GEO 2009-2011 WORK PLAN

Version 2

Submitted for Official Review

(comments to be sent by 3 October 2008 to secretariat@geosec.org)

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Note to the Reader

This second version of a new three-year GEO Work Plan for the period 2009-2011 is based on a set of written guidelines reflecting the GEO-IV Plenary and Cape Town Ministerial Summit conclusions about how the Work Plan should evolve (see Annex I). It incorporates the technical comments and proposals received from the GEO community during the period July to August 2008. Compared with Version 1, it proposes a new section on governance, including a description of the evolving role of GEO Committees and the procedures for Task management. A number of changes have been made to the structure and approach to reflect the evolution of GEOSS since the start of the 2007-2009 Plan. These changes are described in the section below entitled “The New Work Plan”.

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WORK PLAN GOVERNANCE

The annually updated GEO Work Plan provides the agreed framework for implementing the GEOSS 10-Year Implementation Plan (2005-2015). It consists of a set of practical Tasks that are carried out by various GEO Members and Participating Organizations.

I THE NEW WORK PLAN

The Work Plan for 2009-2011 takes the GEOSS 10-Year Implementation Plan up to and past its mid-way point. While the first phase of GEOSS development, from 2005 to 2008, focused on building the GEO community and engaging countries and organizations, the next phase increasingly focuses on actually putting the components of GEOSS into place. As GEOSS takes shape over the next several years, connections will be realized between diverse observing, processing, data-assimilation, modeling, and information-dissemination systems. This will make it possible to obtain a dramatically increased range of data sets, products and services on the key aspects of the Earth system.

To achieve this, the 2009-2011 Work Plan differs from its 2007-2009 predecessor in three main ways: (i) it groups the Tasks into two thematic parts; (ii) it consolidates GEO activities developed in the first years of GEOSS implementation under a smaller number of overarching Tasks; and (iii) it enhances the role of users and Communities of Practice – taking full account of the IGOS transition into GEO. Finally it features "spider diagrams" to illustrate and emphasize how Tasks cut across the Societal Benefit Areas (SBAs) of GEOSS.

(i) A Two-part Structure

The 2009-2011 Work Plan has been structured into two major parts to offer a clearer overview of GEO activities. Part I, "A Transverse GEOSS", highlights how the fundamental, cross-cutting components of GEOSS, such as the GEOSS Common Infrastructure, are being built. Part II, "The nine GEOSS Societal Benefit Areas", describes the services and end-to-end systems that will support decision-making in each of the societal benefit areas. These two parts are intimately linked and fully complementary; they can be seen as representing the two faces of the GEOSS coin.

(ii) A Smaller Number of Consolidated Tasks

The 2009-2011 Work Plan seeks to emphasize the added value that GEO brings to Earth observation. It does this by merging or linking related 2007-2009 Tasks & activities and bringing strategic overarching objectives to ongoing activities – while ensuring continuity. This leads to a grouping of just 36 overarching Tasks (compared with 73 Tasks in the previous 2007-2009 Plan). To facilitate practical implementation, many of the overarching Tasks are sub-divided into sub-tasks, each with its own Lead, Point of Contact and reporting Task Sheet. Details of how the 2007-2009 Tasks have transitioned into the new 2009-2011 Work Plan may be found in Annex II.

(iii) An Enhanced User-driven Approach

The 2009-2011 Work Plan reflects the inputs and engagement of the GEO Communities of Practice including former IGOS themes (for a complete list of Communities of Practice, see p. 43). This marks the start of a reinvigorated effort to ensure that users are engaged with GEO and that they are actively involved in implementing the Work Plan. In addition, in Part II, "Spider-web" diagrams make it possible to visualize the relevance of each Task to all nine SBAs, or in other words, the transverse nature of GEOSS. The relevance to each societal benefit area is graded from a minimum of 0 to a maximum of 5. Tasks in Part I are transverse and therefore by definition relevant to all SBAs.

Taken together, these changes to the Work Plan approach should make the vision of a cross-cutting and user-driven GEOSS clearer for all contributors and participants. By making the linkages between Tasks and components explicit, this more focused approach seeks to bring the 10-Year GEOSS Implementation Plan for 2005-2015 closer to realization.

II EVOLVING ROLE OF GEO COMMITTEES

With the growing maturity of GEOSS and the launch of the three-year 2009-2011Work Plan, the importance of the four GEO Committees is set to increase. The Committees and their individual members will need to maintain the momentum of their existing efforts while tackling new challenges. While working within their existing terms of reference, Committee will need to take additional measures to ensure that GEOSS progresses to the next level and that this progress is recognized by Ministers at the next GEO Summit.

(i) Guiding the Work Plan

The primary responsibility of the Committees is to provide recommendations on the definition and periodic revisions of the Work Plan and its progress. The Architecture and Data Committee (ADC) oversees the construction of the GEOSS architecture and focuses on a specific set of Tasks. The Capacity Building Committee (CBC) promotes the capacity of both the providers and users to engage in GEOSS; it too focuses on certain Tasks but also confirms more broadly that all Tasks contribute to building capacity.

The User Interface Committee (UIC) and the Science and Technology Committee (STC), on the other hand, have more cross-cutting mandates; they review the Work Plan to ensure that GEOSS fully reflects user needs and the best science and technology available. Together with the CBC, they periodically assess how the Work Plan is progressing from their unique vantage points, possibly defining a set of priority Tasks.

To carry out their work, the Committees rely on interactions with Task Leads, reviews of Task Sheets and progress reports issued periodically by the Secretariat. They then provide recommendations for corrective actions when needed. Each Committee also plays an important role in helping identify Leads and contributors for all Work Plan Tasks. They provide expertise, ideas, contacts, recommendations and practical support to the Task teams.

More specifically:

* *The Architecture and Data Committee* oversees the Tasks that are dedicated to building a transverse GEOSS (see Chapters 1.1, 1.2 and 1.3). ADC members are responsible for addressing all issues involving infrastructure, coordinated observation systems and cross-cutting data sets. This Committee has a particularly important role in guiding the Tasks relating to the GEOSS Common Infrastructure and to Data Sharing Principles.

* *The Capacity Building Committee* helps to define and then continuously review the five Tasks dedicated to building capacity for a transverse GEOSS (see chapters 1.1 and 1.4). CBC members also review the capacity-building components in all other Tasks (which are described in a dedicated capacity-building “box” in each Task Sheet) in order to promote synergies, reduce duplication, and address gaps.

* *The Science and Technology Committee* ensures that the Work Plan and its various Tasks reflect the most up-to-date scientific and technological understanding of Earth systems and Earth observation tools. This responsibility includes developing, reviewing and periodically updating the GEOSS Science and Technology Roadmap. The Roadmap describes the major scientific and technological gaps that need to be addressed so that GEOSS can achieve its full potential. STC members also interact with the GEO Communities of Practice and other expert fora.

* *The User Interface Committee* takes the lead in assessing the needs and requirements of the end-users of Earth observations. UIC members ensure that user needs are reflected in the Work Plan Tasks. These diverse user groups need to be engaged actively in the design and construction of GEOSS so that it delivers what they truly need.

(ii) GCI and Data Sharing: the Two Cornerstones of the 2009-2011 Work Plan

If the 2009-2011 Work Plan is to succeed in securing the foundations of GEOSS, the four Committees need to make an essential contribution to advancing two GEOSS cornerstones: the GEOSS Common Infrastructure (GCI) and the implementation of GEOSS Data Sharing Principles. The ADC plays a key role in guiding the construction of these two cornerstones, while other Committees provide additional oversight from their particular perspectives.

The **GEOSS Common Infrastructure (GCI)** consists of a web-based portal, a clearinghouse for searching data, information and services, registries containing information about GEOSS components and associated standards and best practices. It requires specific contributions from each Committee. During the first year of the Work Plan, these contributions will be made via the GCI Initial Operating Capacity (IOC) Task Force. The CBC will contribute to the GCI by ensuring the proper development of the capacity-building components of the GEO Portal. In parallel the STC will ensure that the GCI reflects the best scientific knowledge and technologies available. Finally, the UIC will ensure that the GCI is providing the data sets, products and tools that users need.

The development and implementation of the **GEO Data Sharing Principles** should also be a key priority for all Committees during the first two years of Work Plan implementation – in order to build full consensus of GEO Members and Participating Organizations for adoption at the GEO-VII Plenary and Ministerial Summit in 2010.

(iii) Engaging the GEO Community

In addition to the responsibilities described above, the CBC, STC and UIC contribute to the Work Plan implementation by engaging users and producers of Earth observations and reaching out to resource providers and other interested groups. In particular:

Capacity Building Committee

Resource Mobilization – The CBC is responsible for implementing the Seville Roadmap on Resource Mobilization (available on the GEO website). The road map aims to support the GEO Capacity Building Strategy by positioning GEO as a coordinated mechanism and broker for mobilizing resources. Committee members individually and collectively identify priorities and resource needs for addressing human, institutional and infrastructural capacity in Earth observation. They then seek to identify and engage donors and other providers of resources.

A Coordinated and Effective Approach to Capacity Building – More broadly, CBC members ensure that the GEO community maintains a coordinated and effective approach to capacity building and resource mobilization. They analyze national strategies for capacity-building and proactively seek to ensure that they are coordinated and mutually supportive. The ultimate aim is to ensure that all countries have the capacity to use Earth observation data and products and to contribute observations and systems to GEOSS.

Science and Technology Committee

Engaging the Research Community in GEO – One key function of the STC is to engage the research community in GEOSS. STC members reach out to the world's diverse scientific and technological communities and make GEOSS more visible and attractive to them. To achieve this, they can organize a GEO presence at major symposia and other meetings, for example through plenary presentations or side events. They can contact universities and laboratories to involve them in GEOSS activities, form links with major scientific research enterprises in each societal benefit area, and actively encourage relevant scientists and technical experts to contribute to GEOSS in a truly participatory way. One important document produced by the STC is "The Role of Science and Technology in GEOSS" (available on the GEO website).

Catalyzing Research and Development (R&D) Funding for GEOSS – Committee members also seek to catalyze research and development (R&D) funding for GEOSS. They contact national governments & international organizations and encourage them to integrate GEOSS science and technology needs into national, regional and international R&D programmes. They develop proposals and guidelines to assist R&D agencies to respond to GEO needs and dialogue with key decision makers & funding entities. They identify programmes relevant to GEO's scientific and technological priorities and encourage them to collaborate with one another.

User Interface Committee

Communities of Practice and Partnership Development – The GEO Communities of Practice are a priority mechanism for engaging users and building partnerships. They deserve particular attention because they provide Leads and participants for many Task teams, offer strategic insights and fresh ideas, and promote dialogue between the users and providers of Earth observations. UIC members therefore directly interact with the Communities of Practice as a way of identifying and further refining user needs, in particular for cross-cutting issues. They obtain and analyze information provided by national, regional and project-level surveys (see p.43 for a list of Communities of Practice and countries & organizations involved).

Identifying Synergies between Societal Benefit Areas – The UIC identifies cross-cutting issues and data sets that could strengthen synergies between societal benefit areas. It develops and maintains processes for identifying critical Earth observation needs common to more than one societal benefit area by interacting with scientific and technical experts.

(iv) Coordination and Planning

While allocating differing responsibilities to each of the four Committees is a practical necessity, it is also essential that their work remains fully coordinated. The Co-Chair Coordination Committee (C4) takes responsibility for ensuring that the Co-Chairs of the various committees share information and ideas on a regular basis.

In addition, the work of the Committees is kept in synch by the master schedule adopted at GEO Plenary meetings. Under the current master schedule, each Committee will meet twice a year within two general time slots. The exact dates will be chosen in a way that best supports the yearly Work Plan process and feeds into the meetings of the Executive Committee and GEO Plenary. In order to foster interaction and information exchange, the meetings will be co-located when possible. In addition to these two meetings, Committees may choose to organize a third meeting at the time and location of the annual Plenary meeting.

