Furthering the Practical Application of the Agreed GEOSS Data Sharing Principles

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Preface

The Group on Earth Observations has agreed on a strong set of data sharing principles:

- *There will be full and open exchange of data, metadata, and products shared within GEOSS, while recognizing 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 free of charge or no more than cost of reproduction will be encouraged for research and education.*

Implementation of the principles is a key issue for GEOSS as recognized by 2006 Work Plan task DA-06-01, "Furthering the practical application of the agreed GEOSS data sharing principles." CODATA, the Committee on Data for Science and Technology of the International Council for Science (ICSU), has agreed to lead this task. Its first activity under this task was to organize an experts meeting in conjunction with its 20th International CODATA Conference in Beijing on 22 October 2006. This report summarizes the discussions at the meeting, which included more than 35 data experts from around the world. It should be noted that this summary report is not intended as a consensus document, but is aimed at identifying challenges to further application of the principles, options for addressing these challenges, and possible next steps for this GEO task.

Summary

The Director of the GEO Secretariat, Dr. José Achache, opened the meeting with an overview of GEO, noting that GEO is a voluntary process that relies on international collaboration and cooperation. He highlighted the importance of open access not only from technical and legal perspectives but also for socioeconomic reasons, in terms of spurring new applications of Earth observations. The Secretary General of CODATA, Dr. Robert S. Chen, summarized CODATA's activities related to open access to scientific data in the context of the World Summit on the Information Society (WSIS), the International Polar Year (IPY), and other international initiatives and gave examples of barriers to data sharing due to concerns about national security, intellectual property (IP), protection of confidentiality and sensitive resources, and technical and semantic interoperability.

In the subsequent general discussion, a number of participants emphasized the need to establish incentives for complying with the GEOSS principles, rather than outright enforcement mechanisms. It is important to give credit to data providers, rather than leaving their contributions unrecognized or obscure. Use of automated digital rights management approaches, e.g., as implemented by the Creative Commons, may help address this situation, as would early development and adoption of sound metrics. Peer pressure can be very effective in encouraging participants to share data, especially for situations such as humanitarian crises where needs are obvious. Such precedents can then be extended to other activities such as disaster prevention and development, since these help avoid crisis responses.

The discussion then turned to the two key dimensions of data sharing, policy and technology.

Policy Issues

Although there may be legitimate concerns about national security, IP rights, and the protection of privacy, sensitive resources, and indigenous knowledge, it is important to examine these concerns in more detail so that they do not inadvertently enable large-scale exceptions to open access. For example, the national security concern over the release of the Shuttle Radar Topographic Mission (SRTM) data for the world at 30-meter resolution seems inconsistent with the release of these data for the U.S. at that resolution. The 30-meter data could have significant benefits for a range of societal benefit areas in many parts of the world that lack consistent digital elevation data. An important activity for this GEO task would be to analyze data restrictions in more detail in order to clarify situations in which the risks of release outweigh the benefits of access, as well as options for ameliorating these risks. This could include a review of actual practices in place around the world, e.g., at the World Data Centers and other data centers, or on the part of other international activities and initiatives. This task could then help formulate specific proposed terms for release and use of specific datasets, such as the high-resolution SRTM data, under the auspices of GEOSS.

Another approach is to identify a core set of data that GEOSS could provide that would have a high payoff in one or more of the nine societal benefit areas (natural and human-induced disasters; human health; energy resources; climate variability and change; water resource management; weather information, forecasting, and warning; terrestrial, coastal and marine ecosystems; sustainable agriculture and combating desertification; and biodiversity). This could take the form of high quality reference datasets for key parameters, or a more general set of cross-cutting data needed for key application areas such as disaster mitigation or natural resource management. Some areas of science, such as seismology, have demonstrated the strong benefits of global data sharing and applications; others such as biodiversity are still working to develop global-scale "reference" collections that clearly show the advantages of cross-disciplinary data integration. The Land Imaging Virtual Constellation (including Landsat and the Landsat Data Continuity Mission) could serve as the basis for a vital time series of land cover change useful for multiple benefit areas. A key challenge is in making the transition from research to applications, a process that requires resources, close interactions with users, and commitment on the part of data providers. This GEO task could specify a set of implementation guidelines that would facilitate this transition.

An essential element in implementing the data sharing principles needs to be an overarching "ethos" in favor of open access. The scientific community should take a lead in this, building on new initiatives to open up access to data and information in many areas of science relevant to GEOSS and overcoming more traditional closed approaches. Open access approaches are not incompatible with broad commercialization, and indeed can underpin the development of a large and diverse commercial sector, as in the case of value-added businesses in the U.S. that use public weather and census data or that make spatial data and imagery easily accessible (e.g., Google Earth and MapQuest) One possible activity for this GEO task is to review and summarize various studies that demonstrate the value of products and services derived from more open public data sources, e.g., recent studies from Canada, Australia, the Commission of the European Communities, and the Organisation for Economic Co-operation and Development (OECD). It would be especially interesting to identify new benefit areas, such as renewable energy or reinsurance, and new Internet services, such as 3- and 4-dimensional mapping and visualization, where open access data sharing could have a strong impact. The OECD itself might be a partner in such a review.

Technical Issues

The international scientific community can help improve data quality, data formats, and address other requirements for data sharing and interoperability. Individual scientific unions need to participate in this dialog. The scientific community should help develop clear definitions of and standards for the terms used in the data sharing principles, e.g., what is meant by "minimum time delay" and "minimum cost." Coordination is needed across the various GEO tasks that are addressing issues of data quality assurance, interoperability, and standards.

Another central issue is the need for developing countries for open, low-cost access to GEOSS data and services—this deserves recognition comparable to that given to research and educational uses. Increasing developing country participation in these data policy and access discussions would be valuable. GEOSS initiatives such as GEONETCast and the GEO web portal can serve as testbeds for improving data and information access and interoperability for a wide range of data providers and users in developing countries.

With respect to future activities under this task, it was pointed out that GEO is uniquely positioned to address collaboration among governments and the data systems that governments operate or sponsor. Although broader issues of data sharing and interoperability are certainly important, this task should focus on the implementation of the GEOSS principles for GEOSS elements. A key target for the task should be to provide inputs to the planned GEO Summit in South Africa in 2007, perhaps in the form of a white paper.

Disclaimer

The views expressed in this report are those of individual participants and do not necessarily represent a consensus by all participants, nor the viewpoint of the GEO Secretariat, CODATA, or other organizations represented at the meeting.

Organizers

GEO: The intergovernmental *Group on Earth Observations* (GEO) is leading a worldwide effort to build a Global Earth Observation System of Systems (GEOSS) over the next 10 years. GEOSS will work with and build upon existing national, regional, and international systems to provide comprehensive, coordinated Earth observations from thousands of instruments worldwide, transforming the data they collect into vital information for society. For more information, see http://www.earthobservations.org/about/about_GEO.html.

CODATA, the Committee on Data for Science and Technology, is an international non-governmental organization and an interdisciplinary body of the International Council for Science (ICSU). CODATA works to improve the quality, reliability, management and accessibility of data of importance to all fields of science and technology. For more information, see http://www.codata.org.