

Identification of GEO Work Program Relevant to CBS

(Submitted by the Secretariat)

Summary and Purpose of Document

This paper identifies the issues of the GEO 2006 workplan, version 0 (it basically covers the 2-year targets from the GEO 10-Year Implementation Plan) which are of special interest for CBS and makes proposals on how CBS could react.

Pages 6 to16 provides the general discussion, which is of foremost interest, while page 17ff lists in details the individuals GEO 2006 tasks relevant for CBS and comments on them from a CBS perspective. Paragraph 45 gives suggestions for actions.

ACTION PROPOSED

Review the general discussion presented in this document and address at least the suggestions for actions proposed under paragraph 45, which deal with topics such as:

- (a) Clarifying the future role of the CBS GEOSS co-coordinators
 - (b) Integration of GTS and WIS in GEO planning
 - (c) Initiating collaboration with GEO relating to radio frequencies for Earth observations
 - (d) Reviewing and adapting the work of the ET, etc... in view of the proposition provided in this document, including participation in relevant GEO workshops.
 - (e) Implicating GEO in the planning of the Technical Conference on WIS
 - (f) Implicating GEO in supporting WMO training activities and capacity building activities
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Introduction

1. This paper has been prepared as a contribution to the CBS Expert Meeting on GEOSS Matters (CBS-GEOSS) to be held in Geneva on 7-9 November 2005. The charge to the consultant included:

1. Identify from the 2, 6, and 10-year targets contained in the “GEOSS 10-Year Implementation Plan – Table of Work Plan Targets” those which are of immediate, mid-term and long-term relevance for CBS;
2. Make proposals on how CBS could best respond and contribute to each of the identified immediate and mid-term targets, and provide general recommendation for the relevant long term targets;
3. Review the “GEO Work Plan Team – 2006 Work Programme” and assess if urgent response from CBS is necessary for specific tasks, which are not already covered in 2, or which would need additional attention due to their

urgency. If such tasks are identified, propose course of action to address them in a timely manner;

4. Make suggestions on how CBS should adjust its internal structure and mechanisms of collaboration between CBS and GEO with a view to optimize integration of the WWW subsystems into GEOSS.

2. The paper is based largely on the GEO Work Plan for 2006 – Version 0 (GEO 0204 -0 of 17 September 2005). This Work Plan condenses and consolidates the 2, 6, and 10-year targets put forward in the GEOSS 10-Year Implementation Plan Reference Document (GEO 1000R of February 2005), and which were listed separately in “GEOSS 10 Year Implementation Plan – Table of Work Plan Targets”(see GEO 1000R-T attached to CBS-GEOSS/Doc. 3.2). The GEO/GEOSS is early in its development and to anticipate actions in any specificity beyond the 2-year tasks that are presented in the 2006 Work Plan (GEO 0204-0) seems premature. A good idea of the direction and program that GEO is undertaking can be gleaned from the 2006 Work Plan – and the potential longer term relationships to CBS can be inferred from these immediate tasks that are proposed. The Consultant’s experience with the GEOSS planning and development to date is that the GEO is very flexible and does not have a strong “memory” – its approach and programmatic content will change as experience and events occur, and new concepts and ideas are presented.

3. CBS plans and coordinates the only Earth Observation System, within GEOSS, with operational end-to-end capability (Observing- both *in-situ* and space-based components, Telecommunications, Data Processing, and Product Dissemination to users). At this stage it is imperative that CBS influence the way GEOSS develops so that the integration mentioned in charge 4. above is realized while keeping the integrity and coherence of the WMO/CBS program as its priority.

4. This paper is structured in three main parts;
 1. A brief overview of GEO/GEOSS its structure and function.
 2. A General Discussion - contained in the body of the text, of what the author perceives as the important programmatic activities that CBS might consider in building its relationship with GEO/GEOSS; and
 3. Annex 1 - where a series of “stream of consciousness” comments reacting to each of the tasks outlined in the GEOSS 2006 Work Plan (GEO 0204-0) are recorded. These comments are simply thoughts of the author where concerns are raised concerning GEO/GEOSS interactions or relationships with WMO in general and CBS in particular.

GEO/GEOSS

5. The GEO 2006 Work Plan (GEO 0204-0), in pages 1-4 provides an overview of the GEO/GEOSS concept and gives a brief on how it proposes to function.

The following paragraphs attempt to provide an outline of this material (extracted from the Introduction and Parts I and II).

6. The vision of GEO, through the Global Earth Observation System of Systems (GEOSS), is to:

“... realize a future wherein decisions and actions for the benefit of human kind are informed via coordinated, comprehensive, and sustained Earth observations. The purpose of GEOSS is . . . to improve monitoring of the state of the Earth, increase understanding of Earth processes, and enhance prediction of the behaviour of the Earth system.” (*GEOSS 10-Year Implementation Plan - GEO 1000, 16 February 2005, p.5*)

7. GEO is viewed as the forum to mobilize all actions that will contribute to the realization of the GEOSS. These actions can be articulated around three, overarching objectives:

1. To build a sustainable, comprehensive and coordinated observation system of systems;
2. To provide open and easy access to data anytime and anywhere; and
3. To increase the use of Earth observations

8. GEO activities will range across three areas: (1) program activities, based on the five main elements of the GEOSS 10-Year Implementation Plan, (2) policy activities, which will address key aspects of Earth observation planning and data policy, and (3) institution building activities, which will be designed to strengthen the GEO organization and consolidate its role in the Earth observation community. The three activity areas include:

Programme Activities

The five main elements of the GEO programme are:

1. Design a flexible GEOSS architecture
2. Improve data management
3. Engage user communities – including the global research communities
4. Promote capacity building
5. Engage in outreach and communication

Policy Activities

The GEO policy activities include:

1. Harmonize Earth observation planning.
2. Promote open data policy
3. Engage with international economic development and cooperation organizations

Institution Building Activities

The GEO institution building activities include:

1. Mobilize resources

2. Define relationships with existing coordinating mechanisms, programmes and associations Expand participation in GEO.
 3. Explore the relationship with industry
9. Within each area, three main categories of strategic activity will be required:
1. Activity on the part of GEO Members, coordinated through GEO committees, with the support and engagement of the Secretariat
 2. Activity on the part of GEO Participating Organizations, coordinated through GEO committees and the Secretariat, requiring harmonization with GEO work plans
 3. Activity on the part of the GEO Secretariat, involving modest funding, to ensure overall coordination, stimulate small-scale implementation activities, initiate demonstration projects, and conduct other support activities as required
10. Taken together, the collective Earth observation assets of GEO Members and the GEOSS-related programs of the GEO Participating Organizations represent large investments, on the order of tens of billions of US dollars. The budget of the GEO Secretariat will amount to a small fraction of those investments. The key role of the Secretariat will be to leverage the coordinated deployment of these large Member investments, as well as the harmonization of existing organization programs. In this way, the GEO will collectively deliver the tangible benefits of GEOSS to society.
11. GEO 0204-0 outlines a series of “operational tasks” designed to take the initial steps in implementing a program of “transverse activities” and in undertaking specific tasks within each of the nine “GEO Societal Benefit” areas.

GEO Transverse Activities

- Architecture
- Data management
- User engagement
- Capacity building
- Outreach

GEO Societal Benefit Areas

GEOSS aims to enhance delivery of benefits to society in nine areas:

1. Disasters: Reducing loss of life and property from natural and human-induced disasters
2. Health: Understanding environmental factors affecting human health and well-being
3. Energy: Improving management of energy resources
4. Climate: Understanding, assessing, predicting, mitigating, and adapting to climate variability and change
5. Water: Improving water-resource management through better understanding of the water cycle

6. Weather: Improving weather information, forecasting, and warning
7. Ecosystems: Improving the management and protection of terrestrial, coastal, and marine ecosystems
8. Agriculture: Supporting sustainable agriculture and combating desertification
9. Biodiversity: Understanding, monitoring, and conserving biodiversity

GEO Committees, Task Forces and Working Groups

12. Several mechanisms have been proposed to assist in carrying out the GEOSS activities. No comprehensive information regarding agreed Terms of Reference nor how membership on groups will be determined is available. One gets the impression that a careful analysis of just what work is needed and the most effective structure and function within GEO/GEOSS to accomplish these objectives has not yet been undertaken. The groups mentioned in GEO documentation include (gleaned mostly from GEO 0204-0):

- GEO Committee on Architecture and Data Management
- GEO Committee on User Interface
- GEO Committee on Capacity Building and Outreach
- GEO Working Group on Tsunami Activities
- GEO Human Health, Environment and Earth Observation Task Force
- GEO Energy and Earth Observation Task Force
- GEO Task Force of Legal Experts on Data Policy
- GEO Ecosystem Task Force (also addressing biodiversity matters)
- GEO Agriculture and Earth Observation Task Force
- GEO Working Group on Science and Technology

13. No specific GEO mechanisms are proposed for the Climate, Water and Weather areas. It is assumed that Climate will be largely handled through GCOS with close connection to GOOS and GTOS and of course the WMO/WCP and WCRP. The Water area is left to various meetings and workshops and though it is programatically related to WMO/CHy and GTOS there is no strong connection to these bodies proposed. The Weather area is designated as focused on WMO programs and activities.

14. As pointed out below CBS will need to anticipate how to selectively participate in appropriate GEO tasks and bodies to effectively integrate its activities into the GEO/GEOSS structure and program especially as it relates to the "GEO Transverse Activities" especially Architecture, Data Management and Capacity Building.

General Discussion of Possible CBS Interactions with GEO/GEOSS

15. The GEO Document “GEO Work Plan Team Report on 2005 Planned Activities” (GEO 0107R) of 1 July 2005, in section 3.1 Strategic Activities, explicitly states that the GEO Secretariat... “will engage with the WMO/CBS for inputs on GEOSS architecture and all targets for improving weather information, forecasting and warning”. The author has not been apprised of any results of this “engagement” if there has been contact and discussions between GEO and CBS or the WWW Department. In view of the strong guidance given by the WMO Executive Council and the CBS XIII, this discussion is written from the point of view that both WMO and GEO welcome a proactive role to be played by CBS in the creation and implementation of GEOSS. How to balance the internal work program organized in response to CBS XIII and the extra efforts undertaken in response to GEO will continue to be a challenge for CBS. It is always difficult to please two masters! Placing emphasis on a few high impact activities in the context of GEO would seem to be the most beneficial way to proceed for both CBS and GEO/GEOSS.

