

ERATOSTHENES Centre of
Excellence (ECoE)



ERATOSTHENES:

Excellence Research Centre for Earth Surveillance
& Space-Based Monitoring of the Environment

1st virtual EXCELSIOR International Technical Workshop

15 July 2020

NANO-SATELLITE REMOTE SENSING

@excelsior2020eu



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BEN-GURION UNIVERSITY OF THE NEGEF



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CONSORTIUM



BEN-GURION UNIVERSITY OF THE NEGEV
THE EARTH AND PLANETARY IMAGE FACILITY

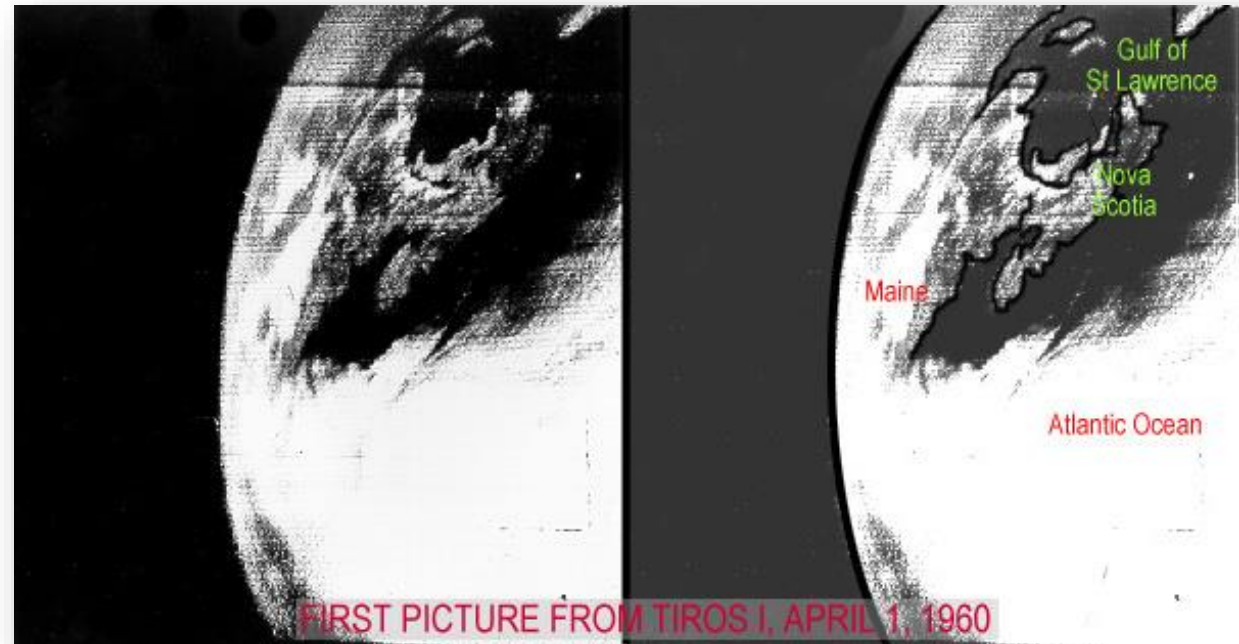
NANO-SATELLITE REMOTE SENSING

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SATELLITE REMOTE SENSING

~60 years of Earth Observations (EO)



TIROS-1,
US meteorological satellite, 1st satellite to be launched for the declared
purpose of EO.

