

Earth Science Information Management and Delivery Subactivity

Program	1999 Estimate	Uncontrol & Related Chgs.	Program Redirect	Program Changes	FY 2000 Budget Request	Change from 1999
Earth Science Information Management and Delivery	36,388	759	-5,197	11,750	43,700	7,312
Total Requirements \$000	36,388	759	-5,197	11,750	43,700	7,312

Note: The Program Redirect column reflects the redirection of funds to the Integrated Science, Science Support, and Facilities activities.

Current Program Highlights

The USGS Earth Science Information Management and Delivery (ESIMD) Subactivity provides (1) the management and archiving of the Nation's largest repository of remotely sensed data gathered from civil, defense, and intelligence satellites, along with other USGS natural science data, (2) provides integrated and open access to agency information and products, and (3) fosters the development, implementation, and maintenance of the National Spatial Data Infrastructure (NSDI; see NMP Activity Summary sidebar). Because these functions are the downstream end of the information flow, these activities often directly connect USGS to its many customers. The delivery pathway of USGS natural science data involves many sources of incoming information, an array of land data archives, and several conduits and access mechanisms used by public and private map users and customers (see Figure NMP-2).

USGS customers are a rich and varied mix of Business Partners, citizens, other agencies, scientific researchers, and academia. Many information-oriented businesses use the uncopyrighted USGS data to add value to their products, and the USGS listens to input and advice from customers. For example, the USGS heard opinions from map retailers at an annual mapping managers conference in Annapolis and at the 1998 International Map Trade Association meeting in Seattle. The agency also gets customer input from the map-buying public through reader survey cards sent out with every printed map order, and online from National Atlas users through a feedback button on the Atlas web site. Information about geographic information system (GIS) users was gleaned from a nationwide customer survey conducted in 1998 by the National States Geographic Information Council, Inc., and these data and those of other customers are presently being analyzed for emerging trends to be factored into strategic decisions of the National Mapping Program.

Figure NMP-2. USGS natural science data and information — Built-in feedback mechanisms connect the end users and customers back into the information sources.

The USGS is improving ways for users to access map data to better meet the needs of this wide-ranging customer base. It is managing the safe-keeping of all geospatial data managed by the National Mapping Program and more effectively integrating different kinds of map data from a variety of producers across the Nation. These strategies require (1) having robust data discovery and access tools to tap databases containing many different kinds of geospatial, business, financial, and knowledge-based information; (2) using many kinds of computer databases featuring online data and seamless or “tiled” geospatial data; and (3) ensuring that these long-term databases can be easily tapped by different users and for different purposes.

During FY 2000, the USGS will continue to print and produce paper maps while shifting away from retail sales of those maps and CD-ROM’s, and magnetic tapes. The USGS will also enable more electronic access to integrated databases by (1) continuing to build data access partnerships, such as those with digital libraries and supercomputing centers, and seeking additional retail business and cooperator partners; (2) using commercial software and access tools; and (3) reducing time between product completion and public accessibility.

The model envisioned for the next five years will involve getting geospatial data better and faster to a growing user community made up of citizens, news media, hazards mitigation experts, public utilities, researchers, retail businesses, policy makers, and land and water resource planners, by moving the map data along a streamlined “data pipeline” from archives to operational databases, via a wide variety of access options and data delivery methods. Longer-term USGS plans for the access and delivery of geospatial data include multiple access paths and mirror-sites (where duplicate datasets are accessible if needed) such as the World Wide Web, other Federal agencies, super-computing centers, universities, USGS business and cooperator partners (including communication companies and other corporate giants), and private and public sector libraries.

Data and Information Management — The USGS-managed natural science data and information, acquired by the bureau, NASA, and other sources, serve as the basic cornerstone for responding to a broad spectrum of needs: local land-use planning; marketing and planning strategies for retail and commercial businesses; emergency 911 network planning; engineering studies; environmental and scientific researchers; hikers, bikers, and recreational users; public utilities; regional and nationwide natural disaster and hazards response planning and monitoring; land and resource analyses; resource management studies; and agricultural evaluations.

In activities funded by this component of the subactivity, USGS organizes and manages digital map and image data and products, including global change and classified data. The agency archives and distributes a huge and continually growing collection of natural science information including more than 135,000 product titles, including topographic maps, thematic maps showing particular kinds of information such as geologic maps and regional watersheds, and USGS reports and circulars; and over 13 million aerial photographs and satellite images. Much of the data are distributed via the Internet at no charge or for nominal fees (to cover costs incurred for printing and distribution). Since USGS data are not copyrighted, this information serves as the base geospatial data for nearly every single value-added natural science map and map product created and sold by the private sector in the United States (for example, National Geographic/Trails Illustrated waterproof maps, MapTech CD-ROMs, and DeLorme State Atlases).