16 The following sections reflect what one might refer to as an “integrated response” to the long list of Operational Tasks for 2006 that is given in Part III of GEO 0204-0 (some 75 tasks are identified). Annex 1. reproduces the complete series of Tasks from GEO 0204-0 and includes commentary on the Tasks that the author sees as related to WMO and CBS. It should be emphasized at the outset that this “zero version” of the GEO 2006 Work Plan is the initial draft that has been issued for technical review; it will be revised after receiving individual comments from reviewers. Following that it will be issued to GEO Members and Participating Organizations for “official review” with comments due on November 11, 2005. The timing of the CBS Expert Meeting on GEO Matters may allow for specific input through WMO in this official comment cycle.

Architecture

Architecture design and interoperability - WIS related issues

17. CBS-XIII, and subsequently the CBS Management Group suggested that the WIS and the GTS should be an initial component as well as an important “backbone building block” within the GEOSS for achieving a greater interoperability and connectivity among individual component observing systems. There is an important opportunity for CBS, at this early stage in GEOSS development, to take steps facilitating this objective.

18. The GEO Tasks **AR-06-01¹, AR-06-02, AR-06-03, Ar-06-04 and Task DA-06-10** should be treated as a group of activities with CBS taking specific action within the GEO Tasks to ensure that the planning and experience of the WIS be

¹ Annex 1 contains the texts of all GEO 2006 Work Plan Tasks.

incorporated as an essential element of the planning. The following CBS actions might be considered:

1. Ensure that appropriate participation of WMO/WIS leadership and technical experts are available (and proactive) to the GEO Committee on Architecture and Data.
2. Arrange for a detailed briefing on WIS (including the active work program being undertaken by CBS in its OPAS-ISS addressing issues such as the development and implementation of advanced data representation formats and codes; metadata standards, practices and implementation, and the systematic upgrade and improvement of the GTS etc.) for the GEO Director and Secretariat. The briefing should underscore the potential for the expansion of the WIS to accommodate other elements of GEOSS into its framework and point out where GEO, in its role as an “advocate”, could have an impact on accelerating its implementation.
3. WMO/CBS might offer to host an early (first?) meeting of the GEO Committee on Architecture and Data and seek to structure its TOR and associated work program to effectively integrate the WIS as a (the ?) core building block.
4. Seek GEO co-sponsorship of the proposed Technical Conference on WIS (perhaps even changing its title to something like “TC on WIS in the Context of GEO/GEOSS” – something that will be attractive to GEO). Other existing programs such as the International Charter on Space and Major Disasters (see **Task DI-06-08**) – an example of a “request/reply” component foreseen in the WIS system, and the Integrated Global Dissemination Service (IGDDS) might also be folded into the Conference program (see **Task DA-06-04**, and **Task WE-06-04**).

A concern is that if the above GEO tasks are taken up separately an unhelpful duplication and confusion will result – not the integration desired.

GEO Architecture tasks relating to *In-situ* Networks and Continuity of Observations

19. GEO 2006 **Task AR-06-06** calls for the production of an inventory, by societal benefit area, of existing *in-situ* observation networks (including airborne). It would perhaps be more useful and productive to base the inventory on the Atmospheric, Oceanic and Terrestrial domains. Most networks are not designed to address individual societal benefit areas exclusively. CBS in collaboration with CAS (others?) would be in a position to produce inventory material re atmospheric networks (WWW/GOS, GAW, etc). Likewise JCOMM could respond for oceanic “networks”, and GTOS in collaboration with CHy and other bodies could address the terrestrial domain. CBS could suggest this change in the approach in **Task AR-06-06**. How CBS will organize its work to provide the inventory information required needs to be decided. Care must be

taken that this doesn't turn into a "make work" task – what will the inventory be used for?

20. GEO 2006 **Task AR-06-05** calls for GEO to "advocate additional resources for maintenance and expansion of *in-situ* observing systems". This has a clear capacity building component (see 2006 **Tasks CB-06-01, CB-06-02, WE-06-01** that will be discussed below in paragraphs 31-34) but it also applies directly to the CBS activities relating to the Implementation Plan for the Evolution of Space-based and Surface-based Subsystems of the GOS, and some aspects of the modernization of the GTS and the implementation of WIS. Are there specific projects or components of these plans and programs that GEO advocacy would be important in the process of convincing governments to support the effort? CBS could isolate individual activities that would supplement the WMO Regular Budget funded activities for planning and coordination, or which could be applied directly toward implementation of the plans within countries (in many cases GEO has political connection to higher levels of government than the NMHSs usually enjoy). It is proposed that CBS specify certain high priority actions that if implemented would accelerate the implementation. GEO would have to cooperate through its advocacy role - and work to obtain support for them. The OPAG-IOIS and its ICT-IOIS and ET-EGOS might be assigned special responsibilities to work with GEO on these matters.

21. GEO **Task AR-06-08** calls for the establishment of a "gap analysis process" for all nine societal benefit areas to examine priorities and ensure continuity of *in-situ* and space based observations. The Task statement identifies the following critical areas for *in-situ* observations;

- Global carbon cycle
- Hydrology
- Seismology
- Atmospheric Chemistry
- Meteorology (in developing countries)

For the Space-based observations the following critical areas were identified:

- SAR interferometry
- Ocean Color
- Moderate to high resolution land-use/land-cover
- Precipitation (rate?)
- Soil moisture
- Global carbon observation.

This list is claimed to be based on a pool (sic) – I assume they mean "poll" but no mention of who was polled. One would think that of any of the areas Climate required continuity of all observations. Climate of course includes the portions of the total observation programs for the Carbon Cycle, Hydrology, Atmospheric Chemistry, and Meteorology --- plus Oceanic and Terrestrial observations. Again, as in the inventory task above, a gap analysis focused on the Atmospheric, Oceanic and Terrestrial domains – then evaluated against the requirements from

the societal benefit areas would seem to be one possible approach. For the immediate interaction with GEO on this task CBS should refer to the WWW Implementation Plan for the Space-based and Surface-based Sub- Systems of the GOS (WMO TD No. 1267) and the associated Statements of Guidance which address some aspects of how well space and *in-situ* sensor capabilities meet WMO User Requirements in 10 Application Areas. In addition there are specific gaps identified in the WMO/GAW program and in the GCOS Implementation Plan (WMO TD No. 1219) and in the Second Report on the Adequacy of the Global Observing Systems for Climate (WMO/TD No. 1143). It is proposed that CBS simply monitor what is being done in this task to set up a gap analysis process and supply the above documentation as an initial contribution if appropriate. The CBS-MG Coordinators for GEOSS would be a logical CBS interface with GEO on this Task.

GEO Architecture Task – Radio Frequencies

22. **GEO Task AR-06-10** calls for an evaluation of challenges facing Earth Observations by interference from other uses of the radio spectrum. The work of the CBS Steering Group on Radio Frequency Coordination (SG-RFC) can contribute substantially to this task and its work must be coordinated with any GEO activity. The GEO effort could possibly reach governments at a higher level than the CBS activity can. It is essential that all “speak with one voice”. CBS to contact GEO to determine how to initiate the collaboration (see further comment in Annex 1). CBS must insist that the GEO Secretariat include coordination with the SG-RFC in its preparations for representation to ITU.

Data Management

Data transfer and dissemination systems

23. The assessment of current data transfer and dissemination systems for all societal benefit areas called for in **Task DA-06-03** and the holding of a GEO workshop on this subject in 2006 is an opportunity for CBS to elaborate on the WWW system and expose the plans for WIS to experts from the various disciplines. CBS, through its OPAG-ISS should participate in this assessment and workshop (see further comment in Annex 1).

Assimilation and modeling

24. **Task DA-06-05** calls for GEO to support and advocate funding for demonstration projects promoting the use of ensemble prediction methodology for the development of decision support tools in areas of disaster mitigation, human health improvement, energy, and crop management. In the 2006 time frame the CBS OPAG on DPFS is planning a “Demonstration Project on Severe Weather Forecasting”. Assuming that ensemble prediction is the focus of this Project this may contribute to the disaster mitigation category of this task. Approach GEO to work with GEO Members to provide support to this effort..

There may also be opportunities in this task for WMO Programs such as THORPEX or the Tropical Cyclone Program, in conjunction with DPFS Centers, to propose demonstration projects and seek GEO support.

25. The WMO framework for standardized verification of ensemble prediction systems is in its way a “demonstration project” that could potentially contribute to GEO objectives in this area. GEO should be appraised of this initiative within CBS and the experience attained, and methodology used by the CBS Lead Centre for EPS Verification located at RSMC Tokyo in undertaking this work.

New data portals and tools

26. See discussion of **Task DA-06-10** in paragraph 18 above. This is essentially an end objective in the development of the GEO Architecture and also of WIS.

27. **Task DA-06-12** speaks to establishing a “GEOSS Best Practices Registry”. The WMO Voluntary Cooperation Program is a “best practices” candidate given the suggested definition. The network of WMO Training Centers, and such initiatives as the WMO/CGMS Virtual Laboratory also may be candidates.

28. The WWW system of Manuals and Guides is also a potential “best practices” example in that it provides the structure and guidance (technical regulations) required to implement a world-wide system comprised of national facilities and institutions all working for the common good.

29. There is no immediate need for CBS action here – like other tasks GEO has to define what the registry is to be used for. The WMO Secretariat should respond to GEO on this task, as appropriate.

Capacity Building

General

30. This section of the 2006 Work Plan is divided into a survey of capacity building initiatives (**Task CB-06-01**), the identification of infrastructure needs (**Task CB-06-02**) and support for the expansion of education and training initiatives (**Task CB-06-03**).

