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# Everything, Everywhere All At Once

Dr Andy Wells, Universal Defence and Security Solutions

Wednesday, 09 August 2023





## A Word From Today's Chairman

Mike Wardle  
CEO & Head of Indices  
Z/Yen Group





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# Today's Agenda



- 11:00 – 11:05 Chairman's Introduction
- 11:05 – 11:25 Keynote Presentation – Dr Andy Wells
- 11:25 – 11:45 Question & Answer



# Today's Speaker



Dr Andy Wells,  
Universal Defence and Security  
Solutions

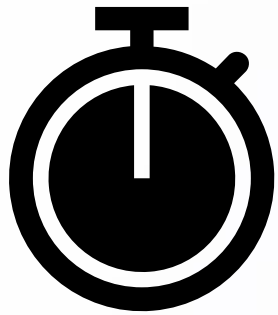
Policy, strategy and operational solutions for Governments, businesses and commercial organisations

# Everything, Everywhere All At Once.

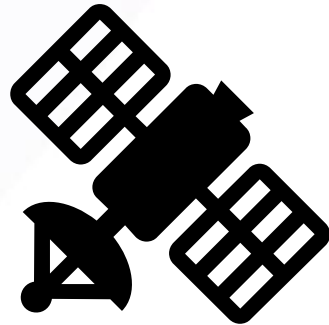
The emergence of satellite imagery as a mainstream intelligence source

Dr Andy Wells  
9<sup>th</sup> August, 2023

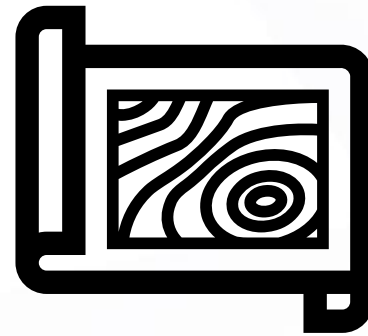
Policy, strategy and operational solutions for Governments, businesses and commercial organisations



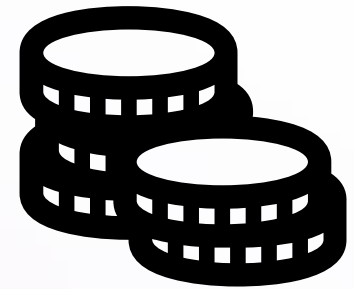
**Availability of  
data**



**Spatial  
Resolution**



**Spectral  
Characteristics**



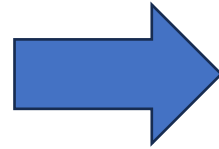
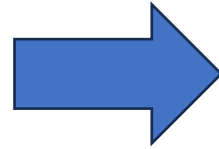
**Value**



NO SIGNAL

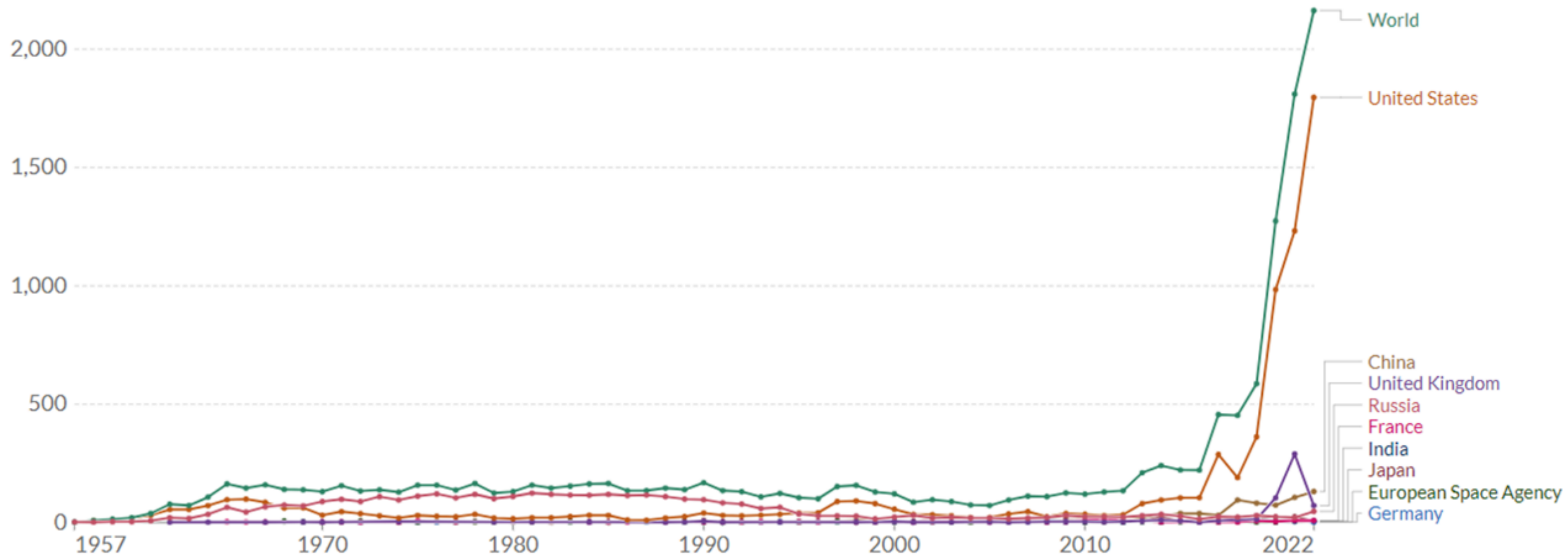






# Annual number of objects launched into space

This includes satellites, probes, landers, crewed spacecrafts, and space station flight elements launched into Earth orbit or beyond.



