

Stop 7. Moraine to Outwash Plain

An outwash plain is the region in front of a glacier where melt-water streams deposit sediments (Fig. 7.). Outwash plains are relatively flat compared to moraines and the sediments are better sorted since they were carried by flowing water. A core sample extracted from this area in 2007 showed sorted sand and gravel typical of stream deposits. At about one meter down, fragmented cobbles were found. One possible explanation for this is that the glacier had advanced this far south depositing the layer of till. As the glacier retreated north to a position in Clara's Woods, melt water streams would have deposited the sandy gravel on top of the till.

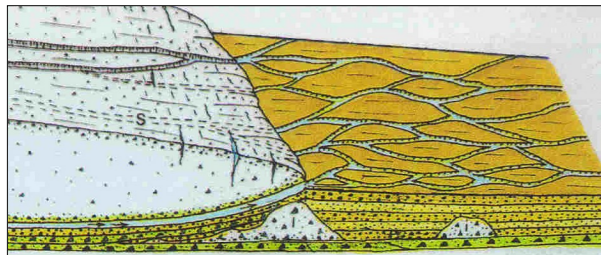
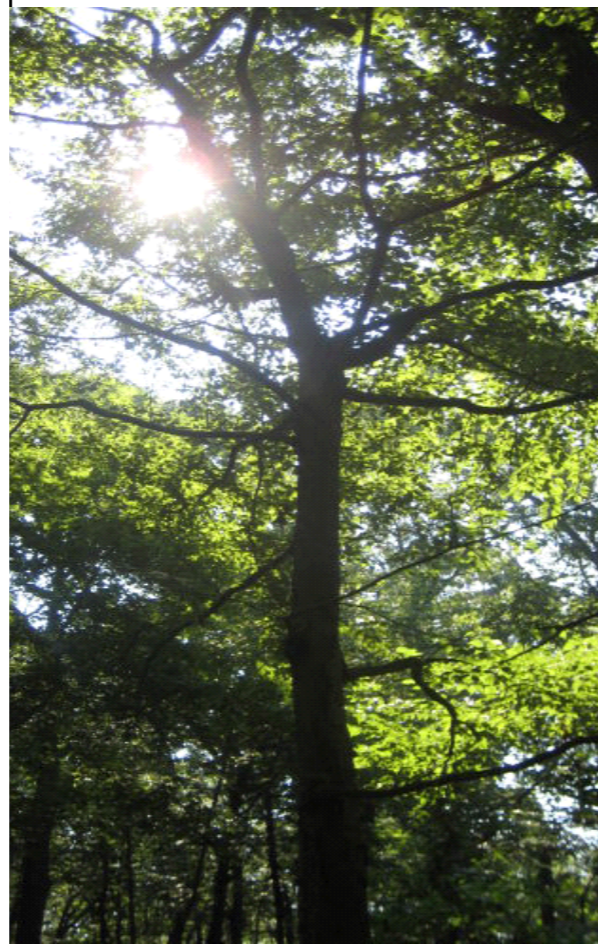


Figure 7. (To the left) Formation of an Outwash plain. Melt water streams carry sediment from the glacier and deposit it in horizontal layers. Notice that there is a layer of glacial till below the outwash sediments.
 ▲ =Till

