

Fundamentals of Stereoscopy

Stereoscopy, sometimes called stereoscopic imaging, is a technique used to enable a three-dimensional effect, adding an illusion of depth to a flat image.

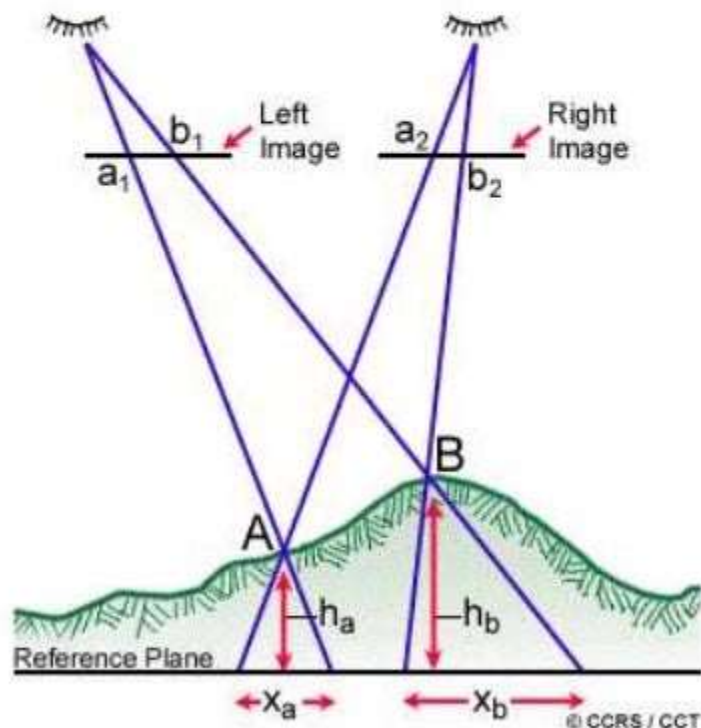
In aerial photography, when two photographs overlap or the same ground area is photographed from two separate positions, it forms a **stereo-pair**, used for three-dimensional viewing. Thus, a pair of stereoscopic photographs or images can be viewed stereoscopically to determine parallax and stereo/3D viewing.

Parallax Measurement

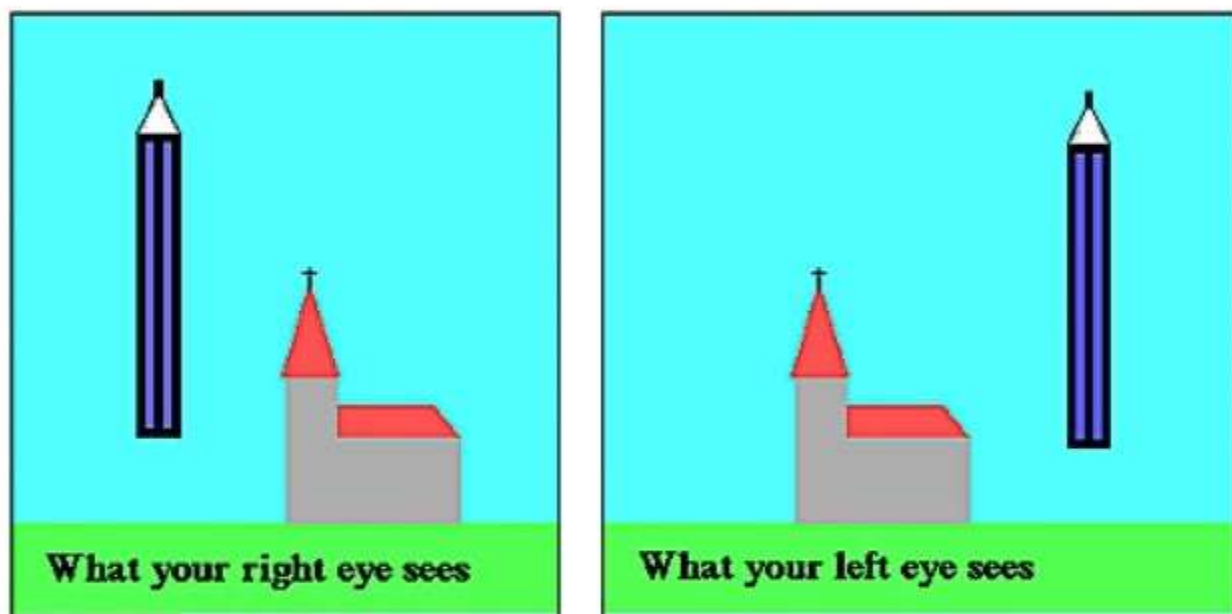
Parallax:

The displacement of an object caused by a change in the point of observation is called parallax.