III TASK MANAGEMENT

The 2009-2011 GEO Work Plan contains 36 overarching Tasks for which overarching coordination is provided by the Secretariat and, as relevant, Committees. Each Task (or sub-task) is implemented by a "Task team" with its own "Lead" or "Co-Leads", "Point of Contact" and set of "contributors".

The process starts with an informal "signing in" procedure through which GEO Members and Participating Organizations volunteer to lead or contribute to a Task (or sub-task). As work on the Task proceeds, additional Leads and contributors may join, thus ensuring wider participation. Specific activities within each Task may be further refined with the agreement of the Leads and contributors. For many Tasks, the process of user engagement will benefit from the work of a related Community of Practice (see User Interface Committee above).

(i) Leading a Task

When a Member or Participating Organization agrees to lead a GEO Task, it takes responsibility for ensuring, on a best effort basis, that Task milestones are reached and deliverables are met. Ideally, more than one Member or Participating Organization should agree to co-lead a Task and share the work of implementation (the order in which Co-Leads are listed in the Work Plan is alphabetical with countries coming first and organizations second). In some cases, the Secretariat or a Committee may invite an external organization to co-lead, or contribute to, a Task. Commitments to lead or contribute to GEO Tasks are not legally binding, but are entered into voluntarily in the spirit of advancing GEOSS under the terms of the GEOSS 10-Year Implementation Plan.

Although Task Leads and contributors are always entities (countries or organizations), the actual leadership comes from individuals who take up responsibility for the Task. Each individual should clarify and confirm that his or her country or organization agrees to lead or contribute to a GEO Task, and that he or she is the responsible party. In addition, Leads and contributors may invite other experts (either internal or external to their government or organization) to participate in the Task in their individual capacity as invited experts.

Task Leads organize the work of their Task in cooperation with other Task Leads and contributors and take steps to ensure that the work is carried out. They coordinate internally within their country or organization to ensure that the appropriate competencies of all of its relevant agencies, divisions, or units are brought into the Task as necessary. They also provide any financial and in-kind resources necessary for implementing the Task, drawing on sources internal to their agency, institution or organization. Throughout Task implementation, Task Leads encourage other organizations and entities to participate on a best effort basis as contributing organizations in the Task, particularly from developing countries whenever possible.

For each Task, an individual volunteer must be identified from among the Task Leads to serve as the Task Point of Contact. The Point of Contact provides a single point of communication for all those involved in the Task and serves as a liaison with other Tasks, the Secretariat and Committees. In addition the Point of Contact is responsible for reporting on progress to the GEO community by updating the detailed "Task Sheet" (see below).

(ii) Contributing to a Task

Contributors support the implementation of a Task through selected activities and projects indirectly providing financial or in-kind resources. This contribution is coordinated with the Task Leads. Contributors also assist in recruiting additional contributing organizations to the Task, particularly within their own country, region, or discipline, and provide other support to the Task Leads where possible. They further provide advice and information to the Task Leads on user requirements and best practices and endeavor to engage user communities.

(iii) Reporting on and Updating Tasks

The GEO Secretariat regularly communicates with Task Leads & Points of Contact and facilitates and supports their work. It provides reporting tools and structures as well as advice and recommendations as necessary. The Secretariat coordinates efforts across Tasks & sub-tasks and, where necessary, assists the Points of Contact with communicating with the Committees.

Reporting on the progress being made by the Task teams occurs in two steps. First, the Points of Contact ensure that they are fully informed of all developments and progress concerning the Task (or sub-Task) and act as a single point of reporting for the entire team. Second, the Point of Contact updates the Task Sheet to reflect progress and submits it to the Secretariat according to the agreed calendar. The format of the Task sheets will be reviewed and updated annually as needed.

Based on the Task Sheet updates, the Secretariat produces periodic Work Plan progress reports presented to the Executive Committee and an annual report presented to the GEO Plenary.

In addition, the Secretariat prepares an annual update of the 2009-2011 Work Plan based on consultations with Task Leads and inputs from Committees (Committees may propose updates and revisions to the Work Plan; see Committees section). This update is submitted to the GEO community for review and then to the GEO Plenary for review and approval.

GEO 2009-2011 WORK PLAN

1 A TRANSVERSE GEOSS

1.1 COMMON INFRASTRUCTURE

AR-09-01: GEOSS Common Infrastructure (GCI)

Address the core architectural principles in GEOSS, and provide useful guidelines and tools to GEO Members and Participating Organizations in the establishment and operation of GEOSS.

a) Enabling Deployment of a GEOSS Architecture (former AR-07-01)

This sub-task is led by USA and IEEE

Facilitate and support deployment and operation of the GCI including the incorporation of contributed components and services consistent with the GEOSS Architecture. Define and solicit support for a contributed systems (e.g., components and services) facilitator function. Expand the existing GEO process for interoperability arrangements including the Standards and Interoperability Forum (SIF) and regional teams, and consensus on linkages of GEOSS components and Spatial Data Infrastructure (SDI). Develop user-driven system-of-systems engineering activities to ensure that the GEOSS reference and functional architecture is appropriately designed. Define and deploy core GEOSS registry infrastructure for GEO Members and Participating Organizations to: (i) commit component systems; (ii) register related resources to GEOSS; and (iii) provide consultation to the contributed system facilitator. The registries in the GCI shall be components and services registries, standards and special arrangement registries, best practices registry, requirements registry and others that are needed to support the core operations requirements of GEOSS. Address integration and user issues emerging from the initial operating capability of the GCI. Document the GEOSS convergence and interoperability supporting the high-level strategic and tactical guidelines of GEOSS implementation. Update and maintain the Strategic and Tactical Guidance Documents to reflect current practices and implementation of the GEOSS Architecture.

b) GEOSS Architecture Implementation Pilot (former AR-07-02)

This sub-task is led by USA and OGC

Develop and pilot new process and infrastructure components for the GCI and the broader GEOSS architecture through continuation of existing efforts and new activities solicited through Architecture Implementation Pilot (AIP) calls for participation and other means. Facilitate continuation of the Interoperability Process Pilot Project (IP3) as a means of coordinating cross-disciplinary interoperability studies and pilots. Coordinate Societal Benefit Area (SBA) support by the IP3 Pilots. As appropriate, incorporate GEOSS contributed infrastructure components into pilot implementations of the GEOSS Architecture in coordination with Task AR-09-01a. Develop a capacity building registry infrastructure to include relevant information on existing Earth observation capacity building efforts and resources**.** The Capacity Building Committee will supply the content for this registry. Provide phased delivery of components to operations under sub-task AR-09-01a: with each phase consisting of: architecture refinement based on user interactions; component interoperability testing; and SBA-focused demonstrations.

c) GEOSS Best Practices Registry (former DA-06-09)

This sub-task is led by Japan and IEEE

Support the operation and upgrade of the GEOSS Best Practices Registry. The registry should be capable of including best practices in observation, modeling and analyses, ontologies, capacity building, existing cost-benefit sharing mechanisms and examples (data sharing, cooperative data acquisition, joint development, joint flight, collaborative sciences, etc) and other relevant GEO best practices. This sub-task will work in coordination with the GEO Committees, Members and Participating Organizations, who will provide the content for the registry.

d) Ontology and Taxonomy Development

This sub-task is led by Japan and IEEE

As part of the Best Practices Registry, create an Ontology and Taxonomy section to get an overview of available ontologies and taxonomies. Compare and analyze ontologies and taxonomies such as to avoid unnecessary overlaps and conflicts. As appropriate, develop ontologies and taxonomies stored in the Best Practices Registry into standards. Assist in the deployment of a reference able ontology for Earth observation to link the User Requirements Registry with the Components and Services Registry.

CB-06-04: GEONETCast

This Task is led by Belgium, China, USA, EUMETSAT and WMO

Establish GEONETCast, first on a demonstration basis, then as a fully operational global system with cross-cutting data serving all GEOSS Societal Benefit Areas. EUMETCast and GEONETCast America will, within their bandwidth capabilities, redistribute FENGYUNCast data and products to all interested users in Europe and America. Similarly, FENGYUNCast will, within its bandwidth capabilities, redistribute EUMETCast and GEONETCast America data and products to all interested users in Asia. This will ensure that data is exchanged among all GEONETCast regional hubs in real time.

The Task will enhance capacity building and user engagement activities, particularly in developing countries. In particular, the GEONETCast Training Channel will focus on (i) training end-users to use products for specific purposes and to disseminate data via GEONETCast; (ii) linking GEONETCast products and product navigator (inside portal) with specific training material; (iii) transmitting training materials via GEONETCast to local trainers; and (iv) disseminating training materials on GEOSS-related environmental data.

Key related Tasks include: AR-09-01 (GEOSS Common Infrastructure), DA-09-01 (Data Management)

CB-09-01: Infrastructure Development and Technology Transfer for Information Access

Identify hardware, software and other technology required to access, use and develop Earth observation data, information and products for decision making. Promote technology transfer (in its very broadest sense), and advance infrastructure and information sharing.

a) Open Source Software (former CB-07-01e)

This sub-task is led by Brazil

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

Priorities for 2009 will include: 1) Providing new versions of SPRING (Image processing and GIS software for use with CBERS images), TerraView and Terralib; 2) Developing TerraView and TerraLib training material, courses, tutorials and documentation for both programmers and end-users available (in English) and develop specialized training material for e-learning; 3) Translating into French Interfaces of TerraLib, TerraView and SPRING and tutorials and manuals of TerraLib, TerraView and SPRING.

b) CBERS

This sub-task is led by Brazil and CEOS

Establish and upgrade the capacity of ground stations with a footprint in Africa to receive, process, store and distribute CBERS (China-Brazil Earth Resources Satellite) imagery. Data will be distributed free of charge to all interested African countries within the footprint of the respective ground stations. Two ground stations have initially been selected to accomplish the sub-task goals: Maspalomas, operated by INTA (Spain), and Hartebeeshoek, operated by CSIR (South Africa). Other possibilities, still requiring further negotiation, include: Matera in Italy, and Malindi in Kenya, both operated by ASI (Italy), and Aswan, operated by NARSS (Egypt).

c) SERVIR Expansion

This sub-task is led by USA

Establish SERVIR regional hubs in geographic regions other than Panama (where it was originally established to serve the Meso-American region), starting with eastern Africa. Develop additional SERVIR tools that can provide early warnings of thunderstorms, flash flooding, vector-borne disease; climate prediction mapping; and air quality monitoring. SERVIR is a system that integrates satellite and other geospatial data for improved scientific knowledge and decision-making by managers, researchers, students, and the general public. The SERVIR system is web-based and makes available previously inaccessible Earth observation data; decision-support tools for interpreting the data; online mapping, and a 3-D interactive visualization of the Earth. It is being used to monitor the weather, forest fires, and ecological changes, as well as respond to severe events such as red tides, tropical storms, and flooding.

d) The African-European Georesources Observation System (AEGOS)

This sub-task is led by France

Design a pan-African infrastructure of interoperable data and user-oriented services to strengthen the sustainable use of georesources in Africa. Safeguard, share, valorise the knowledge and data archived in African and European geological surveys. Support geoscientific communities and institutional decision-makers in the design and implementation of sustainable development public policies.

