

## Vision for GEO 2025

### PART A: THE CASE FOR A RENEWED GEO

#### 1 ADDRESSING SOCIETAL CHALLENGES

Food security - water security - energy security - resilience to natural hazards - mitigation of, and adaptation to, climate change - developing a sustainable economy: these are among our greatest global challenges. These challenges are driven by Earth's changing, interconnected, environmental conditions, in concert with human activities and policy decisions made at every level of a global society. To address these challenges wisely, Ministers, decision-makers and citizens around the world require comprehensive, integrated observations, data and information about the Earth's changing conditions. The intergovernmental Group on Earth Observations (GEO) was launched in 2005 to assemble a fuller picture of our planet, and to enable the science-informed decision-making needed to drive sound policy for the benefit of society. A renewed GEO will expand its commitment to sharing, discovery, access and use of Earth observations in its second decade.

#### 2 VISION

GEO is a partnership of governments and organizations that envisions “a future wherein decisions and actions for the benefit of humankind are informed by coordinated, comprehensive and sustained Earth observations, and information.” At the time of GEO's creation in 2005, Ministers endorsed a 10-Year Implementation Plan containing specific actions designed to promote full and open access to Earth observations, data and information, and work towards building a Global Earth Observation System of Systems (GEOSS) to meet the need for “timely, quality, long-term, global information as the basis for sound decision-making.”<sup>1</sup>

Between 2005 and 2010, GEO began laying the foundation for achieving GEOSS by establishing and refining its diverse program of work, which encompasses a broad array of societal challenges. Key gaps were identified, and Ministers met twice in Cape Town (2007) and Beijing (2010) to renew their commitment to the process. Between 2010 and 2013, GEO's Membership grew to 90 governments and more than 60 Participating Organizations. Examples of new value to society have begun to emerge from the creation of GEO, and steady progress toward the broad GEOSS vision is being realized.

As GEO approaches the end of its first 10-year mandate, the Government of Switzerland has invited Ministers from all GEO Member governments and leaders from all GEO Participating Organizations to Geneva in early 2014 to extend their political commitment to the GEO vision through 2025. The goal is to further leverage GEO's substantial accomplishments to improve Earth observations, as well as to increase the availability of Earth observations, data, and information (see Section 3 below) for the purposes of:

- a) Achieving national and international objectives for a resilient society, sustainable economy and healthy environment worldwide;

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<sup>1</sup> *The Global Earth Observation System of Systems 10-Year Implementation Plan, 2005, p.1*

- b) Addressing global and regional challenges by deepening understanding of Earth system processes and improving the link between scientific understanding and policymaking at these levels; and
- c) Sustainably growing economies, reducing redundancy and reducing costs to public sector budgets through innovation and shared collaborations.

The representatives of GEO's Members and Participating Organizations assembled in the GEO Plenary, having assessed GEO's progress to date and the continuing global need for integrated, comprehensive Earth observations, recommend that Ministers renew GEO's mandate through 2025.

### 3 MAINTAINING GEO'S FRAMEWORK FOR SUCCESS

GEO's value rests in its unique capability to connect Earth observation data to societal needs in high-impact ways. GEO's achievements to date can be characterized broadly in five areas:

- **Data sharing** - GEO has significantly advanced international sharing of Earth observation and environmental data through the world-wide release and exchange of thousands of data sets of universal value, previously available for only limited use. This has proven particularly valuable for both global water research and land and natural resource management, contributing to sustainable economies and environments;
- **Data access and integration** - To advance data interoperability, GEO has effectively promoted the adoption of common standards, and developed pilot phase infrastructure and information architectures. This has been critical to improving the discovery, access, integration and use of Earth observations, with resulting progress in GEO projects concerning global drought and flood information, and the link between air quality and the influence of climate variables on human health, among other areas;
- **Major new global monitoring initiatives** - GEO has fostered substantial collaboration among governments and international organizations by creating four new global Earth observation initiatives: 1) monitoring biodiversity; 2) understanding the stock and flow of carbon at the global level with specific attention given to the world's forests; 3) improving global crop yield forecasts; and 4) coordinating the monitoring of major seismic and volcanic zones. For each, GEO identified specific observation gaps and – often with substantial support from Members and Participating Organizations – launched targeted initiatives, harmonized *in situ* and satellite observations, developed technical tools, communities of practice and, as appropriate, the formal agreements required to begin closing the gaps. These initiatives enable decision-makers to address global challenges such as food security, human health and safety, and maintaining a healthy environment, globally and in each country and region;
- **Regional coordination, research and innovation** - GEO has supported vital regional initiatives focused on the safety and security of the most vulnerable populations, such as water management in Asia and Africa; disaster response in Central America; and environmental monitoring in East Africa and the Himalayas; and
- **User-driven networks and projects** - GEO has advanced new Earth observation efforts by working to close critical information gaps via the creation and development of new, user-driven networks and projects. Examples include the monitoring of mercury compounds and assessing global solar and wind resources, among other efforts to address specific societal needs.

