

## **GEO WORK PLAN SYMPOSIUM 2010**

**17-19 May 2010**

**Pretoria, South Africa**

### **RECORD**

The first Work Plan Symposium was held on 17-19 May 2010 in Pretoria, South Africa, convening over 80 participants from 30 GEO Members and Participating Organizations and representing over 70% of the Work Plan (sub)Tasks. The Work Plan Symposium represented a key opportunity to foster coordination across and within Overarching Tasks, exchange information, and develop synergies across the Work Plan.

The Work Plan Symposium also provided an opportunity to showcase GEO South Africa through some existing and potential South African contributions to the 2009-2011 Work Plan. Possible contributions included the SAEOS portal, Earth Observation Data Centre (CSIR, SAC), South African Risk and Vulnerability Atlas (DST, SAEON, CSIR) and the African Fire information System, AFIS (Meraka, CSIR). South African efforts at meeting user needs in water, agriculture and geology were presented. A strong call was made for the more efficient use and integration of geological data in GEOSS, better access to Earth observation data for all Societal Benefit Areas and the need for continuous focus on the development of capacity at all levels.

The main objectives of the Symposium were to: (i) Foster the Work Plan Implementation across and within GEOSS areas; (ii) Develop practical recommendations for the 2011 Work Plan Update; (iii) Initiate discussions in preparation of the GEO 2012-2015 Work Plan; and (iv) Identify achievements that could be presented at Beijing Ministerial Summit.

Below is a summary of outcomes. All Task Presentations are available at:  
[ftp://ftp.earthobservations.org/201005\\_Work\\_Plan\\_Symposium/Presentations/](ftp://ftp.earthobservations.org/201005_Work_Plan_Symposium/Presentations/)

*Annexes:*

Final Agenda (featuring all presentations)  
Symposium Objectives

**1. 2009 – 2011 Work Plan****ARCHITECTURE***Work Plan Implementation – Key Outcomes, Synergies and Issues***AR-09-01: GEOSS Common Infrastructure (GCI)**

- The GEO Portal and Clearing House are now in final selection phase. Selection is a key step for GCI implementation to proceed
- Collaboration is ongoing with a number of Disasters, Health, Energy, Water, and Biodiversity Tasks through the Architecture Implementation Pilot 3 (AIP-3). Tasks include DI-06-09, DI-09-02, WA-06-02, WA-06-07, BI-07-01, EN-07-02, HE-09-01, and HE-09-02
- Numerous transverse Tasks also contribute to the development of the GCI and GEOSS (e.g. AR-09-02, AR-09-04, US-09-01, DA-06-11, DA-09-01, DA-09-02, DA-09-03)
- The Best Practice Wiki is operational however its usage and submissions remain low. The User Interface and Capacity Building Committees volunteered to help enter practices
- The wiki-based Ontology/Taxonomy development tools, visualization tools and reverse dictionary are available for free. Needed are “publicly accessible” contents (taxonomies, dictionaries) to serve the GEO community and provide data-search support services. New contributors are encouraged to join Ontology/Taxonomy activities.

**AR-09-02: Interoperable Systems for GEOSS**

- CEOS Virtual Constellations cover Atmospheric Composition, Land Surface Imaging, Ocean Colour Radiometry, Ocean Surface Topography, Ocean Surface Vector Wind, and Precipitation. All derived data are registered into the GCI. CEOS Virtual Constellations support numerous Societal Benefit Areas including Climate, Water, Ecosystems and Agriculture
- In the field of metrological data sharing, WIS (WMO Information System) is a good exemplar of interoperability with the GCI (same interoperability standards as GEOSS)
- Sensor Web activities are connected to the GCI through the Architecture Implementation Pilot. Current standards in Sensor Web domain are hard to implement, because they require profiling. Best practices are missing. Investment in tools to facilitate GEOSS-compliant sensor network setup is necessary.
- Virtual Constellations and Sensor Web tend to be complementary supporting satellite and in-situ data integration respectively
- The Model Web sub-task is still in an initial phase. Additional contributions need to be encouraged.
- Cross-cutting activities such as Cal/Val are ongoing. However, encouragements among AR-09-02 sub-tasks are needed to further develop interoperable systems.

**AR-09-03: Advocating for Sustained Observing Systems**

- All data from the WMO Global Observing System (GOS) comply with GEO interoperability arrangements and data sharing principles. WMO has a long-standing policy for broad, open data sharing, governed by Resolutions 40 (meteorological data) and 25 (hydrological data). A stable Global Observing System for the atmosphere is implemented under the framework of GOS, coordinated by WMO, which covers not only satellite observation but also air-borne observation.
- The Global Geodetic Observing Systems (GGOS) is working to recruit sub-task participants from technique disciplines and user community. Studies are underway to develop Network Station configuration and specification. A Call for Participation was drafted to support the network design and planning activity with analysis, simulations, site research (geology, weather, logistics, personnel, etc).

**AR-09-04: Dissemination and Distribution Networks**

- GEONETCast is a multi-purpose system interoperable with the GCI. Alert and Training channels are in operation. Pacific Island states have noted a low availability of environmental and Earth observation information to users in the region.

- GEONET aims to become a comprehensive distribution “network of networks”, complementing GEONETCast and including terrestrial networks, satellite networks and mobile networks. Technical cooperation between GEONET and GEONETCast is in progress in the framework of AR-09-04. Additional inputs and requirements will be collected contacting representatives from the User Interface Committee and Architecture and Data Committee.

**AR-06-11: Radio Frequency Protection**

- AR-06-11 has provided a new and essential political angle to the Earth observation community (e.g. WMO, SFCG, EUMETNET) for dealing with frequency management bodies. However further promotion for radio frequency protection is needed especially in the field of in-situ observations.

*Suggestions for Upcoming Work Plans*

- Integration will be expected within AR-09-04 (Dissemination and Distribution Network) and across AR.09-03e (Global Geodetic Fields) and DA-09-02c (Geodetic Reference Frames)
- The CEOS Working Group on Information Systems and Services should continue to contribute to remote sensing activities

*Possible Contributions to Beijing Ministerial Summit*

- Promotion of the GCI possibly through the 6 showcases
- Various Architecture-related activities at National/Regional Booths
- IEEE booth targeting water-related activities and standards
- GEONETCast booth
- AIP3: Architecture Implementation Pilot Phase 3 (OGC) booth

**DATA MANAGEMENT***Work Plan Implementation – Key Outcomes, Synergies and Issues***DA-06-01: GEOSS Data Sharing Principles**

- The Data Sharing Task Force circulated the Action Plan prepared for the Ministerial Summit to the GEO community for review. All Task teams are requested to provide their feedback to [secretariat@geosec.org](mailto:secretariat@geosec.org)
- In most Work Plan Tasks, significant progress has been achieved on Data Sharing (e.g. GDEM, Landsat, CBERS, OneGeology, GEOBON, Supersites). In many cases, the GEO value-add relates to lighter restrictions applied to a data subset.

**DA-09-01: Data Management**

- Sub-tasks a) “Quality Assurance Strategy” and c) “Long-Term Preservation of Data” develop frameworks in support of all SBA tasks. They will have an impact on the GEOSS architecture and each other. This presents an opportunity for a harmonised approach. It is recommended to host a workshop dedicated to the three DA-09-01 subtask activities.
- Significant independent data management efforts were presented by CDIGAM (Agriculture), GCOS and the Forest Carbon Tracking task (both under Climate). Common approaches with the existing Data Management tasks under DA-09-01 (Quality Assurance) are to be explored.
- Also to be explored is the common ground between the Atmospheric Model Evaluation Network and the Virtual Constellations, the Model Web and the WMO Information System (AR-09-02)
- There is a need to align independent projects on data reprocessing and product re-analysis

**DA-09-02: Data Integration and Analysis**

- Several presentations (e.g. Atmospheric Model Evaluation Network) demonstrated Web Mapping Services. These should be interfaced with the GEOSS Common Infrastructure at service level.

- Several joint task workshops were held (e.g. DA-09-01b and DA-09-02a in November 2009) and these were considered a very useful means for building cross-task linkages
- Common approaches are to be sought for the characterisation of instruments and observables, which is presently being pursued independently for in-situ (AR-09-02c) and satellite instruments (CEOS MIM database)
- Communicating Best Practices is an important pillar of GEOSS, and is supported by the GEOSS Best Practices Registry. It was recommended to host a dedicated GEO Best Practices Workshop

**DA-09-03: Global Data Sets**

- The Global Digital Geological Map project OneGeology (DA-09-03c), and Global Digital Elevation Models GDEM (DA-09-03d) both resulted in openly accessible global datasets.
- Discussions identified opportunities to link activities on land cover (DA-09-03a) and dust and volcanic ash, in particular the volcanic ash alert activity of the Virtual Constellation (AR-09-02a), the sand and dust warning system (HE-09-02a), the aerosol-related actions under GCOS and the in-situ Model Web (AR-09-02b), and finally yet-to-be defined actions on smoke from wildfires and agricultural burning (DI-09-03b).