Key related Tasks include: AR-09-01 (GEOSS Common Infrastructure), AR-09-02 (Connecting Observation Systems for GEOSS), DA-09-03 (Global Data Sets), CB-06-04 (GEONetcast), DI-06-09 (Use of Satellites for Risk Management), DI-09-02b (Risk Management for Floods), CL-09-01 (Environmental Information for Decision-Making), HE-09-01 (Information Systems for Health), HE-09-02 (Monitoring and Prediction Systems for Health)

DA-09-01: Data Management

This Task involves the (i) planning, development, implementation, and administration of systems for the acquisition, storage, and retrieval of data, and the (ii) maintenance and updating of data & information including access and confidentiality, conformity and quality, and content. Also included is the verification, coordination, validation, integration, and control of data requirements; planning for the timely and economical acquisition of data; and management of data assets after receipt.

a) GEOSS Data Sharing Principles (former DA-06-01)

This sub-task is led by ICSU

Invite experts to identify steps required to further the practical application of the agreed GEOSS data sharing principles. Ensure data access for capacity building.

b) GEOSS Quality Assurance Strategy (former DA-06-02)

This sub-task is led by CEOS and IEEE

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

c) Data, Metadata and Products Harmonisation (former DA-06-04)

This sub-task is led by USA and CEOS

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

Key related Tasks include: DA-09-02: Data Integration and Analysis, DA-09-03: Global Data Sets, DA-09-04: Socio-Economic Indicators

1.2 COORDINATED OBSERVATION SYSTEMS

AR-06-11: Radio Frequency Protection

This Task is led by WMO

Recognizing the fundamental importance of radio-frequencies necessary for all GEOSS components, in particular in-situ, ground- and space-based observations, as well as the increasing economical and political pressure on corresponding parts of the spectrum, undertake appropriate coordinated advocacy activities in association with Member countries, including representations to the International Telecommunication Union (ITU) and other bodies in charge of frequency management. This also includes a support to GEO Members in influencing their national and regional frequency management bodies. In particular, the case of passive bands, essential for Earth observations, will be monitored with the highest care, endeavouring to assess the potential impact of interference on Earth observation applications and final products. In this respect, it is also important to link with Scientific Committee on Frequency Allocations for Radio Astronomy and Space Science (IUCAF).

AR-09-02: Connecting Observation Systems for GEOSS

Address the functional and physical connections of GEOSS observation system components – including observing, modeling and information.

a) Virtual Constellations (former DA-07-03)

This sub-task is led by CEOS and GTOS

Advocate rapid development of the "CEOS Constellations Concept". Observations from a virtual constellation would provide better temporal, spatial, and spectral resolution and related data management and dissemination. A series of virtual constellations are in definition by space agencies, in consultation with user communities within the CEOS framework, each addressing key GEOSS observation gaps in the process. Prototype Constellations address:

- Precipitation, which aims to strengthen international cooperation on space-based observations of precipitation, including realisation of the GPM mission and providing guidance to new;
- Land Surface Imaging, designed to ensure the relevant synergy with High Resolution Multispectral Imager Continuity;
- Ocean Surface Topography, designed to ensure continuity of Sea Level measurement in accordance with GCOS requirements;
- Atmospheric Chemistry, which will address many of the needs for atmospheric observations of the climate community;
- Ocean Colour Radiometry which will provide scientific data products related to marine ecosystems and ocean biogeochemistry for near-surface global ocean and coastal waters (pending on the final approval by the CEOS Members)
- Ocean Surface Vector Winds to collect observations of ocean surface vector winds over the global ice-free ocean that will be used for operational analyses and forecasts, as well as retrospective research (pending on the final approval by the CEOS Members)

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

b) WIS (former AR-07-04)

This sub-task is led by WMO

Upgrade and demonstrate the WMO Information System (WIS) as one operational exemplar of the GEOSS architecture implementation process providing improvements for multiple societal benefit areas.

c) Sensor Web Enablement for In-Situ Observing Network Facilitation (former DA-07-04)

This sub-task is led by South Africa

Foster the development of ground-based sensing networks (with advances in communications technology and ground-based in-situ technologies, it is now feasible to consider webs of sensors on all types of platforms with rapid access for observations; this technology has been developed under the names of Sensor Webs and Sensor Networks). Develop scenarios or use cases that demonstrate the value of Sensor Webs to the GEOSS societal benefit areas e.g. Disasters, Health, Biodiversity, Ecosystems and Water. Evaluate the applicable standards and coordinate with AR-09-01 suitable for Sensor Webs.

d) Model Web Development

This sub-task is led by USA and IEEE

Develop a dynamic modeling infrastructure (Model Web) to serve researchers, managers, policy makers and the general public. This will be composed of loosely coupled models that interact via web services, and are independently developed, managed, and operated. Such an approach has many advantages over tightly coupled, closed, integrated systems, which require strong central control, lack flexibility, and provide limited access to products.

Key related Tasks include: AR-09-01 (GEOSS Common Infrastructure), HE-09-01 (Information Systems for Health)

AR-09-03: Advocating for Sustained Observing Systems

Establish actions for the maintenance and expansion of GEOSS-underpinning observing systems including terrestrial, oceanic, air-borne and space-based. Promote stable, reliable and long-term operations of Earth observation networks within the framework of national policies and international obligations.

Note: This Task is supported by the Cryosphere and Coastal Zone Communities of Practice

a) Key Climate Data from Satellite Systems (former CL-06-02)

This sub-task is led by USA, CEOS, GCOS and WMO

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

b) Key Terrestrial Observations for Climate (former CL-06-03)

This sub-task is led by GTOS

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

c) Legacy of the International Polar Year 2007-08 (former CL-06-05)

This sub-task is led by Portugal and WCRP

Coordinate with the International Polar Year (IPY) to enhance the utilization of Earth observations in all appropriate realms (including, but not limited to, sea and land ice, permafrost, coastal erosion, physical and chemical polar ocean changes, marine and terrestrial ecosystem change, biodiversity monitoring and impacts of increased resource exploitation and marine transport). Ensure an appropriate legacy for IPY projects and advocate for the continuation of relevant efforts beyond the duration of the IPY.

d) Global Ocean Observation System (former CL-06-06)

This sub-task is led by GOOS, IEEE and POGO

Enhance and improve coordination of coastal and open ocean observations and modeling in support of a global ocean observation system. Improve the global coverage and data accuracy of the coastal/open ocean observing systems as well as management and archiving of the resulting data and information. Contribute to the implementation of global coastal and open ocean observing networks using the mechanism of GOOS and Regional Alliances. In particular sustain and extend the network of Argo buoys and encourage the establishment of a Program Office to ensure the ongoing implementation of this global array of profiling floats in the ocean. Building on existing capabilities, develop a global coordinated information and data system for deep-ocean monitoring to better understand the dynamics of the ocean processes throughout the ocean water column.

e) Global Observing System for Weather (former WE-06-01 and WE-06-02)

This sub-task is led by USA and WMO

Achieve a complete and stable surface-based (in-situ and airborne, land and possibly ocean) Global Observing System (GOS). High priority should be given to a stable, and as much as possible automated, fully functional World Weather Watch Upper Air Network and the further development of the Aircraft Meteorological Data Relay (AMDAR) programme. In particular advocate the installation of humidity sensors on commercial aircraft as part of the world wide AMDAR program including the development of a standard suite of AMDAR software for all NMHSs for the different aircraft types. To broaden the system value the integration of a sensor for trace gases should be investigated.

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

Key related Tasks include: AR-09-01 (GEOSS Common Infrastructure), CL-06-01 (Sustained Reprocessing and Reanalysis of Climate Data), CL-09-01 (Environmental information for Decision-Making).

1.3 CROSS-CUTTING DATA SETS

DA-09-02: Data Integration and Analysis

Coordinate data management approaches from input to processing, archiving, and dissemination. Enable users to (i) utilize large volumes of data from heterogeneous data sources in cooperation with existing data centers and (ii) more effectively define an action, perform the action at a desired time, monitor the execution status, and view the results.

a) Data Integration and Analysis Systems (former DA-07-06)

This sub-task is led by Japan

Coordinate data management approaches that encompass a broad perspective of the observation data life-cycle – from input to processing, archiving, and dissemination, including reprocessing, analysis and visualization of large volumes and diverse type of data.

b) Meteorological Satellite Observations

This sub-task is led by China

Implement the Chinese Meteorological Satellite Program for global weather and environmental monitoring. The latter will (i) provide users worldwide with low-resolution multiple-source observation data; (ii) develop integrated multi-source satellite retrieval products shared with users; and (iii) enhance capabilities to acquire and apply Chinese meteorological satellite data and products.

c) Ensemble-Technique Forecasting Demonstrations (former DA-06-03)

This sub-task is led by UK

Facilitate the development of demonstration projects promoting the use of ensemble-based techniques in disciplines other than weather forecasting.

d) Global Geodetic Reference Frames (former AR-07-03)

This sub-task is led by IAG

Ensure the availability of accurate, homogenous, long-term, stable, global geodetic reference frames as a mandatory framework and the metrological basis for Earth observation. Identify steps towards such consistent high-accuracy global geodetic reference frames for Earth observation and the observing systems contributing to GEOSS.

e) Atmospheric Model Evaluation Network

This sub-task is led by USA

Demonstrate the use of web services to compare global and regional atmospheric models (including atmospheric chemistry/air quality models). Apply to a variety of Earth observations from distributed archives using standardized approaches to evaluate and improve model performance. Draw upon and contribute to the work of the Task Force on Hemispheric Transport of Air Pollution under the Convention on Long-range Transboundary Air Pollution, the IGAC-SPARC Atmospheric Chemistry and Climate Initiative, AeroCOM, and the Air Model Evaluation International Initiative.

Key related Tasks include: HE-09-02 (Monitoring and Prediction Systems for Health)

DA-09-03: Global Data Sets

Provide a suite of global datasets based on improved and validated data sources. Initiate regular analysis and reporting and promulgate the use of products, especially in developing countries. In addition, facilitate interoperability among data sets.

a) Global Land Cover (former DA-07-02)

This sub-task is led by USA and GTOS

Provide a suite of global land cover datasets, initially based on improved and validated moderate resolution land cover maps and eventually including land-cover change at high resolution. This activity will benefit directly from the establishment of the Land Surface Imaging virtual constellation (see CB-09-04d).

b) Forest Mapping and Change Monitoring (former AG-06-04)

This sub-task is led by USA, GTOS, FAO and supported by the Forest Community of Practice

Integrate international efforts on assessment and monitoring of forests and forest changes using a combination of ground and satellite information and internationally agreed standards. Make relevant synergies with DA-09-05b (Forest Carbon Tracking) and DI-09-03b (Implementation of a Fire Warning System at Global Level).

c) Bio-geophysical & Land Surface Data

This sub-task is led by USA, WCRP and IGBP *(to be confirmed)*

Coordinate the collection and distribution of land surface parameter data such as Leaf Area Index (LAI), Fraction Photosynthetically Available Radiation (FPAR) and Net Primary Productivity (NPP) for modeling. Acquire, process and deliver bio-geophysical and land surface data and parameters (including LAI, FPAR, NPP and Vegetation Index (VI)) as a service to the global modeling communities. There is a heritage of this type of effort (ISLSCP 1 and 2).

d) Global Phenology Data

This sub-task is led by USA

Coordinate the collection of in-situ phenology observations and expand existing observing networks. Identify and generate satellite-derived phenological/temporal metrics and test models for describing the phenological characteristics of natural and modified ecosystems. Changes in vegetation phenology impact biodiversity, net primary productivity, species distribution, albedo, biomass and ultimately the global climate.

e) Global DEM (former DA-07-01)

This sub-task is led by Japan and CEOS

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

f) Development of Global Map for GEOSS Societal Benefit Areas (former DA-06-05)

This sub-task is led by Japan and ISCGM

Foster the use of Global Map in societal benefit areas such as Disasters, Health, Agriculture, Biodiversity and Water. Identify the needs for basic geographic data and reflect these needs in new specifications. Global Map datasets are to provide a full and consistent coverage of land on the Earth – at 1 km resolution. They are composed of the following thematic layers: elevation, vegetation, land-cover, land-use, transportation drainage systems, boundaries and population centers.

DA-09-04: Socio-Economic Indicators

Support the development of methods, models and tools required to produce GEOSS-relevant socio-economic indicators.

a) Socio-Economic Benefits of GEO and GEOSS

This sub-task is led by IIASA

Build on the GEOBENE project (Global Earth Observation - Benefit Estimation: Now, Next and Emerging) to assess Earth observation benefits and GEOSS added-value (including cooperation and data sharing). Define test-cases and develop methodologies and analytical tools in each of the 9 GEOSS societal benefit areas. In particular develop an integrated model that will also serve as an effective decision-making tool to evaluate impacts and benefits of multiple scenarios across societal benefit areas.

b) Spatially-enabled Socio-Economic Databases for Africa

This sub-task is led by UNECA

Support the development of tools and methods for building, visualizing, and analyzing socioeconomic indicators for informed decisionmaking, policy formulation, and operational strategies for development.

