



# Status of GOCI-II Development

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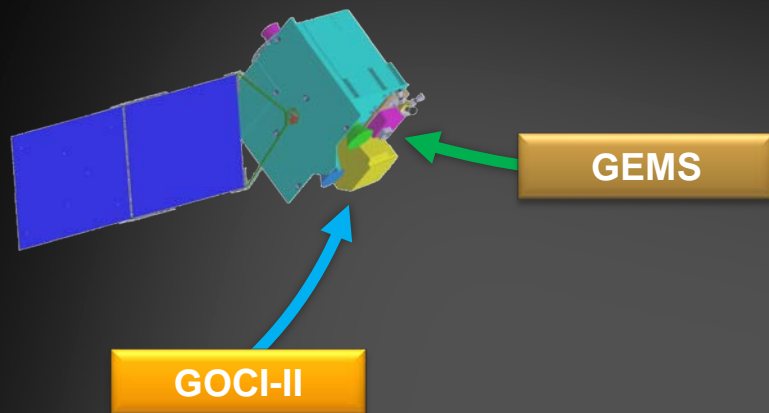
Korea Ocean Satellite Center (KOSC)  
Korea Institute of Ocean Science & Technology (KIOST)



IOCS Meeting 2015, San Francisco, USA

16. June, 2015

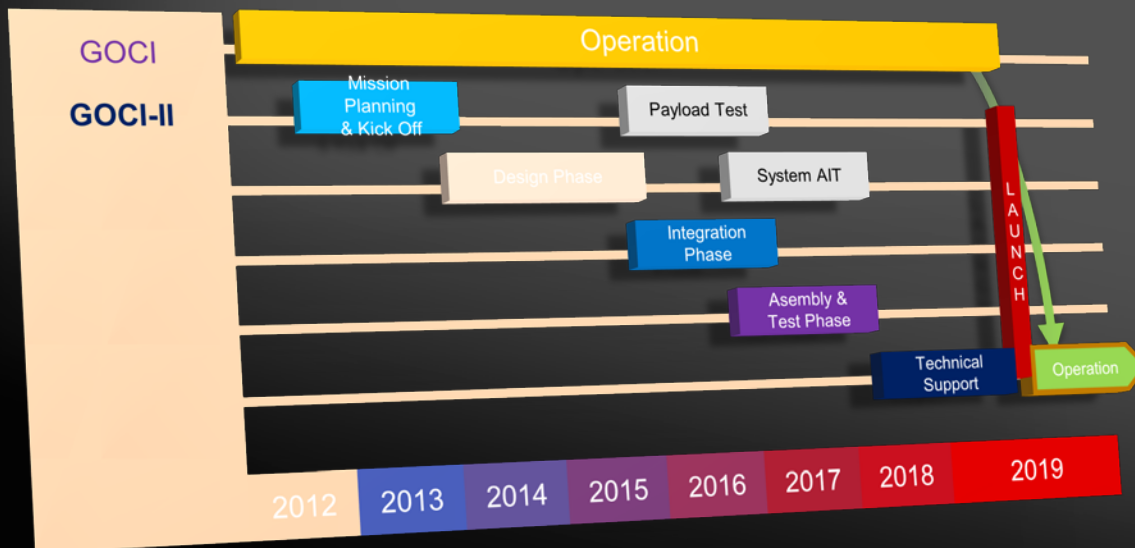




## GeoKompsat-2B : GOCI-II & GEMS(TEMPO)

## GeoKompsat-2A : AMI(ABI)

- ◆ (2008) Planning Study of GOCI-II (KIOST)
- ◆ (2009) 1<sup>st</sup> Preliminary Feasibility Evaluation (MOSF)
  - Approval Pending before GOCI launch
- ◆ (2010) 2<sup>nd</sup> Preliminary Feasibility Evaluation (MOSF)
  - Approved just after GOCI Launch
- ◆ (2011) Delayed Kick-off due to the budget issue
- ◆ (2012) Kick-off of the GOCI-II project
- ◆ (2013) Kick-off of the Joint Development



