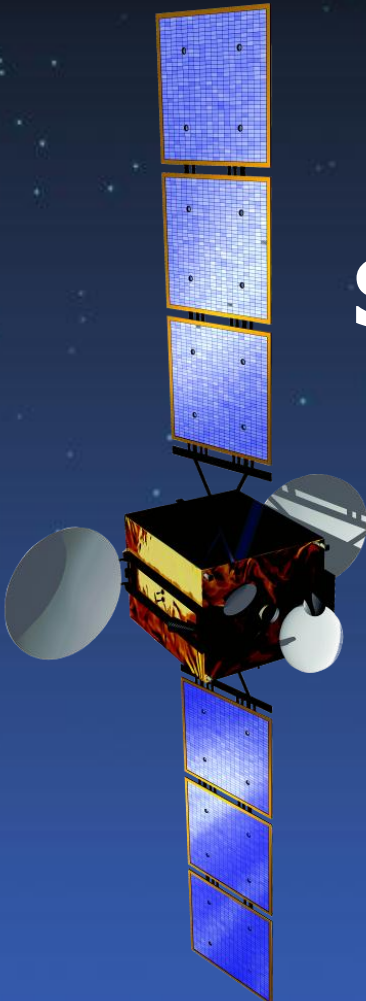
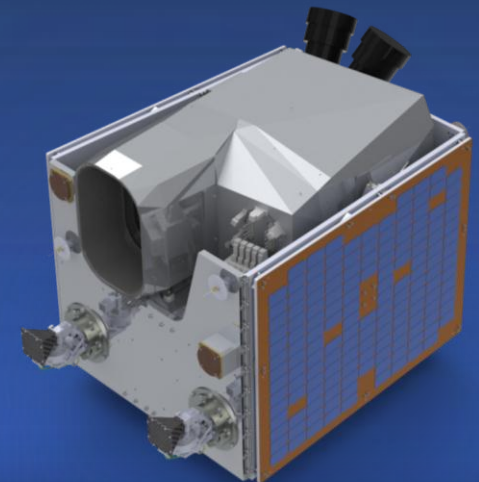


SSTL – British Innovation in Space



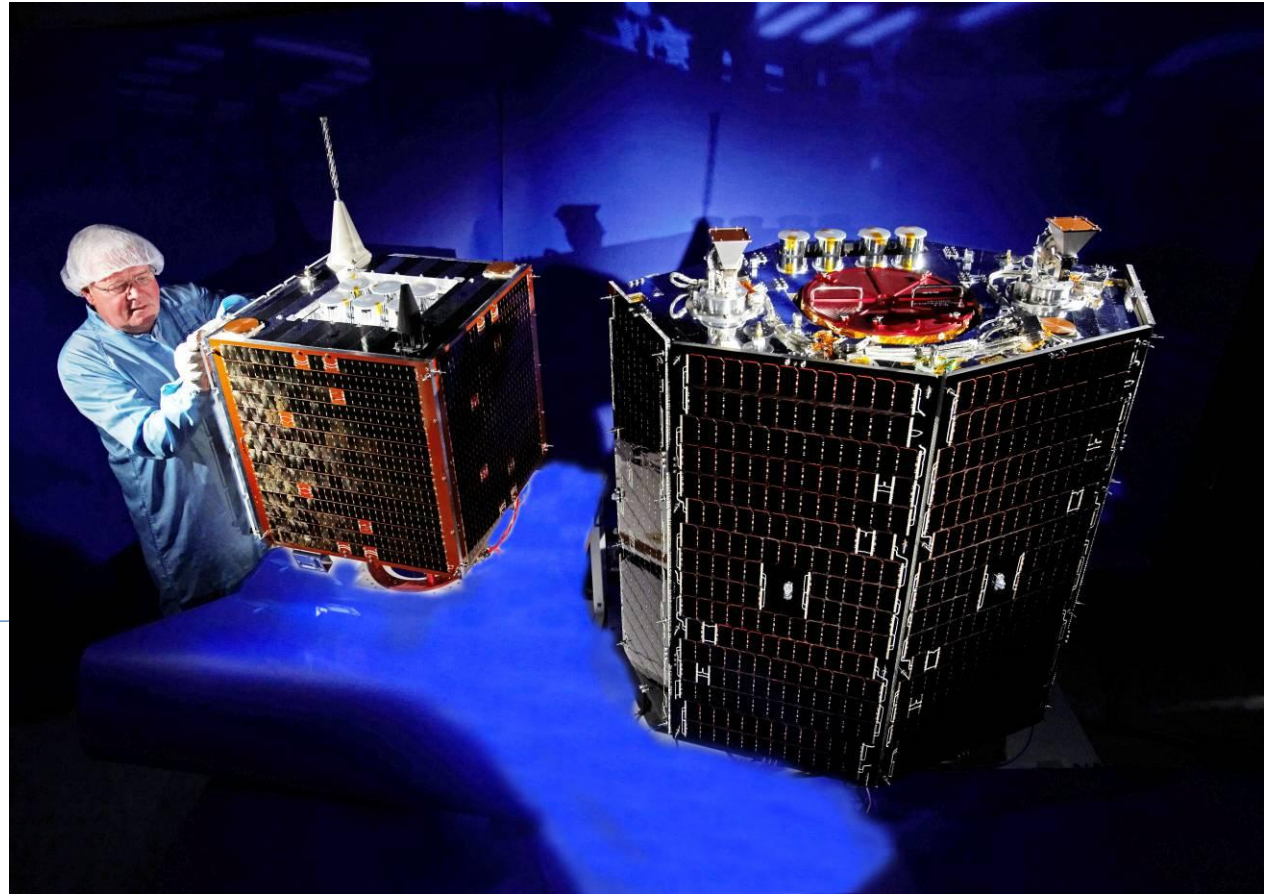
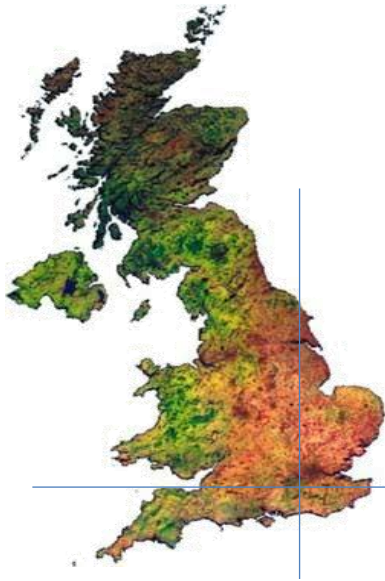
Philip Davies
Business Development Manager
1st July 2013



Changing the Economics of Space

This is achieved through:

Rapid-response small-satellites using advanced terrestrial technology

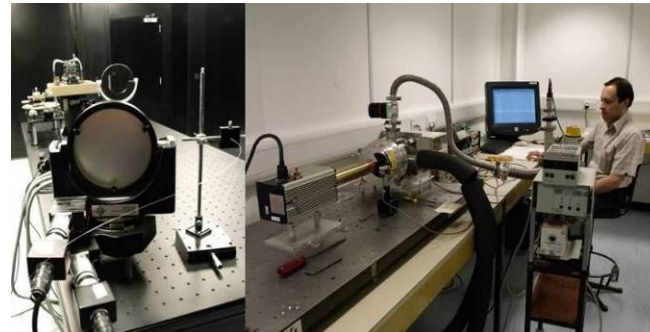


SSTL - The Company

UK satellite manufacturer is owned by
99% EADS Astrium 1% University of Surrey



Since 1985, employing ~600 staff
Facilities in Surrey, Kent, Hampshire & Colorado



