

## **TRACING OF LINEAR PATTERNS ON REMOTELY SENSED IMAGERY OF LONG ISLAND ONTO THE NORTH AMERICAN CONTINENT**

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Side-looking Airborne Radar (SLAR, or SAR) imagery of Long Island, and southeastern New York State, northeastern New Jersey and southern New England was studied to determine linear and other regional structural trends. This imagery shows regional terrain textures and trends well. These trends correlate well with geological provinces mapped on the mainland of the North American continent. Long Island, a 120 mile (198 km.) “gift from the glaciers,” parts of which underlie the two New York City Boroughs of Brooklyn and Queens, and Nassau and Suffolk Counties, sub-parallel the coast of Connecticut from its border with New York State, almost to its border with Rhode Island. The space intervening between Long Island and the coasts mentioned above is the estuary known as Long Island Sound.

Study of the remotely sensed imagery, simultaneously with cultural, topographic and regional tectonic and geologic maps from both shores of Long Island Sound brings some interesting patterns together. First: Long Island has much more frequent and deeply incised patterns of bays at its western end, which lies opposite the New York City Boroughs of Manhattan, and the Bronx, and the northwards continuation of the Reading Prong in Westchester County, New York, than in the central section of the island. Second: there is a common matching of towns between the north and south shores of Long Island Sound, and that these towns are commonly associated with embayments, and or promontories along the coastline. Third: if linears are traced from patterns seen on the mainland across Long Island Sound, and out into the Atlantic Ocean, or if the alignment of matching embayments/promontories and towns are extended towards the continent, they turn out to be the same trends. It could be plausible that there is a cross fabric of structures extending landward across Long Island onto the North American Continent.

The glacial-fluvial- marine character of Long Island has largely kept it from being thought of as related to any basement terrain. Most classical geology texts, or physiographic diagrams show Long Island as a component of the northeastern section of the Coastal Plains Province (e.g. A. K. Lobeck’s, Physiographic Diagram of the United States 1922-1979 editions). Lobeck attributed the origins of Long Island Sound to erosion of the lowest and weakest of the Coastal Plains formations, which abuts against the basement he referred to as the “Old Land of the Interior.” According to Lobeck, this erosional notch, or “Inner Lowland” of the Coastal Plain shows its expression in the province’s northern reaches as Buzzards Bay, Long Island Sound and Raritan Bay. This interpretation of the structure underlying Raritan and Buzzards Bays, and the Long Island Sound infers a continuity of structure along the coastline of North America. There is, however, a large structural bend, which changes the direction of the North American coastline, with its hinge point located in the vicinity of the New York Bight and the City of New York. This same area could also serve as a curve center for tracing the change in the direction of the Appalachian Mountain Chain further inland. This directional change of the Appalachians is commonly referred to as the Northern Appalachian Reentrant (J. Rodgers, The Tectonics of the Appalachians).

The area around New York City is one in which the crystalline rocks of the older Appalachians are in direct contact with the Atlantic Ocean and its estuarine systems. At this point, the coastal exposed coastal plain is very narrow. This area is also associated with the deeply cut Hudson River Canyon which incises the Continental Slope of the North American continental margin.

Prof. John E. Sanders, Jr. (personal communication), and in a published a paper suggested that there might be a “broad terrain of Triassic” buried beneath Long Island. At the time he first expressed his thoughts on the subject, aeromagnetic and gravity charts of the eastern seaboard were not yet published. With the publication of Zeitz et.al.’s aeromagnetic and gravity studies, his ideas on the possibility of this were given more credence. The area of Long Island, which lies opposite the Hartford Basin area of Connecticut, has a smoother coastline than the areas which are opposite older crystalline rock units. It might stand to reason that the bedrock below a graben structure might be covered by more sedimentary layers and, hence, overlying topography might not reflect ancient linear patterns. Relatively recent tectonic maps have inferred that there is Triassic beneath Long Island.

It is plausible that Long Island’s embayments, and promontories might reflect ancient and long lived tectonic lineaments which join the structures of the seafloor to those of the continent. This is a line of thinking I hope many people will follow both shoreward and out to sea. This preliminary study needs to be followed up by intensity comparisons of linears from digital data.