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# The Sun, Sun Myths, and Sun Worship

Most of us take the sun for granted. We know it to be a heavenly body subject to the same laws of physics that govern events on earth. For example, we know that the earth's axis is not vertical to the earth's orbit around the sun; that the resultant oblique angles at which the sun's rays strike the earth cause seasonal variation in radiation (as Figure 1:1 shows); and that the quantity is greatest when the days are longest. We have confidence that the sun will rise each morning and set each evening. We know, as Figure 1:2 demonstrates, that the length of the day will vary regularly; that in the Northern Hemisphere it is maximal at the summer solstice (June 21) and minimal at the winter solstice (December 22); and that the length of day is equal to the length of night at the vernal equinox (March 21) and the autumnal equinox (September 22). The sun presents us with our major cues to time and season, and figures prominently in agricultural practices as well.

We can predict that every 18 years and 11⅓ days the moon, in its orbit around the earth, will be positioned directly between the sun and the earth and will eclipse the sun and create darkeness over a limited area of the earth, even during the brightest part of the day. We do not fear solar eclipses, as many primitive peoples did, because we know that the earth will soon be out of the shade of the moon. A total eclipse of the sun can be viewed only briefly on earth, and as we see in Figure 1:3, it can be viewed only over a circular area with about a 30-mile diameter because of the small diameter of the moon compared to that of the sun. For that reason, astronomers are willing to travel long distances to the right spots



A. C. Giese, *Living with Our Sun's Ultraviolet Rays*

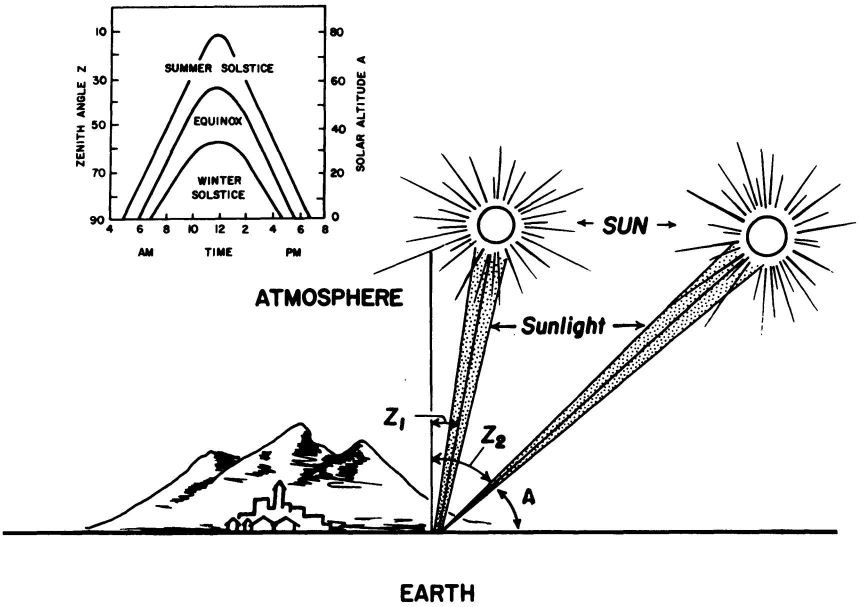


FIGURE 1:1. Diagram showing the effect of season, latitude, and time of day on the depth of atmosphere through which sunlight must pass before reaching a point on the surface of the earth. At noon at the summer solstice, the sun has the smallest zenith angle ($Z_1$), and the angle at noon increases to a maximum at the winter solstice ($Z_2$), the angle between these two extremes being characteristic of the autumn and spring equinoxes. At any time of the year the sun's angle increases with the latitude (as one moves toward the poles from the equator) and during the day on either side of high noon, four hours being equivalent to about 60° for the angle $Z$. The thicker the atmosphere through which sunlight must pass, the lower its intensity at the surface of the earth; thus, any increase in the angle Z results in a lower intensity. Version by Carl May. Insert shows the relationship between the solar zenith angle $Z$ and the time of day at Los Angeles. The solar altitude $A$ is the angle the sun makes with the horizontal ($A = 90° - Z$). After Leighton, *Photochemistry of Air Pollution,* Academic Press, New York, 1961, p. 10.

for viewing eclipses. Much of what astronomers know about the sun's atmosphere and corona, the aura of light seen around the periphery of the eclipsed sun, comes from such limited studies. This corona has a temperature higher than the surface of the sun for reasons not yet fully understood.

## *Sun and Sunlight*

What detailed knowledge we have of the sun and of our universe is relatively recent, for until the middle of the sixteenth century it was still