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NGEA03

Project: Airphoto Interpretation and Spectral Characteristics.

Aim

Airphoto interpretation is based on the skills of the interpreter and the best way to learn is to study images from different areas and with different types of information content. The aim with this project is to give an overview (not exhaustive) of different types of images and how different objects are depicted on different film emulsions.

Material

The projectet is built around a number of examples, each with a series of questions and instructions attached. The image ID-number is found on top of each instruction sheet in the text below. **Please OBSERVE that it is very important that everybody returns the images to the original envelope after interpretation has been completed. If people start mixing images and envelopes it will be very difficult for other students to find their way through the image examples.**

All images are reproductions from originals produced by the Swedish Survey department or similar authorities in other countries. The images have been produced by scanning of original paper images or slides, and the quality has during this process been slightly reduced as compared to the original. Some of the images, particularly the older ones, where already as original of rather bad quality and may be a bit difficult to work with. Altogether, the image examples illustrate what you may expect to encounter when working with airphoto interpretation for applications in the fields of e.g. landscape analysis and environment protection around the world, but with an emphasis on temperate climate zones.

A part from the images you should also have access to one of the suggested textbooks for the course. In the literature you will find pictures showing examples of the objects on the images that will help you to draw the correct conclusions.

General instructions

It is not necessary to study the different examples in any particular order; you may start from the beginning, at the back or in the middle in this project guide, with the exception of the first example that is intended as an introduction. For all examples you should provide basic image data, that is, type of film emulsion, approximate image scale and climate zone.

You are supposed to answer the questions and hand in the results individually, but **we strongly recommend** that you discuss the questions with your fellow students and with the supervisors.

In the course schedule certain occasions are booked for you in the photo interpretation classroom, when you have exclusive access to this facility. However, you are also welcome to work at other times, but than we advice that you check if the facility is booked by other courses. If booking is not made for a lecture or supervised exercise, you may share the facilities with other students doing similar project work.

Everybody may work following her or his own pace, but you have to plan your work to be sure to meet the deadline indicated in the course schedule.

Presentation and Hand-ins

You should present your work by handing in the answers to the questions for each image example (hand written, directly in the Project guide is OK, but typed is better). The project is also presented orally during a seminar when the supervisor randomly selects who is going to present what image example (one example per person) and their findings discussed by supervisors and fellow students. Everybody is expected to play an active role during these presentations.

Airphoto from the Verkaån- area

Material: IR-Colour from the Verkaån area, 1997

Task: Study the images and try to get an idea of the information content. Probably you have already an opinion about black and white images so you will able to compare. Some of you also have field experience from this area. You should study the images in a stereoscope. If you do not find what is asked for in the first stereo-pair – do as much as possible and then change to another stereo-pair. Discuss with your supervisor and fellow students – do they percept things the same way as you do?

What do you think colour adds to the image information content compared to b/w images?

Do you find it strange to interpret this FCC? What is a FCC?

What time of the year are the images from?

How does this influence what you may expect to see in the images?

What type of mapping activity (thematic) do you think the images are intended for, judged by the time of year they were captured?

Which time of the year would you select in order to optimise mapping of:

- Forest
- Soils
- Cultivated areas

Can you find examples of shadows in the images? Can you determine roughly what time of the day they are captured?

Give some examples of advantages and difficulties associated with shadows. Why are shadows particularly pronounced on IR-images!

Using the stereoscopic view – how would you characterise the topography in the area, e.g. flat, undulating, hilly, etc. Is it a homogenous area in respect of topography or would you subdivide in several?

Identify forest in the images. How many different types of forest do you think you could separate in the current images based on differences in colour?

How many distinct colour tones could you separate on forested lands?

Have a look in the literature and try to apply what is said about differences between coniferous and deciduous forest. Is it possible to separate them? How?

Can you find areas with clear-cut forest? How do these look like? Could you detect any specific objects associated to these areas? HINT – check the shadows.

Have a look on darker and lighter forest areas. Try to find what you consider as being the same type of forest in different parts of the stereo image. Could you detect any effects that you can attribute different combinations of sunlight incidence angle and view angle, e.g. looking against the sun or with the sun in your back?

Can you detect any differences in image quality depending on were in the image you look, e.g. centre or edge?

No focus on open areas. Are there more or fewer different colour tones compared to the forest? Why do you may expect open areas to have more tones?

Can you find any textural/structural differences between forest and open areas? Describe them.

Try to find a single field exposing variations in colour tones. How would you explain this phenomena?

Generally you may distinguish two different tones in linear objects that must be roads – what may be the cause of this?

What other linear objects can you find in the images? Try to find examples of:

- Larger ”rivers”
- Small water courses and ditches
- Power lines
- Alleys
- Trees, bushes and schrubs along field borders

Can you find any water bodies, lakes or dams? Since the images are IR-colour, these should be depicted…How? Could you explain exceptions to this general rule?