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National Satellite Land Remote Sensing Data Archive Program — The USGS manages this permanent, mandated government bank of global Landsat and other remotely sensed data, such as declassified Defense reconnaissance satellite (Corona) data spanning 1959 to 1972, Landsat data since 1971, and SPOT (Satellite Pour l'Observation de la Terre) satellite imagery since 1986. The bureau stores, processes, and preserves these satellite data (along with updating the storage media) and then enables timely access for long-term monitoring and global environmental studies.

Beginning in 1999 and thereafter, USGS will be archiving enormous volumes of data from NASA's Earth Observing System (EOS) and Landsat 7 satellites launched in mid 1999. The archive faces exponential near- and long-term growth in digital data. In the first year after the launch, holdings in the archive are expected to double, and this trend will continue with the addition of blocks of declassified intelligence imagery and enormous volumes of digital data from satellite downlinks (see Figure NMP-3). For more information on the additional funds and activities supporting the satellite data archive activities, see the Justification of Program Change at the end of this section.

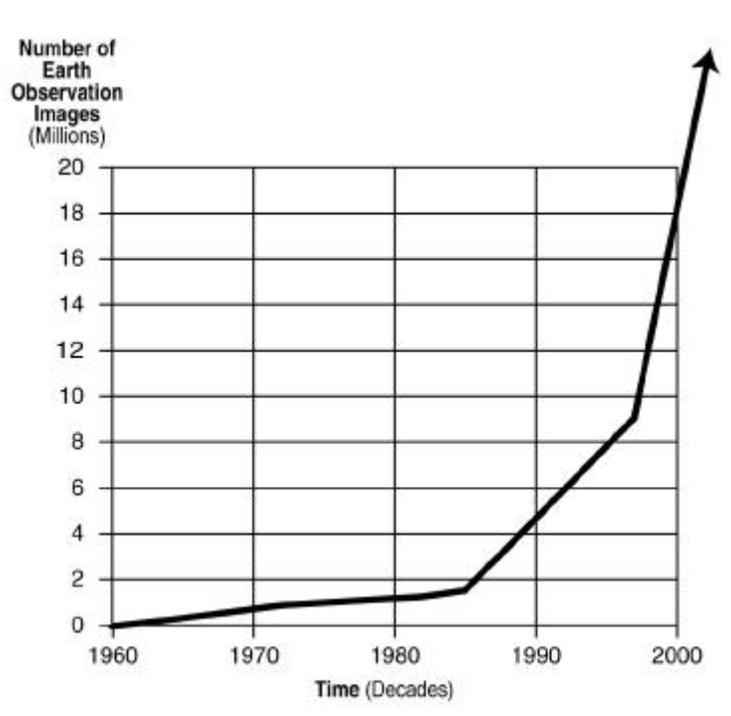


Figure NMP-3. Chart of exponential growth of USGS satellite data archives.

Classified Data and the National Civil Applications Program — As chair of the interagency Federal Civil Applications Committee (CAC), the USGS is responsible for accessing, managing, and applying classified data and information for civil applications. To continue to fill this leadership role in the face of rapid growth in customer interest and demand, the USGS has grouped all of its classified data activities into the National Civil Applications Program. The program focuses on enhancing capabilities to permit historical and near real-time use of classified data to protect the Nation's health, safety, and environment; to manage Federal

lands and resources; and to support economic growth and development. Through this program the USGS provides the necessary secure facilities for civil community use of classified data; oversight and validation of secret-level facilities throughout the civilian community; 24-hour support and facilities operations where needed; and secure or classified planning, collection, archiving, and distribution of classified source materials.

The USGS has significantly augmented its data management capabilities for classified data to handle its responsibility for the Nation's "global fiducial" archive. A global fiducial is a discrete environmental site which has special sensitivity or significance for benchmarking purposes. When fully operational, the global fiducial program will request, interpret, and archive classified collections containing data on almost 500 environmentally sensitive national and international sites, documenting global change using the best available advanced remote sensing capabilities. Prototype efforts have enabled partnering civilian agencies to use the classified data to address mission-related processes such as wetlands mapping, environmental change detection, land use and resources inventory, habitat studies, wildfire management, oil spill monitoring, and flood management.

