2007-2009 WORK PLAN:

TOWARD CONVERGENCE

DRAFT VERSION
for Official Comment

COVER NOTE

GEO Members and Participating Organizations are invited to provide official comments on this document. All comments are due to the Secretariat by ***2 October 2006***

FOREWORD

A Three-Year Plan Toward Convergence

The GEO 2007-2009 Work Plan presents an opportunity to build on the mobilization of 2006 and, simultaneously, drive the process toward convergence of the large number of independent tasks into less numerous but more encompassing cross-disciplinary actions over the coming three years. To facilitate the progressive convergence, the Secretariat has:

- Endeavoured to bring multiple disciplines to activities organized within a task;
- Facilitated the merger of task activities where appropriate;
- Ensured ongoing, interdisciplinary linkages between related but separate tasks.

Altogether, 9 Tasks of the 2006 Work Plan have been completed, 33 have been closed (merged or terminated) and 11 have been recognized as Secretariat supporting activities. Specifically, the Secretariat has responsibility for the following 6 Tasks of the 2006 Work Plan:

- Dialogue on strengthening the Charter on Disasters;
- Explore with ITU on possibilities of a Telecom Charter;
- Organize health related Workshops;
- Raise awareness on Earth observations and health issues;
- Promote interactions to identify user requirements in all Societal Benefit Areas;
- Advocate resources for in-situ systems;

as well as 5 outreach Tasks, for which the Secretariat will produce an Outreach Plan to be submitted to Plenary at GEO-III. In addition, the Secretariat will remain strongly involved in the development of the Capacity Building Strategy and the subsequent advocacy for funding with international donors.

The remaining 44 Tasks of the 2006 Work Plan are to be continued. The list of continuing 2006 Tasks in each area is based on a preliminary assessment by the Secretariat, and details are provided in the 2006 Task Evolution Table at Annex 2.

In addition, 29 new Tasks have been proposed. The new items for 2007 to 2009 have been proposed to accomplish three objectives:

- Merge previously disconnected tasks of the 2006 Work Plan to bring more coherence among related activities;
- Ensure completion of the two-year targets, as well as initiation of activities to meet the six and ten-year targets, identified in the GEOSS 10-Year Implementation Plan;
- Provide opportunity for new ideas to complement and refine the existing tasks and for new groups and communities to join GEO and contribute to GEOSS implementation.

This leads to a total of 73 Tasks. These Tasks distribute almost evenly across the nine Societal Benefits and Transverse Areas:

TASKS BY SOCIETAL BENEFIT AREA	
Disasters	10
Health	4
Energy	4
Climate	6
Water	5
Weather	4
Ecosystems	4
Agriculture	8
Biodiversity	3

TASKS BY TRANSVERSE AREA	
User Engagement	4
Architecture	7
Data Management	10
Capacity Building	4

In order for the Members and Participating Organizations to be able to assess the balance between the different types of strategic activities, to track the transition from the 2006 Work Plan to the 2007-2009 Work Plan and to assess the progress made towards the implementation of the 10-year Implementation Plan, three annexes have been attached to the Plan. In addition, short titles have been introduced to allow readers to capture the content of a task at a glance.

Annex 1 is grouping all the Tasks proposed under five headings which correspond to five strategic approaches for building GEOSS:

1. Establish the basic arrangements and policies to build the system of systems (6 Tasks).
2. Contribute new components and improve existing components of GEOSS (16 Tasks).
3. Produce coordinated observation methodologies (16 Tasks).
4. Make new data sets available (10 Tasks).
5. Engage with communities (support, modelling, workshops, user requirements, etc.) to improve/enhance/increase use of Earth observations (25 Tasks).

Considering that categories 1 and 2 pertain to GEOSS component systems, that 3 and 4 pertain to data, the current work plan provides a balanced distribution of Tasks among system (22), data (26), and users (25).

Annex 2 provides detailed information on the evolution of the 96 Tasks of the 2006 Work Plan, which are to be completed, closed (terminated or merged), or continued.

Annex 3 provides a list of the 2-year and 6-year Targets of the Implementation Plan indicating how they are being addressed. It should be noted that four 2-year Targets remain unaddressed at this stage. Of these, Targets 45 and 67 are advocacy tasks that can be carried out by the Secretariat. Target 23 on Health "paradigm environments" and Target 38 on paleoclimate research cannot be addressed without the commitment of a qualified group of experts. The Secretariat will work to identify such groups (See section 15.1). Only eight 6-year Targets are not yet addressed, but will be in subsequent years.

1 Disasters: Reducing loss of life and property from natural and human-induced disasters

Disaster-induced losses can be reduced through observations relating to hazards such as: wildland fires, volcanic eruptions, earthquakes, tsunamis, subsidence, landslides, avalanches, ice, floods, extreme weather, and pollution events. GEOSS implementation will bring a more timely dissemination of information through better coordinated systems for monitoring, predicting, risk assessment, early warning, mitigating, and responding to hazards at local, national, regional, and global levels.

GEOSS 10-Year Implementation Plan, Section 4.1.1

1.1 Continuing Tasks

DI-06-02: Seismographic networks improvement and coordination

Facilitate improvement of capabilities for global seismographic networks such as GSN, FDSN, DAPHNE, GNSS networks and sharing of data and event products among GEO members."

The title has been slightly modified to give proper visibility to GNSS networks, that, in any case were already included into the task.

DI-06-03: Integration of InSAR technology

Support the improved integration of InSAR (Interferometric Synthetic Aperture Radar) technology for disaster warning and prediction.

It will also include integration of GPS networks data.

DI-06-04: Implementation of a Tsunami Early Warning System at global level

Support the IOC Implementation Plan, through (i) promotion and facilitation of free and unrestricted exchange of all Earth observation data relevant to Tsunami Early Warning Systems (ii) contribution in terms of GEO developed operational capabilities (iii) definition and implementation of standards.

This task now includes all the activities related to the implementation of a Tsunami Early Warning System at global level, including activities from tasks DI-06-01 and DI-06-06.The IOC Implementation Plan will be the programmatic reference for task implementation. JCOMM will be included in the contributing Organisations.

DI-06-05: Reference geographic products

Building on existing techniques, create a plan for the production of high resolution (i) near-shore bathymetric maps (ii) land use/land cover maps and (iii) Digital Elevation Models.

The scope of the task was extended beyond the coastal Regions to provide proper reference to a multihazard approach. Initial focus will anyhow be on coastal regions. Includes activities from task DI-06-01. It will include specific mention of SRTM data.

DI-06-07: All-hazard zonation and maps

Conduct an inventory of existing geologic and all-hazard zonation maps, identify gaps and needs for digitization and progressively develop related products.

The scope of the task was redirected to include progressive production of maps and integration of data (coming also from task DI-06-03) into the GEO clearinghouse.

DI-06-08: Multi-hazard approach definition and progressive implementation

Promote the cooperation of national and international agencies towards the definition and implementation of a multi-hazard approach to systematically address all risks.

The scope of the task was better focused to fully support ISDR in the Implementation of the Hyogo Framework for action. It will include, as an important complement to the on going programs on the implementation of a Tsunami Early Warning System, a pilot project on the implementation of a risk management system for geohazards in the SE Asian Region. This project will be constructed in coordination and in support of existing organisations and projects (such as ASEAN, APEC, Sentinel Asia), with the participation of the Community of practice rather active in the area.

DI-06-09: Use of satellites for Risk Management

With reference to a multi-hazard approach, define and facilitate implementation of a virtual constellation for risk management.

The scope of the task was reviewed in order to take into account related 6-years targets. In coordination with AR-07-P3 (virtual constellations) the main objective would be to identify a virtual constellation for risk management.

DI-06-13: Implementation of a Fire warning System at global level

Initiate a globally coordinated warning system for fire, including the development of improved information products and risk assessment models.

The task will focus on fire warning and not also on forest monitoring data and products of interest for other SBA's will be made available.

1.2 New Tasks

DI-07-P1: Risk Management for Floods

Floods are best suited to apply the full cycle of Risk Management, from the monitoring phase up to damage assessment, passing through early warning and crisis management. The management of the flood risk is being performed by a number of Organisations all around the world at different scales, from local to national to regional. The task will define best practices, here including decision support systems, with the goal to identify minimum required observations and associated networks (in-situ, remote sensing) and models to deal with flood management at different geographical scales. The task will also include analysis and, where deemed applicable, further developments on weather forecast and warning systems, as one of the main inputs, in particular to assess the risk during the monitoring/prevision/prevention phase. This task includes relevant synergies with water and weather tasks.

With reference to and in coordination with the WMO APFM (Associated Programme on Flood Management) the core activity will be constituted by the definition and implementation of a pilot project, centered on the development and demonstration of a Flood risk management system for the South-Central American Regions.

DI-07-P2: Risk Management for Slowly Developing Disasters

Encourage the development of an Earth observation decision-support system for policy and decision makers (at all levels) for slowly developing disasters (e.g. deforestation, soil degradation, public health, food security, drought monitoring and prediction, pest, locust). It will start with initial analysis and assessment of "slow developing disasters" and will then focus on specific applications. Related activities will include: Facilitate the implementation and up scaling of pilot projects demonstrating the use of environmental information in sensitive areas. This task includes relevant synergies with DI-07-P1 and climate tasks.

2 Health: Understanding environmental factors affecting human health and well-being

Health issues with Earth-observation needs include: airborne, marine, and water pollution; stratospheric ozone depletion; persistent organic pollutants; nutrition; and monitoring weather-related disease vectors. GEOSS will improve the flow of appropriate environmental data and health statistics to the health community, promoting a focus on prevention and contributing to continued improvements in human health worldwide.

GEOSS 10-Year Implementation Plan, Section 4.1.2

2.1 Continuing Tasks

HE-06-03: Earth Observation and Health Pilot Projects

Facilitate the formation of international consortia and coordinate, besides advocating funding for, the implementation of major demonstration pilot-projects integrating Earth observations, health and epidemiological as well as socio-economic data. As a priority, a project initiated by THORPEX will focus on the use of advanced weather and climate ensemble forecasting methods to develop and improve the predictability of major health hazards and impacts in developing countries (e.g., West Africa).

The "Health and Climate Partnership for Africa", established by THORPEX will be developed. International demonstration projects under the "Biodiversity, Ecosystem services and Health" research theme will be established. The task will also initiate projects to improve the processing of real-time and historical data and the development of models relating remotely-sensed, in-situ and epidemiological data for detecting disease trends and the provision of early warning systems.

2.2 New Tasks

HE-07-P1: Strengthen observation and information systems for health

The assessment carried out under task HE-06-05 and CB-06-01 will indicate how current observation systems can be better coordinated and will identify how gaps can be filled with new observational data. Initiate pilot projects to improve in-situ data collection for validation of remotely sensed data relevant to health. Explore how the GEOSS will provide for the collection and distribution of information relevant to the diverse needs of the health community. To meet the target of developing an integrated global public health information network database, it will be necessary to begin the planning process to define necessary tools, interoperability standards, architecture and infrastructure. Initiate this process with a workshop involving all stakeholders.

HE-07-P2: Environment and health monitoring and modelling

Initiate projects to further develop and integrate databases of remotely sensed and in situ environmental and geochemical measurements (including baseline data such as trace-element toxicity and deficiencies) together with new observations characterizing atmospheric, soil, river and coastal pollution, and develop models to relate these to related exposure and health effects data. This task will lead to the identification of mechanisms for alerting public health professionals on hazardous conditions identified by the monitoring of these parameters as well as further informing epidemiological modelling studies.

HE-07-P3: Integrated atmospheric pollution monitoring, modelling and forecasting

Advocate a stable and improved surface (in-situ and airborne) and space-based observing system of global air quality including polar and geostationary satellites in line with the Integrated Global Atmospheric Composition Observations (IGACO) recommendations. Support WMO efforts related to increased spatial and temporal resolution. As a priority, evaluate and recommend strategies for an integrated sampling frame for air pollution.

Facilitate international consortia, and coordinate, besides advocating funding for, the implementation of major pilot projects integrating Earth observations of long range transport of air pollutants, health, and socio-economic data to improve decision making. Organize a joint CLRTAP/WMO workshop on integrated observations for assessing hemispheric transport of air pollution in 2007.

Construct a high spatial (kilometers) and temporal resolution (30 minutes) monitoring and forecasting system including observations, modeling and chemical data assimilation for global and local air quality.

Support the development of a "Global Sand and Dust Storm Warning System" bringing together forecasts, observations and users, including weather forecasters, commercial aviation, surface transport, health effects, solar energy and agriculture communities. Organise a WMO International Symposium on a " Global Sand and Dust Storm Warning System" in 2007.

This task has linkages to several other items, including US-06-01, DI-06-09, EC-06-05, as well as the "Air and Health" community of practice formed under US-06-02.

3 Energy: Improving management of energy resources

GEOSS outcomes in the energy area will support: environmentally responsible and equitable energy management; better matching of energy supply and demand; reduction of risks to energy infrastructure; more accurate inventories of greenhouse gases and pollutants; and a better understanding of renewable energy potential.

GEOSS 10-Year Implementation Plan, Section 4.1.3

3.1 Continuing Tasks

EN-06-04: Optimum exploitation of new observation systems

Organize a series of activities including workshops to identify and define the main elements/components of a strategic 5-10 Year Plan for the optimum exploitation of the enhanced capabilities offered by the forthcoming new generation of observing systems and forecasting modelling techniques.

3.2 New Tasks

EN-07-P1: Renewable Energy

Develop the use of Earth observation in the management of uncertainties related to fluctuations and intermittency of renewable energy sources.

Related activities will include: Support the development of Earth observation products and services improving the monitoring and forecast of renewable energy sources. Promote collaboration between users and providers of Earth observation applications to foster the development of innovative Earth observation services in support of renewable energy applications

EN-07-P2: Environmental Impact Monitoring

Set up an Earth observation platform for the monitoring and prediction of environmental impact from energy resource extraction, transportation and/or exploitation.

Related activities will include: Promote and develop the use of Earth observation data for impact monitoring. Support the development of modelling systems helping to quantify and anticipate changes e.g. to freshwater, biodiversity, ecosystems, atmospheric and oceanic composition, and ground elevation. Make relevant synergies with Task US-07-P1.

EN-07-P3: Energy Policy Planning

Encourage the use of Earth observation for informed energy-policy planning in developing countries.

Related activities will include: Identify Earth observation data and products required to better assess countries' potential for renewable and non-renewable energy production. Facilitate access to this data. Encourage training of decision-makers at all relevant levels for interpretation of this data.

4 Climate: Understanding, assessing, predicting, mitigating, and adapting to climate variability and change

The climate has impacts in each of the other eight societal benefit areas. Coping with climate change and variability demands good scientific understanding based on sufficient and reliable observations. GEOSS outcomes will enhance the capacity to model, mitigate, and adapt to climate change and variability. Better understanding of the climate and its impacts on the Earth system, including its human and economic aspects, will contribute to improved climate prediction and facilitate sustainable development while avoiding dangerous perturbations to the climate system.

GEOSS 10-Year Implementation Plan, Section 4.1.4

4.1 Continuing Tasks

CL-06-01: Sustained reprocessing and reanalysis efforts

Ensure the initiation of international mechanisms to coordinate and maintain sustained climate data reprocessing and reanalysis efforts.

CL-06-02: Key data from satellite systems

Establish actions securing the provision of key data for climate studies and forecasting from satellite systems.

CL-06-03: Intergovernmental mechanisms for terrestrial observations

Consolidate the role of existing intergovernmental mechanisms for terrestrial observations needed for climate studies and forecasting. Develop a framework for the preparation of guidance materials, standards, and reporting guidelines for terrestrial observing systems for climate and associated data, metadata, and products to expand the comprehensiveness of current networks, facilitate exchange of data, and provide strategic direction to the terrestrial climate sector.

Will build on the outcome of Task CL-06-02.

CL-06-05: GEOSS IPY Contribution

Coordinate with the International Polar Year (IPY) to enhance the utilization of Earth observations in all appropriate realms (including, but not limited to, sea and land ice, permafrost, coastal erosion, marine and terrestrial ecosystem change, biodiversity monitoring and impacts of increased resource exploitation and marine transport).

CL-06-06: Global ocean observation system

Enhance and improve coordination of coastal and marine climate observations.

4.2 New Tasks

CL-07-P1: Seamless Weather and Climate Prediction System

Support the development of an "International Weather, Climate and Earth-system Science Initiative" proposed by THORPEX (WMO) and WCRP.

Related activities will include: Promote international multi-disciplinary collaboration on the development of a high-resolution seamless weather/climate global prediction system - including high-resolution global and regional data-assimilation. Support the development of an international institutional framework for the design and implementation of a unified approach toward weather, climate, Earth system, and societal-economic research.

