Benha University

Shoubra Faculty of Engineering

Photogrammetry II

Lecture 2: Principles of Photography and Imaging

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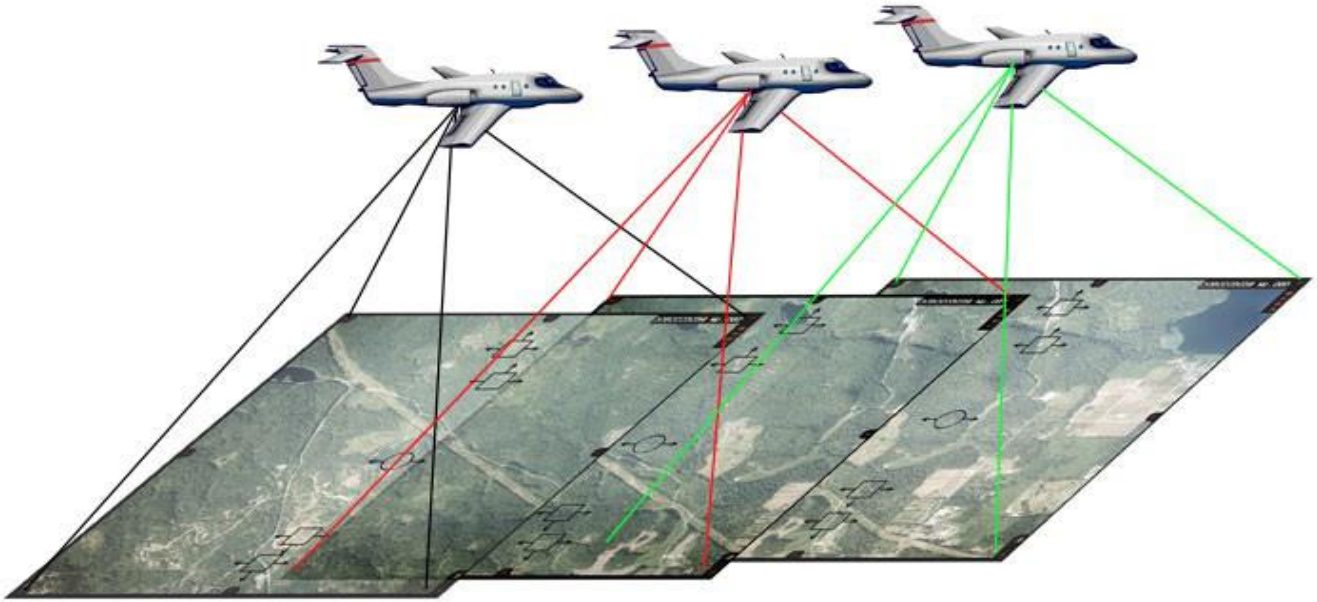
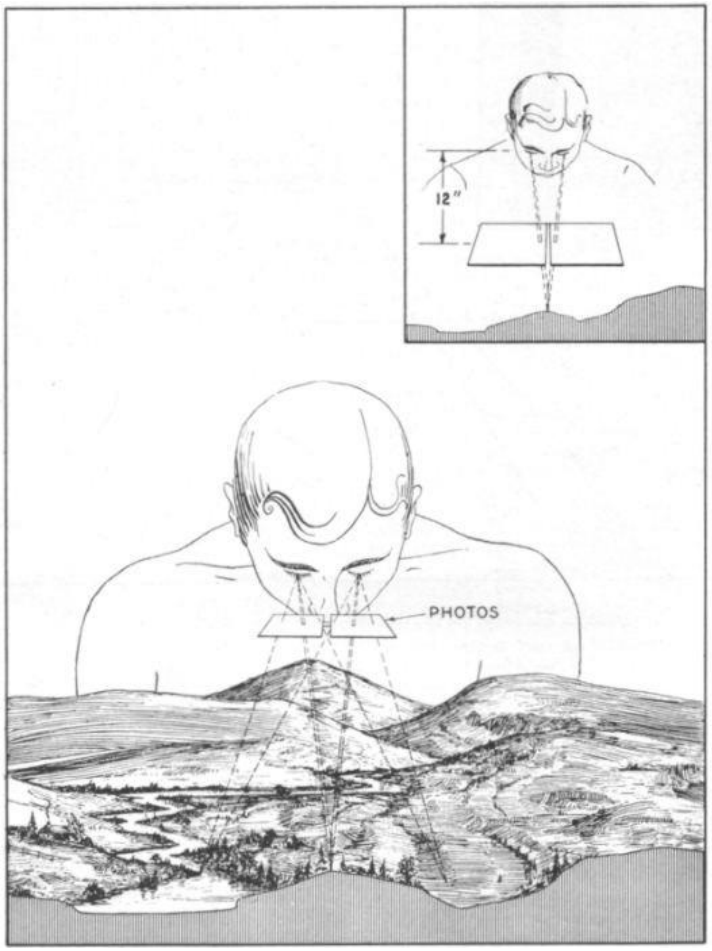
What you learn from this lecture

