

## **Discussion Paper on Broadening the Impact of Earth Observations and GEO**

This Document is submitted to the GEO-XVI Plenary for information.

### **1 [GLOBAL] ECONOMIC IMPACT**

There have been many economic assessments that examine the value of Earth observations, most recently a review of the Landsat programme in the United States that is estimated to contribute in excess of \$4 billion annually to the US economy, as well as considerably outside the US. The Copernicus programme is aimed at developing European information services based on satellite Earth observation and in situ (non-space) data. Since its operation in 2014, the European Union has already invested €9.6 billion in the programme with an additional €5.8 billion allocation proposed for 2021 – 2027. The programme has been assessed as providing economic benefits exceeding the investment, as well as non-monetary benefits. Similar investments in Earth observations are happening all over the world, from Africa to Asia, Europe to the Americas. GEO plays a unique role in bringing together science, technology, policy and business to address important global, regional and local needs.

One example of a global activity in GEO using the open data and information resources that is having a positive impact in many countries is GEOGLAM: GEO's global agricultural monitoring flagship initiative. Following the global food price hikes in 2007/08 and 2010, the G20 Heads of States endorsed in their 2011 Declaration both Global Agricultural Monitoring (GEOGLAM) and the Agricultural Market Information System (AMIS). The role of GEOGLAM is to coordinate satellite monitoring observation systems in different regions of the world in order to enhance crop production projections, weather forecasting, the coordination of policy action in times of market uncertainty. Building on the success of the Crop Monitor for the Agricultural Market Information System (AMIS), which provides crop condition assessments for the main producer and exporter countries, GEOGLAM also produces a crop monitor for countries at risk of food insecurity. These food security assessments and warning systems have led to new GEO partnerships with many of the major global humanitarian organizations, including the United States Agency for International Development (USAID), the United Nations World Food Programme (WFP), the European Commission Joint Research Centre (JRC), the Food and Agriculture Organization of the United Nations (FAO), the Intergovernmental Authority on Development's Climate Prediction and Application Centre (ICPAC) and GEOGLAM Asia Rice.

As highlighted through the activities of the GEO Work Programme, Earth observations have underpinned a number of critical areas for economic growth and environmental sustainability over the last 40 years. Trusted, freely available Earth observation enable insights for decision making across multiple temporal and spatial scales. One of the key

challenges facing society today is the need for collaboration across multiple domains, disciplines and countries, notably linking science and policy. This is where the convening power of GEO is important and helps to bring together regional and global activities.

The *GEO Mexico City Declaration (2015)* and the *GEO Strategic Plan 2016-2025: Implementing GEOSS* set a direction towards inclusivity and engagement with a broader set of stakeholders, including the commercial sector. This direction was further elaborated in GEO's *Rules of Engagement with the Commercial Sector* (contained in the *GEO Rules of Procedure* update approved at the GEO-XIV Plenary, Washington D.C., 2017), where commercial products and services based on Earth observations are seen as providing important public and private benefits, fostering scientific and technological innovation and spurring economic development.

- To this end, during the GEO-XV Plenary in Kyoto, Japan 2018, GEO approved the creation of the GEO Associate membership category which paves the way for commercial (as well as non-governmental, not-for-profit and civil society organizations) to join governments and international organizations as official collaborators of GEO, in its quest to improve the availability, access and use of Earth observations for a sustainable planet. Eligible organizations for inclusion in the Associate category include companies and national associations of companies that have a mandate related to Earth observations and that are registered in a GEO Member territory.

