SURREY
CHANGING THE ECONOMICS OF SPACE

Rapid Revisit Small Satellite Constellations

National EO Conference – CEOI Session

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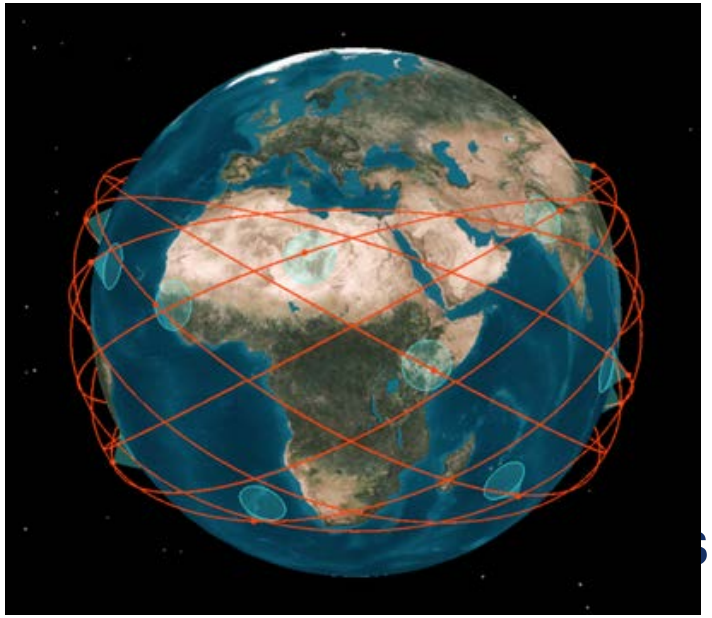
Benefits of Satellite Constellations

- Constellations offer the ability to rapidly re-image the same area of interest to enable activity monitoring, change detection and Pattern of Life assessments
  - Status of disaster events can be regularly updated
  - Robustness against target concealment (i.e. reduces the ability for activities to be from view)
  - Timely production of actionable information
  - Rapid cueing of local air or ground assets
  - Some robustness against variable weather during the day

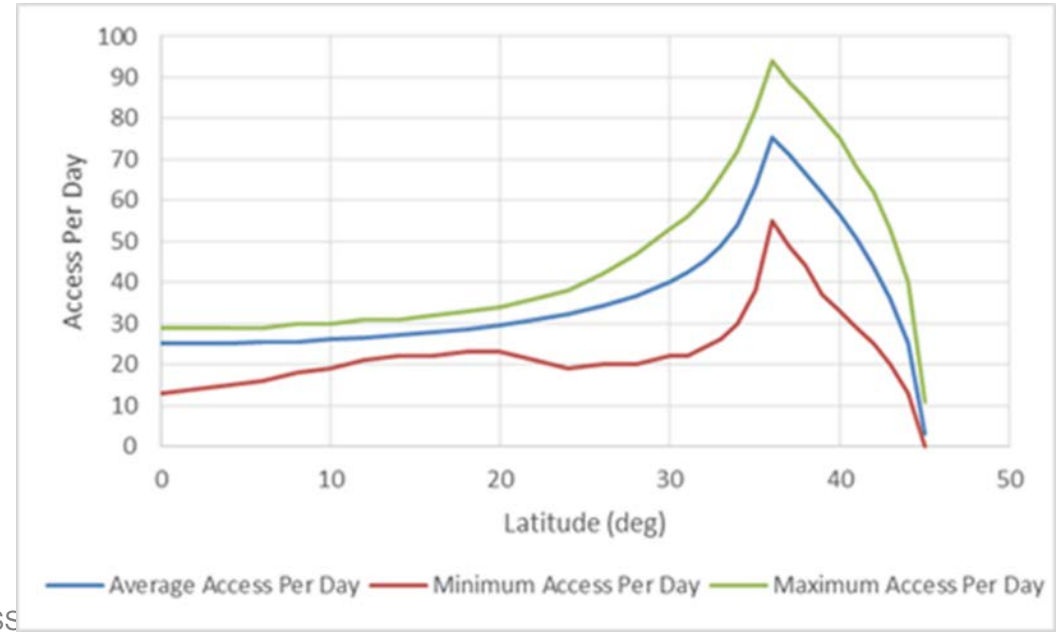


Potential Applications

- Change detection and behavioural analytics
- Disaster monitoring
- Traffic management
- Infrastructure monitoring
- Monitoring key facilities, e.g. airports and ports
- Monitoring ships in EEZ and protected areas
- Border monitoring and security

