



Dr Tuong-Thuy Vu

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Qualification

Ph.D., Docent

Working background/ Area of Expertise / Interest:

A geospatial scientist by training and research, Dr. Vu has over 10-years research and teaching experiences across Eurasia. After obtaining his PhD degree in 2003, he worked as a research scientist at Earthquake Disaster Mitigation Research Center, Kobe, Japan before joined Chiba University as a postdoctoral researcher in between 2006 and 2007. He then joined GEO Grid team of National Institute of Advanced Industrial Science and Technology (AIST), Japan. In 2008, he was with Geoinformatics division, Royal Institute of Technology, Sweden as a lecturer, where he as awarded the Docent title. In early 2011, he took the position at University of Nottingham, Malaysia campus and assisted the establishment of the School of Geography and new MSc programmes at Malaysia campus. He is now an Associate Professor of the School of Environmental and Geographical Sciences, and Head of OSGEO research lab.



TRACERSING
THE PAST
CONSTRUCTING
THE FUTURE

Advanced Remote Sensing for Oil Palm Precision Agriculture

Dr. Tuong-Thuy Vu
Hoa Sen University, Vietnam
University of Nottingham, Malaysia campus



Remote Sensing

Detection: identify forms and anomalies

Measurement: determine quantitative properties

Monitoring: repeated observation to assess change



Ground-based

localised, to the details, can be
any sensors



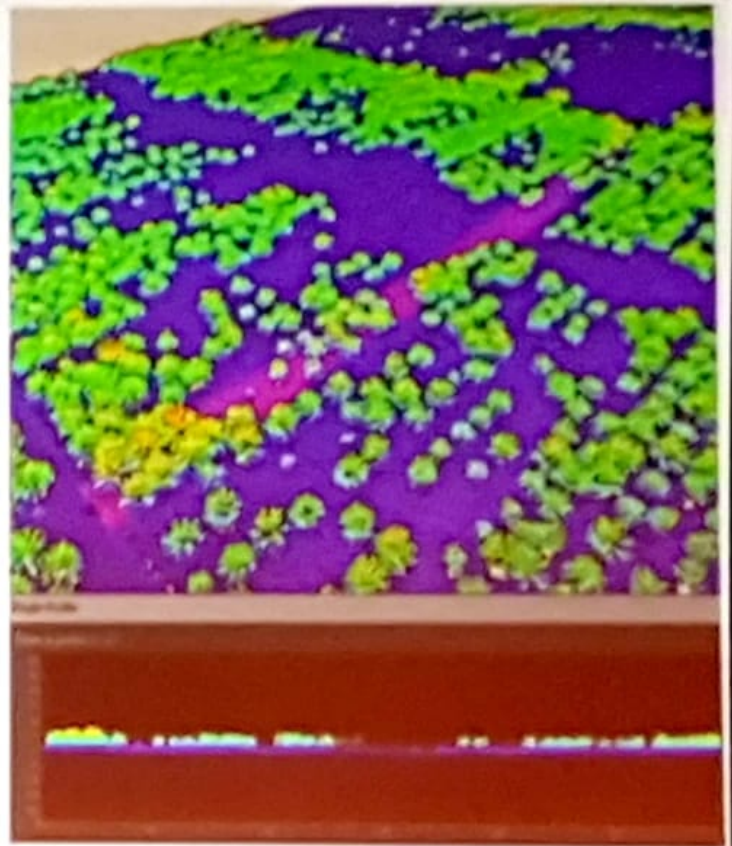
Airborne

quite expensive, reasonable
coverage, variety of sensors
(LiDAR, hyperspectral, ...)



