The Group on Earth Observations (GEO) &
the Global Earth Observation System of Systems:
GEOSS Perspectives

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• Stated that: the achievement of sustainable development requires the integration of its economic, environmental & social components at all levels.

• The WSSD also stressed the need for “Information for Decision-Making & Participation”.

• The outcome of the WSSD therefore highlighted the urgent need for coordinated Earth Observations relating to the state of our Planet Earth to support decision-making in an increasingly complex and environmentally stressed world.
Launched in 2003 by the G8 in response to the call for action by the 2002 World Summit on Sustainable Development for coordinated observations relating to the state of the Earth.

GEO is a voluntary partnership of governments and international org. established by the 3rd EO Ministerial Summit in 2005.

As of June 2010 GEO’s Members include 80 Governments, the European Commission and 58 Participating Organisations.

GEO Plenary is co-chaired by South Africa, EC, USA and China.

EO Ministerial Summit every 2 yrs, next Beijing PRC, Nov. 2010.

GEO is coordinating efforts to build a Global Earth Observation System of Systems, or GEOSS, on the basis of the 10-Year Implementation Plan agreed for the period 2005 to 2015.
GEOSS: Its Vision and Purpose (from the GEOSS Strategic targets)

• The **vision** for GEOSS is to realize a future wherein decisions and actions for the benefit of humankind are informed by coordinated, comprehensive and sustained Earth observations and information.

• The **purpose** of GEOSS is to achieve (these) observations of the Earth system, in order to improve monitoring of the state of the Earth, increase understanding of Earth processes, and enhance prediction of the behaviour of the Earth system. GEOSS will meet the need for timely, quality long-term global information as a basis for sound decision making, and will enhance delivery of benefits to society.
GEO Societal Benefit Areas

GEOSS will enhance delivery of benefits to society in the following initial areas:

• Reducing loss of life & property from natural & human-induced disasters;
• Understanding environmental factors affecting human health and well-being;
• Improving management of energy resources;
• Understanding, assessing, predicting, mitigating, and adapting to climate variability and change;
• Improving water-resource management through better understanding of the water cycle;
• Improving weather information, forecasting, and warning;
• Improving the management and protection of terrestrial, coastal, and marine ecosystems;
• Supporting sustainable agriculture and combating desertification;
• Understanding, monitoring, and conserving biodiversity.
(Selected) GEO Strategic Goals

• Sustain the operation of comprehensive and coordinated space-based, airborne and in situ Earth observation networks that meet user requirements in support of informed decision making;
• Sustain operations of the shared architectural GEOSS components and related information infrastructure;
• Address the need for timely, global and open data sharing across borders and disciplines, to maximize the value and benefit of Earth observation investments.
• Implement interoperability amongst observational, modelling, data assimilation and prediction systems;
• Foster research and development activities and coherent planning for future obs. & info. Systems.
GEOSS Infrastructure represents a COLOSSAL investment by GEO Members & PO in EO systems. (Many 10's of billions.) It delivers major societal benefits to users, e.g.: scientists, policy makers, the commercial sector & citizens. It enables GEOSS resources to be readily discovered and accessed. It provides improved interoperability and delivers trusted data & information. It is "Open", in accordance with Data Sharing Principles. It is a clearing-house of registries: services, standards, best practices, requirements. It is Earth Observations. It is part of the GEO Group on Earth Observations.
GEOSS Notional Architecture

User Interfaces
- GEOSS Web Portal
  - Catalog Client
- Community Portals
- Decision-Support Clients

Business Processes
- GEOSS Clearinghouse
  - Catalog Server
  - Catalog Clients
    - ISO 23950
    - OGC CSW
- Community Catalogs
- Community Services

Data Access
- GEONETCast
- Observation Access Services
- Model Access Services
- Other Services

GEOSS Registries
- Components
- Services
- Standards

Metadata
GEOSS Data Sharing Principles
Section 5.4 of GEOSS 10-year Implementation Plan (2005)

• There will be Full and Open exchange of data, metadata, and products shared within GEOSS, recognising relevant international instruments & national policies and legislation.

