


AGRO/MSYM/AGEN 431

# Basics of Aerial Photography

Viacheslav I. Adamchuk  
Biological Systems Engineering Department  
University of Nebraska-Lincoln

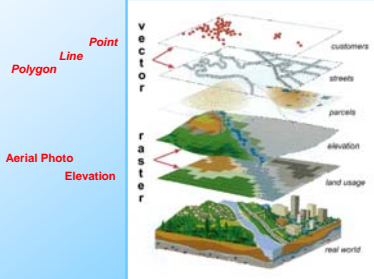
Aaron R. Schepers  
Cornerstone, Inc.  
Lincoln, Nebraska

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## Geographic Information System (GIS)


Overlay layers of information to create maps



## Aerial Photography


Used to collect a wide array of information

- Location of streams and lakes
- Agricultural field boundaries
- Building locations




## Aerial Photography


Used to collect a wide array of information




## Platforms for Aerial Photography




Military




Balloons




Model aircraft



Light aircraft



## Image Distortion



Out-the-window


- Oblique
- Near vertical (*very steep turn*)

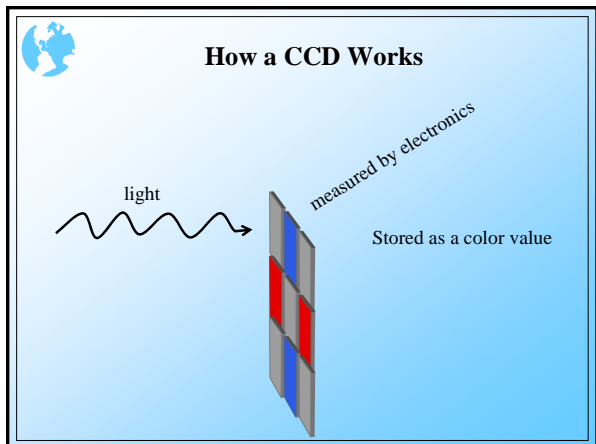
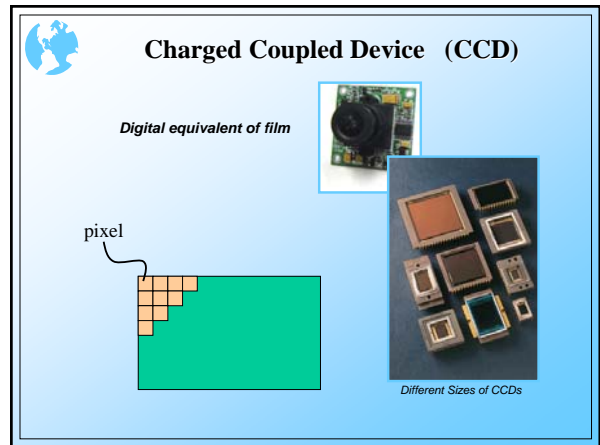
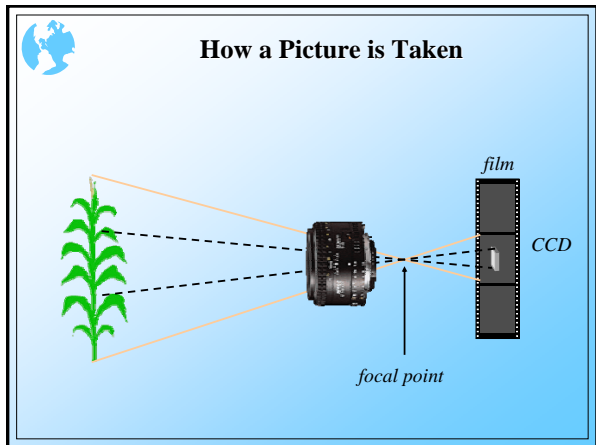
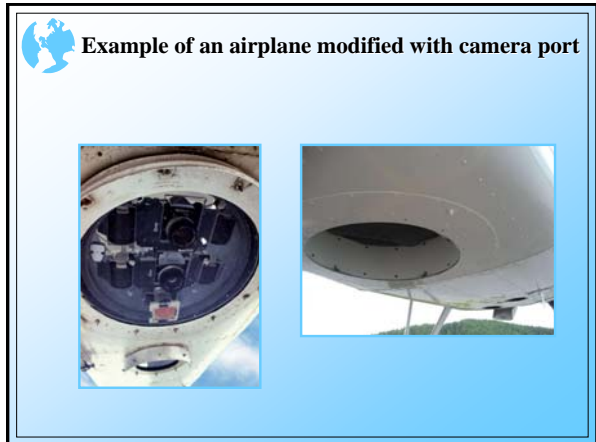
Camera port

- Vertical (*subject to pilot skill and bumpy air*)

