CAN'T SEE THE WOOD

EARTH OBSERVATION'S BIG SPATIAL DATA PROBLEMS AREN'T GOING TO BE SOLVED BY TECHNOLOGY ALONE – THEY'RE GOING TO NEED SOCIAL AND ECONOMIC SOLUTIONS, TOO, ARGUES RICHARD TIPPER

Hardly an Earth-observation (EO) conference presentation goes by without reference to the Big Data associated with new constellations of satellites and the business opportunities to be derived from the exponentially expanding stream of digits.

According to the European Space Agency (ESA), the new constellation of Sentinel satellites will deliver 8TBs of freely available raw image data every day by 2020. This is just the tip of the iceberg when other space programmes and data products derived from the raw data are considered. As a colleague at a recent conference pointed out, "It's like standing next to a dripping tap, expecting it to suddenly turn into a gushing hosepipe."

The potential applications for this free and relatively accessible data are numerous, ranging across the fields of conservation, development, economic strategy and agriculture. The beneficiaries and potential users range from government institutions, small, medium and large businesses to a raft of different civil society organisations and NGOs.

So, how are we going to cope with these data volumes and ensure that we can extract useful information? Technology companies, including ours, get excited about new ways of handling large, continuous flows of data, extracting arrays of functions for complex polygons for particular timeframes, and then processing these into user-accessible graphics and tables.

Technology is undoubtedly an important part of the solution, but the main issues holding back the exploitation of this Big Data treasure trove are social and economic. In the absence of a clear understanding of what end user content is required and without clear business cases for delivery, the technology on its own will not deliver viable services.

The EO community is therefore grappling with the problem of how to turn vast resources of freely available data into economically viable information products.

A regional solution

A new project supported by the UK Space Agency's International Partnership Space Programme (IPSP) is attempting to address this challenge by setting up virtual regional EO labs in partner countries, starting with stakeholders in the forest sectors of Mexico and Brazil. This project, involving several of the UK's leading forest EO researchers and experts (Leicester University, Edinburgh University, Imperial College, Carbomap) co-ordinated by Ecometrica, working in collaboration with leading EO teams from the National Institute For Space Research in Brazil and

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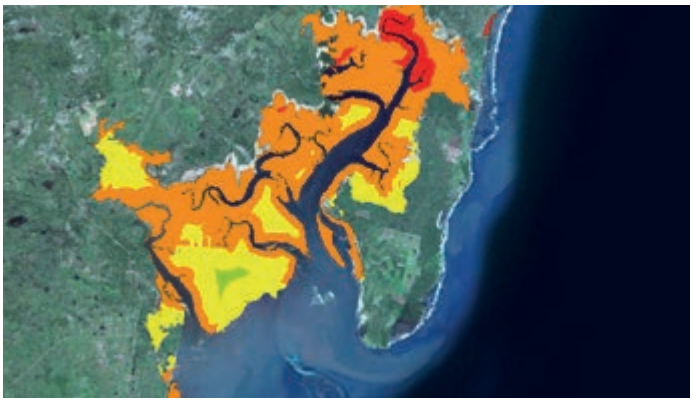
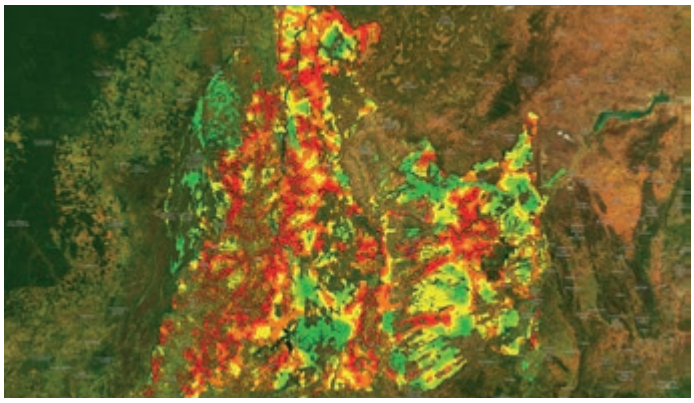


Forests at risk of deforestation in Kenya



Forests at risk of deforestation in Brazil

Mexico's El Colegio de la Frontera Sur, will determine locally relevant EO services for the forest sector.

