

## Core Science Systems—*Mission Overview*

The Core Science Systems Mission Area delivers nationally focused Earth systems and information science that provides fundamental research and data that underpins all Mission Areas of the USGS, the USGS Science Strategy, and Presidential, Secretarial, and societal priorities.

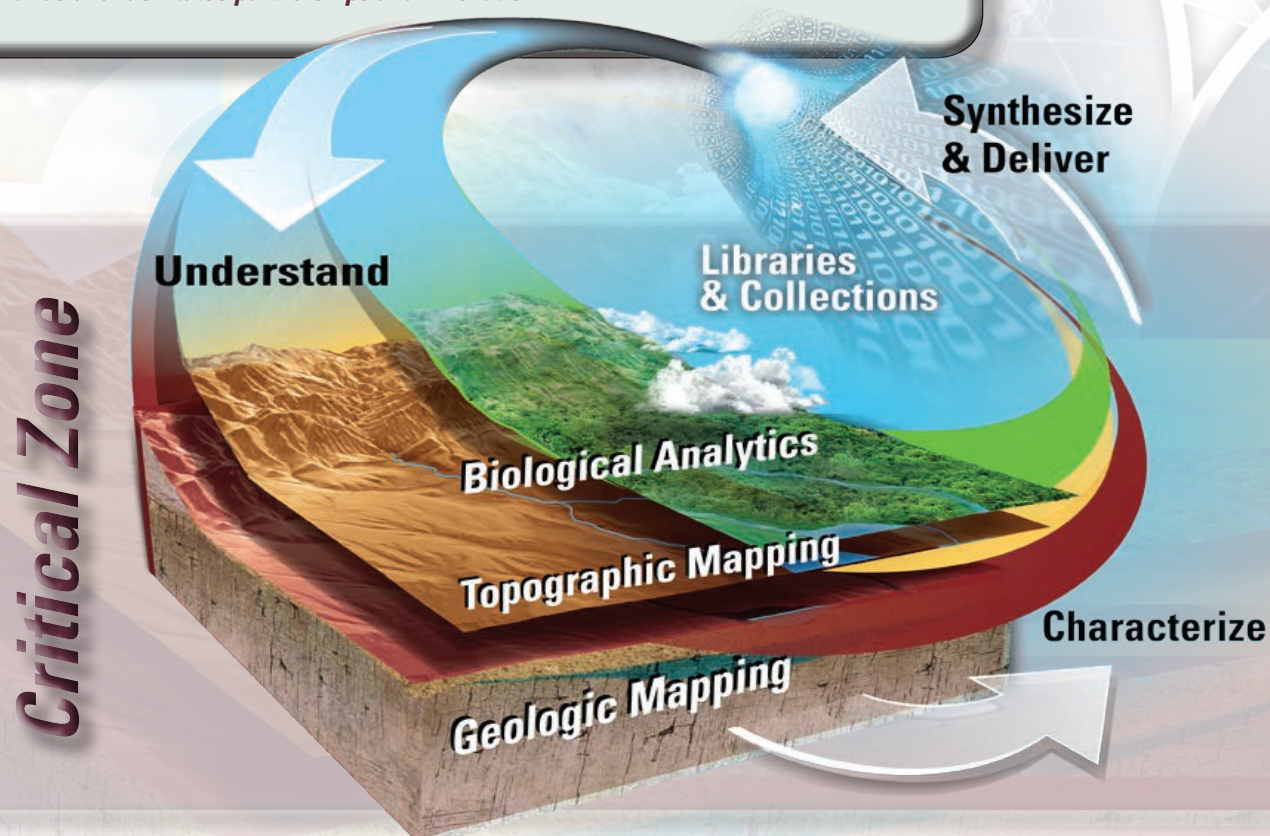
—Kevin T. Gallagher, Associate Director, Core Science Systems

*The U.S. Geological Survey (USGS) Core Science Systems (CSS) Mission Area spans the Earth's "Critical Zone" (National Research Council, 2001). The Critical Zone is the near-surface interface that extends from the tops of the trees down to the base of the deepest groundwater.*

*CSS provides a foundation for all USGS Mission Areas, as well as for the mission of the Department of the Interior (DOI), in the following ways:*

- **Conducts basic and applied science research and development**
- **Fosters broad understanding and application of analyses and information**
- **Provides a framework for data and information sharing**
- **Creates new geospatially enabled data and information**
- **Provides technical expertise in standards and methods**
- **Builds and facilitates partnerships and innovation**

*Mapping  
Research  
Standards  
Synthesis  
Collections  
Partnerships*



CSS continuously strives to better understand, characterize, synthesize, and apply context to the complex processes and interactions taking place in the Critical Zone.