- ◆ GOCI-II Development :
  - Instrument: Joint Development of KIOST-KARI-Airbus DS
  - GS(H/W & S/W): KIOST
  - Bus system - KARI
- ◆ Supervisor : KIOST

# GOCI-II Major User Requirements



## Comparison to GOCI

	GOCI	GOCI-II
Bands	8(VIS/NIR)	13(VIS/NIR)
Ground Sampling Distance	500m (Local Area Mode)	250m (Local Area Mode) 1km (Full Disk Mode)
Coverage	North-East Asian Sea around Korea	NE Asian Sea + Event Area Full Disk
S/N	~1000	~ 1000
Observation interval	An hour (8 times/day)	An hour (10 times/day)

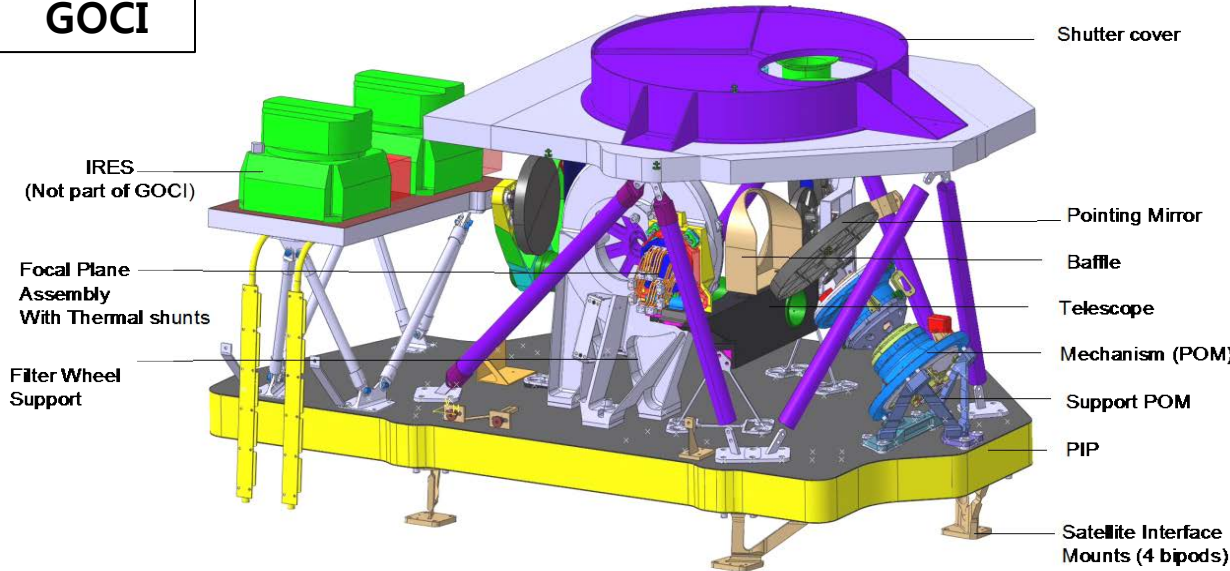
## Rational for the User Requirements

Items	Specs	Rational
<b>Increased</b> band number	13 bands (incl. Panchromatic band)	- PFT, HAB detection - Atmospheric correction improvement
<b>Improved</b> spatial resolution	250m @ nadir	- Monitoring of river estuaries and coastal environments
<b>More</b> observations	10 times/day	- Study of short-term ocean processes (monitoring of diurnal variation)
<b>Pointable &amp; Full Disk</b> coverage	Local Area + Full Disk	- Monitoring of events in the coverage - Study of large-scale phenomena (e.g. ENSO)

