

GLOBAL EARTH OBSERVING SYSTEM OF SYSTEMS (GEOSS)

(Submitted by WMO)

Summary and purpose of document

To inform CGMS Members of the current status and plans for the GEO and its GEOSS.

ACTION PROPOSED

CGMS Members to note and comment as appropriate,

INTRODUCTION

1. The following is an update on the formation and early work of the intergovernmental Group on Earth Observations (GEO) towards building a Global Earth Observation System of Systems (GEOSS) over the next 10 years. GEO's membership continues to grow and as of September 2005 involved 58 countries, the European Commission, and 47 international organizations.

2. Following nearly 2 years of planning GEO was endorsed and formally established at a Ministerial-level Summit held in Brussels in February 2005. On 3 and 4 May 2005, WMO hosted the first Plenary meeting of the Group on Earth Observations (GEO-I). In total over 200 delegates attended the two day session.

3. At GEO-I delegates elected a new Executive Committee to oversee the administrative workings of GEO. The Executive Committee will consist of twelve members representing various regions of the world from which 4 Co-chairs were chosen. The members chosen are: Brazil, Germany, Italy, Honduras, Japan, Morocco, Russian Federation, Thailand, and the Co-chairs are from China, European Commission, South Africa, and the United States of America.

4. GEO Members noted the need for CHF 5 million for the operating costs of the GEO Secretariat and the development and implementation of the 2005 and 2006 work plan. Fifty percent of these resources were pledged by the European Commission at GEO-I. Some of the resources will be monetary donations, others will be fully seconded experts to the GEO Secretariat

5. During the two day session a ribbon cutting ceremony was held to official open the 10 new offices for the GEO Secretariat in the WMO Building. H.E. Mr J. Streuli, Ambassador, Deputy Permanent Representative for Switzerland to the United Nations and International Organizations in Geneva, and WMO Secretary General Mr M. Jarraud joined the GEO Co-chairs for the event. The Swiss Government is providing support for the establishment of the new GEO Secretariat in Geneva by contributing substantially to the furnishing of the offices on the 5th floor of the WMO building.

WMO Space Programme as one of the core contributors to GEOSS

6. With regard to the GEOSS space component, the fifty seventh session of the WMO Executive Council (EC-LVII) agreed that the similarities of objectives of GEOSS and WMO fully justified the willingness of WMO, through its recently established WMO Space Programme, to make a significant contribution in the GEOSS process. The Council agreed that the WMO Space Programme was well placed to participate in GEOSS activities and that WMO should strongly support actions that address the following four axioms:

- With the creation of GEOSS, efforts should be made to minimize the risk of duplication with pre-existing similar (although less ambitious) initiatives and, eventually, of superposition of systems capabilities. Due, in particular, to its strong links with a user community and its focused approach, WMO, through its Space Programme, should play a significant role in order to establish and maintain strong coordination with the various stakeholders and users of GEOSS and to strengthen the coordination needed to warrant the interoperability of existing systems and the progressive integration of future ones;
- GEOSS should benefit from WMO's experience of the space-based component of the GOS as a model for integrating independent space observation capabilities into a single system. The following actions initiated through the WMO Space Programme should be further supported in order to be progressively migrated into GEOSS:

- Integration of the space-component of the various observing systems throughout WMO Programmes and WMO-supported Programmes;
 - Contingency planning;
 - Integrated Global Data Dissemination Service;
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- The multiple benefits gained from the integration of a space-based component in the Global Observing System of the World Weather Watch (global, fair, cost-effective) should be used to promote the potential benefits that GEOSS will bring to society;
 - The most straightforward means of including the space component of the integrated WMO Global Observing System as a core contributor to the space component of GEOSS will be to assist the GEO Secretariat in the implementation of actions and activities identified in the GEOSS Implementation Plan, i.e., agreements to make systems interoperable and to share data; collective optimization of the observation strategy; cooperative gap filling; commitments to observational adequacy and continuity; data transfer and dissemination; collaboration on capacity building; and harmonization of methods and application of observation standards. The co-location of the GEO Secretariat on the premises of WMO in Geneva should greatly facilitate this effort.

