ALOS - Advanced Land Observation Satellite (“Daichi”)

- Developed by JAXA Japanese Aerospace Exploration Agency, Tokyo
- Launched January 24, 2006 from the Tanegashima Space Centre (Japan)
- Decommissioned May 12, 2011 due to meteorite impact
- 3 different sensors:
  - AVNIR - 2 (10m multispectral)
  - PALSAR (10m multispectral)
  - PRISM (2.5m)

- PRISM:
  - 2.5m panchromatic resolution
  - 8 bit radiometric resolution
  - Panchromatic includes bands G ,R and NIR (0.52 -0.77um)


Image via: JAXA

PRISM (Panchromatic Remote-sensing Instrument for Stereo Mapping)

Used specifically for cartographic applications such as highly accurate DEMs

Also used for disaster monitoring and natural resource surveys

Digital Elevation Model using PRISM of Mt. Fuji, Honshu Island, Japan

Red Sludge: Tatui Brazil -> tailings dam of iron mining waste

ALOS Kyoto and Carbon Initiative, 2007 -> Monitoring changes in the global environment vs changes in forests, swamp areas and deserts in South America, Southeast Asia, central Africa, Siberia, Canada and Alaska

Special interest taken in Amazon rainforest, JAXA provided free high quality imagery to the Brazilian Institute of Environment and Renewable Resources (IBAMA)

References:

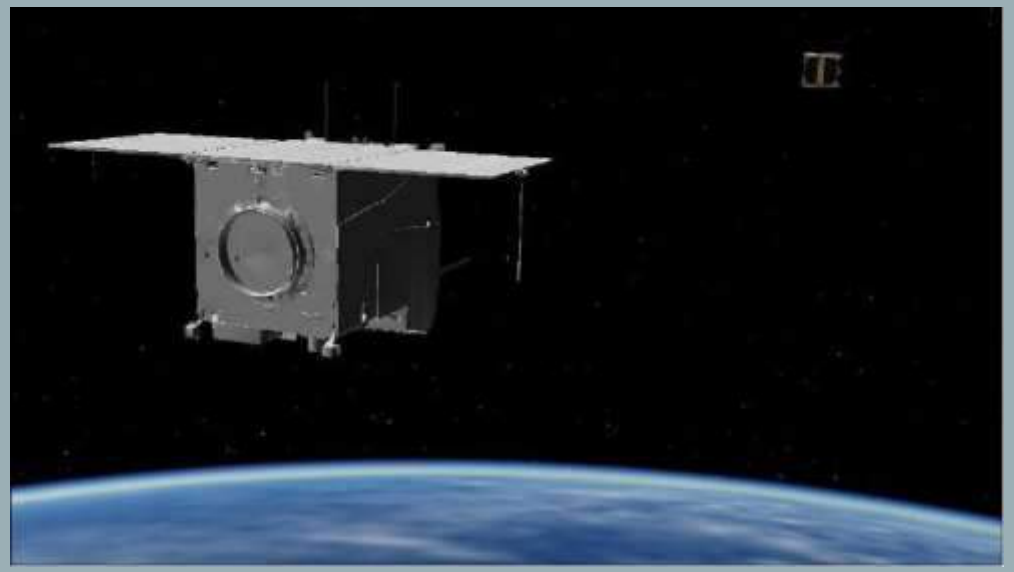
https://www.satimagingcorp.com/satellite-sensors/other-satellite-sensors/alos/

https://earth.esa.int/eogateway/instruments/prism/description

https://earth.esa.int/web/eoportal/satellite-missions/a/alos

BIROS (FIREBIRD 2)

- Bi-spectral InfraRed Optical System
- Berlin InfraRed Optical System (BIROS)
- German Aerospace Center
- Also known as the DLR's Aerospace Research and Technology program
- Predecesor - TET-1 (FireBird 1)
- Part of the DLR's FireBird Constilation
- Launched June 22nd, 2016 in southeast India
- It is still oporational but the design life is only between 3 to 5 years
- Sun orbiting satalite – orbit time 90 minutes
- Orbit elevation at roughly 500 km, 515 km or 530 km
- Inclination = 97.56°
- Spatial Resolution of about 80 meters
- Both sensors have 14 bit Pixels
- Categorized as a minisatellite 130 kg



