

# 2006 General Report on GEOSS Progress

As Accepted at GEO-III

## Cover Note

In 2006, the GEO community began the first year of implementation of the GEOSS 10-Year Implementation Plan, formally agreed on 16 February 2005. This report reflects GEOSS progress since 15 December 2005,\* when the GEO-II Plenary accepted the 2006 Work Plan as a working document.

It should be noted that the majority of the efforts reported here reflect activity between April and October of 2006. The first quarter (January to March) represented a preparatory period of assembling the seconded experts for the Secretariat staff, organizing the four GEO Committees established by the GEO-II Plenary, and finalizing the task sheets and working procedures for carrying out the 2006 Work Plan. It should also be noted that throughout 2006, significant energy was devoted to refining and developing the multi-year 2007 to 2009 Work Plan (GEO-III Document 11), as directed by the GEO-II Plenary.

## 1 Introduction

After one year of activity, the progress made on the GEOSS 10-Year Implementation Plan can be characterized as truly significant. Achievements in all nine societal benefit areas and the four transverse areas are described in this annual report, which complements the quarterly reports issued by the Secretariat throughout the year.

In the transverse areas, two noteworthy achievements have been the production of the GEO Outreach Plan and the creation of the GEO Capacity Building strategy, through a close

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\* GEO activities in 2005 included the establishment of the GEO Secretariat in Geneva, the creation of the GEO Executive Committee, the international recruitment and selection of the first Secretariat Director, the preparation of the 2006 Work Plan, and execution of preliminary GEOSS coordination activities. These activities are recorded in the GEO Report on 2005 Activities (GEO-II Document 0206-1), and the Secretariat Operations Report for 2005 (GEO-II Document 0207-4).

collaboration of the Capacity Building Committee and the Secretariat. Both documents are submitted to the Plenary for consideration.

The year 2006 has also witnessed significant progress in the development of the GEOSS architecture, such as the various registries of components, services and standards, the portal and the clearinghouse as reported here and in detail in the Architecture and Data Committee report. The Architecture and Data Committee correctly refers to these Tasks as “foundational”, as their main elements, which will be in place shortly after the end of the year, will lay the foundations of the GEOSS architecture. They will allow system designers to make the necessary adjustments for existing observation and information components to be contributed to GEOSS.

The involvement of users in GEOSS implementation has been initiated through the creation of six communities of practice, under the guidance of the User Interface Committee. This informal but effective structure, which will benefit from the work conducted over the past decade by the IGOS Partnership, will be instrumental in guiding the implementation of the 2007-2009 Work Plan by ensuring that the new Tasks are properly capturing user requirements in their very early stage.

In addition, significant progress has been made in coordinating with a wide cross-section of GEOSS users. The activities conducted in 2006 through Work Plan implementation, future Work Plan development, and supporting activities have consistently reinforced the cross-cutting, transverse, multidisciplinary, cooperative and coordinated approach which characterizes GEO. Indeed, GEO is about fostering international cooperation and developing synergies between disciplines, observing systems and organizations, and this is its primary value and most critical asset.

Regarding international cooperation, six new Members have joined GEO in 2006, and the Secretariat is currently actively engaged with another 15 that are interested in joining. GEO has also been approached by a growing number of organizations, both intergovernmental and non-governmental. All are attracted by the potential synergies between observing systems to address the needs of their national or organizational constituencies.

Regarding interdisciplinary cooperation, this first year of GEO has been successful in bringing more scientific communities into GEO, as well as in strengthening coordination within disciplines, so that these communities are now well positioned to both contribute to, and benefit from GEOSS. As an example, GEO has been engaged with the ocean community to ensure that this essential part of the Earth science discipline is actively contributing to all nine societal benefit areas.

Among the societal benefit areas, perhaps the greatest progress has been achieved in Ecosystems and Biodiversity. With biodiversity in particular, a significant gap between practitioners collecting *in situ* data and those using remotely sensed data has limited integration of these data thus far. For this community, GEO has acted as a catalyst for the necessary coordination. Through GEO several planned workshops by GTOS, DIVERSITAS and the Global Biodiversity Information Facility (GBIF) were merged into a single workshop co-hosted by the GEO Secretariat in Geneva in October 2006. This workshop of over 40 international, regional and local institutions addressed the harmonization of Earth observation for biodiversity and the development of a coordinated strategy for capturing specimen data. A significant outcome was the decision to create a GEOSS Biodiversity Observation and Monitoring Network to meet the Convention on Biodiversity 2010 indicators and other institutional and conventions mandates. Creating this larger “network of networks” represents a major step forward in harmonizing biodiversity data collection, processing, analysis and reporting.

GEO has also taken initial steps to engage with non-governmental organizations. Indeed, NGOs are very active in collecting biological field data. GEO has been working with a number of governmental and non-governmental institutions to use the tools developed under GITAN (Global Integrated Trends Analysis Network) as an institutional cooperation and data sharing model, and GITAN's Global Data Toolset (GDT) as a model web portal for biodiversity and ecosystems.

Finally, regarding the transverse coordination with existing organizational mechanisms for Earth observations, significant progress have been made in strengthening the links between GEO and CEOS, the Committee on Earth Observation Satellites, on all issues relating to the space components of GEOSS. The concept of virtual constellations put forward by CEOS has been recognized as instrumental for bridging the gap between past and future space observing systems and meet current user's needs through the coordination of existing observing systems. The strong coordination between GEO and GCOS, which, *de facto*, coordinates the development of the climate related components of GEOSS, will strengthen the coordination of observing systems across societal benefit areas.

## 2 General Progress by Area

### 2.1 Disasters

The 2006 Work Plan included 14 tasks in the area of "Reducing loss of life and property from natural and human-induced disasters." Although progress has not been homogenous across all tasks, significant achievements have been made in the following areas:

- Improvement of seismographic observing networks - Good progress has taken place concerning the strengthening of overall coordination among seismographic networks and improved real-time telecommunications, seismic station coverage, and rapid seismic data products in support of tsunami warning systems and earthquake response.
- Multi-hazard approach and hazard zonation inventory - GEO has fostered increased coordination between the communities dealing with meteorological/hydrological hazards and geohazards. In addition, the IGOS Geohazards Bureau, in collaboration with the BRGM (French Geological Survey), has developed an ISO-standard-compliant catalogue of hazard maps, together with a software package, which has been made available to the GEO community in order to populate the catalogue.
- Use of satellites and associated technologies in support of disaster reduction - Fairly good progress is reported in this area, if not always directly linked to the activities identified in the tasks. In particular, the use of Meteosat Second Generation (MSG) for fire detection and mapping is increasing, in some cases integrating MODIS applications worldwide, and EUMETSAT plans to deliver an operational "fire" product starting from 2007. InSAR technology is also becoming more mature as an operational tool for disaster reduction. In addition, the GEO Secretariat has continued discussion with the Board of the International Charter on Space and Major Disasters and with the Director of UNOOSA to ensure coordination on the use of remote sensing for this purpose. Although Charter members are not enthusiastic about the enlarging the Charter's scope and mandate, the COPUOS approved the creation of the SPace based Information for Disaster management and Emergency Response (SPIDER) program, (formerly DMISCO) with an initial arrangement that foresees Offices in Vienna

(UNOOSA), Beijing, Bonn, and Geneva. The GEO Secretariat also initiated preliminary contacts with the International Telecommunication Union (ITU) on the matter of emergency communications, in addition to significant existing activities of ITU in this area, such as the agreement concluded with Thuraya Satellite Telecommunications Company in July 2006 concerning the provision of portable satellite terminals to assist countries in disaster mitigation and relief.