*Suggestions for Upcoming Work Plans*

The Architecture and Data Committee (Ivan DeLoatch) made a presentation on the future of Architecture and Data Management. The ADC introduced ideas to better organize architecture work to meet the goals of GEOSS, especially interoperability. The vision is to have coordinated, comprehensive and sustainable data to support decision making. Tasks should be better aligned with Targets and encourage cross-committee integration. In the architecture realm, GEO needs to move beyond the GCI to a sustainable model, in other words, transition to operations.

*Possible Contributions to Beijing Ministerial Summit*

- Demonstrate the triangular interoperability of GIOVANNI – GENESI-DR and DIAS
- Demonstrate OneGeology as an operational system of systems, interfaced to the GCI
- Consider reinforcing the importance of broad, open, data sharing practices by highlighting the role that the GOS has played since 1960 in supporting weather observations, research and services. This could be emphasized under the Data Sharing framework.

**CAPACITY BUILDING***Work Plan Implementation – Key Outcomes, Synergies and Issues***CB-09-01: Resource (or Seville Roadmap) Mobilization**

- The inventory of existing capacity (individual, infrastructure & institutional) in Earth observation is to be finalized by October 2010; the report on opportunities and bottlenecks by December 2010. The prototype toolkit for awareness raising and dissemination should be ready by the Beijing Ministerial Summit.
- The full Call for Proposal (CFP) review is to be concluded with results to be announced by September 2010. The CFP process will be continued and reinforced

**CB-09-02: Building Individual Capacity in EO**

- There is progress towards bringing together providers, experts and professionals in Earth observation and geo-information sciences, to exchange knowledge, education products and materials across borders and continents
- The 2010 ISPRS COM VI Symposium was held in June 2010 at ITC (Netherlands) and attended by 100 experts from Europe, Asia, Africa and America (report to be available at [www.itc.nl](http://www.itc.nl))
- Lack of funding hindered the implementation of remote-sensing applications using CBERS images; one student from Mozambique was accepted for a Masters Degree at INPE's Remote Sensing Postgraduate Program with fellowship provided by Brazilian Government.

- INPE's new regional center was established in Belém in the Amazon region, aiming at becoming a world reference in the monitoring of tropical forests; the first 4-week course on tropical forest monitoring will be held in July 2010 for Spanish-speaking students and in November 2010 for English-speaking students
- The GEONETCast Training Channel is now operational over Europe, Africa and the Americas; the Asian capability is to come online this year. However it is currently under-used. Task Leads emphasized the need for input and cooperation from the GEO community to determine requirements, users and data for broadcast
- ITC (Netherlands) in partnership with DevCoCast project provided training and capacity building opportunities to potential users in Africa and Latin America. ITC has also helped set up a GEONETCast receiver in Nairobi, Kenya.
- In Brazil, INPE is leading distance learning opportunities for the use of GEONETCast stations and data across Latin America. The latest virtual workshop was held from 3 to 7 May 2010.

**CB-09-03: Building Institutional Capacity to Use Earth Observations**

- A new co-Lead (Peter Zeil, Austria) joined the sub-task CB-09-03a "Building National and Regional Capacity".
- Training events on "risk and vulnerability assessment" and "biodiversity and disaster management" are scheduled for 2010 and 2011. There is a need for more aggressive outreach towards policy and decision makers; for example, participation at Eye on the Earth Summit, Abu Dhabi, December 2010, could be considered.
- The interoperability of the GEONETCast Tool Box with Envisat Data Dissemination System and Fengyun data is now ensured. The Toolbox new version is expected to be launched in June 2010. Demonstrations and hands-on training on the use of the toolbox were scheduled at the AARSE 2010 post-conference two-weeks refreshers course (01-12 November in Addis Abeba, Ethiopia) and in other countries like Brazil, Argentina, Kenya and Thailand.
- A global operational oceanography network was established with partners from Denmark, IOC/GOOS, China, France, Germany, South Korea, Chile, Norway, South Africa and the US.
- Several regional operational oceanography demonstration projects are also ongoing (W. Pacific forecasting system; Chile-EU-USA cooperation on LA West Coast/shelf prediction system; South Africa-Norway initiative - OceanSAfrica). Users meetings were organized in China and South Korea.

**CB-09-04: Capacity Building Needs and Gap Assessment**

- The European FP7 GEONetCab project was launched in January 2010 (Enschede, Netherlands). A dissemination toolkit should become available in 2010 (brochure, poster and an e-book of success stories) and 2011 (road show for investors, and a manual for successful brokerage).
- "Capacity Building Performance Indicators" is now under the leadership of the Centre National de Recherches Météorologiques/DMN (Morocco); the action plan is defined and a report with indicators of capacity building activities in the GEO Work Plan is in preparation (to be ready before the Summit). Recent outputs include capacity building indicators compiled from 119 task sheets of the GEO Work Plan.

**CB-09-05: Infrastructure Development and Technology**

- New versions of TerraView, SPRING and other software will be issued in 2010 (all will be registered in the GCI)
- Progress was reported in establishing and upgrading ground stations in Africa to receive, process, store and distribute CBERS imagery. Recent achievements: Hartebeeshoek fully operational; Maspalomas image catalog working (but still not public); first tests in Aswan, Egypt; agreements signed with Gabon and contacts with Kenya/Italy. CBERS2B operations ended in April 2010.
- The SERVIR nodes in Central America & Eastern Africa are operational. The Central American node responded to more than 40 extreme events during the last two and a half years. The Eastern African node developed ecosystem maps, risk assessment maps and other products. An Himalayan node is under development

- AEGOS mid-term achievements include the analysis of existing situation and best practices and first test of GEONETCast-based broadcasting of geoscience data
- The Committee on Earth Observation Satellites (CEOS) launched a “Data Democracy” initiative. Seminar and user-needs assessments were held in Asia. A GCI components registration effort is ongoing e.g. face-to-face training held during the 2010 Work Plan Symposium. A Data Democracy Portal is to be developed in 2010.

**CB-10-01: Building Capacity through outreach and Awareness Raising**

- Phase 1 of the “EO game for Youth” was concluded with 37 entries from countries such as Cuba, Netherlands, Turkey, US. There is a need to find advisors to work with teenagers.
- Earthzine published 69 original articles and 8 interviews in 2009, covering the nine Societal Benefit Areas. A first international student essay and blogging contest was launched. The number of hits quadrupled attaining an international audience of approximately 4000 readers per month in more than 100 countries.
- 30 user-oriented workshops were conducted since 2005 with another 5 planned for 2010 (program available at [http://www.earthobservations.org/meetings/meet\\_wss.html](http://www.earthobservations.org/meetings/meet_wss.html)).
- Several Atlases of Our Changing Environment were published, including the Uganda Atlas delivered during the AfricaGIS 2009. 2010 deliverables include the Atlas of water resources for Africa; and regional atlases for the Arab states, Europe, and Latin America & the Caribbean.

*Suggestions for Upcoming Work Plans*

- CBERS/GEO Capacity Building Network (CB-09-02d) could be merged with Data Democracy (CB-09-05e)
- The overarching description of Institutional Capacity to use Earth Observations (CB-09-03) should be revised to better align with the GEO Capacity Building Strategic Roadmap
- Open-source software (CB-09-05a) could be merged with Data Democracy (CB-09-05e); Brazil (INPE) would co-lead CB-09-05e together with CEOS
- The Capacity Building Committee will update the Capacity Building Strategic Roadmap in view of the 2012-2015 Work Plan development
- The Capacity Building Committee will reflect on the possible benefits of a revised structure for the 2012-2015 Work Plan. Sub-tasks could for example reflect concepts such as summer schools and training networks.

*Possible Contributions to the Beijing Ministerial Summit*

- The Capacity Building Committee will develop a 3-5 minute video on food security focusing on “benefits to the people”. Possible examples include Early Warning in Africa; Water Management in India; Locust Monitoring in the Sahel; and Crop Yield Prediction in South America.
- The Capacity Building Committee booth would cover the following: Call for Proposals, Capacity Building success stories, GEONETCast, and Data Democracy. Proposals for contributions are requested by mid-June. A Task Force has been set up to coordinate efforts.
- The Atlas of Africa’s Water Resources should be showcased in Beijing

**SCIENCE AND TECHNOLOGY***Work Plan Implementation – Key Outcomes, Synergies and Issues***ST-09-01: Catalyzing Research and Development (R&D) Resources for GEOSS**

- This Task is inherently cross-cutting and linked to all Societal Benefit Areas
- It is being implemented through the analysis of an S&T questionnaire distributed to all Task Leads last April-May. Questions included:
  1. What scientific and/or technological components and/or developments are being used to complete this task?
  2. Do you have sufficient expertise to complete the task? If not, what is missing?
  3. Do you have sufficient resources to complete this task? If not, what do you need?