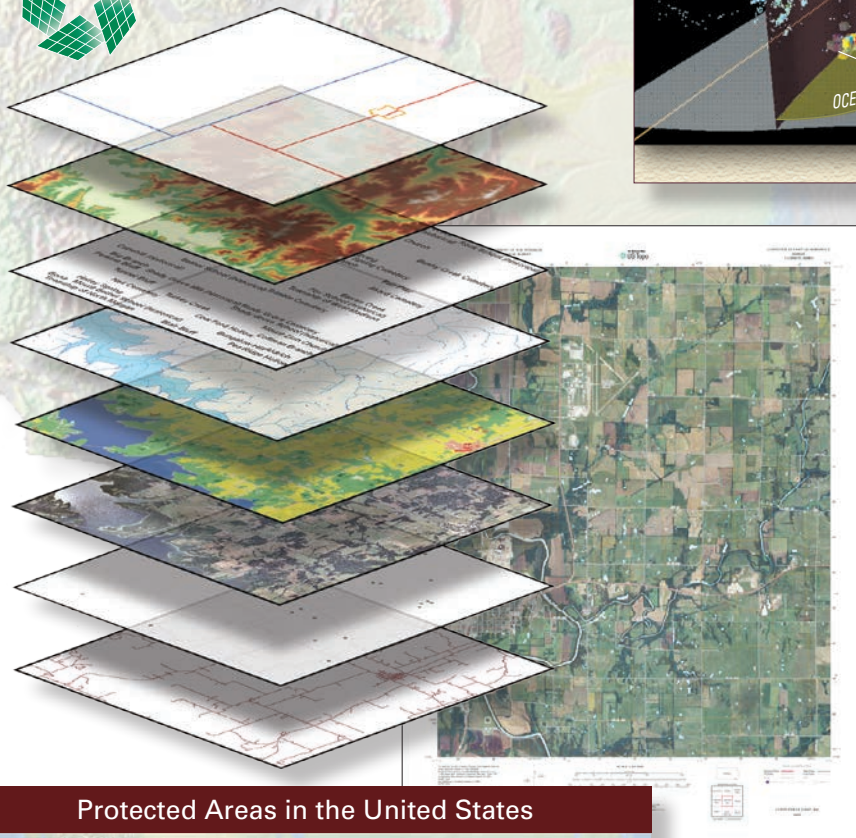
## Mapping

One of the cornerstones of the USGS is our role as the civilian mapping agency for the Nation. Through collaborative efforts with Federal, State, and local partners, the USGS delivers nationally consistent, high-quality geologic, topographic, and biogeographic information. USGS mapping products and services have many uses—from recreation to scientific analysis to emergency response. Accurate geologic maps and three-dimensional framework models are used to help mitigate natural hazards and sustain and improve the quality of life and economic vitality of the Nation.

Mapping is also foundational to addressing the DOI mission to protect America's treasures for future generations, provide access to our Nation's natural and cultural heritage, offer recreational opportunities, honor our Trust responsibilities, conduct scientific research, provide wise stewardship of energy and mineral resources, foster sound use of land and water resources, and conserve and protect fish and wildlife.



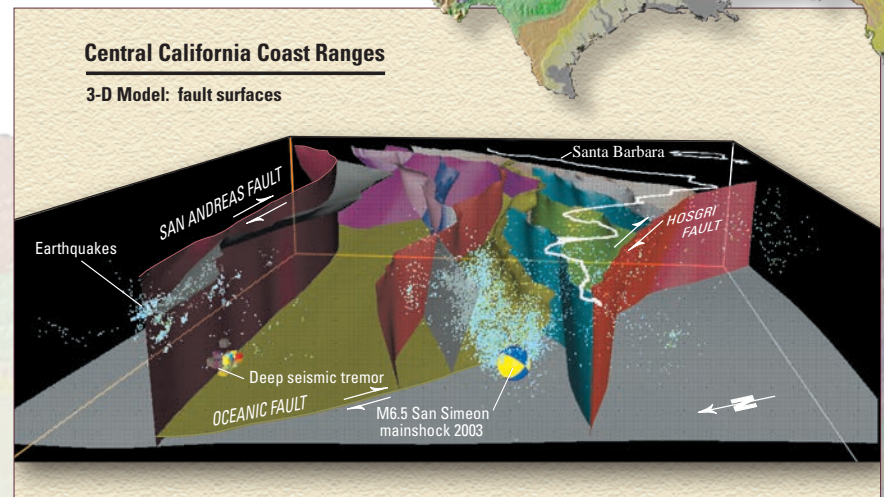
## The National Map



## Lark Bunting gap analysis



(Right) Geologic map of the conterminous United States.