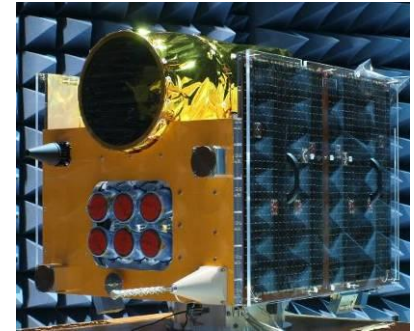
A History of Success



41 Satellites completed

27 payloads in progress

13 Further satellites in progress



HERITAGE

Flight proven – **low risk**

RESULTS

All projects, **fixed price, on-time**
and **on-budget**



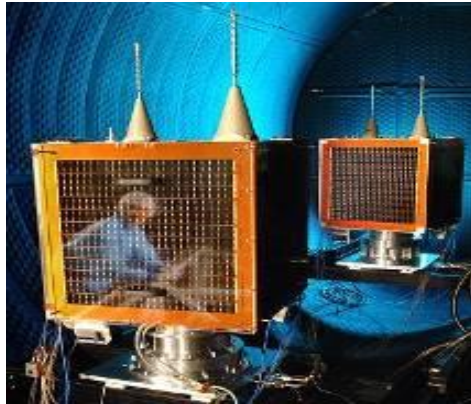
Ground Systems, Operations and Launch



Minimal resources required
 Largely autonomous
 COTS based ground systems
 Low-cost launches

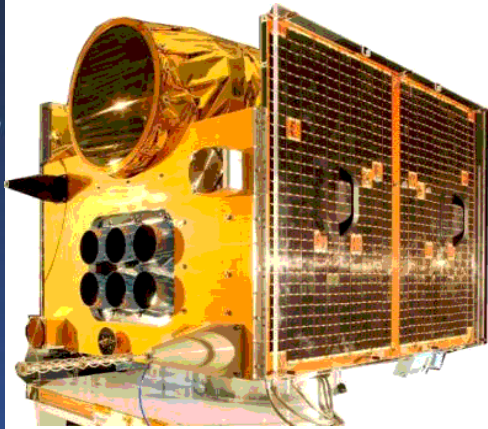


SSTL's Products & Services



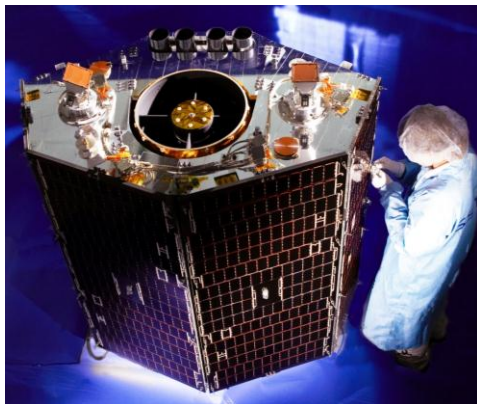
SSTL 100 wide area imaging

Optical, RF payloads and geostationary comms



SSTL 150 high res imaging

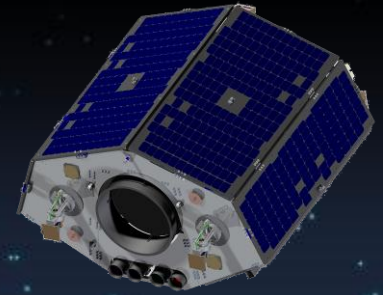
Bus equipment and rapid custom platform design



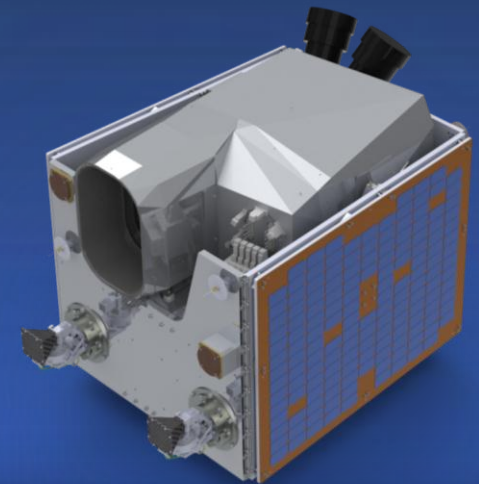
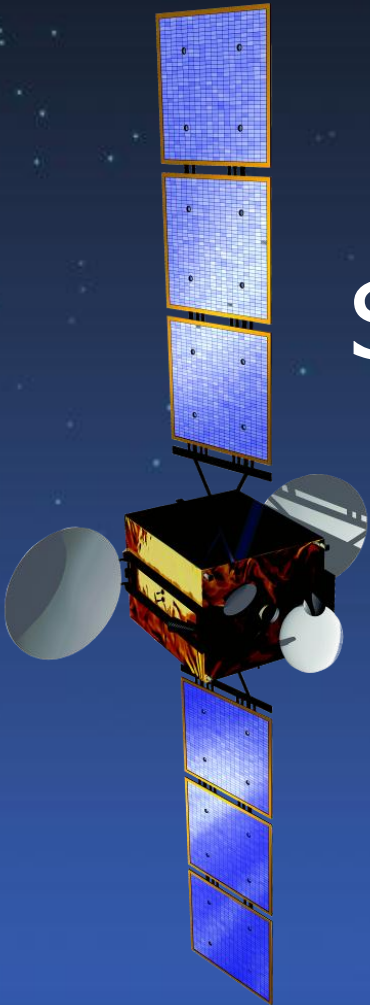
SSTL 300 high performance