31. **Task CB-06-01** calls for “a survey of capacity-building initiatives in GEO member countries and Participating Organizations to identify existing and planned capacity building activities and gaps”. It is impossible without explicit information from GEO how one might respond to this survey request. For example, just within the CBS XIII Report innumerable capacity building activities and proposals are mentioned. The same is true of virtually every other Programme/Commission within WMO. CBS response to this Task must be part of an integrated WMO-wide input. The WMO Technical Cooperation Programme

(including VCP) and the Education and Training Program along with the Regional Offices can provide major inputs for the survey. The WMO input to the survey should be organized to convey the priority needs of the organization. One potential benefit of such a survey would be if items in the list would generate funding through GEO, therefore the presentation of the list should convey a sense of urgent need for the high priority items and be convincing in the explanation of the benefit to GEO objectives.

32. Because of the complexity and breadth of the GEO with the potential of literally thousands of individual “initiatives” submitted by the GEO Members and Participating Organizations (some will be at least partially duplicative) one can anticipate that GEO’s initial (2006) survey will condense and consolidate the material and will most likely end up as a “high level” survey with content of a very general nature (e.g. “initiatives of WMO to implement meteorological observing systems”) with very little detail as to what and where. More guidance should be sought from GEO before major work is undertaken. The WMO Secretariat must take the lead in coordinating with GEO and in preparing the WMO response.

33. **Task CB-06-02** (see also Paragraph 20 above regarding infrastructure improvement and maintenance in general) is also related to all WMO programs and a coordinated WMO program-wide response should be developed. Responding to this tasking is probably best left to the WMO Secretariat with the Technical Commissions asked to submit proposals for inclusion and to review and comment on the submission. CBS should organize to assist as appropriate in this effort.

34. **Task CB-06-03** suggests that GEO “support the expansion of Earth Observation education and training initiatives in developing countries in cooperation with specialized UN and other organizations”. Training activities are proposed in virtually all components of the CBS plans for 2005 -2006: these plans are often directed at assisting in the implementation of CBS systems or procedures (e.g. code matters, AMDAR data, data processing, telecommunications etc.), on developing the capability to apply data and information to weather analysis and forecasting (e.g. satellite data analysis, EPS applications, using LRF products; and on various PWS issues (media skills, product design etc.). Training initiatives are core activities in every other WMO Commission and Programme also. A comprehensive listing of all training proposals and initiatives sponsored, co-sponsored or affiliated in some way with WMO would seem to be very useful for the organization to use in developing its over-all training strategy and to interact with GEO. This also could be a task for the WMO Secretariat.

35. Since this emphasis on training will be a continuing priority of GEO a special effort by CBS, in partnership with GEO, might be proposed to plan and undertake the development of training “systems” with both an intense “hands on” component and a “continuing or refresher education” component like that

pioneered in the Joint WMO CGMS Virtual Laboratory for Data utilization and its associated Centres of Excellence. The effort might also consider utilizing services of systems like the USA COMET Computer Assisted Learning (CAL) System as a basis for the development of training material especially if the content of the modules were aimed at specific geographical regions and in appropriate languages for the region. In addition to Satellite Analysis and application, and EPS, the training might also focus on heavy rain/strong wind prediction, tropical cyclone forecasting or even on some critical infrastructure development subjects related to the modernization of the GTS. If GEO has influence and can deliver support, this kind of comprehensive training program imitative has the potential become a major mechanism to accelerate WWW modernization as well as apply to other WMO Programmes and to GEO objectives in other Societal Benefit areas. CBS might wish to assign someone to undertake the initial planning for such a proposal and too work with GEO on coordination/collaboration.

Capacity Building Activities by Societal Benefit Areas

36. **Task CB-06-07** suggests that GEO “co-organize” (I assume with WMO/ CBS) a series of regional workshops with major numerical weather prediction (NWP) – training centers to assist developing countries in their utilization of currently available forecasts; building in particular upon WMO programmes for the least developed countries”.

37. CBS has developed a 6-day workshop programme on the subject of EPS with the objective that workshops would be organized to train trainers on the concepts and practical use of EPS. Under this programme two workshops are being organized by WMO in 2005: for RAs III/IV in Brasilia (January), and for RAs II/V, tentatively in China (April). Such training is also needed for RA I, and for some Members of RA VI. Training workshops place a high demand on experts who provide the lectures. The development resources needed to prepare the workshops are considerable, especially for suitable materials for specific regions. GEO support for this training program should be sought. The experience gained in these workshops and the training methodology developed would contribute directly to the objectives of this GEO Task in the areas mentioned in the Task statement.

Disasters Societal Benefit Area

38. In the Disasters societal benefit area the GEO 2006 Work Plan almost exclusively focuses on Tsunami's; this reflects the occurrence of the Asian Tsunami at the time that the GEO/GEOSS structure and plan was being developed. Perhaps WMO/CBS can contribute by emphasizing the continuing need for further development of the Tropical Cyclone Program (the proposed Demonstration Project on severe weather associated with Tropical Cyclones

would seem timely – and may attract GEO support) and the CBS Emergency Response Activities. Reference to the important work done by IAEA and WMO regarding emergency support re long range transport for a nuclear environmental emergency (a la Chernobyl) is not mentioned. It should be. The continued effort by CBS to extend this work to non-nuclear environmental emergencies (e.g. chemical spills) is a continuing thrust of CBS and falls within the context of several GEO areas (Disasters, Health, Ecosystems). At this stage it would be good to encourage GEO to look beyond Tsunamis (from what JR understands about it is that the Agencies are handling that without much reliance on GEO anyway) and point GEO to some specific activity in the purview of CBS and associated WMO programs that GEO could assist in, e.g. Tropical Cyclone Warnings (including Ensemble Prediction applications) and Emergency Environmental Response (focusing on the warning system utilizing forecasts of transport of nuclear and non-nuclear material).

39. **Task DI-06-08 and DI-06-10** concerning telecommunications during disasters and the use of meteorological geostationary satellites for data and information dissemination during disasters relates to the overall planning for the comprehensive GEO Architecture and data management discussed above and the relationship to the GTS and WIS. These tasks should be part of the over-all coordinated architecture planning and development (see Para 18).

Climate Societal Benefit Area

40. The Implementation Plan for the Global Observing System for Climate, GCOS-92, WMO/TD No. 1219, lays out a detailed list of actions to implement the global climate observing system. CBS is identified as a participating “action agency” for many of the specified actions and it is responding. GEO should be encouraged to utilize this GCOS Implementation Plan as the basis for Tasking – supporting as appropriate Actions requiring resources and political support unavailable from the existing agencies and participating organizations and countries. GCOS should be the lead. The work program of CBS addresses the close collaboration with GCOS and is compatible with GEO tasking.

41. It should be noted that the tasks included in the Weather Societal Benefit area i.e. **WE-06-01, WE-06-02, and WE-06-03** are addressed in the CBS plans and directly applicable to the objectives of GCOS and meet climate observing requirements. Given that adequate coordination/collaboration occurs between CBS, GCOS and GEO a mutually beneficial set of actions can emerge.

Weather Societal Benefit Area

42. The CBS documentation including:

- WMO TD No.1267 WWW Implementation Plan for Evolution of Space and Surface-based Sub-systems of the GOS

- Current Statements of Guidance Regarding How Well Satellite and In-Situ Sensor Capabilities Meet User Requirements in Ten Application Areas -2004
- WMO CBS Management Group, Fifth Session. Final Report. April 2005

outline the program necessary to further develop the WWW and structure a work program designed to address the issues raised in the list of GEO priorities and objectives. Do the 5 tasks (**WE-06-01, WE-06-02, WE-06-03, WE-06-04 , WE-06-05**) address the most important needs of the WWW in the context of GEOSS? The emphasis in the GEO tasks to implement GUAN and expand AMDAR, and to improve the space-based component are priorities for CBS. The CBS-GEOSS Meeting should identify those issues that would most benefit from GEO support or endorsement – with a view, for example, to attain extra budgetary support for some specific actions or for using GEO to interface with donor governments/agencies in infrastructure and/or capacity building activities. The meeting should refine and identify specific activities that CBS might take forward to GEO to obtain support and assistance.

42. Noted that many infrastructure issues such as GTS/WIS and its relation to GEO architecture and the relation of the DPFS system to GEO product development objectives are covered in the sections above.

CBS Internal Structure and 2005-2006 Work Programme

43. For reference purposes the current CBS structure is listed below:

OPAG on Integrated Observing Systems

- Implementation/Coordination Team on Integrated Observing System (ICT-IOS)
- Expert Team on Evolution of the Global Observing System (ET-EGOS)
- Expert Team on Evolution of Satellite System Utilization and Products (ET-SSUP)
- Expert Team on Satellite Systems (ET-SAT)
- Expert Team on Requirements for Data from Automatic Weather Stations (ET-AWS)
- Rapporteur on AMDAR activities
- Rapporteur on GCOS matters
- Rapporteur on Regulatory Material
- Co-rapporteurs on scientific evaluation of OSEs and OSSEs
- Co-rapporteurs on impacts of new instrumentation on the GOS

OPAG on Information Systems and Services

- Implementation-Coordination Team on Information Systems and Services (ICT-ISS)
- Coordination Team on Migration to Table Driven Code Forms (CT-MTDCF)
- Expert Team on Data Representation and Codes (ET-DRC)
- Inter-Programme Expert Team on Metadata Implementation (IPET-MI)

- Rapporteur on the WMO Guide on Data Management
- Expert Team on WIS-GTS Communication Techniques and Structure (ET-CTS)
- Expert Team on WIS GISCs and DCPCs (ET-WISC)
- Steering Group on Radio-Frequency Coordination (SG-RFC)
- Rapporteur on WWW Monitoring
- Expert Team on GTS-WIS Operations and Implementation (ET-OI)

