



# SI's Evolution from Satellites, Imagery, to AI

Hyun Choi  
SI Imaging Services Co., Ltd.



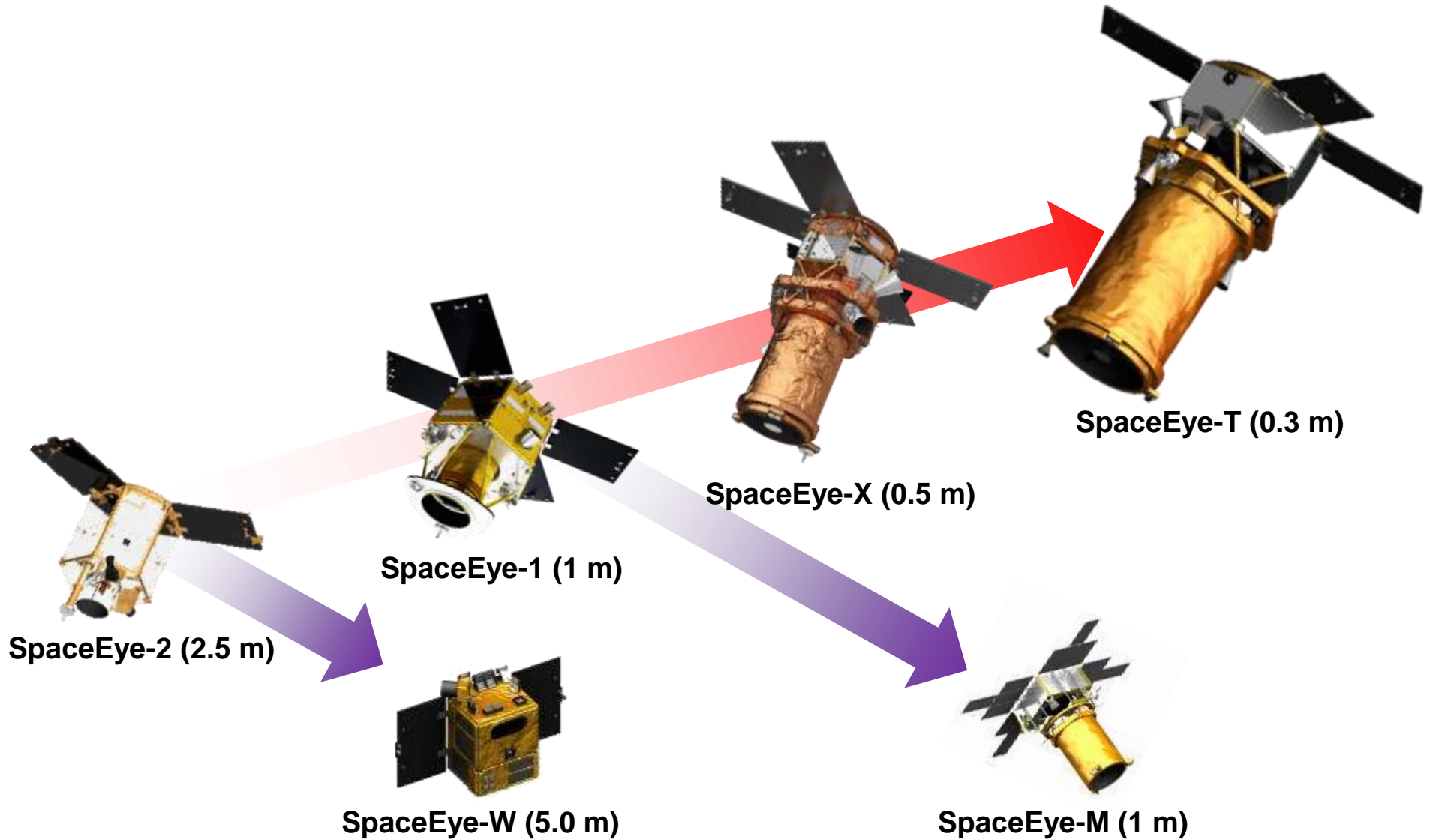
# 30-year Space Experience



- 29+ Years of Space Experience
- 28+ Programs (International & Domestic)
- AS9100 & ISO 9001 certified
  
- ~300 full-time staff (2019)



