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Report on Data Sharing Principles Post-2015 and Mechanisms to Ensure Legal Interoperability of Shared Data

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For consultation.

Report on Data Sharing Principles Post-2015 and Mechanisms to Ensure Legal Interoperability of Data Shared Through GEOSS

During the period of December 2013 to September 2014, the Data Sharing Working Group (DSWG) intensified its work to advance GEOSS Data Sharing Principles.

The DSWG drafted the *GEOSS Data Sharing Principles Post-2015* in order to better reflect the rising Open Data trend observed worldwide and the need to reinforce GEO's impact on promoting availability of data on a free, full and open basis. The new Data Sharing Principles (DSPs) elevate the status of GEOSS Data-CORE to the default standard of data sharing through GEOSS. They include as an exception the possibility of sharing data with restrictions. They broaden the application of free of charge data provision beyond the sole case of "research and education". The new DSPs have been approved by the Executive Committee members during their 31st meeting. They are now annexed to this report for Plenary consultation.

The DSWG revised its background white paper that reviews the definition of legal interoperability, the forms of legal protection of Earth observation data and the legal mechanisms for sharing. The white paper recommends a list of open access licenses and waivers, as well as restricted licenses, as practical tools for GEO contributors to share data as part of the GEOSS Data-CORE. This document has also been approved by the 31st Executive Committee and is now annexed to this report for Plenary consultation.

The DSWG, together with the GEO Secretariat and the European Commission, continued contacting the Members and Participating Organizations that had pledged resources for the GEOSS Data-CORE, but had not yet registered them in the Portal, nor developed interoperability arrangements with the Discovery and Access Broker (DAB). Forty-one institutions from 12 countries or Participating Organizations were contacted, and requested to either register their resources, or rescind their pledge in advance of Executive Committee-31. This exercise resulted in the following: 11 organizations honored their pledge, with 5 having registered their data; 1 organization has rescinded their pledge, and 29 have not responded.

The DSWG has participated in the design of the current Architecture Implementation Pilot (AIP-7) and is conducting a test to check whether the GCI can find the current licensing metadata and make it available to GEOSS users. A call for data providers to assist the group in this effort was issued with some organisations already volunteering to contribute to this exercise. Also within AIP-7, the list of use metrics information to be collected started to be reviewed with the dual aim of (i) understanding how many users can access data through the GEOSS Data-CORE, and (ii) tracking the re-use of data made available through the GEOSS Data-CORE.

The DSWG has started a close collaboration with Infrastructure Implementation Board (IIB) in order to establish a Data Management Principles Task Force (DMP-TF) aiming to develop high-level principles, which should ensure the long-term preservation, distribution, and quality of GEOSS resources, and the GEOSS Data-CORE. The DMP-TF was established in May 2014 and has delivered draft principles for internal and external consultation.

Supported by the GEO Secretariat, the Data Sharing page on the GEO website (http://earthobservations.org/dswg.php) is being reorganized and frequently updated. With reference documents, presentations, formal reports and other essential information, the page is now a knowledge base of GEO Data Sharing Principles and activities that is open to both GEO communities and external users.

In the previous ID-01 Task assessment report several actions were outlined: (i) expand participation in Working Group activities from Members and Participating Organizations, (ii) ensure desirable levels of participation by representatives from developing countries in the Working Group activities and desirable levels of outreach to developing country data users and providers. In response, the DSWG sent a request of expansion to GEO Members and Participating Organizations through the GEO Secretariat. By now, eight nominations have been received, with four from developing countries and three from Participating Organizations. Five of them have already participated in DSWG activities.

Members of the DSWG have been particularly involved this year in a series of outreach activities:

i) March 2014, side event of RDA plenary in Dublin and the Copernicus Big Data Workshop in Brussels;

ii) June 2014, 8th GEO European Project Workshop in Athens;

iii) June 2014, ICSSSM'14 (The 11th International Conference on Service Systems and Service Management) in Beijing;

iv) August 2014, COSPAR Scientific Assembly in Moscow;

v) August 2014, OpenDataSSDC in Nairobi;

vi) September 2014, IAC in Toronto;

vii) November 2014, SciDataCon 2014 in New Delhi.

Three of these activities were held in developing countries and targeted data users and providers in developing countries.

The DSWG, with support from the DMP-TF, will host a side event at the GEO-XI Plenary aiming at presenting the revised DSPs and draft Data Management Principles, and taking stock of perspectives by data users and managers from developing countries, especially those from the Africa.

In summary, the implementation of the GEOSS Data Sharing Action Plan (http://earthobservations.org/documents/geo_vii/07_GEOSS%20Data%20Sharing%20Action%20Plan%20Rev2.pdf) is making good progress. The DSWG is also monitoring whether additional challenges emerge in sharing or accessing data through GEOSS and identifying additional opportunities to further implement the GEOSS Data Sharing Principles.

However, to achieve future success of GEOSS toward a new decade, the DSWG recognizes:

i) It is a **task for all of GEO** to implement GEOSS Data Sharing Principles. **Additional resources from GEO Members** are needed especially to establish national coordinating mechanisms, to trigger capacity building activities related to the uptake of the GEOSS Data Sharing Principles, to promote and monitor engagement of their implementation and to provide feedback to GEO.

ii) It is crucial to strengthen the helpdesk for the GEOSS DataCORE with an IT specialist dedicated exclusively to first help facilitate technical interoperability and ensure realization of the GEOSS Data-CORE pledges.

APPENDIX 1

GEOSS Data Sharing Principles Post-2015

1 INTRODUCTION

Access to data and information by GEOSS users is an integral part of the Group on Earth Observation (GEO) objective "to monitor continuously the state of the Earth, to increase understanding of dynamic Earth processes, to enhance prediction of the Earth system, and to further implement our international environmental treaty obligations."[1] The **GEOSS 10-Year Implementation Plan** accepted in 2005 states: "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." GEO's activities and availability of data shared through GEOSS should contribute to the economic growth of the GEO members, particularly if GEOSS objectives in areas such as improved management of energy resources, sustainable agriculture and enhanced weather information are realized.

One of the first accomplishments of the GEO was the acceptance of a set of high-level principles regarding data sharing as a foundation for GEOSS. The 10-Year Implementation Plan recognizes that "the societal benefits of Earth observations cannot be achieved without data sharing" and sets out three **GEOSS Data Sharing Principles**:

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

Ensuring the implementation of these principles in an effective yet flexible manner remains a major challenge. In particular, although the first GEOSS Data Sharing Principle establishes the "full and open exchange of data, metadata and products" as the norm for GEOSS, it also recognizes that relevant international instruments and national policies and legislation may place restrictions on some data shared within GEOSS. The compromise that it incorporates was designed to address the needs to protect data, and to allow for limitations regarding sharing that members of the GEO community are obligated to impose and implement.

2 PURPOSE

Since the Data Sharing Principles were adopted in February 2005 within the GEOSS 10-Year Implementation Plan, the situation with regard to data sharing has improved considerably, both within GEOSS and across the Earth observation and environmental data landscape. The 2010 Beijing Ministerial Declaration announced the creation of the GEOSS Data Collection of Open Resources for Everyone (GEOSS Data-CORE), consisting of data contributed by the GEO community that can be shared without any restrictions on use. Since then, the commitment to sharing data as part of the GEOSS Data-CORE has increased, and a growing number of GEO Members and Participating

[1] Objective established during the 2003 GEO Washington Summit, in GEOSS 10-Year Implementation Plan at p.27. Online: http://earthobservations.org/docs/GEOSS%2010-Year%20Implementation%20Plan%20(GEO%201000).pdf

Organisations adhere to and benefit from full and open data sharing without restrictions on re-use. In 2013, the consensus regarding the benefits that full and open exchange of data can bring is strong.[2] Many governments and organizations have changed their policies regarding re-use of their information, which has resulted in a significant increase of data and information that are easily accessible and openly re-usable. This includes newly adopted legislation in Europe, open data policies in countries like New Zealand, Denmark, Finland, Argentina, Japan and many others, as well as the G8 Open Data Charter adopted in June 2013. GEO has played a part in bringing about these changes in policy and attitude.

Within this changing landscape, the Data Sharing Working Group (DSWG) believes that the time is right to revisit the 2005 GEOSS Data Sharing Principles, in particular taking into account the current stage of preparing for the next GEO decade 2016-25 and the work on the new Implementation Plan that will determine the further development of the GEOSS. The aim of updating the principles is not only to clarify and improve the language, but more importantly to ensure that they advance GEO's vision and objectives, just as the current principles did when they were first adopted. The DSWG consider this critical to GEO's relevance and value to society. GEO's core principles for data sharing need to strongly support and indeed accelerate the global trend towards truly open data sharing in support of society.

This document outlines two proposals of new GEOSS Data Sharing Principles and provides the rationale for the proposed changes, as well as the differences and similarities compared to the existing GEOSS Data Sharing Principles.

3 PROPOSALS

Version 1 – innovative approach:

1. Data, metadata and products will be shared through GEOSS as Open Data[3] by default, by making them available as part of the GEOSS Data-CORE without charge, without restrictions on reuse, subject to the conditions of registration and attribution when the data are reused;
2. Where international instruments, national policies or legislation preclude the sharing of data as Open Data they should be made available through GEOSS with minimal restrictions on use and at no more than the cost of reproduction and distribution;
3. All shared data, products and metadata will be made available through GEOSS with minimum time delay.