Initial applications of these EO labs in Brazil and Mexico are likely to be in assessing the risks to different forest ecosystems from agricultural expansion, human induced fires and extraction of timber for fuel and construction. While many projects in both countries have sought to avoid deforestation and degradation the measurement of outcomes these efforts in terms of forest retention and regrowth have yet to be carried out systematically, in a way that informs the design and implementation of project interventions, and guides policies promoting sustainable agriculture and bioenergy.

A challenging task

The most challenging task is to move the current state-of-the-art EO applications in forests from a situation where the information products are fragmented, of variable quality, discontinuous and limited in coverage towards products that have plans for continuity, wall-to-wall coverage and defined quality levels. This is quite a task, since the user base is complex and also fragmented, comprising state and federal agencies, NGOs, businesses and the research community. The EO community has become accustomed to using EO applications to address specific questions, and each organisation has typically resourced the work project by project for their own specific needs. While much of the work done is of good quality, it is often filed away in obscure locations in different media and formats and not really accessible. So while the EO teams in the region have been working hard over several years, the sum total of readily available, useable, queryable wall-to-wall information and data products is disappointing.

Long-term viability

A related challenge is ensuring longterm economic viability of information services. There is still a big gap in the understanding of users in the need to pay for information products even when the raw data is free. The IPSP project is addressing this by stipulating that each regional lab must develop a business model to ensure it can continue to deliver and expand its services.

There is a common perception among end users that EO products should be free and open source. While that may be desirable for civil society, there is a need to understand how such products will be paid for. Data processing, classification, calibration and quality controls all require time, effort and resources that are not readily provided by an open data model in the absence of a benevolent state or multinational IT company. We therefore need to consider models of a keystone client for a given information product and then tiers of free and paid content for users requiring different levels of detail.

Our aim in the short-term is to define a core set of good quality, regularly updated, EO products that can be sustained in the long-term in each country. The core can then be expanded on and improved over time as the value added by the service becomes apparent.

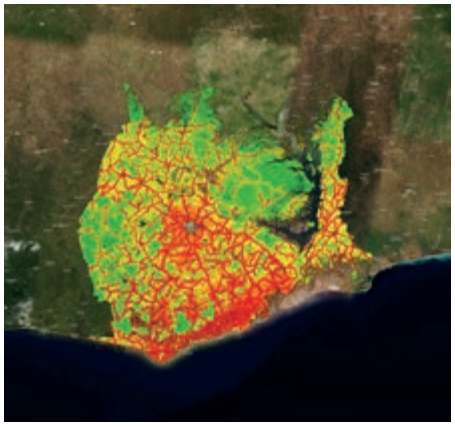
We think that the EO lab model should prove to be a flexible and cost effective delivery mechanism, since it uses scalable cloud computing architecture and can be set up in an existing research organisation without the need for new physical infrastructure. Of course, technology is still important and new advances in the handling of Big Spatial Data allow complex queries to be run on compressed, stacked, flat files without the need to unpack or generate tables.

However, the greatest effort will likely be required in the less glamorous area of dialogue with multiple stakeholders, business planning and collaboration. The sustainability of Big EO Data will come down to good, old-fashioned business sense.

THE SUSTAINABILITY OF BIG EO DATA WILL COME DOWN TO GOOD, OLD-FASHIONED BUSINESS SENSE

Richard Tipper is chairman of Ecometrica (www.ecometrica.com)

Landsat imagery of mangroves in Kenya



Forests at risk of deforestation in Ghana

Brazilian Cerrado agricultural patterns (© NASA/GSFC/METI/ERSDAC/JAROS and US/Japan ASTER Science Team)