OPAG on Data Processing and Forecasting System

- Implementation Coordination Team on DPFS
- Coordination Group for Nuclear Emergency Response Activities (CG-ERA)
- Expert Team on Modelling of Atmospheric Transport for Non-nuclear ERA (ET-ERA)
- Expert Team on Ensemble Prediction Systems (ET-EPS)
- Expert Team on Infrastructure for Long-range Forecasting (ET-LRF/I)
- Expert Team on Standardized Verification System for Long-range Forecasting (ETLRF/V)
- Rapporteur on the Impact of Changes to GOS on NWP
- Rapporteur on the Application of NWP to Severe Weather Forecasting

OPAG on Public Weather Services

- Implementation-Coordination Team on Public Weather Services (ICT)
- Expert Team on Services and Products Improvement (ET-SPI)
- Expert Team on PWS in Support of Disaster Prevention and Mitigation (ET-DPM)
- Expert Team on Communication Aspects of PWS (ET-COM)

CROSS-CUTTING ACTIVITIES

- WMO Space Programme
- Group on Earth Observations
- Disaster Prevention and Mitigation Programme
- Quality Management Framework
- THORPEX
- IPY

45. No adjustments in the structure are proposed at this time. The individual work programs as defined in the report of the 5th Meeting of the CBS Management Group (see CBS-GEOSS/Doc. 4) include collaboration and cooperation with GEO – the details of possible interactions that will require CBS structure changes may emerge more clearly as GEO begins to function. The above analysis of potential interactions between CBS and GEO leads to some potential adjustments in the work programme of some of the elements of the Commission and there may be special *ad hoc* arrangements that could address some GEO-specific issues in the immediate future. The following suggestions arise from the analysis:

- The roles of the two CBS-MG Coordinators for GEOSS need to be determined and their specific relationship to the various CBS bodies and to the GEO, especially the GEO Secretariat, needs to be clarified. This meeting of experts on GEOSS should provide clear guidance to the Coordinators and inform the GEO Secretariat of their availability and role.

- A special mechanism (Task Force?) may be needed that would include high-level CBS leadership, appropriate technical expertise, and WMO Secretariat staff to address the issue of integrating the GTS and WIS into the planning of GEO (see Paragraph 18. above) and participate in the GEO Committee on Architecture and Data Management.
- The OPAG-IOS and its ICT-IOS and ET-EGOS might be assigned specific tasking to work with GEO on issues relative to GEO Task AR-06-05 (see Paragraph 20.).
- In the context of GEO Task AR-06-08 the CBS-MG Coordinators on GEO might take the lead in working with GEO on issues related to the “gap analysis process” (see Paragraph 21).
- Include in the activities assigned to the CBS SG-RFC the responsibility to coordinate with the GEO Secretariat and associated experts in their activities relative to radio frequency protection (see Paragraph 22.).
- Include in the work plan of OPAG-ISS a charge to prepare for participation in the proposed GEO Workshop on data transfer and dissemination systems (see paragraph 23)
- The potential to design a comprehensive training strategy with the co-sponsorship of GEO (see Paragraphs 34 and 35.) may deserve another special mechanism (Task Force?) involving CBS leadership and experts from the ET-SSUP, ICT-DPFS and ET-EPS (others?), and WMO Secretariat staff.
- Include in the OPAG-DPFS activity the responsibility to coordinate with GEO re the offer to “co-organize a series of regional workshops with...NWP Centers” (see Paragraphs 36. and 37.).
- The CBS-MG Coordinators on GEOSS should take the lead in coordinating CBS activities relating to the Tasks in the Weather Societal Benefit area (see Paragraphs 42 and 43)
- Since the GEO tasking emphasizes AMDAR (Task WE- 06-01) the OPAG-IOS Rapporteur on AMDAR activities should include coordination with the GEO Secretariat as part of his responsibilities.

ANNEX 1. Comments on the individual 2006 GEO Work Plan Tasks for 2006

This Annex simply reproduces each of the 2006 tasks as presented in GEO 0204-0 and includes in square italicized brackets [*JR-*] comments of the consultant regarding potential interactions of WMO and in particular CBS with the GEO task if considered appropriate. In many cases the intent of the Task, how it will be carried out, and by whom, is unclear. The comments reflect immediate reactions to individual Tasks as the author read the material – little cross referencing has been done.

GEO Architecture Tasks for 2006

Architecture activities for 2006 will be coordinated with the GEO Committee on Architecture and Data, and will focus on the following:

1. Designing an initial GEOSS architecture
2. Establishing interoperability arrangements
3. Strengthening *in-situ* observation and creating a new framework for *in-situ* observations
4. Expanding capacity for, and identifying challenges to continuity of, observation of key variables commonly required across user communities
5. Advocating protection of radio frequencies

[JR-WMO/CBS should participate in the GEO Committee on Architecture and Data. Perhaps different expertise is required for the various Tasks laid out below; see comments associated with each task.

Clarification re the point 3. above is necessary. Just what does GEO mean by “framework”? For example the WWW has a well structured “framework” for in-situ meteorological observations based on the work of CBS (Manuals and Guides on the GOS, GTS and GDPFS etc) and I would assume a similar effort by IOC/WMO JCOMM is intended for in-situ ocean observations. What is needed perhaps is a framework for terrestrial observations” – this has been called for over the last several years by GCOS and GTOS among others- see also Task CL-06-03 below]

Architecture Design

Task AR-06-01: Identify initial components of GEOSS architecture, including observing systems, data processing facilities and data distribution networks, based upon inputs from GEO Members.

[JR –The structure and function of the WWW (GOS, GTS and GDPFS) will undoubtedly be a major element, if not the “central core”, of any GEOSS architecture. The WWW includes the contributions from all WMO Members – including those from GEO Members. CBS (in association with CAS (GAW) and CHy (WHYCOS) and GCOS with CCl as appropriate must somehow get their associated systems recognized and incorporated in GEOSS appropriately. GEOSS architecture must be designed to be compatible with the WWW and the planning going on within CBS for the future system should be reflected in the GEOSS planning. This may be principally a responsibility of the WMO Secretariat but CBS leadership should also be centrally involved. One might think that this is simply a “make work” exercise but I sense that a early involvement will avoid lots of future problems and misunderstandings – and will build a relationship between GEO/GEOSS and the WMO Systems.]

Task AR-06-02: Design an initial GEOSS architecture to link the foregoing components, allowing for growth potential (see Diagram in GEO 0204-0 page 7).

(Addresses Target 087)

[JR- WMO-CBS must designate appropriate participation and, if invited, take a leadership role in the design effort.]

Interoperability

Task AR-06-03: Develop “GEOSS Interoperability Guidance” document in order to eventually establish GEOSS interoperability specifications.

[JR- The WMO/CBS OPAG-ISS should have a designated participant in the development of the “GEOSS Interoperability Guidance” document]

Task AR-06-04: Initiate development of a publicly accessible, network-distributed catalogue, subject to GEOSS interoperability specifications, and including an inventory of existing data, meta-data, and pre-defined common products.

[JR- This is a massive effort. The potential for the WWW Monitoring activity to contribute?]

(Addresses Targets 042, 052, 084, 085, 087, 088, 089 & 097)

In-situ Networks

Task AR-06-05: Advocate additional resources for the maintenance and expansion of in-situ observing systems in cooperation with major national and international organizations and programmes.

[JR- Here is an opportunity for CBS in cooperation with the WMO Regional Associations to provide in a prioritized list the requirements for support to maintain and complete the plans for in-situ networks. The coordination with GCOS re GUAN and the GSN requirements and the coordination with CAS/GAW re possibly collocation of WWW/GCOS and GAW stations would be a powerful argument for support.]

Task AR-06-06: Produce an inventory, by societal benefit area, of existing *in-situ* observation networks (including airborne).

[JR- CBS to provide WWW network info. Note that different subsets of GOS relate to different societal benefit areas. Perhaps approaching the issue from the Atmospheric, Oceanic and Terrestrial domains would make more sense.]

Task AR-06-07: Initiate the creation of a global *in-situ* coordination mechanism within GEO.

(Addresses Targets 040, 041, 048 & 091)

[JR- What does this mean? Perhaps since data from one network/system might be needed by other Societal Benefit Areas coordination may be required. Such an in-situ coordination mechanism will have to be responded to by CBS since a major part of the observations required by many societal benefit areas will be GOS data. The TOR of the mechanism is important.]

Continuity of Observations

Task AR-06-08: Establish a GEO gap analysis process for all nine societal benefit areas to examine priorities and ensure continuity of *in-situ* and space-based observations.

Based on a preliminary pool, the following critical areas were identified for *in-situ* observations: global carbon cycle, hydrology, seismology, atmospheric chemistry and meteorology (in developing countries).

[JR- Do they mean “pool” or “poll”? and in any case who has been asked to provide input? This is something the scientific community should be asked to provide guidance. The need for in-situ measurements of ocean parameters can not be overlooked. Also are aerosols part of atmospheric

chemistry? In my view a major part of this Task has already been undertaken through WMO/CBS/OPAG-IOS and documented in the “WWW Implementation Plan for Evolution of the Space and Surface-based Sub-Systems of the GOS” (WMO/TD No. 1267) and the associated “Statements of Guidance” which address aspects of several of the GEO Societal Benefit Areas (Disasters, Energy, Climate, Water, Ecosystems and Agriculture as well as Weather). In addition there are requirements laid out in the WMO/GAW planning and the GCOS Implementation Plan (perhaps others programs within WMO also). Just how to ensure that the GEO effort will incorporate this existing activity and material is a key issue. Perhaps the ongoing work of OPAG-IOS and its Expert Team should include explicit terms to contribute here.]

Similarly the following areas were identified for space-based observations: SAR interferometry, ocean colour measurement, moderate-to high-resolution land use/land cover measurement & precipitation measurement, soil moisture measurement and global carbon observation.
[JR- Recommendations of the Space-based Subsystem of GOS and the specific actions planned (as laid out in WMO/TD No. 1267) should be considered in this GEO gap analysis activity. In TD No. 1267 the recommendations S1 through S20 put specific actions on the table and are important to a wide range of users. Additional requirements concerning the Oceanic and Terrestrial domains are covered in the GCOS Implementation Plan. These requirements should be folded into the GEO gap analysis activity and provide more specification to the areas identified.]

