

Lecture 22: *Photogrammetry and air photos for mapping*

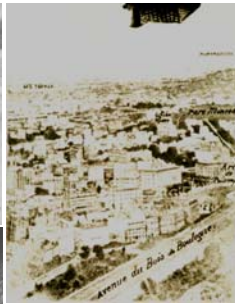
Professor Keith Clarke



Some Definitions

- Photography: The art or process of producing images on a sensitized surface by the action of light or other radiant energy
- Image: A reproduction or imitation of the form of a view of objects
- Photo interpretation: The act of examining aerial photographs/images for the purpose of identifying objects and judging their significance
- Photogrammetry: The science or art of obtaining reliable measurements by means of photography

1858 Photography takes to the air



1858 - Gaspér Felix Tournachon "Nadar" takes the first aerial photograph from a captive balloon from an altitude of 1,200 feet over Paris



Origins of Photogrammetry

- 1887 - Germans began experiments with aerial photographs and photogrammetric techniques for measuring features and areas in forests
- 1889 - Arthur Batut take the first aerial photograph from using a kite of Labruquiere France



WW1 and WW2

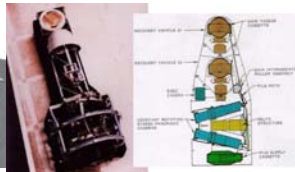


K3 Army Mapping Camera

U-2 & Francis Gary Powers

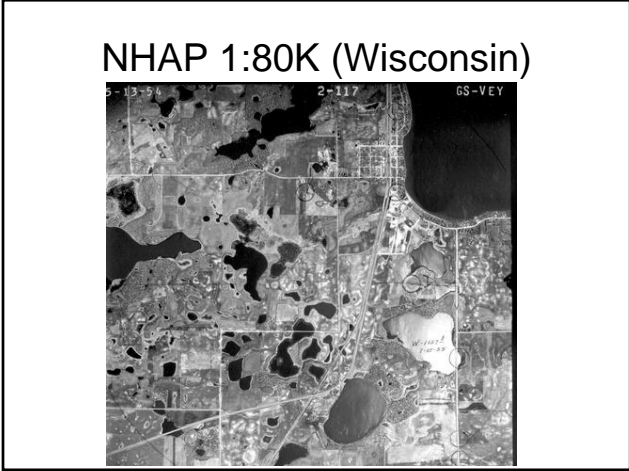
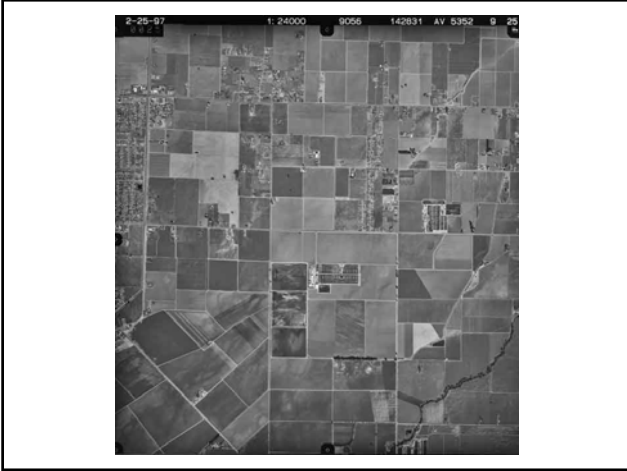


CORONA 1958-1972



Corona Imagery KH-4 1966





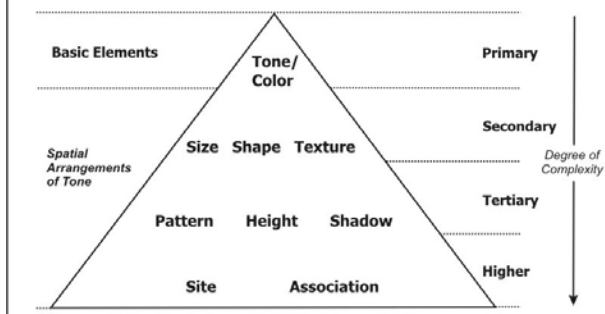
Flight planning



Photo Interpretation Tasks

- Detection and identification of features, phenomena, or processes
 - Detection and interpretation
 - Labeling
 - Confidence assessment
- Measurement and estimation
- Use in topographic and special purpose mapping
- Map update
- Problem solving
 - Object complexes
 - Object relations
 - Assessments/causes
- Rating of evidence
 - Assembly of information
 - Ranking and assessment

Primary Ordering of Image Elements Fundamental to the Analysis Process



Detection



Identification: What is it?