Organization	Launched / Planned launch	Year	Form Factor	Field	Orbiting	Technical and services	Image	Capella Space (Cassia, Whiting)	6 / 10	2019	Monstar	500, Earth-Orbital	0.55m	Resolution from 1 m (600 km) to 30 m (200 km) and, every 34 hours globally and 45 min equatorial regions, improving to every hour in 2-8 years	QinYong	1 / 30	2010	Monstar	Earth-Orbital, 500 / 1000, Hyperspectral, SAR, Infrared	Yes	Working towards 30m - 2m resolution, 100x level coverage for all over China, 10x level coverage for hot spots
Aptelise	11 / 13	2020	Microsat	67 / 100, AIS	Yes, 7	Lowest satellite data volume for monitoring the fuel level, oil and gas pipelines, and middle tracking of shipping containers, oil tankers and tankers		First Space (IAGH)	7 / 140	2018	Monstar, 50 / 50 / 150, 130	67 / 100	\$23M	Main constellation potentially with 120 CubeSats. Selected Sator Automats as the operator provider.	Shanghai Lisheng Satellite	1 / 10	2019	Monstar	Earth-Orbital, 500 / 1000, Hyperspectral, SAR, Infrared	Yes	Improving information and signal integration of ground navigation users and the positioning accuracy of ground navigation terminals.
SeaWiFS	7 / 24	2004	Microsat	67 / 100	Yes, 7	12 kg satellite for commercial data and forecast information		Geostar/GeoEye (Spacecast)	14 / 26	2014	81	67 / 100	Yes	Reliable and economical satellite IoT services and industry solutions for our customers	Dara Space	2 / 100	2010	PlanetQube	Orbital Data Relay, Data Storage	\$10M	Constellation to service other space users with high speed real-time data connection, storage, and compression. For 2 years by Alsat Orbital.
EarthEye	66 / 67	2008	Hotel, Monstar	AIS	Yes, 7	Four non-redundant satellites or Starlink-Hotels payloads on 25 Intelsat-HEAT satellites and TRAC		HeadEye 380	15 / 21	2018	Monstar	RF Spectrum-Monitoring, RF Detection	\$300M	Radio frequency (RF) mapping with 15 kg sets to help monitor transportation across air, land, sea and water in emergencies. Built by OrbitalGen	Joshi Lab (Empire, Magin, Zengli, Golden-Buckley)	7 / 100	2019	61, Monstar, 1	Earth-Orbital, Optical	\$3.2M	Optical resolution better than 4 meters and eventually, 376 satellites to provide details over regions every 10 minutes.
Planet (PlanetEye)	8 / 8	2008	Smallsat	Earth-Orbital, Optical	Yes, 7	3 satellites, 3 optical bands and up to 4.5 million 1.5m image-capture capacity. 100 kg satellite with 6.5m resolution		KEYE	2 / 16	2016	Monstar	SAR, Earth-Orbital	\$20M	Orbital-based payload on First Space Systems	Dara Space	1 / 1	2010	30	HT / MEM	Yes	Part of a constellation for commercial purposes, SAR payload providing a direct satellite for data, video and real-time mapping.
GlobalEye (Second Generation)	25 / 41	2010	Satellite	Home, 67 / 100, Orbital Data Relay, Direct-Cat, Satellite-Orbital	Yes, 7	Live "first look" in minutes in the day. 3rd October satellite print up signals to cover 85% of the Earth's surface.		Hyper Communications (SAR, Infrared)	16 / 140	2018	Monstar, 60 / 30	Home, Direct-Cat, Satellite-Orbital	\$35M	67 / 100 data communication network. Monthly fee based on the data amount. Hqs to achieve rates of 1-40 Mbps.	Hex Systems	1 / 80	2010	120	Earth-Orbital, Optical	\$32M	Capable of 1-meter resolution with 23 Kilobits per frame factor.
Orbcomm (D2)	81 / 82	2012	Microsat	HT / 100, AIS	Yes, 7	World's first and only commercial satellite network, 100%, dedicated to IoT. 5 spare-redundant CubeSats inherit from Orbyon for 2009.		Space (GeoStar/Ger)	300 / 400	2018	Orbcomm	Home, Direct-Cat, Satellite-Orbital	\$10M	227 kg satellite for the constellation. Used to be 400 kg according to CEO Ring. First technology demonstration mission from 2008.	Hex Systems	2 / 80	2010	Orbitel, Monstar	HT / MEM	Yes	RF generation and 100 Tbit/sec data collector approach with patented WFS Manufacturing technology, a miniature microsat that manufactures, wirelessly, programmable, custom made IoT devices.
ISD (ISD-1 or IVD-10)	22 / 70	2010	Satellite	Home	Yes, 7	Satellite in 1000 km medium-mid-orbit (MEO) for Internet backup. Expanded 60-network reach to include 24 in high-orbitation MEO and 36 in LEO orbit 100 km current-orbit altitude.		Aeroh (GeoStar, DASH, IVD-10)	4 / 20	2018	50, 30	Home, HT / MEM, AIS, AIS	\$2.4M	Provisioner one of the first commercial constellations able to deliver thermal data on demand, 1M Angular images for video, 3000, 300 and 1000 images, and thermal infrared (TIR) spectra.	Planet	5 / 100	2020	Monstar	Weather, Hyperspectral, SAR, Optical, Spectrum-Monitoring, SAR	\$22.5M	Based on GPS satellite constellations, IIS has microsatellite space travel & software. Blue Canyon Test Satellite built by Airbus.
Planet (Planet Scout/SuperDove)	814 / 180	2018	3U	Earth-Orbital, Optical	\$73M	20 MP sensor taking images with 3.7 m ground resolution and swath of 34.8 km x 16.4 km from 475 km altitude.		Aurora Insight	3 / 12	2018	81	RF Spectrum-Monitoring, RF Detection	\$19M	Creates maps that allow the availability of radio frequency spectrum and wireless infrastructure, measuring 90, 130, 300, 300 and 700 MHz. First constellation in the world able to provide 30 m spatial video, 100kg, 600x600x600 (6.4x2x2) launched in July 2020.	Inspectrum (IM)	1 / 30	2020	Orbitel	SAR, Earth-Orbital	\$22.5M	Developing 3U probe satellites to 30 m ground resolution and swath width of 100 km.
Planet (NewSat-1/SkyNet)	14 / 24	2018	Smallsat	Earth-Orbital, Optical	Yes, 7	Color and near-infrared image (9C) on resolution in 100 kg package. First ever commercial high-resolution image from a satellite.		Earth (Wind)	1 / 18	2018	Monstar	Earth-Orbital, Optical, Video	\$3.5M		Orbitel (Tandem)	1 / 30	2020	Orbitel	SAR, Earth-Orbital	Yes	X-EO based synthetic aperture radar constellation.
				Weather, AECOSat-6 Early Data Monitoring, Constellation-Auth-Service, GMS-Satellite, (SAR) Radio Constellation, (SAR) SAR, Global, Polar, Polar, Helium-Ground		Measures change in GPS signal after passing atmosphere to calculate precise profiles for temperature, pressure, humidity (GPS-RO). GPS-RO instruments launched in Dec 2019 and Jan 2020. Investigating earthwide (EP) detection.		Fusion Navigation (GPS-RO/Starlink)	6 / 100	2018	Monstar	GPS-RO, PNT (Precision Navigation Timing)	Yes		Orbitel (Tandem)	2 / 10	2020	Monstar, 1	SAR, Earth-Orbital, Optical, Earth-Monitoring	\$10.5M	Multi-sensor camera with four bands of 30 m resolution. Focused on the detection of methane and plastics on the sea.
Sat-Space	160 / 180	2015	3U, 6U, 10U		\$225M			Hexagon (First Fleet)	3 / 36	2018	180, 90		\$25M	World's largest satellite and data constellation to ground with low communication and low data download from satellite.	Planet	1 / 12	2020	Orbitel, Seattle	SAR, Earth-Orbital	\$1.4M	Aiming to launch China's first commercial video satellite to achieve millimeter-level resolution and achieve 300000 satellites data volume. 180 kg SAR satellite with 1 m resolution in Direct, Near-Earth, Near-Earth and 2020.
AAC Oyla Space (SARCOM)	0 / 10	2014	3U	Constellation-Auth-Service	\$23.5M			Hexagon (SAR)	3 / 30	2018	60, 30	Earth-Orbital, Hyperspectral	\$5M	Hyperspectral constellation for smart agriculture with 100s of optical bands and 20 m resolution. 480-1000 nm and 20 m FOV.	Planet	1 / 7	2020	Orbitel	HT / MEM	Yes	Orbitel is a partner of IHS-Orbitel-Orbitel. Satellite operated by AT&T and its partners, according to Freely application.
ISTE (SAR/GPS/Video)	3 / 3	2018	Satellite	Earth-Orbital, Optical	Yes, 7	1 m resolution high-resolution video with high speed download and 45 degree off-pointing.		LiSpace	1 / 12	2018	81	Weather	Yes	Innovease able to 30 mhd data sets from terraconst/Globe Earth Data University provide the equipment.	Space (Space)	7 / 1000	2020	Orbitel	Home, 6U	Yes	Based on the 10 standard LEO mobile communication constellation. User Q/V land spectrum usage. First satellite also called SAR-Orbitel-Orbitel.
Chang Guang (SAR-1)	0 / 300	2018	Satellite	Earth-Orbital, Optical, Video, High Lights	\$73M			Monstar	2 / 80	2018	30	HT / MEM	\$37M	First unique patented software which provides reliable, direct-to-satellite Internet of Things (IoT) connectivity.	Orbitel (Space)	3 / 7	2020	Orbitel, 4U, 7	Lower Communications	\$23M	Optical communications constellation? First beamcom module launch on ITOR Cubesat in Vega.
BlackSky	18 / 16	2018	Microsat	Earth-Orbital, Optical	\$20.5M			Orbitel	3 / 30	2018	60, 30	Earth-Orbital, Hyperspectral	\$5M		Orbitel (Phantom-Hot)	4 / 4	2020	Seattle	Earth-Orbital, Optical	Yes	Four identical 30cm resolution satellites imaging up to 2 billion sq ft per day. Launched 100% by Airbus.
Orbitel	6 / 10	2018	Microsat	Sensors Monitoring	\$73M			Aurora Insight	3 / 12	2018	81	RF Spectrum-Monitoring, RF Detection	\$19M		Orbitel (VIB)	3 / 10	2020	Monstar	Constellation-Auth-Service, Hotspot-Payload	\$18.5M	Constellation of satellite to vary a mix of payloads for customers who don't want to fly their own satellites. Buying satellite buses and offering their own payloads by customers.