# Evolution and Derivation





## In-house Development of Core Electrical / Optical Components





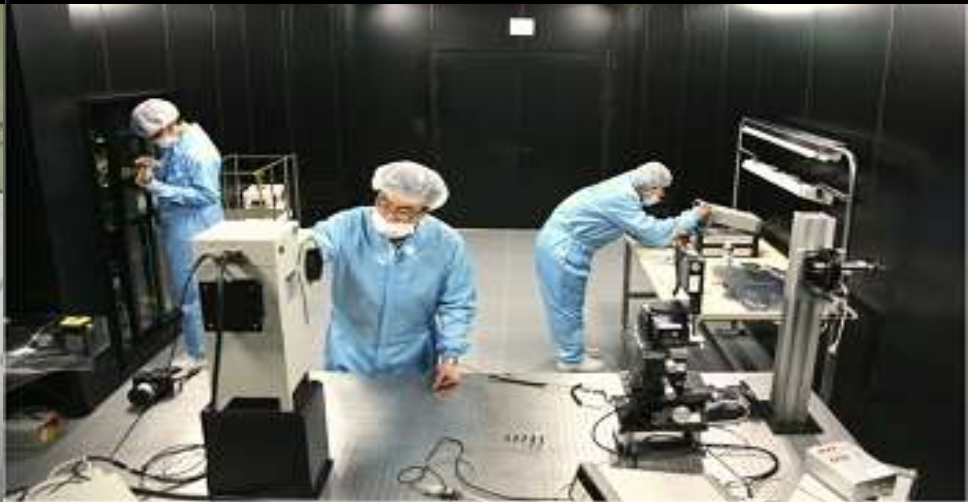
**Electrical Module Manufacturing**



**Satellite Integration & Test**



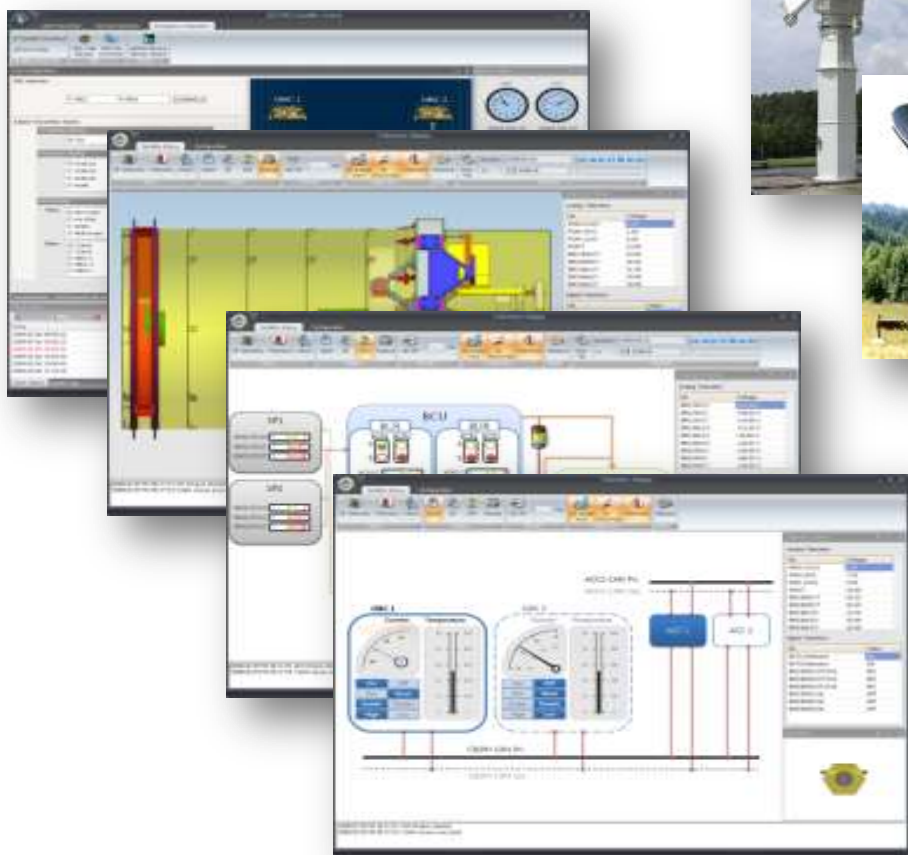
**Electro-Optical Payload Integration & Test**



