



UK SPACE
AGENCY

Strategy for
Earth Observation from Space
2013-16

The Congo River Basin

Credit: ESA



Vision for Earth observation in the UK

The UK Space Agency will drive the shared UK vision for Earth observation (EO) from space with international leadership in development and use of EO-derived information and technology.

Working with partners in academia, government and industry, we will strengthen our world-leading position in EO science and technology, building on the excellent track record of UK scientists, technologists and businesses. The UK will provide leadership in major international space programmes, developing and exploiting EO missions to address critical gaps in our understanding of the Earth system.

We will ensure that EO data, products and services are easily accessible to policy-makers, government agencies, educators, business users and wider consumer markets. We will direct space programmes to meet our international obligations for climate and environmental monitoring. This will improve the capability and efficiency of the public and private sectors, expand consumer choice and inspire a new generation of scientists and entrepreneurs.

World-leading UK businesses must have access to overseas customers and markets. The UK Space Agency will help facilitate that process by participating in international space programmes that give them credibility and space heritage. We will be partners of choice for established and emerging space economies, and support innovative businesses in developing and exporting game-changing technologies, data and services.



Background and context

Earth observation (EO) from space provides routine, reliable and consistent information about our planet on a global scale which, especially when combined with 'in-situ' observations, is an extremely powerful tool for monitoring our environment.

EO is a tool not an end in itself. Space data helps us understand how our planet is changing, from tracking urban development to charting the melting of ice caps. The UK has a world-leading environmental science research community who exploit such data.¹

There is already strong recognition of the role that scientific advance can play in delivering economic growth, where observations today will underpin technologies and services of tomorrow. EO data can be used to create new products and services for a wide range of market sectors. The global market for selling EO data is valued at around £640mn in 2010,² with a strong growth profile in recent years that is expected to more than double to £1.4bn by 2018.³ A recent Knowledge Matrix Ltd⁴ study quantified the size of the commercial aftermarket for climate and weather services. This aftermarket is estimated at £26.6bn for 2010/11 and is predicted to increase to £35.5bn by 2015. EO is an integral part of the growth in the commercial, institutional, and security and defence market segments, projected by the Space Innovation and Growth Strategy.

Additionally, EO underpins much of our public sector policy-making and services. EO provides the monitoring capability to support many of our environmental management obligations at local, national and international levels, including aid efforts and commitments to tackling climate change.

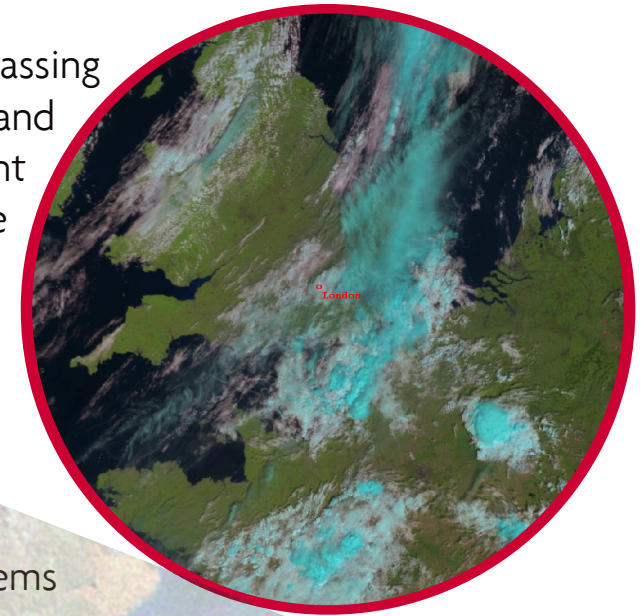
1 BIS International Comparative Performance of the UK Research Base, 2011

2 Satellite Industry Association (2011) State of the Satellite Industry Report

3 Northern Sky Research (2010)

4 Matrix Ltd, Global Weather & Climate Services: Commercial After Market 2010/2011

There are many actors required to deliver a seamless supply-chain for EO data, encompassing those gathering user requirements, providers of space and ground infrastructure and those exploiting the data to generate useful products and services. A key element of the UK Space Agency EO work is to provide coordination across this chain. One critical strand of work will be to ensure programmes remain user-focussed in order to meet the growing requirements for new commercial opportunities, environmental monitoring obligations, or novel scientific observations.