SpaceEye	31 / 30	2018	Microsat	Earth-Orbital, Hyperspectral, Optical, Video, Constellation-Auth-Service	\$19M			Hexagon (SAR)	1 / 30	2018	Monstar	HT / MEM	Yes	Completion in 2021 in multiple phases to provide global broadband access, video communications and other services.	ArroyoSat (AR)	1 / 7	2020	Monstar	Earth-Orbital, Optical	\$71M	Constellation of 100 optical microsatellites for Earth-Orbital. The constellation in orbit.
SpaceView	5 / 18	2018	Satellite	Earth-Orbital, Optical	Yes, 7	First commercial 800 kg DeWisp high-resolution Earth imaging satellite called SuperView (SuperView) with resolution of 0.5 m per pixel.		Hexagon (SAR)	3 / 30	2018	60, 30	Earth-Orbital, Hyperspectral	\$5M		ArroyoSat (AR)	2 / 7	2020	Orbitel, 300	HT / MEM	\$5M	Test FREE will pave the way for future constellation for the amount of IoT data from ground, starting with a first Orbitel mission in 2022.
Alsat	75 / 75	2017	Hotel	AIS-6	\$80M			Free Systems	17 / 16	2018	PlanetQube	HT / MEM	Yes		Orbitel (Space)	3 / 30	2020	Orbitel, 10	Weather	\$22.5M	Orbitel is building a global satellite constellation dedicated to internet-of-things communications.
SAR Positioning	75 / 75	2017	Hotel	GPS	Yes			Free Systems	17 / 16	2018	PlanetQube	HT / MEM	Yes		Orbitel (Space)	1 / 7	2020	Orbitel, 3U	AIS, Positioning	Yes	Demonstrate that constellation to act as the focus for the challenges of maritime surveillance.
Intelsat (NDP)	75 / 75	2017	Satellite	Home, 67 / 100, Orbital Data Relay, Constellation-Auth-Service, Direct-Cat, Satellite-Orbital	\$50M			Free Systems	17 / 16	2018	PlanetQube	HT / MEM	Yes		Orbitel (Space)	1 / 7	2020	Orbitel, 3U	HT / MEM	Yes	Buying additional small satellites for a global Internet of Things network.
Seattle	61 / 66	2017	Satellite	GPS, PNT (Precision Navigation Timing)	\$33.5M			Free Systems	17 / 16	2018	PlanetQube	HT / MEM	Yes		Orbitel (Space)	1 / 7	2020	Orbitel, 3U	HT / MEM	Yes	Support high-speed data transmission, precise navigation, and cloud computing. Low-orbit satellites, daily claims, can be accurate within a centimeter.
GeoOptix (GGCO)	0 / 10	2017	6U, 13U	Weather, GPS-RO, GPS, Radio Constellation	\$135M			KPS	4 / 26	2018	Monstar	SAR, Earth-Orbital	\$1.5M	3.6m diameter large deployable parabolic antenna with only 15 kg of weight.	ArroyoSat (AR)	2 / 7	2020	Orbitel, 300	HT / MEM	\$5M	Test FREE will pave the way for future constellation for the amount of IoT data from ground, starting with a first Orbitel mission in 2022.
Hexagon / Hexagon (Singer 3)	4 / 30	2017	Smallsat	Home, HT / MEM	\$40M			Lemna Space	6 / 24	2018	30, 60	HT / MEM	\$20M	First tested payload on Hexagon-600.	Orbitel (Space)	1 / 30	2020	Orbitel, 10T	HT / MEM	\$10M	World's first universal plug & play IoT device that can provide connectivity through LoRaWAN-Orbitel-Orbitel infrastructure.
ZhuoChen (ZhuoChen 2)	12 / 10	2017	Smallsat	Earth-Orbital, Hyperspectral	Yes	Constellation of different orbits and hyperspectral satellites.		Ignis	6 / 10	2018	Monstar, Hotel, HT / MEM, Satellite-Orbital, Direct-Cat	\$35M	Leverage microsatellites in a unique manner to provide connectivity to regular end users anywhere on the planet.	Orbitel (SAR)	3 / 6	2020	Monstar, 1	Earth-Orbital, Hyperspectral	\$16.7M	First sensor on 6U, Deploying 480 bands in the visible to the infrared (600nm, 420 - 2500nm), 100m resolution, 500 m/s Angular Residual, 20000 Pixels.	
Telstar (SightSaver)	3 / 18	2017	Smallsat	Home	\$40			Orbitel	8M / 4M	2018	Orbitel	Home	\$4M (\$2.7M)	Joint venture with Airbus to build the constellation of 100 kg satellites. Emerged from Orbyon 11 partnership.	Satellite	1 / 100	2020	3U	HT / MEM, Satellite-Orbital, Direct-Cat	\$14.8M	Orbitel continues to expand its network of satellites and launch vehicles over 60 ground stations. Orbitel is building the 600 payload.
Orbitel	1 / 100	2017	Microsat	Earth-Orbital, Optical	Yes	80 km/h/s real-time video and streaming video by terrestrial.		Hex (EarthTV)	1 / 3	2019	180	Earth-Orbital, Optical, Video	\$4.5M	Imaging the Earth in 10cm resolution through the use of an innovative deployable telescope. Live on Orion and beyond we will also streaming platform in orbit in 2019 latest stream's satellite manufactured by SSC Energy.	Singer (Telstar, Orbitel)	1 / 8	2020	Orbitel	Earth-Orbital, Optical	\$23M	Expanding global connectivity through satellite and terrestrial networks over 60 ground stations. Orbitel is building the 600 payload.
HEAD Aerospace (SpaceView)	0 / 48	2017	Microsat	HT / MEM, AIS, AIS, VRS (4S 2S)	Yes	Future VRS and AIS-6 payloads. Low-orbit, deployed into different orbitations and 300 orbits. Worldwide satellite for Chinese satellite imagery.		GreenLake	7 / 25	2018	81	RF Spectrum-Monitoring, RF Detection	\$23M		Orbitel (Space)	1 / 7	2020	30	HT / MEM	Yes	Constellation of 30 hyperspectral satellites by 2023 for the development of a network of IoT applications.
Hexa One (Orbitel)	6 / 30	2017	6U, 10U	HT / MEM	\$1M			Arve AstroOrbitel (AR)	4 / 7	2018	PlanetQube	Earth-Orbital, Weather, Hyperspectral	Yes		Orbitel (Space)	3 / 30	2020	Monstar	SAR, Earth-Orbital, RF Spectrum-Monitoring	\$23M	Software defined radio with 100 MHz of bandwidth. Broadcasting power spectrum area and launch volume. 30 kg satellites, 10 m/s deployment, antenna resolution 60 cm.
SpacePhone	3 / 7	2017	3U	Hotel Payload, Montgomery Equipment	\$8M			AIT (SpaceMobile)	3 / 24	2018	Monstar, 7	Home, Direct-Cat, Satellite-Orbital, Satellite-Orbital	\$125M	The first space-based cellular broadband network for mobile phones. Technology based around the BlackStar 1 CubeSat.	Orbitel (Space)	3 / 7	2020	Orbitel	Orbital Data Relay, Lower Communications	\$5M	Inter-satellite data relay network using optical modules.
Space Technologies	177 / 180	2018	0.5U, 1U	HT / MEM	\$27.7M			MILGreen	1 / 36	2018	81	Home, HT / MEM	\$6.28M	Communications network up to 100 km/h in the world with a novel 1m/s launch volume in 10 cm.	Yunqi (Yunqi)	2 / 80	2020	7	Weather	\$14.8M	60 kg payload with embedded antenna and battery life of 10+ years. Commercializing Doppler Microwave System (DMS) to enable tracking and monitoring of billions of assets.
AOSPACE (Orbitel)	10 / 100	2018	Microsat	Earth-Orbital, Optical	\$125M			Hexagon / Zhongxi	19 / 11	2018	Orbitel	GPS, RF Spectrum-Monitoring	Yes	World's first commercial space-based GNSS spectrum monitoring satellite system.	Telstar (Telstar)	1 / 30	2020	6U	HT / MEM	\$16.5M	Space traffic management and Earth-Orbital services using and operating proprietary CubeSat technologies.
Alsat	141 / 60	2018	3U	HT / MEM	\$60.7M			Orbitel (Space)	1 / 40	2018	30T	Weather	\$4.2M	Weather constellation utilizes microsatellite technology to capture temperature and moisture measurements, water vapor, and infrared every 15 minutes.	Orbitel (Dynamics)	1 / 7	2020	Orbitel	SAR (Space Situational Awareness), Earth-Orbital	Yes	Space traffic management and Earth-Orbital services using and operating proprietary CubeSat technologies.
Capella Space (Cassia, Whiting)	6 / 40	2018	Monstar	SAR, Earth-Orbital	\$475M			QinYong	1 / 30	2018	Monstar	Earth-Orbital, HT / MEM, Hyperspectral, SAR, Infrared	Yes	Working towards 30m - 2m resolution, 100x level coverage for all over China, 10x level coverage for hot spots.	Orbitel (Dynamics)	1 / 30	2020	Orbitel	Infrared, Earth-Orbital	\$11M	Help provide on-air temperature from a constellation of satellites in place to launch.
First Space (IAGH)	7 / 140	2018	Monstar, 50 / 50 / 150, 130	67 / 100	\$73M			Shanghai Lisheng Satellite	1 / 10	2019	Monstar	Earth-Orbital, HT / MEM, PNT (Precision Navigation Timing)	Yes	Improving information and signal integration of ground navigation users and the positioning accuracy of ground navigation terminals.	Orbitel (Space)	1 / 7	2020	Orbitel	In-Orbit Computing	\$3M	Organic satellite to launch multiple LEO satellites that will be down-linked using links for multipurpose applications - the security generation, network numbers.
Geostar/GeoEye (Spacecast)	14 / 26	2018	81	67 / 100	Yes	Reliable and economical satellite IoT services and industry solutions for our customers		Dara Space	2 / 100	2010	PlanetQube	Orbital Data Relay, Data Storage	\$10M	Constellation to service other space users with high speed real-time data connection, storage, and compression. For 2 years by Alsat Orbital.	Singer (Telstar, Orbitel)	1 / 7	2020	Monstar, 1	Home, Space Traffic Management	\$35M	Facilities to providing broadband services, its spacecraft will not be able to capture and download more data to track.
Planet (Planet Scout/SuperDove)	814 / 180	2018	3U	Earth-Orbital, Optical	\$73M			Joshi Lab (Empire, Magin, Zengli, Golden-Buckley)	7 / 100	2019	61, Monstar, 1	Earth-Orbital, Optical	\$3.2M	Optical resolution better than 4 meters and eventually, 376 satellites to provide details over regions every 10 minutes.	Singer (Telstar, Orbitel)	1 / 7	2020	Orbitel	HT / MEM	Yes	Outfitting with 30m to search to tackle space debris and spend.

