

DATA SHARING IN THE SERVICE OF SCIENCE AND SOCIETY: IMPLEMENTATION OF THE GEOSS DATA SHARING PRINCIPLES

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Commission VIII, GEO Special Session

KEY WORDS: GEO, Data Sharing, full and open access, satellite data, in-situ data

ABSTRACT:

GEOSS 10-year Implementation Plan (2005) stated that “The societal benefits of Earth observations cannot be achieved without data sharing” and adopted the GEOSS data sharing principles. To reinforce the principle of data sharing within the GEOSS, the 2007 Cape Town Ministerial Summit recognised that “The success of GEOSS will depend on a commitment by all GEO partners to work together to ensure timely, global and open access to data and products”, and “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 next GEO Ministerial Summit.” The 2008 GEO-V Plenary in Bucharest then established the Data Sharing Task Force (DSTF). The DSTF submitted an updated draft of Implementation Guidelines for the GEOSS Data Sharing Principles to GEO-VI Plenary 2009 in Washington DC and prepared a draft Action Plan to implement the Data Sharing Principles and to enable the development of working procedures for data sharing within GEOSS. The DSTF will submit the Implementation Guidelines and the Action Plan for adoption by 2010 GEO Beijing Ministerial Summit.

1. INTRODUCTION

1.1 Why Share Data Fully and Openly?

Today, our planet is being monitored by land, sea, air and space-based Earth observation systems. But the current system for collecting, storing, analysing and sharing the resulting observations remains fragmented, incomplete or redundant and difficult to integrate. Major observational (and therefore knowledge) gaps remain. Decision makers around the world need a global, coordinated, comprehensive and sustained environmental information system that supports action to be taken whenever necessary.

Recognizing the growing need for improved Earth observations, over 130 governments and leading international organizations are collaborating through the Group on Earth Observations, or GEO, to establish a Global Earth Observation System of Systems (GEOSS) by the year 2015.

The Vision for GEOSS, as described in the GEOSS 10-Year Implementation Plan, “is to realize a future wherein decisions and actions for the benefit of humankind are informed via coordinated, comprehensive and sustained Earth observations and information”.

To achieve this vision, GEO Members and Participating Organisations are contributing the resources from their respective Earth monitoring systems to GEOSS and interlinking these systems so that they work better together. They are developing common technical standards to make it possible to pool information, and they are promoting the full and open sharing and dissemination of their data, metadata and products.

This expanding coalition of countries and organizations is enabling the provision of reliable information and services built on pooled resources and is transforming the ability of

governments to manage natural resources, promote the safety and well-being of their citizens, and meet respective treaty obligations. In this way, the GEO community is supporting international efforts to promote sustainable development and the Millennium Development Goals.

1.2 Background

GEOSS 10-year Implementation Plan (2005) stated that “The societal benefits of Earth observations cannot be achieved without data sharing” and adopted the following GEOSS data sharing principles:

- There will be Full and Open exchange of data, metadata, and products shared within GEOSS, recognising relevant international instruments and national policies and legislation
- All shared data, metadata and products will be made available with minimum time delay and at minimum cost.
- All shared data, metadata and products being free of charge or no more than the cost of reproduction will be encouraged for research & education.

As an initial step, a task was established within the GEO Work Plan that "Invited experts to identify steps required to further the practical application of the agreed GEOSS data sharing principles". This task, DA-06-01, which is led by the Committee on Data for Science and Technology of the International Council for Science (CODATA), an interdisciplinary committee of the International Council for Science (ICSU), prepared the "White Paper on the GEOSS Data Sharing Principles" and developed a set of draft "Implementation Guidelines for the GEOSS Data Sharing Principles".

To reinforce the principle of data sharing within the GEOSS, the Cape Town Ministerial Summit in 2007 recognised that

"The success of GEOSS will depend on a commitment by all GEO partners to work together to ensure timely, global and open access to data and products". The Ministerial Declaration also stated that: "We (the participants) 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 next GEO Ministerial Summit".

In response to the Cape Town Declaration, the GEO-V Plenary therefore endorsed a proposal that a GEOSS Data Sharing Task Force should be established comprising GEO Members and the Task Team (DSTF). The purpose of the DSTF is to support the GEO in its objective to reach a consensus at its 2010 Ministerial Summit on the practical steps to implement the GEOSS Data Sharing Principles.

2. DSTF

A Call for Participation of the DSTF was issued in early 2009 and the first meeting was held in Geneva at the end of May 2009. The followings were selected as Task Force Co-Chairs.