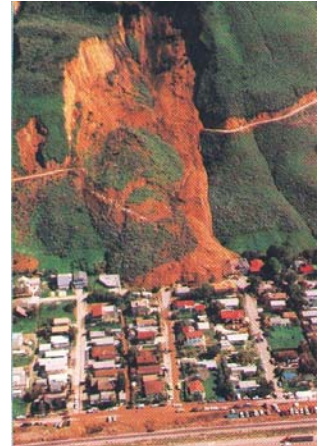
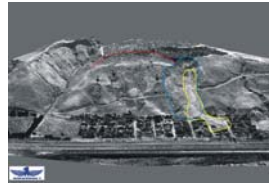
Sitka, Alaska



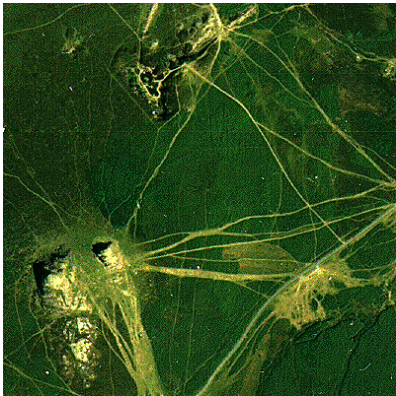
Source: www.mehs.educ.state.ak.us/sitka/cross_sound.html

Process

La Conchita, CA



Process: Inference



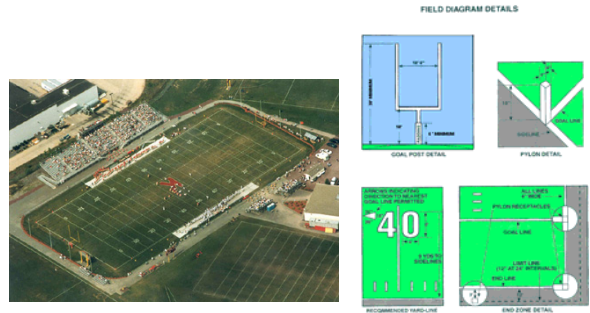
Inference: Sequence



Japanese Tsunami 3/11/11



Measurement

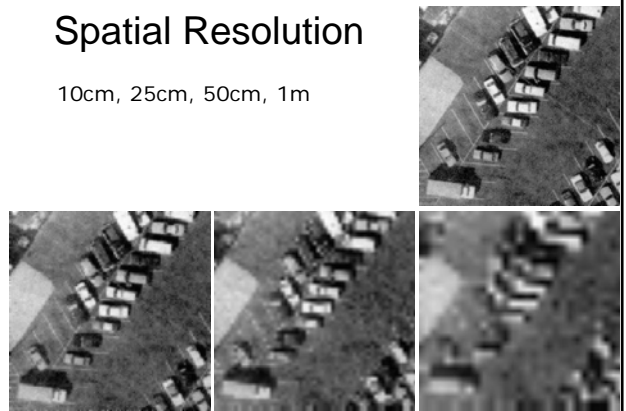


Orientation



Spatial Resolution

10cm, 25cm, 50cm, 1m

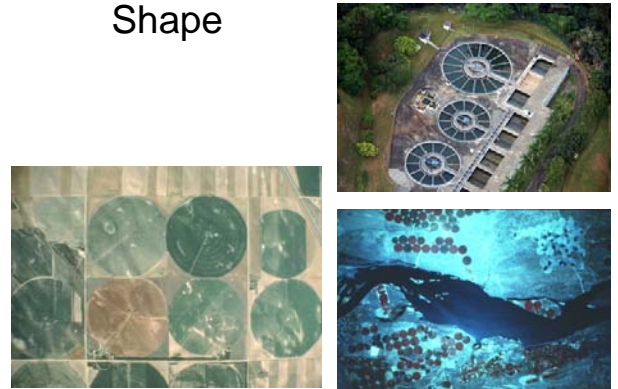


Resolution

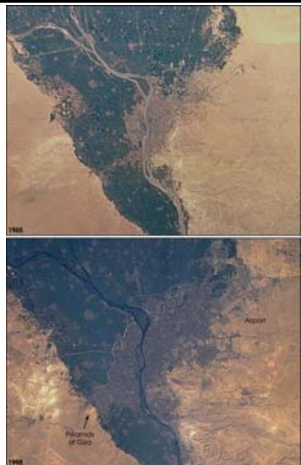


* See mecca_saudi_arabia_quickbird_feb11_2003.tif

Shape



Texture



Pattern



Oblique Low Angle (no apparent horizon visible)



Oblique Low Angle (cont.)



Oblique Low Angle (cont.)



Overhead Vertical True



Oblique: High Angle CIR (apparent horizon visible)



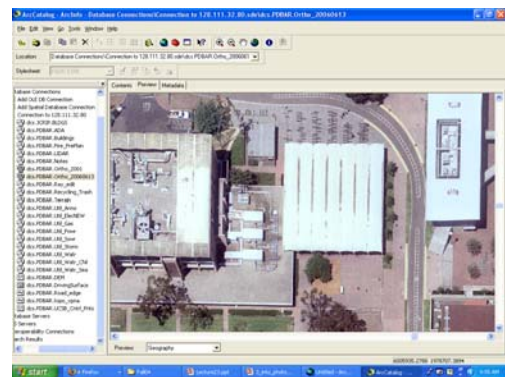
Oblique: High angle (apparent horizon visible)



