

Satellite Applications

Fact Sheet

Environmental Monitoring of Human Activity from Space

Satellites can play a key role
in enabling development and
minimising human impact

We work with
Innovate UK

CATAPULT

Satellites can monitor the impact of human activity on the Earth and play a key role in enabling us to permit development that minimises human impact.

There is now a definite need for balancing economic need vs environmental impact.

Introduction

The protection of the world's environment is an urgent, high-level problem which cannot be ignored. And yet the world's economic development relies on activities which traditionally do damage to the environment.

Satellites can monitor the impact of human activity on the Earth and can therefore play a key role in enabling us to permit development but minimise its impact. What's required is a way of getting the data from those satellites into the hands of everyone affected by such change, in a way that is understandable and useful. This is where a new scheme proposed by the Satellite Applications Catapult comes in.

The Challenge

Most human activity has some impact on the environment or on specific ecosystems. This is true across land, sea and the atmosphere, and applies especially to developing economies which rely on the extraction of raw materials and their initial processing.

The activities with the highest environmental impact include:

- agriculture
- aquaculture and seafood production
- energy extraction, production and distribution
- forestry
- infrastructure construction and maintenance
- mineral extraction, production and distribution
- transport
- urban development
- water management.



Aquaculture and seafood production

Many of these are monitored and regulated by appropriate national organisations. Similarly, environmental impacts are monitored and regulated by supra-national organisations, scientists and non-governmental organisations (NGOs).

Most industrial providers readily subscribe to the need to minimise impact and to comply with regulatory frameworks. Others, however, do not. The high levels of pollution globally provide ample evidence of this, along with the vast scale of 'black market' types of behaviour such as illegal fishing.

Balancing Environmental & Economic Needs

The need for economic development currently outweighs the perceived need for environmental wellbeing. This situation is being exacerbated by the growing global population and will only get worse.

A balanced understanding of, and support for, these contrasting requirements is required in order to begin to address this problem. On the one hand, economic needs drive individuals and industry to maximise their profits, encouraged by government treasuries. On the other, regulators try to impose controls and NGOs help affected communities to make their case for compensation.

To resolve this apparent conflict and then enable the situation to improve requires everyone involved to have respect for policy, the law and pertinent ethical codes. It also requires transparency and trust between the various organisations concerned.

The Solution – Using Satellites to Monitor Environmental Impact

Environmental monitoring using satellites can play a valuable role in achieving trust and transparency.



Satellites can continually monitor environmental changes over huge areas and detect small changes over short periods of time.

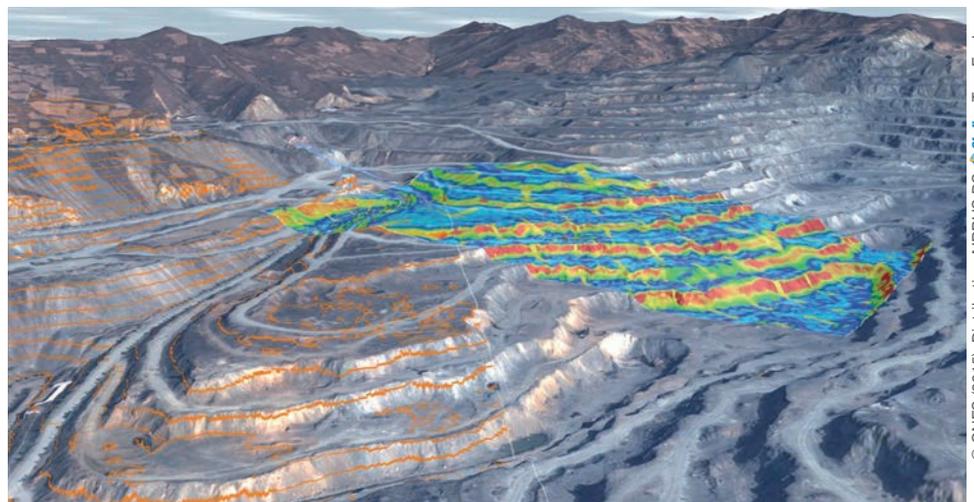
The Catapult is working with industry to make the most relevant data available on an ongoing basis.

Satellites are global by nature and can continually monitor environmental changes over huge areas, for decades in many cases. In addition, they can now detect relatively small changes over short periods of time to very high levels of resolution and accuracy.

Between them satellites use many different wavelengths to monitor the Earth – including visible, infrared and microwave – each of which can sense different features or properties. This allows them to be used to investigate and monitor a number of the environmental changes attributable to human activity, such as the availability and quality of water, the health of vegetation and land stability. Radar satellites allow us to monitor some of these even in bad weather as they are not affected by cloud cover.

Making Satellite Data Available & Usable

Although satellite data is recognised as being increasingly beneficial, it is also perceived as expensive and difficult to acquire and use. The Catapult is working with industry to challenge these perceptions and to make the most relevant data available on an ongoing basis. We also recognise that often satellite data is more valuable when presented alongside other information.