(Above) Three-dimensional geologic models are critical to most earthquake and regional tectonic studies.

(Left) The National Map is a suite of mapping products and services that provides access to geospatial information for the United States and its territories and allows users to develop maps tailored to their purposes. The next generation of topographic maps is called "US Topo."

- **The National Geospatial Program**—Provides geospatial products and services that users incorporate into their decisionmaking and operational activities.
- **The National Cooperative Geologic Mapping Program**—Advances collaboration among Federal, State, and university partners to build and deliver modern geologic map coverage for the Nation.
- **Gap Analysis Program**—Provides searchable, viewable, and downloadable national digital databases of predicted species distribution (based on habitat affinity models), land cover, and land stewardship.
- **Protected Areas Database**—Maintains a comprehensive national inventory of publicly owned and conservation lands in cooperation with Federal, State, and nongovernmental entities.

## Research

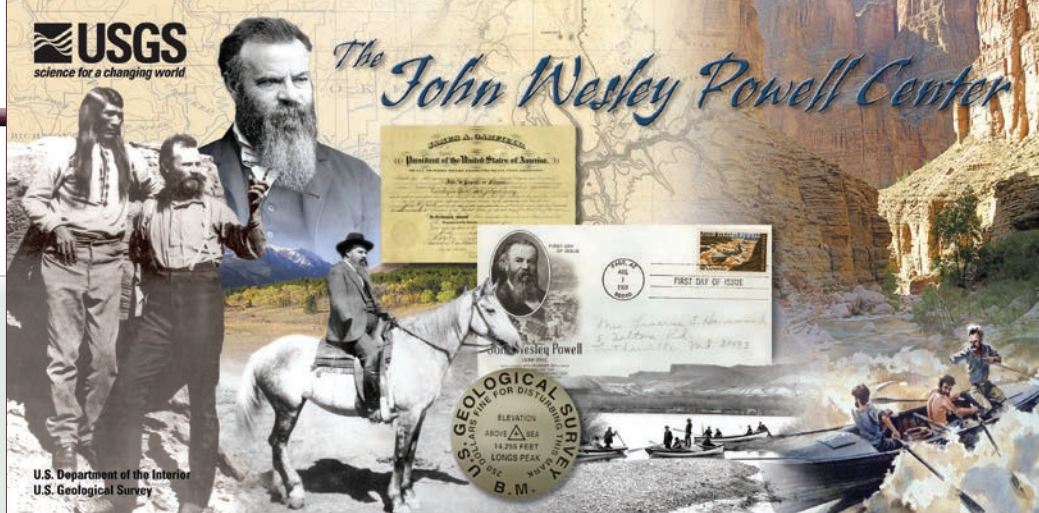
Scientific research within CSS addresses myriad societal issues and contributes to research activities in other USGS Mission Areas.

- **National Cooperative Geologic Mapping Program**—Conducts the breadth of stratigraphic, tectonic, paleontologic, geochronologic, geochemical, and geophysical research portrayed in geologic maps, models, and databases.
- **Center of Excellence for Geospatial Information Science**—Conducts, leads, and influences the research and innovative solutions required by the National Spatial Data Infrastructure and the emerging GeoSpatial Web.
- **Applied Earth Systems Informatics Research**—Partners with computer and information science research institutions, advances use of scientific cyberinfrastructure, and conducts research on topics developed at the Powell Center and by the Community for Data Integration.

## Standards

CSS leads the USGS in the development and implementation of national standards that aid in the creation, management, and dissemination of digital Earth systems information to stakeholders.