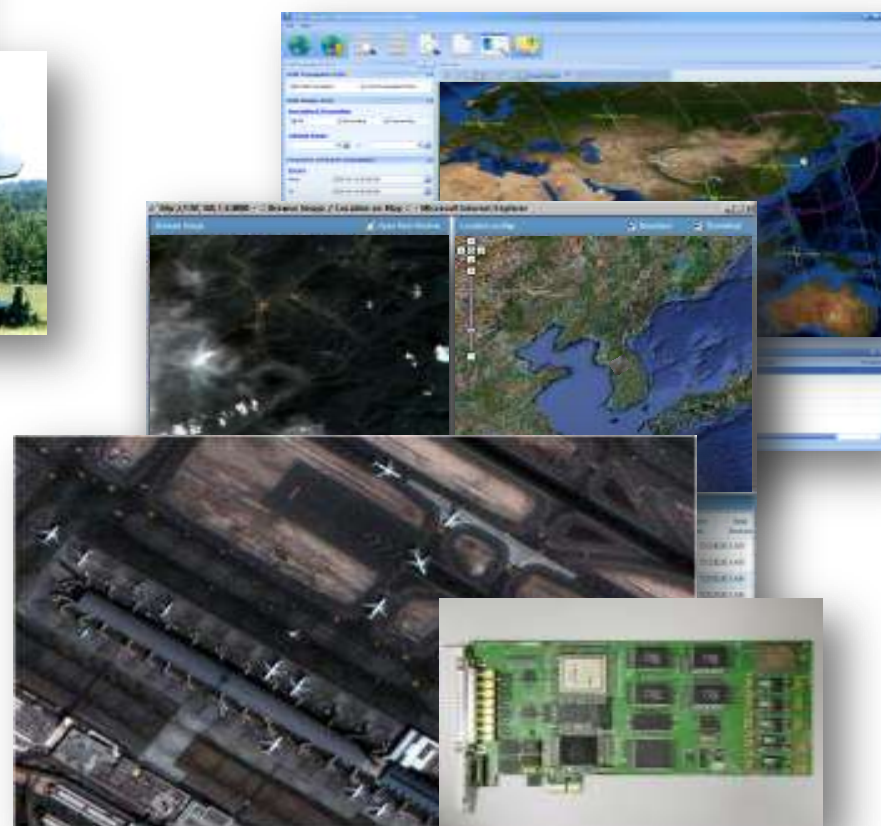
**Attitude Sensor Calibration**



## Mission Control Station (MCS)



## Image Receiving & Processing Station (IRPS)



## ■ KhalifaSat (UAE)

- Launch : Oct, 2018

## ■ TeLEOS-1 (Singapore)

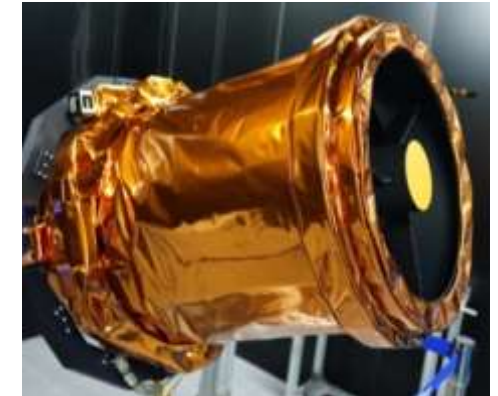
- Launch : Dec, 2015

## ■ Deimos-2 (Spain)

- Launch : Jun , 2014

## ■ DubaiSat-2 (UAE)

- Launch : Nov, 2013





## ■ SpaceEye-X

- Launch : 2022
- 0.5-m optical

## ■ NeuSAR

- Launch : 2022
- High-resolution SAR

## ■ High-resolution Camera

- Launch : 2023
- 0.3-m optical



## ■ Space-proven design

- Deimos-2, DubaiSat-2, KhalifaSat

## ■ Very high-resolution

- Native 0.46 m @ 500 km

## ■ High imaging capacity

- Swath : 16.6 km @ 500 km
- D/L speed : 1.2 Gbps

## ■ High agility & advanced imaging modes

- Mass <400 kg



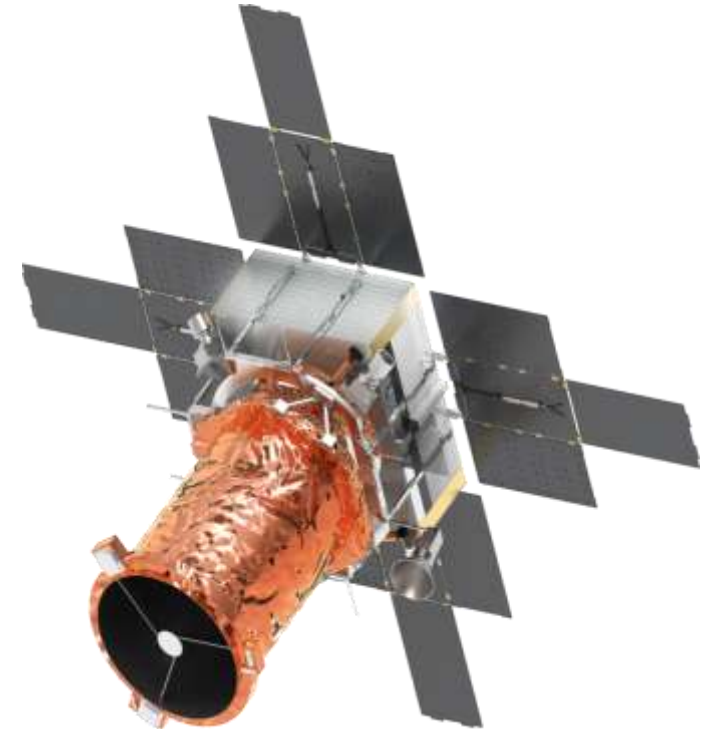


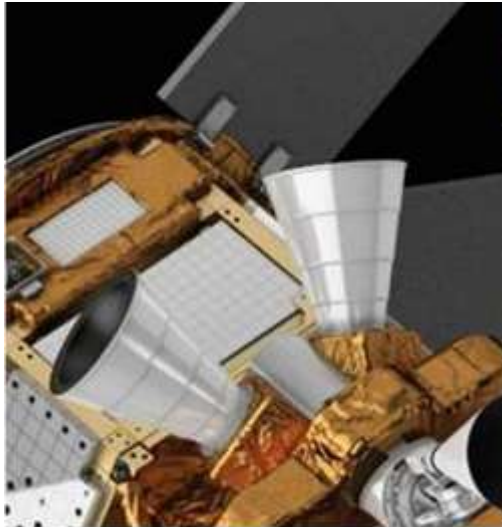
## ■ Very High Resolution EO Micro-Sat

- Mass: <50 kg
- Dimensions: 63 cm x 48 cm x 100 cm
- GSD <1 m
- Design life: 3-yr

## ■ Designed for constellation

- Very high spatial & temporal resolution
- High agility → multiple target imaging
- Low unit/launch cost → suitable for constellation
- Short delivery → responsive space





