Geomorphology
Geology 450/750 – Spring 2006

Lab Exercise 1
Observing, Describing and Measuring Landscape Attributes
Answers to questions due Monday, February 13

Introduction

The goals of this exercise are to:

(1) develop your eye for seeing patterns in the landscape,
(2) develop your ability to describe clearly what you see,
(3) give you an opportunity to pose some of the basic questions about how and why landforms are created, and
(4) challenge you to develop a hypothesis for how you might explain one of the landscape patterns you observe.

We all have lived our entire lives at (or near) the surface of the earth, so we have some familiarity with landscapes. This lab is intended to both clarify and build on your previous ways of seeing the landscape, and also give you a chance to view the landscape with fresh eyes.

One important element of this exercise is to practice separating observation from interpretation. Ideally, observations are objective facts, things other people would see if they followed the same procedure as you did. Interpretations are all the names, explanations and stories we develop as we attempt to make sense of our observations.

The essential principal behind this approach is to have you follow the scientific method for creating new knowledge. Here is an informal list of the step-by-step thinking process that is the Scientific method:

Make initial observations (some phenomenon exists)
Recognize a pattern (it doesn't seem totally random)
Pose a question (why do we see this pattern?)
Invent a hypothesis (a thoughtful guess about what's going on)
Make predictions (if my hypothesis is right then…)
Design an experiment (setting up a test of the hypothesis)
Make systematic observations (collect the data needed to test the hypothesis)
Compare data with prediction (are they consistent?)
If predictions are accurate, then a theory is born, if not, revise the hypothesis.

Procedure

You will work in groups of three (or two), examining three different representations of earth surface topography: a raised relief map, a topographic map, and stereo pairs of aerial photographs. We will come together as a class three times during the lab to report on your group's progress and results, once for each of the three parts (A, B & C) described below.

Each person will turn in their own written answers to the numbered (•#•) questions asked below. List the members of your group and feel free to coordinate and compare your written responses, but make sure to use your own words. As much as possible, all written work should be typed; figures can be attached on separate sheets.

Part A: Observing and describing landscape attributes

Look carefully at the maps and air photos (make sure you get a 3D image through the stereoscopes). How would you describe the topography of the earth's surface to a resident of a planet without a solid surface (a member of an intelligent life form from Saturn or Neptune…)? What patterns do you see?

Make a list of (at least) 10 attributes of the landscape. For example, a trivial yet fundamental attribute of all landscapes is that some points are higher in elevation than others. •1• For each landscape attribute, write a brief (one to three sentence) description, including the raw observations you made and then your interpretation. •2• Also, for each landscape attribute make a simple (line drawing) sketch that defines the attribute visually. Annotate your sketch as needed, with arrows, labels, etc. (Be prepared to reproduce your sketches on the board to show the rest of the class).

Part B: Quantifying landscape attributes

Pick four of your landscape attributes and attempt to measure each one somewhere on one of your maps (you could use the air photos but the maps are likely to be easier). •3• What value did you get? What are the units? •4• Write a brief description of the methods you used to make each measurement.

Part C: Developing a hypothesis and experimental design

Pick (at least) one of your landscape attributes and speculate on why that landscape element occurs. Under what circumstances would it be bigger or smaller, more or less frequent, present or absent? Try to be as specific and as inclusive as possible about the factors that might influence the pattern of occurrence of your chosen attribute. Can you draw a graph that expresses some of your ideas visually? Try to articulate a concise hypothesis, which could be anything from a thoughtful guess to a precise prediction. Think about how you might test your hypothesis: what measurements would you make, how would you decide whether your hypothesis was right or not? •5• Write a paragraph (or more) describing your thinking about what controls the occurrence of this landscape attribute. Include any sketches that might help explain your ideas.