DA-09-05: Global Carbon Observation and Analysis System

Note: This Task is supported by the Carbon Cycle Community of Practice (former IGCO) and the Forest Community of Practice

Implement a global carbon observation and analysis system addressing the three components of the carbon cycle (atmosphere, land and ocean). Develop robust tools and methodologies for high-precision CO_2 measurements and carbon storage evaluation.

a) Integrated Global Carbon Observation (IGCO) (former EC-06-01)

This sub-task is led by Netherlands and USA

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

b) Forest Carbon Tracking

This sub-task is led by Australia, Japan, Norway, CEOS, FAO and GTOS

Coordinate the definition, development and validation of robust tools and methodologies for the evaluation of carbon storage in forests. Building upon existing and planed GEO efforts in forest monitoring, carbon observation and associated modeling, foster the use of these tools coordinating the timely provision of observations required for their operational use. Promote and facilitate the development of reference, coherent and validated databases.

Preliminary activities will include: (i) Coordination of tools and methodologies assessment; (ii) Coordination of observations (securing continuity); (iii) Coordination of reference datasets production; (iv) Improvement of access to observations, datasets, tools and expertise; (v) Pilot initiatives to demonstrate capabilities; and (vi) Capacity building.

Key related Tasks include: AR-09-02a (Virtual Constellations), AR-09-03 (Advocating for Sustained Observing Systems), DA-09-02a (Global Land Cover), DI-09-03 (Warning Systems for Disasters), EC-09-01 (Global Ecosystem Observation and Monitoring Network)

1.4 CAPACITY BUILDING

CB-09-02: Building Individual Capacity in Earth Observations

Identify education and training opportunities across GEO societal benefit areas. Develop synergies, encourage cross-fertilization and address common challenges.

a) Recognition of Cross Border Education and Training in Earth Observation (former CB-08-01)

This sub-task is led by Netherlands

Bring together providers of (international and cross-border) capacity building, experts in recognition (credential valuation and accreditation) and governance (quality assurance) of higher education qualifications, and professionals from the Earth-observation and geographical-information sectors, to exchange knowledge and propose potential solutions on the issues of recognition and exchange of cross-border and international education & training products for Earth observation.

b) Summer Institute on Climate Information for Public Health

This sub-task is led by USA

Develop a sustainable "Summer Institute on Climate Information for Public Health" building on the efforts of the International Research Institute for Climate and Society (IRI), the Center for International Earth Science Information Network (CIESIN) and the Mailman School of Public Health. The Summer Institute will offer public health decision-makers and their partners the opportunity to learn practical methods for integrating climate knowledge and information into health decision-making processes through expert lectures, special seminars, focused discussions and practical exercises.

c) UN-SPIDER/GEOSS Summer Schools on Space-based Solutions for Disaster Management and Emergency Response

This sub-task is led by UNOOSA

Build upon the outcome of GEO 2007-2009 Task CB-07-02 (Knowledge Sharing for Improved Disaster Management and Emergency Response) to establish and support regional training and capacity building programmes related to disaster management and emergency response.

d) Developing the CBERS GEO Capacity Building Network

This sub-task is led by Brazil

Develop and implement a training program for the African end-users of the CBERS images. The programme will foster (i) the use of freeware and open-source geo-processing software (e.g. SPRING and TerraView), and (ii) the development of remote-sensing applications using CBERS images. Initial focus will be on users in Lusophone African countries.

e) Earth Observation Education for Youth – Games Contest and GLOBE/GEO Project

This sub-task is led by USA and IEEE

Initiate an international contest to create a game that emphasizes the impact of Earth observation on societal conditions. Develop an outcome to work with students and young people through their recreational interest to participate in game playing. The winners will support introduction of the game on a global basis, both into schools and through community organizations.

Develop a student research campaign to foster the use of Earth observation data and better prepare the future work force in dealing with changes in the global environment through collaboration between the GEO community and the worldwide community of educators, students, and partners of the GLOBE

(Global Learning and Observations to Benefit the Environment) Program. The GLOBE-GEO Student Climate Research Campaign (SCRC) will complete its planning in 2009 and implement the school-based pilot project in 2010. This pilot project will serve as a model for potential (future) GLOBE-GEO education-research campaigns on topics such as Water, Health, Biodiversity and Energy.

Key related Tasks include: CB-09-03 (Building Institutional Capacity to Use Earth Observations)

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

Coordinate, strengthen and sustain existing capacity building networks within Earth observation communities. As appropriate facilitate the construction of new networks.

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

This sub-task is led by UNEP

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

A related focus will be improving in-country coordination among national statistical organisations, remote sensing agencies, environment, forests, wildlife and water related ministries for providing improved access to national environmental data.

b) Establishing Regional Capacity Building Networks

This sub-task is led by Netherlands

Organize and reinforce international capacity building and training opportunity networks in Earth observation sciences & geo-information provision. These GEO training opportunity networks (e.g. GEOTOPS) will include virtual and e-learning based mode of knowledge transfer. A typical operational capacity building network in a world region will include key institutions in data provision (e.g. space agencies, a GEONETCast member or data provider) and academic (research-oriented capacity development) and professional higher education institutions and regional centers. Capacity building service delivered by those institutions should be embedded in national higher education systems (accredited, e.g. in European Union area), and internationally recognized by professionals and/or other bodies. GEO would have a coordination role (using e.g. its web portal capacity building services and GEONETCast system).

c) Building capacity for non-technical decision-makers in the use and impact of Earth observation

This sub-task is led by IEEE

Maintain a GEOSS-focused web-based magazine for the general public and non-technical managers & decision-makers to complement the existing capacity building efforts in GEO. Update the magazine(s) on a routine basis to inform and provide an understanding of the impacts of Earth observations on societal conditions and the benefits of global observation. Expand on existing GEOSS-focused web-based magazines to incorporate more material from developing countries. Assure that the e-magazine(s) can be accessed through the GEOPortal. Work closely with the Secretariat to provide consistency with material available on the GEO website and the GEOPortal.

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

Engage the user community in identifying their capacity building needs for accessing, using and producing Earth observations for societal benefit. Develop an operational capacity building presence within the GEOSS Common Infrastructure (Task AR-09-01).

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

This sub-task is led by the Netherlands

Through the engagement of user and expert networks, build registry and database content for the existing components, services and best practices registries of Task AR-09-01. This content shall include current and planned capacity building activities, best practices, and identified gaps and needs. Moreover this shall include, as practical, observation, modeling and implementation best practices. Best practice examples might include, but should not be limited to, open-content courses, e-learning material, and downloadable data & products that support the use of GEOSS and capacity building. Develop and disseminate, for each societal benefit area, specific capacity building outreach material reflecting best practices. Enable access to the above through the GEOPortal (AR-09-01b) and GEOSS Best Practices Registry (AR-09-01c).

b) Capacity Building Performance Indicators (former CB-07-01c)

This sub-task is led by Germany, Spain and IOC

Develop reliable and widely accepted qualitative and quantitative metrics for measuring (i) the efficacy of Earth observation capacity building programs and (ii) the implementation of GEO capacity building strategy. The development of these metrics will require the engagement of the entire GEO community to ensure buy-in.

c) User Oriented Workshops for GEOSS Outreach and Feedback

This sub-task is led by Netherlands and IEEE

Organize a series of workshops to demonstrate GEOSS Common Infrastructure to users in all societal benefit areas. Continue series of global and regional workshops to provide avenues for user inputs into the GEOSS requirements and feedback on the operational aspects of GEOSS. Approximately 5 Workshops per year will be organized which should support outreach on GEOSS capabilities

Organize capacity building workshops to expose regional and local stakeholders to best practices in capacity building and the benefits of the GEONETCast data dissemination system – in combination with open source web-based applications and service deliveries, for the various societal benefit areas, and GEOSS observation networks.

2 THE 9 GEOSS SOCIETAL BENEFIT AREAS

2.1 DISASTERS

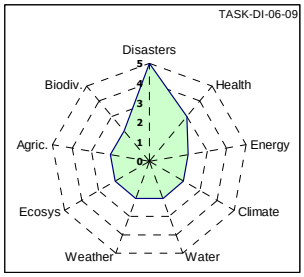
Reducing loss of life and property from natural and human-induced disasters

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

GEOSS 10-Year Implementation Plan, Section 4.1.1

Note: Activities in the Disasters area are supported by the Geohazards, Coastal Zone and Water Cycle (former IGWCO) Communities of Practice

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



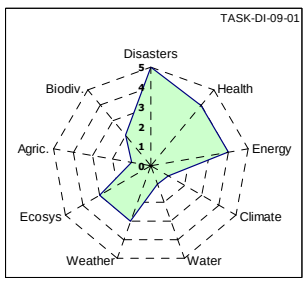
This Task is led by Canada, China, CEOS and UNOOSA

Define and facilitate implementation of satellite constellations for risk management from a multi-hazard perspective. Develop dedicated software tools (based on AR-09-02a output) to be used, in the short term, to analyze the coverage for critical observations and, in the medium-long term, to implement the user interface for products ordering/retrieval and data integration/re-processing.

Deliverables will include: (i) Constellation requirements definition and performance assessment, through the full involvement of users and the participation of "champions" from the Geohazards Community of Practice; (ii) Actions towards the Board of the International Charter and relevant CEOS members, to identify possible strengthening of Charter mechanisms and options for widening its scope; and (iii) Cross-cutting use of satellites for health risk management and emergency response.

Key related Tasks include: CB-06-04 (GEONetcast), AR-09-02a (Virtual Constellations), HE-09-02 (Monitoring and Prediction Systems for Health)

DI-09-01: Systematic Monitoring to Support Geohazards Risk Assessment



Define and implement a unified and integrated approach to geohazards risk assessment. Build upon synergies and integrate data from global in-situ seismographic networks and remote sensing. Coordinate multi-level efforts and implement decision-support tools to facilitate and support data access for selected "Supersites" locations.

a) Vulnerability Mapping and Risk Assessment (former DI-06-03 and DI-06-07)

This sub-task is led by France and WMO

Facilitate access to the remote-sensing & in-situ data required to perform systematic geohazards vulnerability mapping and risk assessment. Related activities will include: (i) Retrieval, integration and systematic access to remote sensing & in-situ data in selected regional areas exposed to geological threats ("Supersites"); the initial objective will be to dramatically enhance access to SAR data and

integration of InSAR & GPS data); (ii) Development, testing and application of global seismic vulnerability mapping to "Supersites" areas.

b) Seismographic Networks Improvement and Coordination (former DI-06-02)

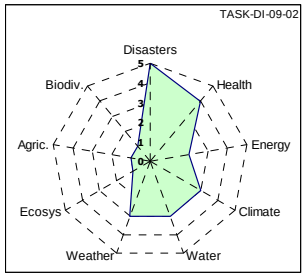
This sub-task is led by Italy, UK, USA, FDSN and ISC

Improve the capabilities of global seismographic networks such as GSN, FDSN, (including regional and global components), GNSS networks and new ocean bottom networks such as VENUS and NEPTUNE. Facilitate sharing of data and event products among GEO members. Expand and coordinate efforts to provide access, using GEOSS interoperability methods, to real time and archived seismological data and products. Develop a portal that will interlink distributed seismological data centers and provide seamless access to other GEOSS components.

Broaden the scope of this activity to identify and build upon synergies across in-situ observing network types (e.g. seismological, GNSS, hydrological). Synergies could range from the use of the same best practices and operational approach, to the use of a common part of the infrastructure for collection and dissemination, and co-location of in-situ instruments.