Space infrastructure companies received \$14.5 billion of private investment in 2021, a new annual record that was up more than 50% from 2020 – (Source CNBC)

## Registry of Open Data on AWS

# Sentinel-2

agriculture disaster response earth observation geospatial natural resource satellite imagery stac

## Description

The [Sentinel-2 mission](#) is a land monitoring constellation of two satellites that provide high resolution optical imagery and provide continuity for the current SPOT and Landsat missions. The mission provides a global coverage of the Earth's land surface every 5 days, making the data of great use in on-going studies. L1C data are available from June 2015 globally. L2A data are available from November 2016 over Europe region and globally since January 2017.

## Update Frequency

New Sentinel data are added regularly, usually within few hours after they are available on Copernicus OpenHub.

**Order Details**

San Diego, CA, USA

[View in ArcGIS Online](#)

**Location**  
-117.16712476773745, 32.718253206373504

**Timeframe**  
Submitted: Saturday, July 2, 2022 3:19 PM UTC  
Try until: Tuesday, July 5, 2022 11:59 PM UTC

**Maximum Allowable Cloud Cover**  
Up to: 30%

**Sun Elevation**  
Between: 10 - 90°

**Navigation:** New Order, Order History, Get Help, Sign Out

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180+  
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Collection Capacity 350M+ km<sup>2</sup>/day



