

US GeoData

Elevation Data
Planimetric Data
Land Use and Land Cover Data
Geographic Names Information Software

U.S. Department of the Interior
U.S. Geological Survey



Isometric display of two merged 7.5-minute digital elevation models, Crater Lake East, Ore., and Crater Lake West, Ore.

Elevation Data Planimetric Data Land Use and Land Cover Data Geographic Names Information Software

The development of geographic information systems (GIS) is a rapidly growing industry that supports natural resources studies, land management, environmental analysis, and urban and transportation planning. The increasing use of computers for storing and analyzing earth science information has greatly expanded the demand for digital cartographic and geographic data. Digital cartography involves the collection, storage, processing, analysis, and display of map data with the aid of computers.

The U.S. Geological Survey (USGS), the Nation's largest earth science research agency, through its National Mapping Program, has expanded digital cartography operations to include the collection of elevation, planimetric, land use and land cover, and geographic names information in digital form. This digital information is available on 9-track magnetic tapes and, in the case of 1:2,000,000-scale planimetric digital line graph data, in Compact Disc Read Only Memory (CD-ROM) format. Digital information can be used with all types of geographic and land information systems.

US GeoData can be used for:

- Transportation planning
- Town and urban planning
- Environmental impact studies
- Land use planning
- Mineral resource assessments
- Wildlife habitat assessments
- Resource management
- Hydrologic modeling
- Rangeland inventories
- Irrigation potential determinations
- Geologic assessments
- Visual interpretations
- Land cover diversity estimates
- Vegetation inventories
- Soil surveys
- Forest fire behavior predictions
- Earthquake hazards mapping
- Coastal zone management
- Environmental assessments
- Geographic names analysis

With the appropriate software you can:

- Combine US GeoData with other data for use in a geographic information system
- Plot your own maps
- Conduct spatial analyses

Elevation Data

Digital elevation models (DEM) are records of terrain elevations at regularly spaced horizontal intervals. Elevation data are available in 7.5-minute, 15-minute, 30-minute, and 1-degree units.

USGS 7.5-Minute DEM Data

The 7.5-minute DEM's are produced in sales units that generally correspond to USGS 7.5-minute topographic quadrangle maps for the conterminous United States, Hawaii, and Puerto Rico. Sales units for Alaska vary depending on the latitude of the sales unit. The data consist of a regular array of elevations referenced horizontally to the Universal Transverse Mercator (UTM) coordinate system, on the North American Datum of 1927. USGS scientists are considering the practicability of placing the data on the North American Datum of 1983.

The data are stored as profiles in which the elevation spacing along the profile and between parallel profiles is 30 meters. These DEM's are prepared directly from contours or from digitizing of stereomodels of high-altitude photographs taken at a nominal scale of 1:80,000, or they are derived from digital line graph (DLG) hydrography data referenced to the DLG hydrography data.

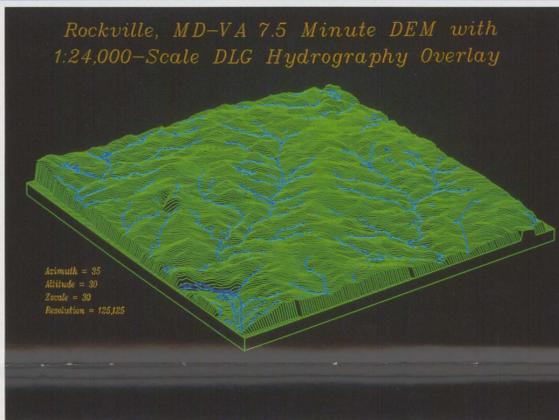
The accuracy of 7.5-minute DEM's depends on the quality of the source data, such as the accuracy of the contours on the map, the scale of the photographs scanned, and the technique used for scanning. The accuracy is derived by comparing map location elevations with linear interpolated elevations in the DEM and computing the statistical standard deviation or the root-mean-square-error (RMSE). The DEM RMSE is expressed in the accuracy record of the DEM. A DEM level code is also stored in the file. DEM levels 1, 2, and 3 are accurate within one, one-half, and one-third, respectively, of the contour interval of the corresponding source graphic. The vertical accuracy of DEM's ranges up to 15 meters.