Version 2 – semi-conservative approach:

1. There will be full and open sharing of data, metadata and products through GEOSS, recognizing relevant international instruments and national policies and legislation;
2. All shared data, metadata and products should be made available free of charge for any purpose and to any user as part of GEOSS Data-CORE;
3. All shared data, metadata and products will be made available with minimum time delay, at no more than the cost of reproduction and distribution, and with attribution as appropriate.

[2] See e.g. The Open Data Barometer 2013 Global Report, T. Davies, online: http://www.opendataresearch.org/dl/odb2013/Open-Data-Barometer-2013-Global-Report.pdf.

[3] See G8 Open Data Charter https://www.gov.uk/government/publications/open-data-charter/g8-open-data-charter-and-technical-annex.

Explanation

In the first proposed data sharing principle *both versions* substitute "within" with "through". This replaces the previous more restrictive term and removes potential ambiguities in its interpretation, such as when data are re-used "outside" of GEOSS itself. In addition, it better reflects technical aspects of how GEOSS enable sharing of data.

Version 1:

The innovative version of the Principles incorporates the concept of "Open Data" to their wording and links the GEOSS Data-CORE with this concept: the latter is presented as a mechanism or mode of sharing Open Data as it rules out restrictions on use, while keeping conditions of attribution and user registration that per se do not affect re-use. Inclusion of GEOSS Data-CORE in the wording of the default data sharing principle recognizes and emphasizes its value for GEOSS and GEO community.

Open Data was chosen to be reflected in the Principles as it is gaining considerable traction as a simple, transparent concept, in particular with regard to the government-held or -produced data. More and more jurisdictions declare Open Data to be the default principle for sharing these data, which above all excludes restrictions on re-use and charges for access to data for any purposes. In June 2013 the G8 countries signed the "Open Data Charter". The document lays down five strategic principles for sharing government data. The first and the most important of these is an expectation that all government data will be published as Open Data by default.

The reference to Open Data in the new first principle sets the unrestricted sharing as the default sharing mechanism for GEO as part of the GEOSS Data-CORE. It further includes interpretation of the concept of Open Data and of the GEOSS Data-CORE by specifying that the data are shared without charge,[4] with no restriction on reuse, and the possibility to impose only the conditions of registration and attribution when the data are reused.

In order to enable sharing through GEOSS resources with restrictions on re-use, the second principle recognizes that restrictions may be imposed by "international instruments, national policies or legislation", and welcomes sharing of such data as well. However, as opposed to the current wording of the Data Sharing Principles, it encourages members and participating organisations to keep such restrictions minimal and refrain from imposing charges that exceed cost of reproduction and distribution.

The third principle of both versions puts emphasis on the provision of data through GEOSS with minimum time delay. This part of the Principles does not differ from the current wording.

Version 2:

This version of the Principles shows continuity and consistency with the important provisions of the current Principles in that its first principle, while putting emphasis on full and open sharing, retains its original limitation of recognising restrictions on the use of data shared through GEOSS imposed by "relevant international instruments and national policies and legislation".

The most innovative provision of this version of the Principles is the second principle that encourages sharing of data "free of charge for any purpose and to any user" when the data are shared as part of the GEOSS Data-CORE. This change reflects the current trend towards Open Data in many jurisdictions, including those who are eager to share their data as part of GEOSS Data-CORE. The principle encourages sharing data as part of the GEOSS Data-CORE, which again emphasizes its importance for the success of GEOSS.

[4] Ideally the provision of data should be free of charge, see G8 Open Data Charter, Principles 3(20) and 5(13). The recovery of the cost of reproduction and distribution is permissible.

The rationale for expanding the second principle is twofold. Firstly, data, metadata, and products should be freely accessible once shared within GEOSS, preferably without cost. The costs associated with implementing a cost recovery system are substantial, and as the cost of media goes down and digital distribution increases, the major portion of the cost of distribution becomes accounting costs. In fact, the incremental cost of anonymous FTP file transfer is close to zero.

Secondly, the existing singular emphasis on no cost data sharing for research and education only should be expanded to other applications for a number of reasons. Most importantly, GEO is concerned with applications that are far broader than research and education. For example, the emergency response community that GEO serves would benefit from a no cost principle. The same holds true for activities in other societal benefit areas. In addition, the economic benefits of data sharing, highlighted above, can best be achieved when data is available beyond the research and education sectors. Lastly, a number of countries that participate in GEO, within their respective legal or policy frameworks already allow cost-free access of their data independently from the purpose of use (the US Landsat, European Copernicus Member States contributions, etc.) DSWG considers this as a highly positive trend that should be promoted on the level of GEOSS Data Sharing Principles.

The third principle replaces a rather vague term “at minimum cost” with a more straightforward “at no more than the cost of reproduction and distribution”. In addition, it introduces the optional “condition of data use” compatible with the GEOSS Data-CORE – “with attribution as appropriate” – that allows the data provider to obligate the user of the shared data to provide information about the owner of the shared data. This also implicitly brings the Principles closer to the Open Data standards, even though there is no explicit mentioning of it within their wording.

4 CONCLUSION

DSWG recommendations regarding strengthening Data Sharing Principles to the Executive Committee and the Working Group on the new GEOSS Implementation Plan.

DSWG strongly encourages that the proposed Version 1 of the new Data Sharing Principles is introduced within the new GEOSS Implementation Plan. The main reasons for this are the following:

1. Asserting that sharing data as part of GEOSS Data-CORE is the default standard for GEO elevates the status of this mechanism, as well as its overall importance for the successful operation of GEOSS and achievements of the GEO goals, including expanded commitment to sharing of Earth observations as emphasised in the Vision for GEO 2025 document adopted by the GEO X Plenary;[5]
2. Reference to the term “Open Data” provides context for the interpretation of the use conditions pertinent to data shared as part of GEOSS Data-CORE, as well as brings GEOSS Data Sharing Principles in line with the relevant international, regional, national and organizational developments;
3. The option of sharing data through GEOSS with restrictions on use is presented as a deviation from the default mechanism, with the emphasis on imposing as few restrictions on the use of shared data as possible. This shift in emphasis better recognizes the motivations for GEOSS: encouraging and facilitating reuse of EO data and products, as well as helping make informed decisions within nine societal benefit areas;
4. The definition of Open Data means that data are shared free of charge, for any purpose and to any user. This reflects the current move by many governments towards Open Data and is in accord with the GEO objectives of encouraging data sharing in order to tackle stated societal

[5] Online: ftp://ftp.earthobservations.org/GEO-X/GEO-X_MS2_Vision%20for%20GEO%202025.pdf.

objectives and promote economic benefits. The current wording of the third Principle that limits free-of-charge sharing to research and education purposes, is less apt to achieve these objectives.

In addition to this main recommendation the DSWG would like to draw attention to the necessity to discuss and resolve the following terms used within the Data Sharing Principles:

1. Formulation of the exact interpretation of the *GEOSS Data-CORE* and its inclusion into the explanatory guidelines to the Data Sharing Principles;
2. Inclusion of the approach towards sharing of data through GEOSS *free of charge* as the underlying principle, while interpreting the level of charges for the data if it is impossible to provide them for free, as the "*cost of reproduction and distribution*";
3. Discussion of the term "*product*" used in the first Principle: the current emphasis of developing more ties with the private sector may necessitate either inclusion of the interpretation of this term or its deletion from the wording of the Data Sharing Principles;
4. Make sure that alignment of the interpretation of the GEOSS Data-CORE with that of Open Data is not carried in such a way that data currently shared as part of the GEOSS Data-CORE may no longer be qualified as such, as this could discourage (active) participation within GEO of at least some of its members. An example of potential interpretational tension is e.g. the condition of registration that is allowed by the GEOSS Data-CORE regime, but discouraged to be applied by the G8 Open Data Charter (Principle 3 (21).

The DSWG hopes for consideration of the proposed revisions of the Data Sharing Principles and is willing to provide any assistance to properly incorporate the necessary changes into the next GEOSS Implementation Plan.

APPENDIX 2

Draft White Paper:
Legal Mechanisms to Share Data as Part of GEOSS Data-CORE[6]

[6] The information contained in this document does not constitute legal representation by the GEO Data Sharing Working Group (GEO DSWG) or its Legal Liability Subgroup. Before using any information in this publication, it is recommended that an attorney licensed in the jurisdiction of interest be consulted for specific legal advice. The DSTF is grateful to its Legal Interoperability Sub-Group members for providing this background white paper. Primary authors of this paper are Catherine Doldirina, Anita Eisenstadt, Harlan Onsrud and Paul Uhlir. The Sub-Group members are: Paul F. Uhlir (Subgroup co-chair), Catherine Doldirina (Subgroup co-chair), Anita Eisenstadt, Harlan Onsrud, Baden Appleyard, Miles Gabriel, Joanne Irene Gabrynowicz, Jeff Heninger, Puneet Kishor, Kevin Pomfret, Daniel Quintart, and Glenn E. Tallia. The views expressed here are those of the authors and not necessarily those of their employing institutions.