Task AR-06-09: Ensure effective communication of user requirements to observing agencies (eg. satellite operators) and monitor the agencies’ response to these requirements.
(Addresses Targets 003,004, 006, 007, 035, 036, 044, 061, 064, 067, 073 & 093)

[JR- The Rolling Review of Requirements, the planning of the evolution of the GOS and the work undertaken within CBS to prepare Statements of Guidance for Agencies and Governments to follow may be one methodology that GEO might expand on to address a wider and more integrated GEOSS. GEO may also contribute to the realization of the CBS proposals – there is danger of confusion if the activity is not coordinated and complementary. The specific actions laid out in TD No. 1287 include just how the WMO Space Program and CBS plan to proceed in communicating with the Space Agencies- these actions should be acknowledged and encouraged (and supported where needed) by GEO]

Protection of Radio Frequencies

Task AR-06-10: Evaluate challenges presented by the industrial development of automobile anti-collision radar and the implications for the use of radio frequencies essential for tropospheric sounding. Prepare a series of appropriate advocacy activities, including representations to the International Telecommunication Union.
(Addresses Target 098)

[JR- The problem of Radio Frequency Coordination and the protection of radio frequencies for meteorological observation application is an ongoing activity within CBS. The GEO activity, while perhaps considering broader applications to Earth observations in general, will address substantially the same issues, and perhaps could enlist broader political interest in the problem. The CBS OPAG on Information Systems and Services (OPAG-ISS,) Steering Group on Radio-Frequency Coordination (SG-RFC) can contribute substantially to this task. GEO activity in this area must be

complementary to, and coordinated with, the ongoing CBS effort so a effort to inform GEO of what CBS is doing is crucial at this stage].

Data Management Tasks for 2006

Data-related activities for 2006 will be coordinated with the GEO Committee on Architecture and Data, and will focus on the following:

1. Initiating steps for creating a common data policy
2. Improving systems for Earth observation data transfer and dissemination
3. Ensuring recovery and archiving of critical historical *in-situ* and space-based observations
4. Supporting the development and use of emerging assimilation and modelling techniques for new applications
5. Developing basic geographic data relevant to GEOSS societal benefit areas
6. Developing common data access tools, portals and best practices for users across societal benefit areas

Data Policy

Task DA-06-01: Establish a Task Force of legal experts on data policy, appointed by the GEO Co-Chairs and supported by the GEO Secretariat, to identify steps required to reach a common GEO data policy. The Task Force will operate in consultation with appropriate GEO committees (mainly Architecture and Data and User Interface). The Task Force, in consultation with GEO Secretariat, will identify specific elements of data policy where early progress can be made and formulate proposals for adoption by the GEO plenary in 2006 and 2007.

(Addresses Targets 042, 052, 097, 105 & 119)

[JR- The WMO Data Policy as addressed in “Resolution 40” and subsequent actions of the WMO Executive Council and Congress must be considered in this policy development activity. Other International Intergovernmental bodies (e.g. UNESCO/IOC) have also taken action on this issue. Since GEO decisions are not “binding” on Governments it brings questions regarding implementation of any GEO policy that is developed. This is perhaps a WMO issue as opposed to a CBS issue – but it does have the potential for adversely affecting individual “Systems” within GEOSS if it is not handled properly. A “task force of legal experts” without Agency reps involved could be too much of a “loose cannon”.]

Archiving, Transfer, and Dissemination

Task DA-06-02: Conduct an inventory of archived-data for each societal benefit area (especially ecosystems), identify data gaps, data at risk and evaluate costs of data rescue. In complement, conduct a workshop to define a data-archiving strategy taking into account data types, processing levels and supporting media.

[JR- The issue of data archives for essentially all data generated through WMO programs have an associated data archive component at both the National and International levels. The WMO experience including its association with the ICSU World Data Center system provides one model for GEO to consider. Participation by WMO (CBS?) in the proposed workshop could be beneficial. Strengthening the archive of meta-data is crucial and the CBS OPAG-ISS Inter-Programme Expert Team on Metadata

Implementation's activity can contribute to the GEO objectives for supporting media. The GEO efforts will also be guided by the same ISO 1900 series of standards.]

Task DA-06-03: Initiate an assessment of current data transfer and dissemination systems for all societal benefit areas, with a special workshop on this subject in 2006.

[JR- Preparations should be undertaken by CBS through its OPAG-ISS to be a major participant (even perhaps offering to host) the proposed workshop. The development of the WIS-GTS and the plans for its further development should be the model for GEO to follow in undertaking its assessment and to provide information regarding the complexities of expanding to other GEO societal benefit areas. The issues of standards, codes and data representation requirements, communication links and security, and data dissemination are a few of the complex issues that GEO must face. The emerging structure and function of the WIS, the fact that at least the initial WIS public access operation is in the demonstration phase, and the potential for using the WIS-GTS to contribute to the broader GEO objective could be crucial to attaining CBS and GEO objectives. The opportunity should be taken.]

Task DA-06-04: Evaluate the potential for extension of the Integrated Global Data Dissemination Service (IGDDS) to all societal benefit areas.

(Addresses Targets 065, 094, 095 & 136)

[JR- Technical issues like this should be followed by CBS to ensure that the idea is compatible and constructive in the evolution of the WIS-GTS]

Assimilation and Modelling

Task DA-06-05: Support and advocate funding for demonstration projects promoting the use of ensemble prediction methodology for the development of decision-support tools in areas of disaster mitigation, human health improvement, energy, and crop management.

[JR- The work program planned for the OPAG-DPFS for the 2005- 2006 outlines specific demonstration projects in the use of Ensemble Prediction Systems aimed at weather prediction on a wide spectrum of space and time scales. Most advanced DPFS centres are now operating or developing Ensemble Prediction Systems (EPS) for use in the short-, medium- and/or long-range. Most operational EPS use global models for medium-range predictions. A small number of regional ensembles focusing on short-range forecasts are in quasi-operational mode and many more are under development. Specific research programs such as the "Poor-Person's Ensembles System (PEPS)" [JR- a poor choice of name, suggest "Practical Ensemble Prediction System (PEPS)"] at the Met Office (UK) has demonstrated that this approach can provide reliable probability forecasts at relatively low cost. A regional PEPS for Europe is under development at DWD (Germany).]

[JR- in addition the WMO framework for standardized verification of EPS is being developed and implemented on an experimental basis by JMA who provided a data server and Web site and RSMC Tokyo is designated as the Lead Centre for verification of EPS]

Task DA-06-06: Initiate and maintain a regular dialogue with relevant entities on continuous provision of InSAR data and expanded application of InSAR techniques.

(Addresses Targets 007, 020, 026 & 206)

[JR- This task is directly related to recommendation S15 (Implementation Plan for Evolution of Space and Surface-based Subsystems of the GOS WMO/TD No. 1267) that addresses the application of SAR data to parameters such as wave spectra, sea ice and land surface cover. The GCOS Implementation Plan also includes the requirement for SAR data]

Basic Geographic Data

Task DA-06-07: Develop a framework document for basic geographic data (including format, precision, accuracy, etc.)

Task DA-06-08: Identify geographic data layers common to all GEOSS societal benefit areas, and those specific to each societal benefit area.

Task DA-06-09: Facilitate interoperability among Digital Elevation Model (DEM) data sets with the goal of producing a global, coordinated and integrated DEM. In parallel, advocate access to all VMAP-1 data for use by several of the GEO communities of practice.

(Addresses Targets 086 & 090)

[JR- CBS OPAG-DPFS should review this development with the objective of ensuring compatibility with DPFS data representation formats etc.]

New Data Portals and Tools

Task DA-06-10: Initiate the creation of a common portal system for access to all Earth observation data, with specific links designed to increase use, quality, and accessibility of existing information tools and networks. Particular attention will be given to the coordination of networks in specific societal benefit areas to avoid redundancy and optimize the system as a whole.

[JR- CBS has emphasized that the evolving WMO Information System (WIS), in particular the WWW GTS, should be an initial component as well as an important backbone building block within the GEO system of systems (GEOSS) for achieving a greater interoperability and connectivity among individual component observing systems. The information collection data flow concept, and the information distribution concept, of interlinked National Centers, Data Collection or Product Centers and Global Information System Centers as foreseen in WIS planning could be expanded to address the needs of other GEO Social Benefit areas. The operation would be governed by the use of standard protocols (application of WMO recommended practices?). The WIS idea of including both routine (i.e. scheduled or automatic broadcast) or–“push” systems component and a request/reply or “pull” systems component would seem apply generally across GEO areas. Security and authorization procedures would have to be expanded beyond that foreseen in the WIS – but WIS recommended practices and protocols would assist in GEO attaining its objectives (do not reinvent the wheel!). One strength of adopting WIS as a core will be to have a system universally accessible by all nations, not just GEO Member States.]

Task DA-06-11: Improve technical capability to (i) create common geo-referenced maps, (ii) merge socio-economic data and geographic information systems (GIS), and (iii) combine geo-referenced maps with application tools to yield basic information systems.

[JR- some CBS DPFS Centers may be able to contribute to this objective]

Task DA-06-12: Establish GEOSS Best Practices Registry, and request hosting proposals and designate host to maintain/update GEOSS Best Practices Registry. The registry should also include existing cost-benefit sharing mechanisms and examples (data sharing, cooperative data acquisition, joint development, joint flight, collaborative sciences, etc).

(Addresses Targets 083, 092 & 114)

[JR- The WWW system of Manuals and Guides perhaps contribute to the GEO “best practices” idea. The WMO Voluntary Cooperation Programme is a “best practices” candidate. Others? WMO to respond as the Registry is defined]

User Engagement Tasks for 2006

The organization of the GEOSS initiative into the nine societal benefit areas demonstrates the commitment to user engagement, as the primary user interface tasks will take place within each societal benefit area. The major transverse objective is the federation of potential users and stakeholders into communities of practice within the various societal benefit areas, to assist them in the identification of their requirements and the validation of applications promoted by GEO. The GEO Committee on User Interface will have lead responsibility for this activity.