- Global Fire Warning - Fairly good progress is reported, even if not always directly linked to the activities identified in the task. Early warning pilot services are being put in place in different countries and regions and a worldwide project has been proposed to UN/ISDR at the 3rd Conference on Early Warning (EWCIII in Bonn, March 2006), and is awaiting approval.
- Tsunami related activities - The tsunami-related tasks have achieved less progress than expected, in particular with regard to the development of associated geographical products and hazard maps. However, IOC has activated, through an initial meeting the 24 of June, the ad hoc Working Group on Global Ocean-related Hazards, Early Warning and Mitigation System, created by IOC Assembly, and also issued the Implementation Plan for the Indian Ocean Tsunami Warning and Mitigation System (IOTWS) in late July 2006. GEO efforts to support IOC will be consolidated and redoubled under Task DI-06-04, the implementation of a Global Tsunami Early Warning System.
- Capacity building for disaster reduction - There was a general understanding of the contributors to these tasks that the overall objectives would be consolidated within the GEO capacity building strategy articulated for 2007 to 2009. In particular, it shall be noted that the objectives for 2006 for the task DI-06-12 (Initiate a knowledge-transfer on the use of Earth observations for disaster management) were pursued. The task has been closed and the relevant report is available. This task will be followed up within the above-mentioned SPIDER program.

## 2.2 Health

In 2006, GEO has initiated a number of activities in the area of “understanding environmental factors affecting human health and well-being.”

- Earth observation, environment, and health demonstration projects - A major focus of the initial work in the GEO Health Societal Benefit Area has been to initiate projects demonstrating the value of Earth observations in improving human health. The World Meteorological Organization WCRP/THORPEX project has initiated the Health and Climate Partnership for Africa (HCPA) to enhance the use of meteorological information to mitigate health impacts. The US Environmental Protection Agency has initiated a research program to explore the relationships between Biodiversity, Ecosystem Services and Human Health. There are a number of similar initiatives in progress currently, and there is a potential role for GEO to increase coordination between these funding programs, to achieve synergies, ensure global coverage and avoid duplication of effort.
- Engagement with the World Health Organization (WHO) – Efforts have been made to engage WHO in the GEO process. A number of working level meetings with WHO personnel have been arranged to elucidate health user needs, as well as potential projects in which WHO could contribute to GEO tasks. In addition, a formal letter of invitation to WHO to become a GEO participating organization has been sent to the Acting Director General of WHO, Dr. Anders

Nordström. The participation of WHO is essential for defining global health priorities and health user requirements for Earth observations.

- Outreach to the public health community - In the context of both obtaining health user requirements and outreach efforts to the global health community, a number of GEO events focusing on health have been organized. There was a strong GEO delegation to the 11th World Congress on Public Health and the 8th Brazilian Congress on Collective Health, in Rio de Janeiro, Brazil, led by the US National Oceanographic and Atmospheric Administration. Another example of this activity was the ISRO/ISPRS/IEEE/OGC GEO workshop “Applications in Public Health for The Indian Ocean Region” held in Goa, India.

## 2.3 Energy

In the area of Energy, progress was achieved in the formation of the GEO Energy Community of Practice and a more informal GEO energy expert group. These two groups, established through close cooperation between the GEO Secretariat, the IEEE, and the GEO User Interface Committee have initiated activities in the following areas:

- GEO Energy web portal – A web-portal for the GEO Energy Community of Practice (see <http://www.geoss-ecp.org>) is being developed. This portal considers renewable as well as non-renewable energy and serves as a solid platform for promoting and developing GEO Energy activities.
- User requirements identification – The group is working toward definition of a common methodology for identifying Earth observation requirements of energy users, based on a combination of targeted questionnaires and one-on-one interviews. In addition, a draft report on wind and solar energy user requirements is to be developed by November 2007 in time for the GEO 2007 Ministerial Meeting.
- Pilot projects - A pilot project has been identified that would support the geographical expansion of a solar database, enhancing solar data access for developed and developing countries (see [www.soda-is.com](http://www.soda-is.com)). In addition, a proposal is being developed to integrate several existing projects into a comprehensive GEO energy project.
- Energy and Earth observation strategic plan. To fulfill on GEOSS 2-yr Target 26, a five-ten year strategic plan is being developed for the optimum exploitation of the enhanced capabilities offered by the new generation of observing systems and forecasting and modelling techniques. A draft of the plan is to be made available by November 2007 in time for the GEO 2007 Ministerial Meeting.

## 2.4 Climate

In the area of Climate, significant progress was achieved on all Tasks. Key milestones include:

- Climate data reprocessing and reanalysis. Plans are underway for developing global reanalysis in Europe, Japan and North America, and the new generation of multi-decadal global reanalysis in particular (see ECMWF/GEO Workshop on Atmospheric Reanalyses, 19-22 June 2006, Reading, UK - <http://www.ecmwf.int/publications/library/do/references/list/20092006>) and the Third International Conference on Reanalyses is to be hosted by Japan in January 2008.

- User requirements refinement. GCOS has developed a document entitled “Systematic Observation Requirements for Satellite-based Products for Climate” and CEOS has prepared a response to these requirements (to be presented at COP-12 UNFCCC in November 2006). In addition, the WCRP Observation and Assimilation Panel (WOAP) has created an informal working group on the “development of improved observational datasets for reanalyses” to provide expertise and support to GEOSS reprocessing and reanalysis activities.
- Terrestrial climate observations framework. Development of a terrestrial framework for the development of standards and guidance material for variables related to climate in support of the UNFCCC has been initiated (see [www.fao.org/gtos/doc/2006-GTOS-SC/13-UNFCCC-reporting-v4.doc](http://www.fao.org/gtos/doc/2006-GTOS-SC/13-UNFCCC-reporting-v4.doc)). GTOS has created a web-forum on its website to assist in the exchange of supporting information, data and ideas.
- Increased coordination for ocean observations. Lead international entities and national focal points have been identified to help determine common goals across national programs and to facilitate the integration of regional observing capabilities into a global system of ocean observations. Preparation of the 3<sup>rd</sup> Forum of GOOS Regional Alliances (14-17 November 2006, Cape Town, South Africa) and of the next I-GOOS meeting (June 2007) is underway, with a view to reach agreement on GOOS sustainability.
- Coordination with the International Polar Year - Contact was established with the International Polar Year Observations Group, Data Group and Space Task Force. Discussions were initiated with the World Meteorological Organization (WMO) and CLIC International Project Office to involve them as contributors to Task CL-06-05. In this respect, the GEO Secretariat agreed with WMO to organize a GEO “cornerstone” Workshop (Geneva, October 2007) to address the legacy aspects of the International Polar Year.

