Bridging the continents

Tim Jacobs discusses the significance of data-sharing for Earth Observation experts in developing countries and highlights the success stories of DevCoCast, which is helping to drive such work globally

Could you begin by outlining the history and objectives of the DevCoCast project, and explain what inspired its creation?

DevCoCast is part of a larger family of projects, and it was inspired by earlier successes in Africa (notably VGT4Africa project that shared SPOT-VEGETATION data) in taking (pre-) operationally-produced datasets, developed by strong R&D, and to distribute these at very low cost, using GEONETCast, to Earth Observation (EO) experts in developing countries. These experts are in turn trained to use GEONETCast and the data it shares in their research, monitoring and decision-making processes.

We applied the same concept to other products, application thematics and user communities – for example, oceans, fires and desert locusts in Africa, the Yellow Sea in China, or severe weather and agriculture in South America – each time building on existing experiences, capacities, user communities and training networks. Our core activities are:

- Extending the GEONETCast data-sharing capacity by adding a large set of products to the broadcast, some produced in Africa and South America
- Building GEONETCast infrastructure, such as central data-sharing hubs and satellite receivers to extend the network
- Increasing capacities by training EO experts in installing and operating GEONETCast and using the shared EO products
- Integrating the data into real-life applications, such as research, environmental monitoring and decision-making processes. In short, this means working with the EO experts in trying to improve their day-to-day work.

How will you disseminate existing environmental added-value datasets to developing countries? Will this be in real-time, and from where does the data originate?

Different data- and information-providing organisations will use different means; internet-based systems are common. In some cases, the GEONETCast satellite broadcast brings additional advantages, such as low-cost, one-stop access to data from many sources, more reliable access, and access in remote areas where internet capacity is too low for large volumes of data. The EO products can have many origins – for example, within Africa, South America or Europe. They derive mostly from EO satellites (data) or expert analysis thereof (information products), sometimes combined with in situ measurements – for example, for validation of satellite imagery.

Delivery through the GEONETCast broadcast will mostly be in near real-time, with archives of historically-produced datasets available on the producer's websites. Some datasets are produced only offline at irregular intervals.

Through sharing a wide variety of EO products, from raw satellite imagery over derived added value maps/indicators, to model outputs (forecasts) and information bulletins from many sources covering several thematics, DevCoCast shows the versatility and efficacy of using GEONETCast across various applications and user communities.

Could you describe some of the products that will be made available through DevCoCast, and how these can be employed to prepare for, and tackle, serious environmental risks?

There are around 50 different products from 10 providers shared in DevCoCast, some of which can be used for many purposes.

Examples would be maps of vegetation indicators used as input to food security early-warning systems or to monitor agriculture and forests, or water indicators used to monitor drought, for water basin management, or for detecting areas at risk for pests and vector-borne diseases. I might also cite Brazilian severe-weather forecasts used by power companies to monitor the risk to their power lines, fire maps in South Africa used by fire-fighting associations and fire managers of natural parks, or maps of green vegetation dynamics used to trigger surveys by desert locust control teams of potential infestation

sites. We also have examples of ocean data to monitor coastal ecosystems, or to help detect potential illegal fishing.

Are there any particular successes from the project so far that you would like to highlight?

The supported development of free software – notably the ILWIS / GEONETCast toolbox – and its successful use in various training workshops, has been a highlight, as has the routine use by UN-FAO of the green vegetation dynamics maps, produced within the Belgian nationally-funded WorldWideWatch project and distributed in DevCoCast. Likewise, the start-up of the related EAMNET project, extending DevCoCast's efforts for the marine user community in Africa, has been a success, and one which effectively fulfils the DevCoCast goal of ensuring that targeted user communities want to continue using GEONETCast beyond the project's lifetime.

Other successes include the effective demonstration of the marine information services at the GEO-VII Ministerial summit in Beijing in November 2010, and the successful use of the provided data in research in Argentina, and for crop monitoring, as well as the detection of eucalyptus tree reforestation in Brazil. We have also seen the uptake of several DevCoCast-shared products in different services developed by AMESD in Africa.

Sustaining Earth Observation capacities at global scale

Sharing Earth Observation data worldwide is key to successful environmental monitoring and mitigating related risks. The **DevCoCast** project is supporting global sustainable development through improved data-sharing between Europe, Africa, Latin America and China

MANY COUNTRIES, IN particular in Africa and South America, face serious environmental risks and need Earth Observation (EO) data and derived environmental information to help them use the Earth's limited resources in a sustainable manner. Their people depend on these resources for their livelihood, and they constitute vital inputs that keep our economies functioning.

