

University of Anbar

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2<sup>nd</sup> Stage

Remote Sensing

Lecture 6 : Aerial Photography



**Aerial photograph** is the picture of the ground surface taken from the air with a camera pointing downward.

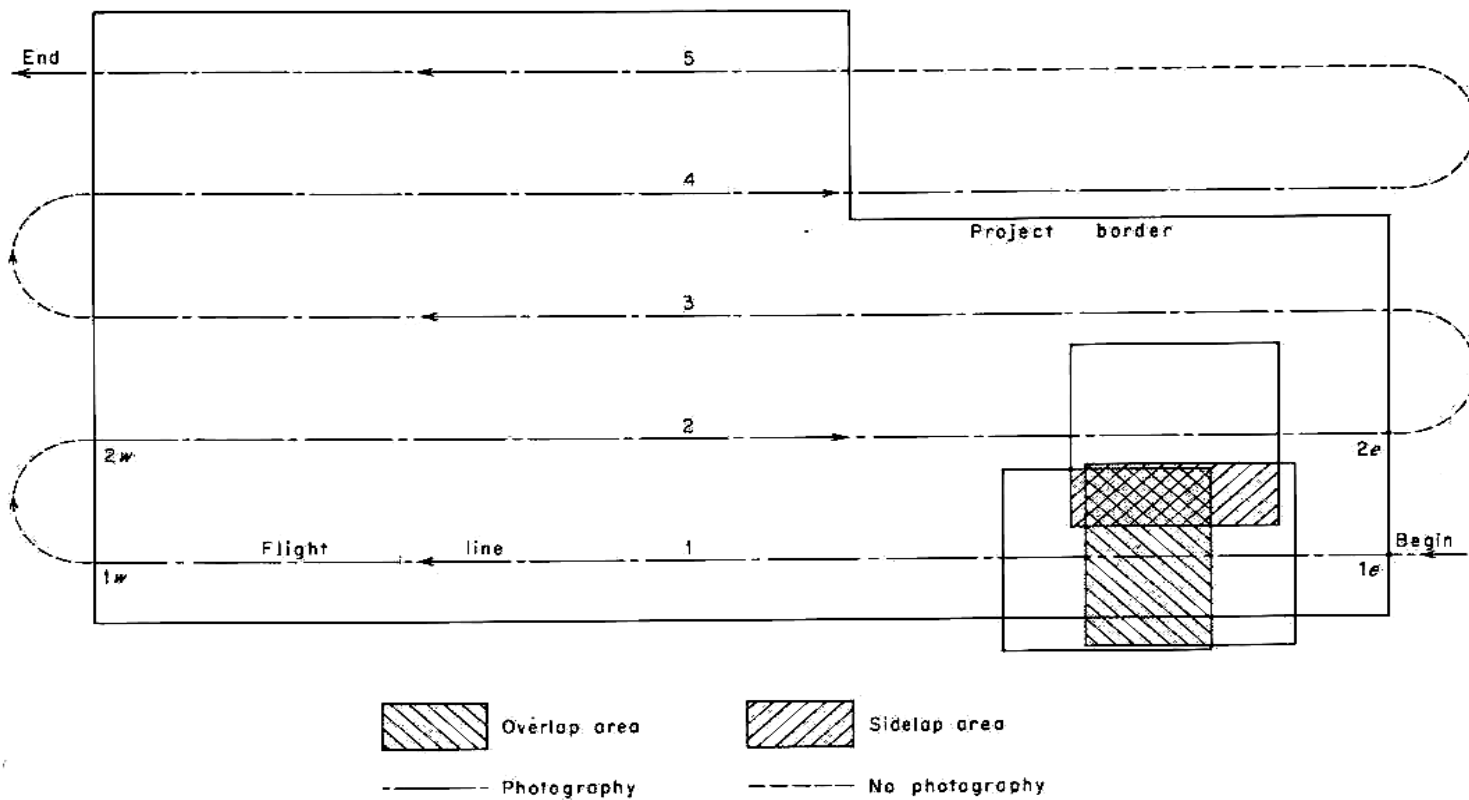
The study of the aerial photographs can't substitute the field investigations but rather it helps and contributes to them. The advantages of the study of the aerial photographs can be listed as follows:

- a. it saves time
- b. it provides to observe a larger area
- c. it has more detailed ground surface than maps
- d. photographs can be studied anytime and at anywhere
- e. studies carried out on the photographs are cheaper than studies in the field
- f. studies carried out on the aerial photographs are easier than studies in the field

