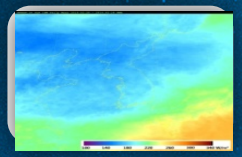

Wildfire

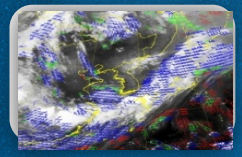


SST

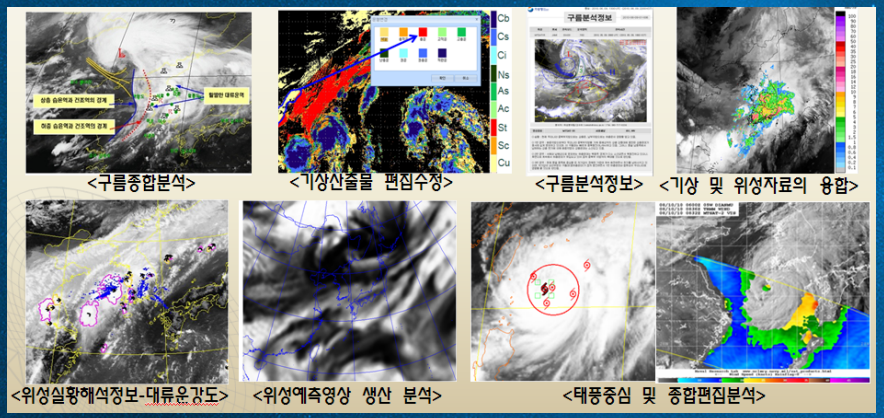

Sea surface wind


Insolation


Upward radiation


AMV

◆ Support for forecast and various applications



<구름종합분석> <기상산출물 편집수정> <구름분석정보> <기상 및 위성자료의 융합>
<위성실황해석정보-대류운강도> <위성예측영상 생산 분석> <태풍중심 및 종합편집분석>

◆ Application for Forecast

- nowcasting
- typhoon
- aviation weather
- marine weather
- NWP model
- Conceptual Model

◆ Application for climate, hydrology, environment etc

◆ Image Processing

- RGB combination,
- Special event images etc.

◆ User Support

- Outreach Program
- Education and Training

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Plan for LEO Satellite

LEO satellite development

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- **Generic technology research**
  - LEO meteorological satellite instruments technology research
  - LEO meteorological satellite development mid-long term loadmap
  - International technology development cooperation research
- **Secure a budget for LEO satellite**
  - Political and technical validity
  - Economical validity and analysis of benefits
  - Surveying industrial ripple effects and proposing the way of improving manpower
- **Development of the LEO meteorological satellite**
  - Developing instruments of the LEO satellite
  - Satellite bus, system integration and developing testing technique
  - Ground segments development and secure a image quality technique
- **Application of data Utilization plan**
  - Apply to weather, climate, earthquake, volcano, disaster, etc.
  - Data utilization research for global water/climate, etc.
  - Supply standard input data of numerical model


Thank You !

COMS Data Service (via COMS)
L/HRIT Dissemination Schedule

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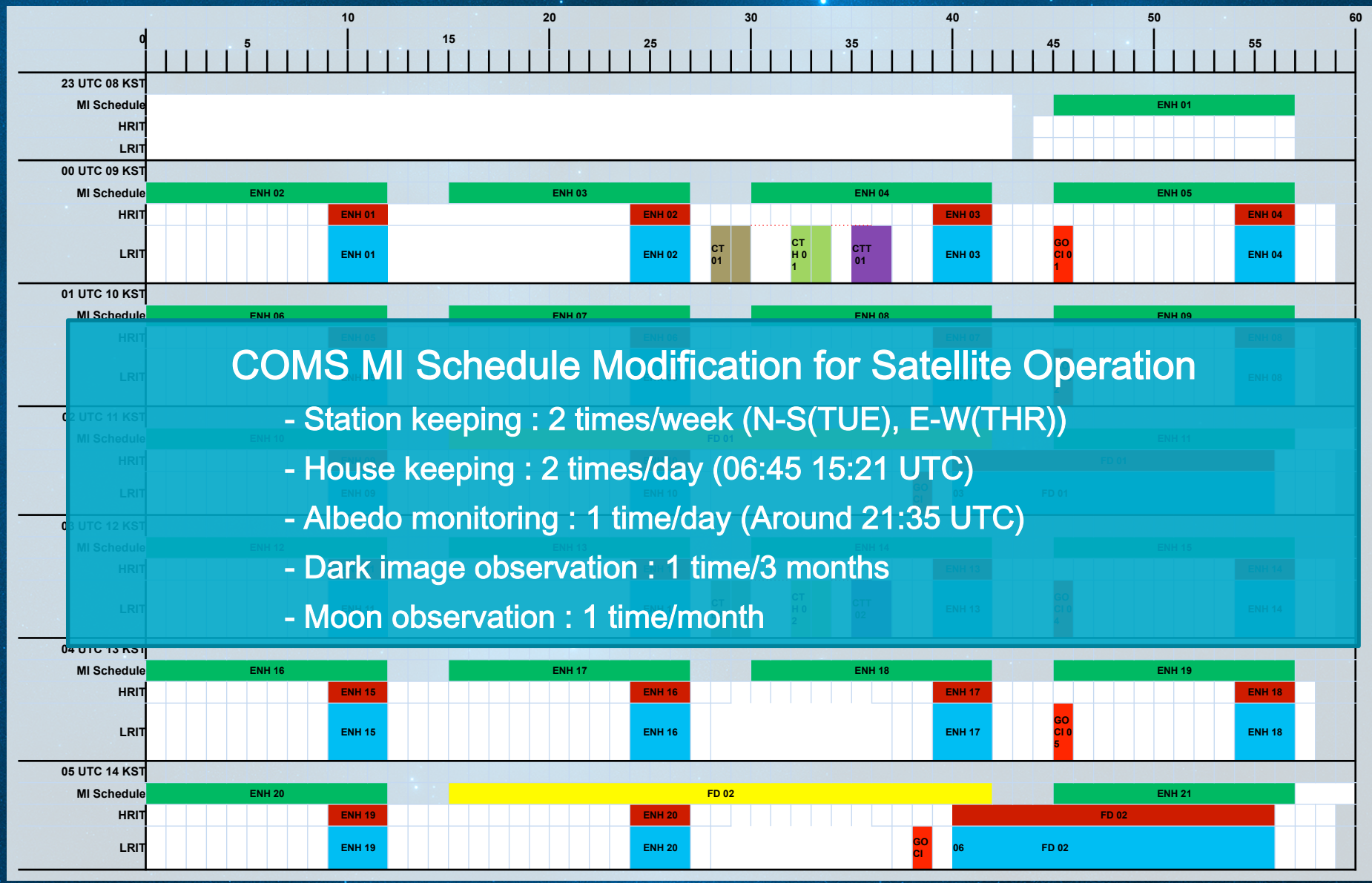

COMS MI Schedule Modification for Satellite Operation

- Station keeping : 2 times/week (N-S(TUE), E-W(THR))
- House keeping : 2 times/day (06:45 15:21 UTC)
- Albedo monitoring : 1 time/day (Around 21:35 UTC)
- Dark image observation : 1 time/3 months
- Moon observation : 1 time/month