Tombstone Weathering Lab

Overview

We will estimate the extent of weathering on tombstones at the Saint Louis Cemetery with two different measures: changes in thickness from top to bottom as measured with a caliper and Visual Weathering Class. We'll try to see if different rocks used for the grave markers erode at different rates.

Field Observations (8 points)

Each group will take and record data from several tombstones with readable dates. Record the following data for each stone:

- Type of rock

- Date on the stone

- Visual weathering class (see Appendix)

- Thickness of the stone near the top (in mm)

- Thickness of the stone 25 cm from the top (in mm)

- Other observations (surface texture, details of location (i.e. under trees, etc), tilting of stone, etc.)

After time in the field, we'll share data between groups. Submit all data sheets to the instructor.

Analysis

We'll make the assumption that the two faces of the stone were originally parallel to one another and that weathering (both physical and chemical) has thinned the upper portion of the stone more effectively that the lower portion. Once you have all the data, plot the age of the stone versus difference in thickness from top to bottom on one graph and plot the age of the stone versus Visual Weathering Class on another graph.

Report

Graphs (8 points)

Submit your graphs with your report.

Questions (4 points)

Answer the following questions.

1) Describe in words the results shown in your graphs. What is the rate of weathering?

2) Do you think the assumption of originally parallel surfaces of stones is reasonable? Explain your reasoning.

3) Does the qualitative visual weathering class correspond to the quantitative measure of change in thickness? Explain your answer.

4) What factors might account for some of the scatter in the relationship between age and weathering?

Proposal (5 points)

Suggest a hypothesis describing how a factor other than age produces differences in the weathering of tombstones at the Cemetery. Outline a research project that would allow you to test this hypothesis – What would you measure? How would you measure it? What result would support your hypothesis?

Appendix: Visual Weathering Classes

Class	Visual Indicators of Class
1	Lettering sharp and distinct. No evidence of change.
2	Lettering slightly rounded showing evidence of some removal of grains. Still legible and clear, though.
3	Lettering rounded. Edges clearly being removed and some original edges removed completely. Still legible and clear.
4	Lettering rounded. All or most original edges removed, lettering still legible, but increasingly becoming indistinct from the surface of gravestone.
5	Lettering disintegrating. Lettering still just about legible, but now almost indistinguishable from the surface of the gravestone
6	What lettering? Lettering virtually disappeared. Need to be able to make out date to be able to date period over which lettering has disappeared.

The visual weathering class is a qualitative measure of how weathered the stone is based on the appearance of the lettering. Edges refers to the edges of the letters.

Scale modified from http://www.envf.port.ac.uk/geo/inkpenr/graveweb/methods.htm

Lab modified from http://www.envf.port.ac.uk/geo/inkpenr/graveweb/methods.htm