KARI's satellites and introduction of Calibration and Validation of them

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KOMPSAT and Satellite program in KARI

LEO

No Working

KOMPSAT-1
1999
VI 6.6m

On Orbit

KOMPSAT-2
2006
VI 1m

KOMPSAT-3
2012
VI 0.7m

KOMPSAT-3A
2015
VI 0.55m
IR 5.5m

KOMPSAT-5
2013
SAR-X 1m

OnGoing

KOMPSAT-7
2022
VI < 0.3m, (IR)

CAS500-1,2
2020, 2021
VI 0.5m

KOMPSAT-6
2021
SAR-X 0.5m

CAS500-4,5
2022, 2025
VI 20m, SAR-C

KOMPSAT-7A
2024
VI < 0.3m, (IR)

SmallSat
2024~2027
VI 1m (11)

OnGoing, too

Advantages of KOMPSAT: fast revisit

- Constellation of VHR optical & SAR sensors
- The only multispectral satellite in the afternoon
- Helpful for the temporal analysis such as change detection

KARI Global Network of Ground Station

Svalvard Ground Station
(Control/Reception)

Neustrelitz Ground Station
(Control/Reception)

KARI Ground tation
(Control/Reception/Process)

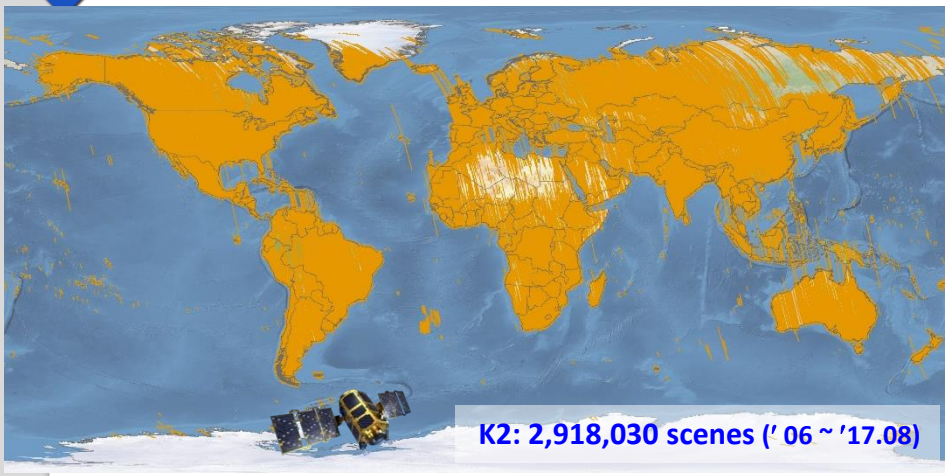
Jeju Ground tation
(Control/Reception)

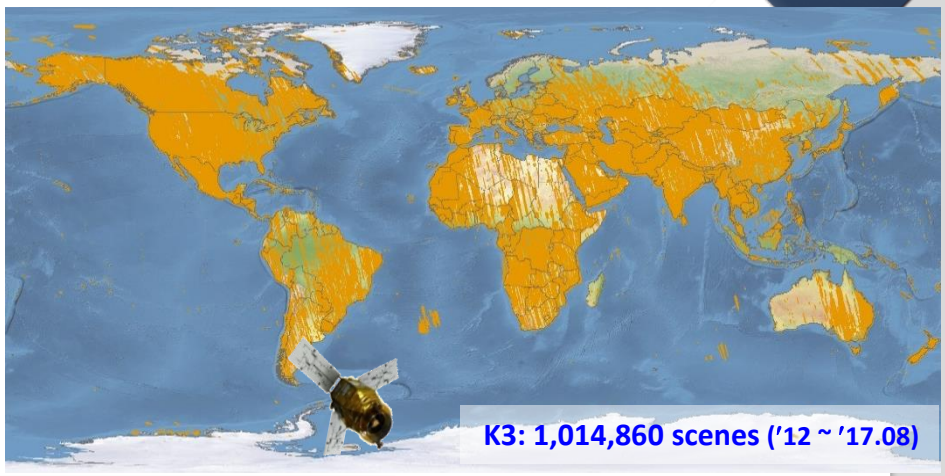
WENO Ground Station
(Control)

SEJONG Ground Station
(Control)

