GEO 2007-2009 WORK PLAN

TOWARD CONVERGENCE

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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

This Task is led by GSN, FSDN and the USA.

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

The title has been slightly modified to give proper visibility to new ocean bottom networks and GNSS networks, the latter being in any case already included into the Task.

DI-06-03: Integration of InSAR Technology

This Task is led by IGOS-P and Greece.

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

The Task will also address the integration of GNSS and InSAR.

DI-06-04: Implementation of a Tsunami Early Warning System at Global Level

This Task is led by IOC, FSDN, GSN and UNOSAT.

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-06-07: Multi-hazard Zonation and Maps

This Task is lead IGOS-P and WMO.

Conduct an inventory of existing geologic and multi-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

This Task is led by WMO .

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 South East 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.

The Task will include links with relevant international Research programs, such the one being launched by ICSU.

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

This Task is led by WMO and China.

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

The Task will include development of dedicated Software tools (based on the basic ones developed within Task AR-07-03) to be used, in the short term, to facilitate the analysis of coverage for critical observations and, in the medium-long term, to implement the user interface with the operators for products ordering and retrieval and to perform data integration and re-processing.

The Task will also include specific activities concerning Constellation requirements definition and performance assessment, with the full involvement of Users, through participation of “champions” from the relevant community of practice.

The Secretariat will continue its action towards the Board of the International Charter as well as relevant CEOS members, in order to identify possible strengthening of Charter mechanisms and options for widening its scope.

DI-06-13: Implementation of a Fire Warning System at Global Level

This Task is led by Portugal and GTOS.

Initiate a globally coordinated warning system for fire, including the development of improved prediction capabilities, analysis tools and response support through sensors, information products and risk assessment models.

Interface coordination will be put in place with activities of other Social Benefit Areas taking benefit from data and products generated within this Task.

The activities will be performed in the following areas:

- review of existing warning systems
- assess ways to enhance current fire early warning systems

- define options and mechanisms for the implementation of an operational global early warning system

Activities will be coordinated with the ISDR initiative on "Wildland fire monitoring network" coordinated by the GMFC (Global Fire Monitoring Center)

1.2 New Tasks

DI-07-01: Risk Management for Floods

Initial support has been expressed by POGO and WMO.

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 and coastal ocean 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 and coastal ocean activities.

With reference to and in coordination with the WMO APFM (Associated Programme on Flood Management) and with similar initiative conducted under national and regional projects, the core activity will be constituted by the definition and implementation of a pilot project, centred on the development and demonstration of a Flood risk management system for the South-Central American Regions. Coastal observations and associated warnings will be part of this activity.

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: Forecast Health Hazards

This Task is led by France and WMO.

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.

Demonstration research projects and other relevant activities under the “Biodiversity, Ecosystem Services and Health” theme will be supported and co-ordinated internationally.

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, socio-economic and epidemiological data for detecting disease trends and the provision of early warning systems.

Part of this Task will include addressing the health impacts of a polluted and warming coastal ocean (e.g. contamination of seafood and bathing water, increased growth of harmful algal blooms, water-borne diseases, such as cholera, etc.).

2.2 New Tasks

HE-07-01: Strengthen Observation and Information Systems for Health

Initial support has been expressed by CEOS.

The assessments carried out under tasks 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. The consultations on requirements and priorities envisaged in Task HE-06-01 will continue under this Task.

Pilot projects will be initiated to improve in-situ environmental and health data collection for the utilisation and validation of remotely sensed data relevant to health, as well as to 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, and user communities, in order to provide input into the GEO architecture and data development phase. This process will be initiated with a workshop involving all stakeholders.

HE-07-02: Environment and Health Monitoring and Modelling

Initial support has been expressed by CEOS, CNES and POGO.

Initiate projects to further develop and integrate databases of remotely sensed and in-situ environmental measurements (including baseline geochemical data such as trace-element toxicity and deficiencies) together with new observations characterizing atmospheric, soil, river, lake and coastal marine pollution, and develop models to relate these to 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-07-03: Integrated Atmospheric Pollution Monitoring, Modelling and Forecasting

Initial support has been expressed by UNECE CLRTAP HTAP, WMO, Brazil, The Netherlands, the USA, ECMWF, CEOS, CNES and POGO.

Advocate a stable and improved in-situ and space-based observing system of global air quality 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.

