

**From Observation to Action—
Achieving Comprehensive, Coordinated, and Sustained Earth Observations for the Benefit of
Humankind**

Framework for a 10-Year Implementation Plan

*As adopted by Earth Observation Summit II
25 April 2004*

1. Introduction

Understanding the Earth system—its weather, climate, oceans, land, geology, natural resources, ecosystems, and natural and human-induced hazards—is crucial to enhancing human health, safety and welfare, alleviating human suffering including poverty, protecting the global environment, and achieving sustainable development. Data collected and information created from Earth observations constitute critical input for advancing this understanding. In 2003, a consensus emerged among governments and international organizations that, while supporting and developing existing Earth observation systems, more can and must be done to strengthen global cooperation and Earth observations. This Framework Document, while not legally binding, marks a crucial step in developing the 10-Year Implementation Plan for the creation of a comprehensive, coordinated, and sustained Earth observation system or systems as envisioned by the Washington Declaration adopted at the Earth Observation Summit of 2003.

2. Benefits of Comprehensive, Coordinated and Sustained Earth Observations

2.1 Observing and understanding the Earth system more completely and comprehensively will expand worldwide capacity and means to achieve sustainable development and will yield advances in many specific areas of socio-economic benefit, including:

- Reducing 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;
- Understanding, monitoring, and conserving biodiversity.

2.2 Globally, these benefits will be realized by a broad range of user communities, including (1) national, regional, and local decision-makers, (2) relevant international organizations responsible for the implementation of international conventions, (3) business, industry, and service sectors, (4) scientists and educators, and (5) the general public. Realizing the benefits of coordinated, comprehensive, and sustained Earth observations (i.e. the improvement of decision-making and prediction abilities) represents a fundamental step toward addressing the challenges articulated in the declarations of the 2002 World Summit on Sustainable Development and fulfilling the Millennium Development Goals agreed at the Millennium Summit in 2000.

2.3 Full participation of developing country members will maximize their opportunities to derive real benefits in the above socio-economic areas. Such participation is supported as it enhances the capacity of the entire Earth observation community to address global sustainable development challenges.

3. Key Earth Observation Areas

3.1 Coordinated and sustained global cooperation on Earth observations is well established in the crucial area of weather. The World Meteorological Organization's World Weather Watch demonstrates the value of international collaboration in this arena. Improvements in observation

networks are still needed and will yield further success through improved accuracy in weather information and long-term prediction.

- 3.2 Cooperation is less advanced in the areas of land, water, climate, ice, and ocean observation. Nevertheless, some important work and guidance for future action has been developed in a number of areas, for example:
- a. Natural hazard understanding through a range of international observing and early warning systems consistent with the International Strategy for Disaster Reduction (ISDR);
 - b. Climate understanding and research through the World Climate Research Program (WCRP), and climate monitoring consistent with the Global Climate Observing System (GCOS) in support of the Conference of Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC);
 - c. Ocean monitoring, modeling and forecasting through the Global Ocean Observing System (GOOS);
 - d. A range of observation themes addressed by the Integrated Global Observing Strategy Partnership (IGOS-P) including oceans; carbon; water cycle; solid earth processes, coastal zone (including coral reef); atmospheric chemistry; and land/biosphere.
- 3.3 In each of these areas, observation efforts to understand dynamic Earth processes have been identified and should be expanded to support action-oriented solutions in the areas of key socio-economic benefit.

4. Shortcomings of Current Observation Systems

- 4.1 Human knowledge of the Earth system, although advanced in certain areas, is far from complete. Current efforts to observe and understand the Earth system must progress from the separate observation systems and programs of today to coordinated, timely, quality, sustained, global information—developed in accordance with compatible standards—as a basis for future sound decisions and actions.

4.2 Many international organizations and programs are working to sustain and improve the coordination of Earth observations. However, current efforts to capture Earth observation data are limited by (1) a lack of access to data and associated benefits especially in the developing world, (2) eroding technical infrastructure, (3) large spatial and temporal gaps in specific data sets, (4) inadequate data integration and interoperability, (5) uncertainty over continuity of observations, (6) inadequate user involvement, (7) a lack of relevant processing systems to transform data into useful information, and (8) insufficient long term data archiving.

5. **What is Needed - The 10-Year Implementation Plan for Earth Observations (2005-2014)**

5.1 To achieve the many benefits of coordinated Earth observations and to move from principles to action, governments adopting this Framework Document set forth the primary components of a 10-Year Implementation Plan for establishing the Global Earth Observation System of Systems (GEOSS). GEOSS will be:

- *comprehensive*, by including observations and products gathered from all components required to serve the needs of participating members;
- *coordinated*, in terms of leveraging resources of individual contributing members to accomplish this system, whose total capacity is greater than the sum of its parts;
- *sustained*, by the collective and individual will and capacity of participating members.