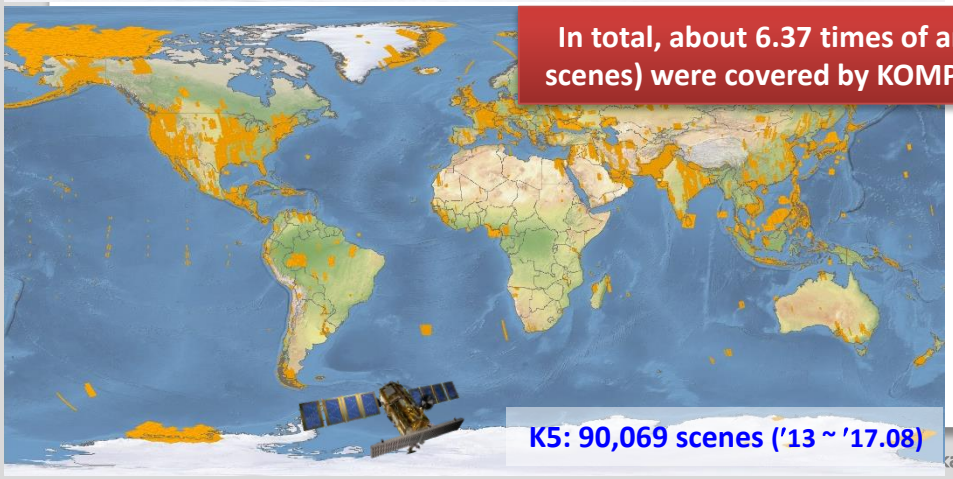
KARI Antenna System

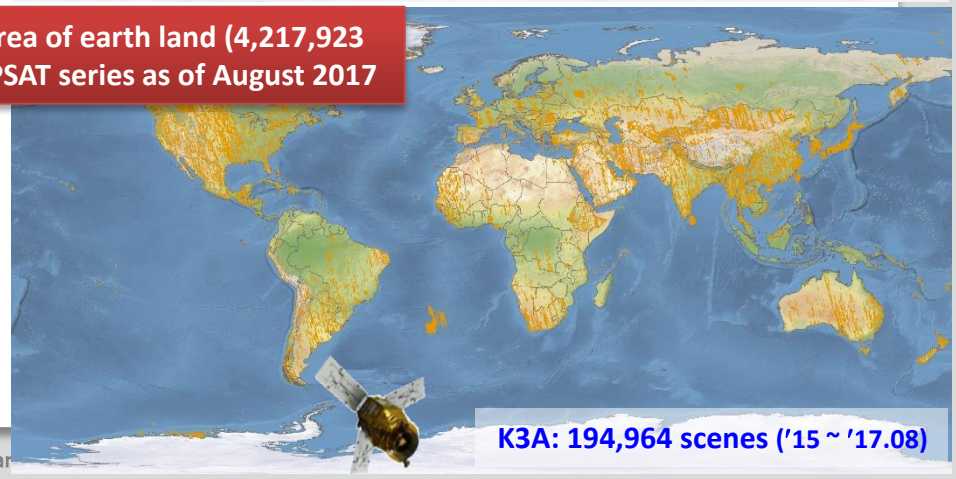
Statistics of KOMPSAT Operation





In total, about 6.37 times of area of earth land (4,217,923 scenes) were covered by KOMPSAT series as of August 2017





Commercialization of Satellite Images

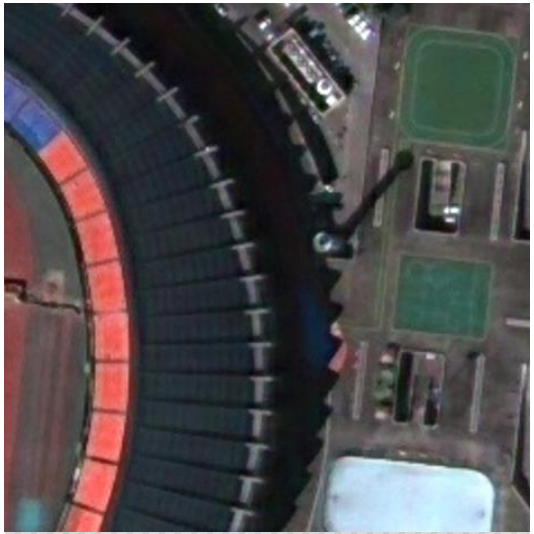
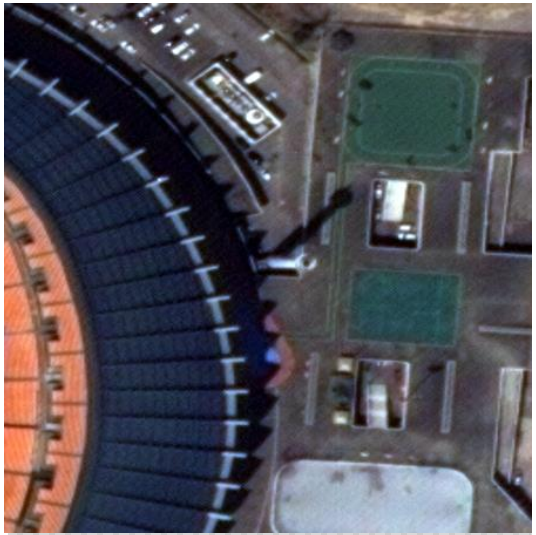
Sales company of KOMPSAT-2/3/5/3A imagery