There is agreement in the climate community to converge future GEO climate activities toward three main streams: “Sustained reprocessing and reanalysis efforts” (continuation of CL-06-01), “Key climate observations in response to GCOS-IP” (broadening of CL-06-02 and continuation of selected aspects of CL-06-03 and CL-06-06) and “Seamless Weather and Climate Prediction System” (the proposed new 2007-09 Task CL-07-01).

## 2.5 Water

The following areas have made progress in the GEOSS area of “improving water resource management through improved understanding of the water cycle.”

- Strengthened water cycle monitoring - Numerous connections have been made between relevant organizations in the water cycle community and discussions have been initiated among the experts to find the gaps and weaknesses in the existing plans for water cycle monitoring. On-going discussions and preliminary plans have been made around activities in the WMO HWR/GCOS driven Global Terrestrial Network-Hydrology (GTN-H) to contribute directly to improving coordination of in-situ water observations, including those in near real time. Also, numerous discussions have taken place on the Improvement of Integrated Hydrological Observation Systems by using satellite altimetry for water level observations in rivers, lakes/reservoirs and estuaries together with in-situ observations. Also plans have been made to open the possibilities for different funding agencies and other entities, such as the World Bank, Global Water Partnership, ESA, NASA, JAXA among others to participate in the GEO work to

fill in gaps in the existing monitoring networks and to build new monitoring systems. In addition, the IGOS Water Cycle Observations (IGWCO) theme held its Second Workshop at UNESCO, on 02-03 March 2006. The main objectives of the meeting were to further develop IGWCO implementation plan in the realms of (i) Soil moisture, (ii) Integrated Precipitation Products, (iii) Water Quality and Bioindicators, (iv) Runoff, and (v) Groundwater and to develop plans for new initiatives including Capacity Building in Southeast Asia and Africa; flood and drought warning and monitoring; integration of socio-economic data.

- Outreach to water resource managers - A GEO side-event entitled "Earth Observation with Wet Feet" - GEO and Water Resources Management was co-organised by the GEO Secretariat and GEWEX for the World Water Forum IV in Mexico City in March. The purpose of this event was to raise awareness among water resource managers about GEO and GEOSS and the value of coordinated Earth observations. In addition, the International Workshop on Capacity Building in Asia on the theme 'Earth Observations in the Service of Water Management' was held in Bangkok, Thailand from 26th to 28th September 2006. The workshop was aimed at exchanging information on best practices and available tools for applications of Earth observations for water resource management in the Asian region. In addition, a plan has been made to 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. Together with IGWCO, CONAE hosted a workshop in Buenos Aires in November 2006 to develop a full capacity building proposal for Latin America.
- Harmonization of coastal and marine observing systems - A Baltic Sea coastal water workshop took place on November 16 in connection with a Baltic Sea and European Marine Strategy symposium in Helsinki. The main goal of the workshop was to decide on the harmonization of the marine observing systems around the Baltic Sea countries and to enhance the coordination of the data and information systems starting from a few countries and broadening the concept to different parts of the world.
- Space-based water quality observations - A workshop focused on the use of remote sensing techniques (satellite, air borne and in-situ) for freshwater water quality monitoring is being planned for February 2007. The workshop will bring leading scientists in this specialized field together to collectively chart a course for the future of remote sensing and water quality. A global community focused on freshwater quality observations has been slow in developing because of the generally localized nature of water quality issues.
- Advancing hydrological prediction – WMO has been promoting hydrological ensemble prediction methods and further supports the development of ensemble prediction products for use by National Hydrological Services. These activities are intended to help assess the value of ensemble forecasts in water resource management.

## 2.6 Weather

GEO activities in the domain of weather, led by the WMO, have addressed strengthening of observing systems, research and development programs, information system and capacity building. Generally, the weather community has made efforts to benefit not only weather but also all societal benefit areas under GEO to meet GEO requirements.

- Development of the Global Observing System (GOS) for meteorology - Significant progress has been made toward achieving a fully functional and operational GOS. The surface-based GOS efforts have been concentrated on the evolution of upper air network and AMDAR, relevant survey, training workshops and instruments inter-comparisons were accomplished, and a revised draft Implementation Plan was reviewed and endorsed. The space-based GOS activities have been focused on improving geostationary imagers and sounders as well as operational testing of polar Doppler wind profiles, an implementation plan was approved. The space-based GOS would now meet the full set of WMO global requirements.
- Strengthened cooperation and data sharing for weather forecasts and prediction models - the Second THORPEX International Science Symposium will be held in December 2006 and will include a main session co-sponsored by GEO on THORPEX TIGGE. A technical proposal for global analyses and forecasts has been developed by the three archive centres (CMA, ECMWF and NCAR) and agreed by eleven potential providers. It is likely that routine access to the data base of global forecasts will be possible in winter 2006-2007 and a start will be made on the development of a TIGGE Limited Area Model approach later in 2006.
- Weather data dissemination - IGDDS, as a component of the WMO Information System (WIS), is the circulation scheme for space-based observational data and products. A workshop reviewed and updated the IGDDS Implementation Plan. A global coverage of data dissemination has made obvious progress with commitments of EUMETSAT, NOAA and CMA. Plans are being finalized in the Asia-Pacific and the Americas. By 2007, IGDDS will provide near global coverage.
- Capacity building for numerical weather prediction (NWP) - In order to assist developing countries in utilization of NWP, a task team has been established with major NWP training institutes, and made a survey. Next step is to co-organize a series capacity building workshops, one workshop on NWP is now being planned at the 2007 AMS International Session.

## 2.7 Ecosystems

In 2006, progress on “Improving the management and protection of terrestrial, coastal, and marine ecosystems” through Earth observation was achieved in the following areas:

- Increased coordination of the ecosystems community for Earth observation - GEO has worked with programmes, entities, and dedicated coordinating mechanisms such as the EC, EEA, JRC, GTOS, GOFC-GOLD, IGOL, DIVERSITAS, Conservation International, academic institutions, ESA, NASA and CEOS and others to develop a coordinated strategy for Earth observation planning.
- Ecosystem classification - Guyra Paraguay, US Geological Survey (USGS) and the US National Biological Information Infrastructure (NBII) co-hosted the 1st Ecosystem Classification Workshop for Marine, Freshwater and Terrestrial Ecosystems in Asuncion Paraguay on 9-13 October. This workshop (Task EC-06-03) began the development and mapping of a global, integrated system for describing and monitoring global ecosystems. A second workshop focusing on freshwater ecosystems was held in the 4th quarter of 2006.
- Improving regional ecosystem observation networks – GEO, working with POGO and GOOS, co-sponsored the “First Chlorophyll Pilot Study Group Workshop, The extended Antares Network” to address GEO Task EC-06-07. As part of the workshop, an analytical cross-

calibration experiment with international *in situ* experts to ground truth satellite chlorophyll by measuring chlorophyll in water was held, and in parallel, a satellite processing and technical inter-comparison and capacity building meeting was conducted to decide on technical specifications for products and recommend software for general network use. The workshop will lead to the development of a proposal for a Global Integrated Network for Chlorophyll monitoring.