- Bands
  - VNIR camera with 3 CCD-line FPA
    - Line 1: 460-560 nm (green)
    - Line 2: 565-725 nm (red)
    - Line 3: 790-930 nm (NIR)
  - 2 Bi-spectral infrared cameras with cooled linear detector arrays
    - MWIR: 3.4 - 4.2 µm
    - LWIR (TIR): 8.5 - 9.3 µm

Miro Nuetzi
GEOG 457
Jan 28th, 2022

PORTUGAL

Fires as of August 11-14, 2016 - Monitoring Map

1:600,000

Legend

Interpretation

Cartographic Information

Data Sources

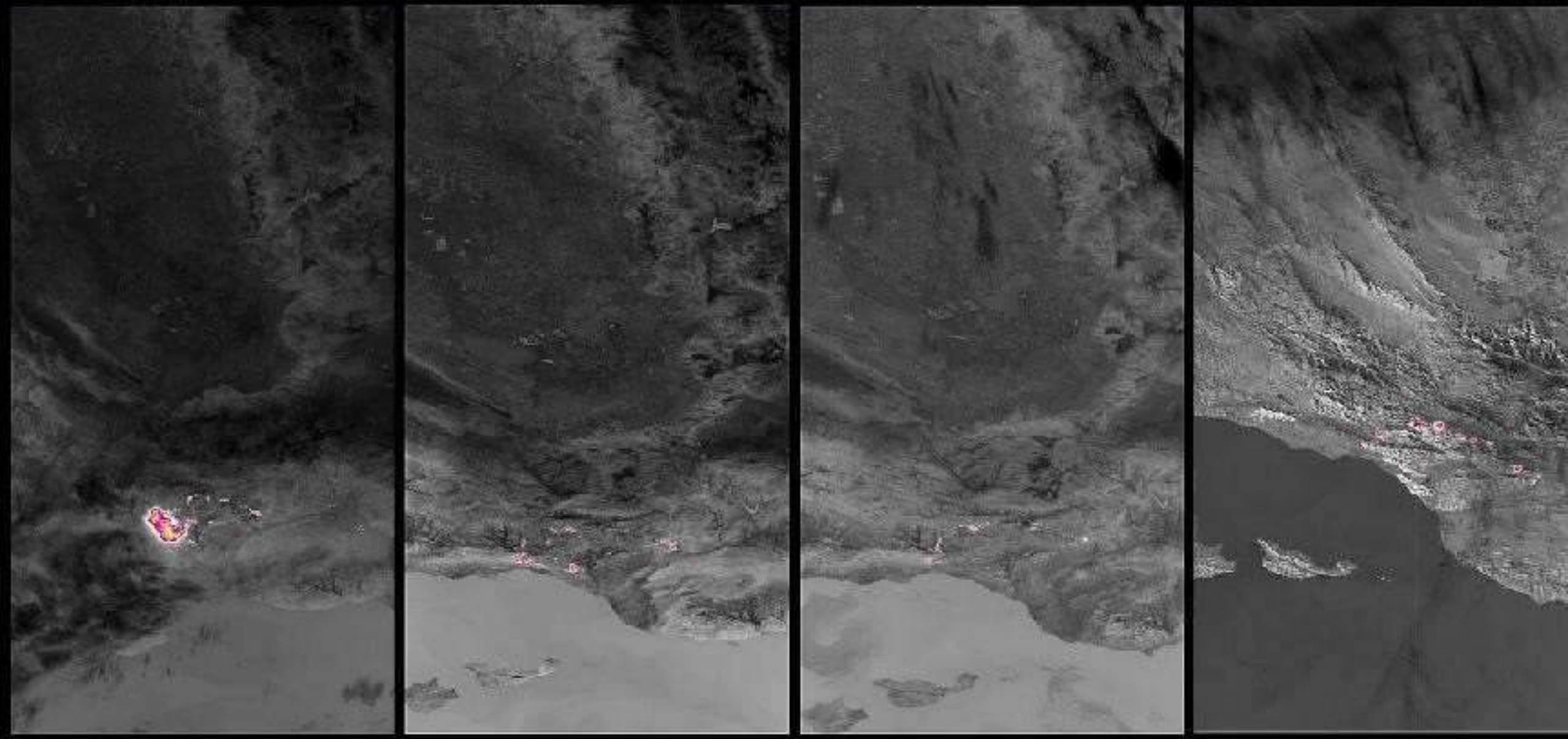
Framework

ZKI

DLR

FireBIRD Feuermonitoring: Waldbrände an der Küste Kaliforniens.