Coordinate and facilitate appropriate activities and consortia that complement UNECE CLRTAP HTAP activities and pursue implementation of projects integrating Earth observation data on long range transport with other data, such as health and socio-economic data, to improve decision making.

Support the development of international systems for both sand and dust storm warning and biomass burning monitoring.

Coordinate the construction of a high spatial and temporal resolution monitoring and forecasting system including atmospheric, terrestrial and oceanic observations, modelling and chemical data assimilation for global and local air quality. Organise appropriate symposia in 2007.

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: Using New Observation Systems for Energy

This Task is led by IEEE, IGOS-P and WMO .

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

The three Energy proposals derive from discussions and interactions with IEEE, Norway, ESA and the Renewable Energy Community of Practice. The GEO Energy Expert Group supported (and reviewed) these proposals.

EN-07-01: Management of Energy Sources

Initial support has been expressed by Norway, CEOS, ICSU, IEA and the EC.

Support the development of Earth observation products and services for improving the resource assessment, monitoring and forecast of fluctuating energy sources (e.g. hydro, solar, wind, ocean).

Related activities will include: Promote collaboration between users and providers of Earth observation applications to foster the development of innovative Earth observation services in support of energy management. Develop the use of Earth observations in the development, operation and management of energy production systems.

EN-07-02: Energy Environmental Impact Monitoring

Initial support has been expressed by South Africa, CEOS, IEEE and the EC.

Promote the development of Earth observation systems for the monitoring and prediction of environmental impact from energy resource exploration, 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 carbon sequestration and greenhouse gas monitoring activities, and with Task US-07-01.

EN-07-03: Energy Policy Planning

Initial support has been expressed by CEOS and the EC.

Encourage the use of Earth observations for informed energy-policy planning in developing and developed countries.

Related activities will include: Encourage the use of Earth science models to support energy scenario assessments. Enhance availability of data and products required to better assess countries' potential for energy production. Promote interactions of data providers and decision-support-system developers. Encourage training of decision-makers at all relevant levels for interpretation of relevant data and products.

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

Note: The GCOS Implementation Plan and the WCRP Strategic Framework represent a commonly agreed basis for GEO actions in the Climate area.

4.1 Continuing Tasks

CL-06-01: Sustained Reprocessing and Reanalysis Efforts

This Task is led by GCOS.

Ensure the development of international mechanisms to coordinate and maintain sustained climate data reprocessing and reanalysis efforts. With regard to the reprocessing of historical datasets (to obtain consistent long-time series of satellite records), make relevant synergies with Task CL-06-02.

CL-06-02: Key Climate Data from Satellite Systems

This Task is led by the USA, CEOS, GCOS and WMO.

Establish actions securing the provision of key data for climate studies and forecasting from satellite systems. Make relevant synergies with Tasks DI-06-13, CL-06-01, WA-07-02, AG-06-04, AG-07-01, AR-06-09, DA-07-01, DA-07-02, and AR-07-03 ("Virtual Constellations") in particular.

CL-06-03: Key Terrestrial Observations for Climate

This Task is led by GTOS.

Develop intergovernmental mechanisms for coordinating terrestrial observations needed for climate studies and forecasting. Develop a framework for the preparation of guidance materials, standards, and reporting guidelines for terrestrial (including land-coast interface) observing systems for climate and associated data, metadata, and products to expand the comprehensiveness of current networks and facilitate exchange of data. This Task will build on the outcome of Task CL-06-02.

CL-06-05: GEOSS IPY Contribution

This Task is led by the Portugal and WCRP (CLiC).

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, physical and chemical polar ocean changes, marine and terrestrial ecosystem change, biodiversity monitoring and impacts of increased resource exploitation and marine transport).

CL-06-06: Global Ocean Observation System

This Task is led by POGO.

Enhance and improve coordination of coastal and marine climate observations in support of a global ocean observation system.

Related activities will include: Improve the global coverage and data accuracy of the climate-monitoring system and coastal observing systems, as well as management and archival of the resulting data, by 2007 and continuing. Contribute to the implementation of a global coastal network using the mechanism of GOOS Regional Alliances, by 2007 and continuing. Establish an Argo Program Office to ensure the ongoing implementation of this global array of profiling floats in the ocean.