• All shared data, metadata & products will be made available with minimum time delay and at minimum cost.

• All shared data, metadata & products, being free of charge or no more than the cost of reproduction, will be encouraged for research & education.
Data Sharing – GEO Ministerials

“We support the establishment of a process with the objective to reach a consensus on the implementation of the Data Sharing Principles for GEOSS to be presented to the 2010 GEO Ministerial Summit”.

- The European Commission firmly believes that the GEO offers an important forum for promoting the sharing of Earth observation data at international level.
- We recognise that all of the potential benefits that the GEOSS can bring for society can only be fully realised if we are able to overcome the obstacles that exist today to the full and open exchange of data.
- We will therefore fully support the Action Plan to be presented to the 2010 GEO Ministerial that will take place in Beijing, PRC, on 5 November 2010
GEOSS Interoperability Basics

• Systems contributed to GEOSS will continue to operate separately within their own mandates while embracing data sharing principles and interoperability arrangements reached through consensus among GEO members.

• In GEOSS “interoperability” is taken to mean the ability to perform a task that spans discrete ICT (information and communications technology) components.
GEOSS Interoperability Strategy

• A Services Oriented Architecture (SOA) approach to interoperability
  – GEOSS is viewed as an assembly of independent components that offer “services” via interfaces where structured messages are exchanged
  – These communications must adhere to selected international standards
  – Interoperability may still not be “automatic”
GEOSS Registries

• Fundamental to the operation of GEOSS is access to information about its components.

• GEOSS Components will be described in a “Components Registry” while the services these components offer will be described in a “Services Registry.”

• The standards that are in use by GEOSS will be described in a “Standards Registry.”

• All GEOSS registries will be interoperable and accessible via the GEOSS “Clearinghouse.”
“Interoperability Arrangements”

• When two GEOSS components conform to the same data description and transport standards, and are well-defined within the GEOSS registries, interoperability should be “readily” achievable.

• Where two GEOSS components do not share common standards, or where the service definitions are not adequate, special “Interoperability Arrangements” will need to be made.

• This will be taken up by the “Standards and Interoperability Forum”, which provides advice, expertise and impartial guidance on issues relating to standards and interoperability for the GEOSS.
SIF modus operandi: Triggering Event

1. **Component Contributor** → **Register Component**
2. **Component has service interface?**
   - **Yes** → **Begin Service Registration**
   - **No** → **Registration Done**
3. **Uses registered standard?**
   - **Yes** → Registration Done
   - **No** → **Capture details of interoperability arrangement**
4. **Pass proposed GISA to SIF**
SIF modus operandi: Process

1. SIF receives proposed GISA
2. Request for Comments posted to SIF website
3. Announcement made to SIF list
4. Other discipline experts invited to comment
5. Arrangement suitable for wider use within GEOSS?
   - Y: GISA entered in Special Arrangements Register
   - N: Arrangement remains as metadata to registered component service
6. Entry in Services Register updated to point to new GISA
Status of EU “direct”(*) research actions in support of GEOSS Implementation

* What is presented in the following slides represents a subset of the EU contribution to GEO / GEOSS. (E.g., no ref. to GMES, INFSO projects, etc., etc.)

The projects shown are funded within the framework of the “Earth and ocean observation systems and monitoring methods for the environment and sustainable development” of the Environment Theme of the current EU Research Framework Programme.
Direct contribution of EU “EO” Research Projects to GEOSS

TRANSVERSE GEOSS (GEOSS Building Blocks)

ARCHITECTURE
- EuroGEOSS (08)
- GEOVIQUA (10: u/n)
- FP7 Call 2011

DATA MANAGEMENT
- FP7 Call 2011

CAPACITY BUILDING
- YEOS (2006)
- DevCocast (2007)
- AEGOS (2007)
- EnviroGRIDS (2008)
- SEOCA (2009)
- GEONETCAB (2009)
- BalkanGEONet (10: u/n)
- OBSERVE (10: u/n)
- Call 2011