(Daten: TET-1, MWIR: mittleres Infrarot)



10. Dezember 2017 | 12. Dezember 2017 | 14. Dezember 2017 | 15. Dezember 2017

- The overall objective is the detection and quantitative analysis of HTE (High Temperature Events) like wildfires and volcanoes
- Detect incipient changes to fires with accuracy and
- Detecting the behaviour and development of major fires more effectively in future.
- Extraction of attributes of hot clusters, such as coordinates, Fire Radiative Power, fire line strength, effective fire temperature and area.
- Know detections are in California, Portugal, Isreal, Chile and Astralia

REFERANCES

- https://www.dlr.de/content/en/articles/missions-projects/firebird/biros.html
- https://directory.eoportal.org/web/eoportal/satellite-missions/b/biros
- https://space.skyrocket.de/doc_sdat/biros.htm
- https://www.mdpi.com/2072-4292/13/8/1459/htm
- https://activations.zki.dlr.de/de/activations/items/ACT129.html

DEIMOS-2 High Resolution Satellite

GEOG 457 Advanced Remote Sensing

Mackenzie Hamm

Specifications:

- Launch Date : June 19th, 2014, with an approximate lifespan of 7 years or more
- Developed by Elecnor Deimos in Spain and was purchased by GEOSAT in 2021
- 1m resolution panchromatic band and four multispectral bands (R,G,B,NIR) with 4m resolution at 10 bit
- 75cm, 4-band pansharpened imagery
- Image Width: 12 km
- Daily Collection Capacity: 200,000 sq km with a revisit frequency of 2 days (global average)

https://apollomapping.com/geosat-2-satellite-imagery

https://directory.eoportal.org/web/eoportal/satellite-missions/d/deimos-2

Deimos-2, Gangneung Olympic Park, South Korea

Calbuco volcano, Chile - 24 April 2015, DEIMOS-2 75cm Pansharpened Image

Applications

- Frequent Monitoring: floods, landslides, volcanic eruptions
- Urban planning and urban change: extract road networks, vegetation and bodies of water
- 3D modelling: stereo acquisitions

https://elecnor-deimos.com/project/safiy/
https://geospatialworldforum.org/speaker/SpeakersImages/vhr-monitoring-of-2015-ebro-river-floods-with-deimos-2.pdf