A good illustration of the benefits of commercial sector engagement is the GEO-Amazon Web Services Earth Observation Cloud Credits Programme, which offers developing countries access to US\$1.5 million in cloud services credits to help with the hosting, processing and analysis of big Earth observation data for sustainable development. A similar arrangement concluded with Sinergise allows €300,000 in credits to assist projects make use of its Sentinel Hub, simplifying the acquisition of Sentinel data. Other opportunities for collaboration are anticipated to materialize in response to the *GEO Announcement of Opportunity: Earth Observation Cloud Services*, released in September 2019. These partnerships illustrate how GEO is working successfully with the commercial sector, as the credits being made available are intended to enable government agencies and research institutions to build Earth observations applications that support environmental and development goals, including the Sendai Framework for Disaster Risk Reduction, the Paris Agreement and the United Nations Sustainable Development Goals.

## 2 REGIONAL IMPACT

GEO offers the opportunity for governments to work at the regional scale across international boundaries. Experience has shown that working towards a concrete, shared goal at the regional scale permits the countries involved to more readily define the scope of the common challenge, which then provides the impetus to share data, technology and best practices as they work together towards finding a solution. One of the most successful examples of this type of regional cooperation with GEO has been the Asian Water Cycle Initiative (AWCI) which has developed integrated water resources management (IWRM) tools and strategies for using Earth observations, as well as developing capacity, across 18 countries in Asia.

Guided by Members of the GEO Caucuses, Regional GEO countries can network as they seek to tackle priority issues at a smaller, more practical scale than would otherwise be possible through the global approach. Conversely, they can downscale and customize global applications of Earth observations developed through the GEO Work Programme for particular needs regionally. Examples of impacts delivered by means of the Regional GEO organizational structure:

- **AfriGEO:** Enhanced food security through AfriGAM, (regional African coordination activity for GEOGLAM activities), action plan and concept developed.
- **AmeriGEO:** Implementation of the Pole-to-Pole Marine Biodiversity Observation Network (MBON) project for ecosystem-based management of fisheries across Canada, the United States of America, Mexico Belize, Costa Rica, Honduras, Panama and Brazil.
- **Asia-Oceania GEO:** Supported the establishment of Open Data Cubes (ODCs) in Australia, Cambodia and Vietnam, with several other countries exploring deployments. Mobilized agencies across the region to provide coordinated access to data and tools for three priority study areas: Samoa, the Mekong River delta and the Kanchenjunga landscape.”
- **EuroGEO:** Development of applications focused on specific user defined scenarios such as identification and use of appropriate climate information for defining building regulations with respect to flood resilience. These very specific applications are where EuroGEO provides added-value, as they are not explicitly addressed by Copernicus Core Services.

### 3 LOCAL IMPACT

The *GEO Strategic Plan 2016-2025: Implementing GEOSS* emphasizes that the scope of GEO includes an “end-to-end process of identifying needs, ensuring the availability of data with which to develop information for addressing societal challenges, and transforming that information into knowledge through the generation of products and services for end-users.”

GEO thus has the mission of improving the capacity of all its members to use Earth observation data for decision making at multiple levels, from global to regional, to local. Achieving this goal of broadening access to global knowledge requires a combination of good practices from the GEO community with long-term capacity development.

Opportunities also exist for engaging the commercial sector in delivering products and services that are tailored to meet user needs at the national and local levels. The GEO-Amazon Earth Observation Cloud Credits Programme is an example of how a partnership between GEO and the commercial sector can provide an opportunity to develop new capacities in the derivation of Earth observation applications. The Programme serves to broaden engagement across GEO by offering developing countries access to free cloud services. This arrangement lowers the barrier for these countries with respect to hosting, processing and analyzing big Earth observation data for sustainable development.

#### 4 ENGAGING AND ENABLING COMMUNITIES AND INSTITUTIONS

GEO recognizes there is a diverse community of “end-users” within its Members that encompasses entities such as government departments making policy or regulatory decisions, or the commercial sector taking business decisions.

To deliver against the needs of such a broad spectrum of potential users of Earth observations, a framework based on the pillars of: *policy- and country-relevant objectives, using project-based methodology, to deliver knowledge-based tangible results for decision-support* is needed in order to underpin and guide activities of the GEO. These pillars provide a consistent approach for GEO structuring activities as its communities identify, select, evaluate and implement actions towards a results-oriented GEOSS by means of its Flagships, Initiatives and Community Activities. Simultaneously, GEO must broaden global access to knowledge through integration of best practices from the GEO community with long-term capacity development, to strengthen the communities and institutions of its Members.