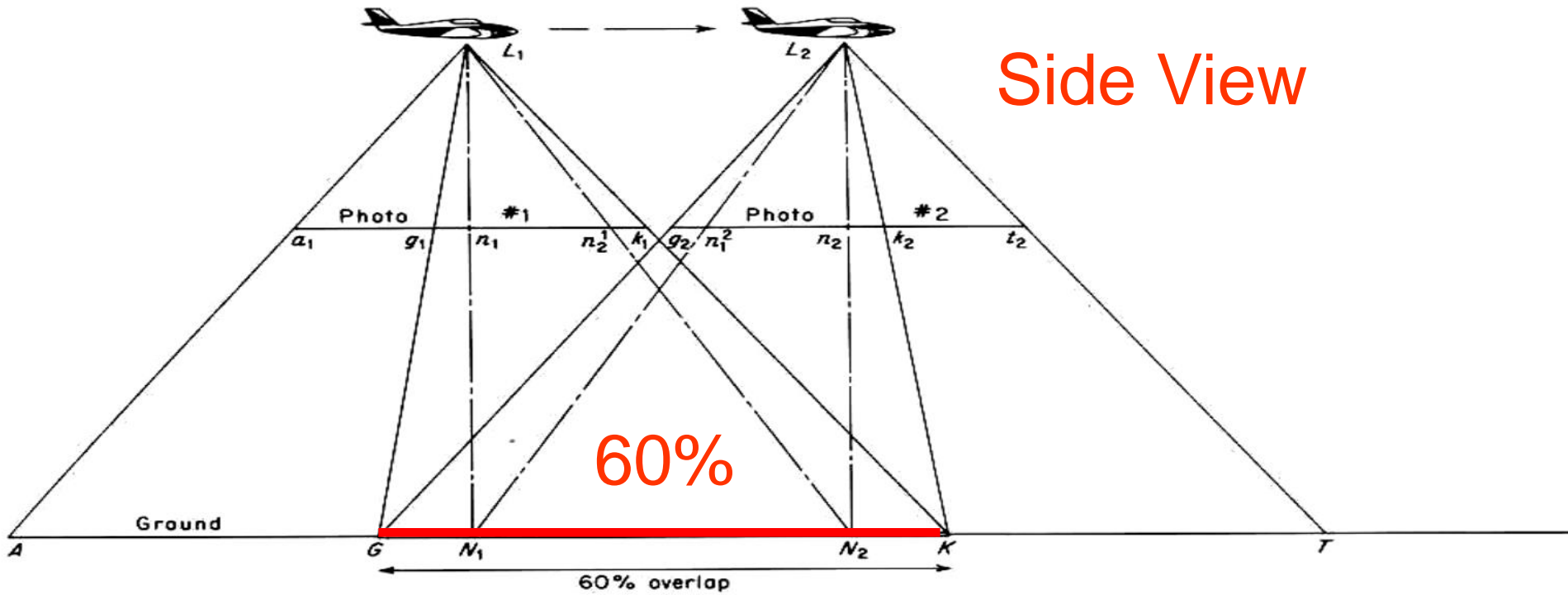
The only disadvantage of the aerial photographs is the absence of the topographic contours and the geographic names.

The photographs are generally taken in spring or autumn, when the ground is not covered by vegetation .

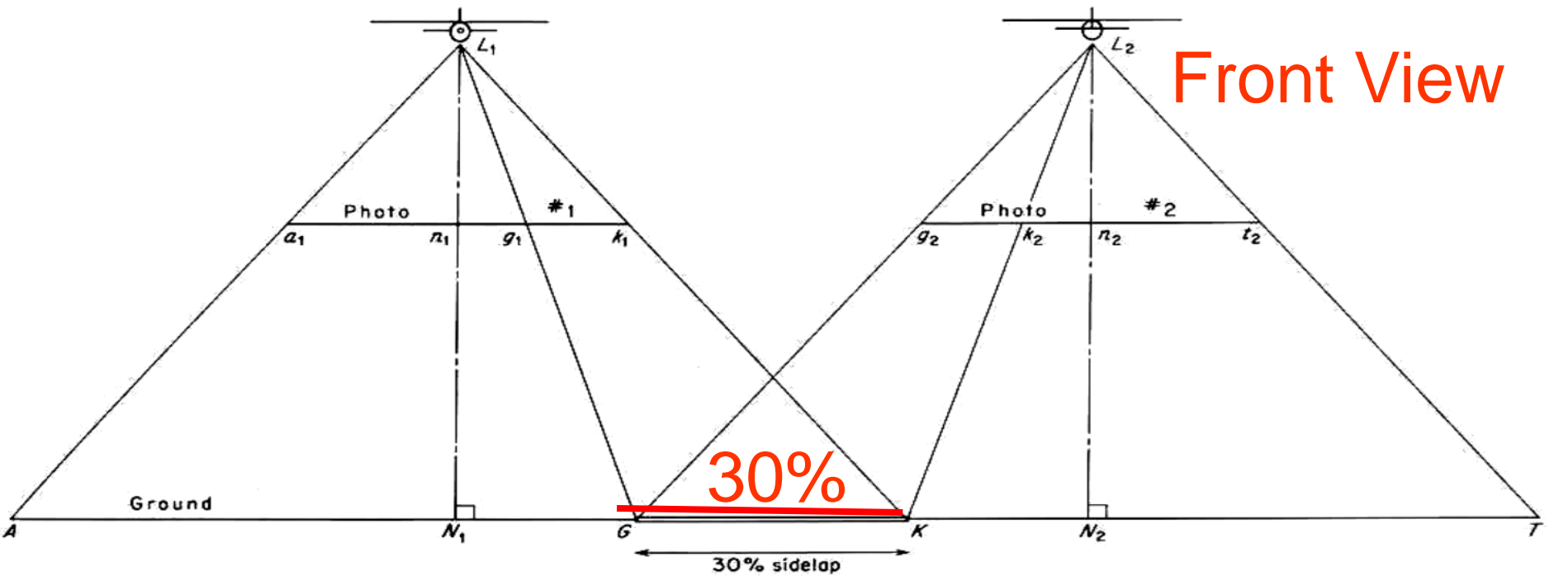
The pictures are taken at series of parallel lines so that it provides overlapping in order to obtain stereoscopic viewing.