# Main Unit Overview



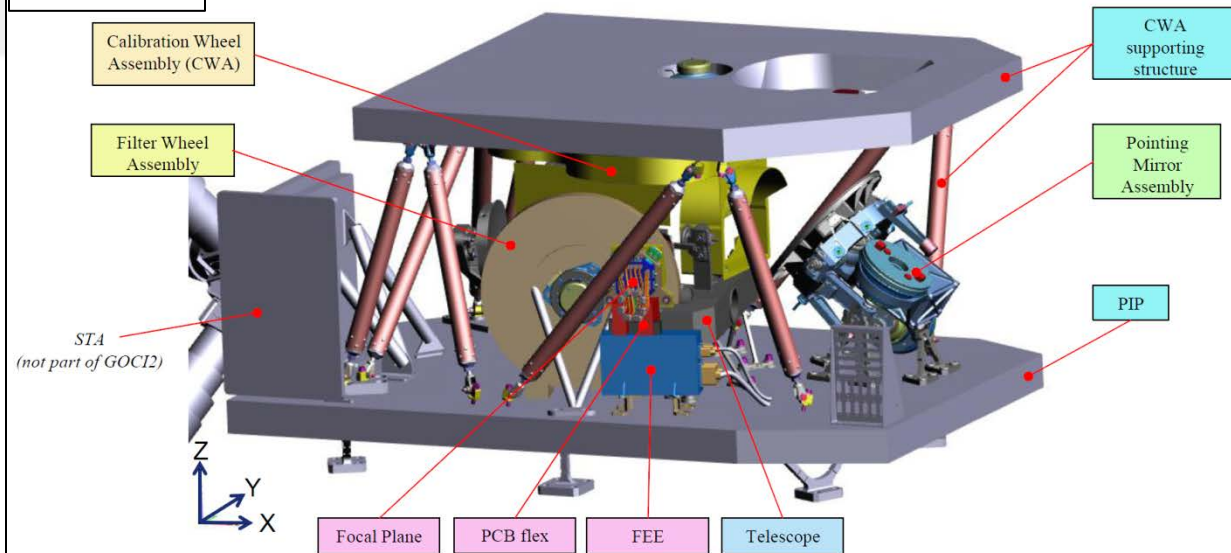
## GOCI



- Dimension is similar to GOCI except the width
  - Width : ~ 50 % increase
- Mass is almost two times

	GOCI	GOCI-II
Dimension	1015 x 888 x 854 mm <sup>2</sup>	1,520 x 1,000 x 891 mm <sup>2</sup>
Main Unit mass	78.5 Kg	140 Kg
Overall mass	83.3 Kg	150 Kg

## GOCI-II



CWA Calibration Wheel Assembly  
 FEE Front End Electronics  
 PIP Payload Interface Plate  
 POM POinting Mechanism  
 STA Star Trackers Assembly