1. Stereoscopic vision.
2. Basic Terms of photogrammetry.
3. Types of Photographs.
4. Relief Displacement.
5. Flight Planning.



Stereoscopic vision

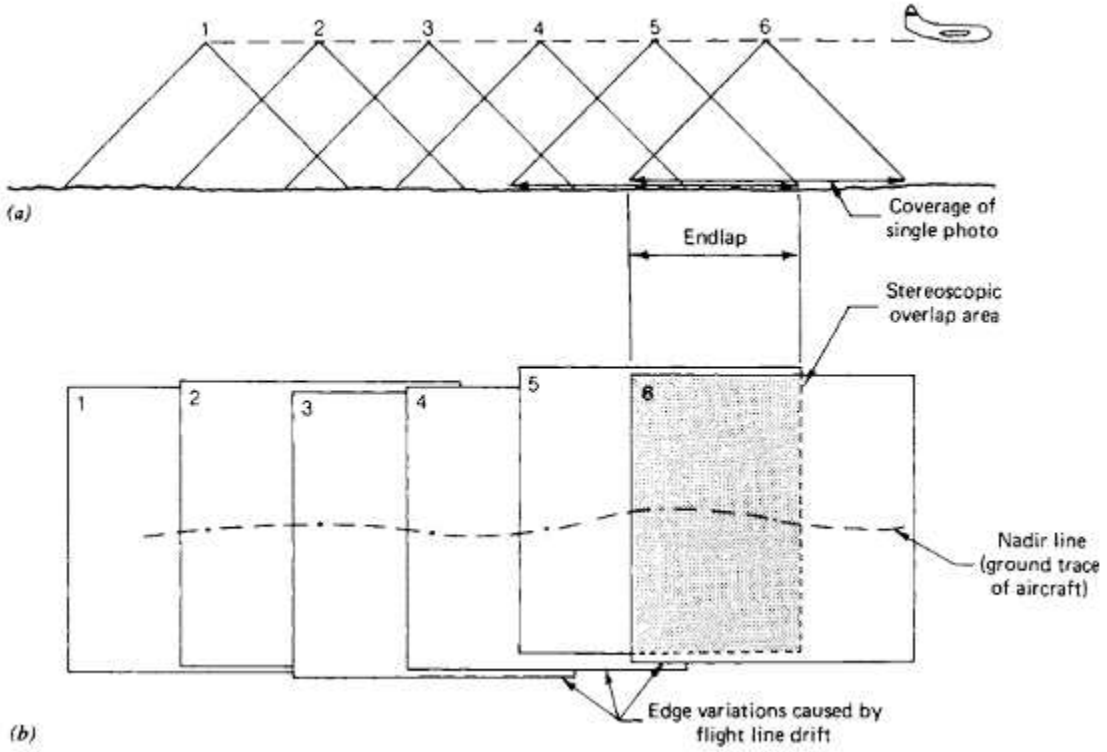
3-D stereoptic viewing of the Earth's surface is possible using overlapping pairs of vertical stereo aerial photographs