Is there any connection between colour variations and topography on open areas?

Some of the roads and what appears to be buildings have a similar colour – what could this indicate?

Generally green healthy vegetation should be depicted as bright red in IR-colour images. Can you find examples of exceptions and give a plausible explanation?

Try to estimate the size of the smallest object you can find in the images. Can you see any cars? What happens to cars when comparing what you see with your left and your right eye?

You have now hopefully gained a rather good impression of what type of information you may expect from IR-colour images. In a later project you will return to these images for a more exhaustive interpretation session. But before you return the images to their envelope, try to find something that is not mentioned in the text above.

Thailand

Material: 2 image pairs from south-central Thailand, VV WWS M 20 AMS 19, black and white, 1953

Task: Answer the questions. Start by studying the two stereo-models one by one. Try to get a general impression of the landscape and climate zone.

Study the list of objects that has been mapped for each stereo-model. Try to identify the different land use classes on the list in the stereo image. Are you capable of identifying natural vegetation and cultivated areas? Keep on trying until you are completely stuck, then fetch the plastic overlay and compare your interpretation with these. Comments? Which land use/vegetation types were easy to determine and which ones were difficult? Comment on general image quality and information content?

Specific objects to study:

Stereo-model: 2648-2649

In one of the corners of the stereo-model you can find two almost circular objects. Describe their topography. What can this be? Is the presence of these objects giving you any additional information about the area?

In the large meander there is a gully that may be part of a captured river system. Can you find it?

Can you find houses and roads? Is it easy to see them?

If you find interesting objects that has not been mentioned in the text, please share them with us here

Stereo-model: 2711-2712

Generel differences between this model and the one above?

The mountain range has very sharp crests – could you conclude rock type from this information?

Try to find cultivation terraces.

The area has more of cultivation than you realise when you just briefly scan the images. Could you also identify settlements and how people are living in these?

Compare north and south facing slopes of the mountain range and comment on information and appearance.

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Forest damages

Material: Stereo-model, 3C72 823

Task: Answer the questions

Give a general impression of the topography.

Try to estimate (compute) aeroplane altitude and image scale – what camera focal length was used to take the photograph?

Different types of forest/trees?

Which is the dominating tree type?

Some trees exhibits non-normal tree reflection due to illness caused by acid rain. Can you detect this in the image? Describe.

Study the shadows, what information do you get from them?

Find examples of forest of different age.

These images are definitely low altitude images. Try to find objects that are too small to be detectable in standard altitude images.

If you find interesting objects that has not been mentioned in the text, please share them with us here

Low altitude images

Material: One stereo-model, origin unknown

Task: Answer the questions.

Climate? Do you think this is a Swedish landscape? Why/why not?

What kind of area are we looking at? Is it permanent living, recreation/summer houses, farms or...?

What kind of film emulsion has been used? IR or ordinary colour?

From what type of vessel do you think the images were taken?

Mention some details that are to small to appear in standard altitude images.

Are decidious or coniferours trees dominating?

Around the buildings you can find two small fields with some kind of crop in very neat rows – suggest what crop it may be?

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Flat landscape with cones

Material: Three images forming two stereo-models, one mostly water, the other mostly land

Task: Answer the questions

A. Stereo-model with water.

Study the model and comment on image quality?

Climate?

Vegetation?

The water body is generally black except in parts of the bay that is present. Here you can see two linear objects with lighter tones. What could this be? Why is water most often black on airphotos? What other type of reflection is also connected to water? Actually you have examples of this type of reflection in the images – try to find it?

The conical objects present over parts of the image – what is this?

Can you find any islands?

What type of built-up areas can you find? Characterise the community?

Parallel to the river there is another linear object present in the images. What could this be?

What do you believe is the main source of living for people in this area?

Can you make any conclusions about geological material?

B. Stereo-model with land

Most of the area is very flat. Suggest vegetation and or land use?

The area has several linear objects that seem to fulfil a particular task. What?

Describe other signs of human activity?

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Svenstorp

Material: Two images, 89 817, one stereo model, 1989, row 01, image 04-05, six different recording dates, 30/4, 15/5, 22/5, 11/6, 26/6 and 21/7. Blind map showing field limits and the answer placing different crops on each field (to be used when you have tried hard enough).

A. Time series and different crops

The most important and unique thing with these images is that they show the same area at six different times during the same vegetation period, starting in April and ending in July. The images were made on request from a research project. Can you suggest the theme or general aim of this research project?

In this area the following crops are cultivated: *Autumn wheat, Spring wheat, Spring barley, Rape seed, Green peas and Sugar beats*. Try to separate these six crops by looking on the time series of airphotos. Hint – Autumn crops generally develops slower than spring crops. You may also use texture as a clue.

