Map database for surficial materials in the conterminous United States

Metadata:

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Citation:

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Originator: Soller, D.R.

Originator: Reheis, M.C.

Originator: Garrity, C.P.

Originator: Van Sistine, D.R.

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Title:

Map database for surficial materials in the conterminous United States

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Description:

Abstract:

The Earth's bedrock is overlain in many places by a loosely compacted and mostly unconsolidated blanket of sediments in which soils commonly are developed. These sediments generally were eroded from underlying rock, and then were transported and deposited. In places, they exceed 1000 ft (330 m) in thickness. Where the sediment blanket is absent, bedrock is either exposed or has been weathered to produce a residual soil. For the conterminous United States, a map by Soller and Reheis (2004, scale 1:5,000,000; http://pubs.usgs.gov/of/2003/of03-275/) shows these sediments and the weathered, residual material; for ease of discussion, these are referred to as "surficial materials." That map was produced as a PDF file, from an Adobe Illustrator-formatted version of the provisional GIS database. The provisional GIS files were further processed without modifying the content of the published map, and are here published.

Purpose:

A detailed understanding of the Earth's blanket of sediment and weathered bedrock is critical to our society, because nearly all human activities occur on or within these materials. Homeowners, communities, and governments can make improved decisions about hazard, resource, and environmental issues, when they understand the nature of surficial materials and how they vary from place to place. For example, are the surficial materials upon which a home is built stable enough to resist subsidence or lateral movement during an earthquake? Do these materials support a ground water resource adequate for new homes? Can they adequately filter contaminants and protect buried aquifers both in underlying sediments and in bedrock? Are they suitable for development of a new wetland? Where can we find materials suitable for aggregate?

The USGS National Cooperative Geologic Mapping Program (NCGMP) works with the State geological surveys to identify priority areas for mapping of surficial materials (for example, in areas of complex and poorly understood deposits of various sediment types, where metropolitan areas are experiencing rapid growth). To help establish these priorities, a quickly prepared, modern, synoptic overview of the geology was needed. The Soller and Reheis, (2004) map was made in response to that need, and provides an overview of current knowledge of the composition

and distribution of surficial materials in the conterminous United States (the map covers only the conterminous U.S. because similar geologic information in digital form was not readily available for Alaska and Hawaii). Before its publication, the best available map had been a highly generalized depiction at 1:7,500,000-scale (about 120 miles to the inch), prepared for the USGS National Atlas (Hunt, 1979).

The Soller and Reheis map was compiled at a slightly more detailed scale (about 80 miles to the inch) than Hunt's map, and used digital methods, which enabled rapid incorporation of the variety of available source maps. State-scale geologic maps from the western United States were brought directly into the map, without expending the time needed to resolve interpretive differences among them. Therefore, abrupt changes in surficial materials are indicated along many State boundaries. This of course is an artifact of the compilation technique, and a limitation on its utility. However, this approach supports the basic premise of the map -- to provide an overview of surficial materials, and to identify areas where additional work may be needed in order to resolve scientific issues that can, in turn, lead to improved mapping. The map also serves to illustrate for educational and planning purposes the general nature and distribution of the Nation's surficial materials at land surface, but does not offer information useful for local decisions because it is not intended to be used at a larger (greater detail) scale than 1:5,000,000.

Supplemental_Information:

Users who wish to display the geologic map symbolization and color palettes similar to those used in the published version of the map (Soller and Reheis, 2004) are encouraged to open the map document (Surficial_Mtls_US.mxd) included in the data package.

Many of the processes that create surficial materials (especially those involving wind or mass movement of materials) tend to vary over small distances, and so the delineation of map areas large enough to be visible at the scale of this map (1 inch on the map equals about 80 miles on the ground) is highly problematic. To improve map legibility and comprehension, a classification system was required that assigned the many complex units on source maps into units much more broadly and simply defined.

In some cases, units on source maps could not be readily assigned to our classification. As an example, a particular geologic unit found mostly in the southeastern U.S. is a residual material that developed mostly in metamorphosed sedimentary rocks and, to a lesser extent, in sedimentary rocks. Rather than define a new map unit, we decided to classify it as "Residual materials developed in sedimentary rocks" to distinguish it from "Residual materials formed in igneous and metamorphic rocks". As another example, the source map for New York and New Jersey classified a unit as "Ice-contact deposits and glacial lake deposits -- A complex of ice-contact sand and gravel and glacial lake sediments." This unit could not readily be assigned in our classification to either a coarse- or a fine-grained unit. Therefore, we decided to assign it to a genetically-related unit, glacial till, whose texture ranges from coarse to fine. This decision certainly is imperfect, and illustrates the difficulties in reinterpreting source map information.

A further challenge is presented where map units from different source maps abut. When compiling a map from numerous published sources, many instances occur where, especially along the edges of adjoining source maps, the materials are described and mapped in different ways. Normally, these inconsistencies can be resolved by additional field mapping or through discussions with the geologists who created the source maps, and this is an especially effective approach when mapping at a relatively detailed scale. Lacking such avenues for resolution, units shown on adjacent source maps could not always be reconciled. Therefore, this map shows numerous instances where different map units meet along straight lines, commonly at state or latitude boundaries. For example, in North Dakota, a map unit extends westward where it seems to correspond to a unit from the adjacent source map. However, on that adjacent map, the surficial materials were not shown; there, it must be assumed that the bedrock is exposed and has been weathered to produce residual materials. The residual materials that are inferred from that map are classified differently than the materials described on the map to the east, hence there appears to be a sharp discontinuity in surficial materials. Because this map is an overview, essentially a "snapshot" of current knowledge that can be represented at a national scale, these inconsistencies are retained to indicate what is actually known about the materials, and to indicate where additional mapping may be beneficial.

Regarding the thickness of these surficial materials, scant information at a regional or national

scale is available, except within the glaciated area. In most places, this is not a significant problem because these materials generally fall within our lower thickness category (<100 ft). However, for large expanses of alluvial and lacustrine materials (for example, in the Mississippi River Valley, the Platte River Valley, and in internally drained valleys of the western United States), thicknesses may exceed 100 ft, even where not so indicated on the map.

In most places, especially in areas not covered by glacially-deposited sediment, the uppermost material generally constitutes most (and in places, all) of the total thickness of sediment overlying bedrock. However, where sediment is shown exceeding 100 feet in thickness, the surficial material mapped at land surface does not necessarily extend downward to bedrock. In many places the uppermost material may be only a few feet thick, but the total thickness of sediment overlying bedrock is much greater. This is especially common in the glaciated area where the peat or loess shown on the map is only a thin veneer that overlies a complex package of other surficial materials which, in places, exceeds 1000 ft in thickness.

GENERAL REFERENCES:

Hunt, C.B., 1986, Surficial deposits of the United States: Van Nostrand Reinhold Company, New York, 189 p.

Hunt, C.B., 1979, Surficial geology of the conterminous United States: U.S. Geological Survey, National Atlas of the United States of America, scale 1:7,500,000.

McMillan, A.A., and Powell, J.H., 1999, BGS Rock Classification Scheme, Volume 4, Classification of artificial (man-made) ground and natural superficial deposits -- applications to geological maps and datasets in the UK: British Geological Survey Research Report, RR 99-04, 65 p.

Soller, D.R., and Reheis, M.C., 2004, Surficial Materials in the conterminous United States: U.S. Geological Survey, Open-file Report 03-275, scale 1:5,000,000, available at http://pubs.usgs.gov/of/2003/of03-275/.

COMPILATION SOURCES FOR EASTERN UNITED STATES (east of 102 degrees West Longitude):

Fullerton, D.S., Bush, C.A., and Pennell, J.N. (U.S. Geological Survey), written commun., Surficial deposits and materials in the eastern and central United States (east of 102 degrees West Longitude): U.S. Geological Survey unpublished database derived from map series "Quaternary Geologic Atlas of the United States, USGS map I-1420", one ArcInfo file, scale 1:2,500,000. [Printed map derived from this database is available as: Fullerton, D.S., Bush, C.A., and Pennell, J.N., 2003, Map of surficial deposits and materials in the eastern and central United States (east of 102 degrees West Longitude): U.S. Geological Survey Geologic Investigations Series Map I-2789, scale 1:2,500,000.]

Kohfield, K.E., and Muhs, D.R., [n.d.], Mid-continental USA gridded maps of loess thickness: World Data Center-A for Paleoclimatology, Data Contribution Series, NOAA-NGDC Paleoclimatology Program, Boulder, CO., <http://www.bgc-jena.mpg.de/bgc_prentice/projects/dirtmap/>.

Mason, J.A., 2001, Transport direction of Peoria Loess in Nebraska and implications for loess sources on the Central Great Plains: Quaternary Research, v. 56, p. 79-86.