- China - Goufu Wang
- India – V. S. Hegde
- European Commission - Alan Edwards
- Japan - Chiyoji Kawamoto
- USA - Linda Moodie
- DA-06-01 Task Team - Paul Uhlir/Robert Chen/Joanne Gabrynowicz

Under its Terms of Reference, the DSTF is convened to:

- Submit an updated draft of **Implementation Guidelines** for the GEOSS Data Sharing Principles to Plenary 2009.
- Interact with GEO Committees and Task Teams on their data sharing opportunities and needs and work to promote harmonization of data sharing procedures consistent with the Data Sharing Principles.
- Prepare an **Action Plan** to implement the Data Sharing Principles and to enable the development of working procedures for data sharing within GEOSS.
- Produce documentation (including assessments on the actions to be taken; some representative costs and benefits; and, responsibilities for the proposed data sharing processes) to support adoption of the Implementation Guidelines and the action plan by the 2010 GEO Ministerial Summit.
- Consider possible recommendations to improve the principles for data sharing within GEOSS.

DSTF submitted an updated draft of Implementation Guidelines for the GEOSS Data Sharing Principles to GEO-VI Plenary 2009 in Washington DC, and the Implementation Guidelines was accepted. DSTF also has been preparing an Action Plan to implement the Data Sharing Principles to be submitted to 2010 GEO Ministerial Summit in Beijing.

3. IMPLEMENTATION GUIDELINES

The updated Implementation Guidelines was submitted to GEO-VI Plenary in Washington D.C. and accepted with some amendments. The accepted Implementation Guidelines includes six main guidelines to implement the GEOSS Data Sharing Principles as below.

3.1 Full and Open Exchange

Promoting the implementation of the principle of full and open exchange of data, metadata and products in accordance with the GEOSS Data Sharing Principles.

(1) For GEOSS to realize its vision and potential, it is essential to promote the full and open exchange of data, metadata and products in accordance with the data sharing principles.

3.2 Reuse and Re-Dissemination

Enabling GEOSS users to reuse and re-disseminate shared data, metadata and products.

(2) The full and open exchange of data called for in the data sharing principles should apply to GEOSS data, metadata and products even after such shared information is disseminated to users. Users need to be able to integrate, reuse, and re-disseminate the shared information with minimal restrictions in order to achieve maximum results in the GEOSS societal benefit areas.

(2.1) GEO should encourage governmental, public-sector organizations to register and provide robust and well-understood data, metadata and products in the GEOSS, without any reuse or re-dissemination restrictions on this data and information.

(2.2) To meet the full range of user needs identified as priorities by GEO, private-sector or hybrid public-private systems, or public-sector organizations that are partly publicly funded, should be encouraged to contribute at least a useful subset of their data and products on a full and open basis, with minimum restrictions as to reuse and/or re-dissemination.

(2.3) Attribution requirements should include recognition of all significant data sources or authors, as well as the GEOSS component that enabled access to and delivery of the data.

3.3 Consistency with National Policies and Legislation

Ensuring consistency in the implementation of the GEOSS Data Sharing Principles with relevant international instruments and national policies and legislation.

(3) Many GEO members and participating organizations have various specific restrictions on the dissemination and use of certain data, metadata and products based on international instruments and national policies and legislation. Such restrictions pertain mainly to concerns regarding the protection of: National Security, financial viability, proprietary interests, privacy, confidentiality, indigenous rights, and conservation of sensitive ecological, natural, archaeological, or cultural resources.

(3.1) GEO Members States and Participating Organizations with reuse and/or re-dissemination restrictions based on legitimate concerns of data misuse or alteration should be encouraged to implement a more enabling data sharing culture, reviewing and wherever possible revising restrictive policies, as practical solutions to these barriers are found.

3.4 Pricing Policies

Implementing pricing policies consistent with the GEOSS Data Sharing Principles.

(4) The pricing of GEOSS data, metadata and products should be based on the premise that the data and information within GEOSS is a public good for public-interest use in the nine societal benefit areas.

GEO, together with its GEOSS data providers, should work to set standards for the full and open exchange of data based on this premise, with the only allowable cost for data being either that of reproduction and distribution, or the marginal cost of fulfilling the user request.

(4.1) The costs of data collection and system development and integration into GEOSS should be considered a previously incurred cost and, when possible, should not be included as part of cost recovery.

(4.2) Metadata should generally be made available openly at no cost, to enable users to discover sources of data and information without restriction.

(4.3) Where required, GEO should encourage development of flexible, online cost recovery mechanisms that allow different types of users to understand their access costs.

(4.4) For developing country users and for applications for non-commercial, public use for societal benefit, which are not covered by the research and education Data Sharing Principle, cost recovery should preferably be waived, or at least be no more than the cost of reproduction and distribution.

(4.5) Approaches to cost recovery and licensing of data, metadata and products contributed to GEOSS that do not require payment for re-use of data, metadata and products already acquired by users should be encouraged.

3.5 Reducing Time Delays

Reducing the time delays for making data available through GEOSS.

(5) GEO should promote “minimal time delay” to data within GEOSS, depending on the type of data and application and the need for appropriate quality control, and data should be transmitted on a real-time basis whenever necessary or practicable.

(5.1) For operational systems, quality control procedures should not introduce unnecessary time delays.

(5.2) For research data, time delays may need to include a limited period of quality control and exclusive use by the data provider. These time delays should nevertheless be minimized.