4.2 New Tasks

CL-07-01: Seamless Weather and Climate Prediction System

Initial support has been expressed by ICSU, WCRP, WMO

Support the development of a THORPEX/WCRP initiative on "International Weather, Climate and Earth-system Science", to better address uncertainties associated with climate variability and change, and related societal impacts.

Related activities will include: Promote international multi-disciplinary (physics-biology-chemistry) collaboration on the development of a high-resolution seamless weather/climate global prediction system - including coupled atmosphere-ocean data assimilation. Support the development of an international 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: Forecast Models for Drought and Water Resource Management

This Task is led by WCRP and IGOS-P.

Enhanced prediction of the global water cycle variation is a key contribution to mitigation of water-related disasters, 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 a global level including moisture flux from the air-sea interface, on a national level including terrestrial systems and then on river basin level. The systems should also be made interoperable to facilitate global exchange of data and information. An international symposium is proposed to be held on approaches to Earth observations, drought predictive capabilities and management responses. This Task has clear links with DI-07-01, WA-06-05 and WA-07-02.

WA-06-05: In-situ Water Cycle Monitoring

This Task is led by Portugal and GOOS.

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 for Water Resource Management

This Task is led by IGOS-P.

Initiate capacity building programs 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. The program will be initiated in Latin America and will then be extended to Asia and Africa. Linkages with existing efforts of GEO Members and Participating Organisations will be made.

5.2 New Tasks

WA-07-01: Global Water Quality Monitoring

Initial support has been expressed by IGWCO, NASA, JAXA, ESA, CSIRO, ICSU, CEOS and POGO.

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 for terrestrial sources and in the coastal ocean. 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 2006 (1st Inland and Coastal Water Quality workshop)and first pilot projects are being planned to begin in Asia as a result of the Asia Water Resource Management Capacity Building Workshop. This Task has relevant synergies with HE-07-02.

WA-07-02: Satellite Water Quantity Measurements and Integration with In-situ Data

Initial support has been expressed by IAG, GCOS, WCRP, CEOS and IGWCO.

Develop an operational mechanism to provide water level observations in rivers, lakes/reservoirs and estuaries from satellite observations to support the upgrade of deficient run-off water gauge networks. Combine different types of satellite data that are relevant for water quantity measurements (snow water equivalent, streamflow) with in-situ observations for better accuracy and global coverage. Produce an implementation plan for a broad and operational global water cycle data integration system that combines in-situ, satellite data and model outputs. An international symposium is proposed to be held to assess techniques and their maturity for transitions to operations. A workshop is planned in 2007.

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 for Weather

This Task is led by WMO.

Advocate a complete and stable surface-based (in-situ and airborne, land and possibly ocean) Global Observing System (GOS). High priority should be given to a stable, and as much as possible automated, 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 for Weather

This Task is led by WMO.

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, (ii) a broader availability of polar Doppler wind profiles for initial operational testing.

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

This Task is led by WMO.

Facilitate the development and maintenance of a prototype global operational multi-model ensemble prediction system (e.g. through THORPEX) incorporating easily accessible databases. Development of TIGGE and the availability of databases will be an important contribution to the successful implementation of a number of GEO tasks that relate to risk management, early warning systems, major hazards and associated impacts.

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

This Task is led by the USA, Greece, Spain and WMO.

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. Build upon WMO programmes for developing countries and giving special emphasis to building capacity for the use of ensemble forecasts for extreme event forecasting.

6.2 New Tasks

WE-07-01: Data Assimilation for Operational Use

Initial support has been expressed by Australia and WMO.

Advocate and facilitate the development and implementation of advanced data assimilation systems that will be able to fully exploit a broad spectrum of surface-based and space-based Earth observations.

This Task should be focused on promoting operational use and closely coordinated with CL-07-01 and WE-06-03.

WE-07-02: Weather Demonstration Project for the Beijing 2008 Olympic Games

Initial support has been expressed by China, Australia, Austria, France, Canada, the USA and Japan.

Establishing strong and effective connection and collaboration between research, operational use, and end users is of particular importance for the success of GEOSS.

By bringing together major advanced numerical weather prediction systems, observations and end users, the Beijing 2008 Forecasting Demonstration Project (B08FDP) will dedicate to nowcasting and the Beijing 2008 Research and Development Project (B08RDP) will dedicate to the mesoscale data assimilation and ensemble prediction system. Together with the demonstration, training workshops for transferring advanced forecasting products to developing countries and facilitating application of advanced observation technology, as well as outreach activities will be organized with co-sponsorship and coordination of GEO.