This strategy sits in the context of the National Space Policy, the National Space Security Policy, and expands on the themes of the UK Civil Space Strategy. It concentrates on civil EO requirements but recognises that some civilian space systems could be dual-use in nature and be capable of supporting national security requirements.

Due to the long time-scales of space programmes, it is necessary to consolidate the areas of UK strength we have today and in doing so, provide data continuity. In parallel, we must identify mechanisms to support new observations and technological evolution to meet future demands.

This strategy is owned by the Chief Executive of the UK Space Agency. The UK Space Agency's EO Advisory Committee will review this strategy annually. During review, account will also be taken of the Innovation and Growth Strategy¹ and national space policy evolution. Delivery of this strategy will be monitored using the measures identified in the overarching national space policy, and refreshed in the same cycle.

¹ A UK Space Innovation and Growth Strategy 2010 to 2030

Strategic Priorities

The UK Space Agency has identified four key strategic priorities for its activities in Earth observation that best deliver the Pathways to Growth of the UK's Civil Space Strategy.

Leverage from our membership of European programmes to secure maximum returns in scientific excellence, programme efficiencies, and economic growth for all UK stakeholders in academia, government and industry.

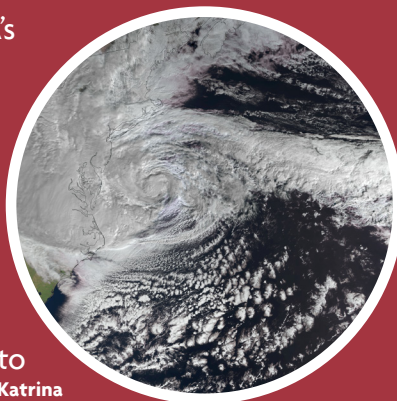
The UK Space Agency is the guardian of our European space subscriptions and will continue to work with all stakeholders to maximise the benefits back to the community.

Case Study: MetOp 2nd Generation

The UK Met Office (and wider user community) worked with European Organisation for the Exploitation of Meteorological Satellites (EUMetSat) to identify that data from the MicroWave Sounder (MWS) instruments was a key requirement for improved weather forecasting.

The UK Space Agency contributions to ESA's meteorological development programmes helped fund the development of MetOp 2nd generation, and UK industry secured the contract for the development of the MWS instruments.

Once operational, MetOp 2G will secure continuity of data for community needs, and also fund recurrent instrument orders to UK industry.

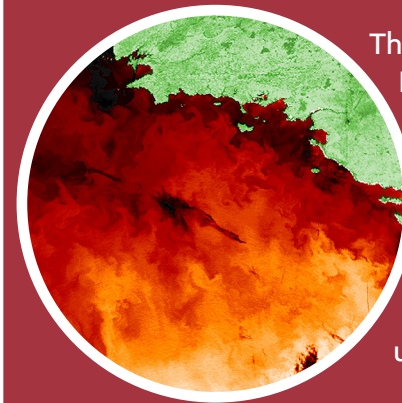


Hurricane Katrina
Credit: ESA

Build on UK leadership in processing, analysis, quality assurance and control, modelling and visualisation of space data for environmental research and climate applications.

The UK has a strong heritage in climate research and a thriving space community which has developed instrumentation to support climate observations, such as the long time-series sea surface temperature measurements. Coupled with our capability in data handling, quality control and metrology we will secure global leadership in this emerging political and economic arena. This will be realised in contributions to the Global Framework for Climate Service (GFCS) and the Global Climate Observing System (GCOS), and through delivery of climate services for growth as recognised in the recent Innovation and Growth Strategy report.

