

RSG Lesson 1
AIR PHOTO INTERPRETATION
TEACHER INFORMATION

Lesson Summary: This activity introduces students to color infrared (CIR) air photo interpretation. Students examine a CIR air photo of their community, identify prominent features and interpret what those features might be through use of an air photo key.

Objectives: Students will begin to identify and interpret prominent landscape features in CIR air photos.

Estimated Time: 1 hour

Correlation to Alaska Standards:

Cultural E-2 Understand the ecology and geography of the bioregion they inhabit.

Geography A Make and use maps, globes and graphs to gather, analyze, and report spatial (geographic) information.

Science A-1 Develop an understanding of the processes of science.

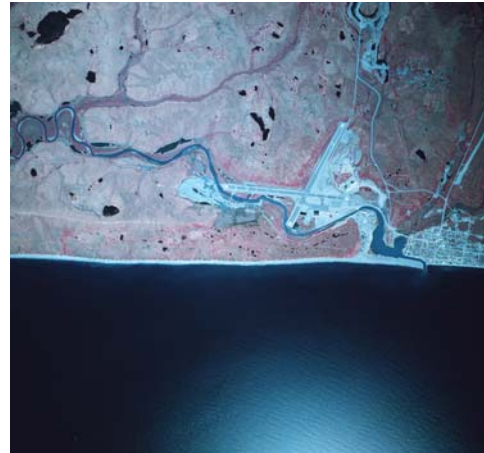
BACKGROUND FOR THE TEACHER

Like maps, aerial photos and satellite images provide a bird's eye view of Earth, but unlike maps, photos are direct images of the landscape and convey firsthand information. Low-flying airplanes and more-distant satellites record everything "indiscriminately." Subtleties such as color variation, tone, texture, size and shape reveal patterns and features of the Earth that can't be seen in any other way. Such images portray not only roads or coastlines, but features not always noted on maps such as mountains, volcanoes, vegetation, sediment in water, sand dunes, sea ice extent and more.

Air photos are generally of two types: true color or color-infrared. True color photos capture the reflectance of visible light and portray the landscape in the blues, browns and greens we associate with Earth. CIR photos capture the reflectance of the invisible infrared spectrum and portray Earth in shades of red, blue, purple and other colors. This lesson uses photos in the CIR spectrum because although true color photos are more familiar looking, CIR photos reveal landscape features in much more detail. (See More Explorations and Teacher Resources for links to understanding light.)



True color image of Nome, Alaska



Color-infrared image of Nome, Alaska

Air photo interpretation involves recognizing and describing objects by key characteristics, many of which can also be helpful when viewing satellite images. Skillful interpretation of air photos is an art acquired only after considerable experience, but beginning students can comprehend common features in air photos with some basic instruction and time to practice. Some of the most common air photo features are portrayed on the Air Photo Key included in this lesson. More information on the history of air photos and on interpretation basics are available in RSG1 Air Photo PowerPoint.

MATERIALS

- CIR image of community for printing and projection (see Technical Appendix B for directions on obtaining this imagery)
- Color printer
- LCD projector
- White chart paper for projection screen.
- Optional: RSG 1 Air Photo PowerPoint (Available for download from the MapTEACH website at <http://www.mapteach.org>)
- For each student:
 - 1 (8" x 8") ICIR print of community
 - Copies of Student Exercise and *Air Photo Key*
 - Fine-tip Sharpies
 - Transparent binder sleeves or mylar
 - Paperclips

INSTRUCTIONAL PROCEDURES

Getting Ready

- In this lesson, students will slip a CIR photo into a transparent binder sleeve and then use Sharpies to trace features on the sleeve, thus preserving the photo for future use.
- To model this lesson, project the CIR photo onto a large piece of white paper and trace the features you want to model directly onto the white paper.

Gear-up

- Ask students "How might air photos and satellite images help you know where you are?"
- Project the CIR photo against white paper.
- Point to the CIR photo and ask what students notice first about it (the funny colors). Ask if anyone has seen this kind of image before and what they might know about what CIR is and why it is preferred for image interpretation? (Briefly explain what/why CIR is used.)
- Examine CIR image. Ask for observations and generally discuss the image as a warm-up to lesson.
- Explain/model the student activity for the day using the Iprojected CIR and sample portion of worksheet to demonstrate the steps:
 - Examine wall CIR closely to get oriented and get a sense of all the variation in color, tone, pattern and texture that there is in the photo.
 - Find a feature of interest and outline it on the white chart paper using a fine tip Sharpie.
 - Spend some time exploring how to describe features and how to use the Air Photo Key to make inferences about what they see.