**Satellites**



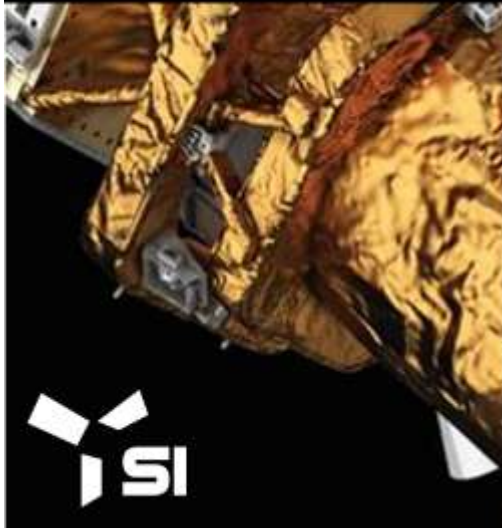
**Ground Stations**



**Imaging Services**

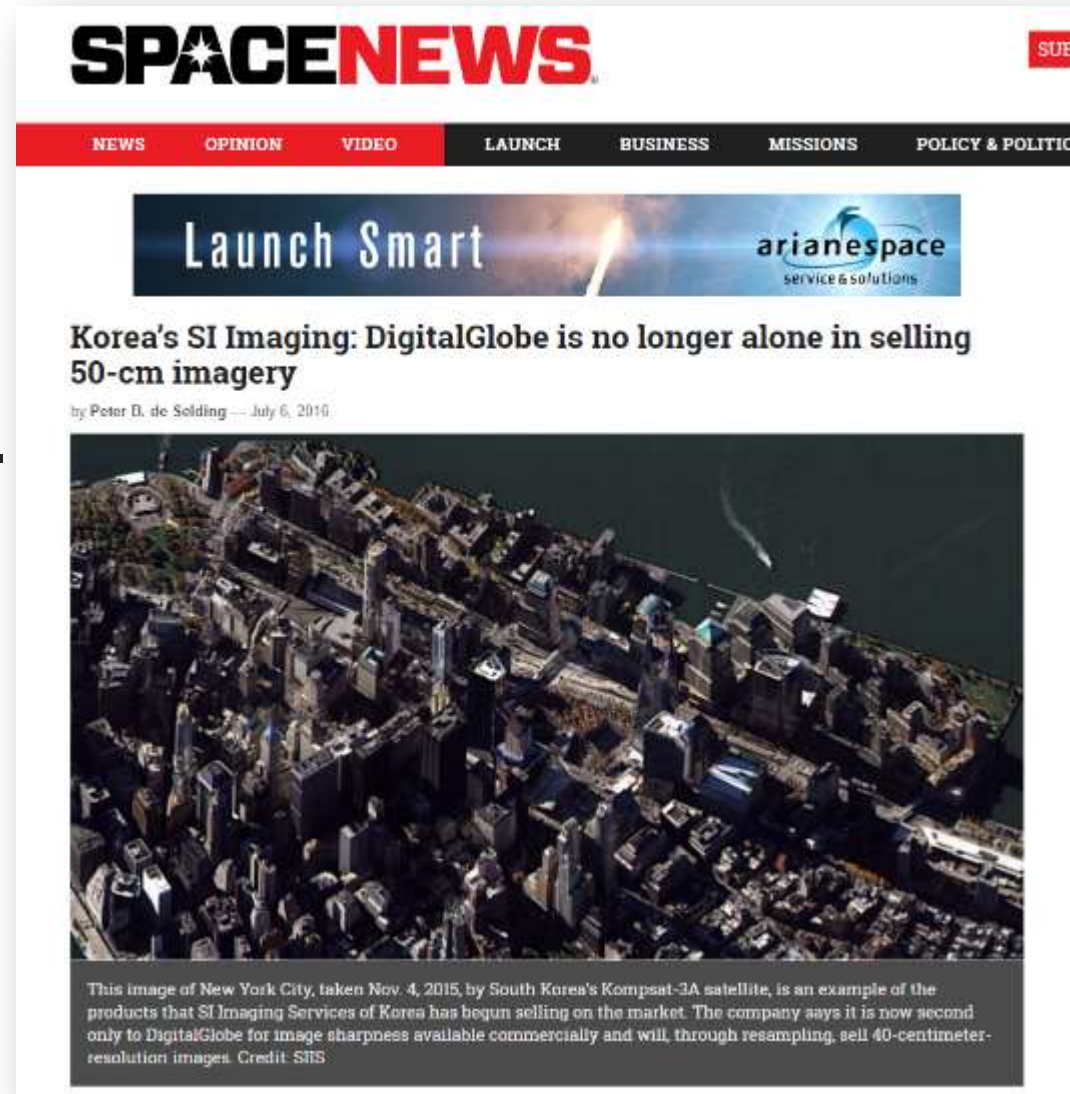


**Analytics**






- **KOMPSAT-2/3/3A (Optical) & 5 (SAR) distributor**
  - 0.4 m Optical & 1.0 m SAR
  - Morning/Afternoon/Dawn/Dusk
- **Korean Government's long-term commitment**
  - KOMPSAT-6 (SAR)
  - KOMPSAT-7 (Optical)
  - and follow-on programs




