EXPLANATION

Thickness (in feet) of drift in glaciated areas and of outwash and glaciolacustrine deposits in sediment-filled valleys beyond the glacial boundary.

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The Drift-Thickness Map of Ohio depicts the thickness and distribution of glacially derived sediments (called drift) and post-glacial stream sediments overlying the buried bedrock surface. This map was produced by subtracting bedrock-surface elevations from land-surface elevations to produce a residual map of drift thickness (see fig. 1). Colors portray thickness intervals of glacial and modern sediments, which range up to several hundred feet.

Prior to the onset of continental glaciation about 1.8 million years ago, the Ohio landscape was dominated by rolling hills and deeply incised, mature rivers and streams. Erosion and deposition by Ice Age glaciers advancing into northern and western Ohio produced a low-relief land surface compared to the unglaciated, high-relief land surface of southeastern Ohio.

Drift thicknesses in western and northern Ohio are highly variable, a consequence of numerous geologic factors. In some areas, drift has been deposited on a relatively flat bedrock surface and changes in drift thickness primarily are the result of variations in the amount of glacial material deposited. In other areas, drift has infilled deeply incised bedrock valleys, and changes in drift thickness primarily are the result of variations in bedrock-surface elevation. In still other areas, the drift surface parallels the underlying bedrock surface to produce areas of relatively uniform drift thickness (fig. 1).

Distinct, narrow linear patterns of thick drift in western and central Ohio are the result of deep incisions in the underlying limestone and dolomite bedrock by a large, northwest-flowing drainage system—the Teays Valley—which existed prior to and during early glaciations (fig. 2). The main Teays Valley entered Ohio at what is now Wheelersburg (Scioto County), where remnants of the Teays Valley still are evident on the land surface. At Chillicothe (Ross County), the valley disappears under glacial sediments that cover western Ohio. However, the valley continues north, below the surface, to Circleville (Pickaway County) and then northwest to Mercer County where the valley exits the state into Indiana. Early southward-advancing glaciers blocked the north-flowing river system of the Teays and created immense lakes in southeastern Ohio (Hansen, 1995).

In northeastern Ohio, narrow areas of thick drift located south of Lake Erie also were preglacial bedrock valleys. These valleys were partially filled with thick deposits of till and glaciolacustrine (glacial lake) sediment and then re-excavated later by northward-flowing rivers, such as the Cuyahoga River and the East Branch of Rocky River.

In northwestern Ohio, repeated scouring of the relatively soft bedrock surface by glacial ice flowing southwestward from the Lake Erie Basin destroyed most pre-existing drainage systems. In this part of Ohio, the bedrock surface is smooth and the upper surface of the drift has been planed off by both wave action and deposition by a post-glacial, high-level ancestral Lake Erie. In the extreme northwest corner of Ohio, in Williams County and portions of Defiance County, drift thickness considerably because of numerous moraines that formed along the northwestern edge of the Erie Lobe.

In western Ohio, draping linear features of thick drift, called ridge moraines (fig. 1), formed along the temporarily stationary ice front as glacial sediment was released from the ice. These ribbons of thick drift define the lateral dimensions of glacial lobes. Many ridge moraines in western and northeastern Ohio have a draped appearance because southward-flowing ice, impeded by bedrock highlands, moved more easily along major lowlands. The numerous resistant bedrock highlands in northeastern Ohio caused ridge moraines to be especially curved and closely stacked.

Southeastern Ohio is unglaciated and devoid of ice-deposited sediment (glacial till). However, many valleys in this area carried huge volumes of glacial meltwater away from the ice front and toward the Ohio River. In the process, many of these valleys at times were made deeper by the erosive force of fast-flowing meltwater streams. At other times, these valleys were partially filled with sediment. Some valleys in unglaciated Ohio contain thick deposits of clay and silt which accumulated on the bottoms of lakes that formed when glacial ice blocked the flow of rivers or when rapidly accumulating meltwater sediments blocked the mouths of smaller tributaries.

This map is a reduced version of Map SG-3: Shaded Drift-Thickness Map of Ohio (Powers and Swinford, 2004). For more information or to order a copy of Map SG-3, visit the Geologic Records Center, 2045 Morse Rd., Bldg. C, Columbus, OH 43229; or call (614) 265-6576; or visit the Division of Geological Survey website: OhioGeology.com.

REFERENCES