In addition, GEO's open, welcoming and voluntary approach has brought 90 Member governments and 67 international Participating Organizations together to coordinate and integrate data across essential socio-economic sectors, scientific and technical disciplines, and geographic

borders. No other organization holds GEO's distinctly critical mandate and flexible governance and management arrangements.

#### 4 NEW GEO ACTIVITIES THROUGH 2025

To continue leveraging these successes through 2025, GEO will engage more deeply with its Participating Organizations, and strengthen GEO's role as a partner for major multilateral agreements and conventions, and as a mechanism for regional capacity building and proactive engagement with developing countries. Through sector-specific, public-private fora and other platforms for dialogue, GEO will further seek to sustain public sector investment in Earth observations while also increasing engagement with the private sector to spur innovations in the exchange and dissemination of, as well as closing gaps in, Earth observations, data and information for the benefit of society.

The GEO Work Plan adopted each year by the GEO Plenary, contains a number of ideas currently in development that, if successful, will mark success for GEO's second decade. Examples of the voluntary, exploratory projects of the current work plan include:

- a global operational ocean forecasting and information system to contribute to healthy oceans;
- a suite of globally agreed land cover data sets;
- a global urban observation system;
- a global wildfire information system to better manage forest fire threats;
- a global drought information system to contribute to sustainable agriculture and food security;
- a global carbon analysis system to better understand climate change;
- a global mountain observation and information network; and
- an information service for cold regions to contribute to the protection of these fragile and unique global ecosystems, in collaboration, where appropriate, with existing international coordination mechanisms, particularly in the Arctic.

To support the development of these and other potential activities highlighted in the annual GEO Work Plan, Part B below outlines consensus recommendations of the GEO Plenary for specific GEO process and activity goals for the decade ahead.

New elements include:

- sustaining an information system that provides access to the data and products of its Member governments and Participating Organizations;
- fostering global initiatives that address identified gaps in Earth observation information including, where appropriate, facilitating the development of partnerships to identify relevant stake-holders (end-users), as well as development of associated services and arranging for their subsequent uptake by relevant entities;
- mobilizing appropriate resources for Earth observation capacity building with a specific emphasis on developing countries through partnerships with relevant governmental, non-governmental and multilateral development institutions;
- allowing for the possibility of modifications to GEO's current Societal Benefit Area structure, exploring linkages to sustainable development themes;
- making a renewed effort, where possible, to collaborate with the private sector while remaining an intergovernmental partnership; and
- developing a specific and strengthened framework or mechanism for steady resource commitments to GEOSS, from both public and non-public sources, while relying on the principle of voluntary contributions.

Part B below outlines initial consensus recommendations of the GEO Plenary for specific GEO process and activity goals for the decade ahead. By the end of 2015, GEO will document the completion of activities under its first 10-year Implementation Plan and substantially elaborate on the below recommendations in the form of a new Implementation Plan for endorsement by Ministers.

## **PART B: RECOMMENDATIONS FOR GEO THROUGH 2025** (for ADOPTION by GEO-X Plenary)

In the 2010 Beijing Ministerial Declaration, the GEO community resolved to review recommendations for the governance, role and future work of GEO through 2025, and to take the necessary decisions, at the next Ministerial Summit. In response to this action, and building on the results of the first ten years of GEO, the GEO-X Plenary is requested to first adopt the following recommendations. Ministers assembled at the Geneva Ministerial Summit will then be invited to endorse these recommendations as referenced in the Geneva Ministerial Declaration.

### **Recommendation 1: Renew GEO and GEOSS for Greater Societal Impacts**

The Group on Earth Observations (GEO):

- is a unique global initiative mandated to coordinate and facilitate the integration of, and access to the data from atmosphere, land and ocean observing networks (both *in situ* and remote sensing) and their associated information systems;
- occupies a key, strategic, upstream coordination position in the international community with respect to observations, data and information about the Earth system in support of other major initiatives; and
- brings together Governments and all relevant intergovernmental, international and regional organizations with an interest in Earth observations under a flexible, voluntary framework for coordinating strategies and investments, as well as developing new initiatives, through the on-going implementation of the Global Earth Observation System of Systems (GEOSS).

To develop and fully utilise a global observing system is a challenge beyond the ability of any single nation, organisation or academic discipline acting independently. GEO is making significant progress towards achieving this goal and should be given a renewed mandate to further implement GEOSS through 2025.

Therefore, GEO and the implementation of the GEOSS will be renewed through 2025.

### **Recommendation 2: GEO Strategic Objectives**

Considering the increasing demand for Earth observations required to address sustainable development needs and future challenges, and inform decision-makers, GEO will focus on the following three Strategic Objectives through 2025:

- Coordinating strategies for acquiring Earth observations, seeking active collaboration with relevant existing and emerging global initiatives with complementary mandates to both ***promote full and open access to Earth observation data, and strengthen Earth observing networks, strategic planning and identification of the needs for applications and services***<sup>2</sup>;
- Facilitating enhanced access to: 1) ***national, regional and global Earth observation data and information*** (including “big data”<sup>3</sup>) by implementing a robust and user friendly GEOSS information system that links available systems, also taking advantage of repositories of “big

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<sup>2</sup>Note: In the context of this paper, the term “service” is defined as the delivery of products based on Earth observation data and information addressing user needs through the coordinated use of the infrastructure and assets of the Members and Participation Organizations.