Global network of ground stations

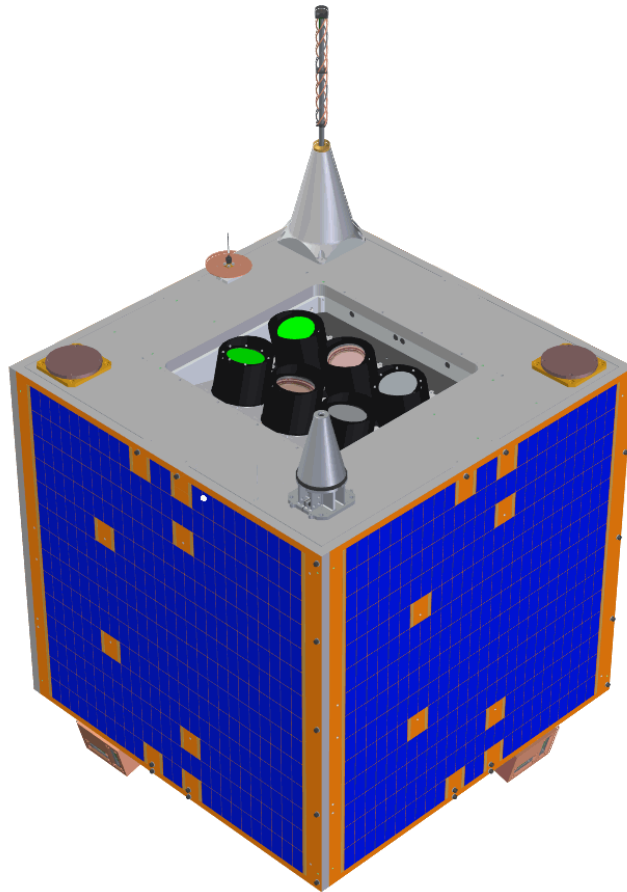




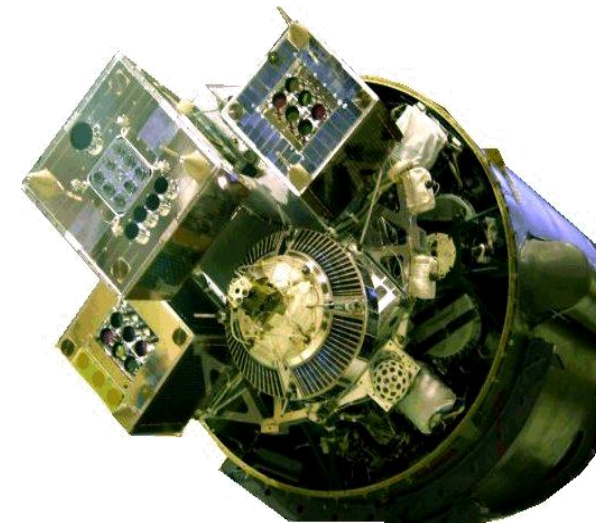
Systems & Applications



SSTL 100 - Compact Modular Platform

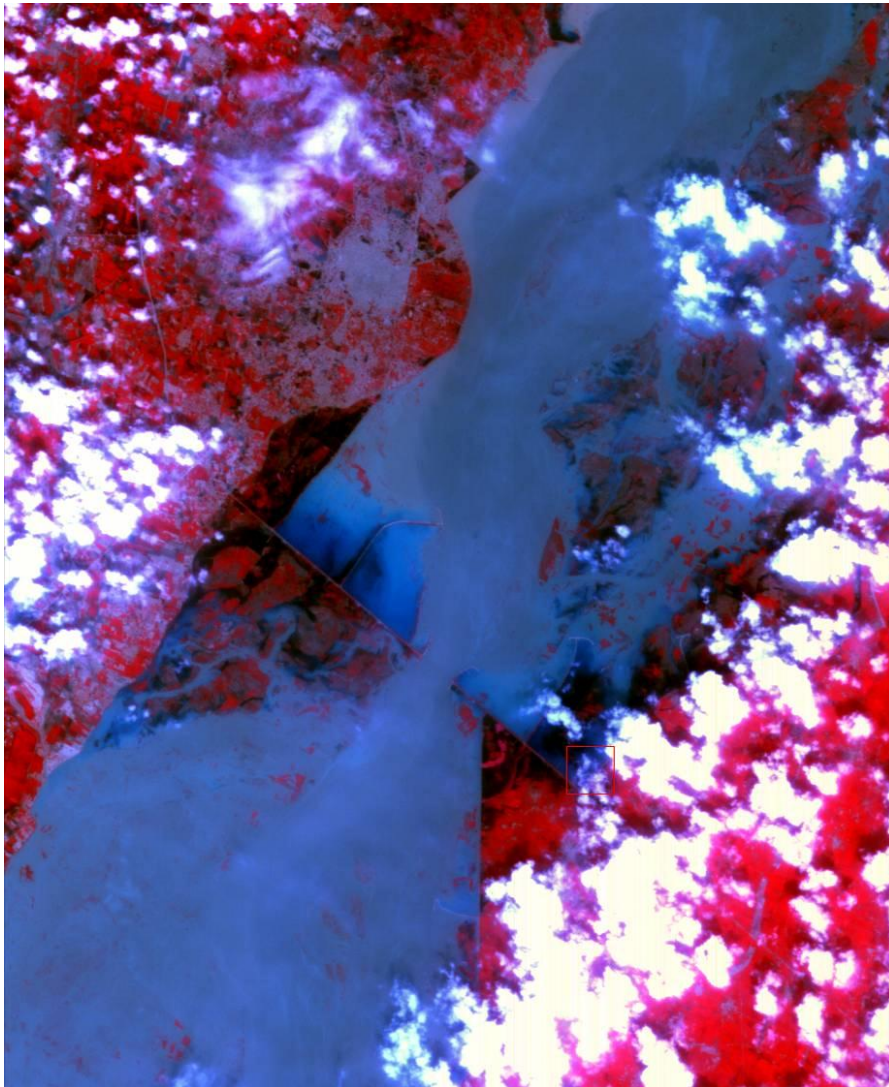


Diverse Payloads
 5 year design life
 High speed downlink



Microsat-70 (14 missions) SSTL-100 (8 missions)
 AISat-1 Bilsat NigeriaSat-1 UK-DMC Deimos-1 UK-DMC2
 ADS-1B NigeriaSat-X

Disaster Imaging

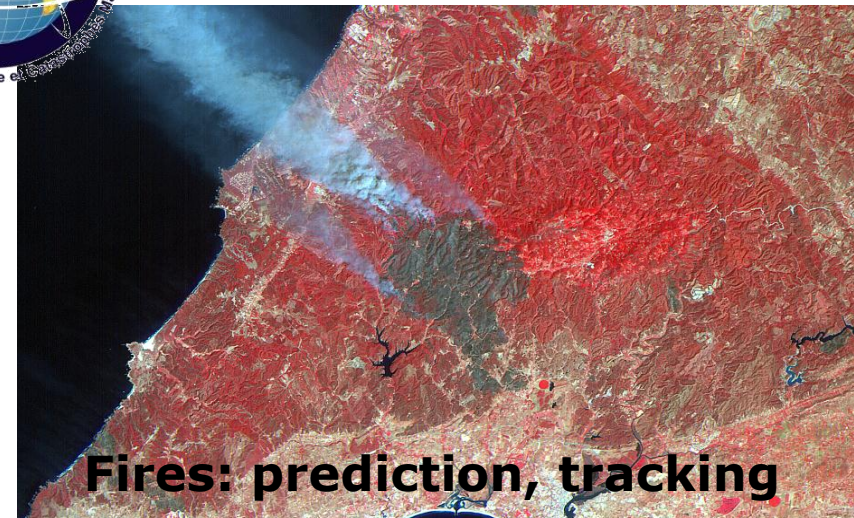
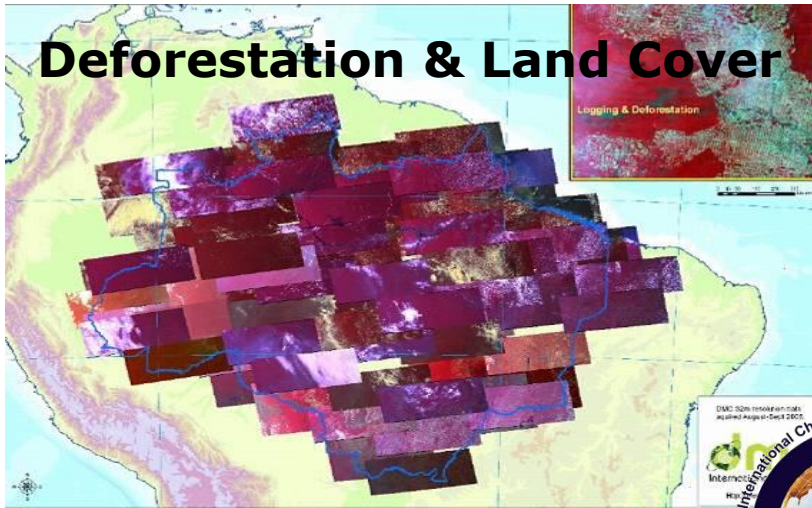


Flooding, Pakistan



Forest Fires, USA

Disaster Monitoring Constellation (DMC)



SSTL 150 - Enhanced Modular Platforms

High-performance operational missions



Higher performance
7-10 year design life
Enhanced power
Bigger payloads
Payload data handling
Propulsion system



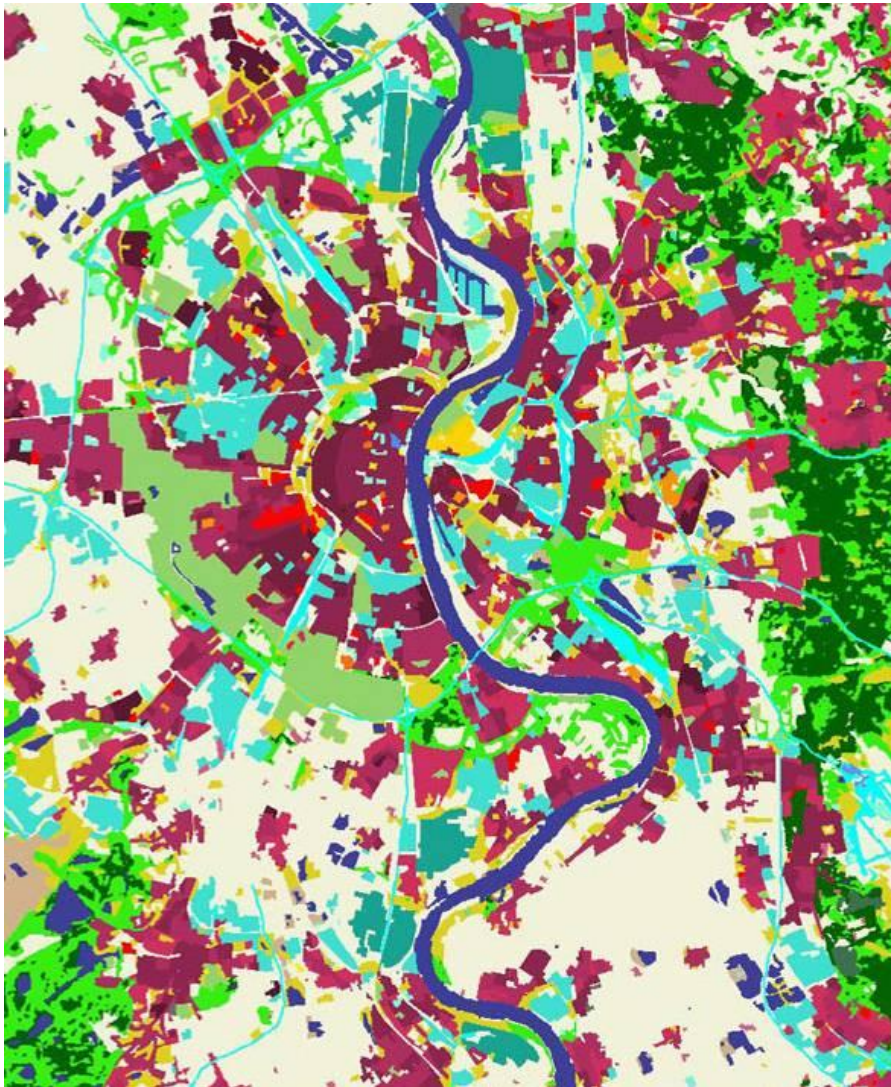
TopSat, DMC+4, CFESat, Rapideye x5, Sapphire, TDS-1, Kaz-Mres