Gokturk-1

Dylan Broeke Pronunciation? Gah-turk

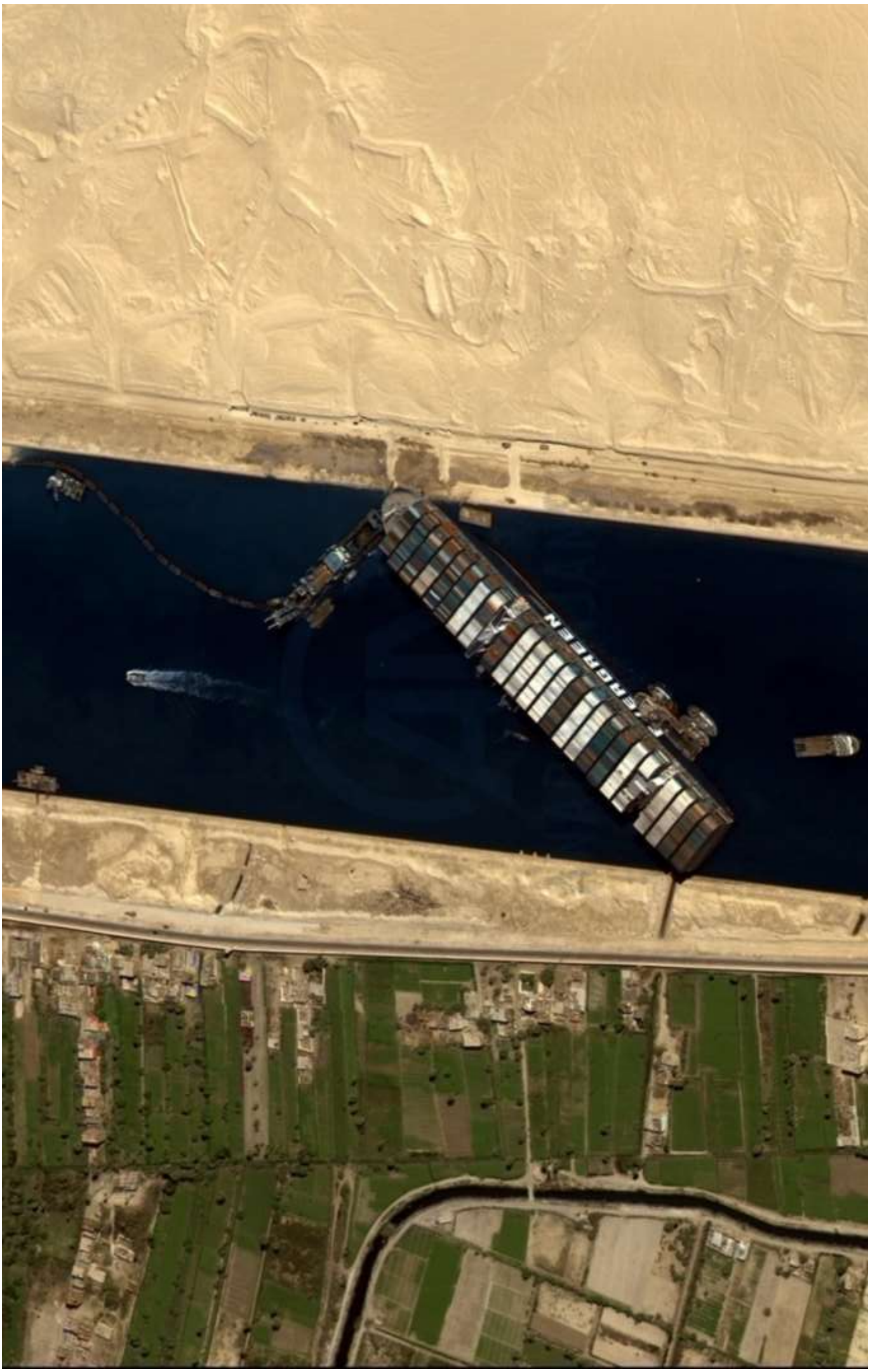
- The Gokturk-1 satellite was a high-resolution, electro-optical sensor (0.8m resolution) designed for the Turkish Ministry of National Defense.
- It was designed by an Italian company, Telespazio, with aid from Turkish companies.
- Gokturk-1 was initially launched on December 5, 2016. It was delayed several times due to political reasons.
- Its sister, Gokturk-2 was launched 4 years earlier in 2012 but it was of lower resolution.

Why was it launched?

- The Gokturk-1 satellite was launched for mainly military scouting missions. The goal was to create a view of any area on Earth. This naturally caused political problems
- Gokturk-1 was also used for many other purposes including geology, mapping, planning, disaster management, and many more.

- Gokturk-1 has a lifespan build of 7 years with decommission in 2023.
- Types of imaging modes: Spot, Strip, Wide Area, Stereo
- Bands: Red, Green, Blue, NIR, and PAN.
- B0= 450-530nm (blue),
- B1= 510-590nm (green),
- B2= 620-700nm (red),
- B3= 775-915nm (NIR)
- Pan: 480-820 nm
- Gokturk-1 is 12 bit per pixel

- Imaging examples: Very little was available to the public of Gokturk-1’s images


FRAUNHOFER

This one would cost nearly $600 to remove the watermark.

References

Agency, A. (n.d.). A handout photo taken by gokturk-1 and gokturk-2 observation... Retrieved January 28, 2022, from https://www.gettyimages.ca/detail/news-photo/handout-photo-taken-by-gokturk-1-and-gokturk-2-observation-news-photo/1234368999

Gokturk-1: Eoportal Directory: Satellite Missions. (n.d.). Retrieved January 28, 2022, from https://directory.eoportal.org/web/eoportal/satellite-missions/g/gokturk-1

GÖKTÜRK-1. (n.d.). Göktürk-1 - tusas. Retrieved January 28, 2022, from https://www.tusas.com/en/products/space/earth-observation-reconnaissance-satellites/gokturk-1

Photo. (n.d.). Retrieved January 28, 2022, from https://www.aa.com.tr/en/pg/photo-gallery/turkish-satellite-gokturk-1-captures-high-definition-vision-of-stuck-ever-given-ship-in-the-suez-canal/0

KOMPSAT-2

- Summary Info:
- Launch date: July 28, 2006
- Still in Operation
- Launched by South Korea
- Developed by Korea Aerospace Research Institute
- Panchromatic is 1M resolution, others are 4M
- 10 bit data
- Two Ground receiving stations, one in Daejeon, South Korea. One in Toulouse, France