3.6 Research and Education

Promoting research and education uses of GEOSS data, metadata and products.

(6) GEO should clarify the definitions of “Research” and “Education.”

(6.1) Recognizing that shared data, metadata and products for research and educational activities (and for support of developing country users and applications for non-commercial, public use for societal benefit, consistent with section 4.d) should ideally be free of charge, or at most no more than the cost of reproduction, then any cost reductions granted by data providers to fulfil these conditions should, wherever possible be documented.

(6.2) Users receiving data at reduced or no cost should be strongly encouraged to provide impact metrics and information regarding their use of the GEOSS data, metadata and products.

4. ACTION PLAN

The DSTF drafted an Action Plan and its supporting documentation which describe the actions that the GEOSS Data Sharing Task Force recommends the GEO to take to address the complex technical, structural and political challenges that, if met, will enable the full and open exchange of data, metadata and products, such that the goals of GEO and the resulting societal benefits can be fully realised. Main body of the plan is composed of the following sections.

- Introduction - why share data fully and openly?
- Background - what is the status of GEOSS data sharing today?
- Vision – where do we want to be and by when?
- What are the benefits of implementing this vision?
- What are the barriers to implementing this vision?
- What actions need to be taken?

The Attached supporting documents include the followings.

- Benefits of Implementing the Data Sharing Principles
- Considerations Arising from the Data Sharing Action Plan for the GEOSS Common Infrastructure
- Considerations for the GEO Community
- Implementation Guidelines for the GEOSS Data Sharing Principles (Accepted at GEO-VI Plenary)
- Glossary
- Seven Case Studies as below.
 - Argo Floats
 - ASTER Global Digital Elevation Model (GDEM)
 - CBERS Satellite Imagery
 - Forest Carbon Tracking (FCT)
 - Global Biodiversity Information Facility (GBIF)
 - International Polar Year (IPY)
 - Landsat

This plan builds upon the crucial concept of full and open exchange and on the Guidelines accepted by the GEO Plenary, which states that data, metadata and products made available through the GEOSS are made accessible with minimal time delay and with as few restrictions as possible, on a non-discriminatory basis, at minimum cost for no more than the cost of reproduction and distribution.

The plan notes that the achievement of full and open exchange of and access to key datasets will require actions by GEO

collectively and by Members and Participating Organizations individually, and by GEOSS tasks and cross-cutting activities.

The Action Plan specifies actions to be pursued by:

GEO collectively to:

- Create the GEOSS Data Collection of Open Resources for Everyone (GEOSS Data CORE) to address GEO Societal Benefit Areas. The GEOSS Data CORE is a distributed pool of documented datasets, contributed by the GEO community on the basis of full and open unrestricted access and at no more than the cost of reproduction and distribution;
- Establish a Task Force within GEO to:
 - Monitor the use and impact of resources made available with full and open access;
 - Promote the efficacy of the Data Sharing Principles in delivering societal benefits;
 - Evaluate the outcomes of this Action Plan and recommend further actions.
- Maintain the GEOSS Common Infrastructure (GCI) as the architectural framework essential to implementing the Data Sharing Principles;
- Integrate implementation of the Data Sharing Principles, as appropriate, into the responsibilities of GEO committees and activities of GEOSS tasks.

GEO Members to:

- Take leadership to establish national coordinating mechanisms to promote and monitor engagement with the implementation of the GEOSS Data Sharing Principles and provide feedback to GEO;
- Develop flexible policy frameworks to ensure that a more open data environment is implemented.

GEO Members and Participating Organizations to:

- Maximise the number of documented datasets made available on the basis of full and open access.
- Promote with data providers within their territories the benefits of full and open access to data.

In this draft Action Plan for Data Sharing within GEOSS, as one of specific actions to be strongly pursued, DSTF proposed to create the GEOSS Data CORE so that GEO Members can/will take a further significant step to demonstrate the practical implementation of the GEOSS Data Sharing Principles. In order to launch this concept, the DSTF has a plan that a letter be sent to GEO Ministers asking that in the crucial area of data sharing, Ministers at Beijing show strong political leadership and demonstrate that they are willing to make a real difference, by taking immediate and concrete action. In the proposed letter, Ministers are invited to announce their contributions to the GEOSS Data CORE in advance of, or at the Beijing GEO Ministerial Summit.

5. CONCLUSION

DSTF updated the Implementation Guidelines and drafted the Action Plan to implement the Data Sharing Principles adopted in 2005. However, there are several issues not yet fully addressed remained, such as handling data with restrictions, reuse/re-distribution and data tagging, license issues and so on. In May 2010, GEO secretariat, on behalf of the DSTF, circulated the draft Action Plan and the draft Supporting Documents to all GEO members and asked for comments in

order to address those issues, sophisticate these draft documents and reach a consensus on the implementation of the Data Sharing Principles. The DSTF will update the Action Plan and its Supporting Documents addressing the comments from the members and submit to GEO-VII Plenary and Ministerial Summit 2010 to be held in Beijing.

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