Sao Paulo Brazil



CHOROS (RapidEye 4) on Nov 11 2008

Urban Information

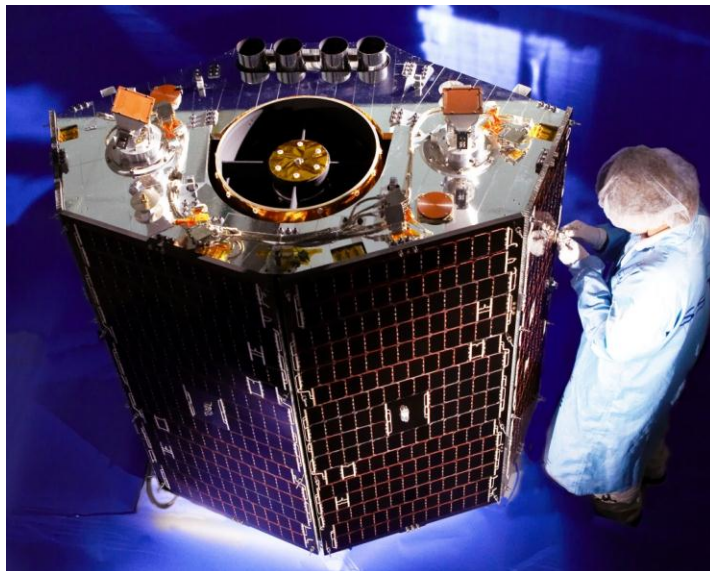
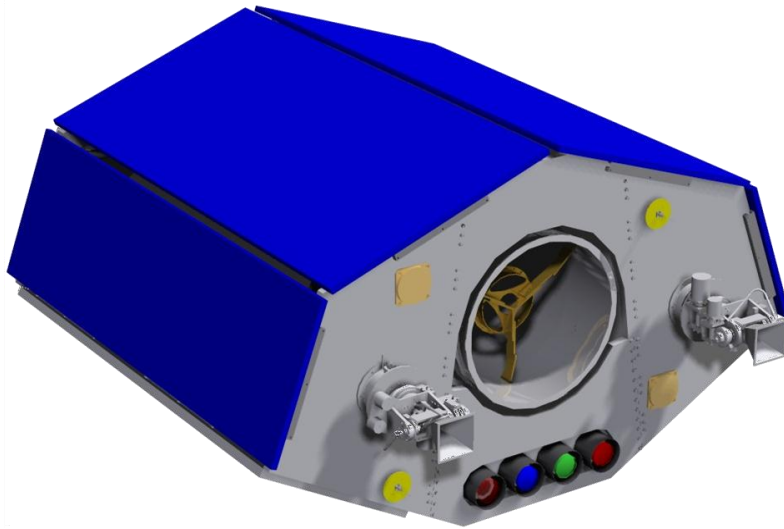


Land Cover Mapping, UK



Consumer Mapping, China

SSTL 300 – High Performance Platforms



Agile

2 Terabit onboard storage

210 Mbps X-band downlink

7 year life

2.5m PAN, 20km swath

5m 4-band multispectral, 20km swath

32m 4-band multispectral 320km swath

NigeriaSat-2 (2011), DMC3 (3 satellites, 2014)