- Global carbon observations - GEO is working with the Integrated Global Carbon Observation (IGCO) to develop a global carbon-observing system, in particular improved global networks of in-situ CO<sub>2</sub> observations, and absorption of CO<sub>2</sub> by the oceans and resulting acidification.

## 2.8 Agriculture

Most of the agricultural Tasks are progressing well. However, a lack of progress has been encountered in the development of agricultural strategies for the coming years. For the Tasks related to Agriculture in developing countries, training plans and modules are being designed, and first inputs are being received. Progress has been made in the following areas.

- Locust infestation monitoring and early warning - A full project proposal addressing early warning of locust infestations in West Africa was completed by WMO and submitted to External Relations Department of Monaco for further consideration. The Task related to using ensemble weather forecast in a demonstration case for improved predictability for food supply has been refocused on predicting locust infestation for food security as case study in relationship to THORPEX.
- Fisheries and aquaculture requirements identification – Earth observation requirements for the fisheries and aquaculture communities have been addressed through a questionnaire. In cooperation with representatives of the Partnership for Observation of the Global Oceans (POGO) and the Sloane Foundation, activities are underway towards assessing and prioritizing the communities' priority requirements. For this purpose a dedicated GEO Workshop is being organized as part of the Annual POGO Assembly in January 2007. Further, a questionnaire focusing on the science community in the areas of fisheries was distributed via email to several Earth observations and fisheries experts from international institutions in this field (GLOBEC SC, SG GOOS, EUROGOOS, ICES, FAO, UNESCO/IOC, National Marine Institutes as IFREMER, NOAA, IMR, GKSS, SMHI, IEO). In addition a first draft report on recommendations from GOOS is being prepared for circulation amongst these experts.
- Training modules for Earth observation applications for agriculture - Training opportunities and modules to demonstrate the usage of Earth observation data products for agricultural sectors in development countries are currently under review. A training plan in this context is being defined and will be harmonized with the capacity building strategy under development.
- Global land cover mapping - GEO is currently facilitating a Web-enabled Tool for Rapid Land Cover Mapping in coordination with the US Geological Survey (USGS), the World Data Centre for Biodiversity and Ecology (WDCBE), NASA and FAO. This tool meets capacity building goals for biodiversity, ecosystems, forests and land cover by providing a simple, but effective, tool for using remotely sensed data to map the current extent and historical extent of land cover.
- Global forest cover monitoring - The GEO Secretariat, with a number of co-sponsors, is organizing the 1st Global Forest Monitoring Symposium to be held in early 2007. A

Symposium Science Steering Committee has been formed and a draft agenda and participant list developed.

## 2.9 Biodiversity

In 2006, progress on “understanding, monitoring, and conserving biodiversity” through Earth observation was achieved in the following areas:

- Increased coordination of global biodiversity observation activities - GEO organized the merger of several planned workshops by GTOS, DIVERSITAS and the Global Biodiversity Information Facility (GBIF) into a single workshop co-hosted at GEO on 23-25 October 2006. This workshop addressed the harmonization of Earth observation for biodiversity the development of a coordinated strategy for capturing specimen data. The workshop was represented by 40 international, regional and local institutions. A significant outcome of this meeting was the mandate to create a GEOSS Global Biodiversity and Monitoring Network to meet CBD 2010 and other institutional and conventions mandates. This Network will represent a major milestone in harmonizing biodiversity data collection, processing, analysis and reporting.
- Biodiversity data and information sharing - GEO is working with a number of governmental and non-governmental institutions to use the tools developed under GITAN (Global Integrated Trends Analysis Network) as an institutional cooperation and data sharing model, and GITAN’s Global Data Toolset (GDT) as a model web portal for biodiversity and ecosystems.

## 2.10 User Engagement

In addition to the user requirements progress cited in each societal benefit areas (notably energy, climate, ecosystems, agriculture, and biodiversity) the GEO User Interface Committee has recognized a number of communities of practice for engaging specific users of Earth observation data and information. These include forest, geohazards, coastal zones, and energy. Additional communities of practice have also been initiated in the areas of air quality and health and water quality and health.

## 2.11 Architecture

The following progress has been achieved in 2006 in the area of developing the architecture of GEOSS:

- GEOSS Components and Interoperable Interface - A specifically established Standard and Interoperability Forum is currently establishing test cases for the GEOSS interoperability processes and associated levels. The draft component registry process is advancing through a definition process, as a consequence of which currently a host proposal for the components registry is expected. Different information systems as candidate components to GEOSS are currently presented by JAXA, WMO, the EC and ESA. The European Space Agency offered the provision of the GEOSS web portal system for access to all Earth Observation data.
- GEO Portal and Clearinghouse - A prototype of a GEOSS Clearinghouse is currently being established to enable discovery and access to distributed GEOSS data and services. This includes the coordination of an inventory between the GEOSS Clearinghouse and the GEOSS

Web Portal. A minimum set of standard interfaces and metadata content/exchange standards is currently being recommended.

- Radio Frequency Protection - Through a large involvement of the scientific community the possibility to transmit in passive bands of the electromagnetic Spectrum, in which “all emissions are prohibited”, is insisted upon, supporting also GEO’s strong advocacy actions toward protection of passive microwave spectral bands.

## 2.12 Data Management

The following progress has been achieved in 2006 in the area of improved data management through GEOSS:

- Advancement of GEOSS data sharing principles - A dialogue was established with CODATA and led to an extensive exchange of ideas on the initiation of the Task on the practical applications of data sharing principles and data policy. A specific GEO Workshop has been organized in conjunction with the annual CODATA Conference to further work in this area.
- Data quality assurance - The data quality assurance strategy task shows clear progress and a concept for a web based Cal/Val portal has been elaborated.
- Digital elevation model (DEM) interoperability - A draft “GEOSS Interoperability Guidance on DEM data” has been developed and is being circulated for further review. Based on the preliminary results of a DEM data survey, draft data items for a registry have been determined.
- Data assimilation demonstration - A data demonstration project for ensemble-based techniques is under preparation in the area of physical oceanography focusing on the example of assimilating Sea Surface Temperature and related climatology data for weather-, climate- and ocean forecasting.
- Basic geographic data - The guidance document for basic geographic data is under development. Contributors and international organizations have been asked to provide information on basic geographic data at the global and national scale. A similar request for national scale data was made of the NMOs (National Mapping Organizations) participating in the Global Mapping Project.
- Continuity of key satellite data sets - Ideas on how best to support the continuity of high-resolution multi-spectral imaging sensors as well as the timely implementation of precipitation have been folded into the four prototype constellation studies (ocean surface topography, atmospheric composition, land surface imaging, precipitation) of the CEOS Virtual Constellation concept. This concept is complemented by ongoing climate and disaster management satellite constellations currently being considered and further elaborated within related GEO Tasks.