Bands
500-900 nm (PAN)
450 - 520 nm (Blue),
520 - 600 nm (Green),
630 - 690 nm (Red),
760 - 900 nm (NIR)

Peru's Quelccaya ice cap. June 29, 2009
Obtained from https://directory.eoportal.org/web/eoportal/satellite-missions/k/kompsat-2

Southern Sudan. Feb 8, 2013
Obtained from https://directory.eoportal.org/web/eoportal/satellite-missions/k/kompsat-2

Some uses of KOMPSAT-2

- Surveillance of North Korea, sends images twice per day
- Oil Spill Mapping in the Gulf of Mexico (Park, S., Jung, H., & Lee, M. (2020)
- Assessing forest disease impacts in California (Chen, G., He, Y., De Santis, A., Li, G., Cobb, R., & Meentemeyer, R. K. (2017))

Kompsat-3

Kyra Egan

Launch date: May 17, 2012

Still working

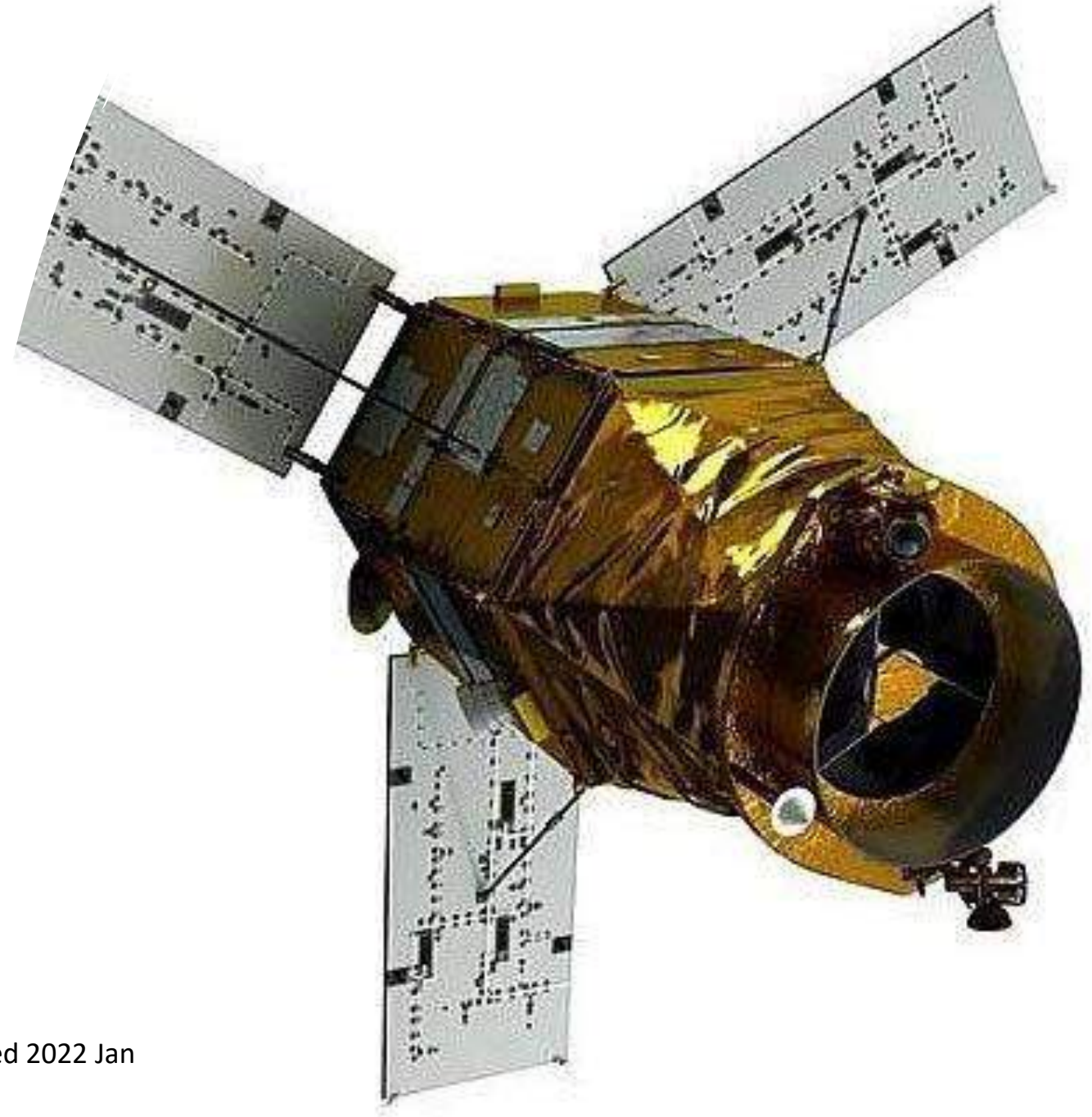
Launcher: Korea Aerospace Research Institute with assistance from Japan