**SPACENEWS** SUB

NEWS OPINION VIDEO LAUNCH BUSINESS MISSIONS POLICY & POLITIC

Launch Smart  arianespace  
service & solutions

**Korea's SI Imaging: DigitalGlobe is no longer alone in selling 50-cm imagery**

by Peter D. de Selding — July 6, 2016



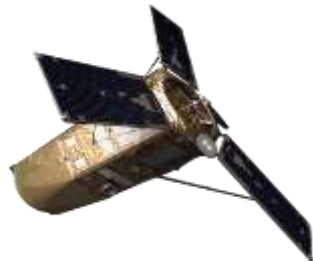
This image of New York City, taken Nov. 4, 2015, by South Korea's Kompsat-3A satellite, is an example of the products that SI Imaging Services of Korea has begun selling on the market. The company says it is now second only to DigitalGlobe for image sharpness available commercially and will, through resampling, sell 40-centimeter-resolution images. Credit: STES

- National Space Program
- Developed and operated by KARI (Korea Aerospace Research Institute)
- Worldwide imagery distribution by SI Imaging



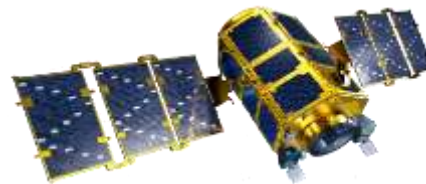
**KOMPSAT-3**

- Launched in May 2012
- **Optical**
- LT: 13:30
- 1 PAN + 4 MS (R/G/B/NIR)
- PAN: 0.5 m (16 km)
- MS: 2.8 m (16 km)



**KOMPSAT-3A**

- Launched in March 2015
- **Optical / IR**
- LT: 13:30
- 1 PAN + 4 MS (R/G/B/NIR)
- PAN: 0.4 m (13 km)
- MS: 2.2 m (13 km)



**KOMPSAT-2**

- Launched in July 2006
- **Optical**
- LT: 10:50
- 1 PAN + 4 MS (R/G/B/NIR)
- PAN: 1 m (15 km)
- MS: 4 m (15 km)



**KOMPSAT-5**

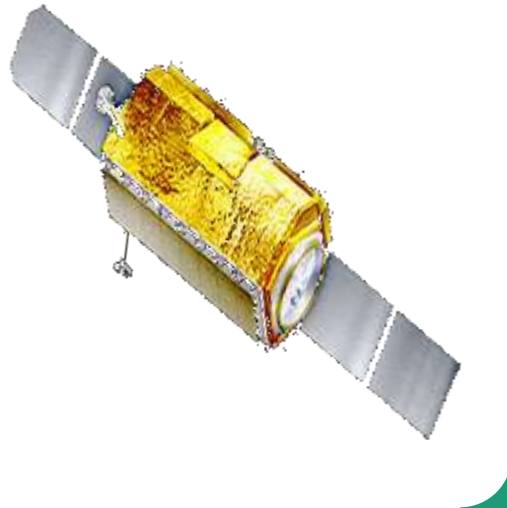
- Launched in August 2013
- **X-band SAR**
- LT: 06:00/18:00
- Spotlight: 0.85~1 m (5 km)
- Strip: 2.5~3 m (30 km)
- ScanSAR: 20 m (100 km)





## CAS500-1 & 2

- Launch in **2020/2021**
- 1 PAN + 4 MS (R/G/B/NIR)
- PAN: **0.5 m** (12 km)
- MS: **2.0 m** (12 km)