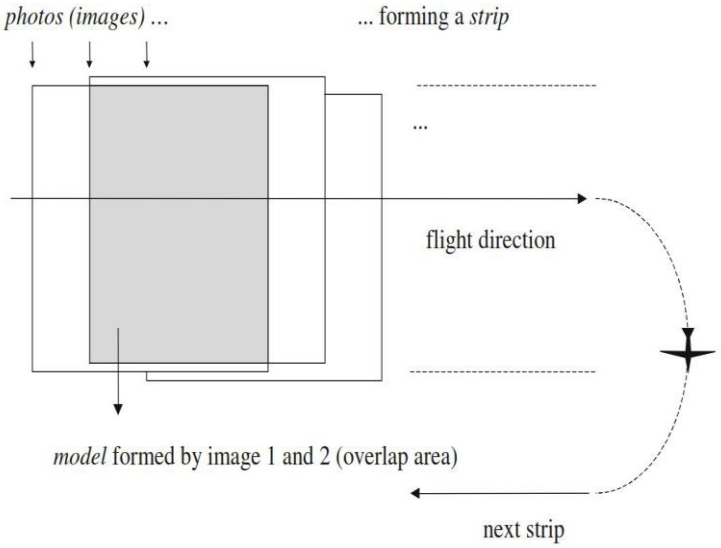


Definitions of some standard terms

- Photo: the original photo (e.g., hard copy aerial photograph)
- Image: the photo in digital representation (e.g., a scanned hard copy of the aerial photograph)
- Model : two neighboring images within a strip Also called “stereo model” , “image pair”
- Strip : all overlapping images taken one after another within one flight line
- Block : all images of all strips
- Base : distance between the projection centers of neighboring images