EXECUTIVE SUMMARY

In 2010, the Group on Earth Observations (GEO) established a Global Earth Observation System of Systems (GEOSS) Data Collection of Open Resources for Everyone (Data-CORE) in accordance with the GEOSS Data Sharing Principles. The purpose of the GEOSS Data-CORE is to promote access to Earth observation datasets and enable use and reuse of the data without restrictions regarding access and use. This white paper follows up on a Summary White Paper on Legal Options for the Exchange of Data through the GEOSS Data-CORE, which was adopted by the GEO Plenary by consensus in 20117 and updated in 2012.8 This paper looks in greater detail at various legal options for GEO and its individual Members and Participating Organizations to place Earth observation datasets in the Data-CORE in accordance with the GEOSS Data Sharing Principles. The paper addresses existing public law statutory, regulatory, and policy approaches, as well as private law instruments, such as waivers, licenses and contracts, that may be used to place the datasets in the public domain, or otherwise make them publicly available for use and re-use without restrictions, as envisaged for GEOSS Data-CORE resources. The paper also updates the previous conclusions and recommendations, presented below, for consideration and adoption by the GEO Plenary.

Based on the work of its Legal Interoperability Subgroup, the GEO Data Sharing Working Group has adopted a revised definition of legal interoperability of data. According to it, legal interoperability among multiple datasets from different sources occurs when:

- use conditions are clearly and readily determinable for each of the datasets,
- the legal use conditions imposed on each dataset allow creation and use of combined or derivative products, and
- users may legally access and use each dataset without seeking authorization from data creators on a case-by-case basis, assuming that the accumulated conditions of use for each and all of the datasets are met.

Public domain status is the best legal option for promoting the various social benefits and goals intended by GEO through making available data as the GEOSS Data-CORE by enabling and securing unrestricted re-use, re-dissemination, and legal interoperability. Public domain may be created formally by public laws through national legislation that excludes certain categories of data and information from copyright protection or prohibits impositions of restrictions on their use. The public domain may also be created through regulation or policies that place publicly-funded data in the public domain, as well as through national funding mechanisms, such as grants or contracts.

Rights under copyright or sui generis database protection arise automatically and last until the term of protection expires, or unless expressly excluded or waived. For this reason, express legislative, regulatory, policy or funding mechanisms are needed, to make the data excluded or waived from protection, or to make the re-use and re-dissemination of data unrestricted. Alternatively, organizations can explicitly waive all such rights through a private law alternative to the extent that is allowed by the national statutory law.

Ideally, datasets already having public domain status should include a notice in their metadata or on the database owner's server informing potential users of their public domain status. The Creative Commons Public Domain Mark serves this purpose. Such a notice could help to overcome the incorrect assumption by some potential users that the data are subject to protection and have attendant restrictions on reuse. Such a notice would thereby promote the further use of the data and legal

[7] Online: https://www.earthobservations.org/documents/dsp/draft_white_paper_geoss_legal_interoperability_30_october_2011.pdf.

[8] On file with the authors.

interoperability through the GEOSS Data-CORE. Many datasets, however, do not have public domain status and are protected in whole or in part under statutory intellectual property laws. In those cases, a legally valid waiver of rights can achieve a private-law equivalent of public domain status, or a common-use license (for example, the Creative Commons Attribution licence) can incorporate the attribution conditions allowed by the GEOSS Data-CORE.

The endorsement by the GEO Plenary of either standard and accepted waivers and licenses, or other customized common-use licenses that meet all of the GEOSS Data-CORE conditions of access and unrestricted re-use of data, would help ensure certainty and legal interoperability of the data, and thus support the important GEO societal benefit goals. Common-use licenses and waivers also would help promote the contribution of databases through the GEOSS Data-CORE, because most jurisdictions do not have public domain status for the data compilations relevant to GEOSS. Such a step will also be helpful for the Members and Participating Organisations that are willing to share data as part of GEOSS Data-CORE as it will economise the resources they would need to spend on developing such licences themselves.

RECOMMENDATIONS FOR THE GEO PLENARY

Consistent with the discussion in this 2014 white paper and with the conclusions of the 2011 summary white paper, as amended in 2012 and adopted by consensus in the GEO plenaries, the GEOSS Data-CORE terms and conditions can best be achieved through any of the following mechanisms: statutory, regulatory or policy created public domain (including government contract or grant provisions), a private-law waiver of rights, or a common-use attribution-only license. The GEO Data Sharing Working Group recommends the use of only standard instruments to help assure legal interoperability of data.

If standard waivers or common-use licenses cannot be used, the data provider may consider adopting a custom waiver or common-use data license. Such waiver or license must be compatible with the GEOSS Data-CORE principles being free of restrictions on re-use, with user registration, attribution conditions and marginal cost recovery charges permitted. In addition, it should be:

a. valid under the laws of as many different jurisdictions as possible;
b. clear and understandable to the data provider or user;
c. easy to find and recognize;
d. embeddable in the data as machine readable metadata whenever possible;
e. available in different languages, at a minimum in the language(s) of the country/organisation making the data available, as well as in English;
f. kept under the legal control of the data providers, and not GEO or GEOSS.

A custom waiver or licence may contain any other terms and conditions, such as a disclaimer of warranty and liability, that do not restrict the user or conflict with any of the terms and conditions summarized in a-f above.

Custom licenses that have the same terms and conditions as the characteristics listed above can also be used to provide data through the GEOSS Data-CORE. The decision as to the compliance of such custom licenses with the conditions of the GEOSS Data-CORE data access and use, however, will be determined solely by the data provider. Use of licences or other permissions beyond those listed above significantly risk diminishing the legal interoperability of data published under the standard licences

As discussed in this paper, the members of the GEO Data Sharing Working Group believe that legislative, regulatory or administrative and other government measures placing all data and information produced by government entities in the public domain, would be the best approach. Until relevant government measures are adopted and enforced in the jurisdictions of GEO Members, waivers and common-use licenses can be adopted on a voluntary basis for the data, metadata and products that

they control. They may also apply open access conditions into public grants contracts, or use other mechanisms to ensure full and open sharing and use of data. Based on the characteristics set forth in the list immediately above, the GEO Members and Participating Organizations should consider adopting one of the following existing voluntary waivers or standard common-use licenses compatible with the GEOSS Data-CORE mechanism:

a. Creative Commons Public Domain Mark;
b. Statutory waiver of copyright;
c. Creative Commons Public Domain Waiver (CC0);
d. Open Data Commons Public Domain Dedication and License (PDDL);
e. Creative Commons Attribution License (CC BY 4.0).

Any of the mechanisms recommended above will advance the goal of promoting access to Earth observation datasets as part of GEOSS Data-CORE data. It will reinforce the interpretation of the GEOSS Data Sharing Principles favouring open access and unrestricted re-use of the data.

1 INTRODUCTION

The Group on Earth Observations (GEO) is a voluntary, legally non-binding partnership[9] of Member states[10] and Participating Organizations[11] that seeks to promote human welfare in nine "societal benefit areas"[12] through the Global Earth Observation System of Systems (GEOSS).

As a "system of systems," GEOSS makes geospatial resources discoverable and accessible through the GEOSS Common Infrastructure (GCI),[13] which consists of a series of registries, the GEO Discovery and Access Broker and a web portal (the GEO Portal[14]). While all the bulk of GEOSS resources (data, products, services) are owned and operated by the GEO Members and Participating Organizations, the GCI is a leveraging platform that makes the overall value of GEOSS much greater than the sum of its parts. Such synergy can be achieved and enhanced as each GEO participant supports common approaches "designed to make shared observations and products more accessible, comparable and understandable." [15]

In addition to the issues regarding legal interoperability of data, the success of GEOSS depends upon the resolution of other challenges more technical in nature. In order to achieve the broad goals GEO has set forth, GEOSS will have to collectively address the following components: identification of common user requirements; acquisition of observational data; processing of data into useful products; exchange, dissemination and archiving of shared data, metadata, and products; and monitoring of performance against the defined requirements and intended benefits.[16] The GEO Members and Participating Organizations are developing technological, semantic, and legal approaches that will promote the major objectives of GEOSS to facilitate access to, use of, and interoperability of data relevant to the nine agreed societal benefit areas.

The GEO Data Sharing Working Group (DSWG) has adopted a revised definition of legal interoperability of data:

Legal interoperability among multiple datasets from different sources occurs when:

- use conditions are clearly and readily determinable for each of the datasets;
- the legal use conditions imposed on each dataset allow creation and use of combined or derivative products; and
- users may legally access and use each dataset without seeking authorization from data creators on a case-by-case basis, assuming that the accumulated conditions of use for each and all of the datasets are met.