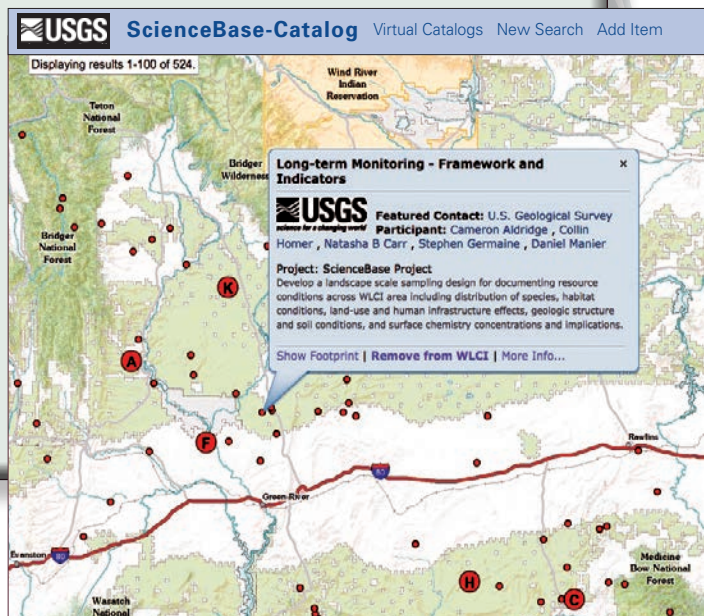
- **Federal Geographic Data Committee, Office of the Secretariat**—Facilitates development and implementation of geospatial data standards with Federal agencies and non-Federal partners.
- **National Geologic Map Database**—Leads national efforts in standardizing geologic map symbolization and database design.
- **Integrated Taxonomic Information System**—Provides authoritative information on scientific and popular species names through an online searchable database.
- **Geographic Names Information System**—Maintains the official standardized geographic names used by the U.S. Board on Geographic Names.
- **Metadata Clearinghouse**—Manages collections of standardized metadata descriptions of scientific datasets and information products.



## Synthesis

Computer and information sciences play an increasingly important role in achieving the USGS mission. CSS facilitates multiple Bureau activities in support of data integration and synthesis.

- **John Wesley Powell Center for Analysis and Synthesis**—Provides a unique and stimulating environment that enables scientists to advance knowledge through collaborative and interdisciplinary investigation.
- **Community for Data Integration**—Supports improved approaches to the integration of diverse data for new scientific insight through a community of practice open to the USGS and its partners.
- **ScienceBase**—Provides a collaborative, dynamic science data management framework that enables complex synthesis and analysis.



## Collections

Earth and natural science research is based on the cumulative observation, analysis, and documentation of generations of researchers. The USGS is the custodian of the record of much of those activities for the Nation, and collections managed by CSS are truly foundational resources for future research activities.

Collections managed by CSS include national map databases, physical samples, data derived for analysis, published research, current and historical photographs, field notes, and records produced in the pursuit of science. These collections continue to grow and are now largely digital. Physical and digital collections are the starting point for much of our future research efforts, and the contexts that these materials provide for ongoing efforts are important and valuable to researchers across the USGS and worldwide.



- **USGS Libraries Program**—Collects, maintains, and supports the world's largest collection of earth and natural science research information in print and digital form.
- **Core Research Center**—Houses physical samples critical to energy, mineral, climate change, and geologic mapping studies. Collections include almost 2 million feet of rock core, cuttings from over 54,000 bore holes, and 1.25 million fossils.
- **National Ice Core Laboratory**—Maintains over 17,000 meters of ice cores from polar regions of the world. Managed by the USGS for the National Science Foundation.
- **National Digital Catalog of Geological and Geophysical Data**—Provides nearly 2 million metadata records on geoscience samples from the USGS and State geological surveys.



## National ICE CORE Laboratory

## Partnerships

Scientific research is inherently based on collaboration, and developing and managing partnerships is a key component of CSS. From facilitating a community for data integration to supporting research projects, CSS develops and applies standards, data management tools, and strategies that address research priorities for the USGS and its partners. CSS leads and collaborates with Federal, State, and international agencies, universities, private industry, and others to achieve societal goals. Also, USGS grants and cooperative agreements managed by CSS provide critical funding to partners.

- **Geologic Mapping**—Fostering a unique partnership among the USGS, State geological surveys, and universities to geologically map the Nation.
- **Wyoming Landscape Conservation Initiative**—Developing data management tools to enable Federal, State, and local entities to monitor and manage habitat while facilitating responsible development in southwestern Wyoming.
- **Landscape Conservation Cooperatives**—Developing an information management framework to improve data accessibility, identify data gaps, foster scientific inquiry, and promote integration of multidisciplinary data for informed decisionmaking.
- **U.S. Geoscience Information Network**—Working with State geological surveys to develop a framework for data exchange built on open standards.
- **National Geospatial Partnership**—Collaborating on acquisition of geospatial data for specific needs of State and Federal agencies to leverage data cost and create efficiencies.
- **Fifty States Initiatives**—Partnering with States through the Federal Geographic Data Committee to bring meaningful contributions to the National Spatial Data Infrastructure through cooperative development and use of State and Territory geospatial strategic and business plans.



## Reference Cited

National Research Council, 2001, Basic research opportunities in Earth science: Washington, D.C., National Academies Press, 153 p.

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