Using Google Earth to Investigate Physical Geography Concepts

Allison Dunn
Worcester State College

Background

- Worcester State College: public liberal arts college; maximum class size of 32
- Physical Geography offered in approximately 12 sections per academic year
- Characteristics of students:
  - Non-science majors
  - Seeking to fulfill science requirement
  - Interest in earth sciences often minimal
  - Recruitment for majors

Course goals:

- Cultivate curiosity about natural world
- Learn how science is used to address questions about the natural world
- Develop critical thinking skills to evaluate scientific issues in the media
- Understand how earth science affects their world

Approach:

- Earth as a system of interdependent spheres (lithosphere, hydrosphere, atmosphere, biosphere)
- Examine processes acting in the four spheres and the *interactions* between these spheres

Google Earth

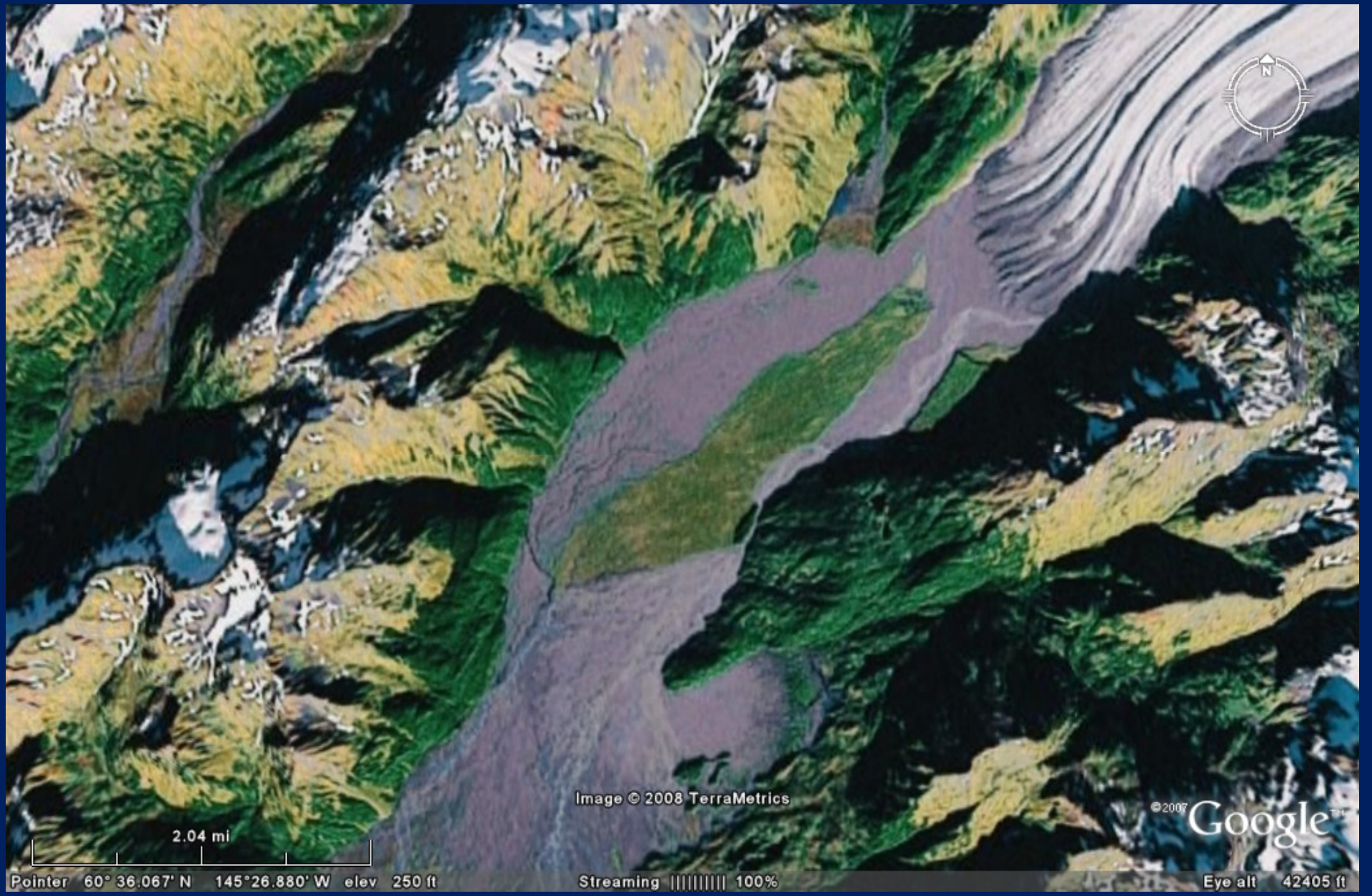
- Free download at earth.google.com
- Interactive mapping tool with different layers incorporating elevation, terrain, geographic and political features, etc.
- Google Earth online community: http://bbs.keyhole.com/ubb/ubbthreads.php/Cat/0