USGS 15-Minute DEM Data

The 15-minute DEM's generally correspond to the coverage of USGS 15-minute topographic quadrangle maps in Alaska. The data consist of a regular array of elevations referenced horizontally to the latitude and longitude coordinate system of the North American Datum of 1927. The spacing between elevations along each profile is 2 arc seconds, and between parallel profiles is 3 arc seconds. These DEM's are derived from DLG hydrography data referenced to the DLG hydrography data. The accuracy (RMSE) of 15-minute DEM's is at least that of one-half the contour interval on the 1:63,360-scale topographic map.

USGS 30-Minute DEM Data

The 30-minute DEM's generally correspond to the east-half or west-half coverage of USGS 30- by 60-minute topographic quadrangle maps



Digital isometric plot of a 7.5-minute digital elevation model superimposed with digital line graph hydrography data from Rockville, Md.-Va.

for the conterminous United States and Hawaii. Therefore, two 30-minute sales units, east half and west half, cover a complete 30- by 60-minute map area. Furthermore, each 30-minute sales unit is formatted into four 15- by 15-minute cells. Like the 15-minute DEM's, these are also referenced horizontally to the coordinate system of the North American Datum of 1927. However, elevation spacing between profiles and along parallel profiles is 2 arc seconds. The DEM's are derived from resampled 7.5-minute DEM's or from DLG hydrography data referenced to the DLG hydrography data. The accuracy (RMSE) of 30-minute DEM's is at least that of one-half the contour interval on the 1:100,000-scale topographic map.

Defense Mapping Agency 1-Degree DEM Data

These data were produced by the Defense Mapping Agency (DMA) in 1- by 1-degree sales units that generally correspond to the east half or west half of USGS 1- by 2-degree series topographic quadrangle maps at 1:250,000 scale for all of the United States and its territories. Therefore, two 1-degree sales units, east half and west half, cover the complete 1- by 2-degree map area. The data consist of a regular array of elevation profiles referenced horizontally on the coordinate system of the World Geodetic System 1972 Horizontal Datum. The elevation spacing along each profile and between parallel profiles is 3 arc seconds except in Alaska, where the spacing between profiles varies depending on the latitude of the DEM. These DEM's are derived from contour

plots that have been digitized and referenced to the hydrography, or from photographic sources using manual and automated photogrammetric correlation techniques. The DEM accuracy depends on the source and the techniques used to collect the data.

Applications

With appropriate software, DEM data may be used to generate graphics displaying slope, aspect (direction of slope), and terrain profiles between selected points. They may also be used in combination with stream locations and weather data to plan forest fire control. Many nongraphic applications have also been developed, such as modeling terrain and gravity data for use in the search for energy resources, determining the volume of proposed reservoirs, calculating the amount of material removed during strip mining, and determining landslide probability.

Ordering Instructions

DEM data may be ordered by identifying the sales units needed by latitude and longitude of the southeast corner of the appropriate topographic quadrangle map, or by map name. Partial coverage of the United States is available for 7.5-, 15-, and 30-minute DEM's; complete coverage is available for the 1-degree DEM's. A DEM 1:24,000-scale index is available free on request.

Geographic Names Information

The Geographic Names Information System (GNIS) is an automated data system providing primary information for all known places, features, and areas in the United States identified by proper names. The information in the system may be used for basic research or may be reformatted and retrieved for specialized needs.

GNIS consists of three separate data bases, each with unique characteristics and functions: the National Geographic Names Data Base, the USGS Topographic Map Names Data Base, and the Reference Data Base.

