

THE LATE WISCONSINAN LOBATE ICE MARGIN ON LONG ISLAND

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The southern margin of the last ice sheet in eastern North America, the Laurentide Ice Sheet, expanded southward to nearly 40° N., reaching its most temperate position in this region about 22,000 years ago. While ice advance was essentially synchronous across the region, the ice margin moved differentially, controlled by topography and bedrock. Upland areas and resistant bedrock impeded ice flow, while deep valleys and softer rock, such as valley fill sediments and deeply weathered crystalline rocks, facilitated advance. Consequently, the ice margin attained an irregular shape, with pronounced salients and sharp re-entrants, defined by geologists as a lobate ice margin. In the context of eastern North America, the dominant lobes of the ice sheet match major regional topographic features from the Great Lakes basins to the submerged topography of the Atlantic continental margin. Major lobes occupied the Lake Michigan and Lake Ontario basins, for example, as well as the South Channel basin off the New England coast. In other areas, relative advances were controlled by lower order bedrock and topographic features. Ice of the Ontario Lobe covered all of west and central New York State except for the Salamanca re-entrant in the southern tier. Ice also plugged east-west valleys riding on softer Paleozoic bedrock and eventually merged with south-flowing Laurentide ice to cover the intervening mountains.

Advancing toward the southern New York-New England region and the Long Island Platform, the ice expanded more readily through the deep north-south river valleys that dissected the Precambrian and Paleozoic upland. Thus, the Hudson-Champlain valley complex, the Connecticut Valley, a Mesozoic sedimentary and structural basin, and the Narragansett Bay Lowland, a basin dating to the late Paleozoic, allowed lobes of Laurentide ice to first confront the off-lapping Mesozoic-Cenozoic strata of the Atlantic coastal plain, while the mass of the glacier slowed against the granitic upland. Ice of the Hudson-Champlain Lobe also flowed furthest south, covering Staten Island and casting outwash into eastern New Jersey, as well as spreading laterally toward Long Island. The Connecticut Lobe covered central Long Island with a south-curving arc of moraine and outwash, while the eastern Connecticut-western Rhode Island lobe, or sublobe, of the glacier impacted eastern Long Island.

Where lobes collided, as between the Hudson-Champlain and Connecticut lobes, zones of interlobate morphology of varying dimension developed, ranging from broad avenues for ice, water and sediment outpouring to simple turning angles (Figure 1). Central to the glacial geomorphology of Long Island during the late Wisconsinan is the massive interlobate zone that lies between the Hudson-Champlain Lobe and the Connecticut Lobe, in central Long Island, south of Huntington. The expanding ice sheet had already overtopped the east-west Cretaceous cuesta to the north and stacked massive blocks of Cretaceous strata, surrounded by late Wisconsinan gravel, in the moraine. Meltwater, much of it channeled between and below the ice lobes, carried quantities of sediment southward, forming a massive delta complex, ranging from topset channel gravels in the north, to cross-bedded foreset sands and gravels to thick bottomset silts and clays in the southern reaches. Diamicts interspersed in the delta strata may be related to the subaqueous distribution of glacial debris. Today, the Interlobate Zone stands as a north-south trending range of hills dissected by gravel-filled, late-glacial meltwater channels that intersect the apparent east-west lincation of the end moraines. The depositional fabric of this interlobate zone helps define the dynamic environment created when these lobes merged.

Two other large interlobate nodes formed along the eastward reach of the ice sheet, as seen in the configuration of the terminal moraine, the thickening of the end moraine south of Riverhead and the Interlobate Zone south of Sag Harbor. The latter feature formed between the Connecticut Lobe and an eastern Connecticut-western Rhode Island Lobe, and was a source of high meltwater flow resulting in dead-ice terrain and pater noster lakes. Remarkably, interlobate features persisted or developed during recession of the ice sheet. Lobate morainal segments, such as the Northport, Stony Brook, Setauket and Mt. Sinai moraines, formed during glacial recession between the Hudson-Champlain and Connecticut lobes, northeast of the early Huntington Interlobate Zone, culminating during further recession of the ice in the pronounced interlobate angle that formed between the Sands Point Moraine of the Hudson Lobe and the Roanoke Point Moraine of the Connecticut Lobe north of Smithtown. Furthermore, the northerly receding array of interlobate angles in the four recessional moraines between the South Fork and the North Fork of eastern Long Island, with nodes at Sag Harbor, North Haven, Shelter Island, Gardiners Island, and Rocky Point serve to illustrate this geomorphology.