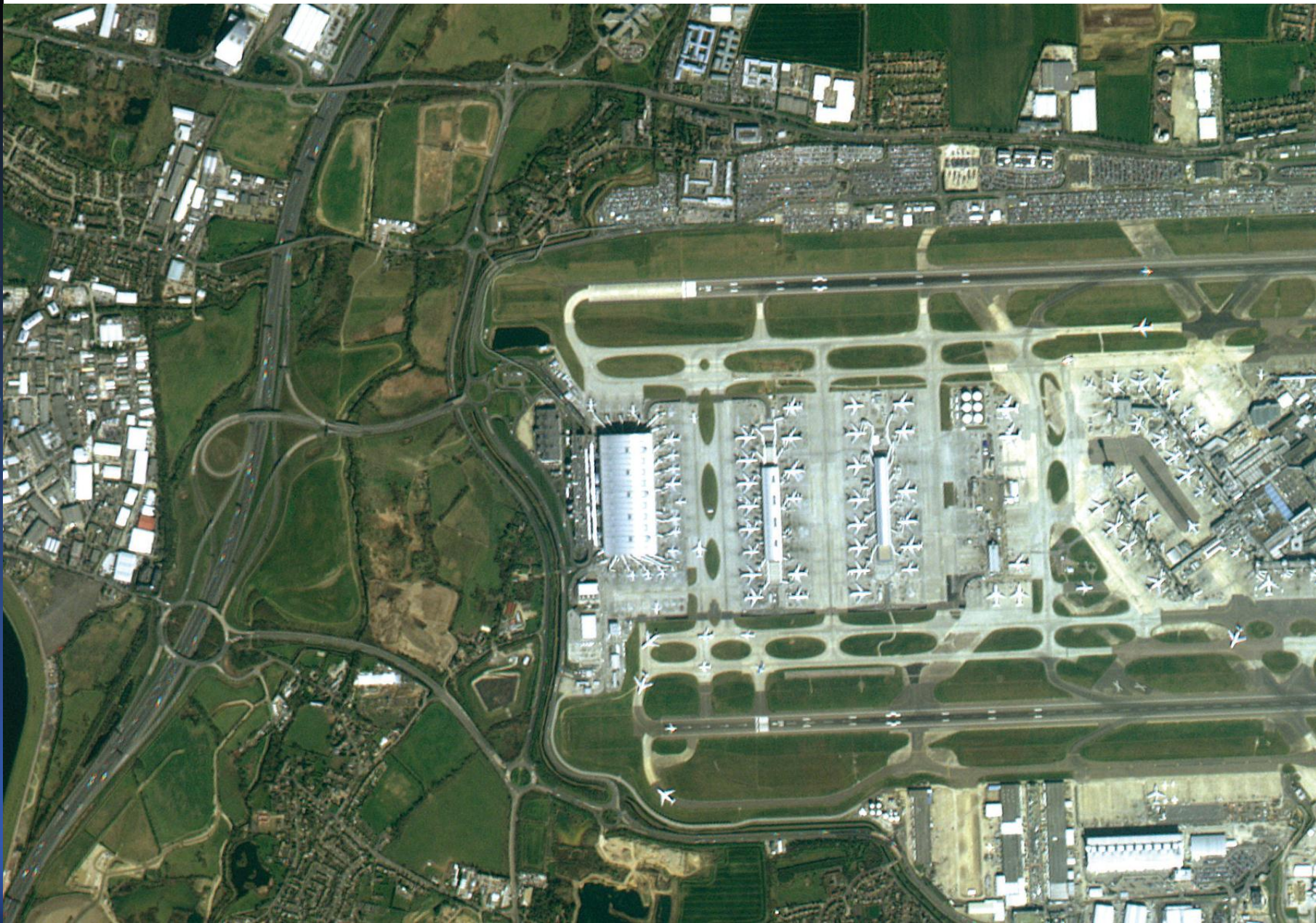
Sydney, Australia



Singapore Strait



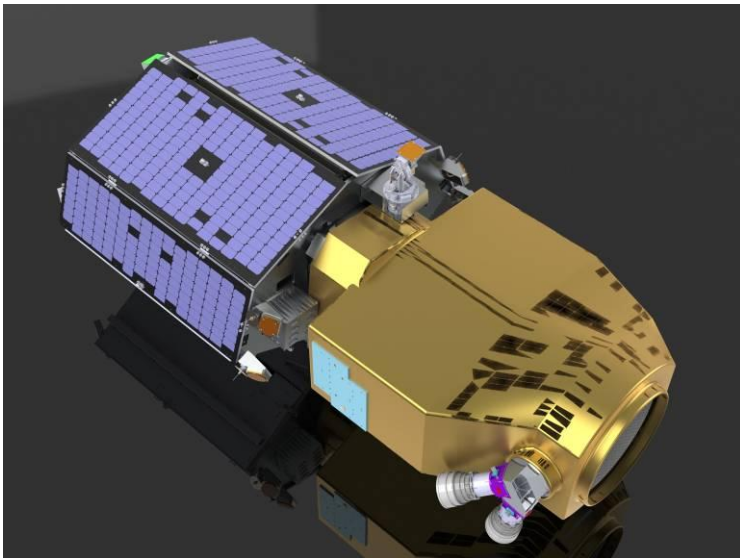
London Heathrow Terminal 5



Next Generation Imaging Missions



DMC-3 high res 1m optical constellation
Ready for launch 2014
3 spacecraft built by SSTL for DMCii
Commercial service provision
Worldwide daily access
~1.5 global access opportunities per day

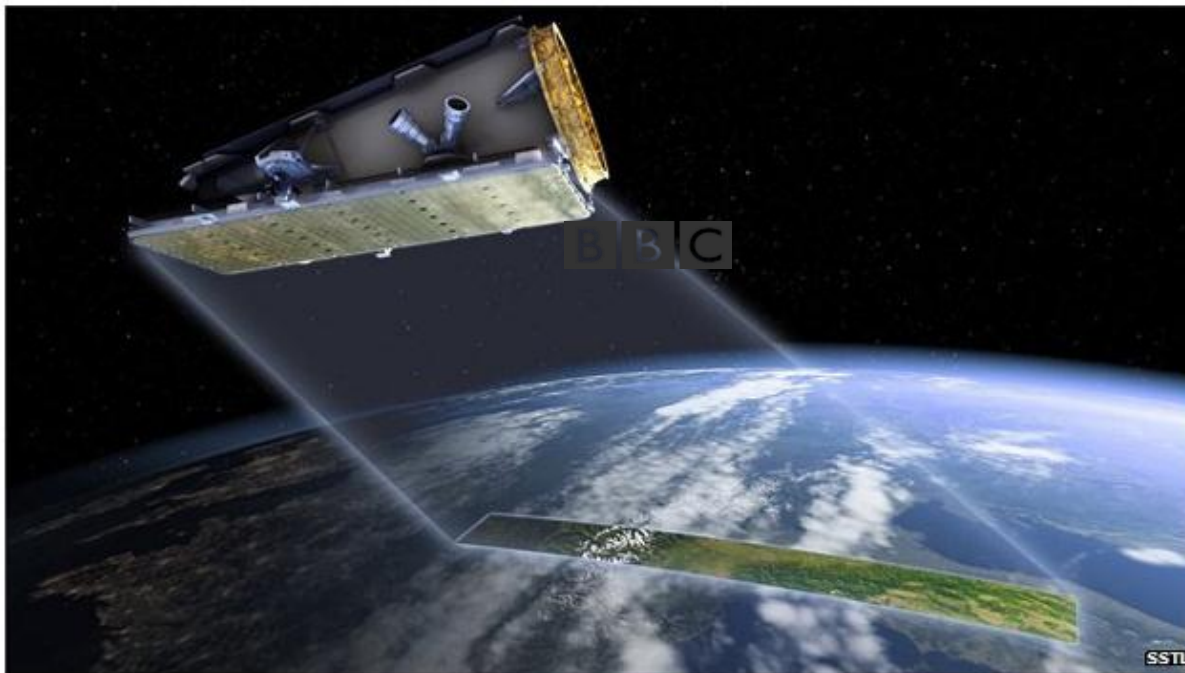


The UK is Investing

UK space radar project initiated



By Jonathan Amos
Science correspondent, BBC News



The Chancellor's money will help get the first satellite in orbit to demonstrate its capabilities

The UK government is to kick-start an innovative project to fly radar satellites around the Earth, with an initial investment of £21m.

Radar spacecraft can see the planet's surface in all weathers, day and night.

Autumn Statement 2011

As it happened: Autumn Statement

At a glance: Key

NovaSAR

Low-cost SAR Satellite

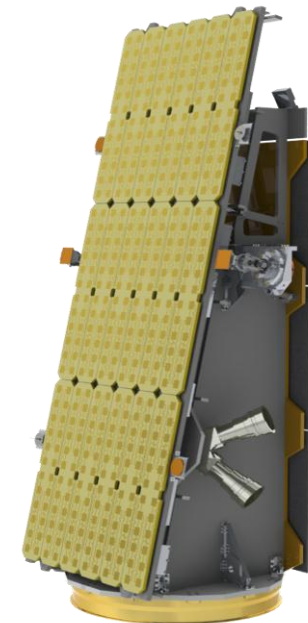
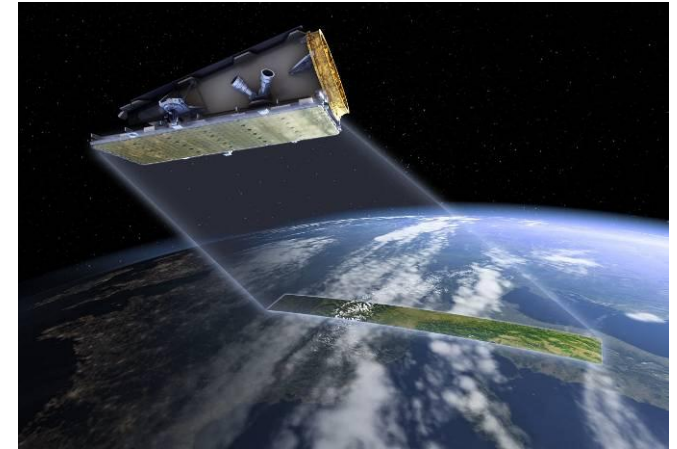
SSTL-Astrium Joint Programme