4. Are there any scientific or technology (or other) barriers or scientific and technology gaps that you foresee that might prevent you from completing this task within the Work Plan time frame? Please describe the need.
  5. What continuity issues (if any) have you identified that should be addressed? (these could be sensor, modeling, technology, observation, or other relevant topic)
  6. Please describe any science or technology (or other) priorities that have arisen during the completion of this task.
- The Science and Technology Committee (STC) is conducting a rolling review of each Societal Benefit Area using, among others, the S&T questionnaire and US-09-01a analysis reports.

**ST-09-02: Promoting Awareness and Benefits of GEO in the Science and Technology Community**

- As above, this Task is inherently cross-cutting and linked to all Societal Benefit Areas
- It is sub-divided into 5 main activities:
  1. Links with major scientific research enterprises
  2. Encourage scientists and technical experts to contribute to GEOSS
  3. Outreach to diverse scientific and technological communities
  4. Contact universities and research laboratories to involve them in GEO activities
  5. Presence of GEO at major symposiums and other meetings on different levels.

*Suggestions for Upcoming Work Plans*

- Keep ST-09-02 Task as a targeted outreach activity to ensure that needed S&T contributions are volunteered to GEOSS
- Strengthen proactive support for a better utilization of on-going research in GEOSS implementation
- Strengthen connections between natural and socio-economic sciences

*Possible Contributions to the Beijing Ministerial Summit*

- Identification and promotion of “compelling examples” showing GEOSS at work in Science and Technology

**USER ENGAGEMENT****US-09-01: User Engagement**

- Final reports have been completed for 7 of the Societal Benefit Areas (Climate, Energy, Disasters, Ecosystems, Water, Weather, Health), with revisions required for Biodiversity. A report is also in preparation for Agriculture. The cross-SBA analysis is in development with a preliminary quantitative meta-analysis completed and an outline of the report completed. The final cross-SBA report is expected for completion in summer 2010.
- This Task is cross-cutting to all GEO Tasks as it is identifying common priority observations across SBAs. It is also using priority observations to conduct gap analyses. The latter help determine where efforts are needed to improve data availability and registration in GEOSS. The plan is to have these reports finished and available for the Summit and through the GEO website.

**US-09-02: Socio-Economic Indicators**

- A global road and human settlements map on GEO Grid is under development. Activities underway for this sub-task include: (i) system development of GEO Grid towards sharing, developing and distributing data, (ii) research & development for producing relevant data using satellite images, and (iii) collection, maintenance, and evaluation of relevant remote sensing and GIS data. The first outcome of this sub-task is a product for cities of population over 1 million (274 cities). Improved products will relate to cities with a population of over 100 thousand (3734 cities) – to be possibly exhibited over the Beijing Ministerial Summit.

**DISASTERS***Work Plan Implementation – Key Outcomes, Synergies and Issues***DI-06-09: Use of satellite for risk management**

- The Charter Board reviewed the Charter access on a region-by-region basis – ensuring that non-Charter countries have a ready-means to access data from Charter satellites to assist in disaster response
- The next objective is to extend the Charter Access to all GEO Members. The proposed strategy consists of two approaches “regional center hub access” and “GEO member Country access” on the basis of a case-by-case scenario (GEO member capacity and needs)
- A thorough assessment of the use of satellite for the management of disasters is currently on going. Satellite user requirements for risk management were identified establishing a baseline for work and projects across the whole Disasters area.
- One challenge is the sharing and timely dissemination of data in support of the full cycle of disaster management at local, national and regional levels
- DI-06-09 is tightly connected to all other Disasters Tasks. Work with GEONETCast (AR-09-04a) is ongoing with trial transmissions of Charter information over regional broadcasts.

**DI-09-01: Systematic Monitoring for Geohazard Assessment**

- The GEO Supersites initiative reacted promptly to the Haiti and Chile earthquakes – granting rapid access to seismic information and ancillary data
- Issues for improving global seismographic networks include: (i) Developing tools to utilize data in near real-time; and (ii) Translating the understanding of the physical mechanisms of disasters into useful measures for disaster mitigation (e.g. building codes or warning systems)
- The GeoHazards Community of Practice (GHCP; [www.geohazcop.org](http://www.geohazcop.org)) developed a Roadmap to address the Disasters Strategic Target. The Roadmap is based on the 4 phases of the risk management cycle and cuts across a number of areas and issues including: Observation-system/sensors/information-system development; Capacity Building and Outreach; Science advances, including promotion of evidence based policy-making; Reaching/connecting scientists/research and/to end-users/operations; Resources – human and financial, for the network and its activities; Data access issues; In-situ data integration and ground truthing; Resilience – before, during and after; Interface with mandated advisory bodies/existing chains of command; Awareness
- Coordination within DI-09-01 needs to be improved. The Supersites initiative for instance should be better integrated. The Geohazards Community of Practice will help improve coordination
- Additional contributions to DI-09-01 are encouraged.

**DI-09-02: Implementation of a Multi-Risk Management and Regional applications**

- Regional end-to-end applications continued to develop through initiatives such as the GEO CSDP “Caribbean Satellite Disaster Pilot”. The Pilot addresses the full cycle of disaster management (from mitigation to recovery) in areas such as flooding and coastal erosion
- The CEOS Disasters Team will review the outputs of the Disasters Tasks to identify potential systems for registration
- The Geohazard Community of Practice and the GEO Secretariat are currently working at re-activating DI-09-02a (Multi-risk Management Approach)

**DI-09-03: Warning Systems for Disasters**

- Global and regional fire danger maps were made available online. Two new fire information systems were contributed to GEOSS: the Global Fire Information for Resource Management System (FIRMS) funded by NASA and managed by the University of Maryland, and the European Forest Fire Information System (EFFIS) managed by the European Commission Joint Research Center.

- Users of the fire information systems include disaster managers; international, national, regional, and local organizations involved in disaster reduction and response.
- The Geohazard Community of Practice is currently working at re-activating DI-09-03a (Tsunami Early Warning System of Systems)

#### *Suggestions for Upcoming Work Plans*

- Early warning is a very important application of Earth observation, which GEO should address.
- Strengthen (multi-hazards) focus on those early warning efforts that require global to regional observation systems. Develop implementation plan for multi-hazard end-to-end risk management
- Support development of end-to-end links and global-to-local links and integrate end-users in Task activities
- Consolidate the Caribbean Mitigation projects and Caribbean Satellite Disaster Pilots
- Consolidate Southern African Flooding projects and Health Pilots

#### *Possible Contributions to the Beijing Ministerial Summit*

- The Supersites initiative was selected as a ministerial showcase
- Create a Wenchuan earthquake Supersite with multi-satellite SAR, GPS, Seismics
- Develop an earthquake Supersites for all large earthquakes ( $M > 7$  or  $> 1M$  affected)
- Develop a volcano Supersites for volcanic crises (initial SAR, Seismic/GPS 6 month delay)
- Disaster video
- Analysis of flood disaster needs and gaps (DI-06-09)
- Results of 2010 Hurricane Season (Caribbean) and 2010 Namibian Flooding and Health Pilot (Africa) (DI-09-02b)

## **HEALTH**

### *Work Plan Implementation – Key Outcomes, Synergies and Issues*

#### **HE-09-02: Monitoring and Prediction Systems for Health**

- Main progress is in establishing regional nodes for the WMO Sand and Dust Storm Warning, Advisory and Alert System (SDS-WAS) with real-time data in the form of web-based graphics. There are plans for greater data access. The 1st training workshops are planned for fall 2010. In situ validation sites remain to be identified.
- Easiest for SDS-WAS was to link to weather and aerosol communities. GEO could help mobilize resources and bring together weather, aerosol, health and ecosystem specialists. SDS-WAS activities are closely connected to meningitis projects such as MERIT.
- Real-time international exchange of aerosol observations is sometimes a limiting factor. In contrast, meteorological data is openly exchanged. Web images, observations, model predictions and reanalysis products could eventually be accessed through the GCI. SDS-WAS-based products could be used in health warning systems.
- AIRNow-International was launched at Shanghai World Expo. Other provinces in the Yangtze River Delta region of China are inquiring about using AIRNow-I in their areas. Discussions are ongoing on a AIRNow pilot in Mexico
- The Air Quality Community of Practice continues to grow
- Complementarities remain to be explored with Atmospheric Transport to Air Quality to Inhalation; Atmospheric Transport/Deposition to Water Quality to Body Burdens.
- AIRNow transverse components:
  - Architecture and Data – AIRNow-International will be largely open-source and will be distributed free-of-charge. It currently participates in the Architecture Implementation Pilot.
  - Science & Tech – Contributes to scientific understanding of air pollution
  - Capacity Building – Similar systems are becoming part of a larger real-time air quality data and forecast infrastructure, ultimately making air quality information available worldwide and will increase public health awareness

- User Engagement – The success of AIRNow is due 40% to technology and 60% to the building and involvement of an Air Quality community (users) who interpret the data and explain Air Quality and health to the public and decision-makers
- The European Commission approved funding for a “Global Mercury Observation System – GMOS“. GMOS has 24 partners from all over the world; it is likely to start in November 2010 and end in 2015
- All HE-09-02 sub-tasks have strong synergies that should be built upon. Links with the following Tasks should also be strengthened: HE-09-03: End to End Projects for Health; DA-09-02d: Atmospheric Model Evaluation Network; US-09-01a: Identifying Synergies between Societal Benefit Areas (Observational Priorities Report for Air Quality & Health); US-09-01b: Communities of Practice and Partnership Development (Air Quality CoP launched 11/09).