National Geographic Names Data Base

The National Geographic Names Data Base contains computer files of more than 2 million place and feature names in the United States—from towns, schools, reservoirs, and parks to streams, valleys, springs, and ridges. The National Geographic Names Data Base is used by scientific and academic communities, government agencies, and the general

public for local transportation planning, regional geographic areas to convey different meanings. The Reference Data Base provides the location, application, and reason for unusual applications of these generic feature types. This data base is also the complete annotated bibliographies of source materials other than USGS topographic maps used in the compilation of the National Geographic Names Data Base.

USGS Topographic Map Names Data Base

The USGS Topographic Map Names Data Base is the official inventory of all topographic maps planned or published by the USGS. The data base includes current and historical map names, geographic coordinates of a reference corner for each map, map scale, and State abbreviation.

Reference Data Base

The Reference Data Base catalogs every type of feature encountered in compiling the National Geographic Names Data Base. Sixty-three broad categories of feature types have been defined in GNIS to help retrieve information about related features. For example, all rivers, creeks, brooks, branches, runs, etc. are categorized as *streams*. About 2,000 types of features have been cross-referenced to these 63 categories. The Reference Data Base defines these feature types and describes them.

The word "slough," for example, is used in different geographic areas to convey different meanings. The Reference Data Base provides the location, application, and reason for unusual applications of these generic feature types. This data base is also the complete annotated bibliographies of source materials other than USGS topographic maps used in the compilation of the National Geographic Names Data Base.

Ordering Instructions

Information from the National Geographic Names Data Base is available on 9-track magnetic tape. Data are arranged by individual State files and include all categories of names. Two national files are available—populated places and concise, which is an abridged version of the State file containing prominent places and features. The USGS Topographic Map Names Data Base, containing all USGS topographic names information, is available on tape. GNIS information can also be purchased as bound books and listings and on microfiche. Custom searches can be performed on information stored in any of the data bases. A list of available products is free of charge.

Planimetric Data

Planimetric data, commonly known as digital line graphs (DLG), are the digital representation of the cartographic line information usually portrayed on a map. DLG's are available for 1:20,000-, 1:24,000-, 1:25,000-, 1:48,000-, 1:62,500-, 1:63,360-, 1:100,000-, and 1:2,000,000-scale maps.

DLG's from 1:20,000-, 1:24,000-, 1:25,000-, 1:48,000-, 1:62,500-, and 1:63,360-Scale Topographic Maps

These DLG's are produced from the largest scale topographic quadrangle maps available, which are usually the USGS 7.5-minute 1:24,000-scale topographic maps for the conterminous United States, Hawaii, and the Virgin Islands. However, DLG's for Puerto Rico are at 1:20,000 scale. Some areas in the conterminous United States are at 1:25,000, 1:48,000, and 1:62,500 scale, and Alaska DLG's are at 1:63,360 scale. DLG sales units at 1:20,000, 1:24,000, 1:25,000, 1:48,000 and 1:62,500 scale generally cover 7.5- by 7.5-minute areas, and sales units for the Alaska 1:63,360-scale DLG's vary depending on the latitude but cover the same areas as the Alaska 15-minute DEM's.

DLG's are sold in five data categories: (1) U.S. Public Land Survey System—including township, range, and section; (2) boundaries—including State, county, city, and other civil divisions as well as State and federally administered lands such as State and national parks; (3) transportation—including roads and trails, railroads, pipelines, and transmission lines; (4) hydrography—including streams and water bodies; and (5) hydrography—including contours. Also available are a limited number of the following data categories: cultural features, vegetative surface cover, nonvegetative features, and survey control and markers.

DLG's are topologically structured, which means that spatial relationships inherent in the map have been preserved. This facilitates general spatial applications and calculations.

DLG's are distributed in two formats: standard and optional. Standard DLG's minimize storage requirements and are encoded using an internal file coordinate system (Cartesian) based on one-thousandths of a map inch. Optional DLG's simplify data usage and are expressed in metric units of the Universal Transverse Mercator (UTM) coordinate system.

