

Lab 1: Aerial photography

Materials

- Digital copies of the following aerial photos:
 - 1_pw-sb-8_9.tif
 - 1_pw-sb-8_10.tif
 - 2_east.tif
 - 2_north.tif
 - 2_south.tif
 - 2_west.tif
 - 3_ASP21010.tif

Introduction: Using Aerial Photography

Aerial photographs are pictures taken from an aircraft (generally a plane) looking down at the surface – similar to how you might use your phone to take a photo of the Earth's surface from a commercial airliner. Historically, aerial photos were stored on film, but most aerial photos today are taken using digital cameras and stored on flash memory or a hard disk. All of the images we examine in this lab were taken with a film camera mounted in the belly of a plane. Aerial photographs are generally taken close to the Earth's surface. This means that we are able to see the Earth in fine detail but can also result in distortion of distances and areas of objects on the surface. We will use both of these features of aerial photographs to demonstrate some physical and photo interpretation concepts often used in remote sensing.

In this lab we will,

- Use Jensen's Elements of Image Interpretation to gain information from three sets of aerial photos such as,
 - Data about the imagery itself (e.g. when the image was taken? which direction was the camera pointing? Note: These data are generally called *metadata*.
 - Data about the environment depicted in the aerial photos (e.g. what is the setting of the photo? what are some major features in the photo?)
 - Data we can *infer* from the aerial photos (what is the environment in the photo used for? how many people live in the area depicted in the photo?)
- Prepare a working environment for future labs by installing and testing Google Earth.

Lab 1: Aerial photography (35 points)

Name Ian Hinds

Part 1: Descriptive Analysis of Aerial Photos

For this assignment we expect short-answer responses; complete sentences and proper grammar are expected for full credit. All questions can be answered in 1–3 sentences, but always be certain to explain your reasoning. Use Jensen's Elements of Image Interpretation in your answers as much as possible:

Location, Size, Shape, Shadow, Tone/Color, Texture, Pattern, Height, Depth, Volume, Slope, Aspect, and Site/Situation/Association

Image Set 1: pw-sb-8_9 and pw-sb-8_10 (14 points)

This is a pair of aerial photos taken from the UCSB campus and Isla Vista area. The date they were taken is on the lower left corner. The photo ID numbers tell you which direction the plane was flying.

Can you identify both of these?

- a. Date (1 point): 6-14-1992
- b. Direction of flight (1 point): (a) north to south (b) south to north
(c) east to west (d) west to east

Prepare the stereopair for viewing as directed in the instructions above. First, overlay the photos in such way to enable stereovision of campus. Once it's all set, take some time to navigate with your stereoscope!

- c. Do you think these images were taken on a weekday or weekend? What clues led you to believe that? (1 point)

- On a weekend, most of the parking lots on the UCSB and surrounding factories/labs are empty. Close to the campus lagoon, there are obvious chairs and a stage structure, most likely for graduation.

- d. What does the landscape in the aerial photos tell you about the general meteorological pattern (e.g. rainfall, temperature) before these photos were taken? Justify your answer. (2 points)

- In the images, there is mostly light brown landscape, exposing a dry spring season. If there was moderate rainfall, there would be more prominently green landscape.

- e. Point out two major changes on campus since the photos were taken. If you're new to campus, use a current campus map to help you. (2 points)

1. Parking lots were removed to open space for more buildings. Large parking structures were later built, and currently take up less space than in the 1992.

2. Infrastructure, meaning number of buildings, roads, and paths have dramatically improved on campus since 1992.

- f. To the north of campus (south of the airport runway), you will see greenish-brown plains with white patches. What do you think the white patches are? Is campus at a higher or lower elevation than the plains? (2 points)

Water basins, or flood collection basins. Campus is at a higher elevation than the plains south of the airport.

g. Locate Ellison hall. Does it appear to be tilting? If so, in which cardinal direction does it appear to be tilting? What does this tell you about the position of the camera relative to Ellison hall? Justify your answer. (3 points)

Yes, Ellison hall appear to be tilting towards the north. The angle of the camera would be south relative to Ellison hall. If the camera was directly over Ellison hall, there wouldn't be a tilting appearance.

h. What's the most noticeable difference between the part of IV closest to the ocean and the one closest to El Colegio Road? What could that suggest regarding the rate of occupation? (2 points)

There are more houses closer to the ocean, and more apartment complexes closer to El Colegio Rd. The population is denser closer to the Ocean, and the property values are higher per capita. The proximity to the ocean is more desirable considering the differences in building density.