Airborne

LIDAR

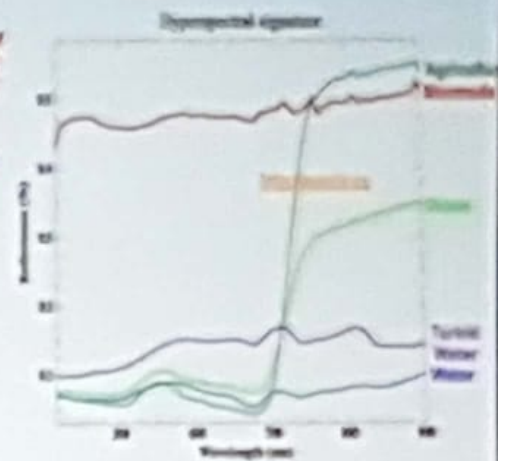


(Deltares.nl)

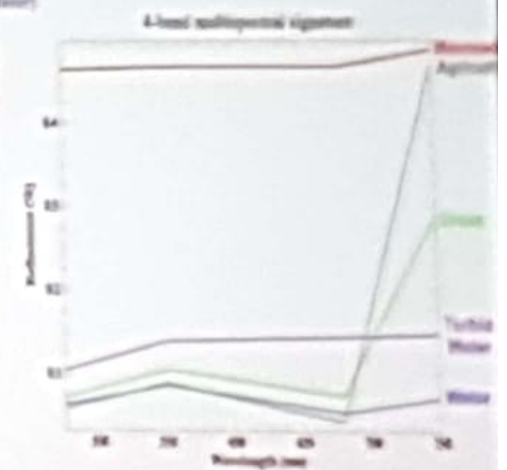
Hyperspectral



Spectral block with 64 bands
from 415 nm to 910 nm



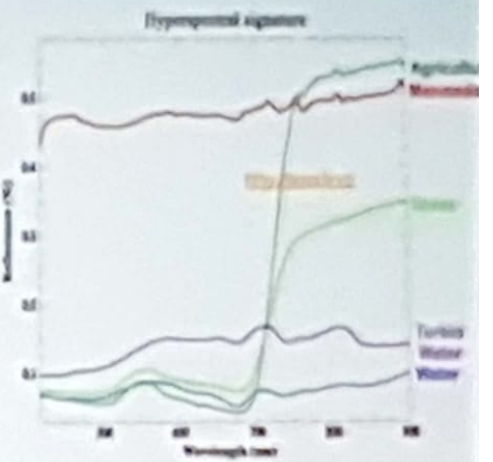
Spectral block with 4 bands
from 475 nm to 710 nm