Difficult to correct distortion

Best scenario





**What are the Types of Aerial Photos**

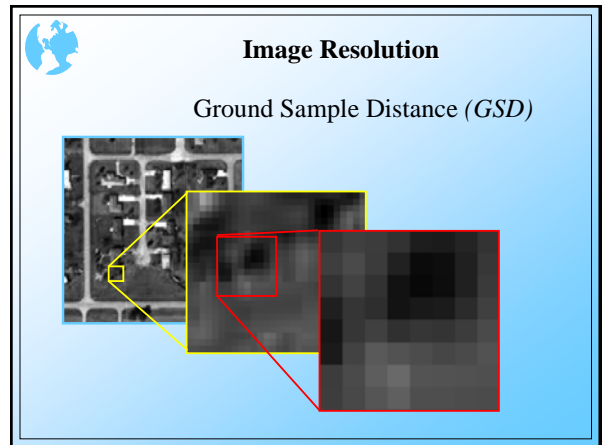
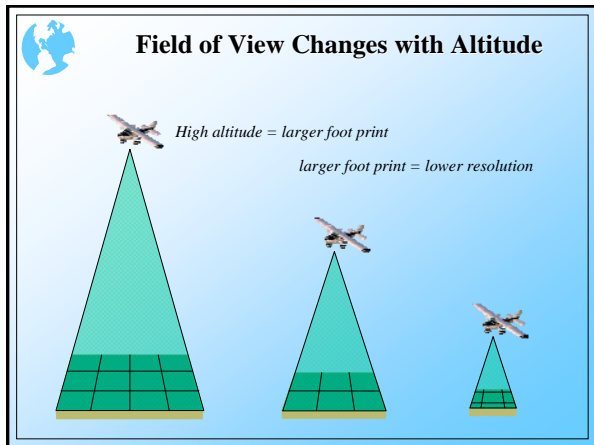
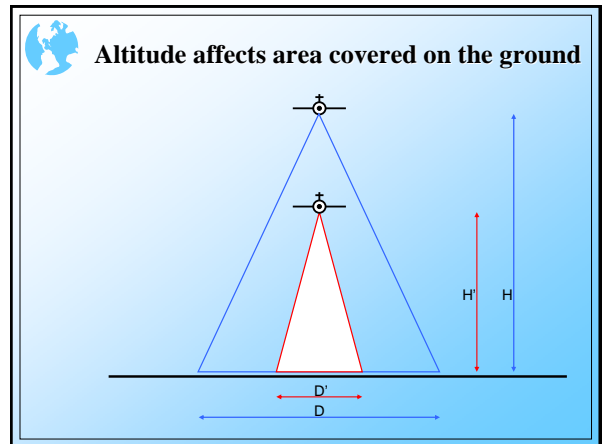
	Film	Digital	Satellite
Panchromatic	✓	✓	✓
Color	✓	✓	✓
Color IR	✓	✓	✓

### Types of Aerial Photography

Black & White (panchromatic)

Color Infrared (Green, Red, IR)

Color (Blue, Green, Red)



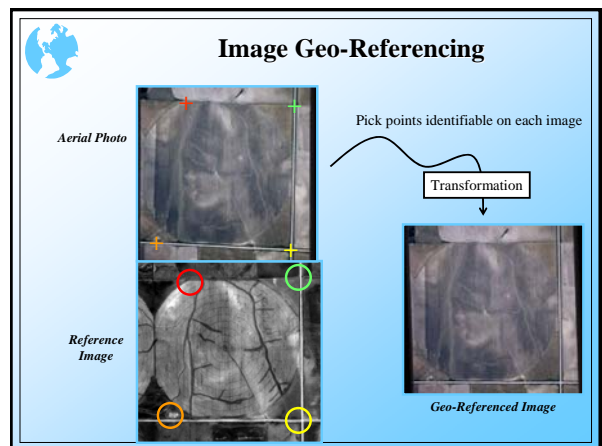
### Aerial Photography

Aerial photos are not maps

Aerial photos are images taken from the air

Corrected for distortions and assigned map coordinates

The diagram compares an aerial photograph with a map. The map is circled in red with a diagonal line through it, indicating that aerial photos are not maps. The aerial photo is shown below, with a grid overlaid, indicating that it is corrected for distortions and assigned map coordinates.



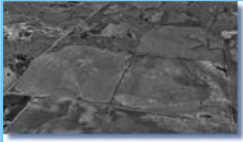
## What is orthorectified imagery ?

An orthophoto is a aerial photo that has been corrected for terrain and camera distortions.

An orthophoto has the properties of a map, such as accurate location and ability to make precise measurements.

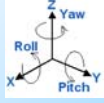
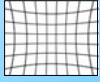

Removes scale variation caused by:

- Topographic relief
- Lens distortion
- Camera orientation



## Ortho Imagery Requirements

- Exterior orientation
  - Camera orientation
- Camera model
  - Accounts for lens distortion
- DEM
  - Relief displacement

## When to Fly Aerial Photography





Application of imagery determines when the aerial photography will be flown

Examples



Flooding	after big rain
Agriculture	during the growing season (summer)
Map side walks	no leaves on the trees (winter/early spring)

## Conditions of Aerial Photography

- No smoke or haze
- No clouds or cloud shadows
- Solar angle 30 degrees above horizon
- Less than 5 degrees of tilt or crab









## Haze and Clouds

## Haze and Clouds

Weather can limit number of days for image collection

### Mission Planning

Sun angle

Summer  
Fall  
Winter

More sun light during the summer

### Mission Planning

FAA controlled airspace  
Other airplanes

Aviation map

### Flight Navigation

GPS guidance  
Camera triggered on pre-planned locations

Altitude  
Airspeed  
Heading

### Flight Planning

Plan photocenters to ensure 100% coverage of project

Project Boundary  
Photocenter  
Flight Line

### Aerial Photo Mosaic

Need to balance color

Corrected Aerial Photo

### Benefits of Film

- **Large foot print**
  - Ability to collect large areas in a short amount of time
- **Resolution**
  - Large film size allows high resolution of large foot prints
- **Hard copy**
  - 9 x 9-inch hard copies of each photo



## Benefits of Digital

- **Image acquisition cost**
  - No cost of film and development
  
- **Turn-around-time**
  - Film requires time to convert from analog to digital
  - Digital systems save directly to hard drive and require little post-processing
  
- **Streamlined workflow**
  - Seamless integration with GIS and image processing software



*<http://bse.unl.edu/adamchuk>  
E:mail: [vadamchuk2@unl.edu](mailto:vadamchuk2@unl.edu)*