### **HE-09-03: End to End Projects for Health**

- The MERIT (Meningitis Environmental Risk Information Technologies project) scientific community was created. Resources mobilisation started and case studies undertaken for Niger and Ethiopia. Modelling studies and decision tool development are ongoing.
- Individual GEO member contributions to the Malaria Warning System are ongoing; however no joint activities are underway between GEO agencies using remote sensing; pilot projects have been developed but no cooperative work has been initiated
- Creating a global Malaria early warning network, or even pilot projects incorporating one or more remote sensing approaches to Malaria prediction, would require substantial additional resources for in situ validation, capacity building, and infrastructure improvements in health reporting and care approaches for target regions. Funding has not been secured through GEO or through national participating agencies for this activity
- Need to increase links with WHO and relevant UN bodies as well as national health and international aid organizations; possible synergy with EC funded project for Africa
- Task participants do not reflect the entire GEO Malaria community. Wider participation in the Health Community of Practice has brought in new experts, but no new funding/in kind resources or programmatic support have materialized, and participation or commitment in wider Malaria community-building have not extended beyond project planning stage.
- The “Ecosystem, Biodiversity and Health” sub-task is unique in its interdisciplinary “Community of Practice” approach, and in encouraging the coordination of Earth observations with field data to study this relationship.
- Infectious Disease-related Tasks: HE-09-01: Information Systems for Health (prediction); HE-09-02A: Aerosol Impacts on Health and Environment (dust & meningitis linkages); HE-09-03A: Implementation of a Meningitis Decision-Support Tool (prevention and response control strategies); HE-09-03B: Towards a Globally Coordinated Malaria Warning System (monitoring environmental conditions conducive to the spread of malaria); HE-09-03C: Ecosystems, Biodiversity and Health (prevention); AR-09-02A: Virtual Constellations (land surface imaging); DA-09-03A: Global Land Cover (eventually land-cover change at high resolution); US-09-03A: Development of Global Map for GEOSS Societal Benefit Areas (land coverage – 1 km res); EC-09-01B: Ecosystem Function & Services (time series of land cover change and fragmentation).
- AIRNow transverse components:
  - Architecture and Data – Need for up-to-date data and GIS information on land use change, ecosystem services and biodiversity loss/gain and weather/climate
  - Science & Tech – Contributes to scientific understanding of the causes of the increasing disease emergence/re-emergence and the scientific, technology & observational opportunities to produce tools to address these causes
  - Capacity Building – Building capacity in communities to understand the relationship of land use changes to ecosystem service changes and disease transmission to humans
  - User Engagement – A “local” interdisciplinary “Biodiversity/Landscape Change and Infectious Diseases” Community of Practice was established in the Northeastern US. Are there a similar interdisciplinary groups working on this type of disease prevention in GEO countries or regions?

*Possible Contributions to Beijing Ministerial Summit*

- A ministerial showcase on “Health Services” is under development
- The Sand and Dust Storm Warning, Advisory and Alert System (SDS-WAS) should be a potential candidate for flyer/pamphlet at the Ministerial Summit

**ENERGY***Work Plan Implementation – Key Outcomes, Synergies and Issues***EN-07-01: Management of Energy Sources**

- NASA Applied Sciences Program project Solar Shield was completed in April 2010; deliverables included the design of an experimental forecasting system to mitigate the impacts of geomagnetically induced current on high-voltage power transmission systems.

**EN-07-02: Energy Environmental Impact Monitoring**

- The European FP7 EnerGEO project was launched in November 2009 (FP7, 4 years, over 8 M Euros). The project is to develop a strategy for making a global assessment of the current and future impact of the exploitation of energy resources on the environment. It will involve using existing environment and energy models and satellite data. Four pilots will demonstrate impacts in the fields of fossil fuels, biomass, wind energy and solar energy.
- A workshop on “Biomass Energy Modelling with GIS and Remote Sensing” was held in conjunction with AfricaGIS 2009 (October 29 - 30, 2009) at the Makerere University, Kampala, Uganda.

**EN-07-03: Energy Policy Planning**

- France (Mines ParisTech) further developed the energy scenario for the GEOSS AIP-3
- The Renewable Energy Scenario Smart Client (AIP-2) will be extended in AIP-3.

*Suggestions for Upcoming Work Plans*

- The three Energy tasks partly build upon common objectives and facilitators. A possible merger could be explored
- The ENDORSE project (2010-2013) could be connected to one of the Energy Tasks; the project is currently in negotiation with the EC
- A research program dedicated to the Energy SBA may be developed through a UNESCO Chair in Energy Management.

*Possible Contributions to Beijing Ministerial Summit*

- EnerGEO as part of the European Commission exhibition
- The Energy Community of Practice at the UIC (or CBC) booth

**CLIMATE***Work Plan Implementation – Key Outcomes, Synergies and Issues***CL-09-01: Environmental Information for Risk Management and Adaptation**

- Cross-links between the Climate Tasks and subtasks are already well developed, and several of the components associated to Climate Tasks (in particular datasets) have been registered in the GCI.
- A strong link between CL-09-01a (Environmental Prediction) and ST-09-01 (Catalyzing R&D funding for GEOSS) was recommended in order to mobilize resources. Other GEO mechanisms should be applied to support the implementation of ClimDevAfrica (CL-09-01b).

**CL-09-02: Accelerating the Implementation of the Global Climate Observing System**

- GCOS represents the climate-observing component of GEOSS and in this capacity reports to the UNFCCC on the status of observing systems for climate.
- Within the last 10 years, GCOS led the development of an implementation and review cycle. Essential Climate Variables (ECVs) as defined in the “Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC” are cutting across all 9 SBAs, and it is recommended to reflect this within GEOSS.
- The purpose of the GCOS Implementation Plan, which is currently undergoing an update and reviewing process, is to provide a set of actions required to implement and maintain a comprehensive global observing system for climate with all its components. The 2010 Update of the Plan will be published in August 2010.
- There are ongoing efforts for the standardization of ECVs in the terrestrial domain, which is far less developed than for example the atmospheric observing networks.
- It was recommended that the “GCOS Climate Monitoring Principles” and the new “Guideline for the Generation of Datasets and Products Meeting GCOS Requirements” be registered in the GEOSS Best Practices Registry, and that the link with QA4EO be strengthened.
- CL-09-02a (GCOS implementation) is by definition strongly cross-linked to AR-09-03 (Sustained Observing Systems), WA-08-01 (Water Resource Management) and all other Climate Tasks. A linkage with Capacity Building is necessary, as sustained observations are at risk, in particular in developing countries.

**CL-09-03: Global Carbon Observation and Analysis System**

- The Forest Carbon Tracking task has developed guidelines, acquisition procedures and data access agreement, and data management solutions. It was recommended to seek further integration with ongoing actions in Data Management and Architecture.
- A boost for this activity is expected through the 2011 Call of the 7<sup>th</sup> Framework Programme.

*Possible Contributions to Beijing Ministerial Summit*

- All CL-09-03 sub-tasks and the Carbon Community of Practice contribute to a Carbon showcase for the Ministerial Summit
- GCOS and the domain-based observing systems (GTOS, GOOS, WIGOS) achievements could be highlighted

**WATER***Work Plan Implementation – Key Outcomes, Synergies and Issues***WA-06-02: Droughts, Floods and Water Resource Management**

- All subtasks are currently linked with activities/outputs under AR-09-02, WE-06-03, CL-06-01, and DI-06-09. As they mature, subtask outputs should link with AR-09-03, CL-09-01, DI-09-02, EN-07-01/03, HE-09-01/02/03, and WE-09-01
- Hydrological ensemble forecasts are being produced through the Hydrologic Ensemble Prediction Experiment (HEPEX) for real time flood, drought and water management applications, such as the European Flood Alert System (EFAS). Some data and services are registered in the GCI.
- ACQWA Data Warehouse is established and comprised of GCM, RCM and remote sensing data and contributed to GCI. Synergies are noted with EC-09-02.
- The US National Integrated Drought Information System (NIDIS) Drought Portal – consisting of interactive drought information clearinghouse and delivery system for products and services, and standardized products (databases, forecasts, GIS, maps, etc.) – was contributed to the GCI.
- Pilot drought monitoring test beds were inaugurated in the US and Canada as first steps towards a Global Drought Early Warning System (GDEWS), using the Standardized Precipitation Index (SPI) as a global index for monitoring drought upon recommendation by the WMO. Standards and best practices associated with project were contributed to GCI. Links should be developed with AG-07-03, perhaps as a new activity, for development of a global index for agricultural drought.

