

**West Stage** Approximately forty-five minutes following sunset; solar depression  $0^{\circ}$  to  $6^{\circ}$

Luminous bands of red-orange, yellow, yellow-white, gray, and blue blend and stack on the horizon. Centered on the lowering Sun, the top segment of the bright glow still visible gives way to a rose-red spot that expands into a widespread purple glow, extending  $40^{\circ}$  to  $80^{\circ}$  in width and upward to as much as  $20^{\circ}$  above the Sun. The luminosity of this purple light is a joint effect of two types of light scattered into our vision: the reddish light scattered by the turbid layer of the atmosphere between twelve and nineteen miles; and the bluish light scattered by molecules higher up in the atmosphere. Its maximum intensity occurs about twenty minutes after sunset, when the Sun is about  $4^{\circ}$  below the horizon. The top of the purple light descends toward the horizon until the solar depression reaches  $7^{\circ}$ .

High cloud tops far enough away from the observer to intercept sunlight in the purple light region cast shadows known as crepuscular rays. Appearing as alternating light and dark bands, these twilight rays diverge in a fanlike array from the solar point.

Stars of the first magnitude become visible.



The clear western sky glows orange, rose-red, and purple forty-five minutes following sunset near Seattle, Washington.

**East Stage** Approximately forty-five minutes following sunset; solar depression  $0^{\circ}$  to  $6^{\circ}$

A curved bluish-gray band of light rises from the eastern horizon. This is the earth shadow, and displays the Earth's curvature quite well. The greater the amount of haze in the atmosphere, and the brighter the sunlight arriving from the west, the more visible and distinct this dark segment appears. Rays skimming the Earth's surface in the lowest, most turbid layer of the atmosphere are the first to be obscured, followed by those at increasing heights as the earth shadow rises and the Sun continues to sink below the horizon.

Just above the edge of the earth shadow appears the countertwilight arch, also known as the Belt of Venus. Between  $6^{\circ}$  and  $12^{\circ}$  in height, this glow blends gray to red to yellow to blue, and is produced by the back-scattered light that has passed through a long path in the upper atmosphere. It more often appears as a pinkish yellow to purplish band of light for the same reasons as the purple light of the western sky. The countertwilight rises with the antisolar point, the spot on the celestial sphere directly opposite the Sun.

Above the countertwilight is a brighter area of light known as the bright reflection, a widespread diffuse reflection of the Sun's light in the west. It appears for about fifteen minutes until the Sun drops about  $3^{\circ}$  below the horizon.



A clear southeastern vista over Crater Lake, Oregon, hosts the rise of the earth shadow, countertwilight arch, and bright reflection thirty minutes after sunset. A nearly full Moon graces the peaceful tableau.

**West Stage** Approximately forty-five minutes to two hours following sunset; solar depression  $6^{\circ}$  to  $18^{\circ}$

The top of the purple light fades, and the twilight glow begins. This faintly glowing band is only a few degrees high, but visible over  $20^{\circ}$  to  $30^{\circ}$  of horizon, as the solar depression angle increases from  $7^{\circ}$  to  $18^{\circ}$ . From this position, only the particulate matter high enough in the atmosphere to be directly illuminated by the Sun scatters any light in our direction, causing the glow.

The faint purple ceases when the Sun's rays just skim the top of the optically effective atmosphere, at a height of thirty to thirty-eight miles. Collectively, the purple light, the twilight glow, and all the other hues of the western twilight are known as the afterglow.



A twenty-seven-hours-old crescent Moon settles with the twilight glow over Rostronën, France in a clear western sky one hour after sunset.

**East Stage** Approximately forty-five minutes to two hours following sunset; solar depression  $6^{\circ}$  to  $18^{\circ}$

The earth shadow appears to rise more rapidly than the Sun sets, becoming less distinct as it reaches  $10^{\circ}$  to  $12^{\circ}$  above the horizon.

The countertwilight arch dims, and its boundary with the dark earth shadow disappears into night. Stars up to the fifth magnitude become visible.



The pastel pinks and blues of the clear eastern sky blend and dim to a dark blue-gray forty-five minutes after sunset as stars begin the night shift over central New Mexico.