Topographical diagram with ISO lines over an open cast mine

Our vision is to create a 'data platform' which combines satellite data with other useful inputs (such as data from terrestrial and airborne sensors, including those on unmanned aerial vehicles [UAVs]) to provide a trusted, transparent and accessible source of information to all stakeholders. This data needs to be available in formats which are useful to everyone involved in monitoring an activity that has an environmental impact, including those who may not have access to business ICT systems and/or who may have limited computer literacy.

This proposed data platform needs to be trustworthy, authoritative and resilient to cyber attacks, and to offer:

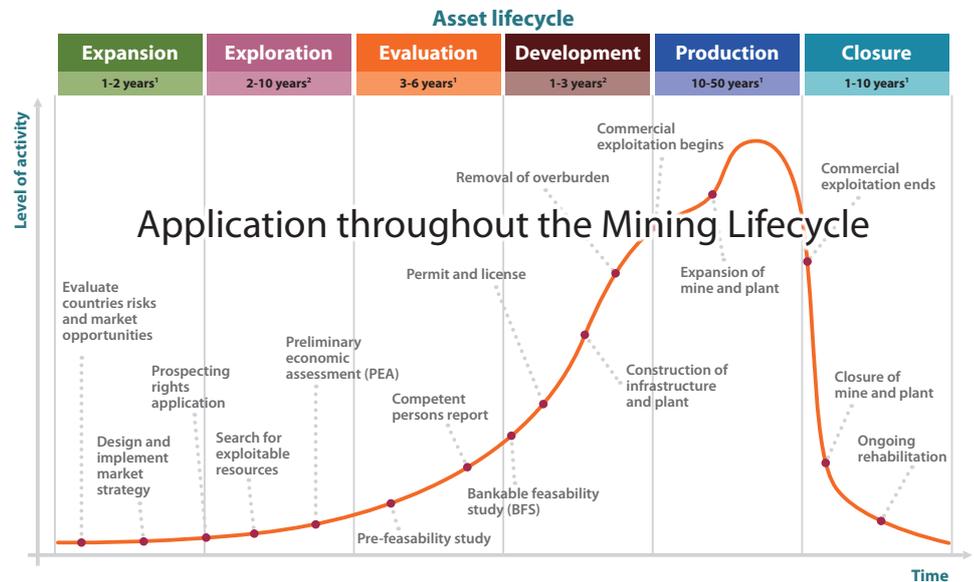
- A full spectrum of proven data, both historic and current, including data from Space (primarily satellite), terrestrial and airborne sensors.
- Data analysis and interpretation, with a high level of imagery and opportunities for client interaction, using algorithms that reflect legislative frameworks and are agreed by all stakeholders.
- Information 'push' by the system (for example using alerts to notify clients of new data) and information 'pull' by clients.
- Access by all concerned parties wherever they are, including non-experts, with imagery delivered via the Internet.

How a Data Platform Will Work in Practice

There are many potential areas of human activity which could be monitored by this kind of data platform; indeed, a single system could be deployed in a number of geographical locations. >

The Catapult has identified mining and mineral extraction as the ideal initial application for the satellite data platform.

The Catapult has identified 'mining and mineral extraction' as an ideal first application for this system, with an initial focus on Chile. This will involve working with mining companies, environmental impact assessors, Government regulators and representatives of affected communities in Chile to demonstrate key features of the concept. We have also identified additional features for development in Colombia and Mexico.



Among the key aims of developing a data platform for this particular application are:

- Reducing inefficient processes in the mining lifecycle.
- Making the economic benefits of the concession available earlier.
- Aligning the various concerns of stakeholders.
- Achieving higher levels of engagement by stakeholders in the environmental dialogue.
- Harmonising the environmental and community dialogue.
- Ensuring governments and industry act responsibly – and are seen to do so.
- Ensuring a safe, secure and healthy environment.
- Reducing costs associated with impact and other studies.
- Producing a 'step and repeat' model that is applicable to various sites and other sectors.

The platform will have a distinctive, independent flavour, as it will be developed neither by the mining companies, nor by regulators, but by a trusted third party organisation that will provide an assured and unambiguous baselining and monitoring service to stakeholders.

The system will use best-of-class inputs from both Space and terrestrial sensors. It will conform to accepted standards in national and international environmental policy, but will also require the exploration and setting of new standards, for example in data access, interpretation and visualisation.

The Future

We believe that the success of the data platform outlined here rests on the credibility and transparency of its foundations. In particular, we believe that the platform should be developed under the leadership and scrutiny of a neutral, trusted organisation; one which is independent of industry and national regulators but which engages experts to ensure the accuracy of the information provided. The Satellite Applications Catapult is uniquely placed to take on this role and is seeking partners globally to further develop the concept and demonstrate its value to all stakeholders.

Electron Building
 Fermi Avenue
 Harwell Oxford
 Didcot
 Oxfordshire
 OX11 0QR

For more information:

T: +44 (0) 1235 567999
 W: sa.catapult.org.uk
 E: info@sa.catapult.org.uk
 @SatAppsCatapult