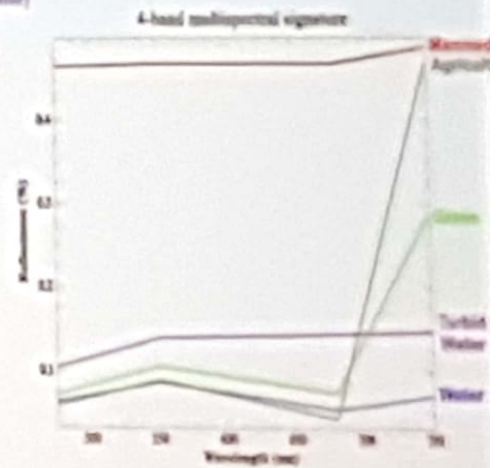
Hyperspectral



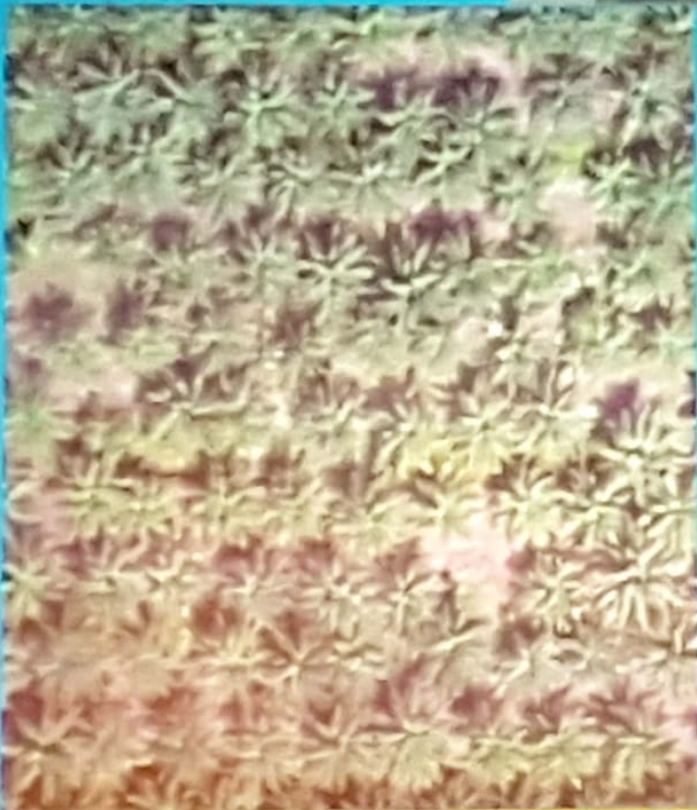
Spectral block with 64 bands from 415 nm to 900 nm