Soller, D.R., and Packard, P.H., 1998, Digital representation of a map showing the thickness and character of Quaternary sediments in the glaciated United States east of the Rocky Mountains: U.S. Geological Survey Digital Data Series, DDS-38, ArcInfo files, scale 1:1,000,000, <http://pubs.usgs.gov/dds/dds38/>.

Swinehart, J.B., and Diffendal, R.F., Jr., 1989, Geology of the pre-dune strata, in A. Bleed and C. Flowerday, eds., An atlas of the Sand Hills: Conservation and Survey Division of the University of Nebraska, Resource Atlas, no. 5, p. 29-42.

COMPILATION SOURCES FOR WESTERN UNITED STATES (west of 102 degrees West Longitude):

ARIZONA

Richard, S.M., Reynolds, S.J., Spencer, J.E., and Pearthree, P.A., 2000, Geologic map of Arizona: Arizona Geological Survey Map 35, scale 1:1,000,000. [Used a slightly modified unpublished digital version of this map.]

CALIFORNIA

Bedford, D.R. (U.S. Geological Survey), written commun., digital file showing geology of California, digitized from Jennings, C.W., Strand, R.G, and Rogers, T.H. (compilers), 1977, Geologic map of California: California Div. Mines and Geology Map GDM 2, scale 1:750,000. [Some information in this file is found in: Bedford, D.R., Ludington, Steve, Nutt, C.M., Stone, P.A., Miller, D.M., Miller, R.J., Wagner, D.L., and Saucedo, G.J., 2003, Geologic database for digital geology of California, Nevada, and Utah - an application of the North American Data Model: USGS Open-File Report 03-135, 35 p., <http://geopubs.wr.usgs.gov/open-file/of03-135/>.]

COLORADO

Green, G.N., 1992, The digital geologic map of Colorado in ArcInfo format: U.S. Geological Survey Open-File Report 92-507, ArcInfo file, <http://pubs.usgs.gov/ of/1992/ofr-92-0507/>. [digitized from Tweto, Ogden, 1979, Geologic map of Colorado: U.S. Geological Survey, scale 1:500,000.]

IDAHO

Johnson, B.R., and Raines, G.L., 1996, Digital representation of the Idaho state geologic map: a contribution to the Interior Columbia River Basin Ecosystem Management Project: U.S. Geological Survey Open-File Report 95-690, ArcInfo file, <http://wrgis.wr. usgs.gov/open-file/of95-690/>. [digitized from Bond, J.G., and Wood, C.H., 1978, Geologic map of Idaho: Idaho Bureau of Mines and Geology, scale 1:500,000.]

KANSAS

Ross, J.A., compiler, Geologic map of Kansas: Kansas Geological Survey Map M-23, ArcInfo file, scale 1:500,000.

MONTANA

Raines, G.L. and Johnson, B.R., 1996, Digital representation of the Montana state geologic map: a contribution to the Interior Columbia River Basin Ecosystem Management Project: U.S. Geological Survey Open-File Report 95-691, ArcInfo file, <http://pubs.usgs.gov/of/ 1995/ofr-95-0691/>. [digitized from Ross, C.P., Andrews, D.A., and Witkind, I.J., 1955, Geologic map of Montana: U.S. Geological Survey, scale 1:500,000.]

Soller, D.R., and Packard, P.H., 1998, Digital representation of a map showing the thickness and character of Quaternary sediments in the glaciated United States east of the Rocky Mountains: U.S. Geological Survey Digital Data Series, DDS-38, ArcInfo files, scale 1:1,000,000, <http://pubs.usgs.gov/dds/dds38/>.

NEBRASKA

Belohlavy, Francis (Conservation and Survey Division, Univ. of Nebraska - Lincoln), written commun., Digital map of soil parent materials (interpreted as bedrock types, alluvium, etc.) assembled by querying STATSGO data (from USDA Nat. Res. Conserv. Serv.), see <http://www.nrc.state.ne.us/databank/metadata/stgo_doc.html>.

NEVADA

Bedford, D.R. (U.S. Geological Survey), written commun., digital file showing geology of Nevada, digitized from Stewart, J.H. and Carlson, J.E., 1978, Geologic map of Nevada: U.S. Geological Survey, scale 1:500,000. [Information about any modifications of the published map are found in: Bedford, D.R., Ludington, Steve, Nutt, C.M., Stone, P.A., Miller, D.M., Miller, R.J., Wagner, D.L., and Saucedo, G.J., 2003, Geologic database for digital geology of California, Nevada, and Utah - an application of the North American Data Model: USGS Open-File Report 03-135, 35p.,<http://geopubs.wr.usgs.gov/open-file/of03-135/>.]

NEW MEXICO

Green, G.N., and Jones, G.E., 1997, The digital geologic map of New Mexico in ArcInfo format: U.S. Geological Survey Open-File Report 97-52, ArcInfo file, <http://pubs.usgs.gov/of/1997/ofr-97-0052/>. [digitized from Anderson, O.J. and Jones, G.E., 1994, Geologic map of New Mexico: New Mexico Bureau of Mines and Mineral Resources, Open-File Report 408 A, B, scale 1:500,000.]

NORTH DAKOTA

Clayton, Lee, 1980, Geologic map of North Dakota: U.S. Geological Survey Special Map prepared in cooperation with North Dakota Geological Survey, scale 1:500,000. [Used an unpublished, digital version of this map.]

Soller, D.R., and Packard, P.H., 1998, Digital representation of a map showing the thickness and character of Quaternary sediments in the glaciated United States east of the Rocky Mountains: U.S. Geological Survey Digital Data Series, DDS-38, ArcInfo files, scale 1:1,000,000, <http://pubs.usgs.gov/dds/dds38/>.

OKLAHOMA

Cederstrand, J.R., 1996, Digital geologic map of Cimarron County, Oklahoma: U.S. Geological Survey Open-File Report 96-372, ArcInfo file. [digitized from Sapik, D.B., and Goemaat, R.L., 1973, Reconnaissance of the ground-water resources of Cimarron County, Oklahoma: U.S. Geological Survey Hydrologic Investigations Atlas HA-373, scale 1:125,000.]

Cederstrand, J.R., 1996, Digital geologic map of Texas County, Oklahoma: U.S. Geological Survey Open-File Report 96-379, ArcInfo file. [digitized from Wood, P.R., and Hart, D.L., Jr., 1967, Availability of ground water in Texas County, Oklahoma: U.S. Geological Survey Hydrologic Investigations Atlas HA-250, scale 1:125,000.]

OREGON

U.S. Geological Survey, unpublished, digital file showing geology of Oregon, digitized from Walker, G.W., and MacLeod, N.S., 1991, Geologic map of Oregon: U.S. Geological Survey, scale 1:500,000, http://geology.wr.usgs.gov/docs/geologic/or/oregon.html. [A digital version of this map was more recently published as Walker, G.W., MacLeod, N.S., Miller, R.J., Raines, G.L., and Connors, K.A., 2003, Spatial database for the geologic map of Oregon: U.S. Geological Survey Open-file Report 2003-67, scale 1:500,000, http://pubs.usgs.gov/of/2003/of03-067/.]

SOUTH DAKOTA

South Dakota Geological Survey, unpublished, digital file showing geology of South Dakota. [Contains map information later published in Martin, J.E., Sawyer, J.F., Fahrenbach, M.D., Tomhave, D.W., and Schulz, L.D., 2004, Geologic map of South Dakota: South Dakota Geological Survey Map 10, 1:500,000.]

TEXAS

Barnes, V.E., editor, 1992, Geologic Map of Texas: Texas Bureau of Economic Geology, scale 1:500,000. [Quaternary units on the map were generalized and then digitized.]

UTAH

Bedford, D.R. (USGS), written commun., digital file showing geology of Utah, adapted from Hintze, L.F., Willis, G.C., Laes, D.Y.M., Sprinkel, D.A., and Brown, K.D., 2000, Digital geologic map of Utah: Utah Geological Survey Map 179DM, CDROM. [Information about modifications of the published map are found in: Bedford, D.R., Ludington, Steve, Nutt, C.M., Stone, P.A., Miller, D.M., Miller, R.J., Wagner, D.L., and Saucedo, G.J., 2003, Geologic database for digital geology of California, Nevada, and Utah - an application of the North American Data Model: USGS Open-File Report 03-135, 35 p., <http://geopubs.wr.usgs.gov/open-file/ of03-135/>.]

WASHINGTON

Raines, G.L., and Johnson, B.R., 1996, Digital representation of the Washington state geologic map: a contribution to the Interior Columbia River Basin Ecosystem Management Project: U.S. Geological Survey Open-File Report 95-684, ArcInfo file, <http://wrgis.wr.usgs.gov/open-file/of95-684/>. [digitized from Hunting, M.T., Bennett, W.A., Livingston, V.E., Jr., and Moen, W.S., 1961, Geologic map of Washington: Washington Division of Mines and Geology, scale 1:500,000.]