SPACECRAFT MINIATURIZATION TRENDS

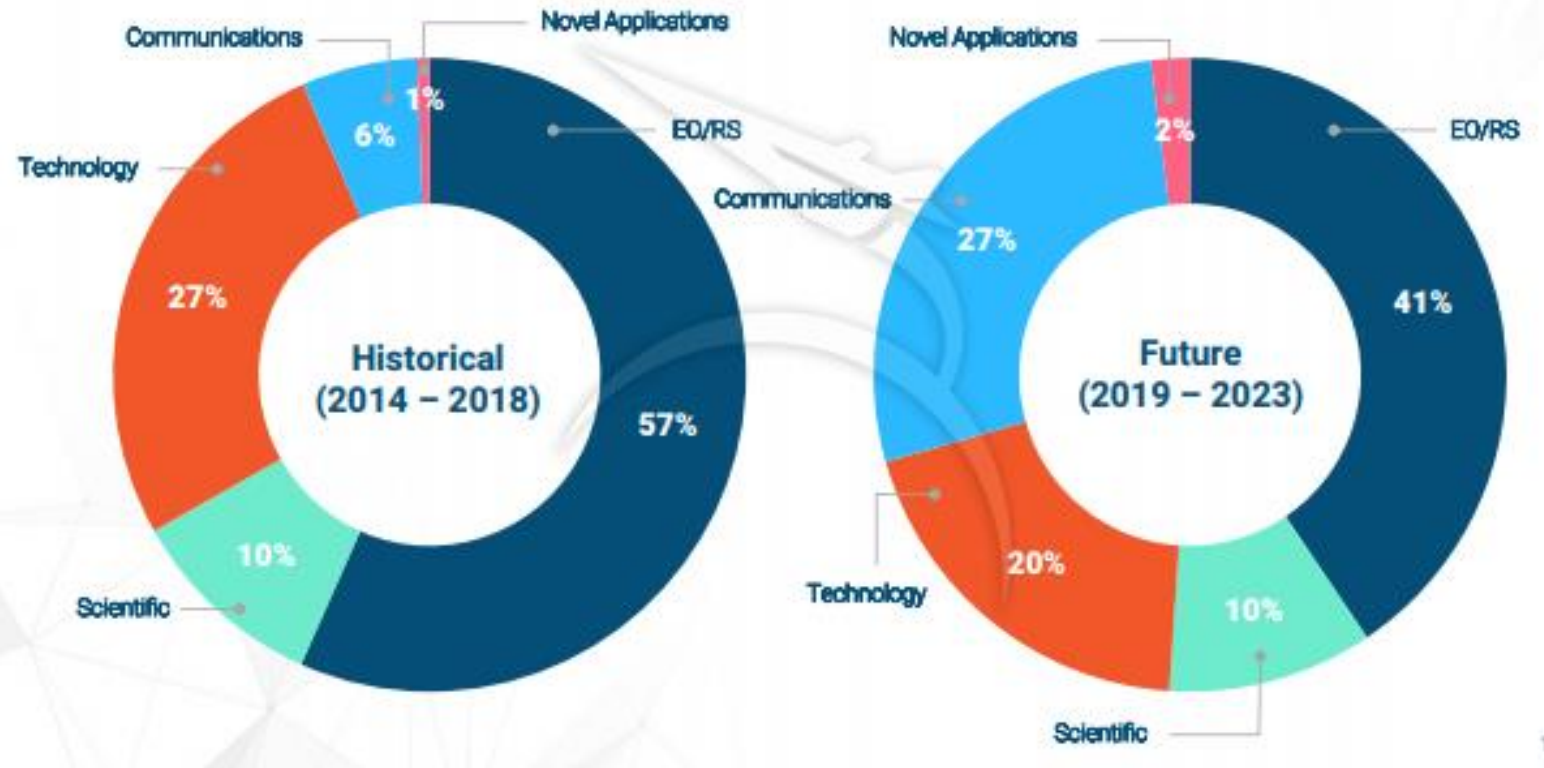


NEW SPACE ERA

EARTH
OBSERVATION
THE NEXT
GENERATION?