[9] See online: https://www.earthobservations.org/documents/ministerial/geneva/MS6_The_Geneva_Declaration.pdf.
[10] See online: http://www.earthobservations.org/ag_members.shtml
[11] See online: http://www.earthobservations.org/ag_partorg.shtml
[12] According to the GEO document "The Global Earth Observation System of Systems (GEOSS): 10-Year Implementation Plan" at pp.3-5 (as adopted 16 February 2005, online: http://www.earthobservations.org/documents/10-Year%20Plan%20Reference%20Document.pdf), the nine agreed societal benefit areas are: Reduction and Prevention of Disasters, Human Health and Epidemiology, Energy Management, Climate Change, Water Management, Weather Forecasting, Ecosystems, Agriculture, Biodiversity.
[13] See online: http://www.htap.org/meetings/2013/2013_04/files/Presentations/20%20Wed/13-30-Volden_GEO%20and%20GEOSS%20-%20for%20HTAP.pdf.
[14] See online: www.geoportal.org.
[15] See the GEO "Strategic Guidance for Current and Potential Contributors to GEOSS" at p.1 (October 2007). Online: http://www.earthobservations.org/documents/portal/25_Strategic%20Guidance%20Document.pdf.
[16] GEOSS 10-Year Implementation Plan (2005) at p. 5.

Legal interoperability also implies that the search for or tracking of licenses or other legal instruments and their compatibility with other legal conditions will occur in online environments. When data are combined from multiple sources the resulting dataset will incorporate the accumulated restrictions imposed by each and every source. Therefore, any restrictions need to be tracked. The fewest restrictions contained in parent datasets results in the fewest restrictions in derivative datasets. The simplest cases for tracking and legal interoperability occur when datasets are affirmatively identified as having no legal restrictions.

The 2005 GEOSS 10-Year Implementation Plan explicitly acknowledges the importance of data sharing in achieving the GEOSS vision and benefits when it states that: "*The societal benefits of Earth observations cannot be achieved without data sharing*".[17] The GEOSS Data Sharing Principles govern sharing of data through GEOSS. They were adopted by consensus in 2005 to serve the primary goal of GEO of promoting the exchange and sharing of data, metadata, and products according to the following requirements:

1. There will be full and open exchange of data, metadata and products shared within GEOSS, recognizing relevant international instruments and national policies and legislation;
2. All shared data, metadata and products will be made available with minimum time delay and at minimum cost;
3. All shared data, metadata and products being free of charge or no more than cost of reproduction will be encouraged for research and education.

The GEOSS Data Sharing Principles aim at sharing data, metadata and products with the minimum restrictions possible. However, in accordance with Principle 1, imposition of restrictions is possible if necessary due to national legislation of GEO Members or their international law obligations. The goals that GEO is set to achieve, however, require unrestricted sharing and use of data. A mechanism agreed upon by GEO Members that ensures such sharing is GEOSS Data-CORE. Resources identified as the GEOSS Data-CORE are a distributed pool of documented datasets "contributed by the GEO community on the basis of full and open exchange (at no more than the cost of reproduction and distribution) and unrestricted access."[18] "The concept of the GEOSS Data-CORE is intended to highlight that subset of data and products within the GEOSS that can be fully and openly exchanged **without restrictions**."[19] The GEO DSWG interprets this to mean that the GEOSS Data-CORE is intended to include data that are free of restrictions on access and reuse. The DSWG also interprets the phrase "without restrictions" to include datasets that impose minimal conditions on users and those conditions have very high value for some contributors. Among these "low burden / high value" conditions that GEO has permitted include:

1. User registration or login to access or use the data is permitted;
2. Attribution of the data provider may be required as a condition of use; and
3. Marginal cost recovery charges (i.e., not greater than the cost of reproduction and distribution) are permitted.[20]

[17] At p.8, emphasis added.
[18] GEOSS Data Sharing Action Plan at http://www.earthobservations.org/documents/geo-vii/07_GEOSS Data Sharing Action Plan Rev2.pdf, p.3 and p.12. Accepted by GEO VII.
[19] Ibid, p.12.
[20] See also "Summary White Paper on Legal Options for the Exchange of Data through the GEOSS Data-CORE" GEO (2011), online: https://www.earthobservations.org/documents/dsp/draft_white_paper_geoss_legal_interoperability_30_october_2011.pdf.

Thus the imposition of one or more of these three conditions by a contributor will not preclude a data contribution from being included in the GEOSS Data-CORE. Data shared in accordance with the GEOSS Data Sharing Principles may carry many more restrictions.

A previous Summary White Paper on Legal Options for the Exchange of Data through the GEOSS Data-CORE was adopted by the GEO Plenary by consensus in 2011 and updated in 2012. The current white paper addresses alternative legal approaches to sharing of data as part of the GEOSS Data-CORE. It analyses barriers to legal interoperability of (geographic) data that may be tagged as part of GEOSS Data CORE, including those based upon the principles of copyright protection, or other legal regimes. It then describes several legal mechanisms that can be utilized to share data as part of GEOSS Data-CORE. These approaches include open data agreements, legislation and policies, as well as use of existing licensing and waiver models.

Comparison of various open data licences enables identification of legally interoperable terms that despite differences in wording, constitute same or similar conditions of use. This will allow data providers interested in or willing to provide data as part of GEOSS Data-CORE to easily identify whether the data in question carry restrictions incompatible with the GEOSS Data-CORE sharing regime, and whether such restrictions can be successfully lifted. This white paper is concerned only with the data, datasets and databases that will be made accessible as part of the GEOSS Data-CORE and the legal mechanisms that should be considered to make those data and databases available globally on terms that are consistent with the GEOSS Data-CORE. Resources that are shared in accordance with the GEOSS Data Sharing Principles may require use of different licences; they are not however addressed in this paper.

2 PROTECTION OF DATA, METADATA AND PRODUCTS BY INTELLECTUAL PROPERTY LAWS

As noted in the Introduction, the GEOSS Data Sharing Principles and their Implementation Guidelines encourage “the full and open exchange of data, metadata and products shared within GEOSS,” The “full and open” principle is subject to “the relevant international instruments and national policies and legislation.” Various laws limit or restrict access to, use and re-use of data and information due to different reasons and interests that include protection of national security, privacy, confidentiality, and intellectual property.[21]

It is important, at the outset, to provide for the working definitions of the most relevant terms regarding data that are used throughout the paper and are in essence the most important elements of the analysis provided. The term “dataset” in this paper refers to a collected, selected, coordinated or arranged set of data elements consisting often of observed, discovered or derived values. A dataset might consist of a brief table of values or might consist of millions of values arranged using a standard format in order to facilitate updates and processing. The term “database” in this paper refers to a collection of information (numeric datasets, full-text fields or documents, images, bibliographic information, metadata, etc.) that is organized so that it can easily be accessed, managed and updated. Metadata that explains the data content by systematic standard means is typically included as a critical component of many scientific and technical databases.

As a general proposition, geospatial and other types of datasets may be subject to copyright or related intellectual property rights (e.g., database protection) in accordance with existing national legislation. Certain types of use or re-use (e.g., copying and subsequent distribution with or without alteration) of many datasets typically require the explicit permission of the rightholder of a dataset. However, it

[21] In some countries freedom of information legislation provides a mechanism for access to government-maintained datasets. Such legislation is not discussed in detail in this paper because it is not typically used by researchers to obtain Earth observation datasets.

should be noted that a variety of uses may be carried out without the permission of the author or holder of intellectual property rights in datasets or data products if they fall under the category of fair use, or are exceptions or limitations to copyright. This section provides an analysis of applicability of copyright protection, as well as some other intellectual property rights protection regimes, to data that may be shared through GEOSS, in particular as part of GEOSS Data-CORE.

2.1 Copyright

2.1.1 Summary of key principles

An international copyright protection regime that would automatically protect rights in creative content on an identical basis throughout the world does not exist. The Berne Convention for the Protection of Literary and Artistic Works sets forth a common international framework for copyright but does not create legally enforceable copyright protection. It is the oldest and the most accepted source of international law that codifies the fundamental principles of copyright protection.[22] Copyright protection varies slightly, depending upon the national laws of each country and their interpretation by the national courts.

The Berne Convention established the fundamental principles of copyright protection. The first one is the principle of creativity: only works that are *intellectual creations of their authors* are eligible for copyright protection.[23] The traditional interpretation of this principle excludes protection of subject-matter that is generated due to input of time, labour or financial resources. It emphasises instead primacy of creativity or personality – attribution of a work to its author and his personal qualities. A second important principle of copyright protection is that only the "*mode or form of expression*" of a work and not ideas on which it is based are protected.[24] In line with this principle, "ideas, processes, methods of operation, mathematical concepts", as well as data and material are excluded from the scope of copyright protection.[25] Furthermore, protection of expression excludes the possibility to protect its content as such. A third principle is that the work must be fixed on a certain tangible medium.[26] Fourth, copyright protection is automatic and does not require any formal registration.[27] Finally, the minimum term of protection under the Berne Convention, as amended, is life of the author, plus fifty years.[28]

In addition, no copyright protection regime is complete without some limitations and exceptions for the users of copyrighted material. Limitations and exceptions can be based on the status of the user, the type of use, its extent, the type of protected works, or other factors. In the United States, the main set of limitations is referred to as "fair use,"[29] while in some other countries a similar but less permissive limitation is known as "fair dealing". In Europe the system of limiting copyright is set up through a

[22] There are other international treaties that regulate copyright: the Universal Copyright Convention, the Agreement on Trade-Related Aspects of Intellectual Property Rights, and the WIPO Copyright Treaty. However, since all of them are complimentary to the Berne Convention, only the latter is discussed here.
[23] Article 2 Berne Convention.
[24] See e.g. Art. 2(1), Berne Convention (implied); Art. 2, WIPO Copyright Treaty (expressed). December 20, 1996, 2186 *U.N.T.S.* 121.