## 2.13 Capacity Building

In addition to the capacity building activities reported in each societal benefit area (notably water, ecosystems and weather), GEO has made significant progress in 2006 in converging on a coordinated approach to capacity building in Earth observation. Specific progress has been made in the following areas:

- Inventory of capacity building initiatives – An initial inventories of capacity building efforts and infrastructure needs have been compiled. In an ongoing process these will continue to be updated and be matched to user needs to determine capacity building priorities.
- Capacity building strategy development - The development of the capacity building strategy follows from a 10-year target in the reference document to the GEOSS 10-Year Implementation Plan, as well as an early recommendation of the GEO Capacity Building Committee for its early initiation. A workshop to develop the thrust of the strategy was held in Brazil in May 2006. Based on existing efforts and best practices, the strategy “envisions a future where Earth observation capacity building efforts are coordinated, and the access to and availability of capacity building programs to users in all of GEO’s societal benefit areas are enhanced”. Priority actions of the strategy relate to the coordination of efforts, establish enhanced coherence, reduce duplication and extend global reach, as well as secure resources for Earth observation capacity building. The strategy has identified priority actions for implementation in the 2007-2009 work plan.
- GEONETCast - GEONETCast is being operated as a GEO tool distributing near real-time data and products. Since GEO-II adopted the concept in principle, as presented by EUMETSAT and the United States, tremendous progress has been made in further developing the concept and filling the gaps in dissemination coverage. GEONETCast is an early success story which will be promoted with a demonstration at GEO-III. The first official GEONETCast participants meeting and a series of early demonstrations were successfully held, and significant progress has been made toward the goal of global coverage. In addition to EUMETCast, a second hub is planned by the United States to cover North and South America, and a third hub, China’s FengYunCast, will broadcast over the Asia-Pacific region. A global, near real time data dissemination system will thus be available, through GEO, in the next year.

## 2.14 Outreach

In 2006, outreach to GEOSS stakeholder communities was achieved primarily through presentations and briefings conducted by the GEO Secretariat Director and staff, principally to scientific and technical audiences, as well as individual briefings conducted by the Secretariat Director. A complete list of these briefings is presented in Annex 1. Additional progress in the area of communication was achieved through the following:

- Targeted Outreach to New Members and Participating Organizations - The Secretariat engaged with the following governments to encourage their participation in GEO: Armenia, Bangladesh, Botswana, Bulgaria, Chad, Costa Rica, Czech Republic, Ethiopia, Guatemala, Ivory Coast, Kenya, Mozambique, Pakistan, Poland, Turkey; as well as the following organizations: ACMAD, APAN, eGY, GEBCO, IHY, INTERMAGNET, WHO. In the case of Poland, the Secretariat Director was invited to Warsaw to meet with the Secretary of State of Poland and to address an inter-ministerial working group on Earth observations. In the case of Mozambique, the Secretariat Director had the opportunity, during the EUMETSAT 7<sup>th</sup> User Forum for Africa, to address the President of the Republic of Mozambique. In addition, specific efforts on the part of the Secretariat staff to engage experts from Paraguay and Uganda led those countries to become full Members of GEO.
- Communication Tools - To support outreach efforts and the broader communication goals of GEO, the Secretariat completed work in 2006 on a new GEO logo and visual identity, as well as

a new website with significantly expanded information and functionality. The logo and website were officially launched on 31 March. Since the launch of the site, it has been upgraded with the “GEO News” feature, providing short articles on Earth observation news on the home page, and improvements to the site have been made on an ongoing basis. In 2006, preliminary materials for general outreach have been developed by the Secretariat, including a general briefing on GEO for use by all GEO Members and Participating Organizations and a one-page flyer on GEO and GEOSS for distribution and use at conferences and other venues, both available to the GEO community on the GEO FTP site.

- Press Events and Interviews - The Secretariat Director participated in a briefing of the science press assembled for the 2006 Joint Assembly of the American Geophysical Union on 23 May in Baltimore, Maryland. The briefing was attended by the BBC and other journalists. The Secretariat Director also led a press briefing on GEO and GEOSS at the Polish National Press Club on 6 October, and will be interviewed on 21 November on the “Wordview” radio program of World Radio Geneva, an English-language news radio channel associated with the BBC Worldservice. A press conference is planned for the GEO-III Plenary, featuring an unveiling of GEONETCast capabilities to the press and the production of a video news release.
- Publications - The Secretariat was invited by Vaisala of Vantaa, Finland to develop and publish a general, 1,000-word article on GEO for the June issue of Vaisala News, an industry publication distributed globally to a wide readership among global meteorological services and industry professionals. The article was released on 1 June. The Secretariat Director was invited to address the WMO 58<sup>th</sup> Executive Committee, and his remarks were published in the October WMO Bulletin as the “Role of Science in the Implementation of GEOSS.” GEOSS will also be mentioned in Wired Magazine in December 2006 issue. In addition, the GEO Senior Scientific Expert for Biodiversity and Ecosystems is guest-editing a Special Issue of the Journal Remote Sensing of Environment on Earth Observation for Biodiversity and Ecosystems. Over 230 abstracts have been reviewed. Because of the large number of submissions relating to coastal and marine ecosystems, the journal will now publish a second Special Issue on Earth Observation for Coastal and Marine Ecosystems and Biodiversity. These Special Issues will highlight the use of Earth Observation for Biodiversity and Ecosystems. The lead articles will serve to review EO requirements and state of the art and science.
- Outreach Plan Development - In 2006, the Secretariat made significant progress in the development of the GEO Outreach Plan. A teleconference of outreach professionals from the United States, European Space Agency and the WMO was held in late July to develop the outlines of the outreach campaign. A draft document was circulated among those professionals in early September, as well as to all GEO Members and Participating Organizations expressing an interest in participating in Outreach tasks and designating a liaison for that purpose. Comments on the plan were collected, and on 25 September a brainstorming session was held to further develop the plan ideas. A final plan was circulated to the wider GEO community as an information document for the GEO Plenary.

### 3 Secretariat Supporting Actions

Throughout 2006, the Secretariat has engaged in specific activities to support and facilitate GEOSS implementation by GEO Members and Participating Organizations. These activities have been described in six categories below: prepare; negotiate; advocate; promote; support; monitor and report.

#### 3.1 Prepare

The Secretariat has initiated groups and discussions in new areas relating to GEOSS. In close coordination with the User Interface and Science and Technology Committees, it has engaged 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. The following specific activities have been conducted in this area:

- Establishment of the GEO energy expert group to cover key aspects of industry and research, renewable and non-renewable energy, in-situ and space observations, weather and climate forecasting, and cost-benefit analyses. Participating GEO Members and Organizations included Canada, China, Denmark, EC, France, Germany, Italy, Norway, South Africa, USA; ECMWF, ESA, GOOS and IEEE. (Activities of this group are reported above in Section 2.3)
- Initiation of an ad hoc water quality expert group, in collaboration with the IGWCO, to support an early start of the work in global water quality monitoring. (Activities of this group are reported above in Section 2.4)

Specific discussions on future initiatives have been initiated with the following Members, Participating Organizations, and external organizations:

- UNEP, on building national capacity in Earth observation, data sharing, and integration;
- Brazil and South Africa, on the promotion of open source software as tool for capacity building;
- Netherlands (ITC), around the development of a “virtual” university as a means of coordinating education and training efforts;
- OGC and South Africa, on applications of Sensor Web technology, as this technology can be applied for strengthening in-situ observing networks for practical use cases (e.g., Disaster, Health, Biodiversity, Ecosystem and Water);
- African Union Commission, concerning implementation of Disaster Risk Reduction (DRR) for Africa;
- EEA, UNEP, UNESCO, ICSU, (as well as ICUN and other NGOs), on improved analytical and web tools for ecosystem observation, interoperability, and conservation applications of Earth observations;
- WMO and the Convention on Long-range Trans-boundary Air Pollution (LTRAP), on the preparation of a joint Task Force on Hemispheric Transport of Air Pollution. In conjunction with this activity, the Secretariat has accepted an invitation to act as a lead author for the 2007 interim report of the Task Force on Hemispheric Transport of Air Pollutants, providing a GEO perspective on the chapter entitled “Integration of Observations, Modeling, and Emissions for Assessing Hemispheric or Intercontinental Transport”.