Case Study: 20 years of continuous data



Surface Temperature in the Bay of Biscay
Credit: ESA

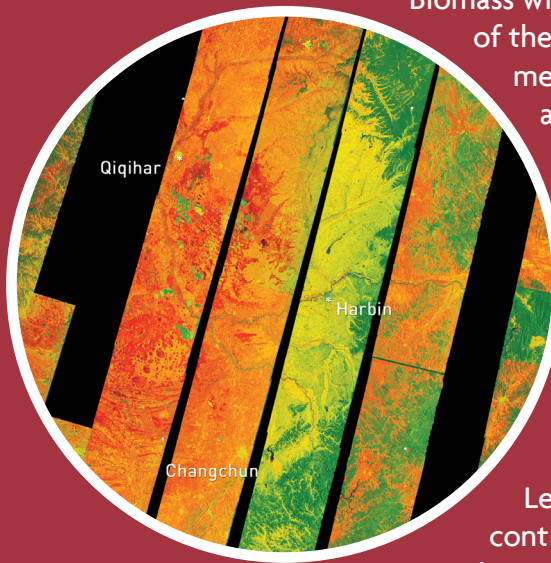
Thanks to excellent ATSR instrumentation on ESA missions like ERS-1, ERS-2 and Envisat, we can now draw on nearly 20 years of data on surface temperatures around the globe.

The UK has led the way in generating quality-assured, long time-series datasets to help scientists around the world to better understand how the Earth's climate works.

Become global leaders in Synthetic Aperture Radar (SAR) technologies and exploitation especially for civil resilience, natural hazard management and maritime security.

Capabilities in both the development of the technology and the exploitation of the resulting data mean that the UK has a competitive edge in SAR technology. The UK has continued to innovate in this area through missions such as Biomass and NovaSAR for scientific, government and commercial applications.

Case Study: Biomass



SAR tracks in China
Credit: ESA

Biomass will help advance our understanding of the Earth's carbon cycle by taking measurements of forest biomass to assess changes in terrestrial carbon stocks.

The UK has a proven track record in development and exploitation of SAR missions, including SAR instruments on 3 successive ESA missions covering a time span of 21 years.

Led by UK science, Biomass will continue the heritage of SAR activities in the UK.

Increase UK leadership in developing small, low-cost missions.

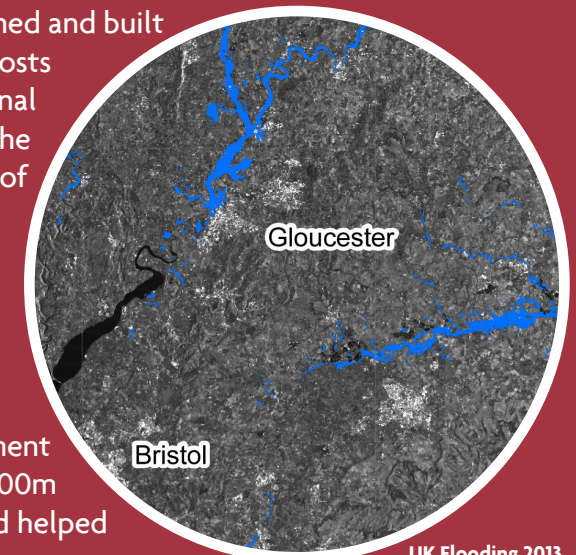
As the cost of space missions has generally been rising, the UK has consistently innovated to deliver spectacularly low cost solutions. The UK Space Agency will continue work at a policy and technical level to retain this edge, enabling constellations to be developed and supporting sustainability of observations in the long term.

Case Study: DMC

The Disaster Monitoring Constellation (DMC) is a network of satellites designed to provide detailed images of any part of the world in times of need. The data is used to produce maps and information to assist relief efforts and ultimately to save lives.

The DMC satellites were designed and built to a standard design at lower costs (much cheaper than conventional Earth Observation satellites). The satellites are typically the size of a domestic washing machine.

UK government investment of £4.5m in 2001 enabled flight demonstration and critical risk reduction work for the innovative design. That investment ultimately led to more than £200m in orders for UK companies and helped deliver the DMC constellation.