Sharing EO data, information, software and training materials more openly and freely, and learning to work together more closely across continents and disciplines offers many advantages. It can help improve resource efficiency and it is vital in facilitating the open exchange of ideas, forming partnerships, and replicating what is shown to work from one area to the next, while respecting each other's experience and maintaining capacities which have been carefully developed.

FROM SHARING DATA FREELY...

GEONETCast is a global, satellite-based dissemination system to reliably share, at low cost to users, many kinds of environmental data and information. It is a key component of the Global Earth Observation System of Systems (GEOSS, www.earthobservations.org). The 'GEONETCast for and by Developing Countries' (DevCoCast) project, largely funded by the EU's Seventh Framework Programme for Research and Technological Development (FP7), helps pave the way for more sustained use of GEONETCast, in particular in Africa and South America.

Tim Jacobs – an engineer working at the Flemish Institute for Technological Research (VITO) in Belgium – coordinates the DevCoCast project: "GEONETCast is an important global initiative, born from meteorology, that has since proven to offer many benefits to other Earth Observation domains, including monitoring of vegetation, agriculture and food security, ocean ecosystems and productivity, disasters and so on," he explains. "DevCoCast supports this initiative, by building and maintaining capacities to effectively use GEONETCast."

In DevCoCast, many EO products, some produced in Latin America and Africa, are shared freely via GEONETCast. They can be received using low-cost ground reception infrastructure in Africa, the Americas and Europe. More importantly, the actual use of the products by a broad user community is supported through training and building on the existing networks and capacities. DevCoCast is successfully extending GEONETCast infrastructure for the central data flow (the so-called 'hubs'), as well as on the receiver side, extending for instance to the ocean institutes in Africa.

SATELLITE ANTENNA AT INTA, ARGENTINA (© INTA)

...TO IMPROVED DECISION MAKING

Extending beyond meteorology (eg. PUMA project) and vegetation data (VGT4Africa project) not only requires a more elaborate partnership, but also leverages experiences and bridges a whole range of international projects. The efforts support one partner's deployment of receivers for fire monitoring in Southern Africa (linking to SAFNET and AMESD), for example, while the ocean partners have set up a related project – EAMNET (FP7) – to further strengthen the EU-African network that uses GEONETCast for coastal and marine observations.

Almost all countries in Africa and Latin America – particularly Brazil and Argentina – and to a lesser extent China and Europe, will gain from DevCoCast, and the benefits from reliable, low-cost access to environmental data and information are numerous. For decision makers, this means the ability to make better or faster decisions, which in turn offer mitigation of risks (eg. from severe weather or out-of-control fire). For routine environment monitoring, it can increase efficiency, as satellites quickly cover large areas and can identify 'hot spots' to survey more closely. This can mean the difference between surveying a large, sparsely-populated country on a random basis and surveying it by targeted, GPS-located sites. At the same time, reliable, timely access to data allows monitoring agencies to create bulletins or reports for their ministries faster, or more frequently. Adding more data can also bring greater insight, or a more comprehensive analysis of the situation, increasing the quality of research and the comprehensiveness of monitoring; it might even enable data access for the first time.

UNDERSTANDING USER NEEDS

Over the years, the DevCoCast partners have trained and supported hundreds of users. The DevCoCast training efforts are cross-continental and cross-thematic, and range from GEONETCast installation or operation to the applied use of the received products in different thematic areas. Whether or not training is of higher value than data access, more generic user support or even the free software depends on the objectives and the participants.

To build long-term sustainability, training efforts and training material development are crucial in reaching out to education specialists, such as universities. Decision makers already have some level of experience and training, so mostly need effective, customised data access. Direct user support, such as help desks, is also effective. DevCoCast workshops have enjoyed a degree of success with stakeholders and target audiences in developing countries, with a large number of attendance requests for the IEEE IGARSS course (2009) and the advanced course at the ITC (2011), with reports showing a need for further training following the INPE online courses, and regular training requests to the help desks.

PHOTOGRAPH FROM 2-WEEKS ADVANCED TRAINING COURSE AT ITC
(© UNIVERSITY TWENTE, FACULTY ITC)

Jacobs believes it is important to find ways to remove obstacles in data access, training and software development, and to really listen to and discuss specific requirements with your counterparts/users in other countries and continents: "With low-cost, reliable data access, free training material and software at nearly everyone's fingertips now, many pieces of the puzzle are in place and just need to be fitted together properly, keeping in mind the final use. Resolving even minor bottlenecks in their work can often go a long way," he summarises.