5  
RAPIDEYE

Archive back to 2009



21  
SKYSAT

400K km<sup>2</sup>/day



30m



10m



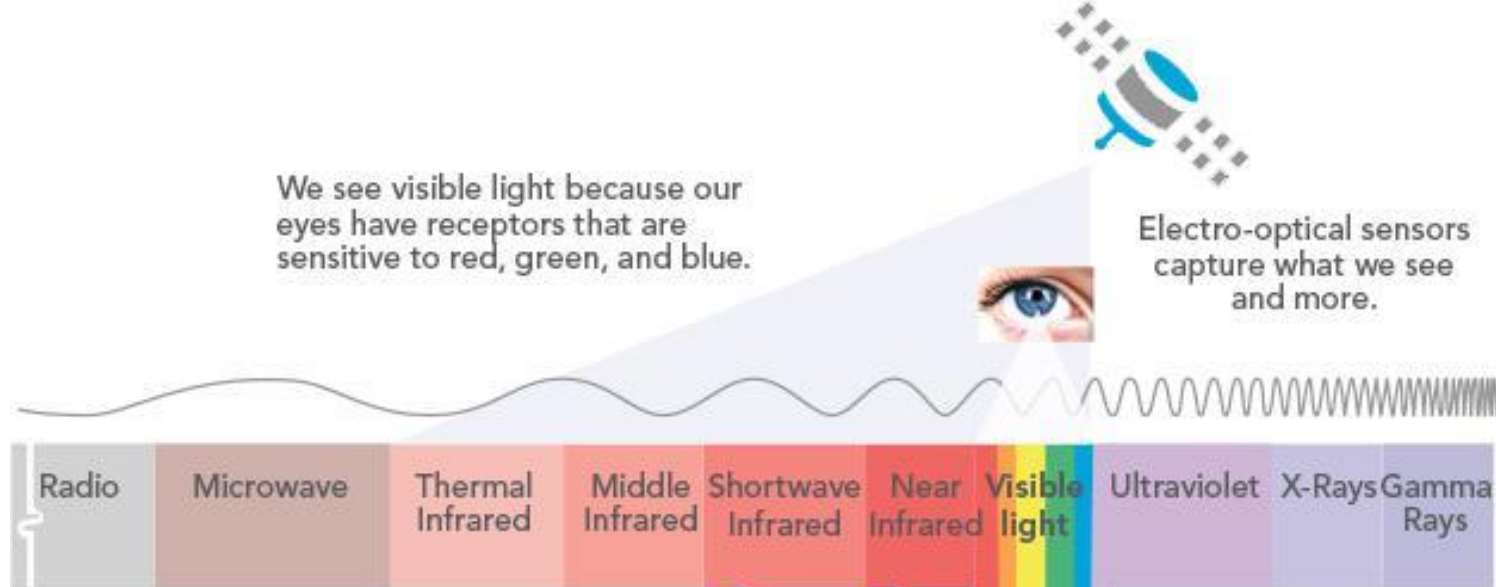
5m



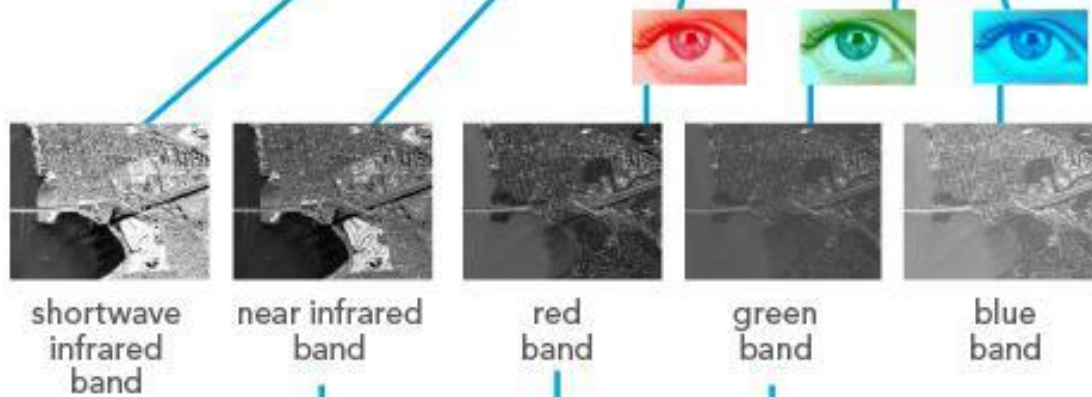
0.5m

We see visible light because our eyes have receptors that are sensitive to red, green, and blue.

Electro-optical sensors capture what we see and more.