Spectral block with 4 bands from 475 nm to 750 nm



DRONE



DRONE



Under canopy



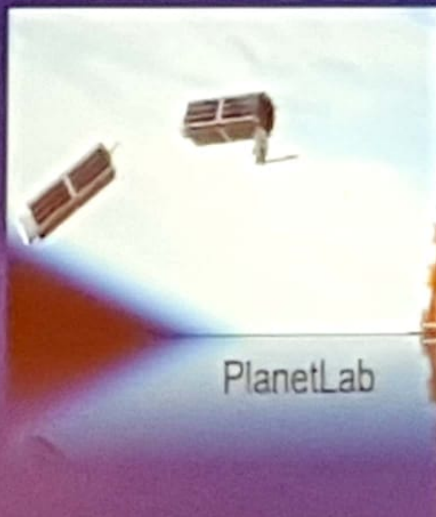
EARTH OBSERVATION SATELLITE

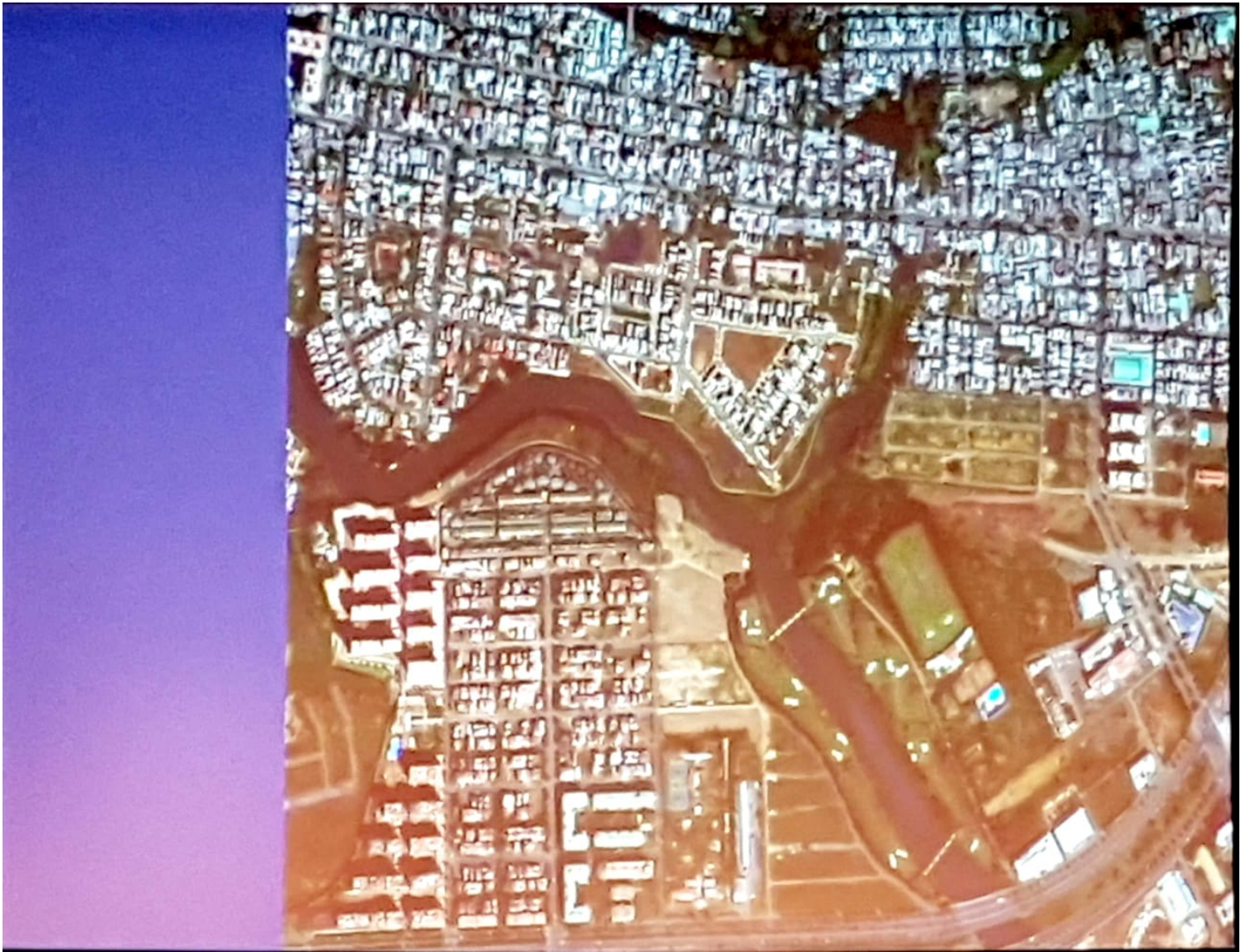
Sentinel-2

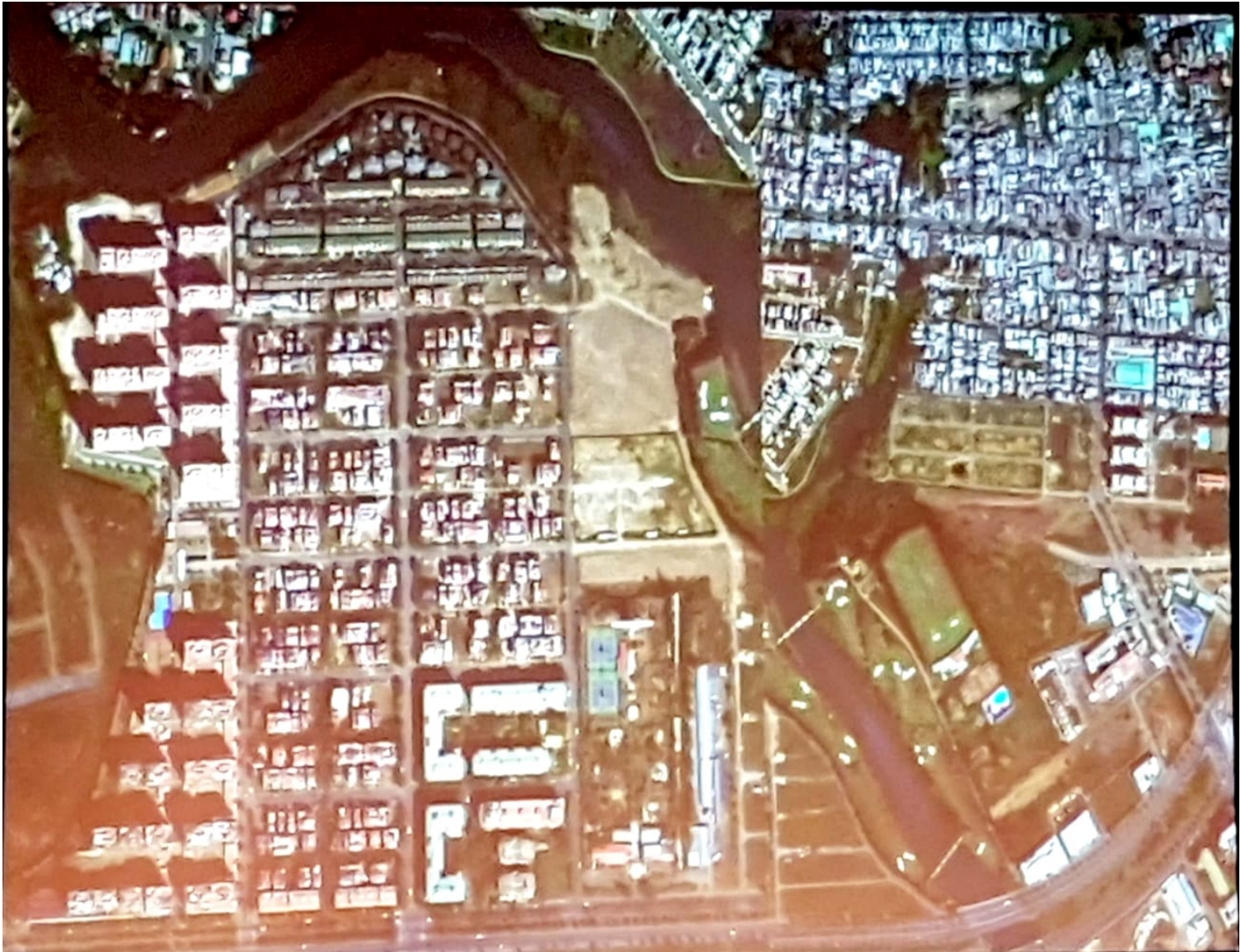
GeoEye

Multi-sensors

Landsat







Optical sensor

- MODIS, NOAA: 250m-1km spatial res., multispectral, high multi-temporal
- LANDSAT 1-8: ~ 30 m spatial res., multispectral
- SPOT 1-6: 2.5m-20m spatial res., multispectral