7. WMO is an active participant in GEOSS and is working with other UN Specialized Agencies, such as FAO, UNESCO, UNEP and WHO, to develop coordinated mechanisms for participation in the GEO activities.

GEO STRUCTURE AND 2006 WORK PLAN

8. At its 3rd meeting on 30 September 2005, the Executive Committee of GEO (ExCom-3) considered a draft paper on proposed Structure and Procedures and a draft Work Plan for 2006. The introduction to the Plan 2006 Work Plan set out some overall Objectives for GEO and a Strategy for the implementation of its Work Plan. Whereas these are still in draft form they are a good indication of the approach GEO will take and are found as an attachment to this paper.

9. The proposed Structure will include a GEO Plenary consisting of GEO Members and Participating Organizations, an Executive Committee (described above), and 4 Standing Committees including: (1) Architecture and Data; (2) Capacity Building and Outreach; (3) Science and Technology; and, (4) User Interface, and finally a Director and GEO Secretariat. The Terms of Reference for the Standing Committees will be approved at the next meeting of the Plenary to be held in Geneva 14-15 December 2005.

10. The draft Work Plan for 2006 (Version 1) based on the direction of the Executive Committee, is now available for broader review and comment. The Plan will be ultimately prepared for approval by the Plenary in December. One of the Tasks that the Executive Committee requested be developed further into a Discussion Paper is the WMO Space Programme's development of Advanced Dissemination Methods (ADM) and of an operational Integrated Global Data Dissemination Service (IGDDS) concept that in a GEO context will be called GEOMETCast and serve the wider GEO community. Please see WMO WP-19 for more details.

EXTRACT FROM THE DRAFT (21 October 2005) GEO 2006 WORK PLAN

PART I: OBJECTIVES OF GEO

GEO provides the forum to mobilize all actions that will contribute to the realization of the GEOSS. These actions can be articulated around three overarching objectives:

- To build a sustainable, comprehensive and coordinated observation system of systems;
- To provide open and easy access to data anytime and anywhere; and,
- To increase the use of Earth observations.

GEO will provide the impetus for this mobilization as follows:

1. To build a sustainable, comprehensive and coordinated observation system of systems

GEOSS, as a “system of systems”, will provide the overall framework for the progressive harmonisation and integration of all Earth observation efforts from GEO Members and Participating Organizations, including *in situ*, airborne and space-based observations. While GEOSS will not substitute for the mandates and governance arrangements of organizations responsible for existing individual observing systems, its coordination efforts will ensure that all systems work in full synergy and that gaps are filled. Its advocacy efforts will result in new or continued observations where necessary. In this way, GEOSS will improve the overall supply and quality of Earth observations.

2. To provide open and easy access to data anytime and anywhere

The societal benefits of Earth observations cannot be achieved without data sharing. GEOSS will ensure that the quality data required by users reaches them in a timely fashion and in an appropriate format. There will be full and open exchange of data, metadata, and products shared within GEOSS, recognizing relevant international instruments and national policies and legislation. To accomplish this technically, GEOSS will link databases and communication networks efficiently through interoperability arrangements based on open, international standards.

3. To increase the use of Earth observations

The end goal of creating the system of systems, and improving access to the data it provides, is to increase the use of such data and to generate information and services for the benefit of society. Building GEOSS will require the development of scientific research and will stimulate the development of operational products, services and tools. It will, in particular, facilitate the transition from research to operations of observing systems and techniques and enable partnerships between research and operational communities. Promotion and outreach activities for emerging communities will contribute to further increase the use of Earth observations. Most critically, achieving the vision of GEOSS will require GEO to facilitate substantial capacity-building efforts in human resources, institutions and observational infrastructures, particularly in developing countries.