SATELLITE APPLICATION TRENDS

Nano/Microsatellites (1 – 50 kg)



(SpaceWorks Enterprises forecast, 2019)

OBJECTIVES



Technology
capability demonstration



Education



Science



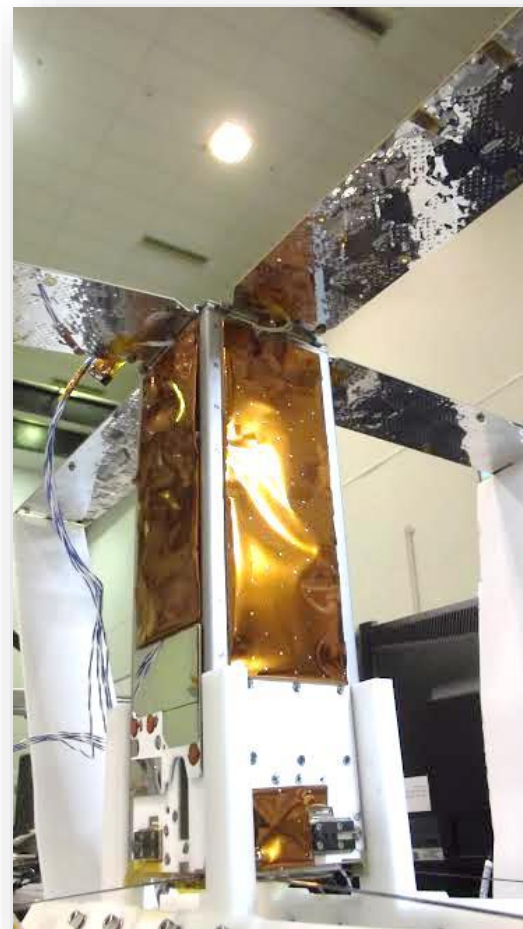
3U CubeSat



LEO



SWIR Imaging



RESULTS

SUCCESSFULLY LAUNCHED!