Key related Tasks include: AR-09-02 (Connecting Observation Systems for GEOSS)

DI-09-02: Implementation of Multi-Risk Management Approach and Regional Applications



Define and implement an integrated approach for all phases of disaster management. Develop a framework for regional disaster management applications.

a) Implementation of a Multi-Risk Management Approach (former DI-06-08)

This sub-task is led by France and WMO

Define and implement an integrated and comprehensive approach to systematically address all risks and all disasters phases, including risk assessment and mapping. Support ISDR in the implementation of the Hyogo Framework for action and promote the development of a Disasters Community of Practice (CoP) that would provide guidance for activities and initiatives in the Disasters societal benefit area (the Disasters CoP would include and embrace existing hazard-thematic CoPs such as the Geohazards CoP).

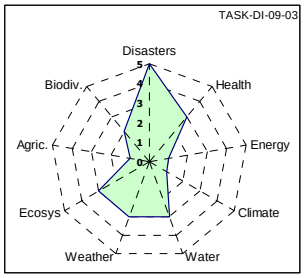
b) Regional End-to-End Disaster Management Applications (former DI-07-01)

This sub-task is led by France

Implement regional and cross-cutting end-to-end projects. Potential areas of application include: Famine and drought early warnings for Africa (activities will be coordinated with AG-07-03); multi-risk (natural hazards and epidemics) decision-support tools for Latin-Central America and Asia; and risk management for floods.

Key related Tasks include: HE-09-01 (Information Systems for Health), WA-06-02 (Droughts, Floods and Water Resource Management), AG-07-03 (Global Agricultural Monitoring)

DI-09-03: Warning Systems for Disasters



Support the development, improvement and coordination of early warning systems for natural disasters.

a) Tsunami Early Warning System of Systems (former DI-06-04)

This sub-task is led by IOC and UNOSAT

Support the establishment and continuation of a multi-hazard fully-operational global tsunami early warning and mitigation system of systems. Promote full and open exchange of publicly-funded, unclassified data relevant to tsunami warning/mitigation systems and enhancement/development of mechanisms for real-time data sharing, including seismic and sea level (deep ocean and tide gauge) data. Contribute to the operationalization of comprehensive observing networks (in-situ sea level, seismic stations and remote monitoring) and data management systems (including integration of the global ocean observing system (GOOS), international seismic networks, and related global telecommunication systems. Define/promote standards/protocols for operating observing systems, and managing data exchange/transmission for multiple observing systems relevant to tsunami detection, early warning and mitigation.

b) Implementation of a Fire Warning System at Global Level (former DI-06-13)

This sub-task is led by Canada, Portugal and GTOS

Develop a globally-coordinated warning system for fire, including improved prediction capabilities, analysis tools and response support through sensors, information products and risk assessment models. Related activities will include: (i) Review of existing warning systems; (ii) Assessment to enhance current fire early warning systems; (iii) Development of mechanisms for the implementation of an operational global early warning system. Activities will be coordinated with the ISDR initiative on “Wildland Fire Monitoring Network” and the GMFC (Global Fire Monitoring Center).

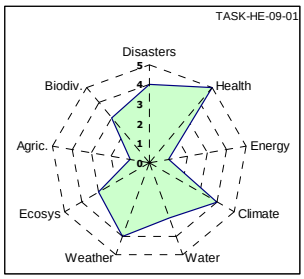
2.2 HEALTH

Understanding environmental factors affecting human health and well-being

> Health issues with Earth-observation needs include: airborne, marine, and water pollution; stratospheric ozone depletion; persistent organic pollutants; nutrition; and monitoring weather-related disease vectors. GEOSS will improve the flow of appropriate environmental data and health statistics to the health community, promoting a focus on prevention and contributing to continued improvements in human health worldwide.
>
> *GEOSS 10-Year Implementation Plan, Section 4.1.2*

Note: Activities in the Health area are supported by the Air Quality & Health Community of Practice and the Atmospheric Chemistry Community of Practice (former IGACO)

HE-09-01: Information Systems for Health

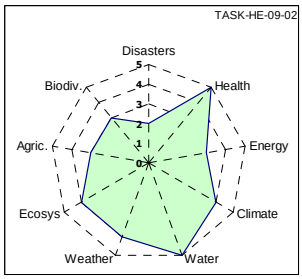


This Task is led by France, IEEE and WHO *(to be confirmed)*

Improve in-situ environmental and health data collection for the utilization and validation of remotely-sensed data. Explore how GEOSS will support the collection & distribution of information and meet the diverse needs of the health community. Develop a global public health information network database to improve health decision-making at the international, regional, country and district levels. As a priority, integrate WHO's Open Health information tool with other health and environmental information systems through the GEO Portal and GEOSS Common Infrastructure (GCI).

Key related Tasks include: AR-09-01 (GEOSS Common Infrastructure), DI-06-09 (Use of Satellites for Risk Management), HE-09-02 (Monitoring and Prediction Systems for Health), HE-09-03 (End to End Projects for Health)

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



Foster the use of established and emerging observation systems in operational health-related applications. Develop associated products such as forecasts and alerts. Include and gradually consolidate contributions from different, not yet coordinated systems. This Task will feed into HE-09-01 and HE-09-03.

a) Aerosol Impacts on Health and Environment: Research, Monitoring and Prediction (former HE-07-03)

This sub-task is led by WMO

Facilitate research and development activities that lead to the delivery of new services related to monitoring of the atmospheric cycles of various aerosols and their improved forecast in operational numerical models of the atmosphere. Emphasis will be on a reduction of risks due to aerosol influences on health and public safety and on assessing the aerosol effects on marine and terrestrial ecosystems. Support international initiatives such as the Sand and Dust Storm Warning, Advisory and Alert System (SDS-WAS) in developing dust storm warning system and assessments. Review current developments in the modeling and observation of bioaerosol transport/deposition and in the present understanding of impacts of the atmospheric deposition of dust (iron, phosphorus) to the ecosystem with the goal of extending the societal benefits of improved prediction of dust and aerosol.

b) Air Quality Observations, Forecasting and Public Information

This sub-task is led by USA

Provide near real-time air quality observations and forecasts for the purposes of air quality and public health management, research and public information. Assimilate Earth observations data into weather models and provide reliable 2-3 day forecasts of air quality. Harmonize standards for sharing air quality observations, forecasts, and related indices and maps for public information so authorities can intervene to reduce human health responses to diseases. Relate statistically the frequency and severity of air quality episodes with health outcomes & records to better understand the transmission pathways of human respiratory diseases. Related activities will include: Protocol Monitoring for the GMES Service Element: Atmosphere (PROMOTE); Ozone Web; PREV'AIR; and AIRNow International

c) Water Quality Monitoring Projects for Human Health (former HE-07-02 and WA-07-01)

This sub-task is led by USA

Initiate projects to develop operational observation and monitoring systems of water quality, integrating in-situ water quality monitoring methods for terrestrial sources & the coastal ocean with remote-sensed operational systems of global-scale freshwater quality. Identify mechanisms for alerting public health professionals on hazardous conditions identified by the monitoring of these parameters, as well as further informing epidemiological modeling studies.

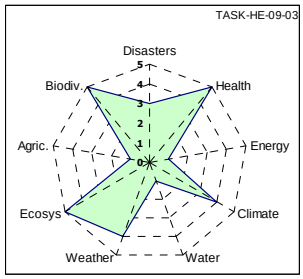
d) Global Monitoring Plan for Persistent Organic Pollutants (POPs)

This sub-task is led by UNEP

Develop and implement a global monitoring plan for tracking changing levels of POPs in the natural environment and in human beings (among other benefits, this monitoring will enable the Stockholm Convention on Persistent Organic Pollutants to evaluate the effectiveness of international efforts to reduce releases of POPs). Interlink existing and emerging systems for monitoring air, water, ice caps and human health. Identify, fill in gaps and address a number of technical and financial barriers. Priorities for 2009 include producing 5 regional monitoring reports that will summarize monitoring data for the Convention's 12 POPs in ambient air & human milk or blood for the period 1998-2008.

Key related Tasks include: HE-09-03 (End to End Projects for Health), WE-06-03 (TIGGE), WA-08-01 (Integrated Products for Water Resource Management and Research)

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



Develop and implement health-environment projects to advance the application of observation, monitoring and forecasting systems to health decision-making processes. Initiate efforts to establish a global health-climate Community of Practice in response to the 61st World Health Assembly's resolution on 'climate change and health', with specific reference to the call to promote effective engagement of the health sector in all related sectors – at national and global levels in order to reduce the projected health risks from climate change.

a) Implementation of a Meningitis Decision-Support Tool (former HE-06-03)

This sub-task is led by Switzerland, USA, WHO and WMO

Support the Meningitis Environmental Risk Information Technologies Project (MERIT) which aims to extend current capabilities to more effectively combine environmental information with knowledge of epidemic meningococcal meningitis. MERIT implementation will have an immediate impact on public health decision-making and outcomes in Africa through increasing the effectiveness of prevention and response control strategies, and ongoing surveillance of meningitis epidemics.

Priorities for 2009 include the implementation of an operational decision-support tool for testing the 2009 meningitis epidemic season in Africa.

b) Implementation of a Malaria Early Warning System

This sub-task is led by CEOS

Initiate a globally coordinated warning system for malaria. Foster the utilization of satellite and in-situ data for monitoring environmental conditions conducive to the spread of malaria and support the development of user training for this technology. Priorities for 2009 include: (i) Develop country specific techniques to use satellite data for early malaria detection and monitoring; (ii) Provide training to developing countries on satellite-based techniques used to identify mosquito habitat that stimulates the spread of malaria; and (iii) Improve techniques by obtaining in-situ malaria data and feedback about the accuracy and effectiveness of the satellite data, analyses and services.

c) Ecosystems, Biodiversity and Health: Decision-Support Tools and Research

This sub-task is led by USA

Implement research activities that foster the application of tools (e.g. indicators, models) to informed decision-making and help reduce the emergence & spread of infectious diseases. Through an interdisciplinary team approach which also includes end-users (e.g. decision-makers), characterize the dynamics and mechanisms underlying the relationship between social stressors, changes in biodiversity, and disease transmission to humans. This sub-task is unique in its interdisciplinary "Community of Practice" approach; and, in encouraging the coordination of Earth observations with field data to study these relationships.

Key related Tasks include: CB-09-02 (Building Individual Capacity in Earth Observations), HE-09-01 (Information Systems for Health), HE-09-02 (Monitoring and Prediction Systems for Health), CL-09-01 (Environmental information for Decision-Making), EC-09-01 (Ecosystem Observation and Monitoring), BI-07-01 (Biodiversity Observation Network)

2.3 ENERGY

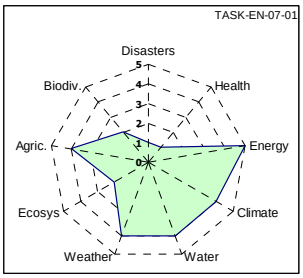
Improving management of energy resources

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

GEOSS 10-Year Implementation Plan, Section 4.1.3

Note: Activities in the Energy area are supported by the Energy Community of Practice

EN-07-01: Management of Energy Sources

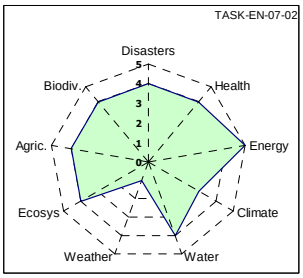


This Task is led by Germany, CEOS and IEEE

Support the development of Earth observation products & services for resource assessment, monitoring and forecast of fluctuating energy sources (e.g. hydro, solar, wind, ocean). Consider end-to-end systems including generation, transmission, distribution and integrated operations (e.g. efficient integration of energy sources into the electricity grid, and electricity grid management).

Related activities will include: Promote collaboration between users and providers of Earth observation applications to foster the development of innovative Earth observation services in support of energy management. Expand the use of Earth observations in the development, operation and management of energy production systems. Assess the utility of Earth system models to inform energy sector decision-making on the future availability of resources in a changing climate.