5 Water: Improving water-resource management through better understanding of the water cycle

Water-related issues addressed by GEOSS will include: precipitation; soil moisture; streamflow; lake and reservoir levels; snow cover; glaciers and ice; evaporation and transpiration; groundwater; and water quality and water use. GEOSS implementation will improve integrated water-resource management by bringing together observations, prediction, and decision-support systems and by creating better linkages to climate and other data. In situ networks and the automation of data collection will be consolidated, and the capacity to collect and use hydrological observations will be built where it is lacking.

GEOSS 10-Year Implementation Plan, Section 4.1.5

5.1 Continuing Tasks

WA-06-02: Forecasts in water resource management

Facilitate the development of one (or more) demonstration-project that points to the added value of hydrological ensemble forecasts in water resource-management.

Enhanced prediction of the global water cycle variation is a key contribution to mitigation of water-related disasters, including floods and drought and sustainable human development. Forecasting methods are to be improved for use by hydrological services throughout the world.

The hydrological data and information system infrastructure should be determined, the data from hydrological and meteorological services should be pulled together first on national level and then on river basin level. The systems should also be made interoperable to facilitate global exchange of data and information.

WA-06-05: In-situ water resource monitoring

Initiate the creation of a coordination mechanism within GEO for global in-situ water observations, including ocean observations, and advocate synergy and sharing of infrastructure among observing systems.

The current water cycle observation capability is inadequate for monitoring long-term changes in the global water system and their feedback into the climate system, and the lack of and inaccessibility of crucial data is also a major constraint for sustainable development of water resources and improvement of water management practices.

In addition to filling gaps in measurement capability, interoperability of observing systems, and standardization of metadata for data sharing, progress in product development of the global near real-time river runoff network, advocate sharing of telecommunication infrastructure and joint know-how are important goals that need to be reached within the next few years.

WA-06-07: Capacity building program in Latin America

Initiate a capacity building program in Latin America to develop tools for using remote sensing data in support of water management, and to show the value of Earth observations generally in water resource management.

A capacity building program in Latin America, focused on the use of Earth observation data for water resources management, will be running for the next years.

5.2 New Tasks

WA-07-P1: Global Water Quality Monitoring

Many aspects of water quality monitoring and assessment, both in-situ and remotely sensed are severely deficient. Many countries lack the technical, institutional, and financial resources to conduct proper assessments using in-situ water quality monitoring methods. Remote-sensed operational systems of global-scale freshwater quality are non-existent. Operational observation systems need to be developed, and the resulting information systems should be made compatible and interoperable as part of the system of systems. This task is built on the outcomes of the water quality workshop in WA-06-01. This item has relevant synergies with HE-07-P2.

WA-07-P2: Satellite Water Measurements

Develop an operational mechanism to provide water level observations in rivers, lakes/reservoirs and estuaries from satellite altimetry to support the upgrade of deficient run-off water gauge networks. Combine different types of satellite data that are relevant for water measurements (quantity and quality) with in-situ observations for better accuracy and global coverage. Produce an implementation plan for a broad global water cycle data integration system that combines in-situ, satellite data and model outputs.

6 Weather: Improving weather information, forecasting and warning

The weather observations encompassed by GEOSS are based on the requirements for timely short- and medium-term forecasts. GEOSS can help fill critical gaps in the observation of, for example, wind and humidity profiles, precipitation, and data collection over ocean areas; extend the use of dynamic sampling methods globally; improve the initialization of forecasts; and increase the capacity in developing countries to deliver essential observations and use forecast products. Every country will have the severe-weather-event information needed to mitigate loss of life and reduce property damage. Access to weather data for the other societal benefit areas will be facilitated.

GEOSS 10-Year Implementation Plan, Section 4.1.6

6.1 Continuing Tasks

WE-06-01: Surface-based Global Observing System

Advocate a complete and stable surface-based (in-situ and airborne) Global Observing System (GOS). High priority should be given to a stable and fully functional World Weather Watch Upper Air Network and the further development of the Aircraft Meteorological Data Relay (AMDAR) programme.

WE-06-02: Space-based Global Observing System

Advocate a stable and improved space-based Global Observing System (GOS) including operational geostationary and polar components. Support WMO efforts related to (i) increased spatial and temporal resolution for geostationary imagers and sounders and (ii) a broader availability of polar Doppler wind profiles for initial operational testing.

WE-06-03: THORPEX Interactive Global Grand Ensemble (TIGGE)

Facilitate the development and maintenance of a prototype global operational multi-model ensemble prediction system (e.g. through THORPEX) incorporating easily accessible databases.

WE-06-05: Numerical Weather-Prediction Capacity Building

Co-organize a series of regional capacity building workshops with major numerical weather-prediction training centres to assist developing countries in their utilization of currently available forecasts; building in particular upon WMO programmes for developing countries.

7 Ecosystems: Improving the management and protection of terrestrial, coastal and marine resources

Observations are needed on the area, condition, and natural-resource stock levels of ecosystems such as forests, rangelands, and oceans. GEOSS implementation will seek to ensure that methodologies and observations are available on a global basis to detect and predict changes in ecosystem condition and to define resource potentials and limits. Ecosystem observations will be better harmonized and shared, spatial and topical gaps will be filled, and in situ data will be better integrated with space-based observations. Continuity of observations for monitoring wild fisheries, the carbon and nitrogen cycles, canopy properties, ocean colour, and temperature will be set in place.

GEOSS 10-Year Implementation Plan, Section 4.1.7

7.1 Continuing Tasks

EC-06-01: Integrated Global Carbon Observation (IGCO)

Support the Integrated Global Carbon Observation (IGCO) development of a global carbon-observing system, in particular improved global networks of in-situ CO2 observations.

EC-06-02: Ecosystem Classification

Establish an ad hoc Ecosystems Classification Task Force, covering terrestrial, freshwater, and ocean ecosystems, with a mandate to create a globally agreed, robust, and viable classification scheme for ecosystems.

EC-06-07: Regional networks for Ecosystems

Build upon existing initiatives (e.g. ANTARES in South America for oceans and GOFC-GOLD regional networks for terrestrial domains) to develop a global network of organization-networks for ecosystems, and coordinate workshops to strengthen observing capacity in developing countries.

7.2 New Tasks

EC-07-P1: Global Ecosystem Observation and Monitoring System

This task incorporates EC-06-03 (Ecosystem Observation and Monitoring Network), EC-06-04 (Explore techniques for up-scaling in situ observations), EC-06-05 (Survey of in situ observations for ecosystems), and EC-06-06 (Inventory and acquisition of archived data for ecosystems).

There is a tremendous need to coordinate and improve terrestrial (forests, forest conversion, forest concession management, urban agriculture, woodlands, grasslands, and deserts), freshwater, ice and oceans ecosystem observation, characterization and monitoring especially in terms of acquisition and use of satellite, aerial and in situ observation. Characterization and monitoring of ecosystems is greatly impeded by the lack of a global sampling frame and protocols for data collection, management and analysis. A global sampling frame is needed to improve data collection. Lacking sampling targets, remotely sensed data are often not acquired, especially from research and sampling missions. This theme will address the development of a global integrated sampling frame based on an approach developed in 2007.

Characterization, mapping and monitoring of ecosystems at local, national, regional and global scales is requires systematic and formal methods for measuring land surface and vegetation

attributes. These data are needed to both calibrate (train) and validate (test) land cover, vegetation and ecosystem maps. While a vast number of systems exist, there is a need to develop formal methods for collecting plot (in-situ) data, and for translating between different systems. This task will produce a manual of field methods for terrestrial data, and capture existing plot data into an operational information system.

Historic AVHRR, MODIS, MERIS and SPOT-VGT data must be reprocessed to develop composite time series and temporal phenologic metrics to enable monitoring of vegetation condition and change over time. The use of earth observation data to detect the effects of insects, pathogens, water and chemical stresses on ecosystems should be promoted, and scaling studies conducted.

8 Agriculture: Supporting sustainable agriculture and combating desertification

Issues addressed by GEOSS will include: crop production; livestock, aquaculture and fishery statistics; food security and drought projections; nutrient balances; farming systems; land use and land-cover change; and changes in the extent and severity of land degradation and desertification. GEOSS implementation will address the continuity of critical data, such as high-resolution observation data from satellites. A truly global mapping and information service, integrating spatially explicit socio-economic data with agricultural, forest, and aquaculture data will be feasible, with applications in poverty and food monitoring, international planning, and sustainable development.

GEOSS 10-Year Implementation Plan, Section 4.1.8

8.1 Continuing Tasks

AG-06-01: GEOSS Agriculture Strategic Plan

Initiate the creation of a 5- to 10-year strategic plan: define specific objectives for 2007 and create a plan of action for GEO in agriculture, taking account of the GEOSS 10 Year Implementation Plan Reference document targets.

AG-06-02: Data Utilisation in Aquaculture

Consult with scientists and experts from the fisheries, aquaculture, coastal zone management and Earth observation communities at international and regional levels to identify opportunities for enhanced utilization of Earth observations in fisheries and aquaculture.

AG-06-04: Forest Mapping and Change Monitoring

Initiate an international assessment effort on forests and forest changes utilizing ongoing land cover mapping projects (e.g. GLOBCOVER). Ensure application of standardized classifications and harmonization of existing datasets.

AG-06-06: Demonstration Project Crop Irrigation

Advocate funding for demonstration projects to produce global irrigated area/crop production datasets and promulgate sustained monitoring efforts utilizing the validated methodologies.

Further clarification of and elaboration on the task by its originators is necessary, as well as the identification and inclusion of other contributing organisations.

AG-06-07: Training Modules for Agriculture

Initiate the design of training modules to demonstrate the usage of Earth observation data and products for the agricultural sectors in Africa, Asia, Latin America, Central and Eastern Europe, and in Small Island States.

8.2 New Tasks

AG-07-P1: Improving measurements of biomass

In order to enable a sustained use of Earth observation data in the area of agriculture and fisheries, it is necessary to further explore the utility of current Earth observations within the agricultural,

fishery and aquaculture sectors, especially in developing countries with an emphasis on improving classification and quantification of biomass, particularly with a view to genetically modified crops.

AG-07-P2: Agricultural Risk Management

Develop and improve analytical tools and methods for agriculture risk assessment, particularly for crop failure, and establish common standards and formats. This should include the establishment of operational monitoring systems and extreme events such as crop water stress. In this context, the implementation of pilot-projects linking Earth system model forecasts to end-user application models (such as crop-yield models) will be facilitated in order to improve food-supply prediction.

AG-07-P3: Operational Agricultural Monitoring System

Develop an Operational Agricultural Monitoring System comprising:

- A global soil and terrain database at the scale of 1:1000000
- A global farming system database regularly updated with satellite observations
- An operational linkage of Earth observation data to geospatially referenced production and use statistics.

9 Biodiversity: Understanding, monitoring and conserving biodiversity

Issues in this area include the condition and extent of ecosystems, distribution and status of species, and genetic diversity in key populations. Implementing GEOSS will unify many disparate biodiversity-observing systems and create a platform to integrate biodiversity data with other types of information. Taxonomic and spatial gaps will be filled, and the pace of information collection and dissemination will be increased.

GEOSS 10-Year Implementation Plan, Section 4.1.9

9.1 Continuing Tasks

BI-06-02: Biodiversity Requirements in Earth Observation

Building on the framework adopted for monitoring biodiversity trends in the UN Convention on Biological Diversity, conduct a series of workshops and meetings to (i) define the needs and requirements of the biodiversity information users sector, (ii) delineate available methodologies and (iii) identify the adequacy of current and past observational strategies.

DIVERSITAS will conduct a workshop represented by some 70 institutions in 2006.

BI-06-03: Capturing Historical Biodiversity Data

Initiate the development of a strategic plan for capturing historical biodiversity data from natural history collections and the research community.

The Global Biodiversity Information Facility will conduct a workshop in collaboration with DIVERSITAS in 2006.

9.2 New Tasks

BI-07-P1: Biodiversity Observation and Monitoring System

Task now includes Task BI-06-04 activities (Periodic assessment of species and ecosystems of merit) and BI-06-05 (Biodiversity Observation and Monitoring Network). Implement coherent biodiversity observation strategies within the context of an agreed ecosystem classification system based on EC-06-02 and the strategic plans of BI-06-04 and BI-06-05. Facilitate the establishment of monitoring systems that enable frequent, repeated, globally coordinated assessment of trends and distributions of species and ecosystems of special conservation merit. Facilitate consensus on data collection protocols and the coordination of the development of interoperability among monitoring programs.

Apply Earth observation to the characterization, mapping and monitoring of global protected areas consisting of World Heritage sites, natural areas, sites of cultural, geological and archaeological significance. Use earth observation and other geospatial data to support the delineation and update of protected areas boundaries. Improve dissemination of earth observation data to protected area planners and managers.

10 User Engagement

> The needs of users, and the technical solutions to those needs, change with time. GEO will organize regular GEOSS User Fora among and within societal benefit areas or sub-areas, making use of user communities where they exist and catalyzing the formation of new ones where they do not. It will also create an appropriate mechanism for coordinating user requirements across societal benefit areas. The function of the User Fora will be to document and review user requirements, assess the extent to which they are being met, and make recommendations to GEO with the objective of improving the delivery of information appropriate to user needs.
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> *GEOSS 10-Year Implementation Plan, Section 4.2*

10.1 Continuing Tasks

US-06-01: Identify priorities and synergies between SBAs

Establish a GEO process for identifying critical Earth observation priorities common to many GEOSS societal benefit areas, involving scientific and technical experts, taking account of socio-economic factors, and building on the results of existing systems' requirements development processes.

US-06-02: Pilot Communities of Practice

Initiate pilot communities of practice to identify and further refine users' needs, in particular on cross-cutting areas, building upon the initial experience of community of practice and on information provided by national, regional and project-level surveys.

The following communities of practice have been recognised by the User Interface Committee:

- Coastal Zone
- Air and Health
- Renewable Energy
- Geohazards
- Water and Heath
- Forest

10.2 New Tasks

US-07-P1: Mesoscale Observing Networks

Build on the Helsinki Testbed experience to establish an international framework for transferring advanced nowcasting and forecasting capabilities to major cities in developed and developing countries.

The Helsinki Testbed is based on the development of enhanced three-dimensional mesoscale observing networks critical to the advancement of modelling systems and related applications to precision weather forecasts, severe weather warnings, hydrology (including flood control), air-quality forecasting, chemical emergency response, transportation safety, and energy management.

It is a public-private-academic partnership aimed at solving regional problems operationally with a strong connection to the end-users. The program is open to all interested parties and the data is freely accessible through the internet. Related stakeholder groups include homeland security, agriculture, insurance, urban management, media, and public safety.

US-07-P2: Millennium Development Goals

Facilitate inter-institutional coordination for common action towards the UN Millennium Development Goals, including poverty and hunger reduction, disease and disaster prevention, and environmental sustainability.

Related activities will include: Improve coordination of existing environmental monitoring activities including actions by the space agencies, research centres, UN agencies and the public/private sectors. Promote the use of available environmental data at national and regional level and support the development of structured user communities at geographic scales from country to continent.

11 Architecture

> The success of GEOSS will depend 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. GEOSS interoperability will be based on non-proprietary standards, with preference given to formal international standards. Interoperability will be focused on interfaces, defining only how system components interface with each other and thereby minimizing any impact on affected systems other than where such systems have interfaces to the shared architecture.
>
> *GEOSS 10-Year Implementation Plan, Section 5.3*

11.1 Continuing Tasks

AR-06-09: High Resolution Multispectral Imager Continuity

Advocate establishing continuity for near real-time, 30-m (or better) resolution, multi-spectral remote-sensing coverage everywhere on the Earth's surface, including support for the launch of a Landsat-equivalent follow-on mission.

AR-06-10: GPM Mission Implementation

Advocate and facilitate the timely implementation of the Global Precipitation Measurement (GPM) mission and encourage more nations to contribute to the GPM constellation

AR-06-11: Radio Frequency Protection

Assess the potential impact of interference on Earth Observations applications and in particular Satellite measurements necessary for the GEOSS and prepare a series of appropriate advocacy activities, including representations to the International Telecommunication Union (ITU) and other bodies in charge of frequency management. In particular, the case of passive bands, essential for Earth observations, will be monitored with the highest care (For example, evaluation of challenges presented by the automotive short-range radars (SRR 24 GHz) applications and their implications).

11.2 New Tasks

The relations between the interoperability related tasks in the GEO 2006 Work Plan (i.e. AR-06-01, AR-06-02, AR-06-03, AR-06-04, AR-06-05, DA-06-07) have been analysed and it was concluded they would benefit from further development in order to establish close connections with the Social Benefit Areas. Therefore these task are regrouped.

AR-07-P1: Interoperability arrangements for GEOSS

This task has four purposes:

- Coordinate the core architectural principles in GEOSS, which have been initiated in AR-06-01, AR-06-02, AR-06-03 and AR-06-04;
- Advocate commitments of newsystems to the architecture of GEOSS, such as Sentinel Asia, GEONET, and WIS in the early operational phase of GEOSS, and ensure proper implementation;
- Test interoperability arrangements on newly contributed systems;
- Contribute additional architectural components to GEOSS.