[25] Cf. Art. 5, WIPO Treaty.
[26] See Art. 2(2), Berne Convention.
[27] Article 5(2) Berne Convention.
[28] Article 7(1). However, many jurisdictions, notably the United States and the countries of the European Union, have adopted an even longer copyright term of protection lasting the life of the author plus 70 years.
[29] Codified in Section 107 of the U.S. Copyright Law of 1976 recognizes a limitation and exception to the exclusive rights granted by copyright law for a set of purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship or research"

closed list of exceptions that allow for use of copyrighted works without prior authorisation or remuneration.[30]

Although these limitations and exceptions to either copyright or the database protection right would be applicable to many non-commercial uses of geospatial data, their applicability is determined on a case-by-case basis. Therefore, because such limitations and exceptions are narrowly drawn, situation-dependent, and inherently uncertain in their application, they do not represent a legally adequate solution to implement the GEOSS Data-CORE requirements.

2.1.2 Application of copyright to factual data, metadata, and products

Primarily data and facts, raw or minimally processed datasets, or databases that contain such subject-matter typically have little or no eligibility for copyright protection. Factual data exist in the world independently or depict the world as it is, and there is no original creative expression attached to them. With regard to compilations (databases) of factual data, it is only the arrangement that is protected, but not the data themselves, as is specifically codified in Article 5 of the WIPO Copyright Treaty.

In the field of Earth observations, the concept of "data" includes individual facts or uncorrected "raw" observations, such as the kind that are streamed from automated sensors, as well as various levels of interpreted data that have resulted from analysis, including visualized depictions in graphs, images, maps or computer simulations. Under traditional copyright law, a specific datum, such as an observation or description of a feature of the surface of the Earth, is a fact not subject to copyright. Therefore, absent any other protection, it may be used, re-used, or re-disseminated by anyone for any (otherwise legal) purpose, once legally accessed. This could be true for at least some data, metadata or products shared as part of GEOSS Data-CORE. A definitive answer is dependent upon the circumstances of each separate case and the characteristics of the shared subject-matter.

Datasets, databases, and other collections of facts or data products (where data from several sources are integrated, rather than "collected"), including geographic data that may be shared as part of the GEOSS Data-CORE, may be subject to copyright protection as "compilations" or "collections" of information, even if they consist entirely of individually non-copyrightable facts, if their "selection, coordination, or arrangement" is achieved through some human creativity or originality.[31] Thus, the classification, coding, formats, and interpretations of data in a compilation may fall under copyright protection. However, in such cases copyright only encompasses the creative arrangement of the elements of a compilation (database), while its "parts" (items, materials…) are either not protected by copyright, or protected independently from the protection granted to the database (compilation).

Compilations of facts and their ancillary information in this category are generally interpreted to have "thin" copyright that protects against wholesale, verbatim copying and against copying any of the creative expression in the original selection, coordination or arrangement. Compilations, particularly of factual material, that are arranged for ease of use, or to comply with standards in some disciplinary or business context, or in some obvious, routine, or mechanical ways (e.g. in alphabetical order), generally are not protected by copyright. Because of national variations in copyright protection of geospatial datasets, the extent of copyright protection afforded to use of all or portions or datasets depends upon the jurisdiction of origination of the dataset and the set of (copyright) rules adopted and implemented there.

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[30] Article 5 Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society. *OJL* 167 (22/06/2001) 10-19.

[31] *Feist Publications, Inc. v. Rural Telephone Service Co.*, 499 U.S. 340 (1991); WIPO Copyright Treaty, art. 5; Council Directive 96/9 of 11 March 1996 on the Legal Protection of Databases, art 3(2) 1996 O.J. (L. 77) 20.

2.1.3 Differences in national implementation of copyright principles

Codification of international law norms regarding principles of copyright protection has resulted in acceptance of minimum requirements throughout the world. However, national law determines the exact scope of the protection granted and its implementation in any given jurisdiction.

There are several areas where the differences can be quite significant. The criteria for copyright protection (creativity, expression, fixation) delineated in the Berne Convention are interpreted differently in various jurisdictions. This is true particularly for the criterion of creativity: its minimum threshold is not interpreted homogeneously. The consequences of such situation are that some subject-matter may be eligible for protection in one jurisdiction, but not in another.

The term of protection can also vary. The life of the author plus 50 year term of protection set forth in the Berne Convention is a minimum term of protection. Many countries have extended the term of protection to life of the author plus 70 years. This again may lead to situations where the same subject-matter is still protected in one state but already in the public domain in another.

The third important area that increases the risk of different protection of the same subject-matter is legislation in some jurisdictions that introduces IP protection different from copyright, like the *sui generis* database right in the European Union. Introduction and implementation of new IP categories can create barriers for exchanging and sharing IP subject-matter across borders. Some of these forms of IP protection are discussed in the following section.

2.2 Database protection legislation and other forms of intellectual property protection

One of the alternative or sometimes complimentary forms of IP protection to copyright is the *sui generis* database right adopted in the European Union and some other countries around the world. In the EU, the Directive on the legal protection of databases was enacted in 1996[32] and transposed into the national legislation of all EU Member States. Several other countries (e.g., Mexico,[33] Russia[34]) have adopted similar legislation. Such laws protect the information compiled in databases, even mere facts that form more than an "insubstantial part" of the database, defined either quantitatively or qualitatively, as long as the database is the result of a "substantial investment".[35] The protection goes far beyond copyright as it protects the *contents* of the database and confers to the database rights holder the right to "prevent extraction and/or re-utilization" of all or substantial parts of the contents of the database.[36]

The codified *sui generis* database right has not been easy to interpret within the jurisprudence so far – this fact also holds true for the European Court of Justice that is the only body that can authoritatively interpret EU legislation. In a number of its decisions the court has clearly stated that the resources spent on the creation of the *contents* of a database may not be counted as resources spent on the creation of the *database* as such. Substantial expenditure on the latter is the only basis to acquire sui

[32] Official Journal of Legislation of the European Union, *OJ L* 077 (27/03/1996) p. 20 – 28, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31996L0009:EN:HTML

[33] See WIPO Summary on Existing Legislation Concerning Intellectual Property in Non-Original Databases. 13 September 2002. Online: http://www.wipo.int/meetings/en/doc_details.jsp?doc_id=2296. See also International Association for the Protection of Intellectual Property, Summary Report, Question Q182: Database protection at national and international level (2004), at pp.3-4. Online: https://www.aippi.org/download/commitees/182/SR182English.pdf.

[34] Arts.1333-1336, Civil Code of the Russian Federation, 18 December 2006 N 230-FZ

[35] Article 7(1) EU Database Directive.

[36] Article 7(2)-(5) EU Database Directive.

generis database protection.[37] Such an interpretation may translate into non-availability of this type of protection for the generators of remote sensing satellite or other geographic data, if it is proven that the expenditure on the generation of the data themselves exceeds the costs of setting-up and maintaining the database in which these data are stored.

The legal merits of the *sui generis* exclusive property right that protects mere investment in factual compilations are not analysed within this paper. What is important to understand in the context of this paper is that such database protection legislation confers additional statutory rights to data providers, which can be used to enforce license provisions (as discussed further below) in those jurisdictions that have enacted such legislation.

Geographic data, including data, metadata and products that can be shared as part of GEOSS Data-CORE can be protected under legal mechanisms other than copyright. They include protection of confidential information, use of trade secret law and the use of contracting mechanisms. All these forms of protection, however, lack the quality of the legislated quasi-property copyright (right against all third parties) and usually bind only the two parties (the right holder of the dataset and the other bound or contracting party). In addition, the nature of these mechanisms, in particular confidential information and trade secret law, is to prevent access to and unrestricted use of the resources. The licensing contracts used to make data and information products available in the marketplace also as a rule contain restrictive conditions that limit further use and dissemination of the licensed products. For these reasons none of these forms of (data) protection is suitable for sharing data as part of GEOSS Data-CORE and are not further discussed in this paper.

3 INAPPLICABILITY OR REMOVAL OF INTELLECTUAL PROPERTY LAW RESTRICTIONS ON THE USE OF DATA, METADATA AND PRODUCTS

The most effective way to make data available without restrictions is to dedicate it to the public domain. Public domain status is the best legal option for promoting the various social benefits and goals intended by GEO through the GEOSS Data-CORE because it enables the unrestricted re-use, re-dissemination, and legal interoperability of data. Moreover, unlike copyright, which lasts for the life of the author plus 50 (or even 70) years, duration of public domain status is unlimited. In cases in which the datasets have not been placed in the public domain (e.g. copyrightable subject-matter arising from privately funded research or government-created), other instruments are available for GEO Member States and Participating organizations to enable sharing of their data as part of the GEOSS-Data CORE.