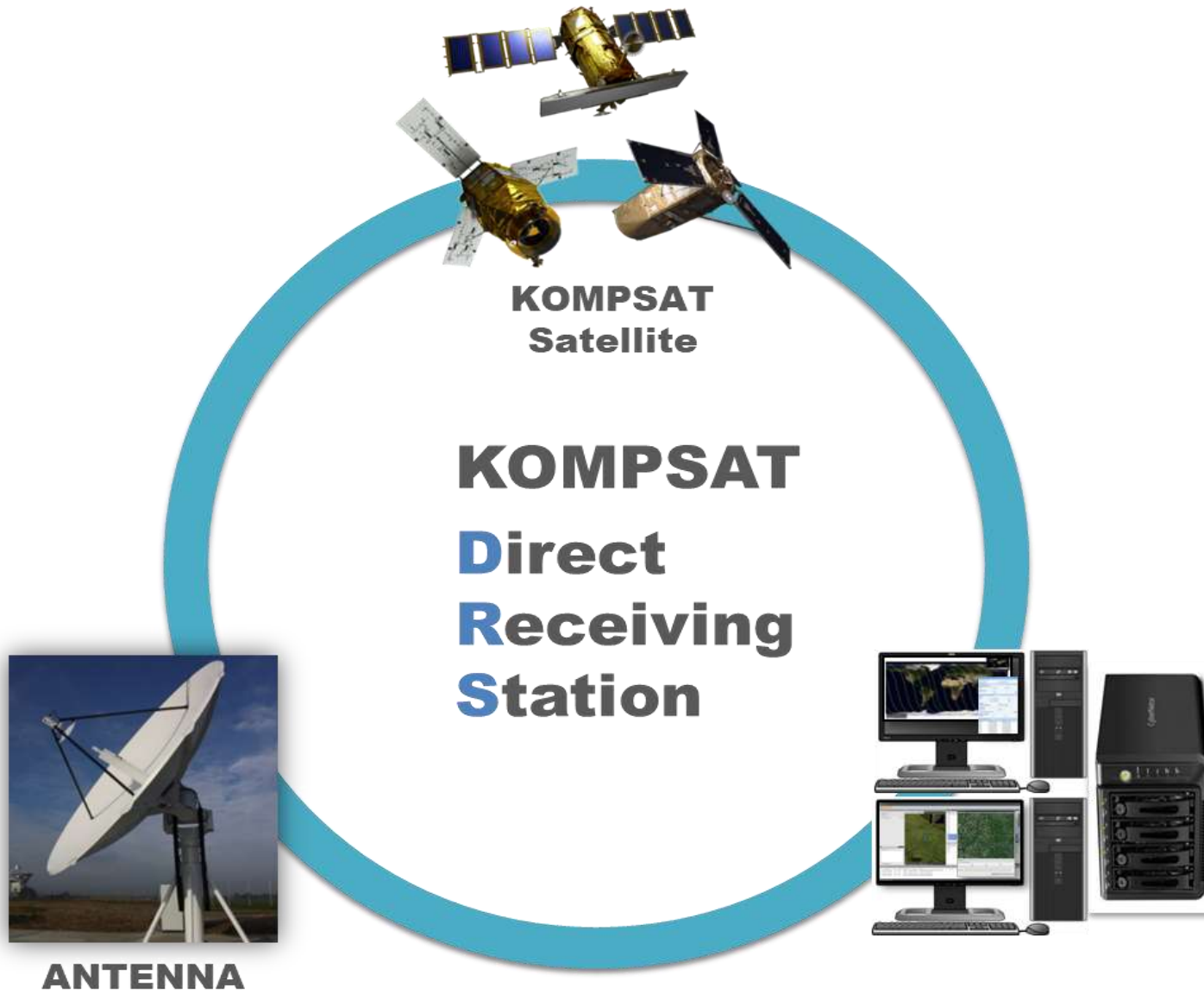
## KOMPSAT-6

- Launch in **2021**
- X-band SAR
- Spotlight: **0.5 m** (5 km)
- Strip: **2.5~3 m** (30 km)
- TOPSAR: **20 m** (100 km)

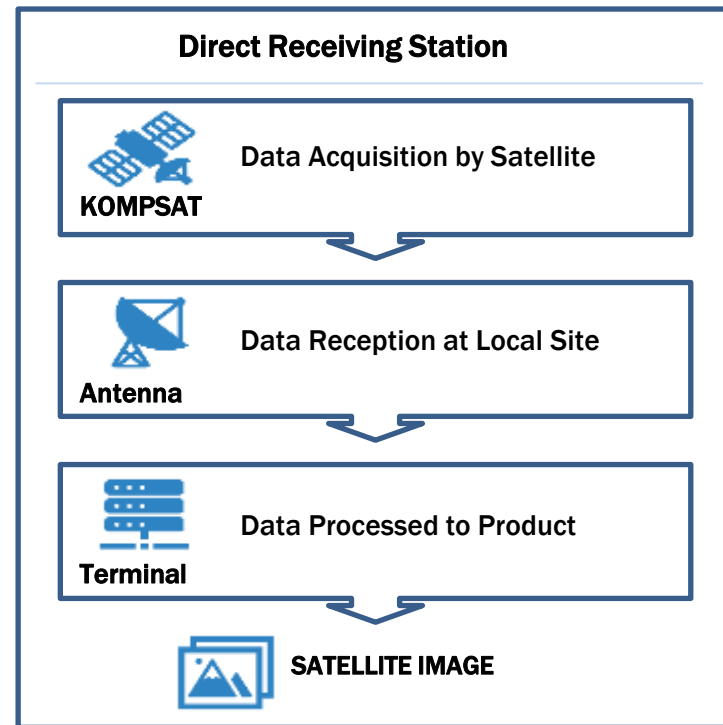
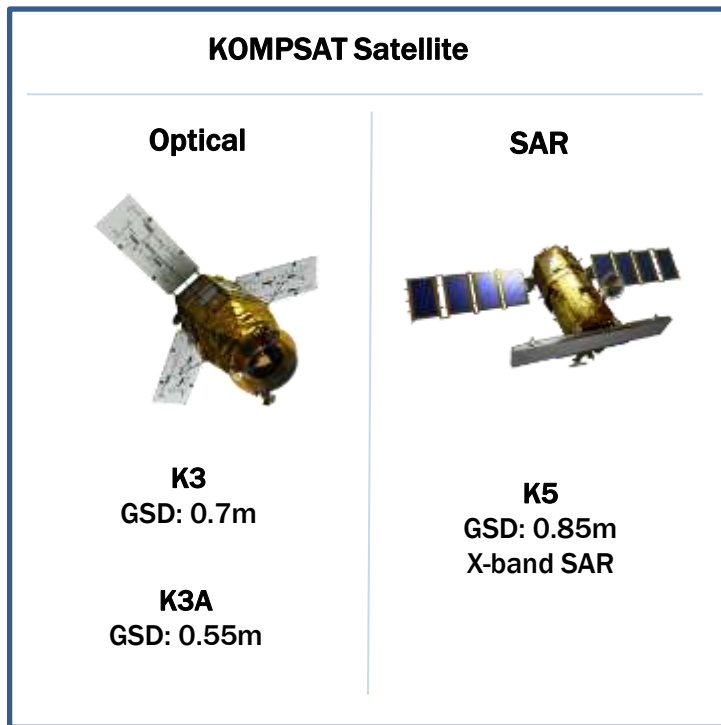


## KOMPSAT-7 & 7A

- Launch in **2022**
- 1 PAN + 4 MS (R/G/B/NIR) + IR
- PAN: **0.3 m**
- MS: **1.2 m**