# Field of Regard coverage

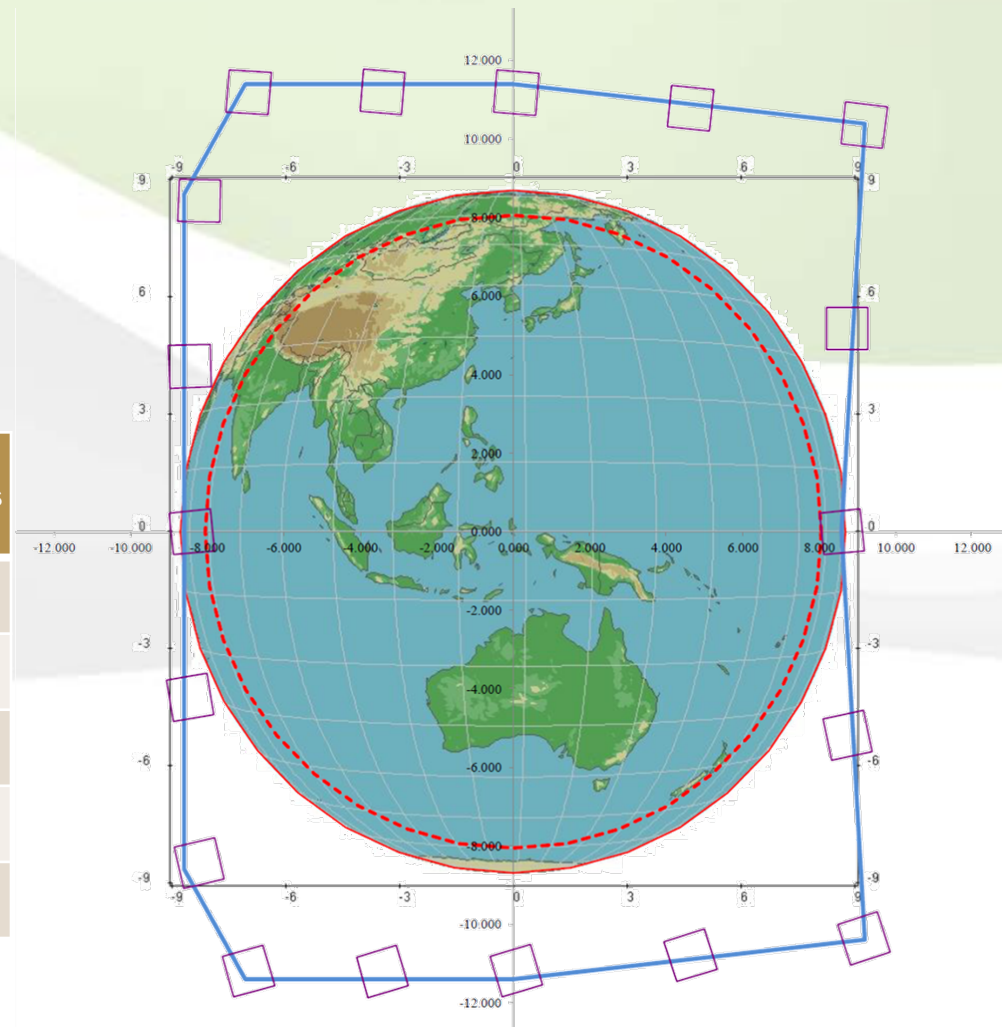


## ▪ Range of gimbal angles:

- x(N/S): -8.20 deg and +8.20 deg
- y(E/W): -4.40 deg and +4.30 deg

## ▪ eGSD (m)

Local Area	GOCI	GOCI-II	Requirements
At center	481	299	< 301 m
At North-East corner	587	364	< 371 m
At North-West corner	575	359	< 371 m
At South-West corner	440	274	< 371 m
At South-East corner	449	278	< 371 m