Feature #	Describe what it looks like	What do you think it is? (Use the Air Photo Key)
Example	Long, straight, grayish line leading into Nenana	Railroad
#1		
#2		

- Model observations of more subtle differences in color, tone, texture etc. (without "naming" the feature). Explain that interpretation of air photos requires close attention to differences; that if something looks different, it probably is different.
- Emphasize that although the key is accurate, the colors in their own community photo may look a bit different and they will have to use what they know about where they live in order to interpret the photo.

Explore

Students work to identify and interpret features.

Generalize

- Have students exchange their worksheets and photos and check to see if students agree on the selections and interpretation.
- Alternatively, debrief activity by asking student volunteers to circle selected features on the wall CIR photo and explain their interpretations.
- Ask students to share questions and examples of disagreement and discuss the feature as a class to try and reach a consensus.
- Discuss why having a complete photo for reference is important.
- Ask again how air photos can help you know where you are.

Apply/Assess

See RSG Lesson 3 "Seeing in Stereo and Route Finding."

MORE EXPLORATIONS

- Have students create a key for the CIR image of their community by viewing it on their computer and taking screen shots to create the key.

TEACHER RESOURCES

University of Colorado at Boulder. "Aerial Photography and Remote Sensing". Available online at

http://www.colorado.edu/geography/gcraft/notes/remote/remote_f.html

Aspen Global Change Institute. 1992. "Ground Truth Studies Teacher Handbook." Aspen, Colorado. Available for purchase online at
www.agci.org/dB/PDFs/Publications/1992_GTSHB.pdf

National Aeronautics and Space Administration. IMAGERS. "Lesson 5, Interpreting Satellite Imagery." Available online at
<http://science.hq.nasa.gov/kids/imagers/teachersite/RS5.htm>

(An interactive web site and teacher guide for grades 5–8 that can introduce students to remote sensing.)

National Aeronautics and Space Administration. Landsat 7 Teacher's Kit. "Lesson 2, Image Interpretation." Available online at
<http://landsat.gsfc.nasa.gov/education/teacherkit>

Biodiversity Informatics Facility at the American Museum of Natural History. "Remote Sensing Resources." Available online at
http://biodiversityinformatics.amnh.org/index.php?section_id=31

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STUDENT EXERCISE

1. Examine the photo closely to get oriented and to get a sense of all the variation of color, tone, pattern and texture in the photo.
2. Slide your photo into the sleeve and "register" the photo by using your Sharpie to mark photo corners and obvious landmarks such as a road or lake.
3. Find at least three features that you recognize. Outline and number them on the sleeve layer and then describe and interpret them below.

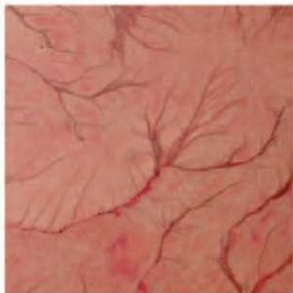
Feature #	Describe what it looks like	What do you think it is? (Use the Air Photo Key)
Example	Long, straight, grayish line leading into Nenana	Railroad
#1		
#2		
#3		

4. Look more closely at your photo and select and number at least four more features that look interesting or distinctive. Use the key to help you figure out what they are and describe and interpret them below.

Feature #	Describe what it looks like	What do you think it is?
#4		
#5		
#6		
#7		

Air Photo Key

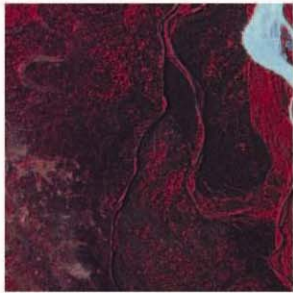
Vegetation Types



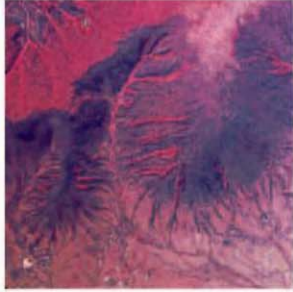
a. Tundra showing drainage pattern.



b. Deciduous or "leafy" vegetation (red).

