
Name: Introduction to Air Photos

Subject: Geography

Grade: 9

Goal:

This lesson will assist students in better understanding of air photographs.

Materials:

<http://pol.pictometry.com/>
Aerial photos of local places
Paper maps of same local places as maps

Expected Duration: One 45 to 50 minute period

Objectives

Academic Standards:

Pennsylvania
7.1.9
Explain geographic tools and their uses.

Assessment

Students will state the differences between paper based maps and aerial photos, and will compare and contrast (in groups of two) the differences and similarities of oblique photos and vertical photos.

Student Objectives: *(related to assessment)*

As a result of this lesson, the students will be able to:

- 1) recognize and state essential air photo concepts
 - 2) recognize, compare and evaluate vertical and oblique air photos
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Lesson Development

Anticipatory Set

Split students into groups of three to four students per group. Provide each group of students with an aerial photo and a paper map of the same area. Have students compare and contrast what they see. Have them focus on things like coloration, detail, and scale. Bring students together as a whole group to see what types of ideas they have come up with. Write the student generated answers on the board.

Instructional Methods/Procedures:

- 1.) Begin by reviewing the basics of air photography with students (see discussion points for teachers below). Have students brainstorm why these types of photos might be helpful to

town planners, builders, etc.

2.) Have students define the following key terms based on the information covered in class.

- a) Tone / Color
- b) Size
- c) Shape
- d) Texture
- e) Pattern
- f) Height
- g) Shadow

3.) Have students work in pairs for the following activity. Log onto Pictometry Online, and decide on a location within the City of Pittsburgh, making sure they have first clicked on the camera icon at the bottom of the screen.

4.) Using locations within the City of Pittsburgh, students should give examples of each of the following key terms above.

5.) Using the same location, have students measure the distance between two locations. What is the distance of the actual line?

6.) Using the equation given below, have students find the scale of their image.

7.) Ask students to share the answers, and whether or not they used a community or neighborhood setting. What are the differences in scale between the two?

8.) Have students click between the oblique photo and the vertical photo within Pictometry Online by clicking on the camera (or arrow) icon at the bottom of the screen. Ask students to describe the major differences between these two types of photos. Which tools were available on the toolbar in each of these cases?

Content Notes for Teachers:

1.) Aerial photography has three general uses:

- Cartographers and engineers take detailed measurements from aerial photos
- Trained interpreters use air photos to map land use and all kinds of human activity
- Earth scientists use air photos to analyze and map the environment

Although both maps and aerial photos present a "bird's-eye" view of the earth, aerial photographs are not generally considered maps.

2.) Advantages of Aerial Photography over Ground Based Observation

- offers an improved vantage point

- capability to take a "snap shot" of time that serves as a permanent record of changes
- broader spectral sensitivity than the human eye and much broader field of view
- better spatial resolution and geometric/radiometric fidelity than many ground based methods
- provides repetitive looks at the same area
- can focus in on a very specific wavelength range and distinguish subtle differences
- can also look at a number of wavelengths simultaneously

3.) Vertical and Oblique Angles

We can define vertical aerial photographs as a photo taken from an aerial platform (either moving or stationary) wherein the camera axis at the moment of exposure is truly vertical. In actuality, vertical airphotos with less than 3° tilt are considered vertical (for most photo interpretation purposes); while those with more than 3° tilt are considered oblique.

4.) Scale

The ratio of the distance between two points on a photo to the actual distance between the same two points on the ground (i.e. 1 unit on the photo equals "x" units on the ground). If a 1 km stretch of highway covers 4 cm on an air photo, the scale is calculated as follows:

$$\frac{\text{PHOTO DISTANCE}}{\text{GROUND DISTANCE}} = \frac{4 \text{ cm}}{1 \text{ km}} = \frac{4 \text{ cm}}{100\,000 \text{ cm}} = \frac{1}{25\,000} \quad \text{SCALE: } 1/25\,000$$

Two terms that are normally mentioned when discussing scale are:

Large Scale - Larger-scale photos (e.g. 1/25 000) cover small areas in greater detail. A large scale photo simply means that ground features are at a larger, more detailed size. The area of ground coverage that is seen on the photo is less than at smaller scales.

Small Scale - Smaller-scale photos (e.g. 1/50 000) cover large areas in less detail. A small scale photo simply means that ground features are at a smaller, less detailed size. The area of ground coverage that is seen on the photo is greater than at larger scales.