In partnership with the Department of Defense and the intelligence community, the USGS is implementing a prototype Hazards Support System that will provide greatly improved and timely information on the occurrence of wildland fires in the United States and volcanic events worldwide. The system will fuse data in near real-time from classified systems and civilian domestic and foreign satellites, to provide 24-hour detection of wildland fire outbreaks in all 50 United States and immediate warning of volcanic eruptions and volcanic ash clouds worldwide. The system will be operated in a test and evaluation mode in close coordination with the fire fighting community through FY 2000.

Data and Information Access and

Delivery — The USGS has intensified its focus on customers and Business Partners and fulfilling their need for geospatial and natural science map data and applications to solve real-world problems. This component provides funding for sending out natural science information and products from the USGS and other Federal agencies (including National Imagery and Mapping Agency, U.S. Forest Service, and Bureau of Land Management), information through the Internet, retail Business Partners, and USGS information offices; printing and replicating maps; and testing high-speed data delivery methods.

USGS Mapping Efforts after Hurricane Georges' Environmental Damage

Extensive landslides and significant shifts in river and stream channels in Puerto Rico were caused by Hurricane Georges in September 1998, prompting a need to revise topographic maps of the Commonwealth. These maps will be used in the future by disaster relief organizations for disaster mitigation, disaster relief, floodplain management, and streamflow modeling.

The USGS routinely reproduces and distributes land remote sensing data products from archives of civil, intelligence, and commercial remote sensing satellites to support a growing community of earth science data users. The agency encourages the development of partnerships with the private sector, educational institutions, and non-profit institutional users who add value to the data by integrating different types of earth science data. In addition to supporting the expanding remote sensing industry, the USGS also provides support to other

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Federal agencies using the data by ensuring a reliable source of land observation information.

Business Partner Program — The USGS has expanded its Business Partner Program beyond the traditional network of topographic and thematic map (maps that showing specialized information such as geologic maps) dealers to include retailers of aerial photographs, satellite images, and digital cartographic data. The program is geared toward improving access to and delivery of USGS products to the public, and is part of a broader USGS effort to further commercialize product distribution. During a recent database software conversion at USGS, a backlog of orders for computer-scanned topographic maps (called digital raster graphics) began to occur. During this period, USGS staff referred all DRG orders to its Business Partners. Customer referrals are becoming routine, with direct Internet links from USGS to Business Partner web sites. In many cases, Business Partners are able to offer quicker turnaround for customer orders. The long-term intent of the USGS is to transfer the major responsibility for retail map and digital sales activities to commercial vendors. Already, approximately 80 percent of non-Federal agency sales of USGS paper maps (about 1.7 million items) are sold by more than 2,500 authorized Business Partners/commercial retailers.

National Spatial Data Infrastructure and External Coordination Support — This component supports the development of partnerships and agreements for all aspects of the National Mapping Program and ensures that the objectives of the National Spatial Data Infrastructure (NSDI) are integrated into the Program. Funding in this component helps the USGS, through the Federal Geographic Data Committee (FGDC), promote the implementation of the National Geospatial Data Clearinghouse, develop geospatial data standards, and encourage cooperative ventures for preparing and sharing commonly used themes of geospatial data among partners in the public and private sectors. The FGDC is a group of 16 agency partners whose charge is to make standardized geographic data easily accessible across the United States. This component also provides staffing for the FGDC Secretariat, which is responsible for interagency liaison and overall coordination of NSDI development.

The FGDC Secretariat administers the NSDI Partnership Programs, which include the Cooperative Agreements Program, the Framework Demonstration Project Program, and the NSDI Benefits Program. The FGDC Secretariat also supports the activities of interagency FGDC working groups which develop standards for the Digital Geospatial Data Framework, a series of commonly used data themes which can be created and shared across the geospatial data community.

Under the Cooperating Group Partnership Program, the FGDC has formally recognized 29 State geographic information coordination councils as partners in building the NSDI. During FY 1998, State councils in Georgia, Illinois, Mississippi, Ohio, Pennsylvania, and West Virginia were recognized as participant councils. The International City/County Management Association was recognized by the FGDC in 1998 as a new stakeholder in the NSDI. The FGDC also maintains working relationships with national organizations such as the National States Geographic Information Council, National Association of Counties, National League of Cities, University Consortium for Geographic Information Science, and Open GIS Consortium, all of which are contributing to NSDI development.

The USGS pursues a variety of customer research and outreach activities aimed at meeting the needs of individual citizens for maps, geospatial data, and information products. These

coordination activities include: (1) providing lectures and educational materials to school groups and youth and civic organizations; (2) conducting facility tours and open house events across the country for the public; (3) demonstrating the use of USGS products at fairs, trade shows, and conventions; (4) analyzing information from mapping industry surveys and customer service feedback mechanisms; (5) working with private industry to evaluate public interest in new map products and data access technologies; and (6) developing World Wide Web tools to encourage public feedback on USGS customer service. The goal is to increase the public's awareness of USGS products and services available to them, to monitor trends in map product usage and purchase, and to proactively solicit feedback on the effectiveness of USGS customer service, products, and information dissemination.