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)

This Task is led by the USA and IGOS-P.

Support the Integrated Global Carbon Observation (IGCO) development of a global carbon-observing system, in particular improved global networks of in-situ CO_2 observations and absorption of CO_2 by the oceans and resulting acidification caused.

EC-06-02: Ecosystem Classification

This Task is led by the USA and Guyra Paraguay.

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. US Geological Survey and Guyra Paraguay in Asuncion Paraguay hosted a workshop on 9- 13 October 2006 to develop protocols for a robust global ecosystem classification system. Efforts should be made to establish links to existing databases, such as the Ocean Biogeographic Information System. In parallel with the classification effort, develop, review, and initiate a mapping approach to spatially delineate the classified ecosystems

EC-06-07: Regional Networks for Ecosystems

This Task is led by the USA, POGO and GTOS.

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

7.2 New Tasks

EC-07-01: Global Ecosystem Observation and Monitoring Network

Initial support has been expressed by the USGS, NASA, Guyra Paraguay, CEOS, UNEP-WCMC.

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).

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. This theme will address the development of a global integrated sampling frame in coordination with the GEOSS Geodesy activities.

Promote characterization, mapping and monitoring of ecosystems at local, national, regional and global scales requires systematic and formal methods for measuring land surface and vegetation attributes. Develop formal methods for collecting plot (in-situ) data, and for translating between different systems, produce a manual of field methods for terrestrial data, and capture existing plot data into an operational information system.

Promote the use of Earth observation data to detect the effects of insects, pathogens, water temperature and elevation and chemical stresses on ecosystems.

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

This Task is led by FAO.

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 Utilization in Aquaculture

This Task is led by Spain and the USA.

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

This Task is led by the USA, FAO and GTOS

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. A Global Forest Monitoring Symposium co-hosted by the Task Lead and participating organizations will be held in 2007.

AG-06-07: Training Modules for Agriculture

This Task is led by the Netherlands.

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-07-01: Improving Measurements of Biomass

This Task was originated by the GEO Secretariat in accordance with the 6-year targets.

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 stock and aquaculture sectors, especially in developing countries with an emphasis on improving classification and quantification of biomass.

AG-07-02: Agricultural Risk Management

Initial support has been expressed by WCRP.

This Task is based on the former Task AG-06-05.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 from agriculture and aquaculture. The techniques developed in the proposed pilot projects shall be well-documented for broad use. The pilot projects should include appropriate documentation, risk assessment analyses, and quantitative comparisons to standard, benchmark practices..

AG-07-03: Operational Agricultural Monitoring System

This Task was originated by the GEO Secretariat following IGOS-P IGOL recommendations.

The purpose of this Task is to support the development of 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 and in-situ 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

This Task is led by DIVERSITAS International.

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, with GTOS and GBIF, conducted a workshop on "Defining user needs for a global observation system for biodiversity" on 23-25 October 2006.

BI-06-03: Capturing Historical Biodiversity Data

This Task is led by GBIF.

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, with DIVERSITAS and GTOS, conducted a workshop on "Defining user needs for a global observation system for biodiversity" on 23-25 October 2006.

9.2 New Tasks

BI-07-01: Biodiversity Observation and Monitoring Network

Initial support has been expressed by USGS, NASA, Guyra Paraguay, UNEP-WCMC, Ramsar and UNESCO.

Develop and implement a biodiversity observation network 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. Develop a strategy for assessing biodiversity at both the species and ecosystems level. 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.

The 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

Apply Earth observation to the characterization, mapping and monitoring of global protected areas consisting of World Heritage and Ramsar 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.

BI-07-02: Invasive Species Monitoring System

Initial support has been expressed by USGS, NASA and IUCN.

Invasive species threaten biodiversity and exert a tremendous cost on society for prevention and eradication. They endanger natural ecosystem functioning and seriously impact biodiversity and agricultural production. It is therefore necessary to characterize, and monitor changes in the distribution of invasive species. This Task will characterize the current requirements and capacity for invasive species monitoring, identify gaps, and develop and implement strategies for a global, operational invasive species monitoring system. Coordinate development of the Invasive Species Monitoring System with the USGS Invasive Species program, IUCN/SSC Invasive Species Specialist Group (ISSG) and other invasive species activities.