The Geology of Clara's Woods

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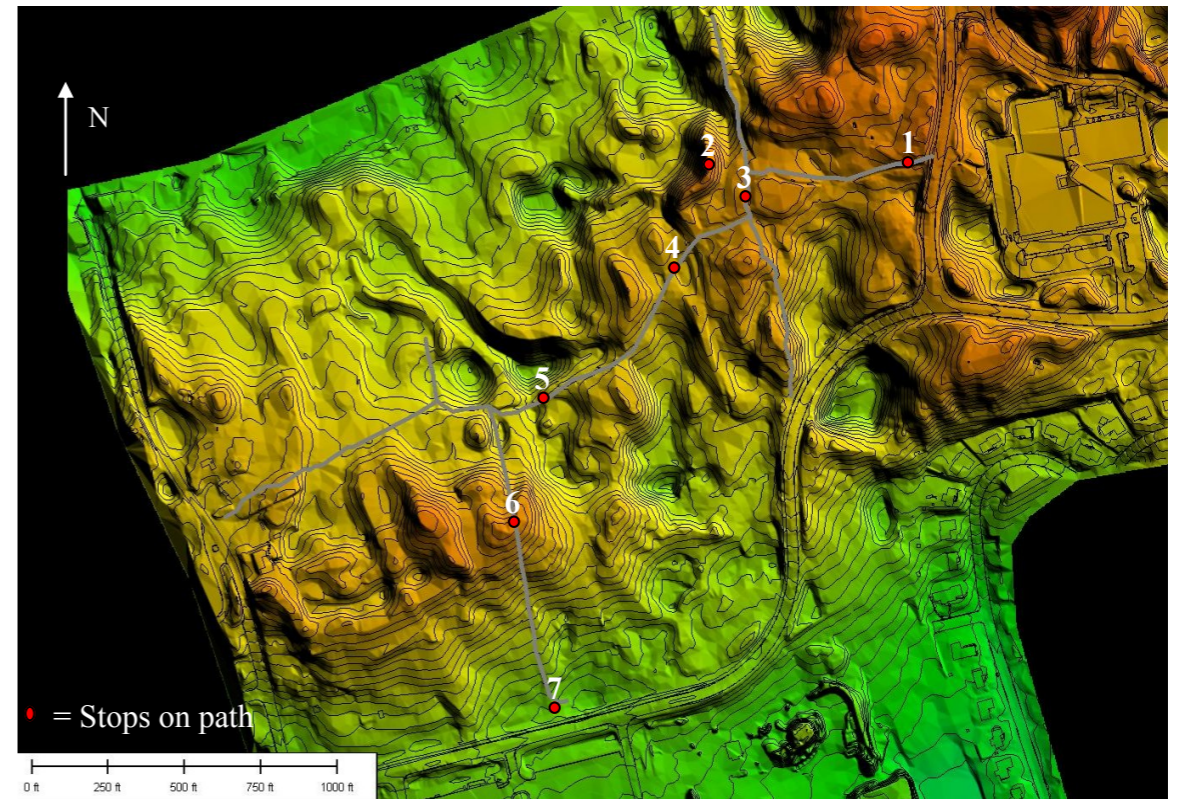


Figure 3. (above) Digital Elevation Model of

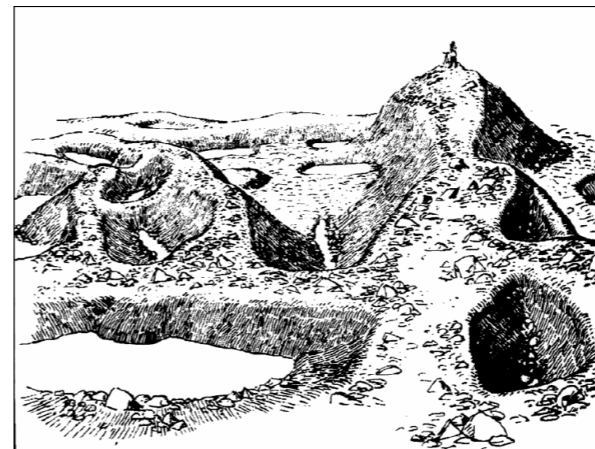


Figure 4.. Hummocky Terrain in Sweden



Figure 5.. Hummocky moraine in front of Austra Broggerbreen, Svalbard.

***Caution: be on the watch for poison ivy and ticks.**

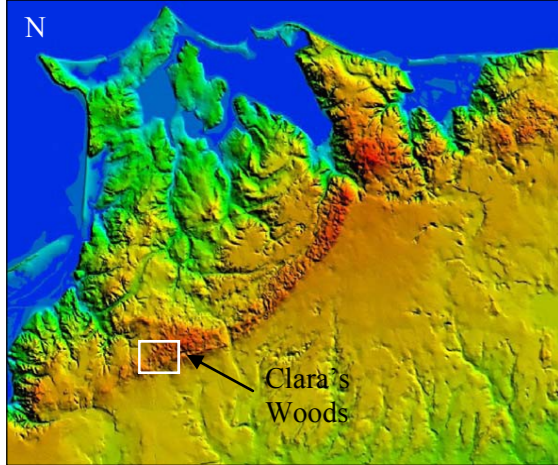


Figure 1 . "A Digital Elevation Model showing the Stony Brook Moraine." (Hanson, 2004).

Stop 1. Introduction

About 20,000 years ago this region was covered by glacial ice. The Laurentian Ice sheet extended as far south as Stony Brook Campus depositing and pushing sediment as it moved, forming the Harbor Hill Moraine, locally known as the Stony Brook Moraine. Fig. 1 is a digital elevation map of the region highlighting Clara's Woods which is on the moraine. The stops for this walk are located on the digital elevation model of this area in Fig. 3. This part of the moraine is a hummocky terrain which is characteristic of the front of the glacier where the ice was stagnant, that is, no longer flowing. This type of terrain forms when stagnant glacial ice melts, leaving depressions in the ground where the ice was. Surrounding the holes are hills and ridges made up of glacial sediments

that washed off of the ice as it melted (Fig. 2). As you walk through Clara's Woods, notice the topography.