**WA-06-07: Capacity Building for Water Resources Management**

- All subtasks are currently linked with activities/outputs under AR-09-02, CL-06-01, and WE-06-03. As they mature, subtask outputs should link with AG-07-03, CL-09-01, DI-06-09, DI-09-02, EN-07-03, and HE-09-02/03.
- A new capacity building program for water management in Latin America & Caribbean was launched under the name of CIEHLYC". As a first step, a dynamic webpage was implemented which features a listing of data services and projects for the region. The latter is not yet registered in the GCI.
- ESA's TIGER project Phase 2, launched in March 2009, is composed of 20 projects from 14 countries involving African scientists and technical centres in collaboration with water authorities. The TIGER initiative is registered with GCI.
- The African Water Cycle Coordination Initiative (AWCCI) is planning a strategy for enhancing coordination among disparate water projects and initiatives in Africa. The scope and nature of African needs and requirements regarding enhanced use of Earth observations for water resource management are being analyzed.
- The Asian Water Cycle Initiative (AWCI) continues to address common water-related problems in Asia and promote integrated water resources management by making information usable through GEOSS. Twenty member countries are collaborating on demonstration projects representing 18 river basins to work on issues related to observational convergence, interoperability and data integration, and capacity building while promoting data sharing principles. All derived data products, information and standards are registered in GCI.

**WA-08-01: Integrated Products for Water Resources Management and Research**

- All subtasks currently linked with activities/outputs under AR-09-03, CL-06-01, DI-06-09, and WE-06-03. As they mature, subtask outputs should link with AG-07-03, CL-09-01, DI-09-02, EC-09-01, EN-07-01/03, and HE-09-02/03
- The International Soil Moisture Working Group (ISMWG) announced the opening of the Global Soil Moisture Network (GSMN). Data products are registered in the GCI
- The European Terrestrial Network for River Discharge (ETN-R) data products are registered in the GCI. This includes near real-time river discharge and water level data from 30 European national and trans-boundary river basins, involving in total 35 countries
- Groundwater datasets – ready to be used in the Global Groundwater Monitoring Network (GGMN) – are registered in the GCI
- Integrated satellite data and products with surface observations and numerical model information continue to provide long-term, fine-scale records of global precipitation. Data and products are registered in the GCI
- The Coordinated Energy and Water Cycle Observations Project (CEOP) continues its activities as a prototype for convergence of water cycle observations (model output, in-situ, remotely-sensed) and integration from over 50 sites globally. Interoperability arrangements between several research and data archiving institutions around the world allow for a well organized approach to collecting, processing, storing, and disseminating shared data, metadata and products. Data products and standards are registered in the GCI
- A series of 7 water quality workshops helped develop aspects of a monitoring system for water quality. The UN Global Environmental Monitoring System for Water (GEMS/Water) Programme is a key component in global water quality monitoring, assessment and research with data products registered in the GCI.

*Suggestions for Upcoming Work Plans*

- Proposed changes to WA-08-01e (Water Cycle Data Integration): Ground-based observations are less visible in this sub-task than satellite-derived observations. Regular activities and also the pilot projects being initiated in the Global Terrestrial Network Hydrology (GTN-H) operated by WMO and GCOS should be considered as contributions to the sub-task. A change in definition will thus be proposed.

- WA-06-02c (Mountain Water Resources) could be merged with EC-09-02d (Vulnerability of Mountain Regions), perhaps under CL-09-01 (Environmental Information for Risk Management and Adaptation). WA-06-02 remaining subtasks could be combined into a single Overarching Task, with two poles of activity: floods and droughts. Contributions to GEOSS could include: Global Flood Alert System; Global Flood Forecasting System; Global Flood Management System; Global Drought Monitoring System; Global Drought Early Warning System. The coordination would be managed through NIDIS, WMO, DRI, and JRC.
- WA-08-01f (Improved Water Discovery and Quality Assessments) could be moved under WA-06-07 (Capacity Building for Water Resource Management). All current WA-06-07 subtasks would be merged into a single Overarching Task, with four poles of activity: Latin America (coordinated by LA&C Community), Africa (coordinated by AWCCI), Asia (coordinated by AWCI), and Pilot Projects (coordinated by IEEE).
- Under WA-08-01 (Integrated Products for Water Resource Management and Research), (i) Expand runoff definition to encompass all surface water storage; (ii) Initiate new activities, centered on evapo-transpiration monitoring; (iii) Merge all subtasks into a single Overarching Task, with various poles of activity; (iv) Demonstrate contributions to GEOSS through integrated surface/sub-surface hydrology project (such as HARON), including water quality, making use of CEOP experience with data integration, culminating in new data products, information, and services for management of water resources.

*Possible Contributions to Beijing Ministerial Summit*

- Examples of hydrological forecast applications (for flood, drought and water management) from some of WA-06-02a's testbed projects
- WA-06-02b has looked at elements of the value chain mapping in drought information services ranging from data collection to research, data collection and analysis to user applications, and could portray this information as an interesting demonstration of the many steps that lead to giving value to Earth observations
- WA-06-02c could provide an example of planned use of hydrological data for studies of climate adaptivity, as well as an example of an end-to-end project plan and implementation
- The US National Integrated Drought Information System (WA-06-02d) and launch of the Soil Moisture data archive (WA-08-01a) could provide good examples of how governments' commitment to address a social and economic need can be used to launch an ambitious project that could be the basis of a global program.
- From the AWCI, applications demonstrating dam management optimization in Vietnam and flood control planning in the context of climate change in Indonesia are potential candidates for the summit exhibition. More generally, the web-based data archiving and integration system being used for uploading, quality control, integration, analysis, and archiving of Earth observation data from the 20 member countries participating in the AWCI is an important prototype demonstration of GEOSS.
- Runoff and surface water storage (WA-08-01b) are increasingly critical for human health and livelihood in many areas of the world. A report on GEO activities at both the global and regional scales in this area would be well received and would demonstrate how GEO is concerned about the daily problems of those who must focus on survival rather than prosperity.
- A demonstration of the Water Cycle data integration could be developed, combining in-situ and satellite-derived estimates (from GRACE) of groundwater. However, such a contribution should point out the hurdles being encountered in accurately depicting groundwater estimates.
- Global Precipitation Climatology Project (GPCP) products are the most mature integrated data product that has been produced from satellite data with products going back approx. 30 years. Progress has been registered in all areas of data integration and success has been validated by use statistics and would make an excellent end-to-end story on data processing and product development.
- Demonstrations of the CEOP online tutorials for data access pertaining to satellite, in-situ, model output as well as data access services via a distributed data integration prototype system.

**WEATHER***Work Plan Implementation – Key Outcomes, Synergies and Issues***WE-06-03: TIGGE and the Development of GIFS (Global Interactive Forecast System for Weather)**

- TIGGE (the THORPEX Interactive Global Grand Ensemble) is a user-friendly database of ensemble forecasts composed of over 500 global numerical simulations per day from 10 global weather forecasting centres worldwide
- The TIGGE data are freely shared within the research community and available through three archiving centers (CMA, ECMWF and NCAR). The TIGGE archives are to be linked to the GCI
- The GIFS-TIGGE working group set up a pilot project for the exchange of real-time tropical cyclone predictions using “Cyclone XML” format
- TIGGE has over 750 registered users
- There is hope that GEO, through various activities and the Portal, will encourage greater user engagement, research, development and assessment of a broad spectrum of applications
- New TIGGE/GIFS probabilistic products should find important applications in the areas of disaster management (typhoons, flooding etc), agriculture, water management, energy etc
- Development of TIGGE and GIFS by WMO will form an important contribution to a number of GEO Tasks related to risk management, early warning systems, major hazards and associated impacts.

**WE-09-01: Capacity Building for High-Impact Weather Prediction**

- The Korean Meteorological Administration (KMA) is leading a capacity building effort in the field of Numerical Weather Prediction in Asia and Africa
- KMA is working closely with WMO, sharing experience and trainees, to support the implementation of WE-09-01b (THORPEX Africa). The latter is also working closely with WE-06-03 (TIGGE) to encourage the use of TIGGE data in Africa
- GEO efforts to improve the global distribution of data and products through GEONETCast are highly relevant and may provide the means to better distribute products developed within the THORPEX Africa initiative
- Synergies with the Water and Disasters areas should be developed (re. early warning, flood forecasting, etc) e.g. WA-06-07c (Capacity Building for Water Resource Management in Africa)
- New contributors are invited to join WE-09-01
- Additional funding will be essential for successful implementation. GEO can assist by providing new funding opportunities for example through rapid implementation of Task ST-09-01.