# Side View



# Front View

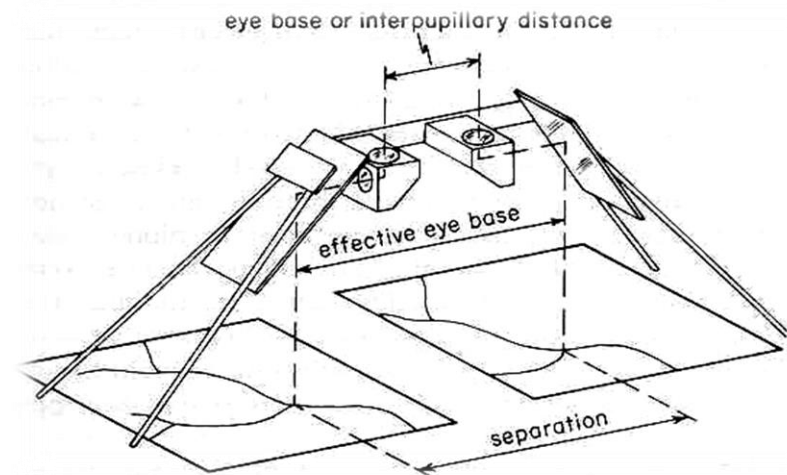
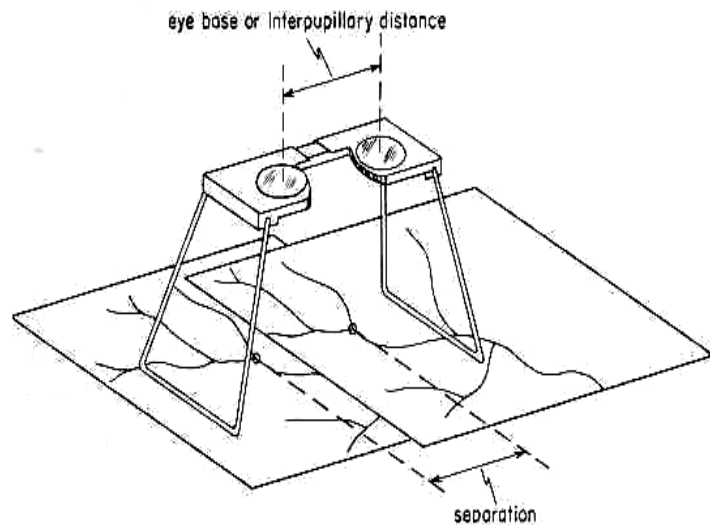


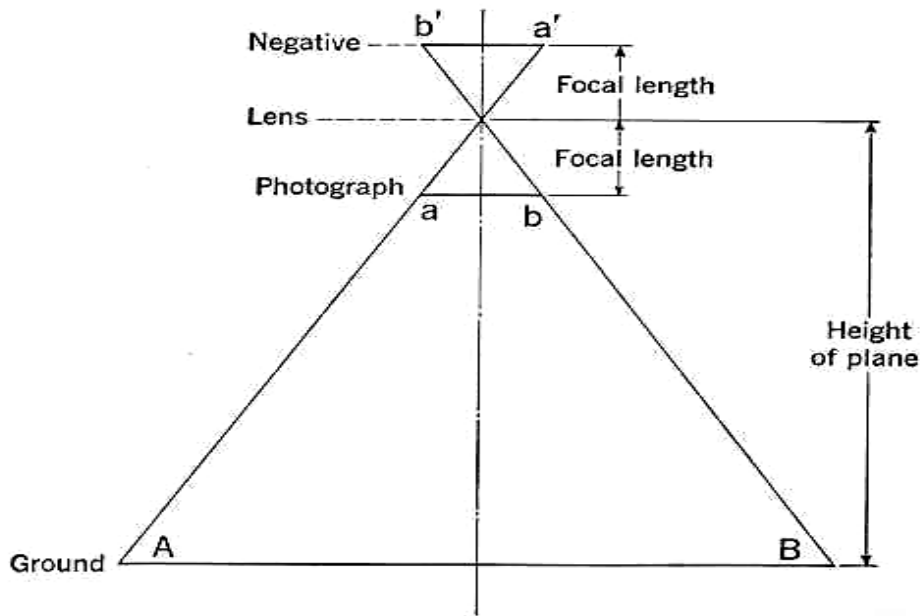
When two pictures of the same area, taken from two different positions, are studied simultaneously with a stereoscope, This model is called stereo model for Two adjacent photographs are called stereo pair