- SIIS(SI Imaging Service)
  - Established on April 2014 (subsidiary of Satrec Initiative)
  - Exclusive worldwide distribution right of KOMPSAT imagery
  - Distribution right of DubaiSat-2, TeLEOS-1 imagery
  - Global network with 98 resellers
  - URL: http://www.si-imaging.com, http://arirang.kari.re.kr(catalogue)

SIIS
SI Imaging Services

KOMPSAT Optical Images

Jamsil Olympic Stadium

KOMPSAT-2	KOMPSAT-3	KOMPSAT-3A
		
Resolution (PAN/MS : 1/4m)	Resolution (PAN/MS : 0.7/2.8m)	Resolution (PAN/MS : 0.55/2.2m)

Integrated Operation of Optical & SAR satellites

Heterogeneous sensor

Colosseum in Rome, Italy taken by KOMPSAT-3(March, 2013) and KOMPSAT-5(May, 2015)

Tornado, KOMPSAT-3, Louisville Mississippi USA
imaging date: 2014.05.05

Google Map	KOMPSAT-3

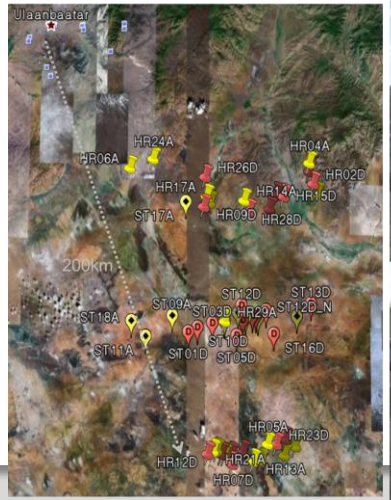
KARI's Calibration and Validation, and ARD

- **KARI's Plan of ARD & Calibration and Validation**
  - **(Work and Share with) CEOS WGCV IVOS & SAR / LSI-VC / JACIE, and~ VH-RODA…**
  - **(ARD) Just started…**

Satellite	'20	'21	'22	'23	'24	'25	'26~	
K2, 3, 3A, 5								K2, 3, 3A (Optic) K5 (SAR-X)
K6		K6						SAR-X (0.5m)
K7			K7					Optic (0.3m)
K7A					K7A			Optic (0.3m)
CAS-1/2	C1	C2						Optic (0.5m)
CAS-4/5			C4			C5		C4 (Optic) (20m) C5 (SAR-C)
SmallSat (11)					S1		S2~6	Optic (1m) (11)

KARI's Calibration and Validation, and ARD

- (For) Calibration / Validation and Image data Quality Control
  - ① (Engineers) Cal/Val team + Satellite + Ground system
  - ② (Resource) CalVal S/W + Site + Equipments
  - ③ (Development & Maintenance) Level Processor & SAR Processor
  - ④ ARD
  - ⑤ (Interaction with) User + Reseller (Satrec-i)
  - ⑥ (Work and Share with) CEOS WGCV + LSI-VC / JACIE and~ VH-RODA…

