Orchard Beach Field Trip

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GEOLOGY

Abstract

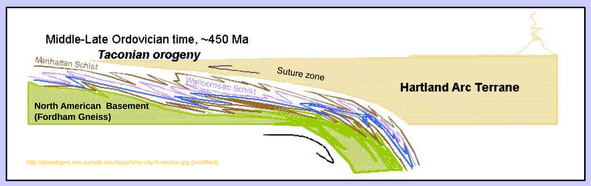
In Orchard Beach we found amphibolites, gneiss, granofels, mica schists, migmatites, pegmatites, milky quartz, and marble. These rocks are made up of minerals such as hornblende, biotite, muscovite, K-feldspar, tourmaline, garnet, apatite, quartz, limonite, kaolinite, epidote, calcite, pyrite, and plagioclase. The parent rocks of the area are turbidities and ophiolites from a fore arc basin. The area was formed mostly during the Taconic orogeny in the Ordovician. Many of the rocks present originated away from the site and was transported and is therefore allochthonous. In the Pleistocene and Holocene the area underwent glacial erosion and weathering.

Introduction

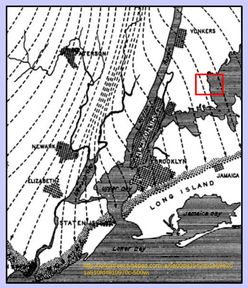
Orchard Beach is a man-made beach; it was created in the 1930's. It is part of Pelham Bay Park, New York City's largest public park with ~2,800 acres of land. Orchard beach itself is 115 acres. On the day of the trip, the weather was sunny and warm. We left Hunter at 3:30 PM and took the 6 train to the last stop, Pelham Bay Park. We took the Bx 27 to the site, and began our surveying.

Major Unit

Pelham Bay Park sits on top of the Hartland formation. The Hartland formation formed ~450 Ma as a result of the collision of the North American Plate with the Hartland arc terrane. This collision resulted in the beginning of the Taconic orogeny; rocks in the New York City area underwent deformation, granitic intrusion, and high grade deformation.



During the Pleistocene Epoch, there were glacial advances. The most recent being the Wisconsin ice sheet which left the biggest impact on NYC and Orchard Beach. The glacier deposited gravel, pebbles, erratic boulders (glacial till) from the Palisades as well as bedrock sources nearby.



Satellite Map

Site Description

Orchard Beach is a man-made beach built with sand imported from Rockaway Inlet. The beach is located is located in Pelham Bay Park. The area sits on top of the Hartland Formation, created during the Taconic Orogeny when a foreign terrane collided with the continent and subsequently became accreted onto the coastline. The westward thrust of the terrane created the crystalline Hartland Schist bedrock, which extends up to Cameron's line. The site contains the following rock types: gneiss, amphibolite, migmatite, pegmatite, quartz veins, marble, ptygmatic folds, pearl gneiss, and boudines. The following minerals can be found here: K-feldspar, quartz, biotite, muscovite, hornblende, garnet, pyrite, limonite, kaolinite, calcite, tourmaline, plagioclase, and chlorite. Glacial tills are abundant, with large erratic boulders littering the area.

Rock Description

1. Glacial striations.
2. Hydrothermal alteration of seafloor rock, with sulfides present.
3. Patches of country rock in pegmatite.
4. Glacial erratic, possibly palisades diabase.
5. 5. Ultramafic pyroxenite boulders.
6. Pearl gneiss with migmatic texture.
7. Boudine
8. Ptygmatic vein.
9. Boulder in which amphibolite has turned completely to biotite.
10. Biotite-hornblende schist outcrop with NE-SW strike and dip angle of 42° to the South.
11. Crosscutting quartz vein.
12. Outcrop of Hartland Formation bedrock.
13. Pegmatite boulder with K-feldspar, some of which may have been weathered to kaolinite.
14. Hudson Highland gneiss showing good banding and quartz veins.
15. Agmatite, a migmatite containing biotite. Biotite mass has been melted and recrystallized.

Conclusion

In the Ordovician the Taconic orogeny began. The Hartland Arc Began to crash into the North American basement rock. This caused extreme temperatures and pressure creating the metamorphic rocks seen in Orchard Beach. As fractures formed in the rocks melted quartz was deposited in the cracks and hardened to form quartz veins. Hydrothermal weathering also affected rocks in the area oxidizing the iron in the rocks. In the Pleistocene and Holocene, glaciers were passing over Orchard beach eroding the rocks as well as depositing erratic boulders from places like the Palisades as well as from surrounding bedrock.

References

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