<sup>3</sup>Note: in the context of this paper, the term “big data” is defined as collections of data sets so large and complex that it becomes difficult to process them using on-hand database management tools or traditional data processing applications. The challenges include capture, curation, storage, search, sharing, transfer, analysis and visualization.

data"; and 2) *tools to transform the data and information into useable formats for resource management and decision-making*;

- Fostering *global initiatives* that address identified gaps in Earth observation information including, where appropriate, facilitating the development of associated services and arranging for their subsequent uptake by relevant entities.

### **Recommendation 3: Societal Challenges to be addressed through GEO post-2015**

GEO will maintain its current working structure organized around coordinating acquisition of, and providing access to, the Earth observations needed to address societal challenges, initially referred to as Societal Benefit Areas, which currently include the following:

- Reducing risks and loss of life and property from natural and human-induced disasters;
- Understanding environmental factors affecting human health and well-being;
- Improving management of energy resources;
- Understanding, assessing, predicting, mitigating and adapting to climate variability and change;
- Improving water-resource management through better understanding of the water cycle;
- Improving weather information, forecasting and warning;
- Improving the management and protection of terrestrial, coastal and marine ecosystems;
- Supporting sustainable agriculture and combating desertification; and
- Understanding, monitoring and conserving biodiversity.

At the same time, GEO will also allow for the possibility of modifications, recognizing the cross-cutting and inter-related nature of these challenges and exploring linkages to sustainable development themes. GEO and GEOSS will build stronger relationships, both upstream and downstream, with complementary global Earth observations organizations, including those UN Agencies that are already Participating Organizations, as well other national, regional and global entities.

### **Recommendation 4: New Implementation Plan for GEOSS through 2025**

During the period 2014-2015 a new Implementation Plan for GEOSS through 2025 will be developed, fully endorsing and extending the concepts in the current GEOSS 10-Year Implementation Plan for 2005-2015, while drawing upon lessons learned. The new Plan will also take into account the GEOSS Strategic Targets agreed at GEO-VI in 2009, as well as update them, and will include the following elements:

#### **4.1 GEO Core Functions:**

To advance the Strategic Objectives of GEO while building upon on its current activities, the resources and activities of GEO will continue to be dedicated to the following Core Functions, in close cooperation with user communities:

- Strengthening observation systems (space-based, airborne and particularly *in situ*) and networks among observation systems;
- Advancing interoperability and integration of Earth observation data;
- Promoting and implementing the GEOSS Data Sharing Principles;
- Building and sustaining an information system that provides access to the data and products of its Members and Participating Organizations;
- Developing capacity to collect and use Earth observations, and promoting regional GEOSS implementation;

- Supporting research and development of integrated applications of Earth observations; and
- Engaging with users and decision-makers, to ensure a user-driven GEOSS.

#### **4.2 Governance**

In the interest of preserving GEO as a flexible, agile and inclusive intergovernmental partnership, GEO will retain its present general governance structure: a regionally-based Executive Committee comprised of Member nations reporting to a full Plenary. However, to maximize the efficiency, effectiveness and success of GEO through 2025, GEO will explore options for modifications to governance including, possibilities for a strengthened role for Participating Organizations, based on the experiences of other international organizations, and for a strengthened Secretariat.

#### **4.3 Engagement with Developing Countries**

GEO will strengthen and incentivize its engagement with developing countries in relation to using Earth observations efficiently for addressing sustainable development, as well as fostering regional cooperation. In particular, capacity building is critical for developing Members' active engagement in the implementation of GEOSS. Thus, GEO will assist countries and regions in increasing their capacity to acquire, share, store, maintain and utilize space-based, airborne and *in situ* Earth observation data that is available on a full and open basis in connection with GEO Data Sharing Principles. To promote the advancement of Earth observation technologies and the further development of national and regional capacity to absorb and use these technologies, GEO will take the lead in mobilizing appropriate resources through partnerships with relevant governmental, non-governmental and multilateral development institutions.

#### **4.4 Engagement with the Private Sector**

While remaining an intergovernmental partnership, GEO will make a renewed effort, where possible, to collaborate with the private sector in achieving the GEO Strategic Objectives (Recommendation 2 above).

#### **4.5 Resources for GEO and GEOSS through 2025**

The resourcing mechanisms for the implementation of GEOSS through 2025 will continue to rely on voluntary contributions. With the aim of more active membership and engagement, and based on this voluntary contribution principle, a specific and strengthened framework or mechanism for steady resource commitments to GEOSS, from both public and non-public sources, will be developed by 2016. This framework will enable GEO to sustain the essential technical and administrative components of GEOSS through 2025 (GEO Secretariat and GEOSS Information System). Additionally, this framework will include support mechanisms for improving the participation of developing countries in GEO, and for the development, as appropriate, of global initiatives. In order to document global support to GEO and its added value, a dedicated registration system will be established to record resource contributions to the GEO Work Plan.