Definitions of some standard terms





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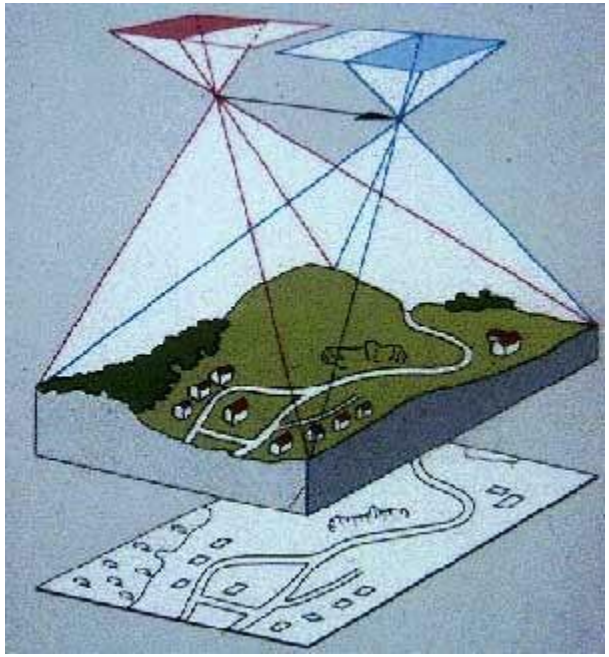