## Stereoscopes

Two photographs of the same terrain, but taken from different camera stations any two successive photographs along the flight line (a line on a map representing the track of the aircraft).

There are two basic types of stereoscopes. These are simple lens or pocket stereoscopes and the mirror stereoscopes





$$\frac{a \ b}{A \ B} = \frac{\text{Focal length}}{\text{Height of plane}}$$

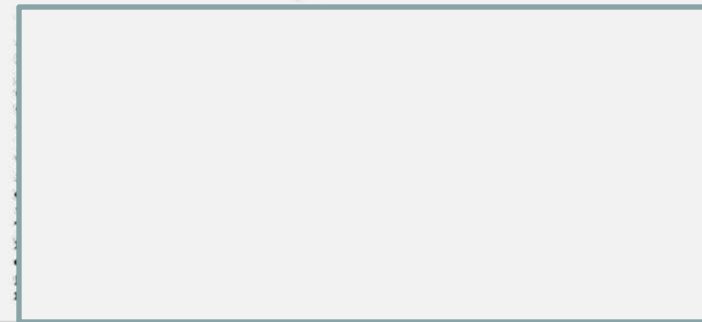
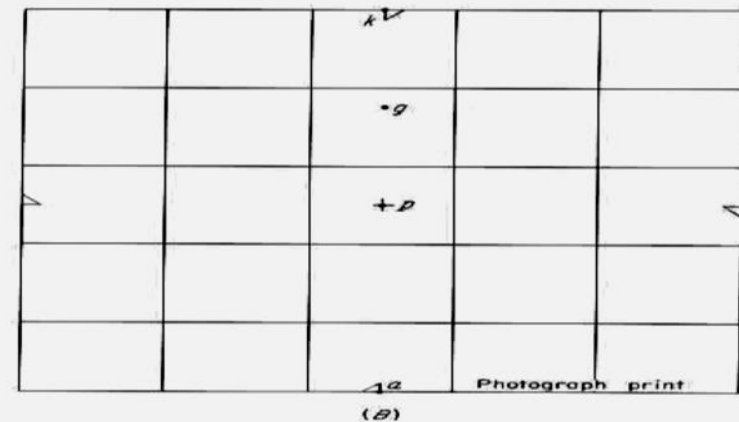
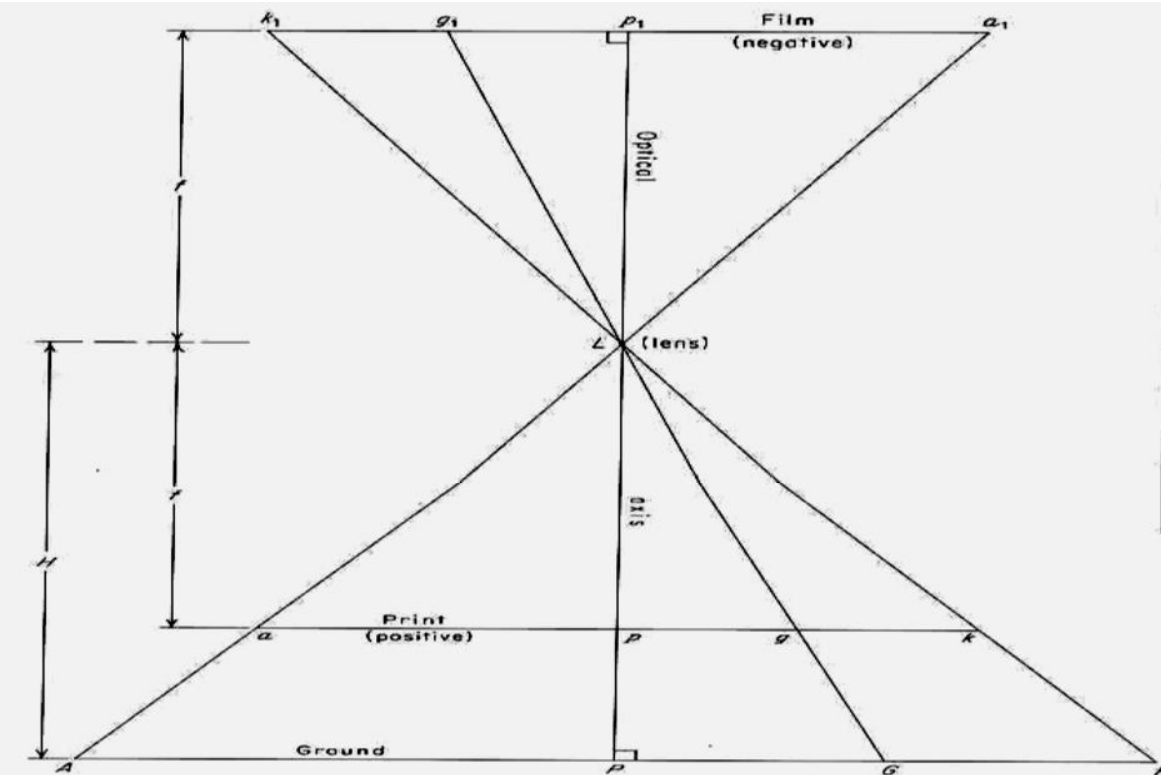
### Focusing