USER ENGAGEMENT
- GeoBene (06)
- EUGENE (09)

SCIENCE AND TECHNOLOGY
- EGIDA (10: u/n)
- GfG2 (10: u/n)

(GEOLOGY)
- AEGOS (07)
Env. Theme 2011 Call for Proposals:
Provisional topics related to GEOSS / GCI development

Inter-operable integration of shared Earth Observations in the Global Context
Develop new tools, processes, procedures and protocols to lift the obstacles to the sharing of Earth observation (EO) data at global level and to address data/product providers identified concerns. Promote harmonization of data sharing consistent with the Data Sharing Implementation Guidelines approved by GEO Plenary VI and enable multidisciplinary interoperability.

In particular focus on 3 GEO SBAs: 1) Weather; 2) Water; 3) Ecosystem (GOOS).

Strengthen the development of the GCI.
(Up to 1 project, max. EU contribution of 7 Million Euro.)

Please note, participation in proposals submitted to this Call is open to all GEO Members and collaboration with GEO Members providing advanced development for the GCI is strongly encouraged.
Direct contribution of EU “EO” Research Projects to GEOSS

9 GEOSS Societal benefit Areas (GEOSS for Society)

- Health
  - EO2HEAVEN (09)
  - EO-MINERS (09)
  - Impact Min (09)
  - GMOS (10: u/n)

- Energy
  - EnerGEO (08)

- Water
  - CEOP-AEGIS (07)
  - HYPOX (08)
  - EUGENE (09)

- Weather
  - Call 2011

- Agriculture
  - Call 2011

- Disaster
  - EUGENE (09)

- Climate
  - COCOS (07)
  - EuroSITES (07)
  - ACOBAR (07)
  - EUGENE (09)
  - ERACLIM (10: u/n)
  - Call 2011

- Ecosystem
  - e-SOTER (07)
  - EnviroGRIDS (08)
  - HYPOX (08)
  - EO-MINERS (09)
  - Impact Min (09)

- Biodiversity
  - EBONE (07)
Building EO Capacity in Europe

Task EC-09-02 Ecosystem Vulnerability to Global Change, EC FP7 EnviroGRIDS will co-lead a sub-task on Vulnerability of Sea Basins.

The Black Sea Basin Observation System will store, analyze, visualize and disseminate information on past, present and future states of the region to assess and predict its sustainability and vulnerability.

The GSDI (Grid enabled Spatial Data Infrastructure) developed will become a component of GEOSS, Compatible with the EU directive INSPIRE.
Building EO Capacity in Africa

African-European Geo-resources Obs. System: AEGOS

- Design a pan-African infrastructure of interoperable data and user-oriented services to strengthen the sustainable use of geo-resources in Africa
- Define common strategies for capacity building & training programmes
- Geoscience contribution to GEOSS, in the context of the INSPIRE Directive
- 23 European and African partners
- FP7 Support Action – 2008-2011
Develop a GEO-consistent methodology to assess the environmental impact and cost of energy resource exploitation.

4 pilots have been selected, for which an application will be built, integrating the existing datasets and modelling techniques, taking account of the INSPIRE directive.

**Fossil Fuels** *(oil, gas, coal)*

**Biomass**

**Solar energy**

**Wind energy**
EBONE will develop a cost effective biodiversity observation system. The outcome of the project will form the foundation for an integrated system based on key biodiversity indicators operating at the European level.

- EBONE will ensure consistent data development in accordance with the INSPIRE Directive and the principles set for GEOSS data sharing.

EBONE will be Pilot project for the GEO BON Global framework for observations.
Summary

• The GEO initiative is a striking example of international cooperation in science and technology to improve our decision-making on the major environmental challenges facing our planet and its people.

• Within its innovative democratic voluntary governance structure, the GEO has demonstrated great vitality in the work being carried out.

• It is helping individuals and institutions to acquire and build the necessary capacity to monitor their environment – and act on this information.

• This is why Europe is continually working to reinforce its contribution to the GEOSS across all the GEO activities, tasks and Societal Benefit Areas.

Thank You