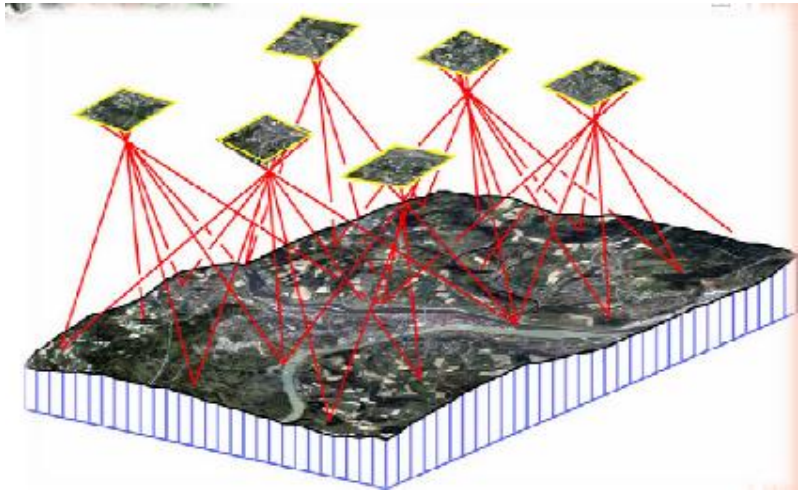
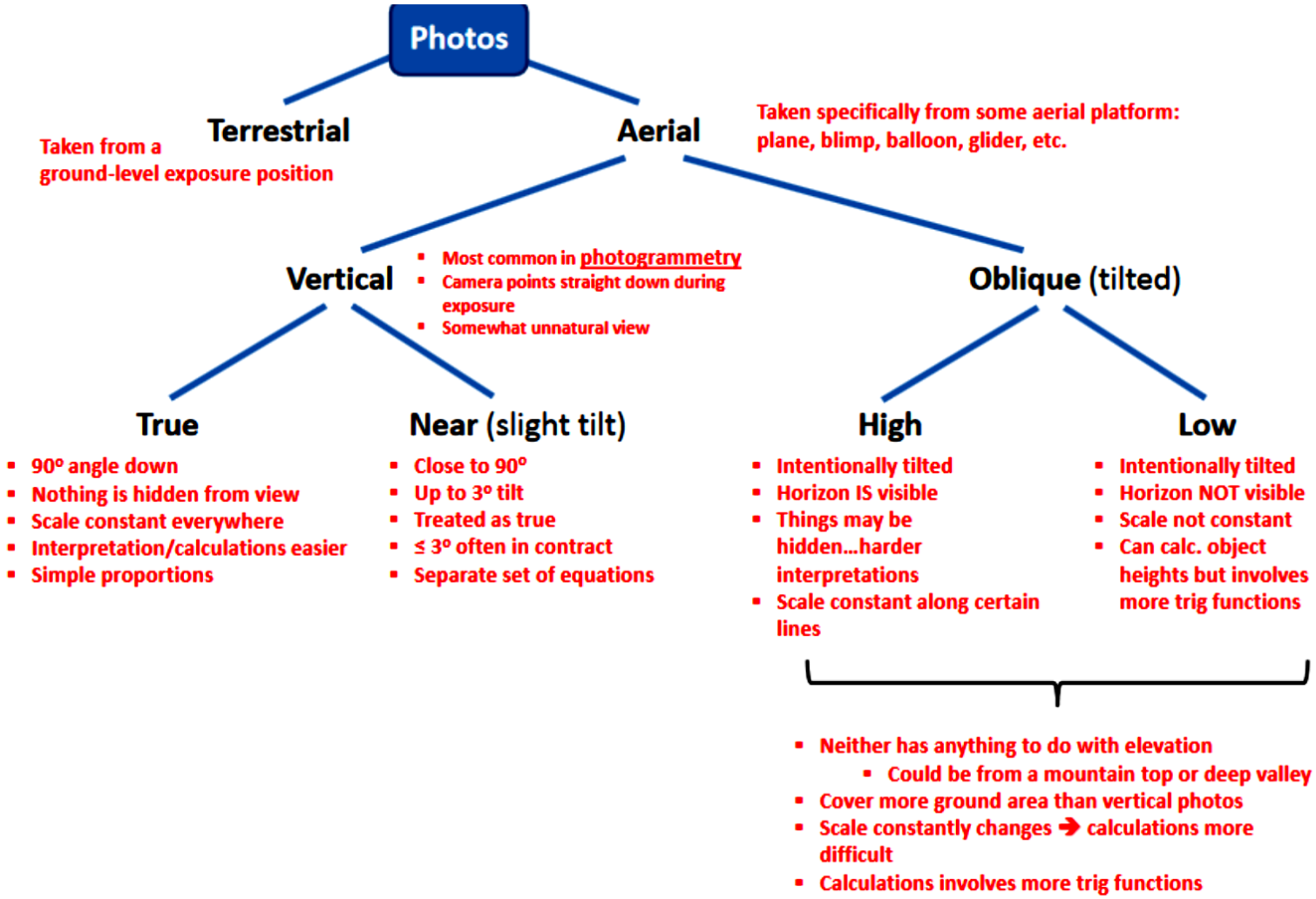
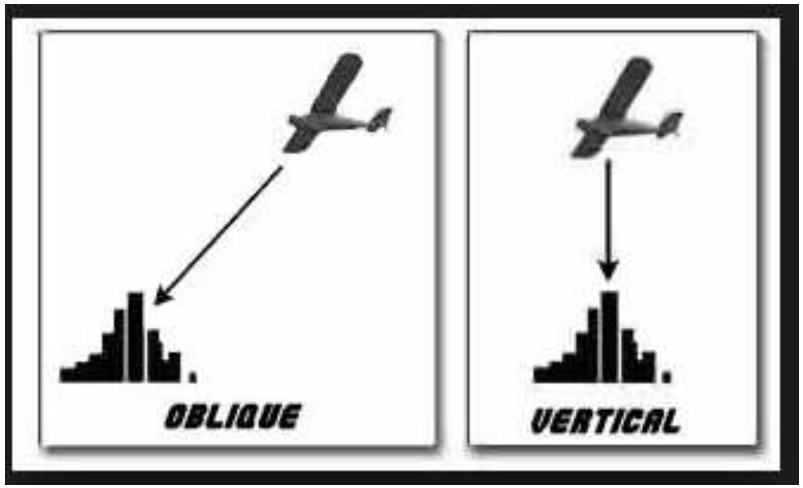


