

## Description of Map Units from: Surficial Materials in the Conterminous United States

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### DESCRIPTION OF MAP UNITS

1) *This map shows the sediments and the weathered rock materials at land surface, and the approximate thickness of the entire succession of sediments that overlie bedrock. 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 (30m) 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 (330m) in thickness.*

2) *Color shades and patterns show thickness variations within each map unit. In the color boxes below, a code indicates sediment thickness, as follows:*

- *“P” – Areas where the surficial material does not everywhere cover the underlying bedrock (i.e., where it is discontinuous, or patchy in distribution).*
- *“<100” – Surficial materials are continuous in distribution, and are generally less than 100 feet thick.*
- *“>100” – Surficial materials exceed 100 feet in thickness.*

**Alluvial sediments** (Holocene to Pliocene) -- 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. However 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.

**Coastal zone sediments (Holocene to Pliocene)** -- sediment 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). Map units are:

- Generally fine-grained sediment deposited in lagoons, tidal flats, backbarriers, and coastal marshes.
- Generally medium-grained sediment deposited on beaches and dunes, and in shallow marine and related alluvial environments.

**Biological sediments (Holocene to middle Pleistocene)** -- 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.

**Organic sediments (Holocene to late Pleistocene)** -- 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. Mapped in the glaciated region and the coastal margins of the Atlantic and Gulf Coast; areas >100 ft thick are found in the glaciated region, but much of that thickness is composed of the underlying glacially-deposited sediment.

**Glacial till sediments (late Wisconsinan to pre-Illinoian)** -- unsorted material ranging in grain size from clay to boulders, deposited by glacial ice. Includes minor areas of ice-contact and lake sediment. Areas of predominantly clayey, loamy (silty), and sandy till are shown separately on the map. These sediments, and any underlying sediments, commonly form a continuous cover on underlying rocks and may exceed 100 ft in thickness, especially in areas that were occupied by numerous glacial ice lobes (for example, central Michigan, northeastern South Dakota). However, in some areas that are mountainous or near the glacial margin, these sediments are patchy in distribution and bedrock commonly is exposed at land surface. Map units are:

- Predominantly clayey till. Mapped mostly in lowlands near the Great Lakes.
- Predominantly loamy (silty) till, or tills of various textures.
- Predominantly sandy till. Mapped mostly in the western half of the U.S., and in New England and the Adirondack Mountains.

**Glaciofluvial ice-contact sediments** (late Wisconsinan to Illinoian) -- 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, commonly form a continuous cover on underlying rocks, and may exceed 100 ft in thickness, especially in modern to pre-glacial river channels. Mapped as small areas within the glaciated region in the eastern U.S., notably in eastern Massachusetts.

**Proglacial sediments** (late Wisconsinan to pre-Illinoian) -- fine- to coarse-grained sediment derived from material eroded and transported by glaciers. As the ice melted, this material was transported and deposited by glacially-fed streams. Map units are:

- 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, commonly form a continuous cover on underlying rocks and may exceed 100 ft in thickness.
- Generally coarse-grained sediment mostly deposited in terraces, river floodplains, buried valleys, and as sheet deposits during intervals when glacial ice was melting. 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, commonly form a continuous cover on underlying rocks and may exceed 100 ft in thickness. Common in glaciated region and the Pacific Northwest.

**Lacustrine and playa sediments** (Holocene to Pliocene) -- fine- to coarse-grained sediment and evaporite salts deposited in mostly undrained basins by perennial and ephemeral lakes in the arid western U.S. Map units are:

- Lacustrine sediments. 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.

- Playa sediments. 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.

**Eolian sediments (Holocene to Pleistocene)** -- silt- and sand-sized sediment deposited by wind. These sediments, and any underlying sediments, commonly form a continuous cover on underlying rocks and generally do not exceed 100 ft in thickness. Map units are:

- 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.
- Mostly dune sands. Notably thick in the Nebraska Sand Hills.
- 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.

**Mass-movement sediments (Holocene to Tertiary)** -- 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. Map units are:

- Mostly colluvial sediments.
- Colluvial and alluvial sediments.
- Colluvial sediments and loess.
- Colluvial sediments and residual material.

**Residual materials** (Holocene to Tertiary) -- these materials formed by the partial chemical dissolution and physical disintegration of bedrock; they include the modern soil profile and extend downward to unweathered rock. Depending on the source rock, these materials can be generally fine- to coarse-grained, and commonly are poorly sorted. Unlike mass-movement sediments, these materials were not transported. In places, this map unit includes alluvial and colluvial sediments. This material is generally less than 10 ft (3m) thick and, in many places, is patchy in distribution. Particularly in mountainous areas, exposed rock can more commonly be found than residual material. Map units are:

- Residual materials developed in igneous and metamorphic rocks.
- Residual materials developed in sedimentary rocks.
- Residual materials developed in fine-grained sedimentary rocks (e.g., shale) that contain smectite (a clay mineral responsible for "swelling soil").
- Residual materials developed in limestone and other carbonate rocks.
- Residual materials developed in alluvial sediments. Mapped mostly on the Atlantic and Gulf coastal margins, adjacent to Coastal zone deposits.
- Mostly residual materials developed in bedrock, with lesser sheetwash alluvial sediments.
- Mostly residual materials developed in bedrock, with lesser colluvial sediments.

**Volcanic rocks** (Holocene to Pliocene) -- 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: silicic eruptions produce domes and ash-flow tuffs, 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.

## **EXPLANATION OF MAP SYMBOLS**

- Contact between major sediment classes (e.g., between Residual and Mass-movement)
- Contact between minor sediment classes (e.g., between clayey till and loamy till)