FEB. 15 2017, PSLV-C37



BGUSAT TELEMETRY SOUND

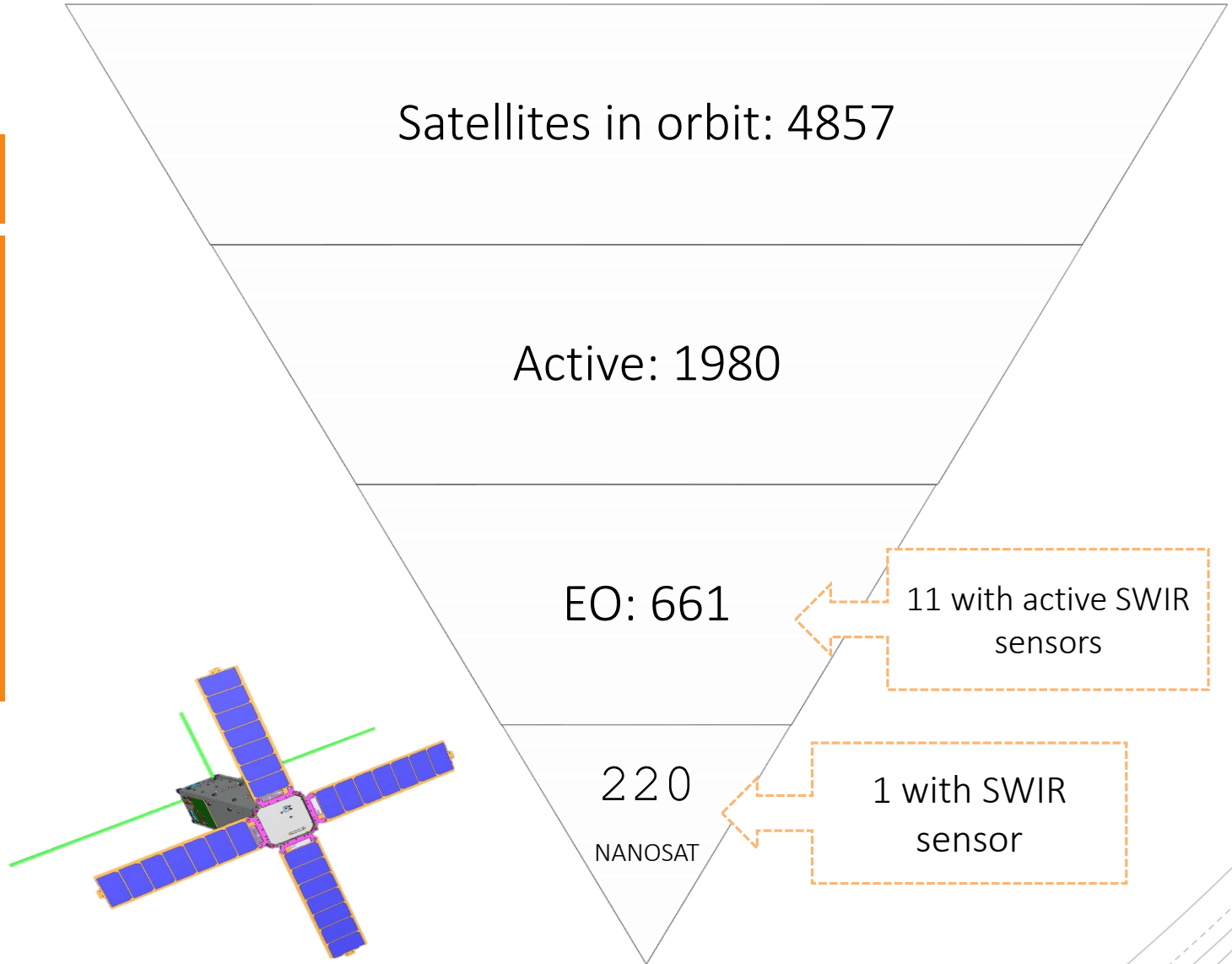


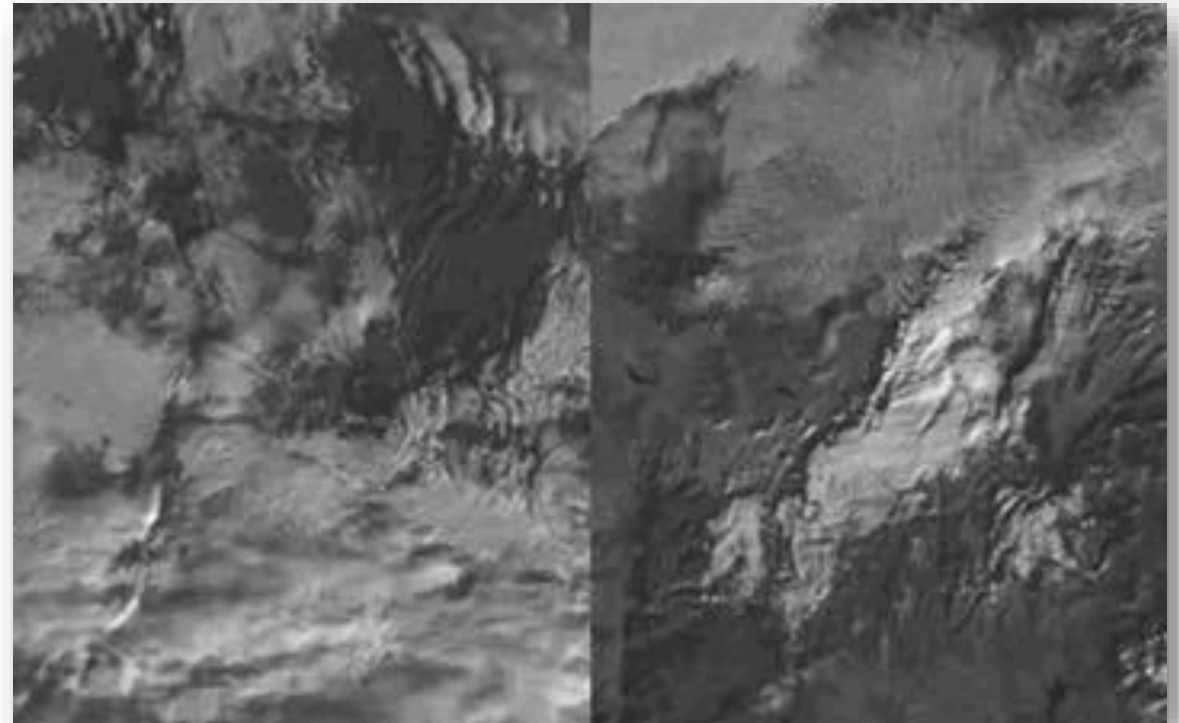
BGUSAT WORLDWIDE IMAGES



EO SWIR SENSORS

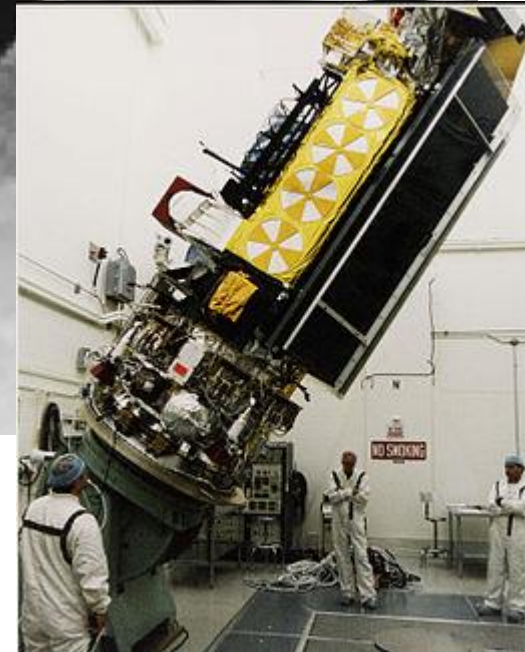
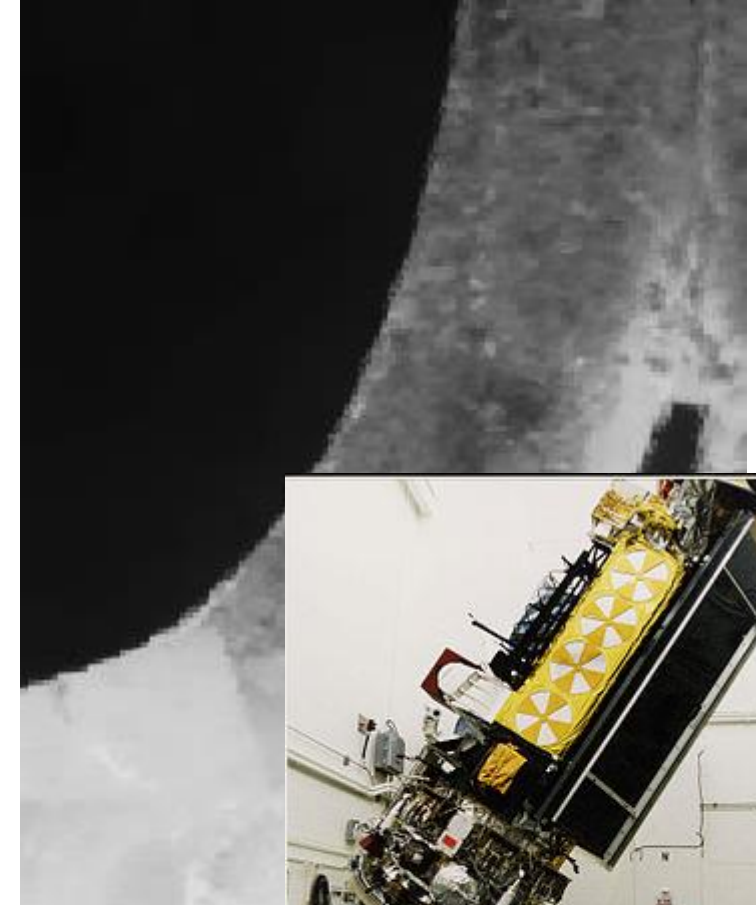
Data from www.pixalytics.com April 2018





Ongoing climate and meteorological research:
cloud coverage & storm observation, CO_2 concentrations.
Terrain Transformation, differentiation of clouds from
snow, determinations of soil and vegetation moisture
content, wildfire monitoring, Earth's Airglow, etc'