## MAJOR APPLICATIONS



**Disaster Management**



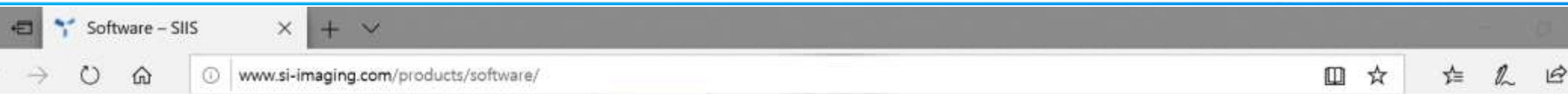
**Surveillance Monitoring**



**Maritime**



**National Security**



PRODUCTS

PURCHASE

ABOUT US



ENG KOR

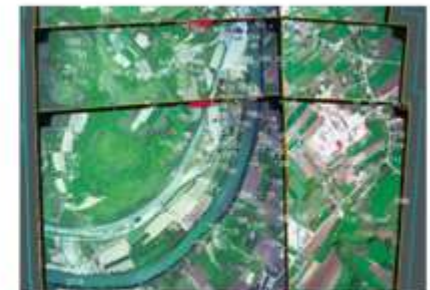


# PHOTOMOD

## PHOTOMOD

PHOTOMOD is a digital photogrammetric system allowing the user to obtain metrically precise spatial data on the basis of commercially available imaging systems, such as frame digital and film cameras, space scanning systems of high resolution, and synthetic aperture radars.

- **Spatial aerial triangulation** : The functions of the aerial triangulation in PHOTOMOD are required to accurately calculate the orientation parameters of images and provide a high geometrical accuracy of the output products: DEM, orthomosaics, digital maps. Aerial triangulation results (orientation parameters) are calculated automatically and the system provides a full range of tools for accuracy evaluation, visual control and errors analysis.



## Geospatial Analytics with Artificial Intelligence



### Dataset



- Dataset Building
- Annotation Tool

### Analytic Engine



- Object Detection
- Change Detection
- Super-Resolution
- Infrastructure monitoring

### Analytic Platform & Service



- Analysis-as-a-Service
- In-house Analytics Platform

### Consultancy



- AI Team Building
- Training & Engineering Assistance



- **AI-based geospatial analytics on satellite/aerial imagery**
- **Automatic detection of airplanes, vessels, vehicles for**
  - Military intelligence, illegal shipping, economic activities
- **Vast amount of imagery analysis possible**



Ship Detection (EO/SAR)

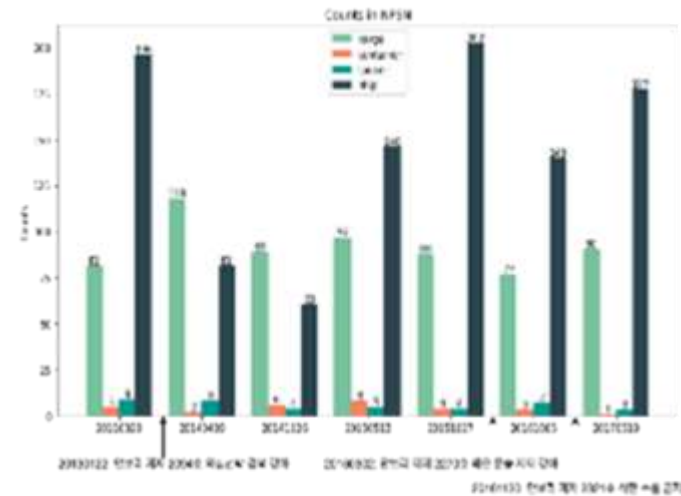


Object Detection (Aerial Imagery)

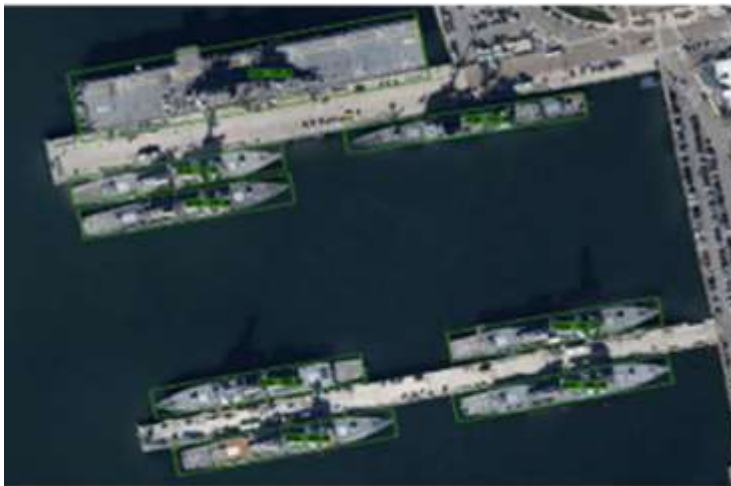
# SI Analytics – Detection and Classification