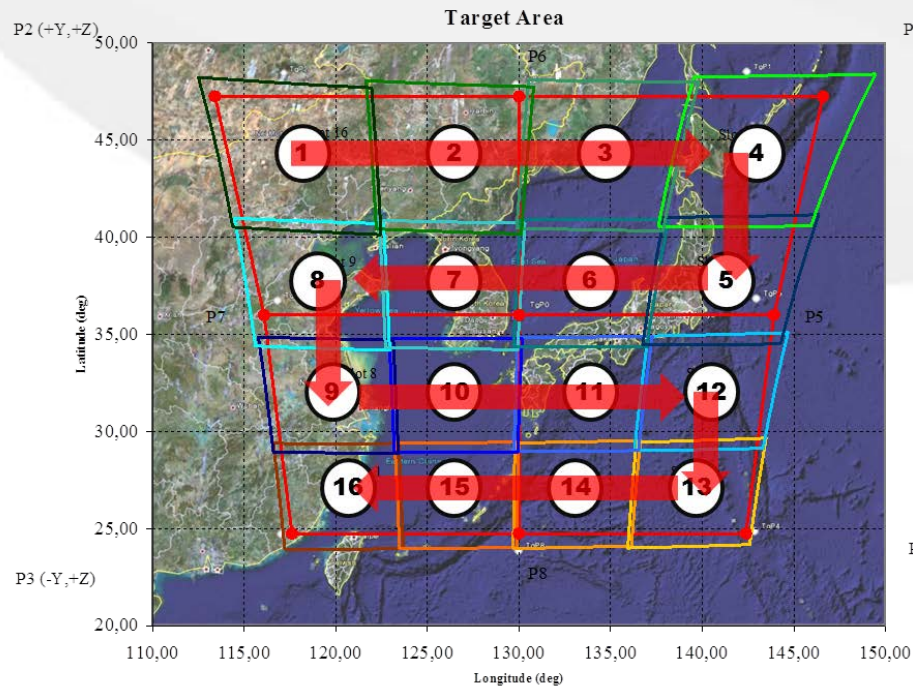


# Mission Operation Plan

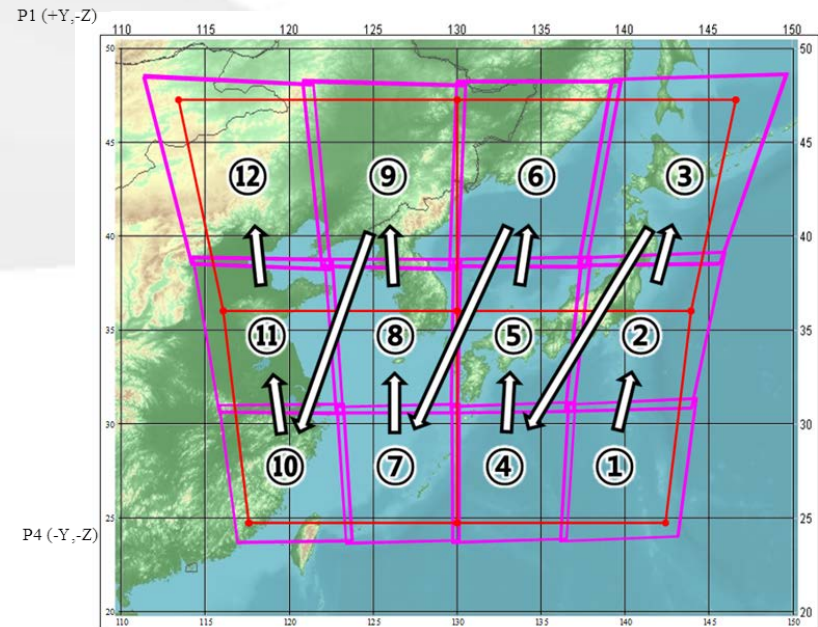


## ▪ Reference Local Area (RLA)

- Baseline for slot imaging acquisition
  - Column-by-column Raster scan
  - South to North within a column, East to West between column
  - For the reduction of ISRD (Inter Slot Radiance Discrepancy) in operation level