- IRS-P6: 6m-23m spatial res., multispectral
- ALOS AVNIR-2: 2.5m-10m spatial res., multispectral

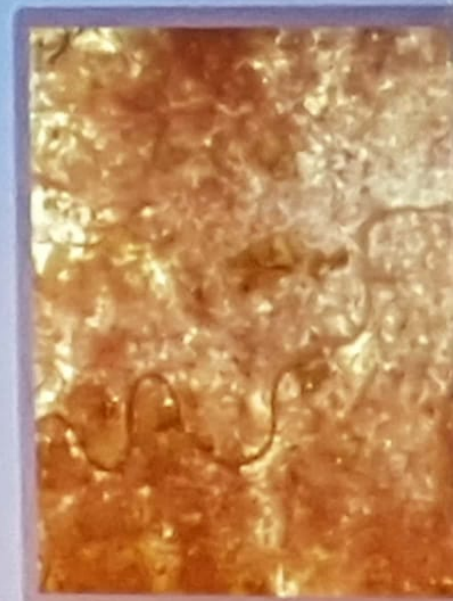
Bio-chemical properties

- QuickBird: 0.6m and 2.4m, 4-band
- IKONOS: 1m and 4m, 4-band
- Geos-2: 0.4m and 1.6m, 4-band
- WorldView-2: 0.46m and 1.84m, 8-band
- Pleiades: 0.5m and 2m, 4-band

IKONOS 1m



Landsat 30m



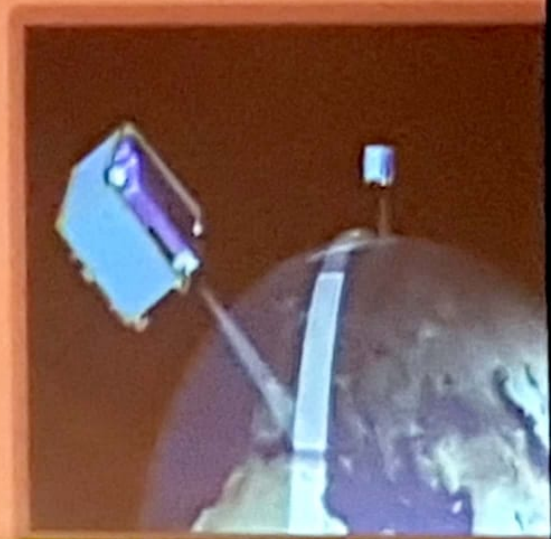
Optical
sensor

Rapid Eye

- 5 identical satellites on the same orbital plane
- 5-m resolution,
- 5 bands
- Daily image