WYOMING

Green, G.N., and Drouillard, P.H., 1994, The digital geologic map of Wyoming in ArcInfo format; U.S. Geological Survey Open-File Report 94-425, ArcInfo file, <http://pubs.usgs.gov/of/1994/ofr-94-0425/>. [digitized from Love, J.D. and Christiansen, A.C., 1985, Geologic map of Wyoming: U.S. Geological Survey, scale 1:500,000.]

GENERAL REFERENCES FOR WESTERN UNITED STATES:

Kerwin, M.W. (U.S. Geological Survey), written commun., digital file showing pluvial lakes of the western U.S. Information mostly derived from:

Reheis, Marith, 1999, Extent of Pleistocene lakes in the western Great Basin: U.S. Geological Survey Miscellaneous Field Studies Map MF-2323, <http://pubs.usgs.gov/mf/1999/mf-2323/>.

Mifflin, M.D., and Wheat, M.M., 1979, Pluvial lakes and estimated pluvial climates of Nevada: Nevada Bureau of Mines and Geology Bulletin 94, 57 p., scale 1:1,000,000.

Snyder, C.T., Hardman, G., and Zdenek, F.F., 1964, Pleistocene lakes in the Great Basin: U.S. Geological Survey Miscellaneous Investigations Map I-416, scale 1:1,000,000.

Locke, B. (Montana State University), and Smith, L. (Montana Bureau of Mines and Geology), written commun., digital files from U.S. Forest Service showing the maximum extent of Glacial Lake Missoula.

Muhs, D.R. (U.S. Geological Survey), written commun., digital file showing surficial sands of the western U.S. Information mostly derived from:

Muhs, D.R., and Zarate, Marcelo, 2001, Late Quaternary eolian records of the Americas and their paleoclimatic significance, in V. Markgraf, ed., Interhemispheric Climate Linkages: Academic Press, San Diego, p. 183-216.

Muhs, D.R., and Holliday, V.T., 1995, Evidence of active dune sand on the Great Plains in the 19th century from accounts of early explorers: Quaternary Research, v. 43, p. 198-208.

Thorpe, J., and Smith, H.T.U., 1952, Pleistocene eolian deposits of the United States, Alaska, and parts of Canada: National Research Council Committee for the Study of Eolian Deposits, Geological Society of America, scale 1:2,500,000.

United States Forest Service, [n.d.], Glacial Lake Missoula and the Channelled Scablands: A digital portrait of landforms of the last ice age, Washington, Oregon, northern Idaho, and western Montana: U.S. Department of Agriculture, United States Forest Service, Northern Rockies Region, scale 1:2,000,000.

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Progress: Complete
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Bounding_Coordinates:
West_Bounding_Coordinate: -127.884613
East_Bounding_Coordinate: -65.342960
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South_Bounding_Coordinate: 22.941934
Keywords:
Theme:
Theme_Keyword_Thesaurus: ISO 19115 Topic Category
Theme_Keyword: Geoscientific Information
Theme_Keyword: Geology
Theme_Keyword: Surficial materials
Place:
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Access_Constraints: None
Use_Constraints:

Point_of_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: David Soller
Contact_Organization: U.S. Geological Survey
Contact_Position: Chief, National Geologic Map Database project
Contact_Address:
Address_Type: physical address
Address:
MS 926-A National Center
City: Reston
State_or_Province: VA
Postal_Code: 20192

Country: USA
Contact_Voice_Telephone: 703-648-6907
Contact_TDD/TTY_Telephone: 703-648-6907
Contact_Facsimile_Telephone: 703-648-6977
Contact_Electronic_Mail_Address: drsoller@usgs.gov
Hours_of_Service: 9:00AM - 6:00PM
Contact Instructions:
Preferred contact method is electronic mail.
Security_Information:
Native_Data_Set_Environment:
Microsoft Windows XP Version 5.1 (Build 2600) Service Pack 2; ESRI ArcCatalog 9.2.6.1500
Cross_Reference:
Citation_Information:
Originator: Soller, D.R.
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Surficial Materials in the conterminous United States
Edition: 1.0
Geospatial_Data_Presentation_Form: map
Series_Information:
Series_Name: Open File Report
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Publication_Place: Reston, VA
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Online_Linkage: http://pubs.usgs.gov/of/2003/of03-275/
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Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report:
Attribute accuracy was tested by manual comparison of the source with hard copy printouts and/or symbolized display of the digital geologic data on an interactive computer graphic system. In addition, attributes were compared to a master set of valid geologic unit attributes.
Logical_Consistency_Report:
Topological accuracy was tested using topology validation tools via ArcGIS 9.2. Specific errors that were checked included: Polygon overlaps and gaps, coincident contact lines and geologic unit borders, self overlapping lines and superfluous pseudo nodes. No duplicate features exist nor duplicate points in a data string. Intersecting lines are separated into individual line segments at the point of intersection. Feature classes in the geodatabase are topologically clean.
Completeness_Report:
Data set complete. No data were intentionally omitted from the hard copy source map.
Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report:
Uncertain. Compiled from various source maps ranging in scale from 1:500,000 to 1:2,500,000.
Lineage:
Source_Information:
Source_Citation:
Citation_Information:
Originator: Soller, D.R.
Originator: Reheis, M.C.
Publication_Date: 2004
Title:
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Edition: 1.0
Geospatial_Data_Presentation_Form: map
Series_Information:
Series_Name: Open File Report
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Publication_Information:
Publication_Place: Reston, VA
Publisher: U.S. Geological Survey
Online_Linkage: http://pubs.usgs.gov/of/2003/of03-275/
Source_Scale_Denominator: 5,000,000
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Source_Time_Period_of_Content:
Time_Period_Information:
Single_Date/Time:
Calendar_Date: 2004
Time of Day: unknown
Source_Currentness_Reference:
publication date
Source_Citation_Abbreviation:
Soller and Reheis, (2004)
Source_Contribution:
See the *Supplemental_Information* section in the metadata for a list of references and compilation sources.

Process_Step:
Process_Description:

Geologic maps and digital files that were used to create this map database are listed in the "References and Compilation Sources" section of the published map (Soller and Reheis, 2004; see http://pubs.usgs.gov/of/2003/of03-275/). David R. Soller (for the eastern States) and Marith C. Reheis (for the western States) compiled and generalized the map units from the source materials. Darren Van Sistine (for the western States) and David R. Soller (for the eastern States) performed the digital processing of map data for the published map, and Christopher P. Garrity performed the final processing for this database.

The compilation of this map began with an inventory of available source maps. We used maps that met the following criteria: were statewide or larger in area; showed surficial materials at land surface (or could be interpreted to derive such information); and were Geographic Information System (GIS) files in ArcInfo (v.7) format. For the conterminous U.S. east of 102 degrees West Longitude, we principally used a 1:2,500,000-scale recompilation (Fullerton and others, written communication) of the "Quaternary Geologic Atlas of the United States" series (U.S. Geological Survey, Map I-1420, scale 1:1,000,000). That recompilation contained more than 150 different types of surficial materials. For the conterminous U.S. west of 102 degrees West Longitude, we principally used published statewide geologic maps, which mostly were at 1:500,000-scale. Those maps emphasized the bedrock geology, although they also showed some of the major unconsolidated units such as alluvium in major river valleys and large deposits of lake sediment. Significant interpretation therefore was required in order to identify the appropriate residual surficial material developed in each mapped bedrock unit.

The disparity in information content among source maps argued for a broad classification with few units. We began with a simple classification based on that of the British Geological Survey (McMillan and Powell, 1999, BGS Rock Classification Scheme, Volume 4, Classification of artificial (man-made) ground and natural superficial deposits -- applications to geological maps and datasets in the UK: British Geological Survey Research Report, RR 99-04, 65 p.). For the eastern source map (Fullerton and others, written communication), each of the 150 source map unit descriptions were interpreted and manually parsed into various attribute fields in a spreadsheet. Attributes included: unit name, dominant sediment texture, geologic age, environment of deposition, and thickness. After using these attributes to classify the map units, the map was displayed and evaluated and, iteratively, a revised classification emerged that adequately displayed and highlighted the broad variations in surficial materials. This

classification emphasizes sediment texture and depositional environment. See Supplemental_Information for discussion of the classification system and its limitations.

For each source map in the western part of the Nation, unconsolidated units were assigned to the appropriate category in our classification, and bedrock units were assigned to the surficial materials category most appropriate to their rock composition; for example, a sedimentary rock unit predominantly comprised of limestone was assigned to the category "Residual materials developed in limestone and other carbonate rocks". These source maps then were appended into a single digital map file of the western States, and additional source information for lake and eolian deposits was added (see list of compilation sources in Supplemental Information section).