*Beijing Ministerial Summit*

- TIGGE will be part of Ministerial publications

**ECOSYSTEMS***Work Plan Implementation – Key Outcomes, Synergies and Issues***EC-09-01: Ecosystem Observation and Monitoring Network (GEO EcoNet)**

- All EC-09-01 sub-tasks are contributing to a loosely connected network of ecosystem observations. While the coordination among tasks is not well established, there is an opportunity over the next few years to bring these closer together
- The Ecosystem Mapping sub-task is well integrated into, and serves as a major framework for, the GEO BON Task (BI-07-01). Ecosystem mapping data are currently being made available on a Rapid Data Distribution System (RDDS) on a USGS server. Mapping for South America, the US, and sub-Saharan Africa has been completed
- The Forest Mapping and Change Monitoring sub-task produces two main products: global and regional change in forest area and global tree cover maps at 250 m resolution. The sub-task integrates international efforts on assessment and monitoring of forests and forest

changes using a combination of ground and satellite information and internationally agreed standards. There is online data portal access to Landsat imagery and auxiliary information developed by FAO for downloading and uploading of validated results

- Sub-task EC-09-01e (Forest Mapping and Change Monitoring) has strong links with CL-09-03b (Forest Carbon Tracking) and potentially with DI-09-03b (Implementation of a Fire Warning System at Global Level). More cooperation with Forest Carbon Tracking could include data sharing, since data inputs are similar and legend classes could be similar
- GEO can help with some of these issues by reducing the potential for duplication of efforts by increasing awareness of existing data, methods and results, continue coordinating with remote sensing data suppliers (including private) to improve access to large area low-cost or free data for global and national forest monitoring, coordinating access to smaller sets of high-resolution data for validation sites, and continuing to develop the GEO Portal for downloading data.

#### **EC-09-02: Ecosystem Vulnerability to Global Change**

- This Overarching Task is a set of sub-tasks with thematic or geographic specialties with regard to the vulnerability of regions or resources to climate change
- With regard to the vulnerability of sea basins, the European project EnviroGRIDS (gridded management system for environmental sustainability and vulnerability) helps develop a Black Sea basin observation and assessment system
- With regard to the vulnerability of mountain regions, the SHARE project provides high-quality, long-term climatic and environmental data (including atmospheric composition and meteorology, glaciology and hydrology) on mountain regions. The latter has strong synergies with activities in the Climate, Health, Water, Energy, Agriculture areas
- There are a wide range of users at local and international levels, including national and international scientific institutions who are directly involved in the SHARE project. Information and knowledge are provided to local communities to improve their capabilities in mountain natural resources management
- Scientific cooperation agreements have been made with local universities, research centers and institutions for the maintenance and functioning of existing stations, for the exchange of information and dissemination of results, and for the support of activities directed towards the promotion of local technical-scientific development.

## **AGRICULTURE**

### *Work Plan Implementation – Key Outcomes, Synergies and Issues*

#### **AG-06-02: Data Utilization in Fisheries and Aquaculture**

- SAFARI (Societal Applications in Fisheries & Aquaculture using Remotely-Sensed Imagery) provides (i) an international forum for coordination and exchange of views on use of remotely-sensed data in fisheries oceanography; (ii) a stimulus for new research and operations in this subject area; and (iii) a vehicle for transfer of knowledge from the research sector to the operational sector.
- Cross-linkages with EC-09-01c (Regional Networks ChloroGIN) have been established. Further linkages with WA-08-01g (Global Water Quality Monitoring) and CB-09-03d (Building Capacity for Operational Oceanography) should be made
- Linkages between SAFARI and ChloroGIN (EC-09-01c) relate to the: (i) Establishment and development of in situ time series stations in waters around Latin America and in the Indian Ocean rim countries; (ii) Extension of ChloroGIN to South East Asia (SEA); (iii) Improvement of data dissemination especially through the internet; (iv) A global set of synoptic, calibrated, consistent satellite data for ecosystem studies in coastal waters of developing countries; (v) Extension of ChloroGIN to lakes; (vi) Training course in India and in Africa; (vii) Development of low-cost bio-optical instrumentation for the ChloroGIN Network; and (viii) Joint International Secretariat for SAFARI and ChloroGIN.

**AG-07-03: Global Agricultural Monitoring**

- GEO Agricultural Monitoring Near Term Task Initiatives (5 years) include:
  - 1: A Multi-source Production, Acreage and Yield (PAY) database to (i) enable the objective assessment of food security and risk management planning, and (ii) facilitate inter-comparison and convergence of estimation methods
  - 2: Joint Experiments on Crop Assessment and Monitoring (JECAM) to undertake data, modeling and monitoring method inter-comparisons, accuracy assessments and integration, based on multi-source satellite and in-situ data. The JECAM website was launched in March 2010 at <http://www.umanitoba.ca/outreach/aesb-jecam/>. In April 2010, the site descriptions and data needs for the initial five JECAM sites were submitted to CEOS for data access considerations
- It was recommended that the Agricultural Monitoring initiatives be connected to the GCI

*Possible Contributions to Beijing Ministerial Summit*

- Demonstrate how agricultural monitoring activities and SAFARI support decision making

**BIODIVERSITY***Work Plan Implementation – Key Outcomes, Synergies and Issues***BI-07-01: Developing a Biodiversity Observation Network**

- A GEO BON Implementation Plan was completed and released on the International Day of Biodiversity, 22 May, 2010. The complete Plan and technical summary are available at [www.earthobservations.org/geobon.shtml](http://www.earthobservations.org/geobon.shtml).
- GEO BON users include: International treaty processes and bodies (CBD, CCD, CITES, Ramsar, CMS); (ii) Biodiversity and conservation NGOs (IUCN, WWF, CI, WCS, TNC etc); (iii) National and subnational biodiversity custodians (conservation agencies, environment ministries) and (iv) Researchers, students, and lay interested parties
- The Global Invasive Species Information Network (GISIN) could be linked to inventory data from GEO-BON and be enhanced using data from the Global Biodiversity Information Facility (GBIF)
- GISIN enables searches across databases, improves access to global data, and integrates invasive and alien species data with other biodiversity data. The Network currently has seven providers and over 500,000 records cached. However there are still barriers to the Network, including lacking a comprehensive system of Global Unique Identifiers, including data providers who do not have a web service, resolving species names, and long term funding and support.
- Invasive species is a naturally cross-cutting issue with other Societal Benefit Areas, such as Agriculture, Health, Ecosystems, Water, and Energy
- GEO BON will contribute to the GCI by registering resources (e.g., web sites, services, data, and portals) and implementing interoperability solutions mediated via the GEO Portal, Clearinghouse Catalogue and registries. Whether GEO BON will need a portal or portals (i.e. Community Portals) is still being investigated, as well as how such components would relate to existing ones (e.g. the GEO Portal and GBIF Data Portal).

*Suggestions for Upcoming Work Plans*

Potential future interactions that may help develop the 2012-2015 Work Plan and coordinate across tasks and Societal Benefit Areas include:

- Biodiversity and Health
- Closer interactions between Invasive Species and Biodiversity
- Closer interactions between Invasive Species and other Societal Benefit Areas
- Capacity development through Regional BONs

*Possible Contributions to Beijing Ministerial Summit*

- Ministerial Plans for Biodiversity include GEO BON as one of the ministerial showcases, an exhibition booth, and contributions to publications.

## 2. Beijing Ministerial Summit

### *Overview of Summit Preparation*

- *Showcases:* 1) Asia region - space observations and water; 2) Geohazards; 3) Health Services; 4) GEO BON; 5) Global Carbon Analysis System; 6) Capacity Building. The next step is a detailed presentation of the 6 showcases to the ministerial Task Force in mid-June
- *Exhibition:* 1620 m<sup>2</sup>; prices and logistical details are to be announced by China in mid-May. Strong interest by Members and Participating Organizations. Collaborative Task, societal benefit area and Community of Practice exhibits are strongly encouraged
- *Publications:* General Summary Report by Ministerial Task Force; Annex by Task Leads (cf. Call for Contributions); Full-color outreach book by Secretariat (image-driven story telling, illustrate how GEOSS really works).

GEO Members and Participations Organizations intending to contribute to the exhibition through national, regional and/or collaborative booths include: European Commission-ESA-EUMESAT, Germany, Japan, UK, South Africa, CEOS, and IEEE, GEONETCast, Asian and African Water Cycle Initiatives, Agriculture Community of Practice, Energy Community of Practice, the Health Services Showcase, and the User Interface Committee (in collaboration with the Capacity Building Committee).

### *2010 Baseline Initiative*

A short status update was presented by the GEO Secretariat – highlighting the following:

- The Baseline should provide a point of departure for retrospective analysis and a point of reference for ongoing monitoring
- It should support mandates of international agreements, as well as serve the research community, decision-makers, managers, and the public
- The data would be collected in a multi-phase schedule, depending upon their production schedule and availability
- A four-Phase approach could be adopted to building the global Baseline through 1) static data; 2) routinely processed data; 3) data derivatives, and 4) re-processed data as it becomes available.
- A timeline for delivery of early products by the Ministerial Summit could be proposed

Considerable discussion followed the presentation leading to the following consensus: The Baseline initiative should be included in the Work Plan and involve GEO Committees (the Architecture and Data Committee in particular). Delivery of products by November was considered to be too optimistic, however there was agreement that the initiative had value and should proceed.

