

Draft GEO Statement on Open Science

This document is submitted by the Capacity Development Working Group to the Programme Board for decision.

1 INTRODUCTION

The Capacity Development Working Group would like to submit the draft GEO Statement on Open Science, appended as Annex A to this document, for consideration by the Programme Board.

The statement was created collaboratively in an iterative process, led by Markus Konkol, Open Science Officer at ITC. The first step was an inquiry to collect similar statements from all co-authors (the list of co-authors is provided as Annex B). In addition, the co-authors took into account the Joint Appeal for Open Science that was made recently by World Health Organization, UNESCO, and United Nations Human Rights. Finally, we used the first draft of the UNESCO Recommendation on Open Science as a guideline for the practices included in Open Science.

Out of these sources, a first draft was prepared by the lead author that was sent to all co-authors to collect feedback. The comments and questions helped to enhance the document considerably. In summary, the main issues raised by the co-authors were addressed as follows.

It was unclear which alternative method should be used to evaluate a researcher's output other than the Journal Impact Factor and the h-index. We added the San Francisco Declaration on Research Assessment (DORA) to address this issue. It was also mentioned that the GEOSS Data Sharing Principles are stronger than the FAIR principles. We kept both as they complement each other. The original section on Open (Source) Software required an open license as well as accessibility by adhering to the FAIR principles. This was seen as too restrictive. We changed it by differentiating between developed software, which should be released under an open license, and re-used software, which should be openly available as much as possible. Finally, we refined the criteria for restricting access to data by listing legitimate reasons and the guiding principle "as open as possible, as closed as necessary".

We sent the second version of the statement back to all co-authors who mentioned only a few minor issues. The resulting third version is the final Open Science Statement.

2 RECOMMENDATION

The Capacity Development Working Group recommends that the Programme Board endorse the draft statement in Annex A to this document for presentation to the GEO Executive Committee.

ANNEX A

DRAFT GEO STATEMENT ON OPEN SCIENCE

Openness in science is a fundamental requirement to ensure the integrity of research and accelerate scientific progress, as well as to disseminate knowledge among scientists, decision-makers, and the general public. In this context, Open Science is an umbrella term comprising a set of practices to share scientific findings by making all stages of the research processes accessible and reusable.

We, the Group on Earth Observations (GEO), advocate the adoption of Open Science to create a research environment that is transparent, diverse, collaborative, and sustainable. GEO aims at lowering the obstacles for everyone to benefit from and contribute to science. We furthermore endorse the San Francisco Declaration on Research Assessment (DORA) to evaluate a scholar's scientific outputs and impact.

Open Science has proven to have played a pivotal role in tackling global challenges such as the current Covid-19 pandemic. Considering that Open Science is also essential to achieve the Sustainable Development Goals, the Paris Agreement objectives, the Sendai Framework for Disaster Risk Reduction, and the reduction of knowledge divide among countries, Open Science is on the rise and receives more and more attention from all actors involved in research. We, therefore, promote the following Open Science practices:

Open Access: Everyone should be able to access and reuse scientific publications fully, immediately after publication, free of charge, and without restrictions.

Open Data: The data needed to reproduce the results reported in scientific publications should be released publicly under an open license and following the GEOSS Data Sharing as well as the FAIR (findable, accessible, interoperable, and reusable) principles using human- and machine-readable data formats. There are legitimate reasons to restrict data access including, for example, privacy, national security, law enforcement, confidentiality, intellectual property, and indigenous data. In the context of data sharing, the guiding principle is “as open as possible, as closed as necessary”.

Open Reproducible Research: The programming code or workflow needed to reproduce the analysis underlying the results (for example: figures, tables, and numbers) in scientific publications should be released under an open license and in accordance with the FAIR principles. The analysis should be executable to facilitate understanding, verification, and reuse by others in new contexts.

Open Software: Any kind of software that is developed during the research process should be released under an open license and in accordance with the FAIR principles. Any kind of reused software upon which the newly developed software is based or that is needed to execute the programming code or workflow should be released under an open license as much as possible and/or made available in accordance with the FAIR principles.

Open Education: The teaching materials should be released under an open license allowing reuse and modification by others and in accordance with the FAIR and Creative Commons principles. Open Education also involves the teaching of Open Science principles and using openly accessible materials (e.g., data and software) as much as possible.

Open Evaluation: Scientific articles should be evaluated in an Open Peer Review process resulting at least in publicly available reviews. To foster the transition to a new recognition and reward system, a researcher's reputation and output should be evaluated according to the Open Science principles, i.e., by focusing primarily on the content (see DORA) rather than the impact factor of a journal and the h-index.

Citizen and Participatory Science: Open Science can also include research performed by actors beyond the scientific community. Science should stimulate the active engagement and contribution of, for example, politicians, economists, and the general public to achieve a higher representation of the society and to build up science literacy. A further aspect of this endeavour is to make the decision process supported by GEO more transparent, inclusive, and user-oriented to achieve a more participatory approach.

Diversity of Knowledge: Science should also take into account the diversity of knowledge systems, holders, and producers. This consideration requires acknowledging the rights of Indigenous People as well as the principles of non-discrimination against income, gender, age, ethnicity, migratory status, disability, and geographic location.

The overarching goal is to make Open Science the new norm across disciplines and to create a scientific landscape that allows everyone to verify, understand, and adopt new research results. Openness in science and education can help to address the local, regional, and global needs of the society by creating an inclusive and interconnected environment. An open environment provides equal opportunities and chances for all to gain scientific literacy and benefit from new knowledge and innovation.

The digitalization era offers new possibilities to improve equal access to knowledge, hence increasing the credibility and trust of scientific findings as well as political decisions that are expected to be based on verifiable facts. We want to achieve that by providing researchers with appropriate conditions to meet high scientific standards and by actively eliminating the barriers that stand in the way of practicing Open Science (e.g., with the help of the GEO Knowledge Hub).

GEO strongly encourages practices that comply with the Open Science principles to increase the impact of the GEO Work programme and shorten the time from discovery to application.

ANNEX B

LIST OF CO-AUTHORS OF THE DRAFT STATEMENT

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