Task US-06-01: Initiate at least one pilot community of practice in early 2006 and at least two more communities of practice in the fourth quarter of 2006, to identify and further refine users’ needs, in particular on cross-cutting areas, building upon the initial experience of community of practice and on information provided by national, regional and project level surveys.

[JR- CBS may need to respond if the data requirements exceed what the WWW and associated WMO Programs can provide. Expect the initial “communities of practice” to be Health and Disasters. One variable that almost all users will require will be precipitation data – does there need to be action within CBS to address precipitation data exchange?]

Task US-06-02: Promote interactions, in the form of fora, between data providers, scientists, industry, international governmental and non-governmental organizations, decision- and policy- makers to identify requirements for new or improved data, products and services.

(Addresses Targets 013, 022, 032, 037, 068, 096 & 153)

[JR- CBS may need to arrange for participation in these for a. Need to see agenda]

Capacity Building Tasks for 2006

Transverse capacity building objectives for 2006 will be coordinated with the GEO Committee on Capacity Building and Outreach and will focus on:

1. Assessing existing and planned capacity-building activities in Earth observations globally, to provide frame for future GEOSS capacity building initiatives
2. Initiating specific activities for a number of societal benefit areas, including Disasters, Health, Water, Weather, Ecosystems and Agriculture

General Activities

Task CB-06-01: Perform a survey of capacity-building initiatives in GEO member countries and Participating Organizations to identify existing and planned capacity-building activities and gaps.

[JR- This should be a WMO –Wide activity to provide input to the survey. The WMO Technical Cooperation Programme (including VCP) and the Education and Training Program along with the Regional Offices can provide major inputs for the survey. The technical programs and Commissions, the WMO Space Programme the Public Weather Service Programme and the Natural Disaster Prevention and Mitigation Programme also have identified requirements for observing stations, training workshops etc. aimed at capacity-building in developing countries. The WMO input to the survey should be organized to convey the priority needs of the organization. The potential benefit of such a survey would be if items in the list would generate funding through GEO, therefore the presentation of the list should convey a sense of urgent need for the high priority items and be convincing in the explanation of the benefit to GEO objectives. See also Tasks CB-06-02 and CB-06-03 below.]

Task CB-06-02: Identify infrastructure needs critical to the implementation of GEOSS in developing countries.

[JR – I assume “infrastructure” covers all aspects of CBS – GOS, GTS-ISS, and GDPFS. CBS should spend some effort listing specific projects or activities within the various WWW plans (with explanation of the need and benefit) that could be accomplished if resources were available to implement them in developing countries. The problem with these Tasks is to present a list of needs that has more content than a simple “shopping list” – it should convey a sense of priority and offer a high probability of success. It will be important to effectively demonstrate needs beyond the Tsunami warning system needs.]

Task CB-06-03: Support the expansion of Earth observation education and training initiatives in developing countries in cooperation with specialized UN and other organizations.

(Addresses Targets 010, 099, 100, 101, 102, 104 & 106)

[JR- see also Task CB-06-07 below. It perhaps is an opportune time to develop a comprehensive training strategy in cooperation with GEO that includes a “hands on” training component and a continuing “distance learning” refresher and technology upgrade component. The Virtual Laboratory model and computer assisted systems such as the USA Comet program might contribute. The idea would be to create a basic system that can be applied first to Weather issues and expanded to other user communities.]

Capacity Building Activities by Societal Benefit Area

Task CB-06-04: Disasters: Initiate a knowledge-transfer programme to developing countries, to ensure minimum capacity to utilise Earth observations for disaster management.

(Addresses Target 005)

[JR- WMO Natural Disaster Prevention and Mitigation Program perhaps can utilize this Task in its activity]]

Task CB-06-05: Health: Perform an assessment (per country, with emphasis on developing countries) of existing capacities for the integration of Earth observation and Health data (in terms of data collection, processing and integration). Identify gaps, and explore funding projects to close gaps.

(Addresses Target 015)

Task CB-06-06: Water: Promote best practices in Earth observation application for integrated water resource management in developing countries by supporting the IGWCO series of workshops in South America, Asia, and Africa.

(Addresses Targets 050, 051 & 052)

Task CB-06-07: Weather: Co-organize a series of regional workshops with major numerical weather-prediction (NWP)-training centres to assist developing countries in their utilization of currently available forecasts; building in particular upon WMO programmes for the least developed countries.

(Addresses Targets 054, 055 & 101)

[JR- This is already planned and underway under the CBS DPFS 6-day Workshop program on EPS applications. Concern has been raised in CBS XIII regarding the resources required to develop the workshops and the demands on experts to provide the lectures. GEO looks to co-organize the program and hopefully can help in supporting the costs etc.- See also CB-06-03 above]

Task CB-06-08: Ecosystems: Build upon the ANTARES initiative in South America to develop a global network of organization-networks for ecosystems (including regional networks), and coordinate workshops to strengthen observing capacity in developing countries.

(Addresses Targets 062 & 063)

Task CB-06-09: Agriculture: Design training modules to demonstrate the usage of Earth observation data and products for the agricultural sector in Africa, Asia, Latin America, and the Indian subcontinent.

(Addresses Targets 070, 071 & 076)

[JR- CAgM might contribute here]

Outreach Tasks for 2006

Outreach goals for 2006 will focus on the following:

1. Enhancing technical engagement with emerging user communities for Earth observations
2. Raising awareness of the availability and potential uses of Earth observations in each societal benefit area

3. Raising general awareness of GEOSS and the value of Earth observations through the design and launch of an 18-month communication campaign to reach prioritized target audiences
4. Maintaining ongoing media contact and interest in GEOSS

Engagement with Specialized Scientific and Technical Audiences

Task OR-06-01: Develop a comprehensive list of major international conferences and workshops relevant to GEOSS (UNFCCC COP, sustainable development fora, etc.) in each societal benefit area and ensure GEOSS participation and visibility in selected events.

[JR- The proposed Technical Conference on the WMO Information System (Nov 2006) offers the opportunity to educate the GEO community about WIS and its potential as a core component within GEOSS. One option will be to invite GEO to co-sponsor and provide support to the conference. The involvement of participants from the developing countries will be attractive to GEO. The agenda might be arranged so that the GEO Secretariat Director and experts from the GEO community could also present their vision of Information Systems (see Task DA-06-10).]

Task OR-06-02: Engage in a series of presentations and briefings to technical audiences in each societal benefit area, with an emphasis on emerging fields of health, energy, water resources management, and ecosystems.

Task OR-06-03: Promote awareness of successful communities of practice activities, advancing awareness of potential applications for Earth observations.

(Addresses Targets 011, 025, 107 & 189)

[JR- Meteorology is obviously a successful “community of practice”. How such promotion is done is important. WMO should monitor GEO activity – and hopefully have a say in the development of promotion information.]

Outreach to Non-Specialists

Task OR-06-04: Implement an outreach campaign plan of targeted communication activities developed by the Secretariat.

Task OR-06-05: Complete preparation of general communication tools for the outreach campaign, including a GEOSS logo/visual identity; an engaging website; an umbrella message and sector-specific messages; multi-media & press tools; and standard PowerPoint briefings.

Task OR-06-06: In coordination with the outreach campaign, engage in a series of regular media roundtables and briefings and occasional well-timed press conferences and special events.

Task OR-06-07: Establish a network of press & media representatives for all GEO members and participating organisations to advance outreach objectives.

(Addresses Targets 107 & 189)

[JR- WMO should be concerned about just what the various “sector – specific messages” contain, and offer to produce materials for appropriate WMO areas of responsibility]]

Disasters Tasks for 2006

Disaster-induced losses can be significantly reduced through an enhanced coordination of observations related to hazards, timely processing of the data and dissemination of the resulting information to relevant authorities. GEOSS implementation will provide a major contribution to the monitoring, prediction, early warning and mitigation of hazards occurring at local, regional and global levels.

Activities for 2006 focus on:

1. Priorities identified by the GEO Working Group on Tsunami Activities including
 - Supporting the Intergovernmental Oceanographic Commission (IOC) in its effort to develop efficient early warning systems in the Indian Ocean (IOTWS), the Pacific (ITSU), the Mediterranean and the Caribbean
 - Expanding data collection and archiving over tsunami-prone areas
 - Producing key missing products and maps
 - Standardizing data formats and facilitating data access for developing countries
 - Developing a multi-hazard approach to coastal management

2. Expanding the use of space-based observations for disaster prevention and mitigation

Data Collection, Archiving and Format

Task DI-06-01: Encourage in-situ and space agencies to (i) systematically record data over regions subject to tsunami risk and (ii) archive data in a form easily accessible to all countries.

Task DI-06-02: Facilitate improvement of capabilities for global seismographic networks such as GSN, FDSN, DAPHNE, and data sharing among GEO members.

Task DI-06-03: Assist IOC in the evaluation of industrial bids in support of in-situ instrument development for tsunami detection.

Task DI-06-04: Promote the format standardization of water-level data (eg. DART data), in a format easily used by developing countries.

(Addresses Targets 003 & 004)

[JR- This series of tasks are totally devoted to Tsunamis. There are issues re data collection, archiving and format that apply to all data related to Disasters. CBS might comment. The tropical cyclone problem is well in hand, except for data coverage. The use of the proposed buoy system to detect Tsunamis should also serve weather and climate sectors, etc etc.. Has this been done?]

Products and Maps

Task DI-06-05: Promote the collection of coastal-land data to produce high-resolution near-shore bathymetric maps and Digital Elevation Maps (DEMs), and in turn better assess vulnerability to tsunami run-up and inundation.

[JR- these maps also have utilization in storm surge models for Tropical Cyclone warning application and for impacts of extreme extra-tropical cyclones affecting shorelines – not only Tsunami prone areas need this data and mapping. In fact highest priority might go to coastal areas vulnerable to both Tsunami and Tropical Cyclones.]

Task DI-06-06: Conduct an inventory of existing geologic and all-hazard zonation maps and identify gaps and needs for digitization.