EN-07-02: Energy Environmental Impact Monitoring

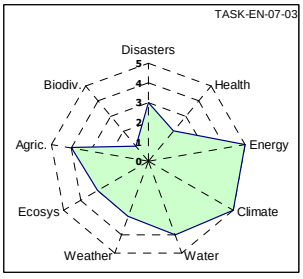


This Task is led by the Netherlands

Promote the development of Earth observation systems for the monitoring and prediction of environmental impact from energy resource exploration, extraction, transportation and/or exploitation.

Related activities will include: Promote and develop the use of Earth observation data for impact monitoring. Support the development of modelling systems helping to quantify and anticipate changes e.g. to freshwater, biodiversity, ecosystems, atmospheric and oceanic composition, and ground elevation. Make relevant synergies with Task DA-09-05 (Global Carbon Observation and Analysis System) and carbon sequestration & greenhouse gas monitoring activities.

EN-07-03: Energy Policy Planning



This Task is led by France

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

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

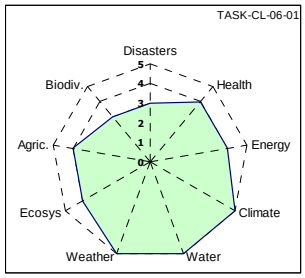
2.4 CLIMATE

Understanding, assessing, predicting, mitigating, and adapting to climate variability and change

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

GEOSS 10-Year Implementation Plan, Section 4.1.4

CL-06-01: Sustained Reprocessing and Reanalysis of Climate Data

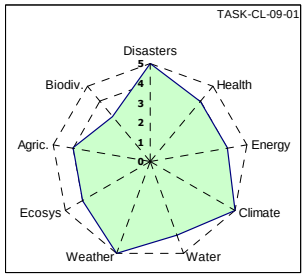


This Task is led by CEOS and GCOS

Ensure the development of international mechanisms to coordinate and maintain sustained climate data reprocessing and reanalysis efforts. With regard to the reprocessing of historical datasets (to obtain consistent long-time series of satellite records), make relevant synergies with AR-09-03a.

Key related Tasks include: AR-09-03 (Advocating for Sustained Observing Systems), DA-09-01 (Data Management), DA-09-02 (Data Integration and Analysis), DA-09-03 (Global Data Sets), CL-09-01 (Environmental information for Decision-Making)

CL-09-01: Environmental Information for Decision-making, Risk Management and Adaptation



Support the integration of climate and environmental risk management into adaptation processes. Coordinate and drive the development of tailored climate products and services. Encourage the use of this information by policy and decision makers (at all levels), and initiate user-oriented activities to do both increase the demand, and foster the supply, of climate and environmental services for development.

a) Towards Enhanced Climate, Weather, Water and Environmental Prediction (former CL-07-01)

This sub-task is led by WMO, WCRP and IGBP

Strengthen the ability worldwide to deliver new and improved climate, weather, water and environmental services. Research objectives include: (i) Seamless weather/climate prediction including ensemble prediction systems; (ii) The multi-scale organisation of tropical convection and its two-way interaction with the global circulation; (iii) Data assimilation for coupled models as a prediction and validation tool for weather and climate research; (iv) Information to assess the risks/benefits of climate/weather predictions on society and the global economy. This sub-task includes the continuation of former Task WE-07-01 (Data Assimilation and Modelling for Operational Use).

b) Climate Information for Decision-making, Risk Management and Adaptation

This sub-task is led by GCOS and WCRP

Promote the resourcing and implementation of the Climate for Development in Africa Programme (ClimDev Africa). The programme is to improve the availability, exchange and use of climate information & services at national, local and regional levels – in support of economic growth and achievement of the Millennium Development Goals. African partners include the African Union, the UN Economic Commission for Africa, the African Development Bank, and the African National Meteorological and Hydrological Services. In parallel, implement the programme "Climate Observations and Regional Modelling in support of climate risk management and sustainable development." This programme is to assist the developing and least developed countries of Eastern Africa to undertake and appropriately use climate projections in adaptation planning.

Key related Tasks include: AR-09-01 (GEOSS Common Infrastructure), AR-09-03 (Advocating for Sustained Observing Systems), CB-09-02 (Building Individual Capacity in Earth Observation), CL-06-01 (Sustained Reprocessing and Reanalysis Efforts), WE-06-03 (TIGGE), WE-09-01 (Capacity Building for High-Impact Weather Prediction).

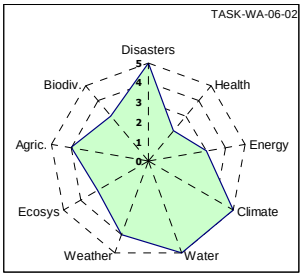
2.5 WATER

Improving water-resource management through better understanding of the water cycle

> Water-related issues addressed by GEOSS will include: precipitation; soil moisture; streamflow; lake and reservoir levels; snow cover; glaciers and ice; evaporation and transpiration; groundwater; and water quality and water use. GEOSS implementation will improve integrated water-resource management by bringing together observations, prediction, and decision-support systems and by creating better linkages to climate and other data. In situ networks and the automation of data collection will be consolidated, and the capacity to collect and use hydrological observations will be built where it is lacking.
>
> *GEOSS 10-Year Implementation Plan, Section 4.1.5*

Note: Activities in the Water area are supported by the Water Cycle Community of Practice (former IGWCO)

WA-06-02: Droughts, Floods and Water Resource Management



Address decision-making challenges related to the management of hydro-meteorological extremes and the sustainable use of water.

a) Forecasting and Early Warning Systems for Droughts and Floods

This sub-task is led by USA

Improve forecasting methods for extreme events (floods, droughts) used by hydrological services throughout the world – to help bridge the gap between research and user communities. Expand upon regional initiatives such as the North American Drought Monitor (NADM) to establish a Global Drought Early Warning Systems(s) (GDEWS).

b) Impacts from Drought

This sub-task is led by Canada, France, USA and WCRP

Track and analyze impacts from drought (including feedbacks such as soil drying) to provide a tangible and practical demonstration of the value of integrated water cycle observations. Develop a full and operational data cycle of environmental information from "producer-to-consumer"/"source to sink," and explore the application of data products to Water and Agriculture.

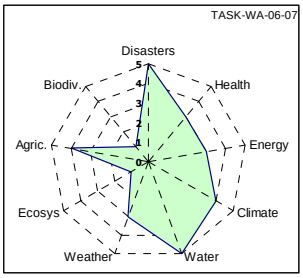
c) ACQWA

This sub-task is led by Switzerland

Analyze the future of water resources in vulnerable mountain regions in the context of climate change and increasing extreme events. Deliverables range in scope from technical papers on downscaling techniques for Hydrological Modeling to water policy recommendations for decision-makers. ACQWA (Assessing Climatic change and impacts on the Quantity and quality of WAter) is a 5-year FP7-funded project.

Key related Tasks include: DI-07-01 (Risk Management for Floods), CL-09-01 (Environmental information for Decision-Making)

WA-06-07: Capacity Building for Water Resource Management



Initiate capacity building programs in support of water management, to show the value of, and develop tools for, Earth observation data.

a) Latin America

This sub-task is led by Argentina and USA

Develop a proposal along the lines of the CEOS/UNESCO TIGER programme focused on the use of Earth observation data for water resources management (surface waters, groundwater). This to help: (i) Identify data and general support from space agencies; (ii) Identify a coordinating agency to organize calls for proposals and securing reviews and monitoring of the proposals; (iii) Identify further funding sources; and (iv) Issue a call for proposals to the research and development community. The program will be initiated in Latin America and then be extended to Asia and Africa. Linkages with existing GEO efforts will be made.

b) Africa

This sub-task is led by CEOS and USA

In the scope of Phase 2 of the TIGER initiative (focusing on the use of space technology for water resource management in Africa), assist African countries to overcome problems faced in the collection, analysis and dissemination of water-related geo-information. Exploit the advantages of Earth Observation (EO) technology to build the basis for an independent African capacity and set up sustainable water observation systems. In addition, build and extend the Central American “SERVIR” (visualization and monitoring using Earth science data) for hydrologic applications (e.g. flood warning) to East Africa and possibly other parts of the world. Other important projects include the hydrologic data integration and assimilation systems of the ‘Land Information System’ (LIS).

c) Asia

This sub-task is led by Japan

Build upon the Asian Water Cycle Initiative (AWCI) to develop competencies among water management practitioners, researchers, and administrators (AWCI addresses climate change monitoring in Asia through the integration of in-situ and satellite/remote sensing). In addition build upon Sentinel Asia to develop disaster management-support systems in the Asia-Pacific region and building capacity for utilization of satellite images.

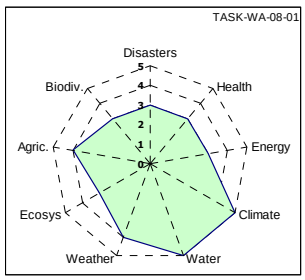
d) Europe

This sub-task is led by Switzerland

Build upon the FP7 EnviroGRIDS project (gridded management system for environmental sustainability and vulnerability) to develop a Black Sea basin observation and assessment system. Develop a collaborative management system to store, analyze, visualize and disseminate crucial information on past, present and future states of the environment – to assess its sustainability and vulnerability. Make relevant synergies with AR-09-01 (GCI). EnviroGRIDS will rely on ultra-modern technology using the largest gridded computing infrastructure in the world.

Key related Tasks include: AR-09-01 (GEOSS Common Infrastructure), DA-09-03 (Global Data Sets), CB-09-03 (Building Institutional Capacity to use Earth observations), WA-08-01 (Integrated Products for Water Resource Management and Research)

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



Improvements and expansion of in-situ networks, combined with new satellite missions (in addition to existing space-borne Earth observing systems) and emerging assimilation and prediction capabilities, are opening the door to a new era in global water-cycle management.

a) Soil Moisture

This sub-task is led by ESA and WCRP

Establish a global in-situ soil moisture network to aid for any type of global soil moisture product. This network needs to be established and is as such a high priority.

b) Runoff

This sub-task is led by Japan and Switzerland

Integrate, in a phased approach, dedicated river gauging networks of existing hydrological stations into a global runoff observation network. The main result of the HARON project (Hydrological Applications and Run-Off Network) will be strengthened in-situ and satellite monitoring networks of estuaries, rivers, lakes, reservoirs, and groundwater levels.

c) Groundwater

This sub-task is led by Netherlands

Establish a Global Groundwater Monitoring Network (GGMN) for a periodic assessment of global groundwater resources, using information from existing national, regional and global networks – in order to represent changes in groundwater resources at scales relevant to regional and global resouce assessment.

d) Precipitation

This sub-task is led by CGMS

Under the guidance of CGMS/International Precipitation Working Group (IPWG), promote and advance the development and validation of multi-sensor satellite-based precipitation estimates, including snowfall. Inputs from the Precipitation Virtual Constellation (AR-09-02a) will supplement these efforts.

e) Water Cycle Data Integration

This sub-task is led by France and WCRP

Upcoming satellite launches and plans for new missions provide new global data sets that will supplement the in-situ networks for many water cycle variables. The Coordinated Energy and water cycle Observations Project (CEOP) under the WCRP Global Energy and Water-cycle Experiment (GEWEX) is tailoring and developing tools to access the various data collections and undertake data integration work over the Internet.

f) Pilot Projects for Improved Water Discovery and Quality Assessments

This sub-task is led by IEEE

Conduct pilot projects in cooperation with local and national governments and other organizations to provide water where it is needed, but not now available. These projects will be focused on developing countries and realizeable in the field within one year. They will be sustainable, resusable, repeatable, and scalable.