4 Modes: 6-30m Resolution

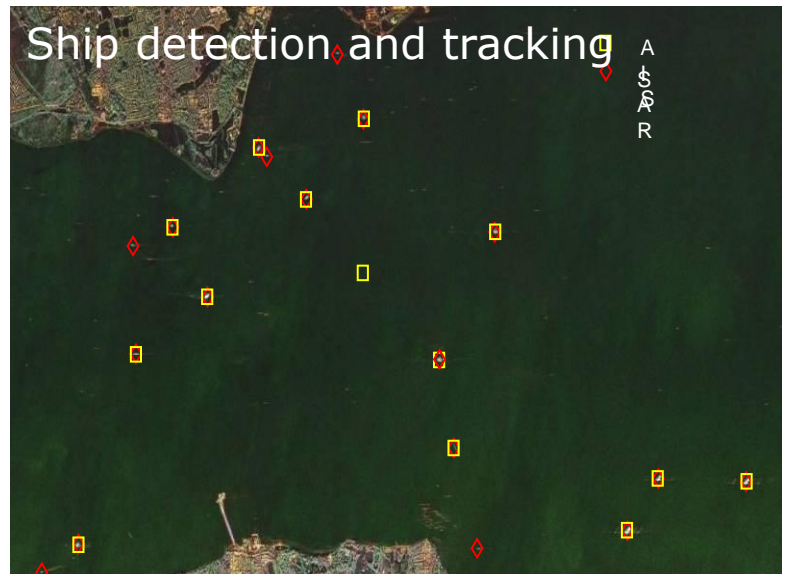
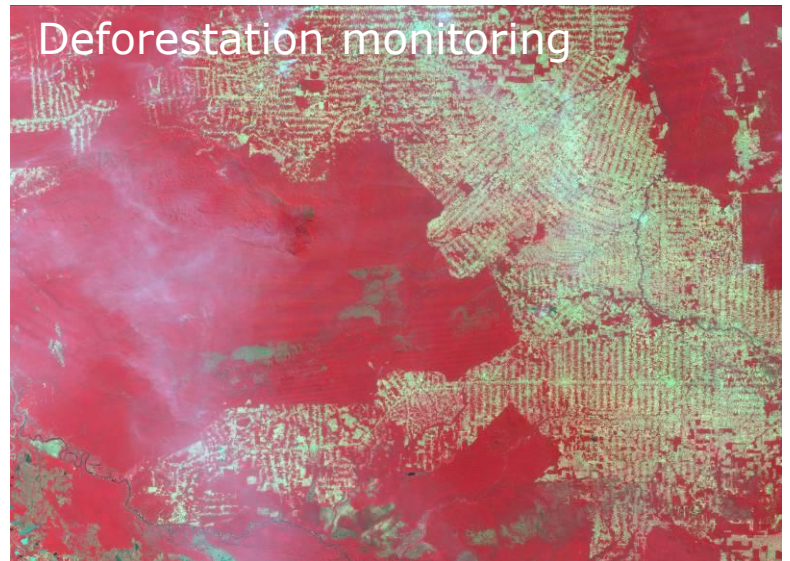
HMG £21m investment in first satellite

Constellation operations

Ready for launch early 2015

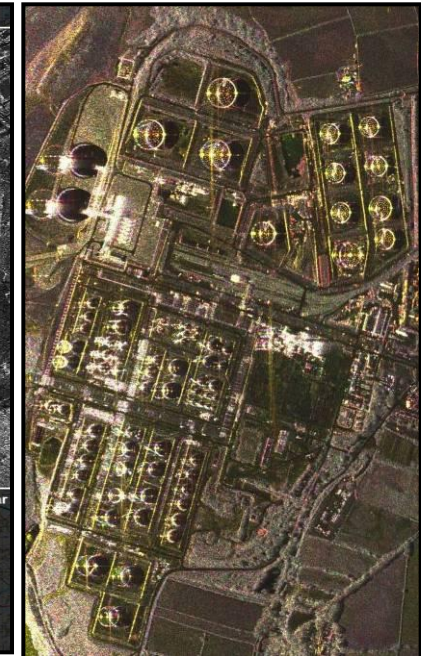
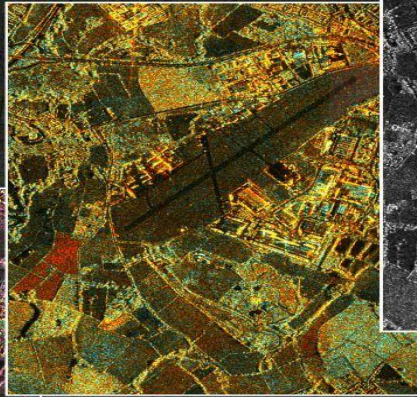
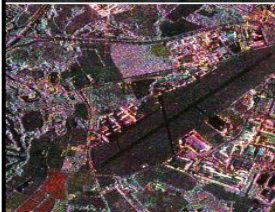
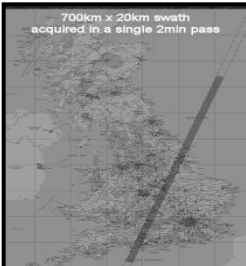


NovaSAR Applications



NovaSAR Results

Airborne results



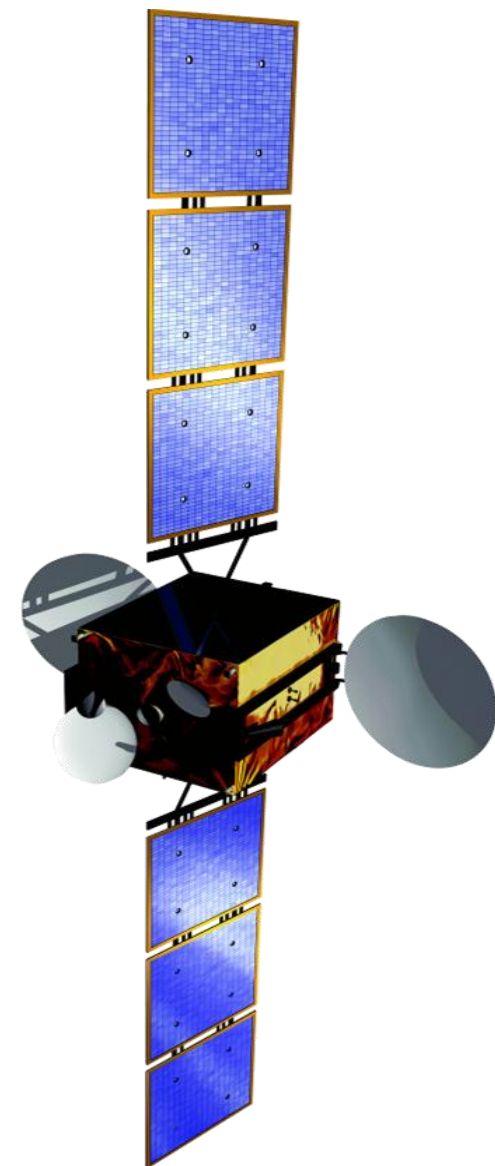
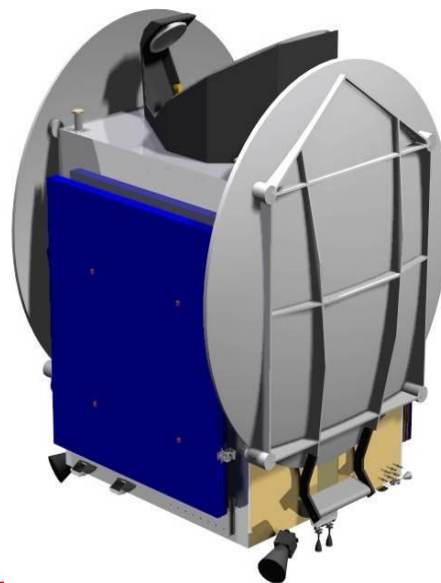
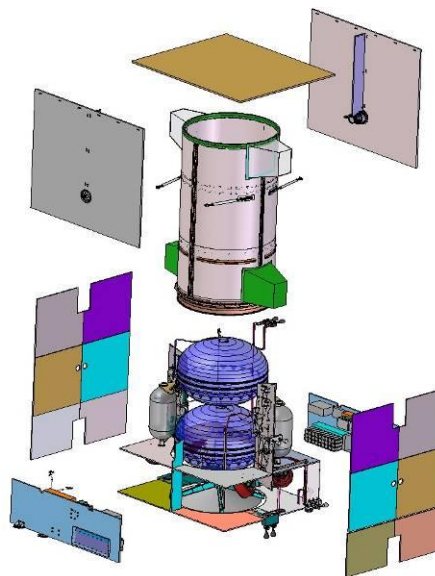
Processed airborne results

10m Resolution, Tri-Polar

GMP - Geostationary Modular Platform

GEO (MEO, HEO, Interplanetary also possible)
 15 year design life
 Modular & flexible design
 300kg, 4.5kW
 ~32 active transponders

Flight heritage
 ESA GIOVE-A (2005)
 ESA ARTES Development



GIOVE-A Satellite

1st Galileo Test bed Satellite for:

- claiming ITU Frequencies
- flight proving Galileo equipment

Representative signals, characterising radiation environment

Launched in 2005

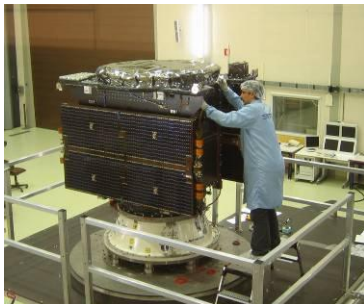
Required 2 year life

Now operating for ~7.5 years

Delivered in 28 months for €28M

In 2008 ESA declared "Full Mission Success"