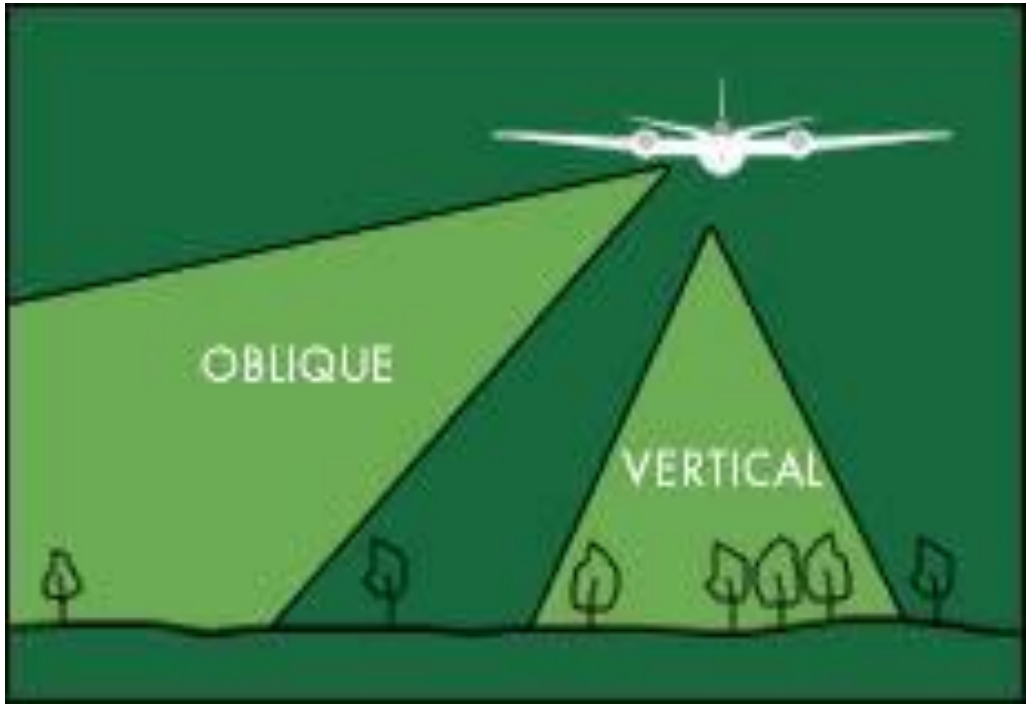


Geometric Types of Photographs



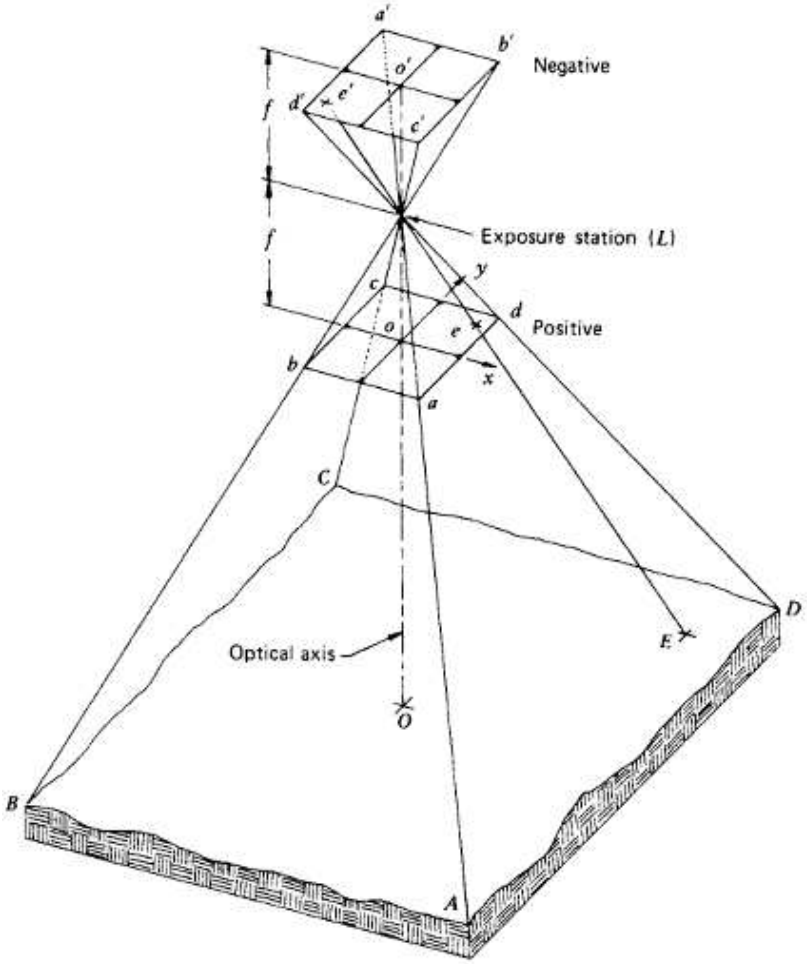
Geometric Types of Aerial Photograph





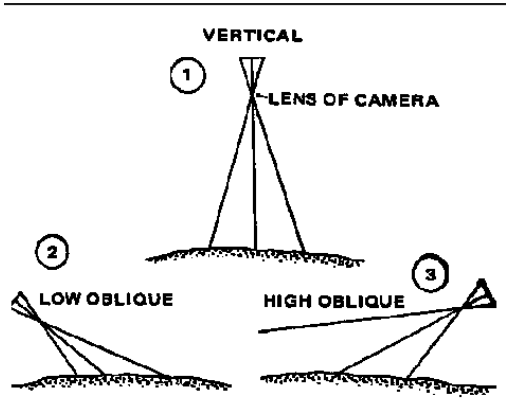
Vertical aerial photographs:

Those made with the camera axis directed as vertically as possible



Oblique aerial photographs:

- Aerial photographs that are taken with an intentional inclination of the camera axis
- High oblique photographs
- Low oblique photographs