Rapid Revisit Constellation

- Coverage optimised for key AOIs at mid-latitudes
- Inclination 40°
  - Coverage from 40N to 40S
- 4 planes of 12 satellites
- 4 launches of a small to medium launch vehicle



- Peak coverage at ~±34-36N
- Up to ~90 passes per day depending on time of year
- Revisit time ~8 mins
- Average of ≥24 passes per day across the whole latitude band

Low Cost Satellites: Key to Success

- The success of a constellation solution is largely dependent on reducing the size, mass and cost of the satellites and their launch
- Supported by CEOI, SSTL, with Surrey Space Centre and University of Oxford, is developing a deployable telescope and a precision in-orbit alignment system
- This novel telescope addresses the market needs for a <1 m GSD imager in a small launch volume
- Facilitates the use of small satellite launches (e.g. small UK launch vehicle)
  - Allows multiple identical satellites to be launched from a single small launch vehicle
  - Satellites launched directly into operational orbital slot - not dependent on high dV and delays introduced by in-orbit constellation phasing

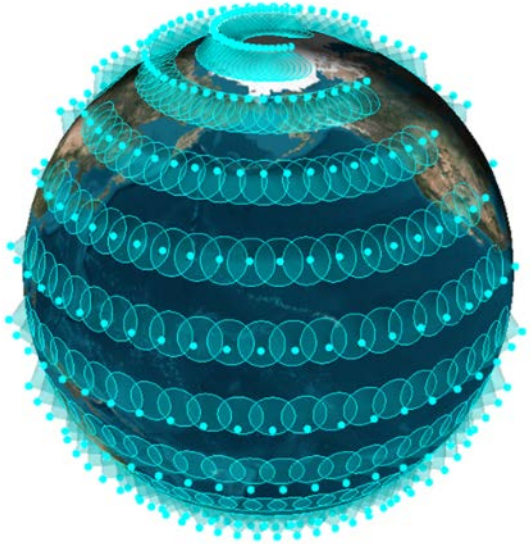
The deployable telescopic barrel, stowed (left) and deployed (right)

Deployed imager accommodated on the SSTL-42 platform

Mega-EO Constellations

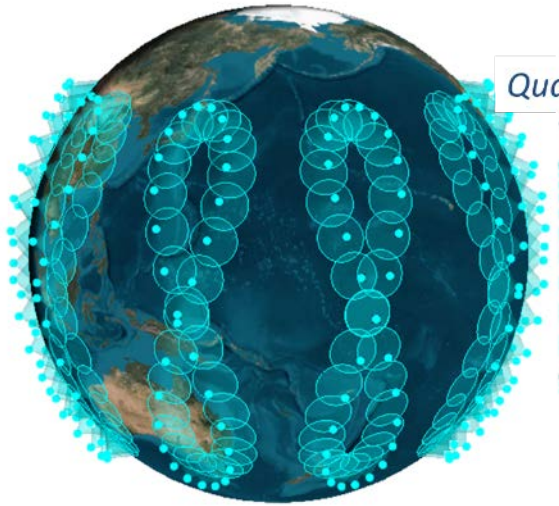
‘Walls of Coverage’

- 484 satellites
- 22 planes of 22 satellites
- Constellation is configured to create wall of sensor coverage over sunlit part of Earth’s surface
  - Provides global revisit time ~ 2 mins
  - Pseudo-persistent surveillance



‘Figure of Eight’

- Provides near simultaneous coverage over a complete latitude band
- Long dwell times (~6 minutes) over a region of interest
- Multiple simultaneous imaging opportunities - i.e. double, triple or quadruple stereo imaging



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Thank You!

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