GOCI Local Area coverage by 16 slots



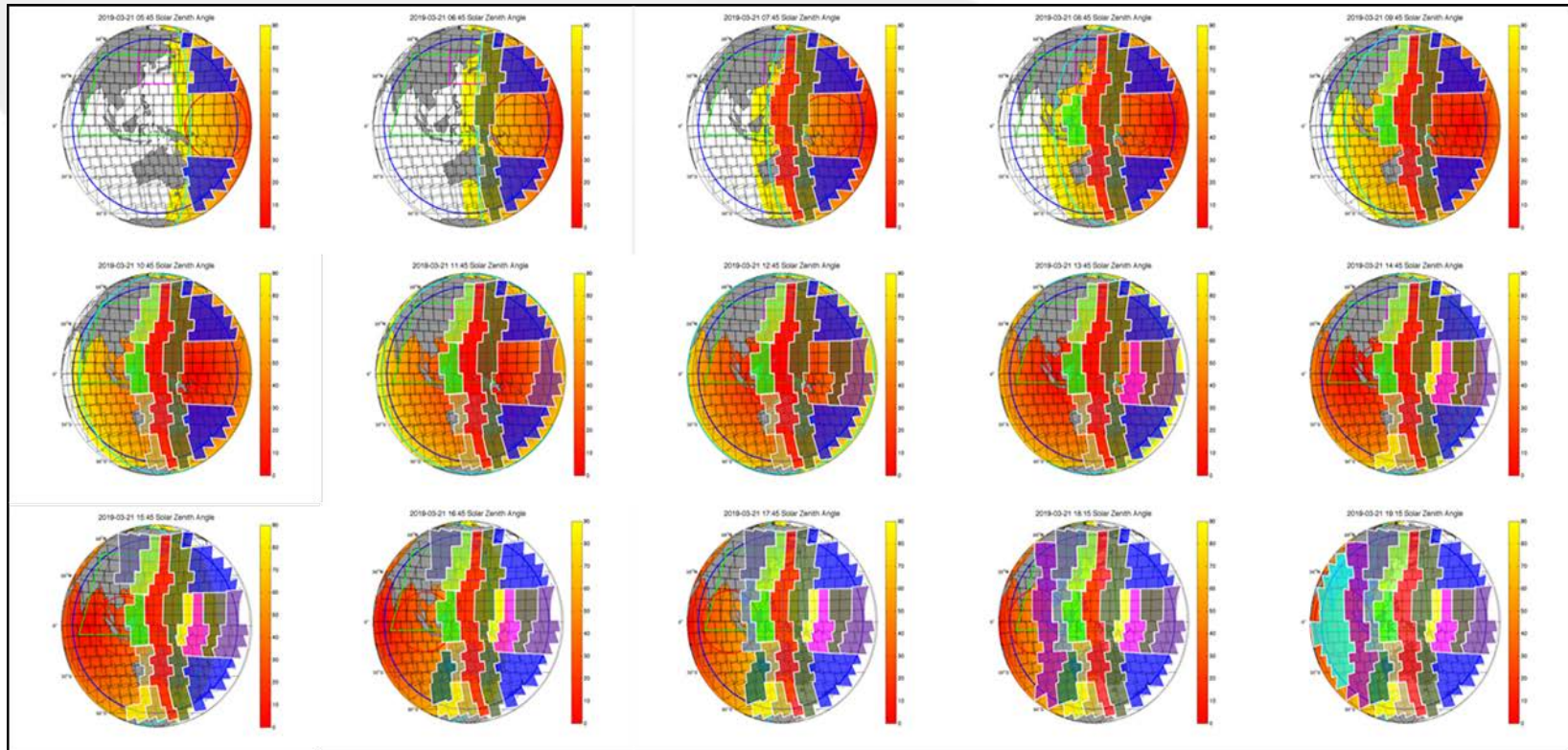
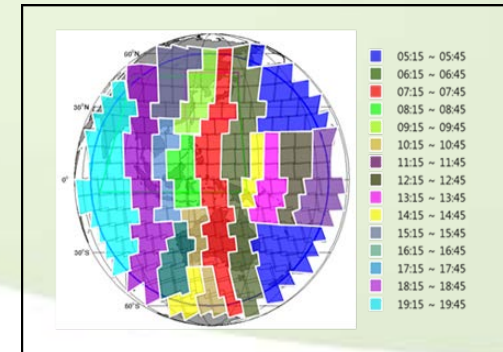
GOCI-II Reference Local Area coverage by 12 slots

# Mission Operation Plan



## ■ Full Disk (FD) (TBD)

- The Imaging time for FD < 240 minutes
- FD image acquisition : 1 image per day (5:15 - 19:45 Korean local time)
- FD imaging criteria
  - Solar Zenith Angle < 80 degrees
  - Sunlint Reflectance < 0.01 sr<sup>-1</sup>
- Preliminary assessment in GOCI-II instrument level based on PDR Design



# Spectral Bands and Performance



## ■ Spectral Bands Requirements

- 13 Bands (GOCI : 8 Bands)
- HAB, PFT identification, Atmospheric Correction Improvement