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.
>
> *GEOSS 10-Year Implementation Plan, Section 4.2*

10.1 Continuing Tasks

US-06-01: Identify Priorities and Synergies between SBAs

This Task is led by the User Interface Committee, supported by the GEO Secretariat.

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

This Task is led by IGOS-P and the User Interface Committee.

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
- Energy
- Geohazards
- Water and Health
- Forest

10.2 New Tasks

US-07-01: Nowcasting and Forecasting User Applications

Initial support has been expressed by Finland and WMO.

Facilitate the transfer of advanced nowcasting and forecasting capabilities from and to major cities in developed and developing countries. Build upon the Helsinki Testbed experience to develop user applications related to precision weather forecasts, severe weather warnings, hydrology (including flood control), air-quality forecasting, chemical emergency response, transportation safety, and

energy management. This Task has synergies with the Beijing 2008 Olympic Games Demonstration Project

The Helsinki Testbed is a Finnish initiative aimed at developing enhanced three-dimensional mesoscale observing networks critical to the advancement of modelling systems and related user applications. It is a public-private-academic partnership. 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, coastal zone management, media, and public safety.

US-07-02: Millennium Development Goals

Initial support has been expressed by CEOS, GCOS, UNEP and WCRP.

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.

US-07-03: Environmental Risk Management

Initial support has been expressed by GCOS.

Support the integration of environmental risk management (including climate risk management) into development processes.

Related activities will include: Facilitate the implementation and up-scaling of pilot projects demonstrating the use of Earth observations in the management of key societal areas (e.g. human health, food security, water resources, coastal and marine hazards). Encourage the development of decision-support systems for policy and decision makers (at all levels), and initiate user-oriented activities to do both increase the demand, and foster the supply, of environmental services for development decisions.

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-06-11: Radio Frequency Protection

This Task is led by WMO.

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 coordinated advocacy activities in association with Member countries, including representations to the International Telecommunication Union (ITU) and other bodies in charge of frequency management. This also include a support to GEO Members in influencing their national and regional frequency management bodies. 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). To this respect, it is also important to link with Scientific Committee on Frequency Allocations for Radio Astronomy and Space Science (IUCAF).

11.2 New Tasks

AR-07-01: Interoperability Arrangements for GEOSS

Initial support has been expressed by CEOS, EC, ESA, IEEE, USGS, WMO, Japan and the Architecture and Data Committee.

This Task addresses the core architectural principles in GEOSS, which had previously been initiated through AR-06-01, AR-06-02, AR-06-03and DA-06-06. Not including the initial implementation in itself this overarching Task will provide useful guidelines and tools to support GEO Members and Participating Organizations in the establishment of GEOSS. It will document GEOSS convergence and interoperability supporting the high level strategic and tactical guidelines of GEOSS implementation. The process for interoperability arrangements, consensus on linkage of GEOSS components and Spatial Data Infrastructure (SDI) will be components of this Task. To ensure the appropriate design of GEOSS reference and functional architecture in some practical use cases, System of Systems Engineering activities will be included. This Task also should closely coordinate with AR-07-04.

AR-07-02: Interface Implementation for GEOSS

Initial support has been expressed by CEOS, EC, ESA, IEEE, USGS, OGC, the Architecture and Data Committee, User Interface Committee and Capacity Building Committee.

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 merged into this Task. The primary outcome of this Task will be to solicit an official GEOSS Web Portal and Clearinghouse search facility to be able to access GEOSS components. In addition, this Task will include development of services accessible through GEOSS Interoperability Arrangement to support the GEOSS Societal Benefit Areas. Such web services are particularly needed for Health, Biodiversity and Ecosystem. This Task should develop the implementation framework of GEOSS in coordination with the AR-07-01. Further it will include the relevant information on existing Earth Observation Capacity Building efforts and resources. The User Interface Committee and Capacity Building Committee will support the Architecture and Data Committee in overviewing this Task.

AR-07-03: Global Geodetic Reference Frames

Initial support has been expressed by IAG, GGOS and CEOS.

This Task has the purpose to ensure the availability of accurate, homogenous, long-term, stable, global geodetic reference frames as a mandatory framework and the metrological basis for Earth observation. Identification of steps towards ensuring consistent, high-accuracy, homogeneous, and long-term stable global geodetic reference frames for Earth observation and the observing systems contributing to GEOSS.

AR-07-04: GEOSS Components Commitment

This Task was originated by GEO.