AR-07-P2: Interface Implementation for GEOSS

With the objective to facilitate the implementation of information system interfaces, the "Clearinghouse task" (AR-06-05) and the "GEO Webportal task" (DA-06-07) are grouped. The prominent requirements for the Health, Ecosystem and Biodiversity SBAs will be addressed as a priority under this task. These communities need to develop a data access and analysis system that will allow researchers and users to overlay their data (e.g. species distribution, protected area boundaries, specimen locations) with remote sensing and other geospatial data. A prototype system would allow subscribers access to these rich geospatial datasets and provides tools for maintaining biological and ecological data interactively (define polygons, update attributes, analyze and report). The User Interface Committee needs to participate with the Architecture and Data Committee on this task.

AR-07-P3: Virtual Constellations

Advocate virtual constellation space observations following the “CEOS constellation concept” for better temporal, spatial, and spectral resolution and related data management and dissemination. Space agencies and related organizations should consider the development of space and ground segments for such constellation concepts in the mission planning phase. Addressing objectives of all SBAs and filling gaps between them must be duly taken into account. This task would include a broad array of active and passive sensor systems operating over broad spectral, spatial and temporal coverage and resolutions, possibly considering specific cases such as constellations of SAR systems or micro satellites for a range of Earth observation applications. In addition, a robust verification and validation program including both spatial and radiometric elements is needed to ensure the accuracy and integration of a diverse collection of sensor systems. The UN registration of space objects in accordance with the Registration Convention (1975) shall be taken into account. This task includes relevant synergies with AR-06-09 and DI-06-09.

AR-07-P4: Global geodetic reference frames

Ensure the availability of accurate, homogenous, long-term, stable, global geodetic reference frames as a mandatory framework and the metrological basis for Earth observation.

12 Data Management

In the implementation of GEOSS, increased sharing of methods for modelling and analysis needed to transform data into useful products will be advocated. The implementation of GEOSS will facilitate, within 6 years, data-management approaches that encompass a broad perspective of the observation-data life cycle, from input through processing, archiving, and dissemination, including reprocessing, analysis and visualization of large volumes and diverse types of data. The implementation of GEOSS will establish, within 6 years, international information sharing and dissemination drawing on existing capabilities through appropriate technologies, including, but not limited to, Internet-based services.

GEOSS 10-Year Implementation Plan, Section 5.1&5.2

12.1 Continuing Tasks

DA-06-01: GEOSS Data Sharing Principles

Invite experts to identify steps required to further the practical application of the agreed GEOSS data sharing principles.

DA-06-02: GEOSS Quality Assurance Strategy

Develop a GEO data quality assurance strategy, beginning with space-based observations and evaluating expansion to in-situ observations, taking account of existing work in this arena.

DA-06-04: Data, Metadata and products Harmonisation

Facilitate the development, availability and harmonization of data, metadata, and products commonly required across diverse societal benefit areas, including base maps, land-cover data sets, and common socio-economic data.

DA-06-05: Guidance Document for Basic Geographic Data

Develop a guidance document for basic geographic data (including format, precision, accuracy, etc.), taking into account relevant national, regional and global initiatives.

DA-06-06: Spatial Data Infrastructures

Advocate use of existing Spatial Data Infrastructure components as institutional and technical precedents, where appropriate, including standard protocols and interoperable system interfaces, among other components.

DA-06-09: GEOSS Best Practices Registry

Establish GEOSS Best Practices Registry by a request for proposals from GEO organizations willing to maintain/update GEOSS Best Practices Registry. The registry should also include existing cost-benefit sharing mechanisms and examples (data sharing, cooperative data acquisition, joint development, joint flight, collaborative sciences, etc).

12.2 New Tasks

DA-07-P1: Higher Level Data Product Tools

Over the past years geophysical retrievals from moderate spatial resolution imaging sensors have shown significant impact for ecosystem and climate monitoring. Several of these products have meanwhile reached operational character (FAPAR, water vapour column abundance, cloud albedo, SST, Case-1 Ocean chlorophyll concentration etc.). In order to enhance global monitoring and prediction capabilities the combination of higher level data from different sources (satellite sensors) is required. To achieve this it is necessary to develop tools enabling the establishment of higher level data products (level-3/4) from different sources (satellites) thus yielding frequent information update through enhanced coverage, as well as the production of higher product level time series and global maps. The output of this task shall follow the guidelines established in DA-06-05.

DA-07-P2: Global Land Cover

Utilizing global and regional high-resolution land cover datasets and earlier 1-km resolution land cover data sets, implement production of a high-resolution global land-cover change dataset and report. Initiate regular analysis and reporting on land cover change and promulgate the use of these products, especially in developing countries.

DA-07-P3: DEM interoperability

Facilitate interoperability among Digital Elevation Model (DEM) data sets with the goal of producing a global, coordinated and integrated DEM. This DEM database should be embedded into a consistent, high accuracy, and long term stable geodetic reference frame for Earth observation.

(Former AR-06-06 reclassified under Data Management, as this task addresses DEM guidance).

DA-07-P4: Data Integration and Analysis System

It is expected that there will be a large increase in the volume of Earth Observation data. In addition to distributed data archives and integration system, data management facilities will be used for diverse and large-volume Earth Observation data from inhomogeneous information sources in cooperation with existing data centres. This task is to coordinate data management approaches that encompass a broad perspective of the observation data life cycle, from input through processing, achieving, and dissemination, including reprocessing, analysis and visualization of large volumes and diverse type of data.

13 Capacity Building

The GEO capacity-building strategy follows the World Summit on Sustainable Development concept of a global partnership between those whose capacity needs development and those who are able to assist in the process, recognizing that activities have intertwined social, environmental, and economic impacts. The GEO capacity-building strategy will be based on best practices derived from studying successful and less-successful approaches.

GEOSS 10-Year Implementation Plan, Section 5.6

13.1 Continuing Tasks

CB-06-04: GEO-NETCast

GEO-NETCast, a real-time data dissemination system - in support of the GEO societal benefit areas - by which environmental /in situ/, airborne, and space-based observations, products, and services are transmitted to users through satellites.

GEO-NETCast needs to:

- Continue coordination with and receive input from user community
- Develop linkages to other dissemination methods as part of the overall GEOSS architecture
- Identify other infrastructure contributors to expand geographical coverage and build a global system
- Incorporate data and product contributions to serve all GEO societal benefit areas, which will likely require expanding bandwidth capacity
- Secure additional resources to evolve from the demonstration phase into a fully operational, global GEO-NETCast system

Where infrastructure contributions are not yet in place, the strategy is to establish GEONETCast on a demonstration basis, then evolve to the full operational system covering both data exchange and dissemination.

13.2 New Tasks

CB-07-P1: Capacity Building Strategy Implementation

The planned symposium in Spain in early 2007 will define the capacity building activities for the next few years. The strategy will identify best practice examples, identify gaps (infrastructure, education and training, institutional) and make recommendations for filling these. Importantly, based on the ongoing review of capacity-building initiatives conducted in CB-06-01, it will make recommendations on synergy and coordination of existing capacity building programs and initiatives. A major new drive will be required to advocate for funding, yond GEO members, for the strategy implementation

Furthermore, the strategy will advocate for a specific capacity building focus to be developed within each task contained in the work plan. Existing capacity building tasks within each societal benefit area will be synergised with objectives of the strategy. Consequently, DI-06-12, DI-06-14 and DA-06-08 capacity building tasks in the 2006 work plan will be incorporated into the 2007 work plan.

CB-07-P2: Capacity Building Indicators

Prepare Input, Output, Impact and Outcome GEO capacity building indicators

This task initiates the 2 year and 6 year capacity building target contained in the 10 year Implementation Plan. It aims to develop reliable qualitative and quantative metrics for measuring the efficacy of Earth observation capacity building programs. The development of these metrics would require the engagement of the entire GEO community to ensure buy in. It provides the basis on which the implementation of the capacity building strategy can be measured.

CB-07-P3: Building National Capacity

Building national capacity to respond to GEO

The objective of this task would be to facilitate the exchange of ideas and identification of best practices in an effort to assist Earth observation communities of GEO members, particularly in developing countries, to respond to GEO. It will further be focused on developing capacities to leverage and implement the benefits of GEO.

14 Outreach

Outreach is essential to many aspects of GEO activities. The outreach objective is to promote and increase the general awareness of the benefits of Earth observation, especially among present and future users, beneficiaries and sponsors of relevant systems. Within 2 years, GEO will produce and begin to implement an outreach plan directed towards key target audiences, including decision makers and policy makers; the general public; industry and service communities; scientific and technical communities; education entities; non-governmental organizations; public-interest advocacy groups; and international financial institutions and official development assistance agencies.

GEOSS 10-Year Implementation Plan, Section 5.7

The outreach activities of GEO will, of necessity, be engaged by all GEO Members and Participating Organizations promoting GEO through a variety of national and regional forums, and by bringing a wide range of expertise to bear on the tasks for which they take responsibility. General outreach activities will be undertaken by the Secretariat as part of its ongoing supporting activities described in Section 15 below, and in the GEOSS Outreach Plan (to be developed).

15 Supporting Activities

Supporting activities, which are carried out by the Secretariat to facilitate GEOSS implementation, are described below in the following categories: prepare; negotiate; advocate; promote; support; monitor and report.

15.1 Prepare

The Secretariat will be initiating groups and discussions in new areas relating to GEOSS. In close coordination with the User Interface and Science and Technology Committees, it will engage with the scientific research and technological community worldwide as well as with all stakeholders and potential users of GEOSS in an effort to identify new applications in existing and emerging fields. This work will contribute to the preparation of GEO Work Plans by collecting inputs, in particular user requirements, and establishing priorities. It will also provide guidance for the annual update of the 2007 to 2009 Work Plan. Activities in this domain include:

- Exploring possibilities for the development of an international charter on telecommunication systems and disasters;
- Increasing collaboration, through workshops and other fora, among stakeholders across diverse sub-communities within the field of human health and the environment;
- Raising awareness of potential uses of GEOSS for health through bi-lateral meetings;
- Promote interactions, in the form of fora, to identify requirements for new or improved data, products and services.

15.2 Negotiate

The Secretariat will facilitate agreement on coordination issues among GEO Members and Participating Organizations and will define relationships between GEO and related programmes, entities, and dedicated coordinating mechanisms. It will engage with implementing agencies to harmonize Earth observation planning, reinforcing synergies among national and/or regional Earth observation planning efforts and enhancing alignment of these efforts with the GEOSS 10-Year Implementation Plan.

15.3 Advocate

The Secretariat will develop and apply strategies for promoting GEO value, and advocate agreed GEOSS priorities (such as the strengthening of networks and closing gaps in developing countries) in the context of budgetary and fiscal cycles of GEO Members and Participating Organizations. The Secretariat will promote the value of Earth observations generally and GEO specifically among decision makers, non-governmental organizations, think tanks, and industry associations.

The Secretariat will endeavour to mobilize resources in support of specific GEO projects. It will draw on the many socio-economic benefit analyses conducted by GEO Members and Participating Organizations and identify potential new funding instruments, in order to advocate the value of GEOSS among international funding agencies, development institutions, and private foundations.

Activities in this domain include:

- Advocating additional resources for the maintenance and expansion of in-situ observing systems;
- Advocating continuity and availability of key data sets derived from satellite observations;

- Advocating increased data sharing, furthering the application of GEOSS data sharing principles.

15.4 Promote

The Secretariat will raise awareness of GEO and GEOSS among the general public and the education community through broadcast and print media placements, public service announcements, educational materials targeted for young people, and the GEO website, and within the scientific and technical community through briefings, presentations, workshops, and side events at major scientific conferences.

Activities in this domain include:

- Implementing a sustained outreach campaign plan of targeted communication activities.
- Engaging in a series of regular media roundtables and briefings and occasional well-timed press conferences and special events.
- Promoting awareness of successful communities of practice activities, advancing awareness of potential applications for Earth observations.
- Maintaining a list of major international conferences and workshops relevant to GEOSS and ensure GEOSS participation and visibility in selected events.
- Continuing presentations and briefings to technical audiences in each societal benefit area, with an emphasis on emerging fields of health, energy, water resources management, and ecosystems.

15.5 Support

In keeping with the GEO Rules of Procedure, the Secretariat will organize, prepare, and support meetings and other work of the GEO Plenary, Executive Committee, and provide full administrative support to all GEO committees and working groups. The activities of the committees and working groups will be closely coordinated with the Secretariat to maintain consistency with the approved GEOSS 10-Year Implementation Plan and to maximize the effectiveness of the GEO. Upon request, the Secretariat will support the Task Leads and participants in coordinating their activities.

15.6 Monitor and Report

The Secretariat will monitor GEO progress. The Secretariat will report on GEOSS implementation and Work Plan progress by generating quarterly updates of the Task sheets. It will report on supporting activities through quarterly reports and an annual report. Special reports on specific aspects of GEOSS implementation will also be produced as needed.

16 Performance Indicators

In accordance with Section 7.2 of the GEOSS 10 Year Implementation Plan, GEO has a mandate to develop performance indicators for GEOSS. Drawing from the material presented in Chapter 9 of the Reference Document, the following list of indicators is proposed, grouped into three categories:

GEOSS implementation progress:

- Size and significance of component systems compliant interoperability arrangements contributed to GEOSS interoperability (once interoperability guidance is defined);
- Users of GEO portal and clearinghouse, once developed (quantified by web traffic);
- New observational products traceable to GEOSS;
- Standards and protocols developed for GEOSS;
- Number of media placements referring to GEOSS;
- Number of peer-reviewed scientific publications referring to GEOSS.
- Implementation plan targets achieved;

Success and efficiency of the GEO process:

- Increasing number of GEO Members and Participating Organizations;
- Size of technical experts roster on record with the Secretariat (GEO-ALL);
- Metrics on number of Tasks completed;
- Financial investment leveraged through GEOSS;
- Number of GEO meetings, average attendance and percentage of participation by region;
- Number of invited talks and lectures by GEO Co-chairs, GEO Principals, Secretariat Director, and Secretariat staff;
- Level of contributions to the GEO Trust Fund.

Efficiency and Effectiveness of the Secretariat

- Number of proposed secondments to the Secretariat as compared to available positions;
- Contributions to the Secretariat;
- Fraction of the Secretariat budget spent on programme operations (meetings and travel) workshop contributions, compared to administrative overhead;
- GEO Plenary actions completed;
- Executive Committee actions completed;
- Percentage of deadlines met;
- Clarity of documents and quality of reporting;
- Successful audit.

The above quantitative variables may be accompanied by internal and external qualitative evaluations as appropriate.

ACRONYMS

ADM	Advanced Dissemination Method
AMDAR	Aircraft Meteorological Data Relay
AMMA	African Monsoon Multidisciplinary Analysis
ANTARES	A Network for the Enhancement of the Education and Scientific Research
APAN	Asia-Pacific Area Network
APEC	Asia-Pacific Economic Cooperation
APFM	Associated Programme on Flood Management
AREP	Atmospheric Research and Environment Programme
ASEAN	Association of Southeast Asian Nations
AVHRR	Advanced Very High Resolution Radiometer
CBD	Convention on Biological Diversity
CEOS	Committee on Earth Observation Satellites
CERN	Centre Européen pour la Recherche Nucleaire
DAPHNE	Deployment of Asia-Pacific-Indian Ocean Hazard Mitigation Network
DEM	Digital Elevation Model
EC	European Commission
EPA	Environmental Protection Agency
EPIDEMIO	Earth Observation in Epidemiology
FAPAR	Fraction of Absorbed Photosynthetically Active Radiation
FDSN	International Federation of Digital Seismograph Networks
GEANT	Gigabit European Academic Network
GEO	Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GIS	Geographical Information System
GMES	Global Monitoring for Environment and Security
GNSS	Global Navigation Satellite System
GOFC-GOLD	Global Observation of Forest and Land Cover Dynamics
GOS	Global Observing System
GPM	Global Precipitation Measurement
GPS	Global Positioning System
GSN	Global Seismographic Network
IGACO	Integrated Global Atmospheric Composition Observations
IGCO	Integrated Global Carbon Observation
IGDDS	Integrated Global Data Dissemination Service
InSAR	Interferometric Synthetic Aperture Radar
INSPIRE	Infrastructure for Spatial Information in Europe
IOC	Intergovernmental Oceanographic Commission
IPY	International Polar Year
ISDR	International Strategy for Disaster Reduction
ITU	International Telecommunication Union
JCOMM	Joint WMO-IOC Technical Commission on Oceanographic and Marine Meteorology

LRTAP	(UNECE Convention on) Long-Range Transboundary Air Pollution
MERIS	Medium Resolution Imaging Spectrometer
MODIS	Moderate Resolution Imaging Spectroradiometer
NASA	National Aeronautics and Space Administration
NGO	Non Governmental Organisation
NIEHS	National Institute of Environmental Health Sciences
SAR	Synthetic Aperture Radar
SBA	Social Benefit Area
SPOT-VGT	SPOT Vegetation
SRR	Short Range Radar
SRTM	Shuttle Radar Topography Mission
SST	Sea Surface Temperature
TF-HTAP	Task Force on Hemispheric Transport of Air Pollution
THORPEX	The Observing-system Research and Predictability Experiment
TIGGE	THORPEX Interactive Global Grand Ensemble
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNFCCC COP	United Nations Framework Convention on Climate Change Conference of the Parties
WCRP	World Climate Research Programme
WHO	World Health Organization
WIS	WMO Information System
WMO	World Meteorological Organization

Annex I
Five Strategic Elements of GEOSS Implementation

This table provides a breakdown of the 73 tasks of the 2007-2009 Work Plan into five strategic elements necessary for GEOSS implementation.