## 3. Towards the 2012-2015 Work Plan

Initial thoughts and possible guidelines for developing the 2012-2015 Work Plan were presented by the GEO Secretariat. The 2012-2015 Work Plan will take GEOSS to the end of the 10-Year Implementation Plan and should as such:

- Fully address the Strategic Targets
- Build on the cross-cutting dimension of GEOSS across: (i) Societal Benefit Areas; (ii) Transverse areas; and (iii) System-type (observing, prediction, information).
- Foster data sharing, distribution and capacity building
- Foster the development of GEOSS products and services, and delivery of benefits to society
- Improve coordination, enhance convergence and ensure continuity as appropriate

The GEO Secretariat also mentioned that:

- A Target-Task visualization tool was being developed by Japan – to be soon made available to the GEO community
- The rationale for developing a 4-year Work Plan (instead of 2- or 3-year Work Plan) was mainly based on Ministerial Summit considerations and related preparations. The next Ministerial Summit will be held towards the end of 2013 (half way through a 2012 – 2015 Work Plan). As

before, a process would be put in place to ensure that necessary Work Plan updates and adjustments are made throughout the 2012-2015 period.

Initial thoughts on the 2012-2015 Work Plan from Task contributors and Committee members included:

- Task Leads, Communities of Practice and Committees were not directly involved in the Strategic Target development process. They do not as such have a clear view of the Target-Task relationship.
- The next Work Plan should be the physical record of a planning process involving the GEO community and aiming at aligning Overarching Tasks and sub-tasks with Strategic Targets.
- The functions and contents of Overarching Tasks should be further developed and improved – keeping in mind their role as a link between Strategic Targets and sub-tasks or activities. In the 2009-2011 Work Plan, Overarching Tasks play an important role, some working well and fostering coordination, others less so.
- The next Work Plan should help the GEO community get as close as possible to the objectives of the Strategic Targets – keeping in mind the voluntary nature of GEO. People should be invited to “think outside the box” and make proposals for a Plan aimed at achieving Targets. In this context, one could think of giving “implementation priority” to a selected Tasks deemed essential to reach specific Targets.
- The 2009-2011 Work Plan is not a real “Work Plan” including deliverables, deadlines etc. Should the next Work Plan have a different philosophy?
- The 2012-2015 Work Plan should build upon the outcomes of the 2010 GEOSS Evaluation and the work of the Monitoring and Evaluation Working Group in general. Analyses by Task Leads should also play a key role.

#### 4. Further Remarks

- Schedule for the 2011 Work Plan Update:

4 May

Work Plan **Revision 2**

Circulated to GEO community for *Technical Review*

Committees invited to comment

Deadline for Comments – 17 June

20 July

Work Plan **Revision 2.1**

Circulated to GEO community for *Official Review*

Deadline for Comments – 19 August

20 Sept

Work Plan **Revision 2.2**

Circulated to GEO Principals as part of GEO-VII Documents

Submitted to GEO-VII for “acceptance as a living document”

- The European Commission (Alan Edwards) introduced the Status of EU “direct” research actions in support of GEOSS Implementation. The EC presented a subset of the EU contribution to GEO and GEOSS (with no reference to GMES, IT projects, etc) – see presentation for details.
- Abu Dhabi UAE (Marc Sorensen) gave a presentation introducing the 2010 “Eyes on Earth Summit”. UAE are organizing this Summit to convene environmental leaders and identify key challenges for Abu Dhabi. The theme is to “convene, converge and collaborate”, and will be addressed through Summit exhibitions.
- The Symposium provided an opportunity for all participants to test the usability of the GEO Portals, as part of the process for selecting the providers for the GEOSS Common Infrastructure.
- Thanks were expressed to South Africa for providing great facilities and support throughout the Symposium.

## FINAL AGENDA

### GEO WORK PLAN SYMPOSIUM 2010

17-19 May 2010

St George's Hotel, 58 Old Pretoria,  
Kempton Park Road, Rietvleidam  
Pretoria, South Africa

#### Monday 17 May

**08:30 1. Opening Event – GEO South Africa**

**Chair: Imraan Saloojee, South Africa**

**08:30 Welcome & Opening Address – Phil Mjwara, DG DST**

**08:45 A 2010 GEOSS Overview – Alexia Massacand, GEO Secretariat**

**09:00 National Space Strategy and ARMC – Sandile Malinga, Head South African Space Agency**

**09:20 SAEOS Portal – Wim Hugo, SAEON**

**09:40 SARV Atlas – Emma Archer, CSIR**

**10:00 Discussion**

**10:30 *Coffee Break***

**11:00 South Africa and Water – Carey Rajah, DWA**

**11:20 Rural Development/Agriculture – Terry Newby, ARC**

**11:40 Disasters Management – Wiseman Mkhonza, NDMCC**

**12:00 Council for Geo Sciences – Luc Chevallier, CGS**

**12:20 Discussion**

**12:30 *Lunch***

**13:30 2. Work Plan Symposium – Why, How and What For?**

#### **Objectives/Deliverables**

- Work Plan Implementation
- 2011 Work Plan Update
- Beijing Ministerial Summit Exhibition
- 2012-2015 Work Plan

**14:00 3. Towards Improved Coordination Across GEOSS Areas**

*For each area, taking each overarching Task in turn*

#### **Individual (sub)task Presentations**

5-10 min; each addressing the Symposium Objectives

**Chair: Alan Edwards, European Commission**

## **ARCHITECTURE**

**14:00 AR-09-01: GEOSS Common Infrastructure (GCI)**

- a: Deployment of a GEOSS Architecture – *Doug Nebert, USA & Siri-Jodha Kahlsa, IEEE*
- b: GEOSS Architecture Implementation Pilot – *George Percivall, OGC*
- c: GEOSS Best Practices Registry – *Siri-Jodha Kahlsa, IEEE*
- d: Ontology and Taxonomy Development – *Ryosuke Shibasaki, Japan*

**14:45 AR-09-02: Interoperable Systems for GEOSS**

- a: Virtual Constellations – *Ivan Petiteville, CEOS*
- c: Sensor Web Enablement for In-Situ Observing Networks – *Terence van Zyl, South Africa*

**15:10 AR-09-03: Advocating for Sustained Observing Systems**

- d: Global Observing System (GOS) – *David Parsons, WMO*
- e: Global Geodetic Observing System (GGOS) – *Ludwig Combrinck, South Africa*

**15:25 AR-09-04: Dissemination and Distribution Networks**

- a: GEONETCast – *Linda Moodie, USA & Shunfang Wang, China*
- b: GEONET – *Mirko Albani, ESA & Mehmet Ulema, IEEE*

**15:45 AR-06-11: Radio Frequency Protection – Alan Edwards, EC**

**16:00 Coffee Break**

## **DATA MANAGEMENT**

**16:30 DA-06-01: GEOSS Data Sharing Principles – Linda Moodie, USA & Alan Edwards, EC**

**16:55 DA-09-01: Data Management**

- a: GEOSS Quality Assurance Strategy – *Gyanesh Chander, USA*
- b: Data, Metadata and Products Harmonisation – *Kenneth McDonald, USA*
- c: Long Term Preservation of Earth Observation Data – *Mirko Albani, ESA*

**17:30 DA-09-02: Data Integration and Analysis**

- a: Data Integration and Analysis Systems – *Toshio Koike, Japan*
- b: Atmospheric Model Evaluation Network – *Gary Foley, USA*
- c: Global Geodetic Reference Frames – *Richard Wonnacott, South Africa*

**17:40 DA-09-03: Global Data Sets**

- c: Digital Geological Map Data – *Stuart Marsh, UK*
- d: Global DEM – *Ivan Petiteville, CEOS*