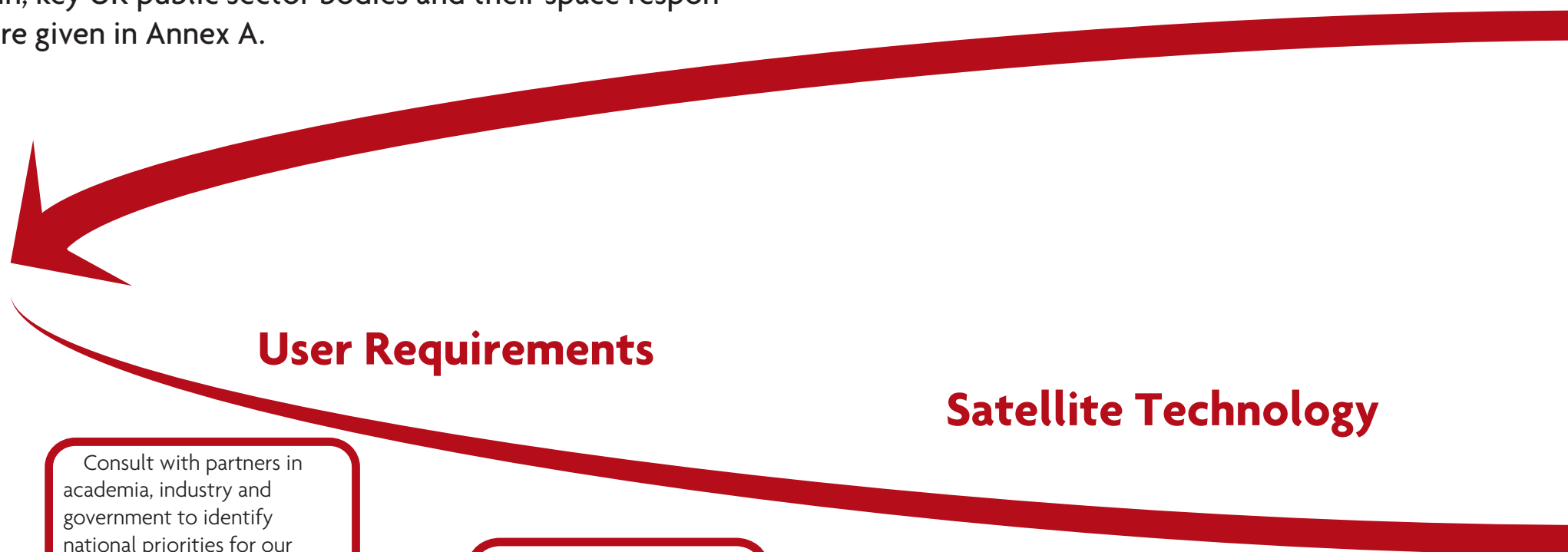
UK Flooding 2013
Credit: DMCii

Delivery

To deliver the broad UK vision for Earth observation and the four UK Space Agency priorities within this, we will ensure a seamless chain of activities from gathering user requirements through to the delivery of science and applications. Many organisations in the UK and beyond are needed to work together across this delivery chain; key UK public sector bodies and their space responsibilities are given in Annex A.

Work through existing agency initiatives with the higher education sector to ensure the skills and training requirements of the EO space sector can be met.

Provide leadership, bringing together interested parties to take decisions and agree joint implementation plans for new initiatives across any or all of government, academia and industry.



User Requirements

Consult with partners in academia, industry and government to identify national priorities for our European investments, working with other departmental leads such as Defra on the Copernicus programme, to ensure these programmes meet UK requirements and deliver maximum benefits back to UK stakeholders.

Provide the central point of advice for users and providers of space technologies and data, representing the broad interests of our stakeholder community in academia, industry and government.

Satellite Technology

Identify new mission, technology and applications ideas through consultation with stakeholders in academia, government and industry.

Incubate such new ideas in the Centre for Earth Observation (CEOI) element of the National Space Programme (NSTP). We will partner programmes such as Strategy Board-funded Knowledge Programmes, NERC and EPSRC.

Work across government to identify opportunities for increased public sector effectiveness through use of space services. With partners in government, we will identify where space data could help deliver policy more efficiently and use the National Space Applications Programme (NSAP) as a vehicle for demonstrating new potential application areas, working with partners including the newly established Space Applications Catapult.

Work with national partners such as UKTI and the Space Applications Catapult to support commercial business targets and export opportunities.

Ensure the UK has appropriate ground systems to exploit data and services arising from the Copernicus and other EO programmes, and capitalise on potential market advantages by combining EO data with novel satellite positioning or telecommunications programmes such as the European Data Relay Satellite (EDRS). We will address both policy and practical issues, to ensure that data is easy to access, easy to use, and easy to share.