The purpose of this Task is to 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.

This Task will support the contribution of both, data dissemination systems and observing systems to GEOSS. First candidate components are WIS (WMO Information System) and GEONETCast which will be made available through the GEOSS interoperable arrangements to serve the needs of the diverse societal benefit areas. In addition ESA/HMA, , Sentinel Asia, FDSN and others will be available as GEOSS system components gradually through this process.

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

This Task is led by CODATA .

Invite experts to identify steps required to further the practical application of the agreed GEOSS data sharing principles. This Task will be coordinated with the Capacity Building Committee to ensure data access for Capacity Building.

DA-06-02: GEOSS Quality Assurance Strategy

This Task is led by CEOS and IEEE.

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-06-03: Ensemble-Technique Forecasting Demonstrations

This Task is led by the UK and Greece .

Facilitate the development of demonstration projects promoting the wider use, in other disciplines, of ensemble-based techniques originally developed for weather forecasting.

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

This Task is led by the USA.

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. This Task should be closely coordinated with US-06-01 and involve the User Interface Committee.

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

This Task is led by Japan and ISCGM.

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

DA-06-09: GEOSS Best Practices Registry

This Task is led by IEEE.

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). This should also include components identified in the Capacity Building Strategy.

12.2 New Tasks

DA-07-01: DEM Interoperability

This Task is originated by the GEO Secretariat in evolution of Task AR-06-06.

This Task has the purpose to 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.

DA-07-02: Global Land Cover

Initial support has been expressed by GTOS and CEOS.

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 ocean dynamics and promulgate the use of these products, especially in developing countries. This Task is an evolution of Task AG-06-03.

DA-07-03: Virtual Constellations

Initial support has been expressed by CEOS

The Task has the purpose to advocate rapid development of the “CEOS Constellations Concept”. Observations from a virtual constellation would provide better temporal, spatial, and spectral resolution and related data management and dissemination. A series of virtual constellations are in definition by space agencies, in consultation with user communities within the CEOS framework, each being designed to address a significant implementation challenge, and each addressing key GEOSS observation gaps in the process. Prototype Constellation address:

The CEOS Constellation for Precipitation, which aims to strengthen international cooperation on space-based observations of precipitation, including realisation of the GPM mission (AR-06-10) and providing guidance to new;

The CEOS Constellation for Land-Surface Imaging, designed to ensure the relevant synergy with High Resolution Multispectral Imager Continuity (AR-06-09);

The CEOS Constellation for Ocean Surface Topography, designed to ensure continuity of Sea Level measurement in accordance with GCOS requirements (CL-06-02);

The CEOS Constellation for Atmospheric Chemistry, which will address many of the needs for atmospheric observations of the climate community (CL-06-02);

Other cases, for instance constellations of SAR systems or micro-satellites for a range of Earth observation applications, will be considered along the line.

DA-07-04: Sensor Web Enablement for In-Situ Observing Network Facilitation

Initial support has been expressed by OGC, South Africa and IEEE.

The GEOSS scope includes spaceborne, airborne and ground based observing systems of the Earth's environment. While the infrastructure for acquisition, processing and distribution of spaceborne sensing has become active in the past few decades, there has been less development of ground based sensing networks. With advances in communications technology and ground-based in-situ technologies it is now feasible to consider webs of sensors on all types of platforms with rapid access for observations. This technology has been developed under the names of Sensor Webs and Sensor Networks. The Task should develop scenarios or use cases that demonstrate the value of Sensor Webs to the GEOSS SBAs. For example, specific domains that can benefit from sensor web are possibly disasters, health (relevant synergies with HE-07-01), biodiversity, ecosystem and water. The Task should evaluate the applicable standards and coordinate with AR-07-01 suitable for Sensor Webs.

DA-07-05: Higher Level Data Product Tools

Initial support has been expressed by CEOS.

Over the past years geophysical retrievals from moderate spatial resolution imaging sensors have significantly benefited ecosystem and climate monitoring. Several of these products have meanwhile reached operational character (FAPAR, LAI, water vapour column abundance, surface 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 either virtual constellations and/or Sensor Webs, 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. The Task will also encourage the reprocessing of historic data (e.g. AVHRR, MODIS, MERIS, SPOT-VGT, others) to develop composite time series and temporal phenologic metrics to enable monitoring of vegetation condition and change over time and to monitor changes in phytoplankton in the oceans.

