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Trees are the easiest way we know to sequester carbon from the atmosphere. However, there are still huge problems in measuring how much carbon is involved. Spatial technologies will be an important part of the solution but it will need a revolution in the industry. (see p.35)
Inside GEOSS

GE OSS is starting to make a difference.

PARVIZ TARIKHI

At the World Summit on Sustainable Development in Johannesburg in 2002, delegates highlighted the urgency of co-ordinated Earth observation.

The following year, the meeting of the Group of Eight leading industrialised countries (the G8) in Evian, France, gave shape to this urgency by setting priorities for Earth observation. These meetings recognised that international collaboration is essential if Earth observation is to support decision-making in an environmentally stressed world. As a result, the first Earth Observation Summit was convened in Washington, DC in July 2003. The meeting agreed to establish the ad hoc intergovernmental Group on Earth Observations. Its first task was to draft a 10-year implementation plan.

In February 2005, at the third summit in Brussels, the implementation plan was endorsed and the GEO was authorised to carry it out. The G8 supported the establishment of the Global Earth Observation System of Systems (GEOSS) in the Gleneagles Plan of Action released in July 2005.

The plan defines a vision statement for GEOSS, its purpose and scope, and expected benefits. This was given shape by GEO-1, the first meeting of the plenary council, which established four committees: architecture and data, science and technology, and user interface and capacity building. It also established a working group for tsunami activities. GEO-1 was held in the aftermath of the Boxing Day tsunami, so ways to combat the effects of tsunamis were very much on the minds of delegates.

A common infrastructure allows users to access the services available through GEOSS. It consists of an internet portal, a clearinghouse, a components and services registry, and a standards registry.

The clearinghouse is the engine that drives the entire system. It connects directly to the various components and services, collects and searches their information, and distributes data and services to the user via the portal.

The components and services registry is similar to a library catalogue. The governments and organisations that contribute components and services to the system provide details about the name, contents, and management of their contribution. This assists the clearinghouse – and ultimately the user – to identify resources that may be of interest.

The standards and interoperability registry provides a framework within which partners can develop new projects. It is vital to the ability of GEOSS to function as a true system of systems and to provide integrated information and services.

The implementation plan explicitly acknowledges the importance of data sharing in achieving the GEOSS vision. It suggests that full and open exchange of data, metadata and products is vital if the plan is to succeed. It also recognises the limitations imposed by national policies and legislation.

The plan argues for sharing based on minimum time delay and at minimum cost. It also encourages reproduction for research and education.

It functions as a true system of systems, to provide integrated information and services...

It acknowledges that other technologies will have a role in implementing its aims. Satellite navigation systems, geoinformation, spatial data management and data handling systems will all be required.

With these high-level principles and plans in place, GEO has been moving to implement some more specific measures aimed at making a difference. For instance, a recent joint initiative with the UN Office for Outer Space Affairs has established the necessary mechanisms to enable GEO members to authorise access to the International Charter on Space and Major Disasters. This will speed up responses to requests for data in the case of a disaster.

Its scope may be expanded to allow for pre-event tasking. This would occur when events can be adequately forecast to justify the action – for instance, with wild fires, some floods and coastal disasters, and volcanic eruptions. The expanded scope would also encompass...
training of local users in affected areas, particularly in developing countries.

GEO already makes a notable contribution to disaster relief through its collaboration with the International Telecommunication Union. This aims to promote the implementation of the international standards for all-media public warnings for disaster and emergency situations.

An agreement between ITU and the GEO secretariat is aimed at strengthening this co-operation. Collaboration between the two organisations will provide for the allocation and protection of the dedicated radio frequencies used by remote sensing satellites and Earth-based monitors to collect data on the global environment.

There are several projects underway that will lead to specific data products. For instance, Japan’s Ministry of Economy, Trade and Industry (METI) will team with NASA to contribute a global digital elevation model to the world’s scientific communities under the auspices of GEOSS.

They will contribute a global DEM to the world’s scientific communities...

The DEM will be produced by the Japanese Earth Remote Sensing Data Analysis Centre. It will use data acquired from METI’s Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) sensor on board NASA’s Terra satellite.

The instrument has been collecting data since February 2000. It provides high-resolution images of the Earth in 15 different bands ranging from visible to thermal infrared light. The resolution ranges between 15 and 90 metres.

Its data is used to create detailed maps of surface temperature of land, emissivity, reflectance, and elevation. The resulting 30 metre DEM will be widely used in many applications with important benefits for society. It will be available at no cost to the worldwide user community early in 2009 as an ASTER data product.

GEO held a ministerial summit in Cape Town on 30 November 2007. At this time China and Brazil resolved to grant free downlink licences to stations that wish to receive, process, store and distribute imagery from the China-Brazil Earth Resources Satellite-2B (CBERS-2B). CBERS is a co-operation program between the two countries, which develops and operates Earth observation satellites.

Brazil’s Instituto Nacional de Pesquisas Espaciais (the National Institute of Space Research), and Agência Espacial Brasileira (Brazilian Space Agency), and the Academy for Space Technology and the National Space Administration in China are already working with agencies in South Africa, Spain and Italy. They plan to sign a memorandum of understanding to cover the distribution of CBERS satellites imagery. Downlink to the South African station has been successfully tested.

Creating common tools is a significant aspect of GEOSS. Since 2006, GEO has been pursuing a demonstration project called GeonetCast. The aim is to create a system to transmit environmental satellite and products from GEOSS to users through a global network of communications satellites.

In the scheme, low-cost user terminals provide access to a NOAA service called GeonetCast Americas. EUMETCast and FengyunCast data exchange are also available. The dissemination of exchanged data starts this year. There are also plans to include the Russian MITRA system.

GEO is examining how this system could evolve into a data collection system.

The organisation is also examining other opportunities for co-operation among the world’s remote sensors. One project under discussion is the use of the 66 satellites of the Iridium Next constellation for small remote sensing instruments. Iridium provides satellite-based communications to handsets globally.

Clearly, it would be too big a task for a single agency to build 66 instruments, unless they were very small. However, a group with the reach of GEO might do it. If they could, it would certainly change remote sensing.

Parviz Tariki is a space science and technology specialist in Iran. He is already defending his thesis for a PhD degree in physics focusing on microwave remote sensing. He has been involved with the United Nations Committee on the Peaceful Uses of Outer Space (UN-COPUOS) since 2000. He is also a freelance journalist and technical writer.