We then combined the eastern and western GIS map files into a single Postscript file and, using Adobe Illustrator, published the map in PDF format, without an accompanying GIS database. The decision to not simultaneously publish the database was not made lightly, but was necessitated by budget and time constraints.

In the course of preparing the map in Adobe Illustrator, certain map units were revised in order to address peer review comments that were received after the export from ArcInfo. To prepare the GIS database for publication, these edits needed to be incorporated. The two ArcInfo files (east and west parts of the map) were written to Export format, and ESRI shapefiles were generated in ArcMap. Harumi Warner (USGS, Denver) incorporated the edits and submitted to the senior author the two shapefiles (east and west parts of the map), for verification.

East and west polygon shapefiles were merged and converted to a file geodatabase. Geodatabase topology was created and topological error logs were generated. Logs listed numerous areas where problems in topological relationships existed. Common topological problems included polygons which overlapped or had gaps between them, overlying line layers (contacts, faults, etc.) which were not coincident with polygon boundaries, and line features that self overlapped. Topology rules were set in ArcMap to remove errors and create a topologically clean layer. For attribution purposes, subtypes were assigned to the geologic contacts layer. The use of subtypes ensured data consistency during the editing stages of the project. Feature class symbolization was created to closely resemble the printed version of surficial materials map and was exported to ESRI layer files.

Process_Date: 20081201
Process_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Christopher Garrity
Contact_Organization: U.S. Geological Survey
Contact_Position: Cartographer
Contact_Address:
Address_Type: mailing and physical address
Address:
12201 Sunrise Valley Drive
Address:
Mail Stop 956
City: Reston
State_or_Province: VA
Postal_Code: 20192
Country: USA
Contact_Voice_Telephone: 703-648-6426
Contact_TDD/TTY_Telephone: 703-648-6426
Contact_Facsimile_Telephone: 703-648-6419
Contact_Electronic_Mail_Address: cgarrity@usgs.gov
Hours_of_Service: 9:00AM - 6:00PM
Contact Instructions:
Preferred contact method is electronic mail.

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Spatial_Data_Organization_Information:

Direct_Spatial_Reference_Method: Vector

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Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Planar:
Map_Projection:
Map_Projection_Name: Albers Conical Equal Area
Albers_Conical_Equal_Area:
Standard_Parallel: 29.500000
Standard_Parallel: 45.500000
Longitude_of_Central_Meridian: -96.000000
Latitude_of_Projection_Origin: 23.000000
False_Easting: 0.000000
False_Northing: 0.000000
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method: coordinate pair
Coordinate_Representation:
Abscissa_Resolution: 0.000100
Ordinate_Resolution: 0.000100
Planar_Distance_Units: meters
Geodetic_Model:
Horizontal_Datum_Name: D_Clarke_1866
Ellipsoid_Name: Clarke 1866
Semi-major_Axis: 6378206.400000
Denominator_of_Flattening_Ratio: 294.978698

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Entity_and_Attribute_Information:
Detailed_Description:
Entity_Type:
Entity_Type_Label: Surficial_materials
Entity_Type_Definition:
Geologic unit polygons. Units are defined on the basis of composition, age, and origin.
Entity_Type_Definition_Source:
Soller and Reheis, (2004)
Attribute:
Attribute_Label: OBJECTID
Attribute_Definition:
Internal feature number.
Attribute_Definition_Source:
ESRI
Attribute_Domain_Values:
Unrepresentable_Domain:
Sequential unique whole numbers that are automatically generated.
Attribute:
Attribute_Label: Shape
Attribute_Definition:
Feature geometry.
Attribute_Definition_Source:
ESRI
Attribute_Domain_Values:
Unrepresentable_Domain:
Coordinates defining the features.
Attribute:
Attribute_Label: UNIT_CODE

Attribute_Definition:
Geologic unit code, composed of two to three digits that are systematically assigned. Used during map compilation as a quick indicator of the material's characteristics, and for symbolizing the map for publication.
Attribute_Domain_Values:
Unrepresentable_Domain:
The digits in the two leftmost positions (except for codes 11 and 12, in which only the left digit) refer to the map unit's genesis and texture. The leftmost digit is the major classifier (e.g., eolian), whereas the next digit refers to a subdivision of that geologic material (e.g., loess). In the interest of brevity, only the leftmost digit is listed here: "0"=alluvial sediments; "1"=biological; "2"=coastal zone; "3"=eolian; "4"=glacial till and glaciofluvial; "5"=lacustrine' "6"=colluvial; "7"=organic-rich; "8"=proglacial; and "9"=residual, volcanic, artificial, and water. The code's rightmost digit refers to the map unit's thickness. "xx0"=discontinuous sediment, with bedrock at or near the surface in most places; "xx1"=continuous cover of surficial deposits, with thickness between 1 and 100 ft; and "xx2"=continuous cover of surficial deposits, with thickness more than 100 ft. *Attribute:*
Attribute_Label: UNIT_NAME
Attribute_Definition:
Name of geologic map unit, as shown on map, or as compiled by reading the map unit description (and parent map unit description, if any).
Attribute_Definition_Source:
Modified from Soller and Reheis, (2004)
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Alluvial sediments, thick
Enumerated_Domain_Value_Definition:
Clay- to gravel-sized sediment, with minor coarser materials, generally moderate- to well-bedded, deposited by perennial and intermittent streams and rivers and by sheetwash flow on uplands. Locally includes associated lake and estuarine sediments. Along perennial streams and rivers, relatively well-sorted sediment underlies floodplains, natural levees, and alluvial terraces that parallel modern or former drainage courses. Alluvial sediments within the glaciated area commonly overlie or are mixed with sediment deposited by water that flowed from the glaciers (see "Glaciofluvial ice-contact sediments", below). On steeper slopes and especially in the arid western U.S., relatively poorly sorted sediment (including debris-flow and debris-avalanche material) underlies alluvial fans and fan piedmonts deposited by intermittent streams. In many places, notably in the Mississippi River Valley, in the glaciated area, on the uplands near the Platte River in Nebraska, and in fault-bounded valleys of the western U.S., these sediments may greatly exceed 100 ft in thickness.
Enumerated_Domain_Value_Definition_Source:
Modified from Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Alluvial sediments, thin
Enumerated_Domain_Value_Definition:
Clay- to gravel-sized sediment, with minor coarser materials, generally moderate- to well-bedded, deposited by perennial and intermittent streams and rivers and by sheetwash flow on uplands. Locally includes associated lake and estuarine sediments. Along perennial streams and rivers, relatively well-sorted sediment underlies floodplains, natural levees, and alluvial terraces that parallel modern or former drainage courses. Alluvial sediments within the glaciated area commonly overlie or are mixed with sediment deposited by water that flowed from the glaciers (see "Glaciofluvial ice-contact sediments", below). On steeper slopes and especially in the arid western U.S., relatively poorly sorted sediment (including debris-flow and debris-avalanche material) underlies alluvial fans and fan piedmonts deposited by intermittent streams. These materials generally form a continuous cover less than 100 feet thick.
Enumerated_Domain_Value_Definition_Source:
Modified from Soller and Reheis, (2004).

Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Biological sediments
Enumerated_Domain_Value_Definition:
Calcareous materials such as algal mats, marl, oolitic and coralline limestone, and shelly sand, deposited in beach and nearshore environments. These sediments, and any underlying sediments, are generally less than 100 ft thick, forming a continuous cover on underlying rocks. Mapped mostly in South Florida.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Coastal zone sediments, mostly fine-grained
Enumerated_Domain_Value_Definition:
Generally fine-grained sediment deposited in lagoons, tidal flats, backbarriers, and coastal marshes. Deposited along the coastal margins of the Atlantic, Gulf of Mexico, and Pacific. Mapped according to sediment texture and environment. These sediments, and any underlying sediments, are generally less than 100 feet thick, forming a continuous cover on underlying rocks (except on Long Island, where the sediments are considerably thicker).
Enumerated_Domain_Value_Definition_Source:
Modified from Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Coastal zone sediments, mostly medium-grained
Enumerated_Domain_Value_Definition:
Generally medium-grained sediment deposited on beaches and dunes, and in shallow marine and related alluvial environments. Deposited along the coastal margins of the Atlantic, Gulf of Mexico, and Pacific. Mapped according to sediment texture and environment. These sediments, and any underlying sediments, are generally less than 100 ft thick, forming a continuous cover on underlying rocks (except on Long Island, where the sediments are considerably thicker).
Enumerated_Domain_Value_Definition_Source:
Modified from Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Colluvial and alluvial sediments
Enumerated_Domain_Value_Definition:
Poorly sorted and stratified sediment ranging from clay to boulders in size; may contain organic material. Formed by weathering and breakdown of underlying rock in areas of steep to moderate slopes. The weathered and broken material has undergone some downslope transport and has been deposited as colluvium, landslides, talus, and rock avalanches. In places, this map unit includes the following: alluvial sediments; residual materials; especially on lower slopes; and fine-grained eolian sediments (loess) overlying the colluvium. These sediments generally are patchy in distribution, especially on steeper slopes where rock can be found exposed amongst these sediments. However, in many areas they do form a continuous cover and, locally in some debris flows and slope failures, they exceed 100 feet in thickness.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Colluvial sediments and loess
Enumerated_Domain_Value_Definition:
Poorly sorted and stratified sediment ranging from clay to boulders in size; may contain organic material. Formed by weathering and breakdown of underlying rock in areas of steep to moderate slopes. The weathered and broken material has undergone some downslope transport and has been deposited as colluvium, landslides, talus, and rock avalanches. In places, this map unit includes the following: fine-grained eolian sediments (loess) overlying the colluvium; residual