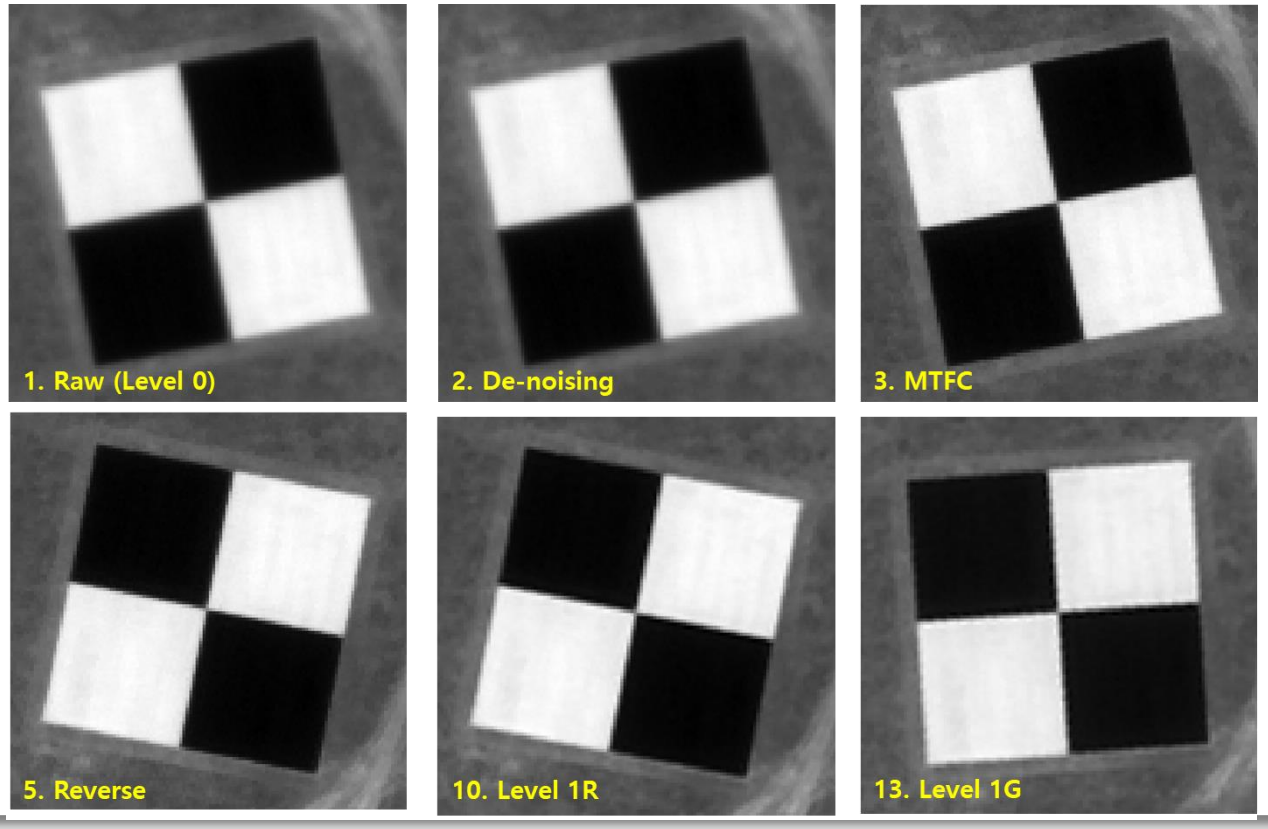


Corner Reflector in Mongolia

Edge target in Mongolia

KARI's Calibration and Validation, and ARD

- **Level Processing of KOMPSAT image data after Cal/Val**

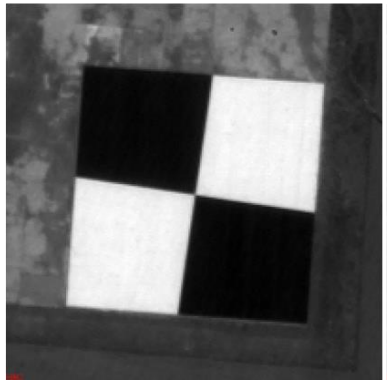


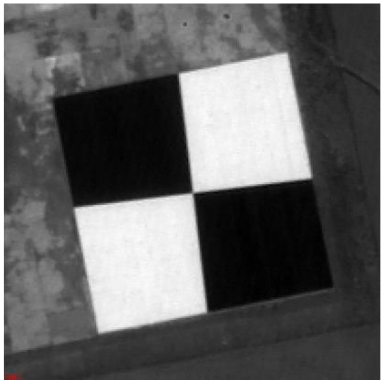
KARI's Calibration and Validation, and ARD

