

Geology 202
Lab 7
Dunes in the Pinebush Preserve
Fall, 2006

General

In this lab, we will focus on sand dunes in the Pinebush Preserve, which comprises 2000 acres between Albany and Schenectady, and in Central Park in Schenectady. The sand dunes in the Pinebush are stratigraphically above sediment of Glacial Lake Albany. These dunes were deposited 5,000-10,000 years ago and are presently inactive. The existence of sand dunes in the region attests to very different environmental conditions at the time of dune deposition. A basic knowledge of these dunes can be used to gain a better understanding of these paleoenvironmental conditions, which include wind direction, wind velocity, sediment availability, and abundance of vegetation.

Sandy soils and frequent natural forest fires have produced the rare and presently-endangered pine barrens ecosystem. Vegetation is dominated by pitch-pine and scrub oak and animal life includes the Karner Blue Butterfly, a threatened species.

Tools Needed:

- field notebooks
- brunton compasses
- 3, 3-m long ropes
- 2 meter stick
- survey tape and stakes
- soil augur
- sample bag
- regional DEM

Objectives

- 1) to determine the type of sand dunes that are present
- 2) to determine the direction and velocity of wind flow that was responsible for dune formation
- 3) to determine whether vegetation was present in the region during the time of dune migration
- 4) to form a hypothesis for the origin of the dunes in the Pinebush during the early Holocene

Part I. In the Field (for both the Pinebush and Central Park dunes).

Measurement of the Orientation of a Dune Crest. We will select one of the largest dunes and divide into teams. Two of the teams will measure the orientation of the dune crest using a 3-m long rope and brunton compasses. The rope will be stretched out between two students and the third will measure the trend of the line and record the result. The process will be repeated for the entire length of the dune. Make a note of which data point corresponds to the point in the dune crest where teams 3 and 4 are measuring their profile. These data will be used to determine the type of sand dune present.

Measurement of the Profile of a Dune Crest. The third and fourth teams will follow the procedure that we used to measure the profile of the Plotterkill slide, we will measure the profile across the crest of our selected dune. These data will be used to determine the type of dune, and direction of paleowind.

Determination of the Grain Size Distribution of Dune Sand. With a soil augur, we will sample dune sand beneath the zone of weathering on the crest of our dune.

Part II. Data Processing

Graphical Representation of Dune Crest. Using compiled data, you will produce a dune crest map; we will go over the procedure in class.

Profile of Dune Crest. Using compiled data, you will then produce a dune cross section using EXCEL using the same procedure that we used for the Plotterkill landslide profile. Be sure to include the relative starting and ending directions (e.g., SW-NE).

Part III. Air Photo Mapping

You can view the Pine Bush dune field on aerial photographs 1170: 39 (S)—37 (N). These will be on the shelf in the back of the classroom. Map the crest of each dune by drawing a colored line along the crest of the dune on the photocopy of air photo 1170: 38. Map all dunes north of I (90).

Report (Due Thursday 10/28):

A ≤ 5 page report that addresses the following questions:

- What was the paleowind direction during deposition of the dune field?
- What was the maximum paleowind velocity (see Ritter et al., 2002, p. 279)?
- What was the average paleowind velocity (see Ritter et al., 2002, p. 279)?
- What types of sand dunes are present in the dune field?
- Was there much vegetation in the region during the deposition of these dunes?
- Why are *fossil* sand dunes common in the eastern Mohawk and central Hudson Valleys?
- How are the sand dunes different in the eastern and western sectors of the Dune field? (see DEM image).
- Is wind velocity today sufficient to move create sand dunes? (NOTE: to answer this you will need to determine the *average wind speed* of the region—to do this you will need to explore the Internet- a good place to start is <http://lwf.ncdc.noaa.gov/oa/climate/online/ccd/avgwind.html>)

Figures and Table:

Your report should have at least two tables and at least four figures. Mandatory tables and figures are:

- Table 1 will be the raw data on EXCEL; this will be placed after the figure(s) in your report; try to consolidate all of your raw data so that you can put it all in one table on one page
- one figure will be your dune crest map from the Pinebush
- one figure will be your dune crest map from Central Park
- one figure will be the dune profile from the Pinebush
- one figure will be the dune profile from Central Park
- one figure will be the DEM map, which is available on the web page
- one figure will be the photocopy of air photo 1170: 38.