materials, especially on lower slopes; and alluvial sediments. These sediments generally are patchy in distribution, especially on steeper slopes where rock can be found exposed amongst these sediments. However, in many areas they do form a continuous cover and, locally in some debris flows and slope failures, they exceed 100 feet in thickness.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Colluvial sediments and residual material
Enumerated_Domain_Value_Definition:
Poorly sorted and stratified sediment ranging from clay to boulders in size; may contain organic material. Formed by weathering and breakdown of underlying rock in areas of steep to moderate slopes. The weathered and broken material has undergone some downslope transport and has been deposited as colluvium, landslides, talus, and rock avalanches. In places, this map unit includes the following: residual materials, especially on lower slopes; alluvial sediments; and fine-grained eolian sediments (loess) overlying the colluvium. These sediments generally are patchy in distribution, especially on steeper slopes where rock can be found exposed amongst these sediments. However, in many areas they do form a continuous cover and, locally in some debris flows and slope failures, they exceed 100 feet in thickness.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Colluvial sediments, discontinuous
Enumerated_Domain_Value_Definition:
Poorly sorted and stratified sediment ranging from clay to boulders in size; may contain organic material. Formed by weathering and breakdown of underlying rock in areas of steep to moderate slopes. The weathered and broken material has undergone some downslope transport and has been deposited as colluvium, landslides, talus, and rock avalanches. In places, this map unit includes the following: residual materials, especially on lower slopes; alluvial sediments; and fine-grained eolian sediments (loess) overlying the colluvium. These sediments generally are patchy in distribution, especially on steeper slopes where rock can be found exposed amongst these sediments. However, in some areas they do form a continuous cover and, locally in some debris flows and slope failures, they exceed 100 feet in thickness.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Colluvial sediments, thin
Enumerated_Domain_Value_Definition:
Poorly sorted and stratified sediment ranging from clay to boulders in size; may contain organic material. Formed by weathering and breakdown of underlying rock in areas of steep to moderate slopes. The weathered and broken material has undergone some downslope transport and has been deposited as colluvium, landslides, talus, and rock avalanches. In places, this map unit includes the following: residual materials, especially on lower slopes; alluvial sediments; and fine-grained eolian sediments (loess) overlying the colluvium. In the eastern U.S., the unit has been subdivided to indicate where these other constituents occur. These sediments generally are patchy in distribution, especially on steeper slopes where rock can be found exposed amongst these sediments. However, in many areas they do form a continuous cover and, locally in some debris flows and slope failures, they exceed 100 feet in thickness.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Eolian sediments on southern High Plains
Enumerated_Domain_Value_Definition:

Silt- and sand-sized sediment deposited by wind. On Southern High Plains in Texas and Oklahoma, the eolian sediments are somewhat different in texture and origin from typical dune sands or loess, forming a complex silty to sandy sediment. In general, the eolian sediments are more sandy in the west or southwest and more silty and clayey in the east or northeast.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Eolian sediments, mostly dune sand, thick
Enumerated_Domain_Value_Definition:
Sand-sized sediment deposited by wind. These sediments, and any underlying sediments, are generally more than 100 feet thick, forming a continuous cover on underlying rocks. Notably thick in the Nebraska Sand Hills.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Eolian sediments, mostly dune sand, thin
Enumerated_Domain_Value_Definition:
Sand-sized sediment deposited by wind. These sediments, and any underlying sediments, are generally less than 100 feet thick, forming a continuous cover on underlying rocks.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Eolian sediments, mostly loess, thick
Enumerated_Domain_Value_Definition:
Mostly loess (a silty material deposited by winds near the glacial margin). Includes minor areas of alluvium and colluvium. These sediments, and any underlying sediments, are generally more than 100 feet thick, forming a continuous cover on underlying rocks.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Eolian sediments, mostly loess, thin
Enumerated_Domain_Value_Definition:
Mostly loess (a silty material deposited by winds near the glacial margin). Includes minor areas of alluvium and colluvium. Loess forms a thin cover over much of the central United States, but is shown on this map only where it is thicker than 20 ft. Maximum thickness of loess and any underlying sediment in this map unit is 100 feet.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Glacial till sediments, mostly clayey, discontinuous
Enumerated_Domain_Value_Definition:
Glacial till is unsorted material ranging in grain size from clay to boulders, deposited by glacial ice; sediment in this unit is dominantly clayey. Includes minor areas of ice-contact and lake sediment. Patchy in distribution; bedrock commonly is exposed at land surface.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Glacial till sediments, mostly clayey, thick
Enumerated_Domain_Value_Definition:
Glacial till is unsorted material ranging in grain size from clay to boulders, deposited by glacial

ice; sediment in this unit is dominantly clayey. Includes minor areas of ice-contact and lake sediment. These sediments, and any underlying sediments, are generally more than 100 feet thick, forming a continuous cover on underlying rocks.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Glacial till sediments, mostly clayey, thin
Enumerated_Domain_Value_Definition:
Glacial till is unsorted material ranging in grain size from clay to boulders, deposited by glacial ice; sediment in this unit is dominantly clayey. Includes minor areas of ice-contact and lake sediment. These sediments, and any underlying sediments, are generally less than 100 feet thick, forming a continuous cover on underlying rocks.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Glacial till sediments, mostly sandy, discontinuous
Enumerated_Domain_Value_Definition:
Glacial till is unsorted material ranging in grain size from clay to boulders, deposited by glacial ice; sediment in this unit is dominantly sandy. Includes minor areas of ice-contact and lake sediment. Patchy in distribution; bedrock commonly is exposed at land surface.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Glacial till sediments, mostly sandy, thin
Enumerated_Domain_Value_Definition:
Glacial till is unsorted material ranging in grain size from clay to boulders, deposited by glacial ice; sediment in this unit is dominantly sandy. Includes minor areas of ice-contact and lake sediment. These sediments, and any underlying sediments, are generally less than 100 feet thick, forming a continuous cover on underlying rocks.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Glacial till sediments, mostly silty, discontinuous
Enumerated_Domain_Value_Definition:
Glacial till is unsorted material ranging in grain size from clay to boulders, deposited by glacial ice; sediment in this unit is dominantly silty or loamy. Includes minor areas of ice-contact and lake sediment. Patchy in distribution; bedrock commonly is exposed at land surface.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Glacial till sediments, mostly silty, thick
Enumerated_Domain_Value_Definition:
Glacial till is unsorted material ranging in grain size from clay to boulders, deposited by glacial ice; sediment in this unit is dominantly silty or loamy. Includes minor areas of ice-contact and lake sediment. These sediments, and any underlying sediments, are generally more than 100 feet thick, forming a continuous cover on underlying rocks.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Glacial till sediments, mostly silty, thin