Google Earth assignment

- Students know fluvial and glacial geomorphology basics
- Assignment requires independent application of concepts
- Caveat – this is a work in process! Only one year of experience thus far…

Potential questions….

- Find an example of a braided river (or meandering river, alpine glacier, etc)
  - Braided river: students must think about where these types of rivers are found
  - Thought process: high sediment load → often found near glaciers → look in regions with alpine glaciers


N
Image © 2008 TerraMetrics
©2007 Google
2.04 mi
Pointer 60° 36.067' N 145°26.880' W elev 250 ft
Streaming 100%
Eye alt 42405 ft

Potential questions….

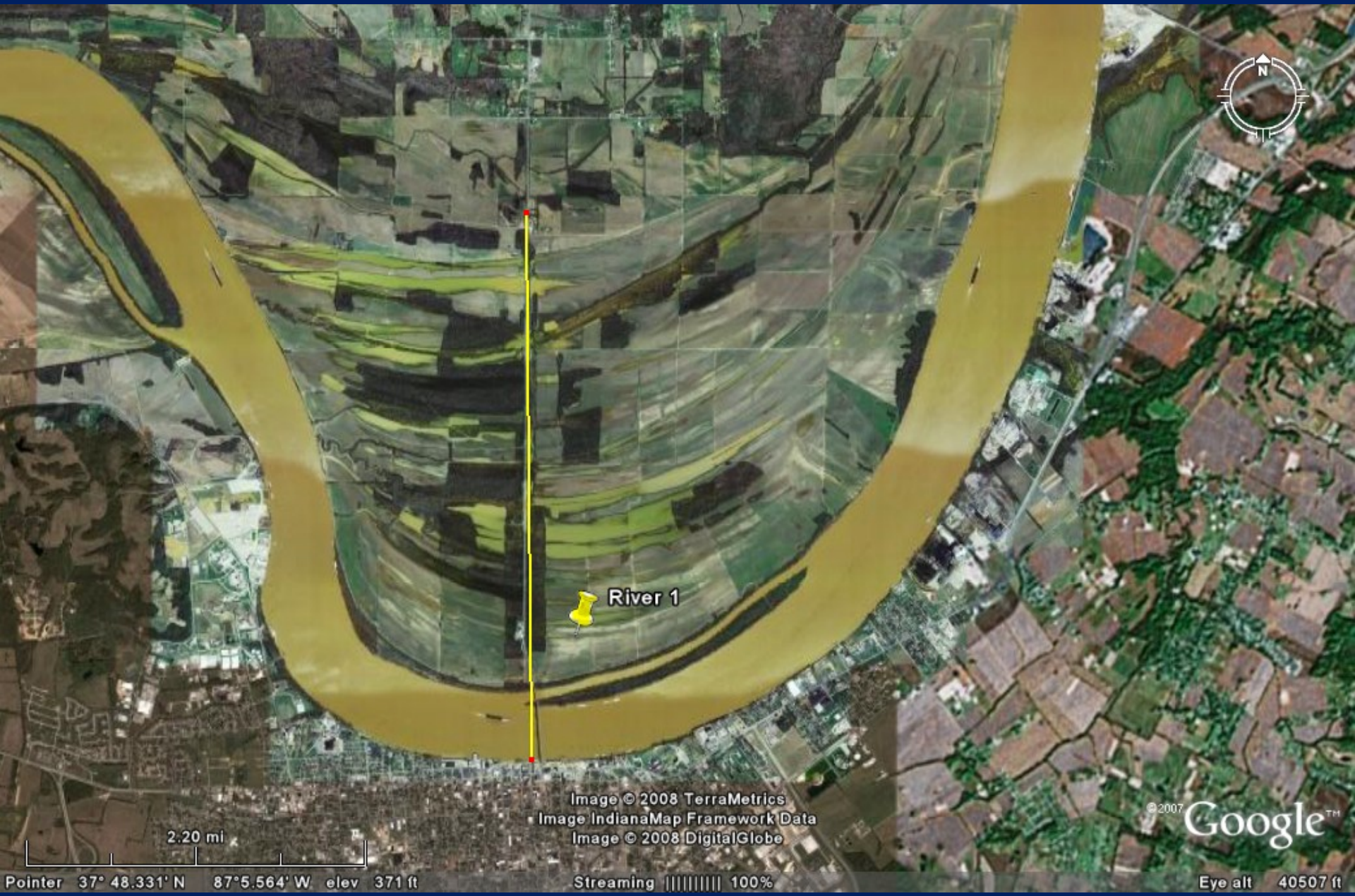
- Find an example of a braided river (or meandering river, alpine glacier, etc)
- Describe fluvial landform, explain how it formed