○ i	⌚ f	⌚ h			
Leveling		Height			
		a			
Date		Photo coord.		Scale	Photo No.
1731 c	12.10.1973 g	2793 b	152.08 d	25.000	757029 e

# Types of Aerial photography

1- Vertical aerial photographs are taken by the camera pointing vertically downward.

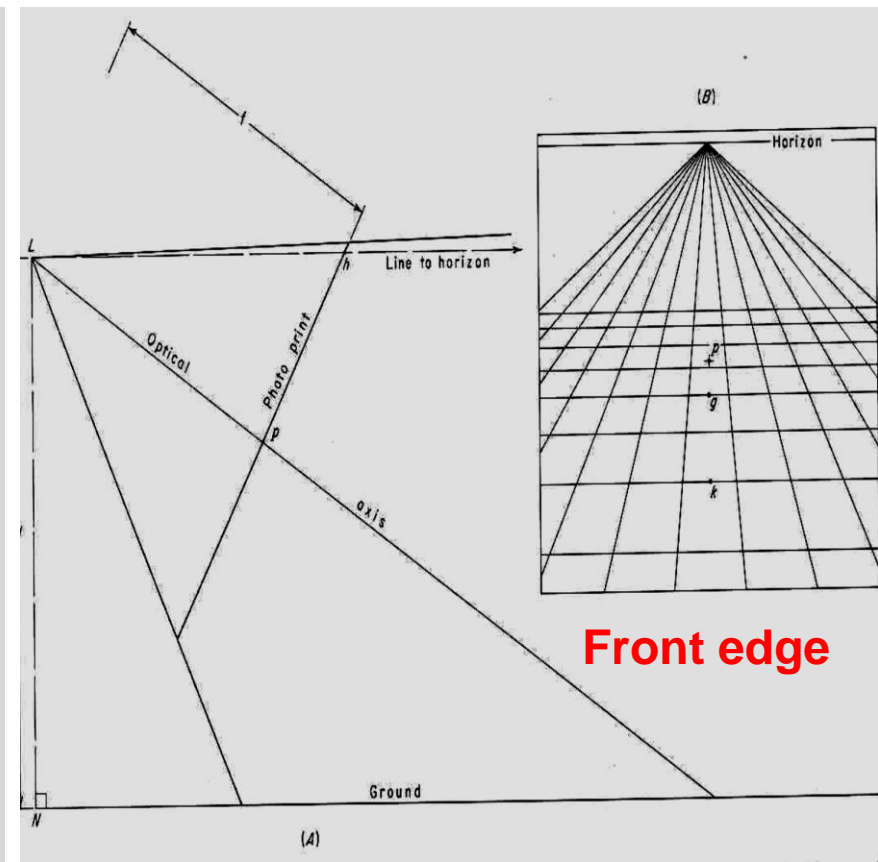
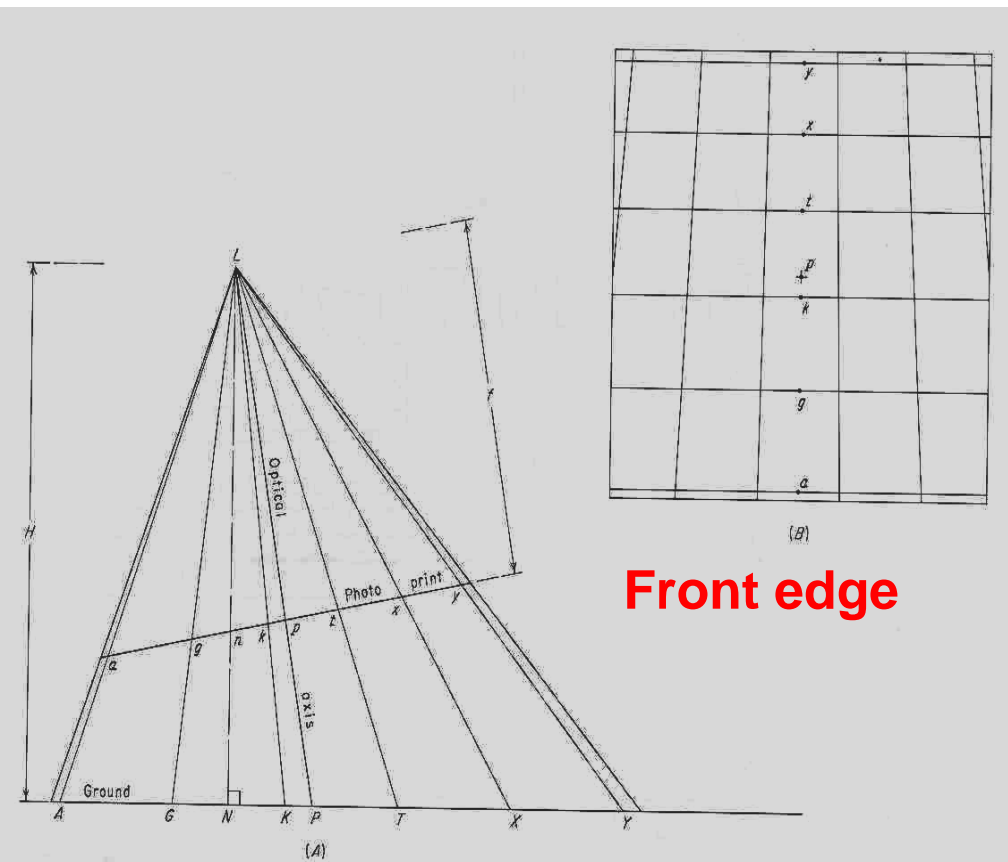
Therefore the optical axis is perpendicular to the ground surface.  
vertical. There is a tilt of  $1^{\circ}$ - $2^{\circ}$ .