## The Electromagnetic Spectrum

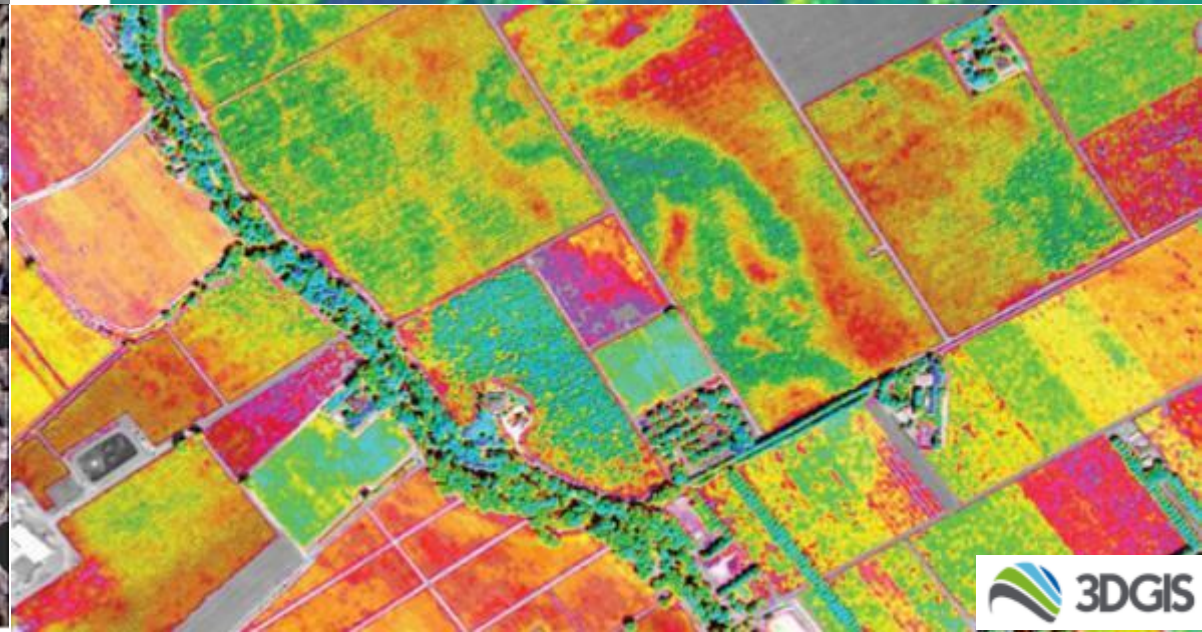
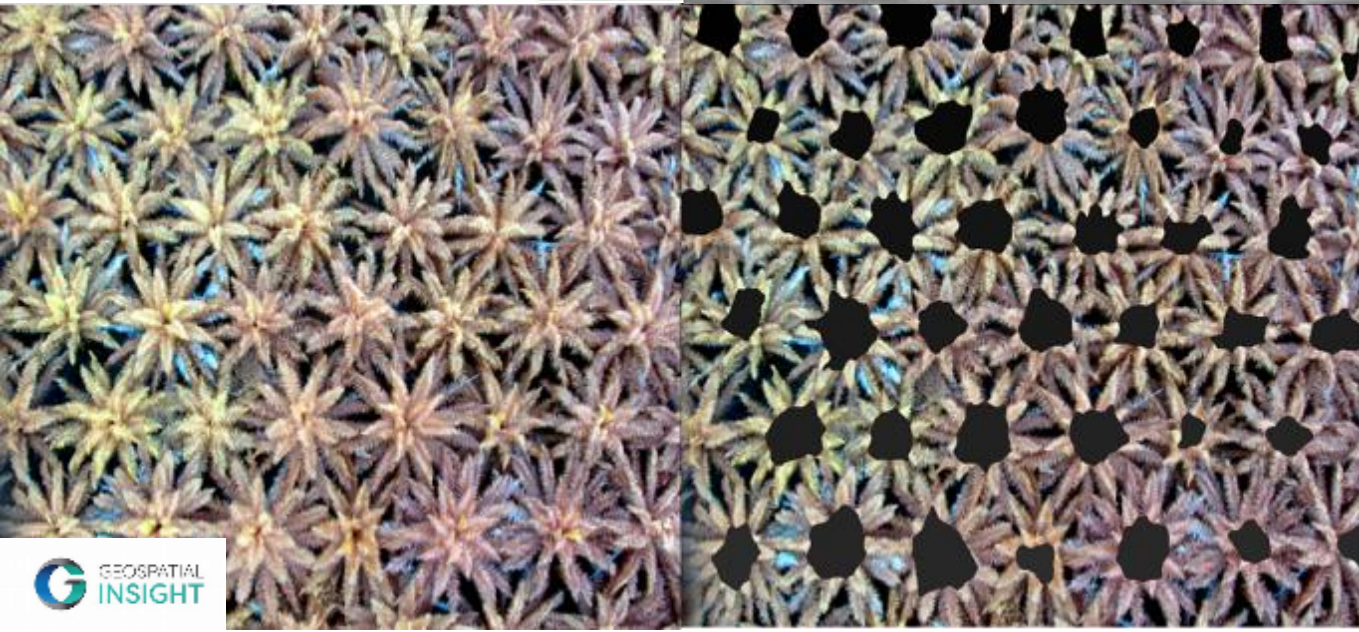
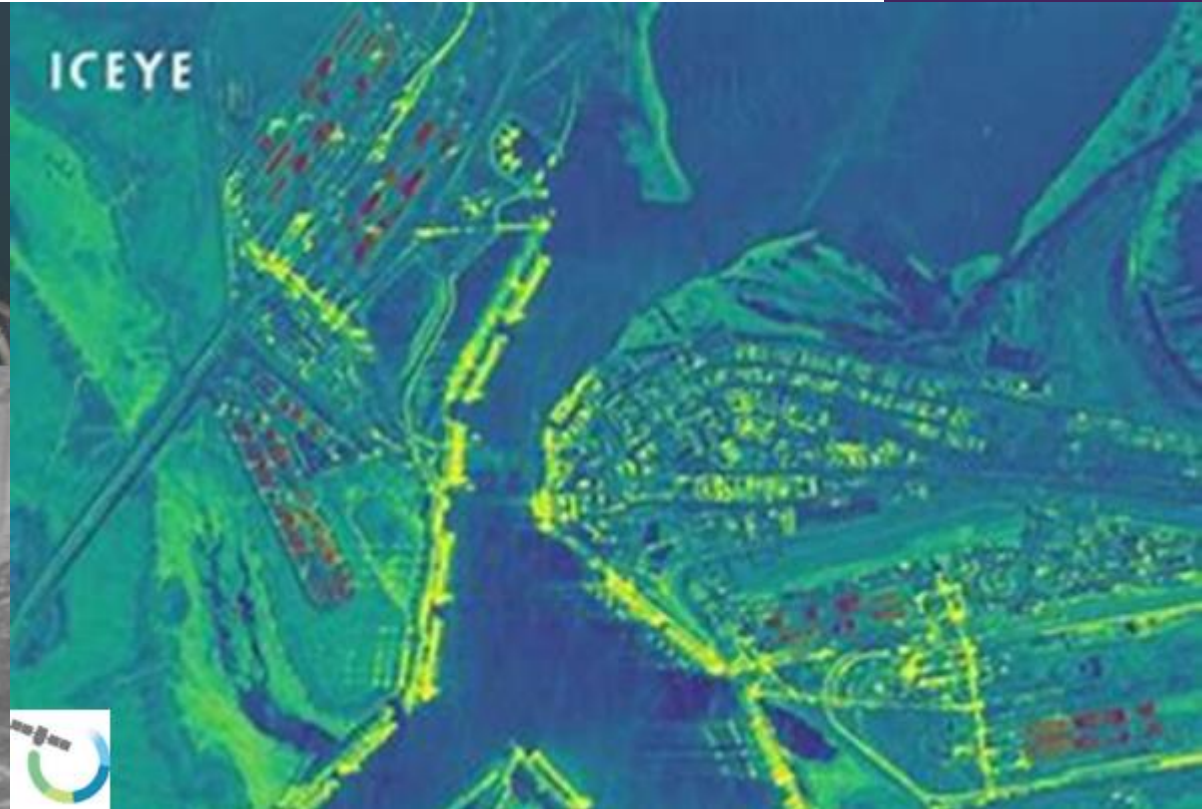
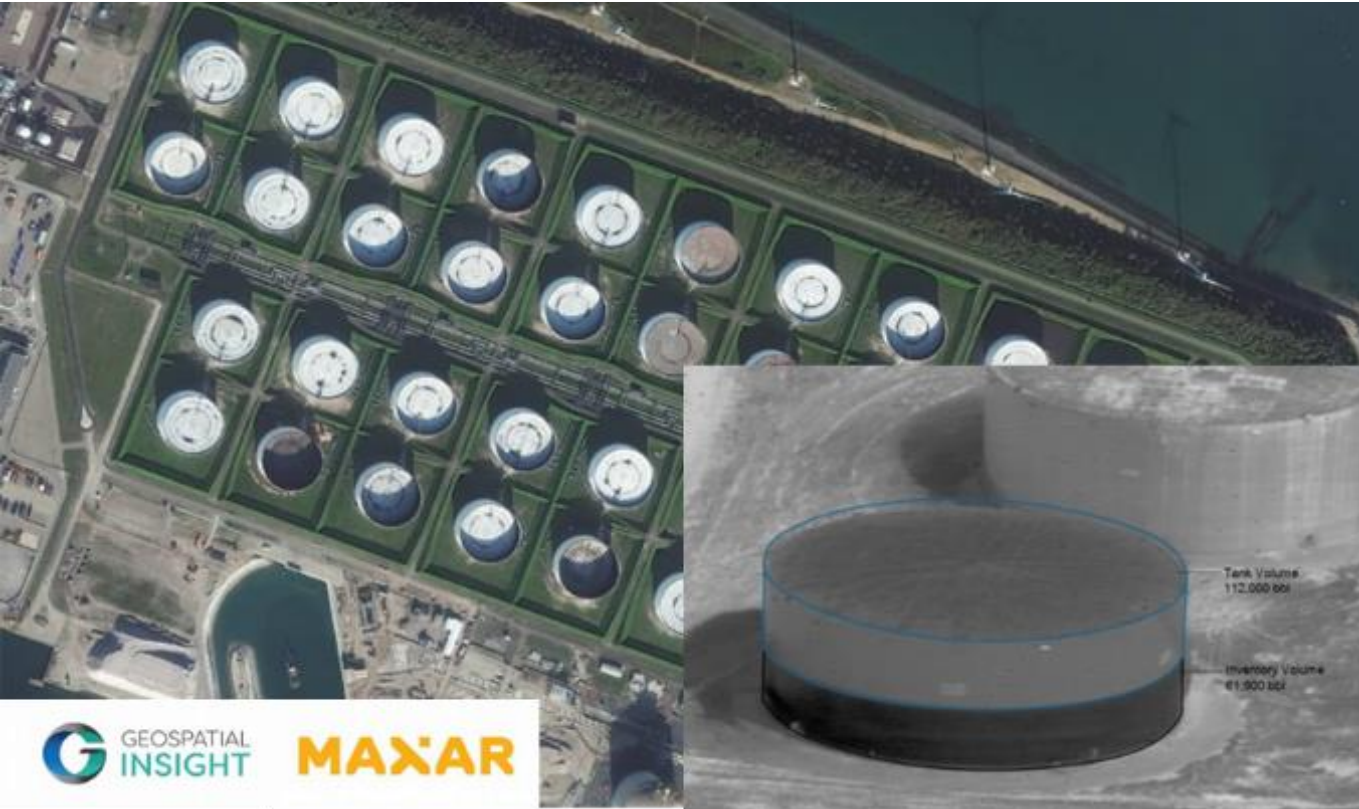


