

# Abstract

The borough of Staten Island in NYC exhibits a unique suite of rocks. The most abundant rock is serpentinite, a very soft, absorbent, and argillaceous rock, consisting of serpentine (mostly the variety antigorite), with accessory minerals of chrysotile, magnetite, montmorillonite and talc.

# Introduction

The Staten Island area is very interesting geologically. With rocks spanning up to 500 million years of history, despite being covered with glacial deposits.

Staten Island is the southernmost part of both the city and state of New York, with Conference House Park at the southern tip of the island and the state. It is the third largest of the NYC boroughs, with a total area of approximately 150km<sup>2</sup>. Travel to Staten Island consists of taking the Ferry. Take the Ferry to St George Ferry Station, then the S61 to Slosson Ave. Then, walk under the highway bridge to Lightner Street and begin surveying observing the area and examining rocks.

# Major Unit

Staten Island Serpentinite, which underlies the "highlands" of Staten Island, is situated between the Newark Basin to the west, and the coastal plain to the east. The Manhattan Prong, a geologic province northeast of Staten Island, contains metamorphosed rocks belonging to the New York City group.

# Geology of Staten Island

By Erica Pittman, Shakira Fernandez and Dorothy Rosensweig

# Site Description

The serpentinite outcrop is located on the end of Lightner St. behind the garden of the last house, and it's situated in a road cut, which has been prepared by Moser to build a highway. Although the project failed, fortunately geologists now have a place where serpentinite can be observed and collected.

Conference House is a historic house, and is surrounded by a park, and a beach. Our area of research is the beach, where there are moraine outcrops and glacial deposits. Partially disturbed by the super storm Sandy. The beach, where we can collect a lot of rock fragments of different compositions.

# Rock Description

Staten Island serpentinite is a soft, water absorbent rock, which easily slides down along slopes due to gravitational pull, due to argillaceous mineral montmorillonite. Exhibits a tectonized, fractured and contorted structure.

Conference House area exhibits a recent beach and the source of the gravels and beach sand which is a glacial till.

Glacial till contains a variety of rock fragments from different origin. Rock fragments are angular and sub-angular, a few of them are even sub-rounded. The rocks belong to all of the formations from Manhattan Prong, most of them come from Newark Basin formation and Atlantic coastal plains. Some pebbles are rounded milky quartz and chert, but the majority of the fragments are sandstone, shale, arkose, diabase, rhyolite, and hornfels.

# Conclusion

S.I. Serpentinite is a relic of the Taconic Orogeny ophiolites—dismembered ancient oceanic crust, showing an extremely tectonized rock with repeated hydrothermal metamorphism & supergene weathering. Most of the Serpentinite body in Staten Island is covered with glacial till which develop on top a better soil and vegetation. Conference House area exhibits a recent beach and the source of the gravels and beach sand. The complex variety of gravel's petrographic composition bring together rocks from Hudson Highlands, Manhattan Prong, Newark Basin and Atlantic Coastal Plain

# References

<http://3dparks.wr.usgs.gov/nyc/parks/loc7.htm>



Slickenside along a fault



"fresh" Serpentinite



Serpentine turning to montmorillonite



Variable alteration & weathering of serpentinite



Vegetation growing on glacial debris, not on weathered serpentinite



Glacial debris, and serpentinite fragments



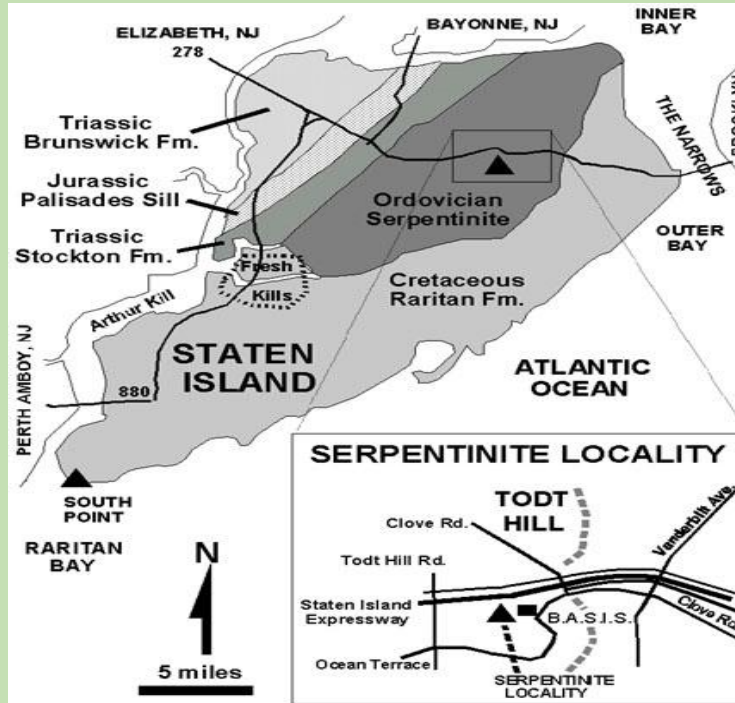
Glacial deposits at Conference house beach



Students on the Conference house beach collecting rocks



Glacial deposits at Conference house after the mega storm Sandy



Cut road to be filled



Partially filled Serpentinite Quarry



Serpentinite, & smectites



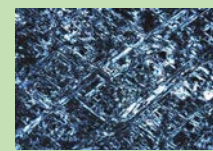
Montmorillonite & Calcite



Conference House beach sand/gravels



Erratics and glacial deposits in Lightners street



Serpentinite under a microscope