2 -Oblique aerial photographs : taken by the camera which has the optical axis being oblique to the ground surface. The angle which is called pointing or sighting angle ranges from  $20^\circ$  to  $60^\circ$ . There are two types of oblique aerial photographs: Low oblique and high oblique aerial photographs.

Low oblique aerial photographs:  $S$  is between  $30^\circ$ - $60^\circ$

High oblique aerial photographs:  $S$  is between  $20^\circ$ - $30^\circ$

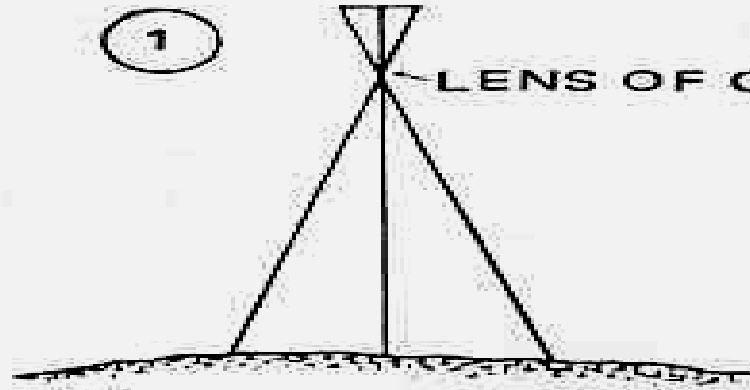




**VERTICAL**

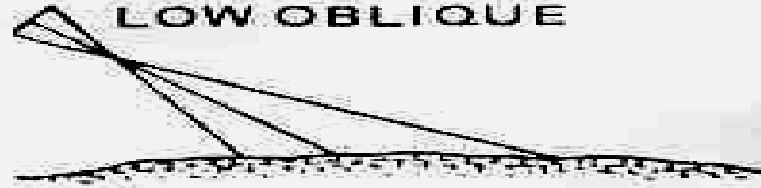
①

LENS OF CAMERA



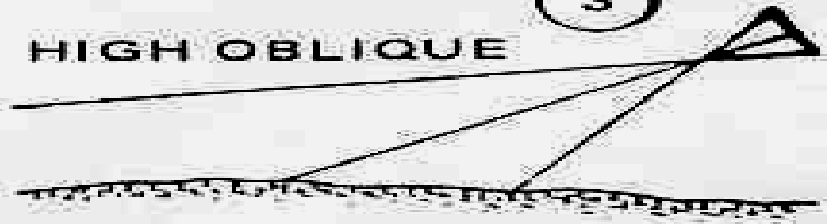
②

LOW OBLIQUE



③

HIGH OBLIQUE



SHAPE OF PHOTOGRAPH

CAMERA

LENS

IMAGINARY HORIZONTAL

LINE PASSING THROUGH

AXIS OF CAMERA

OPTICAL AXIS  
OF CAMERA

ABOUT  
30°