Key related Tasks include: AR-09-01 (GEOSS Common Infrastructure), DA-09-03 (Global Data Sets), HE-09-02c (Water Quality Monitoring Projects for Human Health), HE-09-03 (End to End Projects for Health), CL-09-01 (Environmental information for Decision-Making)

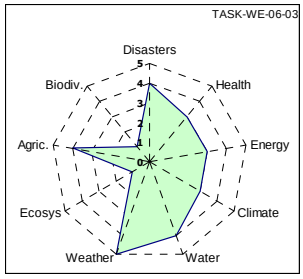
2.6 WEATHER

Improving weather information, forecasting and warning

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

GEOSS 10-Year Implementation Plan, Section 4.1.6

WE-06-03: TIGGE and the Development of a Global Interactive Forecast System for Weather

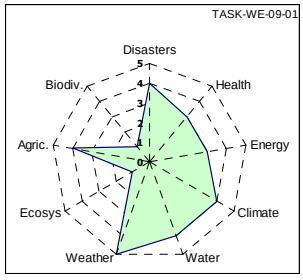


This Task is led by WMO

Complete THORPEX Interactive Global Grand Ensemble (TIGGE) Phase 1 and commence TIGGE Phase 2. Foster real-time data exchange and construct common web interfaces, an improved archiving strategy and a common toolbox to assist the development of useful products. Develop initial products related to probabilistic tropical-cyclone warning services and extreme-precipitation forecasting; the latter will form the early products of a Global Interactive Forecasting System (GIFS) to internationally coordinate advance warnings and forecasts for high impact weather events.

Key related Tasks include: AR-09-01 (GEOSS Common Infrastructure), AR-09-03 (Advocating for Sustained Observing Systems), DA-09-02 (Data Integration and Analysis), DA-09-03 (Global Data Sets), DI-09-03 (Warning Systems for Disasters), CL-09-01 (Environmental information for Decision-Making).

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



Develop capability for numerical weather prediction in developing countries. Focus on high impact weather events and foster rapid progress through enhanced infrastructure and training.

a) Infrastructure for Numerical Weather Prediction

This sub-task is led by Korea

Develop improved system infrastructure for Numerical Weather Prediction (NWP) operation in developing countries – building upon WMO programmes for developing countries. Identify gaps & needs and facilitate technical cooperative activities for the exchange of hardware, software, technologies, and expertise. In addition, co-organize a series of regional capacity building workshops with major numerical weather prediction centres to assist developing countries in their utilization of currently available forecasts.

b) Socio-economic Benefits in Africa from Improved Predictions of High-Impact Weather

This sub-task is led by WMO

Improve the prediction of high-impact weather and help reduce vulnerability to climate variability and change in Africa through the WWRP-THORPEX Africa initiative. The latter is designed to do both accelerate predictive skill and realize the related benefits for African society and the economy through a set of priority demonstration projects.

Key related Tasks include: AR-09-03 (Advocating for Sustained Observing Systems), CB-09-01 (Infrastructure Development and Technology Transfer for Information Access), CB-09-02 (Building Individual Capacity in Earth Observations), CB-09-03 (Building Institutional Capacity to Use Earth Observations), HE-09-02 (Monitoring and Prediction Systems for Health)

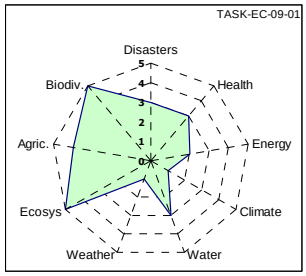
2.7 ECOSYSTEMS

Improving the management and protection of terrestrial, coastal and marine resources

> Observations are needed on the area, condition, and natural-resource stock levels of ecosystems such as forests, rangelands, and oceans. GEOSS implementation will seek to ensure that methodologies and observations are available on a global basis to detect and predict changes in ecosystem condition and to define resource potentials and limits. Ecosystem observations will be better harmonized and shared, spatial and topical gaps will be filled, and in situ data will be better integrated with space-based observations. Continuity of observations for monitoring wild fisheries, the carbon and nitrogen cycles, canopy properties, ocean colour, and temperature will be set in place.
>
> *GEOSS 10-Year Implementation Plan, Section 4.1.7*

Note: Activities in the Ecosystems area are supported by the Forest and Global Agricultural Monitoring Communities of Practice

EC-09-01: Ecosystem Observation and Monitoring Network (GEO EcoNet)



Coordinate and improve the observation, characterization and monitoring of terrestrial (forest, urban agriculture, woodlands, grasslands, and deserts), freshwater, ice and oceans ecosystems – especially in terms of acquisition and use of satellite/aerial/in-situ observation. Develop a global integrated sampling frame in coordination with the GEOSS Geodesy activities.

a) Ecosystem Classification and Mapping (former EC-06-02)

This sub-task is led by Paraguay and USA

Continue the work of the Ecosystems Classification Task Force, covering terrestrial, freshwater, and ocean ecosystems, to create a globally agreed, robust, and viable global classification scheme for ecosystems. Establish links to existing databases, such as the Ocean Bio-geographic Information System. In parallel with the classification effort, develop, review, and initiate a mapping approach to spatially delineate the classified ecosystems.

b) Ecosystem Status and Trends

This sub-task is led by USA

Coordinate the continuing characterization and monitoring of ecosystems status and trends. Using the GEO Ecosystem map as a framework, extract geospatial data on key indicators of all ecosystems' status, health and functioning (key indicators include time series of land cover change, climate variables, population, transportation, water and fragmentation). Major sources will include: (i) The Encyclopedia of Life – an ecosystem of websites that makes key information about all life on Earth accessible to anyone, anywhere in the world; and (ii) The Encyclopedia of Earth – a new electronic reference about the Earth, its natural environments, and their interaction with society. The Encyclopedia is a free, fully searchable collection of articles.

c) Regional Networks for Ecosystems (former EC-06-07)

This sub-task is led by USA, GTOS and POGO

Build upon initial success of extending ANTARES in South America to the global-scale ChloroGIN under POGO and IOCCG, and develop existing initiatives (e.g. IOC-sponsored regional networks; GOFC-GOLD regional networks and ILTER for terrestrial domains).

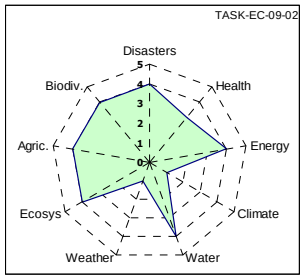
d) Protected Areas Assessment and Monitoring (GEO PAAM)

This sub-task is led by USA, UNEP and UNESCO

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

EC-09-02: Human Dimension of Ecosystem Utilization and Conservation

Identify and assess the risks posed by global change and human development to the environment, society and regional economies. Develop adaptation strategies to reduce these risks and mitigate impacts at local, regional and global levels.



a) Global Road and Human Settlements Mapping on GEO Grid

This sub-task is led by Japan and ICSU

Develop a global road and human settlements map on GEO Grid. Related activities will include: (i) System development of GEO Grid towards sharing, developing and distributing data; (ii) Research & development for producing relevant data using satellite images; and (iii) Collection, maintenance, and evaluation of relevant remote sensing and GIS data.

b) Tourism Impact on Environmental, Social and Economic Regional Activities

This sub-task is led by Greece

Map the potential impacts of global change on key sectors of Eastern Mediterranean's economy and society. Potential impacts include (i) Climate change impacts on agriculture, fisheries and water supplies; (ii) Sea-level rise and its impact on tourism, manufacturing, land use, urban areas and employment; (iii) Impact on employment and other economic variables; and (iv) Intra-regional and extra-regional migration. Based on this mapping, identify potential measures for mitigating the expected impacts of global change. The tourism-intensive Eastern Mediterranean region features an extensive shoreline, thousand of islands, highly sensitive agricultural lands and an unstable economy. As a result, relatively small environmental changes can negatively affect the region's social and economic conditions.

c) Developing Transport Infrastructure in Africa

This sub-Task is led by UNECA

Support the development of transport infrastructure capacities in Africa, strengthening the continent effort in regional integration, economic development and poverty alleviation. In particular produce a comprehensive geo-spatial database, with appropriate applications, to support the preparation of an integrated, all-modes transport infrastructure master plan for Africa.

Key related Tasks include: AR-09-02a (Virtual Constellations), DI-09-03 (Warning Systems for Disasters), DI-09-02b (Risk Management for Floods), DI-09-01 (Systematic Monitoring to Support Geohazards Risk Assessment), EN-07-01 (Management of Energy Sources), EN-07-03 (Energy Policy Planning), EC-09-01 (Ecosystem Observation and Monitoring Network), BI-07-01 (Biodiversity Observation Network).

2.8 AGRICULTURE

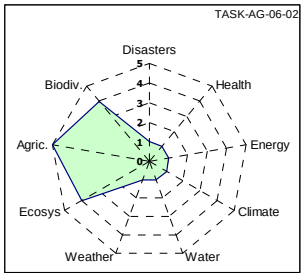
Supporting sustainable agriculture and combating desertification

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

GEOSS 10-Year Implementation Plan, Section 4.1.8

Note: Activities in the Agriculture area are supported by the Global Agricultural Monitoring Community of Practice

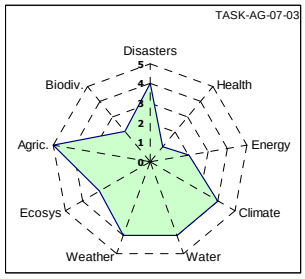
AG-06-02: Data Utilization in Fisheries and Aquaculture



This Task is led by Canada, Spain and POGO

Identify opportunities for the enhanced utilization of Earth observations in fisheries and aquaculture. Consult with experts from fisheries, aquaculture, coastal zone management and Earth observation communities at regional and international levels. Support the implementation of the SAFARI project and IOCCG monograph. Make relevant synergies with AR-09-02a (proposed Virtual Constellation on Ocean Colour Radiometry which will provide scientific data products related to marine ecosystems and ocean biogeochemistry for near-surface global ocean and coastal waters).

AG-07-03: Global Agricultural Monitoring



Support sustainable agriculture management and improve food security through the increased use of Earth observation data. Enhance current global capabilities in the areas of agriculture monitoring, famine early warning, food-supply prediction and agriculture risk assessment. Build the capacity necessary to utilize Earth observation information, especially within the developing world.

a) Global Agricultural Monitoring System (former AG-07-03)

This sub-task is led by USA

Develop and improve a global operational agricultural monitoring system – enhancing current capabilities in the areas of monitoring, famine early warning and food security. Related activities will include: (i) Global mapping and monitoring of changes in distribution of cropland area and associated cropping systems; (ii) Global monitoring of agricultural production leading to accurate and timely reporting of national agricultural statistics, accurate forecasting of shortfalls in crop production, and reduction of risk & increased productivity at a range of scales; (iii) Development of early warning systems for famine, enabling timely mobilization of international response in food aid.

b) Agricultural Risk Management (former AG-07-02)

This sub-task is led by WMO

Develop and improve analytical tools and methods for agriculture risk assessment, particularly for crop failure. Establish common standards and formats. Facilitate the implementation of pilot-projects linking Earth system model forecasts to end-user application models (such as crop-yield models) to improve food-supply prediction.

c) Expanding Earth Observation Applications in Agriculture and Promoting Capacity Building in Developing Countries (former AG-06-07)

This sub-task is led by China, Korea and Uganda

Develop training modules and expand the use of Earth observations for agricultural purposes in Africa, Asia, Latin America, Central and Eastern Europe, and Small Island States. Training modules will be underpinned by practical exercises using multi-source satellite data.

