

## **Earth and Space Science Data Should Be Credited, Preserved, Open, and Accessible as an Integral Responsibility of Scientists, Data Stewards, and Sponsoring Institutions**

*Earth and space sciences data are a world heritage. Properly documented, credited, and archived, they will help future scientists understand the Earth, planetary, and heliophysics systems. They should be preserved long-term for future use. They should be made openly available to the scientific community and the public as soon as possible. They should be accessible in usable formats with sufficient machine-readable documentation to allow informed re-use. These responsibilities are an integral part of scientific research shared by individual scientists, data stewards, and sponsoring institutions.*

Earth, planetary, and heliophysics data collection, analysis, and archiving are essential to our understanding of the natural environment and how it changes with time. This Union policy is grounded in the value of full and open sharing of such data and associated documentation for research and education. Adherence to this policy will foster scientific advances, yield economic benefits, improve decision-making, enhance public safety and well-being, contribute to national and global security, and lead to a more informed public.

AGU extends this policy to all forms of digital data and physical objects acquired with both public and private funding. Publicly funded data are a public good and should be preserved and sustained over time. They should be made as open as ethically possible to maximize scientific, economic, and societal returns. Public data should be available without charge wherever possible. In limited circumstances, access to certain data might be restricted by ethical, but not proprietary, concerns such as to protect security, confidentiality, or to avoid harm to protected entities. Such restrictions should be infrequent and carefully justified on a case-by-case basis. Privately funded data may have legitimate proprietary restrictions but AGU strongly encourages private concerns to make their data as freely and openly available as possible, especially when the public benefit outweighs commercial value. In these situations, the public (i.e. government) has a legitimate role to help preserve the data.

For some issues, such as responding to natural hazards, access to real-time data is critical. Further, assimilation of near-real-time data in models is becoming increasingly important for monitoring and predicting changes in the Earth's environment and climate.

Documenting trends and long-term changes is essential for understanding many natural phenomena. Because the state of natural systems is never repeated, data losses, or missed data collection opportunities can never be corrected. Consequently, the value of Earth, planetary, and

heliophysics data grows with time, placing a premium on very long-term data curation. Therefore, Earth, planetary, and heliophysics data and associated documentation should be submitted promptly to a community-accepted repository sustained for the long-term.

Because datasets are often later used for purposes other than those for which they were collected; accurate, complete, and both machine and human-readable documentation are as important as the data themselves. This documentation should include enough information to ensure the data are correctly and independently usable over the very long-term.

The cost of collecting, processing, validating, and submitting data to a repository should be an integral part of research and operational programs. Because of the explosive growth of Earth and space digital data sets, tools should be developed that provide both machines and humans the ability to quickly discover and efficiently extract data, thereby increasing their utility.

The AGU scientific community should recognize the professional value of such activities and endorse the Joint Declaration of Data Citation Principles. In particular, “Data should be considered legitimate, citable products of research.” Earth and space science data are a world heritage. Properly documented and archived, they will help future scientists understand the Earth, planetary, and heliophysics systems. Taking proper care of such data is our responsibility and our obligation to future generations.