Still being operated by SSTL



Galileo – Full Operational Capability (FOC)

EC programme, ESA procurement

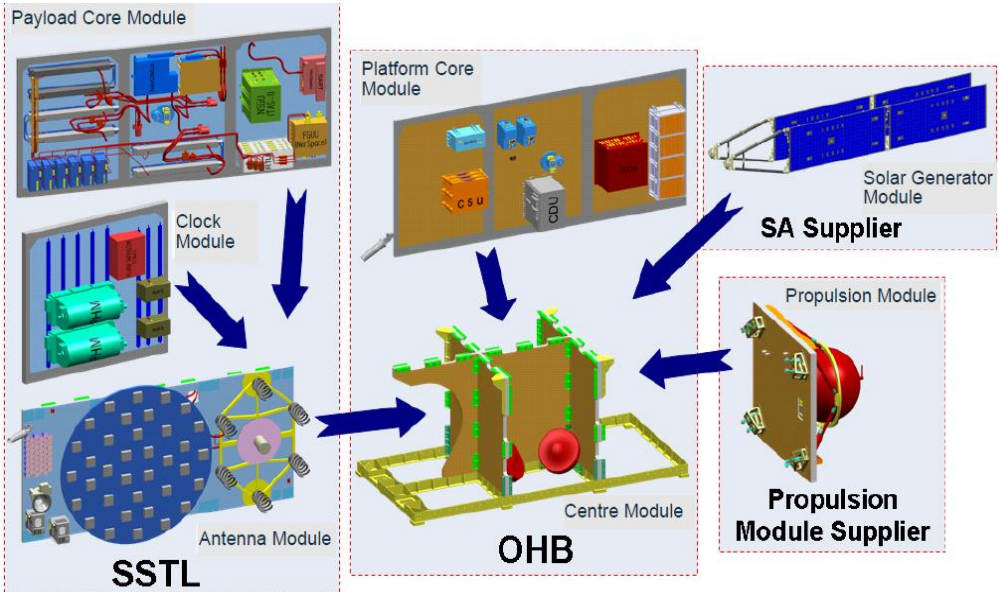
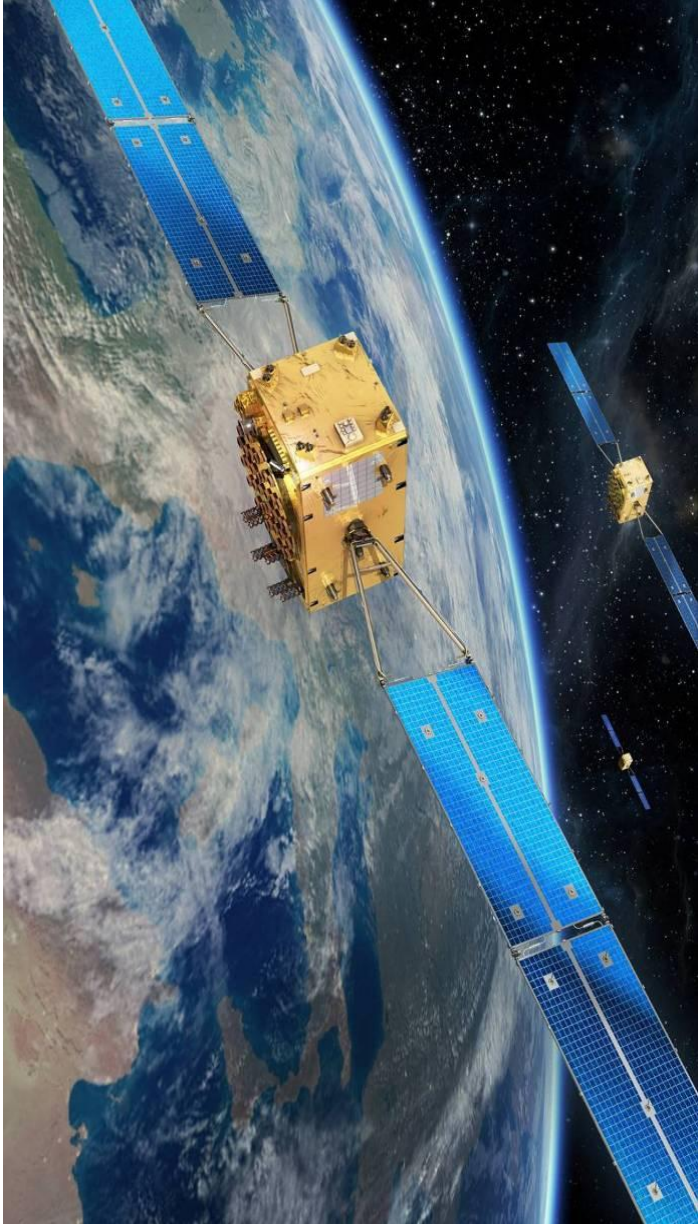
SSTL payload prime for 22 satellites

Working with OHB-System

£250m+ contract for SSTL

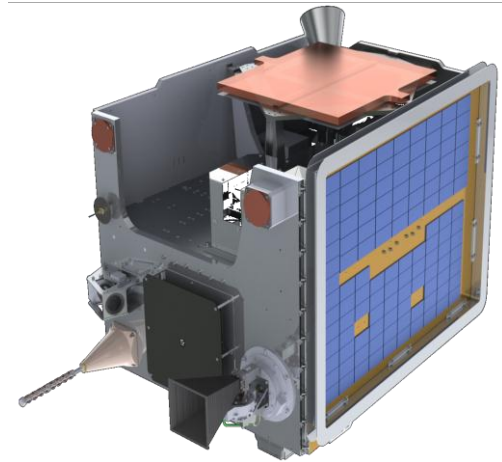
Satellites ready 2013 - 2016

1 payload delivered every 6 weeks



Technology Demonstration Satellites

Demonstration missions
 On-orbit flight experience
 Funding from TSB/SEEDA



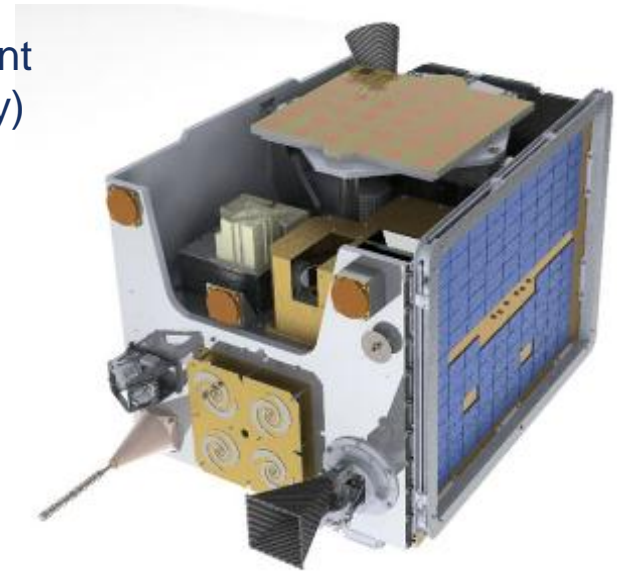
Payload Mass - 50 kg
 Data Rate - 40 Mbit/s
 Power - 50 W
 Volume - 700 x 500 x 900 mm

Future TDS missions being planned (UK, ESA, International)