Key related Tasks include: AR-09-02a (Virtual Constellations), CL-09-01 (Environmental information for Decision-Making)

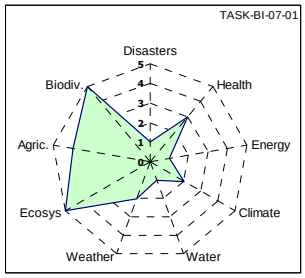
2.9 BIODIVERSITY

Understanding, monitoring and conserving biodiversity

> Issues in this area include the condition and extent of ecosystems, distribution and status of species, and genetic diversity in key populations. Implementing GEOSS will unify many disparate biodiversity-observing systems and create a platform to integrate biodiversity data with other types of information. Taxonomic and spatial gaps will be filled, and the pace of information collection and dissemination will be increased.
>
> *GEOSS 10-Year Implementation Plan, Section 4.1.9*

Note: Activities in the Biodiversity area are supported by the Biodiversity Community of Practice

BI-07-01: Biodiversity Observation Network (GEO BON)



Coordinate and improve biodiversity (animals, plants, genes, etc) observation, assessment and conservation – especially in terms of acquisition and use of satellite/aerial/in-situ observation. Develop a global observation network to facilitate coordination among information users and providers. Improve the quality and quantity of observation and advocate for a better understanding of trends and conservation.

a) Biodiversity Observation Network (GEO BON)

This sub-task is led by Netherlands, USA and DIVERSITAS International

Implement the GEO Biodiversity Observation Network that was launched in April 2008. Targets are spatially and topically prioritized, based on analysis of existing information, identifying unique or highly diverse ecosystems: those supporting migratory, endemic or globally threatened species, and those whose biodiversity is of socio-economic importance, and which can support the 2010 CBD target. Specific objectives include: (i) Develop a strategy for assessing biodiversity at both the species and ecosystems level; (ii) Facilitate the establishment of monitoring systems that enable frequent, repeated, globally coordinated assessment of trends and distributions of species and ecosystems of special conservation merit; and (iii) Facilitate consensus on data collection protocols and the coordination of the development of interoperability among monitoring programs. The marine biodiversity component will be made as strong as possible to animate mutually-beneficial dialogue between terrestrial and marine components.

b) Invasive Species Monitoring System (former BI-07-02)

This sub-task is led by USA

Characterize, monitor and predict changes in the distribution of invasive species. Characterize the current requirements and capacity for invasive species monitoring, identify gaps, and develop strategies for implementing cross-search functionality among existing online invasive species information systems from around the globe. Invasive alien species (IAS) threaten biodiversity and exert a tremendous cost on society for IAS prevention and eradication. They endanger natural ecosystem functioning and seriously impact biodiversity and agricultural production. The Task will be coordinated by members of the Global Invasive Species Information Network (GISIN).

c) Capturing Historical and New Biodiversity Data (former BI-06-03)

This sub-task is led by GBIF

Develop a strategic plan for the capture and mobilisation of various types of "fit-for-use" historical and new biodiversity data through multi-cultural, heterogenous and distributed data custodians. Develop criteria for Data Rescue Centres. Develop strategies for industrialisation of capture, digitisation and mobilisation of primary biodiversity data. Develop strategies for mobilisation of biodiversity data generated through "ad-hoc" and "non-primary" projects. Promote uptake of Global Biodiversity Resources Discovery System (GBRDS). Review and develop primary biodiversity data capture standards. Implement the strategic plan for capturing historical biodiversity data from natural history collections and the research community.

APPENDIX A: GEO COMMUNITIES OF PRACTICE

PRELIMINARY LIST OF PARTICIPANTS

Air Quality and Health

Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Switzerland, UK, USA, CEOS, EEA, ESA, ECMWF, ICSU, ISPRS, WMO

Atmospheric Chemistry (former IGOS Atmospheric Chemistry theme – IGACO)

Under development

Biodiversity

Australia, Botswana, Brazil, Canada, Columbia, Denmark, Estonia, France, Germany, Ghana, Hungary, India, Iran, Israel, Italy, Japan, Mexico, Namibia, Netherlands, Nicaragua, Niger, Nigeria, Norway, Panama, Philippines, Portugal, South Africa, Switzerland, Thailand, Tunisia, UK, Ukraine, Uruguay, USA, ASEAN Centre for Biodiversity, BioNET-INTERNATIONAL, BirdLife International, Conservation International, DIVERSITAS, ESRI, GBIF, Guyra Paraguay, IUCN, LIFEWATCH, The Nature Conservancy, UNEP, UNESCO

Carbon Cycle (former IGOS Carbon theme – IGCO)

Under development

Coastal Zone (reflecting former IGOS Coastal theme)

Algeria, EC, Egypt, Germany, Greece, Italy, Israel, Spain, Sweden, USA, IOC

Cryosphere (former IGOS Cryosphere theme)

Under development

Energy

Australia, Belgium, Canada, China, Denmark, EC, Egypt, France, Germany, India, Italy, Korea, Netherlands, Russia, Switzerland, Thailand, USA, European Wind Energy Association, ESA, GOOS, International Energy Agency, IEEE

Forest

Australia, Brazil, Canada, China, EC, Finland, France, Germany, Italy, Japan, Korea, Niger, Norway, Portugal, Russia, South Africa, Thailand, USA, CEOS, EEA, ESA, EUMETSAT, FAO, GOFC-GOLD, GTOS, ISCGM

Geohazards (former IGOS Geohazards theme)

France, Italy, Japan, UK, USA, ESA, GGOS, UNESCO

Global Agricultural Monitoring (former IGOS Land sub-theme)

Argentina, Australia, Austria, Belgium, Brazil, China, EC, ESA, FAO, France, India, Italy, Netherlands, South Africa, USA, CGIAR, WMO

Water Cycle (former IGOS Water Cycle Theme – IGWCO)

Australia, Canada, China, Finland, Germany, Japan, Netherlands, Panama, Switzerland, UK, USA, UNESCO

APPENDIX B: ACRONYMS

AeroCOM	Aerosol Comparisons between Observations and Models
ACQWA	Assessing Climatic change and impacts on the Quantity and quality of WAter
AG	Agriculture
AMDAR	Aircraft Meteorological Data Relay
ANTARES	A Network for the Enhancement of the Education and Scientific Research
APEC	Asia-Pacific Economic Cooperation
APFM	Associated Programme on Flood Management
AR	Architecture
ASEAN	Association of Southeast Asian Nations
ASI	Italian Space Agency
AVHRR	Advanced Very High Resolution Radiometer
AWCI	Asian Water Cycle Initiative
BI	Biodiversity
CB	Capacity Building
CBD	Convention on Biological Diversity
CBERS	China-Brazil Earth Resources Satellite
CEOP	Coordinated Energy and Water Cycle Observations Project
CEOS	Committee on Earth Observation Satellites
CGIAR	Consultative Group on International Agricultural Research
CGMS	Coordination Group for Meteorological Satellites
CIESIN	Center for International Earth Science Information Network
CL	Climate
CoP	Community of Practice
CSIR	Council for Scientific and Industrial Research, South Africa
DA	Data Management
DEM	Digital Elevation Model
DI	Disasters
DIVERSITAS	An international programme of biodiversity science
EC	European Commission
EC	Ecosystems
ECMWF	European Centre for Medium-range Weather Forecasts
EEA	European Environmental Agency
EN	Energy
EO	Earth Observations
ESA	European Space Agency
ESRI	Environmental Systems Research Institute
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
FAO	Food and Agriculture Organization
FAPAR	Fraction of Absorbed Photosynthetically Active Radiation
FDSN	International Federation of Digital Seismograph Networks

FP7	European Union 7th Framework Programme
FPAR	Fraction Photosynthetically Available Radiation
GAW	Global Atmosphere Watch
GBIF	Global Biodiversity Information Facility
GCI	GEOSS Common Infrastructure
GCOS	Global Climate Observing System
GDEWS	Global Drought Early Warming Systems
GEO	Group on Earth Observations
GEOBENE	Global Earth Observation Benefit Estimation: Now, Next and Emerging
GEOSS	Global Earth Observation System of Systems
GEWEX	Global Energy and Water Cycle Experiment
GGMN	Global Groundwater Monitoring Network
GIFS	Global Interactive Forecast System
GIS	Geographical Information System
GISIN	Global Invasive Species Information Network
GMES	Global Monitoring for Environment and Security
GNSS	Global Navigation Satellite System
GOFC-GOLD	Global Observation of Forest and Land Cover Dynamics
GOOS	Global Ocean Observing System
GOS	Global Observing System
GPM	Global Precipitation Measurement
GPS	Global Positioning System
GSN	Global Seismographic Network
GTOS	Global Terrestrial Observing System
HARON	Hydrological Applications and Run-Off Network
HE	Health
IAG	International Association of Geodesy
IAS	Invasive Alien Species
ICSU	International Council for Science
IEEE	Institute of Electrical and Electronics Engineers
IGAC-SPARC	International Global Atmospheric Chemistry - Stratospheric Processes And their Role in Climate
IGACO	International Global Atmospheric Chemistry Observations
IGBP	International Geosphere-Biosphere Programme
IGCO	Integrated Global Carbon Observation
IGOS	Integrated Global Observing Strategy
IGWCO	Integrated Global Water Cycle Observations (former IGOS Water Theme)
IIASA	International Institute for Applied Systems Analysis
ILTER	International Long Term Ecological Research network
InSAR	Interferometric Synthetic Aperture Radar
INTA	Instituto Nacional de Técnica Aeroespacial, Spain
IOC	Intergovernmental Oceanographic Commission

IOCCG	International Ocean Colour Coordinating Group
IPWG	International Precipitation Working Group
IPY	International Polar Year
IRI	International Research Institute for Climate and Society
ISC	International Seismological Centre
ISCGM	International Steering Committee for Global Mapping
ISDR	International Strategy for Disaster Reduction
ISLSCP	International Satellite Land-Surface Climatology Project
ISPRS	International Society for Photogrammetry and Remote Sensing
ISSG	IUCN/SSC Invasive Species Specialist Group
ITC	International Training Centre
ITU	International Telecommunication Union
IUCAF	Scientific Committee on Frequency Allocations for Radio Astronomy and Space Science
IUCN	International Union for the Conservation of Nature and Natural Resources (World Conservation Union)
IUGG	International Union of Geodesy and Geophysics
LAI	Leaf Area Index
LAM	Limited Area Model
LIS	Land Information System
MERIS	Medium Resolution Imaging Spectrometer
MERIT	Meningitis Environmental Risk Information Technologies
MODIS	Moderate Resolution Imaging Spectroradiometer
NADM	North American Drought Monitor
NARSS	National Authority for Remote Sensing and Space Sciences, Egypt
NASA	National Aeronautics and Space Administration
NBII	National Biological Information Infrastructure
NEPTUNE	The North-east Pacific Time-series Undersea Network Experiments
NMHS	National Meteorological and Hydrological Service
NPP	Net Primary Productivity
NWP	Numerical Weather Prediction
OGC	Open Geospatial Consortium
OS	Open Source
OSS	Open Source Software
PAAM	Protected Areas Assessment and Monitoring
POGO	Partnership for Observation of the Global Ocean
POPs	Persistent Organic Pollutants
PROMOTE	PROtocol MOniTORing (for the GMES Service Element: Atmosphere)
RAMSAR	Convention on Wetlands, Ramsar, Iran, 1971
SAFARI	Societal Applications in Fisheries & Aquaculture using Remotely-Sensed Imagery
SAR	Synthetic Aperture Radar
SBA	Societal Benefit Area

SDI	Space Data Infrastructure
SDI	Spatial Data Infrastructure
SDS	Sand and Dust Storm
SIF	Standards and Interoperability Forum
SPOT	Système Probatoire d'Observation Terrestre
SPOT-VGT	SPOT Vegetation
SSC	Species Survival Commission
SST	Sea Surface Temperature
TerraLib	Open source GIS software library
TerraView	GIS application built on the TerraLib GIS library
THORPEX	The Observing-system Research and Predictability Experiment
TIGER	ESA-launched initiative focusing on the use of space technology for water resource management in Africa
TIGGE	THORPEX Interactive Global Grand Ensemble
UK	United Kingdom
UN	United Nations
UNECA	United Nations Economic Commission for Africa
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational Scientific and Cultural Organization
UNOOSA	United Nations Office for Outer Space Affairs
UNOSAT	United Nations Operational Satellite Applications Programme
US	User Engagement
USA	United States of America
USGS	United States Geological Survey
VENUS	Victoria Experimental Network Under the Sea
VI	Vegetation Index
WA	Water
WCRP	World Climate Research Programme
WE	Weather
WHO	World Health Organization
WIS	WMO Information System
WMO	World Meteorological Organization
WWRP	World Weather Research Programme