5.) Overlap

The amount by which one photograph includes the area covered by another photograph, and is expressed as a percentage. The photo survey is designed to acquire 60 per cent forward overlap (between photos along the same flight line) and 30 per cent lateral overlap (between photos on adjacent flight lines).

6.) Uses of Air Photos

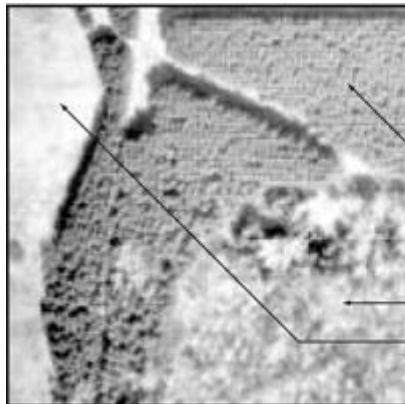
Shape: the form of an object on an air photo helps to identify the object. Regular uniform shapes often indicate a human involvement;



*U"-shaped oxbow lakes

A15183-37 (September 1955)
Chinchaga River, Alberta

Pattern: similar to shape, the spatial arrangement of objects (e.g. row crops vs. pasture) is also useful to identify an object and its usage;



Plantation forest

Natural forest

Open field

A26458-82 (May 1984)
CFB Uplands
Ottawa, Ontario

Size: a measure of the object's surface area (e.g. single-lane vs. multi-lane highways);



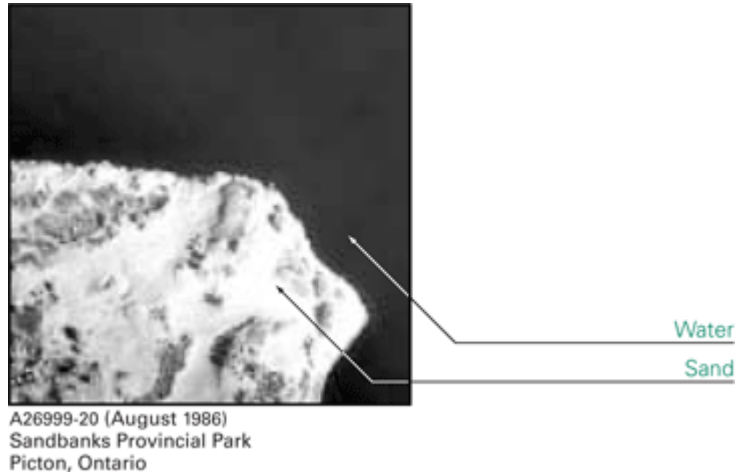
Residential street

Multi-lane highway

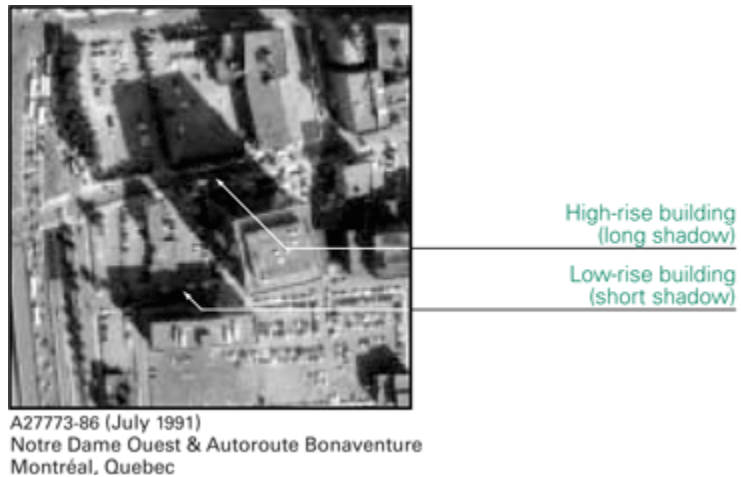
A28411-345 (May 1999)
Highway 401 & Dufferin
Toronto, Ontario

Tone/Color: the color characteristics of an object, relative to other objects in the photo, are

used to identify the feature (e.g. sand has a bright tone, while water usually has a dark tone; tree species can be determined by the color of their leaves at certain times of the year);



Shadow: a shadow provides information about the object's height, shape, and orientation (e.g. tree species);



Texture: the physical characteristics of an object will change the way they appear on a photo (e.g. calm water has a smooth texture; a forest canopy has a rough texture);



Calm water (smooth)

Forest (rough)

A22288-4 (July 1971)
Lake Louise, Alberta