Since 1993 the USGS has participated in the annual U.S. Consumer Map Survey (CMS) conducted by the International Map Trade Association. The CMS interviews 500 general public users of maps, atlases, and travel guides at 24 shopping malls across the United States. Results are used to identify trends in map usage and purchase, general public capabilities for using digital map products, and the types of geospatial data preferred in an electronic atlas. Key findings include: (1) The USGS is the most widely recognized Federal mapping organization, but not nearly as well known as the larger private sector mapping firms. (2) Nearly 60 percent of topographic map buyers use USGS maps for recreation, over 20 percent for business/education, and 15 percent for both purposes. (3) Transportation, place names, landmarks, water features, and political boundaries are the most common important features for both published maps and electronic map products. (4) Topographic map buyers are much more likely to use computers to view or order maps and air photographs than CMS participants as a whole.

The USGS fulfills its leadership role for the land remote sensing user community by routinely querying the user community about needs for present and future requirements for remote sensing data, data access and distribution, and design requirements for the next-generation systems.

Recent Accomplishments

National Atlas — Begun in 1996, the National Atlas of the United States makes reliable and authoritative geographic information more readily accessible to the public. The National Atlas promotes greater geographic awareness through the development and delivery of easy to use, map-like views of our natural and societal landscapes. Children and adults can better visualize and understand the complex relationships between environments, places, and people. Features added in FY 1999 include:

- An online interactive mapping system that allows the public to make and explore their own maps within their favorite World Wide Web browser.
- Information products on the Web that include multimedia maps, links to participating organizations, and fact sheets that describe the scope of the National Atlas and opportunities for business partnerships.
- Complete, consistent, integrated, and documented digital map layers that are used to explore information gathered at a national level.
- Improved and redesigned National Atlas paper maps.

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- An interactive mapping engine and graphical user interface for the interagency “recreation.gov” Internet service, which connects users to Federal agencies’ recreation web sites for information and reservations, onsite weather forecasts, and travel logistics information.

The National Atlas site serves over a quarter of a million web pages each month, to an average of 53,000 users. From June to December 1998, National Atlas customers have downloaded 44,000 digital map layers totaling more than 63 gigabytes of national mapping information. Web site: <http://www-atlas.usgs.gov>.

Enabling High Speed Online Delivery of Geospatial Information Via TerraServer — As part of a research endeavor, the USGS is partnering with Microsoft Corporation and others to serve up to anyone having a personal computer processed, browsable aerial and satellite photographs online at no charge. This is one of the world’s largest online databases and contains over 200 million image “tiles.” The site, averaging serving 5 million pages each day, is used by students and teachers, recreationists, commercial companies, environmental interest groups, and many others. The USGS and Microsoft have agreed to expand their agreement to encompass computer-scanned topographic maps. Web site can be found at: <http://terraserver.microsoft.com>.

Providing Seamless Data Base Access — As part of a 1998 agreement with the Environmental Systems Research Institute, Inc., USGS is designing a custom data delivery system that provides user-defined topographic products over the WWW. The research will pair seamless elevation data (meaning not restricted to a single quadrangle shape) with imagery layers over the same area. The user will define the map product to be delivered, by panning and zooming over a map area to define a geographic area of interest. By turning layers of data on and off, changing background imagery, and moving around the data set, the user will be able to identify what information he or she wants included in their custom product. The bounding rectangle or another bounding polygon such as a county boundary or watershed basin will be used to clip the desired coverages from the seamless data sets, and the product delivered via “zip and ship” or CD-ROM depending on file size.

Strengthened Business Partner Program — By garnering more companies in the Business Partner retail network for selling USGS products (approximately 2,500 businesses as of October 1998) and adding new product lines to the distribution network, the USGS continued to evolve away from being a retail distributor of its products to a combined retail/wholesale operation. In addition to topographic maps, online digital cartographic data and aerial photographs are now sold to retailers. The USGS FY 1999 accomplishments for the Business Partner program include (1) establishing stronger two-way communication with partners through face-to-face meetings, Internet feedback, professional conferences, and quarterly newsletters, (2) incorporating partner feedback to improve the program, (3) adding new products and high-speed delivery mechanisms to all product lines, and (4) adding satellite image data as a new product line.