DLG's from 1:100,000-Scale Topographic Maps

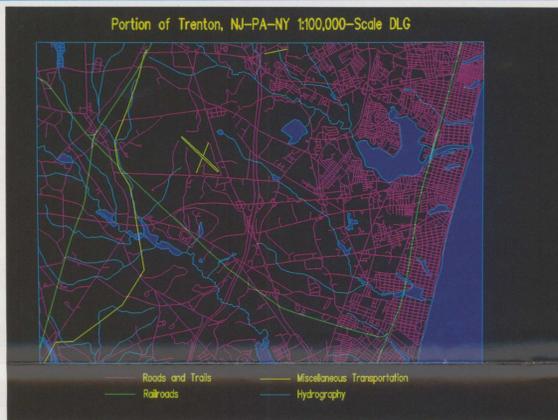
DLG's digitized from USGS 30- by 60-minute series 1:100,000-scale topographic maps are available in 30- by 30-minute sales units for the conterminous United States and Hawaii. Each 30-minute sales unit corresponds to the east half or west half of a 30- by 60-minute 1:100,000-scale topographic map. Therefore, two 30-minute sales units are necessary to cover the complete 30- by 60-minute map area. Each 30-minute sales unit consists of four 15- by 15-minute cells, and in areas of high density, the 15-minute cells may be subdivided into four 7.5- by 7.5-minute cells. DLG's are sold in five data categories: (1) U.S. Public Land Survey System—including township, range, and section; (2) boundaries—including State and county boundaries and State and federally administered lands; (3) transportation—including roads and trails, railroads, and miscellaneous transportation; (4) hydrography—including streams and water bodies; and (5) hydrography—including contours.

The 1:100,000-scale DLG's are distributed in the same formats as the larger scale DLG's and their characteristics are the same.

DLG's from 1:2,000,000-Scale Maps

DLG's digitized from 1:2,000,000-scale series maps are available in 21 geographic section sales units for the entire Nation. Three data categories are available: (1) boundaries—including State, county, and selected large cities, as well as federally administered lands; (2) transportation—including roads, railroads, and airports; and (3) hydrography—including streams and water bodies.

1:2,000,000-scale DLG's are available in two topologically structured formats and a graphic applications format. The topologically structured formats are standard and optional. The standard format is the same as that of the larger scale DLG's. The optional format is also the same as that of the larger scale DLG's except that the data are expressed in meters in the Albers Equal-Area Conic projection. The graphic format was designed



Digital display of a section of 1:100,000-scale digital line graph from Trenton, N.J.-Pa.-N.Y.



Portion of the experimental Bombay, N.Y.-Que. 1:24,000-scale topographic map that was produced from digital line graph data using automated cartographic methods.

to be compatible with the Geological Survey-Cartographic Automatic Mapping software and the values are expressed in degrees, minutes, and seconds of latitude and longitude.

Applications

With appropriate software, the topologically structured format may be used in a variety of calculations and applications in addition to map plotting. For example, DLG's can be combined with census data to produce maps showing population distribution among counties, or DLG's can be combined with ground water, surface geology, well locations, and pollution source data to produce thematic maps for natural resource planning. DLG's can also be used for mathematical computations, such as calculating the distance between locations or determining the length of a lake shoreline.

The graphic applications format may be used to plot maps that show only selected combinations of categories of data, such as national forest lands and railroads, or rivers and railroads, or even to plot a simple base map showing only State boundaries.