1. Establish the basic arrangements and policies to build the system of systems.

Task No.	Title
AR-07-P1	Interoperability arrangements for GEOSS
AR-07-P2	Interface Implementation for GEOSS
AR-07-P3	Virtual Constellation
AR-06-11	Radio Frequency Protection
DA-06-01	GEOSS Data Sharing Principles
DA-06-02	GEOSS Quality Assurance Strategy

2. Contribute new components and improve existing components of GEOSS.

Task No.	Title
DI-06-02	Seismographic networks improvement and coordination
HE-07-P1	Strengthen observation and information systems for health
HE-07-P3	Integrated atmospheric pollution monitoring, modelling and forecasting
CL-06-06	Global ocean observation system
WA-06-05	In-situ water resource monitoring
WA-07-P1	Global Water Quality Monitoring
WE-06-01	Surface-based Global Observing System
WE-06-02	Space-based Global Observing System
EC-06-01	Integrated Global Carbon Observation (IGCO)
EC-06-07	Regional networks for Ecosystems
US-07-P1	Mesoscale Observing Networks
AR-06-09	High Resolution Multispectral Imager Continuity
AR-06-10	GPM Mission Implementation
DA-07-P1	Higher Level Data Product Tools
DA-07-P4	Data Integration and Analysis System
CB-06-04	GEO-NETCast

3. Produce coordinated observation methodologies.

Task No.	Title
DI-06-03	Integration of InSAR technology
CL-06-01	Sustained reprocessing and reanalysis efforts
CL-06-05	GEOSS IPY Contribution
CL-07-P1	Seamless Weather and Climate Prediction System
WA-06-02	Forecasts in water resource-management
EC-07-P1	Global Ecosystem Observation and Monitoring System
AG-06-04	Forest Mapping and Change Monitoring
AG-06-06	Demonstration Project Crop Irrigation
AG-07-P1	Improving measurements of biomass
AG-07-P2	Agricultural Risk Management
BI-07-P1	Biodiversity Observation and Monitoring System
AR-07-P4	Global geodetic reference frames
DA-06-04	Data, Metadata and products Harmonisation
DA-06-05	Guidance Document for Basic Geographic Data
DA-06-06	Spatial Data Infrastructures
DA-07-P3	DEM interoperability

4. Make new data sets available.

Task No.	Title
DI-06-05	Reference geographic products
DI-06-07	All-hazard zonation and maps
DI-06-09	Use of satellites for Risk Management
CL-06-02	Key data from satellite systems
CL-06-03	Intergovernmental mechanisms for terrestrial observations
WA-07-P2	Satellite Water Measurements
AG-06-02	Data Utilisation in Aquaculture
AG-07-P3	Operational Agricultural Monitoring System
BI-06-03	Capturing Historical Biodiversity Data
DA-07-P2	Global Land Cover

5. Engage with communities (support modelling workshops, user requirements, etc.) to improve / enhance / increase use of Earth observations.

Task No.	Title
DI-06-04	Implementation of a Tsunami Early Warning System at global level
DI-06-08	Multi-hazard approachdefinition and progressive implementation
DI-06-13	Implementation of a Fire warning System at global level
DI-07-P1	Risk Management for Floods
DI-07-P2	Risk Management for Slowly Developing Disasters

Task No.	Title
HE-06-03	Earth Observation and Health Pilot Projects
HE-07-P2	Environment and health monitoring and modelling
EN-06-04	Optimum exploitation of new observation systems
EN-07-P1	Renewable Energy
EN-07-P2	Environmental Impact Monitoring
EN-07-P3	Energy Policy Planning
WA-06-07	Capacity building program in Latin America
WE-06-03	THORPEX Interactive Global Grand Ensemble (TIGGE)
WE-06-05	Numerical Weather-Prediction Capacity Building
EC-06-02	Ecosystem Classification
AG-06-01	GEOSS Agriculture Strategic Plan
AG-06-07	Training Modules for Agriculture
BI-06-02	Biodiversity Requirements in Earth Observation
US-06-01	Identify priorities and synergies between SBAs
US-06-02	Pilot Communities of Practice
US-07-P2	Millennium Development Goals
DA-06-09	GEOSS Best Practices Registry
CB-07-P1	Capacity Building Strategy Implementation
CB-07-P2	Capacity Building Indicators
CB-07-P3	Building National Capacity

Annex II

2006 Task Evolution Table

Task No.	Title	Status & Remarks
DI-06-01	Encourage in-situ and space agencies to (i) systematically record data over coastal regions subject to tsunami risk, and (ii) archive data in a form easily accessible to all countries.	**Closed** To be merged into DI-06-04 and DI-06-05
DI-06-02	**Seismographic networks improvement and coordination** Facilitate improvement of capabilities for global seismographic networks such as GSN, FDSN, DAPHNE, and sharing of data and event products among GEO members. New Title: "Facilitate improvement of capabilities for global seismographic networks such as GSN, FDSN, DAPHNE, GNSS networks and sharing of data and event products among GEO members."	**To be continued** The title has been slightly modified to give proper visibility to GNSS networks, that, in any case were already included into the task.

Task No.	Title	Status & Remarks
DI-06-03	**Integration of InSAR technology** Support the improved integration of InSAR (Interferometric Synthetic Aperture Radar) technology for disaster warning and prediction.	**To be continued** It will also include integration of GPS networks data.
DI-06-04	**Implementation of a Tsunami Early Warning System at global level** Promote and facilitate free and unrestricted exchange of all Earth observation data relevant to Tsunami Early Warning Systems. New Title: "Support the IOC Implementation Plan, through (i) promotion and facilitation of free and unrestricted exchange of all Earth observation data relevant to Tsunami Early Warning Systems (ii) contribution in terms of GEO developed operational capabilities (iii) definition and implemntation of standards"	**To be continued** This task now includes all the activities related to the implementation of a Tsunami Early Warning System at global level, including activities from tasks DI-06-01 and DI-06-06.The IOC Implementation Plan will be the programmatic reference for task implementation. JCOMM will be included in the contributing Organisations.
DI-06-05	**Reference geographic products** Building on existing techniques, create a plan for the production in coastal zones of high resolution (i) near-shore bathymetric maps (ii) land use/land cover maps and (iii) Digital Elevation Models. New Title: "Building on existing techniques, create a plan for the production of high resolution (i) near-shore bathymetric maps (ii) land use/land cover maps and (iii) Digital Elevation Models."	**To be continued** The scope of the task was extended beyond the coastal Regions to provide proper reference to a multihazard approach. Initial focus will anyhow be on coastal regions. Includes activities from task DI-06-01. It will include specific mention of SRTM data.
DI-06-06	Harmonize existing efforts towards the preparation of a “global tsunami hazard map” to support coastal zone monitoring and infrastructure planning & investment.	**Closed** To be merged into DI-06-04 and DI-06-07
DI-06-07	**All-hazard zonation and maps** Conduct an inventory of existing geologic and all-hazard zonation maps and identify gaps and needs for digitization. New Title: "Conduct an inventory of existing geologic and all-hazard zonation maps, identify gaps and needs for digitization and progressively develop related products"	**To be continued** The scope of the task was redirected to include progressive production of maps and integration of data (coming also from task DI-06-03) into the GEO clearinghouse.

Task No.	Title	Status & Remarks
DI-06-08	**Multi-hazard approachdefinition and progressive implementation** Promote the cooperation of national and international agencies towards a multi-hazard approach to address more effectively and systematically coastal risks (e.g. from tropical cyclones, storm surges, tsunamis, land slides, volcanic eruption). New Title: "Promote the cooperation of national and international agencies towards the definition and implementation of a multi-hazard approach to systematically address all risks."	**To be continued** The scope of the task was better focused to fully support ISDR in the Implementation of the Hyogo Framework for action. It will include, as an important complement to the on going programs on the implementation of a Tsunami Early Warning System, a pilot project on the implementation of a risk management system for geohazards in the SE Asian Region. This project will be constructed in coordination and in support of existing organisations and projects (such as ASEAN, APEC, Sentinel Asia), with the participation of the Community of practice rather active in the area.
DI-06-09	**Use of satellites for Risk Management** Expand the use of meteorological geostationary satellites for the management of non-weather related hazards. New Title: " With reference to a multi-hazard approach, define and facilitate implementation of a virtual constellation for risk management"	**To be continued** The scope of the task was reviewed in order to take into account related 6-years targets. In coordination with AR-07-P3 (virtual constellations) the main objective would be to identify a virtual constellation for risk management.
DI-06-10	Initiate and maintain a dialogue between GEO, the Board of the International Charter on Space and major Disasters and relevant UN agencies to identify mechanisms for strengthening the scope and mandate of the Charter.	**To be continued as an ongoing supporting activity**
DI-06-11	Explore possibilities for the development of an international charter on telecommunication systems and disasters, building upon the experience of the International Charter on Space and Major Disasters.	**To be continued as an ongoing supporting activity**
DI-06-12	Initiate a knowledge-transfer programme to developing countries, to ensure basic capacity to utilize Earth observations for disaster management.	**Closed** The contents of general nature of this task will be integrated into the Capacity building tasks. Each disaster task that will generate, as output, systems, products/services will include the activities to transfer knowledge and to develop training modules.

Task No.	Title	Status & Remarks
DI-06-13	**Implementation of a Fire warning System at global level** Initiate a globally coordinated warning system for fire and monitoring for forest conversion, including the development of improved information products and risk assessment models. New Title: "Initiate a globally coordinated warning system for fire, including the development of improved information products and risk assessment models."	**To be continued** The task will focus on fire warning and not also on forest monitoring data and products and products of interest for other SBA's will be made available.
DI-06-14	Support the design of multi-media training modules to communicate the levels of risk from hydro-meteorological hazards to the public to enable them to make informed decisions.	**Closed** The contents of general nature of this task will be integrated into the Capacity building tasks. Each disaster task that will generate, as output, systems, products/services will include the activities to transfer knowledge and to develop training modules.
HE-06-01	Consult with scientists and experts from the health, environment, and Earth observation communities to define the requirements and priorities of the Health communities regarding environmental observations.	**To be completed in 2006**
HE-06-02	Organize a workshop in Geneva in 2006 with the external support of WHO on human health issues, and their relations with Earth observations, environmel and disease outbreak modelling, building upon 2005 events (EC workshop on Human health and Global Change, NIEHS/EPA workshop on Human health and Air quality, EPIDEMIO workshop, Wengen meeting on seasonal forecasts for health, etc).	**To be continued as an ongoing supporting activity** (Workshop to be held in early 2007) Increase collaboration among stakeholders across diverse sub-communities within the field of human health and the environment by establishing exchange programmes between relevant experts, as well as promoting international, interdisciplinary workshops and collaborative research projects.
HE-06-03	**Earth Observation and Health Pilot Projects** Facilitate the formation of international consortia and coordinate, besides advocating funding for, the implementation of major demonstration pilot-projects integrating Earth observations, health and epidemiological as well as socio-economic data. As a priority, a project initiated by THORPEX will focus on the use of advanced weather and climate ensemble forecasting methods to develop and improve the predictability of major health hazards and impacts in developing countries (e.g., West Africa).	**To be continued** The "Health and Climate Partnership for Africa", established by THORPEX will be developed. International demonstration projects under the "Biodiversity, Ecosystem services and Health" research theme will be established. The task will also initiate projects to improve the processing of real-time and historical data and the development of models relating remotely-sensed, in-situ and epidemiological data for detecting disease trends and the provision of early warning systems.

Task No.	Title	Status & Remarks
HE-06-04	Organize bi-lateral meetings with major health organizations and associations at national and regional levels and representatives of GEO, to raise awareness of potential uses of GEOSS for health.	**To be continued as an ongoing supporting activity**
HE-06-05	Building on the existing work of WHO, perform an assessment, with emphasis on developing countries, of existing capacities for the integration of Earth observation and health data (in terms of data collection, processing and integration). Identify gaps, and explore funding as well as existing projects to close gaps and build capacity.	**Closed** Merged into CB-07-P1
EN-06-01	Consult with scientists and experts representative of the energy sector (including the private sector) to develop a set of priorities for GEO activities.	**Closed** Merged into EN-06-04
EN-06-02	Conduct a survey and assessment of energy management needs in terms of Earth observations (in-situ, airborne, and space-based) and products in cooperation with national energy agencies and associations, focusing on gaps and requirements for new observations.	**Closed** Merged into EN-06-04 Will be partly implemented in the framework of EN-06-04 Workshop
EN-06-03	Initiate and maintain a dialogue between decision-support tool providers and energy production & distribution managers to identify requirements for the development of improved and/or new tools.	**Closed** Merged into EN-06-04 Will be partly implemented in the framework of EN-06-04 Workshop
EN-06-04	**Optimum exploitation of new observation systems** Organize a major workshop in 2006 to identify and define the main elements and orientations of a strategic 5-10 Year Plan for the optimum exploitation of the enhanced capabilities offered by the forthcoming new generation of observing systems and forecasting modelling techniques (e.g. ensemble-based techniques developed by ECMWF and others). New Title: Organize a series of activities including workshops to identify and define the main elements/components of a strategic 5-10 Year Plan for the optimum exploitation of the enhanced capabilities offered by the forthcoming new generation of observing systems and forecasting modelling techniques.	**To be continued** The activities of tasks EN-06-01, EN-06-02, EN-06-03, EN-06-05 and EN-06-06 were merged into this task.

Task No.	Title	Status & Remarks
EN-06-05	Facilitate the formation of an international consortium to initiate the implementation of a demonstration project utilizing advanced ensemble forecasting techniques to improve energy management – particularly those linked to hydro-power.	**Closed** Merged into EN-06-04
EN-06-06	Participate in major energy fora and roundtables organized by international organizations, energy associations, and business councils.	**Closed** Merged into EN-06-04
CL-06-01	**Sustained reprocessing and reanalysis efforts** Ensure the initiation of international mechanisms to coordinate and maintain sustained climate data reprocessing and reanalysis efforts.	**To be continued**
CL-06-02	**Key data from satellite systems** Establish actions securing the provision of key data for climate studies and forecasting from satellite systems.	**To be continued** Related activities will include: Promote vis-à-vis satellite agencies and policy-makers the implementation of actions proposed to respond to GCOS requirements for key climate data (a list of these actions will be presented at UNFCCC COP-12 in November 2006).
CL-06-03	**Intergovernmental mechanisms for terrestrial observations** Consolidate the role of existing intergovernmental mechanisms for terrestrial observations needed for climate studies and forecasting. Develop a framework for the preparation of guidance materials, standards, and reporting guidelines for terrestrial observing systems for climate and associated data, metadata, and products to expand the comprehensiveness of current networks, facilitate exchange of data, and provide strategic direction to the terrestrial climate sector.	**To be continued** Will build on the outcome of Task CL-06-02.
CL-06-04	Identify lead international entities and national focal points for ocean observation efforts that can articulate national goals for their ocean observing sector and coordinate national activities with other designated national entities in order to evolve toward a truly global system of ocean observations.	**To be completed in 2006**

Task No.	Title	Status & Remarks
CL-06-05	**GEOSS IPY Contribution** Coordinate with the International Polar Year (IPY) to enhance the utilization of Earth observations in all appropriate realms (including, but not limited to, sea and land ice, permafrost, coastal erosion, marine and terrestrial ecosystem change, biodiversity monitoring and impacts of increased resource exploitation and marine transport).	**To be continued**
CL-06-06	**Global ocean observation system** Enhance and improve coordination of coastal and marine climate observations.	**To be continued** Was postponed to 2007
WA-06-01	Organize workshops on water observations, encompassing space-based, airborne, and in-situ observing systems, and focusing on (i) water quality, including fresh, estuarine, and marine water quality, (ii) ground water, (iii) precipitation, soil moisture, surface water, and (iv) hydrological ensemble-based prediction and new observing techniques and products.	**To be completed in 2006**
WA-06-02	**Forecasts in water resource-management** Facilitate the development of one (or more) demonstration-project that points to the added value of hydrological ensemble forecasts in water resource-management.	**To be continued** Enhanced prediction of the global water cycle variation is a key contribution to mitigation of water-related disasters, including floods and drought and sustainable human development. Forecasting methods are to be improved for use by hydrological services throughout the world. The hydrological data and information system infrastructure should be determined, the data from hydrological and meteorological services should be pulled together first on national level and then on river basin level. The systems should also be made interoperable to facilitate global exchange of data and information.
WA-06-03	Organize a side-event at World Water Forum IV (March 2006, Mexico), highlighting the benefits of global and coordinated Earth observations for water resource-management.	**Completed in 2006**.
WA-06-04	Facilitate the development of a global dataset that maps catchments to the first and second order stream level for use in applying land cover data to management of catchments and monitoring the hydrological cycle.	**Closed** No activity reported.