MAY IMAGES OF BGUSAT vs NOAA



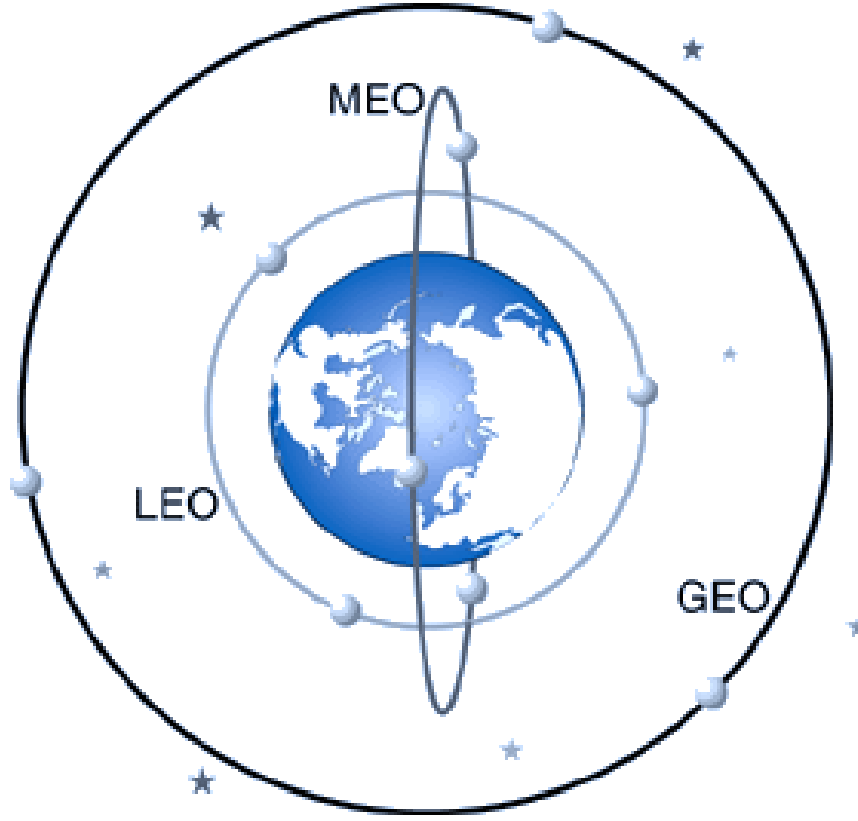
| Satellite | Sensor | Number of bands | SWIR band | Wavelength (μm) | Swath Width (Km) | Spatial res. (m) | Temporal res. (days) |
|----------------------|---------|-----------------|-----------|----------------------|------------------|------------------|----------------------|
| NOAA-17 MetOp-A\B | AVHRR/3 | 5 | 3A | 1.58 – 1.64 | 2900 | 1000 | 0.5 |
| BGUsat | | 1 | | 1.55-1.7 | ~190 | 600 | ~4 |
| Terra \ Aqua | Modis | 36 | 6 | 1.628 - 1.652 | 2330 | 500 | 1-2 |
| Landsat 7 | ETM+ | 7 | 5 | 1.55-1.75 | 185 | 30 | 16 |
| Landsat 8 | OLI | 8 | 6 | 1.566-1.651 | 185 | 30 | 16 |
| Sentinel-2A\2B | MSI | 12 | 11 | 1.565-1655 | 290 | 20 | 5 |
| WorldView 3 | | 17 | SWIR 2 | 1.546 - 1.598 | 13.1 | 3.7 | 1-4.5 |
| | | | SWIR 3 | 1.636-1.686 | | | |