Ordering Instructions

DLG data are sold by data category in 7.5-, 15-, and 30-minute sales units that normally correspond to USGS 1:20,000-, 1:24,000-, 1:25,000-, 1:48,000-,

Land Use and Land Cover and Associated Maps Digital Data

Land use and land cover (LULC) digital data are derived from thematic overlays registered to USGS 1- by 2-degree 1:250,000-scale base maps and a limited number of USGS 30- by 60-minute 1:100,000-scale base maps. LULC maps provide information on urban or built-up land, agricultural land, rangeland, forest land, water, wetlands, barren land, tundra, and perennial snow or ice. Associated maps display information in five data categories: (1) political units, (2) hydrologic units, (3) census county subdivisions, (4) Federal land ownership, and (5) State land ownership.

The 1:100,000- and 1:250,000-scale LULC and associated maps used to produce the digital files are polygon, or areal, maps. Areas consisting of uniform structures and similar characteristics are compiled on the map as a series of lines forming polygons. Each polygon is identified with an attribute code describing the area. Digitized map information is processed through the Geographic Information Retrieval and Analysis System to produce data in two formats: the vector polygon format and the composite theme grid cell format.

In the vector polygon format, all topological elements of the polygon map are represented as points, lines, and areas that (with special software) may be joined to form polygons replicating the graphic map. The LULC data and five categories of the associated map data are available in this format and can be purchased individually.

In the composite theme grid cell format, the map area is divided into 4-hectare (10-acre) cells. Each cell is completely identified with attribute codes for all LULC and associated map data. This format is particularly useful for combining and analyzing various categories of thematic information.

Digital data produced from LULC and associated maps are stored in the UTM coordinate system. The data may be transformed to other map projections and converted to geographic coordinates.

Software

The National Mapping Program of the USGS has developed software to aid in data applications that may require geometric manipulation in surveying, geodesy, remote sensing, and photogrammetry.

Although many of the software packages are for coordinate conversions, software is available for aerotriangulation, instrument calibration, DEM resampling, and DLG plotting.

For Further Details

For more detailed information on digital elevation models, digital line graphs, land use and land cover data, geographic names information, and software, please contact your nearest Earth Science Information Center (ESIC). Factsheets, indexes, price lists, and order forms are available on request. User guides and technical instructions are also available at a nominal charge. ESIC personnel can answer your questions and assist you with ordering any US GeoData product. Contact 1-800-USA-MAPS.

DLG's may be ordered by specifying the scale, format, data category and by identifying the sales unit according to the quadrangle or geographic section name or the southeast latitude and longitude corner coordinates. A DLG 1:24,000-scale index map is available from the USGS at no charge.

The USGS offers a digital cartographic data sampler for a nominal charge. The sampler includes several data types and categories of areas in the Pacific Northwest. Specific information on data content, data formats, and ordering information is given on the US GeoData Sampler factsheet available from any ESIC.



Digital plot showing a portion of the Baltimore, Md.-Va.-Pa.-W.Va. 1:250,000-scale land use and land cover digital data

Applications

With appropriate software, the vector polygon format is useful for readily locating all areas with similar or different characteristics, for plotting maps, and for area analysis. For example, to find the length of the border between two incompatible types of land use or land cover, such as an area of industrial land bordering a lake, the amount of lake shore occupied by the industrial site can be determined.

The composite theme grid cell format is particularly useful for combining and analyzing various categories of information. For example, it is possible to determine how many acres of deciduous forest are on Federal land in a particular county, or how many acres of cropland and pasture are in a hydrologic unit.

LULC data may be plotted with appropriate software. Color plotting may be used to show the distribution of land use and land cover types over a particular area and for various types of spatial analysis. Other data, such as population information, may be combined and analyzed with LULC data.

Ordering Instructions

LULC data may be ordered by specifying the scale, data category, and name of the quadrangle map area desired or by identifying the latitude and longitude of the southeast corner of the appropriate map. An LULC index map is available free on request.

Software packages include Job Control Language to compile and execute the program, FORTRAN source code, and user documentation.

Ordering Instructions

Software packages are available on magnetic tape or floppy disk. Documentation can be purchased separately. A Cartographic Applications Software factsheet and price list are available on request.