When you have decided what crop that is on what field you should compare with the provided answer. BUT you should give it a good try before doing so. How does *rape seed* locks like in the images when in flower?

B. Other

In the 04, 890430 image, in the middle of the big field dominating the image you find a linear structure that initially meanders, then suddenly disappears but could still be ”suspected” to be present due to a series of small round objects. Explain this, what is it, what process is behind the formation and what is the human influence? What happens at the edge of the field?

Next recording date, 890515, even more of the small round object can be detected. Why? You can also se the meandering turning westward downstream, ending in some sort of delta on land in the NW corner of the stereo-model. What has happend? How do the vegetation develop in this particular area during the rest of the season up to 890721?

In the fields to the east of the road you see a branched dark-toned feature in the image from 890430. What is this and what is causing it?

What happens with the dark band over time up to 890721?

In the fields south of the farm situated to the east of the road you see a number of connected linear objects. They are present in all recordings but are easier to see some

dates. What is this? Could you draw conclusions on soil texture based on this information? Is this in line with the preferences of the crop grown here?

Note the ploughing pattern on the field on the north side of the ditch that occupies the depression in the north part of the images. Why?

In the northeast part of the stereo-model you find an intensely red dot in the middle of a field. Describe its topography. Is it a volcano?

What happens with the reflection from the area with more or less natural vegetation along the northern edge of the field 890611, compared to how it looks earlier during the season? Explanation? How does it look 890626? 890721? Comment on this?

Between 0626 och 0721 something has occured in the bright toned field in the upper eastern part of the model. What?

If you find interesting objects that has not been mentioned in the text, please share them with us here

Mountains IR-colour

Material: stereo-model, 78 517 304

Task: Answer the questions, use low magnification

Image altitude above the ground? Compare image information content with standard altitude images?

How large area does an image cover (compute approximate area)?

Can yo find any vegetation big enough to see individual threes or bushes?

Can you find any areas that completely lack vegetation? Can you be sure? What types of vegetation do you expect to find in an area like this one? How does this vegetation look on this type of film?

Can you estimate the approximate altitude of the ground in the area?

Can you find any glaciers?

Can you find any traces of glaciers?

Which process formed the deep valley in the central part of the image? Evidence?

Can you explain how the lakes in the valley developed?

Can you explain how the lakes on the mountain were developed?

Can you find any indications permitting you to say something about the type rock in the mountains, e.g. sedimentary or basement complex?

Can you find any signs of human activity?

Can you find any delta?

Can you find any shadows in the images? What does this tell you about the time of the day the images were captured?

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In the middle of ..., low altitude

Material: Two stereo-models, 83 114 01 image 04-06

Task: Answer the questions.

Scale?

Date of recording? Considering the recording date – what type of mapping are these images designed for?

Compare image quality centre – edge? Explain?

Give a broad description of the landscape regarding topography, land use and natural vegetation? What type of soil could dominate?

What conifer is probably dominating the area? What deciduous tree? Evidence?

A. Stereo-model 04-05

What happens with the reflection in the lake in image 05? What do you call this?

Besides the lake you find a road that cross another road in a small village. What landform is the road constructed on? What process is responsible for this landform? Could this be used as a support for your hypothesis about the dominating soil type?

Besides the road, on the opposite side of the lake you see a water body in an open area inside the forest. What type of land is this and what vegetation could it be?

Is it possible to distinguish grazing land from cultivated fields? How?

Could you find any rock outcrops in the area?

B. Stereo-model 05 – 06

Study the edge of the large lake. Why are the trees fringing the lake lighter in tone than other trees?

What linear structure crosses the image 06? Two alternatives are probably possible?

Can you detect any wetlands in this stereo-model?

Forestry is probably dominating the area. Normally, when forests like this are clear cutted, you leave some isolated Pine trees behind. Find such trees?

If you find interesting objects that has not been mentioned in the text, please share them with us here

In the middle of...Images without numbering

Material: two images, stereo-model

Task: Answer the questions.

These images are taken with a 6 by 6 cm frame size Hasselblad camera mounted in an airplane from low altitude. Comment image quality compared to the rest of the images you have seen. What are the major differences?

Make a guess on climate in this area. Why?

In the area you can see two buildings. Can you figure out what they are used for?

Except the buildings there are only few signs of human activities. What do you find?

You have several patches with dark dots in the images – what could this be? Some of them seem to be organised in a regular pattern, indicating...what? Describe the topography at these locations and explain the connection.

Along the road you can see a fish-bone like pattern. Study topographical differences carefully and try to figure out what process that has caused this pattern?

What is the main source of income in this area?

Around the buildings you can find some circular patches that differs in reflection. What could this be?

Where the road from the buildings exit the image frame you find a short linear structure associated with the regular pattern of dark dots. What is this and what is the function of it?

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