Disaster Monitoring Constellation

- A number of satellites operated by Algeria, Turkey, Nigeria, UK, China, Spain
- 2.5m-5m or 22m-32m resolutions
- Daily image



Radar sensor

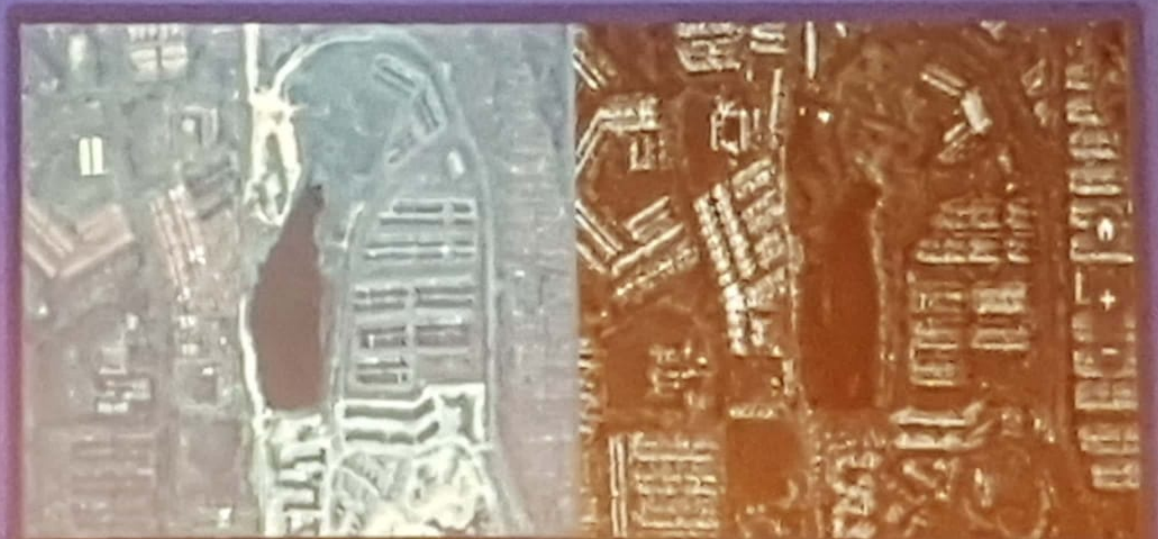
ENVISAT, Sentinel-1 C-band, 5m-100m resolution