The public domain may be defined as encompassing content that is (1) not subject to copyright or related rights (including database protection rights), and (2) not subject to conditions on reuse imposed by other means.[38] The public domain may be created formally through specific national legislation or regulation that expressly excludes certain subject matter from protection under copyright.[39] It may also be created by national policies dedicating government created or funded information (or information resources) to the public domain. Government contracts or grants may also contain provisions requiring

[37] See "First Evaluation Report of Directive 96/6/EC on the legal protection of databases" DG Internal Market and Services Working Paper IP/05/1567 (Brussels, December 12, 2005), para. 4.1.4 – it highlights some of the decisions of the European Court of Justice.

[38] See J.H. Reichman and Paul Uhlir, "*A Contractually Reconstructed Research Commons for Scientific Data in a Highly Protectionist Intellectual Property Environment*, 66 Duke University Law School, Law and Contemporary Problems 318-319 (2003).

[39] See e.g. WIPO Copyright Treaty Article 2, and the discussion in Section A1 above.

research data and results to be dedicated to the public domain.[40] Public domain status may also be attained when the protection of the eligible subject-matter has exceeded the statutory term of protection which is unlikely for almost all data made available through GEOSS as almost all geospatial data is too recent to have exceeded the term of protection.[41] This section addresses two of the common regulatory ways that can confer the data with the status of the public domain.

3.1 Legislative, regulatory and policy approaches

There are several approaches that can be used to place data in the public domain. Two major approaches are discussed in this section. The first one is the option of international "intervention" whereby norms of international public law codify what data shall be made available to users without restrictions. These international obligations or norms can be implemented through national legal regimes. Such an approach may result in a more coherent treatment of data and facilitate global sharing. The other option is for countries to concentrate on their national data policies to adopt necessary legislative, regulatory, or policy measures to make certain types or categories of data publicly available. National leadership on open access policies may influence other countries to follow suit. Either of these approaches may be used in releasing data in compliance with GEOSS Data-CORE conditions, and provides equally viable and valuable contributions.

3.1.1 International executive agreements

Binding international agreements is a mechanism for placing scientific Earth observation data in the public domain. Such agreements may be bilateral or multilateral in nature. For example, many countries have bilateral science and technology agreements which provide that scientific data arising from cooperative activities under the agreement shall be made publicly available in accordance with accepted scientific practice. International agreements establishing large-scale international scientific facilities, such as astronomical observatories or ocean observing systems, typically provide that scientific data generated at the facility will be made publicly available.

Another example is in the case of environmental treaties. For instance, the Antarctic Treaty established, *inter alia*, that "scientific observations and results from Antarctica shall be exchanged and made freely available"[42] Other international treaties in the field of utilisation of natural resources and protection of environment that have similar provisions include the UN Convention on the Law of the Sea, the Ozone Protocol, the Convention on Biodiversity and the Aarhus Convention.

International organizations can also play an important role by developing guidelines or principles to promote the dissemination of scientific data. For example, the Organisation for Economic Cooperation and Development had adopted Principles and Guidelines for Access to Research Data from Public Funding and Guidelines for Enhancing Access to Public Information. [43] Although such Principles and Guidelines are not legally binding upon Member States, this approach in practice may lead to more coherent implementation mechanisms and more uniform interpretation of the major terms and concepts regarding data sharing.

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[40] For example, the United States Geological Survey's National Geospatial Data Center's data acquisition policy requires that all geospatial data arising from its partnerships with state government and business contain a clause that places resulting data in the public domain.

[41] Article 7 of the Berne Convention for the Protection of Literary and Artistic Works establishes a minimum term of protection for copyrights as the life of the author plus 50 years from the year of the first publication of the work. Member states can provide greater protection, as is done, e.g. in the USA, the EU and a number of other countries.

[42] Article III, the Antarctic Treaty, 402 *U.N.T.S.* 71, entered into force June 23, 1961.

[43] OECD Principles and Guidelines for Access to Research Data from Public Funding (OECD, 2007). Available online at: http://www.oecd.org/science/sci-tech/38500813.pdf.

Both sets of OECD Guidelines recognize that national governments may restrict access to data due to national security considerations or privacy concerns. For example, the OECD Guidelines for Access to Research Data from Public Funding provide that '[a]ccess to or use of data may be restricted to safeguard the privacy of individuals, protect confidentiality, proprietary results or national security." Similar restrictions on access to data can be found in many international agreements, and national legislation and policies. Although these restrictions promote legitimate interests and achieve compatibility with other legal requirements, such as national security classification laws or the protection of human subjects, an overly broad application of such restrictions undermines open data principles.

3.1.2 National policies, legislation and regulations

There is an increasing trend towards providing free and open access to Earth observation data from government operated satellites. These policies view the data as a public good whose value increases with increased use by both scientific and commercial users. They also reflect the collective experience that open access to data increases transparency in government, accelerates scientific discovery, and stimulates economic growth. As more countries adopt data policies for their Earth observation data in accordance with the Data-CORE sharing regime or the GEOSS Data Sharing Principles, there will be far fewer legal interoperability challenges to use of GEOSS data.

Governments can (again, depending upon their national legal framework) place government-funded earth observation data in the public domain through the adoption of national policies. For example, the U.S. White House issued a National Strategy for Earth Observations on April 19, 2013, to increase the efficiency and effectiveness of the Nation's Earth-observation systems,[44] Consistent with U.S. global climate research program data principles, the Strategy reaffirms that Earth observations should be fully and openly available to all users promptly in a non-discriminatory manner, and generally free of charge whenever possible.[45] It also highlights the importance of increased access in international Earth observation systems and advancing the GEOSS data sharing principles.

Datasets may also be dedicated to the public domain through legislation. Recent open access legislation has been adopted in Argentina. On November 13, 2013, the Argentine Congress passed legislation requiring all publicly funded research to be available in open access interoperable institutional repositories.[46] The policy applies to research data, journal articles, and dissertation theses reporting on the results of publicly-funded research. A maximum embargo of six months is allowed before articles are made publicly available. The legislation also requires raw data to be published within five years. The law is designed to ensure that Argentine citizens have access to nationally funded research results and to promote the visibility of Argentine research.

Argentina's legislation is synergistic with its participation in the La Referencia project. Initiated in 2012 and funded by the Inter-American Bank (IAB), La Referencia is a network of interoperable national digital repositories for Latin American research. Other participants include Brazil, Colombia, Mexico, Chile, Ecuador, Peru, Venezuela and El Salvador. The IAB predicts that this project could benefit more than 700,000 professors, 70,000 researchers, and 15 million students in Latin America.[47]

The EU has recently adopted the Commission delegated regulation supplementing Regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth monitoring

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[44] http:/ww.whitehouse.gov/sites/default/files/microsites/ostp/nstc_2-13_earthobsstrategy.pdf.

[45] At one time, the U.S. charged for Landsat images. An attempt to commercialize Landsat data resulted in higher prices and diminished use of the images. See, for example, NRC (1997), BITS OF POWER: ISSUES IN GLOBAL ACCESS TO SCIENTIFIC DATA, National Academy Press, Washington, DC, 250 p., at pp. 121-124. Since 2008, the Landsat data archived in the U.S, have been available without any cost or restrictions, worldwide.

[46] http://www1.hcdn.gov.ar/dependencias/dsecretaria/Periodo2012/PDF2012/SANCIONES/1927-D-2011.pdf.

[47] See http://www.mincyt.gob.ar/noticias/es-ley-el-acceso-libre-a-la-informacion-cientifica-9521.

programme (GMES) by establishing registration and licensing conditions for GMES users and defining criteria for restricting access to GMES dedicated data and GMES service information[48]. It places data from Copernicus, the European Union's Earth observation program, in the public domain. Its Article 3 states that "GMES dedicated data and GMES service information" shall be available for users to access freely, openly and fully. Recital 7 of the regulation confirms the commitment of full compatibility of the Copernicus data sharing regime with the GEOSS Data Sharing Principles. The regulation states that "…GMES open dissemination should be fully compatible with the GEOSS data sharing principles." For contributing missions from third parties, however, where data comes not from Sentinel satellites, the data policy will be determined by the provider.

3.2 Voluntary "self-help" approaches

Many organizations and agencies may not need to wait for government entities to authorize removal of intellectual property law restrictions on the use of their data, metadata and data products by others. If the current restrictive policy is an internal policy developed and implemented by the agency or organization and there exist no overriding government regulations or legislation forcing the organization to follow the current restrictive policy, the organization may have the option of simply altering the policy through internal processes. Various self-help approaches the agency or organization might consider include the use of standard waivers, standard common-use licenses, contracts and custom waivers and licenses. Below is a brief discussion of the applicability of these approaches to datasets in conformance with the GEOSS Data-CORE principles, and the benefits and drawbacks of each approach.[49]

3.2.1 Standard waivers

Waivers are an express written statement by the rights holder that no statutory or other rights are retained by that rights holder in the database or other work protected by copyright or database protection legislation. This is the most favorable condition for the user of the dataset, since it provides status equivalent to the public domain, and allows complete freedom for any user to integrate, re-use, and re-disseminate all or a portion of the dataset. It provides full interoperability with no restrictions whatsoever. It retains no protection for the dataset provider, however, including no legally enforceable attribution or any other requirement. The lack of a legally enforceable attribution requirement may not have much practical effect in most cases, since attribution and citation are normative and ethical practices in the academic and scientific communities. Also, many jurisdictions do not allow the waiver of all rights, since the author's moral rights, if applicable, cannot be fully waived. The standard waiver in use across the globe that supports the GEOSS Data-CORE principles is the Creative Commons CC0 waiver (see Table 1 below).