Achieving these objectives will require mobilizing the scientific, technological, and human expertise of all nations. Achieving these objectives will deliver a truly successful GEOSS, resulting in the availability of timely, high-quality information as a sound basis for decision-makers at all levels.

PART II: ACTIVITIES OVERVIEW

In 2006, GEO will begin implementation of the GEOSS 10-Year Implementation Plan as endorsed by the Third Earth Observation Summit. GEO programme activities will cover all five transverse elements and nine societal benefit areas identified in the 10-Year Plan. These fourteen programme areas are guided by principles presented in the 10-Year Plan and summarized below. The detailed work plan of supporting tasks for each programme area is presented in Part III.

The programme tasks identified in Part III will be carried out collectively and cooperatively by GEO, including the Secretariat, individual GEO Members and Participating Organizations, and GEO Committees. While some tasks will be implemented by the Secretariat, others will require the engagement of GEO Members and GEO Participating Organizations. To clarify task responsibilities and to allocate appropriate levels of resource, a task classification scheme is provided in Part III and reflected in the budget description in Part IV.

To reinforce the GEO process, the Secretariat will also engage in a series of institution building activities to strengthen the GEO organization and consolidate its role in the Earth observation community.

1. PROGRAMME ACTIVITIES

1.1. Design an interoperable GEOSS architecture

GEOSS components must work together at the global system level to add value to existing systems and to accommodate new systems. Accomplishing this requires the design of a flexible GEOSS architecture. This architecture will depend chiefly on data and information providers accepting and implementing a set of interoperability arrangements, including technical specifications for collecting, processing, storing, and disseminating shared data, metadata and products. To ensure GEOSS is highly scalable, the same architectural principles that make GEOSS a "system of systems" can be applied independently to any element within GEOSS.

1.2 Improve data sharing and management

Data, the basic output of Earth observation systems, is the essential input for generating products and decision-support tools to inform policymakers. Access to these data is the centrepiece of GEOSS. GEO will pursue activities that progressively ease both technical and legal barriers to data sharing. Technically, systems participating in GEOSS will be required to make data timely and easily available in useful formats. Typically, this involves a multi-step process of data storage, transformation, and exchange, which includes (a) processing and archiving, (b) transfer and dissemination, and (c) assimilation and modelling. Moreover, these data must be presented and made available through the development of user-friendly information tools and products. The rapid development of advanced information technology and communication networks is at the core of this process.

Exchange of data within GEOSS will be based on the following data sharing principles:

- There will be full and open exchange of data, metadata, and products shared within GEOSS, while recognizing relevant international instruments and national policies and legislation;
- All shared data, metadata, and products will be made available with minimum time delay and at minimum cost;
- All shared data, metadata, and products for use in education and research will be encouraged to be made available free of charge or at no more than the cost of reproduction.

1.3 Engage user communities

The ultimate objective of GEO is to enhance the use of Earth observations by a broad range of user communities – from both developed and developing countries. These user communities include policymakers, scientists, industry, international, intergovernmental, and non-governmental organizations. To ensure the link between GEOSS implementation and socio-economic policy maker needs, GEO will define and establish relationships with major international economic development and cooperation programmes and organizations. Engagement of these communities to identify their needs for new or improved services is essential to enhancing the adequacy of provided data and products for a wide diversity of applications.

In particular, it is essential to engage the research community by promoting the involvement of universities and laboratories in GEOSS activities. Mechanisms will be put in place to facilitate the formation of strong consortia in order to benefit from funding of major national and international research programmes of relevance to GEO. Scientific research is also essential to ensure the transition from research to operational systems and generate new applications in existing and emerging fields.

1.4 Build capacity where needed

Capacity building is an integral part of the GEO implementation strategy. Capacity-building activities will build on existing local, national, regional and global initiatives. It will address all issues related to data collection, archiving, distribution, analyses and interpretation. GEO will particularly concentrate its efforts on the development of observation and modelling infrastructures. In addition, attention will be given to expanding training and education in developing countries and economies in transition for specific applications in key emerging areas of societal benefit.