(Addresses Targets 003 & 008)

[JR- The WMO Natural Hazards Prevention and Mitigation Programme may have contribution here, such maps exist for certain countries and regions]

Data Access

Task DI-06-07: Advocate open access to all data relevant to tsunami early warning, vulnerability assessment and post-reconstruction, with particular emphasis on real-time access for developing countries.

[JR- CBS action ? Application of WMO and IOC data policies would seem to meet the objective]

Task DI-06-08: Explore possibilities for the development of an international charter on telecommunication systems and disasters, building upon the experience of the International Charter on Space and Major Disasters. Moreover analyze and define how best to apply lessons learned from the International Charter on Space and Major Disasters as an early successful experiment in rapid Earth observation data access.

(Addresses Targets 001 & 003)

[JR- I expect the GTS provides the most reliable and comprehensive system supporting disaster warning operations in real time. The evolution of the GTS to the ISS-WIS and how this meshes (or doesn't) with the objectives of this task must be considered. CBS should be a major participant in this task.]

Use of Space-based Observations

Task DI-06-09: Conduct an inventory of meteorological geostationary-satellite capabilities for the management of non-weather related disasters.

Task DI-06-10: Explore the dissemination capability of meteorological geostationary satellites for sustaining a global hazard warning system.

[JR- This relates to the GTS/WIS planning. CBS should be aware of activity here.]

Task DI-06-11: Support, and advocate funding for, research projects that contribute to the improved integration of InSAR technology for disaster warning and prediction.

(Addresses Targets 003, 006 & 007)

National and International Cooperation

Task DI-06-12: Provide high-level incentives for the cooperation of national and international agencies towards a multi-hazard “coastal vulnerability” approach, linking coastal flooding, storm surges, tropical cyclones and tsunamis.

[JR- the WMO Tropical Cyclone Program and the network of the five RSMCs with Tropical Cyclone forecasting responsibilities must be a major item here. The longstanding cooperation within and among the WMO Regions and in cooperation with other agencies (e.g. ESCAP) in this program is a model that WMO should exhibit as one way to approach this topic.]

Task DI-06-13: Initiate and maintain a dialogue between GEO and the Board of the International Charter on Space and Major Disasters to identify mechanisms for strengthening the scope and mandate of the Charter.

(Addresses Targets 001, 003 & 005)

[JR- See also Task DI-06-08]

Health Tasks for 2006

The application of Earth observations to improve human health is an emerging field in which GEO can facilitate significant progress by forging new connections between the Earth observation and health sectors at all levels.

Activities for 2006 focus on:

1. Identifying and further refining human health user requirements for Earth observations
2. Improving the Earth observation sector's understanding of these requirements
3. Demonstrating the utility of Earth observations for human health needs
4. Raising awareness of the availability and potential uses of Earth observations for human health

[JR- CBS will eventually have to respond to the user requirements that arise for atmospheric data that emerge from this GEO Activity. Some specialized products may be required from the DPFS centers.]

Task HE-06-01: Building upon 2005 Task 8, establish a GEO Human Health, Environment and Earth Observation Task Force, composed of representatives of the health, environment, and Earth observation communities at national and regional levels, to support the Secretariat in defining priorities and implementing all health-related tasks.

User Requirements

Task HE-06-02: Hold a workshop in Geneva at mid 2006, organized by GEO Secretariat with the support of WHO, that will cover human health issues, including observations, modelling aspects, building upon the 2005 events (EC workshop on Human health and Global Change, NIEHS/EPA workshop on Human health and Air quality, EPIDEMIO workshop, WENGEN meeting on seasonal climate forecasts for health, etc).

(Addresses most Health targets)

Utility of Earth Observations

Task HE-06-03: Facilitate the formation of international consortia and coordinate, besides advocating funding for, the implementation of one to three major demonstration pilot-projects integrating Earth observations, health and epidemiological as well as socio-economic data.

(Addresses Target 015)

Awareness

Task HE-06-04: Organize bi-lateral meetings with major health organizations and associations at national and regional levels and representatives of GEO, to raise awareness of potential uses of Earth observation for Health.

(Addresses Targets 011 & 013)

Energy Tasks for 2006

Much like the health sector, the application of Earth observation information to improve energy development, management and delivery is an emerging field that could bear significant benefits

for economies worldwide and transition economies in particular. Although the need for improved weather forecasting has been well articulated by the energy sector, the application of additional types of Earth observation information remains largely unexplored. Development of new applications in this area must take into account strong industrial competitiveness in the energy sector, which tends to limit the exchange of information between stakeholders.

Activities in the energy sector will focus on:

1. Assessing the importance of Earth observation-derived information for sustainable energy management
2. Producing a strategic 5-10 Year Plan for the exploitation of the new generation of operational observing systems, building upon consultations with international policy and economic organizations, energy providers, and the Earth observation community
3. Facilitating access to existing information and products for energy stakeholders
4. Identifying and further refining Energy users' requirements for Earth-observation-derived information and customized tools
5. Encouraging the development of decision support systems and tools for energy management

Task EN-06-01: Building upon 2005 Task 8, convene a GEO Energy and Earth Observations Task Force, composed of representatives of both the energy and Earth observation communities at national and regional levels, to support the Secretariat in developing and implementing energy-related priorities and tasks.

Task EN-06-02: Build on the 2005 planning meeting of the Energy-Earth Observation Task Force with the objective to hold a major workshop in 2006 for the identification / definition of main elements and components of a strategic 5-10 Year Plan for the optimum exploitation of the enhanced capabilities offered by the forthcoming new generation of observing systems and forecasting modelling techniques (eg. Ensemble-based techniques developed by ECMWF and others).

(Addresses Target 026)

[JR- Potential role for WWW- DPFS Centers. Note ECMWF is identified as an action agency. Other Centers notably the RSMCs specializing in the provision of transport model products for environmental emergency response can contribute.]

User Requirements

Task EN-06-03: Conduct a survey and assessment of energy management needs in terms of environmental information in cooperation with national energy agencies and associations, examining current usage and identifying gaps in observations, models, access to data, etc.

Task EN-06-04: Instigate meetings between information providers (meteorological offices, service companies) and specific energy user communities to identify requirements for improvement of current decision support systems or new developments. (Addresses Targets 025 & 026)

Awareness

Task EN-06-05: Participate in major energy fora and roundtables organized by international organizations, energy associations, and business councils.
(Addresses Targets 025 & 026)

Climate Tasks for 2006

GEO will first emphasize the overriding importance of long-term, homogeneous records of key climate variables in the atmospheric, oceanic, and terrestrial domains. Secondly GEO will focus on the need to develop successful mechanisms for sharing Essential Climate Variable (ECV) data and the need for parity among national structures for producing ECV data in the specific domains of oceans and land.

Activities for 2006 focus on:

1. Providing coherent, consistent, continuous long-term records for key climate datasets
2. Expanding observations of Essential Climate Variable (ECVs)
3. Enhancing and improving coordination of terrestrial climate observations and improving coherence in global ocean observation coordination

[JR- The Implementation Plan for the Global Observing System for Climate, GCOS-92, WMO/TD No. 1219, lays out a detailed list of actions to implement the global climate observing system. CBS is identified as a participating “action agency” for many of the specified actions and it is responding. GEO should be encouraged to utilize this Implementation Plan as the basis for Tasking – supporting as appropriate Actions requiring resources and political support unavailable from the existing agencies and participating organizations and countries. GCOS should be the lead.]

Long-term Records

Task CL-06-01: Create an international mechanism to maintain sustained climate data reprocessing and reanalysis efforts, building on the successes exemplified by projects like the International Satellite Cloud Climatology Project.

(Addresses Target 028)

[JR- Selected DPFS centers in cooperation with research institutions have been involved in the atmospheric re-analysis efforts to date. The reanalysis activity is research driven but requires close cooperation with the operational centers thus CBS may wish to participate in developing the mechanism.]

Essential Climate Variables

Task CL-06-02: In cooperation with GCOS, conduct a current and projected gap analysis for satellite Earth observing systems that provide Essential Climate Variable data to the climate sector.

(Addresses Targets 035 & 036)

[JR- Many of the ECVs are contributed by the WWW/GOS Space Based component. The Implementation Plan for the Evolution ... of the GOS (WMO TD No. 1267) provides and initial analysis. The WMO Space Program should contribute to the gap analysis.]

Terrestrial and Ocean Observations

Task CL-06-03: Clarify and consolidate the role of existing intergovernmental mechanisms for terrestrial climate observations in order to expand the comprehensiveness

of current networks, facilitate exchange of data, and provide strategic direction to the terrestrial climate sector.

[JR- see comment following the introduction to the Architecture section above. This Task asks for the development of a “Commission” analogous to CBS and JCOMM but for terrestrial observations. It could have much broader application (e.g. GEO Societal Benefit Areas of Health, Energy, Water, Ecosystems, Agriculture and Biodiversity) than just terrestrial aspects of Climate although that is probably the place to start. An intergovernmental mechanism that can set standards and procedures – and interact with CBS and JCOMM is needed. CBS should monitor and interact with this organizational activity]

Task CL-06-04: Identify lead national entities or focal points for national ocean observation efforts that can articulate national goals for their ocean observing sector and coordinate national activities with other designated national entities in order to create a truly global system of ocean observations.

(Addresses Targets 027, 033 & 034)

[JR- GOOS and JCOMM essentially have this task. No issue for CBS except as it might affect the current structure and function and workings of the existing Commissions.]

Water Tasks for 2006

Improving water resource management through a better understanding of the water cycle is a priority objective for GEOSS. This implies the integration of observations, data assimilation, prediction models and decision support tools into a coherent and comprehensive management system. Based on activity outcomes from various meetings and workshops in 2005 such as PEHRPP workshop (June), GTN-H meeting (July), NCAR workshop (July), GEOSS-IGWCO workshop (November), AGU water session (December), activities for 2006 will focus on:

1. Improving existing *in-situ* observation networks for hydrology at all levels
2. Improving and expanding space-based observations for measurement of new hydrological variables
3. Developing new ensemble-based hydrological prediction techniques
4. Improving existing water management products
5. Expanding developing country capacity for water resource management through improved access to Earth observation tools

[JR- Role of CHy?]