DA-07-06: Data Integration and Analysis System

Initial support has been expressed by Japan.

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, archiving, 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: GEONETCast

This Task is led by the USA, EUMETSAT and WMO.

GEONETCast, a near 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.

Where infrastructure contributions are not yet in place, the strategy is to establish GEONETCast on a demonstration basis, then evolve to a fully operational global system with diverse data and product contributions to serve all GEO societal benefit areas. Capacity building needs, particularly in developing countries will be addressed.

13.2 New Tasks

CB-07-01: Capacity Building Strategy Implementation

The following sub-tasks originate from priority actions recommended in the capacity building strategy.

- **Engaging Donors (CB-07-01a)**

  Initial support has been expressed by Spain.

  Organise a Capacity Building Symposium in early 2007 to initiate a dialogue and an exchange of views between GEO and the international donor community in support of Earth observation capacity building. . The capacity building strategy as well as priority capacity building activities will be highlighted at the symposium. Follow up actions based on outcome of the symposium will be developed.

- **Identifying Best Practices, Gaps and Needs (CB-07-01b)**

  This sub-Task builds on efforts in CB-06-01, CB-06-02, CB-06-03 and HE-06-05 and will draw on support from GEO Members and Participating Organisations involved in these tasks.

  Through the engagement of user and expert networks, build registries and databases of : current and planned capacity building activities; best practices; and identified gaps and needs; Best practice examples will include, but not will not be limited to, open-content courses; e- learning material; and downloadable data and products that support capacity building. Develop and disseminate, for each societal benefit area, specific capacity building

outreach material reflecting best practices. Enable access to the above through the GEO Web Portal and GEOSS Best Practices Registry (DA-06-09).

- **Capacity building Performance Indicators (CB-07-01c)**

  Develop reliable and widely accepted qualitative and quantative metrics for measuring the efficacy of Earth observation capacity building programs. Develop metrics to measure the implementation GEO capacity building strategy. The development of these metrics would require the engagement of the entire GEO community to ensure buy-in.

- **Building National and Regional Capacity (CB-07-01d)**

  Initial support has been expressed by UNEP.

  Build national capacity in developing countries by enabling human, technical and institutional capacity for coordinating, accessing, using and sharing environmental data, information and services. Develop and implement a participatory model for environmental networking, observing/monitoring, and data and information sharing at the national level. The model will be based on existing national mechanisms. It will include key institutions (data providers and information disseminators), integrating regional and global tools and mechanisms for environmental data and observing systems.

  A related focus for this Task, as well as US-07-02, will be improving in-country coordination among national statistical organisation, remote sensing agencies, environment, forests, wildlife and water related ministries for providing improved access to national environmental data..

- **Open Source Software (CB-07-01e)**

  Initial support has been expressed by Brazil and South Africa.

  Encourage use of open source solutions across/along the Earth observation value chain through the development of an inventory of OSS solutions that could be used within GEO. Make this inventory and identified open source solutions available through the GEO Web portal.

  Encourage the development of open source solutions across/along the Earth observation value chain by building on existing efforts and drawing on networks of OSS developers. As a starting point, use the TerraView and Terralib platform to encourage the development of open source software for end users dealing with integrated Earth observation and GIS data.

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

See the GEO Outreach Plan.

15 Supporting Activities

Supporting activities that 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:

- 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;
- Promoting 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 with regional Earth observation planning efforts, such as GMES and national GEO coordination activities, 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;
- Strengthening coordination in area of airborne Earth observations and ensuring integration of airborne observations into GEO work plan activities;

- Advocating continuity and availability of key data sets derived from satellite observations;
- Advocating for continuity of observation of key variables necessary for cross-disciplinary purposes;
- Advocating increased data sharing, furthering the application of GEOSS data sharing principles.
- Advocate usage and establishment of global fibre optic network infrastructure for Earth observation data dissemination and exchange.

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. These activities are detailed in the GEO Outreach Plan.