Bilateral discussions have also been held with the following organizations in support of the development of new tasks in the 2007-2009 Work Plan.

- Columbia Earth Institute and International Research Institute for Climate and Society (IRI)
- Global Water Partnership
- Millennium Development Goal Centre
- University of KwaZulu-Natal, South Africa
- Higher Council for Environment and Natural Resources, Sudan
- THORPEX Science Steering Committee
- UN World Water Assessment Programme
- Water Supply and Sanitation Collaborative Council.
- WHO, Protection of the Human Environment Programme
- University of Nairobi, Kenya
- World Bank, Commodity and Risk Management Group
- World Food Programme, Business Risk Planning

### **3.2 Negotiate**

The Secretariat has helped define relationships between GEO and related programmes, entities, and dedicated coordinating mechanisms, and engaged 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. While this negotiation activity is true for virtually all tasks, the following specific efforts are highlighted:

- Dialogue with the European Commission on synergies between GEO and the elements of the 7<sup>th</sup> Framework Programme;
- Coordination among GCOS, CEOS, WCRP, and IGOS-P to clarify roles in GEOSS implementation for climate related activities;
- Engagement with Oceans United and POGO to improve the representation of the ocean community priorities in the 2007-09 GEO Work Plan;
- Convergence towards a common understanding of priorities for GEO capacity building through a workshop in Brazil and planned symposium in Spain;
- Coordination with the WMO Hydrology programme, GEWEX, Global Water Partnership, and other water-related agencies to discuss the involvement of the respective agencies in GEO Water tasks and particularly in the *in situ* observation coordination task;
- Engagement with WMO 58<sup>th</sup> Executive Committee and 6<sup>th</sup> Session of the Commission on Basic Systems, to clarify GEO's role as a high level coordinating mechanism in which WMO activity will be featured;

- Participation in the ESA's Heterogeneous Mission Accessibility (HMA) project and Critical Design Review (CDR) to ensure coordination with GEOSS architecture and interoperability.
- Contribution to the progressive, ongoing definition, of the detailed content of the SPIDER program interacting with different actors such as UNOOSA, the Charter on Space and major Disasters, UNOSAT, and the government of Switzerland;
- Interaction with CEOS to refine and consolidate the concept of Virtual Constellations;
- Interaction with UNESCO-IOC to continue the identification of GEO contributions to IOC Implementation plans for Tsunami early warning systems.

### 3.3 Advocate

The Secretariat has developed and applied strategies for promoting GEO, mobilized resources in support of specific GEO projects, and worked to identify potential new funding instruments. The following example activities are highlighted:

- Industry engagement on in-situ observations - The GEO Secretariat visited Vaisala of Finland (19 May, Helsinki) in an attempt to sensitize the in-situ observing system industry partner to GEOSS priorities. The result was an offer from Vaisala to contribute to 2007-09 GEO Work Plan implementation and to co-lead Task US-07-01 (Nowcasting and Forecasting User Applications) in particular.
- Earth observations and development - The Secretariat, at an international high-level conference on global development and finance, trade and health systems (5-6 July, Dublin, Ireland) initiated discussions advocating the benefits of the utilization of development aid resources to improve Earth observation capacity in developing countries, especially in the area of climate observing capacity.
- Coordinated funding for biodiversity-ecosystem-health linkage projects - The GEO Secretariat began to explore the concept of developing coordination between a number of funding agencies that are currently supporting research in the emerging field of "Biodiversity, Ecosystem Service and Health". To date, informal discussions have taken place with the Canadian International Development Research Centre, the US Environmental Protection Agency and the European Commission.
- Data sharing promotion - The GEO Secretariat has worked with ICSU's CODATA to establish a dialogue on the practical applications of GEOSS data sharing principles and data policy, and in preparation for annual CODATA Conference to further work in this area. (This activity is connected to Task DA-06-01).

### 3.4 Promote

Across the nine societal benefit areas the Secretariat has raised awareness of GEO and GEOSS within the scientific and technical community through briefings, presentations, workshops, and side events at major scientific conferences. A detailed list of these activities for 2006 is provided at Annex 1.

### 3.5 Support

In addition to its substantive role in facilitating GEOSS implementation, the Secretariat has also provided technical and administrative support to the GEO Plenary, all GEO committees and working groups, informal expert groups, and task leads and contributors upon request. This support has included preparation and distribution of meeting agendas, documents and reports, teleconference facilitation, meeting logistics in Geneva and in coordination with external hosts, and email discussion and distribution list serves

- GEO Plenary - The Secretariat began preparations for the GEO-III Plenary at the 5<sup>th</sup> GEO Executive Committee in April. Originally planned for Geneva, the GEO Secretariat learned in August that the WMO had an unexpected need to re-locate a regional meeting to Geneva at the end of November. The Secretariat reached out to Germany, which had previously expressed interest in hosting a plenary meeting. Germany quickly agreed to host, and after this was announced in early September, extensive logistical preparations for the Plenary meeting, press conference, exhibit foyer, and accompanying committee meetings were undertaken. In addition, Secretariat prepared 24 official documents for Plenary consideration.
- GEO Executive Committee - The Secretariat prepared logistical arrangements, agendas, official documents and reports for Executive Committee meetings held on 11 April, 5-6 September, and 27 November.
- Architecture and Data Committee - The GEO Secretariat supported the First (2-3 March, Paris, France) and Second (20-21 July, Seattle, USA) Meetings of the Architecture and Data Committee, and made the announcements of the meetings, organized the participation of Committee Members and task leads, managed the attendee lists, supporting the development of the agenda, and drafting meeting records. The Secretariat presented the 2006 work plan progress and the 2007-2009 Work Plan development status in Second Committee meeting for discussions among Committee members. The Secretariat supported Co-Chairs meetings held before and after each Committee meetings, as well as regular Co-Chairs teleconference (11 teleconferences in 2006, as of November 2006). The Secretariat arranged the teleconference service and tested a new web conference tool for the committee co-chairs.
- Capacity Building Committee - The Secretariat has provided support to two meetings of the Capacity Building Committee (6-7 March, Paris, hosted by UNESCO, and 14-15 September hosted by the European Commission), making the announcements of the meetings, managing the attendee lists, facilitating the participation of developing countries, helping to develop the agendas, progress reports and other documents. The Secretariat participated and aided in the development of the Capacity Building Workshop in Sao Paolo, Brazil in June. The GEO Secretariat has facilitated teleconferences for co-chairs and actively supported development and drafting of the capacity building strategy.
- Science and Technology Committee - The Secretariat supported the First (19-20 April, Paris, France) and Second (30 November, Bonn, Germany) Meetings of the Science and Technology Committee, developing the draft agendas, organizing the participation of Committee Members and task leads, and drafting the meeting records. To support the Committee Co-Chairs, the Secretariat hosted an in-person meeting in Geneva on 23 February, facilitated teleconferences, and prepared a draft of the committee's annual report. The Secretariat participated in a meeting of Science and Technology Co-Chairs on 22 September in Brussels to support EC's initiative to produce a draft outline for a Science and Technology Strategic Plan within GEO.