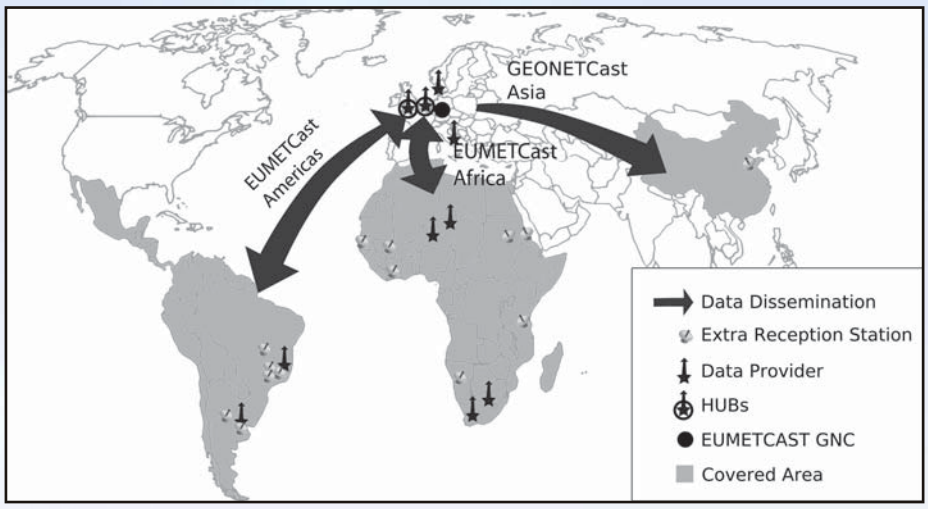
FUTURE DEVELOPMENT

The continuity of DevCoCast's efforts beyond September 2011 is the subject of ongoing discussions with several stakeholders. Nevertheless, GEONETCast, as the central technology that made DevCoCast possible, is a proven success, and continues to grow and evolve. Moving forward it is clear that there is strong potential and consequent need for continuity to meet several upcoming challenges: "Whereas sustainability of EUMETCast in Europe and Africa is assured for the coming years, thanks to a commitment by EUMETSAT, the situation in South America is different, and faces important milestones to prove its long-term added value in the coming two years," he explains. "Likewise, China's CMACast system has undergone a major upgrade and is deploying a large network of receivers, opening up over Asia. This promises many opportunities, as does the addition of Russia's Mitra system."

Further development is already underway – topics for PhD-level research have been identified and are starting to take shape. Similar projects are starting to address areas such as Central Asia, taking GEONETCast data closer to people in the field. The EAMNET project focuses on the ocean thematic, taking capacity building significantly further – in particular towards universities – while AGRICAB will concentrate on agriculture and forests in Africa and improving the distribution of high-resolution data following DevCoCast's pioneering distribution of CBERS.

DevCoCast builds on what exists – products, training networks, EO user communities and GEONETCast – as well as existing expertise and capacities in developing countries, to show how the low-cost, reliable sharing of EO products, combined with free software and training, can really make a difference.

DEVCOCAST PRODUCT SHARING OVERVIEW © VITO



INTELLIGENCE

DEVCOCAST

GEONETCAST FOR AND BY DEVELOPING COUNTRIES

OBJECTIVES

To embed GEONETCast and the data it offers into research, environmental monitoring and planning, and decision making processes, in support of sustainable development.

PARTNERS

Flemish Institute for Technological Research NV, Belgium • **African Centre of Meteorological Application for Development**, Niger • **Aghrymet regional centre**, Niger • **Food Supply Agency of the Ministry of Agriculture**, Brazil • **University of Cordoba – Centre for Surveying and Assessment of Agriculture and Natural Resources**, Argentina • **Council for Scientific and Industrial Research - Meraka Institute**, South Africa • **Danish Meteorological Institute**, Denmark • **European Organisation for the Exploitation of Meteorological Satellites**, Germany • **National Institute for Space Research**, Brazil • **National Institute of Agriculture Technology**, Argentina • **University Twente – Faculty of Geo-Information Science and Earth Observation**, The Netherlands • **Joint Research Centre - Institute for Environment and Sustainability**, Italy • **University of Cape Town – Marine Research Institute**, South Africa • **Natural Environment Research Council – National Oceanography Center Southampton**, UK • **Plymouth Marine Laboratory**, UK

FUNDING

Funded under the EU's Seventh Framework Programme (FP7). Contract no. 211307

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