- **(Spatial Quality Control) KOMPSAT-3A Product (July 2019) – Checking every month**

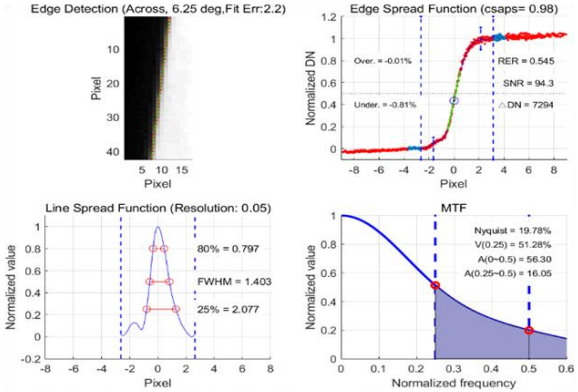
	MTF Across	MTF Along	Average
Raw	11.7	10.5	11.1
1R	18.3	21.1	19.7
1G	9.7	16.3	13.0

	SNR Across	SNR Along	Average
Raw	161	116	138
1R	125	103	114
1G	95	135	115

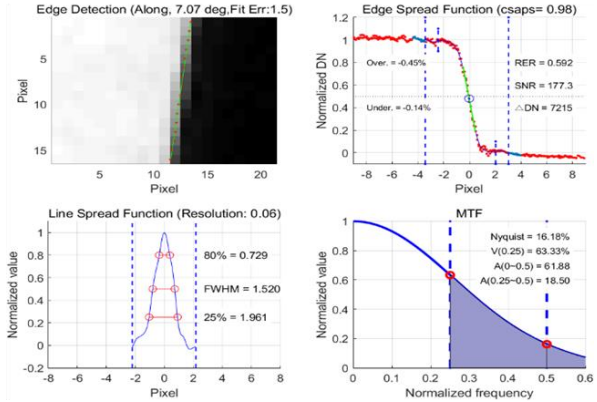




Level 1R
Across-track

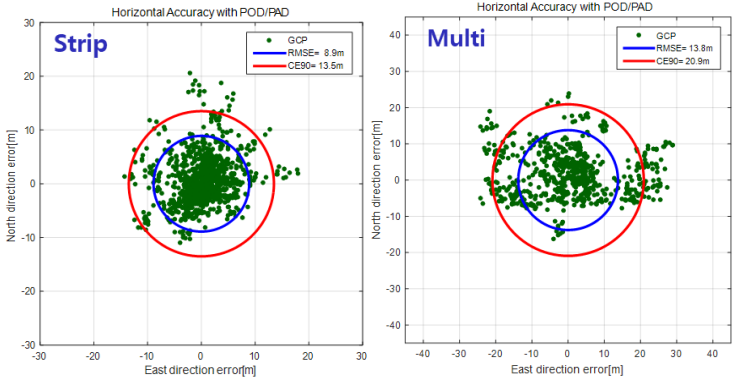


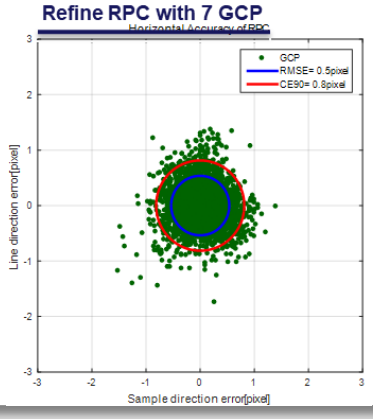
Level 1G
Across-track



KARI's Calibration and Validation, and ARD

▪ Location accuracy & Ortho-image





Ortho-image accuracy with 7 GCPs

Category	Attributes	KOMPSAT-3A after Cal/Val
Spatial	MTF	(PAN) 10~11% (MS) 23%
	MTFC	(PAN) 20%
Radiometric	SNR	>100
Geometric	GSD	0.540m / 2.158m (Nadir, 528km)
	Swath width	13.15km (Nadir, 528km, MS-PAN)
	Location	13.5m(Strip image) 14.9m(One-pass stereo)
	Registration	0.3 pixel (Strip, One-pass stereo, Multi)
	Ortho-image	0.8m (Strip image)

KARI's Calibration and Validation, and ARD

- KARI has just started ARD~!