Bands: Panchromatic, Multispectral, NIR

Wavelengths: 450-900nm

Pixel size: 0.7m for Panchromatic, 2.8m for Multispectral

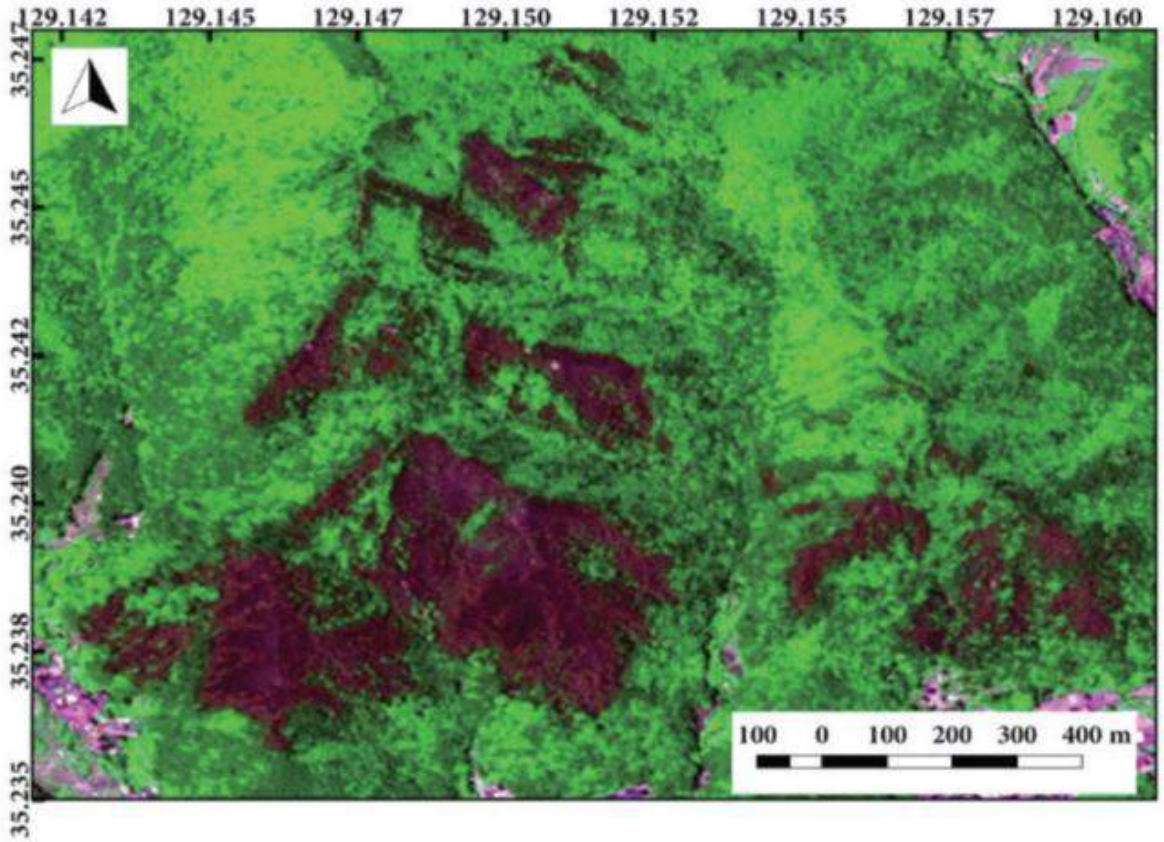
Radiometric Resolution: 14 bit



Kompsat-3 (0.7m) | Satellite Imaging Corp. Satellite Imaging Corp. [accessed 2022 Jan 26]. https://www.satimagingcorp.com/satellite-sensors/kompsat-3/

Classifying Wildfire Damages

- 2019 case study from near Busan, South Korea
- Using NIR to create a false-colour composite to show where the burned parts of the forest are
- Brown areas are the burnt forest, green is normal healthy forest



Lee S-J, Lee Y-W. Detection of Wildfire-Damaged Areas Using Kompsat-3 Image: A Case of the 2019 Unbong Mountain Fire in Busan, South Korea. Korean Journal of Remote Sensing. 2020;36(1):29–39.