Stereoscopic parallax is caused by taking photographs of the same object but from different points of observation.



Parallax



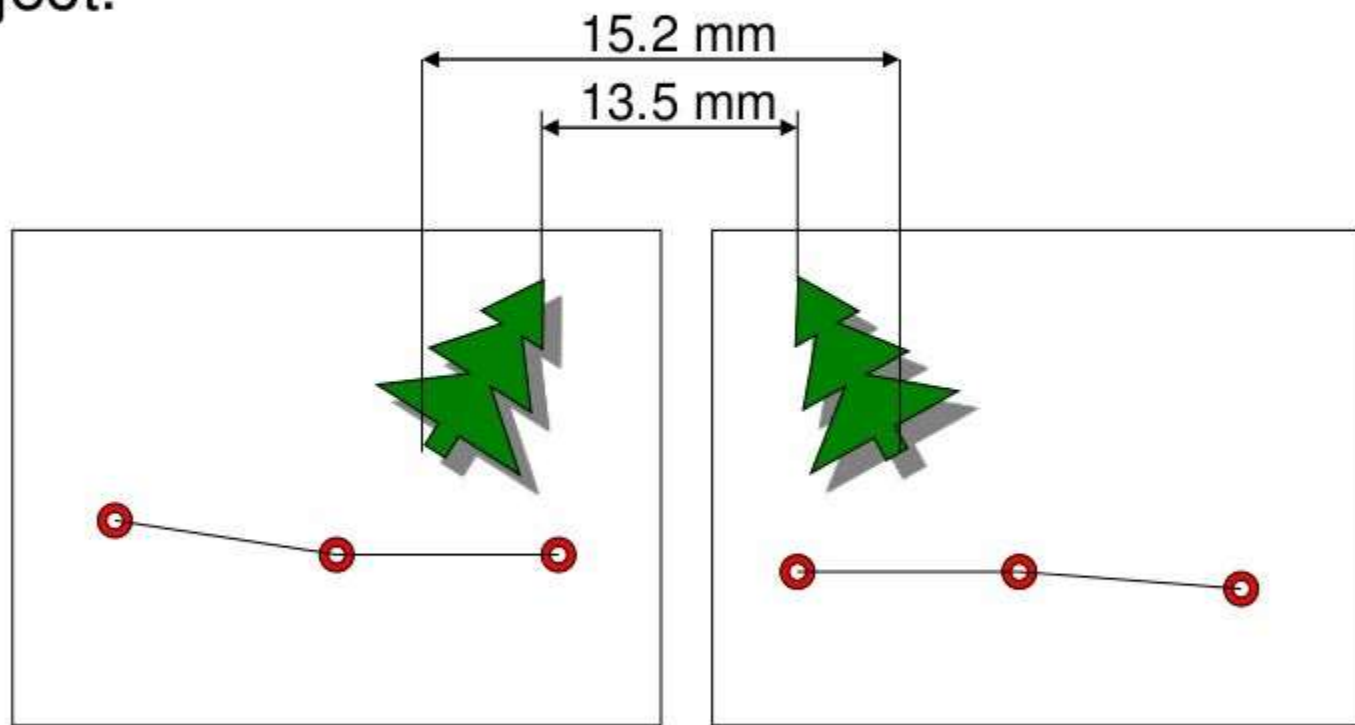
Pencil is very displaced because it is close to observe
Church is less displaced because it is further away

Stereoscopic parallax



The same principle can be used to find height of objects in stereopairs of vertical aerial photographs

- **Differential Parallax** is the difference between the stereoscopic parallax at the top and base of the object.



$$dP = 15.2\text{mm} - 13.5\text{mm} = 1.7\text{ mm}$$

Parallax Measurement

$$\text{Height of object} = \frac{H \cdot dP}{P + dP}$$

H = height of aircraft above ground

P = absolute parallax at base of object being measured*

dP = differential parallax

* For convenience the photo base length of a stereo pair is commonly substituted for absolute stereoscopic

Reference

Textbook of Remote Sensing and Geographical Information Systems

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BS Publications