- User Interface Committee - The Secretariat supported two meetings of the User Interface Committee (8-9 March 2006, Rome (host, Italy-APAT and 5-7 September, Ottawa, Canada, a teleconference for the whole committee on July 10, and several teleconferences for the committee co-chairs.
- Working Group on Tsunami Activities -The Secretariat has supported the activities of the Tsunami Working Group, providing focal point for meeting preparation, execution and for the preparation and circulation of the relevant minutes, for the 3<sup>rd</sup> meeting, which took place on 27-28 February 2006 at the Headquarters of the European space Agency in Paris, France.
- Informal Expert Groups - The GEO Secretariat prepared, monitored, and reported on, the Energy expert group meeting held on 28-29 August, and the Biodiversity expert group on 25-26 October, both hosted in Geneva. The Secretariat also provided some support to the US EPA in the preparation of a GEO workshop on Biodiversity, Ecosystem Services and Health, by liaising with the European Commission (DG Research) and encouraging international participation by relevant experts.
- Task Leads and Contributors: Established 37 list serves for task leads and contributors, and facilitated numerous teleconferences.

### **3.6 Monitor and Report**

The Secretariat, in close coordination with the GEO committees, has engaged in ongoing monitoring of GEO task implementation, maintaining regular communication with Task Leads and Points of Contact, to facilitate and support their work, providing necessary reporting tools and structures as well as advice and recommendations as necessary. A report on these monitoring activities, as well as all Secretariat activities, has been provided to the GEO community at the end of each quarter of 2006: 31 March (issued in April), 30 June (issued in July) and 30 September (issued in November).

## Annex 1

### List of presentations and briefings made by the GEO Secretariat

From	To	Subject	City	Country	Attendees
5 Jan	5 Jan	Meeting with Michael Lightner, President and CEO, IEEE	Geneva	Switzerland	Achache
6 Jan	6 Jan	Meeting with Jürg Streuli, Ambassador, Permanent Mission of Switzerland	Geneva	Switzerland	Achache
9 Jan	13 Jan	GEWEX Scientific Steering Group	Dakar	Senegal	Achache
17 Jan	17 Jan	IFRI/CFE Workshop on GMES, IEOS, and GEOSS	Paris	France	Duchossois
20 Jan	20 Jan	Meeting with Juan Antonio March Pujol, Ambassador, Permanent Mission of Spain	Geneva	Switzerland	Achache
25 Jan	27 Jan	GTOS Steering Committee	Rome	Italy	Achache
30 Jan	1 Feb	WHYCOS Technical Conference			Duchossois
2 Feb	2 Feb	Climate Research Workshop	Brussels	Belgium	Achache
7 Feb	7 Feb	WMO Disaster Preparedness and Response Division expert meeting	Geneva	Switzerland	Colohan
8 Feb	10 Feb	Epidemio Workshop	Brussels	Belgium	Duchossois
16 Feb	17 Feb	OECD Global Forum on Space Economics	Paris	France	Massacand
20 Feb	25 Feb	COPUOS Scientific and Technical Subcommittee Meeting	Vienna	Austria	Duchossois
21 Feb	21 Feb	Meetings with UNEP	Nairobi	Nigeria	Achache
24 Feb	24 Feb	Meeting with Jacqueline McGlade, Executive Director, European Environment Agency	Copenhagen	Denmark	Achache
8 Mar	10 Mar	Epidemio meeting	Frascati	Italy	Duchossois
8 Mar	10 Mar	IGOS/GTOS Agriculture Meeting	Rome	Italy	Muchoney
20 Mar	20 Mar	3rd UN-wide Meeting of the United Nations and the International Charter Space and Major Disasters	Geneva	Switzerland	Duchossois
20 Mar	20 Mar	"Earth Observation with Wet Feet" side event at the World Water Forum IV	Mexico City	Mexico	Herlevi
20 Mar	22 Mar	THORPEX Workshop and Working Group Meetings			Massacand
21 Mar	21 Mar	EARSC Workshop on the Role of Industry in GMES/GEOSS	Paris	France	Colohan
21 Mar	22 Mar	SIT-18	Rome	Italy	Achache, Duchossois
3 Apr	5 Apr	CBS Management Group 6 session	Geneva	Switzerland	Achache, Zhao

From	To	Subject	City	Country	Attendees
6 Apr	6 Apr	Meeting with the International Charter on Space and major Disasters	Frascati	Italy	Duchossois
12 Apr	12 Apr	Meeting with EEA on GEO Portal and Biodiversity activities	Copenhagen	Denmark	Herlevi, Muchoney
12 Apr	12 Apr	Meeting with EEA on GEO Portal and Biodiversity activities	Copenhagen	Denmark	Herlevi, Muchoney
18 Apr	21 Apr	GCOS/UNECA Meeting on Climate for Development in Africa	Addis Ababa	Ethiopia	Massacand
19 Apr	19 Apr	Meeting with UNESCO World Heritage Site to discuss earth observation for managing and monitoring protected areas.	Paris	France	Muchoney
19 Apr	20 Apr	GMES Conference	Graz	Austria	Achache
25 Apr	25 Apr	Meeting with the World Conservation Union (IUCN) to discuss Biodiversity and Ecosystem SBAs	Gland	Switzerland	Muchoney
28 Apr	28 Apr	Meeting honoring Achim Steiner, the outgoing Director of the World Conservation Union and the newly appointed Executive Director of UNEP	Geneva	Switzerland	Achache
2 May	5 May	6th Informal Conference of (South)-Eastern Europe NMHS Directors	Dubrovnik	Croatia	Saloojee
3 May	4 May	EC GEONETCast Workshop	Brussels	Belgium	Ochiai, Zhao
3 May	6 May	Interactions Nature-Société : analyses et modèles	La Baule	France	Muchoney
7 May	12 May	CEOS/WGISS	Budapest	Hungary	Ochiai
9 May	11 May	CEOS WGCV and joint meeting with WIGISS	Budapest	Hungary	Rast
10 May	11 May	Earth Observation Business Network (EOBN)	Vancouver	Canada	Achache
16 May	16 May	Consultative meeting on the question of reforming the UN's institutional framework for environmental activities	Geneva	Switzerland	Achache
19 May	19 May	Vaisala	Vantaa	Finland	Achache, Herlevi, Massacand
22 May	23 May	UNEP meeting on Environment Watch held at EEA	Copenhagen	Denmark	Kelly, Rast
22 May	23 May	IEEE GEOSS Workshop-The User and the GEOSS Architecture III	Beijing	China	Zhao
22 May	24 May	CEOS-GCOS Workshop	Geneva	Switzerland	
23 May	23 May	13th IGOS-P Meeting	Geneva	Switzerland	Herlevi, Ochiai
23 May	26 May	American Geophysical Union	Baltimore	USA	Achache