Task No.	Title	Status & Remarks
WA-06-05	**In-situ water resource monitoring** Initiate the creation of a coordination mechanism within GEO for global in-situ water observations, including ocean observations, and advocate synergy and sharing of infrastructure among observing systems.	**To be continued** The current water cycle observation capability is inadequate for monitoring long-term changes in the global water system and their feedback into the climate system, and the lack of and inaccessibility of crucial data is also a major constraint for sustainable development of water resources and improvement of water management practices. In addition to filling gaps in measurement capability, interoperability of observing systems, and standardization of metadata for data sharing, progress in product development of the global near real-time river runoff network, advocation of sharing of telecommunication infrastructure and joint know-how are important goals that need to be reached within the next few years.
WA-06-06	Promote best practices in Earth observation application for integrated water resource management in developing countries by supporting a series of workshops in South America, Asia, Africa, and a Small Island nation.	**To be completed in 2006**
WA-06-07	**Capacity building program in Latin America** Initiate a capacity building program in Latin America to develop tools for using remote sensing data in support of water management, and to show the value of Earth observations generally in water resource management.	**To be continued** A capacity building program in Latin America, focused on the use of Earth observation data for water resources management, will be running for the next years.
WE-06-01	**Surface-based Global Observing System** Advocate a complete and stable surface-based (in-situ and airborne) Global Observing System (GOS). High priority should be given to a stable and fully functional World Weather Watch Upper Air Network and the further development of the Aircraft Meteorological Data Relay (AMDAR) programme.	**To be continued**
WE-06-02	**Space-based Global Observing System** Advocate a stable and improved space-based Global Observing System (GOS) including operational geostationary and polar components. Support WMO efforts related to (i) increased spatial and temporal resolution for geostationary imagers and sounders and (ii) a broader availability of polar Doppler wind profiles for initial operational testing.	**To be continued**

Task No.	Title	Status & Remarks
WE-06-03	**THORPEX Interactive Global Grand Ensemble (TIGGE)** Facilitate the development and maintenance of a prototype global operational multi-model ensemble prediction system (e.g. through THORPEX) incorporating easily accessible databases.	**To be continued**
WE-06-04	Support the development of Advanced Dissemination Methods (ADMs) within an operational Integrated Global Data Dissemination Service (IGDDS), as a component of WMO Information System (WIS) and a contribution of the WMO Space Programme to GEONETCast.	**Closed** To be implemented through AR-07-P1
WE-06-05	**Numerical Weather-Prediction Capacity Building** Co-organize a series of regional capacity building workshops with major numerical weather-prediction training centres to assist developing countries in their utilization of currently available forecasts; building in particular upon WMO programmes for developing countries.	**To be continued**
EC-06-01	**Integrated Global Carbon Observation (IGCO)** Support the Integrated Global Carbon Observation (IGCO) development of a global carbon-observing system, in particular improved global networks of in-situ CO2 observations.	**To be continued**
EC-06-02	**Ecosystem Classification** Establish an ad hoc Ecosystems Classification Task Force, covering terrestrial, freshwater, and ocean ecosystems, with a mandate to create a globally agreed, robust, and viable classification scheme for ecosystems.	**To be continued**
EC-06-03	Initiate the harmonization of observing-methods and create synergies between ecosystem observing activities and those of other existing groups and mechanisms for terrestrial, freshwater and marine systems.	**Closed** Merged into EC-07-P1
EC-06-04	Explore techniques for up-scaling in-situ ecosystem observations.	**Closed** Merged into EC-07-P1

Task No.	Title	Status & Remarks
EC-06-05	Complete a survey of the research community involved in in-situ observations and modelling for new platform and sensor needs, or for suggestions for better use of existing systems.	**Closed** Merged into EC-07-P1
EC-06-06	Conduct an inventory of archived data for ecosystems, identify data gaps, identify data at risk, and evaluate costs of data rescue. In complement, conduct a workshop to define a data archiving strategy taking into account data types, processing levels and supporting media.	**Closed** Merged into EC-07-P1
EC-06-07	**Regional networks for Ecosystems** Build upon existing initiatives (e.g. ANTARES in South America for oceans and GOFC-GOLD regional networks for terrestrial domains) to develop a global network of organization-networks for ecosystems, and coordinate workshops to strengthen observing capacity in developing countries.	**To be continued** Deliverables will span 2006-2007. Linkages with terrestrial ecosystems will be developed in 2007
AG-06-01	**GEOSS Agriculture Strategic Plan** Initiate the creation of a 5- to 10-year strategic plan: define specific objectives for 2007 and create a plan of action for GEO in agriculture. New Title: Initiate the creation of a 5- to 10-year strategic plan: define specific objectives for 2007 and create a plan of action for GEO in agriculture, taking account of the GEOSS 10 Year Implementation Plan Reference document targets.	**To be continued**
AG-06-02	**Data Utilisation in Aquaculture** Consult with scientists and experts from the fisheries, aquaculture, coastal zone management and Earth observation communities at international and regional levels to identify opportunities for enhanced utilization of Earth observations in fisheries and aquaculture.	**To be continued**

Task No.	Title	Status & Remarks
AG-06-03	Utilizing global and regional high-resolution land-cover datasets (e.g. GLOBCOVER) and earlier 1-km resolution land cover data sets (e.g. Global Land Cover 2000), implement production of a high-resolution global land-cover change dataset and report. Propose mechanisms for regular analysis and reporting on land cover change building on current efforts and promulgate the use of these products, especially in developing countries.	**Closed** Merged into DA-07-P2
AG-06-04	**Forest Mapping and Change Monitoring** Initiate an international assessment effort on forests and forest changes utilizing ongoing land cover mapping projects (e.g. GLOBCOVER). Ensure application of standardized classifications and harmonization of existing datasets.	**To be continued**
AG-06-05	Facilitate the implementation of a demonstration project, initiated by THORPEX and AMMA, on the use of advanced weather and climate ensemble forecasting methods integrating Earth observations, agricultural data and socio-economic data, to develop and improve the predictability of food-supply hazards in Africa.	**Closed** Merged into AG-07-P2
AG-06-06	**Demonstration Project Crop Irrigation** Advocate funding for demonstration projects to produce global irrigated area/crop production datasets and promulgate sustained monitoring efforts utilizing the validated methodologies	**To be continued** Further clarification of and elaboration on the task by its originators is necessary, as well as the identification and inclusion of other contributing organisations.
AG-06-07	**Training Modules for Agriculture** Initiate the design of training modules to demonstrate the usage of Earth observation data and products for the agricultural sectors in Africa, Asia, Latin America, Central and Eastern Europe, and in Small Island States.	**To be continued**
BI-06-01	**Biodivesity and ecosystem classification** Ensure participation of the biodiversity community into the Ecosystem Task Force (see Task EC-06-02) in order to ensure that the ecosystem classification system developed as part of this task is compatible with biodiversity observational requirements.	**To be completed in 2006**

Task No.	Title	Status & Remarks
BI-06-02	**Biodiversity Requirements in Earth Observation** Building on the framework adopted for monitoring biodiversity trends in the UN Convention on Biological Diversity, conduct a series of workshops and meetings to (i) define the needs and requirements of the biodiversity information users sector, (ii) delineate available methodologies and (iii) identify the adequacy of current and past observational strategies.	**To be continued** DIVERSITAS will conduct a workshop represented by some 70 institutions in 2006.
BI-06-03	**Capturing Historical Biodiversity Data** Initiate the development of a strategic plan for capturing historical biodiversity data from natural history collections and the research community.	**To be continued** The Global Biodiversity Information Facility will conduct a workshop in collaboration with DIVERSITAS in 2006.
BI-06-04	**Strategic Plan for Biodiversity Assessment** Initiate the development of a strategic plan for periodic global assessment of status and trends for species of merit, taking into account the Millennium Ecosystem Assessment and CBD 2010 targets. Include the remote sensing community in this discussion to determine the applicability of remote sensing to this topic.	**Closed** Merged into BI-07-P1
BI-06-05	**Biodiversity Observation and Monitoring Network** Facilitate the interoperability of the multi-institutional biodiversity observation network and ensure that it links to data sets of ecological and other related observation systems.	**Closed** Merged into BI-07-P1
US-06-01	**Identify priorities and synergies between SBAs** Establish a GEO process for identifying critical Earth observation priorities common to many GEOSS societal benefit areas, involving scientific and technical experts, taking account of socio-economic factors, and building on the results of existing systems' requirements development processes.	**To be continued**

Task No.	Title	Status & Remarks
US-06-02	**Pilot Communities of Practice** Initiate pilot communities of practice to identify and further refine users' needs, in particular on cross-cutting areas, building upon the initial experience of community of practice and on information provided by national, regional and project-level surveys.	**To be continued** The following task proposals, received in response to version 1 of this work plan, are to be referred to the Air and Health Community of Practice: (1) Facilitate international consortia, and coordinate, besides advocating funding for, the implementation of major pilot projects integrating Earth observations of long range transport of air pollutants, health, and socio-economic data to improve decision making. As a priority, evaluate and recommend strategies for an integrated sampling frame for air pollution. This activity has linkages to several other items, including US-06-01, DI-06-09 and EC-06-05. (2) Advocate a stable and improved surface (in-situ and airborne) and space-based observing system of global air quality including polar and geostationary satellites in line with the Integrated Global Atmospheric Composition Observations (IGACO) recommendations. Support WMO efforts related to increased spatial and temporal resolution. Construct a high spatial (kilometers) and temporal resolution (30 minutes) monitoring and forecasting system including observations, modeling and chemical data assimilation for global and local air quality. (3) Support the development of a "Global Sand and Dust Storm Warning System" bringing together forecasts, observations and users, including weather forecasters, commercial aviation, surface transport, health effects, solar energy and agriculture communities. Specifically, organise a WMO International Symposium on a " Global Sand and Dust Storm Warning System" in Spain in Autumn, 2007 (Task leads:WMO/AREP). (4) Organize a "Joint Workshop on Integrated Observations for Assessing Hemispheric Transport of Air Pollution" (and hence Air Quality) in Geneva 24-26 January 2007. (Task leads: UN-ECE Convention on LRTAP Task Force on Hemispheric Transport of Air Pollution (TF-HTAP) and WMO/AREP).
US-06-03	Promote interactions, in the form of fora, between data providers, scientists, industry, international governmental and non-governmental organizations, decision- and policy- makers to identify requirements for new or improved data, products and services.	**To be continued as an ongoing supporting activity**

Task No.	Title	Status & Remarks
AR-06-01	Establish and maintain a process for reaching interoperability arrangements, informed by ongoing dialogue with major international programmes and consortia. That process is to be sensitive to technology and accessibility disparities among GEO Members and Participating Organizations, and must include mechanisms for upgrading arrangements.	**Closed** Grouped into AR-07-P1
AR-06-02	Produce practical strategic and tactical guidance document on how to converge disparate systems to a higher degree of collaboration and interoperability under GEOSS including its roadmap and using existing efforts wherever possible.	**Closed** Grouped into AR-07-P1
AR-06-03	Reach consensus on how the GEOSS architecture will link the components of GEOSS and allow for growth potential.	**Closed** Grouped into AR-07-P1
AR-06-04	Establish a process for GEO Members and Participating Organizations to commit component systems to GEOSS, and advocate specific initial commitments of contributed systems and other components, including agreement to accept GEOSS interoperability specifications as defined to date, and allowing for growth.	**Closed** Grouped into AR-07-P1
AR-06-05	Initiate development of a publicly accessible, network-distributed clearinghouse, subject to GEOSS interoperability specifications to date, and including an inventory of existing data, metadata, and pre defined common products.	**Closed** Grouped into AR-07-P2
AR-06-06	Facilitate interoperability among Digital Elevation Model (DEM) data sets with the goal of producing a global, coordinated and integrated DEM.	**Closed** Reclassified as DA-07-P3
AR-06-07	Produce an inventory of existing in-situ observation networks (including airborne), beginning with the networks of GEO Members and Participating Organizations, and associate them with societal benefit areas as appropriate.	**Closed** No activity reported
AR-06-08	Advocate additional resources for the maintenance and expansion of in-situ observing systems in cooperation with major national and international organizations and programmes.	**To be continued as an ongoing supporting activity**

Task No.	Title	Status & Remarks
AR-06-09	**High Resolution Multispectral Imager Continuity** Advocate establishing continuity for near real-time, 30-m (or better) resolution, multi-spectral remote-sensing coverage everywhere on the Earth's surface, including support for the launch of a Landsat-equivalent follow-on mission.	**To be continued**
AR-06-10	**GPM Mission Implementation** Advocate and facilitate the timely implementation of the Global Precipitation Measurement (GPM) mission and encourage more nations to contribute to the GPM constellation	**To be continued**
AR-06-11	**Radio Frequency Protection** Prepare a series of appropriate advocacy activities, including representations to the International Telecommunication Union. For example, evaluation of challenges presented by the industrial development of automobile anti-collision radar and the implications for the use of radio frequencies essential for tropospheric sounding. New Title: "Assess the potential impact of interference on Earth Observations applications and in particular Satellite measurements necessary for the GEOSS and prepare a series of appropriate advocacy activities, including representations to the International Telecommunication Union (ITU) and other bodies in charge of frequency management. In particular, the case of passive bands, essential for Earth observations, will be monitor with the highest care (For example, evaluation of challenges presented by the automotive short-range radars (SRR 24 GHz) applications and their implications)."	**To be continued**
DA-06-01	**GEOSS Data Sharing Principles** Invite experts to identify steps required to further the practical application of the agreed GEOSS data sharing principles.	**To be continued**
DA-06-02	**GEOSS Quality Assurance Strategy** Develop a GEO data quality assurance strategy, beginning with space-based observations and evaluating expansion to in-situ observations, taking account of existing work in this arena.	**To be continued**

Task No.	Title	Status & Remarks
DA-06-03	Facilitate the development of demonstration projects promoting the wider use, in other disciplines, of ensemble-based techniques originally developed for weather forecasting.	**Closed** No Task Point of Contact, no activities reported.
DA-06-04	**Data, Metadata and products Harmonisation** Facilitate the development, availability and harmonization of data, metadata, and products commonly required across diverse societal benefit areas, including base maps, land-cover data sets, and common socio-economic data.	**To be continued**
DA-06-05	**Guidance Document for Basic Geographic Data** Develop a guidance document for basic geographic data (including format, precision, accuracy, etc.), taking into account relevant national, regional and global initiatives.	**To be continued**
DA-06-06	**Spatial Data Infrastructures** Advocate use of existing Spatial Data Infrastructure components as institutional and technical precedents, where appropriate, including standard protocols and interoperable system interfaces, among other components.	**To be continued**
DA-06-07	Define a model web portal system for access to all Earth observation data, based on existing portals and systems, designed to increase use, quality, and accessibility of existing information, tools, and networks. Particular attention will be given to the coordination of networks in specific societal benefit areas to enable reuse thereby to achieve synergy and leverage.	**Closed** Grouped into AR-07-P2
DA-06-08	Develop learning tools (based on existing tools) to improve technical capability to (i) create common geo-referenced maps, (ii) merge socio economic data using geographic information systems (GIS), and (iii) combine geo-referenced maps with application tools to yield basic information systems.	**Closed** Transferred to CB-07-P1

Task No.	Title	Status & Remarks
DA-06-09	**GEOSS Best Practices Registry** Establish GEOSS Best Practices Registry by a request for proposals from GEO organizations willing to maintain/update GEOSS Best Practices Registry. The registry should also include existing cost-benefit sharing mechanisms and examples (data sharing, cooperative data acquisition, joint development, joint flight, collaborative sciences, etc).	**To be continued**
CB-06-01	Perform a review of capacity-building initiatives in GEO Members and Participating Organizations, taking into account results of existing surveys, to identify existing and planned capacity-building activities and gaps.	**Closed** To be merged with CB-07-P1
CB-06-02	Perform an analysis of existing documentation of Earth observation infrastructure requirements essential to the implementation of GEOSS in developing countries, and document commonly identified gaps.	**Closed** To be merged with CB-07-P1
CB-06-03	Perform a review of existing education and training initiatives for Earth observation utilization in developing countries, and promulgate the use of best practices in cooperation with specialized UN agencies and other organisations.	**To be completed in 2006**