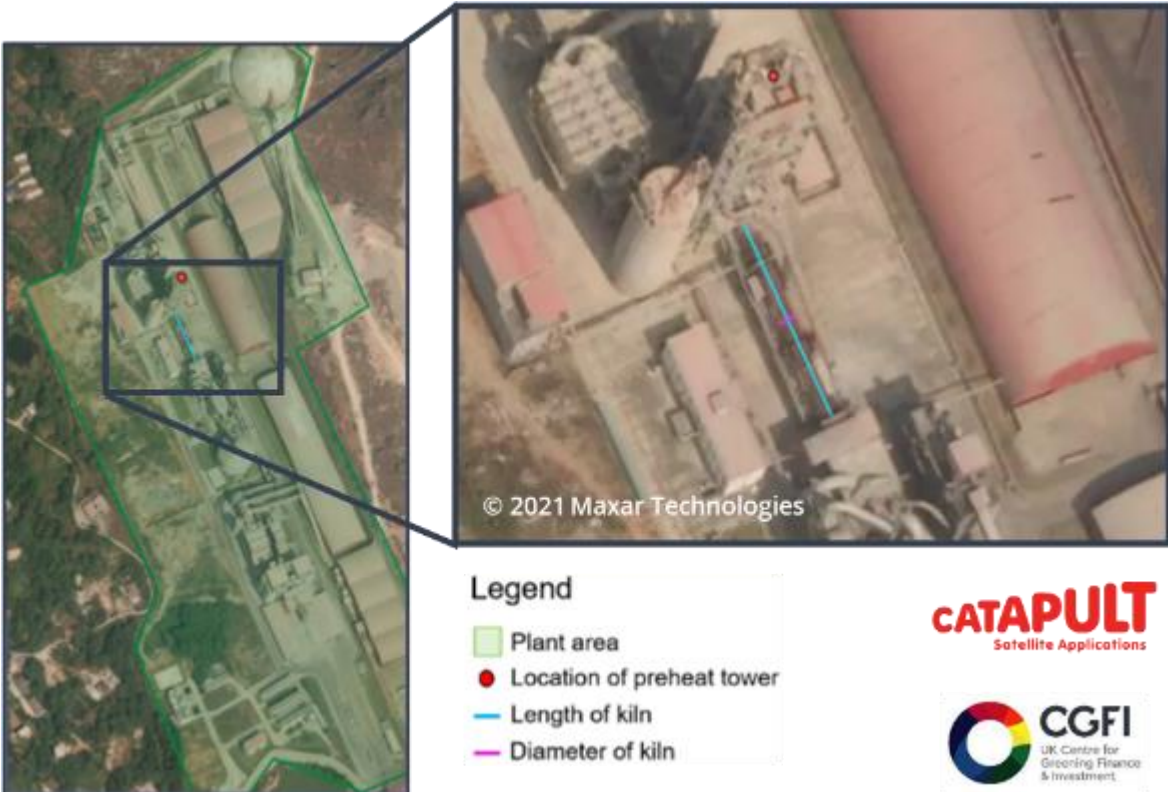




So  
What?

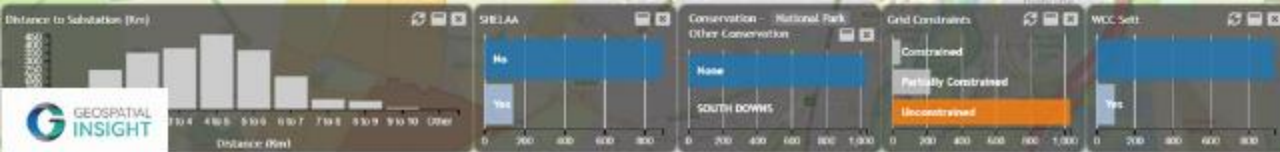
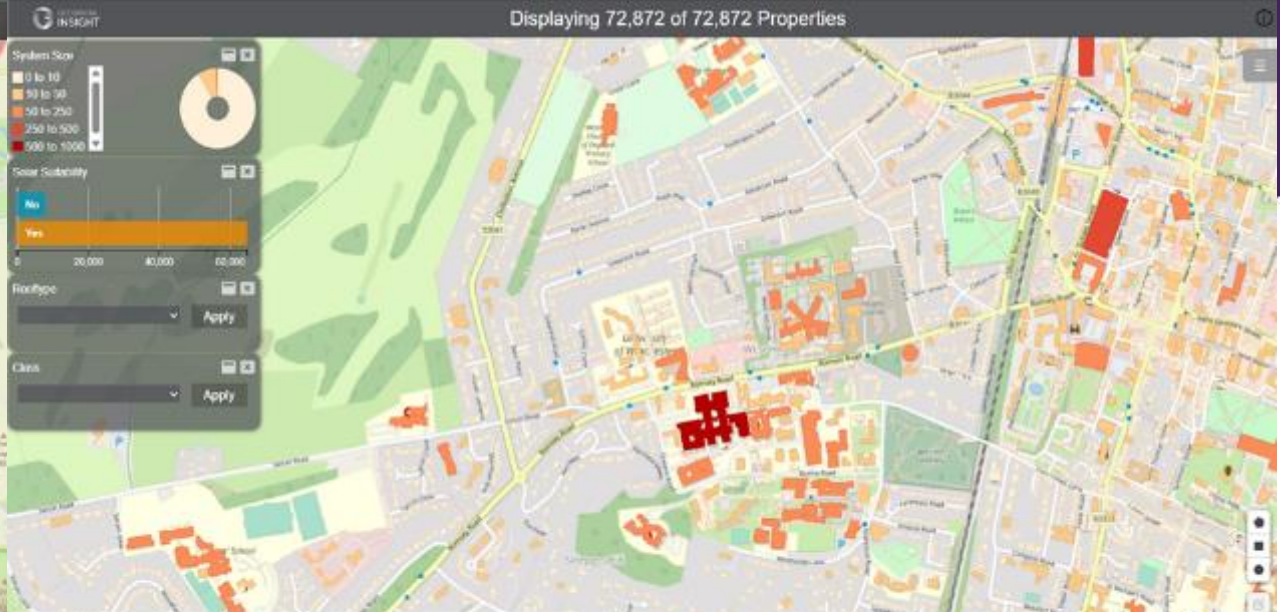
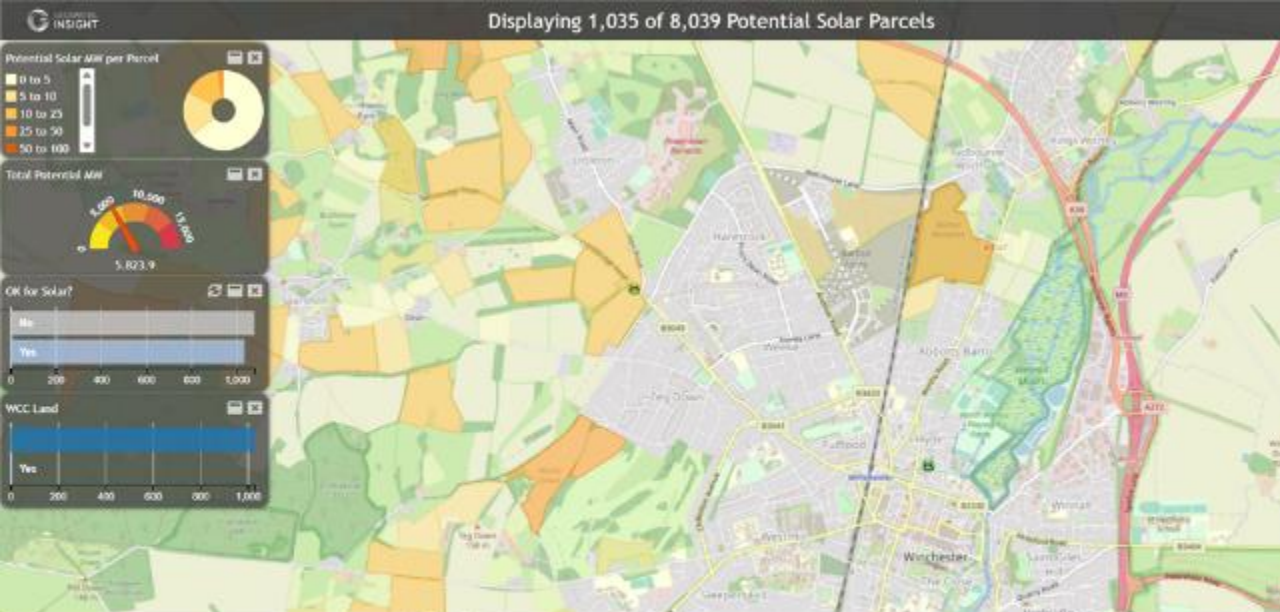