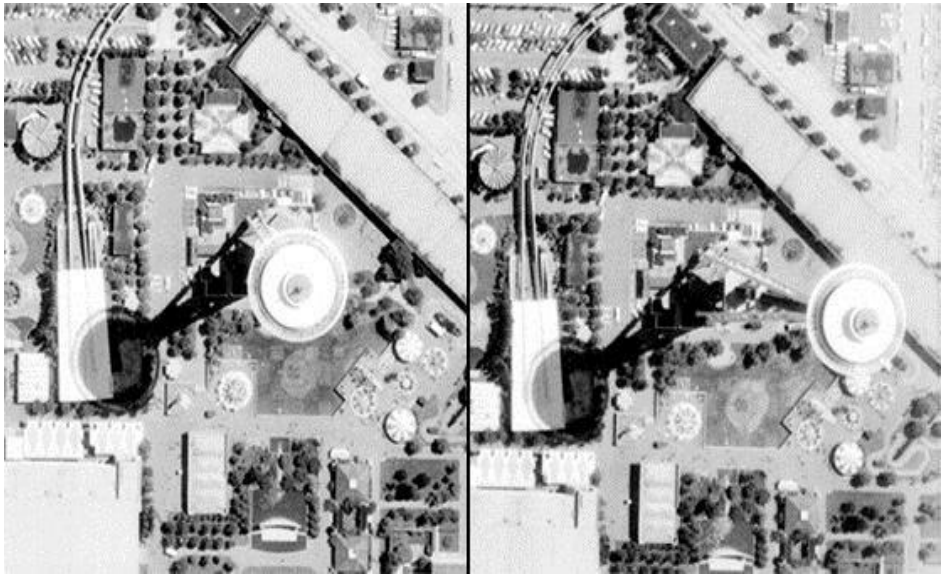


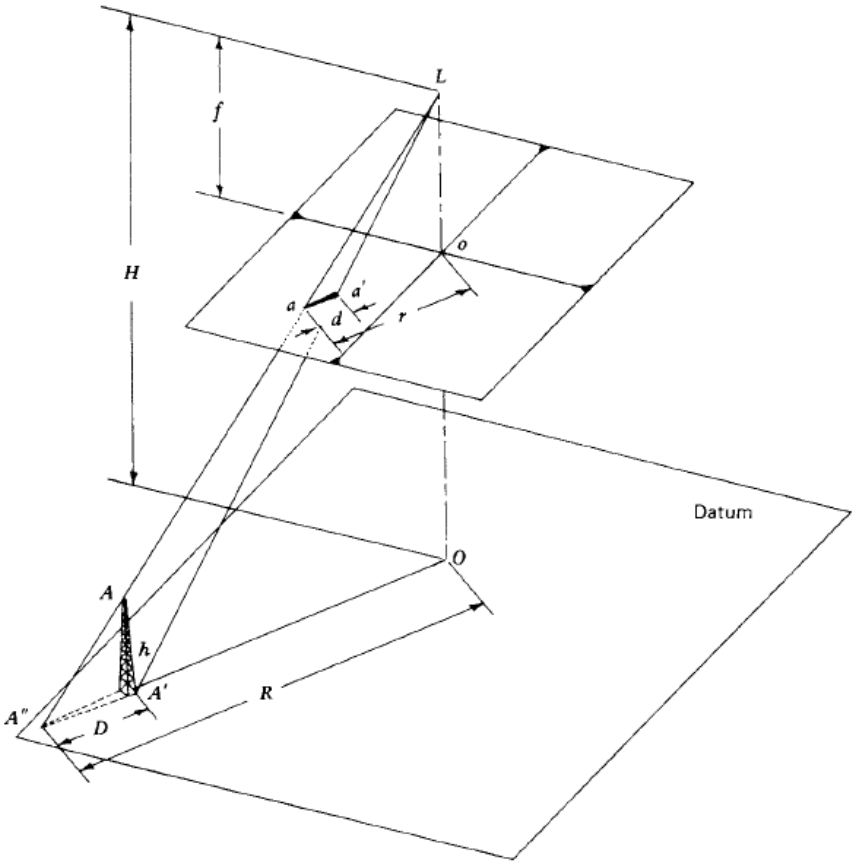
RELIEF DISPLACEMENT:

- The scale of an aerial photograph is partly a function of flying height.
- Thus, variations in elevation cause variations in scale on aerial photographs.
- Specifically, the higher the elevation of an object, the farther the object will be displaced from its actual position away from the principal point of the photograph (the point on the ground surface that is directly below the camera lens).
- The lower the elevation of an object, the more it will be displaced toward the principal point. This effect, called relief displacement, is illustrated in the diagram below.

RELIEF DISPLACEMENT:

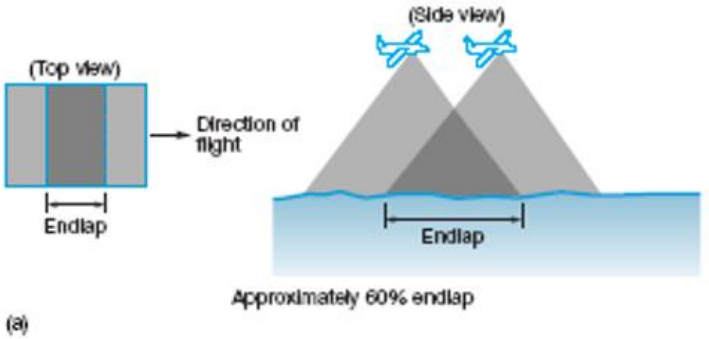
- The tops of objects are always displaced from their bases

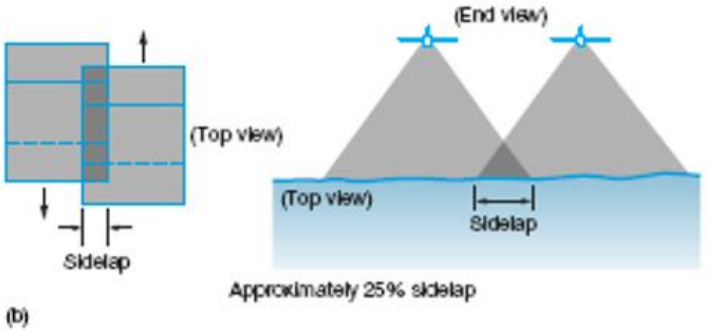


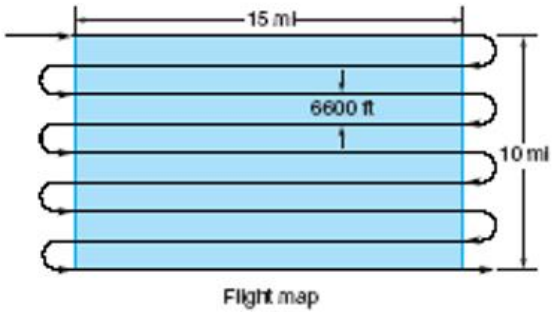


FLIGHT PLANNING:

- focal length of the camera to be used (f)
- size of the area to be photographed
- average elevation of the area to be photographed
- overlap desired
- sidelap desired
- speed of the aircraft to be used





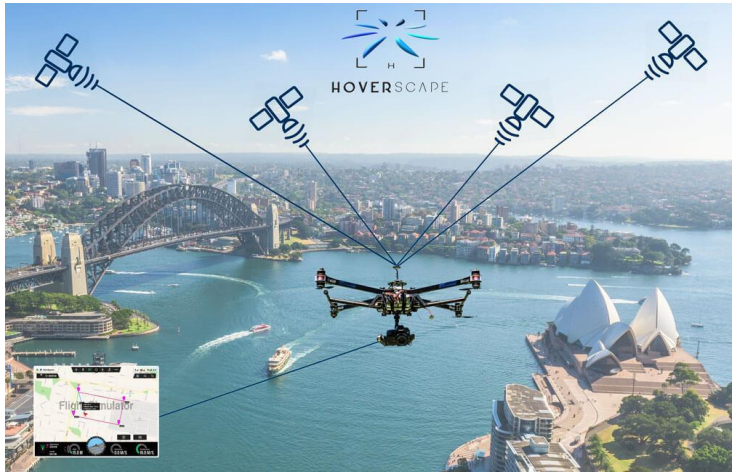


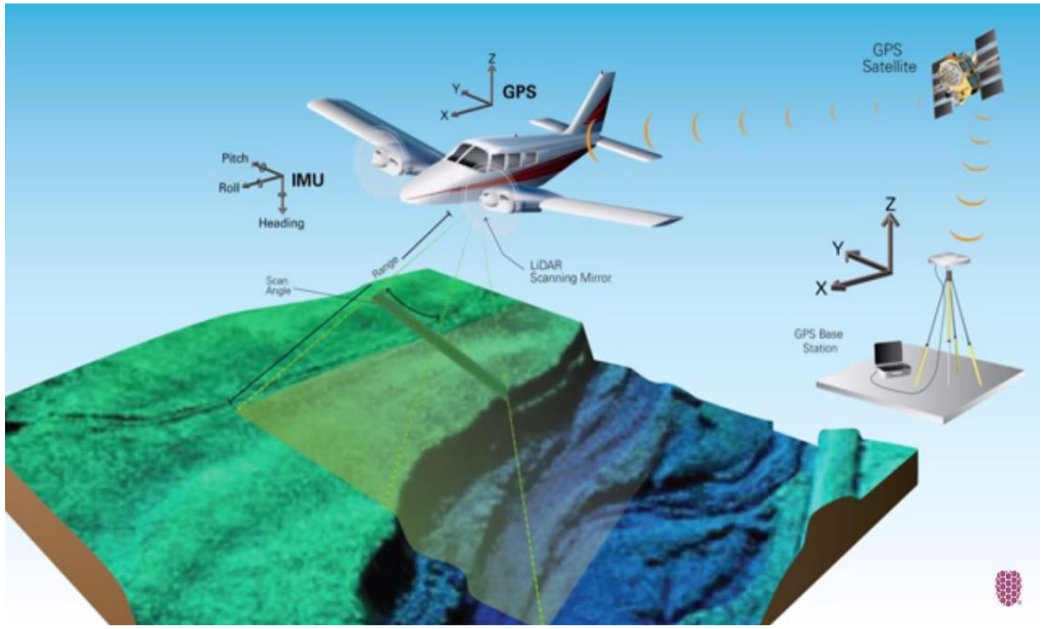
FLIGHT PLANNING:

- From those parameters, the mission planner prepares computations and a flight map that indicate to the flight crew the following:

1. Flying height above datum
2. Location, direction, and number of flight lines to be made over the area to be photographed
3. The time interval between photos
4. The number of photos on each flight line
5. The total number of photos necessary for the mission

The Current Types of Photogrammetry devices





Supplementary files:

- https://www.youtube.com/watch?v=bW2RceUZ50c&t=278s
- https://www.youtube.com/watch?v=CVI79ojfzCA
- https://www.youtube.com/watch?v=RDinJVJodqE
- https://www.youtube.com/watch?v=Kgq2J3Jbc04

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Thanks

Dr.Eng. Hassan Mohamed