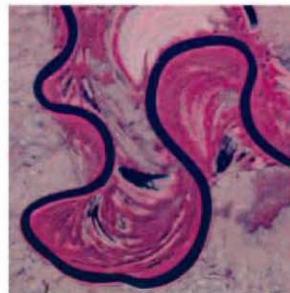


c. Spruce forest (black) with some deciduous (red) trees.



d. Mixed spruce (dark) and deciduous (red) forest on hillside with tundra (light) in valley bottom.

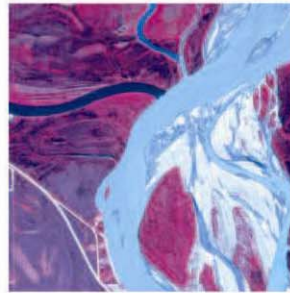
Water



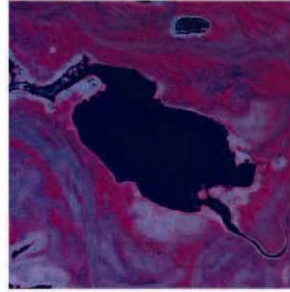
e. Clear river meandering through lowlands. Curved patterns near the river bends show former river channels.



f. Silty river flowing through deciduous forest.

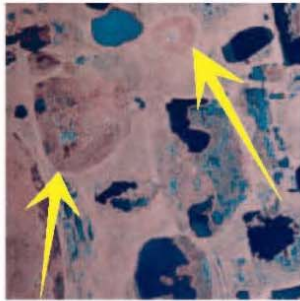


g. Small clear river (dark) flowing into big silty river with sloughs (light blue).



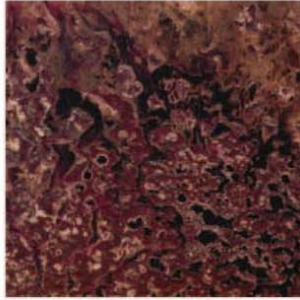
h. Big clear lake in flats.

Wetland

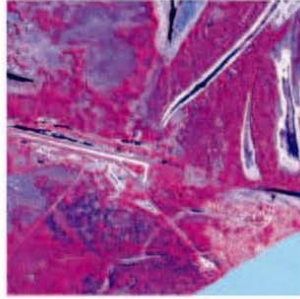


i. Lakes and tundra. Old lakes (yellow arrows) have grown in and look brownish and round.

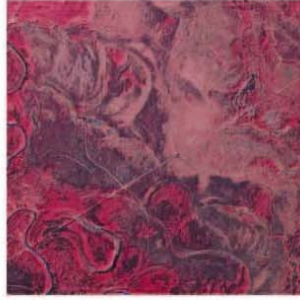
Villages and Trails



j. Marshy tundra with many small ponds.

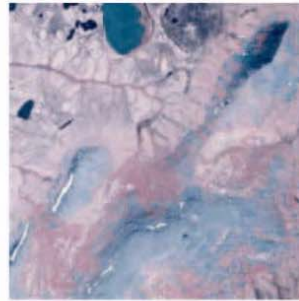


k. Village and airstrip (white-gray). Trail from airstrip is a light pink line.



l. Straight trail running diagonally through varied landscapes. Another trail intersects with the straight trail in spruce forest.

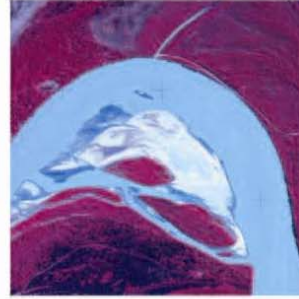
Rocks and Gravel



m. Bare rounded mountains (blue) surrounded by tundra and lakes. Snow (white) near ridge top occurs in linear patches or dots.

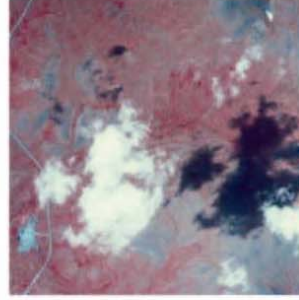


n. Narrow white gravel beach and spit on coast. The sediment plume in the water makes it look lighter in some places.



o. Islands with large gravel bars and smaller vegetated areas.

Clouds



p. White clouds casting black shadows on tundra.