Image set 2: 102 Ranch 01003.01 Obl. North (1-17-01), 102 Ranch 01003.01 Obl. South (1-17-01), 102 Ranch 01003.01 Obl. East (1-17-01), 102 Ranch 01003.01 Obl. West (1-17-01). (8 points)

You are an air-photo interpreter working for a government agency, and your job involves analyzing imagery of industrial infrastructure. Your supervisor hands you a set of four aerial photos each facing a different cardinal direction and asks you to identify the major industrial feature in them, but does not specify where the images are from. You only know that these are from the US.

a. Describe the area surrounding this feature. What are the dominant geographic features that you see? Describe the climate of the region and when these photos were taken. What cues helped you determine this? (2 points)

- **Hills/Mountains**

- **River or Aqueduct system**

- **Industrial sites/buildings**

- **The climate of the region depicted is cold and potentially dry this time of year (The U.S. is in winter during January, when this photo was taken). There is snow scattered across the areas of higher elevation, but an absence of grass or vegetation.**

b. What are the round barrels and smokestacks used for? (1 point)

- **Storing and treating/manipulating liquid materials**

c. Which direction is the wind blowing? (1 point)

- **Easterly (from the east, towards the west)**

d. What is the purpose of the water basins? (1 point)

- **Storage of water to use for hydropower or industrial processing**

e. What are the prominent man-made structures in this photo? (1 point)

- **Roads, Industrial buildings, Quarries, Railroad, Water basins**

f. If these photos were not labeled how could you tell what direction you were looking? (2 points)

- **Analyzing the roads, rivers, and differences in sunlight reflection. If the pictures were taken around the same time of day, there would be more light reflection in one specific direction. In this case, during northern hemispheric winter, there will be more sunlight reflectance towards the south, and the south facing imaging shows this by capturing the reflectance of sunlight on the main water sources. It is not early morning or evening, because there is not immediate light reflection in the eastern or western direction.**

Image set 3: APS 21010 IC (02-08-2001) (8 points)

Working on a land use assessment for the county of Monterey, you have been tasked to analyze this particular area.

a. What dominant land use categories can you see in this image? (2 points)

- **Residential and Agricultural**

b. What kinds of crops are being produced here? How do you know? (2 points)

- **Mostly vegetables, but also wheat or other grain crops. The brown and darker green colors would represent the crop types.**

c. Where do you think the most expensive homes in this photo are located? (1 point)

- **On average, The most expensive homes would be located in the residential area in the bottom of the image.**

d. *Using clues on the margins:* Navigate to the same spot in Google Earth and describe some differences in between the two images. Do you think these were taken in the same time of year? Has there been much development between the two photos? Why or why not? (3 points)

- **The two images were not taken at the same time of year, or in the same year. The google earth image exposes much more agricultural features, because the image was taken during the growing season. The 2001 image was taken during the winter, which was not the main growing season for the depicted region. There has been much more development, mostly in the agricultural region of the two images, there is more crop yield.**

Part 2: Google Earth (5 points)

1. Using [this link](#), navigate to the download page for Google Earth Pro.
2. Click the “Download a Google Earth Pro direct installer” dropdown.
3. Under v7.3.3, click the link that corresponds to your operating system. If you’re using a Windows PC, download the “64-bit” version (not the “32-bit” version).
4. Once the installer has downloaded, double click it to install Google Earth Pro. You will need ~200mb of hard drive space.
5. Now launch Google Earth by double clicking it. You should see a window similar to the one on the following page. Turn off 3D Buildings (by unchecking the box indicated by the red arrow).
6. Try navigating around Google Earth,
 - a. Zoom in/out using the scroll wheel on your mouse (or by swiping on your trackpad).
 - b. Move around by clicking and dragging
 - c. Adjust the angle of azimuth (i.e. the orientation relative to North) and the tilt using the compass in the upper right corner.
7. Insert a screenshot of your Google Earth window centered over UCSB with North pointing up (5 points)



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Data MBARI

Google Earth

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Imagery Date: 8/19/2019 34°24'44.47" N 119°51'32.80" W elev 40 ft eye alt 17070 ft