The GEO community can bridge the gap between those who collect Earth observations and the wide variety of potential end-users who need products and services of which Earth observations form a part. This engagement could be strengthened in order to better leverage the access to decision-makers that enabling (or helper) communities and government institutions can afford, and to support and inform the above-mentioned pillars for GEO Work Programme development.

#### 5 CHALLENGES AND OPPORTUNITIES FOR BROADENING ENGAGEMENT

Related to the impact areas outlined above, several challenges and/or opportunities with respect to broadening engagement across the GEO Community exist:

##### Economic

Challenges to defining collaboration between GEO and the commercial sector include:

- Identifying good practice and developing a clear model for commercial sector engagement in the GEO Work Programme, highlighting reasons for the sector to participate more broadly in GEO.
- Articulating the role that the commercial sector plays in the EO value chain, notably as technologies aligned with big data/science advance more quickly than policy.
- Developing opportunities to network and potentially develop new business with the GEO community (i.e. with GEO Members and Participating Organizations).

A number of commercial sector organisations have already committed to supporting the GEO Week 2019 Industry Track where they can share their experience, knowledge and knowhow, as well as discuss their approaches to solutions for challenges facing the EO sector.

##### Regional

By definition, when working as a regional unit, there may be the tendency for each Regional GEO to work somewhat in isolation from the broader GEO community. This

could lead to insufficient recognition of opportunities for regional collaboration, or even to duplication of efforts. Activities initiated or led by the Regional GEOs must therefore resist the tendency to “reinvent the wheel” by keeping aware of the accomplishments of GEO at the global scale, notably through the GEO Work Programme, as they seek to find solutions applicable at the regional level and vice versa for global activities, so that synergies between global and regional activities can be generated.

### Local

Challenges for GEO remain in terms of making the Earth observation resources available and useful at the local level via the GEOSS Platform, creating barriers to engagement of stakeholders, include:

- Basic awareness of Earth observations, the GEOSS platform and technical expertise for effective exploitation.
- Implementation of a co-design/co-production approach to Earth observation application development to transform data into fit-for-purpose knowledge-based products and services while ensuring ownership and uptake for decision-making at the local level.
- Institutional considerations as to how Earth observations products and services will be operated and supported over the long-term.

### Engaging and Enabling Communities and Institutions

A key challenge is the empowerment of government institutions, particularly those in developing countries, to access and use Earth observations. Currently, many activities of the GEO Work Programme are supported by short-term research and innovation grants. Such a financing model presents a limiting factor to the provision of operational services and resources commensurate with the ambitions of the GEO Engagement Priorities and the GEO Strategic Plan. These grants are mostly focused on innovation, and often do not include a provision for moving from demonstration on pilot scale to operational services. As the positive example of the Digital Earth Africa initiative shows, projects with multi-year funding that include a provision for transition towards operational services and stakeholder engagement provide better means for GEO to achieve its goals. Such project funding could come from GEO Members, Participating Organizations, external sources such as philanthropies, and global financing mechanisms such as the Green Climate Fund and the Adaptation Fund. GEO Members are invited to propose additional means of supporting GEO Work Programme activities through project funding on either an individual or collective basis.

Beyond this, those communities that can help bridge the gap between EO data, products and services and the one hand, and decision-making on the other should be further engaged by GEO. These “enabling communities” feature a variety of individuals who represent a broad spectrum of end-users, from national and local governments, to businesses and civil society. Their deep understanding and knowledge of science and technology can help build trust-based relationships across user communities as they show the way to include the benefits of EO into decision-making. Coupled with the efforts discussed above, enabling communities could contribute to broadening the impact of EO at national, regional and local levels.