Enumerated_Domain_Value_Definition:
Glacial till is unsorted material ranging in grain size from clay to boulders, deposited by glacial ice; sediment in this unit is dominantly silty or loamy. Includes minor areas of ice-contact and lake sediment. These sediments, and any underlying sediments, are generally less than 100 feet thick, forming a continuous cover on underlying rocks.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Glaciofluvial ice-contact sediments, mostly sand and gravel, discontinuous
Enumerated_Domain_Value_Definition:
Mostly sand and gravel with lesser silt, deposited by running water essentially in contact with glacial ice. Includes sediment deposited into water bodies adjacent to the glacial ice margin. Patchy in distribution; bedrock commonly is exposed at land surface. Mapped as small areas within the glaciated region in the eastern U.S., notably in eastern Massachusetts.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Glaciofluvial ice-contact sediments, mostly sand and gravel, thick
Enumerated_Domain_Value_Definition:
Mostly sand and gravel with lesser silt, deposited by running water essentially in contact with glacial ice. Includes sediment deposited into water bodies adjacent to the glacial ice margin. These sediments, and any underlying sediments, are generally more than 100 feet thick, forming a continuous cover on underlying rocks. Mapped as small areas within the glaciated region in the eastern U.S., notably in eastern Massachusetts.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Glaciofluvial ice-contact sediments, mostly sand and gravel, thin
Enumerated_Domain_Value_Definition:
Mostly sand and gravel with lesser silt, deposited by running water essentially in contact with glacial ice. Includes sediment deposited into water bodies adjacent to the glacial ice margin. These sediments, and any underlying sediments, are generally less than 100 feet thick, forming a continuous cover on underlying rocks. Mapped as small areas within the glaciated region in the eastern U.S., notably in eastern Massachusetts.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Lacustrine sediments
Enumerated_Domain_Value_Definition:
Generally well sorted and well bedded material ranging in grain size from clay to coarse gravel, deposited in perennial to intermittent lakes commonly in undrained valleys of the Great Basin. Because these lakes mostly are a response to lower evaporation and increased precipitation rather than to the melting of glaciers, much of the sediment is derived from stream erosion. Locally includes material deposited in playas, mudflats, salt flats, and adjacent saline marshes. Generally interbedded with playa sediment deposited during drier climatic periods; commonly intertongues upslope with sediment deposited by alluvial fans. These sediments, and any underlying sediments, commonly form a continuous cover less than 100 feet thick along valley margins, and may exceed several hundred feet in thickness in long-lived sedimentary basins.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:

Enumerated_Domain:
Enumerated_Domain_Value: Organic-rich muck and peat, thick
Enumerated_Domain_Value_Definition:
Organic-rich muck and peat deposited in poorly drained and swampy areas. These sediments, and any underlying sediments, are generally more than 100 ft thick, forming a continuous cover on underlying rocks. This map unit occurs in the glaciated region, and much of the unit thickness is composed of the underlying glacially-deposited sediment.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Organic-rich muck and peat, thin
Enumerated_Domain_Value_Definition:
Organic-rich muck and peat deposited in poorly drained and swampy areas. These sediments, and any underlying sediments, are generally less than 100 ft thick, forming a continuous cover on underlying rocks.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Playa sediments
Enumerated_Domain_Value_Definition:
Fine-grained sediment and evaporite salts deposited in ephemeral lakes in the centers of undrained basins. Includes material deposited in playas, mudflats, salt flats, and adjacent saline marshes. Generally interbedded with eolian sand and with lacustrine sediment deposited during wetter climatic periods; commonly intertongue upslope with sediment deposited by alluvial fans. These sediments, and any underlying sediments, commonly form a continuous cover less than 100 feet thick, and may exceed several hundred feet in thickness in long-lived sedimentary basins.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Proglacial sediments, mostly coarse-grained, discontinuous
Enumerated_Domain_Value_Definition:
Generally coarse-grained sediment mostly deposited in terraces, river floodplains, buried valleys, and as sheet deposits during intervals when glacial ice was melting. Common in glaciated region and the Pacific Northwest. In the northwest U.S., includes coarse-grained flood sediments from the breaching of glacial Lake Missoula. Includes fine-grained deposits, especially in slackwater areas. In places, interfingers with alluvial sediments. Patchy in distribution; bedrock commonly is exposed at land surface.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Proglacial sediments, mostly coarse-grained, thick
Enumerated_Domain_Value_Definition:
Generally fine-grained sediment melted from glaciers and deposited in lakes and marine environments. In the eastern U.S., these lakes are commonly small and related to ice and sediment damming of waters near the margin of the continental glaciers. In the western U.S., these lakes may be considerably larger (e.g., Lake Missoula in western Montana). Includes some areas of Glacial till and well-sorted glaciofluvial sediment. These sediments, and any underlying sediments, are generally more than 100 feet thick, forming a continuous cover on underlying rocks.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:

Enumerated_Domain:
Enumerated_Domain_Value: Proglacial sediments, mostly coarse-grained, thin
Enumerated_Domain_Value_Definition:
Generally coarse-grained sediment mostly deposited in terraces, river floodplains, buried valleys, and as sheet deposits during intervals when glacial ice was melting. Common in glaciated region and the Pacific Northwest. In the northwest U.S., includes coarse-grained flood sediments from the breaching of glacial Lake Missoula. Includes fine-grained deposits, especially in slackwater areas. In places, interfingers with alluvial sediments. These sediments, and any underlying sediments, are generally less than 100 feet thick, forming a continuous cover on underlying rocks.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Proglacial sediments, mostly fine grained, discontinuous
Enumerated_Domain_Value_Definition:
Generally fine-grained sediment melted from glaciers and deposited in lakes and marine environments. In the eastern U.S., these lakes are commonly small and related to ice and sediment damming of waters near the margin of the continental glaciers. In the western U.S., these lakes may be considerably larger (e.g., Lake Missoula in western Montana). Includes some areas of Glacial till and well-sorted glaciofluvial sediment. Patchy in distribution; bedrock commonly is exposed at land surface.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Proglacial sediments, mostly fine grained, thick
Enumerated_Domain_Value_Definition:
Proglacial sediments, mostly fine grained, thick
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Proglacial sediments, mostly fine grained, thin
Enumerated_Domain_Value_Definition:
Generally fine-grained sediment melted from glaciers and deposited in lakes and marine environments. In the eastern U.S., these lakes are commonly small and related to ice and sediment damming of waters near the margin of the continental glaciers. In the western U.S., these lakes may be considerably larger (e.g., Lake Missoula in western Montana). Includes some areas of Glacial till and well-sorted glaciofluvial sediment. These sediments, and any underlying sediments, are generally less than 100 feet thick, forming a continuous cover on underlying rocks.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Residual materials developed in alluvial sediments
Enumerated_Domain_Value_Definition:
These materials formed by the partial chemical dissolution and physical disintegration of alluvial sediments; they include the modern soil profile and extend downward to unweathered alluvial material. Depending on the composition of the source alluvium, these materials can be generally fine- to coarse-grained, and commonly are poorly sorted. Unlike mass-movement sediments (e.g., colluvium), these materials were not transported. In some areas this map unit includes alluvial and colluvial sediments. This material is generally less than 10 feet thick and, in many places, is patchy in distribution. Particularly in mountainous areas, exposed rock can more commonly be found than residual material. Mapped mostly on the Atlantic and Gulf coastal margins, adjacent to Coastal zone deposits.
Enumerated_Domain_Value_Definition_Source:

Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Residual materials developed in bedrock, discontinuous
Enumerated_Domain_Value_Definition:
These materials formed by the partial chemical dissolution and physical disintegration of bedrock and, to a lesser extent, of colluvial sediments; they include the modern soil profile and extend downward to unweathered rock. Depending on the composition of the source rock or colluvium, these materials can be generally fine- to coarse-grained, and commonly are poorly sorted. Unlike mass-movement sediments (e.g., colluvium), these materials were not transported. This material is generally less than 10 feet thick, and is patchy in distribution. Particularly in mountainous areas, exposed rock can more commonly be found than residual material.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Residual materials developed in bedrock, thin
Enumerated_Domain_Value_Definition:
These materials formed by the partial chemical dissolution and physical disintegration of bedrock and, to a lesser extent, of colluvial sediments; they include the modern soil profile and extend downward to unweathered rock. Depending on the composition of the source rock or colluvium, these materials can be generally fine- to coarse-grained, and commonly are poorly sorted. Unlike mass-movement sediments (e.g., colluvium), these materials were not transported. This material is generally less than 10 feet thick and, in many places, is patchy in distribution. Particularly in mountainous areas, exposed rock can more commonly be found than residual material.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Residual materials developed in bedrock, with alluvial sediments, discontinuous
Enumerated_Domain_Value_Definition:
These materials formed by the partial chemical dissolution and physical disintegration of bedrock and, to a lesser extent, of sheetwash alluvial sediments; they include the modern soil profile and extend downward to unweathered rock. Depending on the composition of the source rock or alluvium, these materials can be generally fine- to coarse-grained, and commonly are poorly sorted. Unlike mass-movement sediments (e.g., colluvium), these materials were not transported. This material is generally less than 10 feet thick, and is patchy in distribution. Particularly in mountainous areas, exposed rock can more commonly be found than residual material.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Residual materials developed in bedrock, with alluvial sediments, thin
Enumerated_Domain_Value_Definition:
These materials formed by the partial chemical dissolution and physical disintegration of bedrock and, to a lesser extent, of sheetwash alluvial sediments; they include the modern soil profile and extend downward to unweathered rock. Depending on the composition of the source rock or alluvium, these materials can be generally fine- to coarse-grained, and commonly are poorly sorted. Unlike mass-movement sediments (e.g., colluvium), these materials were not transported. This material is generally less than 10 feet thick and, in many places, is patchy in distribution. Particularly in mountainous areas, exposed rock can more commonly be found than residual material.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).

Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Residual materials developed in carbonate rocks, discontinuous
Enumerated_Domain_Value_Definition:
These materials formed by the partial chemical dissolution and physical disintegration of limestone and other carbonate rocks; they include the modern soil profile and extend downward to unweathered rock. Depending on the composition of the source rock, these materials can be generally fine- to coarse-grained, and commonly are poorly sorted. Unlike mass-movement sediments (e.g., colluvium), these materials were not transported. This material is generally less than 10 feet thick, and is patchy in distribution. Particularly in mountainous areas, exposed rock can more commonly be found than residual material.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Residual materials developed in carbonate rocks, thin
Enumerated_Domain_Value_Definition:
These materials formed by the partial chemical dissolution and physical disintegration of limestone and other carbonate rocks; they include the modern soil profile and extend downward to unweathered rock. Depending on the composition of the source rock, these materials can be generally fine- to coarse-grained, and commonly are poorly sorted. Unlike mass-movement sediments (e.g., colluvium), these materials were not transported. This material is generally less than 10 feet thick and, in many places, is patchy in distribution. Particularly in mountainous areas, exposed rock can more commonly be found than residual material.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Residual materials developed in fine-grained sedimentary rocks
Enumerated_Domain_Value_Definition:
These materials formed by the partial chemical dissolution and physical disintegration of fine-grained sedimentary rocks (e.g., shale) that contain smectite (a clay mineral responsible for "swelling soil"); they include the modern soil profile and extend downward to unweathered rock. These materials are generally fine-grained, and commonly are poorly sorted. Unlike mass-movement sediments (e.g., colluvium), these materials were not transported. This material is generally less than 10 feet thick and, in many places, is patchy in distribution. Particularly in mountainous areas, exposed rock can more commonly be found than residual material.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Residual materials developed in igneous and metamorphic rocks
Enumerated_Domain_Value_Definition:
These materials formed by the partial chemical dissolution and physical disintegration of igneous and metamorphic rock; they include the modern soil profile and extend downward to unweathered rock. Depending on the composition of the source rock or colluvium, these materials can be generally fine- to coarse-grained, and commonly are poorly sorted. Unlike mass-movement sediments (e.g., colluvium), these materials were not transported. This material is generally less than 10 feet thick and, in many places, is patchy in distribution. Particularly in mountainous areas, exposed rock can more commonly be found than residual material.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Residual materials developed in sedimentary rocks, discontinuous
Enumerated_Domain_Value_Definition:

These materials formed by the partial chemical dissolution and physical disintegration of sedimentary rocks; they include the modern soil profile and extend downward to unweathered rock. Depending on the composition of the source rock, these materials can be generally fine- to coarse-grained, and commonly are poorly sorted. Unlike mass-movement sediments (e.g., colluvium), these materials were not transported. This material is generally less than 10 feet thick, and is patchy in distribution. Particularly in mountainous areas, exposed rock can more commonly be found than residual material.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Residual materials developed in sedimentary rocks, thin
Enumerated_Domain_Value_Definition:
These materials formed by the partial chemical dissolution and physical disintegration of sedimentary rocks; they include the modern soil profile and extend downward to unweathered rock. Depending on the composition of the source rock, these materials can be generally fine- to coarse-grained, and commonly are poorly sorted. Unlike mass-movement sediments (e.g., colluvium), these materials were not transported. This material is generally less than 10 feet thick and, in many places, is patchy in distribution. Particularly in mountainous areas, exposed rock can more commonly be found than residual material.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Volcanic rocks, basaltic and andesitic
Enumerated_Domain_Value_Definition:
Ranges from generally coarse-grained sediment to rocks, formed by volcanic eruptions. Includes dominantly volcanic sediment reworked from original depositional setting by fluvial processes. Character is largely dependent on magma composition: andesitic eruptions along the western plate boundary produce large stratovolcanoes, and basaltic eruptions produce cinder cones and sheet-like flows. Generally between 10 and 100 ft (3 and 30m) thick, except in stratovolcanoes and in the Snake River Plain region (southern Idaho), where stacked basalt flows may be hundreds of feet thick.
Enumerated_Domain_Value_Definition_Source:
Modified from Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Volcanic rocks, rhyolitic
Enumerated_Domain_Value_Definition:
Ranges from generally coarse-grained sediment to rocks, formed by volcanic eruptions. Includes dominantly volcanic sediment reworked from original depositional setting by fluvial processes. Eruptions produce domes and ash-flow rhyolite tuffs. Generally between 10 and 100 ft (3 and 30 m) thick.
Enumerated_Domain_Value_Definition_Source:
Modified from Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Water
Enumerated_Domain_Value_Definition:
Water covers the surficial materials, which were not mapped owing to lack of readily-accessible (digital) information on their characteristics.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute:
Attribute_Label: UNIT_THICK
Attribute_Definition:

Generalized thickness of the mapped unit.
Attribute_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Discontinuous
Enumerated_Domain_Value_Definition:
The sediments shown in this map unit are patchy in distribution; bedrock commonly is exposed at land surface.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: <100
Enumerated_Domain_Value_Definition:
The sediments shown in this map unit, and any underlying sediments, are generally less than 100 feet thick, forming a continuous cover on underlying rocks.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: >100
Enumerated_Domain_Value_Definition:
The sediments shown in this map unit, and any underlying sediments, are generally more than 100 feet thick, forming a continuous cover on underlying rocks.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute:
Attribute_Label: GEOL_AGE
Attribute_Definition:
The maximum span of geologic time during which geologic materials in the map unit were deposited. The deposits of any given area may be significantly restricted in age (i.e., less than this maximum span). By convention, the age range is specified as <younger age> to <older age>.
Attribute_Definition_Source:
Soller and Reheis, (2004); U.S. Geological Survey, 2007, Divisions of Geologic Time - Major Chronostratigraphic and Geochronologic Units: U.S. Geological Survey Fact Sheet 2007-3015, 2 p., http://pubs.usgs.gov/fs/2007/3015/; Richmond and Fullerton, 1986, Introduction to Quaternary glaciations in the United States of America, in V. Sibrava, D.Q. Bowen, and G.M. Richmond, editors, Quaternary Glaciations in the Northern Hemisphere: New York, Pergamon Press, p. 3-10.
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Holocene to late Pleistocene
Enumerated_Domain_Value_Definition:
Deposition occurred sometime between the present day (which is included in the Holocene) and very approximately 122,000 years ago (the beginning of the late Pleistocene). This is the time range for all sediments in the map unit; the age of deposits at a specific location may be significantly more restricted in time.
Enumerated_Domain_Value_Definition_Source:
See Attribute_Definition_Source.
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Holocene to middle Pleistocene
Enumerated_Domain_Value_Definition:
Deposition occurred sometime between the present day (which is included in the Holocene) and very approximately 790,000 years ago (the beginning of the middle Pleistocene). This is the time range for all sediments in the map unit; the age of deposits at a specific location may be

significantly more restricted in time.
Enumerated_Domain_Value_Definition_Source:
See Attribute_Definition_Source.
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Holocene to Pleistocene
Enumerated_Domain_Value_Definition:
Deposition occurred sometime between the present day (which is included in the Holocene) and approximately 1.8 million years ago (the beginning of the Pleistocene). This is the time range for all sediments in the map unit; the age of deposits at a specific location may be significantly more restricted in time.
Enumerated_Domain_Value_Definition_Source:
See Attribute_Definition_Source.
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Holocene to Pliocene
Enumerated_Domain_Value_Definition:
Deposition occurred sometime between the present day (which is included in the Holocene) and approximately 5.3 million years ago (the beginning of the Pliocene). This is the time range for all sediments in the map unit; the age of deposits at a specific location may be significantly more restricted in time.
Enumerated_Domain_Value_Definition_Source:
See Attribute_Definition_Source.
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Holocene to Tertiary
Enumerated_Domain_Value_Definition:
Deposition occurred sometime between the present day (which is included in the Holocene) and approximately 65.5 million years ago (the beginning of the Tertiary). This is the time range for all sediments in the map unit; the age of deposits at a specific location may be significantly more restricted in time.
Enumerated_Domain_Value_Definition_Source:
See Attribute_Definition_Source.
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: late Wisconsinan to Illinoian
Enumerated_Domain_Value_Definition:
Deposition occurred sometime between the end of the last glacial episode (late Wisconsinan, which ended about 11,000 years ago) and about 198,000 years ago (the beginning of the Illinoian glacial episode). This is the time range for all sediments in the map unit; the age of deposits at a specific location may be significantly more restricted in time.
Enumerated_Domain_Value_Definition_Source:
See Attribute_Definition_Source.
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: late Wisconsinan to pre-Illinoian
Enumerated_Domain_Value_Definition:
Deposition occurred sometime between the end of the last glacial episode (late Wisconsinan, which ended about 11,000 years ago) and the beginning of "pre-Illinoian" time (age uncertain, but roughly coinciding with the beginning of the Quaternary, 1.8 million years ago). This is the time range for all sediments in the map unit; the age of deposits at a specific location may be significantly more restricted in time.
Enumerated_Domain_Value_Definition_Source:
See Attribute_Definition_Source.
Attribute:
Attribute_Label: MIN_AGE