Data Reception & Handling

Science and Applications

largely through the
Instrumentation
National Space Technology
also work closely with
the Technology
Knowledge Transfer
RC.

Prioritise emerging mission and/or instrument opportunities creating a 'project pipeline' according to the criteria set out in the UK space agency civil space strategy and by fit to current national priorities. Factors such as economic growth, public good and technical feasibility will also be taken into account. This will be the mechanism by which we identify future priority activities, covering data continuity, new commercial opportunities or new scientific research.

Take such technologies and applications from concept to demonstration using national, ESA, EU or bi-lateral programmes as appropriate. This will often involve developing effective national and international partnerships, and/or fostering effective knowledge exchange between academia, government departments, agencies and industry.

Public Sector



Ensures that the UK retains and grows a strategic capability in the space-based systems, technologies, science and applications. It leads the UK's civil space programme to win sustainable economic growth, secure new scientific knowledge and provide benefits to citizens. Its activities cover funding and delivery of space projects, development of policy and regulation of UK space activities.



Leads UK participation in the European Global Monitoring for Environment and Security Programme (Copernicus) and the International Group on Earth Observations. It also uses space data for development and delivery of policy.

Funds and manages Earth observation research, training and knowledge exchange; it supports the exploitation of data from EO satellites to address key scientific challenges, including research activities that underpin this work such as the development of mission concepts and the calibration and validation of research missions. NERC also facilitates the coordination of the academic community, providing a focal point for stakeholders to engage with the UK academic sector.



Provides downstream collaborative leadership in market-led applications development programmes and access to key national facilities for space applications development.



Support the UK Space Agency in telecommunications and navigation activities. It also funds the core grant for the Satellite Applications

Technology Strategy Board
Driving Innovation

Catapult and provides a facilitated KTN (Knowledge Transfer network) Space Special interest group. This acts as a focal point for engagement

in the space sector in the UK and also provides facilitation support to the national Space Technology Strategy group.



Department of Energy & Climate Change

Supports world-leading climate change research and modelling to provide essential policy-relevant evidence to DECC through the DECC/Defra funded Climate Programme at the Met Office Hadley Centre (MOHC). The MOHC's work (and, indeed, climate research and modelling activity generally) relies heavily on observations of the ECVs,

which are available from many sources - both organisations and data centres - world-wide.

Leads operational weather and climate services including UK representation to The European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), The European Centre for Medium-Range Weather Forecasts (ECMWF) and The World Meteorology Organisation (WMO).



Partner Organisations



CabinetOffice

Leads development of National Space Security Policy; User of space data for the prevention of, preparedness for, response to and recovery from emergencies which may hit the UK. It also acts as the UK focal point for the activation of Copernicus Emergency Management Service and the International Space Charter.

NPL Centre for Carbon Measurement (CCM) assesses the of quality of Earth Observation (EO) and climate data by applying world leading metrological best practice. The Centre pioneers new measurement techniques and standards for calibration and validation of satellite sensors, and the associated uncertainty assessments of their data.



Leads space science and technology development for defence and security applications. Formulates, manages and delivers the military space S&T programme, drawing on expertise in industry and academia and collaboration with allies and other government departments and organisations. Supplies sensitive and specialist space S&T and space technical advice, analysis and assurance for defence and security applications.



STFC's RAL Space provides access to facilities to develop, integrate, calibrate and operate advanced EO missions and instruments, working with ESA, EUMETSAT, academia and industry. It also curates long- time series EO data sets, supporting the academic communities through the Climate and Environmental Monitoring from Space (CEMS) data service

Ensures sufficient assured access to space capabilities to meet our national security and defence requirements.



MINISTRY OF DEFENCE



Assists space sector capture new export opportunities and supports inward investment.

Assists space sector capture new export opportunities and provides international representation of UK policy concerning bilateral and multilateral partnerships and space security. It also is a potential user of space data for development and delivery of policy.



Foreign & Commonwealth Office



Department for International Development

Facilitates use of space data for development and humanitarian activities. It also is a potential user of space data for development and delivery of policy.

UK SPACE AGENCY

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An executive agency of the Department
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