1.5 Develop outreach and communication

The goal of the GEO outreach effort will be to position GEOSS internationally and within member and potential member countries as a critical asset capable of delivering socio-economic benefits to people and economies around the globe. The general objective is to reach the target audiences identified in the GEOSS 10-Year Implementation Plan. Outreach to scientific, technical, and user communities will ensure that the full benefits of GEOSS are realized. Communication with the general public and policymakers will maintain the strong political support necessary for the effective build up of GEOSS.

1.6 Implement activities specific to each societal benefit area

The 10-Year Implementation Plan sets out nine societal benefit areas. Some of these societal benefit areas are themselves complex clusters of issues, with many and varied stakeholders. In each area there are specific observational needs for many variables, with requirements for their accuracy, spatial and temporal resolution and speed of delivery to the user. There was also a recognition very early in the GEO process that there is considerable commonality of observation needs among societal benefit areas, and that clear benefits could be derived from a coordinated global observation system. Nevertheless, it should be recognized that the societal benefit areas are at widely varying levels of maturity with respect to establishing user needs, defining the observation requirements, and implementing coordinated systems. In each of the societal benefit areas, GEO will work with the appropriate GEO Participating Organizations, and when necessary, organizations not currently participating in GEO, to ensure successful execution of the tasks identified.

2. ORGANIZATIONAL ACTIVITIES

2.1 Define relationships with existing coordinating mechanisms, programmes and associations

Today, a diverse array of organizations and bodies are engaged in overlapping Earth observation coordination efforts for a variety of specific observational domains, for specific Earth observation platforms, or for particular user requirements. GEO will engage in dialogue with these bodies (e.g. Committee on Earth Observation Satellites (CEOS); Integrated Global Observing Strategy Partnership (IGOS-P); the Global Climate Observing System (GCOS), as well as relevant UN specialized agencies and the sponsors of major observing strategies, to better define how these bodies can contribute to building and operating GEOSS and to determine how best to streamline and harmonize their efforts in the context of GEO.

2.2 Harmonize Earth observation planning

To ensure the successful implementation of GEOSS, GEO will develop a coordination mechanism to reinforce synergies among national and/or regional Earth observation planning efforts, and enhance alignment of these efforts with the GEOSS 10-Year Implementation Plan, to improve data continuity and fill gaps as necessary. To facilitate this, an ongoing dialogue will be developed with relevant national and regional agencies responsible for *in situ*, airborne, and space-based Earth observation, relying on existing fora where appropriate.

2.3 Mobilize resources

Given the large number of tasks to be coordinated by GEO Secretariat, it is essential to mobilize the adequate level of resources. To do so GEO will: (a) encourage GEO Members and Participating Organizations to contribute to the GEO Trust Fund, (b) establish high-level relationships with key international funding agencies, including the World Bank, and regional development banks (Europe, Asia, Africa, Americas), (c) increase consultation with major G-8 funding entities to finance GEOSS priority activities, and (d) explore the creation of donor mechanisms for funding activities in targeted areas.

2.4 Expand participation in GEO

GEO will seek to increase the number of GEO Members and will endeavour to establish high-level relationships with key international user organizations currently not participating in GEO but relevant to GEO societal benefit areas. For the latter, the goal is to identify relevant organizations and programmes and encourage them to join GEO as Participating Organizations. GEO will also aim to attain observer status in high-level governing bodies (or equivalent) of these organizations in order to define key areas of cooperative activity.

2.5 Explore the relationship with industry

Industry can play a major role in the implementation of GEOSS, particularly in the domain of information technology and value-added products. Industry engagement in GEO activities will ensure that GEOSS is sustainable on a broad base of private sector as well as public sector support, and will also help to ensure that GEOSS stays current with mainstream and emerging information services and technologies.