**17:50 Architecture & Data Strategy – Ivan DeLoatch, USA & Alessandro Annoni, EC**

**18:00 Day-Closing Presentation**

**“Eyes on Earth Summit” – Marc Sorensen, Abu Dhabi UAE**

**18:15 Adjourn**

**Tuesday 18 May****08:30 3. Towards Improved Coordination Across GEOSS Areas (cont')****Chair: Toshio Koike, Japan****WATER****08:30 WA-06-02: Droughts, Floods and Water Resource Management – Rick Lawford, Canada****08:45 WA-06-07: Capacity Building for Water Resource Management**a: Latin America – *Rick Lawford, Canada*b: Africa – *Toshio Koike, Japan and Ivan Petiteville, CEOS*c: Asia – *Toshio Koike, Japan***09:15 WA-08-01: Integrated Products for Water Resource Management and Research**a-d: Soil Moisture; Runoff; Groundwater; Precipitation – *Rick Lawford, Canada*e: Water Cycle Data Integration – *Toshio Koike, Japan*f: Improved Water Discovery and Quality Assessments – *Jay Pearlman, IEEE*g: Global Water Quality Monitoring – *Tiit Kutser, Estonia & Stewart Bernard, South Africa***BIODIVERSITY****10:00 BI-07-01: Developing a Biodiversity Observation Network**a: Biodiversity Observation Network (GEO BON) – *Bob Scholes, South Africa*b: Invasive Species Monitoring System – *Brad Reed for Annie Simpson, USA***10:30 Coffee Break****CLIMATE****11:00 CL-09-01: Environmental Information for Risk Management and Adaptation**a: Enhanced Climate, Weather, Water & Environmental Prediction – *David Parsons, WMO*b: Climate Information for Decision-making and Adaptation – *Anna Kuhn, GCOS***11:20 CL-09-02: Accelerating the Implementation of the Global Climate Observing System**a: Key Observations for Climate – *Anna Kuhn, GCOS*b: Key Climate Data from Satellite Systems – *Ivan Petiteville, CEOS***11:40 CL-09-03: Global Carbon Observation and Analysis System**a: Integrated Global Carbon Observation (IGCO) – *Han Dolman, Netherlands*b: Forest Carbon Tracking – *Øystein Nesje, Norway*c: Global Monitoring of Greenhouse Gases from Space – *Ivan Petiteville, CEOS***HEALTH****12:30 HE-09-02: Monitoring and Prediction Systems for Health**a: Aerosol Impacts: Research, Monitoring & Prediction – *David Parsons, WMO*b: Air Quality Observations, Forecasting and Public Information – *Gary Foley, USA*d: Global Monitoring of Atmospheric Mercury – *Florence Bérourd, EC***13:00 Lunch**

**14:00 3. Towards Improved Coordination Across GEOSS Areas (cont')****Chair: Stuart Minchin, Australia****HEALTH (cont')****14:00 HE-09-03: End to End Projects for Health**a: Implementation of a Meningitis Decision-Support Tool – *Tinni Seydou, ACMAD*b: Towards a Globally Coordinated Malaria Warning System – *George Jungbluth, USA*c: Ecosystems, Biodiversity & Health: Decision Tools & Research – *Gary Foley, USA***ENERGY****14:30 EN-07-01: Management of Energy Sources** – *Emile Elewaut, EC (EnerGEO)***14:40 EN-07-02: Energy Environmental Impact Monitoring** – *Emile Elewaut, EC (EnerGEO)***14:50 EN-07-03: Energy Policy Planning** – *Emile Elewaut, EC (EnerGEO)***WEATHER****15:00 WE-06-03: TIGGE and the Development of GIFS** – *David Parsons, WMO***15:15 WE-09-01: Capacity Building for High-Impact Weather Prediction** – *David Parsons, WMO***DISASTERS****15:30 DI-06-09: Use of Satellites for Risk Management** – *Ivan Petiteville, CEOS***15:40 DI-09-01: Geohazards Risk Assessment** – *Stuart Marsh, UK***15:50 DI-09-02: Multi-Risk Management** – *Stuart Marsh, UK & Ivan Petiteville, CEOS***16:00 DI-09-03: Warning Systems for Disasters** – *Hans-Peter Plag, IEEE***16:15 Coffee Break****AGRICULTURE****16:45 AG-06-02: Data Utilization in Fisheries and Aquaculture** – *Stewart Bernard, South Africa***17:00 AG-07-03: Global Agricultural Monitoring** – *Jai Singh Parihar, India***ECOSYSTEMS****17:15 EC-09-01: Ecosystem Observation and Monitoring Network (GEO EcoNet)**c: Regional Networks for Ecosystems – *Stewart Bernard, South Africa*e: Forest Mapping and Change Monitoring – *Brad Reed for Adam Gerrand, FAO***17:40 EC-09-02: Ecosystem Vulnerability to Global Change**c: Vulnerability of Sea Basins – *Jay Pearlman for Anthony Lehmanns, EC (Envirogrids)*d: Vulnerability of Mountain Regions – *Elisa Vuillermoz, Italy***18:00 Adjourn****18:30** Buses leave St Georges Hotel**19:30** *Symposium Dinner at Lesedi Cultural Village*

**Wednesday 19 May****08:30 3. Towards Improved Coordination Across GEOSS Areas (cont')****Chair: Rick Lawford, Canada****CAPACITY BUILDING****08:30 CB-09-01: Resource (or Seville Roadmap) Mobilization – Ana Casals, Spain****08:45 CB-09-02: Building Individual Capacity in EO**a: Cross Border Education and Training in EO – *Chris Mannaerts, Netherlands*d: CBERS/GEO Capacity Building Network – *Hilcea Ferreira, Brazil*g: GEONETCast Training – *George Jungbluth, USA***09:15 CB-09-03: Building Institutional Capacity to Use EO**a: Building National and Regional Capacity – *Norberto Fernandez, UNEP*b: Establishing Regional Capacity Building Networks – *Chris Mannaerts, Netherlands*d: Building Capacity for Operational Oceanography – *Alan Edwards, EC***09:40 CB-09-04: Capacity Building Needs and Gap Assessment**a: Identifying Best Practices, Gaps and Needs – *Chris Mannaerts, Netherlands*b: Capacity Building Performance Indicators – *Noureddine Filali, Morocco***10:00 CB-09-05: Infrastructure Development and Technology**a: Open Source Software – *Karine Ferreira, Brazil*b: CBERS – *Hilcea Ferreira, Brazil*c: SERVIR Expansion – *Carrie Stokes, USA*d: Geo-resources Services for Africa – *Stuart Marsh, UK*e: Data Democracy – *Hilcea Ferreira, Brazil***10:45 Coffee Break****11:15 CB-10-01: Building Capacity through outreach and Awareness Raising**a: Earth Observation Game for Youth – *Jay Pearlman, IEEE*b-c: Capacity for Non-technical Decision-makers; User Workshops – *Françoise Pearlman, IEEE*d: Atlases of our Changing Environment – *Norberto Fernandez, UNEP***SCIENCE AND TECHNOLOGY****11:50 ST-09-01: Catalyzing R&D Funding for GEOSS – Florence Bérout, EC****12:10 ST-09-02: Promoting Awareness and Benefits of GEO – Hans-Peter Plag, IEEE****USER ENGAGEMENT****12:25 US-09-01: User Engagement**a: Identifying Synergies between Societal Benefit Areas – *Kathy Fontaine, USA*b: Communities of Practice and Partnership Development – *Gary Foley, USA***12:50 US-09-02: Socio-Economic Indicators**c: Global Road and Human Settlements Mapping on GEO Grid – *Hiroyuki Miyazaki, Japan***13:00 Lunch**

**14:00 4. General Discussion****Chair: Alexia Massacand, GEO Secretariat****Beijing Ministerial Summit****14:00** Overview of Summit Preparation**14:10** Status of the 2010 Baseline Initiative – *Bradley Reed***14:20** Discussion around Exhibition and Outreach Publications**14:40 Towards the 2012-2015 Work Plan**

Thoughts and Suggestions for the next Work Plan

**GEOSS Implementation****2011 Work Plan Update**

Summary of Session 3 Outcomes:

**15:00** Architecture, Weather – *Koki Iwao***15:10** Data Management, Climate, Agriculture – *Robert Koopman***15:20** Water, Disasters, Science & Technology – *Douglas Cripe***15:30** Biodiversity, Ecosystems, User Engagement – *Bradley Reed***15:40** Health, Energy, Capacity Building – *Fernando Ramos***15:50** Final Comments**16:00 5. Conclusions – Next Steps**

Follow-up Actions

Schedule - 2011 Work Plan Update

**6. Any Other Business****16:30 Adjourn**

## **GEO WORK PLAN SYMPOSIUM 2010**

**17-19 May 2010**

**Pretoria, South Africa**

### **OBJECTIVES**

The main objectives of the Symposium are to:

- Foster the Work Plan Implementation across and within GEOSS areas;
- Develop practical recommendations for the 2011 Work Plan Update;
- Identify achievements that could be presented at Beijing Ministerial Summit Exhibition; and
- Initiate reflections and discussions in preparation of the GEO 2012-2015 Work Plan.

In order to structure the presentations, discussions and syntheses throughout the meeting, participants are encouraged to:

- Identify common inputs, outputs or methodologies across (sub)tasks;
- Explore complementarities across (sub)tasks;
- Identify options for better connecting existing systems (observing, modeling, information) and/or the outputs of those systems (data, products, information);
- Launch practical actions for fostering new and existing interactions across (sub)tasks;
- Evaluate the extent to which existing products, tools, systems and services are already registered in the GEOSS Common Infrastructure (GCI); identify obstacles to registration and options to overcome these obstacles;
- Evaluate the extent to which data and information are already shared within GEO; identify obstacles to data-sharing and options to overcome these obstacles;
- Identify (sub)task components related to Capacity Building, Science and Technology, and User engagement. Strengthen connections with Committees and Communities of Practice;
- Improve Overarching Task and sub-task descriptions/contents;
- Suggest mergers of relevant sub-tasks to improve coordination/reduce duplication;
- Identify opportunities for the Beijing Ministerial Summit Exhibition.