AREA COVERED

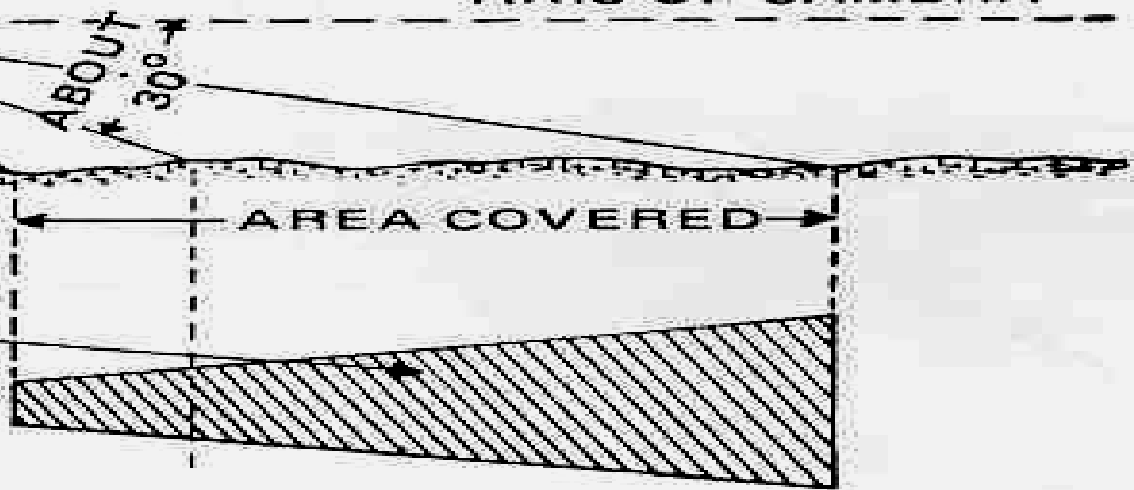
SHAPE OF GROUND

AREA COVERED

BY OBLIQUE

PHOTOGRAPH

④

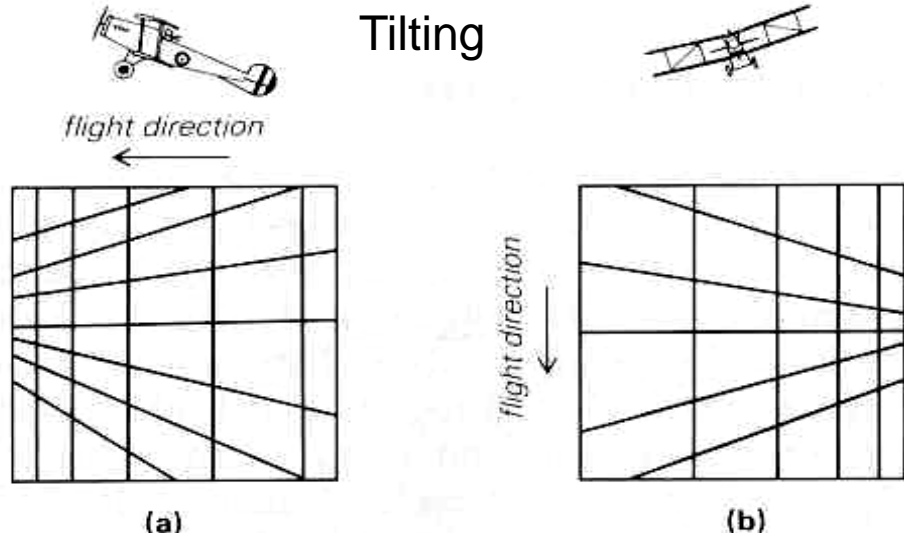


## The comparison of vertical and oblique aerial photographs:

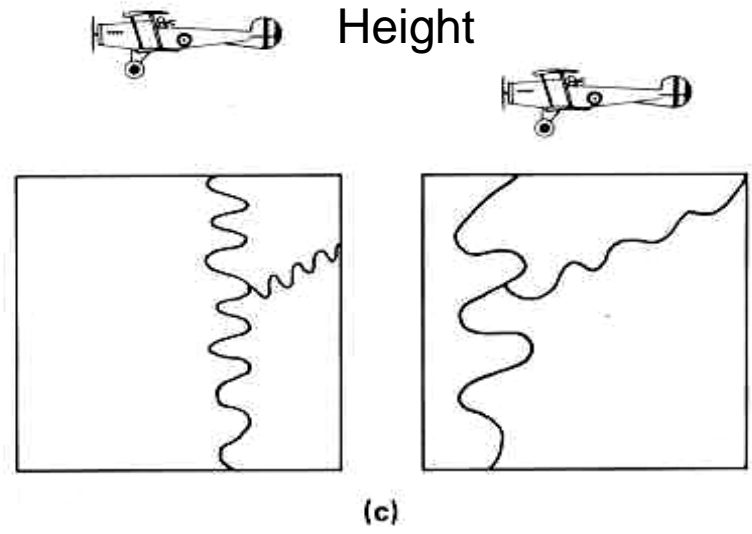
1. No (or less) distortion on vertical, but quite large distortion on oblique ones.
2. The front edge is the same in both, but back edge is different (in oblique greater)
3. The vertical photographs cover less area than oblique, that depends on the amount of sighting angle. With a less angle the larger area will be taken.
4. The horizon is generally seen on oblique photographs but not on vertical ones
5. Oblique aerial photographs are not suitable to get 3-D view because of the scale difference between the front and back