3.2.2 Standard common-use licenses

Licenses and contracts[50] are used if the database provider wishes to retain some rights and control the use(s) of the data in some way. There is a popular misconception, however, that licenses and contracts are the same thing. They are not. The differences between the two will become clear from the discussion regarding contracts below.

Licenses are based upon existing statutory rights for implementation. They are applied automatically and do not depend on a contractual agreement between the rights holder and the user(s). They do not extend to facts or materials already in the public domain, because there is no underlying statutory

[48] No 1159/2013 of 12 July 2013. *OJ L* 309/1 (19.11.2013).

[49] For more detail about voluntary waivers of rights, common-use licenses and contracts see Pearson, Sarah Hinchliff, "Three Legal Mechanisms", in NRC (2012), FOR ATTRIBUTION: DEVELOPING ATTRIBUTION AND CITATION PRACTICES AND STANDARDS, Paul F. Uhlir, ed., National Academies Press, Washington, DC, 238 p., at 71-75. See also www.creativecommons.org.

[50] Contract and agreement are used interchangeably.

protection for that material, but can apply to databases or protectable portions of databases, although the uncertainty of enforcing the rights when necessary remains. Finally, licenses can be used to decrease or increase level of protection within the scope of the statutory protection.

It is important to note that the attribution requirement may not be legally enforceable for all data used in all jurisdictions. In those cases that it is not, attribution may be seen as a standard community practice or norm, or a moral or ethical imperative. Although it is not exactly the same as a legally enforceable requirement, proper attribution is the accepted standard practice in the scientific and larger academic community. GEO has adopted GEOSS Data Citation Guidelines that can help in this regard.[51] Failure to provide proper attribution may rise to the level of plagiarism, a form of research or academic misconduct.

There are many kinds of standard licenses, primary difference being the amount of rights that are granted to the licensee by the licensor. Some licenses permit only a restricted number of uses, while others grant the user greater freedom to reuse the work, with only some rights reserved by the licensor. The latter licenses are broadly referred to as "common use" licenses. Moreover new, custom licenses, which the GEO DSWG does not endorse, can be created by any provider with any mix of terms and conditions, depending on the jurisdiction.[52]

The most widely used and prevalent set of common use licenses is the set offered by Creative Commons (CC). According to the CC website all Creative Commons licenses have three layers of description. One is a "machine readable" version which is tagged to the licensed work for online use in CC Rights Expression Language (CC REL). Another is called the "Commons Deed," which is a "human readable" version of the license that summarizes the most important terms and conditions for non-legal experts. The final layer is the "legal code", a traditional legal tool in language that lawyers understand. The CC licenses have been reviewed in over 70 countries and are in use throughout the world. Although the exact numbers of works that use a CC license or waiver is not known, it is estimated that there are over one billion online.[53]

Waivers and common-use licenses that most certainly meet the requirements of the GEOSS Data-CORE include the licenses shown in Table 1, listed in order of least number of terms and conditions to the most.

Table 1: Acknowledgements, Waivers and Common Use Licenses compatible with the GEOSS Data-CORE Requirements

Name of Waiver or License	Summary Description
Acknowledgement of Public-Domain Status: Creative Commons Public Domain Mark[54]	The CC Public Domain Mark is used to mark datasets over which copyright has expired, and thus are already in the public domain, enabling their more ready identification in global web searches. Except for datasets in historic documents, few datasets should likely have this mark applied.
Statutory Waiver of copyright[55]	Copyright protection is proactively waived by the legislator.

[51] See online: http://www.gstss.org/library/GEOSS_Data_Citation_Guidelines_V2.0.pdf.

[52] E.g., according to the Directive of 23 April 2009 on the legal protection of computer programs, Article 5(2) "the making of a back-up copy by a person having a right to use the computer program may not be prevented by contract".

[53] For example, the website flickr.com alone has over 350 million photographs tagged with CC licenses. Presentation by Puneet Kishor at the Research Data Alliance conference, in Dublin, Ireland, 28 March 2014.

[54] http://creativecommons.org/choose/mark/.

[55] Creative Commons does not recommend use of the Public Domain Mark for works with "limited, hybrid public domain status." However, Creative Commons plans to develop and make available a Public Domain Mark

	Example: Not applicable to the U.S. federal government and its employees in the scope of their employment (United States Copyright Act (1976), 17 U.S.C. section 105.)
Voluntary Waiver of Rights: Creative Commons Tool (CC0)[56]	To the extent possible under law across the world, the person or authority who associates CC0 with the work waives all copyright and related or neighboring rights to this work.
Voluntary Waiver of Rights: Open Data Commons Public Domain Dedication and License (PDDL)[57]	The PDDL allows the database user to "copy, distribute and use the database"; "produce works from the database"; and "modify, transfer and build upon the database."
Attribution License: Creative Commons Attribution License (CC BY 4.0)[58]	The CC BY 4.0 license allows the database user to "Share— copy and redistribute the material in any medium or format Adapt— remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms." However: "You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use." This license applies to both copyrighted works and those covered by database protection legislation.

The table above is not intended to be comprehensive, but to provide recommendations that will make data available efficiently as part of the GEOSS Data-CORE.[59] For comparison purposes, open access projects exist that might support a very large database and a software infrastructure with tools for facilitating data contributions from many disparate sources. These efforts may choose to impose one open access license for the entire dataset, or allow one or more alternative open access licenses for the contributed data in the database. Thus the arrangement of open access licenses can become very complex in order to support a range of objectives. GEO currently does not envisage aggregation of Earth observation data instead of providing access to them from original places where they are archived by their owners. Providing access to shared data in such mode makes inevitable existence and

for those works with limited, hybrid public domain status. This would make it more difficult for others to restrict access to data placed in the public domain by data producing countries.

[56] Online: http://creativecommons.org/choose/zero/; explanation at http://creativecommons.org/about/CC0.

[57] This license may be used to cover both the database and its data. It may also be used to cover just the database with the data left to be covered by another license. In this context ""data" is defined as the contents of the database, which includes the information, independent works, or other material collected into the Database while "database" is defined as a collection of data arranged in a systematic or methodical way and individually accessible by electronic or other means. See http://www.opendatacommons.org/licenses/pddl/1-0/.

[58] Online: http://creativecommons.org/licenses/by/4.0/.

[59] Examples of standard, common-use licenses that meet the GEOSS Data-CORE terms and conditions, but that are geographically limited or constrained to a particular type of data and information (e.g., information generated by a government agency) include: the U.K. Open Government Licence for Public Sector Information (OGL), available at http://www.nationalarchives.gov.uk/doc/open-government-licence/, and the Norwegian Open Data License for Public Sector Information (NLOD), available at http://data.norge.no/nlod.

use of a range and combinations of open access licenses that might be used in a more complex arrangement are not discussed further.[60]

There are several other features of common use licenses that should be noted. One can only license the rights that one owns. Licensors can add both warranties and disclaimers to their licensed works, and these must be retained with the work. Whenever the recommended CC licenses are used, a clause regarding disclaimer of warranties and limitation of liability is already part of their text, and does not need to be taken care of separately. However, if it is the wish of data provider to provide for a warranty or liability, then relevant clauses need to be amended. In such cases the license will become customized. Finally, maximum interoperability occurs when a combined work incorporates works that all bear the same common use license. When this is not possible, the separate license for each work incorporated into a combined work must be retained and marked clearly in that combined work.

3.2.3 Elements of licenses compatible with the GEOSS Data-CORE

The preceding discussion was only intended to identify standard private-law instruments that have characteristics that are compatible with the GEOSS Data-CORE principles and that would make the available data legally interoperable. Although the GEO DSWG recommends the use of only the standard waivers or common use licenses to make data available through the GEOSS Data-CORE, in practice, some data providers may use such customized instruments, Therefore, in those cases where other waivers or common-use licenses are used to share data as part of the GEOSS Data-CORE, they should incorporate the following clauses and characteristics.

In the first place, they should be compatible with the GEOSS Data-CORE principles, i.e. not contain restrictions on access and use of the data shared. Secondly, the terms of use should be clear for both data providers and users, while balanced against the need to maintain the legal validity and integrity of the license, and that there is some risk in over-simplifying licenses. Thirdly, the licences used should be easy to recognize, find and to access online by all potential users. Metadata should incorporate information about the type of licence used, ideally imbedded and machine readable, searchable and trackable online. These two steps will promote greater use and interoperability of the data, particularly since data are increasingly accessed and used on a machine-to-machine basis, without human intervention. This will promote the goal of legal certainty and acceptance.

Finally, due to the nature of GEO activities and availability of data shared through GEOSS in many countries worldwide, GEO Members and Participating Organisations who share data should make an effort to have the licences they use available in different languages. Although the common language used in GEO is English, many potential users of GEOSS data, as well as many data providers, speak English as a second language or not at all. The waivers or licenses, and the key metadata, should be available in as many other languages as is practicable, beginning with the language(s) of the country making the data available, plus English, followed by those languages that are the most widely spoken by the greatest number of GEOSS data users.