User-Friendly Access Tools — The USGS has adopted user-friendly tools to get USGS data to consumers and agency customers. It now makes datasets on customer-created CD’s tailored to individual customer needs. In FY 1999, USGS launched the free Internet distribution of sets of hydrographic data from National Hydrographic Data program using data

created in collaboration with the Environmental Protection Agency. The USGS improved its ability to serve elevation data over increasingly large areas, in response to customer demands. These data are browsable, paneled-together cells that are portrayed in shaded relief. The agency also streamlined distribution of domestic topographic maps to Defense agencies through the National Imagery and Mapping Agency.

New NSDI Partnership Agreements — In 1998, 53 new NSDI Partnership Program agreements were awarded to consortiums of Federal agencies, State and local governments, university researchers, private companies, and non-profit organizations to implement nodes on the Internet-based National Geospatial Data Clearinghouse, to prepare framework geospatial data, and to apply framework data to solving community and regional problems. Through FY 1998, 1,061 public and private organizations have participated in NSDI Partnership programs.

New National Standards Developed — The USGS participated with the Federal Geographic Data Committee to establish new criteria for geospatial data standards, including those for digital orthoimagery, digital elevation data, metadata (or descriptions of data sources and quality), and accuracy.

Customer Survey of Framework Geospatial Data Availability — Under a cooperative agreement with the National States Geographic Information Council, the FGDC helped sponsor a survey of State, county, and municipal agencies, non-profit organizations, and Federal offices within States to assess the potential availability of framework geospatial data. In spring 1998, approximately 12,000 survey questionnaires were distributed by the National States Geographic Information Council, Inc., State coordinators. Over 4,000 responses have been received to date. About 70 percent of the respondents reported that their organizations create framework-like data. The FGDC hopes to use the data to identify candidates for NSDI partnerships at the State, regional, and local level.

Justification for Program Change

Disaster Information Network (+\$8.0 million) — The proposed increase will support a multiagency effort to establish a robust, integrated, disaster information network for cooperative exchange of timely, relevant information that can be used during all phases of disaster management to save lives and reduce economic losses.

Funds will be used to improve the organization of and access to disaster information; to enhance coordination among appropriate Federal, other government, and private organizations; to ensure the reliability of Federal intranets and other communication channels during disasters; to standardize data sets, data access, and data analysis tools; and to establish protocols for disaster information gathering, processing, and release. Efforts to achieve these results include adapting appropriate technologies, supporting some research and development for integrating data among appropriate agencies and stakeholders and disseminating disaster information. Federal coordination will be achieved through an integrated program office, composed of representatives from appropriate agencies and hosted by the USGS. The program office will develop policy and work to integrate

	FY 2000 Request	Program Change
\$(000)	43,700	+11,750

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information and establish a national disaster information network. Coordinating mechanisms with the private sector will be established in the development of this information system to involve those who manage or are affected by disasters.

Satellite Data Archive (+\$2.5 million) — Managing over three million individual scenes of film and digital satellite data under current management, this national archive faces dramatic near-term growth with the addition of enormous volumes (scheduled to double in the first year after the launch) of digital data received directly from NASA Earth Observing System sensors, in addition to global Landsat 7 data downlinks, and large blocks of declassified intelligence imagery. Current funding levels are insufficient to guarantee the long-term preservation of existing data or to acquire and preserve predicted massive future data additions to the archive. The total base budget requirement for preparing and maintaining the archive is \$5.0 million annually — \$2.5 million base increase in each of FY 1999 and FY 2000. The FY 2000 request of \$2.5 million to the base will continue to build on the work begun in FY 1999 in four areas: (1) sustaining operations to preserve and manage current and future data in environmentally secure facilities, (2) migrating data from obsolete and deteriorating media (each media migration requires the development of new techniques, such as inventing a baking system to allow data stored on tape to be transferred to another media or rebuilding processing systems to convert information from the old media) to modern, vendor-supported media, (3) augmenting inventory systems to prepare them for a huge increase in data resulting from planned FY 1999 satellite missions, such as Landsat 7, and (4) preparing for acquisition of new data received from multiple sources.

Community/Federal Information Partnership (C/FIP) (+\$1.25 million) — As a lead participant in the interagency Community/Federal Information Partnership (C/FIP) effort, the USGS will work with State, local, and Tribal governments, the private sector, and others to advance the capacity of communities to create and use geospatial data, and to improve the USGS's ability to meet communities' needs for spatially referenced earth science information. Resources requested would provide for metadata development and clearinghouse participation guided by the National Spatial Data Infrastructure and Executive Order 12906, and for Internet-based access to the USGS's vast collection of geographic, cartographic, and remote sensing information, maps, and research.