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 regular updates of the Task sheets. It will report on supporting activities through periodic 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:

- Number, size and significance of component systems contributed to GEOSS
- Number, size and significance of component systems made compliant with GEOSS interoperability arrangements (once interoperability guidance is defined)
- Users of GEO portal and clearinghouse, once developed (quantified by web traffic)
- Impact of data and information supplied through the GEO portal, including the number of Social Benefit Area communities connected through the portal
- Number of catalogue nodes which can be searched through the Clearinghouse
- New observational products traceable to GEOSS
- Standards and protocols developed for GEOSS
- Number of media placements and trade journal articles highlighting GEOSS
- Number of peer-reviewed scientific publications and journal issues 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 distribution list)
- 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. These will include an examination of more general value, outcomes and impacts of Earth observations for the end user for policy development and decision-making. Measures and metrics for this evaluation will be developed in cooperation with the User Interface Committee.

ACRONYMS

AMDAR	Aircraft Meteorological Data Relay
ANTARES	A Network for the Enhancement of the Education and Scientific Research
APEC	Asia-Pacific Economic Cooperation
APFM	Associated Programme on Flood Management
ASEAN	Association of Southeast Asian Nations
AVHRR	Advanced Very High Resolution Radiometer
B08FDP	Beijing 2008 Forecasting Demonstration Project
B08RDP	Beijing 2008 Research and Development Project
CBD	Convention on Biological Diversity
CNES	Centre National d'Etudes Spatiales
CEOS	Committee on Earth Observation Satellites
CLRTAP	Convention on Long-Range Transboundary Air Pollution
CSIRO	Commonwealth Scientific and Industrial Research Organisation *(Australia)*
DAPHNE	Deployment of Asia-Pacific-Indian Ocean Hazard Mitigation Network
DEM	Digital Elevation Model
EC	European Commission
ECMWF	European Centre for Medium-Range Weather Forecasts
ESA	European Space Agency
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
FAO	Food and Agriculture Organization
FAPAR	Fraction of Absorbed Photosynthetically Active Radiation
FDSN	International Federation of Digital Seismograph Networks
GBIF	Global Biodiversity Information Facility
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
GCOS	Global Climate Observing System
GGOS	Global Geodetic Observing System
GOOS	Global Ocean Observing System
GOS	Global Observing System
GTOS	Global Terrestrial Observing System
GPM	Global Precipitation Measurement
GSN	Global Seismographic Network
HMA	Heterogeneous Mission Accessibility *(ESA)*
HTAP	(Task force on) Hemispheric Transport of Air Pollution
IAG	International Association of Geodesy

IEA	International Energy Agency
ICSU	International Council for Science
IEEE	Institute of Electrical and Electronics Engineers
IGACO	Integrated Global Atmospheric Composition Observations
IGBP	International Geosphere-Biosphere Program
IGCO	Integrated Global Carbon Observation
IGOL	Integrated Global Observations for Land
IGOS-P	Integrated Global Observing Strategy Partnership
IGWCO	Integrated Global Water Cycle Observations
ILTER	International Long Term Ecological Research network
InSAR	Interferometric Synthetic Aperture Radar
IOC	Intergovernmental Oceanographic Commission
IPY	International Polar Year
ISDR	International Strategy for Disaster Reduction
ITU	International Telecommunication Union
IUCN	International Union for the Conservation of Nature and Natural Resources (World Conservation Union)
ISSG	IUCN/SSC Invasive Species Specialist Group
JAXA	Japan Aerospace Exploration Agency
JCOMM	Joint WMO-IOC Technical Commission on Oceanographic and Marine Meteorology
MERIS	Medium Resolution Imaging Spectrometer
MODIS	Moderate Resolution Imaging Spectroradiometer
NASA	National Aeronautics and Space Administration
NEPTUNE	The North-east Pacific Time-series Undersea Network Experiments
OGC	Open Geospatial Consortium
OSS	Open Source Software
POGO	Partnership for Observation of the Global Ocean
SAR	Synthetic Aperture Radar
SPOT	Système Probatoire d'Observation Terrestre
SPOT-VGT	SPOT Vegetation
SRR	Short Range Radar
SSC	Species Survival Commission
SST	Sea Surface Temperature
THORPEX	The Observing-system Research and Predictability Experiment *(WMO, ICSU)*
TIGGE	THORPEX Interactive Global Grand Ensemble
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNEP-WCMC	UNEP World Conservation Monitoring Centre
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNOSAT	United Nations Operational Satellite Applications Programme

USGS	United States Geological Survey
VENUS	The Victoria Experimental Network Under the Sea
WCRP	World Climate Research Programme *(IOC, WMO, ICSU)*
WIS	WMO Information System
WMO	World Meteorological Organization