Two additional issues that are independent from the data owners need to be taken into account as they are quintessential to the activity of GEO and the successful operations of GEOSS. Firstly, data that today are or can be shared through GEOSS originate from 90 GEO Member states and 77 Participating

[60] A case in point is OpenStreetMap (http://www.openstreetmap.org). The Open Street Map Foundation (OSMF) uses the Open Database License (ODbL) for the entire database (http://www.opendatacommons.org/licenses/odbl/), requires contributors to waive their rights in the individual contents of the database by using the Database Contents License (DbCL), publishes the map tiles under CC-BY-SA, and sub-licenses the contents of the database through ODbL, CC-BY-SA and other free and open licenses that may from time to time be chosen by the OSMF membership and approved by a 2/3 majority vote of the active contributors. (See http://wiki.osmfoundation.org/wiki/License/Contributor_Terms). At the current time it appears that an alternative has been approved that allows contributors to affirmatively place their data contributions into the public domain if they should so desire.

Organizations, while users of the data can potentially be located in every country in the world. This brings up the challenge of using licences that are valid under the laws of different jurisdictions. It is the task for GEO to promote the use of waivers or licenses with terms and conditions found to be valid internationally, preferably ones that have a proven track record of use in multiple jurisdictions. However, to achieve legal interoperability of shared data, the entities who share their data should be receptive to the recommendations regarding licences that GEO may adopt. That is why it is important to incorporate in any licences that are used clauses that are compatible with those licences indicated in this paper as compliant with the GEOSS Data-CORE.

Due to the nature of GEOSS, the datasets shared through the GEOSS portal remain under the legal control of the data providers, who can set the terms and conditions of access and (re)use. By registering their data with GEOSS, data providers will benefit from greater potential discovery of their data, while enabling numerous users to benefit from using the data that otherwise would not be available to them. The absence of control in this regard on the part of GEOSS should be taken into account before the data are in fact shared.

3.2.4 Contracts

Contracts, unlike licenses, are based upon the express agreement of the parties. Contracts require formal offer, acceptance, consideration, and (usually) written terms. Formal offer and acceptance for databases and other digital information products are made typically with “click through” agreements online, or “shrink wrap” agreements on CDs and other physical media. Unlike licenses, contracts are not dependent on their enforcement for an underlying statute, although of course they must not be made for an illegal purpose. Also unlike licenses, they can apply to data otherwise unprotected by statute (e.g., factual material in the public domain). Contracts are only valid for the agreeing parties, so others who may obtain the dataset are not bound by the terms of the original agreement. This makes contracts susceptible to leakage and they can therefore be an uncertain mechanism for rights holders. Finally, in contrast to many licenses, contracts and agreements are not standard. They may be lengthy and frequently are so confusing that their terms are misunderstood or even ignored by the user.

Even though they have significant limitations, contracts may be used as a means for bringing data into alignment with the GEOSS Data-CORE principles. This might occur when two or more parties contractually agree that the results of their joint or cooperative efforts will be placed into an open access legal framework. By example, the contract might specify which of the waivers or licenses in Table 1 will be applied to the results of the cooperative effort. In this sense, the GEO DSWG recommends the use of contracts as an efficient means in some instances for growing the body of data meeting the GEOSS Data-CORE principles.

4 CONCLUSIONS AND RECOMMENDATIONS

The foregoing analysis leads to a number of conclusions and recommendations for consideration by the GEO Members and Participating Organizations.

4.1 Conclusions

Public domain status is the best legal option for promoting the various social benefits and goals intended by GEO through making available data as the GEOSS Data-CORE by enabling and securing unrestricted re-use, re-dissemination, and legal interoperability. Public domain may be created formally by public laws through national legislation that excludes certain categories of data and information from copyright protection or places them in the public domain. The public domain may also be created through regulation or policies that place publicly-funded data in the public domain. National funding mechanisms, such as grants or contracts, may also contain provisions requiring that resulting datasets be made publicly available.

Rights under copyright or *sui generis* EU database protection laws arise automatically (i.e., they do not have to be claimed by a copyright filing or statement), unless expressly excluded or waived. Hence, express legislative, regulatory, policy or funding mechanisms are needed, or a waiver of all rights through a private law alternative to make the data excluded or waived from protection, or to make the re-use and re-dissemination of data unrestricted.

Ideally, datasets already having public domain status should include a notice in their metadata or on the database owner's server informing potential users of their public domain status. The Creative Commons Public Domain Mark, noted above, serves this purpose. Such a notice could help to overcome the incorrect assumption by some potential users that the data are subject to protection and have attendant restrictions on reuse. Such a notice would thereby promote the further use of the data and legal interoperability through the GEOSS Data-CORE. Many datasets, however, do not have public domain status and are protected in whole or in part under statutory intellectual property laws. In those cases, a legally valid waiver of rights can achieve a private-law equivalent of public domain status, or a common-use license can incorporate the attribution conditions allowed by the GEOSS Data-CORE (see the CC BY 4.0).

The endorsement by the GEO Plenary of either standard and accepted waivers and licenses, or other customized common-use licenses that meet all of the GEOSS Data-CORE conditions of access and unrestricted re-use of data, would help ensure certainty and legal interoperability of the data, and thus support the important GEO societal benefit goals. Common-use licenses and waivers also would help promote the contribution of databases through the GEOSS Data-CORE, because most jurisdictions do not have public domain status for the data compilations relevant to GEOSS. Such a step will also be helpful for the Members and Participating Organisations that are willing to share data as part of GEOSS Data-CORE as it will economise the resources they would need to spend on developing such licences themselves.

4.2 Recommendations for the GEO Plenary

Consistent with the discussion in this 2014 white paper and with the conclusions of the 2011 summary white paper, as amended in 2012 and adopted by consensus in the GEO plenaries, the GEOSS Data-CORE terms and conditions can best be achieved through any of the following mechanisms: statutory, regulatory or policy created public domain (including government contract or grant provisions), a private-law waiver of rights, or a common-use attribution-only license.

If the shared dataset is not in the public domain as a result of statutory, regulatory, policy, government funding instruments, or private law waiver of rights, or by the expiration of the term of protection of any rights, the GEO Members and Participating Organizations should consider adopting a waiver or common-use data license with the following characteristics.

Such waiver or license must be compatible with the GEOSS Data-CORE principles as established in the 2010 GEOSS Action Plan, specifically:

- data are free of restrictions on re-use;
- user registration or login to access or use the data is permitted;
- attribution of the data provider is permitted as a condition of use; and
- marginal cost recovery charges (i.e., not greater than the cost of reproduction and distribution) are permitted.

In addition, such waiver or licence should be:

- valid under the laws of as many different jurisdictions as possible;
- clear and understandable to the data provider or user;

- easy to find and recognize;
- embeddable in the data as machine readable metadata whenever possible;
- be available in different languages, at a minimum in the language(s) of the country/organisation making the data available, as well as in English;
- kept under the legal control of the data providers, and not GEO or GEOSS.

A custom waiver or licence may contain any other terms and conditions, such as a disclaimer of warranty and liability, that do not restrict the user or conflict with any of the terms and conditions summarized in a-f above.

Custom licenses that have the same terms and conditions as the characteristics listed above can also be used to provide data through the GEOSS Data-CORE. The decision as to the compliance of such custom licenses with the conditions of the GEOSS Data-CORE data access and use, however, will be determined solely by the data provider. This may diminish the legal interoperability that use of standard licenses that are approved by the GEO Members aims to achieve.

As discussed in this paper, the GEO DSWG believes that a legislative waiver of rights and the placing of all data and information produced by government entities in the public domain, would be the best approach. Until relevant legislative measures are adopted and enforced in the jurisdictions of GEO Members, waivers and common-use licenses can be adopted on a voluntary basis for the data, metadata and products that they control. They may also apply open access conditions into public grants contracts, or use other mechanisms to ensure full and open sharing and use of data. Based on the characteristics set forth in the list immediately above, the GEO Members and Participating Organizations should consider adopting one of existing voluntary waivers or standard common-use licenses[61] compatible with the GEOSS Data-CORE mechanism that include the following:

- Creative Commons Public Domain Mark;
- Statutory waiver of copyright;
- Creative Commons Public Domain Waiver (CC0);
- Open Data Commons Public Domain Dedication and License (PDDL);
- Creative Commons Attribution License (CC BY 4.0).

Any of the mechanisms recommended above will advance the goal of promoting access to Earth observation datasets as part of GEOSS Data-CORE data. It will reinforce the interpretation of the GEOSS Data Sharing Principles favouring open access and unrestricted re-use of the data.

[61] Examples of standard, common-use licenses that meet the GEOSS Data-CORE terms and conditions, but that are geographically limited or constrained to a particular type of data and information (e.g., information generated by a government agency) include: the U.K. Open Government Licence for Public Sector Information (OGL), available at http://www.nationalarchives.gov.uk/doc/open-government-licence/, and the Norwegian Open Data License for Public Sector Information (NLOD), available at http://data.norge.no/nlod.