Radiance : W/m<sup>2</sup>/um/sr

GOCI Band	GOCI-II Band	Bandcenter	Bandwidth	Nominal Radiance	Maximum Ocean radiance	Threshold Radiance	Maximum Cloud Radiance	NEdL	SNR @ Nominal radiance
-	1	380 nm	20 nm	93	139.5	143.1	634.4	0.093	998
1	2	412 nm	20 nm	100	150	152	601.6	0.095	1050
2	3	443 nm	20 nm	92.5	145.8	148	679.1	0.081	1145
3	4	490 nm	20 nm	72.2	115.5	116	682.1	0.059	1128
-	5	510 nm	20 nm	64.9	108.5	122	665.3	0.055	1180
4	6	555 nm	20 nm	55.3	85.2	87	649.7	0.049	1124
-	7	620 nm	20 nm	53.3	64.1	65.5	629.5	0.048	1102
5	8	660 nm	20 nm	32	58.3	61	589	0.03	1060
6	9	680 nm	10 nm	27.1	46.2	47	549.3	0.03	914
-	10	709 nm	10 nm	27.7	50.6	51.5	450	0.03	914
7	11	745 nm	20 nm	17.7	33	33	429.8	0.02	903
8	12	865 nm	40 nm	12	23.4	24	343.8	0.015	788
-	13	643.5 nm	483 nm	-	-	-	-	-	-



# In-Orbit Solar & Lunar Calibration Plan



## ▪ Enhancement of Radiometric Performance

- **Better uniformity of detector response for GOCI-II is expected**
  - On-going verification of in-house detector prototype performance test

## ▪ Enhancement of Solar Calibration

- **Full Characterization of diffuser w.r.t. incident angle variation is planned**
  - This was not fully performed for GOCI even though highly requested by User
- **Lambertian transmission is one of key criteria for the selection of diffusers**
  - Nearly perfect Lambertian diffuser is introduced for GOCI-II
  - Internal gas bubbles enable ideal light scattering for Lambertian property
  - Lambertian characteristics is recently verified by in-house sample test
- **Same as GOCI, second diffuser for monitoring the aging of main diffuser is implemented for GOCI-II**

## ▪ Lunar Calibration : complementary calibration method

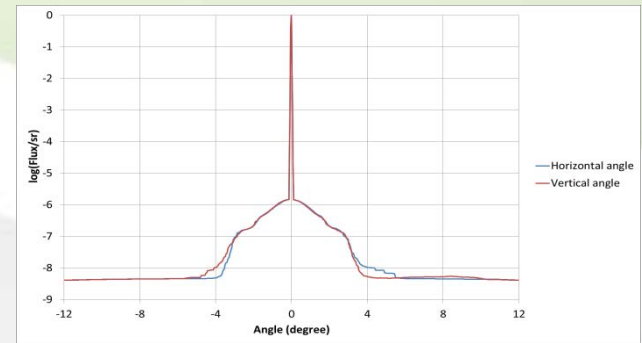
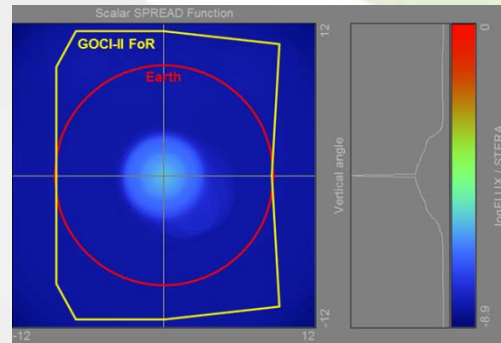
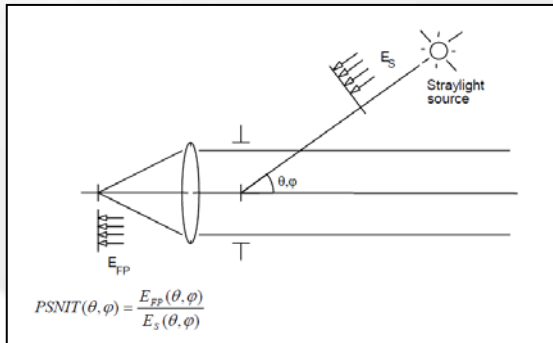
- **ROLO model : Reference Lunar Spectra Model for GOCI-II**
- **Required Research for Mission Operation Plan of Lunar Calibration**
  - Observable Time Period for Lunar Calibration (Phase > 60%)
- **Operational Issues for GOCI-II Lunar Calibration**
  - Moon(even in 100% phase) may not cover the whole GOCI-II IFOV
  - Limitation of Moon Image Acquisition