5.2 GEOSS will be a distributed system of systems, building step-by-step on current cooperation efforts among existing observing and processing systems within their mandates, while encouraging and accommodating new components. Participating members will determine ways and means of their participation in GEOSS. The 10-Year Implementation Plan for GEOSS will be based on the following considerations:

- a. With the socio-economic benefits identified in Section 2 as the roadmap, the 10-Year Implementation Plan will identify, document, and prioritize actions to address user requirements for current and future Earth observations. This process will be based on

- appropriate dialogue and procedures, taking advantage of and building upon the experience of existing initiatives and infrastructures.
- b. The architecture model will build incrementally on existing systems to create a distributed system of systems, incorporating an observation component, a data processing and archiving component, and a data exchange and dissemination component.
 - c. The 10-Year Implementation Plan will elucidate practical methods for filling critical gaps in, *inter alia*, observation parameters, geographical areas, observation specifications, and accessibility.
- 5.3 The GEOSS will address key challenges of data utilization, including the need for:
- Full and open exchange of observations with minimum time delay and minimum costs, recognizing relevant international instruments and national policies and legislation;
 - Assured data utility and usability (including thresholds for validation, calibration, and spatial and temporal resolution);
 - Assured continuity and availability of the many observations and products in place or planned;
 - A robust regulatory framework for Earth observations (e.g. through protection of radio frequency bands that are uniquely essential for Earth observations).
- 5.4 The plan will facilitate both current and new capacity building efforts, particularly in developing countries, across the entire continuum of GEOSS activities, which will include education, training, institutional networks, communication, and outreach as fundamental to those efforts. Building on existing local, national, regional, and global capacity building initiatives, GEOSS will:
- a. Focus on training and education for the development and/or utilization of existing human, institutional, and technical capacities for data utilization;

- b. Develop the infrastructure resources necessary to meet research and operational requirements;
 - c. Build on globally accepted sustainable development principles – most notably those outlined in the World Summit on Sustainable Development Plan of Implementation.
- 5.5 The development of GEOSS should take maximum advantage of developments in research and technologies. Conversely it will enable the global scientific community to address key scientific questions concerning the functioning of the Earth system.

6. Outcomes

The success of the 10-Year Implementation Plan will be measured by the operational achievement of GEOSS. Specific outcomes for GEOSS, both short and long-term, will be elaborated in the 10-Year Implementation Plan, including but not limited to the following:

- a. Enabling global, multi-system information capabilities for each of the following:
 - disaster reduction, including response and recovery;
 - integrated water resource management;
 - ocean monitoring and marine resources management;
 - air quality monitoring and forecasting;
 - biodiversity conservation;
 - sustainable land use and management.
- b. Global tracking of invasive species;
- c. Comprehensive monitoring of global and regional climate on annual, decadal, and longer time scales, and enabling information products related to climate variability and change;
- d. Improving the coverage, quality, and availability of essential information from the *in situ* networks and improving the integration of *in situ* and satellite data;

- e. Involvement of users from developed and developing countries, monitoring their needs and fulfillment over time;
- f. An outreach mechanism to actively demonstrate the usefulness of Earth observation to decision makers in key user communities.

7. The Way Forward

- 7.1 The adoption of this Framework Document indicates a decision to proceed with the elaboration of the GEOSS 10-Year Implementation Plan along the lines set forth in this Document and a willingness to cooperate on, and participate in, the implementation of the plan. At present, the *ad hoc* Group on Earth Observations (GEO) is a “best efforts” activity with voluntary input from States and advice and support from international organizations.
- 7.2 For 2005 and beyond, the implementation of the “10-Year Implementation Plan” will require a ministerial-guided successor mechanism with maximum flexibility—a single intergovernmental group for Earth observations drawing on the experience of the *ad hoc* GEO, with membership open to all interested governments and the European Commission, and with representatives of relevant international organizations taking part.
- 7.3 The GEOSS 10-Year Implementation Plan will elaborate details for this Group, which will provide generally for:
- a. Coordination and planning of GEOSS implementation (*in situ* and remotely sensed);
 - b. Opportunities for engagement of all members and relevant international and regional organizations;
 - c. Involvement of user communities;
 - d. Measuring, monitoring, and facilitating openness of GEOSS to improve cross-flow of observations and products;
 - e. Co-ordination and facilitation of the development and exchange of observations and products between members and relevant international and regional organizations.