12. Stereoscopy

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If you have normal or corrected vision in both eyes, your view of the world is stereoscopic. Viewing your environment simultaneously from two slightly different perspectives enables you to estimate very accurately which objects in your visual field are nearer, and which are farther away. You know this ability as **depth perception**.

When you fix your gaze upon an object, the intersection of your two optical axes at the object form what is called a **parallactic angle**. On average, people can detect changes as small as 3 seconds in the parallactic angle, an angular resolution that compares well to transits and theodolites. The keenness of human depth perception is what makes photogrammetric measurements possible.

Your perception of a three-dimensional environment is produced from two separate two-dimensional images. The images produced by your eyes are analogous to two aerial images taken one after another along a flight path. Objects that appear in the area of overlap between two aerial images are seen from two different perspectives. A pair of overlapping vertical aerial images is called a **stereopair**. When a stereopair is viewed such that each eye sees only one image, it is possible to envision a three-dimensional image of the area of overlap.

On the following page, you'll find a couple of examples of how stereoscopy is used to create planimetrically-correct views of the Earth's surface. If you have anaglyph stereo (red/blue) glasses, you'll be able to see stereo yourself. First, let's practice viewing anaglyph stereo images.

Try This!

One way to see in stereo is with an instrument called a **stereoscope** (see examples on the *Interpreting Imagery* page at James Madison University's Spatial Information Clearinghouse). Another way that works on computer screens and doesn't require expensive equipment is called **anaglyph stereo** (anaglyph comes from a Greek word that means, "to carve in relief"). The anaglyph method involves special glasses in which the left and right eyes are covered by blue and red filters.

The anaglyph image shown below consists of a superimposed stereopair in which the left image is shown in red and the right image is shown in green and blue. The filters in the glasses ensure each eye sees only one image. Can you make out the three-dimensional image of the U-shaped valley formed by glaciers in the French Alps?

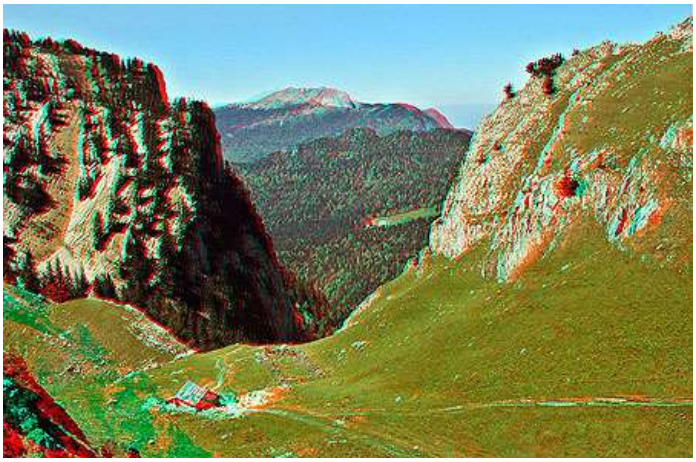

Figure 6.13.1 Anaglyph stereopair by Pierre Gidon showing a scene in the French Alps. Requires red/blue glasses.

Credit: The image is used by permission of the author.

How about this one: a panorama of the surface of Mars imaged during the Pathfinder mission, July 1997?

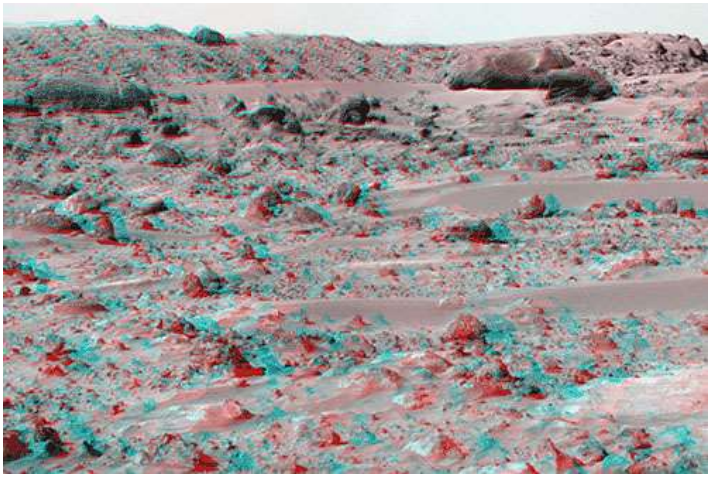

Figure 6.13.2

Credit: NASA, 1997. Image processing and mosaic by Tim Parker.

To find other stereo images on the World Wide Web, search on "anaglyph."

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‹ 11. Perspective and Planimetry up 13. Rectification by Stereoscopy ›

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