N
River Feature 1
North Hadley
©2007 Google™
3254 ft
© 2008 Tele Atlas
Pointer 42° 23.682' N 72°35.865' W elev 121 ft
Streaming 100%
Eye alt 11409 ft

Potential questions….

- Find an example of a braided river (or meandering river, alpine glacier, etc)
- Describe fluvial landform, explain how it formed

- Measure channel width and floodplain width
- Calculate *gradient* of river using elevation & line tool


N
River 1
Image © 2008 TerraMetrics
Image IndianaMap Framework Data
Image © 2008 DigitalGlobe
©2007 Google™
2.20 mi
Pointer 37° 48.331' N 87°5.564' W elev 371 ft
Streaming 100%
Eye alt 40507 ft

Potential questions….

- Find an example of a braided river (or meandering river, alpine glacier, etc)
- Describe fluvial landform, explain how it formed

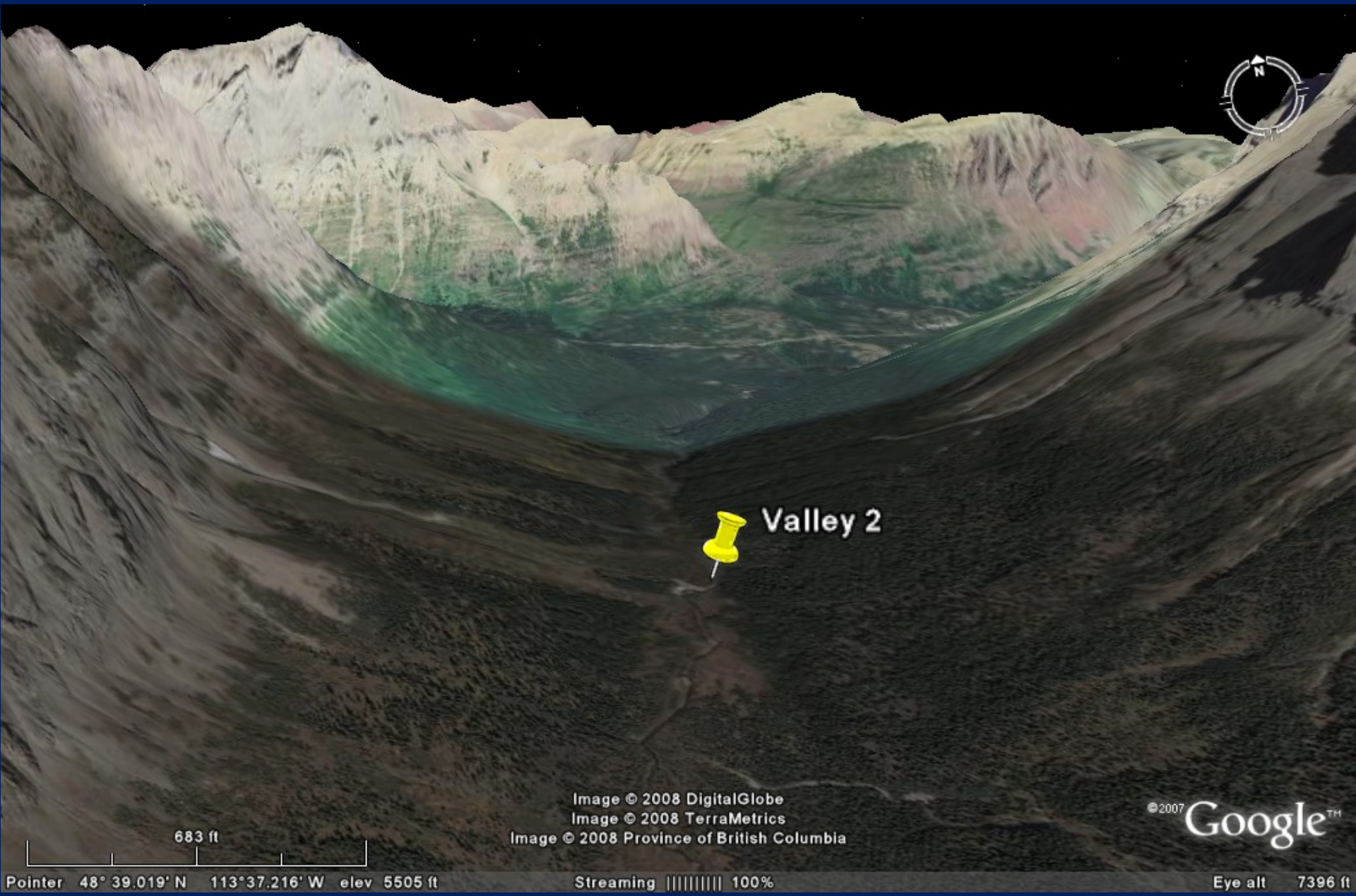
- Measure channel width and floodplain width
- Calculate *gradient* of river using elevation & line tool

- Discussion points in class/on assignment:
  - Floodplain morphology: why is the city located on the S side of the river in given example?
  - Relative gradients of braided river near mountains vs. meandering river on lowlands

Valley formation

- In lecture, students learn concept of U-shaped valleys (formed by glaciers) vs. V-shaped valleys (formed by rivers)
- Students were given two latitude/longitude pairs to examine with GE
- Using the tilt feature, they viewed the terrain and determined the shape of the valley (U or V)
- They were asked to describe what sort of process formed the valley and how they knew


Valley 1
Image © 2008 DigitalGlobe
Image © 2008 TerraMetrics
©2007 Google™
359 ft
Pointer 38° 35.739' N 107°47.760' W elev 6161 ft
Streaming 65%
Eye alt 6387 ft


Valley 2
Image © 2008 DigitalGlobe
Image © 2008 TerraMetrics
Image © 2008 Province of British Columbia
©2007 Google™
683 ft
Pointer 48° 39.019' N 113°37.216' W elev 5505 ft
Streaming 100%
Eye alt 7396 ft

Nuts, bolts, and comments….

- Access: if computers not required of students, computer labs must be made available
- Assignment can be fully electronic, allows copying & pasting of images without worrying about printing cost
- Some students “cheat” by using Wikipedia to guide them towards the correct answer
  - Wikipedia has examples of meandering and braided streams that appeared in ~10% of my students’ assignments
  - May wish to specify at the outset that these answers are not acceptable