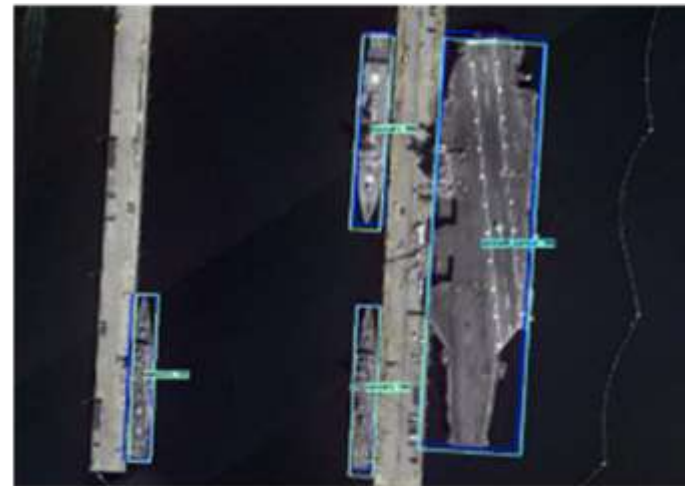
Detection and Classification Results (Nampo, North Korea)



Check implementation of UNSC Resolutions against NK



Detection Results on Benchmark dataset (HRSC2016)



Classification Results on Benchmark dataset (HRSC2016)

# SI Analytics – Multiple Objects Detection



Detection Results (densely distributed vehicles: parking lot)



Detection Results (densely distributed ships: harbor)



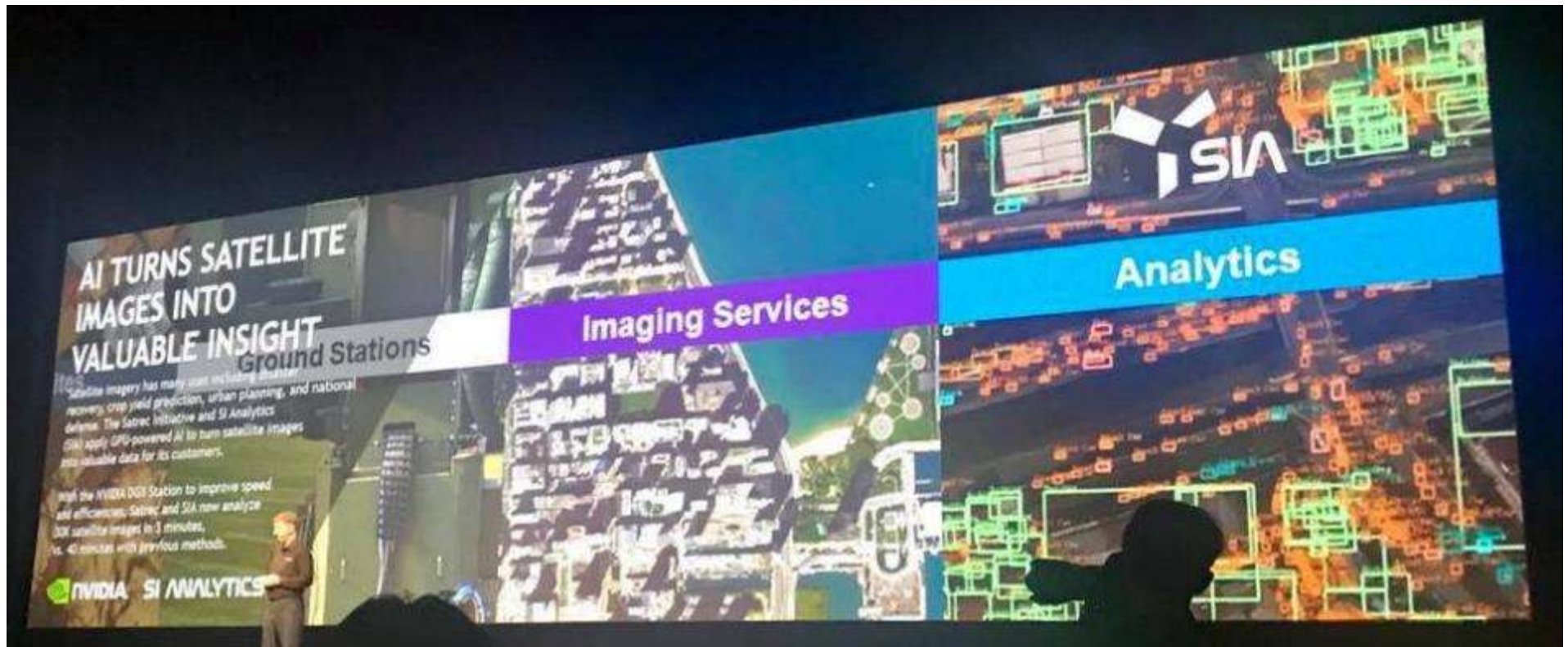
Detection Results with Huge scale variations (GSD: 4.5m)



Detection Results with arbitrary orientation



- NVIDIA Partnership (Nov '18)
- Invited for NVIDIA GPU Technology Conference (Mar 18-21, '19)





# SATREC INITIATIVE

Challenging Space Smart

Software - SIS


주시요함 | si-imaging.com/products/software/

SIS SI IMAGING SERVICES

PRODUCTS PURCHASE ABOUT US ENG KOR

Software

Photomod



# PHOTOMOD

PHOTOMOD is a digital photogrammetric system allowing the user to obtain metrically precise spatial data on the basis of commercially available imaging systems, such as frame digital and film cameras, space scanning systems of high resolution, and synthetic aperture radars.

- **Spatial aerial triangulation** : The functions of the aerial triangulation in PHOTOMOD are required to