# Straylight analysis



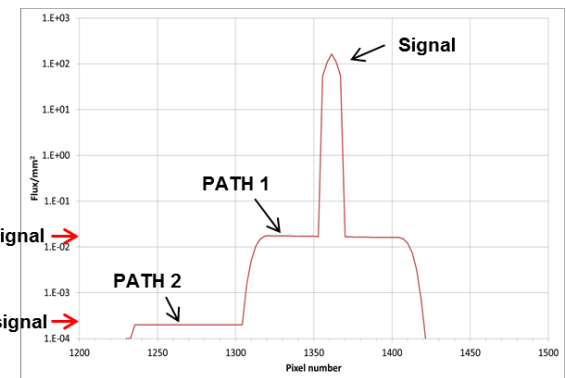
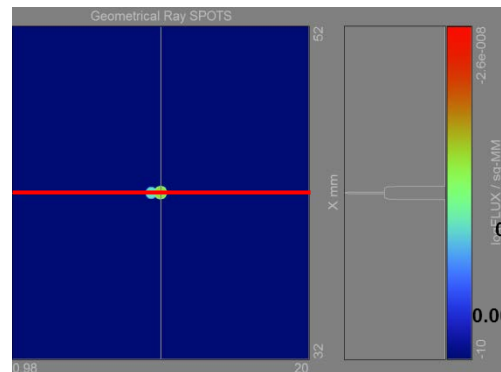
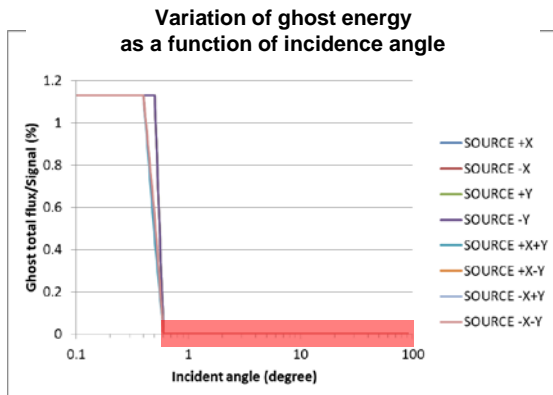
## Straylight analysis by PSNIT

- Be Included the Earth flux by the sun and other sources such as sun, moon and so on.
- The straylight level is dominated by the mirror scattering.



## Ghost

- Block the unwanted light from out of FoV by Field stop.
- GOCI ISRD main source is the ghost caused by out of FoV.





## ▪ **Development Status of GOCI-II**

- System Design Review was successful in 2013.
- Preliminary Design Review was successful in 2014.
- Critical Design Review is planned in late 2015.
- Expected launch date of GOCI-II/GK2B is early 2019.

## ▪ **Other Enhancement of GOCI-II**

- Operational Flexibility(# of band for each slot, # of image for each band, etc.)
- Extended FoR (Field of Regards) for the effective Lunar Calibration, Star Imaging & Full Disk
- Star Imaging capability for the Image Navigation & Registration (INR)
- Planned Pixel-level Spectral Response Function(SRF)
- Panchromatic Band (bandwidth: B2~B12) for the Star Imaging and more