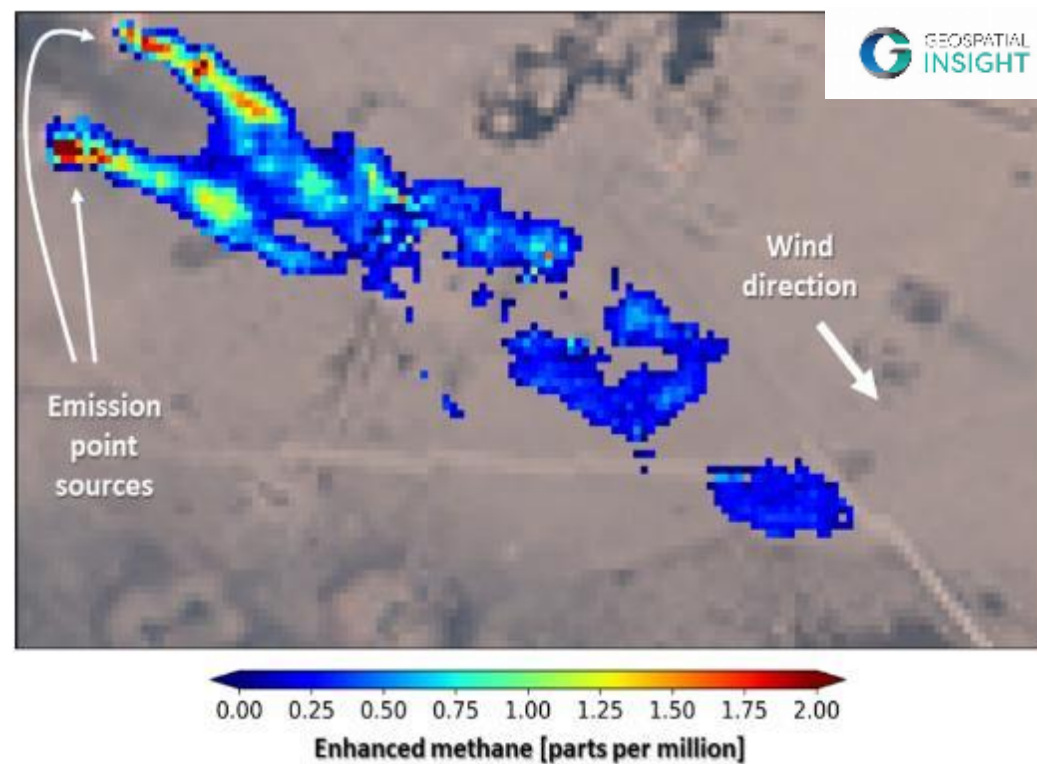






- affected
- destroyed
- major
- minor







# Terra Motion

£55,261 p.a.  
1,105 tonnes CO2e p.a.

£495,654 p.a.  
9,193 tonnes CO2e p.a.

£87,658 p.a.  
1,753 tonnes CO2e p.a.

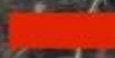
£247,724 p.a.  
4,954 tonnes CO2e p.a.

£71,162 p.a.  
1,423 tonnes CO2e p.a.


£217,090 p.a.  
4,342 tonnes CO2e p.a.

£80,570 p.a.  
1,611 tonnes CO2e p.a.


£72,359 p.a.  
1,447 tonnes CO2e p.a.

 Peatland Areas with High Carbon Potential


CO2 Emission Transparency

min  max

WTD Transparency

min  max

Average Velocity Transparency

±Stmly  ±Stmly

Range:

Select a geoJSON:



# UDSS – Professionalism Integrity Partnership (PIP)

## Who are we?

Largest pool of former UK military staff, across land, sea, air and Civil Service - over 600 Members  
Knowledge applied across defence, security and industrial sectors supporting companies, governments and NGO's

## How do we Meet the challenge of engaging the marketplace?

The satellite technology market is fragmented

50+ global data providers

100+ analytics companies just in the UK

30+ service providers in Europe

Technology solution vs business answer

## What do we offer?

Understand the business challenge and translate to the technology providers

Find the right partners

Apply their experience to maximise the delivery

Provide a neutral, trusted partnership

# UDSS space leadership - significant experience - trusted to deliver



**Air Marshal (Ret'd) Phil Osborn** Formerly the Chief of Defence Intelligence



**Peter Hewitt** Co-Founder and Co-Chairman of UDSS. Strong business background having been Chairman or Director of 13 UK Public Companies



**Air Marshal (Ret'd) Edward Stringer.** Formerly Director General Joint Force Development



**Michelle Howard** Lead on gov relations / strategic policy advisor in defence and space. Previously operational on sensitive government programmes across the M East, SE Asia and E Africa



**Air Commodore (Ret'd) Phil Lester** 30 years' experience within the Defence and Security community including with numerous allies and partners.



**Air Commodore (Ret'd) Steven Thornber.** Formally UK MoD National Imagery Collection Manager. Also oversaw space-based IMINT, SIGINT and MASINT capabilities and commanded the UK's national IMINT capability.



**Dr Jamie Saunders** Formerly board member of the UK National Crime Agency after twenty-nine years of public service, within UK's national signals intelligence and cyber agency, GCHQ.



**Dr Andy Wells** 30 years specialising in the application of satellite and geospatial technology to meet both business and governmental challenges.



**Dr Michael Holden** Currently works across UK Gov, industry, and academia developing Space offerings. Previously worked on UK's Satcom and PNT programmes as well as senior lead on Boeing programmes



**Gp Capt (Ret'd) Sean O'Connor.** In-depth knowledge of the UK civil and defence space landscape following leadership of a cross-functional team to shape space capabilities development - UKMoD



**Air Vice-Marshal (Ret'd) Mike Hart.** 35 years as a RAF Intelligence Officer. Senior Associate Fellow at RUSI, and works with the Cambridge Centre for Geopolitics and the Brenthurst Foundation's Africa Security Dialogue



Policy, strategy and operational solutions for Governments, businesses and commercial organisations

# Everything, Everywhere All At Once - Really?

Maybe

Be curious

If you don't ask, you will never know

— UNIVERSAL —  
**DEFENCE & SECURITY**  
— SOLUTIONS —

POLICY, STRATEGY AND OPERATIONAL SOLUTIONS FOR GOVERNMENTS AND ORGANISATIONS

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Dr Andy Wells

[andy.wells@universal-defence.com](mailto:andy.wells@universal-defence.com)

07736316622



# Comments, Questions & Answers



横浜市営地下鉄

レールライン

Yokohama City Subway



観光案内所

Question & Answer

问讯处 詢問處 안내소

西口

West Exit

西出口 서쪽



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# Thank You For Participating



## Forthcoming Events

- Mon, 21 August (11:00-11:45) Perseus – Help Unlock Finance For SMEs In The Race To Zero
- Wed, 23 August (11:00 – 11:45) Financing For Steel Sector Decarbonization And The Significance Of Standards
- Tue, 29 August (11:00-11:45) Authorised Push Payments (APP): Banks Must Now Make Any Valid Payment

Visit <https://fsclub.zyen.com/events/forthcoming-events/>

Watch past webinars <https://www.youtube.com/zyengroup>