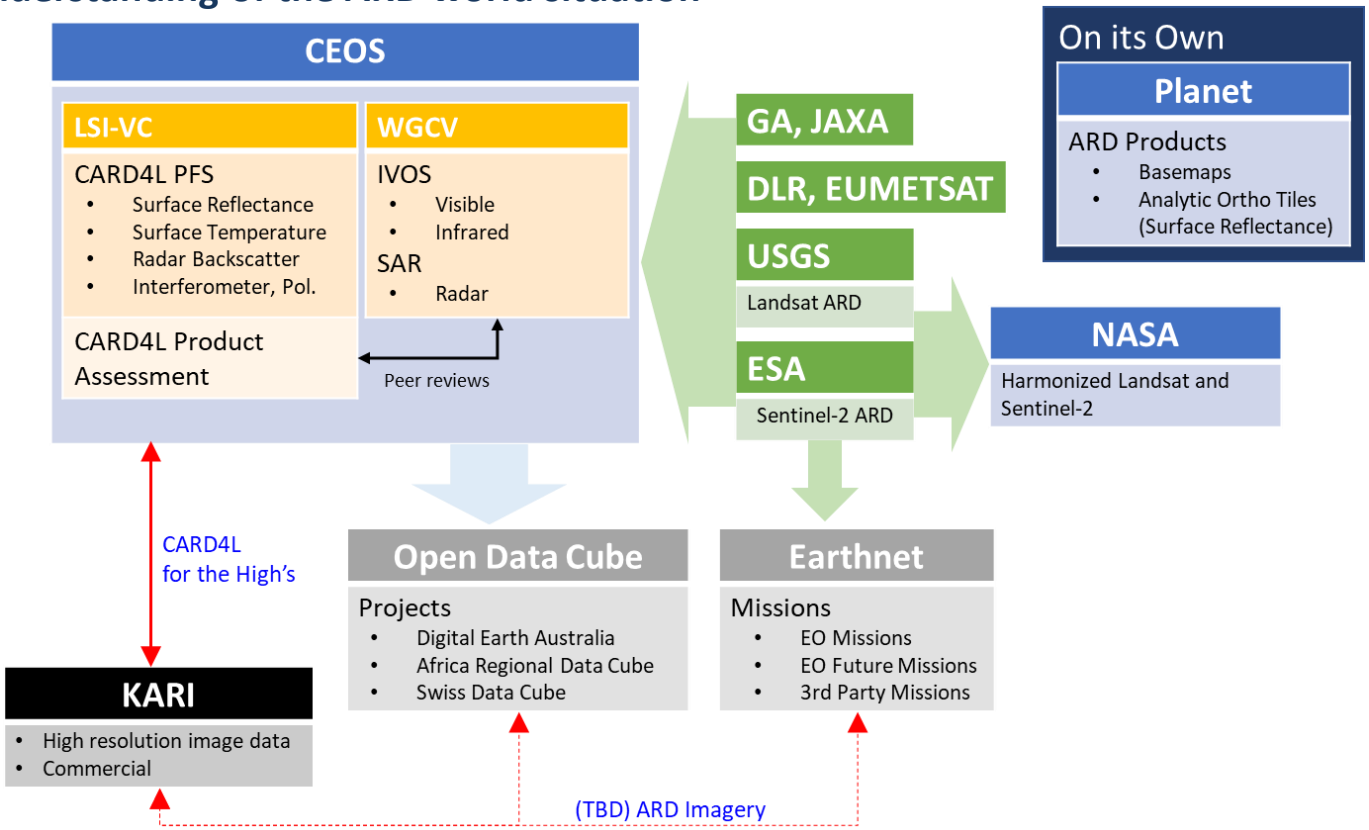
- KARI's Satellite
  - KOMPSAT-3, 3A, 7, 7A (Visible) / KOMPSAT-5, 6 (SAR-X) / CAS-5 (SAR-C)
  - CAS-1, 2, 4 (Visible) / SmallSat (11) (Visible)
  - Etc.

- (Work and Share with) CEOS WGCV + LSI-VC / JACIE and~ VH-RODA…

- Some issues of KARI's
  - High resolution image data
    - ✓ CARD4L of the High's should be more defined in the future.
  - Commercial image data (Reseller: Satrec-i)
  - KARI's 10 year plan for ARD

KARI's Calibration and Validation, and ARD

- **KARI's understanding of the ARD world situation**



Thank you!