Task No.	Title	Status & Remarks
CB-06-04	**GEO-NETCast** GEO-NETCast, an operational service delivering data and products based on the use of communication satellites New Title: "GEO-NETCast, a real-time data dissemination system - in support of the GEO societal benefit areas - by which environmental /in situ/, airborne, and space-based observations, products, and services are transmitted to users through satellites."	**To be continued** It is expected that the world wide satellite dissemination aspects will be covered in near future. GEO-NETCast needs to: ▪ Continue coordination with and receive input from user community ▪ Develop linkages to other dissemination methods as part of the overall GEOSS architecture ▪ Identify other infrastructure contributors to expand geographical coverage and build a global system ▪ Incorporate data and product contributions to serve all GEO societal benefit areas, which will likely require expanding bandwidth capacity ▪ Secure additional resources to evolve from the demonstration phase into a fully operational, global GEO-NETCast system Where infrastructure contributions are not yet in place, the strategy is to establish GEONETCast on a demonstration basis, then evolve to the full operational system covering both data exchange and dissemination.
OR-06-01	Develop a comprehensive list of major international conferences and workshops relevant to GEOSS (UNFCCC COP, sustainable development fora, etc.) in each societal benefit area and ensure GEOSS participation and visibility in selected events.	**To be continued as an ongoing supporting activity**
OR-06-02	Engage in a series of presentations and briefings to technical audiences in each societal benefit area, with an emphasis on emerging fields of health, energy, water resources management, and ecosystems.	**To be continued as an ongoing supporting activity**
OR-06-03	Promote awareness of successful communities of practice activities, advancing awareness of potential applications for Earth observations.	**To be continued as an ongoing supporting activity**
OR-06-04	Implement a sustained outreach campaign plan of targeted communication activities.	**To be continued as an ongoing supporting activity**

Task No.	Title	Status & Remarks
OR-06-05	Complete preparation of outreach campaign communication tools begun in 2005, including a GEOSS logo/visual identity; an engaging website; an umbrella message and sector-specific messages; multi-media and press tools; and standard PowerPoint briefings.	**To be completed in 2006**
OR-06-06	In coordination with the outreach campaign, engage in a series of regular media roundtables and briefings and occasional well-timed press conferences and special events.	**To be continued as an ongoing supporting activity**
OR-06-07	Establish a network of press & media representatives for all GEO members and participating organizations to advance outreach objectives.	**To be completed in 2006**

Annex III

Mapping of tasks to the 2 and 6 year targets

2 YEAR TARGETS

Target #	Reference Doc. Sec.#	Area	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Ref.Doc)	Related Tasks
001	4.1.4-2.1	DISASTERS	Advocate strengthening of the International Charter on Space and Major Disasters and similar support activities to enable better response to and documentation of effects of disasters, such as floods, earthquakes and oil spills. Its scope may be expanded to allow for pre-event tasking where forecasting is adequate to justify the effort (wildland fires, some floods and coastal disasters, volcanic eruptions). An expanded scope may also encompass Earth Observation training and capacity building of local users in affected areas, particularly in developing countries.	Ongoing support activity (DI-06-10; DI-06-11) DI-06-04 DI-06-08 DI-06-13 DI-07-P1
002	4.1.4-2.2	DISASTERS	Facilitate global access to the 100-metre (C-band) and 30-metre (X-band) horizontal resolution digital terrain information produced during the Shuttle Radar Topography Mission (SRTM).	DI-06-05

Target #	Reference Doc. Sec.#	Area	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Ref.Doc)	Related Tasks
003	4.1.4-2.3	DISASTERS	Advocate expansion of seismic monitoring networks, plus expansion of the present network of ocean-bottom pressure sensors, and upgrade existing global networks (e.g. the GSN) so that all critical instruments relay data in real time, in support of better tsunami warning worldwide.	DI-06-02 DI-06-04
004	4.1.4-2.4	DISASTERS	Facilitate focused pilot studies in under-served hazardous areas, for example Japan's Deployment of Asia-Pacific Hazard-mitigation Network for Earthquakes and volcanoes (DAPHNE).	DI-06-04 DI-06-08 DI-06-13 DI-07-P1
005	4.1.4-2.5	DISASTERS	Facilitate ongoing capacity building, with a focus on transferring technologies and best practices. Also essential are best practices for the dissemination of real-time information and early warnings to end users and the public. Specifically, improvements in real-time flood forecasting for developing countries should be a priority, in concert with efforts by UNESCO and WMO to expand and improve flood-related information systems.	CB-07-P1 DI-07-P1
006	4.1.4-2.6	DISASTERS	Facilitate effective monitoring from existing geostationary satellites, launched primarily for weather monitoring, for non-weather applications such as volcanic eruptions and volcanic ash clouds, forest fires, aerosols, and other hazards that require a high observation frequency.	DI-06-09
007	4.1.4-2.7	DISASTERS	Advocate integration of InSAR technology into disaster warning and prediction systems, in particular related to floods, earthquakes, landslides and volcanic eruptions. The ERS (European Remote Sensing) and Envisat missions of the European Space Agency have pioneered these applications and should be continued for global, long-term applications. Also, the Canadian Space Agency's Radarsat-1 mission with its InSAR capability contributed significantly to the development of applications related to geohazard monitoring and research. In this respect, Radarsat-2 should be a data source for geohazard InSAR applications. As part of this effort, efficient exploitation of data from Japan's upcoming Advanced Land Observation Satellite (ALOS) should also be facilitated. Its L-band SAR sensor is the first such sensor since 1998.	DI-06-03
008	4.1.4-2.8	DISASTERS	Produce an inventory of existing geologic and hazards zonation maps and identify areas and types of hazards where they are most critically lacking, or where maps need to be digitized.	DI-06-07

Target #	Reference Doc. Sec.#	Area	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Ref.Doc)	Related Tasks
009	4.1.4-2.9	DISASTERS	Advocate further development of the Global Spatial Data Infrastructure (GSDI) and draw on GSDI components as institutional and technical precedents.	DI-06-05 DI-06-07 DI-06-08
010	4.1.4-2.10	DISASTERS	Produce a comprehensive gaps analysis to assess the status and regional distribution of existing disaster management capacity-building programmes and initiatives.	DI-07-P2
011	4.2.4-2.1	HEALTH	Advocate new, high-resolution Earth observations relevant to health needs.	HE-07-P1 HE-07-P3
012	4.2.4-2.2	HEALTH	Facilitate the establishment of exchanges between health care experts in developed countries, developing countries, and indigenous communities to ensure a global perspective of the challenges and some coordinated development of a network to address problems and to leverage Earth Observation systems where appropriate.	HE-06-03 CB-07-P1 US-06-P2
013	4.2.4-2.3	HEALTH	Facilitate mechanisms that help to translate the needs of health data users into requirements that Earth Observation data providers can address.	HE-06-01 HE-06-03 HE-06-04 CB-07-P1 Ongoing supporting activity (HE-06-02)
014	4.2.4-2.4	HEALTH	Promote the development of an integrated public health information network database that includes information relevant to human health officials and agencies, and includes multi-scaled, multi-temporal spatial data collected from remote sensing data sources, to provide better predictive models of the effects of environmental factors affecting human health and well-being.	HE-07-P1 HE-07-P2

Target #	Reference Doc. Sec.#	Area	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Ref.Doc)	Related Tasks
015	4.2.4-2.5	HEALTH	Facilitate development of data products and systems that integrate Earth science databases with health and epidemiological information. This includes social and infrastructure data needed in decision support systems for health care planning and delivery. For example, in places having no water quality data but large populations with a reduced life span, the best way to improve health may be to monitor water quality/drinking water, implement water purification, and inform the public about the need to use purified water.	HE-06-03 HE-07-P2 US-07-P2 CB-07-P1
016	4.2.4-2.6	HEALTH	Advocate enhancements to international networks and systems needed to support Earth Observation data sharing in areas of human health.	HE-06-03 HE-07-P1 AR-07-P1 CB-07-P1
017	4.2.4-2.7	HEALTH	Produce a comprehensive gaps analysis of existing capacity building programmes and aggressively promote initiatives for improved coordination.	HE-07-P1 CB-07-P1
018	4.2.4-2.8	HEALTH	Advocate, within its field of competence, an increase in collaborative research programmes between developed and developing country scientists and indigenous communities, to their mutual benefit.	HE-06-03 US-06-P2
019	4.2.4-2.9	HEALTH	Facilitate the ability to overlay on epidemiology maps the variety of relevant inventoried and processed data, including meteorological, aerosol, ocean and land features, demographic, and infrastructure. This kind of overlay map will be created through interoperable databases and services provided by existing national and international Spatial Data Infrastructures (SDIs).	HE-07-P1 HE-07-P3
020	4.2.4-2.10	HEALTH	Facilitate reductions in the lag time in the temporal collection and assimilation of human health data (in some cases, this can mean years) and the “real-time” synoptic data that is collected by remote sensing systems.	HE-07-P1

Target #	Reference Doc. Sec.#	Area	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Ref.Doc)	Related Tasks
021	4.2.4-2.11	HEALTH	Facilitate provision of historical remote sensing data that can be used for tracking or monitoring environmental changes as precursors for what exists today and for modelling future human health scenarios.	HE-07-P1 HE-07-P2
022	4.2.4-2.12	HEALTH	Facilitate identification of technical needs in terms of instrumentation and data products that will yield useful epidemiological data at the community level.	HE-07-P1 CB-07-P1 Ongoing supporting activity (HE-06-02)
023	4.2.4-2.13	HEALTH	Facilitate identification of “paradigm environments”, such as vaccine field sites that have strong epidemiological and demographic data, and demonstrate the utility of overlaying high resolution remotely sensed data as a way to correlate environmental factors and specific infectious diseases (e.g. cholera and malaria).	
024	4.2.4-2.14	HEALTH	Facilitate development of models relating remotely sensed and *in situ* data to the epidemiology of environmentally related infectious and chronic diseases	HE-06-03 HE-07-P3
025	4.3.4-2.1	ENERGY	Facilitate the exchange and use of existing data/products and forecast information through specific initiatives and actions in coordination with the energy community: (i) to raise awareness about the importance and potential of environmental information; (ii) to facilitate access to the existing information and products; and (iii) to develop training and encourage the development of decision-support tools for optimal energy use.	EN-06-04 EN-07-P1 EN-07-P2 EN-07-P3 US-06-02 US-07-P1 Ongoing supporting activity (US-06-03)

Target #	Reference Doc. Sec.#	Area	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Ref.Doc)	Related Tasks
026	4.3.4-2.2	ENERGY	Produce, in coordination with the energy community, a strategic 5-10 year plan for exploitation of the benefits of the new generation of operational observing systems - both space-based and in situ - which comes on-stream in this decade. The plan should include efforts on: (i) operationalizing existing research capabilities to meet the needs of the energy industry; (ii) research and development in advanced end-to end modelling and forecasting techniques (such as ensemble-based methods) covering both environmental and energy processes, and with an emphasis on issues of risk assessment; (iii) the improvement of information networks by linking existing systems and making them inter-operable; (iv) continue efforts to raise awareness of, facilitate access to, and operationalize improved methodologies for exploitation of GEOSS data and information products for the industry.	EN-06-04 EN-07-P1 EN-07-P2 EN-07-P3 US-06-02 US-07-P1 Ongoing supporting activity (US-06-03)
027	4.4.4-2.1	CLIMATE	Support GSN and GUAN networks, Global Atmosphere Watch (GAW) observatories, initial Global Ocean Observing System (GOOS), river discharge, lake levels, soil moisture, permafrost, snow cover and glacier observing networks, which are recommended in the GCOS Implementation Plan.	CL-06-03 CL-06-04 (completed) CL-06-05 CL-06-06 WE-06-01 WA-06-01 (completed) WA-06-05

Target #	Reference Doc. Sec.#	Area	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Ref.Doc)	Related Tasks
028	4.4.4-2.2	CLIMATE	Support implementation of actions called for in GCOS Implementation Plan and the relevant IGOS-P Theme Reports.	CL-06-01 CL-06-02 CL-06-03 CL-06-04 (completed) CL-06-06 WE-06-01 WA-06-01 (completed) WA-06-05
029	4.4.4-2.3	CLIMATE	Improve the reporting of observations to international data and analysis centres in terms of data volumes, quality and timeliness.	CL-06-03
030	4.4.4-2.4	CLIMATE	Improve the capability of international data centres for data archiving and distribution of data and products.	CL-06-03 WE-06-03 (completed)
031	4.4.4-2.5	CLIMATE	Establish a strong collaboration mechanism between observational organizations and research communities, and users of climate information, to further refine the observations, analyses and products required.	CL-06-02 US-06-01 Ongoing supporting activity (US-06-03)
032	4.4.4-2.6	CLIMATE	Identify the needs and solutions necessary to implement the global observing systems for climate in all regions and countries based on the recommendation of GCOS Implementation Plan and specific regional action plans.	CL-06-02 CL-06-04 (completed) CL-06-05 WA-06-01 (completed)

Target #	Reference Doc. Sec.#	Area	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Ref.Doc)	Related Tasks
033	4.4.4-2.7	CLIMATE	Initiate an intergovernmental mechanism in the terrestrial domain to prepare and issue regulatory and guidance information on observational procedures and data management as, for example, also asked for in decision 9/CP.9 (UNFCCC, 2003).	CL-06-03
034	4.4.4-2.8	CLIMATE	Support JCOMM to coordinate the implementation of and prepare regulatory and guidance information for an operational *in situ* ocean observing system.	CL-06-04 CL-06-06 US-06-02
035	4.4.4-2.9	CLIMATE	Emphasize to satellite agencies the importance of satellites for long-term climate monitoring, and advocate that all Earth observing satellite systems adhere to the GCOS Climate Monitoring Principles (WMO, 2003) and commit to the suite of instrumentation called for in the GCOS Implementation Plan and in the relevant IGOS-P Theme Reports.	CL-06-02 AR-06-10 WA-07-P2
036	4.4.4-2.10	CLIMATE	Focus on research programmes to support the development of observational capabilities for ECVs such as tropospheric ozone, cloud and aerosol properties and their vertical profiles, CO2 and other greenhouse gases, soil moisture and groundwater, above-ground biomass, permafrost, snow cover and glaciers, and ocean salinity, carbon and nutrients and their vertical profiles.	CL-06-02 CL-06-03 CL-06-05 CL-06-06 WE-06-01 WE-06-02 WA-07-P2
037	4.4.4-2.11	CLIMATE	Coordinate climate sectors and broad user groups to clarify and specify requirements for socio-economic benefit areas (disaster prevention, health, energy, water resources, ecosystem, agriculture, and biodiversity) for climate products and information.	US-06-01 CL-07-P1 DI-07-P2 Ongoing supporting activity (US-06-03)

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038	4.4.4-2.12	CLIMATE	Enforce paleoclimate research to improve knowledge about historical and current climate change, by combining natural science data and socio-economic information.	
039	4.4.4-2.13	CLIMATE	Promote the improvement of emission databases for aerosols, greenhouse gases and their precursors.	CL-06-01 CL-06-02 CL-06-03
040	4.5.4-2.1	WATER	Facilitate, with countries, WMO and UNESCO, improvements in existing *in situ* observation systems through coordination and optimization of existing *in situ* networks at global, regional and national level.	WA-06-05 Ongoing supporting activity (AR-06-08)
041	4.5.4-2.2	WATER	Produce a plan for a network of sophisticated, integrated *in situ* observation sites, to support process studies and algorithm and model development.	WA-06-02 WA-06-05
042	4.5.4-2.3	WATER	Facilitate international data sharing and exchange agreements for water data with countries, WMO, and UNESCO, and monitor and routinely report compliance with the policy.	WA-06-02 WA-06-05 WA-06-06 (completed)
043	4.5.4-2.4	WATER	Produce an implementation plan for a broad global water cycle data integration system that combines *in situ* and satellite and numerical model outputs and disseminates usable information for decision-making.	WA-07-P2
044	4.5.4-2.5	WATER	Facilitate, with space agencies and research communities, more accurate, frequent (3-hourly), global, high spatial resolution, and microphysically detailed measurements of precipitation through a global constellation of satellites carrying passive microwave radiometers in complementary orbits.	AR-06-10 WA-07-P2
045	4.5.4-2.6	WATER	Advocate that IGOS-P should take the lead in development of integrated precipitation and soil moisture products and new products including indicators.	