From	To	Subject	City	Country	Attendees
24 May	24 May	GARS-IGOS Geohazards Joint Committee	Geneva	Switzerland	Ochiai
29 May	31 May	GEO Capacity Building Workshop	São José dos Campos	Brazil	Saloojee, Zhao
2 Jun	2 Jun	OECD Global Forum on Space Economics	Paris	France	Massacand
6 Jun	6 Jun	Cercle Espace	Paris	France	Achache
6 Jun	9 Jun	WCRP Sea-level Rise Meeting	Paris	France	Achache, Herlevi, Massacand
7 Jun	9 Jun	Encuentro Iberoamericano sobre Cambio Climático y Desastres Naturales	Guayaquil	Ecuador	Rum
12 Jun	12 Jun	COPUOS	Vienna	Austria	Achache
14 Jun	14 Jun	Meeting with ESA on data access and communication networks	Geneva	Switzerland	Achache, Ochiai, Rast, Rum, Zhao
14 Jun	14 Jun	Meeting with European Commission, DG RTD	Brussels	Belgium	Kelly
19 Jun	19 Jun	Meeting with the World Conservation Union (IUCN) to discuss biodiversity and Ecosystem SBAs	Gland	Switzerland	Muchoney
19 Jun	19 Jun	Meeting with representatives of the PolarView GMES Service Element consortium	Geneva	Switzerland	
20 Jun	20 Jun	The World's Water Crisis	Brussels	Belgium	Herlevi
20 Jun	20 Jun	Meeting with the US National Biological Information Infrastructure (NBII) and the World Data Centers for Biodiversity and Ecosystems to discuss Biodiversity and Ecosystem SBAs	Geneva	Switzerland	Muchoney
22 Jun	22 Jun	58th WMO Executive Committee	Geneva	Switzerland	Achache
24 Jun	24 Jun	IOC Ad-hoc Working Group on Global Ocean related Hazards Early Warning on Mitigation Systems	Paris	France	Achache
29 Jun	30 Jun	South East Asia Geohazards Workshop	Kuala Lumpur	Malaysia	Rum
3 Jul	6 Jul	SFPT/ISPRS Commission I Symposium	Paris	France	Achache
17 Jul	19 Jul	Living with Climate Variability & Change	Helsinki	Finland	Herlevi, Massacand
19 Jul	19 Jul	GEONETCast meeting	Seattle	USA	Achache, Ochiai, Rast

From	To	Subject	City	Country	Attendees
19 Jul	22 Jul	ADC Committee and ADC co-Chairs Meeting	Seattle	USA	Achache, Ochiai, Rast
20 Jul	21 Jul	Architecture and Data Committee Meeting	Seattle	USA	Achache
24 Jul	24 Jul	Meeting with Tsunami Working Group co-chairs on Tsunami activities and WG follow-on	Paris	France	Massacand, rum
25 Jul	25 Jul	Meeting with WMO on coordination on Disaster reduction activities	Geneva	Switzerland	Rum
31 Jul	4 Aug	International Geoscience and Remote Sensing Symposium (IGARSS) 2006	Denver	USA	Achache
3 Aug	4 Aug	Capacity Building Strategy Writing meeting	Enschede	Netherlands	Eleni, Saloojee, Zhao
4 Aug	4 Aug	Meeting with the UNOSAT, the Swiss Federal Department of Foreign Affairs and the CERN IT Office on options for DMISCO/SPIDER implementation	Geneva	Switzerland	Achache, Rum
21 Aug	25 Aug	11th World Congress on Public Health & 8th Brazilian Congress on Collective Health	Rio de Janeiro	Brazil	Kelly
22 Aug	25 Aug	1st European Congress on Conservation Biology	Eger	Hungary	Muchoney
24 Aug	25 Aug	Capacity Building Strategy Writing meeting	Washington, DC	USA	Eleni, Saloojee
28 Aug	29 Aug	GEO Energy Expert Meeting	Geneva	Switzerland	Massacand
28 Aug	30 Aug	2nd WCRP WOAP Meeting	Ispra	Italy	Rast
28 Aug	31 Aug	IDRC (International Disaster Reduction Conference)	Davos	Switzerland	Rum
31 Aug	1 Sep	3rd Global Workshop on RARS and IGDDS	Geneva	Switzerland	Zhao
4 Sep	8 Sep	Opening Ceremony of the Joint 6th European Meteorological Society Meeting & 6th European Conference on Applied Climatology	Ljubljana	Slovenia	Achache
5 Sep	6 Sep	ESA/HMA CDR	Frascati	Italy	Ochiai
5 Sep	7 Sep	User Interface Committee meeting	Ottawa	Canada	Kelly
6 Sep	6 Sep	16th Krynica Economic Forum – Earth Observations in the New Economy	Krynica	Poland	Colohan
7 Sep	7 Sep	Meeting with EEA on GEO Portal and Biodiversity activities	Copenhagen	Denmark	Muchoney, Wilson



From	To	Subject	City	Country	Attendees
8 Sep	8 Sep	Meeting with the Global Biodiversity Information Facility, DIVERSITAS and GTOS to plan for joint biodiversity workshop areas.	Copenhagen	Denmark	Muchoney, Wislon
11 Sep	11 Sep	Meeting with the UNEP-WCMC, WCDCBE (ICSU) and Birdlife International	Cambridge	UK	Muchoney, Wilson
12 Sep	12 Sep	FOSS4G	Lausanne	Switzerland	Ochiai
14 Sep	15 Sep	US EPA Biodiversity and Health Workshop	Washington, DC	USA	Achache, Kelly
14 Sep	15 Sep	2nd Capacity building committee meeting	Brussels	Belgium	Eleni, Saloojee, Zhao
14 Sep	15 Sep	CEOS/WGISS-22	Annapolis	USA	Ochiai
16 Sep	21 Sep	Oceans'06 MTS/IEEE Conference	Boston	USA	Achache
18 Sep	22 Sep	Extended Antares Network Workshop	Plymouth	UK	Rast
19 Sep	20 Sep	US EPA/Centers for Disease Control and Prevention (CDC) Symposium on Air Pollution Exposure and Health.	Research Triangle Park, NC	USA	Kelly
19 Sep	20 Sep	CEOS/SIT-19	La Jolla	USA	Ochiai
20 Sep	22 Sep	North American Land Cover Summit	Washington, DC	USA	Muchoney
22 Sep	22 Sep	North American Land Cover Summit	Washington, DC	USA	Muchoney
25 Sep	29 Sep	Recent Advances in Quantitative Remote Sensing RAQRS	Valencia	Spain	Rast
26 Sep	28 Sep	Asian Water Resources Management Capacity Building workshop	Bangkok	Thailand	Herlevi
26 Sep	28 Sep	Asian Water Resources Management Capacity Building worksho	Bangkok	Thailand	Herlevi
28 Sep	28 Sep	ITC, Opening of the Academic Year	Enschede	Netherlands	Achache