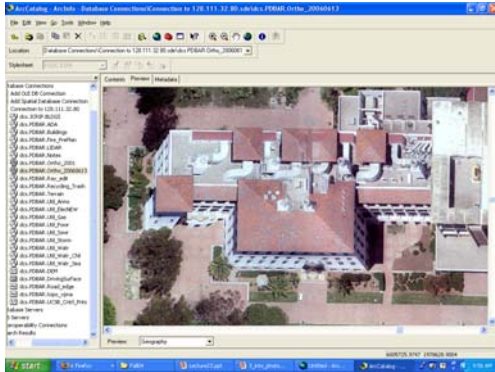
Examples of High Oblique Photographs
Mozambique Flooding, March 2000



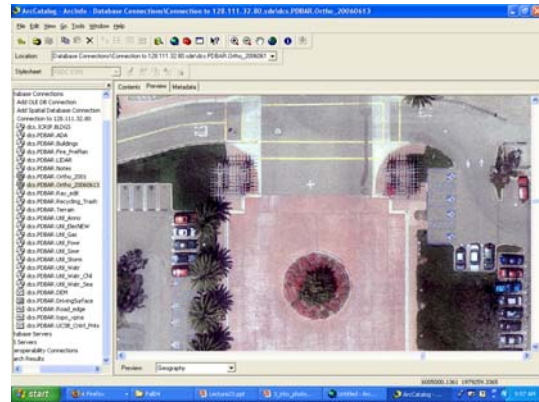
UCSB Campus Orthophotography



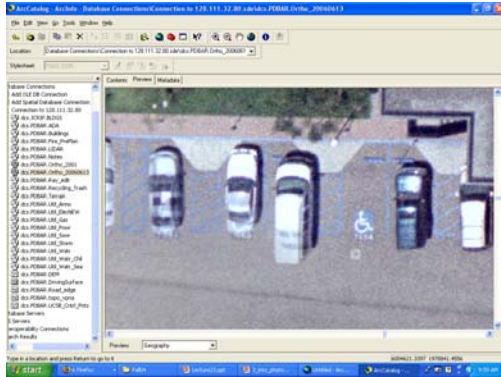
Chem Building: Nadir



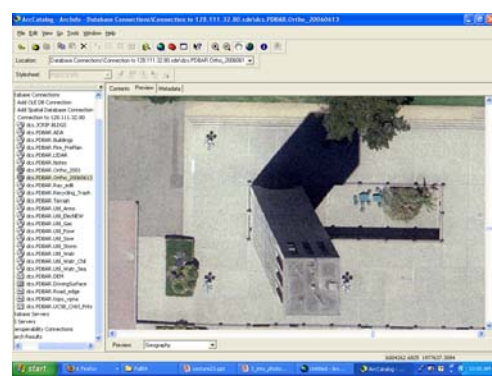
Control Point



Motion blur



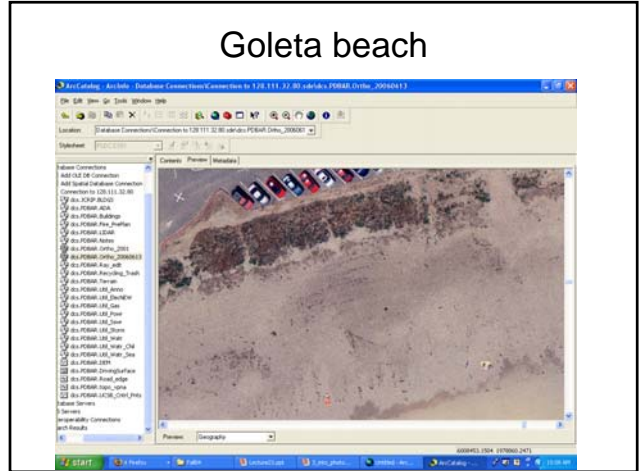
Storke Tower



Outside Corwin



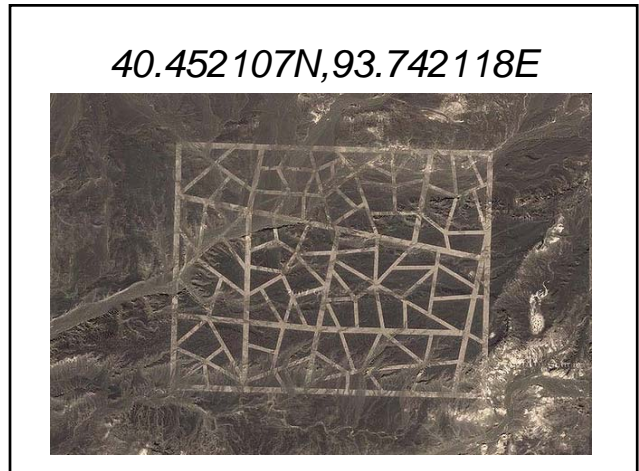
Goleta beach



Latest imagery 2011



40.452107N,93.742118E



Fort Huachuca, AZ



Summary

- Air photos have been used for mapping for over 100 years
- Science of photogrammetry
- Satellites, planes, kites, balloons, drones
- Images are systematically distorted, and must be corrected for mapping
- Interpretation: A skill
- Images and maps now almost interchangeable