Target #	Reference Doc. Sec.#	Area	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Ref.Doc)	Related Tasks
046	4.5.4-2.7	WATER	Facilitate, with space agencies and research communities, studies to evaluate the contribution of space-based observations to the determination of surface water quality and mapping of critical aquatic habitats.	WA-07-P1 WA-07-P2
047	4.5.4-2.8	WATER	Produce an evaluation of the resolution and accuracy requirements for applying satellite altimetry to the measurement of streamflow and surface water storage.	WA-07-P2
048	4.5.4-2.9	WATER	Facilitate establishment of an international coordination function for *in situ* water cycle observation and data integration and dissemination.	WA-06-05 Ongoing supporting activity (AR-06-08)
049	4.5.4-2.10	WATER	Produce a framework for developing ensemble-based hydrological predictions and improve the ability of users to exploit the information.	WA-06-02 US-06-02
050	4.5.4-2.11	WATER	Advocate and globalize ongoing activities that promote the use of Earth observation for both monitoring the state of, and improving implementation of, water resources management in developing countries, particularly in concert with the activities pursued by the CEOS WSSD Follow-up Programme.	WA-06-06 (completed) WA-06-07
051	4.5.4-2.12	WATER	Organise workshops and special studies for documenting the cultural barriers to technology transfer and procedures in order to identify and avoid these obstacles.	WA-06-06 (completed)
052	4.5.4-2.13	WATER	Advocate eliminating barriers to the free and open exchange of data and software to enable full access by water managers in developing countries.	WA-06-06 (completed) WA-06-07
053	4.6.4-2.1	WEATHER	Facilitate investment in the critical data gaps (atmospheric wind and humidity profiles, ocean evaporation and precipitation, soil moisture, precipitation) and improve predictive models to augment the quality of forecasts of severe events and general weather conditions.	WE-06-01 WE-06-02
054	4.6.4-2.2	WEATHER	Advocate support for plans to assist developing countries to utilize the forecasts in order to reduce impacts on life and property.	WE-06-05

Target #	Reference Doc. Sec.#	Area	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Ref.Doc)	Related Tasks
055	4.6.4-2.3	WEATHER	Facilitate, with WMO, education and training of developing country personnel in the effective use of currently available weather information.	WE-06-05
056	4.6.4-2.4	WEATHER	Advocate support for existing weather capacity building programmes and initiatives, understanding their status and regional distribution.	WE-06-01 WE-06-02 WE-06-03 WE-06-05
057	4.6.4-2.5	WEATHER	Advocate support for the WMO plans to establish the feasibility of expanding EUCOS to other regions.	WE-06-01
058	4.7.4-2.1	ECOSYSTEMS	Facilitate the harmonization of methods for observing the GEOSS set of ecosystem variables.	EC-07-P1 BI-06-02 AR-07-P2
059	4.7.4-2.2	ECOSYSTEMS	Facilitate the full implementation of a global carbon observing system, in accordance with the specifications detailed in the IGOS-P IGCO Theme Report, which incorporates the Terrestrial Carbon Observation plan of GTOS, and carbonrelated components of GOOS and GCOS.	EC-06-01
060	4.7.4-2.3	ECOSYSTEMS	Facilitate a globally agreed, robust and implementable (operational) classification scheme for ecosystems.	EC-06-02 EC-07-P1 BI-06-01 (completed)
061	4.7.4-2.4	ECOSYSTEMS	Advocate the operational continuity of moderate to high-resolution Earth-observing satellites for land cover and ocean colour.	DA-07-P2

Target #	Reference Doc. Sec.#	Area	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Ref.Doc)	Related Tasks
062	4.7.4-2.5	ECOSYSTEMS	Facilitate efforts to eliminate regional disparity in observing capacity. For example, two thirds of the World's oceans are in the Southern Hemisphere, whereas most of the advanced oceanographic centres are in the Northern Hemisphere. Stations for observing ecological variables on land are much more closely spaced in temperate countries than in the tropical belt.	EC-07-P1
063	4.7.4-2.6	ECOSYSTEMS	Facilitate the networking of institutions making observations relating to ecosystems.	EC-06-02 EC-07-P1 BI-06-02 BI-06-03 AR-07-P2
064	4.7.4-2.7	ECOSYSTEMS	Advocate the development of tools to scale up from a limited number of *in situ* ecosystem observations made at local scales, to arrive at a large-scale, comprehensive picture of ecosystems.	EC-07-P1
065	4.7.4-2.8	ECOSYSTEMS	Advocate the continued rescue, acquisition, digitisation and making accessible of historical information relating to ecosystems.	EC-07-P1
066	4.7.4-2.9	ECOSYSTEMS	Facilitate the validation of existing tools such as synthetic aperture radar and hyperspectral imagers for the measurement of ecosystem properties.	AR-07-P2
067	4.7.4-2.10	ECOSYSTEMS	Advocate the development of new sensors and platforms, and facilitate their use for routine observations in the field on an operational basis. For example, airborne sensor technologies such as LIDAR are ready to move out of the research domain. Molecular tools are now being developed to study the microbial ecology of marine systems. *In situ*, self-contained, flow cytometers for classification of phytoplankton and bacteria (the "cytobuoys") and underwater laser imaging and scanning techniques that can be used for recording marine life underwater and for detecting terrestrial ecosystem structures, are in advanced stages of development. New sensors are also on the horizon for measurement of the chemical properties of the ocean and terrestrial ecosystems.	

Target #	Reference Doc. Sec.#	Area	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Ref.Doc)	Related Tasks
068	4.8.4-2.1	AGRICULTURE	Facilitate - with relevant users at regional, national and local level - definition of user needs for agriculture, rangelands, forestry and fisheries in terms of Earth Observation data and information, as well as mechanisms to keep users informed.	AG-06-01 AG-06-04 EC-07-P1 DA-07-P2
069	4.8.4-2.2	AGRICULTURE	Advocate and facilitate existing initiatives that regularly provide updates of land cover data at 1:1,000,000 scale; use agreed ISO standard to initiate land cover mapping activities at 1:500,000.	DA-07-P2
070	4.8.4-2.3	AGRICULTURE	Facilitate regional training in land cover classification and the assimilation of existing data sets in Africa, Asia and Latin America.	AG-06-07 DA-06-04 DA-07-P2 EC-07-P1
071	4.8.4-2.4	AGRICULTURE	Facilitate the use of agriculture, forestry, and fishery production statistics to be exploited at pixel level.	AG-06-04
072	4.8.4-2.5	AGRICULTURE	Advocate the adoption and use of geostationary satellite data (e.g. Meteosat Second Generation) in food-insecure regions.	AG-06-01
073	4.8.4-2.6	AGRICULTURE	Facilitate establishment of a basis for the continuity of high resolution optical and radar satellite observing networks (5-30 m).	AR-06-09 DA-07-P2
074	4.8.4-2.7	AGRICULTURE	Facilitate production of a map of the World's irrigated agriculture areas, and the establishment of a monitoring programme among users.	DA-07-P2

Target #	Reference Doc. Sec.#	Area	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Ref.Doc)	Related Tasks
075	4.8.4-2.8	AGRICULTURE	Advocate the development of on-time monitoring and information systems for significant and extreme events such as fire, forest conversion, and forest concession management.	EC-07-P1
076	4.8.4-2.9	AGRICULTURE	Facilitate the development of courses to demonstrate the usage of Earth observation data and products in developing countries.	AG-06-07
077	4.9.4-2.1	BIODIVERSITY	Facilitate the interoperability of the multi-institutional biodiversity observation network through GBIF and ensure that it links to data sets of ecological and other related observation systems.	BI-07-P1
078	4.9.4-2.2	BIODIVERSITY	Develop a biodiversity observation strategy that is spatially and topically prioritized, based on analysis of existing information, identifying unique or highly diverse ecosystems and those supporting migratory, endemic or globally threatened species, those whose biodiversity is of socio-economic importance, and which can support the 2010 CBD target.	BI-06-02 BI-07-P1
079	4.9.4-2.3	BIODIVERSITY	Facilitate the capture of ten million new biodiversity observations per year, the agreement to data collection protocols by networks of permanent sites, and the launch of initiatives on three key issues.	BI-06-03 EC-07-P1 AR-07-P2
080	4.9.4-2.4	BIODIVERSITY	Advocate additional support to permit data system integration sharing by data providers, particularly the research and collections institutions.	AR-07-P2
081	4.9.4-2.5	BIODIVERSITY	Produce an analysis of the gaps and needs in capacity building initiatives within the biodiversity observation system, including for microbial biodiversity.	BI-06-03 BI-07-P1
082	4.9.4-2.6	BIODIVERSITY	Produce a strategy for capturing the outputs of citizen-based biodiversity monitoring systems.	AR-07-P2

Target #	Reference Doc. Sec.#	Area	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Ref.Doc)	Related Tasks
083	4.10.4-2.1	COMMONALITIES	Facilitate sharing of best practices for the development of products customized for particular socio-economic benefits.	DA-06-09 US-06-02 US-06-P1
084	4.10.4-2.2	COMMONALITIES	Produce practical strategic and tactical guidance on how to converge disparate systems to a higher degree of collaboration and interoperability using GEOSS principles.	AR-07-P1
085	4.10.4-2.3	COMMONALITIES	Facilitate interoperability among data sets acquired by different countries and agencies, as these are not likely to be in compatible formats or easily usable form.	HE-07-P3 DA-06-04 US-06-02 DA-07-P3 AR-07-P2
086	4.10.4-2.4	COMMONALITIES	Facilitate the development of basic geographic framework data.	DA-06-05 AR-07-P2
087	5.8-2.1	ARCHITECTURE	Advocate formal commitments of contributions by GEO Members and Participating Organizations, including agreement to adhere to GEOSS interoperability specifications.	AR-07-P1
088	5.8-2.2	ARCHITECTURE	Produce a publicly accessible, network-distributed catalogue maintained collectively under the auspices of GEOSS. The catalogue will include information on GEO Members and Participating Organizations and the components they support. The catalogue system will itself be subject to GEOSS interoperability specifications, including the standard search service and geospatial services.	AR-07-P2
089	5.8-2.3	ARCHITECTURE	Establish and maintain a process for reaching interoperability arrangements, informed by ongoing dialogue with major international programmes and consortia. That process is to be sensitive to technology and accessibility disparities among GEO Members and Participating Organizations, and must include mechanisms for upgrading arrangements.	AR-07-P1

Target #	Reference Doc. Sec.#	Area	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Ref.Doc)	Related Tasks
090	5.8-2.4	ARCHITECTURE	Advocate use of existing Spatial Data Infrastructure (SDI) components as institutional and technical precedents in areas such as geodetic reference frames, common geographic data, standard protocols, and interoperable system interfaces, among other components.	DA-06-06
091	5.8-2.5	ARCHITECTURE	Establish and maintain baseline sites for global *in situ* networks.	WA-06-05 EC-07-P1 Ongoing supporting activity (AR-06-08)
092	5.8-2.6	ARCHITECTURE	Develop a cost-and-benefit-sharing mechanism(s) for observations by which an optimum observation system can be realized.	DA-06-09
093	5.8-2.7	ARCHITECTURE	Provide a framework for securing the future continuity of necessary observations and initiating new observations.	AR-06-09 AR-06-10 AR-07-P2
094	5.8-2.8	ARCHITECTURE	Facilitate the analysis of the current and planned systems for data transfer and dissemination by GEOSS members.	AR-07-P1 AR-07-P2
095	5.8-2.9	ARCHITECTURE	Facilitate a common understanding of future capabilities at a global level for data dissemination.	AR-07-P2 CB-06-04

Target #	Reference Doc. Sec.#	Area	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Ref.Doc)	Related Tasks
096	6.6-2.1	DATA & USERS	Establish a mechanism for coordinating user needs within the various societal benefit areas.	EC-07-P1 BI-07-P1 DA-06-01 AR-07-P2 US-06-01 US-06-02 Ongoing supporting activity (US-06-03)
097	6.6-2.2	DATA & USERS	Facilitate, with relevant countries and international organizations, the development and availability of data, metadata, and products commonly required across diverse societal benefit areas, including base maps and common socio-economic data.	US-06-01 AR-07-P2 DA-06-04 DA-07-P2 Ongoing supporting activity (US-06-03)
098	6.6-2.3	DATA & USERS	Advocate, through appropriate representations to the International Telecommunication Union, the protection of radio frequencies critical to Earth observation.	AR-06-11
099	7.5-2.1	CAPACITY BUILDING	Produce a comprehensive review and gaps analysis based on existing regional and international capacity building efforts as a first step in the implementation of GEOSS. GEO will facilitate coordination of those efforts with the objective of achieving the maximum return for the effort expended.	CB-06-03 (completed) CB-07-P1
100	7.5-2.2	CAPACITY BUILDING	Produce methodologies to monitor and evaluate capacity building initiatives relating to Earth Observation systems.	CB-07-P2

Target #	Reference Doc. Sec.#	Area	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Ref.Doc)	Related Tasks
101	7.5-2.3	CAPACITY BUILDING	Facilitate, with existing international, regional and national efforts, the maintenance and strengthening of education, training, research, and communication so that each country reaches and sustains a level of capability that enables them to participate in GEOSS, receiving maximum benefits from it according to their needs.	CB-06-03(completed) CB-07-P1
102	7.5-2.4	CAPACITY BUILDING	Facilitate, with developing countries and across all societal benefit areas, the establishment and maintenance of baseline sites for global *in situ* and remote sensing networks that cannot always be justified on national grounds alone, in cooperation with relevant global research programs and activities to ensure that synergies in observations and understanding are achieved. Examples include the inadequacy of GCOS, GTOS, GOOS, and Global Geodetic Observing System (GGOS) sites in developing countries and the need to establish a minimum set of oceanic, terrestrial and atmospheric reference stations for long-term observations of key variables.	AR-07-P2 CB-07-P1
103	7.5-2.5	CAPACITY BUILDING	Develop a network of experts involved in existing local, national and global capacity building initiatives related to Earth Observation to facilitate the task of furthering capacity building, and inform the GEO Members and Participating Organizations of existing efforts in capacity building. GEO will encourage users to access this knowledge base.	CB-07-P1 CB-07-P3
104	7.5-2.6	CAPACITY BUILDING	Encourage, in each societal benefit area, the development of capacity building components as a requirement to any network, project, activity, or user forum that will be a component of GEOSS.	CB-07-P1
105	7.5-2.7	CAPACITY BUILDING	Facilitate access to data and models, particularly for developing countries.	CB-07-P1 AR-07-P2 US-06-P2
106	7.5-2.8	CAPACITY BUILDING	Develop recommended priorities for new or augmented efforts in capacity building, to meet the objectives of the overall GEOSS 10-Year Implementation Plan.	CB-07-P1

Target #	Reference Doc. Sec.#	Area	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Ref.Doc)	Related Tasks
107	8.4.1-2.1	OUTREACH	GEO will produce and begin to implement an outreach plan directed toward key target audiences, including decision-makers and policy makers; educators and trainers; the general public; industry and service communities; scientific and technical communities; non-governmental organizations; public interest advocacy groups; and international financial institutions and official development assistance agencies.	OR-06-05 (completed) OR-06-07 (completed) Ongoing supporting activity (OR-06-01; OR-06-02; OR-06-03; OR-06-04; OR-06-06)

6 YEAR TARGETS

Target #	Reference Doc. Sec.#	Area	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Ref.Doc)	Tasks
108	4.1.4-6.1	DISASTERS	Facilitate widespread use of LiDAR and InSAR technologies for topography in areas of low relief. For floods and coastal hazards, the most crucial need is for high vertical resolution (less than 1 metre) topographic data, plus good shallow-water bathymetry.	DI-06-03
109	4.1.4-6.2	DISASTERS	Advocate continuity and interoperability of all satellite systems providing global positioning, such as the United States Global Positioning System (GPS), European GALILEO, Russian Global Orbiting Navigation Satellite System (GLONASS) and Japanese Quasi-Zenith Satellite System (QZSS). This includes support of the global geodetic network services such as Very Long Baseline Interferometry (VLBI) and Satellite Laser Ranging (SLR), that define the orbits of the GPS satellites and thereby enable the use of GPS for precise geo-location. Applications of GPS essential to disaster response include precision topography, mapping support, and deformation monitoring, as well as geo-location for search and rescue operations.	DI-06-03

Target #	Reference Doc. Sec.#	Area	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Ref.Doc)	Tasks
110	4.1.4-6.3	DISASTERS	Advocate that the international satellite community, coordinated through the Committee on Earth Observation Satellites (CEOS), plan for assured continuity of critical sensing capabilities. For example, certain research systems should become operational systems and the projected lifetimes of some systems should not result in service gaps of key satellite sensor data. Longer-term actions for monitoring of geohazards include realization of an integrated observation system of SAR interferometry and GPS.	DI-06-09
111	4.1.4-6.4	DISASTERS	Advocate enhancements of the automatic processing and evaluation of satellite imagery, to facilitate production of digital topography, and to support rapid detection of fires, oil spills, or other hazards.	DI-06-04 DI-06-05 DI-06-08 DI-06-13 DI-07-P1
112	4.1.4-6.5	DISASTERS	Advocate more rapid SAR processing for interferometry to enable strain mapping over large seismically active zones and to monitor landslides and subsidence in populated areas and along transportation corridors.	DI-06-03
113	4.1.4-6.6	DISASTERS	Advocate systematic expansion of the inventory of geologic and hazards zonation maps and expansion of Geographic Information Systems (GIS) as a critical tool for managing spatial information for disaster management. In this context, digital maps based on distributed systems and data sources and conforming to recognized international GIS standards (e.g. International Organization for Standardization standards and Open Geospatial Consortium specifications).	DI-06-07 DI-06-08 DI-07-P2
114	4.1.4-6.7	DISASTERS	Facilitate the development and sharing of critical airborne sensors and capabilities, such as hyper-spectral sensors, high-resolution infrared sensors and LiDAR.	DI-06-09