Attribute_Definition:
Minimum (youngest) geologic age during which materials in the map unit were deposited. This is the minimum age for all sediments in the map unit; the deposits at a specific location may be significantly older.
Attribute_Definition_Source:
Soller and Reheis, (2004); U.S. Geological Survey, 2007, Divisions of Geologic Time - Major Chronostratigraphic and Geochronologic Units: U.S. Geological Survey Fact Sheet 2007-3015, 2 p., http://pubs.usgs.gov/fs/2007/3015/; Richmond and Fullerton, 1986, Introduction to Quaternary glaciations in the United States of America, in V. Sibrava, D.Q. Bowen, and G.M. Richmond, editors, Quaternary Glaciations in the Northern Hemisphere: New York, Pergamon Press, p. 3-10.
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Holocene
Enumerated_Domain_Value_Definition:
The youngest formal subdivision of time, extending from the present to approximately 11,000 years ago.
Enumerated_Domain_Value_Definition_Source:
See Attribute_Definition_Source.
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: late Pleistocene
Enumerated_Domain_Value_Definition:
An informal subdivision of time, extending from about 11,000 to 122,000 years ago.
Enumerated_Domain_Value_Definition_Source:
See Attribute_Definition_Source.
Attribute:
Attribute_Label: MAX_AGE
Attribute_Definition:
Maximum (oldest) geologic age during which materials in the map unit were deposited. This is the maximum age for all sediments in the map unit; the deposits at a specific location may be significantly younger.
Attribute_Definition_Source:
Soller and Reheis, (2004); U.S. Geological Survey, 2007, Divisions of Geologic Time - Major Chronostratigraphic and Geochronologic Units: U.S. Geological Survey Fact Sheet 2007-3015, 2 p., http://pubs.usgs.gov/fs/2007/3015/; Richmond and Fullerton, 1986, Introduction to Quaternary glaciations in the United States of America, in V. Sibrava, D.Q. Bowen, and G.M. Richmond, editors, Quaternary Glaciations in the Northern Hemisphere: New York, Pergamon Press, p. 3-10.
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: early Pleistocene
Enumerated_Domain_Value_Definition:
An informal subdivision of time, extending from about 788,000 to 1.8 million years ago.
Enumerated_Domain_Value_Definition_Source:
See Attribute_Definition_Source.
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: late Pleistocene
Enumerated_Domain_Value_Definition:
An informal subdivision of time, extending from about 11,000 to 122,000 years ago.
Enumerated_Domain_Value_Definition_Source:
See Attribute_Definition_Source.
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: middle Pleistocene
Enumerated_Domain_Value_Definition:
An informal subdivision of time, extending from about 122,000 to 788,000 years ago.

Enumerated_Domain_Value_Definition_Source:
See Attribute_Definition_Source.
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Pleistocene
Enumerated_Domain_Value_Definition:
The first epoch of the Quaternary Period. It extended from about 11,000 to 1.8 million years ago.
Enumerated_Domain_Value_Definition_Source:
See Attribute_Definition_Source.
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Pliocene
Enumerated_Domain_Value_Definition:
The last epoch of the Tertiary Period. It extended from about 1.8 to 5.3 million years ago.
Enumerated_Domain_Value_Definition_Source:
See Attribute_Definition_Source.
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Tertiary
Enumerated_Domain_Value_Definition:
The first period of the Cenozoic Era. It extended from about 1.8 to 65.5 million years ago.
Enumerated_Domain_Value_Definition_Source:
See Attribute_Definition_Source.
Attribute:
Attribute_Label: DMU_HIER
Attribute_Definition:
A set of unique arbitrary number sequences assigned to each of the geologic material types. The number sequence is essentially an outline format. When the number sequences are sorted in ascending order, the map units are arranged as in the hierarchical, ordered format shown on the source map's Description of Map Units.
Attribute_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Unrepresentable_Domain:
Arbitrary number sequences arranged in outline form (e.g., "001", "001-001", "001-002", "002", "003", etc.).
Attribute:
Attribute_Label: Shape_Length
Attribute_Definition:
Length of feature in internal units.
Attribute_Definition_Source:
ESRI
Attribute_Domain_Values:
Unrepresentable_Domain:
Positive real numbers that are automatically generated.
Attribute:
Attribute_Label: Shape_Area
Attribute_Definition:
Area of feature in internal units squared.
Attribute_Definition_Source:
ESRI
Attribute_Domain_Values:
Unrepresentable_Domain:
Positive real numbers that are automatically generated.
Entity_and_Attribute_Information:
Detailed_Description:

Entity_Type:
Entity_Type_Label: Contacts
Entity_Type_Definition:
Geologic unit boundaries.
Entity_Type_Definition_Source:
Soller and Reheis (2004).
Attribute:
Attribute_Label: OBJECTID
Attribute_Definition:
Internal feature number.
Attribute_Definition_Source:
ESRI
Attribute_Domain_Values:
Unrepresentable_Domain:
Sequential unique whole numbers that are automatically generated.
Attribute:
Attribute_Label: Shape
Attribute_Definition:
Feature geometry.
Attribute_Definition_Source:
ESRI
Attribute_Domain_Values:
Unrepresentable_Domain:
Coordinates defining the features.
Attribute:
Attribute_Label: Shape_Length
Attribute_Definition:
Length of feature in internal units.
Attribute_Definition_Source:
ESRI
Attribute_Domain_Values:
Unrepresentable_Domain:
Positive real numbers that are automatically generated.
Attribute:
Attribute_Label: LINE_CODE
Attribute_Definition:
Numerical subtype codes assigned to unique unit boundary type.
Attribute_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Major unit class boundary
Enumerated_Domain_Value_Definition:
Contact between major sediment classes (e.g., between residual and mass-movement materials).
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Minor unit class boundary
Enumerated_Domain_Value_Definition:
Contact between minor sediment classes (e.g., between clayey till and loamy till).
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Unit thickness scratch boundary

Enumerated_Domain_Value_Definition:
Contact between thickness classes of a single unit (e.g., clayey till); shown on the map as an invisible "scratch" boundary line.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: Water or map area boundary
Enumerated_Domain_Value_Definition:
Line between geology and bodies of water or the map area boundary. Represented on the printed map as a solid, blue line.
Enumerated_Domain_Value_Definition_Source:
Soller and Reheis, (2004).

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Distribution_Information:
Distributor:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: USGS Information Services
Contact_Address:
Address_Type: mailing and physical address
Address:
Box 25286
City: Denver
State_or_Province: CO
Postal_Code: 80225
Country: USA
Contact_Voice_Telephone: 1-888-ASK-USGS
Contact_TDD/TTY_Telephone: 1-888-ASK-USGS
Contact_Facsimile_Telephone: 303-202-4693
Contact_Electronic_Mail_Address: http://store.usgs.gov/
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Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name: GDB

Format_Version_Number: 9.2
Format_Specification:
ESRI File Geodatabase
Format_Information_Content:
Polygon, line, and point feature classes
File_Decompression_Technique: File Geodatabase compression (uncompress with ArcCatalog)
Transfer_Size: 100 MB
Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
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Box 25286
Denver, CO 80225
Technical_Prerequisites:
ArcGIS Desktop 9.X is required to open the map document (Surf_Mtls_US.mxd).

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Metadata_Reference_Information:
Metadata_Date: 20090226
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: U.S. Geological Survey
Contact_Person: Christopher Garrity
Contact_Position: Cartographer
Contact_Address:
Address_Type: mailing address
Address:
12201 Sunrise Valley Drive
Address:
Mail Stop 956
City: Reston
State_or_Province: VA
Postal_Code: 20192
Country: USA
Contact_Voice_Telephone: 703-648-6426
Contact_TDD/TTY_Telephone: 703-648-6426
Contact_Facsimile_Telephone: 703-648-6419
Contact_Electronic_Mail_Address: cgarrity@usgs.gov
Hours_of_Service: 9:00 AM - 6:00 PM
Contact Instructions:
Electronic mail is preferred method of contact
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: local time
Metadata_Extensions:

Online_Linkage: http://www.esri.com/metadata/esriprof80.html
Profile_Name: ESRI Metadata Profile
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