ALOS PALSAR L-band, 10m-100m

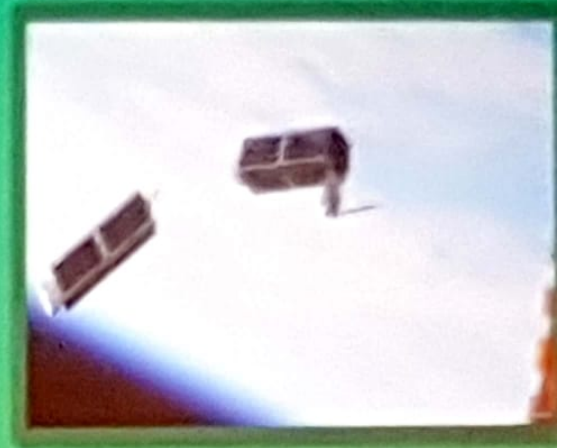
RADARSAT C-band, 1m-100m

TerraSAR X-band, 1m-16m

Physical,
structural
properties



Cube Sat



Planet Labs

4 kg

10x10x30 cm

Orbit at a height of about 401 km

Image resolution 3-5 m

Constellation of 28 satellites

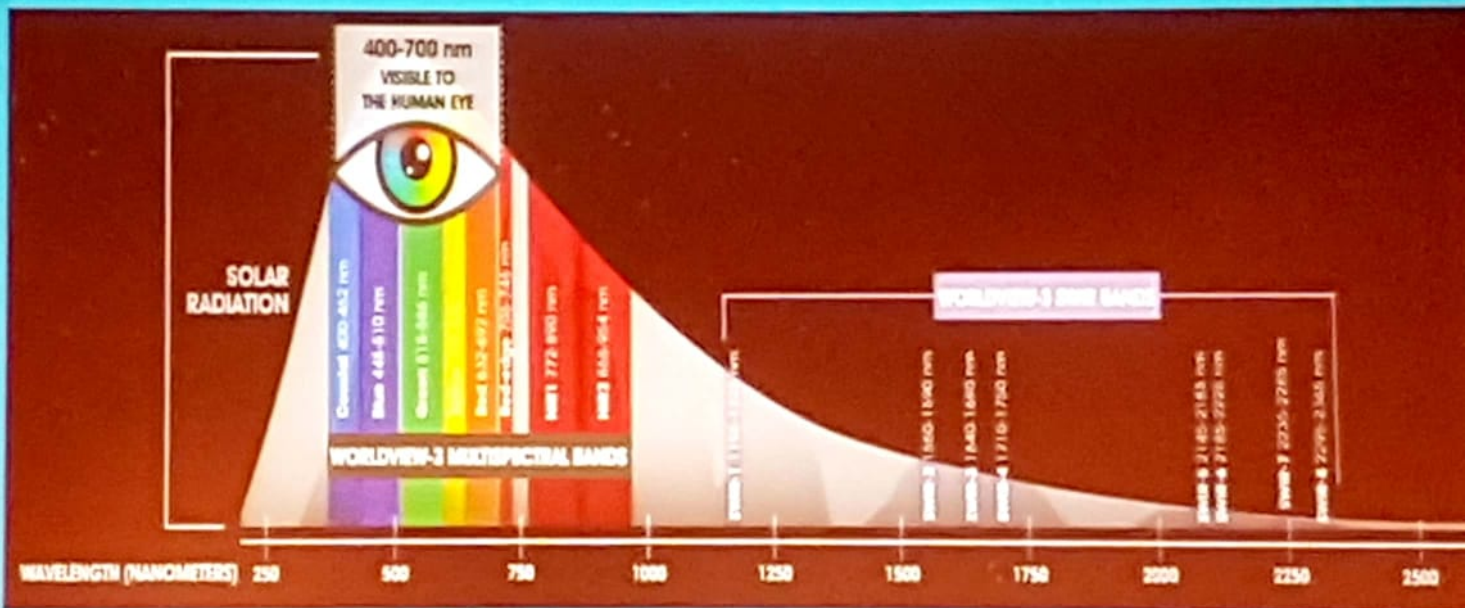
Skybox Imaging

Capture 90s video 30 frames/sec

Constellation of 24 satellites

50cm spatial resolution

Worldview 3



50cm spatial resolution

Worldview 3



Srestasathien and Rakwatn. 2014



SUMMARY

1 | Great opportunities
with satellite remote
sensing

Spatial, spectral, temporal
resolutions

Free Landsat, Sentinel images

Flexible choice to have timely
data for monitoring and
management

2 | Airborne-based is still
a good option

Expensive, on-demand flight

Deploy LIDAR &
hyperspectral sensors

Drone can be a cost-effective
solution

3 | Ground-based
provides the
complement

Lighter, better platforms and
sensors

Crowd-sourcing

GEOSPATIAL DATA SCIENCE
BIG DATA ANALYTICS
OPEN-SOURCE GEOSPATIAL