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115	4.1.4-6.8	DISASTERS	Advocate the development of models to better support disaster response. One area of particular interest is the dispersion of pollution plumes in the atmosphere or in water (including the spread of oil spills in the marine environment).	DI-06-04 DI-06-08 DI-06-13 DI-07-P1
116	4.1.4-6.9	DISASTERS	Establish a process for monitoring of capacity-building efforts in disaster management to enable building upon strong existing programmes in the continuing efforts to integrate and share resources.	CB-07-P2
117	4.1.4-6.10	DISASTERS	Advocate access to data from seismic and infrasound networks operated by the Preparatory Commission for the Comprehensive Nuclear Test-Ban Treaty Organization (CTBTO) that are useful and relevant for monitoring earthquakes and volcanic activity.'	
118	4.1.4-6.11	DISASTERS	Facilitate access to real-time data analyzing technology and real-time access to critical data for all hazards.	DI-06-04 DI-06-08 DI-06-13 DI-07-P1
119	4.1.4-6.12	DISASTERS	Advocate real-time monitoring of submarine seismic and volcanic activities and tsunami propagation.	DI-06-02 DI-06-04

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120	4.2.4-6.1	HEALTH	Produce an inventory of available Earth remote sensing and ground-based databases that can be associated with known health problems such as asthma, pollutant exposure, birth defects, seafood contamination and certain infectious and vector-borne diseases. This includes remote sensing and ground-based databases, historic data sets encompassing well characterized epidemics, and gaps in human health related environmental data (e.g. places where water, soil, or air quality are not measured.) To accomplish this, GEOSS will develop the tools, architecture and infrastructure for a public health information network data base that can be accessed and used by the public health community at large to obtain historical and current health data for better predictability of environmental effects on human health.	
121	4.2.4-6.2	HEALTH	Facilitate further development of remotely sensed maps describing the global system for sources, transport and sinks/deposition of gasses and aerosols, and systems characterizing atmospheric, soil, river and coastal pollution.	HE-07-P2
122	4.2.4-6.3	HEALTH	Facilitate human health community input to the technical specification of new major environmental observation capabilities, including *in situ* and remotely sensed observations.	HE-06-01 (completed) HE-07-P3 Ongoing supporting activity (HE-06-02)
123	4.2.4-6.4	HEALTH	Facilitate the development of sets of environment and infrastructural determinants of health, e.g. sanitation, transport, energy, communications, traffic management systems, and housing.	HE-06-04
124	4.2.4-6.5	HEALTH	Facilitate the development of the tools and processes needed to address health concerns and develop a useful regional network of experts and information databases, working primarily through the GEOSS coordination group for health described above.	HE-06-01 (completed) HE-07-P3 CB-07-P1
125	4.2.4-6.6	HEALTH	Facilitate the establishment of a coordinating group focused on health organizations as users of Earth Observation data and information. This outreach and information sharing group must engage developed and developing country health communities to ensure a global perspective of the challenges and to catalyze a global network to address problems.	HE-06-01 (completed)

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126	4.2.4-6.7	HEALTH	Advocate the development of indicators of human health based on environmental measurements.	
127	4.2.4-6.8	HEALTH	Facilitate the development of monitoring methods and systems to detect early evidence of health-related changes and to further inform epidemiological modeling studies.	HE-06-03 HE-07-P1 HE-07-P2
128	4.2.4-6.9	HEALTH	Facilitate coordinated approaches to the integration of environmental monitoring parameters with vectors, animal reservoirs of disease, and clinical admissions.	HE-06-03 HE-07-P1
129	4.2.4-6.10	HEALTH	Facilitate the development of mechanisms for alerting public health professionals to hazardous conditions identified by environmental monitoring.	HE-06-03 HE-07-P2
130	4.2.4-6.11	HEALTH	Facilitate the availability of wide-area health parameters derived from satellite data, e.g. sanitation, transport, energy, communications, traffic management systems, and housing.	HE-07-P3
131	4.2.4-6.12	HEALTH	Facilitate the development of geochemical baseline data and maps, such as trace element toxicity and deficiencies.	HE-07-P2
132	4.3.4-6.1	ENERGY	Produce an evaluation of the Plan's progress with regard to energy and revise strategy as needed. The revised Plan will also include an assessment of the needs of the energy sector for new and/or enhanced GEOSS observations and products.	
133	4.3.4-6.2	ENERGY	Facilitate the exchange of data and products for efficient energy management.	EN-06-04 EN-07-P1 EN-07-P2 EN-07-P3 US-07-P1

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134	4.3.4-6.3	ENERGY	Facilitate the use of improved weather and climate products for the development of new energy tailored products and services.	EN-06-04 EN-07-P1 US-07-P1 Ongoing supporting activity (US-06-03)
135	4.4.4-6.1	CLIMATE	Enhance the collaboration mechanism between observation organizations and research communities with users of climate information to make maximum use of the observations, analyses and products.	CL-06-02 US-06-01 Ongoing supporting activity (US-06-03)
136	4.4.4-6.2	CLIMATE	Support implementation of actions called for in the GCOS Implementation Plan and the relevant IGOS-P Theme Reports.	CL-06-01 CL-06-02 CL-06-03 CL-06-04 (completed) CL-06-06 WE-06-01 WA-06-01 (completed) WA-06-05
137	4.4.4-6.3	CLIMATE	Promote the establishment of data archive centres for all ECVs.	WE-06-03 WA-07-P2
138	4.4.4-6.4	CLIMATE	Promote institutional commitments to provide integrated global analyses of all ECVs.	CL-06-01

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139	4.4.4-6.5	CLIMATE	Develop data integration facilities for exchanging data, products and information between climate sectors and socio-economic benefit areas.	US-06-01 CL-07-P1 DI-07-P2 Ongoing supporting activity (US-06-03)
140	4.4.4-6.6	CLIMATE	Emphasize detection of current and historical climate changes and their impacts linked with other societal benefit areas such as disaster, health, water, ecosystem and agriculture by combining the natural scientific data and socio-economic information and enforcing paleoclimate research approaches.	CL-06-01 CL-06-02 CL-06-03 CL-06-05 CL-06-06 CL-07-P1 WE-06-03 EC-07-P1
141	4.4.4-6.7	CLIMATE	Develop and operate new *in situ* and/or space-based observation instruments for the observation of ECV such as cloud and aerosol properties and their vertical profiles, ocean salinity, ocean carbon and nutrients, soil moisture and ground water, CO2 and other greenhouse gasses.	CL-06-02 CL-06-03 CL-06-05 CL-06-06 WE-06-01 WE-06-02 WA-07-P2
142	4.4.4-6.8	WATER	Produce a number of new products for precipitation, soil moisture, evaporation, evapotranspiration and other water cycle variables, by *in situ* observations and the planned space missions.	WA-06-05 WA-07-P2

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143	4.4.4-6.9	WATER	Provide validation of the accuracy of new water cycle data products, involving “virtual water” with respect to food production and its transportation.	
144	4.4.4-6.10	WATER	Advocate continuous sensor development with improvement of accuracy and higher spatial-temporal resolutions, and with special attention to snow water equivalent and streamflow.	WA-07-P2
145	4.4.4-6.11	WATER	Facilitate international and fully networked operational data exchange capabilities.	WA-06-05 Ongoing supporting activity (AR-06-08)
146	4.4.4-6.12	WATER	Facilitate testing of a fully integrated prototype data system, with data assimilation, analysis and visualization capabilities for the water cycle.	WA-06-02
147	4.4.4-6.13	WATER	Advocate a study of the water resource variables required to support an expert system in water management and provide prototyping on an operational system for assimilating routine water cycle observations for improved monitoring and management of water resources.	WA-06-05
148	4.4.4-6.14	WATER	Advocate a system for the routine collection of water level data for use in validating satellite data and for monitoring surface water storage.	WA-06-05 WA-07-P2
149	4.4.4-6.15	WATER	Advocate precision gravity field missions for global water storage monitoring.	WA-07-P2 AR-07-P4
150	4.4.4-6.16	WATER	Produce a plan for institutionalizing surface water and energy flux measurements.	EN-06-04
151	4.4.4-6.17	WATER	Facilitate the establishment of coordinated *in situ* observation networks with high (and low) elevation sites along mountain transects.	WA-06-05 Ongoing supporting activity (AR-06-08)
152	4.5.4-6.1	WATER	Produce an experiment using the global network of sophistically and temporally integrated *in situ* observation sites for water cycle observations.	WA-06-05

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153	4.5.4-6.2	WATER	Produce integrated water cycle data sets (including predictions) on a continental scale, such as the Asian monsoon region or any large river watershed.	WA-06-05
154	4.5.4-6.3	WATER	Produce an evaluation of the data and product requirements for use in applications to water-related health issues with a view to developing a specialized observing system in support of health.	WA-07-P1 US-06-02
155	4.5.4-6.4	WATER	Produce a plan for monitoring drinking water quality, along with efforts to extend water and sanitation services, especially in developing countries.	WA-07-P1
156	4.5.4-6.5	WATER	Facilitate, with space agencies and research communities, the development of effective sensors and missions for precipitation (GPM), surface and subsurface water stores – including snow water equivalence, water stored in natural and manmade reservoirs, and groundwater.	WA-07-P2 AR-06-10
157	4.5.4-6.6	WATER	Facilitate, with numerical weather prediction agencies, space agencies and international research programmes, the reanalysis of products for use in determining trends in water cycle variables.	WA-06-02
158	4.5.4-6.7	WATER	Produce a plan for capacity building to support water management, including hardware and software for receiving and processing satellite and appropriate *in situ* data, and training modules for the developing countries.	WA-06-07 CB-07-P1
159	4.6.4-6.1	WEATHER	Advocate support for WMO coordinated activities to improve data observations and models to produce reliable forecasts of severe weather. These are forecasts that include reliability/probability estimates, as well as a range of possible outcomes, and interact with local authorities to improve usage and provide tailored services through newly established regional and local warning centres.	WE-06-01 WE-06-02 WE-06-03 WE-06-05
160	4.6.4-6.2	WEATHER	Advocate support for WMO plans in developing countries to support the establishment of new regional centres, to allow reliable warnings of impending severe events.	WE-06-05

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161	4.6.4-6.3	WEATHER	Advocate support for WMO plans to establish better coordinated regional *in situ* observation networks on the basis of the EUCOS model.	WE-06-01
162	4.7.4-6.1	ECOSYSTEMS	Facilitate the execution of a global (terrestrial, inland water, coastal, and oceanic) ecosystem mapping initiative at a resolution of 500 m, using a standardized classification and the tools validated above, and integrated with the Global Spatial Data Initiative.	EC-07-P1
163	4.7.4-6.2	ECOSYSTEMS	Facilitate the implementation of a global nitrogen observing system.	
164	4.7.4-6.3	ECOSYSTEMS	Facilitate the coordination and expansion of a network of land, ocean and coastal reference stations for monitoring ecosystem properties such as carbon, nitrogen, phosphorus, and iron fluxes, including change detection.	
165	4.7.4-6.4	ECOSYSTEMS	Facilitate the establishment of a global, sufficient and representative *in situ* and airborne network for validating and enhancing space-based observations of ecosystem properties in both terrestrial and aquatic ecosystems, based on existing national and regional integrated environmental monitoring networks, and coordinated with and linked to the network described above.	EC-07-P1 AR-07-P2
166	4.7.4-6.5	ECOSYSTEMS	Produce or facilitate the production of baseline maps for the globe, with adequate resolution and known uncertainty, of selected ecosystem properties such as: leaf area phenology, phytoplankton bloom dynamics; primary production, and net carbon exchange; energy and water exchange; productivity at higher trophic levels (e.g. grazing, fisheries production), and ancillary data such as topography, land use, geology and soils.	AR-07-P2 EC-07-P1
167	4.8.4-6.1	AGRICULTURE	Advocate the development and improvement of the analytical tools and methods for agriculture risk assessment, and establish common standards and formats.	AG-07-P2
168	4.8.4-6.2	AGRICULTURE	Advocate support for the completion of the World soil and terrain database (SoTer) at a resolution of 1:1 million.	AG-07-P3

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169	4.8.4-6.3	AGRICULTURE	Advocate support for the completion of land degradation and desertification assessment in drylands (LADA).	EC-07-P1
170	4.8.4-6.4	AGRICULTURE	Facilitate provision of regularly validated global land cover product at 1:500,000.	DA-07-P2 EC-07-P1
171	4.8.4-6.5	AGRICULTURE	Facilitate the role of satellite data in monitoring and maintaining a global farming systems database.	AG-07-P1 AG-07-P3
172	4.8.4-6.6	AGRICULTURE	Facilitate the establishment of operational linkage of Earth Observation data to geospatially referenced production and use statistics. This should cover crop agriculture, livestock, forestry and freshwater fisheries.	AG-07-P1 AG-07-P3
173	4.8.4-6.7	AGRICULTURE	Facilitate the continuity of high-resolution imagery for monitoring logging concessions in areas with high biodiversity concentrations.	EC-07-P1 Ongoing supporting activity (AR-06-09)
174	4.8.4-6.8	AGRICULTURE	Advocate operational on-time monitoring and information systems introduced for significant and extreme events such as crop yield and crop water stress.	AG-07-P2
175	4.9.4-6.1	BIODIVERSITY	Produce timely data and information for local, national, regional and international policy makers, scientists and natural resource managers through the distributed observation network.	EC-07-P1 AR-07-P2
176	4.9.4-6.2	BIODIVERSITY	Facilitate the establishment of monitoring systems for policy-interest and endangered species, allowing frequently-repeated globally-coordinated assessment of trends and distributions of species of special conservation merit, including domesticated animals, cultivated plants, and fish species and their wild relatives and species of medicinal or economic value.	EC-07-P1 BI-07-P1 AR-07-P2

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177	4.9.4-6.3	BIODIVERSITY	Facilitate the operational deployment of a system to provide near-real-time data on detection, establishment and spread of problematic invasive organisms.	
178	4.9.4-6.4	BIODIVERSITY	Facilitate the systematic monitoring of biodiversity in all ecosystems using statistically valid methods.	AR-07-P2 BI-07-P1 EC-07-P1
179	4.9.4-6.5	BIODIVERSITY	Facilitate the full operationality and integration of citizen-based biodiversity observation systems.	BI-07-P1 AR-07-P2
180	4.9.4-6.6	BIODIVERSITY	Facilitate the addition of twelve million new spatially and temporally explicit observation records yearly.	BI-07-P1
181	4.9.4-6.7	BIODIVERSITY	Facilitate the delivery of capacity building programmes on data use and interpretation.	CB-07-P1 CB-07-P3
182	4.10.4-6.1	COMMONALITIES	Facilitate the joint evaluation of prototypes that connect multiple systems, and support making operational any research demonstrations of such collaboration and interoperability.	AR-07-P1 DI-06-04 DI-06-08 DI-06-13 DI-07-P1 US-06-P1
183	4.10.4-6.1	COMMONALITIES	Facilitate periodic demonstrations of the overall progress toward the highest level of collaboration and interoperability achieved, as a measure of realizing the full vision of a global system of systems for Earth observations.	AR-07-P1

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184	6.6-6.1	DATA & USERS	Facilitate data management approaches that encompass a broad perspective of the observation data life cycle, from input through data acquisition, processing, archiving, and dissemination, including analysis and visualization of large volumes and diverse types of data.	DA-07-P4
185	6.6-6.2	DATA & USERS	Advocate and facilitate international information sharing capabilities through appropriate technologies, including, but not limited to, Internet-based services.	AR-07-P2 CB-06-04
186	7.5-6.1	CAPACITY BUILDING	Advocate funding of multinational projects to leverage the end-to-end value of observations including the establishment of necessary infrastructure.	CB-07-P1
187	7.5-6.2	CAPACITY BUILDING	Produce monitoring and evaluation mechanisms aimed at determining the efficacy of GEO capacity building efforts.	CB-07-P2
188	7.5-6.3	CAPACITY BUILDING	Facilitate education and training to provide a global base of technical expertise for GEOSS.	CB-07-P1 CB-06-03 (completed)
189	7.5-6.4	CAPACITY BUILDING	Develop recommended priorities for new or augmented efforts in capacity building, to meet the objectives of the GEOSS 10-Year Implementation Plan.	CB-07-P1
190	8.4.1-6.1	OUTREACH	All target audiences should be reached, although with different priority levels and resources. Decision-makers, educators and trainers, and the general public will remain of highest priority. In the longer term, priority will be given to private sector needs for triple bottom line reporting.	OR-06-05 (completed) OR-06-07 (completed) Ongoing supporting activity (OR-06-01; OR-06-02; OR-06-03; OR-06-04; OR-06-06)