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Position Summary. The Geological Society of America (GSA) supports the preservation of geoscience samples and data sets for the public good and urges public and private sector organizations and individuals to routinely catalog and preserve their collections and make them more widely accessible.

This position statement (1) summarizes the consensus view of GSA on issues related to data preservation; (2) advocates for the preservation, archiving, and increased availability of data sets and physical collections; (3) encourages agencies and organizations to work toward improved data preservation and dissemination; and (4) provides a communication tool for geoscientists.

CONCLUSIONS AND RECOMMENDATIONS

The Geological Society of America supports federal, state, university, and related public and private sector funding for all of the essential geoscience data activities listed below. Of particular note, we encourage GSA members to support the goals, mission, and expanded funding of the USGS National Geological and Geophysical Data Preservation Program. The NGGDPP was created as part of the Energy Policy Act of 2005 and, since its implementation, has created significant momentum in critical data preservation activity in state and federal geological surveys across the country. In fact, GSA encourages all appropriate state and federal agencies, industry, and universities engaged in geoscience data development, preservation, and curation to create and seek out similar collaborative opportunities and programs.

Government, educational, and private sector organizations, individually as well as collectively, are encouraged to aggressively address the following geoscience data–preservation challenges:

- Identifying, organizing, documenting, and cataloging existing data collections, preferably in a digital format;
- Constructing logical linkages and search engines that implement FAIR (findable, accessible, interoperable, and reusable) principles and facilitate easily discoverable access to organizations and their geoscience sample and data collections;
- Dedicating adequate space — physical and digital — for storage of and efficient access to existing and future samples and data sets, as well as ensuring adequate equipment and compatibility to be able to read existing data in the future;
- Using accepted standards and best practices for metadata, such as those developed by the Federal Geospatial Data Committee (FGDC, <https://www.fgdc.gov/technical-guidance/metadata/fgdc-technical-guidance-datagov-geoplatform-ngda.pdf>), International Organization for Standardization (ISO, <https://www.fgdc.gov/metadata/iso-standards>), and the Library of Congress (<https://www.loc.gov/standards/mdc/>):
 - Proactively migrating data to new standards;
 - Adding suitably documented new material to the collections responsibly and selectively;
 - Document new data as they are created;
- Training geoscientists to share their data and samples during their professional careers, to document precise sample sources, including latitude-longitude, if relevant, and to make suitable arrangements for the preservation of these materials upon their retirement; and

- Committing continuing financial and personnel resources to do all of the above.

GSA also urges the broader geoscience community to give appropriate professional recognition and data citation to those organizations and individuals who serve as geoscience “libraries and librarians.”

RATIONALE

The work of earth scientists depends on the availability of representative samples and measurements collected above, at, and beneath Earth’s surface. Such collections include geologic samples from surface exposures, drill cuttings and cores, photographs, maps, remote sensing data, geophysical surveys and well logs, and other assorted field and laboratory observations, analyses, and measurements in analog and digital form. These samples and data sets are fundamental references supporting basic and applied research and education, professional publications, geologic maps and reports, natural resource assessments, environmental protection plans, natural hazards assessment and mitigation, and the continued development of a broad understanding of Earth’s processes and history. Equally important, these collections are regularly reexamined as required by new societal issues, environmental concerns, scientific interpretations, and analytical techniques. Reanalysis of samples and data with new techniques and new context routinely produces new knowledge.

A 2002 National Academies report, “Geoscience Data and Collections: National Resources in Peril” (<https://nap.nationalacademies.org/catalog/10348/geoscience-data-and-collections-national-resources-in-peril>), characterizes these samples and data collections as a library of geologic reference materials. The analogy is especially apt because it emphasizes the future value of information contained in but not yet fully extracted from the collections. Like many library collections, these data sets and samples often include individual specimens acquired at great cost and with substantial difficulty and that are rare or unique. Many samples are irreplaceable, for example, obtained where ore deposits are mined, glaciers melt, or where urban development, environmental restrictions, and other limits on land access restrict or prohibit the collecting of new specimens. Even when re-sampling is possible, replacement costs are discouragingly high. Original samples are often the only samples.

The federal government, through a 2009 study conducted by the Interagency Working Group on Scientific Collections (<https://iwgsc.nal.usda.gov/iwgsc-documents>), recognized the importance and continuing contributions of well-maintained scientific collections and made recommendations for federally managed scientific collections. However, many collections, including those housed by federal and state agencies, universities, museums, private companies, and individuals, are at risk because of severely limited space and funding for proper curation. Physical samples are inadequately housed in garages, basements, deteriorating warehouses, semi-trailers, or shipping containers. Analog data, including maps, photographs, and field notes, often suffer a similar fate. Digital information may reside on obsolete formats. All too commonly, these collections and data sets are also incompletely inventoried and inadequately documented. There are no efficient ways to identify, search for, and retrieve items of interest. In fact, potential users may not even be able to determine that a relevant collection exists. Inaccessible, irretrievable collections are unusable and have little value until they are opened to scientific and public access. GSA encourages geoscientists to pursue appropriate measures, as described above, to remedy such situations to ensure preservation and accessibility of data collections.

Adopted October 2005; Revised May 2009, November 2012, October 2017, and October 2022

ABOUT THE GEOLOGICAL SOCIETY OF AMERICA

The Geological Society of America unites a diverse community of geoscientists in a common purpose to study the mysteries of our planet (and beyond) and share scientific findings. Members and friends around the world, from academia, government, and industry, participate in GSA meetings, publications, and programs at all career levels, to foster professional excellence. GSA values and supports inclusion through cooperative research, public dialogue on earth issues, science education, and the application of geoscience in the service of humankind.

OPPORTUNITIES FOR GSA AND ITS MEMBERS TO HELP IMPLEMENT RECOMMENDATIONS

To facilitate implementation of the goals of this position statement, the Geological Society of America recommends the following actions:

- GSA members can present this position statement as part of their advocacy for preservation and proper curation of specific collections of geoscience samples and/or data sets that are at risk of being discarded. This effort should be part of GSA members' efforts to highlight opportunities for research and documentation that preservation can provide.
- GSA encourages its members and their associated departments/institutions to profile collections and promote the value of well-maintained collections for continuing analyses.
- Geoscience departments/institutions are encouraged to provide institutional support for data and sample preservation.
- GSA members and collaborators are encouraged to profile and share best practices for data and collections preservation and documentation, and to avail themselves of resources and best practices from external sources as well (e.g., <https://nml.gov/data/repositories>; www.aam-us.org/resources/ethics-standards-and-best-practices).

REFERENCES AND RESOURCES

1. Federal Geographic Data Committee, 2021. FGDC Technical Guidance: Data.gov
2. The GeoPlatform Metadata Recommendations, Including Guidelines for National Geospatial Data Assets (NGDA) (<https://www.fgdc.gov/technical-guidance/metadata/fgdc-technical-guidance-datagov-geoplatform-ngda.pdf>).