

## Glacial Terminology

The last glacial advance in Michigan is known as the Wisconsin advance. The late Wisconsin period occurred between 25,000 and 10,000 years ago. Virtually all of Michigan's present surface landforms were shaped during this time.

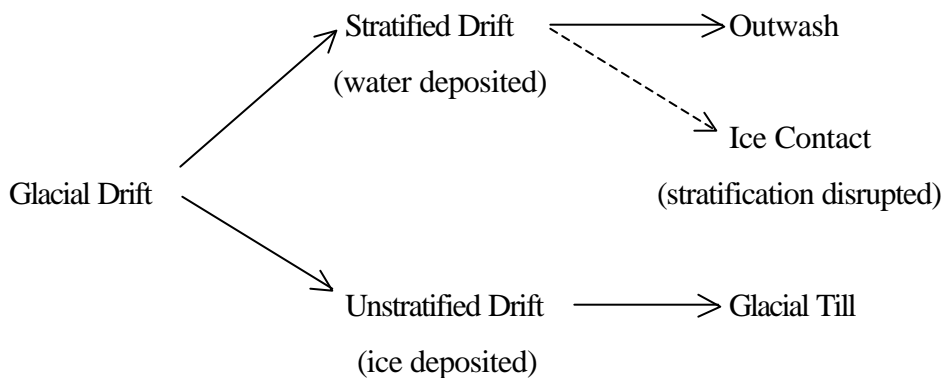
### A. Glacial Materials

**Glacial Drift:** material transported and deposited by glacial action. Note that most glacial features are recessional, i.e., they are formed by retreating ice. Materials deposited during glacial advance are usually overridden and destroyed or buried before the glacier has reached its maximum.

**Till:** unstratified drift (e.g., material not organized into distinct layers), ice-transported, highly variable, may consist of any range of particles from clay to boulders. *Ice-deposited* material is indicated by random assemblage of particle sizes, such as clay, sand and cobbles mixed together. *Ice-worked* material is indicated by sharp-edged or irregular shaped pebbles and cobbles, formed by the coarse grinding action of the ice.

**Outwash:** stratified drift (e.g., material organized into distinct horizontal layers or bands), water-transported, consists mainly of sand (fine to coarse) and gravel rounded in shape. Meltwater streams flowing away from glacier as it recedes carries particles that are sorted by size on deposition dependent upon the water flow velocity – larger particles are deposited in faster moving water. *Water-deposited* material is indicated by stratified layers of different sized sand particles and smooth rounded pebbles, consistent in size within each band. *Water-worked* material is indicated by smooth, rounded particles, formed by the fine grinding action of particles moved by water.

**Ice-contact Material:** partially-stratified or unstratified drift, usually consisting of sand and gravel. This material was originally water-deposited (stratified) on or in glacial ice, then slumped when ice melted, thus mixing the material and destroying stratification.



## B. Landforms

**Moraine:** an accumulation of till deposited by direct glacial action. *Ground moraines* are relatively level to gently rolling and are formed by the deposition of accumulated material beneath the glacier. *End moraines* are ridgelike accumulations of drift built along any part of the margin of an active glacier. An *interlobate moraine* is a moraine built between two adjacent lobes of a glacier. The material composition of moraines depends on the material in the path of the glacier that deposited it. In southern Michigan, most moraines have a substantial clay component, while in northern Michigan, many moraines have much more sand than clay.

**Outwash:** relatively level to gently rolling topography, usually found at lower elevations in the landscape. Outwash may be intermingled with morainal landforms due to local glacial re-advances. There may be deposition of till during glacial advance followed by outwash deposition upon retreat, or vice versa. Along the margins of such areas, such a *lithological discontinuity* may be close enough to the soil surface to cause distinct differences in texture and structure between upper and lower horizons. Note that these differences are unrelated to the processes of weathering following parent material deposition (e.g., they are not pedogenic).

**Kame:** a mound-like hill of ice-contact stratified drift. Kames are formed when sediments lodged in crevasses in or on the surface of stagnant ice are deposited when the ice melts away.

**Kettle:** a round basin created by the melting of a block of ice buried within glacial drift. Frequently observed in association with kames in a type of ice-contact topography known as *kettle-and-kame topography*.

**Esker:** a long narrow ice-contact ridge. Eskers are usually sinuous and are composed of stratified drift. They typically originate in tunnels at the base of a glacier during a late phase of deglaciation when the ice is thin and stagnant.

**Lake Plain:** level to gently-sloping extent of stratified drift, usually silty, originally deposited in a lake held in a temporary basin. Most lake plains were formed by the margin of a glacier advancing over ice-free ground that sloped down toward the glacier. An example is the Erie lake plain to the south of Ann Arbor.

**Beach Ridge:** a long, broadly curve-shaped, gently sloping, sandy deposit formed by the action of wind and waves. Originally a beach of a former glacial lake. There are often several beach ridges associated with a glacial lake, corresponding to different levels where the lake stood.