edges. Therefore, generally the oblique aerial photographs are used to study gentle dipping features such as unconformities and thrust.
6. Oblique aerial photographs are used to illustrate the reports to show the route of the proposed roads, while the vertical ones are used mainly for photo interpretation.

# Some errors in areal Photography

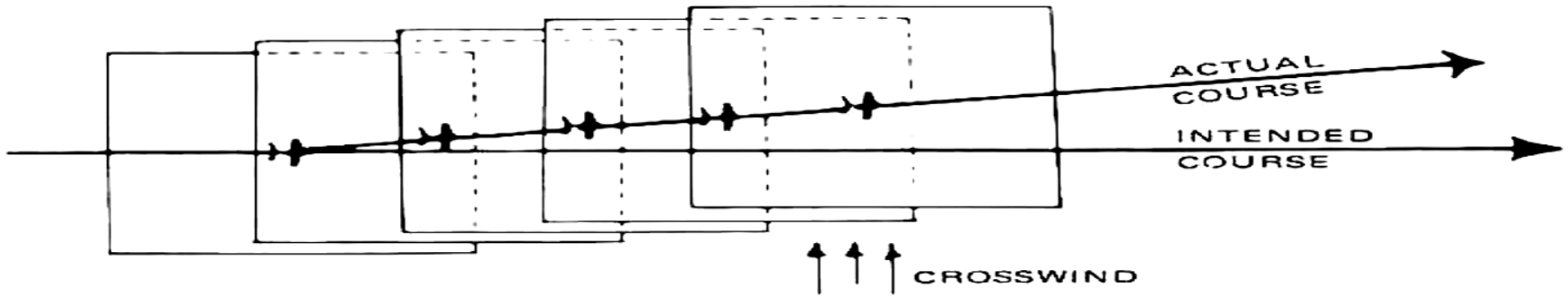
Tilting



Height

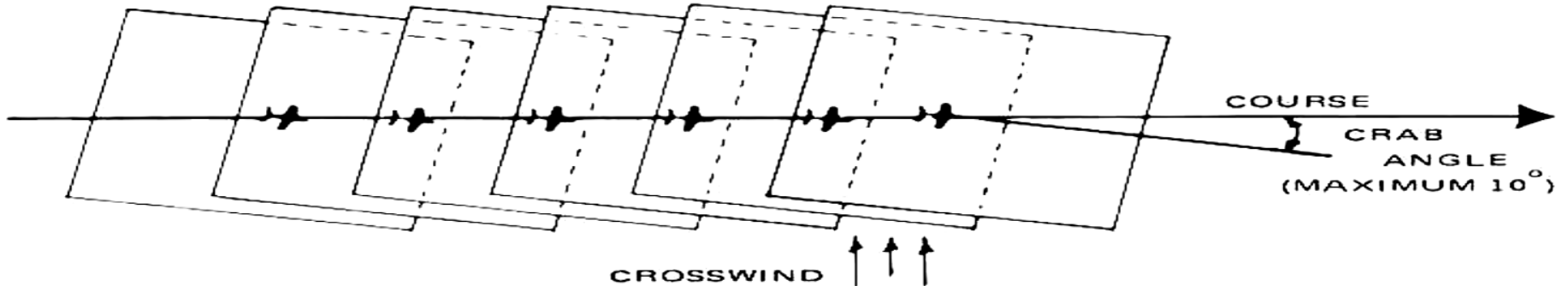


DRIFT



CRAB

Wind effects



# References

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# Earth Science Satellite Remote Sensing Vol. 1: Science and Instruments , Qu J. J., Gao W. , Kafatos M. , Murphy R. E, Salomonson V. V., Tsinghua University Press, Beijing and Springer-Verlag GmbH Berlin Heidelberg . 2006

# Internet Remote Sensing Lectures sites