In-situ and Space Observing Systems

Task WA-06-01: Hold one large workshop on Water and Earth observations, combining space and in-situ observing systems and focussing on (1) water quality, (2) surface and ground waters, (3) precipitation, (4) soil moisture, (5) hydrological ensemble-based prediction and (6) new observing techniques and products

(Addresses Targets 040, 041, 042, 043, 044, 045, 046, 047 & 049)

[JR- Some of the variables fall ,at least partially, within the purview of CBS (e.g. precipitation and soil moisture) and others in the area of responsibility of CHy. Participation by CBS in this workshop would be useful. The GCOS Implementation plan addresses this subject in some depth.]]

Hydrological Prediction Techniques

Task WA-06-02: Help coordinate and advocate funding (NSF, EC, etc.) for one (or more) demonstration-project that points to the added value of hydrological ensemble-based forecasts in local water resource-management.

(Addresses Target 049)

[JR- of interest to CHy?]

Water Resource Management

Task WA-06-03: Plan a session for World Water Forum IV (March 2006, Mexico), highlighting the benefits of global and coordinated Earth observations for water resource-management

Task WA-06-04: Produce a global dataset mapping catchments to the first and second order stream level for use in applying land cover data to management of catchments and monitoring the hydrological cycle.

(Addresses Targets 50 & 069)

Weather Tasks for 2006

The GEO priorities in the realm of weather are consistent with, and supportive of, those of the World Meteorological Organization (WMO). Consistently objectives for 2006 were designed to support WMO efforts in addressing issues of data continuity, data gaps and predictive model improvements. These include:

40. Advocating the stability (and improvement as necessary) of space-based and surface-based observing systems
41. Encouraging the development of advanced forecasting systems and decision-support tools to fully realize the potential of these observing systems
42. Improving access to sophisticated numerical weather prediction products for developing and least developed countries

Surface-based and Space-based Observing Systems

Task WE-06-01: Advocate a complete and stable surface-based (in-situ and airborne) Global Observing System (GOS). High priority should be given to a stable and fully functional GCOS Upper Air Network (GUAN) and the further development of the Aircraft Meteorological Data Relay (AMDAR) programme including homogenous coverage of AMDAR data over 24 hours and improved vertical resolution of vertical profiles.

[JR- this seem like a reasonable high priority task for GEO to advocate. Perhaps there are special actions that CBS can take to ensure that GEO makes appropriate connections in its advocacy role – especially for the AMDAR.]

Task WE-06-02: Advocate a stable and improved space-based Global Observing System (GOS) including operational geostationary and polar components. In particular support WMO efforts related to (i) increased spatial and temporal resolution for geostationary imagers and sounders; (ii) a broader availability of polar Doppler wind profiles for initial operational testing.

[JR- does this jive with the Implementation Plan For Evolution ofGOS (WMO TD No. 1267) ? As far as I can tell it does.]

Task WE-06-03: Facilitate the timely implementation of the Global Precipitation Measurement mission.
(Addresses Target 053)

[JR- this is a priority for CBS too.]

Data Dissemination

Task WE-06-04: Support the WMO Space Programme in the development of Advanced Dissemination Methods (ADMs) and of an operational Integrated Global Data Dissemination Service (IGDDS), to help meet requirements related to data timeliness and improved communication systems in numerical weather prediction (NWP) application areas.

(Addresses Targets 053 & 57)

[JR- Again, this is part of the general Architecture-Data Management planning. And it is part of the CBS planning.]

Data Access

Task WE-06-05: Initiate and maintain a regular dialogue with international weather data centres to promote wide distribution and international exchange of NWP data, including free access for developing countries.

(Addresses Targets 054 & 105)

[JR- this “business as usual” for CBS. Perhaps GEO doesn’t realize how it has worked for the last 50 years]

Ecosystems Tasks for 2006

The goal of systematic, global ecosystems observations is to describe and to assess the condition of ecosystem services, including current pressures and impacts on those services, with particular regard to natural resource management. A key outcome of GEOSS is to support natural resource industries and managers in understanding resource production potential and limits within the context of ecosystems, to inform policy making and promote sustainability.

For this, it is essential to improve the basic knowledge of the temporal and spatial variation in the ecosystems. The vision for GEOSS is to allow repeated mapping of ecosystem extent and the quantification of ecosystem condition. This requires the development of standardized and integrated methodologies, observations, and products on a global basis.

Objectives for 2006 focus on:

1. Initiating planning and investment for a global carbon observing system
2. Developing a global operational scheme for ecosystem classification
3. Pursuing harmonization of ecosystem observing methods
4. Improving tools for space-based and in-situ ecosystem observations

Global Carbon Observing System

Task EC-06-01: Support the Integrated Global Carbon Observation (IGCO) in elaborating specific investment recommendations for the development of a global carbon-observing system, in particular improved global networks of in-situ CO₂ observations. (Addresses Target 059)

Ecosystem Classification & Observing Methods

Task EC-06-02: Formally establish an Ecosystems Classification Task Force, covering terrestrial, freshwater, and ocean ecosystems, with a mandate to create a globally agreed, robust, and viable classification scheme for ecosystems.

Task EC-06-03: Create synergies between ecosystem observing activities and those of existing groups and mechanisms for terrestrial, and marine systems.

Task EC-06-04: Initiate the harmonization of observing-methods. (Addresses Targets 058, 059 & 060)

Observation Tools

Task EC-06-05: Explore techniques for up-scaling in-situ ecosystem observations.

Task EC-06-06: Carry out the 2005-initiated survey of the research community involved in in-situ observations and modelling for new platform and sensor needs, or for suggestions for better use of existing systems.

(Addresses Targets 064 & 067)

Agriculture Tasks for 2006

The primary GEO goal within the Agriculture societal benefit area is to increase food security through the utilization of Earth observations. This requires provision of a set of forecasting tools to be used by agricultural planners, policy makers and land managers in food-insecure regions of the world and provision of training at local and regional levels in the use of these tools. Some of the immediate needs that have been identified include the development of (i) standardized value-added products,

(ii) commitment to produce regular updates to these products in order to track change affecting the agricultural sector, and (iii) early-warning or on-time information delivery systems that reach the appropriate levels for action.

Activities in 2006 will focus on:

1. Further refining agriculture user requirements for Earth observations
2. Identifying resources necessary to develop, validate, and deliver appropriately-scaled Earth observation products and tools to regional and local agricultural planning entities in the developing world
3. Identifying resources to develop robust methodologies for mapping and monitoring diverse examples of irrigated areas and food production from irrigated areas in the developing world

Task AG-06-01: Establish a GEO Agriculture and Earth Observations Task Force to create a 5 to 10 year strategic plan, define a series of specific objectives for 2006 and create a plan of action for GEOSS. The Task Force is to include, but will not be limited to, representation from the Food and Agriculture Organization, the European Environmental Agency, the food production industry and GEO member nations.

[JR- CBS will have to address the results of the strategic planning process relative to its impact on the GOS, GTS/WIS and DPFS. CAgM and the Agriculture Meteorology

Program of WMO should be involved in the strategic planning. The development of useful satellite products such as soil moisture will depend on appropriate in-situ “ground truth” and validation measurements which could involve action on the part of CBS – beyond what is already in the Manuals and Guides. An attempt to address how well the existing systems meet the needs for Agrometeorology are summarized in the Statements of Guidance document. This might be useful for the GEO Agriculture and Earth Observation Task Force.]

Land Cover Change Dataset

Task AG-06-02: Utilize the 2005 global land use/land cover data set from GLOBCOVER and the earlier 1-km resolution land cover data set released by the Joint Research Centre in 2000, to produce a global land cover change dataset and report. Create mechanisms for regular analysis and reporting on land cover change. (Addresses Target 069)

Methodology for Mapping

Task AG-06-03: Advocate funding for demonstration projects to produce global irrigated area/crop production datasets and promulgate sustained monitoring efforts utilizing the validated methodologies.

Task AG-06-04: Investigate how precision farming techniques and applications could be adapted and appropriately transferred to developing countries. (Addresses Targets 069 & 074)

Biodiversity Tasks for 2006

Biodiversity monitoring efforts worldwide engage the interest and concern of population segments as diverse as the ecotourism industry, the pharmaceutical industry, environmental organizations, the agricultural sector, and, of course, the scientific community. The community of networks monitoring various aspects of biodiversity is highly diverse and topically focused. The challenge for building GEOSS in this realm is to assist these monitoring communities to develop comprehensive classification and observing strategies that will allow both observational standards and interoperability to emerge from the current monitoring activities, thus allowing global integration of data generated by these efforts.

Activities in 2006 will focus on: 1. 2. 3.

1. Developing coherent biodiversity observation strategies within the context of an agreed upon ecosystem classification system
2. Facilitating the establishment of monitoring systems for policy-interest and endangered species, allowing frequently-repeated, globally-coordinated assessment of trends and distributions of species of special conservation merit, including domesticated animals; cultivated plants and fish species and their wild relatives; and species of medicinal or economic value
3. Facilitating the capture of ten million new biodiversity observations per year, the agreement to data collection protocols by networks of permanent sites, and the launch of initiatives on three key issues

Observation Strategy

Task BI-06-01: Ensure participation of the biodiversity community on the Ecosystem Task Force (see Task EC-06-01) in order to ensure that the classification system developed as part of this task is compatible with biodiversity observational requirements.

Task BI-06-02: Conduct a series of workshops and meetings to 1) define the needs and requirements of the biodiversity information users sector, 2) delineate available methodologies and 3) identify the adequacy of current observational strategies.

Task BI-06-03: Initiate the development of a strategic plan for periodic global assessment of status and trends for species of merit. Include the remote sensing community in this discussion to determine the applicability of remote sensing to this topic.

(Addresses Targets 077 & 078)

Biodiversity Observations

Task BI-06-04: Facilitate the identification of a network of permanent observation sites and key issues that focus on the recommendations of Task BI-06-02.

(Addresses Target 078)