Images: Kramer H. KOMPSAT-3 (Korea Multi-Purpose Satellite-3) / Arirang-3. Kompsat-3 - EOPORTAL directory - satellite missions. [accessed 2022 Jan 26]. https://directory.eoportal.org/web/eoportal/satellite-missions/k/kompsat-3#DVtAH1177Herb

KOMPSAT-3A

(Korea Multi-Purpose Satellite-3A) / Arirang-3A

(KARI, n.d.)

Summary

Launch date: March 25th, 2015
Launcher: South Korea (Korean Aerospace Research Institute)
Launch location: Jasny Dombarovsky launch site in Russia via Ukrainian-built Dnepr rocket
Status: Fully operational (January 2019)

Bands:

- -450-900 nm Pan (Panchromatic)
- -450-520 nm MS1 (Multispectral), blue
- -520-600 nm MS2, green
- -630-690 nm MS3, red
- -760-900 nm MS4, NIR (Near Infrared)

Wavelengths: Visible and infrared

Pixel size:

- -Panchromatic resolution: 0.55 m
- -Multispectral resolution: 2.20 m
- -Infrared: 5.5 m

Radiometric resolution: 14-bit

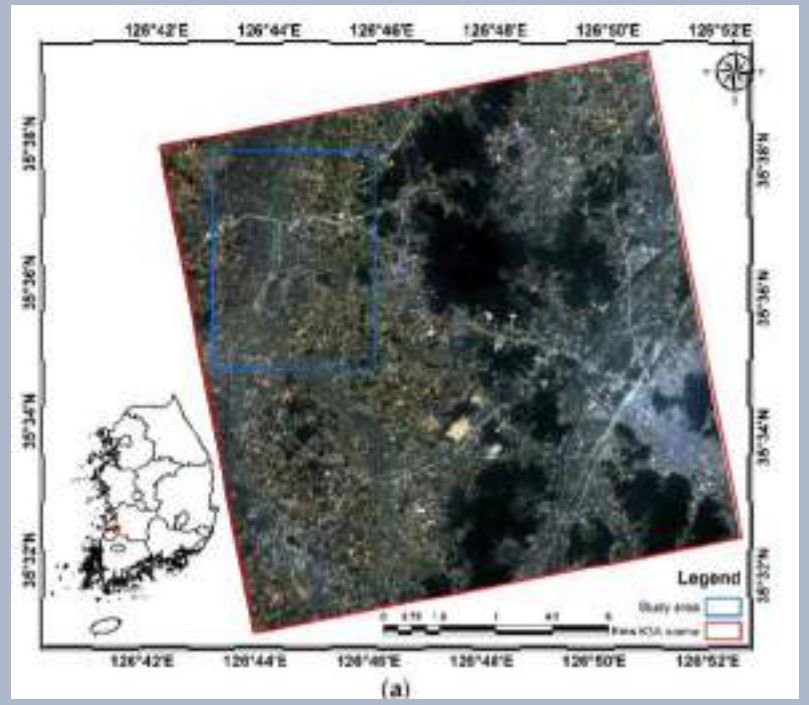
(eoProtal, n.d.; Satimagingcorp, n.d.)

Palm Jumeirah, Dubai

(KARI, n.d.)

Project examples

Land Cover Classification Using KOMPSAT-3A



Engineering surveys

-Satellite elevation surveying for engineering and construction

-Elevation grid from KOMPSAT-3A imagery held up to a highly accurate LiDAR elevation grid

-Alternative to LiDAR

(Acharya et al., 2016)

References

Acharya, T., Yang, I., & Lee, D. (2016). Land Cover Classification Using a KOMPSAT-3A Multi-Spectral Satellite Image. MDPI-Applied Sciences.

eoProtal. (n.d.). *KOMPSAT-3A (Korea Multi-Purpose Satellite-3A) / Arirang-3A*. Retrieved from Sharing Earth Observation Resources: https://directory.eoportal.org/web/eoportal/satellite-missions/k/kompsat-3A#spacecraft

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