COMBINING
LEO & GEO FOR
RS\EO

Temporal
resolution of
GEO missions



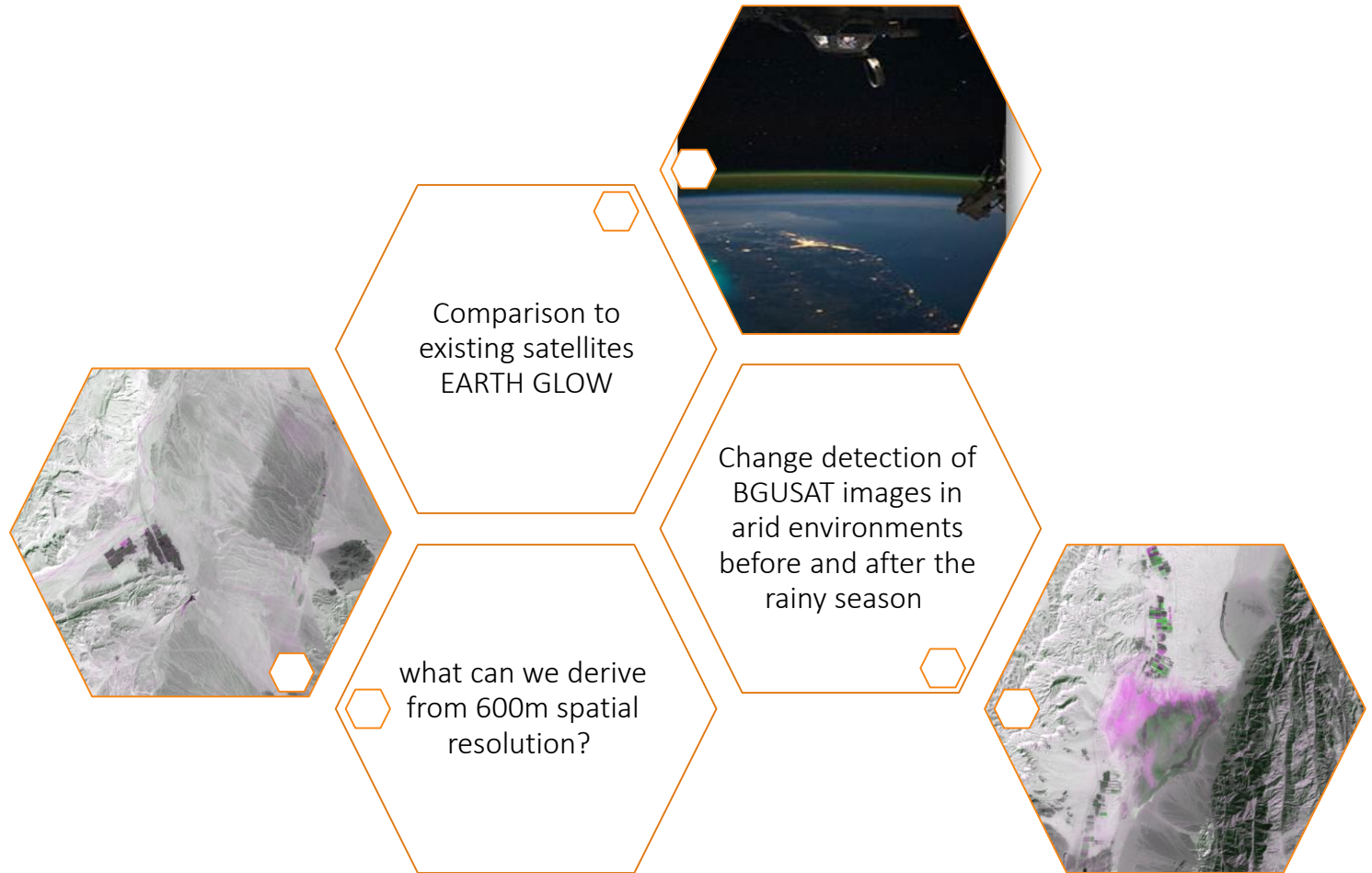
Spatial
resolution of
LEO missions



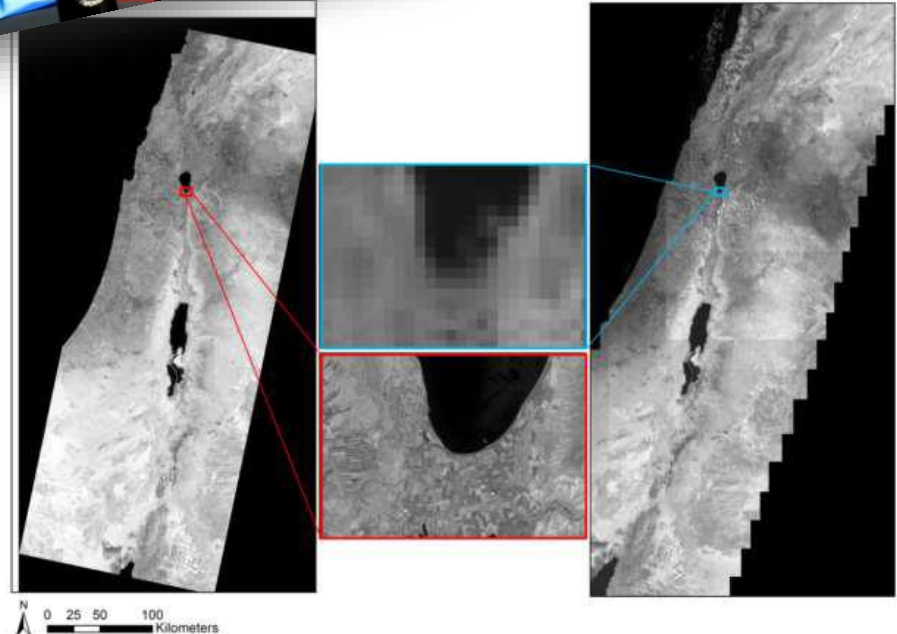
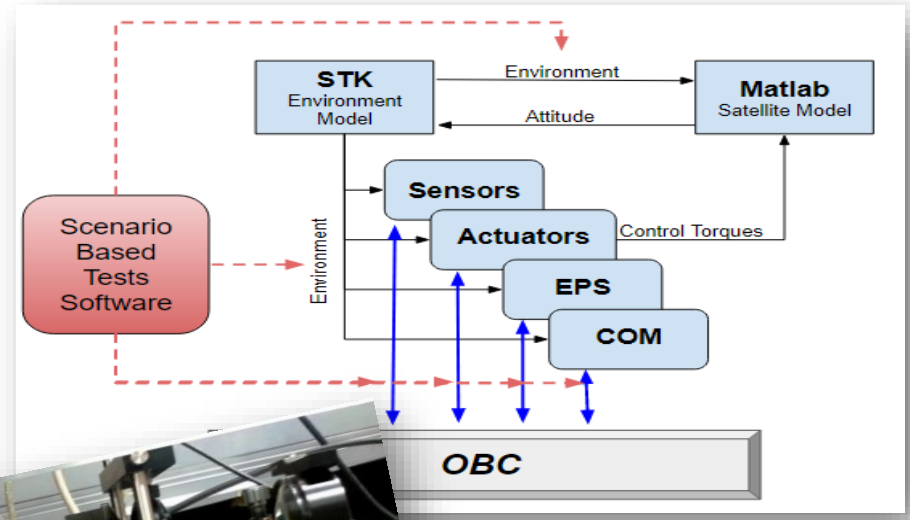
BGUSAT IMAGE BROWSER

The screenshot displays the BGUSAT Image Browser interface. At the top, the browser title is "BGUSAT Image Browser". Below the title is a satellite map of the region. To the right, there are logos for IAI (Israel Aerospace Industries) and a globe icon. A "Sign Up" form is visible, with a notice: "Notice! The required authentication details are not related to your university authentication information. Please use a different password than your official university's password." Below the form, there are two pop-up boxes showing geographical data for "Israel" and "Angola". The main content area is titled "BGU Satellite Pictures" and shows a grid of satellite images for "Israel". The first image is labeled "Cluster 1" and includes the following metadata: "Time Of Center: 2017-05-10 07:33:19", "Latitude: 34.3330999365234375", and "Longitude: 35.305110931396484". Below each image is a "download image as tiff" button. A "Help" button is located at the bottom left of the image grid.

ONGOING EO RESEARCH



NEGEVSAT



THANK YOU!