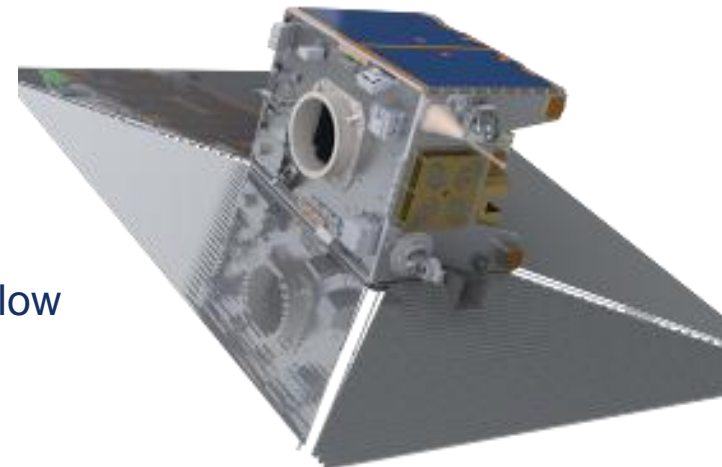
SSTL, Surrey Space Centre, RAL, Langton Star Centre,
 Cranfield Uni, MSSL, Oxford Uni, Satellite Services Ltd

UK TDS-1 Technologies

- TDS-1 demonstrations include:
 - ReSI GNSS ocean state reflectometry instrument
 - S-band altimeter – (test of NovaSAR technology)
 - Highly-miniaturised radiation monitors
 - LUCID cosmic ray detector
 - Charged particle spectrometer
 - Compact modular sounder
 - Cubesat attitude control system
 - De-orbit sail
 - 400 Mb/s steerable downlink
 - 128 GB flash MMU
 - Next generation OBC-750
 - Star tracker and low cost data processor
 - MEMS gyros
 - Micro-vibe experiment
 - New mid-range reaction wheel
 - Inspection camera
 - New 150 W BCR – (SAR technology)
 - Pinhole Sun-sensor
 - AOCS interface module
 - Additively manufactured bracket supporting hollow cathode EP system
 - Also: New CAN protocol, new GaAs cells

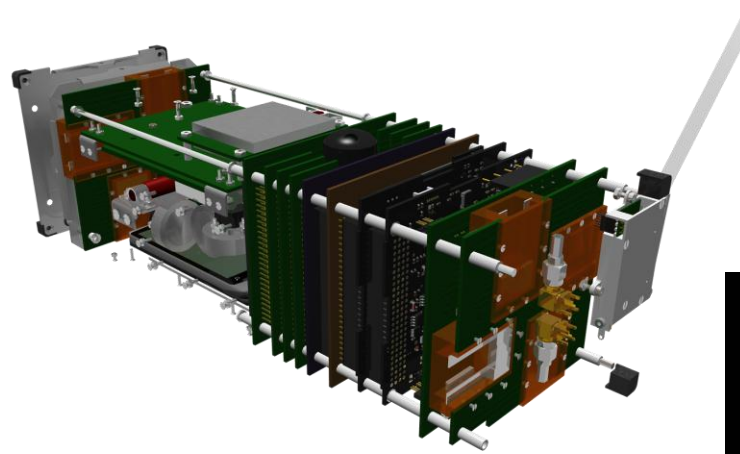


The TDS-1 mission before and after de-orbit sail deployment



Nanosatellites: STRaND Programme

Pushing the Boundaries (and cool!)...

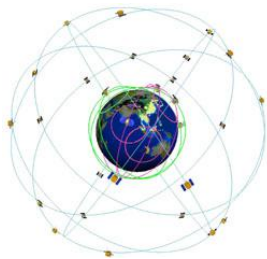
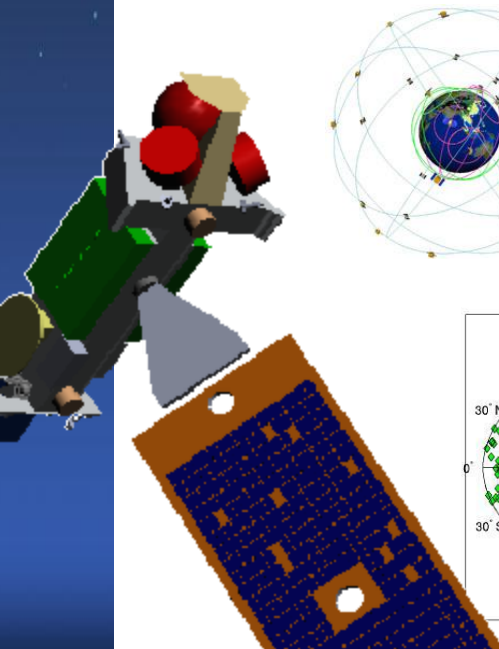


Most Recent Mission: FS7/Cosmic-2

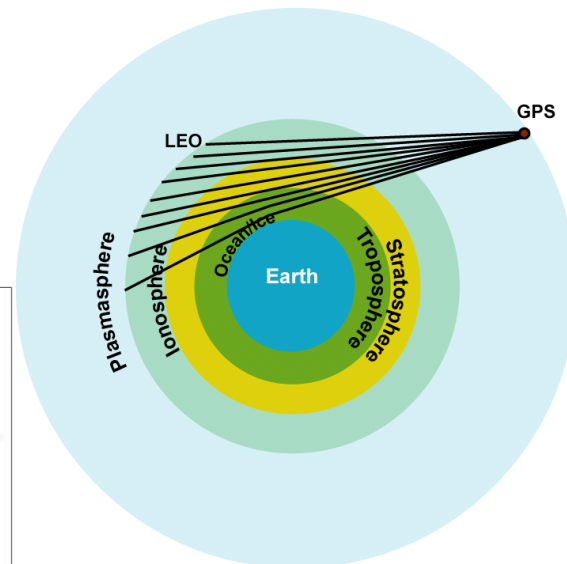
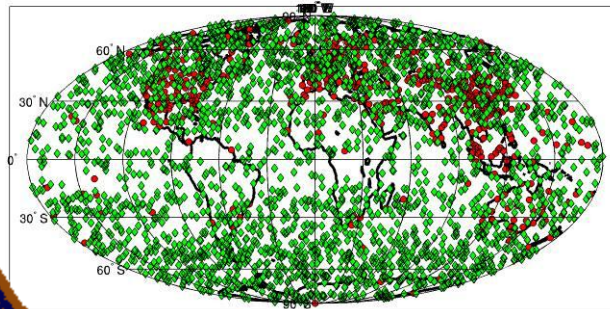
- Taiwan/USA project
- Operational Meteorology
- SSTL provides
 - satellite design
 - 6+6 LEO platforms
 - Launch planned 2016 and 2018



Contract Signature 2012

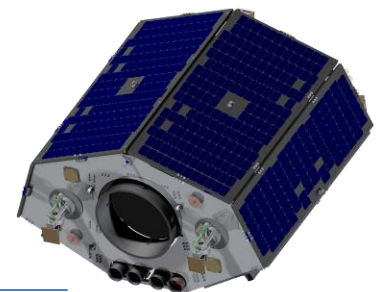
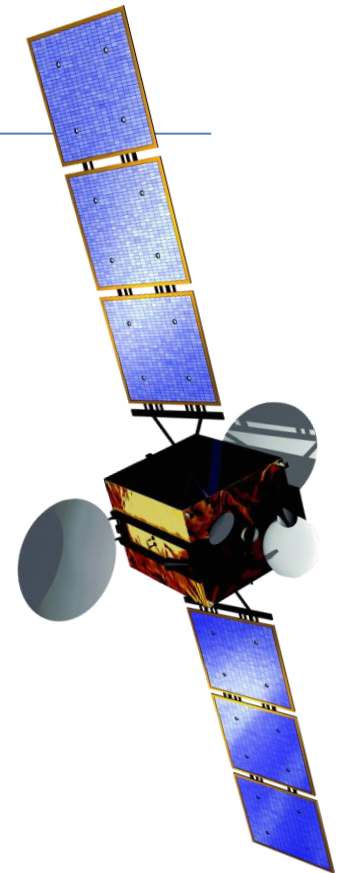


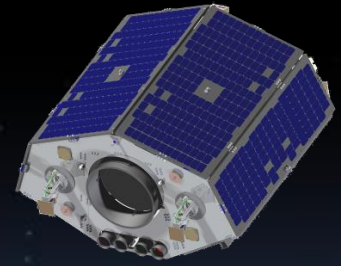
Occultation Locations for COSMIC, 6 S/C, 6 Planes, 24 Hrs



Conclusions

- SSTL continues to innovate
- Systems now are predominantly operational
- For both governments and commercial customers
- SSTL is “changing the economics of space”





Thank You