Stop 2. Ridge

At stop two we are standing on the top of a ridge. Compare the map in Fig. 3 with the illustration of a hummocky terrain in Sweden in Fig. 4. Both figures clearly depict a series of hills, ridges and depressions. The view from the top of this ridge is similar to what you would see if you were standing on the ridge in Fig. 4. Now compare Fig. 4 to Fig. 5 which is a photograph of a developing hummocky terrain showing the same pattern of depressions, hills and ridges.

Ground penetrating radar revealed an abundance of cobbles and boulders along the sides of this ridge. Directly under the center of this ridge is a clay rich layer discovered by resistivity experiments. These results are characteristic of hummocky terrain because as the ice melted, sediments were deposited

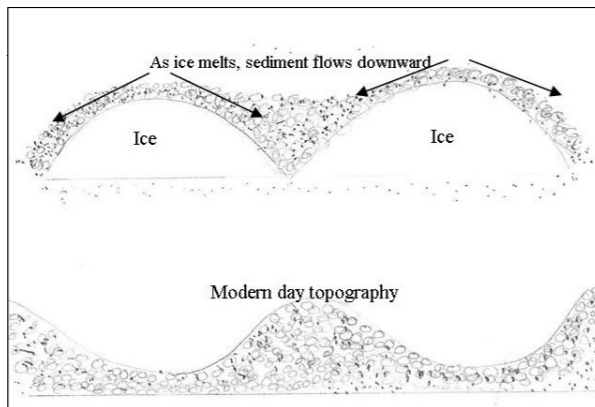


Figure 2.. Cross section of stagnant ice covered with till at the front of a glacier showing the formation of hummocky terrain. (J. Cacioli)

on the sides of the ridge, and clay rich sediments settled in a small pool between the mounds of ice (see Fig. 5).

Stop 3. Boulder

How large do you think this boulder is? Consider other boulders you have seen on campus. During a glacier's migration it bulldozes sediments and large rocks. The force of the glacier can remove pieces of bedrock and carry them. This boulder was once part of the igneous bedrock to the north of Lon Island. If you look closely, you can see the minerals in the rock. They are mainly quartz and feldspar.

Stop 4. Till

Look at the ground. What you are walking on is glacial till. Till is unsorted material composed of clay, silt, sand, pebbles, cobbles and boulders. This till was formed at the base of the glacier where it was compressed by the weight of the glacier. This till preserves the landscape because it is very resistant to erosion. As a result the till preserves the hummocky landscape you see in Clara's Woods.

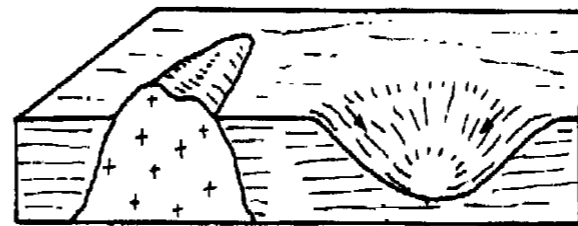


Figure 6. Formation of a Kettle. (Martini, et al, 2001)

Stop 5. Kettle

If you look to the right of the path, you'll see a bowl shaped depression. This is a kettle. Fig. 6. depicts the formation of a kettle. Imagine that the figure shows a boulder instead of ice. What would happen if you pulled the boulder out of the ground? A hole would remain. This is essentially what happens with the formation of kettles. A chunk of buried ice melts, leaving a depression behind. Hills and kettles are characteristic features of hummocky terrain.

Stop 6. Hill

You have just walked up to the highest elevation on our trip. Ground Penetrating Radar (GPR) studies at this site help us to understand how this region formed. GPR sends radar signals into the ground and creates a map based on what the signal bounces off of. GPR data at this location reveals a compact layer of cobbles within centimeters to meters of the surface below us. Cobbles are rock fragments that range in size from ping pong to basketball size. Also, below us are boulders ranging from one to two meters in size. Distinct layers dotted with glacial till can be detected in the data. Perhaps these layers are evidence of glacial melt-water streams that flowed as the glacier melted. Differences in slope among the layers may mean that the glacier advanced and retreated pausing here for long periods of time. It's possible that, as the glacier remained at this point, it dumped the material (till) that formed this hill.